MSI 3750

ELECTRONIC
DIGITAL WEIGHT
INDICATOR

User Guide

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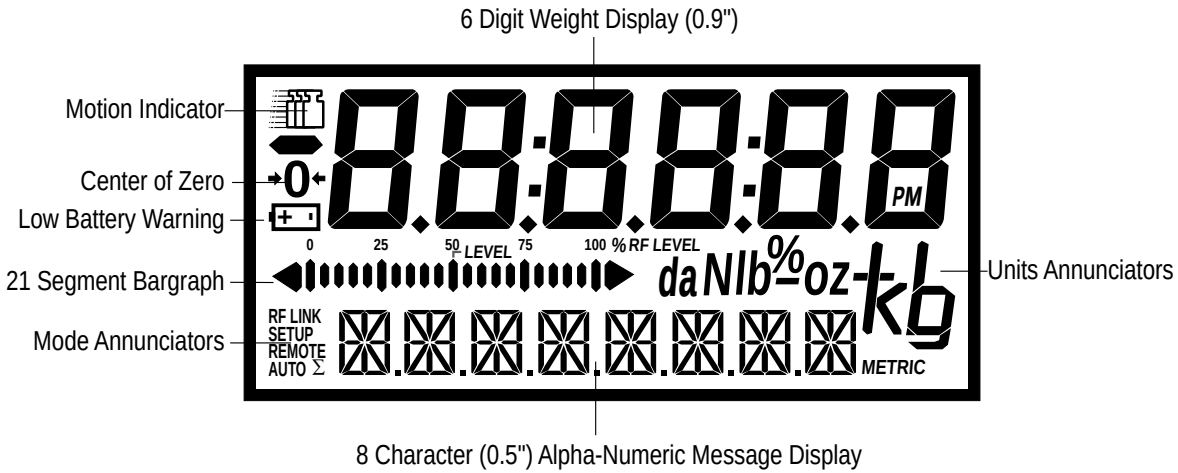
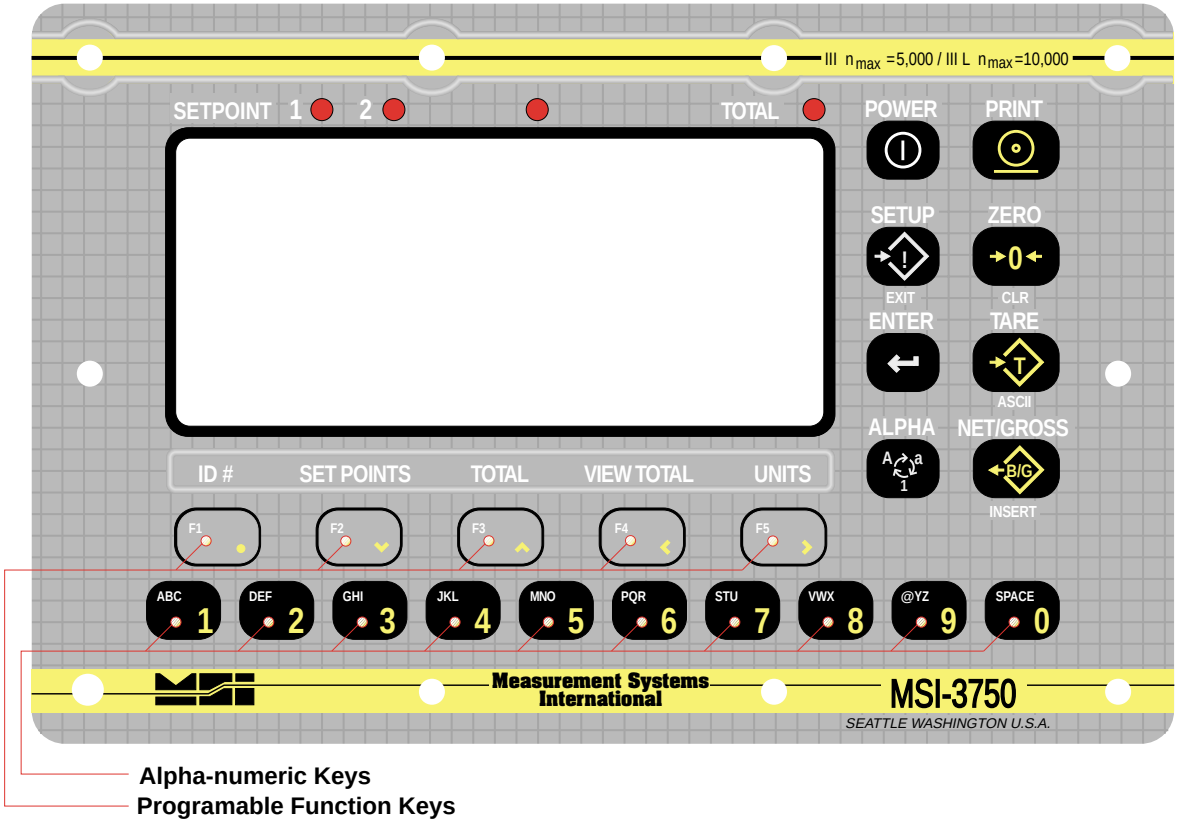
INTRODUCTION

The Measurement Systems International MSI 3750 Weigh Meter represents a new level of technology and performance in the Scale Industry. A 16 bit Microcontroller and 20 bit A/D Converter coupled with an alpha-numeric display gives unprecedented versatility and programmability. The large, backlit, alpha-numeric display provides precise, unambiguous indication of operating modes such as Net, Gross, or Total. Digital calibration makes maintaining the scale a snap, and the single board, marine-proof (NEMA 4) construction makes for a rugged and reliable scale. An option card can be plugged in which provides 7 set point relays, a Logic Output, and an additional isolated RS232 port or RS-485 port. A Statistics option is available for process or production monitoring of up to 350 ID Codes. The 3750 is designed to meet or exceed the requirements of all regulatory agencies.

3750 DISPLAY



3750 FRONT PANEL



FEATURES

- Designed to meet or exceed all US and international standards.
- 6 Large, .9” digits for clear weight readings from a distance.
- Up to 350 built-in ID Codes with separate Alphanumeric Names, Tare, Mode. ID Codes are addressed by any customer given name.
- Easy to read annunciation of ID Names and Menu Prompts are provided on eight .5” alphanumeric Characters.
- Full RS232 output formatting offers exceptionally versatile data output. Weight data can be printed in any desired way, the customer can add any alpha characters and/or printer formatting commands, including formatting for Bar Code printers.
- Analog bargraph provided for relative to full-scale weight indication. Also used for tilt indication with the Magnum Fork Lift System.
- Display illumination uses rugged, long life, LED back-lighting coupled with a transflective LCD to provide optimum display contrast under all ambient conditions from full sunlight to total darkness. Operation is light-sensing automatic or manually set.
- Versatile power input options: AC Only (90-260 VAC 45-65 Hz), 9-36 VDC Input, 18-60VDC and two D Cell Battery operation. Accessory Power Supplies are available to allow 250VDC operation as well.
- Easy to maintain: Full digital calibration assures reliable, repeat-able measurements.
- Selectable for lb, kg, g, tons, metric tons, ounces, and per cent (some units and /or units switching may be prohibited in legal for trade units).
- Automatic or manual weight totalization for logging total throughput.
- Complete Marine sealing ensures reliable operations under harsh conditions. Rugged cast aluminum package is coated to resist corrosive atmospheres. Meets all requirements of NEMA 4 and IP65.
- 8 set points standard – programmable for any in-range weight for operator alerts or process control. Optional set point Relay outputs are available for conveyor belt or any other process control.

BATTERIES (OPTION)

Type:

2 Standard “D” Cells, or 2 High Capacity Ni-Cads. With standard D cells, alkaline type is preferred but standard Carbon-Zinc can also be used. Using Ni-Cads or Carbon-Zinc batteries typically will cut the available battery life in half.

Installing /Changing:

1) The batteries must have enough charge to ensure accurate operation. (2 batteries in series must total more than 1.6V).
2) Turn the 3750 off.
3) Remove the Battery Cover by turning the cap counter-clockwise.
4) Remove the old batteries by pushing in on the battery rapidly and allowing the spring to push the batteries out. Replace the batteries with two fresh “D” cells. The negative end goes in first.
5) Reinstall the battery cap by turning the knob clockwise.
6) (Optional) The batteries can be checked with the Test Mode. Power displayed is in relative % of battery life. If the number with fresh batteries is extremely low, (<20%) turn off the power, remove the batteries, and check that the polarity of both batteries is correct.

Low Battery Indication

A small Battery Symbol will appear on the LCD when there is approximately 10% of battery life remaining. The symbol will start flashing when power failure is imminent. At this point the backlight will also turn off to try to conserve battery life. You must replace the batteries when the symbol starts flashing. The unit will automatically shut down if the batteries are not replaced shortly after the battery symbol starts flashing (actual time depends on load conditions).

12V CAR BATTERY INPUT (OPTION)

The 3750 can be configured to accept a 12V Car battery as a power source. A typical 12V Car battery will provide several weeks of operation before the battery must be recharged.

LOAD CELL HOOKUP

1) Unplug the meter, or if battery powered, remove the batteries. Remove the front panel of the 3750 with a properly sized Phillips screwdriver. Note the position of the seal screw that has a side hole (lower left corner viewed from the front).
2) Gently pull the front panel out and lay it down in front of the cast housing.
3) Loosen the right side (viewed from the back) liquid tight feedthrough connector fitting with a 3/4" open wrench. Feed the Load Cell cable through the liquid tight connector.
4) Strip and tin the Load Cell leads and attach them to the appropriate terminals with a small screwdriver. The 3750 comes standard with 4 terminal connections which are adequate for cable lengths of 50' (15 meters). Any shield should be connected to the Shield terminal. See Appendix D for wiring diagrams.
5) After pulling lightly on the wires to check for firm connection, take the slack out of the load cell cable as you close up the case.
6) Tighten the liquid tight feedthrough connector to ensure a watertight enclosure.
7) Put 2 screws in the front panel to hold it in place. Restore the power (batteries or AC).
8) Refer to the calibration section. If this is a first time hookup of this capacity load cell, perform the RESET CALIBRATION procedure followed by the INITIAL CALIBRATION procedure. If an identical Load Cell with the same capacity was replaced (or cable replaced, etc.) it should only be necessary to do a standard calibration.
9) If there were no calibration errors reported and the calibration is complete, install the remaining screws loosely. When all the screws are in place tighten them down in a left, right, up, down pattern, never tightening any one screw all the way until all the screws are mostly tightened. This ensures even pressure on the O-ring. If you have access to a torque driver, tighten each screw to 3 to 4 in-lb.
10) Install the meter bracket. See drawing at end of manual.

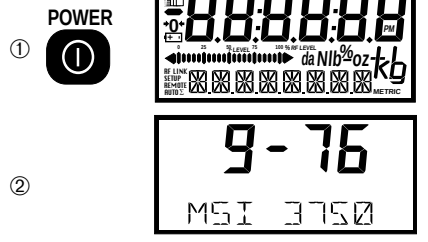
SECTION 1 – SCALE OPERATION

POWER

Turns the Weight Indicator On and Off.

To Turn On the Power

1) Push **POWER**. The system performs a display check: All segments and the Set Point/Total LED's illuminate for 3 seconds, then turn off for 1/2 second.
2) The LCD displays "3750" and the software version number.
3) The Microcontroller tests the internal circuitry. Any test failure will produce an error message on the LCD.



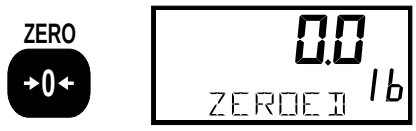
Rules for Use:

1) Make sure power is applied. The power source must have sufficient voltage (depends on power option).
2) Ambient temperature must be between -20°C to +60°C.

ZERO

Sets the zero reading of the scale. Use the zero key to take out small deviations in zero when the scale is unloaded. (See “TARE”, pg. 9, for zeroing (Tareing) package or pallet weights)

To Zero

Push **ZERO**. The weight reading must be stable within the motion band for the zero function to work. The display temporarily reads “ZEROED” and the digits display 0. The backup memory stores the zero reading, and can restore it even if power fails. Final: The numeric digits display “0”(or 0.0 or 0.00, etc.).	

Rules for Use:

1) Works in GROSS or NET mode.When in NET mode the display will return to the negative Tare value
2) The scale must be stable. The scale will not zero if the motion detect annunciator is on.
3) The scale will accept a zero setting over the full range of the scale (NTEP and other Legal-for-Trade models may have a limited zero range). Zero settings above 4% of full scale will subtract from the overall capacity of the scale. For example if you zero out 100 lb on a 1000 lb scale the overall capacity of the scale will reduce to 900 lb plus the allowed over-range amount.

TARE

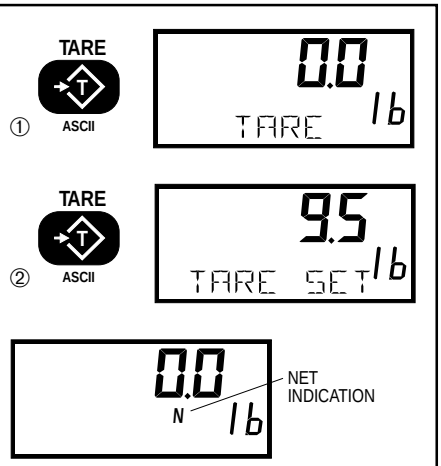
Tare is typically used to zero out a known weight such as a packing container or pallet and display the load in NET weight. A Tare value is entered in one of three ways:

1) AUTO TARE – When the **TARE** key is pushed twice (or once if the Tare Mode is Auto), the current weight is zeroed and Net Weight is displayed.
2) KEYBOARD TARE – Using the numeric keys, the operator keys in the desired Tare Weight then pushes the **ENTER** Key.
3) TARE UP/DOWN – Using the Scroll Keys, the Tare value is changed one scale division at a time. TARE UP/DOWN is useful for incrementing or decrementing the current Tare value slightly. The Keyboard Tare and Tare Up/Down modes can be disabled through the use of SETUP TARE. In the “AUTO” mode a single push of the **TARE** key will enact AUTO TARE.

1) Push **TARE**. The current Tare value is displayed.

Note: If the TARE key is setup for "AUTO" only one push of the TARE key will be necessary.

2) Push **TARE** again. Assuming no motion, the display temporarily reads "TARE SET" and then converts to a "NET" display. All following readings are deviations from the set Tare value.



To Auto Tare

Rules for Use:

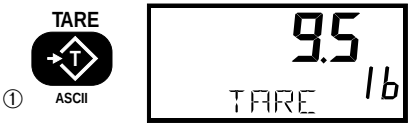
1) Only positive gross weight readings can be tared. Weight can be tared in both the NET and GROSS modes. When in the NET mode, the TARE is not cumulative, all the weight is zeroed.
2) The motion annunciator must be off. The weight reading must be stable.
3) Setting or changing the tare has no effect on the Gross zero setting.
4) Taring will reduce the apparent over range of the scale. For example, taring a 10 lb container on a 60 lb scale, the scale will overload at a net weight of 50 lb (60-10) plus any additional allowed overload (usually ~4%).
5) The scale stores the Tare value in the current ID Code memory until cleared. Each available ID Code can store independent Tare values.

To Read the Tare Value

(without changing it) **TARE** *key function must be set to "KBD/UPDN".*

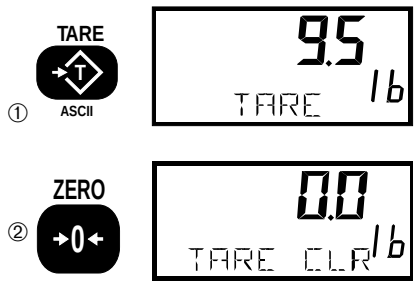
1) Push **TARE**. The message display reads "TARE" and the current Tare value appears on the numeric digits for 2 seconds. Note or Print the value as desired.

Alternate method: Remove all weight from the scale (Gross Zero). The numeric display will show the TARE weight as a negative number. This method is not as accurate due to the possibility of zero offset.



To Clear Tare and return to GROSS mode

1) Push **TARE** followed by **CLR** (**ZERO**). The message display reads “TARE CLR”. The scale returns to the GROSS mode. Alternate method: Remove all weight from the scale (Gross Zero) and push **TARE**. The message display temporarily reads “TARE CLR”. Then the scale returns to the GROSS mode.



To Keyboard Tare

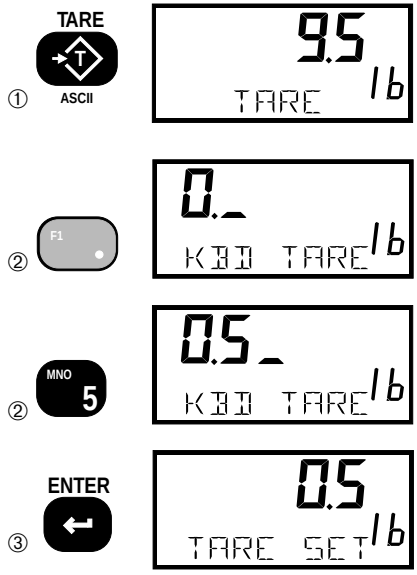
*(**TARE** key function must be set to “KBD/UPDN”)*

1) Push **TARE**. The display reads “TARE”. Any current Tare value is displayed.

2) Using the numeric keys input the value desired. In this example we’ll use 0.5 lb as a Tare Value.

   Note: The 3750 will automatically place a leading zero if the Tare value starts with the decimal point.

3) The Tare Value “0.5” is displayed. Push **ENTER** to place the value in the Tare Register. The display reads “TARE SET” and displays the Tare value for 1 second. All subsequent readings have the Tare value subtracted and are displayed in “NET” weight.



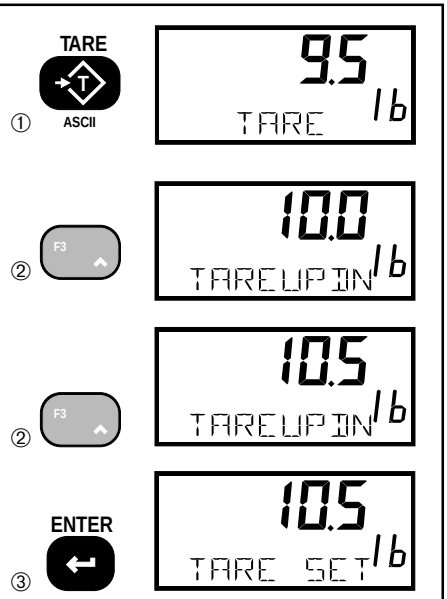
To Use Tare Up/Down

*(**TARE** key function must be set to "KBD/UPDN")*

1) Push **TARE**. The display reads "TARE". Any current Tare value is displayed. In this example a value of 9.5 LB was previously Tared.

2) Within 2 seconds after pushing the **TARE** key, use the **UP** or **DOWN** scroll keys to increment or decrement the Tare value. Each single push of the scroll keys will change the current Tare value 1 scale division. In this example, the scale increment is .5 lb.

3) The Tare Value "10.5" is displayed. Push **ENTER** to place the value in the Tare Register. The display reads "TARE SET" and displays the Tare value for 1 second. All subsequent readings have the Tare value subtracted and are displayed in "NET" weight.



Multiple Tare Memories

The 3750 is capable of storing Tare values through the use of the ID Codes. Each ID code stores an independent Tare. See Section 3 "ID Codes" for more information.

SETUP TARE

Programs the **TARE** key mode (TAREMODE), the automatic TARE Clear function (AUTO CLR), and the TAREALL function.

TAREMODE

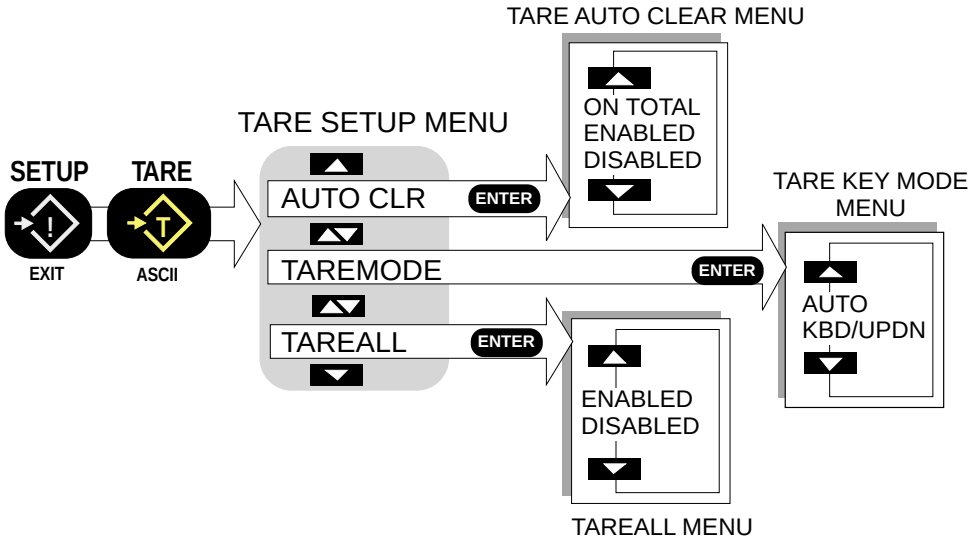
1) AUTO – Only Auto Tare is in operation. Every time the **TARE** key is pushed, the current weight on the scale is tared.
2) KBD/UPDN – In this mode, pushing the **TARE** key will enable the numeric keypad for Keyboard Tare and the **UP/DOWN** scroll keys for TARE UP/DOWN. Also in this mode, pushing the **TARE** button a second time will enact AUTO Tare.

TAREALL

The TAREALL feature allows a single Tare value to be shared by all ID Codes. With TAREALL enabled the individual Tares stored with each ID Code are ignored (but not erased). Disabling TAREALL will restore the original Tare values. TARE ALL is intended for those applications where a common carrier or pallet is used, but multiple ID Codes are necessary for data collection.

AUTO CLR

Enabling "AUTO CLR" causes the 3750 to clear the Tare Value after each lift greater than 0 NET. The Tare Value is cleared and the display mode reverts to Gross Weight once the load is removed (the weight goes below 0 NET). The "ON TOTAL" setting clears the Tare Value after the load is totaled. The default for the "AUTO CLR" function is "DISABLED" . When disabled, the Tare Value can only be cleared manually (see "To Clear Tare and return to Gross Mode".)



To Setup the Tare Key Mode

1) Push **SETUP** followed immediately by the **TARE** switch.

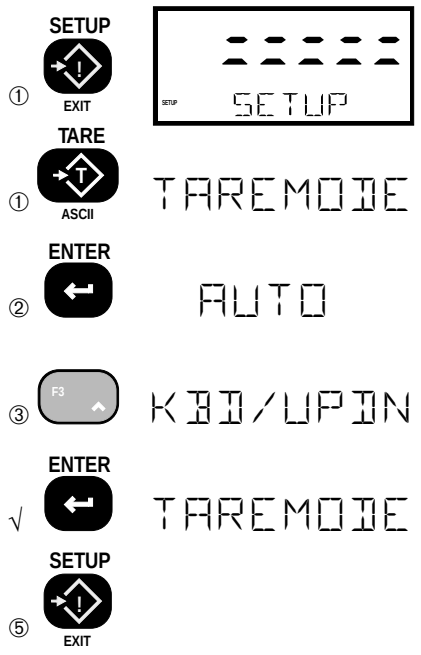
   *Note: If the **TARE** switch was pushed too late, the scale will go into the main SETUP menu. Push **EXIT** and try again.*

2) Push **ENTER**. The first menu choice is the current TARE key mode. In this example, the "AUTO" mode is enabled. We'll change the mode to "KBD/UPDN".

3) Push the **UP** key to change the Tare Key mode to "KBD/UPDN".

4) Push **ENTER**. The Scale returns to the SETUP TARE menu.

5) Push **EXIT** to return to normal operation with the **TARE** key function altered.



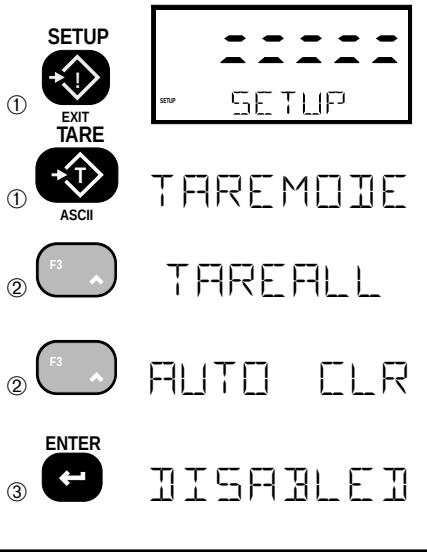
To Enable Tare Auto Clear

1) Push **SETUP** followed immediately by the **TARE** switch. The first menu choice "TAREMODE" appears.

   Note: If the TARE switch was pushed too late, the scale will go into the main SETUP menu. Push EXIT and try again.

2) Push the **UP** scroll key to change the menu to "AUTO CLR".

3) Push **ENTER**. The first selection is the current AUTO CLR mode.



4) Push the **UP** key to change the AUTO CLR mode to “ENABLED”.

5) Push **ENTER**. The AUTO CLR is now enabled and the 3750 is back in the SETUP TARE menu.

6) Push **EXIT** to return to normal scale operation (with the AUTO CLEAR TARE function enabled).

To Enable TAREALL

1) Push **SETUP** followed immediately by the **TARE** switch. The first menu choice “TAREMODE” appears.

Note: If the TARE switch was pushed too late, the scale will go into the main SETUP menu. Push EXIT and try again.

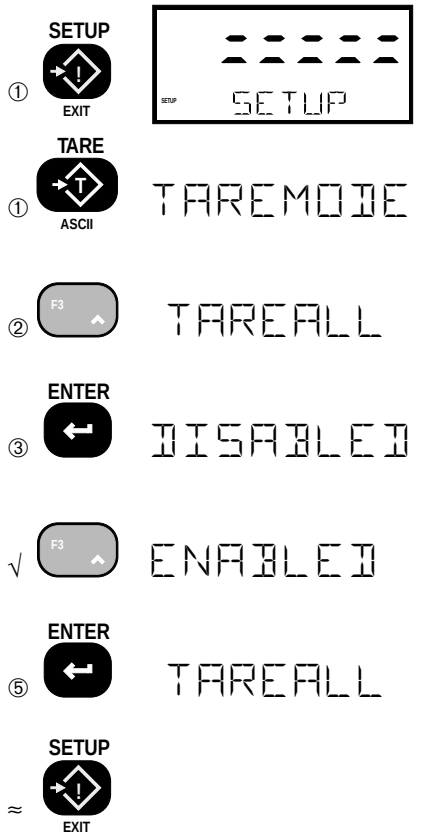
2) Push the **UP** scroll key to change the menu to “TAREALL”.

3) Push **ENTER**. The first selection is the current TAREALL mode.

4) Push the **UP** key to change TAREALL to “ENABLED”.

5) Push **ENTER**. TAREALL is now enabled and the 3750 is back in the SETUP TARE menu.

6) Push **EXIT** to return to normal scale operation (with the TAREALL function enabled).



NET/GROSS

Switches the display between Net and Gross modes. Net Weight is defined as Gross Weight minus a Tare Weight. Note: Switching back to Gross mode from Net mode will not clear the Tare value. This allows the operator to use the Gross Mode temporarily without having to reestablish the Tare value. Only manually clearing the Tare or setting a new Tare will change the tare value held before switching into Gross Mode.

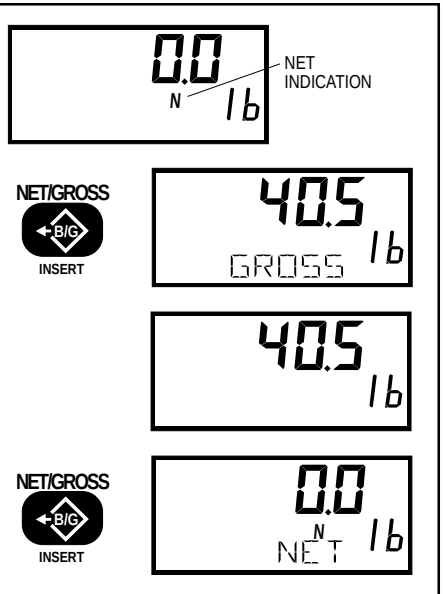
*OIML Legal-for-trade units only: The **NET/GROSS** key is temporary action only. The Gross weight is displayed for 2 seconds and then the display returns to the Net Mode. The only way to return to permanent Gross readings is to clear the Tare (see "To Clear Tare and return to GROSS mode", pg.11).*

To Switch Between Net Mode and Gross Mode

1) Starting in the NET weight mode –This example has a TARE weight equal to 40.5 lb. Push **NET/GROSS**. The message will briefly display "GROSS". All subsequent readings will be Gross weight until the **NET/GROSS** key is pushed again, or until the TARE is changed.

   Note: If working with an ID Code present the ID Name will return to the message display after the "GROSS" or "NET" message shows.

2) Pushing **NET/GROSS** again will revert the display to the NET mode.



UNITS

Allows easy weight units conversions. Up to 8 Units are available. See "SETUP UNITS" for details on activating the available units.

*Note: This operation requires that one of the Function Keys is setup as the **UNITS** key. See "FUNCTION KEYS". The example given below has **F5** programmed to be "UNITS" which is the default 3750 mode. Change the example as required if one of the other keys is programmed to be "UNITS". 3750s equipped with the Statistics Option are limited to one functional unit. Statistical Units can be changed only if all the ID Code Totals are Cleared using the "CLEAR ALL TOTALS" procedure in Section 4.*

To Change the UNITS

Push **UNITS** (Usually **F5**). The displayed weight will change to the next activated unit. If more than two units are activated, pushing the **UNITS** key will rotate through the available choices.

SETUP UNITS

Enables the desired weight units for activation by the **UNITS** key. For example, if an operator only wants pounds and kilograms activated, all other units can be disabled. This Menu is moved to the Calibrate Setup menu in NIST and OIML units.

Note: This operation requires that one of the Function Keys is setup as the **UNITS** *key.*

To Enable/Disable UNITS

1) Push the **SETUP** key followed immediately by the **UNITS** key (usually **F5**). The menu will display "UNITS"

   Tons available on capacities 2,000 lb and over. Metric Tons available on capacities 1000 kg and over. lb-oz, oz, and g available on scales 250 lb and under.

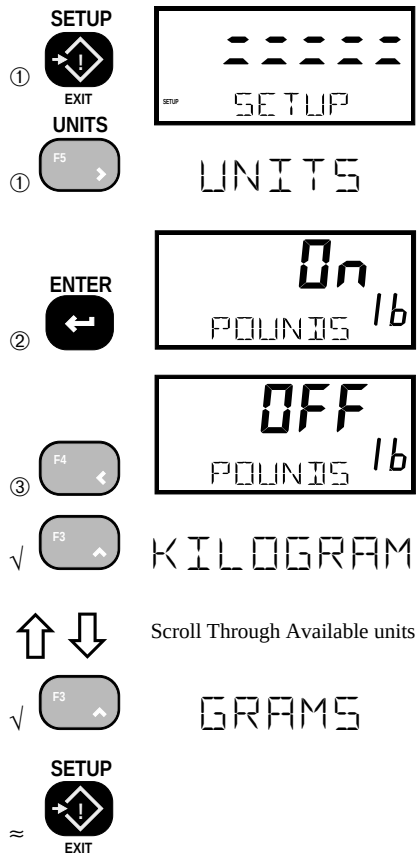
2) Push **ENTER**. The unit POUNDS will appear.

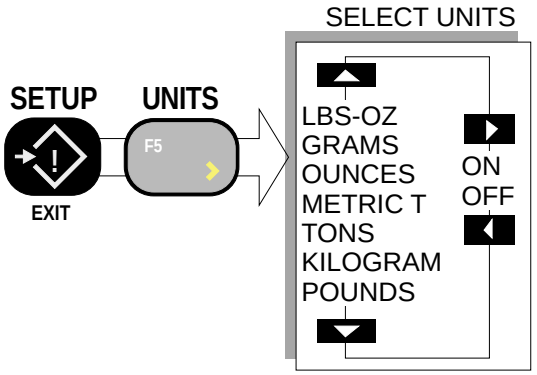
3) The numeric display will read "On" if the displayed unit is activated or will read "OFF" if it is inactivated. Use the **LEFT** or **RIGHT** Cursor keys to change the status of the displayed unit from "On" to "Off"

4) Use the **UP** Scroll key to scroll through all the available UNITS and use the **LEFT** or **RIGHT** Cursor keys to enable (On) or disable (OFF) the unit as desired.

   Note: If the user attempts to disable all units, Pounds will automatically be enabled. OIML units are limited to kg, g, and metric Tons.

5) When finished selecting units, push **EXIT** to return to normal scale operation.





PEAK HOLD (FUNCTION KEY OPTION)

Allows monitoring peak weight. Uses a special mode of the A/D converter for capturing transient events.

To Capture Peak Weight Readings

1) Program a **FUNCTION** key for "PEAKHOLD" (See Section 2).
2) Turn on the Peak Hold mode by pushing the selected **FUNCTION** key. The display reads "PEAK NET" or "PK GROSS" to indicate peak hold mode is enabled. The display will only update when a greater value than previously recorded is detected.

To Clear Peak Weight Readings

Turn off the Peak mode by pushing the **FUNCTION** key programmed as "PEAK HOLD". The 3750 reads "PEAK OFF" and clears the peak value from memory. The display will revert to NET or GROSS mode.

Note: Peak Hold captures data at a reading rate of 7.5 times per second. It has a full scale step time constant of approximately 150ms. This function is not suitable for high speed dynamic testing.

PRINT

Sends the current displayed reading to the printer or selected Comm Port, unless otherwise setup in the Print Setup menu . Any or all weight, time, date, and scale parameter functions can be printed as set in the Comm Port Parameters Menu. Refer to Section 7 for more details.

Pushing the **PRINT** button alone will cause both Comm Ports to output their specified print string unless specifically disabled in the Comm Port Parameters Menu.

TEST

Provides a functional system test, and an on-demand display check without disturbing the current weighment. The Test function can be interrupted by pushing any key during the test.

Note: The TEST function is also available as a FUNCTION key function. See "FUNCTION Keys" Section 2.

Test Meter Operation

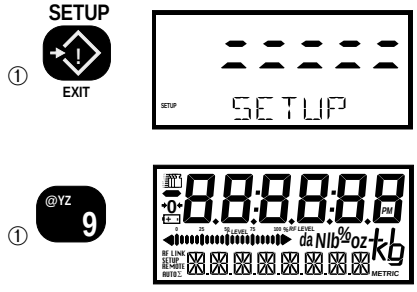
1) Push the **SETUP** key followed immediately by the **9** key.

a) All segments turn on for 1 second, then off for 1/2 second.

b) All digits (7 segment and 16 segment) count once from 0 to 9. All anunciators are tested including lb, kg, t. and the Total LED.

c) Battery condition is displayed next in the form: % of Battery life with a figure from 1 to 100 on the digits. The % battery life will vary depending on whether the backlight is on or off.

d) Internal tests are performed to further ensure scale integrity.



Final: Either the reading returns to the pre-test condition, or an error message is displayed.

SECTION 2 – FUNCTION KEYS

SETUP FUNCTION KEYS

The 3750 has five FUNCTION keys that can be programmed to any of several functions. The default functions are: ID#, SET POINTS, TOTAL, VIEW TOTAL, and UNITS. Each key can be programmed for other functions. For example, the **UNITS** key can be changed into a GRAND TOTAL key. Also any of the five keys can be disabled.

MSI provides Function Key Labels with every 3750. After the Function Keys are programmed as desired, apply the appropriate label to the embossed area above the key. MSI can supply custom labels on request. For example, if the String 1 function is to be used to input a customer number, MSI can supply a label that reads “CUSTOMER”. Contact MSI to order custom Function Key labels.

Function	*Default*	*Function Description*
CLRLATCH		Clears any latched Set Points
DISABLED		Key does nothing
GRNDTOTL		Gives the grand total of all ID Codes
ID NUMBR	F1	Push to change the ID Code
PEAKHOLD		Turns Peak Hold on and off.
SCALENUM		Changes the Scale Input
SETPOINT	F2	Allows setting the set point values.
STATS		Shows Statistics on the current ID Code.
STRING 1		Direct access to ID String1. Use for Customer Name, Operator, etc.
STRING 2		Direct access to ID String2. Use for Customer Name, Operator, etc.
TEST	Setup 9	Test Display, battery, A/D converter (see TEST)
TOTL	F3	Add current weight to the total (Manual Total) or turn Auto Total On/Off (Auto Total Mode).
UNITS	F5	Change weight Units.
VIEW Σ	F4	Display the Total weight of the current ID Code.

To Define the Function Keys

1) Push **SETUP**. First the LCD will display the SETUP Screen, then the first setup menu item is "KEY FCTN".

In this example we'll change the function of the SET POINTS key (F2) to "PEAK HOLD".

2) Push **ENTER**. You are now in the KEY FUNCTION Menu. The LCD reads "ASSGN F1".

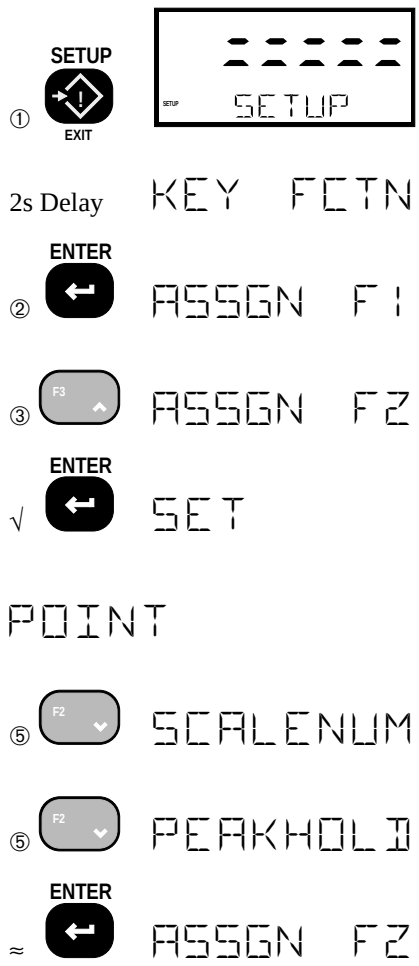
3) Push the **UP** Scroll key to change to "ASSGN F2".

4) Push **ENTER**. The Function Key selection list is shown.

5) Use the **UP/DOWN** keys to scroll through all the functions that **F2** key can be set to. Stop on "PEAKHOLD". Note: If you hold down the scroll key it will start to increment automatically.

6) Push **ENTER** to assign the PEAKHOLD function to **F2**. The display shows the menu item "ASSGN F2".

7) Push **EXIT** (**SETUP**) twice to return to normal scale operation, or assign another Function key using steps 3-6.

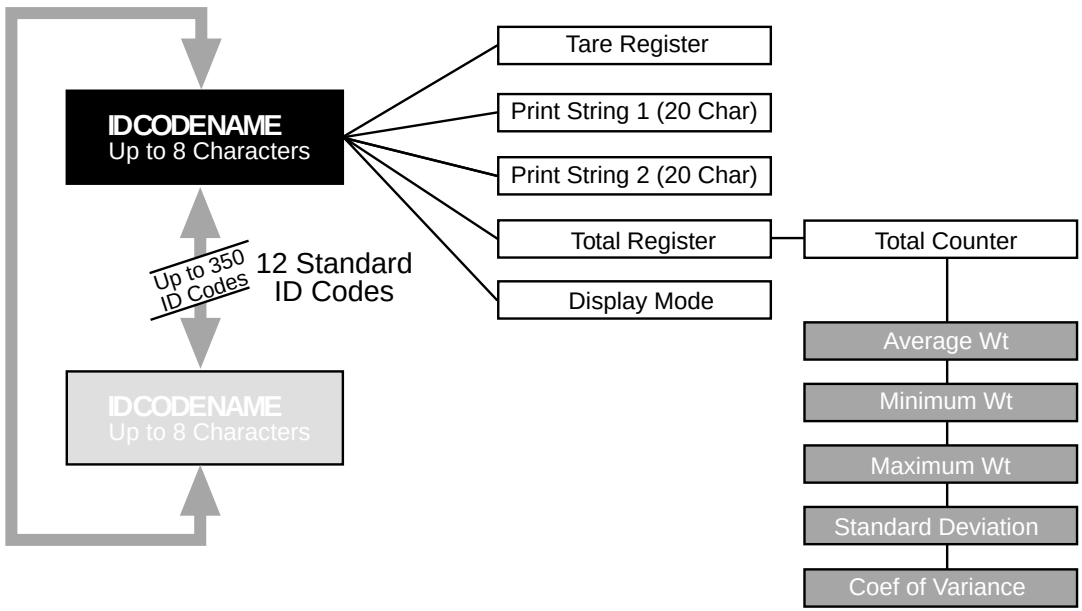


Some functions are not available on NIST and OIML configured 3750s.

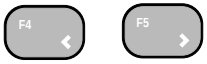
SECTION 3 – ID CODES

- The 3750 can store 12 ID codes (or up to 350 with optional memory, see options Appendix A).
- Each ID Code stores a Tare Value, a Total Value, a weighment counter, display mode (Net, Gross, Peak, etc.), Unit (lb, kg, ton, etc.), and two 20 character ID code print strings. With the optional Statistics Package, each product code also computes and stores Average, Min., Max., Standard Deviation, and Coefficient of Variance.
- Product Codes are created when a new name is entered by the user. The name can be all numbers, all letters, or a combination of numerals and letters. Once the name is entered by the user, the 3750 scans its memory to see if the ID Code already exists. If it does, all new totaled weighments are added to the previously totaled weighments, and any preexisting Tare value will be used for NET weight computation. If the name did not already exist, the 3750 creates a new ID Code.
- ID Codes are alphabetized when created using the standard ASCII convention.
- The 3750 provides a way to scroll through all existing ID Codes as an alternate means of selecting an existing ID code.

ID CODE ORGANIZATION



Key Functions during ID Entry

ID# 	Used to Initiate ID Code entry. **F1** *is the default ID# key. The location of ID# can be changed with the Function Key Setup procedure.*
ENTER 	Used to enter characters. If pushed twice Enter also functions as "EXIT and SAVE".
SETUP 	Pushing the **EXIT** key will terminate the data entry and cause any changes made to be canceled. "EXIT and don't SAVE".
ALPHA 	The **ALPHA** Key is used to change the data entry from Numeric to Alpha-numeric. The LCD indicates "n" for numeric entry, "U" for upper case Alpha-numeric, and "L" for lower case Alpha-numeric.
	Alpha-numeric Keys. When the Alpha key is in the "n" condition, these keys provide direct numeric digits. When the Alpha key is in the "U" condition, the keys provide the letters and number. For example, the 2 key provides "D", "E", "F", and "2" in rotation.
ZERO 	Clear. Will erase any character the cursor is positioned on and move the remaining characters to the left. *Note: Pushing CLEAR followed by the* **LEFT** *Cursor key will clear the entire data line.*
	Up and Down Scroll keys (numeric mode). Used to scroll through the available character set. Using the Scroll keys can be an alternate to using the Alpha-numeric keys. They provide a convenient way to change, for example, a 1 to a 2.
	Left and Right Cursor Keys. Use to position the cursor under characters to be edited. Use the Right Cursor as a space character.
NET/GROSS  INSERT	Used to insert characters within a string. Position the cursor over the character you wish to insert in front of, then push the **NET/GROSS** key. The "highlight" character will appear on the current position. Pressing the **DOWN** Scroll key will delete the current character. Pressing the **UP** Scroll key will insert a character.
	In Alpha mode, the space key provides space and punctuation marks: @ ! " # $ % & ' ( ) * +, – . / : ; < = > ? [\ ] ^ _ ` *Some of the punctuation marks are hard to recognize on the 16 segment display. Use the ASCII chart and the numeric display to verify the identity of the mark.*

General Alpha-numeric Entry Procedure

1) Use the **Aa1** (**ALPHA**) key to switch between numeric “n”, upper case “U”, or lower case “L”.
2) Press the desired character key. If a “B” is needed, push the **ABC1** key twice.
3) Enter the displayed character by either pushing a different key, or the **ENTER** key. If, for example, two “B”s in a row are needed, use the **ENTER** key.
4) Terminate the character string by pushing **ENTER** twice.

Note: Some lower case characters can not be properly represented on the 16 segment displays. Lower case letters with descenders may be represented with the upper-case equivalent on the LCD. However, when the ID Code is printed or transmitted to a computer, the proper lower case character will be sent. Font Substitutions: “F” for “f”, “P” for “p”, “X” for “x”,

USING ID CODES

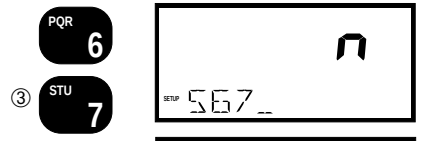
To Create a New ID Code (Numeric example)

1) Push **ID#** (usually **F1**). The current ID is displayed.

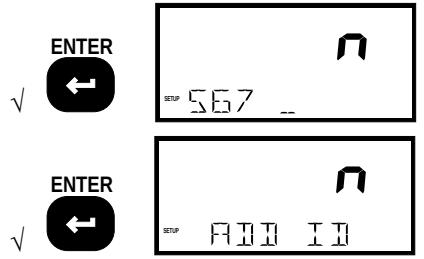
2) Push the first digit of the new ID Code. In this example, the ID Code will be "567".

3) Push the second and third numbers.

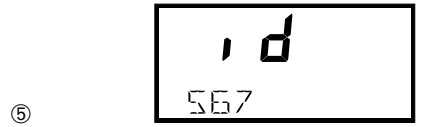
Note: So far, the Enter key has not been necessary.



4) Push the **ENTER** key twice to terminate the ID Code entry. The 3750 pauses while checking its memory for a match. If no match is made the display reads "ADD ID".



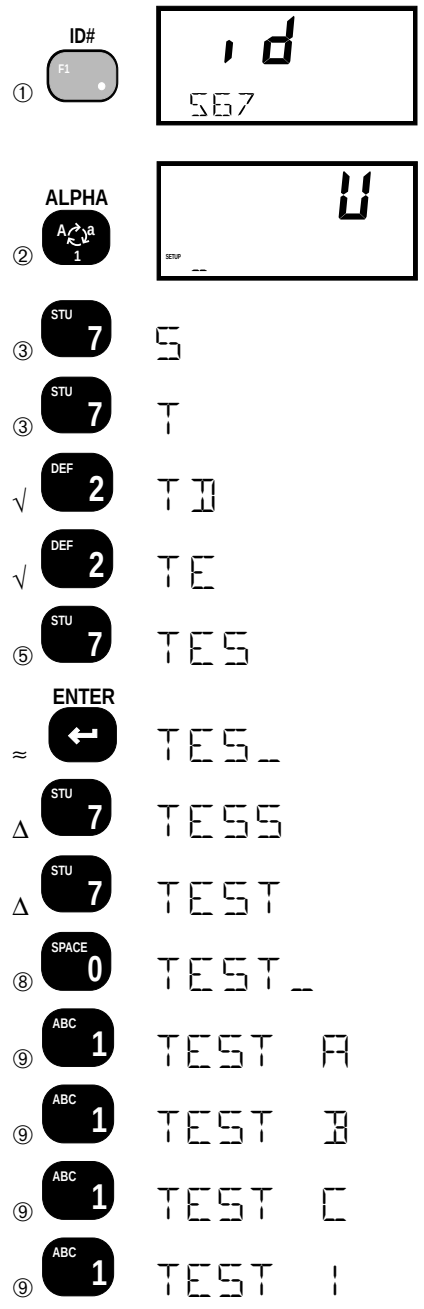
5) The new ID Code appears briefly on the screen. Next, the 3750 returns to narmal scale operation with tthe new ID Code. Any Tare value and new totals will be stored in the new ID Code.



To Create a New ID Code (Alpha example)

1) Push **ID#**. The current ID is displayed.
2) Push the **Aa1** (**ALPHA**) key to enable the Alphanumeric keys. The rightmost numeric digit displays a "U" indicating Upper Case. In this example, the ID Code will be "TEST 1a".
3) Enter in the word "TEST". As the "S" and "T" are on the same key, this is a good illustration of how to handle this situation. Push the **STU7** key twice to get the "T" to appear.
4) Push the **DEF2** key twice for an "E". Note: So far, using the Enter key has not been necessary.
5) Push the **STU7** key for an "S".
6) Now, in order to get the next "T" to appear, the **ENTER** key must be pushed so that the cursor will move on to the next character position.
7) Push the **STU7** key twice to get the "T" to appear.
8) Push the **SPACE 0** key to input a space.
9) Push the **ABC1** key four times to get a "1" to appear.

   Note: Alternately the Alpha key could be pressed to numeric mode "n" to input a 1.

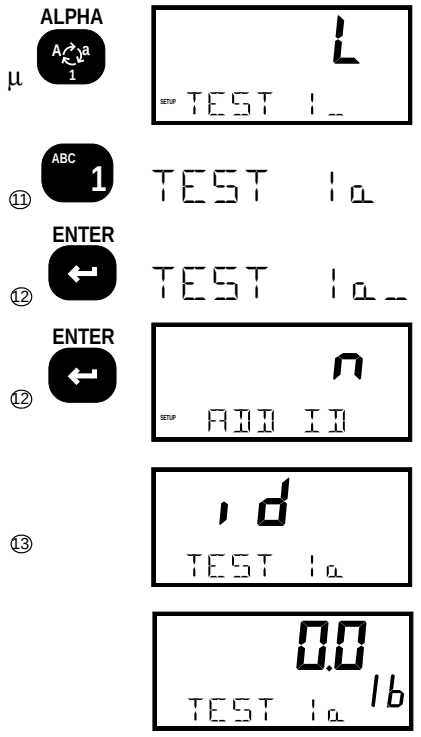


10) Push the **Aa1** (**ALPHA**) key to change to lower case letters. An "L" will indicate the change.

11) Push the **ABC1** key for a lower case "a".

12) Push the **ENTER** key twice to terminate the ID Code entry. The 3750 pauses while checking its memory for a match. If no match is made the display reads "ADD ID".

13) The new ID Code appears briefly on the screen. Next, the 3750 returns to normal scale operation with the new ID Code. Any Tare value and new totals will be stored in the new ID Code.



To Access an Existing ID Code (Numeric only example)

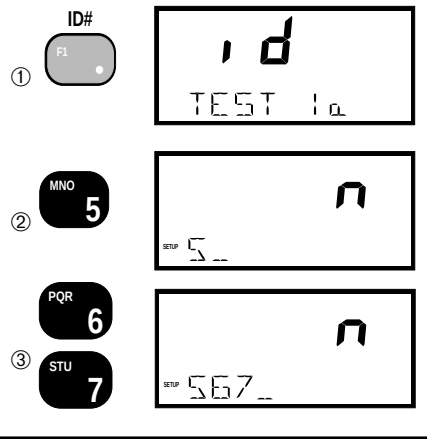
The process of accessing an existing ID Code is identical to the process of creating a new ID Code. When the 3750 detects an ID Code entry it always checks to see if the Code already exists.

1) Push **ID#**. (Usually **F1**, can be changed with the Function Key setup procedure). The current ID is displayed.

2) Push the first digit of the new ID Code. In this example, we are searching for the ID Code "567" we used in the earlier example.

3) Push the second and third numbers.

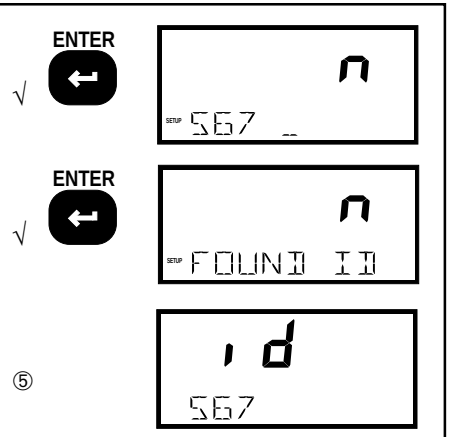
Note: So far, no Enter key has been necessary.



4) Push the **ENTER** key twice to terminate the ID Code entry. The 3750 checks its memory for a match. When the match is made the message reads “FOUND ID”.

Note: If at this step, the message reads “ADD ID”, then the name was not entered the same way it was created. See “Deleting an ID Code”.

5) The 3750 briefly shows the ID number and then returns to normal scale operation. Any Tare value and new totals will be stored in the ID Code “567”. Total readings will be added to any existing totals previously stored on ID Code “567”.



Default ID Code

The 3750 maintains a default ID Code that functions identically to user entered ID Codes except that no name is required. Any totals taken in the default ID Code are included in the grand total. The best way to recognize that the default code is in operation is that it has no ID Code name. The default ID Code can be given a name using “SETUP ID CODES”, but it will not be alphabetized, it will always be first on the list.

Note: The default ID Code is number 1, therefore using the @C command (see section 7) will always start with #2 for user entered ID Codes.

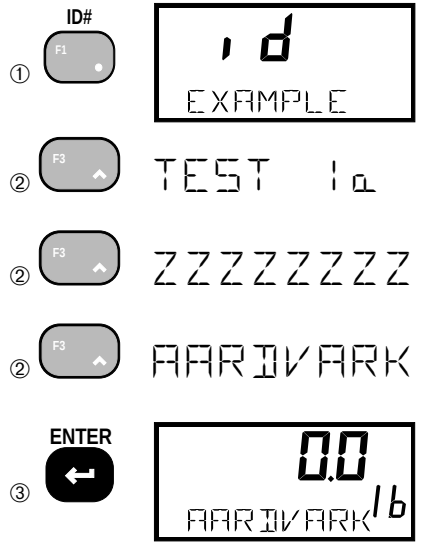
To Scroll through Existing ID Codes

1) Push **ID#** (Usually **F1**, can be changed with the Function Key setup procedure). The current ID is displayed.

2) Using the **UP** or **DOWN** Scroll key, scroll through the available IDs.

Note: The UP key progresses forward through the alphabet. The DOWN key back steps alphabetically. The ID# Key will also function as the UP Scroll key.

3) When the desired ID Code appears, push the **ENTER** key to select the ID Code. The 3750 returns to normal scale operation with the new ID Code “AARDVARK” (for example) active. Any Tare value and new totals will be stored in the ID Code “AARDVARK”.



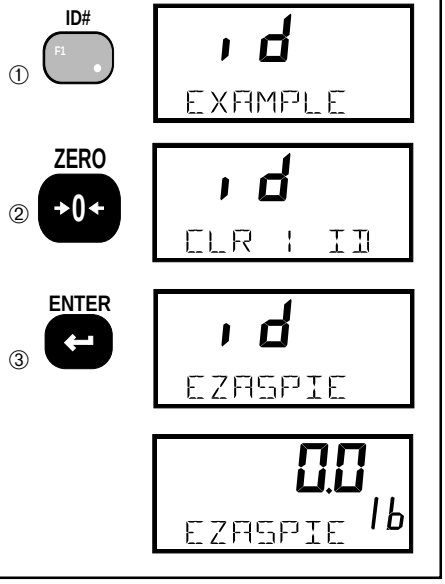
To Delete an ID Code

Note: This procedure will delete the current ID as displayed on the message line. Recall or scroll to the ID Code you wish to delete using either of the two methods detailed previously.

1) Push **ID#**. The current ID is displayed.

2) Push the **CLR** key. The message “CLR 1 ID” appears.

3) Push **ENTER** to delete the ID Code. The previous ID Code is deleted and the next ID Code (alphabetically) will become active. Note: Push **EXIT** instead of **ENTER** to cancel the ID Code delete.



The following procedure deletes all existing ID Codes and any totals and statistics stored in them. To delete just the Totals and Statistics while otherwise leaving the ID Code intact, see "To Clear All Totals" (in section 4, pg.42).

To Delete all ID Codes

1) Push **ID#**. The current ID is displayed.

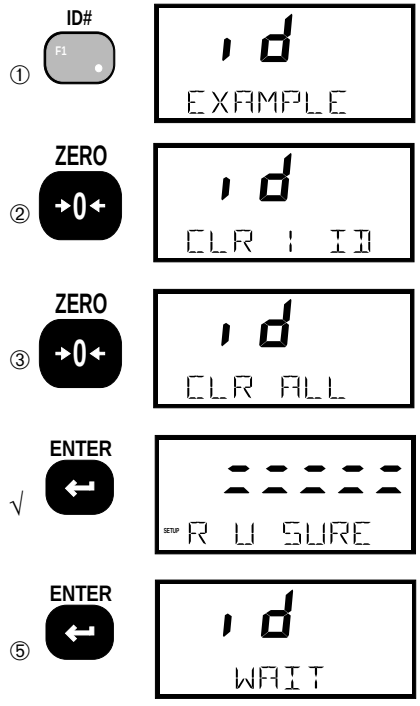
2) Push the **CLR** key. The message "CLR 1 ID" appears.

3) Push the **CLR** key again. The message "CLR ALL" appears.

4) Push **ENTER** to delete all the ID Codes (and Total & Statistics Registers). The 3750 double checks your intent with an "R U SURE" screen.

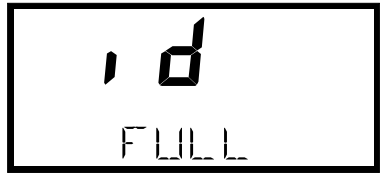
   Push EXIT or any other key to cancel Delete All ID Codes.

5) Push **ENTER** again to complete the Clear function. It can take a while to clear all the registers. The 3750 indicates "WAIT" while this is occurring. Once finished deleting, the 3750 returns to the scale mode with the default ID code activated.



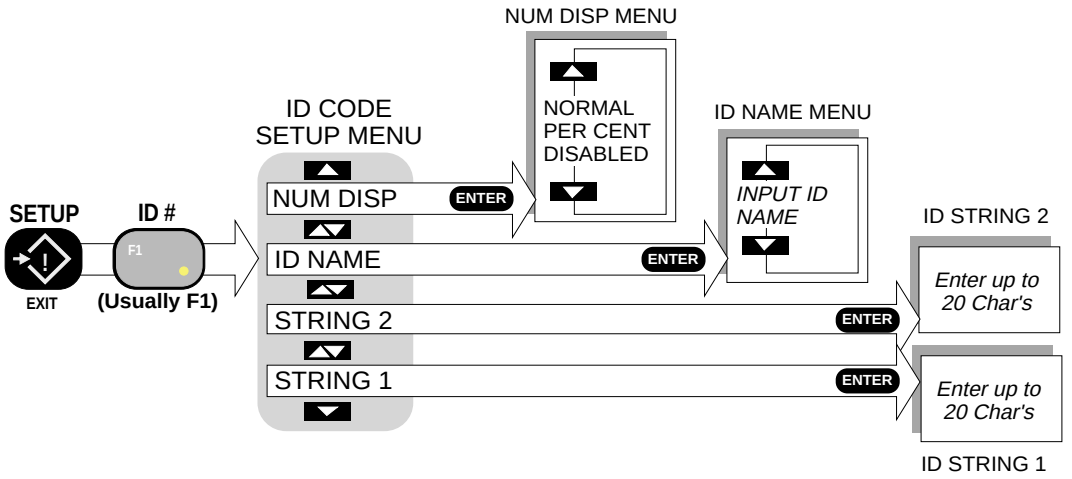
Memory Full

When the 3750s ID Code memory is full this screen appears if you try to enter a new ID Code.



SETUP ID CODES

Allows Front Panel setup of ID Codes features. The 8 character ID Name can be edited, two 20 character print strings can be assigned to each ID Code, and the Numeric Display mode can be modified. In addition the display mode for the desired ID code can be changed to a PER CENT reading or the display can be turned off.



ID NAME

The name of each ID Code can be changed as desired using the scroll keys, cursor keys, and the Alpha-numeric keys. This menu item is not used for initial ID Code name entry (see ID CODES). If the name is edited, it might no longer be in alphabetical order.

To Edit the current ID Code Name

1) Push **SETUP** followed immediately by the **ID#** key (usually **F1**). The message display reads “ID NUMBR”.

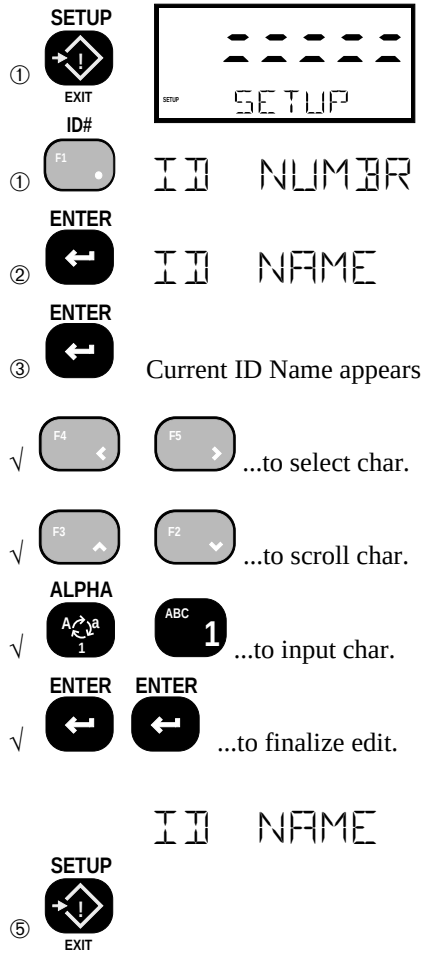
2) Press **ENTER**. The display reads “ID NAME”.

3) Push **ENTER** to go to the edit screen.

4) The message display will show the far left character blinking. Use the **LEFT/RIGHT** Cursor keys to select the character you wish to edit. Use the **UP/DOWN** keys or use the standard Alpha-Numeric entry procedure to change the letter(s). When finished editing, push the **ENTER** key twice.

   See “General Alpha-Numeric Character Entry Procedure”.

5) The display reads “ID NAME”. Press **EXIT** to return to normal weighing mode or press **UP** or **DOWN** to reach the next selection..



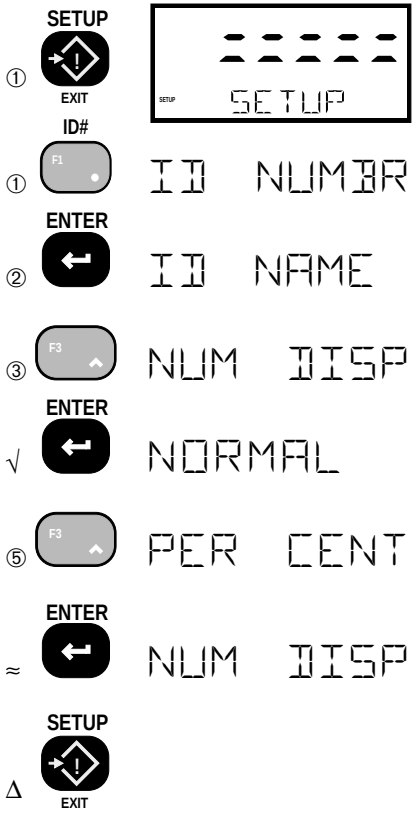
NUM DISP

The function of the numeric (weight) display can be modified. The “NORMAL” setting displays standard NET or GROSS weight. The “PERCENT” setting turns the numeric display into a percentage weight meter. In the PERCENT mode, the 0% and 100% values are determined by the BARGRAPH settings (see “BARGRAPH MENU” for setting the 0% and 100% values). You *must* set the 0% and 100% values for the PERCENT mode to function. The “DISABLED” mode turns off the weight display altogether. This would be used when only the bargraph is desired or the meter is used to check set points only.

Use of the “DISABLED” mode can cause confusion as the weight reading blanks out. Be sure this is what you want to do before disabling the display. If the numeric display is blanked out, push the SETUP key twice, up key to NUM DISP, push ENTER, up key to “NORMAL”, push ENTER, push EXIT to return to normal operation.

To Change the Numeric Display Mode

1) Push **SETUP** followed immediately by the **ID#** key. The message reads “ID NUMBR”.
2) Push **ENTER** to access the menus.
3) Push **UP** until the message reads “NUM DISP”.
4) Push **ENTER**. The message indicates the first “NUM DISP” menu choice – “NORMAL”.
5) Select the “NORMAL”, “PERCENT”, or “DISABLED” display modes by using the **UP/DOWN** keys to scroll through the choices. In this example, we’ll pick the “PER CENT” mode.
6) Push **ENTER** to set the Number Display mode.
7) You are back in the SETUP ID# menu. Return to normal scale operation (in PER CENT) by pushing **EXIT** .



ID CODE STRING 1 & STRING 2

Each ID code can be further identified with one or two ID Code Strings. A string is simply a set of alphanumeric characters that can be displayed and/or printed. The ID Code Strings differ from the ID Code Name in that they are only used in conjunction with the RS-232 option and can't be displayed on the Message display (except during the text entry process). Each string can be up to 20 characters in length. The MSI "@ codes" can also be embedded in the string which provides an extremely versatile output capability. See Section 7 – Comm Ports for more details on programming "@ codes".

Use the ID Code Strings to set up a print string that changes with every ID code. Combined with the standard Comm Port print strings, the Code Labels can be used to design a very sophisticated bar code label with three fields that change with every ID Code – the ID Code Name, and ID String 1 and 2.

The entry procedure for ID Code Strings is identical to the Name procedure, except that you are not limited to 8 characters. After the first 8 characters are entered, the letters will scroll to the left.

The Function keys can be programmed to allow one button access to 1 or both ID Strings. This can be used for Operator ID entry, or direct access to the label printer data when the ID string is embedded in the main Comm Port output.

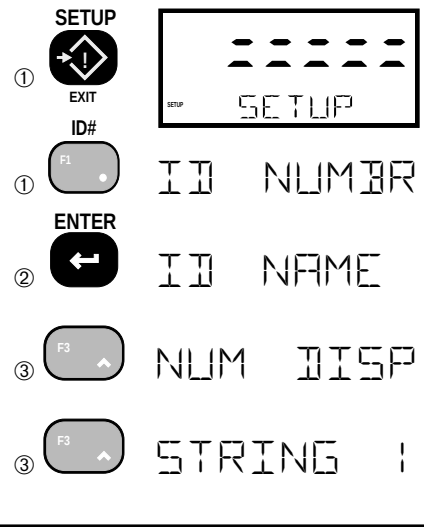
To Add or Edit an ID Code String

Select the ID Code you wish using the procedure "To Access an Existing ID Code" (page 26-27)

1) Push **SETUP** followed immediately by the **ID#** key. The message reads "ID NUMBR"

2) Push **ENTER** to access the menus.

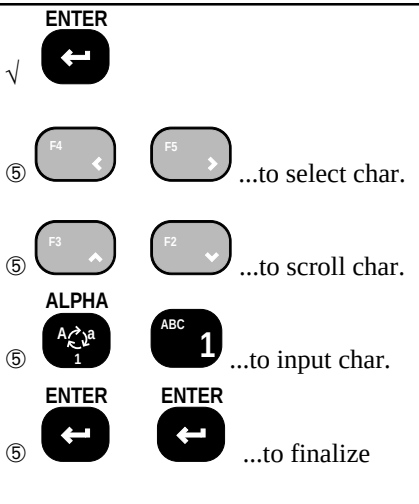
3) Use the **UP** key to find the desired ID Code String ("STRING 1" or "STRING 2").



4) Push **ENTER**.The current string (if any) will be displayed.

5) The message display will show the far left character blinking. Use the **LEFT/RIGHT** Cursor keys to select the character you wish to edit. Use the **UP/DOWN** keys or use the standard Alpha-Numeric entry procedure to change the letter(s). When finished, push the **ENTER** key twice. (See "General Alpha-Numeric Character Entry Procedure")

Note: The characters will scroll left or right when the string is larger than 8 characters. Use the LEFT or RIGHT cursor keys to maneuver through the string.



To Access the ID Code Strings with the FUNCTION keys

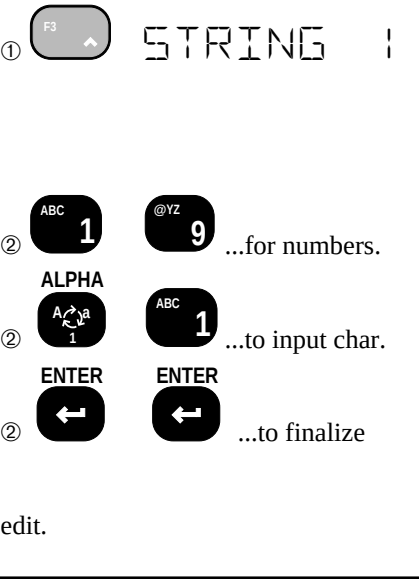
For this procedure to function, a FUNCTION key must be programmed for "STRING 1" and/or "STRING 2". The key(s) used for this purpose can be labeled to suit your needs (e.g. "CUSTOMER" or 'OPERATOR", etc.) See Section 2– Function Keys, for details.

1) Push the **FUNCTION** key once to access a STRING. The current string (if previously entered) will display.

F3 shown for example only. Use the key you programmed for the STRING entry.

2) The current string is displayed. Use the **UP/DOWN** keys to enter characters. Push **ENTER** when the desired character is displayed. Use the **LEFT** and **RIGHT** cursor keys to move the cursor to allow editing the String. When finished, push the **ENTER** key twice.

See "General Alpha-Numeric Character Entry Procedure".



SECTION 4 – TOTAL / STATISTICS

TOTAL

- The 3750 can add independent weighments together and keep a counter of how many weighments were added (Totaled). The Weighments counter can be thought of as a box or palette counter.
- "TOTAL" always uses the displayed weight, so gross and net readings can be added into the same total.
- There are two modes of Totaling which are set in the SETUP TOTAL section. The Manual mode uses the **TOTAL** key to add the current weight to the previously totaled value. The Auto mode will automatically add the last, settled value to the total (or optionally the highest value). See "SETUP TOTAL" for instructions to enable the AUTO TOTAL modes.
- Both modes have a means to prevent the same load from totaling twice. Once totaled, the load must be removed from the scale before a new load can be added to the Total. Applied weight must be greater than the Total Threshold before it can be totaled. See "SETUP TOTAL" for instructions on how to set the Total Threshold.

To Total with the **TOTAL** Key

(Unit must be setup to Manual Total mode)

1) Place the weight to be totaled on the scale. When the weight has stabilized, push the **TOTAL** Key (usually **F3**). The current weight is added to the total register. The display gives an indication of how many weighments have been totaled. i.e. 1 TOTAL, 2 TOTAL, …x TOTAL.

Rules for use:

1) The motion annunciator must be off, the scale must be stable unless motion is disabled in the Setup Total menu.
2) Only positive readings can be accumulated.
3) The scale adds the current reading (relative to the Net zero or Gross zero depending on mode) to the contents of the accumulate register.
4) After a weighment is totaled, the weight must go below the Total Threshold before another weight can be added to the total. This assures that a weight on the scale is only added to the total once.
5) When the total weight exceeds the display capability of 999,999 counts, or the total weighments count exceeds 9999, dashes will appear to reflect a

display overflow. The larger numbers can be printed through the use of the **PRINT** button, or with a computer hookup.

AUTO TOTAL

SETUP Option, see "SETUP TOTAL" to enable Auto Total.

When the weight exceeds the Total Threshold the total function operates automatically. The displayed weight is held in a holding register and added when the weight returns below the Total Threshold. When a weight settles (no motion), the Total LED indicator will flash three times. If the weight changes to a new settled value the LED will flash again indicating that the previous settled reading has been replaced. The last settled reading is what will be used for totaling when the scale returns below the Total Threshold. The user must make sure that while removing the load the scale does not stabilize enough for a new reading or an erroneous weighment addition could occur. The last settled weight is actually added to the total when the scale returns to below the Total Threshold. The "AUTOPEAK" total mode works the same, except that the highest settled reading will be used for totaling on return to zero, rather than the last settled reading.

Auto Total Operation

1) Enable the Auto Total mode in the "SETUP TOTAL" menu (see "SETUP TOTAL"). Select either the "AUTONORM" or the "AUTOPEAK" mode. Exit from the setup menu.
2) Use the **TOTAL** key to disable ("TOTALOFF") or enable ("TOTAL ON") Auto Total.
3) Place the weight to be totaled on the scale. The Total LED will flash three or more times when the weight is settled. In high speed operations it is not necessary to wait for the three flashes. The total is accepted when the first flash appears.
4) Remove the weight. The screen will read "x TOTAL" where x is the number of totaled weighments.

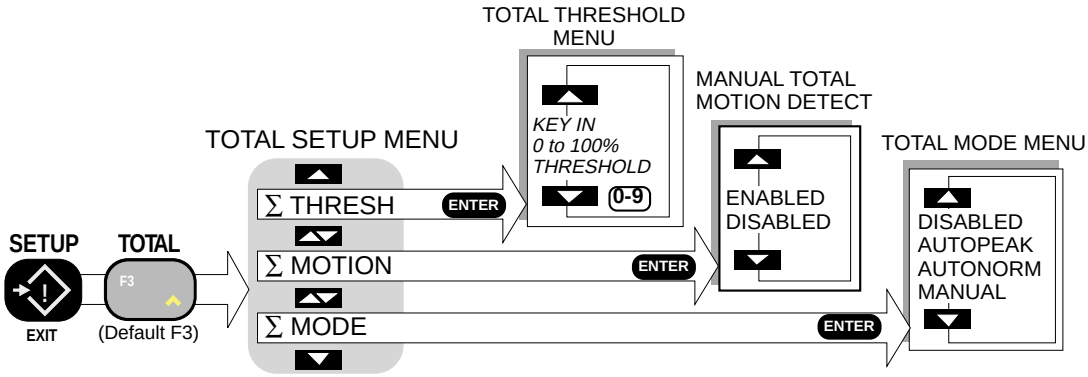
Note: The total key is used as a Total On, Total Off, toggle key which is indicated briefly on the message display (i.e. "TOTAL ON" or "TOTAL OFF"). Auto Totaling will only occur in the TOTAL ON mode. The Auto Total On mode is indicated by an "AUTO Σ" annunciator on the LCD. This feature allows the user to turn off Auto Total for periods in which the scale needs to be used without adding to the total. Turning the Auto Total off does not erase the current total. See "To Clear the Total Value" to learn how to erase the Total.

Rules for Auto Total:

1) Cannot be in motion. An Auto Total acceptable reading is indicated by three or more short flashes of the Total LED.
2) Weight readings must be greater than the set Total Threshold.
3) Each reading added to total must be preceded by a return to zero (Net or Gross) or below the Total Threshold.

TOTAL Menu (SETUP TOTAL)

Allows Front Panel entry of Totalization parameters.



∑ MODE

The Manual mode requires that the **TOTAL** key (or IR Remote Total key) is pushed when the weight currently on the scale should be added to the previously accumulated value. The Auto Norm mode will automatically add the last, settled value to the total. The Auto Peak mode will automatically add the highest settled value to the total. All total modes require that the scale returns below the Total Threshold before the next weighment can be added. Applied weight must be greater than the Total Threshold before it can be totaled. See TOTAL for more details. In NIST or OIML standards, the AUTOPEAK and AUTONORM selections will not appear unless you enable AUTO Total in the Calibartion Setup menu. The use of AUTOTOTAL must be approved per application by the sealing official.

∑ MOTION

Enables or disables Motion Detection for Manual Total. Has no effect on AUTOTOTAL. This menu item controls whether the scale has to be out of motion before it will total. In certain high vibration applications it is sometimes desirable to turn off the motion detect so that Totalization can occur. This feature is disabled for legal-for-trade systems.

∑ THRESHOLD

Sets the weight value above which Totalization is allowed. For example, setting the threshold to 10% on a 200 lb scale will set the threshold at 20 lb. Only weight above 20 lb will add to the Total. Once totaled, the weight must return below the Total Threshold to enable the next totalization. This prevents the same weight from being totaled twice.

Another example: On a scale with a capacity of 1000 kg the user desires to Auto

Total all weight that exceeds 50kg. Since 50kg is 5% of 1000kg, the Total Threshold is set to 5%.

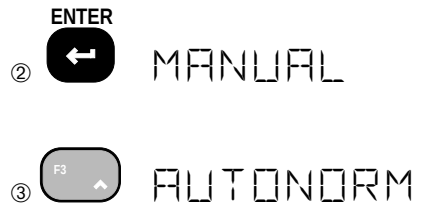
Note: The Threshold is entered in 1% increments.

To Set the TOTAL MODE

*The following example assumes the **F3** function key is programmed to "TOTAL". If the TOTAL key has been moved to a different "F" key use that key for the following procedure.*

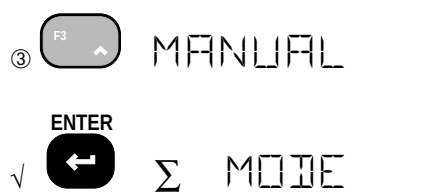
1) Push **SETUP** followed immediately by the **TOTAL** switch (usually **F3**).

2) Push **ENTER**. The first menu choice is "MANUAL" (or the last set mode). In this example, we'll enable the "AUTONORM" mode.



3) Push the **UP** or **DOWN** key to scroll through the Total Mode options. Shown here are all the Total Mode Options to illustrate how the menu structure works. It is not necessary to go through all options.

4) When the desired choice is displayed, push **ENTER**. The **ENTER** key should be pushed after the LCD indicates "AUTONORM".

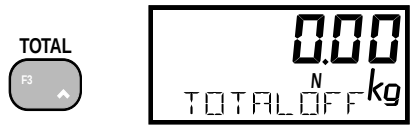


5) Push the **EXIT** key to return to normal scale operation. Auto Total is now enabled. The small "AUTO Σ" annunciator will appear.

To Turn Off Auto Total

It is often desirable to temporarily turn off Auto Total.

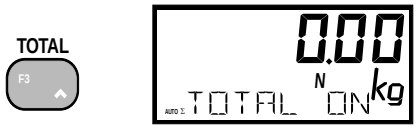
1) Push **TOTAL**. The display reads "TOTALOFF" and the small "AUTO Σ" annunciator turns off. Then the scale resumes normal operation but will not Total.



To Turn On Auto Total

Return to Auto Total operation.

1) Turn on Auto Totaling by pushing the **TOTAL** key. The display will read "TOTAL ON" and the small "AUTO Σ" annunciator will appear.



To Set the Total Threshold

1) Push **SETUP** followed immediately by the **TOTAL** switch (usually **F3**).

2) Push the **UP** Scroll key until the menu choice is "Σ THRESH".

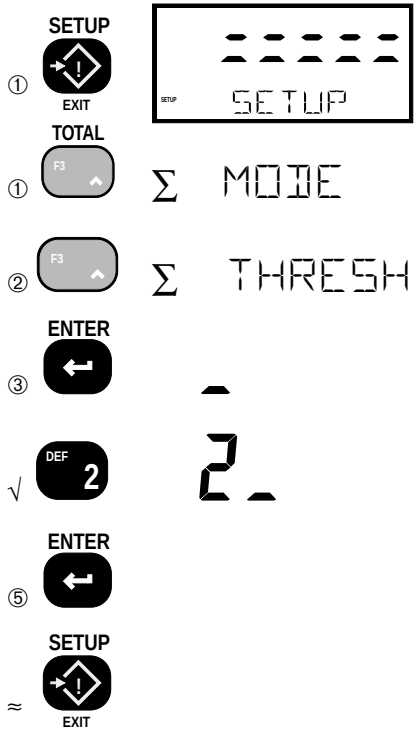
3) Push **ENTER**. The % Threshold Screen will appear. The currently set threshold is displayed on the Weight Display.

4) Use the numeric keys to input the desired Total Threshold. Remember that the threshold is based on per cent of Scale capacity. In this example we'll input 2% as a threshold.

   Calculation example – If the Scale Capacity is 1000kg and the user wishes all weight above 50kg totaled, enter 5% (1000 x 0.05).

5) After the number is finished push **ENTER**.

6) Push the **EXIT** key to return to normal scale operation.



To Enable/Disable Total Motion Detect

1) Push **SETUP** followed immediately by the **TOTAL** switch (usually **F3**).

2) Push the **UP** Scroll key until the menu choice is "Σ MOTION".

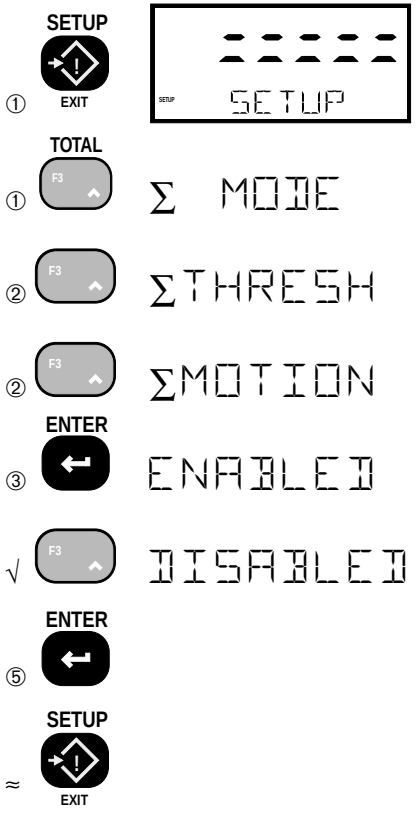
3) Push **ENTER**.

4) Change the state of Total Motion detect with the **UP** key.

5) When the desired mode is displayed, push **ENTER**.

   Note: Total Motion has no effect on AUTO TOTAL. It is for use with MANUAL TOTAL only.

6) Push the **EXIT** key to return to normal scale operation.



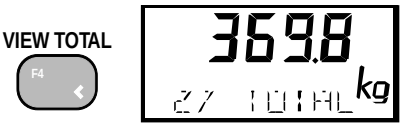
VIEW TOTAL

Displays the current Total value of the selected ID and allows the total(s) to be cleared.

*The following examples assume the **F4** function key is programmed to "VIEW TOTAL". If the **VIEW TOTAL** key has been moved to a different F key use that key for the following procedure.*

To Display the Current ID's Totaled Weight

Push **VIEW TOTAL**. The totaled weight and the number of weighments will be displayed for 4 seconds.



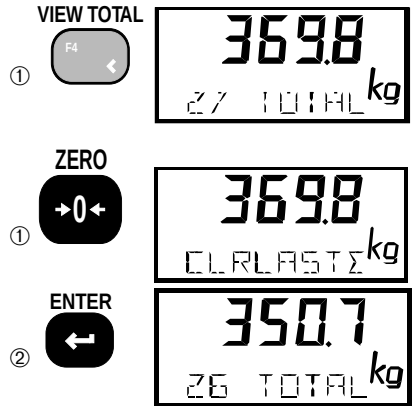
To Erase the last Totaled Weight

If the last totaled (automatic or manual) weighment was a mistake, it can be erased with the following procedure. This erases only the last weighed value.

1) Push **VIEW TOTAL**, (usually **F4**), then **CLR** (**ZERO**). The message reads "x TOTAL" (where x is the number of totaled weighments), then "CLRLAST∑".

2) Press **ENTER**. The last weight totaled is subracted and the number of weighments counter is reduced by one.

If you change your mind, push EXIT to cancel the Clear Last Total operation.



To Clear the Total Value (Current ID Code only)

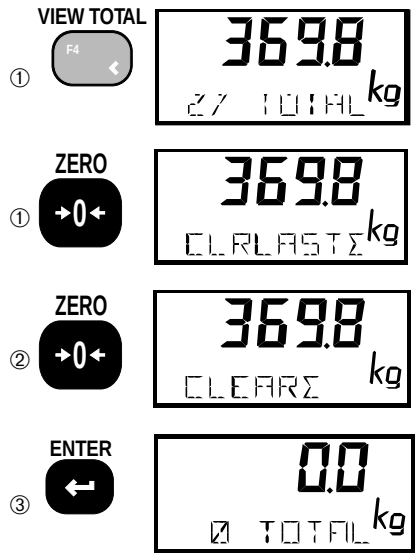
Note: At any time during the following procedure the **EXIT** *key cancels the Clear operation.*

1) Push **VIEW TOTAL**, (usually **F4**), then **CLR** (**ZERO**). The message reads "x TOTAL" (where x is the number of totaled weighments), then "CLRLAST∑".

2) Press **CLR** again. The message reads "CLEAR ∑".

3) Press **ENTER**. The total reading and the number of weighments counter will revert to zero.

If you change your mind, push EXIT to cancel the Clear Total operation or push CLEAR to go back to the "CLRLAST∑" mode.



CLEAR ALL TOTALS

Allows Clearing all totals (and Statistics registers) on all ID codes at once.

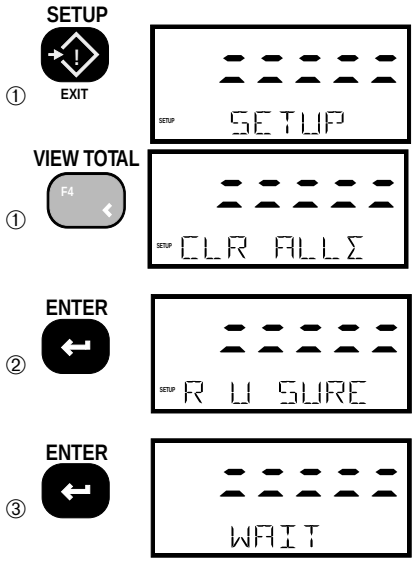
To Clear All the Totals of all ID Codes at once.

1) Push **SETUP** followed immediately by the **VIEW TOTAL** switch (usually **F4**).

2) Push **ENTER** to Clear all the Total Registers (and Statistics Registers) of all ID Codes. The 3750 double checks your intent with an "R U SURE" screen.

3) Push **ENTER** again to complete the Clear function. It can take a while to clear all the registers. The 3750 indicates "WAIT" while this is occurring.

WARNING! *This will completely erase all Total and Statistics registers for every ID Code at once. If this is not what you want to do, push* EXIT .



STATISTICS (OPTION)

The Statistics option works in conjunction with the Total function and adds MIN, MAX, Average, Standard Deviation, and Coefficient of Variance. All these computations are kept for every ID Code independently. The number of samples that statistics can be calculated for is limited only by memory requirements and will vary from a few thousand to >100000 samples. Individual samples are not stored. If needed, individual samples can be logged through either RS-232 port using the "PRINT on TOTAL" function.

A "GRAND TOTAL" function is also included with the Statistics option. The Grand Total adds all the weight in all the ID Codes and provides the following information: GRAND TOTAL, Number of Totals, and the Overall Average (GRAND TOTAL divided by Number of Totals).

Statistics are accessed in either of two ways: 1) Program a Function Key to be "STATS". 2) The statistic registers can be accessed with a computer or terminal through an RS-232 /485 port.

DEFINITIONS AND FORMULAS

AVERAGE – is computed by dividing the total by the number of samples.

MIN – is a single weight register that records the minimum weighment that was added to the total.

MAX– is a single weight register that records the maximum weighment that was added to the total.

STANDARD DEVIATION – is a measure of how widely values are dispersed from the average value (the mean). The 3750 uses the "non-biased" or "n-1" method that is based on sampling a portion of each available weighment.

Standard Deviation uses the following formula where x is equal to the total, and n is equal to the number of samples.

$$\sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

COEFFICIENT OF VARIANCE – is a relative dispersion calculated from the sample standard deviation and the mean with the following formula:

$$\frac{100(StdDev)}{Average}\%$$

GRAND TOTAL – is computed by adding together the totals of all the ID Codes (adjusted to the default unit set in calibration if necessary).

GRAND AVERAGE – is computed by dividing the Grand Total by the number of samples of all the ID Codes.

Units and the Statistics Registers

Due to the mathematical interaction of the Statistics Registers, only one unit (lb, kg, etc.) is available across all the ID Codes. So unlike standard ID Codes without statistics, once a total has been taken in any ID Code the units function is locked. The only way to change units is to clear the registers using the CLEAR ALL TOTALS (SETUP VIEW TOTAL) procedure detailed in the Total Section. Once all the total and statistics registers are cleared, the units can be changed.

USING STATISTICS

To View Statistics for the current ID Code

The following example assumes F2 was programmed to be "STATS". Use the **VIEW TOTAL** *key for the T otal and number of samples.*

1) Push **STATS** (usually **F2**). The first statistic displayed is "AVG WGT".

   ***Note** : The STATS key will not function until weight has been totaled in the current ID Code.*

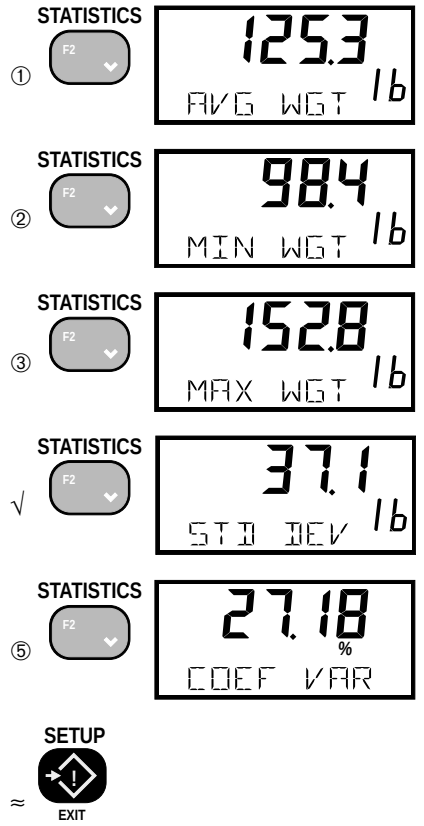
2) Push **STATS** (**F2**) again. The second statistic is the Minimum Weight.

3) Push **STATS** (**F2**). The third statistic is the Maximum Weight.

4) Push **STATS** (**F2**). The fourth statistic is the Standard Deviation.

5) Push **STATS** (**F2**) again. The fifth statistic is the Coefficient of Variance.

6) Push **EXIT** to return to normal scale operation.

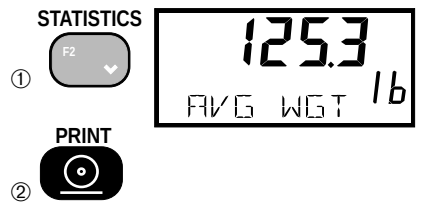


To Print the Current ID Code's Statistics

1) Push **STATS** (usually **F2**). The first statistic displayed is "AVG WGT".

   ***Note** : The STATS key will not function until weight has been totaled in the current ID Code.*

2) With a suitable printer or computer attached to the COMM Port1, push **PRINT**.



To View the Grand Total and Average for all ID Codes

The following example assumes F5 was programmed to be "GRNDTOTL".

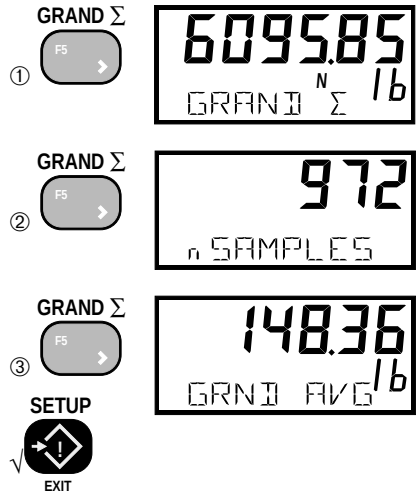
1) Push **GRAND TOTAL** (**F5**). The first statistic displayed is the Grand Total obtained by adding the totals of all product codes.

   ***Note** : The GRAND TOTAL key will not function until weight has been totaled in at least 1 ID Code.*

2) Push **GRAND TOTAL** (**F5**) again. The second statistic is the number of samples.

3) Push **GRAND TOTAL** (**F5**). The third statistic is the Grand average weight.

4) Push **EXIT** to return to normal scale operation.

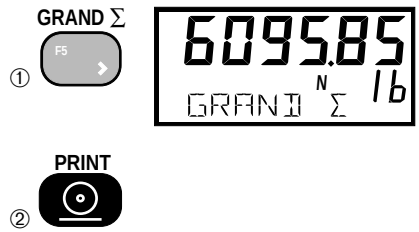


To Print the All Product Code's Statistics

1) Push **GRAND TOTAL** (usually **F5**). The first statistic displayed is the Grand Total obtained by adding the totals of all product codes.

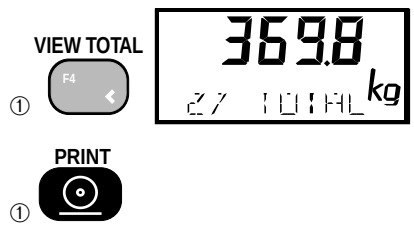
   ***Note** : The GRAND TOTAL key will not function until weight has been totaled in at least 1 ID Code.*

2) With a suitable printer or computer attached to the COMM Port1, push **PRINT**. All statistics plus the Grand Total statistic will print. Product Codes that have no Totaled Data will not print out in this procedure.



To Print the Current Product Code's Total Only

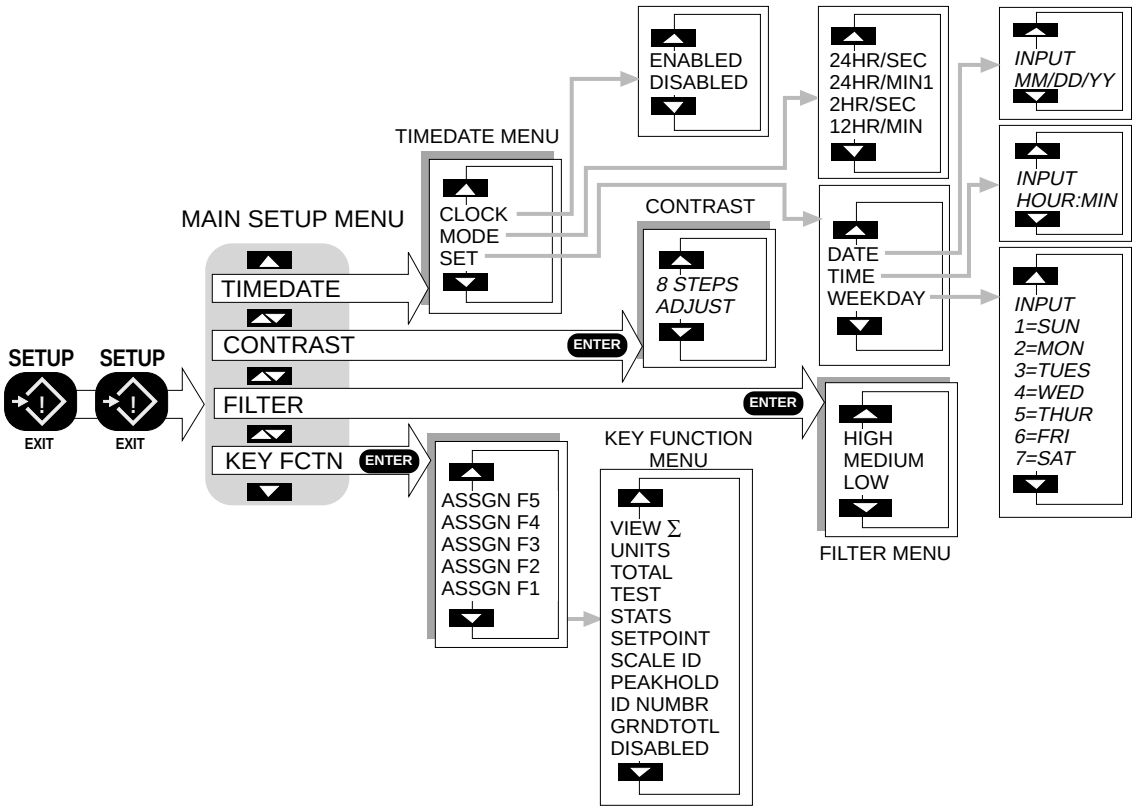
1) Push **VIEW TOTAL** (usually **F4**) followed quickly by the PRINT key. Just the Total and the number of samples will print.



SECTION 5 – 3750 METER SETUP

MAIN SETUP MENU

Allows the user to set the A/D filter, the display contrast, the Time and Date, and program the Function keys *(see section 2 for information on programming the function keys)*. Setup Functions are organized into Menus. You navigate through the menus using the **UP** or **DOWN** Scroll keys. You select menu items using the **ENTER** key. Pushing the **EXIT** key will step back one menu level at a time and is used to return to normal scale operation. Using the **EXIT** key at the Selection level voids any change in the active menu.



NOTE: Not all the selections above are activated on every MSI 3750. Legal-for-trade issues and application issues require certain menu items to be under the Calibrate menu (under seal, see calibration section), and certain items to be disabled. Any or all menu items can be eliminated under software control (contact factory for details).

FILTER

Use the LOW setting for most scale applications. It settles fastest and is intended for general use. Use the MEDIUM setting when the scale is being used under conditions that cause light to medium swinging. Use the HIGH setting when there is a lot of scale motion or vibration. There is a time penalty to pay for using the HIGH setting. The user should wait at least 5 seconds to ensure that the final reading has settled (Motion indicator off).

Not available in some legal-for-trade systems or the FILTER menu is moved to the Calibrate Setup Menu.

To Change the Filter Setting

1) Push **SETUP**. Wait 2 seconds (or push **SETUP** again).The message reads “KEY FCTN”.

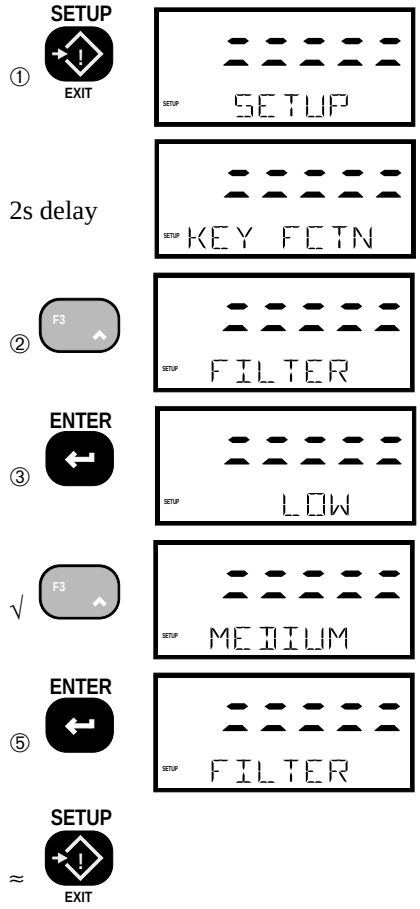
2) Push the **UP** scroll key to change the menu selection to “FILTER”.

3) Push **ENTER.**

4) Select the “LOW”, “MEDIUM”, or “HIGH” filter by using the **UP/DOWN** keys to scroll through the choices. In this example, we’ll pick the MEDIUM filter which is suitable to medium to high vibration situations.

5) Push **ENTER**.

6) You are back in the **SETUP** menu. Return to normal scale operation (MEDIUM Filter on) by pushing **EXIT** (**SETUP**).



CONTRAST

Used to optimize the contrast of the LCD at various viewing angles. This is factory preset for optimal viewing. By stepping through the 8 settings, the contrast can be improved for off-angle or temperature extreme applications. If the display is ghosting (off segments are visible), use a lower setting such as 1-4. If the display is too dim, use a higher setting such as 5-8.

To Adjust the LCD Contrast

1) Push **SETUP**. Wait 2 seconds (or push **SETUP** again).The message reads “KEY FCTN”.

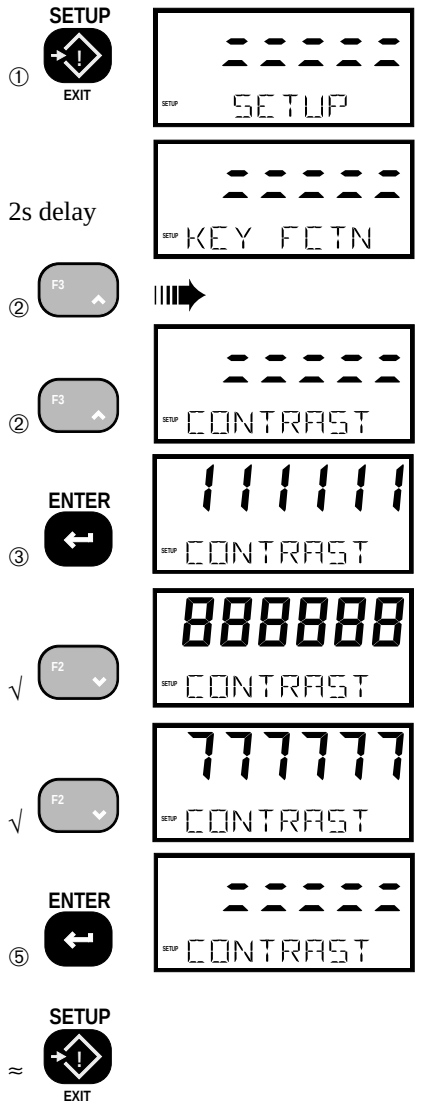
2) Push the **UP** scroll key until the menu selection is “CONTRAST”.

3) Push **ENTER.**

4) Adjust the contrast by pushing the **UP** or **DOWN** key. Push **ENTER** when the desired display contrast is achieved. There are 8 steps. You can also change the contrast directly by pushing the 1-8 key.

5) Push **ENTER**.You are back in the **SETUP** menu.

6) Return to normal scale operation by pushing **EXIT** (**SETUP**).



REAL TIME CLOCK/CALENDAR

A clock/calendar for full time and date stamping is installed with the RS-232 option. The Clock can be set to automate weighing functions to time and date. When the scale is not being used, a digital clock display can be enabled. The Real Time Clock / Calendar is adjusted in the Setup Menu. The 3750 RTC is fully Y2K compliant. The user can choose 2 or 4 digit year outputs.

To Set the Time and Date

1) Push **SETUP**. Wait 2 seconds (or push **SETUP** again).The message reads "KEY FCTN".

2) Push the **UP** scroll key until the menu selection is "TIMEDATE".

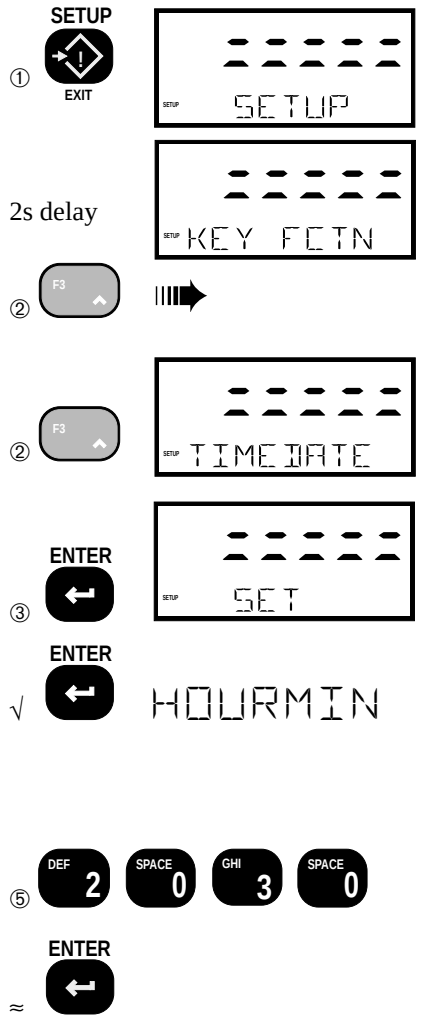
3) Push **ENTER.** The menu reads "SET".

4) Push **ENTER** again.The message reads "HOURMIN". The current set time is displayed.

5) Input the hours and minutes in 24 hour mode with the numeric keys. The seconds field is fixed at 00. In this example we'll push 2, 0, 3 key 0 key to input 20:30 hours (8:30PM).

   Note: To Sync the 3750 Clock with an external clock push ENTER precisely at the 00 second point. The 3750 Real Time Clock can also be synched to the second if set through the Comm Port by computer.

6) When the proper time is displayed, push **ENTER**. You are back in the TimeDate menu.



Follow a similar procedure for the Date entry. The Date is entered in the order MM DD YY. When finished setting all the Clock/Calendar parameters, push **EXIT** three times to return to normal scale operation. To ensure Y2K compatibility, any two year digits between 80 and 99 are assumed to be in the 1900s. All year dates from 00 to 79 are assumed to be in the 2000s.

MODE

The MODE sets the display mode of the real-time Clock when the clock is enabled. Select “12HR/MIN” to display the time in 12 hour format with hours, minutes, and a PM indication. Select “12HR/SEC” to display the time in 12 hour format with hours, minutes, seconds, and a PM indication. Select “24HR/MIN” for 24 hour indication with hours and minutes. Select “24HR/SEC” for 24 hour indication with hours, minutes, and seconds.

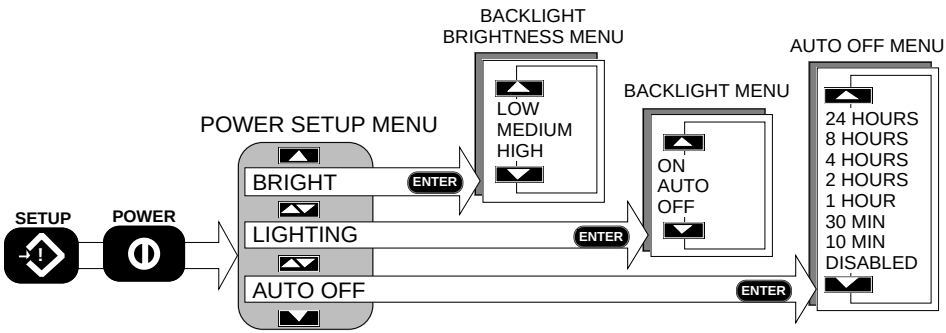
CLOCK

Select “ENABLED” to turn the scale into a clock calendar when the power is not on. The Micro-processor wakes up to update the display either every minute or every second depending on the mode selected. The processor will also check for activity on the Comm Ports to see if a Power up command is received. Therefore to achieve no worse than a 1 second turn on, set the mode to the 12HR/SEC or the 24HR/SEC selection. The mode has no effect on the power switch.

Note: Operating the Clock from a battery powered MSI 3750 has very little effect on battery life. The LCD and LCD drivers use only minimal power. The µC is only awake long enough to update the LCD so its average power consumption is small. Using the /MIN mode selections minimizes the µP power drain.

SETUP POWER MENU

Allows Front Panel entry of parameters involving power consumption.



AUTO OFF

The AUTO OFF feature when enabled prolongs the battery life of the scale by turning the power off after a set time of non use. Depressing any key, or any change in the detected weight will reset the time limit . This feature defaults to the disabled mode when initially calibrated. When disabled the scale will stay

on, only the power key (or Remote) will turn it off.

LIGHTING

A photoresistor detects ambient light and determines if the backlight should be on or off (AUTO mode). The “ON” mode turns the backlight on full time. For decreased power drain, the “OFF” mode disables the backlight.

To Turn on the Backlight

1) Push **SETUP** followed immediately by the **POWER** key.

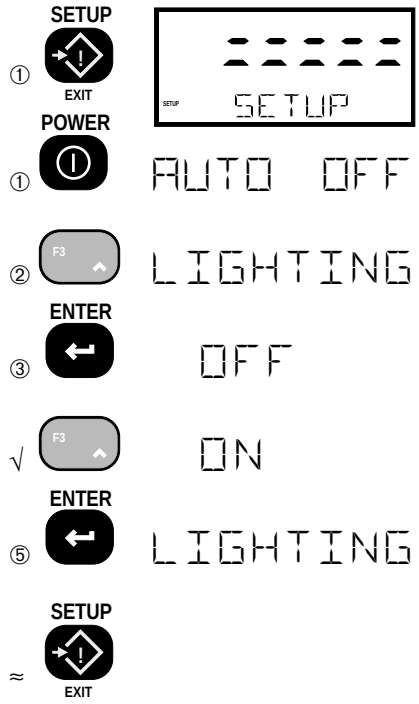
2) Push the **UP** key to select the menu item “LIGHTING”.

3) Push **ENTER**.The current Backlight mode is shown.

4) Push the **UP** key until the message reads “ON”.

5) Push **ENTER**. The backlight will turn on.

6) Push **EXIT** (**SETUP**) to return to normal scale operation or use the **UP/DOWN** and **ENTER** keys to change another Setup Power parameter.



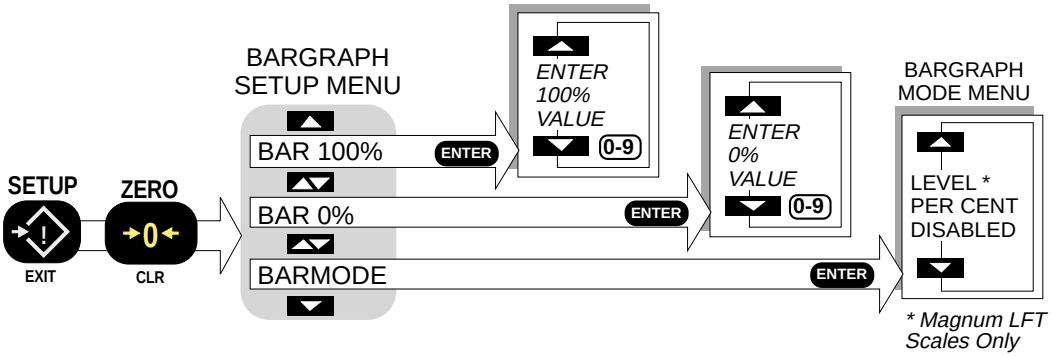
BRIGHT

The Fiber-Optic LED Backlight has three brightness settings. On battery powered units, use “LOW” to maximize battery life in low light situations. This feature is not available on units equipted with two Comm Ports.

BARGRAPH MENU

Controls the operation and calibration of the Bargraph. The Bargraph can indicate relative weight. In conjunction with the “NUM DISP” setup mode, the BAR 0% and BAR 100% setting also control the numeric display PER CENT parameters.

The 0% and 100% points of the bargraph can be set to any weight within the capacity of the scale. Normally a lower weight is set for the 0% value. If desired, the 0% point can be set to a higher value than the 100% point if pour down or similar applications dictate.



BARMODE

The BARMODE menu has three settings:

1) LEVEL – Used only on the Magnum Lift Truck Scale. Indicates how level the vehicle is and if the level is within range for accurate weight readings.
2) PER CENT – The Bargraph represents a user programmed span of the weight reading. The 100% and 0% settings are programmable anywhere within the capacity of the scale.
3) DISABLED – Turns off the Bargraph.

The 3750 defaults to the DISABLED setting of the Bargraph. The following procedure shows how to set up the Bargraph for PER CENT operation.

To Set Up Bargraph Per Cent Operation

1) Push **SETUP** followed immediately by the **ZERO** key. The Menu reads "BAR MODE".

2) Push **ENTER**. The menu item will be the current Bargraph Mode (defaults to "MODEM").

3) Push the **UP** key until the message reads “PER CENT”. (How many times you push the **UP** key is dependent on the last mode set.).

4) Push **ENTER**.

5) Next , using the **DOWN** key, scroll to the “BAR 0%” menu.

6) Push **ENTER**. The message display indicates "WEIGHT" and the numeric display shows the current 0% value (defaults to 0).

7) Using the numeric keys enter the value that you want to equal 0% on the bargraph. In this example we’ll key in 10lb (or whatever units the scale is in) as 0%.

8) Push **ENTER**.

9) Use the **UP** key to scroll to the the “BAR 100%” selection.

10) Push **ENTER**.

11) Using the numeric keys enter the value that you want to equal 100% on the bargraph. In this example we'll enter 20 lb as 100%.

12) Push **ENTER**...back to the MENU level.

13) Push the **EXIT** (**SETUP**) key to return to normal scale operation. The Bargraph is now activated. The 0% segment is equal to 10 lb, the 100% segment is equal to 20 lb.

Bargraph Resolution

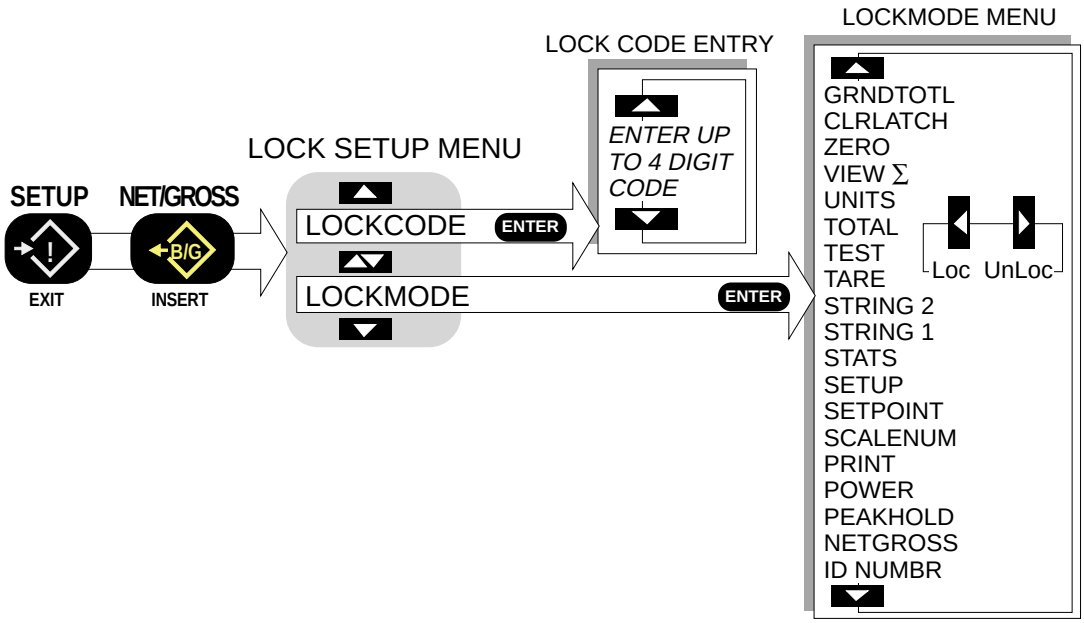
The bargraph has 20 segments plus under range and over range arrows. Each segment is equal to a span of 5%. To calculate the resolution of each segment use the following formula.

$$\frac{100\%\text{Value} - 0\%\text{ Value}}{20}$$

LOCK

The Lock function allows the user to lock various setups and or functions to prevent unauthorized changing or erasing of scale functions, features and statistical data. For added security an optional lock code (1-4 characters) can be entered. Once the MSI 3750 is locked the message "LOCKED" will appear whenever a locked function is tried. To unlock push **SETUP NET/GROSS** and enter the lock code number.

The "LOCKMODE" menu determines which functions/features are locked. For example, locking the **SETUP** key would prevent any setup functions from being used (except of course, the LOCK function (**SETUP NETGROSS**). There is no need to lock out functions that are only available on the Fx keys if no key is assigned to that function (e.g. PEAKHOLD). See "FUNCTION KEYS" for details on programming the Function Keys.



Selecting Which Features to Lock

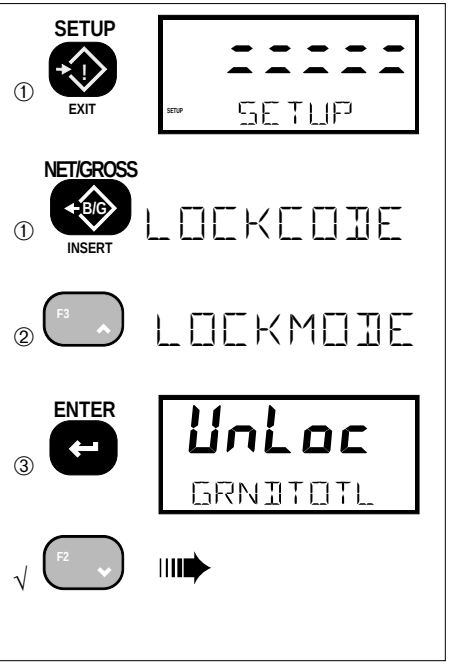
Note: You must set at least one item to "Loc" for the Lock Code to function.

1) Push **SETUP** followed immediately by the **NET/GROSS** key. The message display reads "LOCKCODE".

2) Push the **UP** key to select the menu item "LOCKMODE".

3) Push **ENTER**.The list of lockable items appears. The numeric display indicates if the item is locked (Loc) or unlocked (UnLoc).

4) Use the **UP** or **DOWN** keys to scroll through the list. Use the **LEFT** or **RIGHT** cursor keys to toggle between locked and

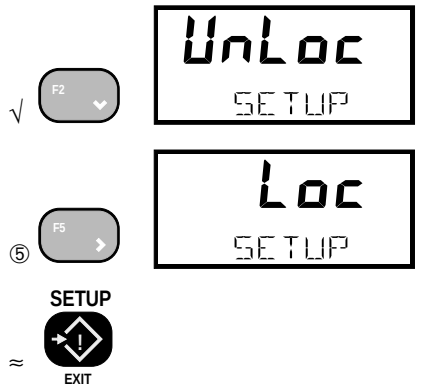


unlocked.In this example we'll lock out SETUP to prevent unauthorized changing of scale parameters. Use the **DOWN** key to scroll to "SETUP".

5) Use the **RIGHT** cursor key to lock "SETUP".

   Use the **UP/DOWN** keys to scroll to any other features you wish to lock or unlock. Use the **LEFT/RIGHT** keys to change the lock status.

6) Push **EXIT** (**SETUP**) to return to the Lock Menu, or push **EXIT** again to return to normal scale operation.



Lock Operation

1) Push **SETUP** followed immediately by the **NET/GROSS** switch. The message display reads "LOCKCODE".

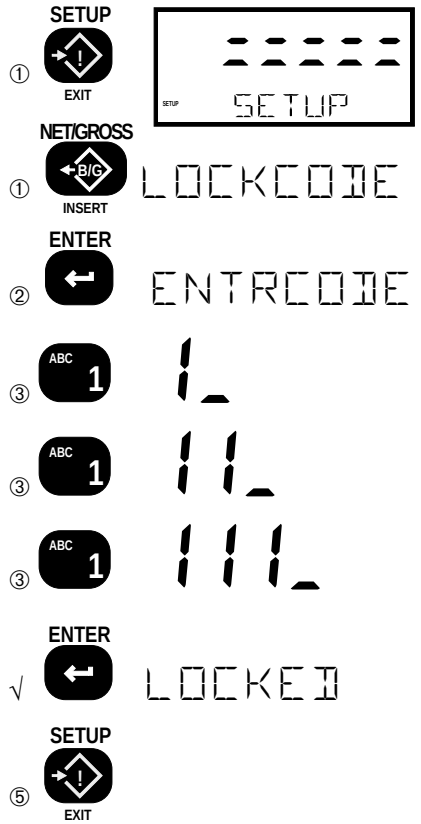
2) Push **ENTER**. The message reads "ENTRCODE"

3) Push **ENTER** if no security code is needed. If a custom lock code is desired, enter up to a four digit lock code with the **Numeric** keys.

   IMPORTANT! Make note of the code. In this example, we'll use "111" as a lock code.

4) Push **ENTER** to lock the 3750.

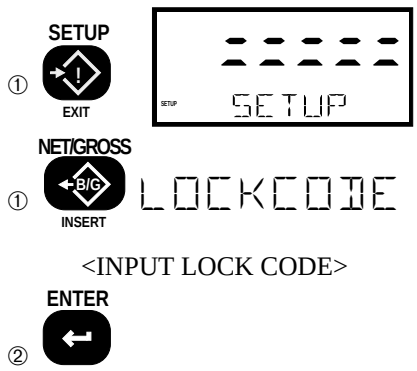
5) Push **EXIT** to return to normal scale operation. The LCD message reads "LOCKED" whenever a locked function is tried.



To Unlock

1) Push **SETUP** followed immediately by the **NET/GROSS** switch. The message display reads “LOCKCODE” .

2) Enter the Lock code with the Numeric keys.(the example lock code is 111) when finished, push **ENTER**. Note: If the lock code was empty just push **ENTER** and the scale will unlock.



If the lock code is lost, the calibration seal must be broken to reset and unlock the 3750. Follow the “RESET ALL” procedure then perform a complete calibration. MSI Service personnel can provide an unlock code if you are unable to recalibrate.

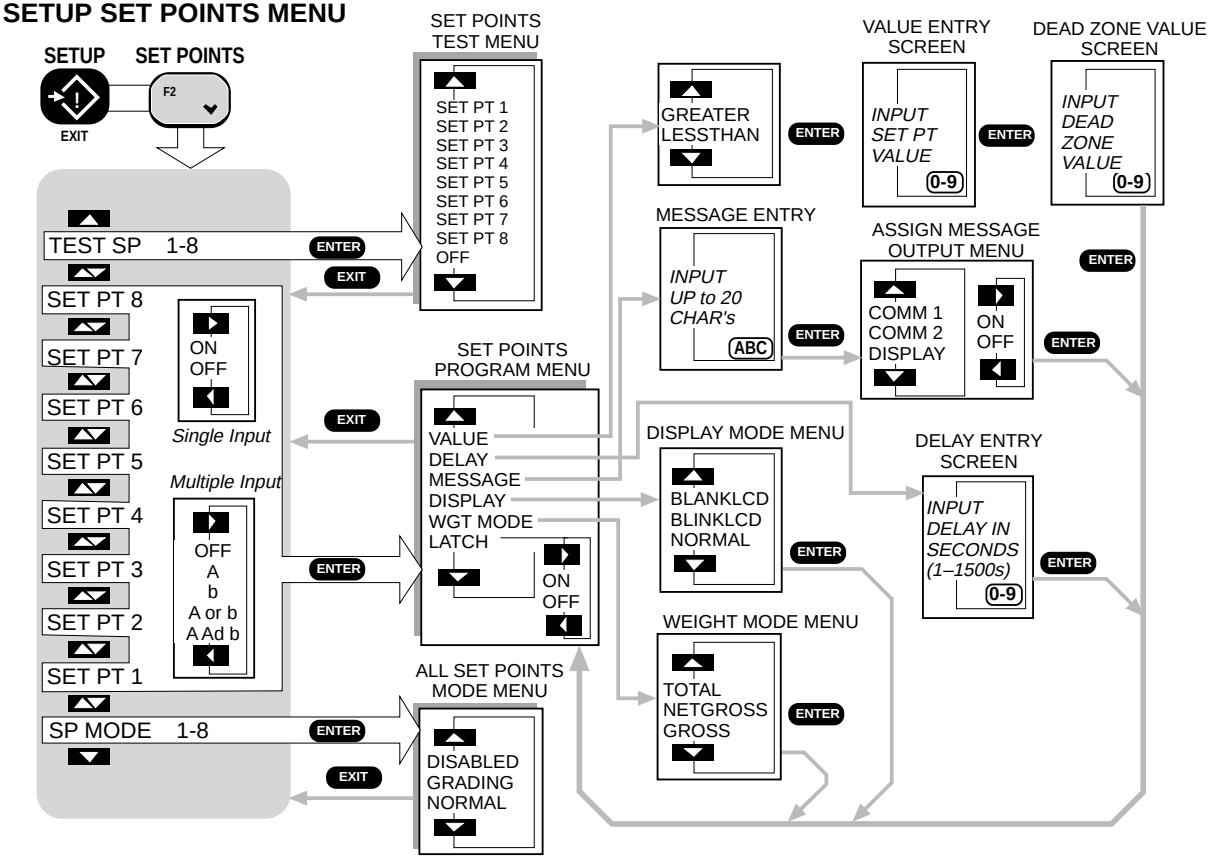
SECTION 6 – SET POINTS

INTRODUCTION

The 3750 comes standard with 8 Software set points. The 3750 Meter can fill a variety of applications in control, batching, safety and informational warnings. Set points can also be used to trigger RS-232 data transmissions (see "COMM PORTS"). All the set point values can be changed directly from the front panel or downloaded from a computer or terminal via RS-232. All the set points put a message on the display or blink or blank the display. Set points 1 and 2 have front panel LED indication. Add the set points Relay Option for relay outputs. This option includes seven 115VAC 1A relays and an 8th logic output.

On dual input configured 3750s, each set point can be assigned to a single input A or B, the combination "A or B", or the sum of the inputs A+B, designated as "A Ad b".

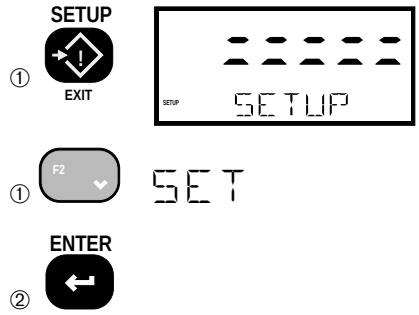
SETUP SET POINTS MENU



Setup Set Points Menu Entry Procedure

1) Push **SETUP** followed immediately by the **SET POINTS** key (usually **F2**).

2) Push the **ENTER** key. You are now in the Setup Set Points Menu.



SP MODE

The SP MODE (All Set Points Mode) menu selection provides the Master enable/disable of set points. In addition, the set points can be configured in a "GRADING" mode, where each set point represents a grade threshold. The set points must be enabled in this menu to function.

All Set Points Mode Procedure

You must first be in the SETUP SET POINTS menu to proceed. See procedure above.

1) If necessary, use the **UP** or **DOWN** key to scroll to the "SP MODE" menu.

2) Push the **ENTER** key. You are now in the "SP MODE" menu. The current mode is displayed.

3) Use the **UP** or **DOWN** scroll key to select the desired set point mode; NORMAL, DISABLED, or GRADING. In this example we will enable the set points as "NORMAL".

4) Push **ENTER** to store your selection. You are now back in the "SETUP SET POINTS" menu. Use the **UP/DOWN** keys to select the next set point menu or push **EXIT** to return to normal scale operation.

SET PT1 THROUGH SET PT8

Set points are functional on the Front panel with LED anunciators (SP1-2) or messages (SP1-8). The MSI 3750 Relay Option Board adds up to 7 set point relay outputs and 1 external non-isolated logic output. These set points provide warnings and indications of weighing events. When the weight is above (greater than) or below (less than) a set value the 3750 can respond in a variety of ways:

- Turn on a relay.
- Blank or blink the Weight display.
- Send a message to the display.
- Send a message out either of the Comm Ports.

These outputs are useful in batching and filling operations as well as safety related alarms. It is also easy to make window comparators by combining two set points. For example, program set point 5 for ≥50lb and set point 6 for ≤60lb. By combining the relay outputs, a window comparison for all weight between 50 and 60 lb has been created. See “Relay Applications” for more details. Another way to obtain window comparisons is to use the “GRADING” mode, however, all the set points become interactive.

Each set point has five sub-menus: “WGT MODE”, “VALUE”, “DISPLAY”, “LATCH”, and “MESSAGE”.

SET PT1 through SET PT8 (MAIN MENU LEVEL)
On the main SETUP SET POINTS MENU level, each set point can be enabled on or off by using the scroll keys. Turning the set point off does not change any parameters set in the set point Program menus.

Dual Input Configured 3750s only:

On a dual input 3750, each set point can be set to “look” at either input or combinations of both inputs. There are 5 modes:

1) **A** – The set point compares to Input A.
2) **b** – The set point compares to Input B.
3) **A or b** – The set point compares to both Input A or Input B. If either input meets the set point Value, the set point will trigger.
4) **A Ad b** – The set point compares to the sum of Input A and Input B.
5) **OFF** – The set point is disabled. Turning the set point off does not change any parameters set in the set point Program menus.

WEIGHT MODE MENU
The set point Weight Mode menu has three choices:

1) GROSS – In the “GROSS” mode the set point will operate at the value set based on Gross Weight regardless of any tare value. This is the mode to use for Safety warnings.
2) NETGROSS – If the set point should operate relative to a tared weight, use

the "NET/GROSS" mode. In this mode the set point will operate at the value which represents either a Gross weight or a Net weight.

3) TOTAL – Set points can also be programmed to correspond to a Totaled Weight In the "TOTAL" mode you can enter a set point value greater than capacity.

DISPLAY MODE MENU

The set point Response Menu is used to program what will happen when the set point becomes active. There are 3 choices:

1) BLINKLCD – The Weight Display will blink. This allows the weight still to be read while alerting the user that the set point is on.
2) BLANKLCD – The Weight Display will turn off. If you absolutely want to prevent weight readings when the set point is on.
3) NORMAL – The relay will change. Set points 1 and 2 also have a front panel LED indication. No other LCD indication is provided.

MESSAGE ENTRY

The set point Message Entry screen allow the user to input a message of up to 20 characters. After inputting the message, you can assign the message to display on the LCD, and/or to transmit out either COMM Port. You can embed MSI "@ Codes" in the set point message that can cause the weight, time, date, etc., to print out the selected Comm Port.

Messages displayed on the LCD are prioritized by the SP number. Set point 8's message will take priority over SP1-7, Set point 7's message will take priority over SP1-6, and so on. The most important message should be programmed into the highest used SP number.

DELAY

The set point action can be delayed by entering a value from 1 to 1500 seconds. If the set point condition goes away before the delay time-out is completed, the set point action is canceled.

VALUE ENTRY

The set point Value Menu is used to input the weight value for the set point. It also sets the sense of the set point…greater than (or equal to) or less than. Overload alarms should always use "GREATER".

DEAD ZONE VALUE ENTRY

After inputting the value, the 3750 allows entering a "Dead Zone" value (also known as hysteresis). The set point Dead Zone can be used to prevent relay chatter or to latch a set point over a specific weight range. In certain situations, without dead zone, the set point will respond to small weight fluctuations. This can cause the set point relay to turn on and off rapidly, possibly damaging a

motor or solenoid. This can be prevented by using a dead zone to cause the set point to have one value for turning on, and a different value for turning off. For example: A set point set to ≥500 lb with a dead zone of 10 lb will turn on at ≥500 lb. It will not turn off until the weight goes below 490 lb (500–10). A set point set to ≤750 lb with a dead zone of 20 lb will turn on when the weight is ≤ 750 lb. It will not turn off until the weight is ≥770 lb (750+20).

Note: A Dead Zone value of zero is equal to 1/2 "d".

SP LATCH MENU

The set point Latch Menu is used to latch the set point relay on until it is cleared manually. There are two standard ways to clear a latched set point:

1) Program a function key to "RESET SP".
2) Turn the 3750 off, then on again.

USING SET POINTS

Set Point Entry Procedure

You must first be in the SETUP SET POINTS menu to proceed. See procedure above.

1) Use the **UP** or **DOWN** key to scroll to the set point (1-8) you wish to program.

2) Push the **ENTER** key. You are now in the "SET POINTS PROGRAM MENU". The LCD indicates if the set point is active (ON) or inactive (OFF).

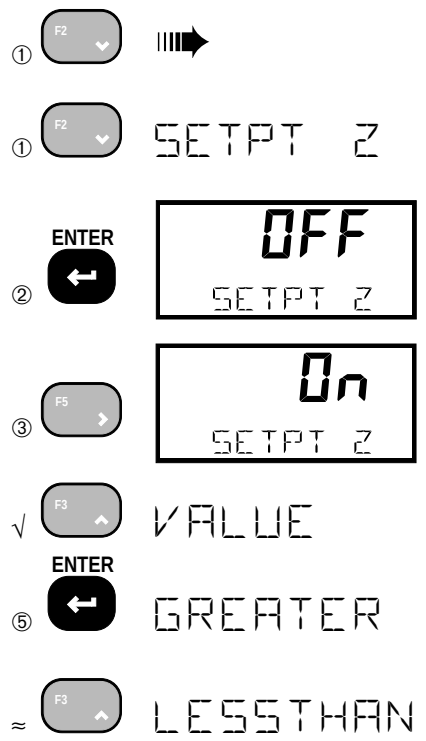
   In this example we'll program set point 2, but the procedure applies for any set point.

3) Use the **LEFT** or **RIGHT** cursor key to enable the set point. Dual Input 3750s: Use the **LEFT** or **RIGHT** Cursor keys to select A, B, A or B, A Ad b (Summed A+B)

4) The next step is to assign a weight value to the set point. Use the **UP** key (if necessary) to scroll to the "VALUE" menu.

5) Push **ENTER**.

6) For a set point that will switch on when the weight is greater than or equal to the value



select "GREATER. For a "less than" set point, push the **UP** key to select "LESSTHAN". In this example we'll program a overload warning set at ≥200lb so we will leave the sense at "GREATER". LESSTHAN and GREATER are shown here for clarity. There is no need to use the **UP** key to scroll to LESSTHAN if GREATER is what you want.

7) Push **ENTER** to accept GREATER than as the set point sensing mode. The weight entry screen now appears.

8) Input the desired set point Value with the numeric keys.

   Note: Set point Values are limited to Capacity +5% unless the WGT MODE is "TOTAL". Dual Input 3750s are limited to the sum of the capacity of Input A plus the capacity of Input B +5%.

9) Push **ENTER** to store your set point value.

10) You are now in the "DEAD ZONE VALUE MENU".This step is optional. Skip to step 11 if a Dead Zone value is not needed (Dead Zone value of 0). Use the numeric keys to input the weight range desired for the Dead Zone.

    In this example we desire a dead zone of 50 lb. The example set point will turn on at weights ≥200 lb and will turn off at weights ≤150 lb.

    Note: The maximum value of the Dead Zone can not exceed the set point value. The error message "TOO BIG" will display.

11) Push **ENTER** to set the Dead Zone value. This is the end of the value entry for a set point. Now other parameters for set points can be entered.

12) This step is optional, skip to step 16 if a time delay is not needed. Push the **UP** key to the "DELAY" menu.

13) Push **ENTER**. The "SPx DLAY" (where 'x' is 1-8) entry screen will appear.

14) Use the **Numeric** keys to input the delay time in seconds. 1 to 1500 seconds.

    In this example we'll enter a 2 second delay which delays the set point responses. Note: If you input a number larger than 1500 the message "TOO BIG" will appear.

15) Push **ENTER** to set the delay time.

16) This step is Optional, skip to step 21 if a set point Message is not needed. Push the **UP** key to the "MESSAGE" menu.

17) Push **ENTER**. The message entry screen will appear.

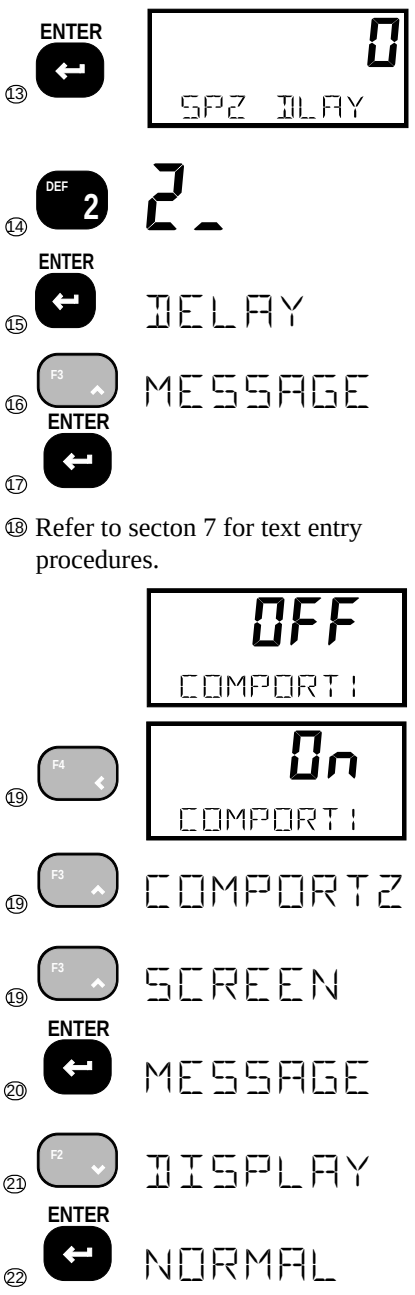
18) Use the **ALPHA**, 1-9 and **ENTER** keys to input a message up to 20 characters. You can include "@" codes for printing current weight, time, and date with the set point message. See the Comm Port Section 7 for details on entering the message. Refer to section 7 for text entry procedures.

19) After the text entry, you can assign the message to Commport1, Commport2, and/ or the LC Display "SCREEN". Use the **UP** key to see the message assign choices. Use the **LEFT** Cursor key to change from "OFF" to "ON".

20) After you have set all the message assign-ments, push **ENTER** to finish.

21) This step is Optional, skip to step 23 if blinking or blanking the display is not needed. Next, tell the set point how to display when the set point turns on. Use the **DOWN** key to move to the "DISPLAY" menu.

22) Push **ENTER**.The first menu choice will be the last set mode. In this case, the "RESPONSE" was set to "NORMAL".



23) For this example we'll change the display mode to "BLINKLCD" by pushing the **DOWN** key twice.

24) Push **ENTER** to store your choice. You are now back in the "SET POINTS PROGRAM MENU".

See "DISPLAY MENU" above for a description of each menu choice.

25) Push the **DOWN** scroll key as necessary to locate the "WGT MODE" menu.

26) Push **ENTER** to go into the "WGT MODE" menu. In our example, we'll have set point 2 respond to GROSS weight regardless of any Tare value. The first menu choice will be the last set mode. In this case, the set point was in the NETGROSS mode.

27) Use the **UP** or **DOWN** key to scroll through the menu choices.

28) When the desired choice appears push **ENTER** to store your selection. You are now back in the "SET POINTS PROGRAM MENU". See "MODE MENU" above for a description of each menu choice.

29) This step is optional, skip to step 31 if you don't need to enable the set point latch. Push the **UP** key to scroll to the "LATCH" screen.

30) Push the **LEFT** cursor key to toggle the set point latch "OFF" to "On".

31) You are now back in the "SET POINTS PROGRAM MENU". Push **EXIT** to return to the "SETUP SET POINTS" menu.

32) From here, you could scroll to another set point and repeat steps 1-30, or push **EXIT** again to return to normal scale operation.

NOTE: In order for set points to function they must be enabled in both the individual Mode menu and the general "SP MODE" menu. See "All Set Point Mode Procedure" , pg. 59.

ENABLING / DISABLING SET POINTS

It is often useful to be able to set up a set point ahead of time and disable it for testing purposes.

To Enable or Disable a SINGLE Set Point

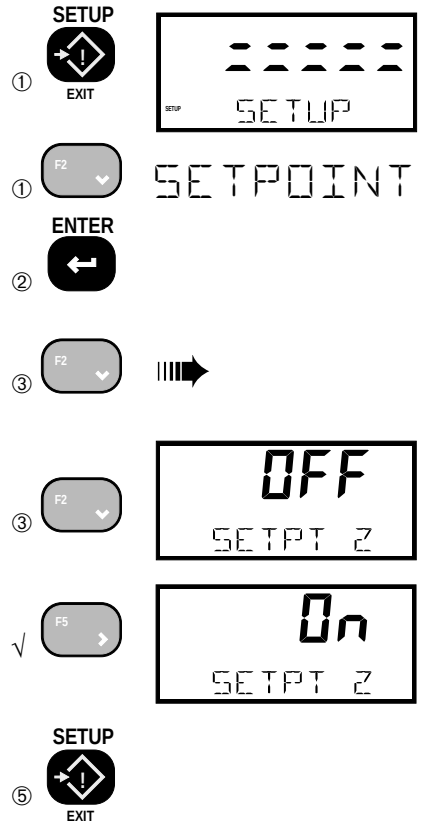
1) Push **SETUP** followed immediately by the **SET POINTS** key (usually **F2**).

2) Push the **ENTER** key. You are now in the "SETUP SETPOINTS MENU.

3) Use the **UP** or **DOWN** key to scroll to the set point (1-8) you wish to enable or disable.In this example we'll enable set point 2, but the procedure applies for any set point.

4) Use the **LEFT** or **RIGHT** cursor key to enable the set point. Dual Input 3750s: Use the **LEFT** or **RIGHT** Cursor keys to select A, B, A or B., A Ad b (Summed A+B).

5) Push **EXIT** to return to normal scale operation or use the **UP** or **DOWN** keys to scroll to other set points.



To Disable all Set Points

You must enable the set point menus to proceed. See procedure above.

1) Push **SETUP** followed immediately by the **SET POINTS** key (usually **F2**).

2) Push the **ENTER** key. You are now in the "SETUP SETPOINTS MENU.

3) The "SP MODE" menu is the first selection. Push the **ENTER** key.

4) You are now in the "SP MODE" menu. The current mode is displayed. Use the **UP** or **DOWN** scroll key to select "DISABLED".

5) Push **ENTER** to store your selection. You are now back in the "SETUP SET POINTS" menu.

6) Push **EXIT** to return to normal scale operation.

To re-enable all the Set Points

Follow steps 1-5 above except on step 4 select the "NORMAL" (or GRADING) mode. This does not override the settings of each set point. You must enable them individually if they were in the "OFF" condition.

USING THE MSI 3750 AS A GRADING SCALE

The MSI 3750 with or without the Set points relay option, can be set up as a multiple zone (up to 8) grading scale. The relay outputs can be connected to grading lights, or to automatic bins. In this example the 3750 will be used to grade in 6 zones, with additional over and under zones for a total of 8. In this example our grading zones are: <10 lb, 10 to 10.5 lb, 10.5 to 11 lb, 11 to 11.5 lb, 11.5 to 12 lb, 12 to 12.5 lb, 12.5 to 13 lb, and ≥13 lb. Also, by programming the optional "MESSAGE", the display gives an indication of the Grade, removing the need for any external lights or bins, etc., in a manual grading operation.

Grading Setup Procedure

1) Push **SETUP** followed immediately by the **SET POINTS** key (usually **F2**).

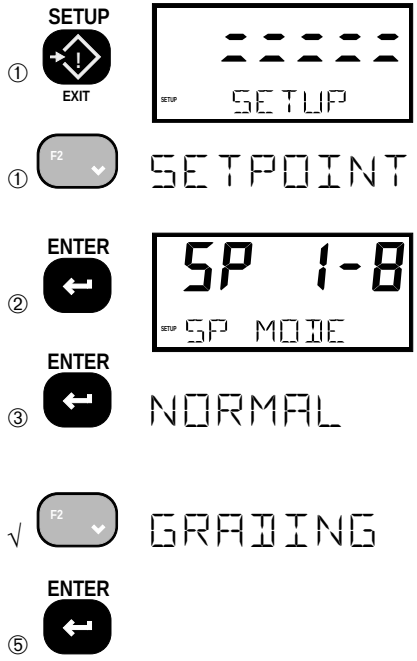
2) Push the **ENTER** key. You are now in the "SETUP SETPOINTS MENU.

3) The "SP MODE" menu is the first selection. Push the **ENTER** key.

4) You are now in the "SP MODE" menu. The current mode is displayed. Use the **UP** or **DOWN** scroll key to select "GRADING".

5) Push **ENTER** to store your selection. You are now back in the "SETUP SET POINTS" menu.

6) Use the "SET POINT ENTRY PROCEDURE" above to program all 8 set points to the following settings:



≈ Set point 1: On, MODE = GROSS, MESSAGE = "<10", VALUE = 10. Set the DEAD ZONE to 0 on this and all subsequent set points.

Set point 2: On, MODE = GROSS, MESSAGE = "10–10.5", VALUE = 10

Set point 3: On, MODE = GROSS, MESSAGE = "10.5–11", VALUE = 10.5

Set point 4: On, MODE = GROSS, MESSAGE = "11–11.5", VALUE = 11

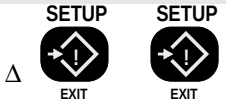
Set point 5: On, MODE = GROSS, MESSAGE = "11.5–12", VALUE = 11.5

Set point 6: On, MODE = GROSS, MESSAGE = "12–12.5", VALUE = 12,

Set point 7: On, MODE = GROSS, MESSAGE = "12.5–13", VALUE = 12.5

Set point 8: On, MODE = GROSS, MESSAGE = ">= 13", VALUE = 13

7) Return to normal scale operation by pushing **EXIT** twice after entering the last set point (8)



NOTE: When GRADING mode is selected, the "VALUE" entry skips the "GREATER" and "LESSTHAN" entries. If the set points values were entered prior to enabling the "GRADING" mode the "GREATER" and "LESSTHAN" selections will be ignored.

RELAY OUTPUT OPTION

This option adds 7 SPDT Relays and 1 Logic Level output to the MSI 3750. The relays can be used in conjunction with alarms, motors, and other control circuitry to provide a complete automated production line, or to provide additional information to the scale operator.

Relay Function: The total of 8 set point outputs are addressable through the set point routines of the 3750. Each set point output is fully programmable to respond to weight changes. This section is intended to cover the electro-mechanical details of hooking up and using the set point outputs. For details on programming the set points, refer to the "SET POINTS" section.

Electrical Specifications

Contacts	Form C, common pin with 1 normally open, 1 normally closed contact
Contact Rating	2A 30V DC, 0.6A 110V DC, 1A 125V AC (not rated for 240VAC!)
Max. Power	60W, 125VA
Expected Life	Mechanical: 10^8 Cycles
	Electrical: 10^5 Cycles @ 0.5A 125V AC resistive
Fuse	2A 125V rated SMD fuse (MSI P/N 10473)
Isolation	280VAC 50/60 Hz
Logic Output	1 normally high output, 1 normally low output (not isolated).
	Fanout:1 TTL load, 25 CMOS loads

RELAY CABLING

The Relay connections are made into terminal blocks found on the circuit board internal to the MSI 3750. Due to wash down requirements, use round cable that has an outside diameter of .187" to .312" (5mm to 8mm) for proper sealing with the watertight fittings. The terminal blocks are suitable for wires from 16 to 24 gauge. There are up to three watertight fittings dedicated to the Set point Outputs. Multiple conductor cable will be necessary to access all of the relays.

Cable Installation Procedure

1) Unplug the 3750 from the AC or DC power source.
2) Remove the 10 screws holding the front panel on.
3) Strip the outer insulation from the cable. Peel back the foil shield (if any) being careful not to nick the conductors. Cut off the foil shield leaving the drain wire intact. Strip 3/16" (5mm) from each conductor and tin the wires. Slip a piece of sleeving over the drain wire and tin the end of the drain wire. It is also wise to shrink a short piece of heat shrink tubing over the end of the outer jacket to further insulate the shield.
4) Loosen the watertight feedthrough and remove the white plug. Feed the cable through the watertight feedthrough.
5) Insert the wires as shown in the following diagram. Push down the white lever with a small screwdriver, insert the wire, then release the lever. It might be necessary to use needle nose pliers to help insert the wires into the

terminal strips. After all the pins are connected, lightly wiggle and tug on each wire to ensure that they are securely attached.

6) Tighten the watertight feedthrough around the outer insulation to ensure the water seal.

7) Replace the front panel being careful to seat the gasket evenly around the lip of the cabinet. Screw down the 10 screws in a criss-cross pattern to seat the gasket evenly.

RELAY APPLICATIONS

Some examples of uses for the set point relays are: Using the normally open position of a set point as a switch to turn on a light or siren when the set point is reached, using the normally closed position to cut out a motor when a set point is reached, or using the set point relays to change speeds on a motor. See Figure 1 for an example hook up to a lamp. The normally open (NO) contact of a relay is used to turn devices on when a set point is reached, while the normally closed (NC) contact is used to turn a device off when the set point is reached. The common (COM) contact connects the power to the relay.

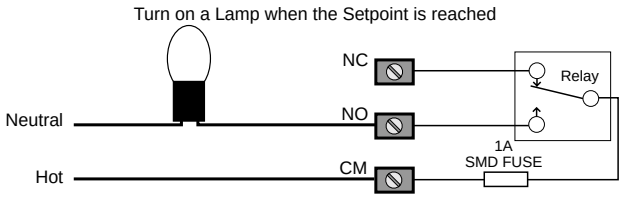


Figure 1

Set points are often used in conjunction with automatic conveyer belts. By using the set point relays, conveyor belts can be controlled by weight. Using two set points allows speed control for dribbling or speeding up, etc. Figure 2 shows a simple arrangement where the motor is turned off when a set point is reached. Pay attention to the current and voltage ratings of the relay when using them for motor control. It may be necessary to use a boost relay externally as in Figure 3.

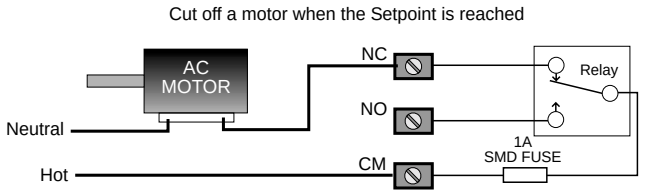


Figure 2

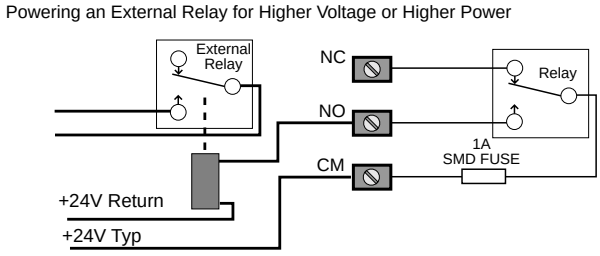


Figure 3

By combining the relay outputs of 2 or more set points, complex in limits, out of limits, and speed controls can be implemented. In Figure 4, two set point outputs are combined to cut off a motor when the weight is outside two limits. In Figure 5 two relays are combined to turn on a motor when the weight is outside two limits.

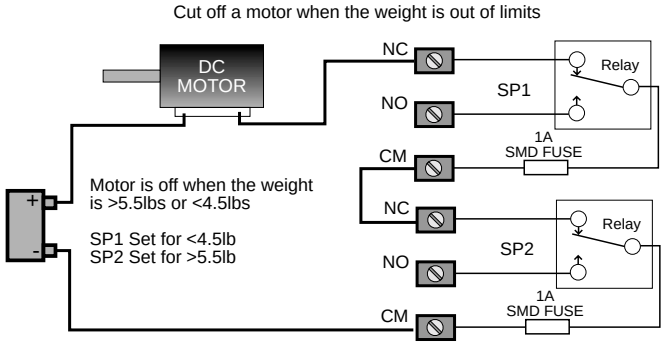


Figure 4

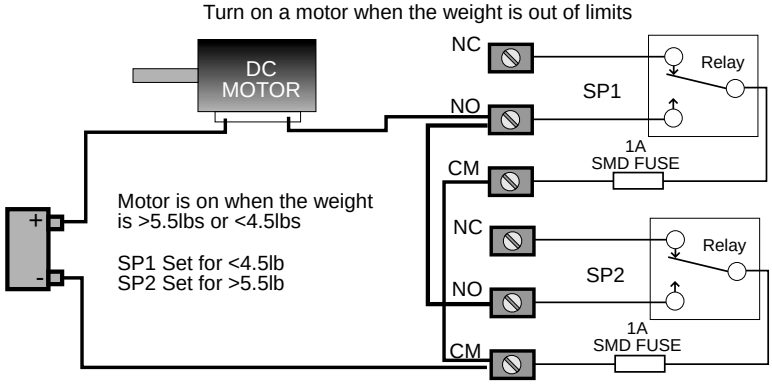


Figure 5

Programmable Logic Controllers (PLCs) are in common use for machinery control. The 3750 can interface to PLCs with the relay outputs or with the logic output on set point 8. Figure 6 shows one possible way of interfacing to a PLC. More sophisticated PLCs are able to take data directly from RS-232 and integrate the data into the control process. See the RS-232 option section for details.

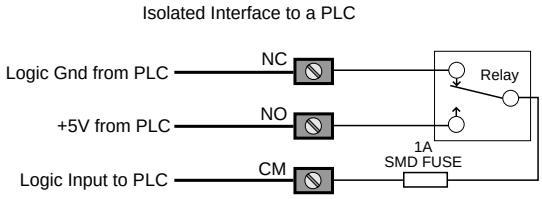


Figure 6

LOGIC OUTPUT (SET POINT 8)

Set Point 8 is unique from Set Points 1-7. The output consists of a logic output capable of driving standard TTL loads. As the output is in reality 4000B series CMOS devices, it may be necessary to provide an external pull-up resistor in certain cases. Values of 1kΩ to 4.7kΩ usually will suffice. There are two complementary outputs as shown in Figure 7. The TTL Hi output goes high when the set point is tripped. The TTL Low output goes low when the output is tripped. The logic output ground must be connected to provide a reference level. Output level is nominally 5V but can vary from 4.8 to 5.2V.

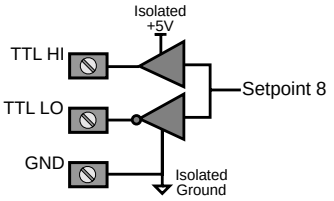


Figure 7

Besides providing a direct logic output to PLCs or other controllers, the logic output can be used to drive external relays. Figure 8 shows an example of the logic output driving an external N-channel MOSFET which can turn on a high-power relay.

Do not connect any voltage outputs to the Logic Output Pins. They are protected for up to 15V only. The Logic Output should be interfaced only with logic inputs or base/gate connections to transistors.

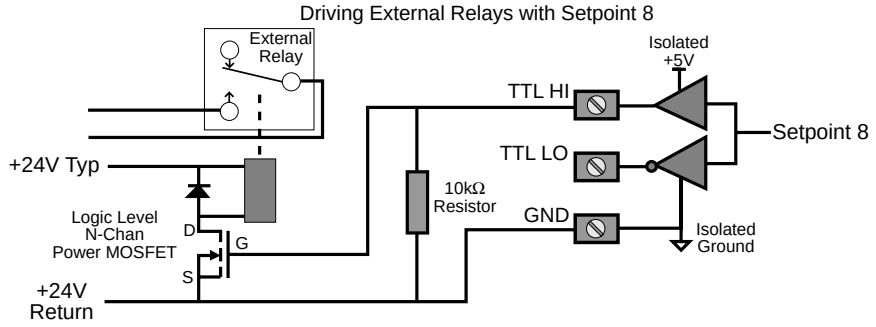


Figure 8

TEST SET POINT RELAYS

To test the connections and exercise the relays use the following procedure.

1) Push **SETUP** followed immediately by the **SET POINTS** key (usually **F2**). Push **ENTER**. You are now in the SET POINTS menu.
2) Use the **DOWN** key to scroll to the "TEST SP" selection. Push **ENTER**.
3) Use the **UP** key to step progressively through each set point. Each relay will turn on in succession and the message display indicates which set point relay is activated.
4) When done testing the relays push **EXIT** twice to return to normal scale operation.

This procedure will turn on and off any device connected to the relays. Make sure that doing so will not cause a safety hazard or damage property or goods.

Potentially fatal voltages are present within the meter! Always remove power from the meter and your circuit before opening the cabinet and connecting the relay circuits. Ensure that the conductors to your circuit are securely fastened in the terminal block and that the cable is securely fastened in the watertight fitting. All wiring should comply with local electrical codes.

SECTION 7 – COMMUNICATION PORTS

INTRODUCTION

- The MSI 3750 is equipped with a single RS-232 serial input/output and a Real Time Clock/Calendar. The Comm Port is intended for interfacing printers, data loggers, scoreboards, and computers to the 3750 Meter. The real-time clock allows the user to time and/or date stamp any data obtained from the 3750.
- The data output is fully formatable. The 3750, under menu control will print control characters for easy interfacing to any label printer. An initialize string combined with start string, product labels, user programmable data, weight data, and end strings, provides complete control over printed data.
- A second Comm Port option is available (must be ordered separately). The second Comm Port can be RS-485, RS-422, RS-232, or a Fiber-Optic output. The second Comm Port has independent data string and port settings from Comm Port1 and can be used for a different function than Comm Port1. For example, a printer could connect to Comm Port1, and a scoreboard or computer to Comm Port2.
- Many scales and weigh meters suspend weighing operation while printing and will not function until a print job is completed. The MSI 3750 RS-232 option uses advanced DMA (direct memory access) techniques for transmitting the print strings. This prevents long print jobs from interfering with scale operation.

Comm Port Function

The RS-232 output is used in conjunction with the PRINT key to output weight and total data to a printer or can be used for 2-way communications with a computer. In addition there are several automatic print modes including print on Total, when there is a weight change, or when a set point is reached. Interval and continuous printing is available for data logging or interfacing Scoreboard displays.

ELECTRICAL CONFORMANCE

COMM PORT 1

The electrical characteristics of the serial input/output conform to the EIA Standard EIA-232-D (downward compatible with RS-232-C). Comm Port 1 is configured as DCE. Cable connections include RXD (input), TXD (output), Ground, CTS (input), RTS (output), and Shield Ground (also known as Frame Ground). CTS/RTS handshaking is optional and the lines do not need to be connected.

COMM PORT 2 (2nd Comm Port Option only)

Comm Port 2 can be configured in three ways:

1) RS-232 – In the RS-232 mode, the electrical characteristics of the serial output is configured to conform to the EIA Standard EIA-232-D (downward compatible with RS-232-C). The port is configured as DCE. Cable connections include RXD (input), TXD (output), Signal Ground, and RTS (Output). The RTS output is passive and indicates to the DTE port that the cable connection is made. There is no shield ground connection due to the isolated port. Tie the shield ground to the chassis of the DTE side. Cut any shield ground off and insulate it from the MSI-3750 chassis.
2) RS-485 – The RS-485 mode is a half-duplex serial communications channel capable of driving up to 4000 feet of cable. In addition, 32 RS-485 devices can be daisy-chained together providing networking capabilities. In accordance with RS-485 standards the cabling should be terminated at the extreme ends of the cable (not at each node) with a 120Ω resistor in series with a 0.1µF ceramic capacitor. Cable Connections are I/O+, I/O-, and signal ground. Serial data is both transmitted and received on the same lines (half duplex). As an output, the 485 Driver is compatible with RS-422 Receivers.
3) Fiber-Optic Output (Option) – The Fiber-Optic Output provides an output capable of driving 3000 feet of plastic fiber optic cable. This is an output only and intended for driving printers or transmitting data to a computer when no computer control or handshaking is necessary.

COMM PORT CABLING

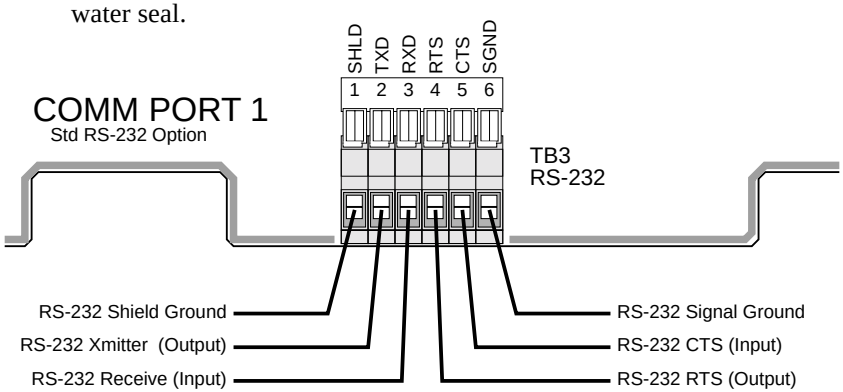
The Comm Port 1 RS-232 connections are made into TB3 found on the circuit board internal to the MSI 3750. Due to wash down requirements, no interface cable is supplied. Cables with an outside diameter of .187” to .300” (5mm to 7.5mm) are sealable with the watertight fitting. Preferably, cables should have twisted pair connections with an over shield. In the table below, twisted pairs are represented by A, B, and C.

RS-232 Cable Installation, Comm Port 1

1) Unplug the power cable. Remove the 10 screws holding the front panel on.
2) Strip the outer insulation 1.5” (40mm) from the cable. Peel back the foil shield (if any) being careful not to nick the conductors. Cut off the foil shield leaving the drain wire intact. Strip 3/16” (5mm) from each conductor and tin the wires. Slip a 1 5/16” (33mm) piece of sleeving over the drain wire and tin the end of the drain wire. It is also wise to shrink a short piece of heat shrink tubing over the end of the outer jacket to further insulate the shield.
3) Loosen the center watertight feedthrough and remove the white plug. Feed the RS-232 cable through the center watertight feedthrough.
4) The terminal block uses push levers. Insert the wires as shown in the

following diagram. Insert a small flat bladed screwdriver in the white lever and push down to insert the wire. Use only the wires necessary for your application per table 1. Be sure to terminate the shield wire in position 1 (Shield Ground AKA Frame ground). In the Duplex w/ CTS/RTS mode where there are two signal grounds, connect both signal grounds to pin 6. After all the pins are connected, lightly wiggle and tug on each wire to ensure that they are securely attached. Reset or reposition the wires as necessary.

5) Replace the front panel being careful to seat the gasket evenly around the lip of the cabinet. Screw down the 10 panel screws in a criss-cross pattern to seat the gasket evenly.
6) Tighten the watertight feedthrough around the outer insulation to ensure the water seal.



RS-232 Cable Installation, Comm Port2

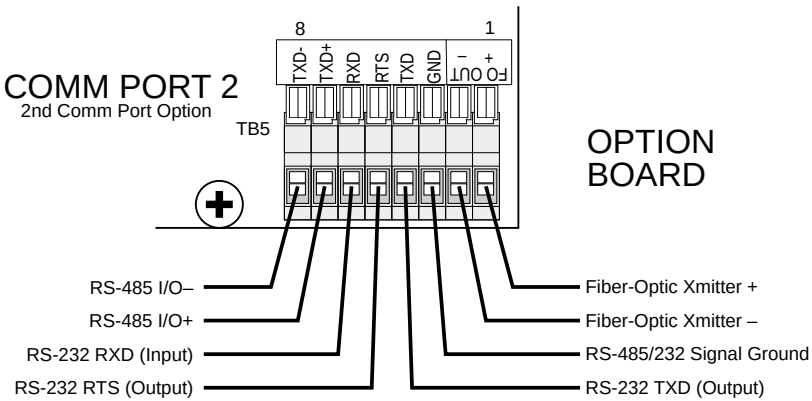
1) Unplug the power cable. Remove the 10 screws holding the front panel on.
2) Strip the outer insulation 1.5” (40 mm) from the cable. Peel back the foil shield (if any) being careful not to nick the conductors. Cut off the foil shield and the drain wire. Strip 3/16” (5 mm) from each conductor and tin the wires. It is wise to shrink a short piece of heat shrink tubing over the end of the outer jacket to further insulate the shield.
3) Loosen the center watertight feedthrough and remove the white plug. Feed the RS-232 cable through the center watertight feedthrough. If the center watertight feedthrough is occupied, install the 2nd Comm Port cable through the watertight feedthrough on the rear panel.
4) Insert the wires as shown in the following diagram. Insert a small flat bladed screwdriver in the white lever and push down to insert the wire. Use only the wires necessary for your application per table 1. Note that RTS is a passive output in Comm Port 2 and that there is no CTS. After all the pins are connected, lightly wiggle and tug on each wire to ensure that they are securely attached. Reposition the wires as necessary.
5) Replace the front panel being careful to seat the gasket evenly around the lip

of the cabinet. Screw down the 10 front panel screws in a criss-cross pattern to seat the gasket evenly.

6) Tighten the watertight feedthrough around the outer insulation to ensure the water seal.

RS-485 Cable Installation, Comm Port2

1) Remove the 10 screws holding the front panel on.
2) Strip the outer insulation 1.5” (40mm) from the cable. Peel back the foil shield (if any) being careful not to nick the conductors. Cut off the foil shield leaving the drain wire intact. Strip 3/16” (5mm) from each conductor and tin the wires. Slip a 1 5/16” (33mm) piece of sleeving over the drain wire and tin the end of the drain wire. It is wise to shrink a short piece of heat shrink tubing over the end of the outer jacket to further insulate the shield.
3) Loosen the center watertight feedthrough and remove the white plug. Feed the RS-485 cable through the center watertight feedthrough. If the center watertight feedthrough is occupied, install the 2nd Comm Port cable through the watertight feedthrough on the rear panel.
4) Insert the wires as shown in the following diagram. Insert a small flat bladed screwdriver in the white lever and push down to insert the wire. Connect wire 1A to I/O+ and wire 2A to I/O-. Connect the shield to pin 3 ground After all the pins are connected, lightly wiggle and tug on each wire to ensure that they are securely attached. Reposition the wires as necessary.
5) Replace the front panel being careful to seat the gasket evenly around the lip of the cabinet. Screw down the 10 front panel screws in a criss-cross pattern to seat the gasket evenly.
6) Tighten the watertight feedthrough around the outer insulation to ensure the water seal.



DATA CONFIGURATION

The 3750 serial port options are configured with the “COMPORT” Menus. Standard data configuration is:

Parameter	Default	Menu Choices
Baud Rate	9600	300, 600, 1200, 2400, 4800, 9600, 19200
Data Bits	8	7 or 8
Parity	None	None, Even, Odd
Start Bits	1	1 (can't be changed)
Stop Bits	1	1 or 2

Data parameters are independent for Comm Port 1 and Comm Port 2.

Data String Buffers

A Data String is simply a collection of characters stored in memory, that are used to format the Comm Port output. Data Strings are defined by the user. The length of the formatting strings are limited to 255 characters.. However, since 3 or 4 character commands can cause an output of up to 99 characters in length, the following numbers do not represent the maximum size of the data output. The 3750 offers the programmer the ability to print any and all weight data, time and date stamp, and formatting controls suitable for even the most complex bar code printer.

Data Format

Each transmitted reading consists of a number of programmable character strings. Data is completely user programmable and can include formatting characters and text in addition to all weight parameters. The End-of-Line string is used for Carriage Return or other end-of-line control characters. These are easily entered through the Comm Port menu or downloaded through a computer.

OUTPUT CONTROL

The MSI 3750 serial ports function in any of 10 modes:

1) **Front Panel Print Key**:
   This is a print on command mode which works when the print button on the front panel is pushed. The Print key is active in all modes unless disabled by computer control or the Lock Function. The “MOTN DET” menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable.
2) **Computer Control**:
   The computer can control and receive data from the MSI 3750 through the

use of simple ASCII commands. These commands can be sent through the use of a data communications terminal, or a custom computer program. The "MOTN DET" menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable.

3) **Print on Total**:
When the weight is totaled, one transmission of data will occur. Once transmitted, the scale must return below the Total Threshold (See Total Setup pg. 37) to re-enable the transmission. Interval has no effect in this mode.

Using Print on Total with the Auto Total enabled should not be used with any weight print-out other than W7. Use "Print on Load" to print the totaled weight.

4,5 & 6) **Print on Set-Point**:
Set-point1, Set-point2, or Set-point 1&2 can be configured to trigger a data print. Once transmitted, the set-point must go off then on again to transmit again. Print on a set point can also be configured to print when two set-points are true. This configuration allows printing when the weight is outside two limits or when the weight is inside two limits (windowed). The "MOTN DET" menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable.

7) **Print On Change**:
Every time the weight changes 1 full display count or more, one transmission of data will occur. The "MOTN DET" menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable. Interval has no effect in this mode.

8) **Print on Load Change**:
When the load weight exceeds the Total Threshold and motion ceases, one transmission of data will occur. Once transmitted, the scale must return below the Total Threshold to re-enable the transmission. Interval has no effect in this mode.

9) **Print Continuous or on Intervals**:
The Data String can be transmitted continuously for driving scoreboards. The "MOTN DET" menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable.

10) **Print on CTS** (Clear to Send, a RS-232 handshake line):
By toggling the CTS line from space to mark, the print string will be transmitted. If the interval is set, the string will continue to print as long as CTS is asserted.

In addition to the Control modes above, each of the 8 set points can independently send a formatted print string. This is detailed in Section 6. These print strings are usually used for warnings or annunciation of weighing events. As the 3750 "@" commands can be buried in the set point strings, this capability greatly expands the versatility of the Comm Ports.

There is also a special print mode used with the VIEW ∑ key. Pushing VIEW ∑ followed immediately by the PRINT key will output just the current ID Codes total and Total Count. See "@W7" for formatting information on this special output.

COMMPORT SETUP MENU

COMM PORT setup and Data Formatting.

COMM PORT 1

This menu choice leads to the COMM PORT PARAMETERS Menu for all parameters related to COMM PORT 1.

COMM PORT 2

This menu choice leads to the COMM PORT PARAMETERS Menu for all parameters related to COMM PORT 2.

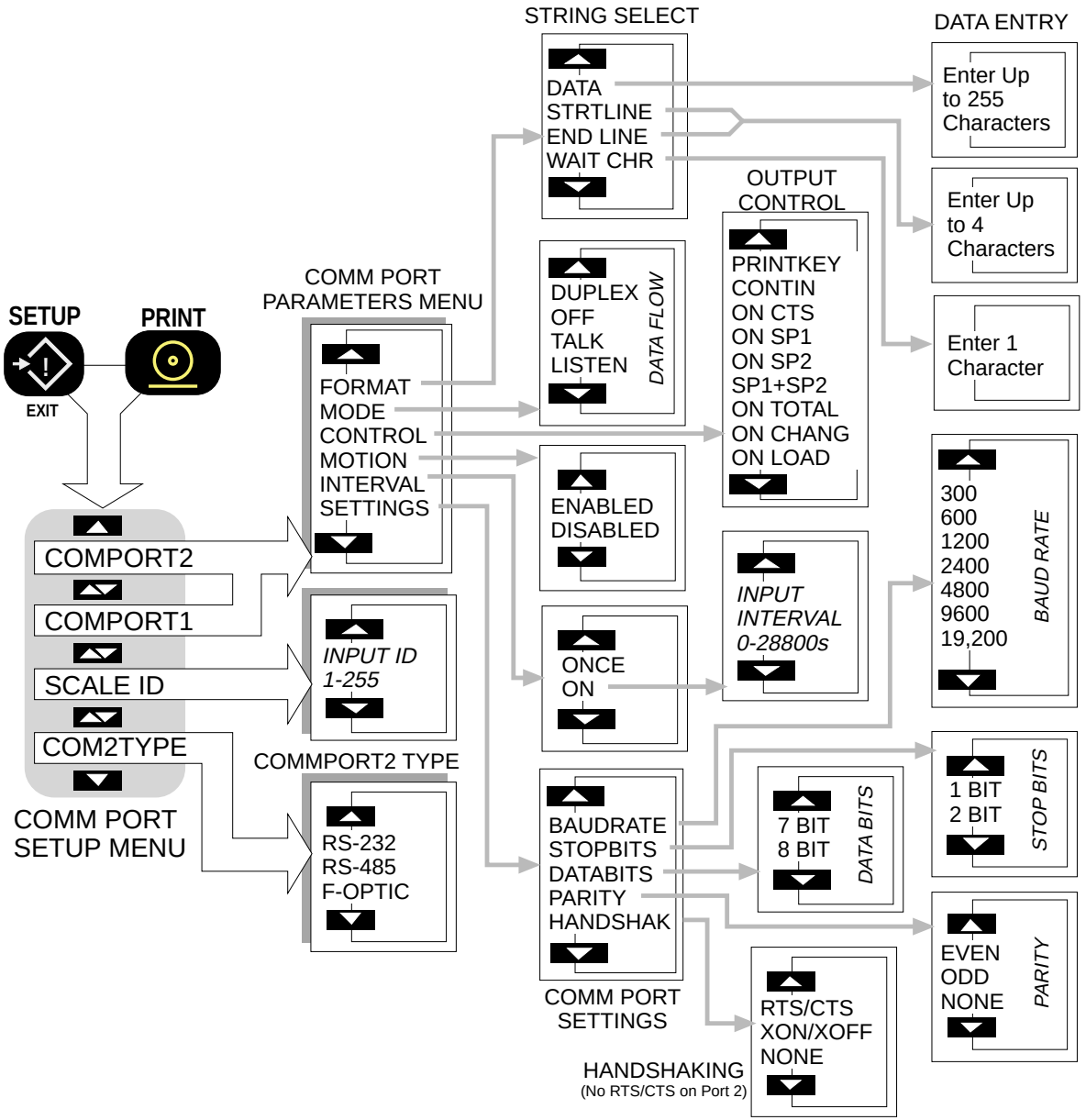
SCALE ID

This menu designates an ID number that is required for multiple scale setups (usually networked with RS-485). The user can assign a unique number per scale from 1 to 255.

COM2TYPE

This menu designates the operating mode of Comm Port 2. Comm Port 2 works as a RS-232, RS-485, or Fiber Optic output (units installed with fiber optic output option only).

COMM PORT PARAMETERS MENU



FORMAT

The FORMAT menu is the heart of the communications system. It controls the data output generated by the 3750 Meter.

DATA: The “DATA” section is where all printing and formatting commands are entered. This is covered in depth in the “Printer/Output Formatting” section.

STRTLINE: The “START LINE” string can be 0 to 4 characters long. It is intended for commonly used commands that usually precede printed lines. Typically ESC codes are used on some printers to enable or format the print string. The start of line string is usually referred to as the “SOL string”. The string defaults to empty.

END LINE: The “END-OF-LINE” string can be 0 to 4 characters long. Most commonly used for Carriage Return (CR) or Line Feed (LF), or CR/LF. The EOL string defaults to Line Feed. See “Programming the End of Line String” for an example.

WAIT CHR: The “WAIT CHARACTER”, if entered, will cause the print output to pause after each EOL string until the designated character is received by the port. To use the Wait Character mode, the Comm Port mode must be Duplex. Once the proper Wait Character has been received the 3750 will output the next data string up to the next EOL string.

MODE: The MODE menu sets the communications mode for the port. Use “TALK” for outputting data to a printer that uses hardware handshaking or no handshaking. Use “DUPLEX” for printers with software handshaking (XON / XOFF, etc.) or to talk and listen to a computer. Use “LISTEN” to only receive commands from a computer. Use “OFF” to disable the port (and save power on battery units).

CONTROL: The control menu designates the condition that causes the 3750 to output data. The Print key will always work unless specifically locked out. When the designated control is received by the scale, the print string specified in the “DATA” menu will be transmitted. If the “MOTION” parameter is enabled, the motion annunciator must be off for the scale to output data. If a valid control is received, the 3750 will wait for the next settled (out of Motion) reading before it will output data. See descriptions of the Control Modes in the “Output Control” section on pg. 78..

MOTION: When enabled the scale will only print settled data, i.e. when the motion detection annunciator is off. In legal for trade systems, the MOTN DET menu item is not editable. Use disabled when it is necessary to send data out the

Comm port while the weight is in motion.

INTERVAL: Selecting “ONCE” means that after the trigger condition, a single transmission of data will occur. Selecting “ON” enables a timed transmission rate. A print interval can be entered from 0 to 28,800 seconds. Used in conjunction with the Continuous output mode, this can generate a time based data-logging system. An interval of 0 seconds means that the scale will output data at the highest rate possible (limited to 4 readings per second). Interval used with other control modes can be useful for control and monitoring purposes.

SETTINGS: The Settings menu is used to set standard Comm Port parameters:
BAUDRATE: Standard Baud Rates available are 300, 600, 1200, 2400, 4800, 9600, 19200. The 3750 defaults to 9600 Baud. See “To Set The Baud Rate”.
STOP BITS: Either 1 or 2 Stop Bits can be set. The 3750 Stop Bits default to 1.
DATA BITS: Either 7 or 8 Data Bits can be set. If 7 bit mode is set, Data Characters above 127dec cannot be sent or received. The 3750 defaults to 8 bits.
PARITY: Parity mode is NONE, EVEN or ODD. The 3750 defaults to “NONE”, parity off.
HANDSHAK(e): Comm Port Handshaking is set in this menu. Use XON/XOFF for software handshaking commonly used in communicating with computers. Use CTS/RTS for hardware handshaking. Use NONE for situations where no handshaking is required or possible.

To Set the Baud Rate

1) Push **SETUP** followed immediately by the **PRINT** key. The message reads "COM-PORT1".

2) Push **ENTER.** The message reads "FOR-MAT".

3) Push the **DOWN** key to locate the "SET-TINGS" sub-menus.

4) Push **ENTER**. The first sub-menu choice in the Settings menu is "BAUDRATE".

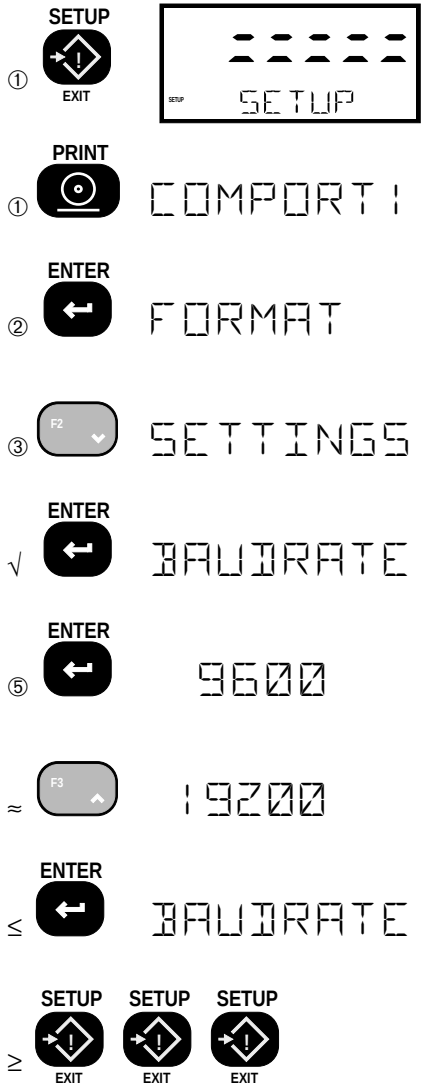
5) Push **ENTER**. The current Baud Rate is displayed.

6) Use the **UP** or **DOWN** key to scroll through the available Baud Rates.

7) When the desired rate is shown, push **ENTER**. You are now back in the "SET-TINGS" Menu.In this example we'll change the Baud Rate to 19,200.

8) Either use the **UP/DOWN** scroll keys to select another SETTINGS menu or push the **EXIT** key three times to return to normal scale operation.

Each push of the EXIT key will backup 1 menu level.



PRINTER / OUTPUT FORMATTING

The RS-232 Option can format virtually any Printer or Serial Data Device including complex bar-code label printers through the use of the built in printer formatting. To use this versatile feature, the user must input command codes and data in a specific manner. Each command code consists of a 1 or 2 letter mnemonic. Some command codes also require a numeric suffix.

A simple example of this structure is the default print data string: **@W1@E** ☒. The "@W" command code means to print weight. The "1" means print the current display mode. The "@E" will cause the End-of-line string to be printed. The command string must always be terminated by an ASCII 255 character. The 3750 indicates ASCII 255s with " ☒ ".

By combining the "@" commands with standard ASCII characters, control characters, etc., any data available from the scale, plus any additional text, can be printed in any order desired. Using formatting controls typical to modern bar-code printers is simply a matter of formatting the printer strings.

The MSI 3750 character set includes all upper case letters, lower case letters, numbers, and most of the rest of the standard ASCII set.

General Alpha-numeric Entry Procedure

1) Use the **Aa1** (ALPHA) key to switch between numeric "n", upper case "U", or lower case "L".
2) Press the desired character key. If a "B" is needed, push the **ABC** key twice.
3) Enter the displayed character by either pushing a different key, or the **ENTER** key. For example, if two "B"s in a row are needed, use the **ENTER** key.
4) Terminate the character string by pushing **ENTER** twice.

LCD Display Character Set

ABCDEFGHIJKLMNOPQRSTUVWXYZ [\] "_'
abcdefghijklmnopqrstuvwxyz~spc !"$%&? ( ) *+. – 0123456789:;<=>?@

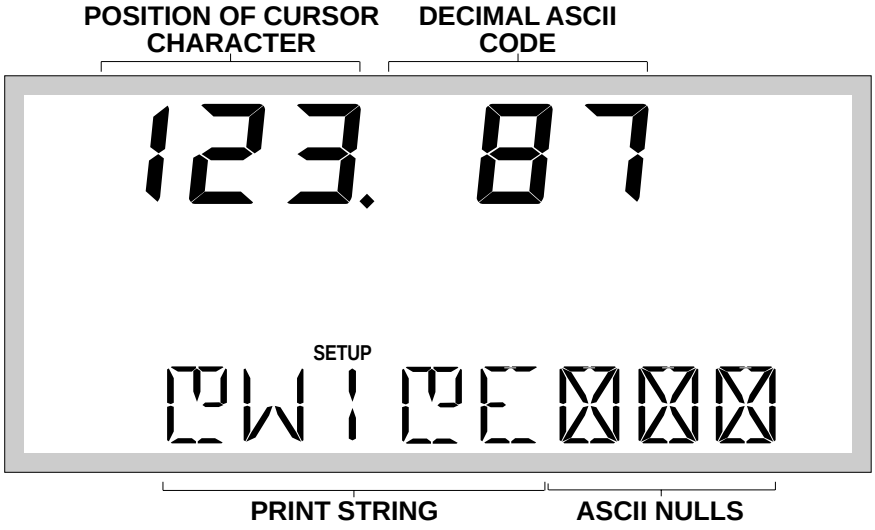
Control characters and any other character can be printed with the following procedure.

Alternate Characters and Control Characters

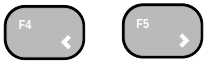
1) Push the **TARE** key. This enables the ASCII numeric entry mode. A place holder character indicates an ASCII character not included in the MSI 3750 character set.
2) Use the **UP/DOWN** keys to scroll to the decimal number of the desired ASCII character. Refer to the ASCII table in Appendix B. The left digits on the LCD represent the character position. The right digits represent the ASCII decimal character number. When

the desired character number is displayed push **ENTER**.

See "Programming the End of Line String" for an example of using the ASCII entry mode.



3750 Key Functions during Data Entry

TARE  ASCII	Enables the “ENTER ASCII” mode. Use this key to enter ASCII characters and control characters not included in the standard MSI 3750 character set.
ENTER 	Used to enter characters. If pushed twice Enter also functions as “EXIT and SAVE”.
SETUP  EXIT	Pushing the EXIT key will terminate the data entry and cause any changes made to be canceled. “EXIT and don’t SAVE”.
ALPHA 	The Alpha Key is used to change the data entry from Numeric to Alpha-numeric. The LCD indicates “n” for numeric entry, “U” for upper case Alpha-numeric, and “L” for lower case Alpha-numeric.
	Alpha-numeric Keys. When the Alpha key is in the “n” condition, these keys provide direct numeric digits. When the Alpha key is in the “U” condition, the keys provide the letters and number. For example, the 2 key provides “D”, “E”, “F”, and “2” in rotation.
ZERO 	Clear. Will erase any character the cursor is positioned on and move the remaining characters to the left. *Note: Pushing CLEAR followed by the LEFT Cursor key will clear the entire data line.*
	Up and Down Scroll keys (numeric mode). Used to scroll through the available character set. Using the Scroll keys can be an alternate to using the Alpha-numeric keys. They provide a convenient way to change, for example, a 1 to a 2.
	Left and Right Cursor Keys. Use to position the cursor under characters to be edited. Use the Right Cursor as a space character.
NET/GROSS  INSERT	Used to insert characters within a string. Position the cursor over the character you wish to insert in front of, then push the NET/GROSS key. The “highlight” character will appear on the current position. Pressing the DOWN Scroll key will delete the current character. Pressing the UP Scroll key will insert a character.
	In Alpha mode, the space key provides space and punctuation marks: @ ! “ # $ % & ‘ ( ) * +, – . / : ; < = > ? [\ ] ^ _ ` *Some of the punctuation marks are hard to recognize on the 16 segment display. Use the ASCII chart and the numeric display to verify the identity of the mark.*

EXAMPLE PRINTER FORMATTING

The following example will take you step by step through a formatting process. The end result of this example will produce a printout similar to this:

PEARS
4.500 lb NET 8/15/2002

In this example we'll use control characters to both print in red and expand the characters for "PEARS". **Note**: control codes used in this example are unique to a specific printer (a Star Micronics DP8340) and are used for example only. The necessary string will be:

ASCII	27		14						20	27											255
String	ESC	4	SO	P	E	A	R	S	DC4	ESC	5	@	E	@	W	3	@	D	6	@	E	ESC
Notes	❶	❷							❸	❹		❺		❻			❼			❽		❾

∂ The 27 is an ESC followed by a 4 which equals "Red Character Print instruction"

Σ The 14 is an SO which turns on the Expanded character instruction

∏ The 20 is an DC4 which turns off the Expanded character instruction

π The 27 is an ESC followed by a 5 which turns off the Red Character Print instruction

∫ @E causes the end-of-line string to be sent.

❻ @W3 causes the current Net weight to be printed. If the scale was in the NET mode, @W1 would have worked as well.

❼ @D2 causes the current date to be printed in MM/DD/YY format

Ω @E causes the end-of-line string to be sent.

❾ 255 is used by the 3750 to terminate the entire print string.

Example Print Data Formatting

1) Push **SETUP** followed immediately by the **PRINT** key. The message reads "COM-PORT1".

2) Push **ENTER.** The message reads "FOR-MAT".

3) Push **ENTER**. The message reads "DATA".

4) Push **ENTER**. The LCD changes into the formatting mode. Any previously stored printer DATA will appear on the screen. You can just write over the top of it.

5) *First we need to enter an ASCII ESC character. Referring to the ASCII chart (Appendix B) we find the an ESC is decimal 27. We will use the ASCII entry mode to place a 27 in the string.*

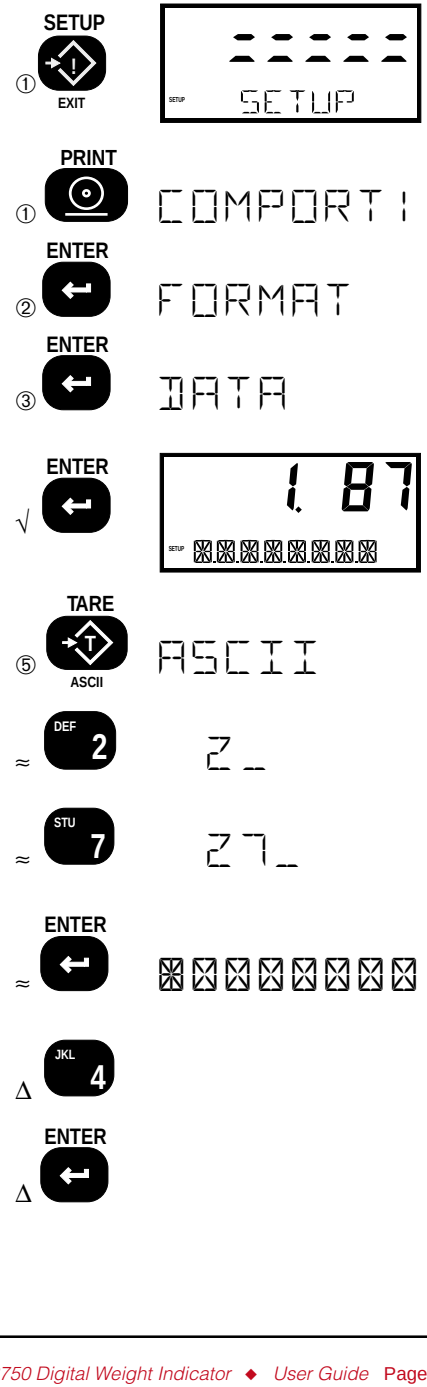
   Push **ASCII (TARE)**. The LCD message changes to "ASCII". The numeric digits indicate the decimal number of the ASCII character.

6) Push the **2** key then the **7** key. Push **ENTER**. The resultant string so far should look like this:

   The ▩ character takes the place of the 27 we just entered. This can be verified by backspacing 1 space and noting the decimal display. It should read " 1. 27" meaning the first character is an ASCII 27.

7) Push the **4** key to enter the next needed character. Push **ENTER**.

8) Using the step 5 procedure, enter an ASCII 14.



9) Next enter the text “PEARS” through the use of the **ALPHA** key and the appropriate Letter keys. (See “General Alphanumeric Entry Technique”).The resultant string so far should look like this:☒4☒PEARS

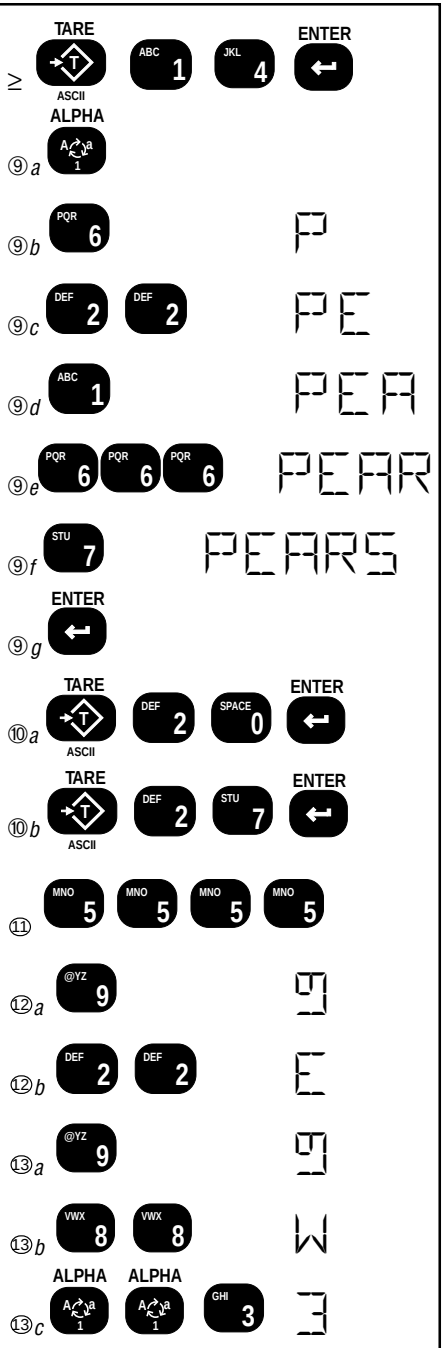
10) Use the ASCII mode to enter the following two characters – the “DC4” (dec 20) and an “ESC” (dec 27).The resultant string so far should look like this:☒4☒PEARS☒☒

11) Enter the “5”. Since the Alpha mode is in the Upper case condition, push the **5** key four times (or push the ALPHA key to change to the numeric mode).

12) Enter the “@E” to embed the end of line string in the Data String.

13) Enter the “@W3” to place the Net Weight reading in the Data string.The resultant string so far should look like this:
☒4☒PEARS☒☒5@E@W3

Note: Only 8 characters are viewable at a time. Use the Left/Right Scroll Keys to move the string window for checking purposes.



14) Enter the "@D2" to date stamp the printed Data.

15) Enter the "@E" to terminate with another end of line string.

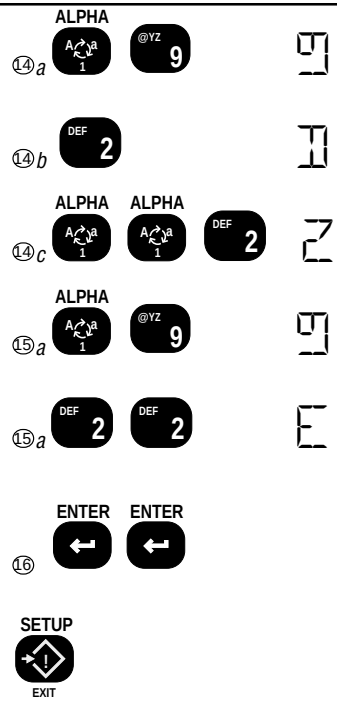
*The entire string must end with an ASCII 255. If the final character is not followed by a 255 character "☒" put one in. To force an ASCII 255 position the cursor 1 character past the last wanted character and push the **CLR** key.*

16) Finish out the String Entry by pushing **ENTER** twice.

Final String

☒4☒PEARS☒☒59E9W39D29E☒

Push EXIT to return to normal scale operation or use the UP/DOWN keys to continue through the COMMPORT setup menus.

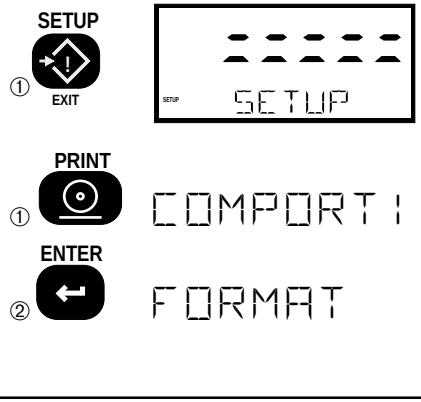


PROGRAMMING THE END OF LINE STRING

The End of Line String is used to terminate print strings and is printer dependent. The default string is Line Feed (LF=ASCII 10). In this example a Carriage Return (CR=ASCII 13) will be added to the EOL String. Refer to the ASCII table in the Appendix for proper codes.

1) Push **SETUP** followed immediately by the **PRINT** key. The message reads "COMPORT1".

2) Push **ENTER.** The message reads "FORMAT". The "END LINE" entry screen is in the FORMAT Menu.



3) Push **ENTER**. The message reads "DATA".

4) Use the **UP** key to scroll to "END LINE".

5) Push **ENTER**. You are now in the EOL entry screen. The current EOL String is displayed. The cursor is flashing on the LF character.

6) Insert a character position by pushing the **NET/GROSS** key. The LF (10) character will move to the right. The place holder character (255) is now flashing.

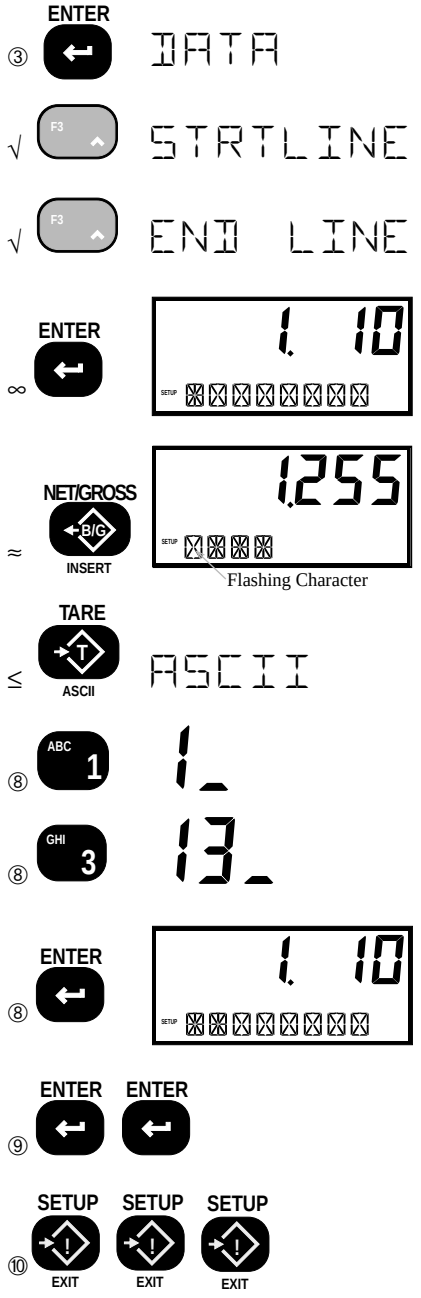
7) Since the CR is a control character, push the **TARE** key to enable the ASCII Entry screen.

8) Change the 255 character into a CR by pushing 1 then 3 then **ENTER**. The EOL screen reappears with the cursor on the next character, the LF that was present before. The EOL string now consists of two characters (other than the place holders).

   You can use the cursor keys to verify that character 1 is a 13 (Carriage Return) and that character 2 is a 10 (Line Feed).

9) Push **ENTER** twice to return to the Format Menu.

10) Use the **UP/DOWN** keys to scroll to another FORMAT menu, or push the **EXIT** key several times to return to normal scale operation. Each push of the **EXIT** key will backup 1 menu level.



EDITING THE PRINT STRING

To change a character

Use the **LEFT**(<) and **RIGHT** (>) Scroll keys (Alpha mode must be "n") to move around in the print string. The flashing digit indicates the editable character. Once the desired character is flashing, use the **Alpha** key to change to the Alpha mode, then use the letter keys to change it. If you need to change it to a character not in the 3750 character set, use the ASCII number entry procedure. Push **ENTER** twice to store the edited string.

To insert a character

Use the **LEFT**(<) and **RIGHT** (>) Scroll keys to move around in the print string. The flashing digit indicates the editable character. Insert a new character in front of the flashing digit by pushing the **NET/GROSS** key. Next input the desired character. Push **ENTER** twice to store the edited string.

To delete a character

Position the cursor (blinking character) over the character you wish to delete. Push **CLR**. The remaining characters move over 1 space. Push **ENTER** twice to store the edited string.

Note: Pushing the EXIT key will exit out of the menu and restore the string as it was. The changes must be saved with the double ENTER key push or by pushing the POWER key.

To disable the Entire Print String

Position the cursor (blinking character) over the first character in the Print String. Push **INSERT** to insert a "☒" (ASCII 255) character at the beginning of the String. Push **ENTER** twice to store the disabled string. This procedure is more efficient than using the **CLR** key to delete the entire String, especially if the String is very long. The 3750 ignores all characters past the first "☒" it encounters. To enable the string, position the cursor over the "☒"character and push **CLEAR**. This procedure can also be used to divide a long print string into smaller parts by inserting a "☒" character at discrete locations.

Note: Memory space is always allocated for the Print Strings. There is no benefit to actually deleting characters past the first ☒.

GENERAL TEXT/CONTROL CHARACTER ENTRY

Text or control characters are simply entered into the printer data string. All ASCII characters from 0dec to 127dec can be entered with the exception of the "@" symbol which the 3750 uses for its control characters (enter "@@" to print a single "@"). If 8 bit data transmission is enabled additional codes 128 to 255 can also be assigned. These upper numbers are often used for graphics characters on printers. "@" Commands are case sensitive, only capital letters are used.

Input Data Form

With the exception of characters following the command "@" symbol, all characters are treated as printable text or control characters. The MSI 3750 represents characters that can't be displayed on the LCD with a "☒". Terminate the string with a dec255 character (ASCII 255). ASCll 255 characters are represented with a "☒". The "ASCII Entry Mode" is provided to input Control Characters and any other character not included in the standard 3750 character set. Use the ASCII table (Appendix B) to determine the decimal number equal to any desired character. See "Example Printer Formatting", pg. 88, for a tutorial in programming a print string.

SERIAL OUTPUT "@" COMMANDS

The printer formatting "@" commands and their data configurations are as follows:

@@ PRINT AN "@"

Purpose:
Use the @@ command to cause the output to send an "@" sign. Since this character is normally used for printer formatting, this is the only way to output the @ sign by itself.

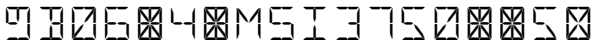
@B PRINT BLANK SPACES

Purpose:
Use the @B command to cause the output to send a series of spaces. Can be used to position data on a label without having to enter multiple spaces.

Input Data Form:
@Bxx where xx is any number from 01 to 99 which equals the number of spaces desired. *Note: Exactly two digits must follow the "@B" command.*

Output Data Form:
"x" spaces are output limited to 99. For more spaces use two @B commands in series.
Note: For spaces fewer than 5, it is more efficient to enter spaces instead of the @B command.

Example - Building on the previous example, we'll center the "MSI 3750" on a 20 column printer:



The @B06 command printed 6 spaces followed by "MSI 3750" in red expanded characters.

@C PRINT ID CODE NUMBER

Purpose:
Use the @C command to cause the output to send the current product code number. The number can vary from 0 to 999 depending on the current ID# that the scale is set in. Note that the blank place holder ID# is always 1, so the lowest alpha entry will be ID#2.

Input Data Form:
@C1 to print the ID Code number plus descriptor
@C2 to print the ID Code number only

Output Data Form:

@C1

1	2	3	4	5	6	7	8	9	10	11	12
I	D		C	O	D	E		#			4

Length: 12 Justification: “ID CODE” left justified, number right justified.

@C2

1	2	3
		4

Length: 3 Justification: right

@D PRINT DATE

Purpose:
Use the @D command to print the date register of the real time clock/calendar.

Input Data Form:

@D1 Full alpha date in the form DDMMMYY with the month spelled out
@D2 Print date in the form MM/DD/YY
@D3 Print date in the form DD/MM/YY (European Standard)
@D4 Print the day of the week
@D5 Full alpha date in the form DDMMMYYYY with month spelled out
@D6 Print date in the form MM/DD/YYYY
@D7 Print date in the form DD/MM/YYYY (European Standard)

Output Data Form:

@D1

DAY		MONTH			YEAR		SP
1	2	3	4	5	6	7	8
2	5	J	U	L	0	0	

Length: 8 Justification: left, leading day zero suppressed

@D2

MONTH		/	DAY		/	YEAR	
1	2	3	4	5	6	7	8
	4	/	2	5	/	0	0

Length: 8 Justification: full, leading month zero suppressed

@D3

DAY		/	MONTH		/	YEAR	
1	2	3	4	5	6	7	8
2	5	/	0	7	/	0	1

Length: 8 Justification: left, leading day zero suppressed

@D4

DAY OF THE WEEK									SP
1	2	3	4	5	6	7	8	9	10
S	A	T	U	R	D	A	Y		

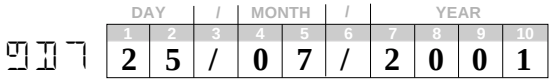
Length: 10 Justification: left, position 10 always a space.

@D5

DAY		MONTH			YEAR				SP
1	2	3	4	5	6	7	8	9	10
2	5	J	U	L	2	0	0	0	

Length: 10 Justification: left, leading month zero suppressed, pos 10 is space

Length: 10 Justification: full, leading month zero suppressed



Length: 10 Justification: full, leading day zero suppressed

@E PRINT END OF LINE

Purpose:
Use the @E command to output the end-of-line string. The EOL string is entered in the printer Format section

Input Data Form:
@E

Output Data Form:
Sends out the EOL string. Usually a Carriage Return or Line Feed, CR/LF, ETX, etc. Can include formatting commands. See Format

@H PRINT HORIZONTAL TABS

Purpose:
Use the @H command to send a series of Tabs. Can be used to position data on a label without having to enter multiple spaces. Not all printers support tabs. Check with printer manual for proper application of tabs in printer formatting.

Input Data Form:
@Hxx where xx is any number from 01 to 99 which equals the number of tabs desired. ***Note****: you must enter two digits following the "@H".*

Output Data Form:
"x" tabs are printed (limited to 99). For more tabs use two @H commands in series.

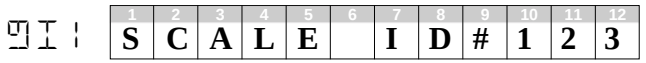
@I PRINT SCALE ID

Purpose:
Use the @I command to print the scale ID number. Probably most important when multiple scales are in the area and there is a need to identify which scale supplied the data. *Not to be confused with ID Codes, see @N and @C.*

Input Data Form:
@I1 Print scale ID# (0-255) and descriptor

@I2 Print scale ID# (0-255) only

Output Data Form:



1	2	3	4	5	6	7	8	9	10	11	12
S	C	A	L	E		I	D	#	1	2	3

Length: 12 Justification: word left, number right, leading zeros suppressed

1	2	3
1	2	3

Length: 3 Justification: right

@L PRINT ID CODE STRINGS

Purpose:
Use the @L command to print one or both of the ID Code Strings. ID Code Strings will change as the ID code number is changed. ID Code Strings can include text, numbers, and control codes thereby allowing the printer format or text to change with the ID Code.

Input Data Form:
@L1 Print ID Code String 1
@L2 Print ID Code String 2

Output Data Form:
Depends on user entered Strings. Up to 20 bytes unless "@" codes are embedded, which could increase the length of data generated by this command. **Caution**: Do not embed an "@L" command inside the ID String as this will cause an endless loop.

@M PRINT WEIGHING MODE

Purpose:
Use the @M command to print either the current weighing mode or print the internal mode strings.

Input Data Form:
@M1 Print current displayed weighing mode
@M2 Print "GROSS"
@M3 Print "NET"
@M4 Print "TARE"
@M5 Print "TOTAL"
@M6 Print "T CNT" (Total CouNT= number of weighments totaled)
@M7 Print "TOTAL T CNT"
@M8 *Reserved - Not used on 3750*
@M9 Print "GROSS+" or "NET+" or "AD2TOT" depending on the last totaled weight mode.

Output Data Form:

@M1

1	2	3	4	5	6
*	*	*	*	*	*

Length: 6 Justification: left ***** = Current Displayed mode, see @M2,@M3, @M4, @M8.

@M2

1	2	3	4	5	6
G	R	O	S	S	

Length: 6 Justification: left

@M3

1	2	3	4	5	6
N	E	T			

Length: 6 Justification: left

@M4

1	2	3	4	5	6
T	A	R	E		

Length: 6 Justification: left

@M5

1	2	3	4	5	6
T	O	T	A	L	

Length: 6 Justification: left

@M6

1	2	3	4	5	6
T	-	C	N	T	

Length: 6 Justification: left

@M7

1	2	3	4	5	6	7	8	9	10	11	12
T	O	T	A	L	,	T	-	C	N	T	

Length: 12 Justification: left

@M9 **If Gross weight is added**

1	2	3	4	5	6
G	R	O	S	S	+

Length: 6 Justification: left

@M9 **If Net weight is added**

1	2	3	4	5	6
N	E	T	+		

Length: 6 Justification: left

@M9 **If Register is Empty**

1	2	3	4	5	6
A	D	2	T	O	T

Length: 6 Justification: left, the "+" indicates that it is the weight from the last totaled register

@N PRINT ID CODE NAME

Purpose:
Use the @N command to print the current ID Code Name.

Input Data Form:
@N

Output Data Form:

9N

1	2	3	4	5	6	7	8
I	**D**	**N**	**A**	**M**	**E**	*****	*****

Length: 8 Justification: left (*Up to 8 Characters)

@S PRINT START OF LINE STRING

Purpose:
Use the @S command to output the Start of Line string. The SOL string is preprogrammed in the “COMM PORT Setup Menus”.

Input Data Form:
@S Print SOL String

Output Data Form:
Sends out the SOL string, a maximum of 4 bytes.

@T PRINT TIME

Purpose:
Use the @T command to print the current time register from the real-time Clock.

Input Data Form:
@T1 12 hour format with HH:MM
@T2 12 hour format with HH:MM:SS
@T3 24 hour format with HH:MM
@T4 24 hour format with HH:MM:SS

Output Data Form:

9T1

	HH		MM			AM/PM	
1	2	3	4	5	6	7	8
	2	**:**	**0**	**8**		**P**	**M**

Length: 8 Justification: full, leading hours zero suppressed

9T2

	HH		MM			SS			AM/PM	
1	2	3	4	5	6	7	8	9	10	11
	2	**:**	**0**	**8**	**:**	**3**	**6**		**P**	**M**

Length: 11 Justification: full, leading hours zero suppressed

9T3

	HH	:	MM	
1	2	3	4	5
1	**4**	**:**	**0**	**8**

Length: 5 Justification: left, leading hours zero suppressed

@T4

HH		MM		SS
1 2	3	4 5	6	7 8
1 4	:	0 8	:	3 6

Length: 8 Justification: left, leading hours zero suppressed

@U PRINT CURRENT UNITS

Purpose:
Use the @U command to output the current weight units.

Input Data Form:
@U

Output Data Form:

@U

1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
L B	K G	O Z	G

Length: 4 Justification: left

@U

1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
T O N	T N E	T R O Z	

Length: 4 (Units available depend on capacity and legal-for-trade setups)

@V PRINT WEIGHT

Purpose:
Use the @V command to print the current weight without units or mode printed.
Note: @V is not available on LFT configured 3750s

Input Data Form:
@V1 Displayed weight (GROSS, NET, DEV, %DEV)
@V2 Gross weight
@V3 Net weight ***Note** : will print dashes if NET mode is not enabled*
@V4 Tare weight ***Note** : will print dashes if no TARE value has been established*
@V5 Total weight
@V6 n Totals (weighments counter)
@V7 Total + n Totals (Combined @V5 and @V6)
@V8 *Reserved - not functional on 3750*
@V9 Last Totaled Weight ***Note** : will print dashes if no weight has been totaled.*

Output Data Form:

@W1 @W2 @W3 @W4 @W8 @W9

1	2	3	4	5	6	7	8
		2	0	.	5	0	2

Length: 8 Justification: full, leading zeros suppressed

@W5

1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	.	8	9

Length: 10 Justification: right, leading zeros suppressed

@W6

1	2	3	4	5
	1	2	3	4

Length: 5 Justification: right, leading zeros suppressed

@W7

TOTAL VALUE											# OF WEIGHMENTS				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	.	8	9	,		1	2	3	4

Length: 16 Justification: each number field - right, leading zeros suppressed

@W8 Not functional on 3750

@W9

1	2	3	4	5	6	7	8
		2	0	.	5	0	2

Length: 8 Justification: full, leading zeros suppressed

@W PRINT WEIGHT FULLY

Purpose:
Use the @W command to print the current weight with units and mode printed.

Input Data Form:

@W1 Displayed weight
@W2 Gross weight
@W3 Net weight ***Note*** : *will print dashes if NET mode is not enabled*
@W4 Tare weight ***Note*** : *will print dashes if no Tare value has been established*
@W5 Total weight
@W6 n Totals (weighments counter)
@W7 Total with n Totals (combined @W5 and @W6)
@W8 *Reserved - not functional on 3750*
@W9 Last totaled weight ***Note*** : *will print dashes if no weight has been totaled.*

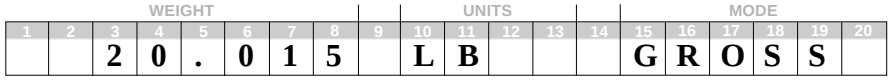
Output Data Form:

@W1

WEIGHT									UNITS					MODE					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		2	0	.	0	1	5		L	B				*	*	*	*	*	

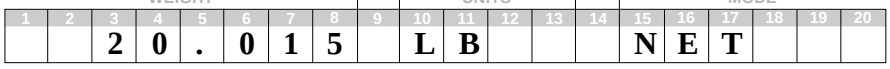
Length: 20 Justification: Weight - right, Units - left, Mode - left, ***** = Current Scale Display mode (GROSS, NET, PK GRSS or PK NET) Does not include Total, Tare, or Target.

SW2



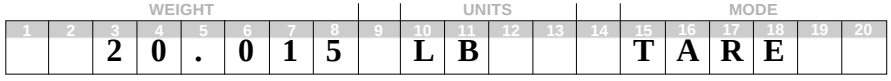
Length: 20 Justification: Weight - right, Units - left, Mode - left

SW3



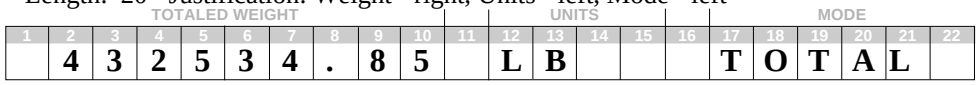
Length: 20 Justification: Weight - right, Units - left, Mode - left

SW4



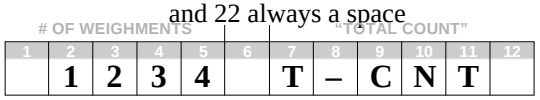
Length: 20 Justification: Weight - right, Units - left, Mode - left

SW5



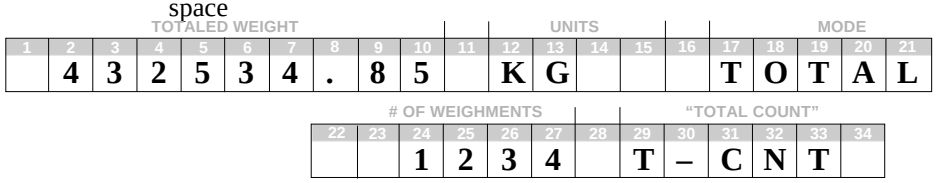
Length: 22 Justification: Weight - right, Units - left, Mode - left, characters 11,16 and 22 always a space

SW6



Length: 12 Justification: Counts - right, Mode - left, characters 1, 6 and 12 always a space

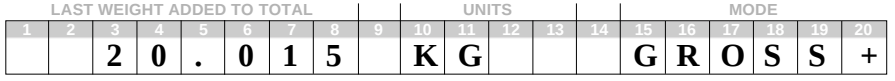
SW7



Length: 34 Justification: Weight - right, Units - left, Mode - left, Weighments right, "T–CNT" left

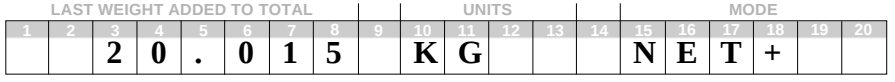
If gross weight is added

SW9



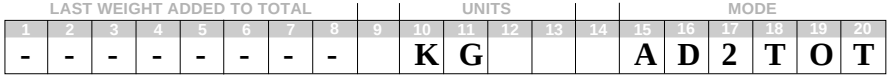
If net weight is added

SW9



If total register is empty

SW9



Length: 20 Justification: Weight - right, Units - left, Mode - left, the "+" indicates that it is the weight from the last totaled register

@X PRINT STATISTICS VALUE ONLY (requires Statistics Option)

Purpose:
Use the @X command to print the statistics of the current ID Code. Numeric value only, no description text.

Input Data Form:

@X1 Average weight
@X2 Minimum weight
@X3 Maximum weight
@X4 Standard Deviation
@X5 Coefficient of Variance (%)
@X6 Grand Total
@X7 Grand Total Average
@X8 Grand Total Number of Samples

Output Data Form:

@X1 @X2 @X3 @X4 @X5 @X7

STATISTICAL VALUE

1	2	3	4	5	6	7	8
	-	2	0	.	5	0	2

Length: 8 Justification: right justified

@X6

GRAND TOTAL WEIGHT

1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	.	0	5

Length: 10 Justification: right, leading zeros suppressed

@W8

GRAND NUMBER OF SAMPLES

1	2	3	4	5	6	7	8	9	10
		1	2	3	4	5	6	7	8

Length: 10 Justification: right, leading zeros suppressed

@Y PRINT STATISTICS FULLY (requires Statistics Option)

Purpose:
Use the @Y command to print the statistics of the current ID Code with text descriptor.

Input Data Form:

@Y1 Average weight
@Y2 Minimum weight
@Y3 Maximum weight
@Y4 Standard Deviation
@Y5 Coefficient of Variance (%)
@Y6 Grand Total
@Y7 Grand Average
@Y8 Grand Number of Samples

Output Data Form:

9Y1

		%COEFFICIENT OF VARIANCE								%					“COEFFICIENT OF VARIANCE”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		1	3	.	3	5	5		K	G				A	V	G			

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y2

		AVERAGE WEIGHT								UNITS					“AVERAGE”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			3	.	2	1	0		K	G				M	I	N			

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y3

		MINIMUM WEIGHT								UNITS					“MINIMUM”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		2	0	.	0	1	5		K	G				M	A	X			

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y4

		MAXIMUM WEIGHT								UNITS					“MAXIMUM”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		2	0	.	0	1	5		K	G				S	T	D	D	E	V

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y5

		STANDARD DEVIATION								UNITS					“STANDARD DEVIATION”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			3	2	.	5	0		%					C	O	.	V	A	R

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y6

		GRAND TOTAL WEIGHT										UNITS					“GRAND TOTAL”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	4	3	1	3	5	.	5	5			K	G				G	–	T	O	T	L

Length: 22 Justification: Weight - right, Units - left, Mode - left

9Y7

		GRAND AVERAGE WEIGHT								UNITS					“GRAND AVERAGE”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			4	.	3	2	7		K	G				G	–	A	V	G	

Length: 20 Justification: Weight - right, Units - left, Mode - left

9Y8

	GRAND # OF SAMPLES							“GRAND TOTAL COUNT”					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1	2	3	4	5	6		G	–	C	N	T	

Length: 14 Justification: Counts - right, Mode - left

@Z PRINT ALL STATISTICS & GRAND TOTAL (requires Statistics Option)

Purpose:
Use the @Z command to print the statistics of all the ID Codes followed by the Grand Total Statistics.

Input Data Form:
@Z1 Print All without labels
@Z2 Print All with labels

Output Data Form:
The @Z Command combines data from all the ID Codes Statistics and prints them in a formatted form. This output can be quite lengthy depending on the number of ID Codes in use. Only ID Codes that have at least one Total weighment will print.

@1 DATA FROM SCALE A

@2 DATA FROM SCALE B

@3 DATA FROM SCALES A+B

@4 DATA FROM SCALES A–B

These @ commands are unique to the Dual Load Cell (ABC) Meter.

Purpose:
Use the @1, @2, @3, and @4 commands in conjunction with the @Vx or @Wx commands to cause the print string to take data from one of the four weight modes. When preceded by the @1-4 command, do not use the @ sign in front of the weight command; e.g. @1W3. If the @W or @V commands are used without the @1-4 in front, the scale mode currently displayed will provide the data.

Input Data Form (examples, any W or V command will work):
@1W1 Print the Weight in the last display mode of Scale A.
@2V2 Print the Gross Weight of Scale B.

Output Data Form:
Is dictated by the suffix command, see “@W” and “@V”.

COMPUTER OPERATION

The MSI-3750 can interface to computers via the RS-232 or RS-485 options. All functions can be controlled remotely and all setups can be downloaded automatically. The computer can query the scale at any time to get status, weight, or accumulated totals. In a RS-485 network, multiple scales (up to 255) can be "daisy-chained" to one or more RS-485 equipped computers for a complete scale control and data system. Scales can "talk" and "listen" to the master computer independently, or the master computer can download commands to any or all scales on the network.

General Protocol

The MSI-3750 responds to ASCII commands that consist of a two letter mnemonic. Depending on the command, a 1 or 2 digit item selection (sub-code) may be required. Certain commands require user supplied data. Commands sent from a host computer can be chained together in any order. Commands are terminated by another command or by a semicolon (;). It is necessary to end a multiple command string with the semicolon as a terminator. Variable length numeric data must be terminated by a semicolon or by another command. Variable length alphanumeric data must be terminated by a semicolon before adding additional commands. Commands are case sensitive, only capital letters are used. The 3750 will not accept commands if it is in any setup mode caused by pushing the **SETUP** key.

It is important that the final character sent to the 3750 is a semicolon (;).

"@" COMMANDS UNDER COMPUTER CONTROL

The "@" commands also function under computer control, however they act differently than standard computer commands. The "@" commands, when received by the 3750, will cause the immediate transmission of the asked for data type out the same port. The ";" delimiter is usually not necessary unless the "@" commands are combined with the standard computer commands. The preferred way to get data from the 3750 is to use the "CD" command, set up a print string with all the @ codes desired, then use the "PR" command to cause a data transmission. Once the print string is set up with the desired data, only the PR command is needed.

Description	Command	Suffix (Bold text indicates default)	Comments
Auto Off	**AO**	1=**Disabled** 2=10 Min. 3=30 Min. 4=1 Hour 5=2 Hours 6=4 Hours 7=8 Hours 8=24 Hrs	Once the scale is off, the computer will not be able to talk to it unless the Clock Mode is enabled
Back Light	**BL**	1=**Automatic** 2=On 3=Off	Not Available on units equipped with the 2nd Comm Port option.
Brightness of Backlight	**BR**	1=Low 2=Medium 3=**High**	Not Available on units equipped with the 2nd Comm Port option.
Back Light	**BL**	1=**Automatic** 2=On 3=Off	Not Available on units equipped with the 2nd Comm Port option.
Comm Port Data	**CD**	Up to 480 characters	Send CD followed by all '@' commands + text. Must be ended with a ";" (semicolon).
Comm Port Data Query	**?D**	1=Comm Port 1 2=Comm Port 2	Print out Comm Port data string as entered, not with interpreted data. See the "PR" command.
Enable Comm Port (for receiving control formatting)	**CE**	1=Comm Port 1 2=Comm Port 2	All @ and C commands will be directed to the last enabled port..
Total Mode	**EM**	**1=Disabled** 2=Manual 3=Not used 4=Auto Norm 5=Auto Peak	
Filter	**FL**	**1=Low Filter** 2=Med Filter 3=High Filter	
Bar Graph 100% Value	**GH**	Enter value = to 100%	Terminate Value with any command or a ";" (semicolon).
Bar Graph 0% Value	**GZ**	Enter value = to 0%	Terminate Value with any command or a ";" (semicolon).

Description	Command	Suffix (Bold text indicates default)	Comments
Bar Graph Mode	**GM**	**1=Disabled** 2=Per Cent 3=Level (option only)	
ID Code	**ID**	Enter ID number desired	Terminate Value with any command or a ";" (semicolon).
ID Code LC Display Mode	**IL**	1=Disabled **2=Normal** 3=Per Cent	
ID Name	**IN**	Input up to an 8 character name	End with ";" (semicolon) if less than 8 characters.
ID String	**IS**	1=ID String 1 2=ID String 2	Example: IS1This is a test; *Must be terminated with semicolon.*
Query ID String	**?I**	in the form abbb where a=String1 or 2 and b= 3 digit ID #	Sends out the ID string uninterpreted (@codes don't function) for troubleshooting.
Keyboard	**KE**	1=Disabled **2=Enabled**	Disables all front panel switches.
Keyboard Function Emulate	**KF**	1=Power 2=Zero 3=Gross 4=Net 5=Tare 6=Total 7=View Total 8=Clear Last Total 9=Clear Total 10=Clear all Totals 11=Print 12=Peak Hold On 13=Peak Hold Off	Terminate Value with any command or a ";"
Listen	**LI**	0=Listen Always (all scales) 1-255 (Scale ID#)*	* to cause only the selected scale to listen
Lock Value	**LV**	0000-9999	Enter Lock Code Value to lock or unlock the scale as set in the Lock Mode menu.
Turn on the Power	**O**	None	Clock mode must be enabled with seconds showing. Delay at least 200ms before sending commands

Description	Command	Suffix (Bold text indicates default)	Comments
Print	**PR**	1=Print Comm 1 string 2=Print Comm 2 string 3=Print Both	Causes the current print format strings to be printed.
Calendar Date Set	**RD**	Enter date in MM/DD/YY order	Example: RD10/05/01; Is equal to October 5th, 2001
Real Time Clock/Calendar Enable	**RE**	**1=Disabled** 2=On	Turns on Clock Calendar when power is off and enables scale-off data reception
Real-Time Clock Display Mode	**RM**	**1=12HR/MIN** 2=12HR/MIN/SEC 3=24HR/MIN 4=24HR/MIN/SEC	Formatting for LCD Clock mode only, see @T for time formatting the print or output.
Real Time Clock Set	**RT**	Enter time in HH:MM:SS	Example: RT22:35:55; is equal to 10:35:55 PM
Day of Week Set	**RW**	1=Sunday 2=Monday 3=Tuesday 4=Wednesday 5=Thursday 6=Friday 7=Saturday	
CommPort Quiet Off	**QI**	1=CommPort1 2=CommPort2	Releases data held in buffers. Cancels the QU command
CommPort Quiet On	**QU**	1=CommPort1 2=CommPort2	Hold serial data in buffers. Used for networking.
Set Point Receive Data Enable	**S#**	1-8 for Set Points 1 through 8	S#1 to S#8 enables each set point. The last enabled set point receives any set point data or parameters.
Set Point Dead Zone Value	**SD**	Enter value in current units	Terminate weight value with a semicolon or another command.
General Set Points Mode Enable	**SE**	**1=Disabled** 2=Normal 3=Grading	
Set Point Latch	**SL**	**0=Off** 1=On	

Description	Command	Suffix (Bold text indicates default)	Comments
Set Point Mode	**SM**	**1=Disabled** 2= Total 3=Net/Gross 4= Gross	
Set Pt Message output to Comm 1	**SO1**	**0=Off** 1=On	
Set Pt Message output to Comm 2	**SO2**	**0=Off** 1=On	
Set Pt Message output to LCD Screen	**SOS**	**0=Off** 1=On	
Set Point Display	**SR**	**1=Normal** 2=Blank LCD 3=Blink LCD	
Set Point String	**SS**	Enter up to 20 characters	Terminate string with semicolon. See S# Command to enable for any given set point.
Query Set Point String	**?S**	1-8 for Set Point 1-8.	Transmits the Set Point string uninterpreted for troubleshooting and editing..
Set Point Delay	**ST**	Input # of seconds delay 0-1500 seconds	End with ;
Set Point Value	**SV**	> or< followed by Weight in current units.	Terminate weight value with a semicolon or another command.
Tare	**TA**	Input Tare Value in displayed units	Terminate string with semicolon. See “KF5” for Auto Tare
Units Print Mode	**UM**	**1=upper case** 2=lower case	If your printer prints lower case letters select 2.
Set Units	**UN**	1=lb 2=kg 3=tons 4=metric tons (tne) 5=oz 6=g 7=daN 8=lb-oz	Terminate Value with any command or a “;”

SECTION 8 – SCALE CALIBRATION

CALIBRATE GENERAL INFORMATION

The following sections are intended for qualified scale technicians. Calibrating a scale based on the 3750 Meter requires that adequate test weights are available (at least 20% of capacity required).

See the "Calibration Flowchart" for an overview of the calibration process.

It is not necessary to remove the meter front panel to calibrate. Only the small seal port screw on the left side of the unit should be removed!

For a new installation, replacing the meter, or setting the Capacity and/or Count-by (d):

1) First, follow the "Reset Calibration" procedure below.
2) If the unit is legal for trade, set the appropriate standard with the "LEGAL STANDARD" procedure. If the unit is to be used with metric units only set the standard to "METRIC".
3) Follow the "INITIAL CALIBRATION" procedure to set calibration units, capacity, "d", and gain.
4) Reseal the Cal port when finished.

For a simple calibration:

1) First follow the "Enable Calibration" procedure below.
2) Next, follow the procedure in the "STANDARD CALIBRATION" section.
3) Reseal the Cal port when finished.

Dual Load Cell (ABC) Systems: Program a Function Key to the function "SCALENUM" in order to select which input is to be calibrated. See Section 2. Both Input A and Input B must be calibrated after a Reset Cal or Reset All.

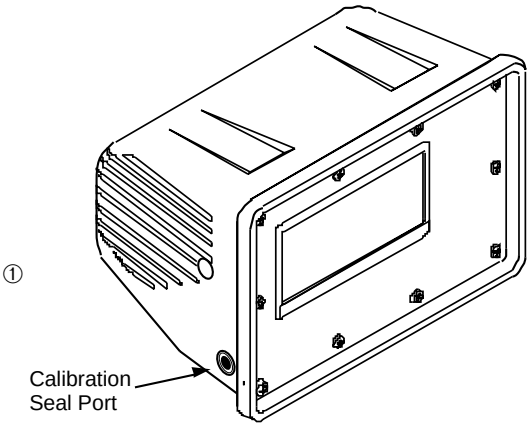
ENABLE CALIBRATION

The seal port must be opened to enable calibration. Before starting this procedure you should have an accurate test weight system of adequate capacity (at least 20% of capacity) for the load receptor connected to the MSI 3750. Calibrate a Legal-For-Tade 3750 with test weights certified by the appropriate regulatory agency.

To Enter the Calibration Menus

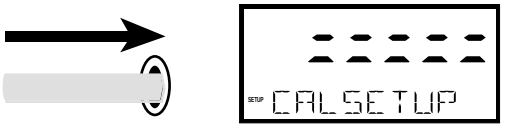
1) Expose the Calibration Seal Port by removing the seal screw on the left side of the 3750 Meter Casting with a Phillips Head Screwdriver.

Note: Dual Input 3750 Meters Only– Use the ScaleID Key to select which Scale (A or B) will be calibrated. To Calibrate both Scale Inputs, you must complete the first. Exit out of the Calibration Menus. Select the other scale with the ScaleID Key. Then enable Calibration again.

① 

2) Insert a small non-metallic screwdriver or the wooden stem of a "Q-Tip" and press the switch button in the hole. The display reads "CALSETUP" for 2 seconds. *Tip: A wooden Golf Tee fits the hole perfectly.*

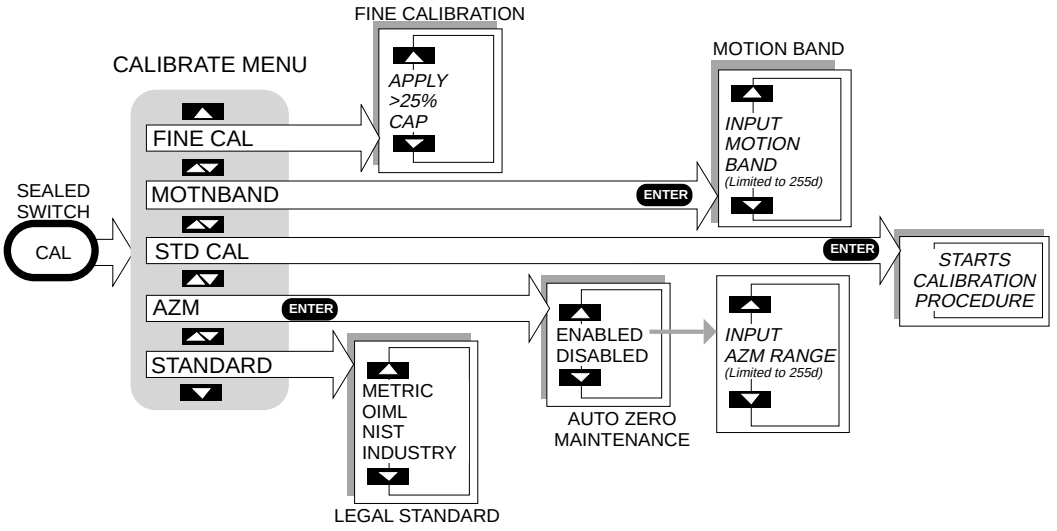
Dual Input (ABC) units will also display the message "LOAD EE?" for 2 seconds.

② 

3) The first item in the Calibrate Setup Menu appears Use the **UP** or **DOWN** scroll keys to locate the desired Calibrate operation as described in the following procedures.

③ 

CALIBRATE SETUP MENU



Lega-For-Trade systems will modify this menu. The Print, Filter, Units, and Auto Total (AUTO ∑) may be added to the Calibration Setup Menu so they can be sealed. Information on how these setup menus work are found in other sections of this manual.

TO SELECT LEGAL STANDARD

The STANDARD function allows the Model 3750 to be configured as required by various regulatory agencies. The “INDUSTRY” selection is the default. Choose “NIST” for US and Canadian Legal-for-Trade units. Choose “OIML” for European LFT applications. “METRIC” is the same as “INDUSTRY” except only kg and g units are enabled.

Note (Dual Load Cell Systems Only): The “STANDARD” menu is not available on Dual Load Cell ABC Systems. The standard is fixed at “Industrial”.

Note: Before starting the following procedure, you must be in the Top Menu Level of Calibration. See “Enable Calibration”.

Setting the Legal Standard

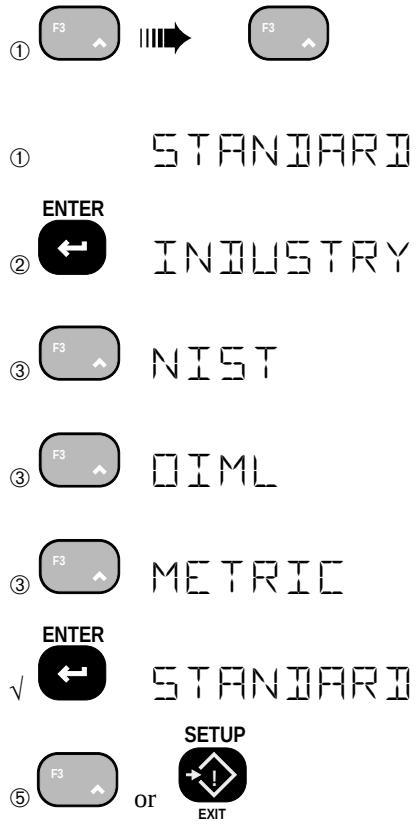
1) Use the **UP** or **DOWN** scroll key to scroll to the “STANDARD” message.

2) Press **ENTER**. The current Standard is displayed.

3) Use the **UP** or **DOWN** key to scroll through the Standards options. For this example we’ll pick the “METRIC” standard. This will limit the units choices to kg and g (and Metric Tons if the capacity is high enough).

4) Push **ENTER** to set your selection.

5) You are now back in the “CAL SETUP” menu. Use the **UP/DOWN** keys to scroll to the next calibration operation or push **EXIT** to return to normal scale operation.



NOTE: Contact MSI for details on the differences between the various configurations.

TO CALIBRATE (STANDARD CALIBRATION)

Use this Calibration procedure for normal test weight calibration of the MSI 3750. If capacity or gain changes are necessary (such as an initial setup of a system) go to the Initial Calibration Procedure.

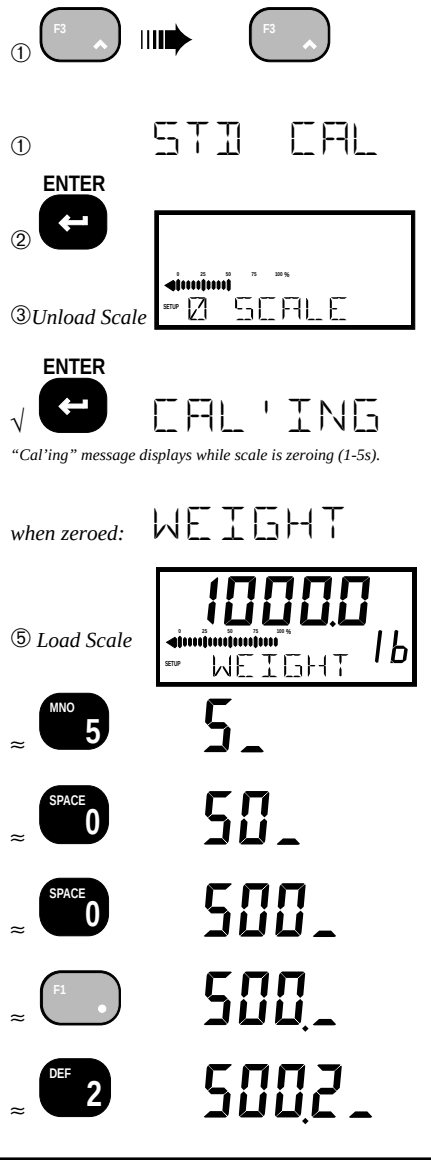
Note: Before starting the following procedure, you must be in the Top Menu Level of Calibration. See "Enable Calibration".

1) Use the **UP** or **DOWN** scroll key to scroll to the "STD CAL" message.
2) Press **ENTER**.
3) Zero Calibration – The message reads "Ø SCALE". Remove all weight from the scale and wait until the scale is motionless.

   The bargraph indicates relative A/D counts. With exactly zero volts input it will indicate 50%. Readings from 10% to 60% are fine for cal. Readings above 60% are too high and should be corrected with Coarse Zero.
4) When the load receptor is stable push **ZERO** or **ENTER**. The display reads "CAL'ING". Wait for about 5 seconds. If the detected zero weight is within acceptable limits the message "WEIGHT" will appear.
5) Span Calibration – The 3750 can be calibrated with any in span test weight from 20% to 100% of capacity.Place the calibration weight on the load receptor. MSI suggests that an ideal test weight is equal to capacity, but any weight ≥ 20% of capacity will suffice.

   The bargraph again indicates relative A/D counts. With full scale span input the bargraph should indicate at least 20% above the zero reading. If this is not true, go to "Init Cal" and change the Gain setting.
6) Next, you will need to input the exact value of your calibration weight. Input your calibration weight value using the numeric keys. In this example, we show calibrating with a Test Weight certified at 500.2 lb.

   Metric Cal Example *: 5 lb of dead weights are*



*available to calibrate a 2.5 kg scale. Since 5.000 lb = 2.268 kg (5*0.4536), the number inputted with the Numeric and ENTER keys would be 2.268. The 3750 calculates the span factor needed.*

7) Once the weight on the load receptor is stable, push **ENTER**. The message "CAL'ING" appears. The 3750 checks to see if the weight data is within acceptable limits.

8) If the Span parameters were OK, the message will read "CAL OK" then "STORING". Calibration is complete, push **EXIT** to return to normal scale operation, or push **UP/DOWN** to choose another Calibrate Setup function. Seal the calibration port.

Wait for stability on scale...no motion.

Δ

CAL'ING

CAL OK

STORING

⑧

CALIBRATION ERROR MESSAGES

Note: Many calibration errors are caused by misconnected load cells. Check that the wiring is correct and that the leads are securely in the input terminals before trying any other corrective actions.

Error Message	Description	Corrective Action
-- ZEROERR Negative Zero Error	This error indicates that there is too much negative offset in the load cell.	1) Change the gain. 2) Add dead load 3) Use the Coarse Zero Adjustment procedure.
CAL ERR Span Calibration Error	This error indicates that there is either insufficient or too much weight on the Scale for proper calibration to the set capacity. Pushing **ENTER** will return you to the ZERO step so you can try agagin with the proper weight. Pushing **EXIT** will restore the previous calibration constants.	1) Check that the calibration weight is 20% of capacity or more. 2) Verify the cal weight is entered correctly. 3) Go to the "INIT CAL" procedure and change the gain.
UNDERRNG A/D converter underrange.	In the calibrate menus, an under range indication means that the A/D is out of zero range. This can be caused by a load cell with too much negative offset.	1) Add dead load or use the coarse zero DIP switch to bring the zero counts higher. 2) Gain is set too low. Increase the Gain in the INIT CAL procedure.
OVER RNG A/D converter overrange.	In the calibrate menus, an Over range indication means that the A/D has exceeded its maximum count. This can be caused by excessive positive offset, or by too much weight on the scale.	1) Reduce the load on the scale or use the Coarse Zero Adjustment to offset the load negatively. 2) Or... the Gain must be reduced in the INIT CAL procedure.
0 CPACTY Capacity register zeroed	Displayed when the entered scale capacity is zero or the capacity register is empty.	1) Input the capacity properly (Init Cal)

Error Message	Description	Corrective Action
0 TES WT Capacity register zeroed	Displayed when the test weight value was not entered or entered as zero.	1) Input the test weight value properly
UNCAL'ED Calibration Registers Incomplete	Displayed when the scale prompts the user to unload the scale and the user does not hit **ENTER** or **ZERO**. Also displayed when a test weight value was typed in incorrectly.	1) Use the **ENTER** key to properly store the cal constants.
LC ERROR Capacity register zeroed	Displayed when an error was detected in the A/D.	1) Turn off unit, unplug it. Try CAL again. 2) Check wiring to load cell.
XS RANGE Calculated A/D range is not sufficient	Displayed when either a test weight value entered exceeds capacity or when the scale will not have enough A/D counts to measure full capacity plus 10 divisions.	1) Verify the test weight value was entered properly. 2) Reduce the gain (INIT CAL).
XS LOAD Insufficient A/D resolution for requested display resolution.	After calibration, the scale determines if the number of counts between zero weight and full scale is between 31% and 97% of the A/D range and also if there will be a least 4 A/D counts for every division. If either of these two tests fail, this error message will be displayed.	1) Verify the test weight value was entered properly. 2) Reduce the gain (INIT CAL) if readings are too high to achieve full capacity. 3) Increase the gain if not enough counts..
0 MAG WT Magnum weight not entered or ≤0	(LFT Magnum units only) Displayed when the weight of the Magnum unit entered is less than or equal to zero.	1) Use the zero offset procedure (coarse zero) to add counts on the low end.

RESET CALIBRATION

DO NOT initiate this function unless you are prepared and qualified to perform a complete initialization and Calibration procedure.

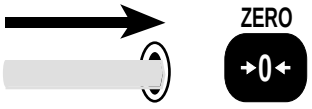
Completely clears the internal EEROM of calibration settings, including capacity and count-by (d). Does not erase other user functions such as ID Codes, or RS-232 settings. Usually used for board replacement, changing capacity and/or resolution, troubleshooting, or Load cell replacement. Does not change any previously set Setup functions. A full calibration must follow this operation.

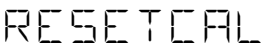
To Reset all the Calibration Constants

This procedure will not work if the scale is already in the CAL SETUP Menus. Push the EXIT key to get out of "CAL SETUP".

1) Expose the Calibration Seal Port by removing the seal screw on the left side of the 3750 Meter Casting with a Phillips Head Screwdriver.
2) Insert a small non-metallic screwdriver or the stem side of a wooden "Q-Tip" and press and release the switch button in the hole followed immediately by the **ZERO** key. The display reads "RESETCAL".
3) The first item in the Calibrate Setup Menu appears Use the **UP** or **DOWN** scroll keys to locate the next desired Calibrate operation.

① *(see "Enable Calibration" for the location of the Cal Port)*

② 

③ 

③ 

RESET ALL

Similar to the RESETCAL plus all setup functions are returned to defaults and all ID Codes are erased. Starts the scale from scratch. Usually used for board replacement, changing capacity and/or resolution, troubleshooting, or Load cell replacement. A full calibration must follow this operation.

This procedure erases all calibration constants, all the ID Codes, all Set Points, all Print Strings, and resets all the registers back to factory defaults. DO NOT initiate this function unless you are prepared and qualified to perform a complete initialization and Calibration procedure.

To Completely Reset the 3750

This procedure will not work if the scale is already in the CAL SETUP Menus. Push the EXIT key to get out of "CAL SETUP".

1) Turn off the 3750 Power. Expose the Calibration Port by removing the seal screw on the left side of the 3750 Meter housing.

2) Insert a small non-metallic screwdriver or the stem side of a wooden "Q-Tip" and press the switch button in the hole. While holding in the cal Switch, trun on the 3750. The display reads "RESETALL" followed by "R U SURE".

3) To complete RESETALL push **ENTER**.

   To cancel this operation leaving the previous calibration and setup registers intact, push EXIT.

4) The system will now be in the "UNCAL'ED" state. Push the cal switch and use the "INITIAL CALIBRATION" procedure to calibrate the 3750.

① *(see "Enable Calibration" for the location of the Cal Port)*

INITIAL CALIBRATION

(Performed only after a “Reset Calibration” or “Reset All”)

NOTE: The following procedure is for use only when changing the load cell, the electronics package, or when changing the capacity or count-by (d) of the scale. Use the “STANDARD CALIBRATION” procedure for routine calibration of a 3750 based scale system.

Before starting the following procedure, you must Reset Calibration. See “RESET CAL or RESET ALL”.

1) Use the **UP** or **DOWN** scroll key to scroll to the “STD CAL” message.

2) Press **ENTER**.

3) Use the **UP** or **DOWN** key to tell the scale what power source it will use: “PWR AC” for 115 or 230 VAC, “PWR VEHI” for the 12 to 48 V adapter, “PWR BATT” if the scale is equipped with the 2 D cell option.

4) Push **ENTER** when the proper choice is displayed. In this example the 3750 is a standard AC unit.

   Scales equipped with the special option for 12V batteries or AC should use the “PWR AC” setting.

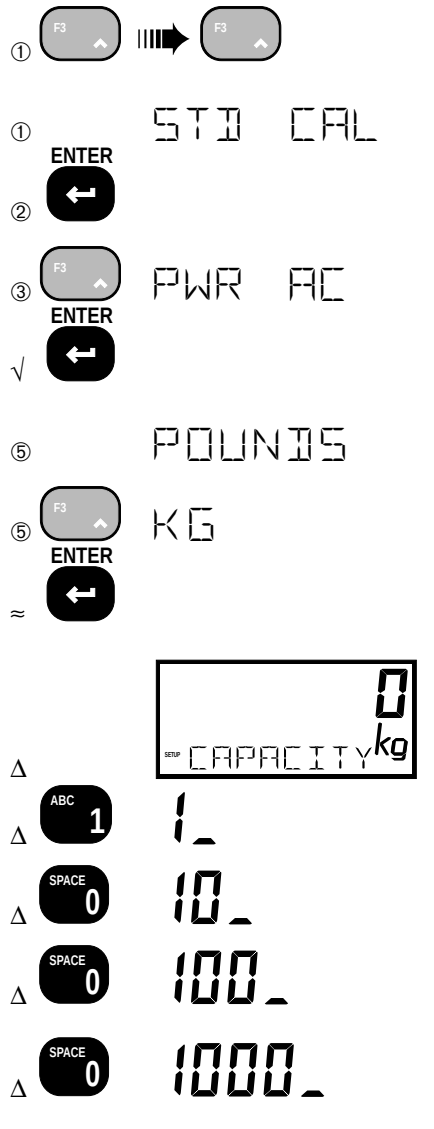
5) Next set the default units the scale is calibrated in. The capacity initially programmed in the calibration units determines the overload value. Use the **UP** or **DOWN** key to scroll to the desired Calibration Unit (lb, kg, g, oz, t, etc.).

   In this example, we’ll pick “KG”.

6) Press **ENTER** to set the Calibration Units.

7) Next set the capacity of the system in Calibration Units. The display reads “CAPACITY”. Use the numeric keys to set the capacity value.

   In this example we’ll set the meter Capacity at 1000 kg. The Capacity is defined as the maximum weight the scale is expected to weigh.



The 3750 will actually overload slightly higher than the set capacity (Usually 7-9 "d" higher). ***NOTE*** *: Capacities range up to 999,999 calibration units in any units. If "lb-oz" is the desired measurement mode, enter the capacity in pounds and/or fractional pounds. During capacity entry, you can back step delete any incorrect entry using the* ***CLR*** *(ZERO) key.*

8) Push **ENTER** to complete the capacity value entry.

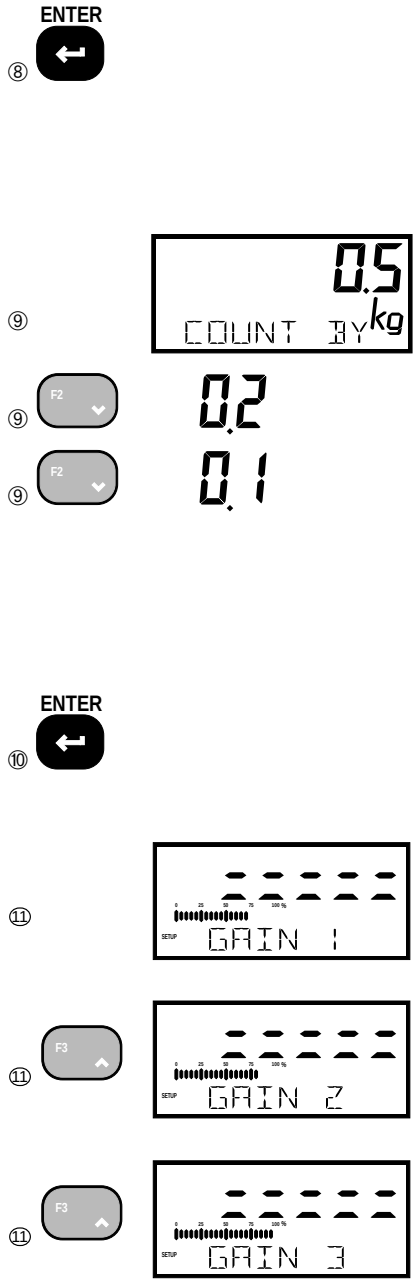
9) Next, use the **UP** or **DOWN** keys to enter the resolution in scale divisions (d). The 3750 defaults to 3000 counts or less resolution. The message display reads "COUNT BY". The numeric display indicates the calculated "d" value. Use the **UP** key to decrease resolution (increase the count-by). Use the **DOWN** key to increase resolution (decrease the count-by). Increments are in a 1-2-5 sequence.

In this example we'll change the scale divisions to 0.1 kg ***NOTE*** *: MSI does not recommend increasing the resolution beyond 12500 counts. You can determine resolution by dividing the capacity by the count by. For example, a 250 kg capacity scale with a count by of 0.02 kg would have 12500 counts (250/.02). Going beyond 12500 counts can cause noisy readings. Most Strain Gage based Load Cells Scale Systems are best suited for resolutions of 10,000 counts or lower.*

10) Push **ENTER** when the desired scale division is displayed.

11) Next, the MSI 3750 prompts you to enter the "GAIN". Use the **UP** or **DOWN** or numeric keys to select the range which matches the mV/V of your load cell.

If you can load the scale to capacity, use the Bar Graph as an indication. Increase the Gain until the display indicates "OVER RNG", then back down one step. If you cannot load the scale to capacity, use the gain table to set the gain. This table cannot be absolutely correct due to variations in offsets and dead loads and is



intended only as a guide. If the gain is set too high it can be corrected later. The gain setting must be made properly to ensure that there is an adequate number of A/D counts. Too low a setting can result in linearity or noise problems. Too high a setting will cause the A/D to over range prematurely.

12) When the proper gain is displayed push **ENTER**.

13) Zero Calibration – The message reads "Ø SCALE". Remove all weight from the scale.

14) When the load receptor is stable push **ZERO** or **ENTER**. The display reads "CAL'ING". Wait for about 5 seconds. If the detected zero weight is within acceptable limits the message "WEIGHT" will appear.

The bargraph indicates relative A/D counts. With exactly zero volts input it will indicate 50%. Readings from 10% to 60% are fine for cal. Readings above 60% are too high and should be corrected with Coarse Zero.

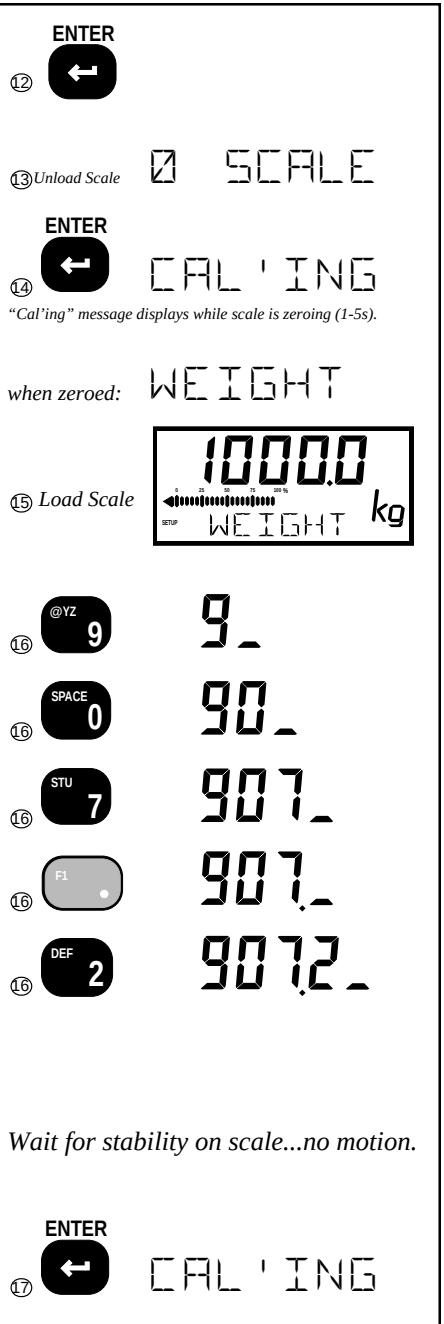
15) Span Calibration – The 3750 can be calibrated with any in span test weight from 20% to 100% of capacity.Place the calibration weight on the load receptor.

MSI suggests that an ideal test weight is equal to capacity, but any weight ≥ 20% of capacity will suffice. The bargraph again indicates relative A/D counts. With full scale span input the bargraph should indicate at least 20% above the zero reading. If this is not true, go to "INIT CAL" and increase the Gain.

16) Next, you will need to input the exact value of your calibration weight using the numeric keys.

In this example, we show calibrating out 1000kg capacity scale with a Test Weight certified at 2000 lb. Since 2000 lb is equal 907.2 kg (2000.4536) we'll use 907.2 here.*

17) Once the weight on the load receptor is



stable, push **ENTER**. The message "CAL'ING" appears. The 3750 checks to see if the weight data is within acceptable limits.

18) If all the Span parameters were OK, the message will read "CAL OK" then "STORING". Calibration is complete, push **EXIT** to return to normal scale operation, or push **UP/DOWN** to choose another Calibrate Setup function. Seal the calibration port.

Gain Table

Load Cell Output Range	*Gain*
<.65 mV/V	8
.65 to .90	7
.90 to 1.25	6
1.25 to 1.8	5
1.8 to 2.6	4
2.6 to 3.6	3
3.6 to 5.2	2
5.2 to 7.3	1

TO ENABLE/DISABLE AZM (AUTO ZERO MAINTENANCE)

Auto Zero Maintenance is used to adjust out variations at zero caused by debris or water on the scale, temperature drift, and any other minor variation that affects the zero setting. Typically AZM is set to 0.5d or 1d, which is adequate for most modern scale systems. The 3750 allows for a much greater AZM range (non legal for trade scales only) for unique applications. Use this feature cautiously as it can zero out large quantities automatically.

An example of where this can be advantageous is when packing produce, there is some variation in the weight of the packing boxes. By setting the AZM to equal the largest variation in box weight, the error in weight caused by the box can be eliminated. The key to making this work is that the first amount of produce placed in the box has to weigh more than the AZM range so that the produce isn't also zeroed out.

Note: Before starting the following procedure, you must be in the Top Menu Level of Calibration. See "Enable Calibration".

Enable/Disable AZM (Auto Zero Maintenance)

1) Use the **UP** or **DOWN** scroll key to scroll to the “AZM” message.

2) Press **ENTER** to access the AZM submenu.

3) Change AZM to “DISABLED” or “ENABLED” as desired. using the **UP** or **DOWN** key.

4) Push **ENTER.**

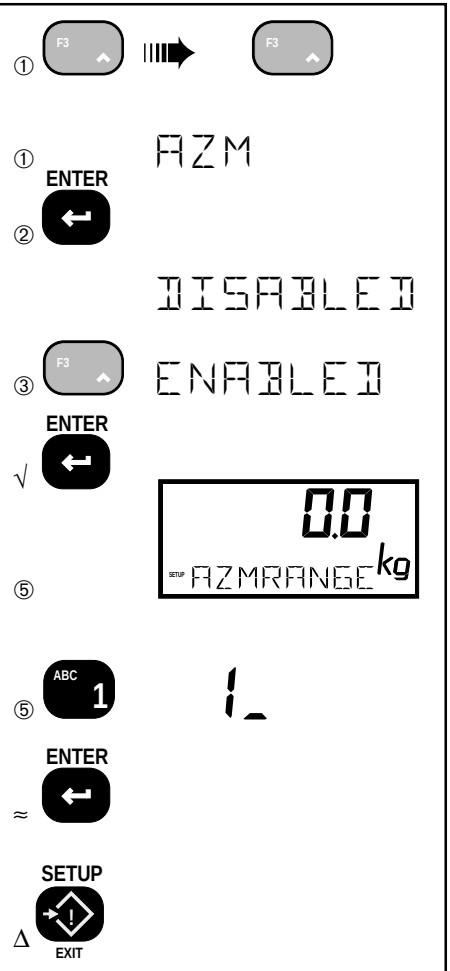
5) If you selected “ENABLED” in the previous step the “AZMRANGE” screen will appear. Use the numeric keys to input the weight range the system can zero out automatically. Use “0” for standard AZM operation. This sets the AZM window at ±0.5d.

   In this example, we’ll enter ±1kg as the AZM range.

   Note: The AZM ± range is limited to a maximum of 255 `d`. If you exceed this range, the 3750 will return the error message “TOO BIG”.

6) After keying in the desired AZM range, push **ENTER**.

7) Push **EXIT** to return to normal scale operation, or push **UP** or **DOWN** to choose another Calibrate Setup function.



Note: In Legal-for-Trade systems the width of AZM can not be adjusted.

CAUTION

Disabling Auto Zero Maintenance will degrade temperature and drift performance of the MSI 3750. Also use caution in setting the AZM window too large. This can cause the scale to zero unexpectedly. MSI recommends keeping AZM below 5d for most applications.

TO ADJUST THE MOTION BAND

The motion band determines the range of weight variation that the indicator considers to be stable weight. Since the 3750 will not zero or tare a value in motion, the motion band directly influences the accuracy of the scale system. The motion band in Legal-For-Trade systems is fixed at ≤ 0.6d and cannot be altered. In systems used for industrial applications, the motion band can be adjusted larger. Adjusting the motion band larger can help in medium accuracy applications where there is a lot of vibration or noise and it is difficult to hold the weight steady enough to tare, zero, or total. For example, setting the motion band to 5 d would allow a tare (or zero or total) to be as much as 5d off of its ideal value but it will make the indicator easier to use as you don't have to wait until the weight is completely stable.

Note: Before starting the following procedure, you must be in the Top Menu Level of Calibration. See "Enable Calibration".

1) Use the **UP** or **DOWN** scroll key to scroll to the "MOTNBAND" message.

2) Press **ENTER** to access the Motion Band Submenu .

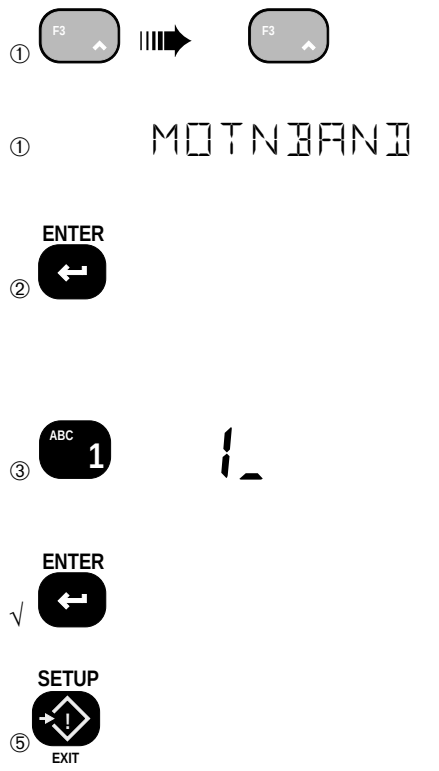
3) The "MOTNBAND" screen will appear. Use the numeric keys to input the weight range the system uses to detect Motion. Use "1" for standard operation. This sets the Motion Band to ±1d.

   In this example, we'll enter ±1d as the Motion Band.

   Note: The Motion Band ± range is limited to a maximum of 255 `d`. If you exceed this range, the 3750 will return the error message "TOO BIG". Setting the Motion Band to 0 is equal to a range of ±0.5d.

4) After entering the desired motion band, push **ENTER**.

5) Push **EXIT** to return to normal scale operation, or push **UP** or **DOWN** to choose another Calibrate Setup function.

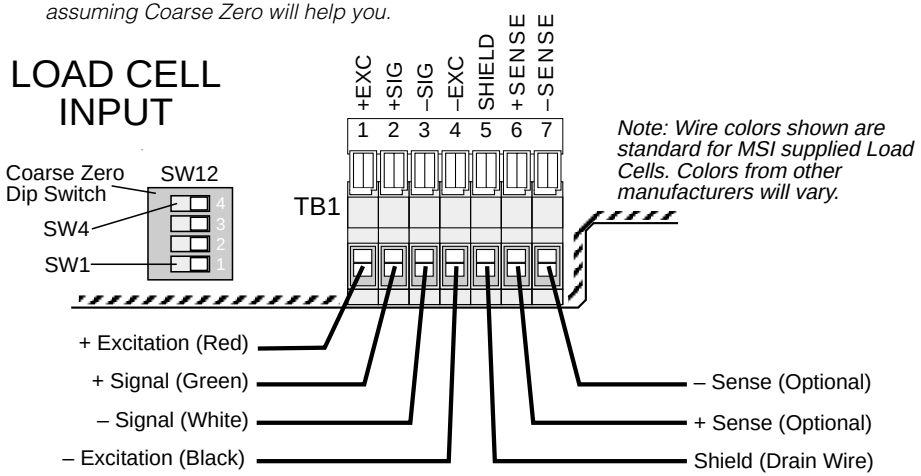


Note: In Legal-for-Trade systems the Motion Band can not be adjusted.

COARSE ZERO

Scales that have large dead loads or have large initial positive offset can often take away a large portion of the available A/D counts. Scales can also have large negative offset that keep the A/D under ranged. Use the Coarse zero dip switch to restore A/D range by offsetting the A/D positive or negative. One indication that the offset is too large is the Bar Graph during calibration. With no load on the platter, if the Bargraph is more than 3/4 scale the system should be offset negatively. If the bargraph is less than 2 segments on the left, the system should be offset positively. For best results, the bargraph should indicate zero load at between 2 segments (10%) and 12 segments (60%). This leaves plenty of range for the A/D converter to calibrate. Coarse zero interacts with gain. It may be necessary and desirable to change the gain up or down after the coarse zero is changed.

Note: The use of Coarse Zero is usually not necessary. This procedure should not be used routinely. This is intended only for hard to calibrate situations where dead load or severe zero shift has occurred. Check the scale for damage or misadjusted stops before assuming Coarse Zero will help you.



Setting the Coarse Zero DIP Switch

1) Unplug the 3750and remove the front panel screws. The Coarse Zero DIP Switch is a very small surface mount switch located next to the orange Load Cell Input Block. It may be necessary to remove the orange Kapton cover from the DIP Switch. Use a pick or other sharp object to change the DIP Switch settings.
2) If the offset is positive (at zero load the Bargraph is >50%), turn on SW4. If the offset is negative (at zero load the Bargraph is under 10%), turn on SW3. Do not have both SW3 and SW4 on at the same time. *Turning both on will not damage the scale, but the*

scale will not weigh. This is equivalent to shorting out the signal leads.

3) SW1 and SW2 switch in offsetting resistors. The offset can be overcome with combinations of SW1 and SW2. Use the following table for guidance while watching the bargraph in the calibrate zero step. Note in the table that "-50%" indicates that the offset will be reduced by 50%. Therefore use -50% for scales that have positive offset. The percentage is approximate and depends on the actual mV/V of the load cell.

~% Offset	*SW1*	*SW2*	*SW3*	*SW4*
-50%	Off	On	Off	On
-100%	On	Off	Off	On
-150%	On	On	Off	On
+50%	Off	On	On	Off
+100%	On	Off	On	Off
+150%	On	On	On	Off
No Change	X	X	Off	Off

x= don't care

4) Once the offset has been overcome and the bargraph at zero load shows a reading from 10% to 60%, proceed at step 8 of the Init Cal Procedure.

RAW COUNTS

The 3750 uses a 20 bit A/D converter to measure and convert the output from load cells. It is sometimes useful see the "Raw Counts" of the A/D to ensure system functionality. A very useful application of Raw Counts is in balancing multiple load cells with summing boxes. Raw counts are displayed divided by 10 so that 50000 raw counts displayed is equal to 500000 internal counts.

The following procedure will erase any calibrations and Scale setups. Following the use of Raw Counts, the user must perform an "INIT CAL" procedure. If you wish to use Raw Counts, do it before calibrating the system.

Displaying Raw A/D Counts

1) First follow the "RESET CAL" procedure.
2) Next follow the "INIT CAL" procedure completing all the steps up to and including step 6. Be sure you set the appropriate gain for your load cell(s).
3) Now instead of Zeroing the Scale, push the **EXIT** key twice. The

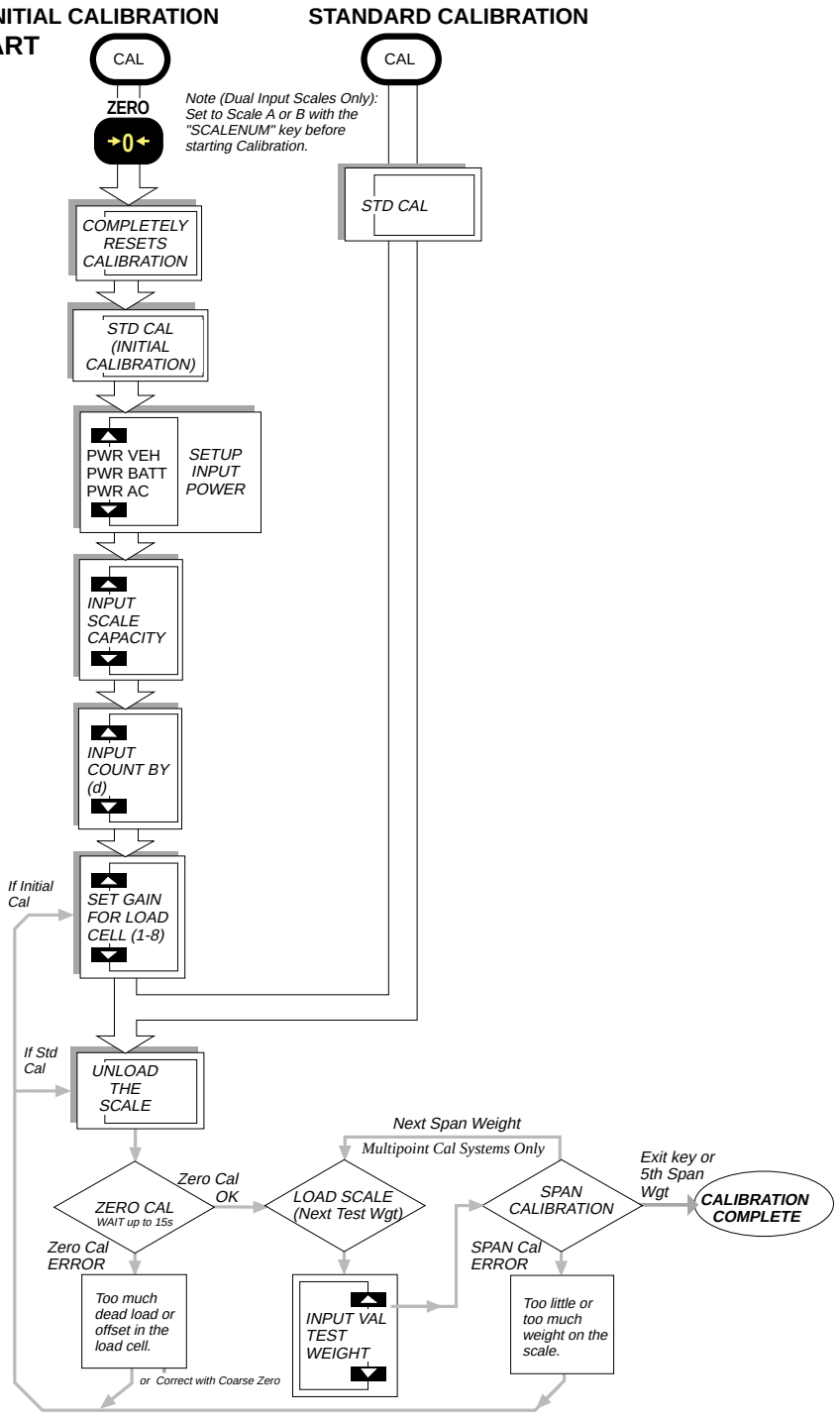
message display will read “UNCAL’ED” and the numeric display will read the weight in “Raw Counts” (internal A/D counts divided by 10).

Note: Due to the very high resolution of “Raw Counts”, the display can and will exhibit unstable readings with typical mechanical scale systems. This is not indicative of any problem with the Meter or the load receptor. The sensitivity of the display is dependent on the mV/V output of the load cell(s) and the Gain set in “INIT CAL”.

Using Raw A/D Counts to Balance Multiple Load Cells connected by a Summing Box

1) Use the preceding procedure to set the 3750 into Raw Counts.
2) Turn all the pots of the summing box fully clockwise to maximize the load cell outputs.
3) Load each load cell as independently as possible and determine which load cell has the lowest output in Raw Counts. Note the reading of the lowest output load cell. This is the reference load cell.
4) Load, in sequence, the higher output load cells as independently as possible. Adjust the corresponding pot for each load cell to match the noted reading of the lowest load cell.
5) Load the reference load cell with the test load again. Note the new value.
6) Repeat steps 4 and 5 until no further adjustment is required. Remember that Raw Counts is typically 10 times the resolution displayed so don’t worry about getting the readings exact.
7) Once the readings have converged, enable Calibration and calibrate the system with the “Init Cal” procedure.

CALIBRATION FLOWCHART



APPENDIX A - SPECIFICATIONS & OPTIONS

SPECIFICATIONS

Accuracy
- HB-44 Class III/IIIL

Maximum Resolution
- 12,500 displayed counts
- 1,048,576 counts internal (20 bit)

Standard Industrial Resolution
- Up to 10000 displayed counts, Class III or IIIL

Load Cells
- Will drive up to 8 350Ω cells.

Sensitivity
- .3 microvolt per displayed digit minimum. Suitable for load cells from .6mV/V to 7mV/V.

Drift
- Zero: <5PPM/°C Span: <15PPM/°C

Capacity
- Any capacity can be specified up to 999,999 units (lb, kg, tons, etc.)

Over Capacity
- Indicates “ERROR OVERLOAD” when the set capacity is exceeded by 8 ‘d’.

Increments (d)
- Programmable to multiples or sub-multiples of X1, X2, X5 down to X0.0001

Display
- 6 digit .9"/23 mm numeric weight LC display
- 8 digit 0.45"/11 mm alphanumeric LCD (message / units display)
- 21 Segment Bargraph for process control % indications, also used for level indications on the MSI Forklift Scale (LFT versions)
- Anunciators for measurement modes
- Sunlight visible LED indicator for Totalization, Set Points 1 and 2
- Photocell activated fiber-optic LED backlighting

Filtering
- 6 pole digital filtering, Low, Medium, High

Power
- 90 to 125VAC, or 180 to 250 VAC 48 to 400 Hz <3VA
- Or battery operated with 2 standard D Cells
- DC operated from 12 to 56 V (vehicle option)

Battery Operating Time
- 400 hours (2000Ω gages) or 100 hours (350Ω gages) typical with occasional use of the LCD backlight . Typically 100 hours (2000Ω gages) with continuous use of backlight (on low setting).

Temperature Range

- -10° C to +40°C NTEP certified range
- -20° C to +60°C Operating (-4°F to 140°F)
- -40°C to +80°C Storage (-40°F to 176°F)

Enclosure

- NEMA 4, Alodined and powder coated cast aluminum

Calibration

- Fully digital

Warranty

- One Year

OPTIONS

- NTEP certification and OIML legal-for-trade approved (approvals pending). Contact factory for US and International specifications. Class III / IIIL
- 2nd Isolated RS-232/RS-485 w/ Set Point Relays

  Note: The 3750 comes standard with 1 Comm Port built in. Set Points are also standard, but relay outputs require this option.

  Isolated 2 way RS-232 communications can interface the 3750 to a remote printer, scoreboard, or computer. Requires cable. RS-485 output provided for networking or driving long cables (up to 4000' or 1300 m). The Set Point relays provide up to 8 set point outputs for interfacing to external devices such as warning lights, process relays, or sirens. 7 SPDT (form C) 1A/ 115VAC relays are provided internal to the 3750 meter for direct set-point interfacing. The 8th output is a TTL compatible Logic output. Connections are made through liquid tight feedthrough connectors to screw terminal blocks.
- Statistics Package

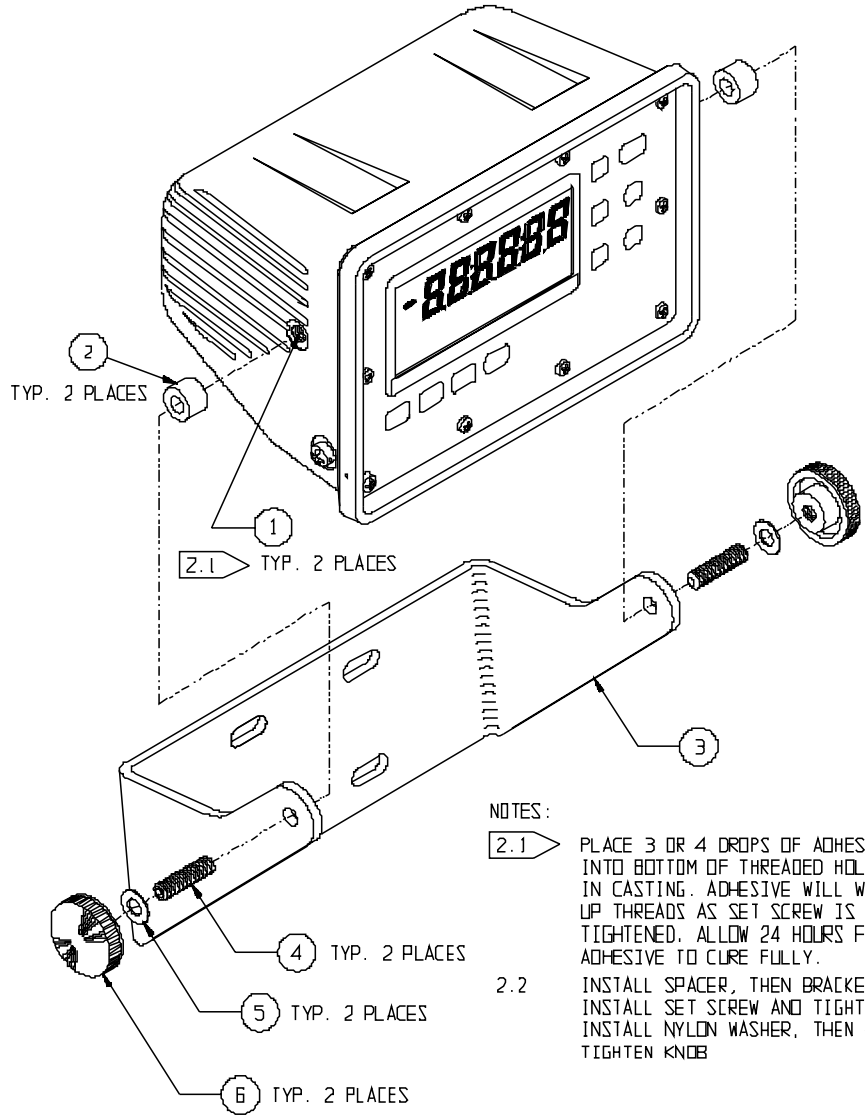
  Adds complete statistics package for up to 350 ID codes (depends on expansion memory). Each ID Code stores and computes Standard Deviation, Coefficient of Variance, Max., Min., and Average. In addition, a grand total is kept of all ID Codes. The Statistics option is available in two versions. Version 1 is expandable to a maximum of 190 ID codes. Version 2 is expandable to 350 ID codes but does not have the 20 byte ID strings. Please specify.
- Dual Load Cell Option (ABC Scale)

  Provides a second independent A/D converter that will read a second weight receptor. Provides A, B, A-B, and A+B capability. The Set Points can be assigned to either input or the sum of inputs allowing process controls on two scales simultaneously. This feature should not be confused with Weigh Meters that have multiple inputs that switch between inputs. The 3750 converts two scales independently and can check against set points even

while looking at only one of the two scale inputs.

- Expanded ID Memory - 8k or 16k
  Expands the ID memory from 12 ID codes to 120 or 240 ID codes (Statistics Option units from 12 to 95, 190 or 350). Each ID code has an 8 character name, and stores independently units, tare, display mode, two 20 byte print strings, and total with weighments counter.
- Audible Set Points Indicator
  Coupled with the internal Set Points, an overload alarm can sound at any weight. Can also be used for accept or an out-of-limits indicator for blind check-weighing. Compatible with AC or battery powered units.
- Aux. Digital Inputs
  Any key or all keys can be duplicated external to the meter. Factory set for TOTAL. Can be changed by special order.
- Mounting Bracket
  For Wall or Bulkhead Mounting. 180° Swing

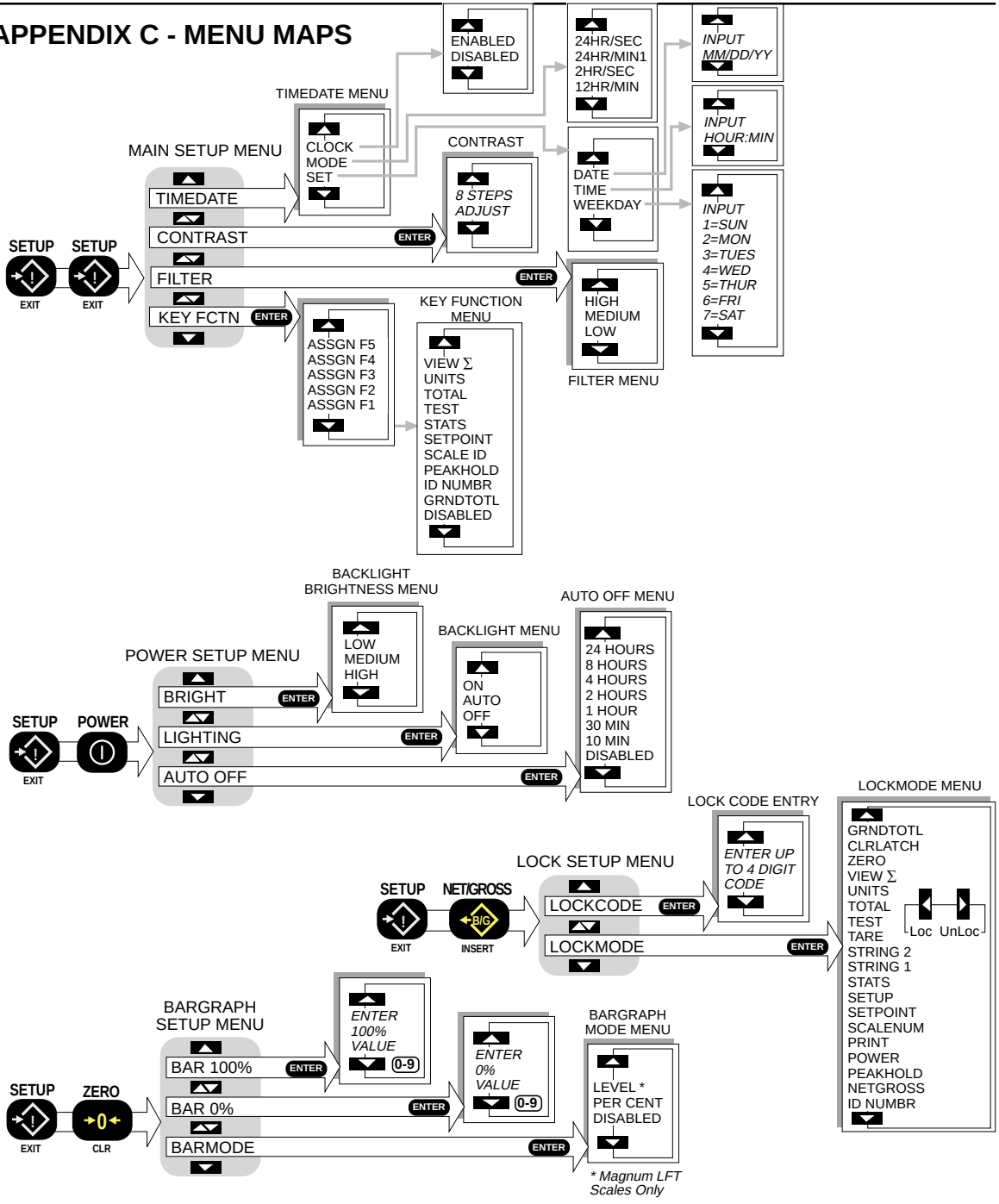
METER MOUNTING BRACKET

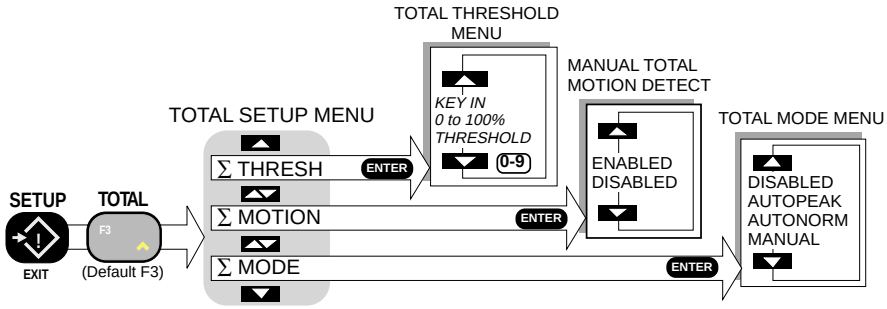


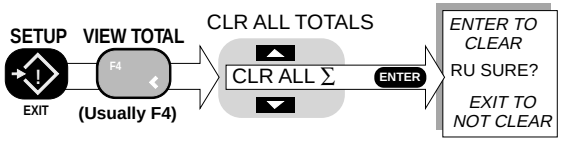
APPENDIX B - ASCII TABLE

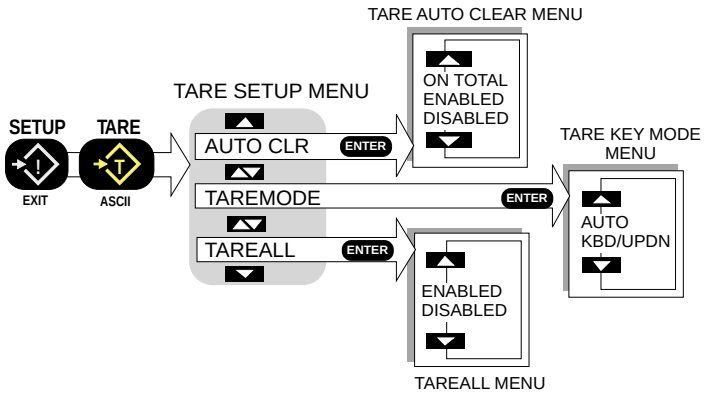
DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR
0	00	^@ NUL	32	20	SPC	64	40	@	96	60	`
1	01	^A SOH	33	21	!	65	41	A	97	61	a
2	02	^B STX	34	22	“	66	42	B	98	62	b
3	03	^C ETX	35	23	#	67	43	C	99	63	c
4	04	^D EOT	36	24	$	68	44	D	100	64	d
5	05	^E ENQ	37	25	%	69	45	E	101	65	e
6	06	^F ACK	38	26	&	70	46	F	102	66	f
7	07	^G BEL	39	27	‘	71	47	G	103	67	g
8	08	^H BS	40	28	(	72	48	H	104	68	h
9	09	^I HT	41	29	)	73	49	I	105	69	i
10	0A	^J LF	42	2A	*	74	4A	J	106	6A	j
11	0B	^K VT	43	2B	+	75	4B	K	107	6B	k
12	0C	^K FF	44	2C	,	76	4C	L	108	6C	l
13	0D	^M CR	45	2D	-	77	4D	M	109	6D	m
14	0E	^N SO	46	2E	.	78	4E	N	110	6E	n
15	0F	^O SI	47	2F	/	79	4F	O	111	6F	o
16	10	^P DLE	48	30	0	80	50	P	112	70	p
17	11	^Q DC1	49	31	1	81	51	Q	113	71	q
18	12	^R DC2	50	32	2	82	52	R	114	72	r
19	13	^S DC3	51	33	3	83	53	S	115	73	s
20	14	^T DC4	52	34	4	84	54	T	116	74	t
21	15	^U NAK	53	35	5	85	55	U	117	75	u
22	16	^V SYN	54	36	6	86	56	V	118	76	v
23	17	^W ETB	55	37	7	87	57	W	119	77	w
24	18	^X CAN	56	38	8	88	58	X	120	78	x
25	19	^Y EM	57	39	9	89	59	Y	121	79	y
26	1A	^Z DUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	^ [ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	^ \ FS	60	3C	<	92	5C	\	124	7C	|
29	1D	^ [GS	61	3D	=	93	5D	]	125	7D	}
30	1E	^ ^ RS	62	3E	>	94	5E	^	126	7E	~
31	1F	^ _ US	63	3F	?	95	5F	_	127	7F	DEL

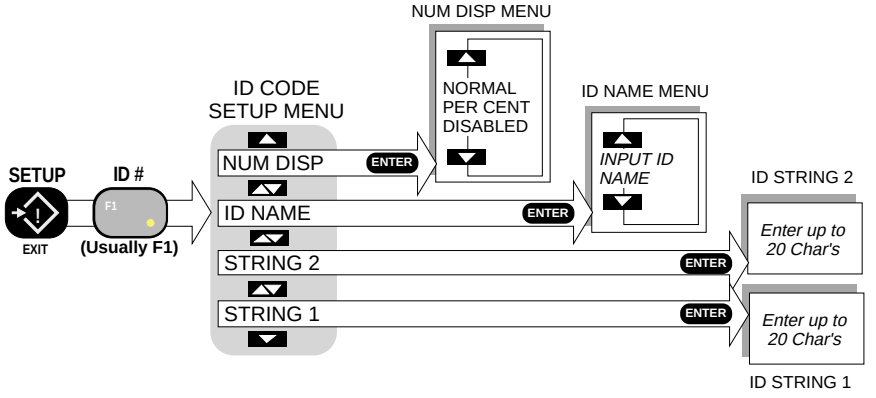
APPENDIX C - MENU MAPS

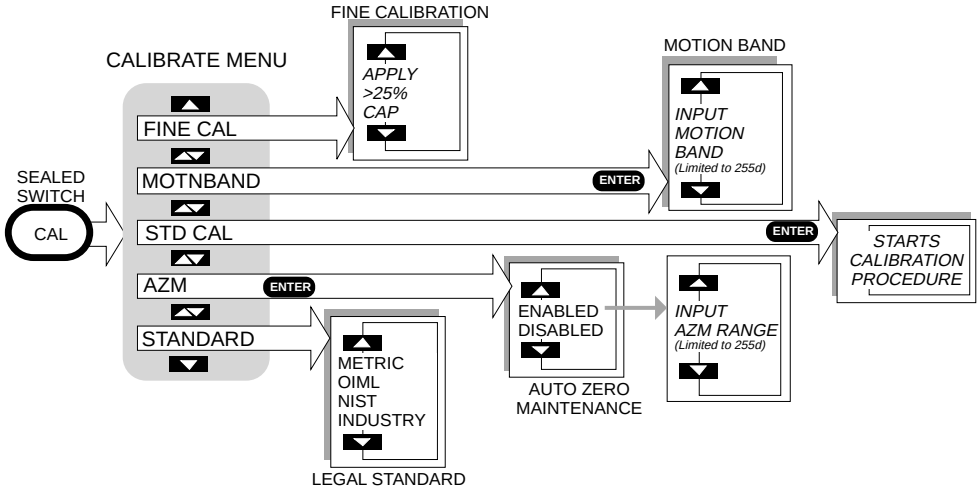


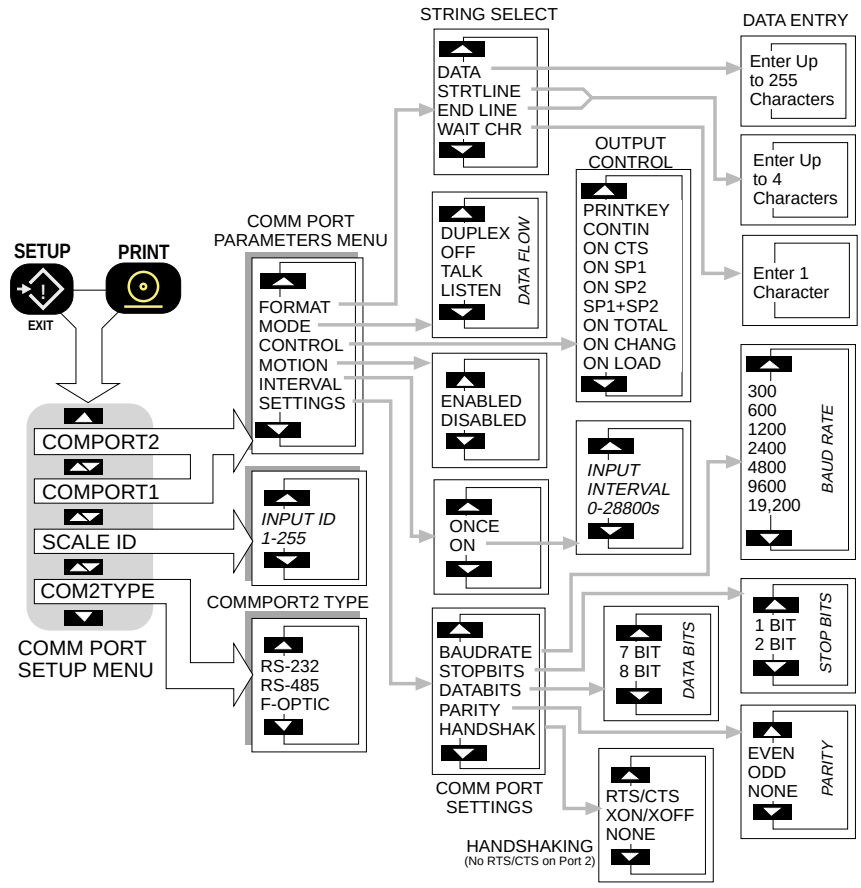

TOTAL THRESHOLD MENU
MANUAL TOTAL MOTION DETECT
TOTAL SETUP MENU
KEY IN 0 to 100% THRESHOLD
0-9
ENABLED DISABLED
TOTAL MODE MENU
DISABLED AUTOPEAK AUTONORM MANUAL
SETUP
TOTAL
F3
EXIT
(Default F3)
Σ THRESH
ENTER
Σ MOTION
ENTER
Σ MODE
ENTER

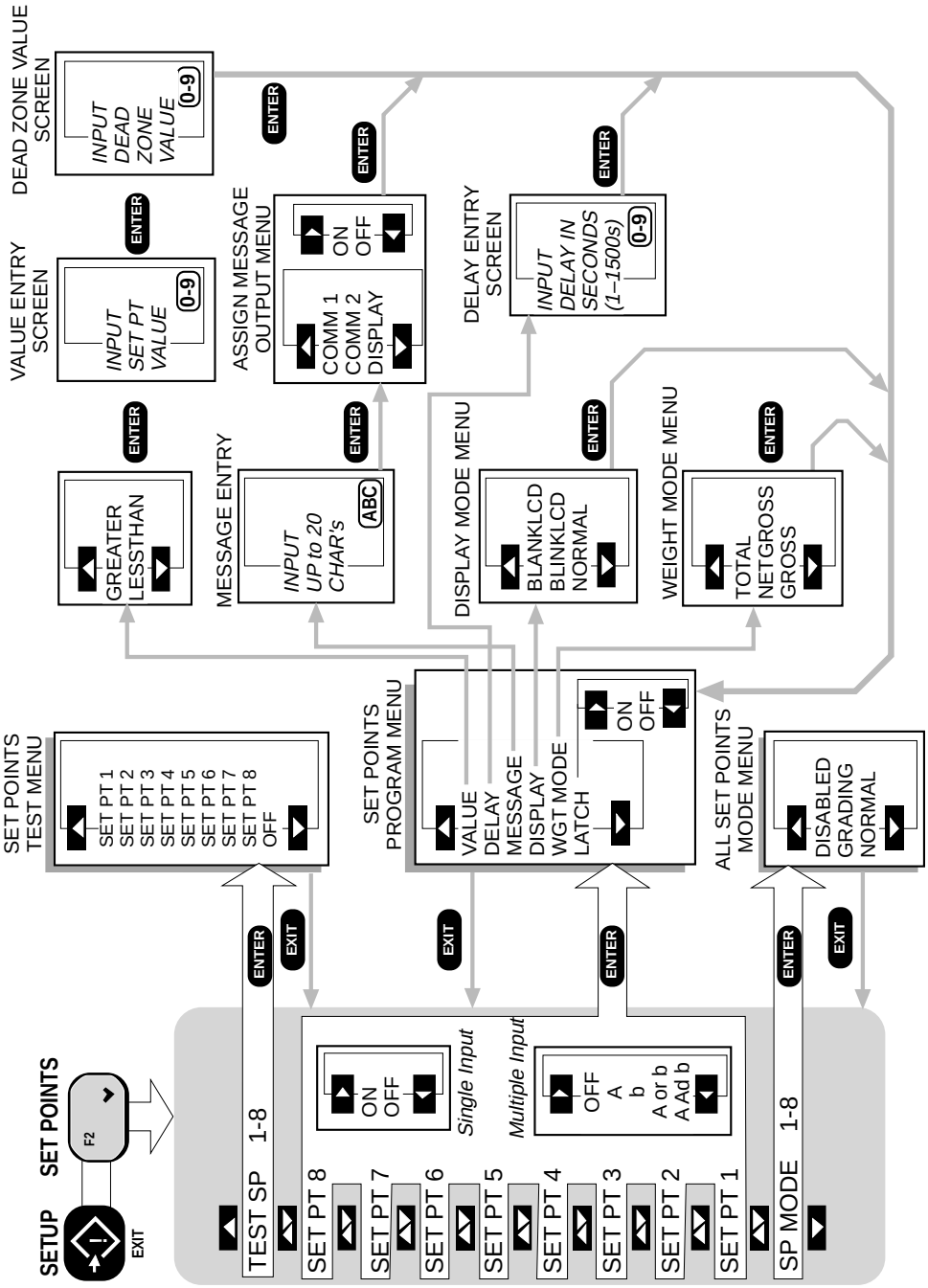

CLR ALL TOTALS
SETUP
VIEW TOTAL
F4
EXIT
(Usually F4)
CLR ALL Σ
ENTER
ENTER TO CLEAR
RU SURE?
EXIT TO NOT CLEAR


TARE AUTO CLEAR MENU
TARE SETUP MENU
ON TOTAL ENABLED DISABLED
SETUP
TARE
EXIT
ASCII
AUTO CLR
ENTER
TARE KEY MODE MENU
TAREMODE
ENTER
AUTO KBD/UPDN
TAREALL
ENTER
ENABLED DISABLED
TAREALL MENU


NUM DISP MENU
ID CODE SETUP MENU
NORMAL PER CENT DISABLED
ID NAME MENU
SETUP
ID #
F1
EXIT
(Usually F1)
NUM DISP
ENTER
INPUT ID NAME
ID STRING 2
ID NAME
ENTER
Enter up to 20 Char's
STRING 2
ENTER
STRING 1
ENTER
Enter up to 20 Char's
ID STRING 1

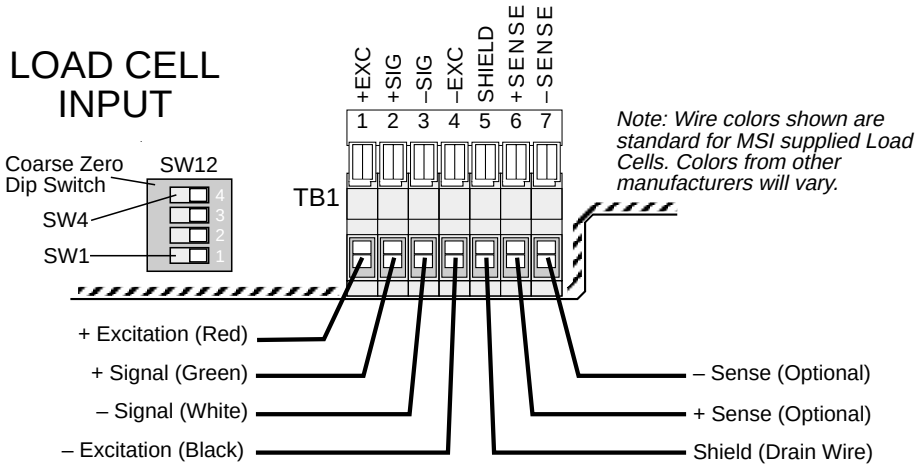

FINE CALIBRATION
CALIBRATE MENU
APPLY >25% CAP
MOTION BAND
INPUT MOTION BAND (Limited to 255d)
SEALED SWITCH
CAL
FINE CAL
MOTNBAND
ENTER
STD CAL
ENTER
STARTS CALIBRATION PROCEDURE
AZM
ENTER
ENABLED DISABLED
INPUT AZM RANGE (Limited to 255d)
AUTO ZERO MAINTENANCE
STANDARD
METRIC OIML NIST INDUSTRY
LEGAL STANDARD


STRING SELECT
DATA ENTRY
DATA
STRTLINE
END LINE
WAIT CHR
Enter Up to 255 Characters
Enter Up to 4 Characters
Enter 1 Character
OUTPUT CONTROL
PRINTKEY
CONTIN
ON CTS
ON SP1
ON SP2
SP1+SP2
ON TOTAL
ON CHANG
ON LOAD
COMM PORT PARAMETERS MENU
SETUP
PRINT
EXIT
DUPLEX
OFF
TALK
LISTEN
DATA FLOW
FORMAT
MODE
CONTROL
MOTION
INTERVAL
SETTINGS
ENABLED DISABLED
INPUT INTERVAL 0-28800s
ONCE
ON
300
600
1200
2400
4800
9600
19,200
BAUD RATE
COMPORT2
COMPORT1
SCALE ID
COM2TYPE
INPUT ID 1-255
COMMPORT2 TYPE
RS-232
RS-485
F-OPTIC
COMM PORT SETUP MENU
BAUDRATE
STOPBITS
DATABITS
PARITY
HANDSHAK
7 BIT
8 BIT
DATA BITS
1 BIT
2 BIT
STOP BITS
EVEN
ODD
NONE
PARITY
COMM PORT SETTINGS
RTS/CTS
XON/XOFF
NONE
HANDSHAKING
(No RTS/CTS on Port 2)

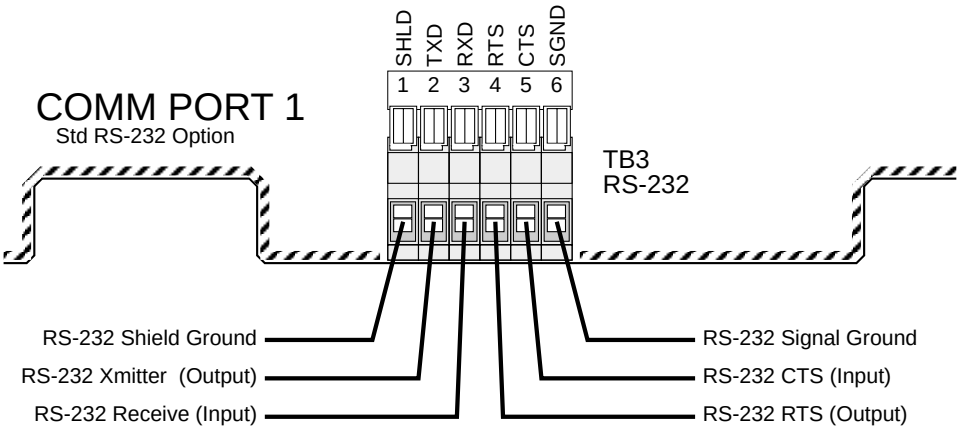

SETUP
SET POINTS
F2
EXIT
TEST SP 1-8
SET PT 8
SET PT 7
SET PT 6
SET PT 5
SET PT 4
SET PT 3
SET PT 2
SET PT 1
SP MODE 1-8
ON
OFF
Single Input
OFF
A
b
A or b
A Ad b
Multiple Input
ENTER
EXIT
SET POINTS TEST MENU
SET PT 1
SET PT 2
SET PT 3
SET PT 4
SET PT 5
SET PT 6
SET PT 7
SET PT 8
OFF
SET POINTS PROGRAM MENU
VALUE
DELAY
MESSAGE
DISPLAY
WGT MODE
LATCH
ON
OFF
ALL SET POINTS MODE MENU
DISABLED
GRADING
NORMAL
VALUE ENTRY SCREEN
INPUT SET PT VALUE
0-9
GREATER
LESSTHAN
MESSAGE ENTRY
INPUT UP to 20 CHAR's
ABC
ASSIGN MESSAGE OUTPUT MENU
COMM 1
COMM 2
DISPLAY
ON
OFF
DEAD ZONE VALUE SCREEN
INPUT DEAD ZONE VALUE
0-9
DISPLAY MODE MENU
BLANKLCD
BLINKLCD
NORMAL
DELAY ENTRY SCREEN
INPUT DELAY IN SECONDS (1–1500s)
0-9
WEIGHT MODE MENU
TOTAL
NETGROSS
GROSS

APPENDIX D - WIRING CONNECTIONS

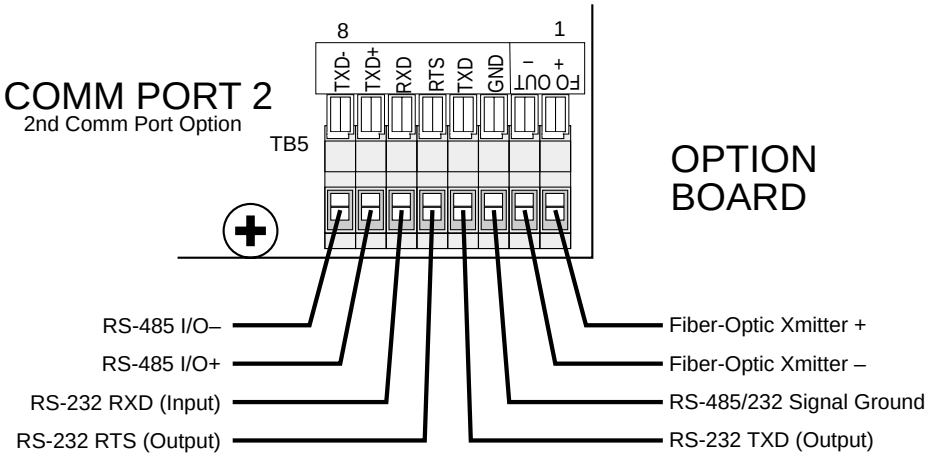
LOAD CELL CONNECTIONS



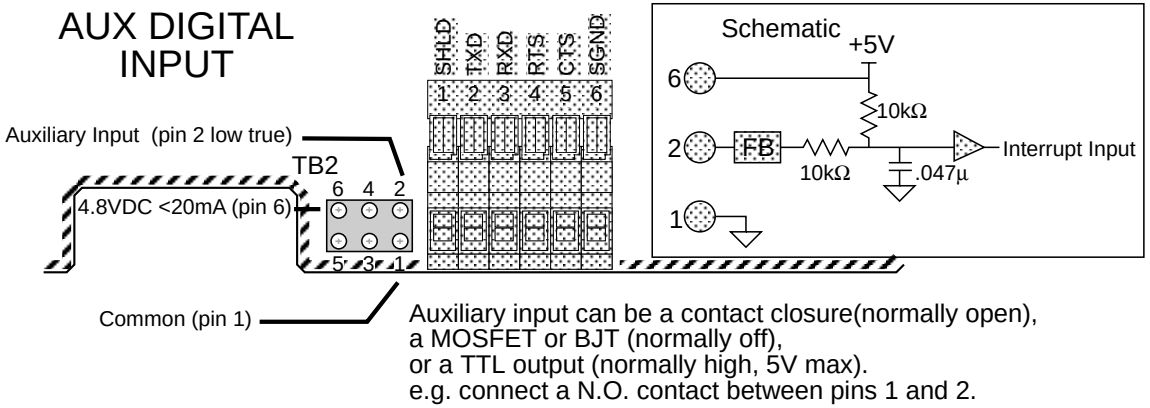
RS-232 CONNECTIONS



2ND COMM PORT & RS-485 CONNECTIONS

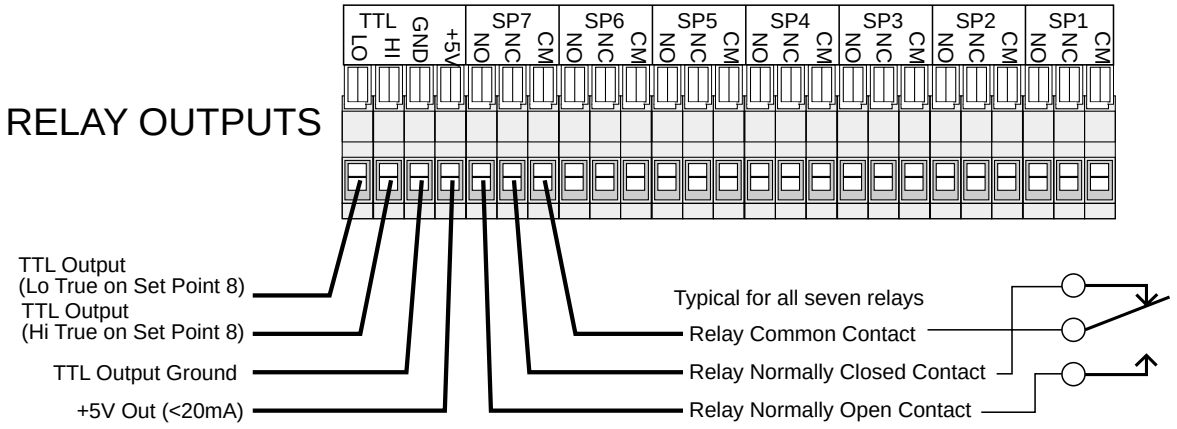


AUXILIARY DIGITAL INPUT



Auxiliary input can be a contact closure(normally open),
a MOSFET or BJT (normally off),
or a TTL output (normally high, 5V max).
e.g. connect a N.O. contact between pins 1 and 2.

RELAY OPTION BOARD CONNECTIONS



THE MSI LIMITED WARRANTY

MEASUREMENT SYSTEMS INTERNATIONAL, INC. (the Company), WARRANTS load sensing elements and meters against defects in workmanship and materials for a period of one year from date of purchase and warrants electrical cables and batteries against the same defects for a period for ninety (90) days from date of purchase.

Any device which proves defective during the warranty period will be replaced or repaired at no charge provided that the defective device is returned to the Company freight prepaid.

In no event shall the Company be liable for the cost of any repairs or alterations made by others except those repairs or alterations made with its specific written consent, nor shall Measurement Systems International be liable for any damages or delays whether caused by defective workmanship, materials or otherwise.

The Company shall not be liable for any personal injury or property damage resulting from the handling, possession or use of the equipment by the customer.

The warranty set forth herein is exclusive and is expressly in lieu of all other warranties, express or implied, including without limitation any implied warranties of merchantability or fitness, or of any other obligations or liability on the part of the Company.

The liability of the Company under this warranty is limited solely to repairing or replacing its products during the warranty periods; and the final judgement and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

MADE IN THE USA

Printed in U.S.A.
PUB225-10-96B

Measurement Systems
INTERNATIONAL

14240 INTERURBAN AVENUE SOUTH
SEATTLE, WASHINGTON 98168-4660 U.S.A.
206-433-0199 • FAX: 206-244-8470
Web: www.msiscales.com • Email: info@msiscales.com