STERLING SCALE

XC780 HIGH ACCURACY PIECE COUNTER

OPERATION MANUAL

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GENERAL INFORMATION

The Sterling Scale Model XC780 is a high accuracy piece counter designed for industrial applications.

Standard Features include:
-High Resolution-1,000,000 internal counts for optimum accuracy
-Fast Update Rate-10 times per second
-Up to four scale operation
-Full keyboard calibration-with fine span digital adjust
-All steel industrial enclosure
-Mechanical keyswitches-maximum reliability
-EMI/RFI/Static protection
-Comprehensive setpoint control
-Over/Under/Go operation
-Bi-directional RS-232 port
-Built in self test
-Single keystroke parts counting
-Sample enhancement
-Reverse Sampling
-Sample Guide-Percent accuracy display
-APW/Tare/ID storage
-Auto accumulation
-lb,kg,g operation
-Operator Programmable Ticket Format
-Operator Programmable Output Format-Programmable RS-232 output

Available Options include:
-Additional scale inputs
-Battery operation
-Barcode reader
-Barcode printer
-Ticket printer
-Tape printer
-Time/date with battery memory backup
-20 ma current loop
-Additional RS-232/RS-485 ports
-Memory Upgrades(Custom only)
-0-10VDC/4-20ma analog output
-Wall mount enclosure
-External relays
-Over/Under/Go Comparator display
-Alpha-numeric keyboard and display

The Sterling XC780 is a precision instrument which will provide years of dependable use when installed and maintained correctly. This manual provides important information on the care and operation of the XC780. Please read the entire manual thoroughly and store it in a convenient place for reference. Pay special attention to any **NOTE**s or **WARNING**s. These messages contain information which can help prevent damage to the unit or cause inaccurate counts. Happy

Counting.

INSTALLATION

The XC780 is shipped to you complete with all options installed. Upon receipt, check the packaging for shipping damage and report any damage to your carrier. In the package you should find:

    1   XC780 with options installed
    1   External Power Supply
    1   Platter Support assembly
    1   Platter
    1   Hardware kit(mounting screws, spare fuse, cable clip,
    capacity label, jumpers, etc.)
    1   XC780 Manual
    1   Battery Pack(if purchased with the Battery Operation
    option)

Carefully unpack all contents, saving the packing material for storage or transportation later. If any of the contents are missing, contact your dealer immediately. (If the Battery Operation option was not purchased, the battery pack space in the shipping package will be empty).

The XC780 is shipped with the platter assembly disconnected to avoid load cell damage during shipping. The assembly is quite simple.

WARNING: DO NOT APPLY EXCESSIVE DOWNWARD,UPWARD, OR TWIST PRESSURE ON THE LOAD CELL WHEN WORKING WITH THE PLATTER ASSEMBLY!!! THIS COULD CAUSE LOAD CELL DAMAGE.

Installation:

1. Set the XC780 on a flat level surface.

2. If the built-in scale is used no load cell wiring will be necessary. If an external load cell is connected to the XC780, remove the dust cover and connect the load cell cable to the seven pin load cell input terminal block(P6) as shown in figure 1. The pins are labeled on the analog board:

Pin 1   +EX   +Excitation Voltage(10 VDC)
Pin 2   +SEN   +Sense line for external sensing(remove
                            J1,J4 if sense used)
Pin 3   +SIG   +Signal line
Pin 4   -SIG   -Signal line
Pin 5   -SEN   -Sense line for external sensing(remove
                            J1,J4 if sense used)
Pin 6   -EX   -Excitation Voltage(GND)
Pin 7   Shield   Shield connection

Figure 1

3. If an external remote scale base is to be connected, do so now following the instructions described in the "Remote scale input option" section of the XC780 Technical Manual.

4. Position the platter support assembly on the load cell as shown in figure 2.

5. Insert the 1/4 20 x 1 1/4" screws into the mounting holes and tighten firmly but not excessively (40 to 60 inch-pounds of torque).

WARNING!! Do not press DOWN on the load cell screws with more force than the capacity of the cell. The overload stops will not protect the cell when the screws are loose.

Figure 2

6. Mount the platter to the platter support assembly by lining up the pins on the bottom of the platter with the grommets on the platter support. The platter should slide into place. See figure 3.

7. Connect any external printer or computer cables required.

8. Connect the AC/DC adaptor to the input plug in the back of the XC780. The clip supplied in the hardware kit may be used to hold the cable in place so it cannot be accidentally removed. See figure 3.

9. Be sure that the input voltage on the AC/DC adaptor matches the ac power used. Plug the AC/DC adaptor into a suitable ac wall plug. The AC/DC adapter is specially selected for the XC780, another power supply may not perform as well.

10. Turn the power switch located on the back of the XC780 to on(the switch will show red when on).

11. The XC780 will run through a display check(all display segments on), an internal self test, and then be ready for use. (For maximum accuracy, the unit should be allowed to warm up for five minutes)

Note: Each XC780 is pre-calibrated at the factory for the built in scale. If an external scale base is connected or the unit displays incorrect weight, please consult the chapter on "Calibration Setup".

Note: If the XC780 is to be used in a potentially high static area, such as plastic filling or counting, special precautions MUST be taken. See the section on "Static Protection" for more information.

The XC780 keyboard contains 20 switches, 21 annunciator lights, and an 8 digit display.

The SHIFT key is used to activate the upper functions on some of the keyswitches, similar to the way the SHIFT key works on a typewriter. The SHIFT actuated function is the function shown on the upper portion of the key.

The convention used when operating the function keys is to always enter numeric data([0]-[9], [.]) first on the keypad and then press the required function key (count, tare, APW, store, id, etc.).

KEYS:

ZERO: The ZERO key returns the scale to the center of zero. If any weight is on the scale when ZERO is pressed, it will be zeroed out. Pressing the zero key also initiates an internal calibration cycle which will factor out errors due to temperature or drift factors. The scale must be stable to complete zero. (i.e. the motion band set by the motion Band parameter must be within the motion window for the scale to clear zero.)

TARE: The PUSH/TARE key, like all keys with dual markings, has different functions for SHIFT and non-SHIFT operation. The TARE key is operated by pressing the TARE key without shift being activated. The TARE key is used for keyboard entered tare and tare recall. For keyboard tare operation, simply enter the tare value on the numeric keypad and press the TARE key. The XC780 switches to net weight mode, stores the tare weight, and displays the net weight. The TARE key, when pressed without first entering data, is used to display the current tare value. The tare may be cleared by entering 0, then pressing the TARE key.

push to TARE: The PUSH to TARE key is used for auto-tare operation. For auto-tare, place an empty container on the scale and press the SHIFT key followed by the TARE key. The XC780 switches to net weight mode, stores the tare weight, and displays a reading of zero. Tare or tare weight is the term used to describe the deduction from the gross weight of a substance and its container to account for the weight of the container. The tare weight is the weight of the container.

PRINT: The PRINT key is used to output weight and scale information to a printer or computer. For customizing this output see the sections on "Operator Programmable Ticket Format" and "Operator Programmable Output Format" in the XC780 Technical Manual. During the SETUP modes, the PRINT key is used to select the current value and continue to the next parameter. (See "Parameter Setup" and "Calibration" for details)

SCALE SELECT: The SCALE SELECT key switches the displayed value(count or weight) to the next operational scale. If only one scale is selected during calibration setup, the SCALE SELECT key will have no effect. During the SETUP

modes, SCALE SELECT is used to select from the various options available for each parameter. (See "Parameter Setup" and "Calibration" for details).

COUNT: The COUNT key is used to enter the piece count mode in the XC780. There are several ways to use this key to count parts:
1) Variable sampling - While in the weight mode, entering the number of samples followed by pressing the COUNT key samples that number of parts.
2) Fixed sampling - Pressing the COUNT key alone samples the number of parts set with the "SAMP " parameter.
3) Sample enhancement - While in the count mode, pressing the COUNT key activates manual sample enhancement.
4) Reverse sampling - With a full load of parts on the scale, press the COUNT key to initialize the reverse sampling feature.

Please see the section on "Operation" for complete instructions.

SHIFT/COUNT: The SHIFT/COUNT combination is used when operating the reverse sample feature of the XC780. See "Piece Counting Operation/Reverse Sampling" for details.

APW: The APW key is used to enter a known Average Piece Weight(APW) for counting or for displaying the current APW. The APW key is operated by pressing the APW/STORE key without shift being activated. Enter the Average Piece Weight on the numeric keyboard(be sure to use sufficient precision) and press the APW key. The XC780 will store the entered APW as the current APW and switch to the count mode. Once in the count mode, pressing the APW key without entering data displays the currently entered Average Piece Weight.

STORE: The STORE key is used to enter ID, APW, and tare information into the XC780 memory for recall later. The STORE key is operated by first pressing the SHIFT key, then the APW|STORE key. After counting a part, simply enter the numeric ID you would like to use on the keypad and press SHIFT followed by the APW|STORE key. For complete instructions see the section on "Piece Counting Operation" and "ID/Accumulation" in the XC780 Technical Manual.

ID: The ID key is used to make a new ID the current ID. After storing piece count information with the STORE key, the ID key is used to recall the quantity, APW, and tare information to be used in counting parts. The ID recall is performed by entering the ID number of the part whose piece count information you wish to retrieve on the numeric keypad and pressing the ID key. The quantity, and/or APW and/or tare for that ID will now be the current APW and/or tare used by the XC780 for counting and accumulation. The ID may be reset to the default value of zero, by entering 0 for the ID. See the section on "ID/Accumulation" in the XC780 Technical Manual for more details.

SHIFT: The SHIFT key is used to activate the second function on all dual function keys. Pressing the SHIFT key enters the shift mode(the shift light

comes on). Pressing the SHIFT key again exits the shift mode. Entering any valid second function key also exits the shift mode.

RESET: The RESET key is used to exit the current mode and return to the weight mode.

CLEAR: The CLEAR key is used to erase the current keyboard entry, without resetting to the weight mode. Press the SHIFT key followed by the RESET|CLEAR key.

[.]:   The decimal point key is used to enter a decimal point into any numeric entry string.

TIME: The TIME key is used to enter the time/date mode if your XC780 is equipped with the time/date option. Press the SHIFT key followed by the [.]|TIME key. The display will show the current month. Press the PRINT key to display date, year, hour, and minute. See the "Time/Date with Battery Memory Backup" section of the XC780 Technical Manual for more details.

[0]-[9]:   The numeric keys are used to enter data into the XC780. The convention for data entry is to enter the data on the numeric keys, and then press the appropriate function key.

+ACCUM: The +ACCUM key adds the current quantity to the total stored quantity. Press the SHIFT key followed by the [7]|+ACCUM key. The accumulated value is stored by ID. See the "Accumulator Operation" section for details.

-ACCUM: The -ACCUM key subtracts the current quantity from the total stored quantity. Press the SHIFT key followed by the [8]|-ACCUM key. The accumulated value is stored by ID. See the "Accumulator Operation" section for details.

MEMORY: The MEMORY key is used to retrieve the total accumulated quantity value (for the current ID) from memory. Press the SHIFT key followed by the [9]|MEMORY key.

GROSS: The GROSS key switches the display from net weight to gross weight if a tare weight is entered. Press the SHIFT key followed by the [6]|GROSS key. Pressing the SHIFT|GROSS key while in the count mode will display the gross weight until the key is released.

NET: The NET key switches the display from gross weight to net weight if a tare weight is entered. Press the SHIFT key followed by the [7]|NET key. Pressing the SHIFT|NET key while in the count mode will temporarily display the NET weight.

RECALL: Reserved for future use.

SP1:   The SP1 key is used to enter and view data for setpoint 1 and the low cutoff for the comparator. To store a value, enter the setpoint/cutoff

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value on the keypad and press the SHIFT key followed by the [1]|SP1 key. To review the entered value press the SHIFT key follow by the [1]|SP1 key without entering any data. See the section on "Setpoint/Comparator Operation" for more information.

SP2:   The SP2 key is used to enter and view data for setpoint 2 and the high cutoff for the comparator. To store a value, enter the setpoint/cutoff value on the keypad and press the SHIFT key followed by the [3]|SP2 key. To review the entered value press the SHIFT key follow by the [3]|SP2 key without entering any data. See the section on "Setpoint/Comparator Operation" for more information.

F1:   The F1 key is used to display the Percent Accuracy expected from the current piece count sample. After sampling a part, press the SHIFT key followed by the [2]|F1 key to display the minimum percent accuracy. If the value is too low, re-sample using more parts. See "Piece Count Operation" for more details.

F2:   Reserved for future use.

ANNUNCIATOR LIGHTS:

kg: The kg lamp is on when the XC780 is displaying weight in
               kilograms(kg).

g: The g lamp is on when the XC780 is displaying weight in
               grams(gr).

lb: The lb lamp is on when the XC780 is displaying weight in
               pounds(lb).

pcs: The pcs lamp is on when the XC780 is displaying the
               number of pieces(pcs).

SET1:   The SET1 lamp is on when the value of setpoint 1 has been
               exceeded.

SET2:   The SET2 lamp is on when the value of setpoint 2 has been
               exceeded.

OVER: The OVER lamp comes on when the weight or count is over
               the upper limit of the comparator set by SET2.

UNDER: The UNDER lamp comes on when the weight or count is under
               the lower limit of the comparator set by SET1.

ADD: The ADD light comes on during piece counting when the
               sample size used is too small(less than "PCT   " percent
               full scale capacity as set in parameters).

MOTION: The MOTION light comes on when the scale is not stable.

GROSS: The GROSS lamp is on when the XC780 is displaying the gross weight.

NET: The NET lamp is on when the XC780 is displaying the net weight.

ZERO: The zero light comes on when the scale is within +/- 1/4 graduation of center zero.

TARE: The TARE light comes on when any positive tare weight is in XC780 memory.

SCALE 1-4:   The SCALE 1,2,3,4 lights indicate which scale is currently being displayed.

COUNT: The COUNT light comes on when the XC780 is in the piece count mode.

ID: The ID light comes on when a non zero ID is made the current ID in XC780 memory.

SHIFT: The SHIFT light comes on when the shift key is pressed to indicate that the next key press will activate the key's second function.

General Operation:

> 1) Switch the On/Off switch to on. The On/Off switch is located on the back of the XC780 enclosure.
>
> 2) The XC780 will run a display check(all segments on), an internal self test, and display gross weight in the units set in parameters. If the Time/Date option is installed, the XC780 will return to the same mode it was in when power was interrupted. Allow five minutes to warm up for maximum precision.

SINGLE SCALE OPERATION

COUNTING OPERATION:

Fixed Sample Operation:
> 1) Place the fixed number of sample parts on the scale platform and press the COUNT key. The display will show the sample count.
> 2) Place the product to be counted on the scale platform. The display will show the total piece count.

Press the RESET key and repeat steps one and two to count a different part.

Variable Sample Operation:
> 1) Place the sample parts on the scale platform and enter the number of samples used via the keyboard.
> 2) Press the COUNT key. The display will show the sample count.
> 3) Place the product to be counted on the scale platform. The display will show the total piece count.

ENTER TARE WEIGHT:

Entering tare weight of full container:
> 1) Place a container of parts on the scale platform
> 2) Enter the weight of the container via the keyboard and press the TARE key. The weight of the container is

subtracted.

Taring an empty container:
> 1) Place an empty container on the scale platform
> 2) Press the SHIFT key and then press the TARE key. The weight of the container is subtracted.

COUNTING OPERATION:

Fixed sample operation:
Press the SCALE SELECT key to select the scale you will use to
          sample parts.
     1)   Place the fixed number of sample parts on the scale
          platform and press the COUNT key. The display will show
          the sample count.
     2)   Press the SCALE SELECT key to select the desired platform.
     3)   Place the product to be counted on the scale platform.
          The display will show the total piece count.
Press the RESET key and repeat steps one through four to count a different
part.

Variable sample operation:
Press the SCALE SELECT key to select the scale you will use to sample parts.
     1)   Place the sample parts on the scale platform and enter the
          number of samples used via the keyboard.
     2)   Press the COUNT key. The display will show the sample
          count.
     3)   Place the product to be counted on the scale platform.
          The display will show the total piece count.

ENTER TARE WEIGHT:

Entering tare weight of full container:
     1)   Place a container of parts on the scale platform.
     2)   Press the SCALE SELECT key to select the desired platform.
     3)   Enter the weight of the container via the keyboard and
          press the TARE key. The weight of the container is
          subtracted.

Taring an empty container:
     1)   Place an empty container on the scale platform
     2)   Press the SCALE SELECT key to select the desired platform.
     3)   Press the SHIFT key and the press the TARE key. The
          weight of the container is subtracted.

STANDARD FEATURES OPERATION

Counting with a known average piece weight(APW):
     1)   Place parts on the scale platform.
     2)   Enter the known average piece weight via the keyboard(use
          the decimal key if required).
     3)   Press the APW key. The display will show the total piece
          count.

Storing an average piece weight and tare weight in memory: Note:
     either or both can be stored depending on the setup of the
     scale.
1) Count parts using the any method.
2) Enter an ID number 1 to 300 via the keyboard.
3) Press the SHIFT key and then the APW|STORE key. The
    average piece weight and/or tare are stored in memory
    under the ID number.

Counting parts using stored average piece weight and/or stored tare weight:
1) Place parts on the scale platform. Use the container if
    tare weight stored.
2) Enter the ID number of the part on the keyboard and press
    the ID key. The total number of parts will be displayed.

Reviewing a stored average piece weight:
The scale must be in the COUNT mode.
1) Enter the ID number of the part on the keyboard and press
    the ID key.
2) Press the APW key. The stored Average Piece Weight will
    be displayed.

Reviewing a stored tare value:
1) Enter the ID number of the part on the keyboard and press
    the ID key.
2) Press the TARE key. The stored TARE will be displayed.

Clearing an average piece weight, tare, and accumulated quantity from memory:
1) Enter the ID number of the part on the keyboard and press
    the ID key.
2) Press the SHIFT key and then the RESET|CLEAR key. The
    stored average piece weight, tare, and accumulated
    quantity will be cleared from memory.

Reverse Sampling:
The scale must be in the weight mode.
1) Place a full container of parts on the scale.
2) Enter the exact tare weight of the container via the
    keypad and press the TARE key.
3) Press the SHIFT/COUNT keys. The display will show decimal
    points until motion clears.
4) Remove an adequate number of samples(0.4%) from the
    container and enter the number via the keypad.
5) Press the COUNT key. The display will show the total
    piece count.

ACCUMULATION OPERATION:

Add to Accumulator:

1) Enter the ID number of the part on the keyboard and press the ID key.
2) Count parts using any method.
3) Press the SHIFT key and then press the 7|+ACCUM key to add the displayed quantity to the accumulated quantity.

Subtract from Accumulator:
1) Enter the ID number of the part on the keyboard and press the ID key.
2) Count parts using any method.
3) Press the SHIFT key and then press the 8|-ACCUM key to subtract the displayed quantity from the accumulated quantity.

Display Accumulated Quantity:
1) Enter the ID number of the part on the keyboard and press the ID key.
2) Press the SHIFT key and then press the 9|MEMORY key to display the total accumulated quantity for the entered ID.
3) Press RESET to return to the COUNT mode.

Clear Accumulated Quantity:
1) Enter the ID number of the part on the keyboard and press the ID key.
2) Press the SHIFT key and then the 9|MEMORY key to display the total accumulated quantity.
3) Press the SHIFT key and then the RESET|CLEAR key to clear the quantity to zero.

COMPARATOR/SETPOINT OPERATION

Comparator: UNDER < Displayed value < OVER
Setpoints: SP 1/SP 2 > Displayed value

Enter Under/Setpoint 1 Value:
1) Enter the numeric value of the lower comparator threshold or setpoint 1 via the numeric keypad.
2) Press the SHIFT key and then the 1|SP 1 key to enter the value.

Enter Over/Setpoint 2 Value:
1) Enter the numeric value of the upper comparator threshold or setpoint 2 via the numeric keypad.
2) Press the SHIFT key and then the 3|SP 2 key to enter the value.

Display Under/Setpoint 1 Value:
1) Press the SHIFT key and then the 1|SP 1 key to display the lower comparator or setpoint 1 value.

Display Over/Setpoint 2 Value:
    1)   Press the SHIFT key and then the 3│SP 2 key to display the upper comparator or setpoint 2 value.

GENERAL OPERATION

Zero the scale:
    1)   Press the ZERO key. Any weight on the scale is subtracted and the scale will display zero.

Display gross weight:
    1)   While in the COUNT mode, press the SHIFT key and then the 5│GROSS key to temporarily display the gross weight.
    2)   While in the COUNT mode, press the RESET key to return the scale to the weight mode.
    3)   While in the weight mode, press the SHIFT key and then the 5│GROSS key to switch to the gross weight mode.

Display net weight:
    1)   While in the COUNT mode, press the SHIFT key and then the 6│NET key to temporarily display the net weight.
    2)   While in the COUNT mode, press the RESET key to return the scale to the weight mode.
    3)   While in the weight mode, press the SHIFT key and then the 6│NET key to switch to the net weight mode.

Display count:
    1)   While in the weight mode, press the APW key.
    2)   The APW of the last part counted is recalled. The scale switches to COUNT mode and displays the piece count.

Sample guide:
    1)   Count parts using any method.
    2)   Press the SHIFT key and then press the 2│F1 key to display the Percent accuracy for the sample used.
    3)   Re-sample with more parts if the percent accuracy is too low.

Sample Enhancement:
    1)   Count parts using any method.
    2)   Use the sample guide to check the percent accuracy.
    3)   If low, add 100 % more parts to the scale and press the COUNT key to activate sample enhancement.
    4)   Repeat steps 2 and 3 until the percent accuracy is high enough.

Print data:
    1)   Press the PRINT key to output data in the format set in parameters.

Select a new scale:

    1) Press the SCALE SELECT key to switch to the next scale. This button only works if more than one scale is selected in calibration setup.

Tips for piece counting:

1.   A count is only as good as the sample- The sampling phase of the counting operation is the most critical. Do not bump or move the scale while sampling.

2.   Use sufficient sample size- The weight of the parts you count vary from part to part. The more samples used, the better average part weight you will get, and the more accurate the count will be. Use the Percent accuracy feature to calculate the expected accuracy of the piece count. Re-sample with more parts if required.

3.   Use the ADD light- The ADD light will tell you the <u>minimum</u> number of samples to use. The ADD light and message are controlled by the "PCT   " minimum percent loading parameter(SETUP 03). Set the "PCT   " parameter as high as feasible in your application.

4.   Use the Sample Guide - The sample guide is used to display the minimum percent error expected for the sample currently entered. Press the SHIFT/F1 key to display the percent error. If the error is too great, re-sample the part using more samples.

5.   Use Sample Enhancement- Sample enhancement allows you to add parts while continually updating the Average Piece Weight to the full 1,000,000 count internal accuracy. Using this feature allows the operator to easily get the best samples and the most accurate piece counts. See "Sample Enhancement" in the "Parameter Setup" section for details.

6.   Use a low motion band- The XC780 waits until motion clears before performing the sample. For maximum accuracy, use the lowest motion band possible for your application.

7.   Use push-to-TARE(SHIFT/TARE) when counting small parts or using small sample sizes. The tare weight is stored with greater precision(full internal resolution) if push-to-TARE is used than can be entered by using the keyboard tare.

8.   Use speed up features- The XC780 is capable of very simple counting. Fixed sample counting, APW storage by ID, and barcoding capabilities can greatly increase the speed and efficiency of counting operations.

9.   Place the XC780 on a <u>solid</u> surface- In order to achieve the full high resolution capabilities of the XC780, the surface it sets on must not move at all. Most tables and desks are not sufficiently sturdy to be perfectly stable. Chose the counting location carefully for maximum accuracy.

10.   Minimize external effects- Minimizing wind currents and mechanical vibration is essential to obtain the full accuracy of the XC780. In certain industrial environments with excessive mechanical vibration or drafts, special mounting arrangements and wind shields will improve counting accuracy.

11.   If RESET is pushed when counting to display the weight, you can return to the count mode by simply pressing the APW key. The XC780 remembers the last APW used and recalls that value when the APW key is pressed while in the weight mode.

12.   While in the count mode, press the SHIFT/GROSS or SHIFT/NET keys to temporarily display the weight.

PARAMETER SETUP

Parameter setup is used to configure the operating mode of the XC780. All counting, setpoint, and communications parameters are configured by selecting the appropriate entry.

All parameters are stored in non-volatile memory. This means that even if power is disconnected, all entered parameters will be saved.

During parameter setup, some keys have alternate functions:

PRINT: The PRINT key is used to select the currently entered parameter value and advance to the next parameter.

TARE: The TARE key is used to select the currently entered parameter value and back up to the last parameter.

SCALE SELECT: The SCALE SELECT key is used to select from the options available for each parameter.

COUNT: The COUNT key is used to jump directly to the parameter you wish to modify. By pushing the COUNT key at any time in parameter setup, the "SEtUP" message appears. The number following the message indicates the number of the current parameter. By entering the number of the desired parameter and pressing the PRINT key, the operator can jump directly to that parameter.

SHIFT/CLEAR: The SHIFT/CLEAR key is used to return the value of the parameter to its default setting.

RESET: The RESET key is used to exit parameter setup.

The J3 jumper on the XC780 logic board is used to lock out entry into the parameter and calibration setup modes. Placing a jumper plug on J3 will lock out entry into the setup modes, removing the jumper enables access.

J3 location drawing

Some of the messages on the main XC780 display during parameter setup are cryptic. Use the examples shown in the manual to guide you through.

Entering Parameter Setup:

Step 1: **Enter the numbers [8], [6], [2], [4] on the numeric keypad and**

press the PRINT key to enter parameter setup. *If the "diSAbLEd" message is displayed, remove the J3 jumper on the 780-001 digital board to enter parameter setup.

Step 2:   The "SEtuP 01" message will now be displayed. Enter the number of the parameter you wish to modify on the keypad and press the PRINT key. (You may also step through all parameters by pressing the PRINT key repeatedly).

Step 3:   The parameter symbol and the current parameter value will be displayed. Select from the options available for the parameter by pressing the SCALE SELECT key till the required value is displayed.

Step 4:   Press the PRINT key to enter the desired symbol or value and go to the next parameter.

Step 5:   Press the RESET key to exit parameter setup.

```
SETUP          DEFAULT         DESCRIPTION
NUMBER
------------------------------------------------------------------------
               SEtuP 01        Setup Parameter Number
                               Jumps directly to desired parameter by number(1->27).


01             CALSEt F        Scale Setup Configuration and Calibration
                               Allows for Scale configuration and initial
                               calibration.  This procedure is used when first
                               connecting a new scale platform to the XC780.  The
                               number of scales in the system, the scale capacities,
                               and the incremental weight(graduation size) of each
                               scale can be configured.  Select:
                               F(alse) - If not configuring scale(s) or doing
                                           initial calibration.
                               t(rue) -  If configuring scale(s) or doing initial
                                           calibration.
                               See the "Calibration" section before proceeding with
                               calibration.


02             SCLCAL F        Quick Scale Calibration and Fine Span Adjust
                               Allows for quick calibration and fine adjustment of
                               span.  Quick calibration is used to re-calibrate a
                               previously calibrated scale during service
                               maintenance or routine checkup.  Fine span adjustment
                               may be used to correct small span errors(due to load
                               cell drift or calibration errors) without performing
                               a complete re-calibration.  Most calibration can be
                               performed using quick calibration.  Select:
                               F - If not calibrating or adjusting scale.
                               t - If doing quick calibration or adjusting span.

                               See the "Calibration" section before proceeding with
                               calibration.


03             PCt   0.0       Minimum PerCent Sample loading
                               Selects the minimum weight, in percentage of sample
                               scale capacity, required for accurate sampling(the
                               sample weight required to turn of the add message).
                               Select:
                               0.0 - If minimum is 1 display graduation.
                               0.2 - If minimum is 0.2% of full scale capacity
                               0.5 - If minimum is 0.5% of full scale capacity
                               1.0 - If minimum is 1.0% of full scale capacity


04             trAC   F        Automatic Zero Tracking
                               Selects whether the XC780 will automatically zero the
```

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current scale when the weight is less than 1/5 of one
graduation from center zero. This feature allows for
correction of zero drift due to load cell drift,
temperature changes, or deadload drift(dust,
evaporation,etc). Use zero tracking only if counting
parts which individually weigh more than 0.2 scale
graduations. Select:
t(rue) - To enable zero tracking
F(alse) - To disable zero tracking

05   DA   LO   Digital Averaging
                              Digital averaging is used to stabilize the displayed
                              weight or count by continually averaging weight
                              readings. Use medium or high digital averaging if
                              the scale environment includes substantial mechanical
                              vibration or air currents. Use low digital averaging
                              if fast responses to changes in load are required
                              (i.e. fast filling operation). Select:
                              LO - For low averaging(less stable) and faster
                                    display updates(faster response).
                              MEd - For Medium averaging and displayed updates.
                              HI - For High averaging(more stable) and
                                    slower display updates(slower response).

06   unit lb   Unit of Weight
                              Selects the unit of weight for display and data
                              output. Select:
                              lb - If using pounds for unit of weight
                              Kg - If using Kilograms for unit of weight
                              gr - If using grams for unit of weight

07   BAnd 0.02   Motion Band Width
                              Selects the amount of scale motion(in fractions of
                              a displayed grad) allowed when zeroing or measuring
                              an APW when sampling. Lower motion band values will
                              give more accurate piece counts, while higher values
                              allow for greater vibration. Select the lowest
                              motion value which give a reasonable settling time.
                              Select:
                              0.02 - Motion band will clear with less than 0.02
                                     graduations motion.
                              0.10 - Motion band will clear with less than 0.10
                                     graduations motion.
                              0.20 - Motion band will clear with less than 0.20
                                     graduations motion.
                              0.30 - Motion band will clear with less than 0.30
                                     graduations motion.

08   SAMPSL t   Sample Select Variable or Selectable Sampling
                              Enables or disables variable sampling. If enabled,

this feature allows the operator to enter the sample
quantity from the numeric keypad. If disabled, fixed
sample, as set by the "SAMP" parameter, must be used
for parts counting. Select:
t - To enable variable sampling
F - To disable variable sampling

09   SAMP   10   Fixed sample quantity
                                Selects the sample quantity to be used for fixed
                                sample (single key) counting. The value selected
                                will be used for the sample quantity when the count
                                key, alone, is pressed. Select:
                                10 - 10 samples are used when single key sampling
                                20 - 20 samples are used when single key sampling
                                50 - 50 samples are used when single key sampling
                                100- 100 samples are used when single key sampling
                                5 - 5 samples are used when single key sampling

10   Enhanc F   Sample Enhancement
                                Enables or disables the automatic sample enhancement
                                feature. If enabled, sample enhancement can be used
                                to significantly improve the accuracy of part counts
                                by re-calculating the average piece weight of the
                                sample quantity to the full internal resolution of
                                the XC780. The XC780 will recompute the APW as
                                pieces are added if: 1) Sample enhancement is
                                enabled. 2) The XC780 is in the count mode. 3)
                                The sample weight is less than 4% of full scale
                                capacity. 4) The scale is not in motion. 5) The
                                last addition to sample quantity does not exceed 3
                                times the previous sample quantity. Select:
                                F - To disable sample enhancement
                                t - To enable sample enhancement

                                The sample enhancement feature can be manually
                                activated at any time while counting by pushing the
                                COUNT key.

11   ACC MAnL   Accumulation
                                Selects when accumulation of piece counts can occur.
                                Select:
                                MAnL - If manually accumulating using the +accum and
                                       -accum keys. The scale must return to near
                                       zero gross weight before next accumulation.
                                Auto - If automatically accumulating whenever the net
                                       scale weight stabilizes at greater than 0.04%
                                       capacity. The scale must return to near zero
                                       gross weight before the next accumulation.

Near zero is less than .04% of full scale capacity.

12   SPo oFF

Setpoint Output mode
Selects the control mode for the setpoint/comparator outputs. Select:
oFF -   To disable setpoint or comparator operation. The outputs will be in there de-activated state as defined by the "SPA" parameter.
CutoF - To select setpoint/cutoff operation. The setpoint output will actuate(with annunciator indication) when the keyboard entered setpoint value is exceeded.
COMP -   To select comparator operation. This mode is used for check weighing or any operation requiring Over/Under/Go verification. Outputs are controlled using the SP 1 and SP 2 values such that: UNDER(SP 1) < GO < OVER(SP 2). Upper and lower limits can be set in the weigh or count mode. Front panel annunciators indicate state of comparator outputs.

13   SPA oFF

Setpoint Activation State
Sets the normal setpoint/comparator output state to normally off(relay open) or normally on(relay closed). Select:
oFF - If output is normally oFF(open)
on - If output is normally on(closed)

14   SPD qty

Setpoint Data Type
Sets setpoint/comparator actuation for quantity, net weight, or gross weight. Select:
qty - Output will actuate on quantity data.
nEt - Output will actuate on net weight data.
grS - Output will actuate on gross weight data.

15   SPStbL F

Setpoint Activation on Stable Weight
Selects if setpoint/comparator outputs will activate only on stable weight(no motion). Select:
F(alse) - If stable weight is not required.
t(rue) - If stable weight is required.

16   id-APW F

ID Memory APW configuration
Selects the information stored when ID memory is used. Select:
F - No APW will be recalled with the stored ID memory.
t - If the APW will be recalled along with total quantity accumulation when the ID memory is used.   St ID/Accumulation operation). Use this mode if APW

values remain constant for a particular part ID.

17   idtArE F   ID Memory Tare configuration
                            Selects the information stored when ID memory is
                            used. Select:
                            F - No tare weight will be recalled with the stored
                                ID memory.
                            t - If the tare weight will be recalled along with
                                total quantity accumulation when the ID memory
                                is used. Stored tare weights can be used for
                                counting parts. Use this mode if tare values
                                remain constant for a particular part ID.

18   out nonE   Data Output Mode
                            Selects the conditions required for serial data
                            output to occur. Select:
                            nonE - If serial data output is disabled.
                            Prnt - If serial output is to occur when the PRINT
                                   key is pressed. The XC780 must be in the
                                   weigh or count mode and the scale weight must
                                   be stable.
                            Cont - If serial data output occurs continuously when
                                   the XC780 is in weigh or count mode,
                                   regardless of scale weight or stability.
                            StbL - If serial data output occurs continuously when
                                   the XC780 is in weigh or count mode, ONLY when
                                   the scale weight is stable.
                            Auto - If serial data output is to occur ONCE when
                                   the scale net weight exceeds 0.04% of capacity
                                   and the scale weight is stable(no motion).
                                   The scale gross weight must return to near
                                   zero before the next data output can occur.

                            Near zero is less than .04% of full scale capacity.

19   bPS 9600   RS-232C Baud Rate(Bits Per Second)
                            Selects the baud rate for serial RS-232C data
                            interface. The baud rate of the XC780 must match the
                            connected device. Higher baud rates yield faster
                            data transmission. Lower baud rates allow longer
                            cables and more secure data transmission. Select:
                            9600 - 9600 bits per second.
                            19200 - 19200 bits per second.
                            150   - 150 bits per second.
                            300   - 300 bits per second.
                            600   - 600 bits per second.
                            1200 - 1200 bits per second.
                            2400 - 2400 bits per second.
                            4800 - 4800 bits per second.

20   PAr nonE   RS-232C Parity Bit
                              Selects the parity bit configuration for serial data
                              interface. Select:
                              nonE - If no parity bit is used.
                              odd - If odd parity bit is used.
                              EvEn - If even parity bit is used.

21   dbitS 8   RS-232C Data Bits
                              Selects the number of data bits used for serial
                              RS-232C data interface. Select:
                              8 - 8 data bits used.
                              7 - 7 data bits used.

22   rdybSy F   Ready/Busy Flow Control
                              Selects if flow control(hardware handshaking) is to
                              be used with printer port data interface. Flow
                              control is used to regulate the flow of data.
                              Consult the manual of the device being interfaced to
                              determine if flow control is required. The XC-780
                              uses low true busy handshaking at the CTS line.
                              Select:
                              F - If not using ready/busy flow control.
                              t - If using ready/busy flow control.

23   FMt   Std   RS-232C Data Output Format
                              Selects the format used for serial RS-232 data
                              output. Select:
                              Std - If using standard printer format. See the
                                     "RS-232C Output Format" section in the XC780
                                     Technical manual for an example of the
                                     standard printer output format. This
                                     format requires no operator programming.
                              CuSt - If using the customized printer format
                                     feature. Once selected the actual output
                                     format can be easily programmed to meet the
                                     desired application. See the "Custom Ticket
                                     Format" section in the XC780 Technical
                                     Manual for details on configuring a
                                     custom ticket format.
                              SPCL - If using the special programmable output
                                     feature of the XC780. This feature gives the
                                     operator complete flexibility in determining
                                     how the XC780 will interface with printers,
                                     computers, and other devices. See the
                                     "Special Programmable Output" section in the
                                     this feature.

24   ProgrM F   Program Data Output Format

Enters program mode for Customized Ticket Format or Special Programmable Output format. Select:

F - If not programming format of if standard data
    output mode was selected.
t - If programming data output. The type of format
    to be programmed is selected by the "FMt   "
    parameter. See the "Custom Printer Format" or
    "Special Programmable Output" section in the
    XC780 Technical manual for details on how to
    program a format.

25   bEEPEr t   <u>Beeper Enable</u>
                          Turns the beeper(Audio transducer) on and off. Any
                          modification will not take effect until parameters
                          are exited. Select:
                          t - Beeper sounds when a key is pushed.
                          F - Beeper does not sound when a key is pushed.

26   StAtn F   <u>Station Number</u>
                          Allows a station number to be assigned to the XC780.
                          The station number can be output to a printer or host
                          computer and is required when using the XC780 in a
                          multi-drop communications network. Select:
                          F - If not entering or modifying the station number.
                          t - If entering or modifying the station number.
                              After selecting t(rue) proceed with the following
                              steps:
                          1)   The XC780 will prompt with "Sttn XX" where XX
                          is the current station number.
                          2)   Enter the desired number (0-99) on the numeric
                          keypad. If [0] is entered the station number will
                          not be output from the RS-232C port. If using the
                          XC780 in a multi-drop network, each XC780 on the
                          network must have a unique, non-zero station number.
                          3)   Press the print key to save the new station
                          number in non-volatile memory.

27   SErno F   <u>Transaction Serial (Sequential) Number</u>
                          Allows the transaction serial number to be entered
                          or modified. The serial number is used to identify
                          a particular scale transaction and can be output to
                          a printer or computer. After the scale data is
                          output, the serial number is automatically
                          incremented by one. Select:
                          F - If not entering or modifying the transaction
                              serial number.
                          t - If entering or modifying the transaction serial
                              number. After selecting t(rue) proceed with the
                              following steps:
                          1)   The XC780 will prompt with "Sn XXXXX" where XXXXX

is the current transaction serial number.
2) Enter the desired number (0-99999) on the numeric keypad. Enter [0] to reset the serial number.
3) Press the print key to save the new transaction serial number in non-volatile memory.

PARAMETER EXPLANATION

        Setup Number - Enter a parameter number on the numeric keypad and press
the PRINT key to jump directly to that parameter. This feature can be operated
at any time (while in parameter setup) by pressing the COUNT key.

1.   Scale Setup Configuration and Calibration - See the "Calibration Setup"
section for more details.

2.   Quick Scale Calibration and Fine Span Adjust - See the "Quick
calibration" section for more details.

3.   Minimum allowable piece count sample loading - The value entered for this
parameter is the percentage of the full scale weight required for the ADD lamp
to remain off. The higher this value, the greater the number of samples that
will have to be added to accept the sample as sufficient and turn off the ADD
lamp. The greater the number of samples used, the more accurate the count.
Use as high a value as feasible for your application.

4.   Automatic Zero Tracking - Zero tracking automatically zeros the scale
once per second if the weight is less than 1/4 graduations from current zero.
This feature is used to correct zero errors due to load cell drift, temperature
changes, or deadload drift(dust,evaporation,etc.). Zero tracking should be set
on for most applications where the APW is greater than .2 display graduations.

5.   Digital Averaging - Digital averaging is used to "smooth out" the
displayed reading. The XC780 is a very sensitive instrument, which can be
affected by vibration or air currents which cannot be felt be the operator.
Increasing digital averaging will stabilize the weight reading if mechanical
vibration is present. Decreasing digital averaging will allow the XC780 to
respond faster to changes in load.   Use lower values for fast filling
operations.

6.   Units of Weight - Select the units(pounds, kilograms, or grams) that will
be displayed or the XC780 main display. The corresponding annunciator lamp
will light. If the units are changed after calibration, the scale capacity
will remain exactly the same while the graduation size will be rounded to the
nearest multiple of 1,2, or 5. The XC780 does not require re-calibration if
the units are changed.

7.   Motion Band Width - Motion band is used to set how stable the scale must
be to sample. The value is a fraction of one graduation. The actual motion
on the scale must be less than this fraction to allow the scale to sample.
Lower values of motion band will give more accurate counts, while higher values
allow for scale vibration. Use 0.02 to start and go up if counting takes too
long to clear.

8.   Sample Select - This parameter is used to allow the operator to enter any
random sample size, or require the operator to use a fixed number of samples
only(as set by the "SAMP " parameter). Select F(alse) to chose only fixed

sampling, if the operator will be counting similar parts. Fixed(one key) sampling simplifies and speeds up the counting procedure. Select t(rue) to enable variable sampling if parts of widely varying weight are counted and the operator has sufficient skills to decide on the correct sample size. The Fixed Sample Quantity parameter is used to set the fixed sample size.

9.   Fixed Sample Quantity - Selects the quantity of parts used for single keystroke counting(sampling by pushing the COUNT key only). Be sure to use as large a number as possible for maximum accuracy. The sample size should be large enough to provide at least 0.4% full scale loading with the smallest size part to be counted. The XC780 must be in weight mode to use single key, fixed sample counting.

10.   Sample Enhancement - Sample enhancement is used to automatically correct for inconsistent piece weights. The feature can be set to automatically re-compute the APW for every three pieces that are added. That means the APW is calculated to the full 1,000,000 internal count resolution of the XC780. This yields more accurate sample APWs and therefor more accurate final piece counts. To use sample enhancement:

Step 1:   Set the "EnhAnC F" parameter to "EnhAnC t".

Step 2:   Count the part(See piece count operation)

Step 3:   Add parts one at a time. Every three pieces the APW will update. Keep adding until the required accuracy is achieved. Use the Sample Guide (SHIFT/F1) to display the percent accuracy.

If while using sample enhancement,the count shows inaccurate, remove parts till the display is accurate and press the COUNT key to update the APW.

The sample enhancement feature can be manually activated at any time while counting by pushing the COUNT key.

11.   Accumulation - The accumulation features are used to record the total quantity of each part being counted. In the Auto-accumulate mode, the XC780 will automatically accumulate as soon as the count stabilizes. The scale will not accumulate again until the weight is returned near zero. In the Manual-accumulate mode, the displayed quantity is added to the accumulated quantity when the SHIFT/+ACCUM key is pressed.   SHIFT/-ACCUM subtracts from the accumulator. Use Manual accumulation for most situations, although auto-accum can be a great time saver when used.

12.   Setpoint Output Mode - Selects which setpoint mode is used.

OFF disables setpoint operation. The setpoints will always be in their de-activated state as defined by the "SPA" parameter.

COMP selects comparator operation. This mode is used for check weighing or any operation requiring OVER/UNDER/GO indication.   The UNDER output is actuated

when the displayed data is less than or equal to the value in setpoint 1. The OVER output is actuated when the displayed data is greater than or equal to the value in setpoint 2. The GO output is actuated when the displayed data is greater than setpoint 1 and less than setpoint 2. An external comparator display option is available.

CUtof selects normal setpoint cutoff operation. As soon as the entered setpoint value is exceeded, the setpoint output is activated.

13. <u>Setpoint Activation State</u> - Selects whether the setpoint output is normally off(relay open) in its inactive state or normally on(relay closed) in its inactive state.

14. <u>Setpoint Data Type</u> - Selects the type of weight data which controls the setpoint and comparator outputs; quantity, net weight, or gross weight. The XC780 assumes the entered setpoint data is of the selected type.

15. <u>Setpoint Activation on Stable Weight</u> - When setpoint stability is on, the setpoints are only activated when the weight is stable.

16. <u>ID Memory APW configuration</u> - The ID-APW parameter selects what information is stored when using the ID/Accumulation features. When ID-APW is selected, the Average Piece Weight and accumulated Count quantity are stored and recalled during ID/Accumulation operation. By enabling APW storage, once a part has been sampled, and the APW of the part has been stored under an ID number, the part can be counted by simply entering the ID number. Use APW storage if the weight of the parts to be counted are very repeatable from lot to lot. Use this mode to count the same part again and again, without sampling each time. Do not use this mode if the Average Piece Weight of the part may vary from lot to lot. When both ID-APW and ID-tare are not selected, only the accumulated quantity is stored.

17. <u>ID Memory Tare configuration</u> - The ID-tare parameter selects what information is stored when using the ID/Accumulation features. When ID-tare is selected, the tare and accumulated Count quantity are stored and recalled during ID/Accumulation operation. Use this mode if the containers used to count the part will remain the same each time the part is counted(each ID part has its own tare container). Disable the tare mode if the container used to count the part will change each time the part is counted or if all parts are counted in the same container(just enter the tare weight once). When both ID-APW and ID-tare are not selected only the accumulated quantity is stored.

18. <u>Data Output Mode</u> - The output data parameter selects when the XC780 will output data from the RS-232 printer port. NonE disables the output completely. Prnt outputs data whenever the PRINT key is pressed. Auto automatically outputs data continuously regardless of all other conditions. Stbl outputs data only when the weight or count reading is stable. The format of the output data is as defined by the "FMt " data output format parameter.

19. <u>RS-232C Baud Rate</u> - Baud rate is the speed at which RS-232 data is

transmitted. Consult the manual of the device which you are interfacing for the required baud rate. 9600 is a very common baud rate. Slower baud rates allow secure data transmission over longer distances. 19200 will allow very fast data transmission, although cable lengths over 50 feet are not recommended at this speed.

20.   RS-232C Parity Bit - Parity is used to detect errors in the data transmission. Consult the manual of the device which you are interfacing for the required parity selection. Even parity is quite common.

21.   RS-232C Data Bits - This parameter selects the number of data bits transmitted with each data packet. Consult the manual of the device which you are interfacing for the required number of data bits. Seven data bits are quite common.

22.   Ready/BUSy Flow Control - The Ready/BUSy flow control is used with any printer or computer which requires hardware handshaking to regulate the flow of data. Consult the manual of the device being interfaced to determine if hardware handshaking is required. The XC780 uses low true busy handshaking.

23.   RS-232C Data Output Format - The data output format determines the format of the data output from the RS-232 port. For simple printing of standard tickets select the "FMt Std" format. A description of the standard ticket format is given in the "Printer Format" section. The "CUSt"om ticket and "SPeC"iaL operator programmable output formats are used to totally customize the output for printer or computer use. These formats are described in detail in the "Operator Programmable Custom Ticket Format" and Operator Programmable Special Output Format" sections of the XC780 Technical Manual.

24.   Program Data Output Format - The Program format parameter allows the operator to custom program the ticket and output formats. See the "Operator Programmable Ticket Format" and Operator Programmable Output Format" sections of the XC780 Technical manual for details.

25.   bEEPer Enable - The beeper control turns the XC780 beeper on and off. Turn off the beeper to conserve battery power or operate quietly.

26.   Station Number - The Station number feature is used to identify a particular XC780 in a network situation. The Station number can be output using the operator programmable output formats. The station number also distinguishes one particular XC780 from another in multi-drop RS-485 communication networks.   To enter the Station number:

Step 1:   Select "StAtn t" and press the PRINT key. The current station number will be displayed(0 if no station number entered).

Step 2:   Enter the new Station number on the numeric keypad.

Step 3:   Press the PRINT key to lock in the new station number.

27. <u>Serial Number</u> - The serial number feature allows a serial number to be entered which may then be output using the operator programmable output formats. Each time data is output, the serial number is automatically incremented by one to allow tracking of parts or tickets. To enter the serial number:

Step 1:   Select "Serno t" and press the PRINT key. The current serial number will be displayed(blank if no serial number entered).

Step 2:   Enter the new Serial number starting point on the numeric keypad.

Step 3:   Press the PRINT key to lock in the new serial number.

CALIBRATION

The XC780 has two modes of calibration; Quick cal and calibration setup. Quick calibration is used to recalibrate the scale during service maintenance or routine checkup. Calibration Setup is used when first connecting a new scale platform to the XC780. As all internal scales are pre-calibrated at the factory, only Quick cal will be used in most situations.

Some of the keys have alternate functions during Quick Calibration and Calibration setup:

PRINT: The print key is used to select the currently entered
              item value and advance to the next item.

TARE: The TARE key is used to used to select the currently
              entered item value and back up to the last item.

SCALE SELECT: The SCALE SELECT key is used to select from the
              options available for each item.

SHIFT/CLEAR: The SHIFT/CLEAR key is used to return the value of the
              item to its default setting.

RESET: The RESET key is used to exit calibration.

The J3 jumper on the XC780 logic board is used to lock out entry into the parameter and calibration setup modes. Placing a jumper plug on J3 will lock out entry into the setup modes, removing the jumper enables access.

          J3 location drawing

Some of the messages on the main XC780 display during calibration setup take a little getting used to. Use the examples shown in the manual to guide you through.

Quick Calibration:

Quick Calibration takes less than 1 minute to complete. Be sure you have an accurate calibration weight of at least 25% of full scale capacity and do not have motion in the area of the XC780 during calibration.

Step 1:   **Enter [8], [6], [2], [4] on the XC780 numeric keypad and press the PRINT key to enter Parameter Setup.** *If the "diSAbLEd" message is displayed, remove the J3 jumper on the digital board to enter parameters.

Step 2:   The display will read "SEtuP 01". Press the [2] key followed by

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the PRINT key to advance to the 2nd parameter, "SCLCAL F" (Quick calibration).

Step 3:   Select "SCLCAL t" with the SCALE SELECT key. Press the PRINT key to enter the Quick Scale Calibration mode..

Step 4:   The display will read "1CALib F". Select "1CALib t" with the SCALE SELECT key to calibrate scale 1. Press the PRINT key. The display will flash "CLEAr""SCALE".(To calibrate the 2nd, 3rd, or 4th scales, press PRINT when the "1CALib F" message is displayed.)

Step 5:   Clear the scale platform and press the PRINT key. The "StEP 1" message will be displayed. Do not move the XC780 or its table during calibration.

Step 6:   In a few seconds, when motion clears, the "EntEr Lb", "EntEr kg", or "EntEr gr" message will be displayed and the XC780 will beep twice.(The units used for calibration are entered using the Calibration Setup parameter (SETUP 01)).

Step 7:   Enter the weight to be used for calibration on the numeric keypad and press the PRINT key. The "Step 2" message will be displayed. (If you enter an incorrect calibration weight by mistake, press the SHIFT/CLEAR keys to re-enter the weight.)

NOTE: At least 25% of full scale capacity is required for accurate calibration.

Step 8:   When the "SPAn 0.0" message is displayed, calibration is complete. Press the RESET key to exit Quick Calibration.

NOTE: If the "Adj GAin" message is displayed at the end of quick cal, it probably means the calibration weight was entered incorrectly. Check the weight and units and try Quick Calibration again. If the "Adj GAin" message appears again, full calibration through Calibration Setup is required.

Fine Span Digital Adjust:

If a small calibration span error is found (due to load cell drift, platform relocation, or calibration error), this item is used to adjust the calibration span without performing a complete re-calibration. No weights are necessary for Fine Span Adjust. By entering a value other than zero for this item, the FULL SCALE SPAN is changed by the number of graduations entered.

Example: If a 2000 lb base is off by 1 count at 1000 lbs(1/2 full scale), the full scale change required is 2 graduations. If more than 2 graduations(full scale) of adjustment are required, complete re-calibration is recommended. If this is not possible, larger adjustments can be made by repeating the procedure the required number of times. For example, if 3 1/2 full scale graduations of adjustment are required, simply enter separate adjustments of 2 and 1.5.

NOTE: When using Fine Span Digital Adjust, be sure that the error noticed is SPAN error. Inaccurate test weights, zero shift, or platform problems may appear as span error. Correcting for these types of errors with fine span digital adjust can actually induce larger errors.

To enter a Fine Span digital adjust correction:

Step 1.   Enter Quick Calibration mode(see "Quick Calibration") and press the PRINT key until "SPAN 0.0" is displayed for the scale you wish to modify.

Step 2.   Press the SCALE SELECT key until the required adjustment is displayed.

Step 3.   Press PRINT to enter the value.   Repeat procedure if necessary.

Calibration Setup:

Calibration Setup is used whenever a new scale is connected to the XC780. All parameters controlling calibration are configured during calibration setup. Calibration in this mode takes approximately two minutes. Be sure you have an accurate calibration weight of at least 25% of full scale capacity and do not cause motion in the area of the XC780 during calibration.

Step 1:   **Enter [8], [6], [2], [4] on the XC780 numeric keypad and press the PRINT key.** *If the "diSAbLEd" message is displayed, remove the J3 jumper on the digital board to enter Calibration Setup.

Step 2:   Press the PRINT key to advance to the 1st parameter, "CALSEt F" (<u>Cal</u>ibration <u>Set</u>up).

Step 3:   Select "CALSEt t" with the SCALE SELECT key and press the PRINT key. This enters Calibration Setup.

Step 4:   The display will read "SCALES ". Select the total number of SCALES which will be used with the XC780 using the SCALE SELECT key. Include the internal scale as 1. Press the PRINT key.

Step 5:   The current full scale capacity of the first scale will be displayed(i.e. "1C 00100"). Select a new full scale capacity for scale 1 if necessary. The capacity can be entered directly on the keypad or selected using the SCALE SELECT key. Press the PRINT key.

Step 6:   The optimum graduation size for the capacity selected in step 3 will automatically be selected and displayed(i.e. "1grd .01"). Select a new graduation size if desired(Greater than 50,000 counts will not be allowed). Press the PRINT key. The graduation size can be changed at any time without re-calibrating the XC780.

Step 7:   The current calibration unit type will now be displayed(i.e. "unit lb"). Select the units to be used for calibration with the SCALE SELECT key and press the PRINT key. The XC780 may be calibrated with one unit type and display another.

Step 8:   The display will read "1CALib F". Select "1CALib t" to calibrate scale 1. Press the PRINT key. Selecting "1CALib F" skips scale 1 and moves to scale 2(if 2 or more scales are selected).

Step 9:   The display will flash "CLEAR""SCALE". Clear the scale platform and press the PRINT key. Do not move the XC780 or its table during calibration. The "StEP1 32" message will be displayed with the value counting down.

STEP 10:   When the "StEP1 0" message has counted down, the EntEr LB, EntEr kg, or EntEr gr message will be displayed(depending on the units selected), and

the XC780 will beep twice.

Step 11:   Enter the weight to be used for calibration on the numeric keypad and press the PRINT key. The "StEP2 32" message will be displayed with the value counting down. When the optimum step 2 value is reached(not necessarily 0), the display will exit scale 1 and proceed to the next scale if selected.

NOTE: If the "StEP2 32" message get all the way to zero without finding the optimum calibration point the "Adj GAIn" message will be displayed. This message indicates that either the load cell platform has less than 1mV/V output or there is a connection problem. Connecting the jumpers J1 and J4 on the analog board will correct for a low output load cell. Connect the jumpers and re-calibrate.

NOTE: At least 25% of full scale capacity is required for accurate calibration.

Step 12:   Follow steps 3 through 8 for each scale you wish to calibrate. Future re-calibrations should be done using Quick Calibration.

Step 13:   Press the RESET key to exit Calibration Setup.

CALIBRATION SETUP LIST

ITEM	EXAMPLE	DESCRIPTION
SCALES	SCALES 1	Number of Scales

SCALES   SCALES 1   <u>Number of Scales</u>
Selects the number of total scales that
will be used in the system. Selecting
2,3,or 4 for this item requires the remote
scale input board option. Select:
1 - Internal scale only
2 - Internal scale plus one remote scale
3 - Internal scale plus two remote scales
4 - Internal scale plus three remote
    scales

1C   1C 00100   <u>1st Scale Capacity</u>
Selects the full scale capacity of
scale 1(internal scale). Select the
units(lb,kg,g)later in calibration with
the units item. Select:

Any full scale capacity can be entered.

1grd   1grd .01   <u>1st Scale Graduation Size</u>
Selects the graduation size for scale 1.
The optimum graduation size for the full
scale capacity entered for 1st Scale
Capacity will be automatically
displayed(10,000 to 15,000 displayed
graduations). Other values may be
selected but the XC780 will reject any
entered data requiring greater than 50,000
displayed graduations. The graduation
size is the minimum displayed weight
change. Graduation size may be changed
without affecting calibration. Select:
.0001 - graduation size
.0002 - graduation size
.0005 - graduation size
.001 - graduation size
.002 - graduation size
.005 - graduation size
.01 - graduation size
.02 - graduation size
.05 - graduation size
.1 - graduation size
.2 - graduation size
.5 - graduation size
1 - graduation size
2 - graduation size

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                            5 - graduation size
                            10 - graduation size
                            20 - graduation size
                            50 - graduation size


unit        unit  lb        Calibration units
                            Selects the units that were used when the
                            calibration data was entered(full scale
                            capacity, graduation size, calibration
                            weight).  The units selected here effect
                            only calibration entries.To select
                            displayed units see Parameter Setup.  The
                            XC780 can be calibrated with one unit type
                            and display another.  Select:
                            Lb - Calibration weights are in pounds(lb)
                            Kg - Calibration weights are in
                                 Kilograms(kg)
                            gr - Calibration weights are in grams(gr)




1CALib      1CALib F        Calibrate 1st scale
                            Selects either to calibrate scale 1 or
                            proceed to the next item.  Select:
                            t(rue) -  to start calibration of
                                      scale 1.
                            F(alse) - to not calibrate scale 1 and
                                      proceed to the next item.


The previous four items will be repeated for each scale indicated
by the "SCALES " item.
                            i.e.
                            2C 00100
                            2grd .01
                            units lb
                            2CALib t
                            3C 05000
                            etc.
```

STATIC PREVENTION

The Sterling Scale XC780 has been tested for ElectroStatic Discharge(ESD) susceptibility according to the new international 801.2 air discharge ESD standard(150 ohm, 150 pF). The XC780 was tested to withstand 25,000 Volts ESD non-destructive and 15,000 volts ESD non-disruptive.

Line transient tests have also been performed on the XC780 using the standard IEEE 587 line transient standard category A(8 usec x 20 usec pulse). The XC780 was tested to withstand 6000 Volts non-destructive and 5000 Volts non-disruptive.

Because the XC780 piece counter is often used in harsh industrial environments, extensive static, EMI, and RFI protection has been designed into the instrument. For these protective measures to work correctly, some special considerations must be made in high static, EMI, and RFI environments.

NOTE: Most applications of the XC780 WILL NOT need these extra considerations. Only environments that generate greater than 15,000 volts of static interference need additional protection.

Electrostatic Discharge(ESD):

Static electricity buildup is present on any surface which develops an electrical charge which cannot be dissipated as fast as it is developed. ElectroStatic Discharge(ESD) occurs when this developed charge finds a quick and easy path to discharge. For example, when you walk across a rug in leather shoes(the triboelectric effect) on a dry day, the motion of your shoes against the rug develops an electrical charge faster than it can be dissipated(dissipated either through the air or your feet). Now when you reach for a door knob, the built-up charge discovers a discharge path to that door knob. The snap that you feel is the ElectroStatic Discharge.

There are three ways to stop the Static Voltages from damaging electronic equipment:

1.   Stop the static buildup- The first and most effective method of stopping static damage is to not allow static to be generated in the first place. Humidifying the air, using conductive forklift tires, and special storage and shipping containers will all help minimize static build up.

2.   Dissipate the static charge- The charge can be dissipated, or "bled off". This way it never reaches dangerous levels and static damage can be avoided. Personnel can wear static straps or special conductive floor mats and table tops can be installed in the static area. Fork lift trucks can drag static straps and filling machinery can be grounded. A conductive path to ground on anything or anyone that generates static, can help eliminate static problems before they build up.

3.   Provide an alternate discharge path- This is accomplished in the

design of the instrument and scale system. If a Electrostatic discharge reaches the instrument, an alternate ground path must be provided that does not include the sensitive electronics of the instrument. To facilitate this alternate ground path, PROPER GROUNDING IS ESSENTIAL! A thick,short ground cable connected directly to a ground rod or similar direct earth ground is necessary for proper protection. The 200 feet of 18 gauge wire used in the earth ground circuit of most three prong plugs is not adequate to dissipate the nano-second rise times of ElectroStatic Discharge pulses.

Proper shielding of all interconnect cables is also required. Connect the shield, preferably at the load cell or receiving end. NEVER CONNECT THE SHIELD AT BOTH ENDS. Connecting the shield at both ends causes ground currents to flow in the shield, which can create ground loop problems.

AC power

Before continuing with the Electrostatic Discharge(ESD) solution, lets discuss power for a few paragraphs. Many times ESD is blamed for damage that is actually due to line power problems. Surges and sags in the average 110 volt ac power line are very common, and heavy industrial use only makes the power "dirtier". If you suspect power problems, there are many good products on the market to "clean up" your ac power. The XC780 has been tested to withstand 6000 Volts of standard line transient, which should be more than enough for the average user. However, some industrial locations may generate larger non-standard transients and lightning is always a possibility, so certain applications may still require transient suppression.

1.   Surge Suppressors- These devices absorb the energy of a large voltage surge on the power line before it reaches the instrument. They are effective for large industrial line spikes or lightning.

2.   Voltage Regulators- Voltage regulators will maintain a constant voltage output with varying voltage inputs. Most also contain surge suppressors. These are effective for power brownouts(when the 110 ac line voltage drops).

3.   Uninteruptable Power Supplies(UPS)- UPS devices will always maintain power to the instrument. In the event of power failure, a battery in the UPS powers the output until an orderly shutdown can be performed. Most UPSs also contain surge suppressors. This type of device is used in critical applications where the instrument cannot be allowed to shut down, even if the power does. The XC780 Battery Operation option provides a similar function.

Selecting the right power protection components for your application requires careful consideration. If unsure of your requirements, contact your dealer or Sterling Scale for assistance.

Static Protection for the XC780:

The static protection built into the XC780 requires a good ground point to work effectively. The ground provided by the AC adapter will work in most cases, but severe environments may require additional grounding. If unsure if your application requires additional protection, follow the following instructions, just to be safe.

The best way to protect the XC780 from excessive static is to provide a SHORT, THICK GROUND line directly from the XC780 enclosure to earth ground. The best earth ground point is a copper grounding rod driven directly into the earth next to the instrument. A support beam or copper pipe which go to earth nearby will also work. Be sure the connection at both the XC780 and ground are solid, tight connections to bare metal. Scrape away the paint if you have to.

If an external scale platform is being used, its platter or deck plate may also be connected to earth ground to stop static charges from traveling up the load cell lines into the XC780. If the platform is earth grounded, the load cell shield should be connected at the scale platform end only.

If external devices such as printers and computers are connected, the interface cable shield should be connected at the external device end only. For especially bad static areas, EMI filter interface connectors are available for additional protection.

ERROR MESSAGES

When the XC780 is powered up, it executes a built in self test. Any errors found will be displayed on the main display. Incorrectly entered data, calibration problems, and incorrect sequence of operation will also cause error messages to appear.

ERROR MESSAGE	DESCRIPTION
oL	Overload - Displayed when the scale value is greater than rated capacity of the scale. Scale over-capacity calculation also takes into account push-button zero and tracked zero.
bAd id	ID Error - This message is displayed if the entered ID is not a valid ID from 0 to 300.
diSAbLEd	Parameter access disabled - Displayed when parameter access is attempted with the parameter lock jumper on. Remove the J3 jumper from the 780-003 digital board to enable parameter access.
CAL Error	Calibration Error - If the StEp1 message gets all the way to zero without finding the optimum calibration point, the "CAL Error" message will be displayed. This message indicates that a load cell connection problem exists. Check connections and re-calibrate.
Adj gAIn	Adjust gain - If the Step2 message gets all the way to zero without finding the optimum calibration point, the "Adj GAIn" message will be displayed. This message indicates that either the load cell platform has less than 1mV/V output or there is a connection problem. Connecting the jumpers J1 and J4 on the 780-003 analog board will correct for a low output load cell. Connect the jumpers and re -calibrate.
Lo bAtt	Low battery - The low battery message indicates that the battery charge is low. Under normal circumstances the low batt message will appear approximately one hour before the XC780 operation is effected.
tr Err	Transmit Error - Displayed when the XC780 is unable to complete transmission of data through RS-232C port. Consult factory representative if this error occurs.
EE SE	Non-volatile Memory Write Error - Consult factory representative if this error occurs.

EE rE   Non-volatile Memory Read Error - Consult factory
                 representative if this error occurs.

rA Err   RAM Memory Error - Consult factory representative
                 if this error occurs.

Error __   Communications Error - Check use of Ready/Busy line
                 and consult factory representative.

JUMPER SETTINGS

Digital board(780-001):

```
J4     Backlight   no jumper            Backlight off
                            1 -> 2      Backlight on


J3     Parameter   no jumper            Unlock parameters
       Lock                 1 -> 2      Lock parameters


J1     Expansion BUS    no jumper   Expansion BUS activated
                            1 -> 2      Expansion BUS de-activated


J2     Interrupt  1 -> 2  Expansion BUS interrupt enabled
       Control              2 -> 3      Misc interface interrupt enabled
```

Analog board(780-003):

```
J1     External    no jumper            Use external sense
       sense(+)             1 -> 2      No external sense


J4     External    no jumper            Use external sense
       sense(-)             1 -> 2      No external sense


J2,3   Gain Adjust     no jumper    1 mV/V to 3mV/V input
                            both on     1->2 .5mV/V to 1.5mV/V input
```

GLOSSARY OF TERMS

Accumulation - The process of adding the current displayed value to a saved total value in memory.

Accuracy - The measure of closeness of a reading to a known good value.

Average Piece Weight(APW) - The average weight of one(1) part used while counting.

Alpha Numeric - Letters as well as numbers

Baud Rate - The speed of serial data transmission.

Calibration - To set the weight of the scale to read the same as a known accurate standard.

Comparator - A function which compares the displayed scale value to the two entered thresholds and indicates; over both(OVER), under both(UNDER), or between them(GO).

Digital Averaging - The process of averaging multiple readings and displaying the result.

EMI - Electro-Magnetic Interference. Interference from electro-mechanical waves.

Excitation Voltage - The voltage used to drive the load cell output.

Gain - The amount of amplification used to increase the load cell signal to a usable amount.

Gross Weight - The total weight on the scale.

g - grams. 1 gram = .002204623 lbs

ID - The number (0-300) which identifies the information stored for a part.

kg - Kilograms. 1 kg = 1000 g. 1 kg = 2.204622622 lbs

lb - Pounds. 1 lb = 0.45359237 kg

Motion - Any movement detected by the scale.

Motion Band - The window which triggers motion.

Net Weight - The total (Gross Weight) minus the weight of the container (Tare Weight).

Parameter - A item in the menu used to configure scale operation.

Parity - An error detection method used for serial communication.

Platter - The area of the scale where the weight is applied.

Remote Scale - A scale base not internal to the XC780, but connected to it.

Resolution - the smallest change in weight that the scale can distinguish.

RFI - Radio Frequency Interference. Interference from any transmitted waves in the radio band.

RS-232C - A standard for serial communication between two computer devices.

Sample - The parts used as an example to represent the parts that will be counted.

Sample Enhancement - Recalculating the Average Piece Weight with a larger sample size to achieve a more accurate Average Piece Weight.

Sample Guide - Display the percent accuracy expected for the current sample.

Sense - A connection used to correct for inaccuracies caused by losses in long cables.

Serial Communication - The transmission of data in a string format.

Setpoint - An output triggered when the displayed scale value exceeds the entered threshold.

Signal - The load cell output signal.

Store - The operation which saves data in memory.

Tare - The deduction from the gross weight of a substance and its container made in allowance for the weight of the container.

Update Rate - The speed at which the display changes from the last value to the next value.

Zero - The reading when the scale is empty.

```
                          SPECIFICATIONS


Physical:

    Dimensions - 12.375" wide x 16.55" deep x 3.5" high
    Weight - 18 lbs (20 lbs w/ battery option)
    Shipping Weight - 22 lbs (24 lbs w/ battery option)
    Operating Temperature Range - 0 deg C(32 F) to 40 deg C(104 F)
    Maximum Humidity - 85% non-condensing
    Power Requirement - 115 vac, 60 Hz, .25 amp, single phase
    Static Protection - 25,000 volts, 801.2 human body model
    Surge Protection - 6000 volts, IEEE Std 587 Category A(ANSI C62.41)

Operational:

    Internal Counts - 1,000,000
    Display Counts - 10,000 recommended (50,000 allowed)
    Display update - 10 per second min.
    Input sensitivity - 0.5 mV/V min (.5 uV per count)
    Linearity - 0.01% of full scale
    Overload Capacity - 105% full scale
    Load Cell excitation - 10 VDC (250 ma max) nine 350 ohm load cells max

Calibration:

    Method - full digital calibration
    Range -  1mV/V to 3mV/V uncompensated, .5mV/V to 1.5 mV/V compensated
    Adjustments - Fine span digital adjust

Display:

    Display digits - 8 digit .5" height yellow backlit LCD
    Capacity - 99,999,999 max.
    Decimal point - automatic

RS-232 output

    Baud rate - 150 to 19200 Bits per second
    Start bit - 1 start bit
    Stop bit - 1 stop bit
    Parity - none,even,odd
    Word size - 7 or 8 bits
```

Warranty Information

Sterling Scale Company warrants that the Model XC780 shall be free of defects in material and workmanship for a period of one(1) years from date of shipment from Sterling Scale. Sterling Scale will repair or replace, at its discretion, free of charge(exclusive of shipping costs), any equipment covered by this warranty.

This warranty DOES NOT apply if:

1. The XC780 has been repaired or modified by anyone other than Sterling Scale if in their judgement such repair or modification has detrimentally effected the performance or reliability of the product.

2. The XC780 has been improperly installed or not setup in accordance with the instruction provided herein.

3. The XC780 has been mishandled, abused, or in the judgement of Sterling Scale has been exposed to an environment for which the product was not designed.

This warranty constitutes Sterling Scale's exclusive warrantee, there being no other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

Sterling Scale Company is not liable for any consequential damages.

Sterling Scale reserves exclusive rights to warrantee repair determination.