MSI 6000

CHECKWEIGH & BENCH SCALE
INCLUDING MSI-6000 MC
MOTION-COMPENSATED SCALE

User Guide

Quality Industrial Weighing and Force Measurement Equipment

Measurement Systems International

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SECTION 1 - INTRODUCTION

The Measurement Systems International 6000 Check-Weigh series represents a new level of technology and performance in the Scale Industry.

The MSI 6000 comes with up to 199 (12 standard) user defined target settings organized into “Product Codes”. Each product code has a user defined name (8 characters), target accept ranges, bargraph sensitivity adjustment, two 20 byte print strings, and a separate totalize register. The optional statistics package adds min, max, average, standard deviation, and coefficient of variance for each product code.

A 16 bit Microcontroller coupled with an alphanumeric display gives unprecedented versatility and ease of programming.

In battery powered applications, advanced power saving circuitry provides up to 400 hours of operating time from 3 ordinary D cell alkaline batteries.
The large alphanumeric LCD provides precise, unambiguous display of operating modes and check weighing setup menus. Digital calibration makes maintaining the scale a snap, and the sprayproof, waterproof construction makes for a rugged and reliable scale.

The RS-232 option provides the most powerful printer interface yet devised for driving barcode printers directly. In addition, all functions of the 6000 are controllable remotely allowing downloading of target values, print functions and user lockout modes. An optional I/O card provides set points and an additional isolated RS-232 port or RS-485 port. The MSI6000 meets or exceeds the requirements of all regulatory agencies.

Also available is the Measurement Systems International 6000MC Motion Compensated Check-Weigh. The MSI6000MC can be used reliably under conditions that would render a conventional scale useless. The MSI6000MC is ideal for use on shipboard for processing and packaging. This is not just a filtering technique. A second compensating load cell is used in combination with special real-time software that can correct for the effects of acceleration, deceleration, and tilting caused by normal and adverse sea conditions.

SYSTEM INSTALLATION

1) Assembly: Attach the neck with the supplied hardware. Make sure the neck does not bind on the scale surface before tightening.
2) Working Surface: Install the scale on a level, flat, and rigid surface. (MC scales should be installed on a rigid surface, but can tolerate tilt and typical shipboard vibration).
3) Leveling: Insure that all four adjustable feet are in contact with the working

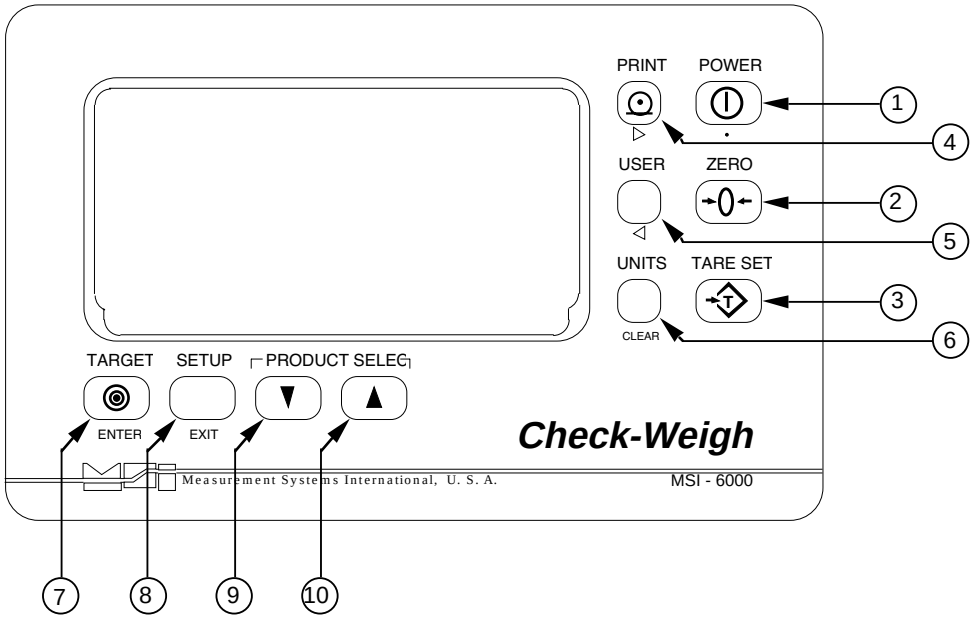
surface. If the scale tips corner to corner, adjust the feet by loosening the lock nuts and turning the foot until level. There is a bubble level under the platform to assist in leveling the 6000. The MSI-6000 must be leveled to achieve its rated accuracy. (MC units remain accurate for tilt up to 10 degrees.)

4) Overload Stops: The MSI-6000 is provided with oveload protection which prevents damage to the load cell during inadvertant overload conditions. Overload stops are set at the factory and should not need adjustment during setup. The stops should not be screwed down as this may damage the load cell.

5) Cabling: For RS-232 or Set Point equipped units, refer to Appendix C for details of the terminal blocks. Further information can be found in Sections 8 (Set Points) and 9 (RS-232). Use only round jacketed cable to ensure a water tight seal on the cable glands.

Caution: The MSI-6000 is a sensitive electronic instrument. Impact loading should be avoided. The scale should never be lifted by the upper support member (Spider assembly), as the load cell may be damaged. Always lift the MSI-6000 using the lower spider.

QUICK KEYBOARD OPERATION OVERVIEW



Scale Functions:

1) POWER
Turns the MSI Model 6000 On and Off.

2) ZERO
Used to zero out the scale platter.
3) TARE SET
Used to “Tare” out package or container weight for NET weight measurements. When in NET mode, pushing the TARE SET key will display the current Tare value for 2 seconds. Push the CLEAR key (UNITS) during the Tare value display to return to the GROSS mode.
4) PRINT (RS-232 option only)
Used to output the current weight to externally connected devices such as printers or computers.
5) USER
The USER key is a multiple use key for user defined functions. The default function of the USER key is TEST.
6) UNITS
Changes measurement units. Pounds, kilograms, grams, ounces, and pounds - ounces are available. (Troy Oz by special order)

Checkweighing Functions:

7) TARGET
Sets the target weight used for checkweighing. Place a weight equal to the desired target weight and push TARGET.
8) SETUP
Combined with the TARGET and PRODUCT SELECT keys, the SETUP key allows changing the target weight parameters such as high low target limits and Bargraph sensitivity.
9) PRODUCT SELECT / DOWN
10) PRODUCT SELECT / UP
The MSI 6000 can have multiple Target setups. The UP/DOWN PRODUCT SELECT keys scroll between the available Product Codes. When in menus or number entry modes, the UP/DOWN keys are used for scrolling through menu choices or entering alphanumerics.

FEATURES

- Rugged, all stainless steel construction. All materials approved by the USDA for direct food contact. Complete hose down proof sealing ensures reliable operations under harsh conditions. The rugged stainless steel cabinet resists corrosive atmospheres and meets all requirements of NEMA 4X.
- Easy to set Target Weights with adjustable accept range and adjustable Bargraph resolution.
- Analog Bargraph provided for target over, under, and accept indication. In addition to the Bargraph OVER, UNDER and ACCEPT segments, the accept window is backlit with bright LED’s providing a simple go/no-go indication. The

accept window is red when OVER or UNDER (no go), and green when in the accept range (go).

- While Check weighing, weight can be displayed as Deviation from the Target weight, Per Cent Deviation from the Target weight, actual weight, or the weight display can be blanked out.
- The MSI 6000 stores Target weights along with units, tare, display parameters and 2 optional alphanumeric messages as product codes. Comes standard with 12 Product Codes and is expandable to 199 with the optional memory upgrades.
- Compensates scale motion and angle for accurate weight reading in high motion environments (6000-MC models).
- Three lock modes prevent unauthorized target value changing, or lock out advanced features for simple applications.
- Designed to meet or exceed all US and international standards. NTEP COC #94-303.
- Precise high resolution 20 bit A/D conversion provides over 1,000,000 counts of internal resolution. An advanced 16 bit Microcontroller provides world class features and accuracy.
- 6 Large, (.5") digits for clear weight readings from a distance. 8 alphanumeric characters provide easy to read annunciation of weight modes and menu prompts.
- Automatic or manual weight totalization for data logging total weights and number of weighments. Each product code has independent total registers.
- Now available with a full Statistics Option. Each product code can store Statistics independently. Statistics calculated are Min, Max, Total, Average, # of Samples, Standard Deviation, Coefficient of Variance, Weighments over target, under target, and within Target, and Grand Total and Average of all Product Codes.
- Optional RS-232 I/O offers complete printer formatting for driving Bar-Code label printers and for computer interface and control. There are 10 Automatic print modes including print on Accept.
- Real-time Clock/Calendar provides time and date stamping of weight printouts and measurement of scale throughput performance with time. This feature can be used to fine tune production rates and make production tracking data available for statistical process control.
- Optional display illumination uses rugged, long life, LED fiber-optic back-lighting coupled with a transflective LCD. Operation of the Backlight is auto-matic light-sensing or manually set. The LCD provides optimum display contrast under all ambient conditions from full sunlight to total darkness.
- Versatile power input options: AC Only (90-260 VAC 45-65 Hz), Battery only (3 “D” cells), 12-48 VDC Input.
- Exceptional battery life (Battery Powered units): Up to 400 hours of continuous use provided by 3 alkaline ‘D’ Cells.
- Easy to maintain: Full digital calibration assures reliable, repeatable measure-ments.
- Selectable for lb, kg, g, ounces, and pounds-ounces (lb-oz not available for NTEP approved scales).

- Auxiliary Digital Input for high speed Totalization uses a direct interrupt driven processor line. Digital input function is programmable to any function by special order.
- Optional 8 set points setable for any in-range weight for operator alerts or process control. Additional set point outputs are available for conveyor belt control, product grading, or any other process control.
- Grading Scale capability built in (with set-point option). Up to 8 grading zones are easily programmed.

BATTERIES (BATTERY OPTION UNITS ONLY)

Type:
3 standard alkaline “D” cells, or 3 high capacity Ni-Cads. The scale will also operate from heavy duty Carbon-Zinc batteries which will give about 1/3 to 1/2 the battery life of alkalines.

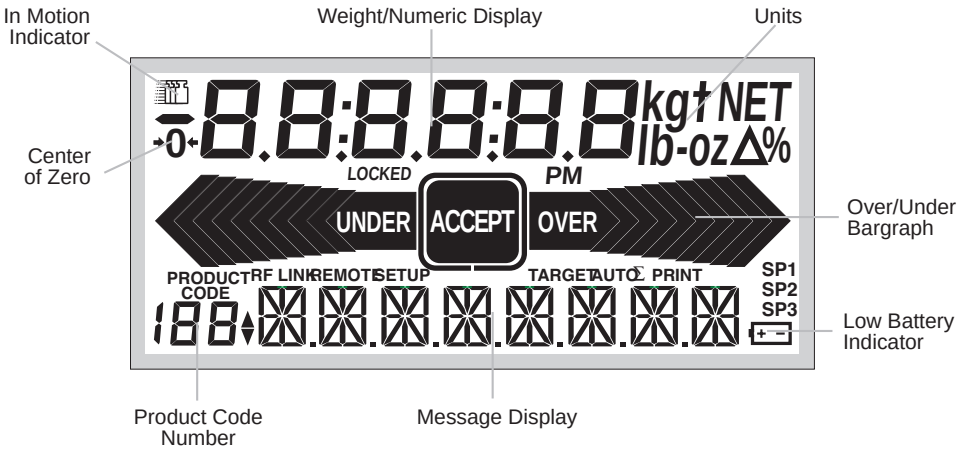
When the low battery annunciator is on, there is about 10% of battery life left. When the battery symbol starts to blink, battery failure is imminent. It is OK to continue to operate the scale until it no longer will turn on. Then replace the batteries with the following procedure.

Installing/Changing:

1) Turn the 6000 off.
2) Remove the top platter to expose the battery cover. Remove the battery cover by turning the two fasteners counterclockwise.
3) Flip the battery cover over. Remove the old batteries and replace with three fresh D cells. Observe the + polarity markers indicated on the battery holder.
4) Seat the battery cover back on the gasket and while pressing down on the cover turn the two fasteners clockwise to reseal.
5) (Optional) Push the TEST (USER) key to check the battery status. Power displayed is in relative % of battery life. If the number with fresh batteries is low, (<20%) turn off the power, remove the battery holder and check that the polarity of all three batteries is correct.

Note: Charge Ni-Cad batteries external to the MSI6000. Any commercially available Ni-Cad battery charger will suffice.

LIQUID CRYSTAL DISPLAY OVERVIEW

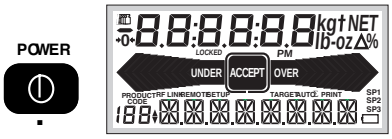


SECTION 2 - SCALE OPERATION GUIDE

This section describes how to use the standard Scale functions of the MSI-6000 and MSI-6000-MC.

POWER

Turns the Scale On and Off.

1) Push **POWER**. Display Check: All segments and the OVER/UNDER/ACCEPT LED's illuminate for 2 seconds.	
2) Next, the message displays "MSI 6000", the numerics give the software version number (2 secs). After the display routines are finished, the unit reads the current weight in the last set mode (NET, GROSS, or Deviation Δ).	

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 SET" for zeroing (Tareing) package weights). The backup memory stores the zero reading, and can restore it even if power fails.

Note: Zero will not function in the NET mode. If you are in NET mode, push TARE SET then CLEAR to return to GROSS mode. Zero range is 100% in the industrial modes and -1% to +3% in the Legal for Trade modes.

To Zero the Scale:

Push **ZERO**. The weight reading must be stable within ±1 d (Motion Indicator off). The display temporarily reads "ZEROED" and the digits display 0.		
Final Check-Weighing mode: The display returns to the last set check-weighing target and display mode. Bench-Scale Mode: The numeric digits display "0"(or 0.0 or 0.00, etc.).		

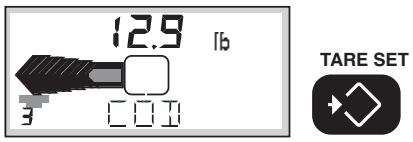
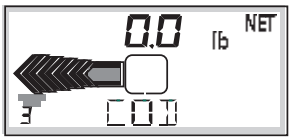
TARE SET

Stores a Tare Weight and converts the weight mode to “NET”. Tare is typically used to zero out a known weight such as a packing container or pallet. For keyboard entry of the Tare value, see “SETUP TARE MENU”.

Rules for Use:

1) Only positive weight readings can be tared.
2) The motion annunciator must be off. The weight reading must be stable.
3) Setting or changing the tare has no effect on the zero setting.
4) When in Net mode, the ZERO key is inoperative.
5) Taring will reduce the apparent overrange 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%).
6) The scale stores the tare value in the current Product Code memory until cleared. Each product code can store a completely independent Tare value.

To Tare:

1) Place the Tare Weight on the platter. Push **TARE SET**. The weight reading must be stable within +/-1 division (Motion annunciator off) and has to be a positive reading. The entire range of the scale can be tared.	
2) 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 Display the Current Tare Value:

While in NET mode, push **SETUP** followed by **TARE SET**. The message display reads "KBD TARE". Push **ENTER**. The numerics indicate the Tare value. Push **EXIT** to return immediately to NET mode.	

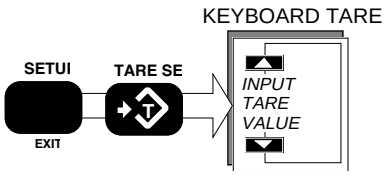
To Clear Tare and return to GROSS mode:

Push **TARE SET** followed quickly by **CLEAR** (UNITS). The message display reads "TARE CLR". The scale returns to the GROSS mode.	

Alternate Methods: Removing all TARE weight from the platter (return to Gross Zero) and pushing TARE SET will also cancel the NET mode. Another alternative is to program the USER key to be NET/GROSS and use the USER key to switch in and out of NET mode.

SETUP TARE MENU

Allows manual keyboard entry of Tare.



Keyboard Tare:

1) Push **SETUP** followed immediately by the **TARE SET** switch. The Display reads "KBD TARE". Push **ENTER**.	① SETUP ② TARE SET ③ ENTER — KBD TARE
2) Enter the desired **TARE** value using the **UP /DOWN** and **ENTER** keys. Use the **POWER** switch to enter a decimal point. *In this example, we'll enter 3.1 lb as a tare weight.*	① 0 ② 1 ③ 2 ④ 3 ⑤ ENTER 3- ⑥ · 3.- ⑦ 3.0 ⑧ 3.1 ⑨ ENTER
3) Finish out the Tare entry by pushing the **ENTER** key on a blank character. The scale returns to operation in the **NET** mode.	3.1_ ENTER

NET/GROSS

(USER key option, see User Setup to enable this function)
Switches the display between Net and Gross modes. Net Weight is defined as Gross Weight minus a Tare Weight.

Rules for Use:

1) There must be a Tare weight established to switch from Gross mode to Net mode (see Tare).
2) NET/GROSS will work even when the scale is in motion.

Operation:
Push NET/GROSS (USER key programmed to be a NET/GROSS key)

- If no current tare is stored (Tare = Ø): No action, Gross weight only.
- If a tare value is stored: Toggles between Net and Gross display modes. Display reads “GROSS” briefly, or “NET”.

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 functions can be printed as set in the Print Setup Mode. Refer to Section 9 - Comm Ports, for more details.

UNITS

Push the UNITS key to change the weight Units. Units available are lb (pounds), kg (kilograms), oz (ounces), g (grams), and lb-oz (pounds and ounces) (Troy Oz by special order). Units can be enabled or disabled in the Calibration section (see UNIT SEL) so that only the units desired will appear when the Units key is pressed. See “UNIT SEL” in Section 10.

Note: All units will not be available on Metric or certain legal-for-trade MSI-6000’s.

LONG ZERO (MOTION COMPENSATED UNITS ONLY)

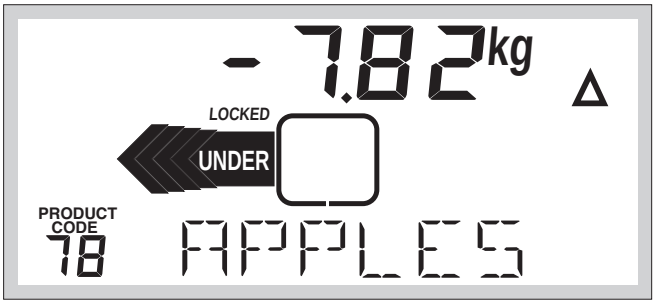
When installing or moving a motion compensated checkweigh (6000MC models) it is important that the 1 gravity reference is re-established. The following procedure resets the 1 gravity reference and ensures accurate weighing in motion conditions. This procedure is best performed with little or no at sea motion.

1) Remove the platter exposing the base assembly and set aside.

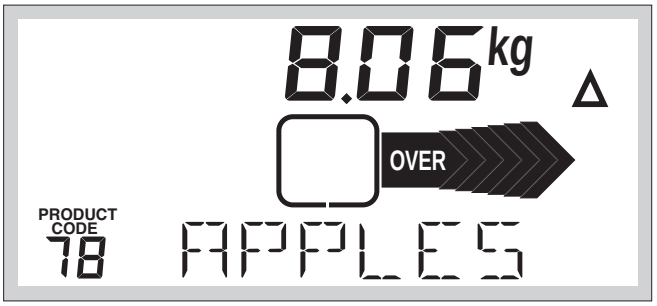
2) With the Model 6000MC off, push and hold the zero button and turn on the 6000MC with the power key.
3) The display will count down from 30 seconds while the long zero value is reestablished. Do not touch or move the unit during this time.
4) Replace the platter. Push the zero key to remove the platter weight. The system is now ready for standard weighing operation.

SECTION 3 - CHECK-WEIGHING FUNCTIONS

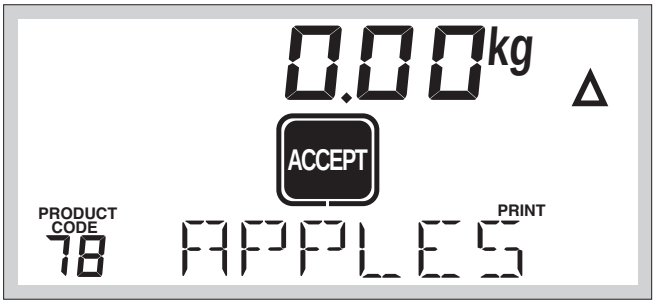
The MSI 6000 provides an easy to use over-under-accept operation for general purpose check weighing. When in the check weighing mode, a large three section bargraph is active. The bargraph has 10 under segments, 10 over segments, and an accept window. The accept window is backlit with bright LED's that provide a simple and clear go/no-go indication. The accept window glows red when the weight is under or over the target. The accept window glows green and the word "ACCEPT" appears when the weight is in the programmed accept range.



The 6000 LCD showing an Under target reading in the deviation weight mode.



The 6000 LCD showing an Over target reading in the deviation weight mode.



The 6000 LCD showing an Accept target reading in the deviation weight mode.
The display won't necessarily read zero when in accept. This depends on the width of the accept range programmed.

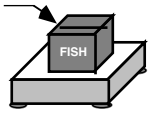
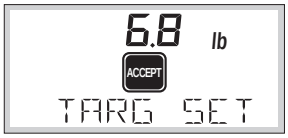
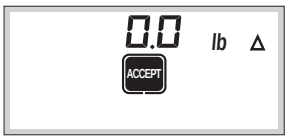
TARGET

Stores a Target Weight and enables the Check-Weighing mode.

Target Use Rules:

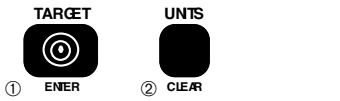
1) Only use positive weight readings for target weights. The set target range includes the entire capacity of the scale.
2) The motion annunciator must be off, the weight reading must be stable (does not apply when the target weight is entered manually).
3) Setting or changing the target has no effect on the zero setting.
4) Settings are not lost with power off or removal of power.

To set a Target Weight with a test weight (simple method):

1) Remove any weight from the platter and zero the scale.	
2) Place a test weight or standard product sample on the platter.	
3) Push **TARGET**. The display temporarily reads "TARG SET".	 
The Bargraph appears and functions as an "Over/Under/Accept" display. The message display will be blank or will display a Product Code Label (if entered), and the digits register Ø. The numeric digits display deviation (Δ) from the target weight.	
The Target is set. The numeric digits display deviation from the target weight (to display in actual weight or per cent deviation, see “To Change the Numeric Display Format”). The default Accept range width is ±0.5 divisions and each over and under bar segment defaults to 1 scale division. The Accept Range and Bargraph sensitivity can be changed with the SETUP TARGET procedures following.	

To Return the MSI-6000 to a Standard Bench Scale:

Push the **TARGET** key followed immediately by the **CLEAR** (UNITS) key. The Bargraph will disappear and the message reads "TARG CLR" temporarily. If the product codes are enabled, you could select an unused or unneeded product code with the **UP** or **DOWN** product code keys before clearing the Target.



Alternate method:
When the scale is unloaded (at Gross or Net Zero) push TARGET. The message reads "TARG CLR" and the Bargraph disappears.

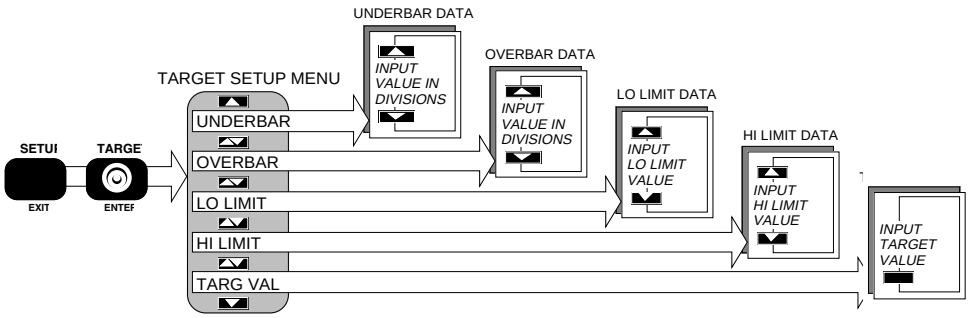
Note: Clearing the Target does not change the accept range. The accept range must be changed with the HI LIMIT and LO LIMIT procedures.

To Return operation to the Check Weighing mode:
Push the UP or DOWN product code key to select the desired product code number. The Product code indicator and the Bargraph will reappear and the scale will be in the Check weigh mode. Alternately, push the TARGET key to set a new target weight.

SETUP TARGET

Use SETUP TARGET to change all the Target parameters numerically. The value, Hi and Lo limit, and the sensitivity of the Bargraph can all be adjusted.

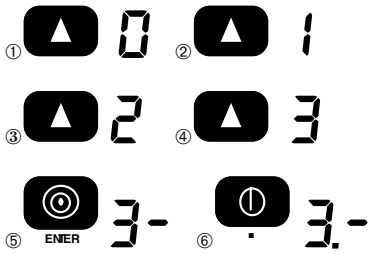
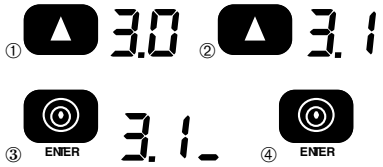
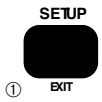
Note: The letter "d" is defined as a scale division. i.e. "d" is equal to .002 lb in a scale that is rated 6 lb X .002 lb.



Setup Target Select Menu

Menu	*Range*	*Purpose*
TARG VAL	Zero to Capacity	Enter Target Value
HI LIMIT	Target Value to Cap	Enter the High Limit
LO LIMIT	Target Value to Zero	Enter the Low Limit
OVERBAR	.5 to 100 d	Enter divisions/seg for the Over Bargraph
UNDERBAR	.5 to 100 d	Enter divisions/seg for the Under Bargraph

To Set a Target Weight When Test Weights are Not Available:

1)	Push **SETUP** followed quickly by **TARGET**.	
2)	The message display reads "TARG VAL" (Target Value). Push **ENTER** (TARGET).	
3)	The current Target Weight (if any) is displayed. This example enters the number 3.1 as a target weight. Push the **UP** key (Product Select keys) four times to enter the first digit of the desired Target weight value. Push **ENTER** (TARGET). Next, use the **POWER** key to enter a decimal point. ***Note:*** *Do not push the Enter key after putting in the decimal point. The decimal point is entered automatically. If the decimal point is placed in the wrong location, use the Clear key to erase it.*	
4)	The next most significant digit flashes. Use the **UP**, **DOWN** and **ENTER** keys to finish out the value entry. Finish the Target entry by pushing **ENTER** on a blank character. ***Note****: You should input the precise target value desired. If a wide accept range is desired, adjust the accept range with the HI LIMIT and LO LIMIT functions.*	
5)	After entering the entire Target weight the display will return to the next menu item (HI LIMIT). Push **EXIT** to return to normal operation or use the select **UP/DOWN** keys to go to a different function.	
	The Target is set. The numeric digits display deviation (Δ) from the target weight (see "To Change the Numeric Display Format" for other options). The Accept range width is ±.5 division and each over and under bar segment is equal to 1 division.	

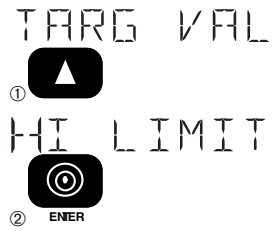
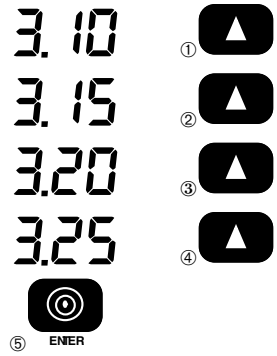
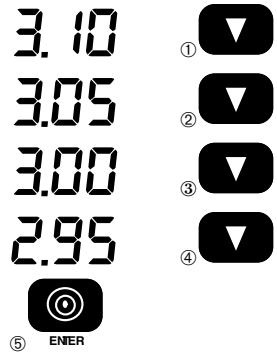
Note: The error message "TOO BIG" will appear if you enter a target value greater than capacity.

HI LIMIT AND LO LIMIT

The Hi and Lo limits of the accept range can be adjusted with the following procedure. Hi and Lo limits are stored as Δ weight from the target. Therefore if the Target value changes, the limit will change with it.

Note: Changing the Target Value does not affect the Target accept range. For example, a 5 lb target is set with 5.1 lb as the upper limit, and 4.96 lb as the lower limit. Changing the target value to 4 lb will give an accept range of 3.96 to 4.1 lb. Each Product Code has independent accept ranges. The only way to reset the accept range is to go back into HI and LO LIMIT.

To Change the Target Weight Accept Range:

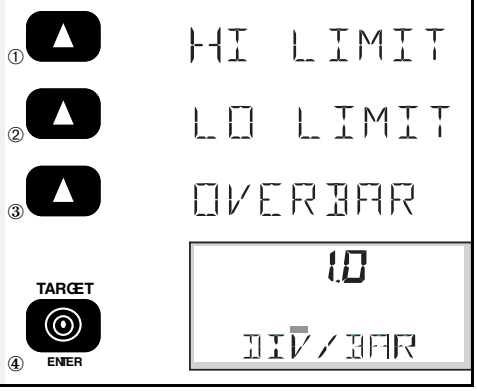
1) Push **SETUP** followed quickly by **TARGET**.	
2) The message display reads "TARG VAL". Push the **UP** select key until the message display reads "HI LIMIT". Push **ENTER** (TARGET).	
3) The display shows the current Target Hi Limit on the numeric digits. The message display reads "HI LIMIT". Using the **UP** or **DOWN** keys change the upper limit of the accept range. Each push of the **UP** key increments the accept width by 1 scale division. Each push of the **DOWN** key decrements the accept width by 1 scale division. When the display indicates the desired value, push **ENTER** (TARGET). Example with a 3.1 lb Target, 3.25 Hi Limit	
4) Push the **UP** select key until the message display reads "LO LIMIT". Push "**ENTER**" (TARGET).	
5) Using the **UP** or **DOWN** keys change the lower limit of the accept range. When the display indicates the desired value, push **ENTER** (TARGET). Example with a 3.1 lb Target, 2.95 Lo Limit	
6) Push **EXIT** to return to normal scale operation or use the select keys to go to a different function.	

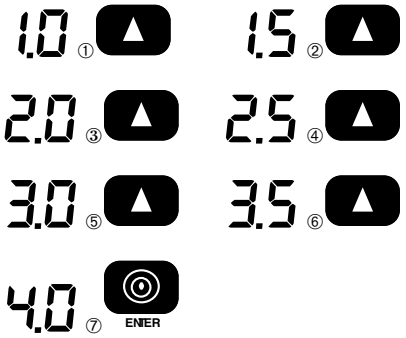
OVERBAR AND UNDERBAR

The MSI-6000 Over and Under Bargraph defaults to 1 scale division per bar segment. It is often useful to change the sensitivity of the bargraph to aid the scale operator to reach the Target weight more efficiently. The under and over sections of the bargraph have independent sensitivity settings. The under and over bargraph sensitivity can be adjusted from 1/2 d to 100 d with the following procedure.

Application example: A Banana packing operation using a 30x.01kg scale sets the overbar and underbar sensitivity so that each bar segment is equal to the weight of one banana (~.2kg). So in this example the over and under sensitivity is set to 20 divisions. Now, at a glance, the packer can tell how many bananas it takes to reach the accept target by counting the "Underbars". If the box is overloaded by one or two segments, the packer removes one or two bananas to bring it into accept.

To Change the Bargraph Sensitivity:

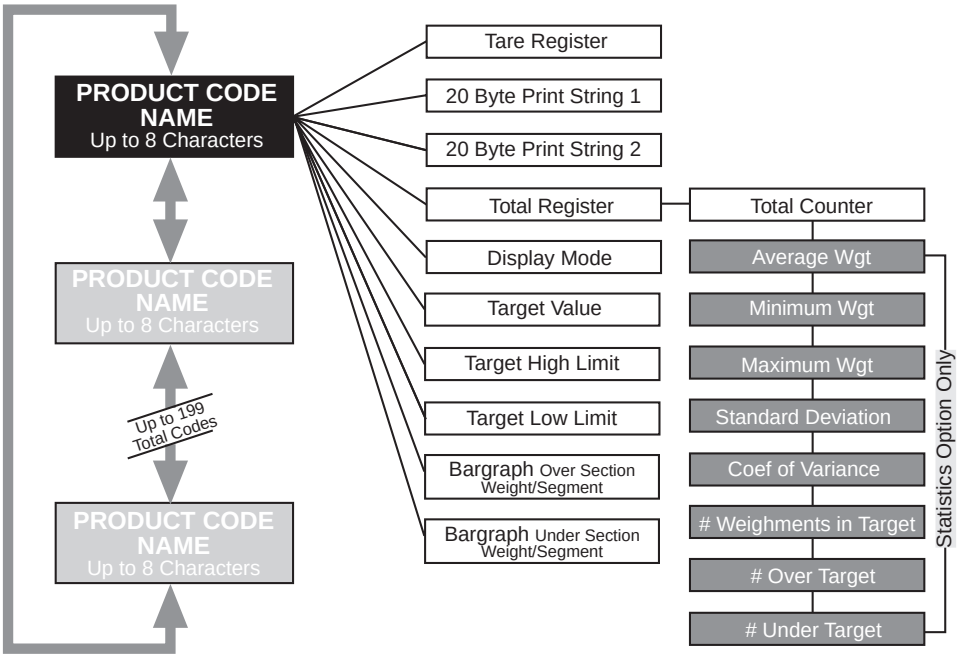
1) Push **SETUP** then **TARGET**. The message display reads "TARG VAL".	
2) Push the **UP** select key until the message display reads "OVERBAR. Push **ENTER** (TARGET). The Setup display indicates the Over section Bargraph sensitivity in Scale Divisions (d) per Bar.	

3)	Use the **UP** or **DOWN** keys to change the sensitivity. The sensitivity has an adjustment from 0.5 divisions to 100 divisions in .5 division steps. ***Note**: The divisions are equal to the "count by" printed on the capacity label. For example, a 60 lb MSI 6000 has divisions equal to 0.02 lb. Therefore each bar segment can be equal to .01 to 2 lb in .01 lb (1/2 d) increments.* Push **ENTER** when the desired number of divisions is displayed. *This example changes the over segments on a 60 X .02 lb MSI6060 to 0.08 lb per Bargraph segment.*	
4)	Use the **UP** key to scroll to "UNDERBAR". Push **ENTER** (TARGET).	
5)	The numerics display the under Bargraph sensitivity in divisions. Use the **UP** or **DOWN** keys to change the sensitivity. The sensitivity has an adjustment from 0 divisions to 100 divisions in .5 division steps. *This example changes the under segments on a 60 X .02 lb MSI 6000 to 0.04 lb (2d) per Bargraph segment.*	
6)	Push **EXIT** to return to normal scale operation or use the **UP DOWN** keys to go to a different function.	

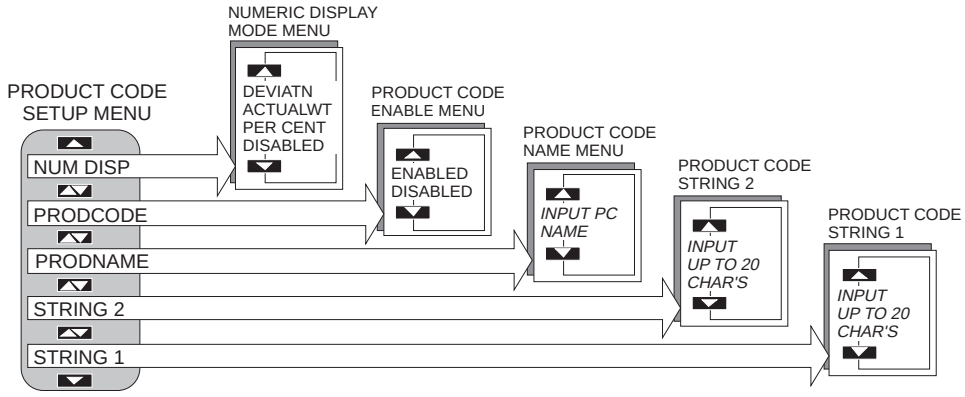
PRODUCT CODES (UP AND DOWN KEYS)

The Product Codes allow the user to set up several different product accept programs and label the product accept program with any eight character name. This is particularly useful when check weighing more than one type or weight of product on the same scale. Each Product Code stores the current Target Weight, accept tolerance, over and under Bargraph sensitivity, units, tare weight, display mode (Deviation, NET, or GROSS), and 2 optional print strings. The 6000 comes standard with 12 product codes but can easily be expanded to 100 or 199 product codes with the memory option. In addition each product code has a totalization register that is accessed with the Total function. If the

Statistics option is installed, each product code also stores independent statistics registers.



Use the UP and DOWN Product Code Select Keys to scroll through the various available codes. The MSI 6000 functions as a standard bench scale with the Bargraph turned off until a target weight is set.

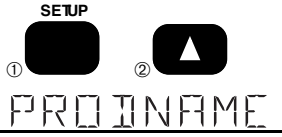
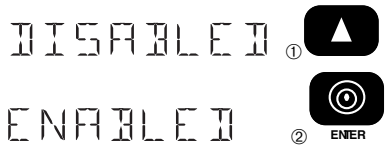


Setup Product Select Menu

Top Menu	*Selections*
PRODNAME	Enter up to an 8 character name
PRODCODE	DISABLED, ENABLED
NUM DISP	DEVIATN, ACTUALWT, PER CENT, DISABLE
STRING 1	Enter up to 20 characters
STRING 2	Enter up to 20 characters

Note: As shipped, the model 6000 has only 1 target weight available for simplicity. Enable all Product Codes with the following procedure.

To Enable or Disable Product Codes:

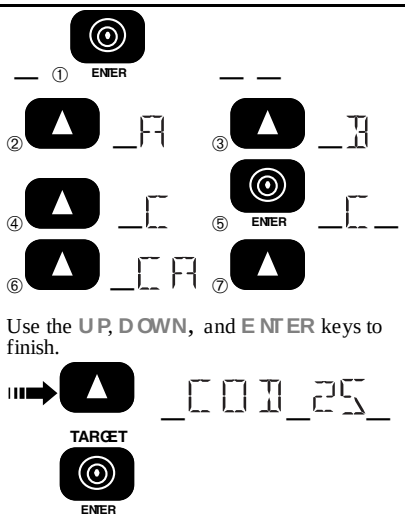
1) Push **SETUP** followed by either **PRODUCT SELECT** (**UP** or **DOWN**) key.	
2) Push the UP key until the message display reads "PRODCODE". Push **ENTER** (TARGET).	
3) Push the **UP** key to toggle the mode between "ENABLED" and "DISABLED". When the desired mode is displayed, push **ENTER** (TARGET).	
4) Push the **EXIT** key to return to normal operation with Product Codes enabled.	

To Change the Product Code:
Push the UP or DOWN product code key to scroll through the product code selections. Product codes with targets already established will have the Bargraph on. If no Target exists for the product code, the Bargraph will be off and the scale will function as a standard bench scale. A small numeric indicator displays the product code number.
Note: The scale blanks the weight reading during product code selection. Weight readings restart about 1 second after releasing the select key.

PRODUCT CODE NAME

The product can be identified with a Product Code Name. Any combination of 8 alpha-numeric characters can be stored per product code with the following procedure.

To Add or Edit a Product Code Name:

1) Push the **UP** or **DOWN** Product Select key to locate the desired product code number.	
2) Push **SETUP** followed by either **PRODUCT SELECT** (**UP** or **DOWN**) key. The message display reads "PRODNAME". Push **ENTER**.	
3) The message display will show the current product name with a flashing cursor (underscore) positioned on the first character. Use the **UP** or **DOWN** key to scroll through the available character list. When the desired character is shown, push **ENTER**. Continue selecting characters as before. To finish the label entry, push **ENTER** twice. When editing, or entering a space, push the **RIGHT** or **LEFT** arrow key to go to the desired character position. In this example we'll enter the word "COD 25" to represent the target being 25 lb COD cold packs. We'll start with a space to center the word. ***Note**: When entering a character for the first time, the initial choice is a space. Pushing the UP key will start with "A". Pushing the **DOWN** key twice will start with the number 9.*	
4) The display reads "NUM DISPLAY". Press **EXIT** to return to normal weighing mode or press **UP** / **DOWN** to reach the next menu selection.	

Character Set
spaceABCDEFGHIJKLMNOPQRSTUVWXYZ"$%()*+- /<=>?\:0123456789@ (back to "space")

Note: Holding down the UP or DOWN keys will cause the characters to scroll.

To Delete a Product Code Name:

1)	Push the **UP** or **DOWN** product code key to locate the Product Label to be deleted. In this example, we'll delete the label "SALMON" of product code 2.	
2)	Push **SETUP** followed by either **PRODUCT SELECT** (**UP** or **DOWN**) key. The message display reads "PRODNAME". Push **ENTER**.	
3)	The message display will show the current product name with the cursor (underscore) positioned on the first character. Push **CLEAR** (**UNITS**). Push **CLEAR** again. The whole Product Name erases and you're back in the SETUP menu.	
4)	Push **EXIT** to return to scale operation, or push the **DOWN** key to go back into the "PRODNAME" function and use the **UP/DOWN** keys to enter a new name.	

PRODUCT CODE STRING 1 & STRING 2

Each product code can be further identified with one or two Product Code Strings. A string is simply a set of alphanumeric characters that can be displayed and/or printed. The Product Code Strings differ from the Product 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 the MSI Options Manual for more details on programming "@ codes".

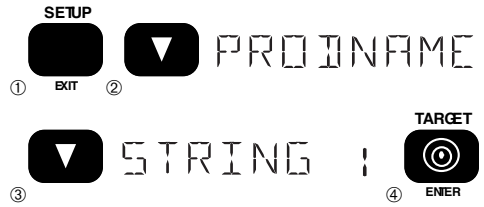
Use the Product Code Strings to set up a print string that changes with every product code. Combined with the standard Comm Port print strings, the Code Labels can be used

to design a very sophisticated bar code label with three fields that change with every Product Code - the Product Code Name, and PC String 1 and 2.

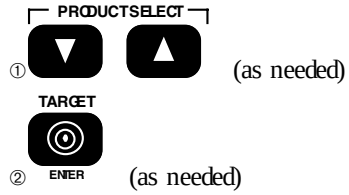
The entry procedure for Product Code Strings is identical to the Name procedure, except that you are not limited to 8 characters. After the first 8 characters are entered, the letters will scroll to the left.

The USER key can be programmed to allow single button access to the PC 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 a Product Code String:

1) Push the **UP** or **DOWN** Product Select key to locate the desired product code number.	
2) Push **SETUP** followed by either **PRODUCT SELECT** (**UP** or **DOWN**) key. The message display reads “PRODNAME”. Use the **DOWN** key to find the desired Product Code String (“STRING 1” or “STRING 2”). Push **ENTER**. Proceed at step three on the “Product Code Name” procedure.	

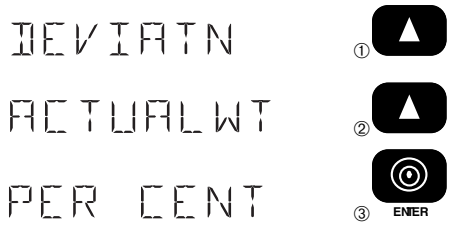
To Access the Product Code Strings with the USER key:
For this procedure to function, the USER key must be programmed for “PCSTRNGS”. See Section 7 - USER KEY PROGRAMMING for details.

1) Push the **USER** key once to access STRING1 or twice within 2 seconds to access STRING2.	
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.	
Proceed at step three on the “Product Code Name” procedure.	

NUMERIC DISPLAY FORMAT

During check weighing, the numeric digits function in any of four modes: 1) Deviation from the target weight (default mode), 2) Actual Weight (Net or Gross), 3) Per Cent Deviation from the target weight, or 4) disabled. When the numeric display is disabled, only the Bargraph functions for check weighing. When Product codes are enabled, each product code has independent numeric display formatting.

To Change the Numeric Display Format:

1) Push the **UP** or **DOWN** product code key to locate the desired product code number.	
2) Push **SETUP** followed by either **PRODUCT SELECT** (**UP** or **DOWN**) key. The message display reads “PRODNAME”.	
3) Push the **DOWN** key to scroll to “NUM DISP, push **ENTER**.	
4) Push the **UP** or **DOWN** key to select the numeric display mode. To disable any numeric weight display and use the Bargraph only select “DISABLED”. To display weight in deviation from the Target weight select “DEVIATN”. To display the actual gross or net weight select “ACTUALWT”. In this example we’ll change the Numeric Display mode to “PERCENT”.	

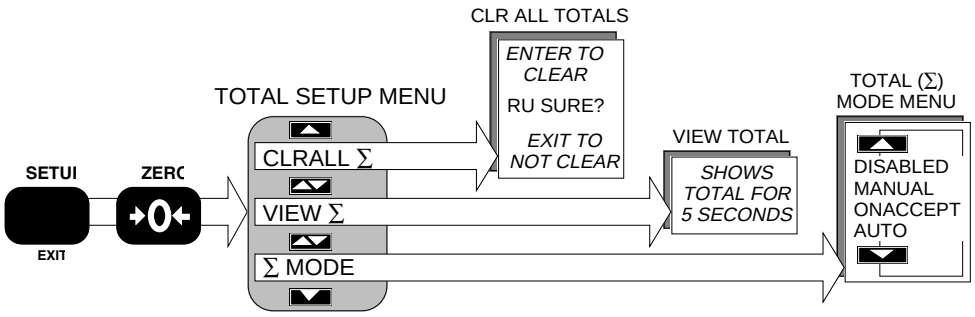
SECTION 4 - TOTAL

The total function is used to keep track of total weights and number of totaled weighments. The accumulator always uses the displayed weight, so gross and net readings can be added into the same total. There are three modes of totaling which are selected in the “SETUP TOTAL” menu. The “MANUAL” mode requires user to push the TOTAL (USER) key when the weight on the scale should be added to the total register (or use the Aux Digital Input). The “AUTO” mode will automatically add the last, settled value (before the scale returns to zero) to the total. The “ONACCEPT” mode works in conjunction with the Target value. When the weight is in the accept range, the weight will be added to the total. All autototal modes require that the scale returns within 1% (relative to full scale) of gross zero or net zero before the scale adds in the last weighment. Applied weight must be 2% above gross zero or net Zero to enable the total function (percentage is adjustable with the statistics option). The Total function always keeps a running weighments counter for measuring productivity or product throughput. All total modes automatically program the USER key to become a “TOTAL” key.

TOTAL SETUP MENU

Allows front panel setup of the total mode, clearing all total registers, and a secondary “View Total” display mode.

Note: This menu is modified on 6000s equipped with the statistics option.



Top Menu	*Selections*
Σ MODE	DISABLED, MANUAL, ONACCEPT, AUTO
VIEW Σ	Displays the Total and number of Totaled weighments.
CLRALL Σ	“RU SURE” ENTER to clear, EXIT to quit and not clear

∑MODE
The Total function will operate in three modes: Manual, Auto, or On Accept. See

TOTAL for more details.

Note: Enabling the Total modes will automatically program the USER key for the appropriate Total function. If the USER key function is changed with the KEYFUNC mode, the Manual total mode will no longer function. Use the "KEYFUNC" mode to change the USER key back to TOTAL to enable the Manual Total mode or enable View Total for the Auto Total modes.

To Setup the TOTAL MODE:

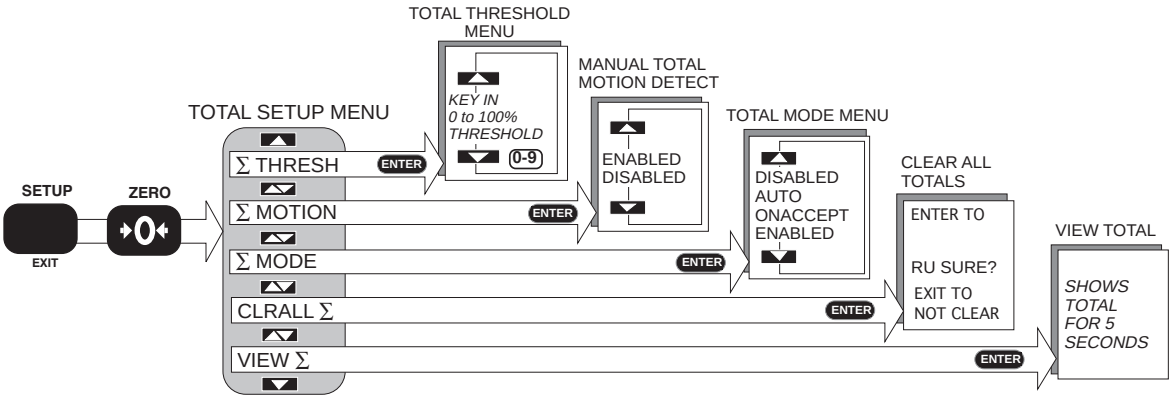
1) Push **SETUP** followed immediately by the **ZERO** switch.	
2) Push **ENTER**. The first menu choice is "DISABLED" (or the last set mode). In this example, we'll enable the "ONACCEPT" mode.	
3) Push the **UP** or **DOWN** key to scroll through the Total Mode options. When the message reads "ONACCEPT", push **ENTER**.	
4) The display reads "VIEWΣ". Press **EXIT** to return to normal weighing mode or use the **UP** /**DOWN** and **ENTER** keys to use a different SETUP Total menu selection.	

VIEW Σ
Pushing ENTER will cause the current product code's total to be displayed. Push the ENTER or EXIT key to return to the menu. This provides a way to see the total value even if the USER key is reprogrammed.

CLRALL Σ
This function will completely clear all stored totals for all Product Codes at once. Push EXIT (or any key) if this is not what you want. Push ENTER to clear.

TOTAL SETUP MENU (STATISTICS)

(Statistics Option Only)
The TOTALIZE SETUP MENU has been enhanced for use with the statistics option. The "ΣTHRSHLD" and "Σ MOTION" menus have been added. "Clear All Totals" also clears the statistics registers. See Section 5.



Σ MODE

The manual mode requires that the USER key (programmed as TOTAL) is pushed when the weight currently on the scale should be added to the previously accumulated value. The “On Accept” mode will only add weighments in the accept window. If you want to keep statistics on products that fall outside the accept window, use the “Auto” mode. The auto mode will automatically add the last, settled value to the total whether it is in Accept or not. 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.

Σ MOTION

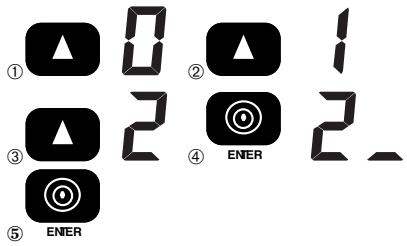
Enables or disables motion detection for manual total. Has no effect on “AUTOTOTAL”. This menu item controls whether the scale has to be out of motion before it will totalize. In certain high vibration applications it is sometimes desireable to turn off the motion detect so that totalization can occur. This feature is disabled for legal-for-trade systems.

Σ THRESHOLD

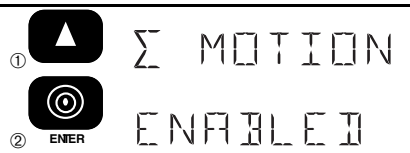
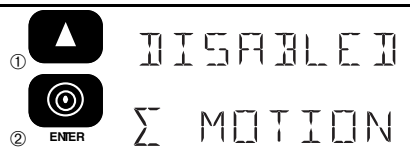
Sets the weight value in percent of capacity above which totalization is allowed. For example, setting the threshold to 10% on a 200lb scale will set the threshold at 20 lb. Only weight above 20 lb will add to the total. Once totaled, the weight must return below the total threshold to enable the next totalization. This prevents the same weight from being totaled twice. Another example: On a scale with a capacity of 100kg the user desires to autototal all weight that exceeds 5kg. Since 5kg is 5% of 100kg, the Total Threshold is set to 5%.

Note: The Threshold is entered in 1% increments.

To Set the Total Threshold:

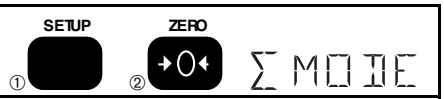
1) Push **SETUP** followed immediately by the **ZERO** switch.	
2) Push the **UP** Scroll (Product Select) key until the menu choice is "Σ THRESH". Push **ENTER**. The % Threshold Screen will appear. The currently set threshold is displayed on the Weight Display.	
3) Use the **UP** and **ENTER** keys to input the desired total threshold in per cent of capacity. In this example we'll input 2% as a threshold. *Calculation example - If the scale capacity is 1,000 kg and the user wishes all weight above 50kg totaled, enter 5% (1000 x 0.05).*	
4) The total threshold has been set to 2%. Push **EXIT** to return to normal scale operation.	

To Enable/Disable Total Motion Detect:

1) Push **SETUP** followed immediately by the **TOTAL** switch.	
2) Push the **UP** Scroll key until the menu choice is "Σ MOTION". Push **ENTER**..	
3) Change the state of total motion detect with the **UP** key. 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.*	
4) You are now back in the TOTAL SETUP MENU. Push the **EXIT** key to return to normal scale operation.	

MANUAL TOTAL

To set up the "Manual Total Mode":

1) Push **SETUP** followed immediately by the **ZERO** switch.	
2) Push **ENTER**. The first menu choice is "DISABLED" (or the last set mode). In this example, we'll enable the "MANUAL" mode.	
3) Push the **UP** or **DOWN** key to scroll through the total mode options. When the message reads "MANUAL", push **ENTER**.	
4) The display reads "VIEW∑". Press **EXIT** to return to normal weighing mode.	

USING THE MANUAL TOTAL MODE

Manual Total is achieved using either the front panel USER key programmed to be TOTAL, or by using the Auxiliary Digital Input.

Using the TOTAL (USER) key:
When the weight on the scale has settled to the value you wish to totalize, push USER.

Using the Aux Digital Input for Total:
When the weight on the scale has settled to the value you wish to totalize, close the switch contact connected to the auxiliary Digital Input. See Appendix C for details on wiring the Auxiliary Digital Input.

After either the Total key is pushed or the Aux digital input is closed:

- The current weight is added to the total register.
- When a valid value is added, the display gives an indication of how many weighments have been totaled. i.e. 1 TOTAL , 2 TOTAL , 3 TOTAL, ...x TOTAL.

Note: The manual total requires the use of the USER key. If the USER key function has been changed from TOTAL to something else, Manual Total will not function. If the Manual Total fails to function, go to SETUP USER (see page 21) and change the USER key function back to TOTAL.

Manual Total Rules:

1) The motion annunciator must be off, the scale must be stable.
2) Total works on positive readings only. Must be at weight readings 2% of Scale Capacity above Gross Zero or Net Zero. (e.g. 0.6 lb on a 30 lb scale, .06 kg on a 3 kg scale)
3) After the scale totals a weighment, the scale must return to below 1% of Scale Capacity relative to Gross Zero or Net Zero before another totalization can occur. This ensures that a weight on the scale is only added to the total once. Pushing the TOTAL (USER) key without returning to zero or if the scale is below 2% of capacity, will display the current total weight and number of weighments.
4) 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. No data is lost, it is just too large to view on the 6000 display. With the RS-232 option, the larger numbers can be printed through the use of the PRINT button, or viewed with a computer hookup.

AUTO TOTAL

Allows for automatic totaling. The total function operates automatically and adds the last settled reading to the totaled value when the platter returns to zero. The "∑" LED will flash three times to indicate that the weight is in the pretotal register. Should the weight change to a new settled value, the ∑ LED will flash again indicating a new weight is in the pretotal register. The pretotal register weight will be added to the total only when the scale returns within 1% of zero (Net or Gross).

To Setup the AUTOTOTAL MODE:

1) Push **SETUP** followed immediately by the **ZERO** switch.	
2) Push **ENTER**. The first menu choice is "DISABLED" (or the last set mode).	
3) Push the **UP** or **DOWN** key to scroll through the Total Mode options. When the message reads "AUTO", push **ENTER**.	
4) The display reads "VIEW∑". Press **EXIT** to return to normal weighing mode.	

Auto Total Operation:

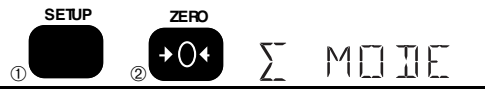
1) Place the product on the scale. When the ∑ LED flashes, the weight has been placed in the pretotal register prior to totalization. As long as the scale does not return to zero the weight to be totaled can be adjusted. Each adjustment, once settled, will trigger three flashes of the ∑ LED. To totalize, remove the product from the scale.
2) The message display will indicate that the scale totaled by briefly displaying "xxx Total" where xxx is the number of totaled weighments.

Rules for Auto Total:

1) The motion annunciator must be off, the scale must be stable.
2) Total works on positive readings only. Must be at weight readings 2% of FS above Gross Zero or Net Zero.
3) Each reading added to total must be preceded by a return to zero (Net or Gross) ±1% of FS. Totalization of the accept weight is indicated by the message "xxx TOTAL" where xxx is the number of totaled weighments.

On Accept Auto Total:
Allows for totaling automatically when the weight is in the Target accept range. The "∑" LED will flash three times to indicate that the weight has been added to the total register. Should the weight change to a new settled value still in the accept window, it will not register the new value. You must delete the last totaled weight to allow the new in-Accept reading to store in the Total register. See "To Delete the last Totaled Value".

To Set up the "On Accept Total Mode":

1) Push **SETUP** followed immediately by the **ZERO** switch.	
2) Push **ENTER**. The first menu choice is "DISABLED" (or the last set mode).	
3) Push the **UP** or **DOWN** key to scroll through the Total Mode options. When the message reads "ONACCEPT", push **ENTER**.	
4) The display reads "VIEW∑". Press **EXIT** to return to normal weighing mode.	

On Accept Auto Total Operation:
Place the product on the scale. If the product is in the accept target range, the ∑ LED

will flash three times. When the ∑ LED flashes, the weight has been added to the total register.

Note: It is not necessary to wait for all three flashes of the LED before removing the weight. Faster throughput can be achieved by removing the product when the first ∑LED flash appears.

Rules for On Accept Auto Total:
Same as "AUTO TOTAL" except:

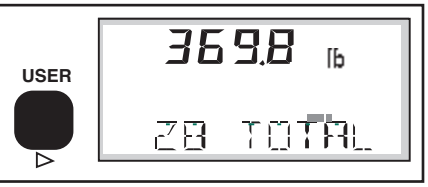
1) The motion annunciator must be off, the scale must be stable and in the accept window.
2) Total works on positive readings only. Must be at weight readings 2% of FS above Gross Zero or Net Zero.
3) Each reading added to total must be followed by a return to zero (Net or Gross) ±1% of FS. Totalization of the accept weight is indicated by the message "xxx TOTAL " where xxx is the number of totaled weighments.

DISPLAYING AND/OR CLEARING TOTAL

The procedures in this section do not apply to 6000s equipped with the Statistics option. See Section 5.

To Display the Totaled Weight:

Push USER. The totaled weight and the number of weighments will be displayed for 2 seconds. (Assumes that Total has been enabled and that the USER key function has not been modified.



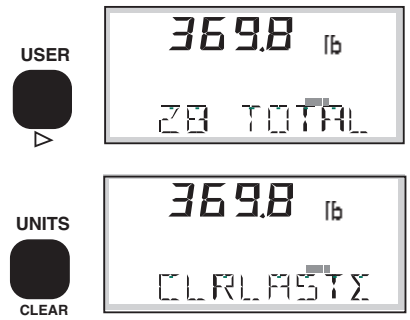
Caution: While in Manual Total, if the weight on the scale is >2% of capacity and has not already been added to the total, pushing the USER key will add this weight to the total. To prevent this remove the weight on the scale before pushing the USER key. In Auto or On Accept total modes, the USER key can be pushed at any time to read the totaled weight.

To Erase the Last Totaled Weight:

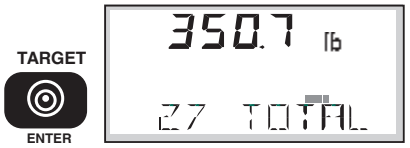
If the last totaled (automatic or manual) weighment was a mistake, it can be erased with the following procedure. This erases only the last weighed value. (This procedure assumes that you have not modified the USER key function.)

Note: *When displaying the Total, the UNITS key is inoperative and functions as a CLEAR key.*

1) Push USER, then CLEAR (UNITS). The message reads "x TOTAL" (where x is the number of weighments), then "CLRLASTΣ".



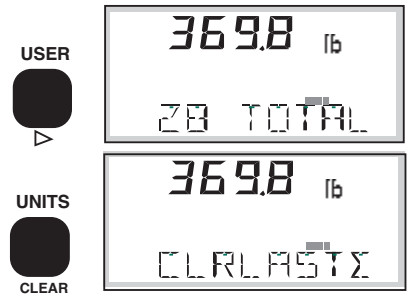
2) Press ENTER (TARGET). *If you change your mind, push EXIT to cancel the "Clear Last Total" operation.* The last weight totaled is subtracted and the number of weighments counter is reduced by one.



To Clear the Total Value:

1) Push USER, then CLEAR (UNITS). The message reads "x TOTAL" (where x is the number of weighments), then "CLRLASTΣ".

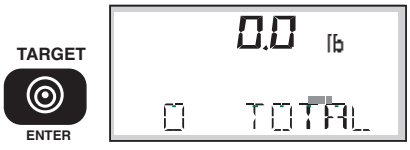
This procedure assumes that you have not modified the USER key function.



2) Press CLEAR again. The message reads "CLEARΣ"

3) Press ENTER (TARGET). 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 "CLRLASTΣ" mode.)



At any time the EXIT key cancels the Clear operation without clearing anything.

To Calculate the Average Packing Weight:

1) Setup the Auto Total for the “ON ACCEPT” mode. Each check weighed portion will be automatically totaled and a number of weighments counter will be activated.
2) To obtain the average packing weight push USER. Note the Total Weight and the number of weighments.
3) Divide the Total Weight by the number of weighments. This calculation is the average packing weight.

Note: Average is calculated automatically if the Statistics Option is installed.

SECTION 5 - 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 Product 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 >100,000 samples. Individual samples are not stored. If needed, individual samples can be logged through either RS-232 port using the “PRINT on TOTAL” (Manual mode) or “PRINT on LOAD” (AUTO mode) function.

The Statistics option, when used with the TARGET features, can also store the number of samples totaled over the target (“n OVER”), under the target (“n UNDER”), and inside the target (“n ACCEPT”).

A “GRAND TOTAL” function is also included with the Statistics option. The Grand Total adds all the weight in all the PRODUCT Codes and provides the following information: GRAND TOTAL, Number of Totals, the Overall Average (GRAND TOTAL divided by Number of Totals), Number of Samples Over the Target, Number of Samples Under the Target, and the Number of Samples in Target (Accept).

The Total Function must be enabled for Statistics to function. Statistics are accessed in either of two ways: 1) Program the USER Key to be “TOTAL”. 2) The statistic registers can be accessed with a computer or terminal through either RS-232 port.

DEFINITIONS AND FORMULAS

AVERAGE - is computed by dividing the total weight 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 6000 uses the “non-biased” or “n-1” method that is based on sampling a portion of all available weighments.
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:

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

n OVER, n UNDER, n ACCEPT are registers the 6000 keeps as a record against the Target Weight. If totalized weighments are allowed out of the Target limits, these registers keep track of how many weighments were higher, lower, and acceptable relative to the Target.

GRAND TOTAL - is computed by adding the Totals of all the Product Codes. The Grand Total is computed in the default unit set in calibration.

n SAMPLES - is the number of Totals taken across all Product Codes.

GRAND AVERAGE - is computed by dividing the Grand Total by the number of samples of all the Product Codes.

∑ ACCEPT, ∑ OVER, ∑ UNDER - are the weighments in Target, over Target, and under Target added together from all Product Codes.

STATISTICS OPERATION

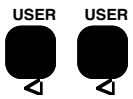
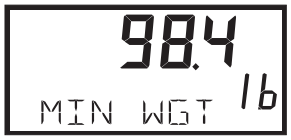
To Enable Statistics:

1) Use the “Setup Manual Total” procedure (6000 Manual Section 4) or the “Setup AUTOTOTAL MODE” procedure. Which of these to use depends on the application.

Note: Do not use “AUTOTOTAL on ACCEPT” mode if you wish to count the samples under, over, and in Target because only the sample in ACCEPT will be counted. Use Manual Mode or the standard Auto Mode.

2) Set up the Product Code targets as normal (see Section 3).

To View Statistics for the current Product Code:

1) Push **USER** twice. The first statistic displayed is "AVG WGT". ***Note**: The USER key will not function until weight has been totaled in the current product code.*		
2) Push the **UP** key. The second statistic is the Minimum Weight.		
3) Push **UP** . The third statistic is the Maximum Weight.		
4) Push **UP** . The forth statistic is the Standard Deviation.		
5) Push **UP**. The fifth statistic is the Coefficient of Variance.		
6) Push **UP**. The sixth statistic is the number of samples in Target ("n ACCEPT").		
7) Push **UP**. The seventh statistic is the number of samples over Target ("n OVER").		
8) Push **UP**. The eighth statistic is the number of samples under Target ("n UNDER"). This is the final single Product Code Statistic.		
9) Push **EXIT** to return to normal scale operation or push the **USER** key to view the "Grand Total Statistics" (start at step two below).		

To View the Grand Total Statistics for all Product Codes:

1) Push **USER** three times. The 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 one product code.*	 GRND TOTL
2) Push the **UP** key. The second statistic is the number of samples taken across all product codes.	 n SAMPLES
3) Push **UP** . The third statistic is the Grand average weight. (Average of all product codes totaled)	 GRND AVG
4) Push **UP** . The fourth statistic is the number of totals taken within the Target window ("∑ ACCEPT").	 ∑ ACCEPT
5) Push **UP** . The fifth statistic is the number of totals taken that were over the Target window ("∑ OVER").	 ∑ OVER
6) Push **UP** . The sixth statistic is the number of totals taken under the Target window ("∑ UNDER").	 ∑ UNDER
7) Push **EXIT** to return to normal scale operation.	

To Erase the Statistics of a single Product Code:

1) Use the UP or DOWN scroll key to locate the Product Code you wish to clear Statistics from.
2) Use the "To Clear the Total Value" procedure in Section 4. This procedure erases all the Totals, and also clears the statistics registers.

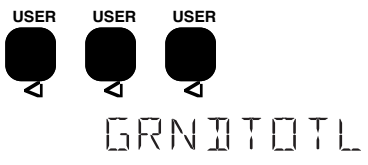
To Erase all Product Code Statistics:
Use the "CLR ALL ∑" procedure as follows. This procedure erases all the Totals and Statistics registers of all the Product Codes.

1) Push **SETUP** followed immediately by the **ZERO** key. The message displays "Σ MODE".	
2) Push the **UP** key twice to scroll to the "CLR ALLΣ" message.	
3) Push **ENTER**. The message reads "R U SURE" to give you a chance to change your mind. *If you do not wish to Clear all the statistics, push **EXIT** to cancel the clear all function.*	
4) Push **ENTER** to erase all the totals and statistics. The message indicates "WAIT" while the processor clears all the Total and Statistics registers.	

To Print the Current Product Code's Statistics:

1) Push **USER** twice. The first statistic displayed is "AVG WGT". ***Note**: The USER key will not function until weight has been totaled in the current product code.*	
2) With a suitable printer or computer attached to the COMM Port1, push **PRINT**.	

To Print the All Product Code's Statistics:

1) Push **USER** three times. The 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 one product code.*	
2) With a suitable printer or computer attached to the COMM Port1, push **PRINT**. All statistics plus the Grand Total statistics will print. ***Product Codes that have no Totaled Data will not print out in this procedure.***	

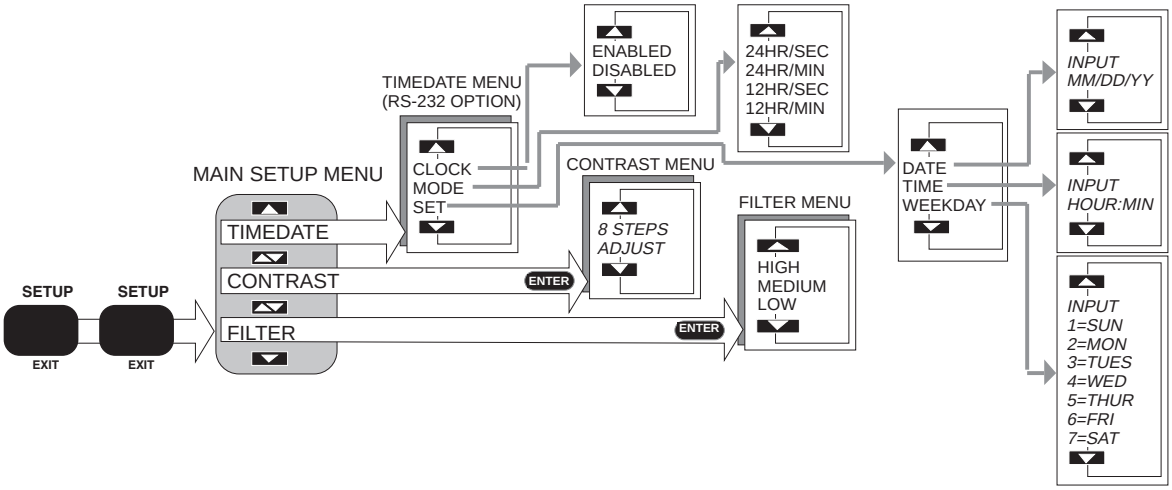
To Print the Current Product Code's Total Only:

1) Push **USER** followed quickly by the **PRINT** key. Just the Total and the number of samples will print.	

SECTION 6 - SETUP

The Setup key is used in conjunction with other keys for setting up various functions. If no other key is pushed within 2 seconds of pushing the Setup key, the scale will go into the Main Setup Menu.

MAIN SETUP



Main Setup Menu:

Top Menu	*Selections*
CONTRAST	8 steps with "123456" and “CONTRAST”
FILTER	LOW, MEDIUM, HIGH
TIMEDATE	Set time, date, and day of week registers

FILTER:
Use the LOW setting for most scale applications. It settles fastest and is intended for general use. Use the MEDIUM setting for conditions that cause light to medium vibration or for higher resolution scales (> than 3000 counts). Use the HIGH setting when there is a lot of scale motion. There is a time penalty to pay for using the HIGH setting. The user should wait at least 3 seconds to be sure that the final reading has settled (Motion indicator off). Filter Setup not available in some legal-for-trade systems.

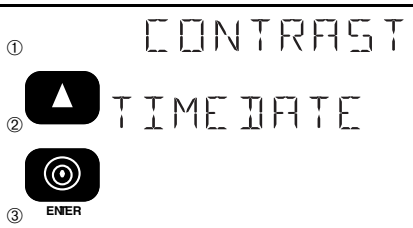
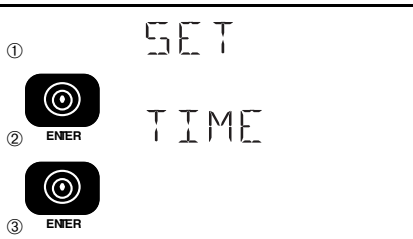
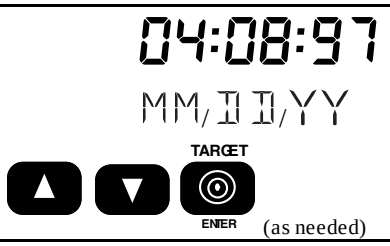
To Change the Filter Setting:

1) Push **SETUP**. Wait 2 seconds (or push SETUP again).	① SETUP
2) The message reads "CONTRAST". Use the **DOWN** key to scroll to "FILTER". Push **ENTER**	① CONTRAST ② ▼ FILTER ③ ENTER
3) 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/motion environments.	① LOW ② ▲ MEDIUM ③ ENTER
4) Return to normal scale operation (MEDIUM Filter on) by pushing **EXIT**.	① EXIT

CONTRAST
Used to adjust the contrast of the LCD at various viewing angles. This is factory preset for optimal viewing. Adjust the LCD contrast for off-angle applications or for temperature extremes by stepping through 8 steps with the UP/DOWN keys.

TIMEDATE
Set the time and date and display modes for the Real Time Clock. By enabling the "CLOCK" selection, the MSI6000 functions as a desk clock / calendar when not being used as a weigh meter. Use the "MODE" menu to set the time display - 12 or 24 hour mode with seconds, or 12 or 24 hour mode without seconds.

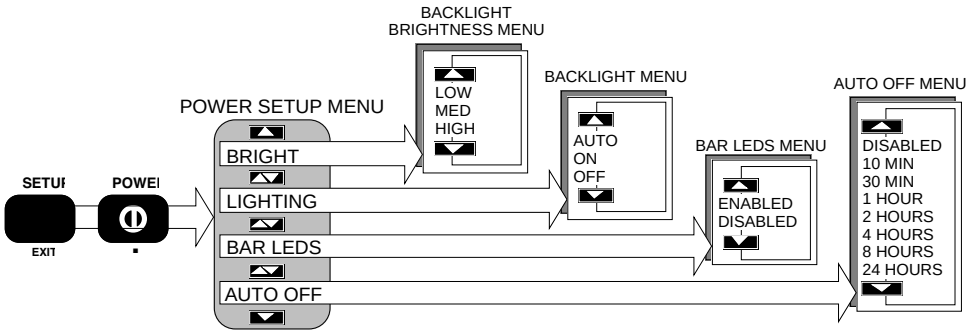
To set the Time, Date, and Day of Week:

1) Push **SETUP**. Wait 2 seconds (or push SETUP again).	
2) The message reads "CONTRAST". Use the **UP** key to scroll to "TIMEDATE". Push **ENTER**.	
3) Select "SET" by pushing **ENTER**. Select "TIME" by pushing **ENTER**.	
4) Input the Time using the **UP** / **DOWN** keys and the **ENTER** key. Time is entered in 24 hour mode so to input 2:30 PM you must enter 14:30. The seconds are not programmable. The seconds will restart at 00 when the minutes digit is set with the **ENTER** key.	 (as needed)
5) Select "DATE" by pushing **ENTER**.	
6) Input the Date using the **UP** / **DOWN** keys and the **ENTER** key. The Date is entered in MM/DD/YY mode. The month, day, and year must be entered in two digits each. For example, April 8th, 1997 is entered as "04:08:97".	 (as needed)

7) Select "WEEKDAY" by pushing **ENTER**.	① WEEKDAY TARGET ② ENTER
8) Input the day of the week using the **UP** / **DOWN** keys and the **ENTER** key. The Weekday is entered in a single digit mode with 1=Sunday, 2=Monday, 3=Tuesday, 4=Wednesday, 5=Thursday, 6=Friday, and 7=Saturday. When the correct number representing the weekday is shown, push **ENTER**.	3 WEEKDAY TARGET ENTER (as needed)
9) The Time, Date, and Weekday have been set. Push **EXIT** three times to return to normal scale operation.	① EXIT SET ② EXIT TIMEDATE ③ EXIT

SETUP POWER

Allows Front Panel entry of seldom set parameters that affect power consumption.



Set Up Power Menu:

Top Menu	*Selections*
AUTO OFF	DISABLED, 10 MIN, 30 MIN, 1 HOUR, 2 HOURS, 4 HOURS, 8 HOURS, 24 HOURS
BAR LED's	DISABLED, ENABLED
LIGHTING	AUTO, ON, OFF
BRIGHT	LOW, MEDIUM, HIGH

To Turn on the Backlight (Setup Power operation example):

Note: All SETUP POWER operations are similar to the following procedure. Use the UP/DOWN keys to select the desired operation, and then use the ENTER key to "enter" into the chosen setup menu.

1) Push **SETUP** followed immediately by the **POWER** key.	① SETUP ② POWER — AUTO OFF
2) Push the **UP** key two times until the display reads "LIGHTING". Push **ENTER**.	① ▲ ② ▲ ③ TARGET — BARLEDS / LIGHTING / AUTO
3) Push the **UP** key until the message reads "ON". (How many times you push the **UP** key is dependent on the last mode set.) Push **ENTER**.	① ▲ → ON ② TARGET
4) The Backlight will turn on. Push **EXIT** to return to normal scale operation or use the **UP/DOWN** and **ENTER** keys to change another Setup Power parameter.	① SETUP EXIT

Note: It is unwise to turn on the Backlight full time on battery powered units. The Backlight in the bright setting reduces battery life considerably. Use the "AUTO" or "OFF" modes to conserve battery life.

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 will reset the time limit. This feature defaults to the disabled mode when initially calibrated. When disabled, the scale will stay on and only the power key (or remote from a terminal or computer) will turn it off.

BAR LEDS
Use “DISABLED” to turn off the red and green accept/over/under LED lamps. On battery powered units, disabling the LEDs will increase battery life.

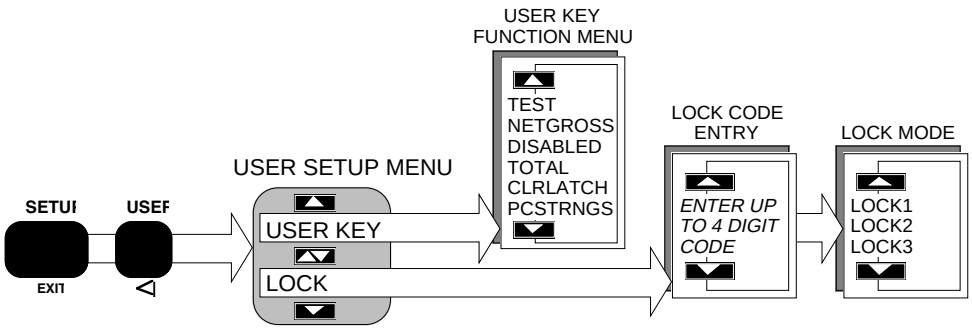
LIGHTING (Backlight option)
“AUTO” - A photocell detects ambient light and determines if the Backlight should be on or off. The “ON” mode turns the Backlight on full time. For increased battery life, the “OFF” mode disables the Backlight.

BRIGHT (Backlight option)
The Fiber-Optic LED Backlight has three brightness settings. On battery powered units, use “LOW” to maximize battery life in low light situations.

SECTION 7 - USER KEY PROGRAMMING / AUX DIGITAL INPUT

USER KEY

The operator can program the USER key to any of 6 functions: Test (default), Net/Gross, Total, PCStrings (Product Code Print Strings), Clear Latch, or disabled. See “SETUP USER Menu” for instructions on programming the User key.



Setup USER Menu:
This setup menu defines what the USER key does, and enables the functional lock.

Top Menu	*Selections*
LOCK (Ent Code)	LOCK 1, LOCK 2, LOCK 3
USER KEY	DISABLED, PCSTRNGS, NET/GROSS, TOTAL, TEST

LOCK

The Lock functions allow the user to lock various setups to prevent unauthorized changing or erasing of scale functions and features. For added security an optional lock code (1-4 numerals) can be entered. Once the MSI 6000 is locked a small annunciator appears on the LCD. To unlock push the Setup key and enter the lock code number. If the lock code is lost, call MSI for instructions. In all lock modes, the ZERO, PRINT, and POWER keys always work. The three lock modes differ in what functions are still active as detailed in the following table:

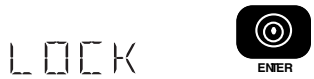
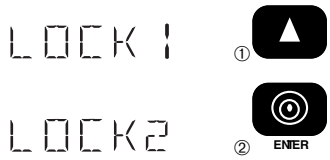
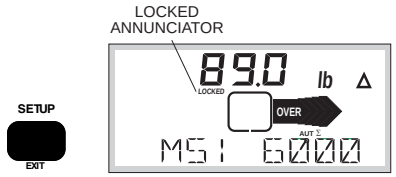
Key/Function	*LOCK 1*	*LOCK 2*	*LOCK 3*
TARGET	Locked	Locked	Functional
SETUP	Locked	Locked	Locked
PRODUCT SELECT	Functional	Locked	Locked
UNITS	Locked	Locked	Functional
USER	Locked	Locked	Functional
USER as TOTAL	Functional	Functional	Functional
TARE SET/CLR	Locked	Functional	Functional

LOCK 1:
The LOCK 1 lock mode allows all the Product Codes to be selected, but not modified. All Target setups and Scale setups are protected from unauthorized changes. Use this mode on production lines that routinely change products and need access to the various product codes.

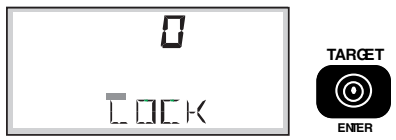
LOCK 2:
The LOCK 2 lock mode prevents any changes to Targets or Setups, but allow changes to the Tare weight. Whatever product code that is enabled when the lock is applied is the only one accessible. Use this mode on product lines that seldom change check weighing setups.

LOCK 3:
The LOCK 3 mode allows all scale and check weighing functions to operate, but prevents changes to the various setups.

Lock Operation:

1) Push **SETUP** followed immediately by the **USER** switch.	
2) The message display reads "LOCK" . Push **ENTER**.	
3) Push **ENTER** if no security is needed. If a custom lock code is desired, enter up to a four digit lock code by using the **UP /DOWN** and **ENTER** keys. The lock code you enter appears in the numeric display. **IMPORTANT!** Make note of the code. In this example, no lock code is needed.	
4) Use the **UP /DOWN** keys to select the Lock mode as described in the lock mode table above. Push **ENTER**. In this example we'll select LOCK2.	
5) Push **EXIT**. The scale returns to normal operation except those functions that are locked. The LCD shows a small "LOCKED" annunciator.	

To Unlock:

1) Push **SETUP** followed immediately by the **USER** switch. The message display reads "LOCK".	
2) Use the **UP /DOWN** and **ENTER** keys to input the lock code. The code is up to 4 characters long. In this example, no lock code was entered so no lock code is needed. If the entered code is correct the "LOCKED" annunciator will go off and the scale will return to normal operation.	

USER KEY PROGRAMMING

Programs the User key function. The USER key defaults to the Test mode. Available functions are: TEST, NET/GROSS, TOTAL, CLRLATCH, PCSTRNGS, or DISABLED. The Totalize function, when enabled, automatically turns the USER key into a TOTAL key.

To Define the User Key:

1) Push **SETUP** followed immediately by the **USER** switch.	
2) The message display reads "LOCK" . Use the **UP** key to scroll to the "KEYFUNC" message. Push **ENTER**.	
3) Use the **UP** /**DOWN** keys to scroll through the USER key options. In this example, we'll change the function of the USER key from TEST (which is the default) to NET/GROSS. NET/GROSS is useful when you need to change often between gross readings and a Tared (NET) reading.	
4) Push **EXIT** to return to normal scale operation.	

TEST
(User key option, see User Setup to enable this function).
Provides a functional system test, and an on-demand display check without disturbing the current weighment. Also provides calibration verification in the form of a load cell Calibration number.

Operation:
Press TEST (USER key)To start the test sequence.

1) Display test: All digits (7 segment and 16 segment), and all LED annunciators turn on at once.
2) RCAL - The scale displays the RCAL number next. This number can be used to verify scale performance. The RCAL as calibrated at MSI, is printed on the serial number tag. If there is no RCAL number stored, the message RCAL ERR appears. This does not mean the scale is not functional.

3) Power Test: The LCD displays the Battery or AC power condition in the form % of capacity with a figure from 1 to 100 on the digits. The % power will vary depending on whether the backlight is on or off. In a battery unit, replace the batteries if the unit indicates 10% or less.
4) All numeric and alphanumeric digits count once from 0 to 9. The Bargraph counts through all segments.
5) Electronic Tests: The Microprocessor performs internal tests to further test scale integrity.

Final:
Either the reading returns to the last condition, or the meter will display an error message.

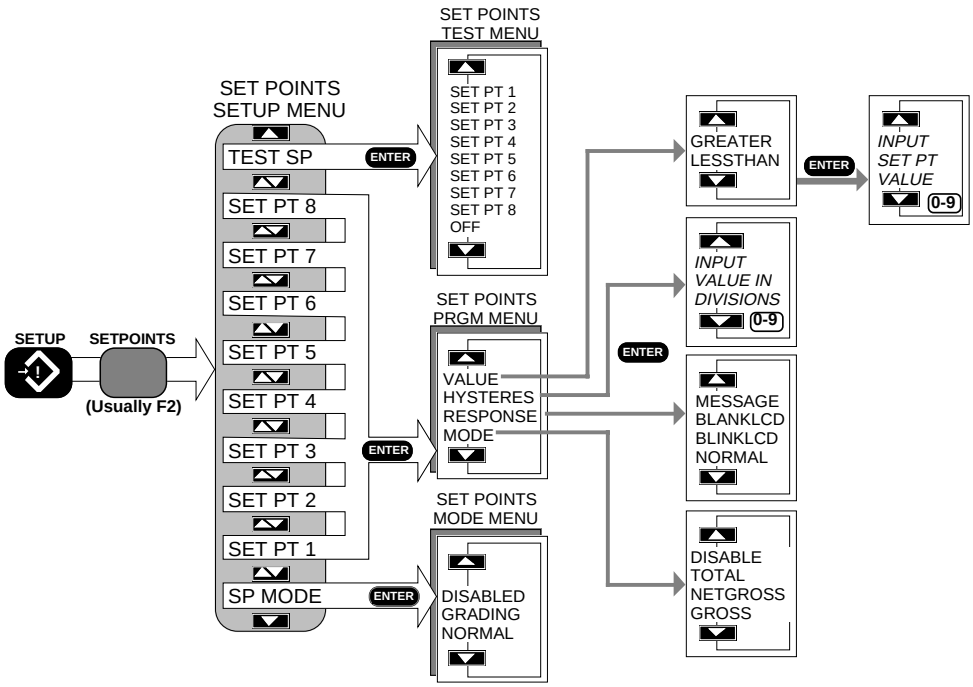
Note: Hitting any key during the test will exit and return the scale to normal operation.

PCSTRNGS:
(User key option, see User Setup to enable this function).
Allows single button access to the PC Strings. By programming the USER key to this function, the scale operator can access the PC strings directly without going through the setup functions. Pushing the USER key once displays STRING1. Pushing it again displays STRING2. This allows editing the strings with the standard editing modes discussed in the Comm Port section 9. This feature is used for operator ID's, customer ID's or any other mode where text data is stored with the weight readings.

SECTION 8 - SET POINTS (OPTION)

The RS-232 and Set Point Option equipts the 6000 with 8 Software Set points. With this option, the 6000 Meter can fill a variety of applications in control, batching, and safety warnings. Set points can also be used to trigger RS-232 data transmissions. All the setpoint values can be changed directly from the front panel or downloaded from a computer or terminal via RS-232. All the Set Points can put a message on the display or blink or blank the display. Set Points 1, 2, and 3 have front panel LCD indication. Combined with the RS-232 option, the Set Points provide output messaging and display warnings without any additional hardware. Add the Set Points Relay Option for relay outputs. This option includes seven 115VAC 1A (2A @ 24Vdc) relays and an 8th logic output.

SETUP SET POINTS MENU



Set Points Setup Menus:

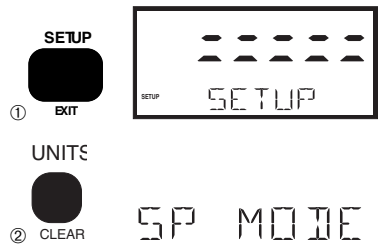
Top Menu	*Selections*
SP MODE	NORMAL, GRADING, BARSTPT, DISABLED
SET PT 1-8	MODE, RESPONSE, VALUE, HYSTERES
TEST SP	OFF, SET PT1, SET PT2, SET PT3, SET PT4, SET PT5, SET PT6, SET PT7, SET PT8

Set Points Program Submenus:

Top Menu	*Selections*
MODE	DISABLED, GROSS, NETGROSS, TOTAL,
RESPONSE	NORMAL, BLANK LCD, BLINK LCD, MESSAGE
VALUE	GREATER or LESSTHAN then value
HYSTERE	Up to 255 divisions

Enable the Set Point Menus:

Push **SETUP** followed immediately by the **UNITS** key. The first menu displayed is the "All Set Points Mode".



ALL SET POINTS MODE

The SP MODE (All Set Points Mode) menu selection provide a general 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 BARSETPT automatically activates Set Points 5, 6, and 7 to match the UNDER, ACCEPT, and OVER target parameters respectively. When enabled the BARSETPT overrides the regular settings of set points 5, 6, and 7. In the BARSETPT mode set points 1-4 and 8 function normally. The BARSETPT mode is particularly useful in controlling automated process lines. When in the BARSETPT mode, the set point values automatically change when you change product codes.

The Set Points must be enabled in this menu to function.

All Set Points Mode Procedure:
You must enable the SET POINT menus to proceed. See procedure above.

1) Use the **UP** or **DOWN** key to scroll to the "SP MODE" menu. Push the **ENTER** key. You are now in the "All SP MODE" menu.	
2) The current mode is displayed. 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". *All selections of this menu are shown to illustrate the choices. The "NORMAL" selection can be reached faster with the UP key.*	
3) 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 show their status on the Front panel with LCD anunciators (SP1-3) or messages (SP1-8) displayed on the LCD or transmitted out the Comm Ports. The MSI 6000 Relay Option Board adds up to 7 setpoint relay outputs and 1 external non-isolated logic output. Set Points provide warnings and indications of weighing events. When the weight is above (greater than) or below (less than) a set value the 6000 can respond in a variety of ways:

- Turn on a relay.
- Blank or blink the Weight display.
- Send message to the display.
- Send a custom message out either of the Comm Ports (see Section 9).

When equipped with the relay option, the relay response to a set point is automatic. 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: “MODE”, “RESPONSE”, “VALUE”, and “HYSTERES”.

WEIGHT MODE MENU

The Set Point Weight Mode menu has four choices:

1) GROSS - In the “GROSS” mode the setpoint 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.
4) DISABLED - Set point does not operate. All other parameters can be set, but the set point will not operate if disabled.

RESPONSE MENU

The Set Point Response Menu is used to program what the 6000 does when the set point is 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. The corresponding relay will close.
2) BLANKLCD - The Weight Display will turn off. If you absolutely want to prevent weight readings when the set point is on. The corresponding relay will close.
3) NORMAL - Only the relay will change. Set Points 1 and 2 also have a front panel LED indication. No other LCD indication is provided.
4) MESSAGE - The set point will display on the message display. Messages displayed on the LCD are prioritized by the SP number. Setpoint 8’s message will take priority over SP1-7, Setpoint 7’s message will take priority over SP1-6, and so on.

VALUE ENTRY

The Set Point Value Menu is used to input the weight value for the setpoint. Also sets the sense of the setpoint...greater than (or equal to) or less than. Overload alarms should always use “GREATER”.

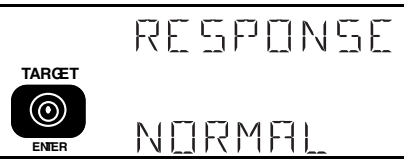
HYSTERESIS VALUE ENTRY

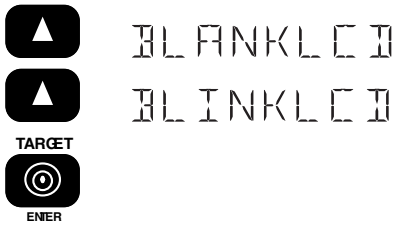
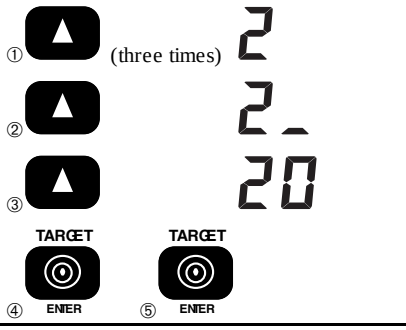
After entering the set point value, the 6000 allows entering a “Hysteresis” value. Hysteresis can be used to prevent relay chatter or to latch a set point over a specific weight range. In certain situations, without hysteresis, the set point will respond to small weight fluctuations. This can cause the set point relay to turn on and off rapidly, possibly damaging a motor or solenoid. This can be prevented by using hysteresis 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 ≥50 lb with a hysteresis of 1 lb will be on at ≥50 lb. It will not turn off again until the weight goes below 49 lb (50-1). A set point set to ≤75 lb with a hysteresis of 2 lb will turn on when the weight is ≤ 75 lb. It will not turn off until the weight is ≥77 lb (75+2).

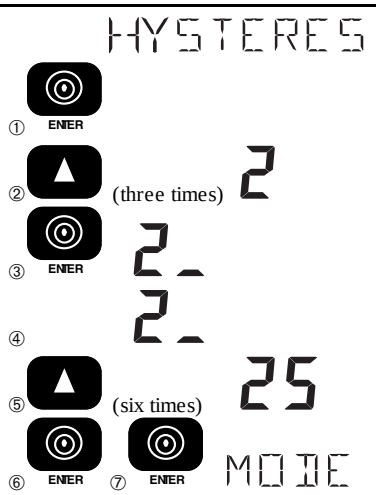
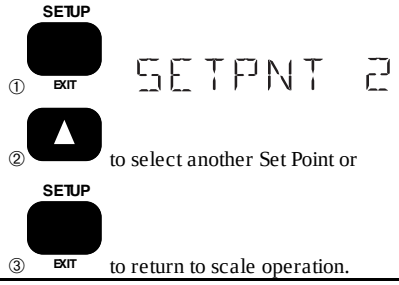
Note: A hysteresis value of zero is equal to 1/2 “d”.

SET POINT ENTRY PROCEDURE

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

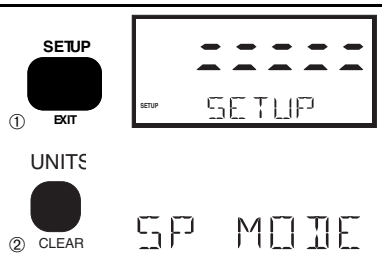
1) Use the **UP** or **DOWN** key to scroll to the Set Point (1-8) you wish to program. In this example we’ll program Set Point 2, but the procedure applies for any Set Point.	
2) Push **ENTER** to enter into the “SET POINTS PROGRAM MENU”.	
3) The first menu choice is “MODE”. Push **ENTER**.	
4) Use the UP scroll key to select GROSS or NET/GROSS (see discussion above about which to choose). Push **ENTER**.	
5) The next menu choice is “RESPONSE”. Push **ENTER**.	

6)	Use the **UP** scroll key to select the response desired. In this example we'll pick "BLINKLCD". Push **ENTER**.	
7)	The next menu choice is "VALUE". This menu item is used to assign a weight value to the Set Point. Push **ENTER**.	
8)	For a set point that will go off when the weight is greater than or equal to the value push **ENTER**. For a "less than" set point, push the **UP** key then push **ENTER**. In this example we'll program a overload warning set at ≥20lb so we will leave the sense at "GREATER". Next the Weight entry screen appears.	
9)	Input the desired Set Point Value using the **UP/DOWN** keys to scroll through the numbers. Push **ENTER** to store each digit. Two **ENTER** keys in a row will finalize the entry of your Set Point value. ***Note**: Use the Power key to input a decimal point. Set Point Values are limited to capacity +5% unless the WGT MODE is "TOTAL".*	

10) You are now in the "HYSTERESis" menu. This step is optional. Push **EXIT** and go to step 11 if hysteresis is not needed. Push **ENTER** if a hysteresis value is needed. Use the **UP**/**DOWN** keys and **ENTER** to input the weight desired in scale divisions. Two **ENTER** keys in a row (or enter on the third digit) will finalize the entry of your hysteresis value. In this example the scale division is 0.1lb. We desire a hysteresis of 2.5 lb. Therefore it will take 25 divisions to equal 2.5 lb (2.5 / 0.1). The example set point will turn on at weights ≥20b and will turn off at weights ≤17.5lb (20 – 2.5). ***Note**: The maximum value of the hysteresis cannot exceed 255 divisions.*	
11) You are now back in the "SET POINTS PROGRAM MENU". Push **EXIT** to return to the "SETUP SET POINTS" menu. From here, you could scroll to another Set Point and repeat steps 1-10, 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 "Set Point Mode Procedure" above.

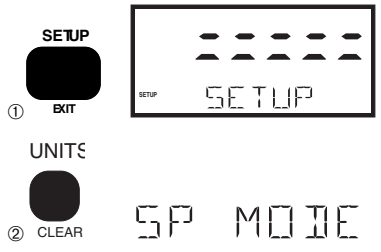
To Disable all Set Points:
You must enable the SET POINT menus to proceed. See procedure above.

1) Push **SETUP** followed immediately by the **UNITS** key.	
2) Push the **ENTER** key. You are now in the "ALL SETPOINTS MODE MENU".	
3) The current mode is displayed. Use the **UP** or **DOWN** scroll key to select "DISABLED".	
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.	

To re-enable all the Set Points:
...follow steps 1-4 above except on step 3 select the "NORMAL" (or GRADING or BARSETPT) 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 6000 AS A GRADING SCALE

The MSI 6000 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 6000 will be used to grade in three zones, with an additional over and under zones for a total of 5. 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.

1) Push **SETUP** followed immediately by the **UNITS** key. The menu displayed is the "All Set Points Mode" (SP MODE).	
2) Push the **ENTER** key. The first menu item is "NORMAL".	
3) The current mode is displayed. Use the **UP** or **DOWN** scroll key to select "GRADING".	
4) Push **ENTER** to store your selection. You are now back in the "SETUP SET POINTS" menu.	
5) Use the "SET POINT ENTRY PROCEDURE" above to program all 8 Set Points to the following settings: Set Point 1 as follows: On, MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 10. Set the HYSTERES to 0 on this and all subsequent Set Points. Set Point 2: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 10 Set Point 3: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 10.5 Set Point 4: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 11 Set Point 5: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 11.5 Set Point 6: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 12, Set Point 7: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 12.5 Set Point 8: MODE = GROSS, RESPONSE = "MESSAGE", VALUE = 13	
6) 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 6000. 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. The total of 8 set point outputs are addressable through the set point routines of the 6000. Each set point output is fully programmable to respond to weight changes. This manual 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 to terminal blocks found internally on the Relay Option Board. 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 water-tight fittings dedicated to the Set-Point Outputs. Multiple conductor cable will be necessary to access all of the relays.

Cable Installation Procedure:

1) Remove the screws holding the rear panel on.
2) Strip the outer insulation from the cable. Peel back the foil shield (if present) being careful not to nick the conductors. Cut off the foil shield and any drain wire. Strip 3/16" (5mm) from each conductor. 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. Connect the shield (if present) on the other end of the cable (outside the 6000) to a good earth ground.
3) Loosen an available watertight feedthrough and remove the white plug. Insert the cable.
4) Insert the wires as shown in Appendix C and the relay application diagrams. 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.

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

WARNING: Potentially fatal voltages are present within the meter! Always remove power from the meter and from your circuit before opening the cabinet and connecting or servicing 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. Make sure that your wiring complies with all local electrical codes.

RELAY APPLICATIONS

Some examples of uses for the setpoint 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.

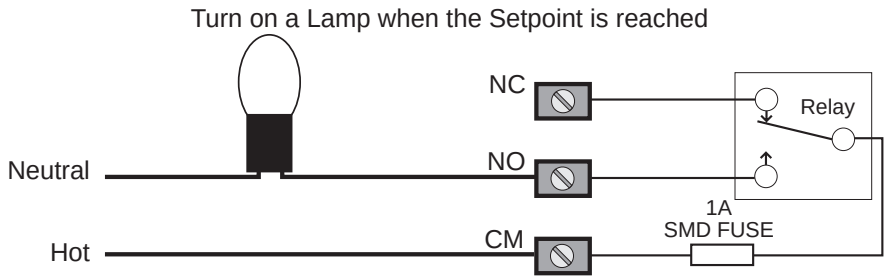


Figure 1

Set Points are often used in conjunction with automatic conveyer belts. By using the setpoint 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 setpoint 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.

Cut off a motor when the Setpoint is reached

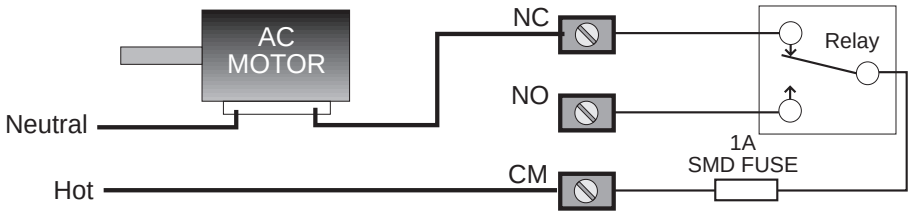


Figure 2

Powering an External Relay for Higher Voltage or Higher Power

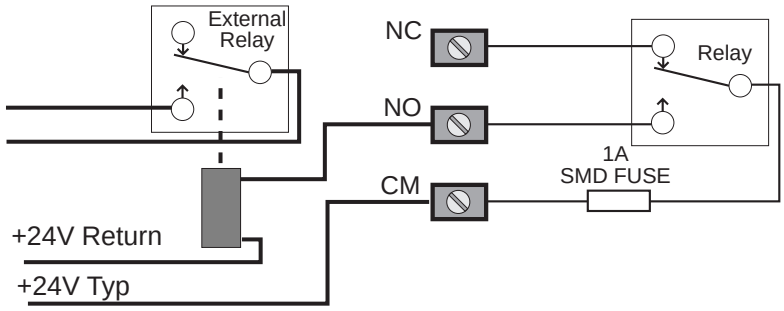


Figure 3

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 setpoint 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.

Cut off a motor when the weight is out of limits

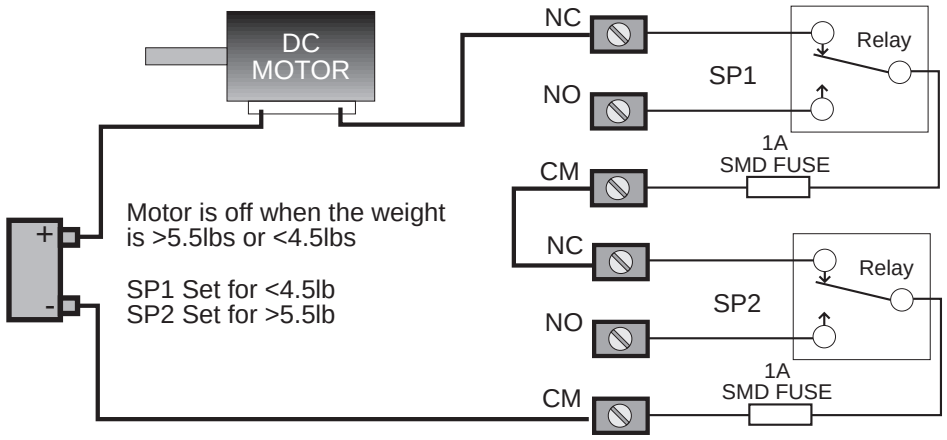


Figure 4

Turn on a motor when the weight is out of limits

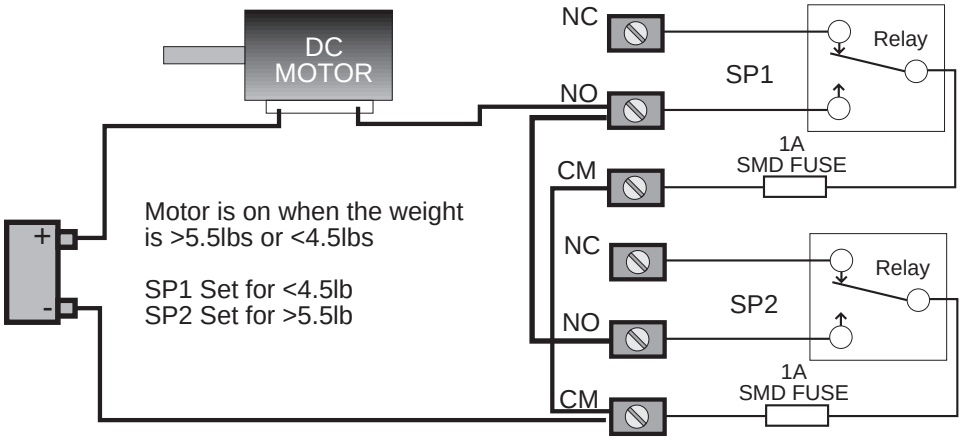


Figure 5

Programmable Logic Controllers (PLC's) are in common use for machinery control. The 6000 can interface to PLC's with the relay outputs or with the logic output on setpoint 8. Figure 6 shows one possible way of interfacing to a PLC. More sophisticated PLC's 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.

Isolated Interface to a PLC

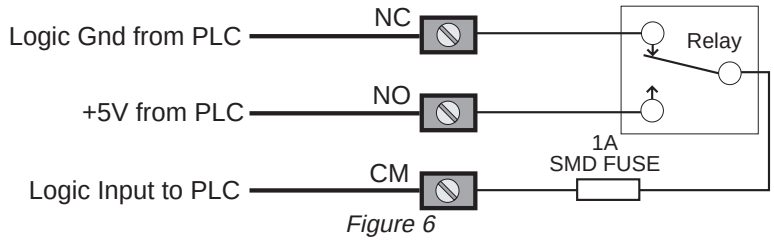


Figure 6

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 setpoint is tripped. The TTL Lo 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.

WARNING: 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.

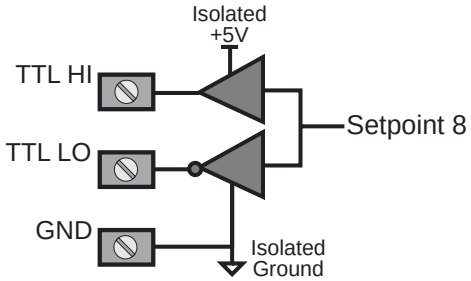


Figure 7

Besides providing a direct logic output to PLC's 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.

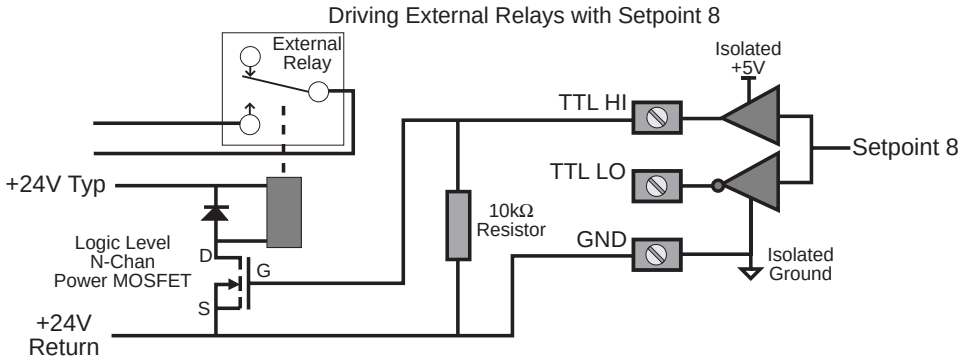


Figure 8

TEST SET POINT RELAYS

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

1) Push SETUP followed immediately by the UNITS key. Push ENTER. You are now in the SETPOINTS 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 setpoint. Each relay will turn on in succession and the message display indicates which setpoint relay is activated.
4) When done testing the relays push EXIT twice to return to normal scale operation.

Caution: 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.

SECTION 9 - COMM PORTS (RS-232 & RS-485) (OPTION)

INTRODUCTION

This option adds a single RS-232 serial input/output and a Real Time Clock/Calendar. The serial I/O is intended for interfacing printers, data loggers, scoreboards, and computers to the Check-Weigh 6000 Meter. The real-time clock allows the user to time and/or date stamp any data obtained from the 6000.

The 6000 can output control characters for easy interfacing to any label printer. A programmable start string, product labels, user programmable data, weight data, and end string, provides complete control over printed data. The print/output data can include three fields that change with each product code; the Product Code Name, String 1, and String 2. This feature combined with the "@ Codes" allows extremely versatile data or label formatting.

A second Comm Port option is available (must be ordered seperately). The second Comm Port is configurable as RS-485, RS-232, or a Fiber-Optic output. The second Comm Port is programmed independently from Comm Port1 and can be used for a different function than Comm Port1. For example, a printer could be connected to Comm Port 1, and a computer connected to Comm Port 2. If the 6000 is AC powered, the 2nd Comm Port is isolated from ground.

Many scales and weigh meters suspend weighing operation while printing and will not function until a print job is completed. The MSI 6000 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.

The RS-232 I/O 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 ACCEPT, when there is a weight change, or when a setpoint is reached. The Set Points messaging feature can output set point conditions directly to either Comm Port automatically.

ELECTRICAL CONFORMANCE

COMM PORT 1:
The serial output is configured to 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. Each line is protected from ESD to ±10kV. The RS-232 stamdard dictates cable lengths of up to 50' but reliable operation is possible over much longer cable lengths, especially at the lower baud rates and using high quality, low capacitance cable.

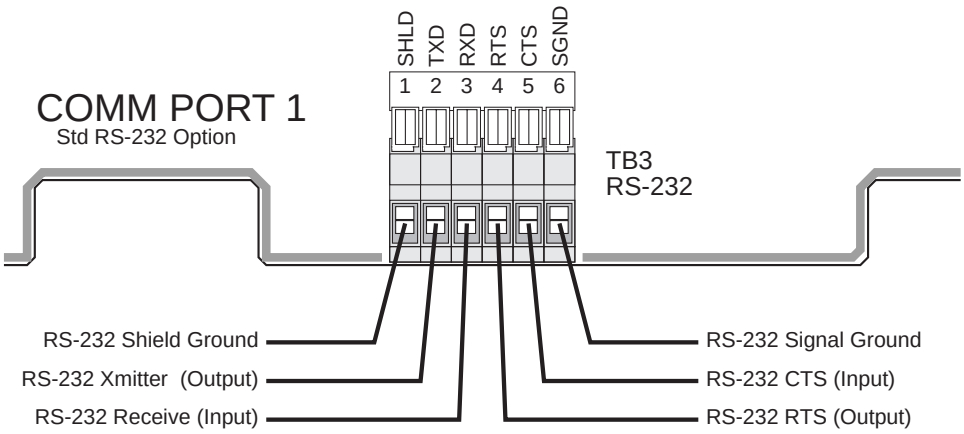
COMM PORT 2 (2nd Comm Port Option only):
Comm Port 2 can be configured in three ways:

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-6000 chassis. Each line is protected from ESD to ±10kV.
2) RS-485 - The RS-485 mode is a half-duplex serial communications channel capable of driving up to 4000 feet (1200 meters) 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. This termination is built in to the Option Board. If multiple 6000's are being connected on the same twisted pair, contact MSI for instructions on removing the terminations on the scales that are not the end of the cable. The Cable Connections are TXD+, TXD-, and signal ground. Serial data is both transmitted and received on the same lines (half duplex).

RS-232 Cable Installation, Comm Port 1:

1) Remove all power sources. Remove the 10 screws holding the rear 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 rear 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.

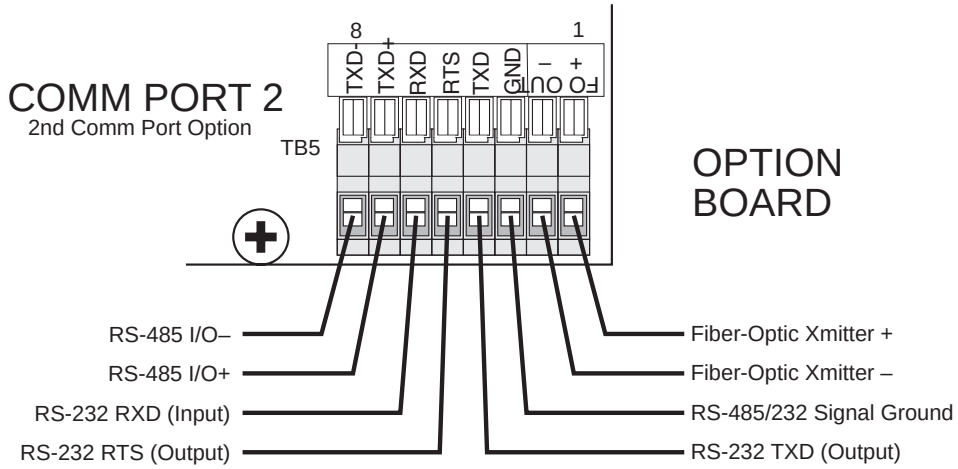


RS-232 Cable Installation, Comm Port2:

1) Remove power from the meter. Remove the 10 screws holding the rear 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 and the drain wire. Strip 3/16" (5mm) 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 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 rear panel being careful to seat the gasket evenly around the lip of the cabinet. Screw down the 10 rear 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 power from the meter. Remove the 10 screws holding the rear 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 toTXD+ and wire 2A to TXD-. 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 6000 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. In other words, Comm Port 1 could be connected to a printer running at 2400 baud, and Comm Port 2 could be hooked to a computer running at 19200 baud.

Data String Buffers:
Data Strings are defined by the user. The length of the formatting strings are limited per the following table. 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.

STRING	*PORT1 MAX CHAR'S*	*PORT2 MAX CHAR'S*
Data:	255	255
Start Line:	4	4
End Line:	4	4
Wait Char:	1	1

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.

OPERATION

The MSI 6000 serial port can be used in 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. 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 6000 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 Accept:
When the accept range is reached and motion ceases, one transmission of data will occur. Once transmitted, the scale must return to within 1% of Net or Gross zero to reenable the transmission. Interval has no effect in this mode.

4,5 & 6) Print on Set-Point:
Set point1, Set point2, or Set point 1&2 can be configured to generate a data output. 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.

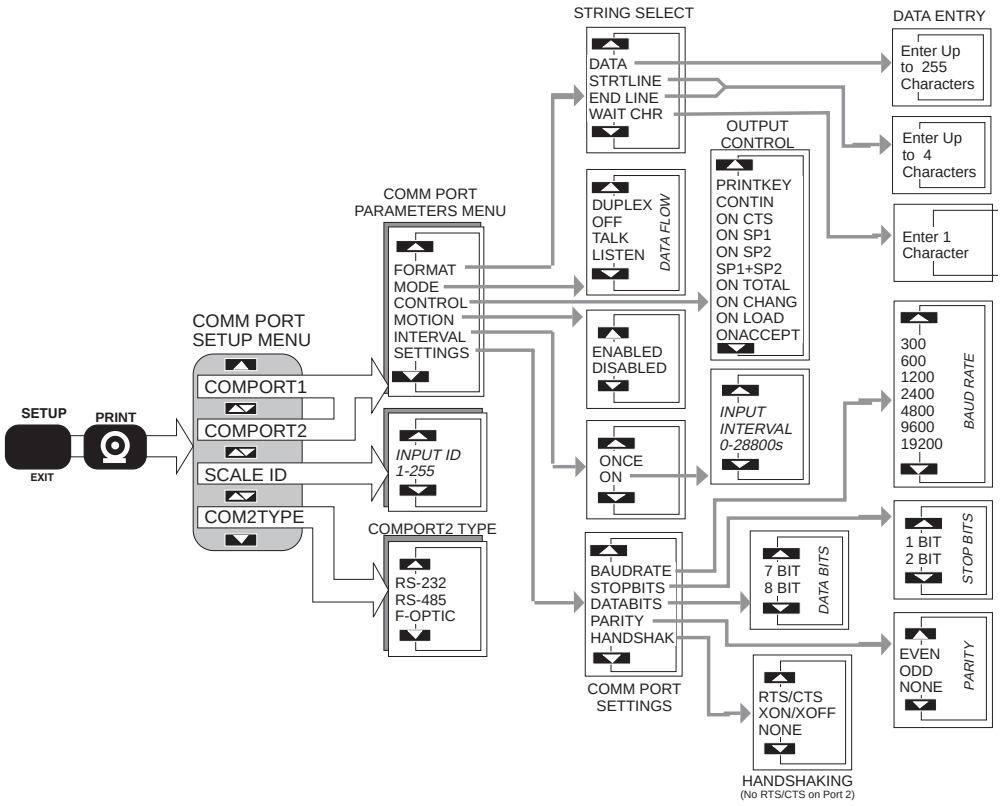
7) Print On Change:
Every time the weight changes 1 full display count or more, one transmission of data will occur.The “MOTN DET” menu determines if printing is allowed or disallowed when the weight is in motion and/or not stable. Interval has no effect in this mode.

8) Print on Load Change:
When the load weight exceeds 2% of capacity and motion ceases, one transmission of data will occur. Once transmitted, the scale must return to within 1% of Net or Gross zero 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:
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.

COMM PORT SETUP MENUS



FORMAT:

The FORMAT menu is the heart of the communications system.

DATA:

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

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 6000 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 6000 to print. 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 or the scale will ignore the print command.

PRINTKEY:

Pushing the front panel switch will cause 1 data transmission.

CONTIN:

The data string will print continuously. The speed of the transmission is limited by the display update rate (usually 4 readings/s), by the baud rate specified, and the length of the Data Transmission. You can specify an interval transmission from 0 to 28800 seconds. See “INTERVAL” for details.

ON CTS:

A transition on the CTS line from space to mark will cause 1 data transmission.

ON SP1:

When Set-Point 1 is true, and motion ceases, 1 data transmission will occur. The set-point must go false before another transmission is enabled.

ON SP2:

When Set-Point 2 is true, and motion ceases, 1 data transmission will occur. The set-point must go false before another transmission is enabled.

SP1+SP2:

Both Set-Point 1 and 2 must be true to cause a data transmission. This provides a data transmission that will print when the weight is inside a weight window, or outside a weight window.

ON CHANG:

When the weight changes by at least 1 d and motion ceases, a new data transmission occurs.

ON LOAD:

When the weight makes a transition from net or gross zero to a stable reading

(must be above 2% of capacity), 1 data transmission will occur. The weight must return to below 1% of capacity relative to net or gross zero to reenable the transmission. This prevents the same weighment from printing twice. Interval has no effect in this mode.

ONACCEPT:

When the weight is in the accept range and motion ceases, 1 data transmission will occur.

ON TOTAL:

Whenever a total is taken (either manual or automatic), 1 data transmission will occur.

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.

SCALE ID:
This menu designates an ID number that is needed in multiple scale setups (usually hooked up with RS485). A unique number per scale from 1 to 255 is programmed.

COM2TYPE (Comm Port 2 option installed):
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 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.

SETTINGS

The Settings menu is used to set standard Comm Port parameters:

BAUDRATE:
Standard Baud Rates available are 300, 600, 1200, 2400, 4800, 9600, and 19200. The 6000 defaults to 9600 Baud. See “To Set The Baud Rate”.

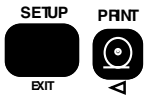
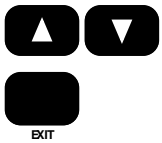
STOP BITS:
Either 1 or 2 Stop Bits can be set. The 6000 Stop Bits default is 1.

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 6000 defaults to 8 bits.

PARITY:
Parity mode is NONE, EVEN or ODD. The 6000 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 handshaking is not required or possible.

To Set the Baud Rate (Comm Port 1 example).

1)	Push **SETUP** followed immediately by the **PRINT** key. The message reads "COMPORT1".	 
2)	Push **ENTER**. The message reads "FORMAT".	 
3)	Push the **DOWN** key to locate the "SETTINGS" sub-menus. Push **ENTER**. The first sub-menu choice in the Settings menu is "BAUDRATE".	 
4)	Push **ENTER**. The current Baud Rate is displayed. Use the **UP** or **DOWN** key to scroll through the available Baud Rates. When the desired rate is shown, push **ENTER**. You are now back in the "SETTINGS" Menu. In this example we'll change the Baud Rate to 19,200.	 
5)	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 back up 1 menu level.*	 (as needed)

TEST COMM PORT

The following test will verify port formats such as baud rate and stop bits, and will send out a listing of all the data formatting commands. The listing will aid in developing your print strings.

Test Comm Port is not available with the Statistics Option.

1) Remove the seal port on the left side of the 6000.
2) With your finger poised over the Print key, push the Calibrate enable switch inside the seal port followed immediately by the Print key.
3) The printer should start printing a listing of all the commands. If it does not, check the wiring, baud rate, data bits, stop bits, parity and handshaking to make sure that the 6000 and the printer are configured and wired correctly for each other.

4) When the listing is finished printing the scale returns to normal operation.

COMM PORT OUTPUT FORMATTING

The RS-232 I/O can format virtually any printer including complex bar-code label printers through the use of 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 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 $^{N}_{U_L}$. The "@W" command code means to print weight. The "1" means print the current display mode (Gross or Net or Deviation). The "@E" will cause the end-of-line string to be printed (usually CR LF). The command string must always be terminated by an ASCII null character (ASCII 0). The 6000 indicates nulls with "$^{N}_{U_L}$".

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 MSI6000 character set is limited to upper case letters, numbers, and a few punctuation characters. To output any other characters such as lower case or control codes, it is necessary to input them in numeric form.

General Data Entry Procedure:

1) To input a standard MSI6000 character, use the UP/DOWN keys to scroll through the available character set. When the desired character is displayed, push ENTER.
2) The cursor will move over for the next character. Continue entering characters until finished. Push ENTER twice to exit and save the data entry. Alternately push the POWER button to exit and save the data entry.

Hint: The standard character set always starts with a space. Pushing the Down key once will move directly to the "@" symbol allowing quick entry of the printer formatting codes. Continuing down goes directly to the numerics needed for the control code suffixes.

Character Set:
space ABCDEFGHIJKLMNOPQRSTUVWXYZ "$%()*+- /<=>?\: 976543210@
Any other character can be printed with the following procedure.

Data Entry Procedure - Alternate Characters and Control Characters:

1) Push the TARE key. This enables the ASCII numeric entry mode. A placeholder character indicates an ASCII character not included in the MSI6000 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 A. The left digits on the LCD represents the character position. The right digits represent the ASCII decimal character number. When the desired character number is displayed push ENTER.

KEY FUNCTIONS DURING DATA ENTRY

	Used as “SAVE and EXIT”. Most useful when editing a long text string.
	Enables the “ENTER ASCII” mode. Use this key to enter ASCII characters and control characters not included in the standard MSI6000 character set.
	Used to insert characters within a string. Position the cursor over the character you wish to insert in front of, then push the zero key. The Zero key inputs an ASCII Null and therefore can also be used to terminate a print string.
	Used to enter characters. If pushed twice on a Null character (ASCII 0) functions as “EXIT and SAVE”. Also, if the cursor is positioned over a character that has already been entered, pushing the Enter key functions as “EXIT and SAVE”.
	Pushing the EXIT key will terminate the data entry and cause any changes made to be cancelled.
	Used to scroll through the available character set or to scroll numbers for the ASCII entry mode.
	Left cursor. Use to move the text string left and to position the cursor over characters to be edited.
	Right cursor. Use to move the text string right and to position the cursor over characters to be edited.
	Clear. Will erase any character the cursor is positioned on and move the remaining characters to the left.

EXAMPLE PRINTER FORMATTING SESSION

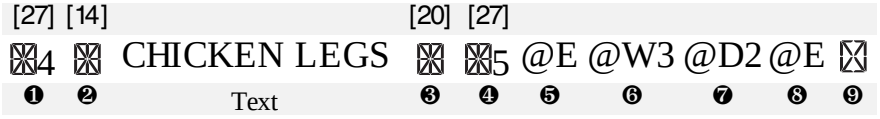
The following example will take you step by step through a formatting process. The end result of this example will produce a print out like this.

CHICKEN LEGS
4.500 lb NET 8/15/96

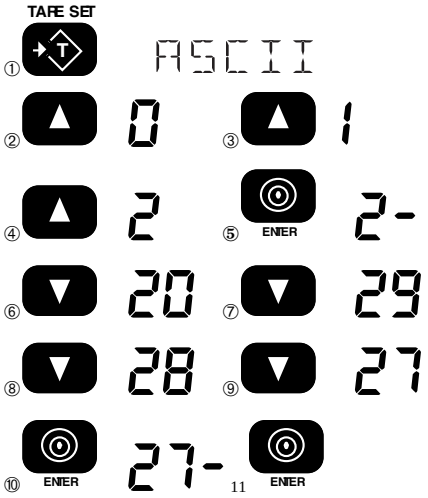
In this example we'll use control characters to both print in red and expand the characters for "Chicken Legs".

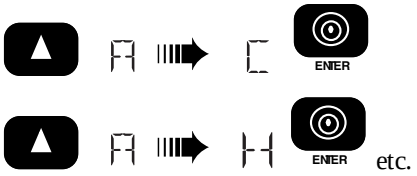
Note: Control codes used in this example are unique to a specific printer (a Star Micronics DP8340) and are used for example only.

The necessary string will be:



1) The 27 is an ESC followed by a 4 which equals "Red Character Print instruction"
2) The 14 is an SO which turns on the Expanded character instruction
3) The 20 is an DC4 which turns off the Expanded character instruction
4) The 27 is an ESC followed by a 5 which turns off the Red Character Print instruction
5) @E causes the end-of-line string to be sent.
6) @W3 causes the current Net weight to be printed. If the scale was in the NET mode, @W1 would have worked as well.
7) @D2 causes the current date to be printed in MM/DD/YY format
8) @E causes the end-of-line string to be sent.
9) The 0 is a NULL which terminates the entire print string.

1)	Push **SETUP** followed immediately by the **PRINT** key.	
2)	The message reads "COMPORT1". Push **ENTER**.	
3)	The message reads "FORMAT". Push **ENTER**.	
4)	The message reads "DATA". 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 D) we find an ESC is decimal 27. We will use the ASCII entry mode to place a 27 in the string. Push **TARE SET**. The LCD message changes to "ASCII". The numeric digits indicate the decimal number of the ASCII character. Push the **UP** key to enter a new number. Push **UP** twice until a 2 appears. Push **ENTER**. Use the **DOWN** key to change the next number to a 7. Push **ENTER**. Push **ENTER** on the blank character to finish. 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.	

6) Push the **DOWN** key and the letter "@" appears. Continue pushing the **DOWN** key until the number 4 appears. If you overshoot use the **UP** key to backstep. Once the blinking letter is at a "4", push **ENTER**. Our string now is at "☒4".	
7) Using the step 5 procedure, enter an ASCII 14	
8) Next enter the text "CHICKEN LEGS" through the use of the **UP**/ **DOWN** and **ENTER** keys. The resultant string so far should look like this: ☒4☒CHICKEN LEGS	
Finish out the remaining characters of our example in a like manner. The entire string must end with an ASCII null. If the final character is not followed by a null character "☒" put one in. To force an ASCII null push the **CLEAR** key.	

EDITING THE PRINT STRING

To change a character:
Use the PRINT(<) and USER (>) keys to move around in the print string. The flashing digit indicates the editable character. Once the unwanted character is flashing, use the UP or DOWN keys to change it. If you need to change it to a character not in the 6000 character set, use the ASCII number entry procedure. Push ENTER twice to store the edited string.

To insert a character:
Use the PRINT(<) and USER (>) 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 ZERO key. Next input the desired character with the UP/DOWN keys or use the ASCII number entry procedure. 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 CLEAR. 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.

Example @ Code Print Strings:

Print Gross, Net, Tare, and Date all on separate lines. The double "@E" prints a blank line between records.	@W2@E@W3@E@W4@E@D1@E @E
Print Display Weight, company text, Date and Time all on same line.	@W1 YOUR COMPANY HERE @D1@T1@E@E
Print the weight with Target value, hi and lo limit, and Time. Weight on separate line.	@W1@E@R4@R5@R6@E@T2@E @E

@PRINTER CONTROL "@" 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 Sj ªe 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 code efficient to enter spaces instead of the @B command.

Example - Building on the previous example, we'll center the "MSI 6000" on a 20 column printer:

@B06☒4☒MSI 6000☒☒5☒

The @B06 command printed 6 spaces followed by "MSI 6000" in red expanded characters.

@C 6000 PRINT PRODUCT 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 PC# that the scale is set in.

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

Output Data Form:

@C1

P	R	O	D	U	C	T		#			4
1	2	3	4	5	6	7	8	9	10	11	12

Length: 12 Justification: "PRODUCT" left justified, number right justified.

@C2

		4
1	2	3

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 DD,MMM,YY with the month spelled out
@D2 Print date in the form MM/DD/YY
@D3 Print date in the form DD/MM/YY
@D4 Print the day of the week
@D5 Full alpha date in the form DD,MMM,YYYY with the month spelled out
@D6 Print date in the form MM/DD/YYYY
@D7 Print date in the form DD/MM/YYYY

Output Data Form:

@D1

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

Length: 8 Justification: left, leading day zero suppressed

@D2

MONTH		/	DAY		/	YEAR	
	7	/	2	5	/	9	2
1	2	3	4	5	6	7	8

Length: 8 Justification: full, leading month zero suppressed

@D3

DAY		/	MONTH		/	YEAR	
2	5	/	0	7	/	9	2
1	2	3	4	5	6	7	8

Length: 8 Justification: full, leading day zero suppressed

@D4

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

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

@D5

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

Length: 10 Justification: left, leading day zero suppressed

@D6

MONTH		/	DAY		/	YEAR			
	7	/	2	5	/	1	9	9	8
1	2	3	4	5	6	7	8	9	10

Length: 10 Justification: full, leading month zero suppressed

@D7

DAY		/	MONTH		/	YEAR			
2	5	/	0	7	/	1	9	9	8
1	2	3	4	5	6	7	8	9	10

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.

Input Data Form:
@I1 Print scale ID# (0-255) and descriptor
@I2 Print scale ID# (0-255) only

Output Data Form:

@I1

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

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

@I2

1	2	3
1	2	3

Length: 3 Justification: right

@L PRINT PRODUCT CODE PC STRINGS
Purpose:
Use the @L command to print one or both of the product code labels. Product code labels will change as the product code number is changed. Product Code Labels can include text, numbers, and control codes thereby allowing the printer format or text to change with the product code.

Input Data Form:
@L1 Print Product Code String 1
@L2 Print Product 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.

@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 totalized)
@M7 Print "TOTAL T CNT"
@M8 Print "DEV" or "% DEV" (when target mode is in effect)
@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

@M8

1	2	3	4	5	6
D	E	V			

@M8 (alternate)

1	2	3	4	5	6
%		D	E	V	

Length: 6 Justification: left

@M9 If gross wgt is added

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

@M9 If net wgt is added

1	2	3	4	5	6
N	E	T	+		

@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 PRODUCT CODE NAME

Purpose:

Use the @N command to print the Product Code Name associated with the current Product Code.

Input Data Form:

@N

Output Data Form:

@N

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

Length: 8 Justification: left

@R PRINT TARGET PARAMETERS
Purpose:
Use the @R command to print the Product Code Target, High Limit, and Low Limit associated with the current Product Code.

Input Data Form:
@R1 Print Target Value (numeric only)
@R2 Print High Limit (numeric only)
@R3 Print Low Limit (numeric only)
@R4 Print Target Value with text
@R5 Print High Limit with text
@R6 Print Low Limit with text

Output Data Form:

@R1,@R2,@R3

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

Length: 8 Justification: right justified

@R4

TARGET VALUE								SP	UNITS				SP	"TARGET"					
1	2	1 3	1 4	. 5	7 6	0 7	5 8	 9	K 10	G 11	 12	 13	 14	T 15	A 16	R 17	G 18	E 19	T 20

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

@R5

HI LIMIT VALUE								SP	UNITS				SP	"HI LIMIT"					
1	2	1 3	1 4	. 5	8 6	5 7	5 8	 9	K 10	G 11	 12	 13	 14	H 15	I 16	 17	L 18	I 19	M 20

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

@R6

LO LIMIT VALUE								SP	UNITS				SP	"LO LIMIT"					
1	2	1 3	1 4	. 5	5 6	0 7	0 8	 9	K 10	G 11	 12	 13	 14	L 15	O 16	 17	L 18	I 19	M 20

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

@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:

@T1

HOURS			MIN			AM/PM	
1	2	:	0	8	6	P	M
	2	3	4	5		7	8

Length: 8 Justification: full, leading hours zero suppressed

@T2

HOURS			MIN			SEC			AM/PM	
1	2	:	0	8	:	3	6	9	P	M
	2	3	4	5	6	7	8		10	11

Length: 11 Justification: full, leading hours zero suppressed

@T3

HOURS			MIN	
1	4	:	0	8
1	2	3	4	5

Length: 5 Justification: left, leading hours zero suppressed

@T4

HOURS			MIN			SEC	
1	4	:	0	8	:	3	6
1	2	3	4	5	6	7	8

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

L	B		
1	2	3	4

K	G		
1	2	3	4

O	Z		
1	2	3	4

@U

G			
1	2	3	4

L	B	O	Z
1	2	3	4

T	R	O	Z
1	2	3	4

Length: 4 Justification: left (Special Order)

@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 6000s

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 Deviation from Target (in weight or per cent depending on display mode)
@V9 Last Totaled Weight Note: will print dashes if no weight has been totaled.

Output Data Form:

@V1, @V2, @V3, @V4, @V8, @V9

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

Length: 8 Justification: right justified

@V5

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

Length: 10 Justification: right, leading zeros suppressed

@V6

# 0F WEIGHMENTS				
1	1 2	2 3	3 4	4 5

Length: 5 Justification: right, leading zeros suppressed

@V7

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

Length: 16 Justification: each number field - right, 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 Deviation from Target (in weight or per cent depending on display mode)
Note: will print dashes if TARGET mode is not enabled
@W9 Last totaled weight Note: will print dashes if no weight has been totaled.

Output Data Form:

@W1, @W9

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

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

@W2

GROSS WEIGHT								SP	UNITS				SP	MODE					
1	2	2 3	0 4	5 5	. 6	0 7	8 8	9	K 10	G 11	12	13	14	G 15	R 16	O 17	S 18	S 19	20

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

@W3

NET WEIGHT								SP					SP	MODE					
1	9 2	5 3	- 4	1 5	5 6	. 7	5 8	9	L 10	B 11	O 12	Z 13	14	N 15	E 16	T 17	18	19	20

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

@W4

TARE WEIGHT								SP	UNITS				SP	MODE					
1	2	1 3	0 4	. 5	5 6	0 7	2 8	9	L 10	B 11	12	13	14	T 15	A 16	R 17	E 18	19	20

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

@W5

TOTAL WEIGHT										SP	UNITS				SP	MODE					
	4	3	2	5	3	4	.	8	5		K	G				T	O	T	A	L	
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

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

@W6

# OF WEIGHMENTS						SP	"TOTAL COUNT"				SP
	1	2	3	4		T	-	C	N	T	
1	2	3	4	5	6	7	8	9	10	11	12

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

@W7

TOTAL WEIGHT										SP	UNITS				SP	MODE					
	4	3	2	5	3	4	.	8	5		K	G				T	O	T	A	L	,
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

					SP	MODE					SP
1	2	3	4	5		T	-	C	N	T	
23	24	25	26	27	28	29	30	31	32	33	34

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

@W8

DEVIATION WEIGHT								SP	UNITS				SP	MODE					
		-	5	2	.	5	0		L	B				D	E	V			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1	0	.	0	2							%	D	E	V		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Length: 20 Justification: Weight - right justified, Units - left justified, Mode - left justified, characters 9 and 14 always a space.

@W9

LAST WGT ADDED TO TOTAL								SP	UNITS				SP	MODE						
		1	0	0	.	5	0		K	G				G	R	O	S	S	+	if gross weight is added
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
		1	0	0	.	5	0		K	G				N	E	T	+			if net weight is added
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
-	-	-	-	-	-	-	-		K	G				A	D	2	T	O	T	if register is empty
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

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

@X PRINT STATISTICS VALUE ONLY

Purpose:

Use the @X command to print the statistics of the current ID Code. Numeric value only, no description text (requires Statistics Option).

Input Data Form:

@X1 Average weight
@X2 Minimum weight
@X3 Maximum weight
@X4 Standard Deviation
@X5 Coefficient of Variance (%)
@X6 Number of Samples in Accept range
@X7 Number of Samples Over Target
@X8 Number of Samples Under Target
@X9 Grand Total
@X10 Grand Average
@X11 Grand # of Samples in Accept
@X12 Grand # of Samples Over Target
@X13 Grand # of Samples Under Target
@X14 Grand # of Samples

Output Data Form:
@X1, @X2, @X3
@X4, @X5

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

Length: 8 Justification: right justified

@X6, @X11

# IN ACCEPT				
1	1 2	2 3	3 4	4 5

Length: 5 Justification: right, leading zeros suppressed

@X7, @X12

# OVER TARGET				
1	1 2	2 3	3 4	4 5

Length: 5 Justification: right, leading zeros suppressed

@X8, @X13

# UNDER TARGET				
1	1 2	2 3	3 4	4 5

Length: 5 Justification: right, leading zeros suppressed

@X9

GRAND TOTAL WEIGHT											
1 1	2 2	3 3	4 4	5 5	6 6	7 7	8 8	9 9	. 10	0 11	5 12

Length: 12 Justification: right, leading zeros suppressed

@X10

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

Length: 8 Justification: right justified

@X14

GRAND # OF SAMPLES							
1	- 2	2 3	0 4	. 5	5 6	0 7	2 8

Length: 8 Justification: right justified

@Y PRINT STATISTICS FULLY

Purpose:

Use the @Y command to print the statistics of the current ID Code with text descriptor (requires Statistics Option).

Input Data Form:

@Y1 Average weight
@Y2 Minimum weight
@Y3 Maximum weight
@Y4 Standard Deviation
@Y5 Coefficient of Variance (%)
@Y6 Number of Samples in Accept range
@Y7 Number of Samples Over Target
@Y8 Number of Samples Under Target
@Y9 Grand Total
@Y10 Grand Average
@Y11 Grand # of Samples in Accept
@Y12 Grand # of Samples Over Target
@Y13 Grand # of Samples Under Target
@Y14 Grand # of Samples

Output Data Form:

@Y1

AVERAGE WEIGHT								SP	UNITS				SP	"AVERAGE"					
1	2	1 3	3 4	. 5	3 6	5 7	0 8	9	L 10	B 11	12	13	14	A 15	V 16	G 17	18	19	20

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

@Y2

MINIMUM WEIGHT								SP	UNITS				SP	"MINIMUM"					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			3	.	2	0	0		L	B				M	I	N			

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

@Y3

MAXIMUM WEIGHT								SP	UNITS				SP	"MAXIMUM"					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		1	6	.	6	5	0		L	B				M	A	X			

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

@Y4

STANDARD DEVIATION								SP	UNITS				SP	"STANDARD DEV"					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			2	.	3	9	2		L	B				S	T	D	D	E	V

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

@Y5

%COEFFICIENT OF VARIANCE								SP	%				SP	"COEFFICIENT OF VAR"					
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 justified, Units - left justified, Mode - left justified

@Y6

# SAMPLES IN ACCEPT							SP	IN ACCEPT WINDOW					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1	2	3	4	3	4		A	C	C	E	P	T

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

@Y7

# SAMPLES OVER TARG							SP	OVER TARGET					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1	2	3	4	3	4		O	V	E	R		

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

@Y8

# SAMPLES UNDER TARG							SP	UNDER TARGET					
	1	2	3	4	3	4		G	–	S	M	P	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14

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

@Y9

GRAND TOTAL WEIGHT										SP	UNITS				SP	"GRAND TOTAL"					
4	5	6	3	2	8	5	.	5	5		L	B				G	-	T	O	T	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

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

@Y10

GRAND AVERAGE WEIGHT								SP	UNITS				SP	"GRAND AVERAGE"					
			5	2	,	5	0		L	B				G	–	A	V	G	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

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

@Y11

GRAND # OF WEIGHMENTS							SP	IN ACCEPT					
	1	2	3	4	3	4		G	–	A	C	P	T
1	2	3	4	5	6	7	8	9	10	11	12	13	14

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

@Y12

GRAND # OF WEIGHMENTS							SP	OVER TARGET					
	1	2	3	4	3	4		G	–	O	V	E	R
1	2	3	4	5	6	7	8	9	10	11	12	13	14

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

@Y13

GRAND # OF WEIGHMENTS							SP	UNDER TARGET					
	1	2	3	4	3	4		G	–	U	N	D	R
1	2	3	4	5	6	7	8	9	10	11	12	13	14

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

@Y14

GRAND # OF WEIGHMENTS							SP	GRND TOTL COUNT						
	1	2	3	4	3	4		G	–	S	M	P	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14

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

@Z PRINT ALL STATISTICS & GRAND TOTAL
Purpose:
Use the @Z command to print the statistics of all the ID Codes followed by the Grand Total Statistics (requires Statistics Option).

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

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

COMPUTER OPERATION

The MSI-6000 series can interface to computers via the RS-232 or RS-485 options. All functions can be controlled remotely and all Target 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-6000 responds to ASCII commands that consist of a two letter mnemonic. Depending on the command, a 1 or 2 digit item selection 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 data must be terminated by a semicolon or by another command. Although it is possible to use “@ Codes” directly from the computer, care must be taken when using half duplex RS-485. See the “@ Codes” description in the previous section.

Note: It is important that the final character sent to the 6000 is a semicolon (;).

Duplex Operation:
As soon as "@" commands are received by the 6000, the requested data type is transmitted immediately out the data port. Some computer operating systems can fail to detect incoming data while still outputting data. In a half duplex mode (such as RS-485) care must be taken to avoid data collisions. In half duplex operation it is better to not use @ commands. Instead, program the print string using the CD command, then use the PR command to obtain data. There is no problem using the @ commands in full duplex RS-232.

	Description	*Suffix or additional data*	*Comments*
@@	Print an "@"		
@B	Print Blanks (spaces)	01-99 2 digits required	
@C	Print Product Code#	1=3 digit value+8 char name 2=3 digit value only	1-6 on standard units expanded mem = more
@D	Print Date	1=Full Date 2=MM/DD/YY 3=DD/MM/YY 4=Day of Week 5=Full Date 6=MM/DD/YYYY 7=DD/MM/YYYY Full date has month spelled out as in 23 JAN 92 or 23 JAN 1992.	
@E	Print End of Line	Up to 4 characters	Defaults to Carriage Return
@H	Print Horizontal Tabs	01-99	Actual tab length determined by printer
@I	Print Scale ID	1=3 digit value + word 2=3 digit value only	
@L	Print Product Code String	1=String 1 2=String 2	Current Product Code String only
@M	Print Weight Mode	1=displayed 2=GROSS 3=NET 4=TARE 5=TOTAL 6=n Totals 7=TOTAL & n Totals 8=Deviation 9=Target	
@N	Print Product Name	(8 characters)	Prints current PC product name
@R	Print Target Parameters	1=Target Value (nbr) 2=High Limit 3=Low Limit 4=Target w/ Text 5=High Limit w/ Text 6=Low Limit w/ Text	
@S	Print Start-of-Line string		

	Description	*Suffix or additional data*	*Comments*
@T	Print Time (current)	1=12HR/MIN 2=12HR/MIN/SEC 3=24HR/MIN 4=24HR/MIN/SEC	
@U	Print Units (current)		
@V	Print Weight (number only)	1=displayed 2=GROSS 3=NET 4=TARE 5=TOTAL 6=n Totals 7=TOTAL & n Totals 8=Deviation 9=Last Totaled Wgt	
@W	Print Weight Fully	1=displayed 2=GROSS 3=NET 4=TARE 5=TOTAL 6=n Totals 7=TOTAL & n Totals 8=Deviation 9=Last Totaled Wgt	
@X	Print Statistics (Numeric Only)	1=Average weight 2=Minimum weight 3=Maximum weight 4=Standard Deviation 5=Coefficient of Variance(%) 6=# of Samples In Accept 7=# of Samples Over Target 8=# of Samples Under Target 9=Grand Total 10=Grand Average 11=Grand number of Samples in Accept 12=Grand number of Samples over Target 13=Grand number of Samples under Target 14=Grand Number of Samples	Statistics option only

	Description	*Suffix or additional data*	*Comments*
@Y	Print Statistics (with labels)	1=Average weight 2=Minimum weight 3=Maximum weight 4=Standard Deviation 5=Coefficient of Variance(%) 6=# of Samples In Accept 7=# of Samples Over Target 8=# of Samples Under Target 9=Grand Total 10=Grand Average 11=Grand number of Samples in Accept 12=Grand number of Samples over Target 13=Grand number of Samples under Target 14=Grand Number of Samples	Statistics option only
@Z	Print All Statistics & Grand Total	1=Print all without Labels 2=Print all with Labels	Statistics option only
AO	Auto Off	1=Disabled 2=10 Min 3=30 Min 4=1 Hour 5=2 Hours 6=4 Hours 7=8 Hours 8=24 Hours	Once the scale is off, the computer will not be able to talk to it unless the Clock Mode is enabled
BL	Back Light	1=Automatic 2=On 3=Off	
BR	Brightness of Backlight	1=Low 2=Medium 3=High	Not Available on units equipped with the 2nd Comm Port option.
CD	Comm Port Data	Up to 255 characters	Send CD followed by all '@' commands + text. End with a ";".
CE	Enable Comm Port	1=Comm Port 1 2=Comm Port 2	All @ and C commands will be directed to the last enabled port.

	Description	*Suffix or additional data*	*Comments*
EM	Total Mode	1=Disabled 2=Manual 3=On Accept 4=Auto Norm 5=Auto Peak	
FL	Filter	1=Low Filter 2=Med Filter 3=High Filter	
GL	Bar Graph LEDs	1=Disabled 2=Enabled	
ID	Product Code Number	Enter number desired	Terminate value with any command or a ";" (semicolon).
IE	Product Code Enable	1=Disabled 2=Enabled	
IL	Product Code Display Mode	1=Disabled 2=Deviation 3=Actual Wgt 4=Δ Per Cent	
IN	Product Code Name	Input up to an 8 character name	End with ";" (semicolon) if less than 8 characters.
IS	Product Code String	1=PC String 1 2=PC String 2	Follow command with up to 20 characters. End each string with a ";" (semicolon).
KE	Keyboard	1=Disabled 2=Enabled	Disables all front panel switches.
KF	Keyboard Function Emulate	1=Power 2=Zero 3=Gross 4=Net 5=Tare 6=Total 7=View Total 8=Clear Last Total 9=Clear Total (current PC) 10=Clear all Totals 11=Print 12=Target	Terminate Value with any command or a ";" (semicolon).
LI	Listen	0=Listen Always (all scales) 1-255 (Scale ID#)*	* to cause only the selected scale to listen

	Description	*Suffix or additional data*	*Comments*
LM	Lock Mode	0=Unlock 1=Lock Mode 1 2=Lock Mode 2 3=Lock Mode 3	See the manual for a description of the 3 lock modes
LV	Lock Value	Up to 4 numbers for a lock code	Terminate Value with any command or a ";" (semicolon).
O	Turn on the Power	None	Clock mode must be enabled with seconds showing.
PR	Print	1=Print Comm port 1 string 2=Print Comm port 2 string 3=Print Both	Causes the current print format strings to be printed.
RD	Real Time Calendar Date Set	Enter date in MM/DD/YY order	
RE	Real Time Clock/Calendar Enable	1=Disabled 2=On	Turns on Clock Calendar when power is off and enables scale-off data reception
RM	Real-Time Clock Display Mode (formatting for LCD only, see @T for time formatting the print)	1=12HR/MIN 2=12HR/MIN/SEC 3=24HR/MIN 4=24HR/MIN/SEC	
RT	Real Time Clock Set	Enter time in HH:MM:SS order	
RW	Set Day of Week	1=Sunday 2=Monday 3=Tuesday 4=Wednesday 5=Thursday 6=Friday 7= Saturday	
S#	Set Point Receive Data Enable	1-8 for Set Points 1 through 8	S#1 to S#8 enables each setpoint. The last enabled setpoint receives any setpoint data or parameters.

	Description	*Suffix or additional data*	*Comments*
SE	General Set Points Mode Enable	1=Disabled 2=Normal 3=Grading 4=Bar Graph Set Points Mode	
SH	Set Point Hysteresis Value	Enter in scale divisions (d). Limited to 0-255	Terminate value with a semicolon or another command.
SM	Set Point Mode	1= Disabled 2=Total 3=Net/Gross 4= Gross	
SR	Set Point Response	1=Normal 2=Blank LCD 3=Blink LCD 4=Message	
SV	Setpoint Value	> or< followed by Weight in current units.	Terminate weight value with a semicolon or another command.
TA	Tare	Input Tare Value in displayed units	See “KF5” for Auto Tare
TH	Target High Limit	Input High Limit	Enter Δ wgt from target
TL	Target Low Limit	Input Low Limit	Enter Δ wgt from target
TO	Over Bargraph sensitivity	1 to 200 where 1=.5d	
TU	Under Bargraph sensitivity	1 to 200 where 1=.5d	
TV	Target Value	Input Target Value in displayed units	See “KB2” for Auto Target.
UM	Units print mode	1=upper case 2=lower case	
UN	Set Units	1=lb 2=kg 3=reserved 4=reserved 5=oz 6=g 7=lb oz	
US	Define the User Key	1=Disabled 2=Test 3=Total 4=Net/Gross 5= PC Strings	Enabling Total forces the User key to be Total. Change after enabling total if this is not what you want

SECTION 10 - CALIBRATION

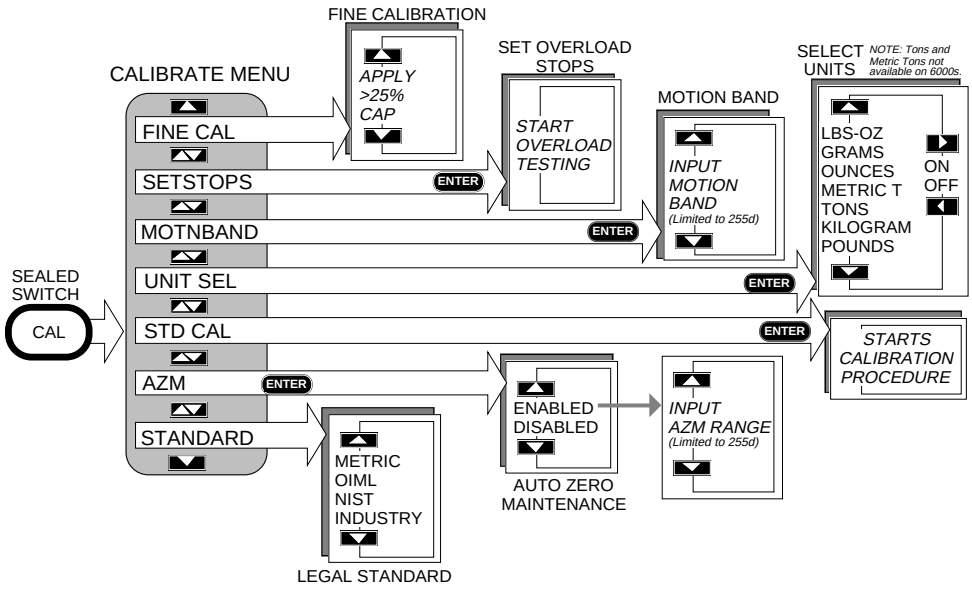
The following sections are intended for qualified scale technicians.

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

General Information:
For a standard Calibration follow the procedure in the “STANDARD CALIBRATION” section. For an initial calibration due to circuit board or load cell change, or to change the Capacity or Count-by (d):

1) Follow the Reset Calibration procedure.
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.
   If the load cell was changed out, the “Set Stops Procedure” should be performed.

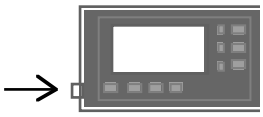
CALIBRATE SETUP MENU



Top Menu	*Selections*
STD CAL	Starts the calibration
UNIT SEL	lb, kg, oz, lb-oz*, g (tr oz by special order)
MOTNBAND	Input motion band in scale divisions *
SETSTOPS	Special overranging mode for overload stop setting
FINE CAL	Allows minor trimming of calibration
STANDARD	INDUSTRY, NIST, OIML, METRIC
AZM	ENABLE, DISABLE, if enabled enter AZM range *

* Not operable in NIST or OIML standards. When NIST or OIML are selected as the standard the “FILTER” menu and the “AUTO ∑” menu are moved to the calibrate menus (under seal as required by NIST). See the Setup and Total sections for details on using these menus.

To select Legal Standard:
The STANDARD function allows the Model 6000 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 available.

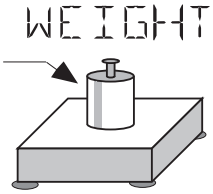
1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	 CALSETUP
2) Use the **UP** or **DOWN** key to scroll to the "STANDARD" message. Press **ENTER** (TARGET). In this example, we'll change the standard to "METRIC", which limits the units to kg or g.	① STD CAL ② ▼ AZM ③ ▼ STANDARD ⑥ ENTER
3) Use the **UP** or **DOWN** key to scroll through the Standards options. When the display indicates the desired configuration, push **ENTER** (TARGET). ***Note:*** *Contact MSI for details on the differences between the various configurations.*	① INDUSTRY ② ▲ NIST ③ ▲ OIML ④ ▲ METRIC ⑤ ENTER CALSETUP
4) Using the **UP** or **DOWN** key, move on to the Calibration Menu, or if only a change in standard is desired, push exit to leave the calibration menus and return to normal scale operation.	① EXIT

WARNING: A change in Standard will cause all setup modes to be set to the new standard. Menus can change, and features may no longer be available. For example, in the NIST mode, Auto Total is disabled and is only available in the calibrate menus. This allows the feature to be used only if the local jurisdiction approves it.

STANDARD CALIBRATION

Note: If the main circuit board is being replaced, run the Calibration Reset procedure and go to the "Initial Calibration" procedure. If no units, capacity or gain changes are necessary (such as a recalibration of an existing system) proceed with the Standard Calibration. Use the Standard Calibration for normal test weight calibration of the MSI 6000.

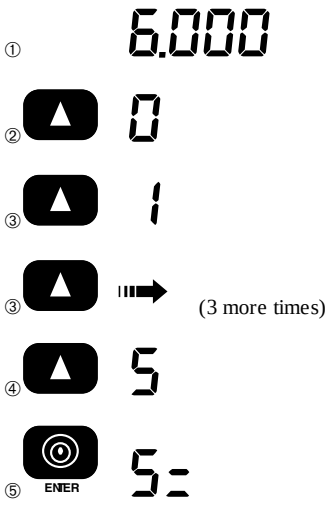
Cal Procedure:

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	
2) The message display reads "STDCAL". Push **ENTER**.	①  ② STD CAL
3) The message reads "Ø SCALE". Remove all weight from the scale. When the motion icon turns off, push **ZERO** or **ENTER**. The display reads "CAL'ING". Wait until the message reads "WEIGHT" indicating it is time to apply the test weight(s).	①  ② Ø SCALE CALING
4) Load the Scale with at least 20% of capacity. ***Note**: A test weight of 50% or more of capacity is recommended for highest accuracy.*	
5) If you are loading the scale with exact, full capacity go on to step 8. If loading the scale with anything other than full capacity, go to step 6.	

6) Enter the first digit of the calibration weight by using the **UP** or **DOWN** keys. When a match is made push **ENTER** (TARGET).

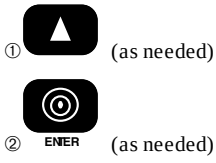
In this example we'll use 5.5 lbs to calibrate a 6 lb scale.

*Conversion Calibration Example: 5 lb of dead weights are available to calibrate a 3 kg scale. Since 5.000 lb = 2.268 kg (5*0.4536), the number entered with the UP/DOWN and ENTER keys would be 2.268. The 6000 calculates the span factor needed.*



7) Repeat using the **UP, DOWN**, and **ENTER** keys for the remaining digits.

Use the POWER key to enter a decimal point if needed (do not use the ENTER key on the decimal point).

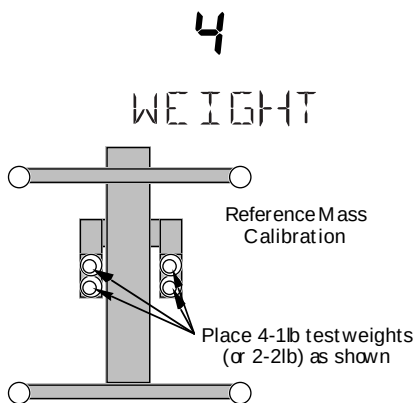


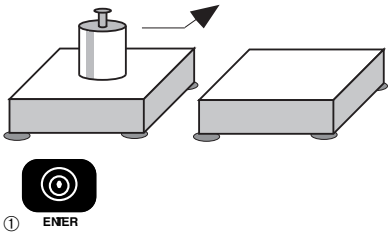
8) Finalize the calibration weight entry by pushing **ENTER** on a blank (blinking cursor) character. If the span constant is within acceptable limits the message display reads "CAL OK" briefly.

8A) ***This step is for Motion Compensated MSI-6000MC models only. Standard 6000 skip on to step 9.***

Reference mass calibration: the 6000-MC prompts "WEIGHT" with 4 lb on the numeric display. Remove the platter. Place a 2 lb test weight on each thick portion of the reference mass (4 lb total). Press **ENTER**. If the reference mass calibration constant is within acceptable limits the message display reads "CAL OK" briefly, followed by the message "STORING".

Note: Although 4 lb is recommended as a Ref mass calibration weight, weight from 2 to 10 lb (or 1 to 4 kg) are possible. Enter the Ref mass calibration weight in the same manner as the regular calibration weight. Be sure to balance the ref mass evenly.



9) Next the 6000 prompts you to "UNLOAD" the scale. Remove any weight on the platter and push **ENTER**. Wait.	
10) The RCAL value is calculated and displayed for 5 seconds. At any time pushing the **ENTER** or **EXIT** keys will cause the RCAL value to be stored in permanent memory. Make a note of the value for future reference.	
11) Calibration is complete, push **EXIT** to return to normal scale operation, or push **UP** /**DOWN** to choose another Calibrate Setup function.	

CALIBRATION ERROR MESSAGES

Note: Most 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
–ZERO ERR	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	The "CAL ERR" message indicates there was 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 (step 2) so you can try again with the proper weight. Pushing **EXIT** will restore the previous calibration constants and return you to the Calibration Setup Menu.	1) Check calibration weight is 20% or more of capacity. 2) Verify the cal weight is entered correctly. 3) Go to INIT CAL and change the gain.
UNDERRNG	In the calibrate menus, an underrange 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 deadload or use the coarse zero DIP switch to bring the zero counts higher. 2) There is also a possibility that the Gain is set too low. Increase the Gain in the INIT CAL procedure.
OVER RNG	In the calibrate menus, an Overrange 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) If you are unable to bring Full Scale inputs in range, the Gain must be reduced in the INIT CAL procedure.
0 CPACTY	Displayed when the entered scale capacity is zero or less.	Input the capacity properly (Init Cal).
0 TES WT	Displayed when a test weight value was typed in as zero.	Input the test weight properly (Init Cal).
UNCAL'ED	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.	Use the ENTER key to properly store the cal constants.

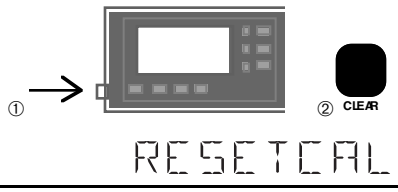
LC ERROR	Displayed when an error was detected in the A/D.	Turn off unit, unplug it. Try again. If this doesn't cure the problem, system may need service.
XS RANGE	Displayed when either a test weight value entered exceeds capacity or when the scale will not have enough A/D counts to measure full capacity plus 10 divisions.	1) Verify the test weight value was entered properly. 2) Reduce the gain (INIT CAL).
XS LOAD	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).

RESET CALIBRATION

Caution: DO NOT initiate this function you are prepared and qualified to perform a complete initialization and Calibration procedure. This procedure is NOT needed for routine calibration of the scale.

Function:
Completely clears the internal EEROM of calibration settings and starts the scale from scratch. Reset Cal is usually used for board replacement, troubleshooting, or load cell replacement.

To Reset All Calibration Parameters:

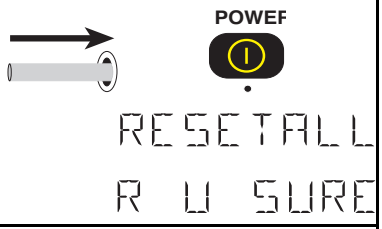
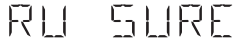
1) Push the **CALIBRATION** (inside the seal port) button and immediately after push the **CLEAR** (UNITS) key. The message will display "RESETCAL". A full calibration must follow this operation.	
2) After the memory has been cleared, the message display reads "STDCAL". Go on to the "INITIAL CALIBRATION" procedure, step 2.	① STD CAL

RESET ALL

Caution: This procedure erases 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.

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.

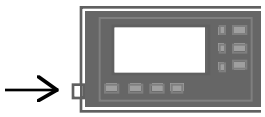
To Completely Reset the 3750:
This procedure will not work if the scale is already in the CAL SETUP Menus. Push the EXIT key to get out of “CAL SETUP”.

1) Turn off the 6000s power. Expose the Calibration Port by removing the seal screw on the left side of the 6000 Meter Casting with a Phillips Head Screwdriver.	(see “Enable Calibration” for the location of the Cal Port)
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, turn on the 6000. The display reads “RESETALL” followed by “R U SURE”.	
3) The display asks “RU SURE”. Push **ENTER** if you are. Push **EXIT** to stop RESET ALL.	
4) The system will now be the “UNCAL’ED” state. Push the cal switch and use the “INITIAL CALIBRATION” procedure to calibrate the 6000.	

INITIAL CALIBRATION (PERFORMED ONLY AFTER A RESET CALIBRATION OR A RESET ALL)

Set the appropriate standard before starting this procedure (see above). Do NOT use this procedure for Motion Compensated Models (6000-MC).

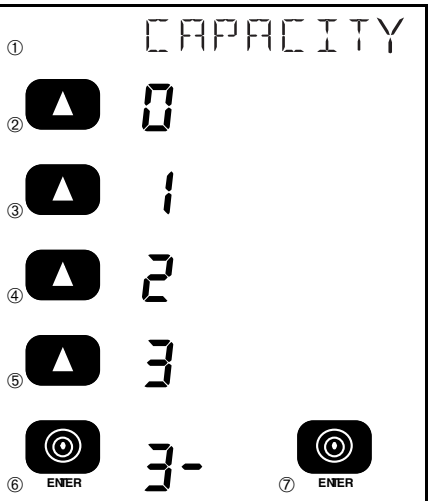
Init Cal Procedure:

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	
2) The message display reads "STDCAL". Push **ENTER**.	① STD CAL ② ENTER
3) First, the power input mode must be selected. The "PWR BATT" message is displayed. If the unit is powered by the MSI Battery Option push **ENTER**. If the unit is powered by AC (115 or 230V), push the **UP** key until the display reads "PWR AC", then push **ENTER**. If the unit is powered by the MSI 12-56V adaptor, push the **UP** key until the display reads "PWR VEH", then push **ENTER**. *In this example, we'll pick "PWRAC", the most common power source.*	① PWR BATT ② PWR AC ③ ENTER
4) 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). Press **ENTER** (TARGET). *In this example, we'll pick "KILOGRAM".* ***Note**: If lb-oz is the preferred measurement mode, calibrate the scale in pounds.*	① POUNDS ② KILOGRAM ③ ENTER

5) The display reads "CAPACITY". Capacity is usually set to the published capacity of the load cell. Push the **UP** or **DOWN** key until the display indicates the first digit of the desired full scale capacity. Push **ENTER** (TARGET). The next most significant digit flashes. Use the **UP**, **DOWN** and **ENTER** (TARGET) keys to finish out the capacity entry. If a decimal point is needed, use the **POWER** key. Push **ENTER** on a blank character to finalize the capacity value.

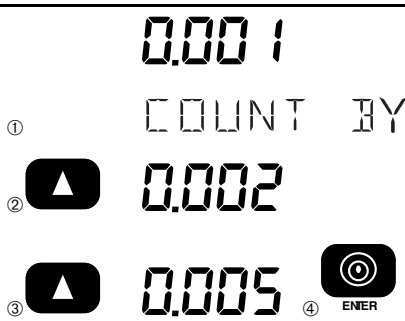
In this example we'll set the capacity to 3 kg.

***Note**: During capacity entry, you can backstep delete any incorrect entry using the **CLEAR** (UNITS) key. Capacities range from 999,999 calibration units in any units. If "lb-oz" is the desired measurement mode, enter the capacity in pounds and/or fractional pounds.*



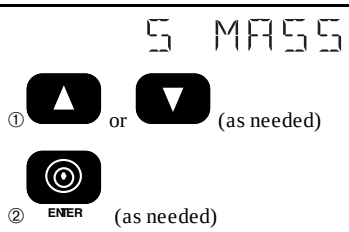
6) Next, enter the resolution in scale divisions (d). The 6000 defaults to 3000 counts or less resolution. The message display reads "COUNT BY". The numeric display indicates the calculated "d" value. Use the **UP** key to decrease resolution (increase the count-by). Use the **DOWN** key to increase resolution (decrease the count-by). Increments are in a 1-2-5 sequence.

In this example, we'll increase the count-by (d) to .005 kg thereby reducing resolution to 5 parts in 3000.



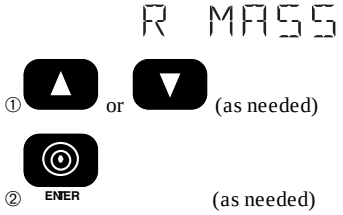
6A) ***Steps 6A and 6B are for Motion Compensated MSI-6000MC models only. Standard MSI-6000 systems skip on to step 7.***

The MSI 6000-MC now prompts for the "S MASS". The S Mass is a constant that is supplied with each platform. The S Mass value is printed on the serial number label found near the neck mount on the platter. Use the **UP** , **DOWN** and **ENTER** (TARGET) keys to enter the S Mass value. Use the **POWER** key to input a decimal point. Push **ENTER** on a blank character to finalize the S Mass value entry. This number entry must be precise for motion compensation to function.



6B) The MSI 6000-MC now prompts for the "R MASS". Using the same procedure as in step 6A, enter the R Mass value found on the serial number label.

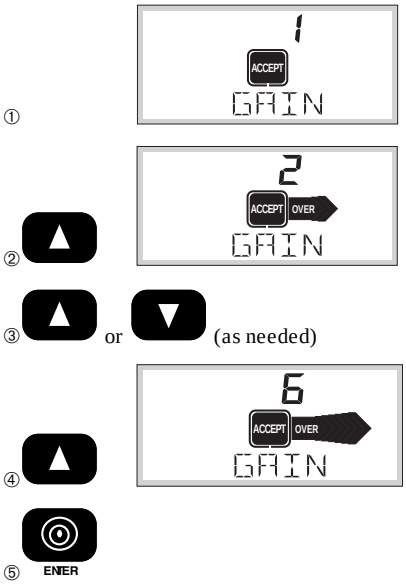
***Note**: Changing any platform-section scale component may alter the value of S Mass or R Mass. This can greatly affect scale accuracy and motion compensation effectiveness. Contact MSI for information on these constants.*



7) Next, the MSI 6000 prompts you to enter the “GAIN”. Use the **UP** or **DOWN** key to select the gain as indicated on the gain table for your loadcell. See the gain tables at the end of this procedure.

If the proper gain setting is unknown, the Bargraph is used to aid in picking the proper gain. Load the scale to capacity. Increase the gain until the farthest right segment is illuminated, then back down one gain setting. The “ACCEPT” is equal to half scale. Each under segment equals 5% of span below half scale. Each over segment equals 5% of span above half scale. Typically the system will start at half scale.

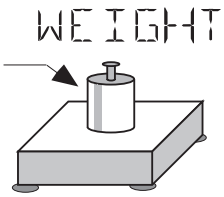
***Note**: A large negative or positive bargraph reading with the platter unloaded can indicate excessive offset. See “Coarse Zero”.*



8) The message reads “Ø SCALE”. Remove all weight from the scale. When the motion icon turns off, push **ZERO** or **ENTER**. The display reads “CAL’ING”. Wait until the message reads “WEIGHT” indicating it is time to apply the test weight(s).

9) Load the Scale with at least 20% of capacity.

***Note**: A test weight of at least 50% capacity is recommended for highest accuracy.*

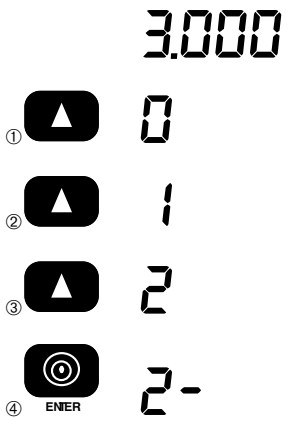


10) If you are loading the scale with exact, full capacity go on to step 13. If loading the scale with anything other than full capacity, go to step 11.

11) Enter the first digit of the calibration weight by using the **UP** or **DOWN** keys. When a match is made push **ENTER** (TARGET).

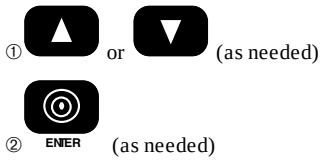
In this example we'll use 2.5kg to calibrate a 3 kg scale.

*Conversion Calibration Example: 5 lb of dead weights are available to calibrate a 3 kg scale. Since 5.000 lb = 2.268 kg (5*0.4536), the number entered with the UP/DOWN and ENTER keys would be 2.268. The 6000 calculates the span factor needed.*



12 Repeat using the **UP, DOWN**, and **ENTER** keys for the remaining digits.

Use the POWER key to enter a decimal point if needed (do not use the ENTER key on the decimal point).

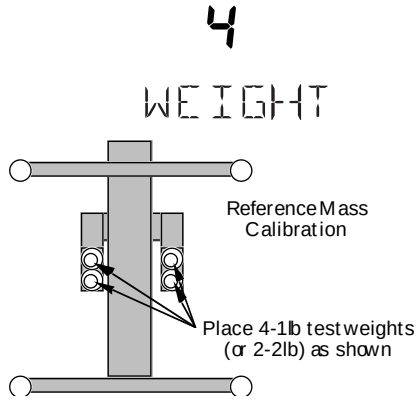


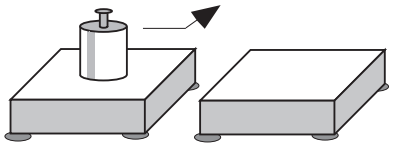
13) Finalize the calibration weight entry by pushing **ENTER** on a blank (blinking cursor) character. If the span constant is within acceptable limits the message display reads "CAL OK" briefly.

13A)***This step is for Motion Compensated MSI-6000MC models only. Standard 6000 skip on to step 14.***

Reference mass calibration: the 6000-MC prompts "WEIGHT" with 4 lb on the numeric display. Remove the platter. Place a 2 lb test weight on each thick portion of the reference mass (4 lb total). Press **ENTER**. If the reference mass calibration constant is within acceptable limits the message display reads "CAL OK" briefly, followed by the message "STORING".

***Note**: Although 4 lb is recommended as a Ref mass calibration weight, weight from 2 to 10 lb (or 1 to 4 kg) are possible. Enter the Ref mass calibration weight in the same manner as the regular calibration weight. Be sure to balance the ref mass evenly.*



14) Next the 6000 prompts you to "UNLOAD" the scale. Remove any weight on the platter and push **ENTER**. Wait. *This step is optional. The MSI-6000 calculates an "RCAL" value by placing an offset register in circuit with the load cell. The RCAL is used for a quick check to verify scale accuracy. Not all load cells will generate a valid RCAL reading. If this happens the display will flash "RCAL ERR". This does not indicate that the scale is unusable, only that the RCAL was out of range. You can skip the RCAL step by pushing EXIT.*	 ① ENTER
15) The RCAL value is calculated and displayed for 5 seconds. At any time pushing the **ENTER** or **EXIT** keys will cause the RCAL value to be stored in permanent memory. Make a note of the value for future reference.	 1.575 RCAL
16) Init Calibration is complete, push **EXIT** to return to normal scale operation, or push **UP** /**DOWN** to choose another Calibrate Setup function.	 EXIT

Note on resolution: MSI does not recommend increasing the resolution beyond 10000 counts. You can determine resolution by dividing the capacity by the count by (d). For example, a 500 kg capacity scale with a count by of 0.05 kg would have 10000 counts (500/.05). Going beyond 6000 counts can cause noisy readings especially on lower capacity scales. Noise can be reduced through the use of the Medium or High Filter, if necessary. Most platform Load Cells are best suited for resolutions of 5000 counts or lower. The 6000-MC defaults to 1500 counts or less resolution, and should not be changed without checking with MSI first.

Gain Tables:

Load Cell Output Range	*Gain*
<.6mV/V	8
.6 to .84	7
.85 to 1.19	6
1.2 to 1.69	5
1.7 to 2.39	4
2.4 to 3.39	3
3.4 to 4.79	2
4.8 to 7.0	1

MSI Load Cell	*Gain*
6 lb / 3kg	5 or 6
10 lb / 5kg	6 or 7
12 lb / 6 kg	5 or 6
20 lb / 10 kg	7 or 8
30 lb / 15 kg	6 or 7
50 lb / 25 kg	5 or 6
60 lb / 30 kg	4 or 5
100 lb / 50 kg	6 or 7
120 lb / 60 kg	5 or 6
220 lb / 100 kg	4 or 5
300 lb / 150 kg	4 or 5

COARSE ZERO

Scales that have large deadloads 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 underranged. 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 desireable 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 deadload 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 6000 and remove the rear 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

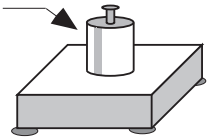
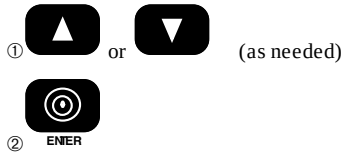
x= don't care

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.

FINE CALIBRATION

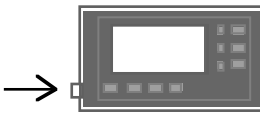
Fine calibration is for minor adjustments to the calibration and is usually not necessary.

Fine Cal Procedure:
Before starting this procedure, ZERO the scale with no load on the platter.

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	
2) The message display reads "STDCAL". Use the **UP** /**DOWN** key to scroll to the "FINE CAL" message. Push **ENTER** (TARGET). Push **ENTER**.	
3) Place a test weight of at least 20% of capacity on the platter. The weight is indicated on the numeric digits. WARNING: This function will not work unless the scale is loaded at 20% of capacity or more.	
4) Use the **UP** key to cause the displayed reading to move up slightly. Use the **DOWN** key to cause the reading to move down. Each push of the key is about equal to a 1/4 count span change so multiple pushes may be needed to see a difference. When the displayed reading is acceptable push **ENTER** (TARGET).	
5) Fine Calibration is complete, push **EXIT** to return to normal scale operation, or push **UP** / **DOWN** to choose another Calibrate Setup function.	

TO ENABLE UNITS

The UNIT SEL menu lets the calibrator determine which units are available to the operator with the UNITS key. The initial units available are determined by the STANDARDS selection. Units can be added or removed with this procedure:

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	 CALSETUP
2) Use the **UP** or **DOWN** key to scroll to the "UNIT SEL" message. Press **ENTER** (TARGET).	① STDCAL ② ▲ UNIT SEL ③ ENTER
3) Use the **UP** key to scroll through the Units options. As the Units are displayed, the numeric display indicates "On" or "OFF". Use the **RIGHT ARROW** (USER) key, or the **LEFT ARROW** (CLEAR) key to toggle between "On" or "OFF". Press ENTER. In this example we'll change Kilograms from off to on.	① On POUNDS ② ▲ OFF KILOGRAM ③ ▷ On KILOGRAM
4) When all the desired units are enabled push **EXIT** to return the the CAL SETUP menu. Push **EXIT** again to leave the calibration menus and return to normal scale operation, or use the **UP**/**DOWN** keys to scroll to a different calibration menu.	① EXIT UNIT SEL ② EXIT

AUTO ZERO MAINTENANCE (AZM)

AZM is used to automatically adjust small zero variations due to temperature drift and/or debris buildup (water on the scale, dirt, etc.). The 6000 has the ability to adjust the amount of AZM for particular applications. The AZM rate is 1 per second, so to prevent accidental zeroing of weight, the weight must exceed the AZM range within 1 second. This can be particularly critical in liquid pouring applications. With the AZM set to the default 1d, this is unlikely, but the AZM can be disabled if necessary. The frequent use of the Zero button is required for accurate readings if the AZM is disabled.

In NTEP and OIML certified 6000s, the AZM range is fixed at .6d and cannot be changed.

To Disable AZM (Auto Zero Maintenance):

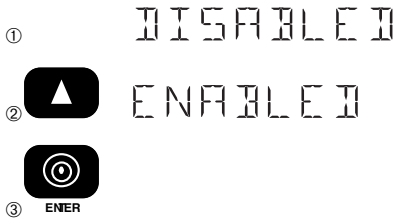
Caution: Disabling Auto Zero Maintenance will degrade temperature and drift performance of the MSI 6000. Disable AZM only for meter testing purposes or use the Zero key frequently.

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	
2) Use the **UP** / **DOWN** keys to scroll to the "AZM" message. Push **ENTER** (TARGET).	① STDCAL ② ▼ AZM ⑤ ENTER
3) Use the **UP** / **DOWN** keys to ENABLE or DISABLE AZM. Push **ENTER** (TARGET).	① ENABLED ② ▲ DISABLED ③ ENTER AZM
4) Push **EXIT** again to leave the calibration menus and return to normal scale operation, or use the **UP**/**DOWN** keys to scroll to a different calibration menu.	① EXIT

Programmable AZM:
The MSI6000 has the ability to configure the amount of weight that the scale will automatically zero. For example, trays used to weigh produce vary in weight by up to 1kg. This difference normally has to be zeroed out by the operator before loading each tray. By setting the AZM range to 1kg the MSI-6000 will automatically zero out the difference in empty tray weights. The best way to utilize this feature is to analyze the container weight range to find minimum and maximum weight. This will determine the AZM range programmed into the scale. When ready to weigh product, zero out the first container using the ZERO key. Then proceed to pack product.

Caution: The AZM range must be less than the smallest weight loaded at a time. For example, if the AZM range is set to 1kg and a fruit that weighs less than 1kg falls in the container, the fruits weight will be zeroed out and will not be weighed. Remedy this situation by either making the AZM range less than the smallest weight, or always place multiple product on the scale at once. Once the recorded weight is greater than the AZM range, then small weights can be added to top out the container.

To Enable AZM and Set the AZM Range:

1) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden "Q-Tip" and press the switch button in the hole. Once the switch is pushed, the display will read "CALSETUP" for 2 seconds.	
2) Use the **UP** / **DOWN** keys to scroll to the "AZM" message. Push **ENTER** (TARGET).	
3) The display should read "ENABLED". If it does not, use the **UP** / **DOWN** keys to ENABLE AZM. Push **ENTER** (TARGET).	
4) The display reads "AZMRANGE" and the numeric display indicates AZM range (in current cal units).	

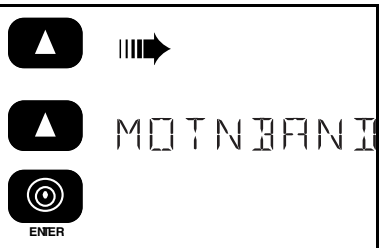
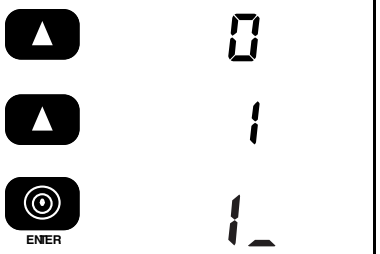
5) Use the **UP/DOWN** keys to enter the **AZM** range in current units. After each digit, push **ENTER**. Use the **POWER** button to enter a decimal point if needed. When the value is finished, push **ENTER** twice.	①  or  (as needed) ②  (as needed) ENTER
6) Push **EXIT** to leave the calibration menus and return to normal scale operation, or use the **UP/DOWN** keys to scroll to a different calibration menu.	①  EXIT

ADJUSTING THE MOTION BAND - Applicable to MSI-6000 with advanced options software (9-76)

The motion band determins the range of weight variation that the indicator considers to be stable weight. Since the MSI-6000 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.

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 5d 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 will not have to wait until the weight is completely stable.

Note: Before starting the folowing 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. Press **ENTER** .	
2)	The “MOTNBAND” screen will appear. Use the UP/DOWN keys to input the weight range the system uses to detect Motion. Use “1” for standard operation. This sets the Motion Band to ±1d. After entering each digit, push **ENTER**. When finished push **ENTER** again. 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 6000 will return the error message “TOOBIG”. Setting the Motion Band to 0 is equal to a range of +/- 0.5d.*	
3)	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 must be adjusted to the range approved by the local jurisdiction.

SETTING THE OVERLOAD STOPS

The overload stops must be set properly to ensure the reliability of the load cell. Failure to set the stops properly can result in failure or large zero shifts due to overloading. To set the overload stops, the scale must first be calibrated (see “TO CALIBRATE”).

Note: This procedure should only be necessary when the load cell or any base/spider assembly part is replaced. Overload stops are set at MSI before delivery.

1) Adjustment Wrenches or Sockets needed

PLATTER SIZE	*UP PER DOWN STOP*	*LOWER DOWN STOP*	*UP STOP*	*CORNER STOPS*
8.5" X 8.5"	5/16"	1/4"	5/16"	1/4"&11/32"
14" X 16"	1/4"	1/4"	5/16"	1/2"
20" X 20"	5/16"	5/16"	5/16"	1/2"

2) Test Weights (see table)
3) 4 blocks of equal length of sufficient size and strength to elevate the scale and provide access to the adjustment screws on the bottom of the base assembly. Another possibility is two equal height tables with the scale suspended between them or a table with a hole cut in it allowing access to the stops from below.

Enable the Overload Stops Setting Procedure:

1) After calibration, elevate the scale on wood blocks to provide access to the adjustment screws on the bottom (or alternately, mount the scale between two tables or over a hole in a table). Remove the scale platter and turn it up side down, centered on the spider assembly. Zero the scale. The display now must be put in “SETSTOPS” mode to accommodate setting the load cell stops.
2) Enable Calibration by removing the seal screw on the left side of the 6000 Meter. Insert a small non-metallic screwdriver or wooden “Q-Tip” and press the switch button in the hole. Once the switch is pushed, the display will read “CALSETUP” for 2 seconds.
3) Use the arrow keys to scroll through the menu to “SETSTOPS”. When “SETSTOPS” is displayed, push the ENTER (TARGET) key. The display is now in the load cell stop setting mode. The display does not register any weight below the scale capacity. At or above capacity, the scale reads the approximate weight on the platter. NOTE: Readings above capacity may not be accurate, but are accurate enough for the purpose of setting stops.

   With the scale in “SETSTOPS” mode, follow the steps below to set the overload stops. Refer to Figure 1 for overload stop locations. Refer to Figure 2 for weight locations. When setting the overload stops, load the scale as directed to the adjustment weight plus the weight shown below.

This table is for standard units

CAPACITY STD UNITS	*ADJUSTMENT WEIGHT*	*EXTRA WEIGHT*
6 lb	6.5 lb	0.50
12 lb	13 lb	1 lb
30 lb	33 lb	3 lb
60 lb	65 lb	5 lb
120 lb	130 lb	10 lb
220 lb	240 lb	20 lb
300 lb	330 lb	20 lb
3 kg	3.3 kg	.3 kg
6 kg	6.5 kg	.5 kg
15 kg	16.5 kg	1 kg
30 kg	33 kg	2 kg
60 kg	65 kg	5 kg
100 kg	110 kg	10 kg
150 kg	165 kg	10 kg

This table is for Motion Compensated units only.

CAPACITY STD UNITS	*ADJUSTMENT WEIGHT*	*EXTRA WEIGHT*
60 lb	85 lb	5 lb
120 lb	170 lb	10 lb
220 lb	310 lb	20 lb
30 kg	42 kg	2 kg
60 kg	85 kg	5 kg
100 kg	140 kg	10 kg

1) Center the adjustment weight at Location A (see figure 2) and record the reading as reading 1. Apply the extra weight at location A and record the reading as reading 2. Remove the weights and platter. Install the Upper Down Stop (see figure 1) with Loctite 242 (Blue) and turn the screw until it barely touches the load cell. Then back off the screw 2 full turns. The goal is to adjust the upper down stop for a reading between readings 1 and 2 with the extra weight applied.
2) Recenter the upside-down platter on the spider and reapply the adjustment and extra weights in exactly the same way at location A. Adjust the upper down stop by repeatedly removing the platter and weights, adjusting the upper down stop screw, and reapplying the platter and weights until the reading is between readings 1 and 2. Note: This process can be simplified by using a special adjustment platter with a hole over the upper down stop. Contact MSI for details.
3) With the adjustment weight plus the extra weight still at Location A, turn the

Corner Stop nearest Location A until it just makes contact with the spider. Tighten the jam nut against the base or lower spider to lock the Corner Stop in place. Check that the scale still reads between readings 1 and 2. If not, back off the Corner Stop slightly.

4) Center the adjustment weight plus the extra weight at Location B. Check that the scale reading still reads between readings 1 and 2. If not, turn the Upper Down Stop until the scale reading is between readings 1 and 2.
5) With the adjustment weight plus the extra weight still at Location B, turn the Corner Stop nearest Location B until it just makes contact with the spider. Tighten the jam nut against the base or lower spider to lock the Corner Stop in place. Check that the scale still reads between readings 1 and 2. If not, back off the Corner Stop slightly.
6) Center the adjustment weight plus the extra weight at Location C. Install the Lower Down Stop with Loctite 242 (Blue) and turn the screw until the scale reading is greater than reading 1, but less than the reading 2.
7) Remove the extra weight and check that the scale does not read less than reading 1. If it does, turn the Lower Down Stop until the reading is at reading 1. Reapply the extra weight and check that the scale reading is less than reading 2. If not, turn the Lower Down Stop until the reading is less than reading 2. Repeat as necessary.
8) With the adjustment weight plus the extra weight still at Location C, turn the Corner Stop nearest Location C until it just makes contact with the spider. Tighten the jam nut against the base or lower spider to lock the Corner Stop in place. Check that the scale still reads between readings 1 and 2. If not, back off the Corner Stop slightly.
9) Center the adjustment weight plus the extra weight at Location D. Check that the scale reading still reads greater than reading 1. If not, turn the Lower Down Stop until the scale reads between reading 1 and reading 2.
10) With the adjustment weight plus the extra weight still at Location D, turn the Corner Stop nearest Location D until it just makes contact with the spider. Tighten the jam nut against the base or lower spider to lock the Corner Stop in place. Check that the scale still reads between reading 1 and reading 2.
11) Take the scale out of “SETSTOPS” mode by pushing the EXIT (SETUP) key twice. With no weight on the scale platter, install the Up Stop from underneath with Loctite 242 (Blue), turn the screw until the display starts to change, then back the screw off 1/3 of a turn.

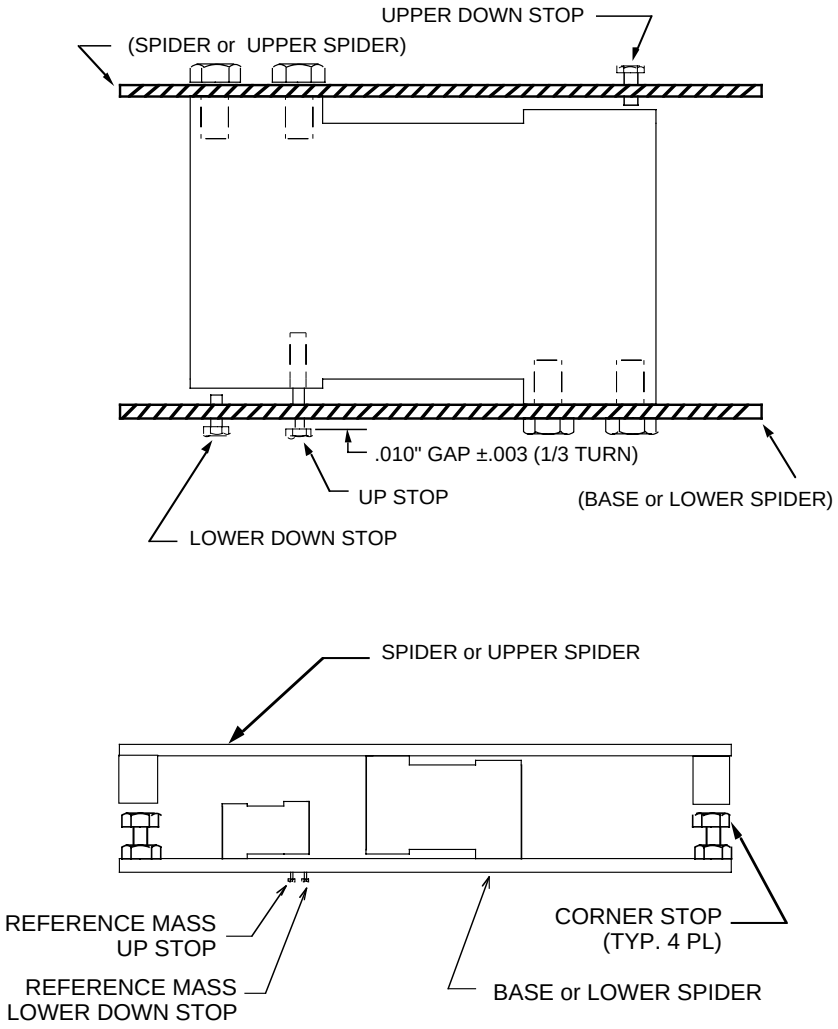
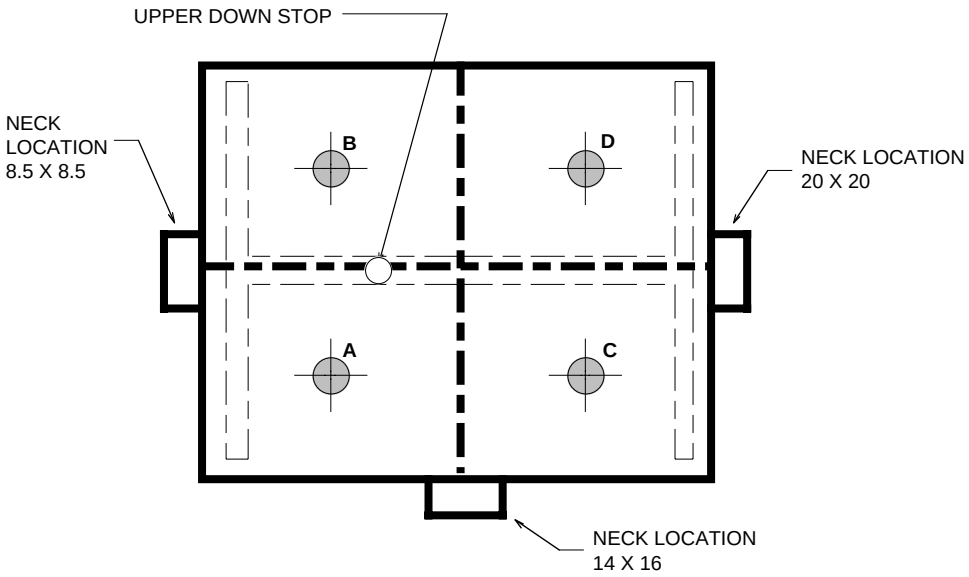


FIGURE 1
OVERLOAD STOP LOCATIONS
(Reference Mass on 6000MC only)



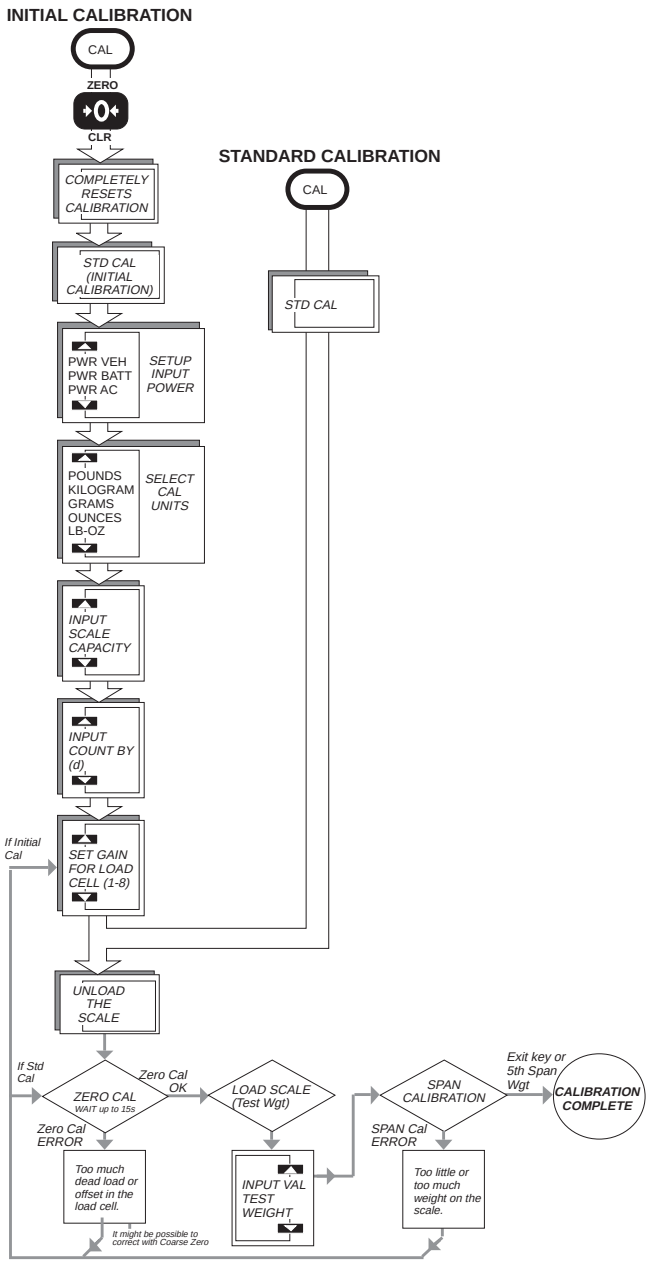
"QUADRANT" refers to one of the four equal areas the Check-weigh platter can be divided into.

LOCATION A & B: Center of the quadrants nearest the Upper Down Stop.

LOCATION C & D: Center of the quadrants farthest from the Upper Down Stop.

FIGURE 2
WEIGHT LOCATIONS

CALIBRATION FLOW CHART



APPENDIX A - SPECIFICATIONS , DIMENSIONS, & OPTIONS

SPECIFICATIONS

Accuracy
- ±0.1% of applied load for all capacities. Meets HB-44 Class III specifications (COC# 93-330)

Maximum Resolution
- 3000 to 15,000 displayed counts (special order)
- Motion Compensated models -1000 to 3000 displayed counts
- >1,000,000 counts internal (20 bit)

Standard Resolution (NTEP Approved)
- Models 6006, 6030, 6060, 6300 — 3000 displayed counts
- Models 6012, 6120 — 2400 displayed counts
- Models 6220 — 2200 displayed counts
- Models 6060-MC, 6120-MC — 1200 displayed counts
- Models 6220-MC — 1100 displayed counts

Display
- 6 digit 0.5"/19 mm high numeric LCD (weight display)
- 8 digit 0.45"/11 mm high alphanumeric LCD (message display)
- 21 Segment Bargraph for OVER/UNDER/ACCEPT Check-Weighing with unique LED Go/NoGo indicators backlighting the Bargraph center section.
- Annunciators for measurement and setup modes
- Photocell activated LED Backlighting

Filtering
- Low, Medium, High (programmable)

Power
- 90 to 250 VAC 48 to 400 Hz <3VA
- Battery operated with 3 standard D Cells (Option)

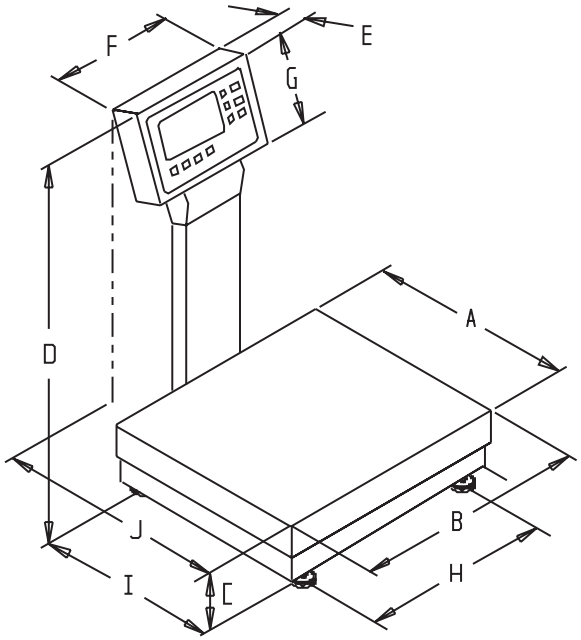
Battery Operating Time
- Up to 400 hours typical with occasional use of the LED Backlight. >80 hours with continuous use of Backlight.

Temperature Range
- -20° C to +60° C Operating (-4°F to 140°F)
- -10° C to +40° C NTEP range (14°F to 104°F)
- -40°C to +80°C Storage (-40°F to 176°F)

Enclosure
- NEMA 4X, Stainless Steel. USDA Approved. All materials used are USDA/FDA approved.

Comm Ports (2 bidirectional)
- Baud Rate: 300, 600, 1200, 2400, 4800, 9600, 19.2k
- Data: 7 or 8 bit
- Parity: None, Even, or Odd

DIMENSIONS



MODEL	MSI-6000 DIMENSIONS (inches / mm)									(MAX / MIN)
	A	B	C	D	E	F	G	H	I	J
6006, 6012	8.5* 216	8.5 216	3.37 86	18.30 465	2.00 51	8.57 218	5.75 146	7.00 178	9.00 229	13.8 / 10.25 351 / 260
6030, 6060 6120, 6220	14.00 356	16.00 406	5.00 127	23.50 597	2.00 51	8.57 218	5.75 146	13.50 343	12.62 321	19.75 / 16.15 502 / 410
6300, 6XXXMC	20.00 508	20.00 508	5.75 146	23.75 603	2.00 51	8.57 218	5.75 146	18.30 465	18.30 465	26.0 / 22.25 502 / 410

*Usable platter area.

OPTIONS

Bidirectional RS-232 W/ Set Points:
The RS-232 option enhances the MSI 6000 by providing an interface for printers, scoreboards, or computers. The RS-232 data output is fully formattable. Any combination of weight data, time, date, text, and printer formatting codes can be user programmed. 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 AC-CEPT, when there is a weight change, or when a setpoint is reached. The MSI-6000 can be remotely controlled from a computer or terminal, with complete remote setup and configuration. Data can be downloaded from the scale at any time. Many scales and weigh meters suspend weighing operation while printing and will not function until a print job is completed. The MSI 6000 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.

The MSI-6000 Set Points are truly versatile. Up to 8 set points can be programmed. Each set point has independent value, dead zone (hysteresis), delay, and user programmable 20 character message. The message can be sent to the display, and/or either comm port. Combined with the Set Point Relay Option, the set points can be used in process control, batching and other advanced system configurations.

The MSI-6000 comes standard with a Real-time clock. The Real-time clock provide full time and date stamping of any and all printed data. The RT Clock can provide scale throughput monitoring in combination with the Total functions. The RT Clock functions as a clock/calendar when the scale is off.

Additional Memory:
Additional memory is available in two quantities: 100 Product Codes, or 199 Product Codes. (Greater number of product codes available by special order, contact MSI for details)

2nd Isolated RS-232/485 w/ Set Point Relay Outputs:
2nd, isolated 2 way RS-232 or RS-485 communications can interface the 6000 to a remote printer, scoreboard, or computer. The data I/O of this port is independent of Port 1. Use RS-485 I/O for long cable runs of up to 4000 feet (1300 meters). Requires cable.

The Set Point Output works in conjunction with the Set Point Option above. The Relay output board provides up to 8 set point outputs for interfacing to external devices such as warning lights, process relays, or sirens. 7 SPDT (form C) relays are provided for direct set-point interfacing. An additional Logic Level output is provided for Set Point 8. Relay board mounts inside the head assembly. Connections to external devices are through cage clamp terminals. Relay contacts are rated at 125 VAC, 2A.

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 Product Code independently. The number of samples that statistics can be calculated for is limited only by memory requirements and will vary from a few thou-sand to >100000 samples. Individual samples are not stored. If needed, individual

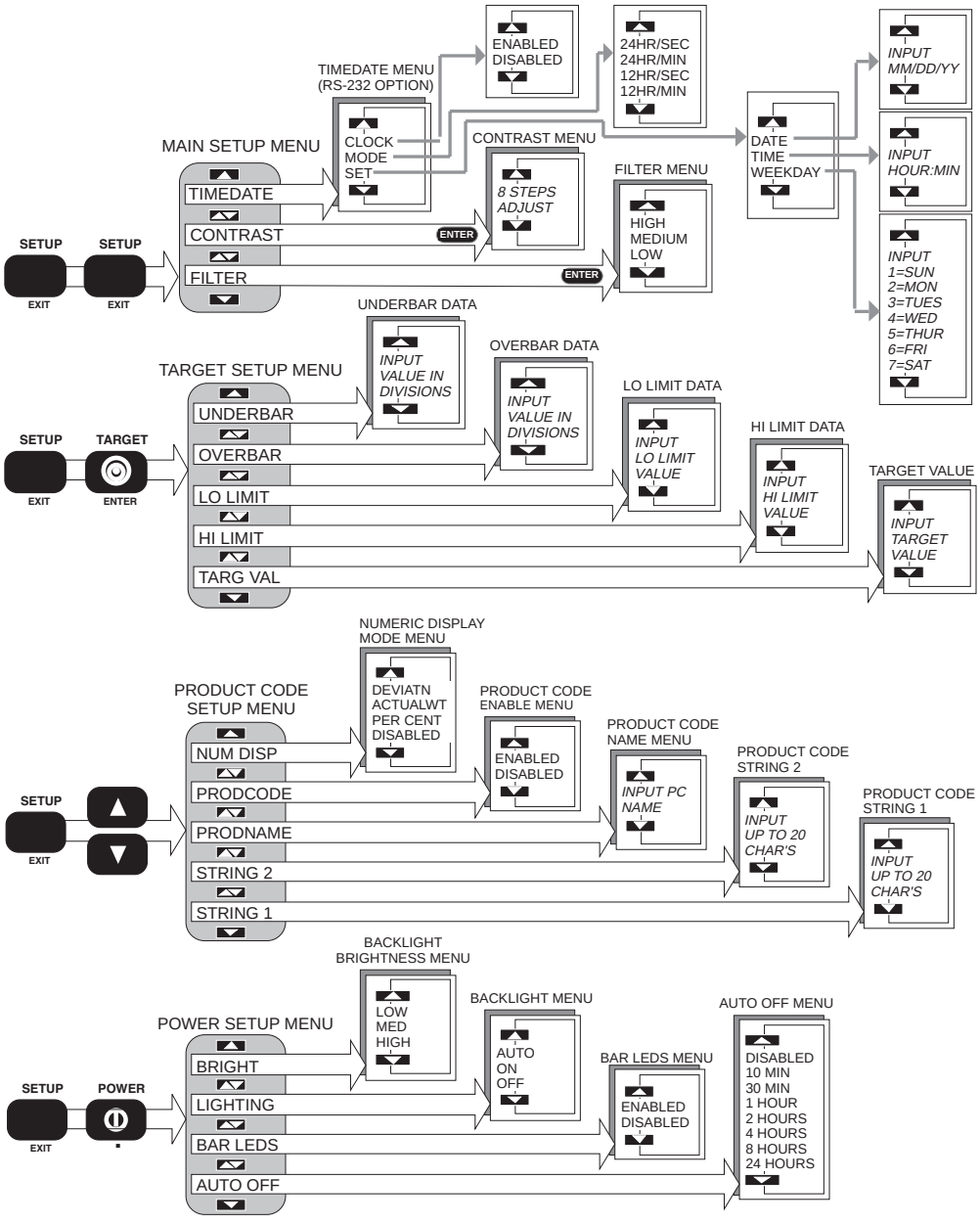
samples can be logged through either RS-232 port using the “PRINT on TOTAL” (Manual mode) or “PRINT on LOAD” (AUTO mode) function.

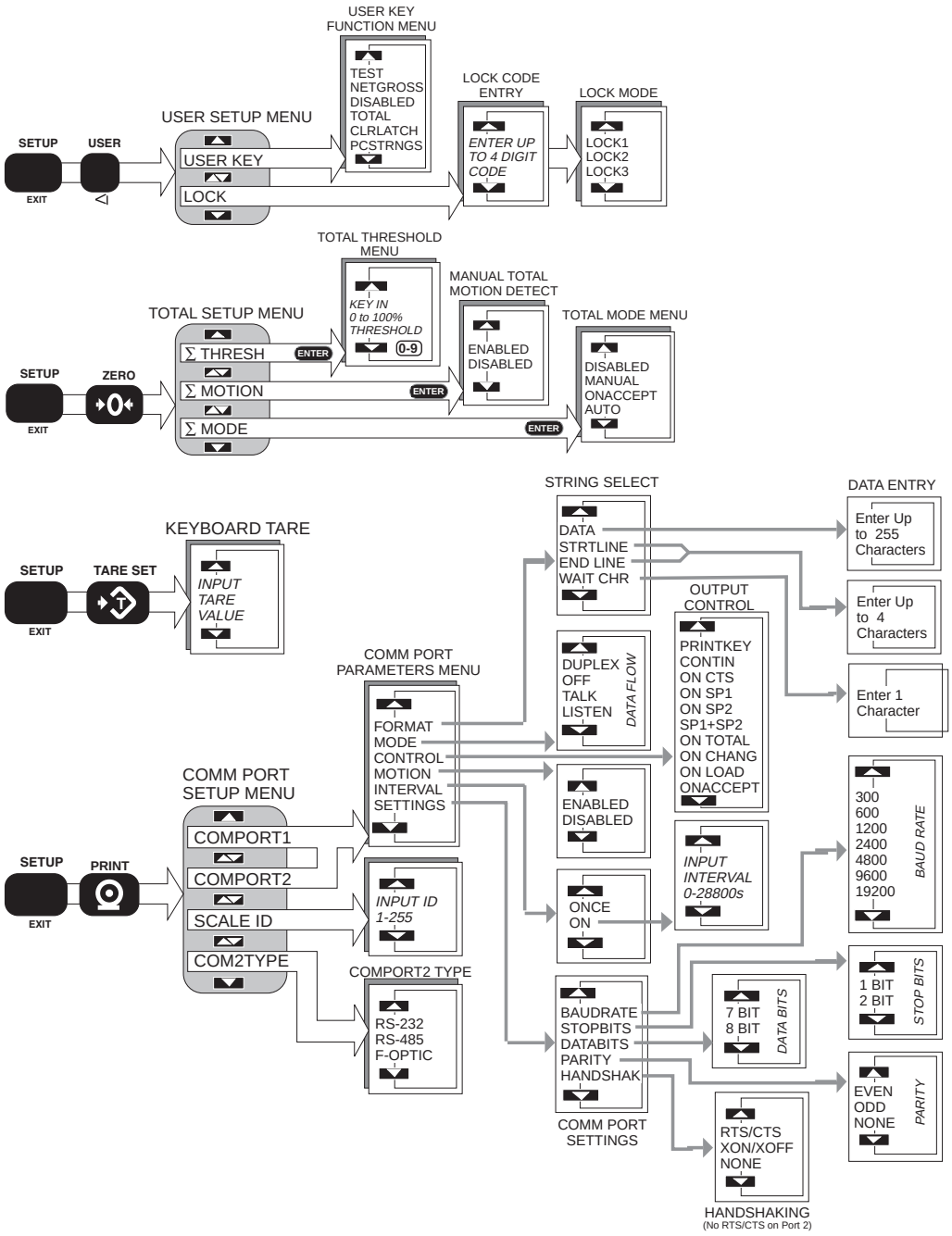
The Statistics option, when used with the TARGET features, can also store the number of samples totaled over the target (“n OVER”), under the target (“n UNDER”), and inside the target (“n ACCEPT”).

A “GRAND TOTAL” function is also included with the Statistics option. The Grand Total adds all the weight in all the PRODUCT Codes and provides the following information: GRAND TOTAL, Number of Totals, the Overall Average (GRAND TOTAL divided by Number of Totals), Number of Samples Over the Target, Number of Samples Under the Target, and the Number of Samples in Target (Accept).

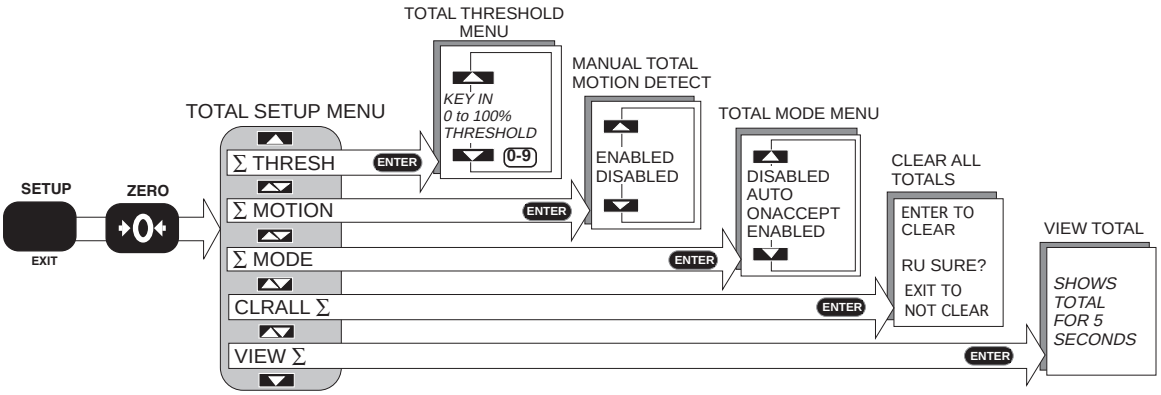
Audible Set Points Indicator:
Requires the Set Point Relay Option - Coupled with the internal set points, an audible alarm can sound at any weight. Can also be used for accept or out-of-limits indicator for blind check-weighing. Installed with the Set Point Relay option, comes prewired to SP 5 which can be used to indicate “ACCEPT”. The SP that the alarm is wired to is easily changed and can be used for Over, Under, Accept, Overload, or any other weight related warning desired. The Audible Alarm is mounted on the rear panel of the 6000 meter head and is not suitable or approved for food contact. An internally mounted alarm is available for food processing applications by special order. (Contact MSI for additional information)

APPENDIX B - MENU STRUCTURE



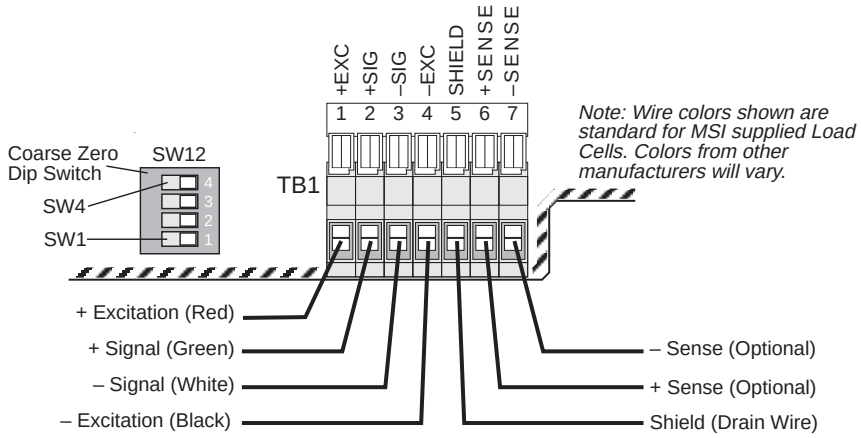

USER KEY FUNCTION MENU
TEST
NETGROSS
DISABLED
TOTAL
CLRLATCH
PCSTRNGS
LOCK CODE ENTRY
ENTER UP TO 4 DIGIT CODE
LOCK MODE
LOCK1
LOCK2
LOCK3
USER SETUP MENU
SETUP
USER
EXIT
USER KEY
LOCK
TOTAL THRESHOLD MENU
KEY IN 0 to 100% THRESHOLD
0-9
MANUAL TOTAL MOTION DETECT
ENABLED
DISABLED
TOTAL MODE MENU
DISABLED
MANUAL
ONACCEPT
AUTO
TOTAL SETUP MENU
SETUP
ZERO
EXIT
Σ THRESH
ENTER
Σ MOTION
ENTER
Σ MODE
ENTER
STRING SELECT
DATA ENTRY
KEYBOARD TARE
SETUP
TARE SET
EXIT
INPUT TARE VALUE
DATA
STRTLINE
END LINE
WAIT CHR
Enter Up to 255 Characters
Enter Up to 4 Characters
Enter 1 Character
OUTPUT CONTROL
COMM PORT PARAMETERS MENU
DUPLEX
OFF
TALK
LISTEN
DATA FLOW
PRINTKEY
CONTIN
ON CTS
ON SP1
ON SP2
SP1+SP2
ON TOTAL
ON CHANG
ON LOAD
ONACCEPT
FORMAT
MODE
CONTROL
MOTION
INTERVAL
SETTINGS
COMM PORT SETUP MENU
ENABLED
DISABLED
INPUT INTERVAL 0-28800s
300
600
1200
2400
4800
9600
19200
BAUD RATE
SETUP
PRINT
EXIT
COMPORT1
COMPORT2
SCALE ID
COM2TYPE
INPUT ID 1-255
ONCE
ON
COMPORT2 TYPE
RS-232
RS-485
F-OPTIC
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)

Statistics Equipped Units only:

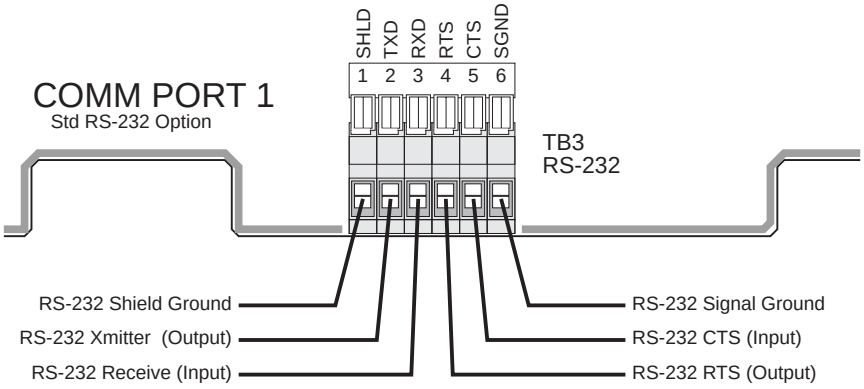


APPENDIX C - WIRING CONNECTIONS

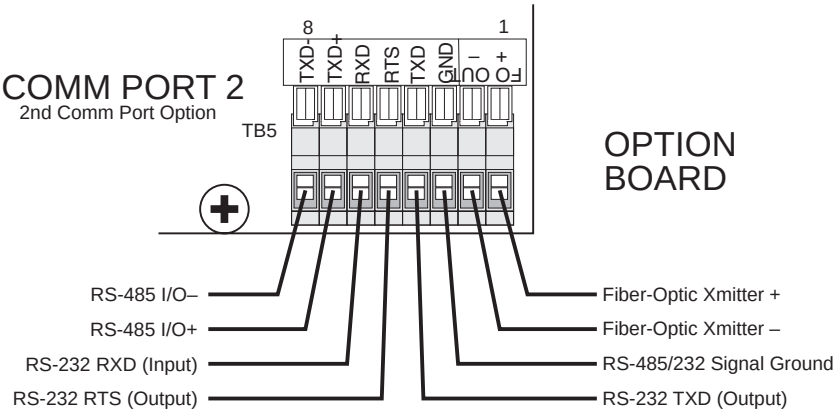
LOAD CELL CONNECTIONS



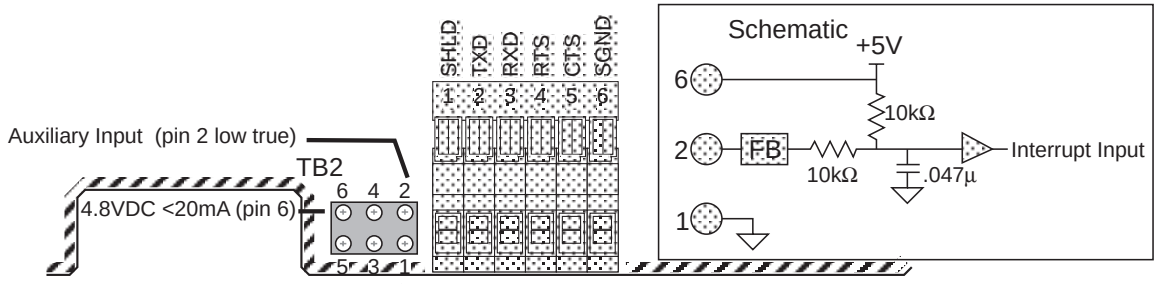
RS-232 CONNECTIONS



2ND COMM PORT & RS-485 CONNECTIONS

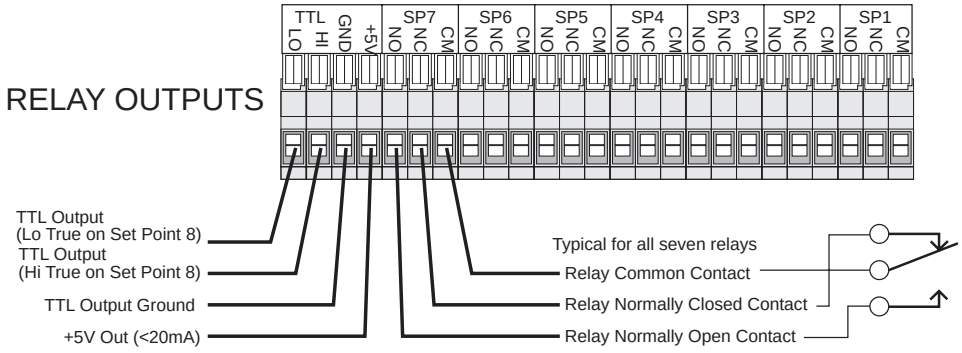


AUXILIARY DIGITAL INPUT



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



APPENDIX D - ASCII TABLE

DEC	HEX	CHAR		DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR
0	0	^@	NUL	32	20	SPC	64	40	@	96	60	‘
1	1	^A	SOH	33	21	!	65	41	A	97	61	a
2	2	^B	STX	34	22	“	66	42	B	98	62	b
3	3	^C	ETX	35	23	#	67	43	C	99	63	c
4	4	^D	EOT	36	24	$	68	44	D	100	64	d
5	5	^E	ENQ	37	25	%	69	45	E	101	65	e
6	6	^F	ACK	38	26	&	70	46	F	102	66	f
7	7	^G	BEL	39	27	‘	71	47	G	103	67	g
8	8	^H	BS	40	28	(	72	48	H	104	68	h
9	9	^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	^L	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	SUB	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

THE MSI LIMITED WARRANTY

MEASUREMENT SYSTEMS INTERNATIONAL, INC., 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 of 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 pre-paid.

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 the Company 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 judgment and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

MADE IN THE USA

PUB.228-05-93D

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