Section ZD
LCD Touchscreen Interface for Model MPPU – Level 4
Operators Manual

Section Table of Contents

ZD.1 Introduction

The SCAN-A-LINE™ Multi-Purpose Processing Unit-Model MPPU Level 4 incorporates an LCD Touchscreen display customer interface{Figure ZD.1-1}. This processing unit is set up and adjusted from the front panel (or from a remote installation of the display Level 4/50 Option [Section ZD.5.b]. All commands and functions are available from the Level 4 display via the Touchscreen, though the RS-232 Customer Interface – Level 1 [Section ZA] can be used in conjunction with the Level 4 customer interface for configuration, control and operation of the Model MPPU.

This manual covers only the functions and operation of the Level 4 interface. Other information pertaining to the Model MPPU, such as analog outputs, installation, and sensor connections, are located in the main section of the manual [Section Z]. For information on other interfaces, refer to Level 1 [Section ZA] or Level 3 [Section ZC] (if applicable). For information on customized Model MPPUs, refer to any EVO documentation.

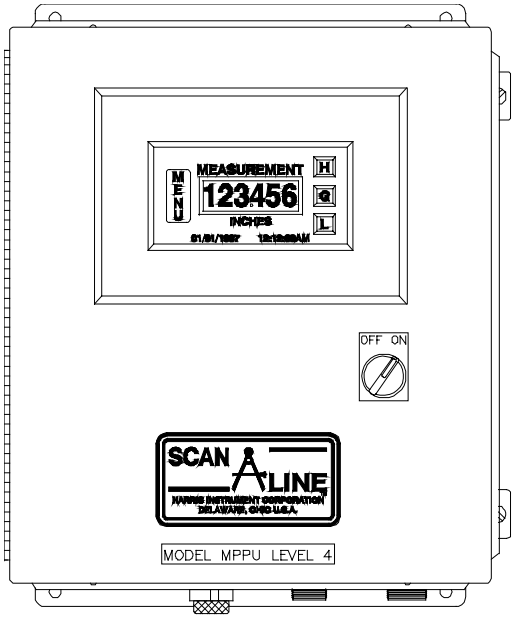

Figure ZD.1-1: Model MPPU Level 4

ZD.1.a Functional Description

The Model MPPU Level 4 consists of a 2.5 inch [63.5mm] by 5 inch [127mm] Liquid Crystal Diode (LCD) Touchscreen mounted in an aluminum bezel. The customer interface is typically mounted on the front panel of the processing unit; or may be mounted remotely (Level 4/50 Option). The Model MPPU can also be configured with a separate, secondary customer interface. If a secondary interface is installed, the RS-232-1 port will be used to connect the remote display. RS-232-2 may be used to connect to a host computer for operation of the Level 1 [Section ZA] software or for serial output of measurement readings.

ZD.1.b Manual Conventions

Throughout this section, there are many touchscreen graphic shots that are used to provide command entry examples. Different graphics will be used to designate a command, system response or data entry. Screen captures of the LCD Touchscreen display will also be used as a guide to how the system should look when performing a particular configuration or operational procedure.

ZD.1.c Operational Considerations

The Model MPPU Level 4 interface is designed to operate in an industrial environment and can readily tolerate average factory conditions. Commonsense considerations for protection and maintenance of the Level 4 will ensure it's operation for years to come.

Operational temperatures should fall in the range from 32°F to 122°F [0°C to 50°C]. Temperatures above 140°F [60°C] for prolonged periods of operation or storage can lead to the degradation of the integrated circuits in the Level 4 interface. If temperatures outside this specified range are expected, special provisions should be made to protect the equipment from temperature extremes outside the standard operational ranges.

SCAN-A-LINE™ processing units can tolerate reasonable amounts of shock and vibration. The major problem with vibration is the increase in probability of loose hardware and/or connectors. Mount the processing unit to a solid, fixed mounting where vibration is minimum. When high levels of vibration or shock are likely, shock absorbing mounts may reduce any problems.

ZD.1.d Touchscreen Interface

The Model MPPU Level 4 has a single display screen attached to RS-232-0 communications port. The LCD Touchscreen has a plastic membrane surface that is relatively resistant to most industrial environments, but care should be taken when operating any of the functions with the touchscreen. Sharp and/or pointed objects SHOULD NOT TOUCH the membrane, as they will possibly damage the unit permanently. Damage to the touchscreen from sharp objects or other negligent actions IS NOT COVERED by the unit warranty. Harris Instrument Corporation suggests using either a finger – gloved or not, or flat pencil rubber eraser to perform the functions of the touchscreen.

NOTE:

Keep sharp and/or pointed objects from touching the LCD Touchscreen membrane, as these can permanently damage the unit. Open flames, sparks and other hot materials should also be restricted from contacting the touchscreen membrane.

ZD.1.e Data Entry

All data entry to the Level 4 unit can be performed via the touchscreen (as well as most functions via the Level 1 RS-232 Customer Interface). Menu buttons and keys are displayed for various input functions and requests from the unit. All numeric data entered via the touchscreen (LOWER Limit, Target, Deviation Analog, etc.) may be entered as 1 to 6 digit numbers with a decimal point if necessary.

The position of the decimal point on the *Readings Screen* is selectable by the customer with the Set Decimal Point position function [Section ZD.2.d]. All displayed values in all screens will use the position set by this function.

ZD.1.f Data Entry & Data Display Resolution

When outputting data on the Model MPPU Level 4 Customer Interface, the resolution of the data output or display is set by the Decimal Point Position function [Section ZD.2.b]. This does not mean that the data entered has to have the same decimal point position. The serial communications output will be rounded from four down and from five up to the output set with the Decimal Point Position. The data entered, no matter what the resolution (number of decimal places), is left intact. This means that if the Decimal Point Position is set to two places (XX.XX), the output of the value 12.345 would be 12.35 but the entry of the value 12.345 would remain constant. This allows for greater resolution to be entered while maintaining the output characteristics defined by the operator.

Figure ZD.1-2: Model MPPU Level 4 Start-up Screen

ZD.1.g System Start-up

If the Model MPPU is correctly configured with the Level 4 interface, when power is applied to the Model MPPU, the touchscreen should display the screen shown in Figure ZD.1-2.

The Model MPPU then displays the *Readings Screen* that shows the current measurement from the sensor(s). These readings may not be valid as the system is not yet completely configured. If there is no material in the sensor window, the Model MPPU will output the last good reading (or “0.00” on startup) and “FAULT A” in the upper-left corner of the screen (if operating with a dual-sensor system, “FAULT A & FAULT B”).

ZD.2 Operational Screens

There are two main screens for operation that include sub-routines for the Model MPPU Level 4 interface.

ZD.2.a Readings Screen

The Level 4 display shows the current measurement reading in the Measurement Window, the status of the limit relays [Section ZD.2.b], the current date & time [Section ZD.2.a Date & Time Display], and whether the sensor(s) is faulted [Section ZD.2.a VIDEO FAULT Warnings] from the *Readings Screen* {Figure ZD.2-1}. This screen is automatically displayed a few seconds after the power-up screen. The SYS DEFAULTS display refers to the Factory System Default Settings [Section ZD.2.c].

Pressing the "MENU" button will display the *Main Menu Screen,* stop all measurement readings and serial communications output.

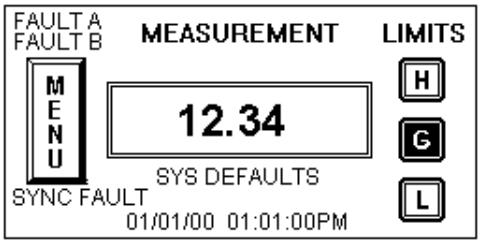

Figure ZD.2-1: Readings Screen

Measurement Window

Measurement readings from the Model MPPU are displayed in the Measurement Window {Figure ZD.2-2}. The window can display up to six characters with or without a decimal point. If a sensor VIDEO FAULT [Section ZD.2.a] is detected for more than 100 emitter scans, it hold at the last good reading to alert the operator of a continuous sensor FAULT condition and the Measurement Window will alternately reverse contrast (flash). Units configured for Multi-Strip Measurement may have up to 4 windows for displaying the measurement of all four strips.

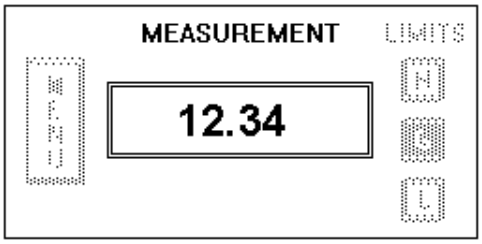

Figure ZD.2-2: Measurement Window

Units of Measure Display

While on the *Readings Screen*, the units of measure are displayed directly below the Measurement Window {Figure ZD.2-3}. The units of measure available for the system are:

INCHES, (IN) MILLIMETERS (MM),
FEET (FT), METERS (M), YARDS (YD),
and CENTIMETERS (CM).

Selecting the units of measure is part of the calibration routine (Section ZD.4) on units built prior to 15 December 1996. Units built after that time have a separate units of measure function ("UNITS" button [Section ZD.2.b]).

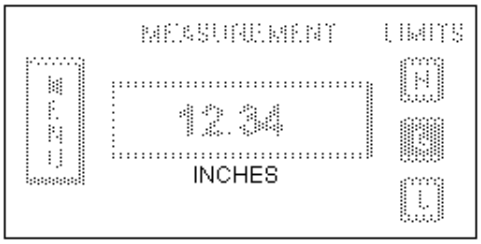

Figure ZD.2-3: Units of Measure Display

System Defaults Warning

Whenever the Factory Default System Settings [Section ZD.2.c] have been loaded into the on-board RAM from the EPROM, a warning label is displayed below the Measurement Window {Figure ZD.2-4}. The customer settings for the system have been lost if this warning label is displayed (or is the first time the unit is powered up on-line). The possible reasons for the display of this label are:

a) The EPROM has been replaced,
b) The battery-backed RAM has been lost due to a loss of power for more than 30 days,
c) The battery-backed RAM chip has been replaced,
d) The battery for the battery-backed RAM chip has been replaced.

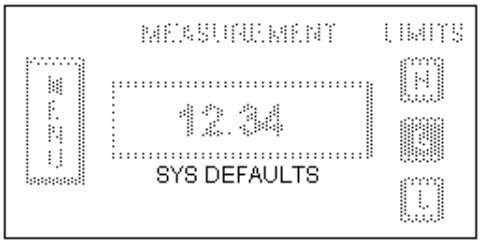

Figure ZD.2-4: System Defaults Warning

Before continuing with operation of the Model MPPU, be sure to calibrate and setup the unit. Refer any questions to Harris Instrument Corporation Service.

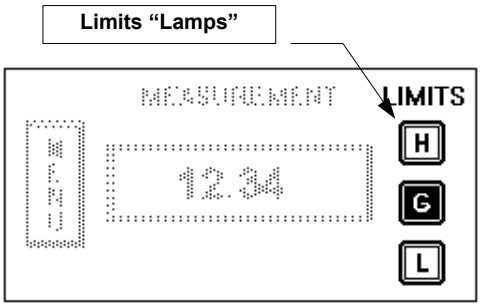

Figure ZD.2-5: Relay Activation GO Relay Activated

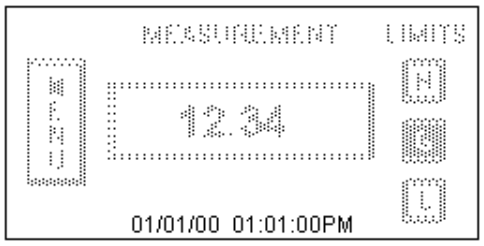

Figure ZD.2-6: System Date & Time Display

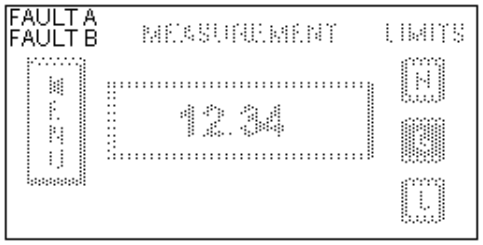

Figure ZD.2-7: Video Fault Warning Display

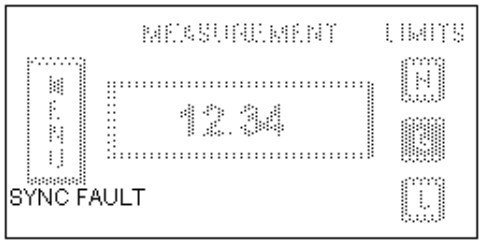

Figure ZD.2-8: SYNC Fault Warning Display

Relay Activation

The Model MPPU contains three relay contact closures [Section Z.4.d] for the UPPER limit (HI), the LOWER limit (LO) and for when the measurement is between the upper and lower limits (GO). Whenever one of these relays is activated, one of the display "lamps" on the *Readings Screens* will darken {Figure ZD.2-5}. As each relay is activated, the corresponding "lamp" will darken to alert the operator of a relay contact closure. During an extended sensor FAULT condition, all three relays contacts will open until the FAULT condition is corrected.

Date & Time Display

The current date and time monitored by the on-board clock/calendar in the Model MPPU micro-controller is displayed on the Readings Screen below the unit of measure label {Figure ZD.2-6}. The date and time can be changed with the Set Date & Time function [Section ZD.2.a].

VIDEO FAULT Warnings

The Model MPPU has a fault detection circuit to alert the operator of a sensor VIDEO FAULT condition. VIDEO FAULT can be caused by a number of reasons which are detailed in the Main Section Model MPPU manual [Section Z.3.e].

VIDEO FAULT warning for a single-sensor system will show as FAULT A, while VIDEO FAULT warning for a dual-sensor system will display FAULT A or FAULT B (or both warnings if both sensors are faulted).

The Level 4 interface will alert the operator when the sensors are experiencing a FAULT condition. Transient FAULTS will be displayed as they occur. After 100 scans, if the FAULT condition still persists:

1) The Measurement Window will display the last good reading;
2) The Measurement Window will alternate reverse contrast (Flash);
3) HI/GO/LO relays will open;
4) FAULT warnings will be displayed on the screen {Figure ZD.2-7};
5) The Open Collector TB3-6 [Section Z.4.g] switch to ON;
6) The RS-232-2 will output:
   a) Sensor Fault: A;
   b) Sensor Fault: B;
   c) Sensor Fault: SYNC;
   d) or a combination of the three.

NOTE:

It is VERY IMPORTANT for operators of closed loop control systems to monitor the HI/GO/LO relays, Open Collector TB3-6 and/or the RS-232-2 output for warnings about VIDEO and/or SYNC FAULT conditions.

SYNC FAULT Warning

The sensor SYNC signal informs the processing unit of the beginning of a sensor scan. If SYNC is not relayed to the processing unit, a malfunction of the sensor (or its associated cables) may have occurred. The Level 4 interface will display a SYNC warning label if a SYNC FAULT is detected {Figure ZD.2-8} and the RS-232 output will read:

Sensor Fault: SYNC.

ZD.2.b Main Menu Screen

The *Main Menu Screen* for Level 4 interfaces displays the various setup and adjustment functions for selection by the operator. System setup, graphing and target and limit setting functions are all accessible from this menu. Pressing the MENU button on the *Readings Screen* will display the *Main Menu Screen* {Figure ZD.2-9}.

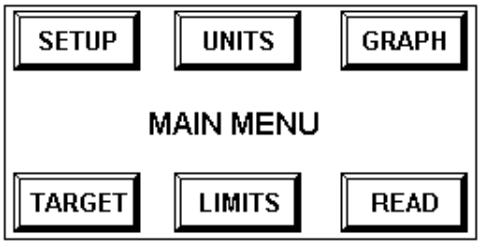

Figure ZD.2-9: Main Menu Screen

The *Main Menu Screen* has several buttons for displaying other screens:

a) SETUP Button: The *System Setup Menu Screen* has the various calibration, setup and configuration functions for the Model MPPU Level 4.

b) UNITS Button: The Units Setup Screen displays the instructions for setting the units of measure (inches, millimeters, etc.) and the decimal point position for the measurement displays. This button is only available on units built after 15 December 1996.

c) GRAPH Button: The *Graph Screen* displays the graphing function of the Level 4 Interface.

d) TARGET Button: The *Target Screen* is designed for setting the material target width or length.

e) LIMITS Button: The *Limits Screen* allows the operator to set the material upper and lower limits for the activation of the HI and LO relay contact closures.

The "READ" button exits the Main Menu Screen and returns the display to the Readings Screen.

Set Target/Limits – Tolerance Screens

The target value is the size value of the target material that the deviation analog function uses as a base point to determine the deviation value. This value is also used for limit relay activation with tolerance. The *Set Target Screen* shows the current target value stored in memory in the Target Display Window on the right of the screen {Figure ZD.2-10}.

Pressing the "MENU" button on the *Set Target Screen* will return the touchscreen to the *Main Menu Screen* with no changes to the target value.

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "TARGET" on the *Main Menu Screen* to display the *Set Target Screen*.
3) Press "TARGET" on the *Set Target Screen* to begin the Set Target function.

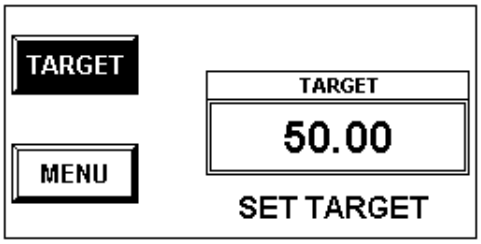

Figure ZD.2-10: Set Target Screen

The *Numeric Entry Screen* appears for entering the target value {Figure ZD.2-11}. The current target value stored in the system RAM is shown in the Display Window of the *Numeric Entry Screen.* The current function (Target) is shown in the Title Window below the numeric keys. Note that no lock out codes [Section ZD.2.c] are used for setting the target.

4) Press "CLEAR" on the *Numeric Entry Screen* to clear the current value in the screen. If the target value is not to be changed, press "ENTER" to return to the *Set Target Screen*.
5) Enter the target value with the numeric keys.
6) Press "ENTER" on the *Numeric Entry Screen* to accept the new target value.

The Level 4 interface displays the *Numeric Entry Screen* again for the entry of a Limit Tolerance. A tolerance value can then be set as a "plus-or-minus" value that will activate the UPPER limit relay when the target plus the tolerance value is measured (or will activate the LOWER limit relay when the target minus the tolerance value is measured).

Note that if the Absolute Limit Sensing is to be used, a value of zero (0) should be entered.

7) Press "CLEAR" on the *Numeric Entry Screen* to clear the current value in the screen. If the tolerance value is not to be changed, press "ENTER" to return to the *Set Target Screen.*
8) Enter the new value for the limit tolerance.
9) Press "ENTER" on the *Numeric Entry Screen* to accept the new tolerance value.

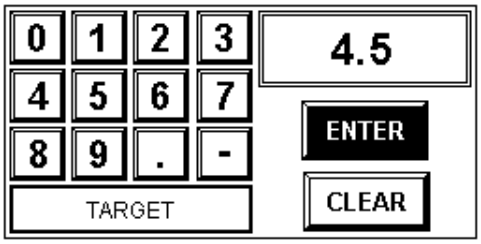

Figure ZD.2-11: Numeric Entry for Target

The Level 4 Interface returns to the *Set Target Screen*. Press "MENU" to return to the *Main Menu Screen* and then press "READ" to return to the *Readings Screen*. The target is set.

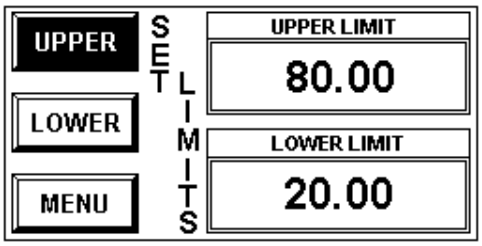

Figure ZD.2-12: Set Limits Screen

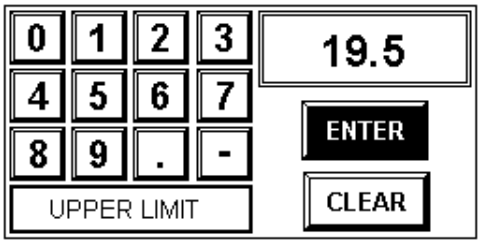

Figure ZD.2-13: Numeric Entry for Upper Limit

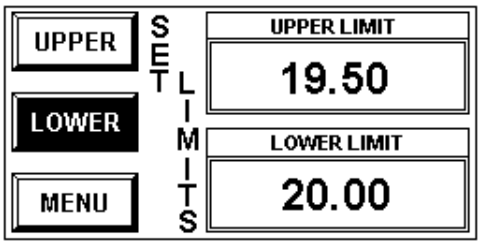

Figure ZD.2-14: Set Limits Screen

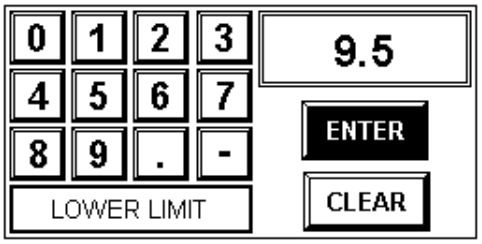

Figure ZD.2-15: Numeric Entry for Lower Limit

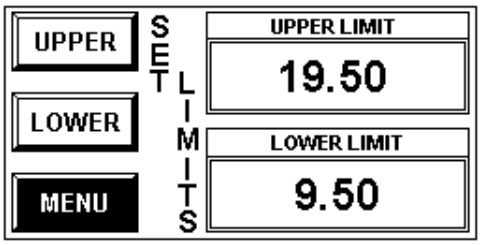

Figure ZD.2-16: Set Limits Screen with New Settings

Set Limits – Absolute Screen

Once the system has been calibrated, the measurement limits can be set from the *Set Limits Screen* {Figure ZD.2-12}. There are two measurement limit settings for the Model MPPU (UPPER – HI and LOWER – LO). These settings tell the Model MPPU when to activate the HI and LO relay closures.

Pressing the "MENU" button on the *Set Limits Screen* will return to the *Main Menu Screen*.

To set the UPPER (HI) measurement limit:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "LIMITS" on the *Main Menu Screen* to display the *Set Limits Screen*.
3) Press "UPPER" on the *Set Limits Screen* to begin the Set Upper Limit function.

The *Numeric Entry Screen* is displayed for entering the upper limit value {Figure ZD.2-13}. The current upper limit value stored in the system RAM is shown in the Display Window of the *Numeric Entry Screen.* The current function (UPPER Limit) is displayed in the Title Window below the numeric keys. Note that no lock out codes [Section ZD.2.c] are used for setting the limit activation values.

4) Press "CLEAR" on the *Numeric Entry Screen* to clear the current upper limit value in the Display Window; or if the value is not to be changed, press "ENTER" to return to the *Set Limits Screen*.
5) Enter the upper limit value with the numeric keys.
6) Press "ENTER" on the *Numeric Entry Screen* to accept the new upper limit value.

The touchscreen returns to the *Set Limits Screen*. Press "MENU" to return to the *Main Menu Screen* and press "READ" to return to the *Readings Screen*. The UPPER limit is set

To set the LOWER (LO) measurement limit:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "LIMITS" on the *Main Menu Screen* to display the *Set Limits Screen* {Figure ZD.2-14}.
3) Press "LOWER" on the *Set Limits Screen* to begin the Set Lower Limit function.

The *Numeric Entry Screen* is displayed for entering the LOWER limit value {Figure ZD.2-15}. The current lower limit value stored in system RAM is shown in the Display Window.

4) Press "CLEAR" on the *Numeric Entry Screen* to clear the current value in the Display Window; or if the value is not to be changed, press "ENTER" to return to the *Set Limits Screen*.
5) Enter the new lower limit value with the numeric entry keys.
6) Press "ENTER" on the *Numeric Entry Screen* to accept the new lower limit value.

The display returns to the *Set Limits Screen* {Figure ZD.2-16}. Press "MENU" to return to the *Main Menu Screen* and press "READ" to return to the *Readings Screen*. The LOWER limit is set.

Once the limits are set, any time the material being measured on the line is between the Upper and Lower limits, the normally-open GO relay will close and the GO "lamp" on the *Readings Screen* will be lit. When the UPPER limit (or LOWER limit) is exceeded, the HI (or LO) "lamp" on the *Readings Screen* will be lit and their corresponding normally-open relay is closed.

View Graph Screen

The Model MPPU Level 4 contains a graphic display screen for viewing the measurements on the process line in a X-Y line graph. The *Graph Screen* is customizable for axis scaling, graph titles and labels {Figure ZD.2-17}.

To view the *Graph Screen*:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "GRAPH" on the *Main Menu Screen* to display the *Graph Screen*.

The Graph Screen is displayed.

3) Press "MENU" on the *Graph Screen* to return to the *Main Menu Screen*.
4) Press "READ" on the *Main Menu Screen* to return to the *Readings Screen*.

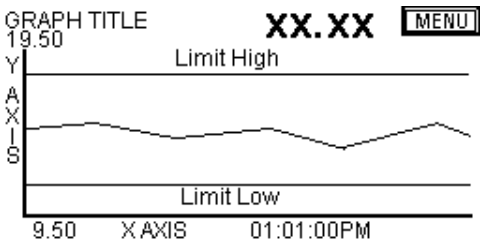

Figure ZD.2-17: Graph Screen

System Setup Menu Screen

The *System Setup Menu Screen* is displayed by pressing "MENU" on the *Main Menu Screen* and then "SETUP". For more information on the *System Setup Menu Screen*, see the applicable section.

Units Setup Screen

The *Units Setup* Screen {Figure ZD.2-18} allows the operator to set the units of measure label for the *Readings Screen* as well as the decimal point position for display.

NOTE:

Some early Model MPPU units set the units of measure and the decimal point position as part of the Calibration Procedure. All units manufactured before 15 December.1996 should refer to the calibration procedure (Section ZD.4) for information on setting the decimal point and units of measure.

To setup the units of measure:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "UNITS" on the *Main Menu Screen* to display the *Units Setup Screen*.

The *Units Setup Screen* is displayed {Figure ZD.2-18}. To set the units of measure for the Measurement Window on the *Readings Screen*, press "SETUP" or to ignore the units of measure and continue to the Set Decimal Point function, press "NEXT" and skip to step 6.

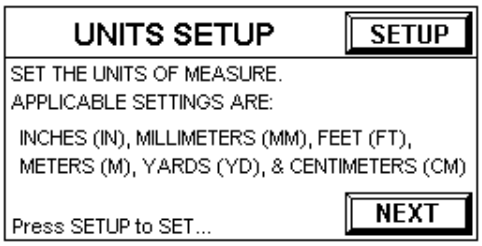

Figure ZD.2-18: Units Setup Screen

3) Press "SETUP" on the *Units Setup Screen*.

The *ASCII Character Entry Screen* is shown with the Display Units label in the Title Window {Figure ZD.2-19}. Enter the units of measure with the alpha-numeric buttons. As they are entered, they are shown in the Display Window.

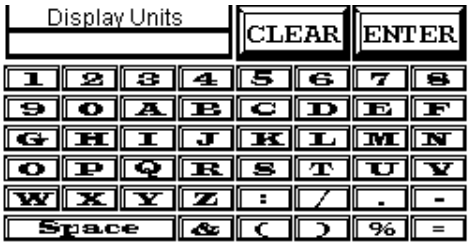

Figure ZD.2-19: Display Units Entry Screen

4) Press "CLEAR" to clear the Display Window of the current units of measure entry (if any).

Applicable units of measure for the Level 4 display are:

INCHES (or IN), MILLIMETERS (or MM), FEET (or FT), METERS (or M), YARDS (or YD), and CENTIMETERS (or CM).

5) Enter the new units of measure and press "ENTER" to accept.

The *Units Setup Screen* is displayed again prompting the operator to set the decimal point position for measurement resolution and display {Figure ZD.2-20}. If the decimal point position is not to be changed, press "NEXT" to return to the *Main Menu Screen*.

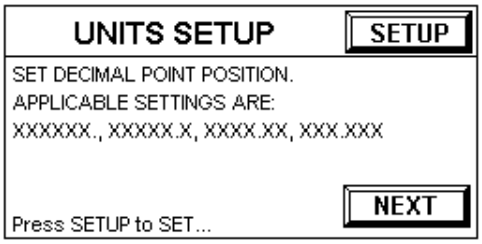

Figure ZD.2-20: Decimal Point Setup Screen

6) Press "SETUP" to set the decimal point position.

The *Numeric Entry Screen* is displayed for entering the decimal point position {Figure ZD.2-21}. The current decimal point position stored in the system RAM is shown in the Display Window of the *Numeric*

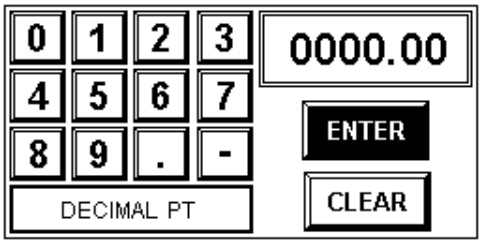

Figure ZD.2-21: Decimal Point Entry Screen

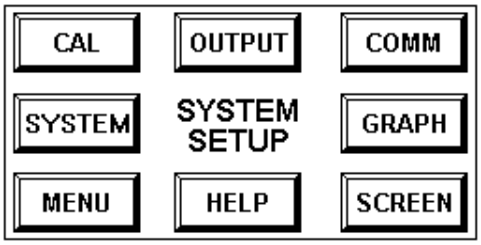

Figure ZD.2-22: System Setup Menu Screen

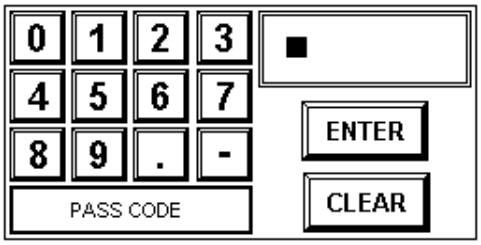

Figure ZD.2-23: Lock Out Code Entry Screen

Entry Screen with the function (decimal point position) displayed in the Title Window.

7) Press "CLEAR" to clear the current decimal point position in the Display Window.
8) Enter the new decimal point position. Applicable positions are:

XXXXXX., XXXXX.X, XXXX.XX, XXX.XXX

9) Press "ENTER" to accept the new decimal point position.

The *Main Menu Screen* is displayed.

10) Press "READ" to exit the *Main Menu Screen* and return to the *Readings Screen*.

Return to Readings Screen

To return to the Readings Screen from the Main Menu Screen, press the "READ" button on the Main Menu Screen.

ZD.2.c System Setup Menu Screen

The *System Setup Menu Screen* {Figure ZD.2-22} provides the operator with many of the system settings and calibration routines such as:

a) CAL: Calibration Routines for system calibration, sensor size and type, date & time and the diagnostic screen,
b) OUTPUT: Analog Output setup and scaling [Section ZD.4.d],
c) COMM: Serial Port 2 baud rate setting [Section ZD.2.c],
d) SYSTEM: Current system settings review and restoration of Factory Default System Settings [Section ZD.2.c] Only available on units built after 15 December, 1996,
e) GRAPH: Graph Screen setup and configuration [Section ZD.2.e],
f) SCREEN: Screen contrast setting [Section ZD.2.c],
g) HELP: System Help information [Section ZD.2.c].

Press "MENU" to exit the *System Setup Menu Screen* and return to the *Main Menu Screen*. Many of the functions on the System Setup Menu Screen call other screens and data entry screens.

Lock Out Codes

Many of the Model MPPU Level 4 interface configuration functions in *System Setup Menu Screen* have a lock out (or pass) code to prevent the unauthorized access to the system commands. This command code can be optionally customized (see any EVO documentation for information on custom configurations).

The functions with this lock out code are:

a) CAL button for system calibration,
b) OUTPUT button for the analog outputs,
c) COMM button for the serial communications through port RS-232-2.

When the particular button is pushed that has a lock out code, the *Numeric Entry Screen* is displayed for the entry of the code {Figure ZD.2-23}. Be sure to press the "ENTER" button to accept the newly entered lock out code. An improper lock out code, or just pressing the "ENTER" button, will cause the system to return to the *System Setup Menu Screen*. Other lock out codes are also used as access codes (also called pass codes) to access specific functions of the Level 4 interface. The functions with these other codes will be identified in the sections pertaining to those functions.

Lock Out Code Listing

Function	Code	Menu Button
Change Date/Time	*1234*	*CAL*
Calibrate Sensor	*9876*	*CAL*
Scale Analog Outputs	*9876*	*OUTPUT*
Set Baud Rate	*9876*	*COMM*
Reset Factory System Settings	*4321*	*SYSTEM*
Set Sensor Type	*6778*	*CAL*
Set Filter Snap	*7627*	*CAL*
Exponential Averaging	*3976*	*CAL*
Display Diagnostic Screen	*5678*	*CAL*
Manual Calibration	*6666*	*CAL*
EVP Module Setup	*6778*	*CAL*
Table ZD.2-1: Level 4 Lock Out Codes		

NOTE:

Other lock out codes may be used in the system depending upon any options purchased with the unit. Review any other manual sections for more information.

Factory Default System Settings

Model MPPUs built after 15 December 1996 contain the Factory Default System Settings in the on-board EPROM. These settings can be loaded into the battery-backed RAM and are available for restoration by the operator.

The "SYS DEFAULTS" label below the Measurement Window on the *Readings Screen* informs the operator that the Factory Default System Settings have been loaded into battery-backed RAM and the customer selected system settings have been lost. The Model MPPU must be set up and configured again before operations can continue. This message also appears when the system battery is low or when system RAM is lost due to power failure.

These Factory Default System Settings are available via the customer interface in the *System Setup Menu Screen* on units built after 15 December 1996. These settings can be loaded into memory by the operator.

NOTE:

It is generally not necessary to restore Factory Default System Settings unless:

a) The EPROMs have been replaced;

b) The sensor type or size has been changed.

The factory default settings for the Model MPPU are as follows:

Baud rate: 9600
Filter Snap: 0.05
Exponential Averaging: 0.025
Upper Limit: 80.00
Target: 50.00
Lower Limit: 20.00
Absolute Analog: 30.00=10 volts
Target Deviation: 4.00=10 volts
Sensor setup is: Single-Sensor Model 10XAAS
Emitter size is: 10000 (for ten-inch [254mm] sensor).

To view the current system settings for the Model MPPU:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "SETUP" on the *Main Menu Screen* to display the *System Setup Menu Screen*.
3) Press "SYSTEM" on the *System Setup Menu Screen* to begin the System Settings function.

The *System Settings Screen* is displayed {Figure ZD.2-24}. Notice the readings of the variables pertaining to sensor size/type, analog outputs, etc.

4) To exit the *System Settings Screen* without changing anything, press "SETUP" to return to the *System Setup Menu Screen* or press "RESET" to reset the Factory Default System Settings.

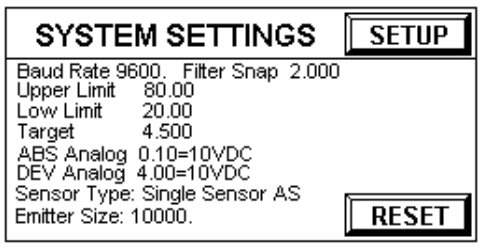

Figure ZD.2-24: System Setup Menu Screen

The display will return to the *System Setup Menu Screen* leaving the system settings intact by pressing "SETUP". Restoring the Factory Default System Settings (pressing "RESET") requires a lock out (or

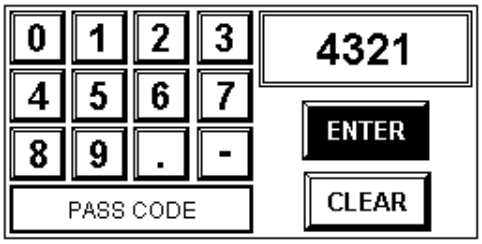

Figure ZD.2-25: Defaults Lock Out Code

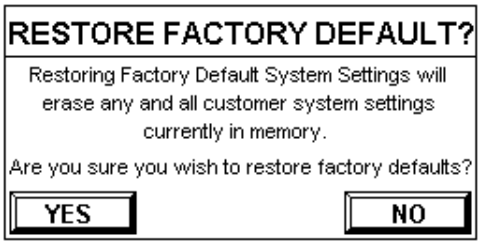

Figure ZD.2-26: Restore Defaults Screen

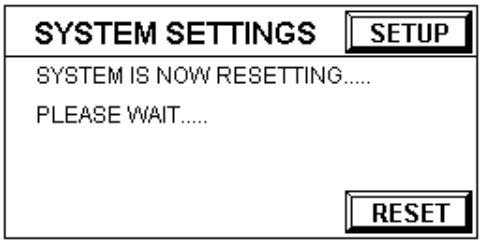

Figure ZD.2-27: Restoring Defaults

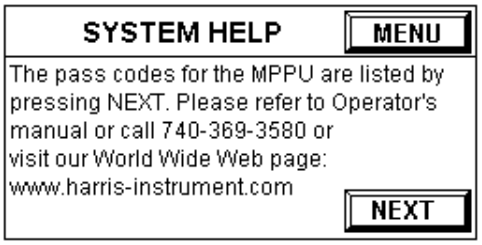

Figure ZD.2-28: Technical Assistance System Help Screen

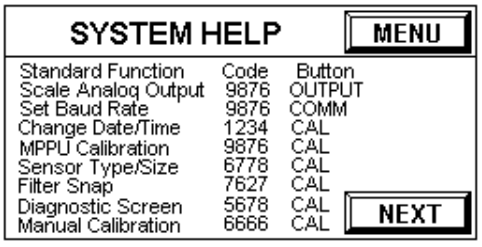

Figure ZD.2-29: Standard Lock Out Codes & Functions System Help Screen

pass) code. The lock out code for Restoring the Factory Default System Settings is:

4321

To restore the Factory Default System Settings:

1) Press "MENU" on the *Readings Screen* to access the *Main Menu Screen*.
2) Press "SETUP" on the *Main Menu Screen* to display the *System Setup Menu Screen*.
3) Press "SYSTEM" on the *System Setup Menu Screen* to begin the System Settings function.
4) Press "RESET" on the *System Settings Screen.*

The *Numeric Entry Screen* appears {Figure ZD.2-25} prompting the operator for the lock out (or pass) code to reset the Factory Default System Settings.

5) Enter the Restore Factory Default System Settings lock out code **(4321)** and press "ENTER".

The unit displays the *Restore Defaults Screen* asking the operator to confirm the restoration of the Factory Default System Settings {Figure ZD.2-26}.

6) Press "YES" to Restore Factory Defaults or "NO" to return to the *System Settings Screen*. After pressing "YES", the screen in Figure ZD.2-27 is displayed, alerting the operator that the Factory Default System Settings are being restored, and then returns to the *System Settings Screen*.
7) Press "MENU" to return to the *Main Menu Screen*.
8) Press "READ" to return to the *Readings Screen*.

Notice that when returning to the Readings Screen, that the sensor(s) are probably showing a FAULT condition (unless the system is running a single Model 10XAAS-10 sensor), that the measurement readings are invalid and that the units of measure label reads "SYS DEFAULTS". The Model MPPU must now be reconfigured for operation with your particular setup.

System Help

The Model MPPU Level 4 interface contains a help function that can assist the operator in setup functions. Press the "HELP" button to review the functions in the *System Help Screen*.

The first screen that appears gives the address and phone numbers for Harris Instrument Corporation for assistance from factory service personnel {Figure ZD.2-28}. The "MENU" button returns the screen to the *System Setup Menu Screen*. Pressing the "NEXT" button displays the second *System Help Screen*.

The second *System Help Screen* displays all of the standard pass codes available with this Model MPPU Level 4 system {Figure ZD.2-29}. Press the "MENU" button to return to the *System Setup Menu Screen*. or the "NEXT" button to display the optional functions and lock out codes (if applicable).

Optional functions and lock out codes available with the particular Model MPPU are listed on the third *System Help Screen* {Figure ZD.2-30}. If no options are available with this particular Model MPPU, pressing the "NEXT" button from the second *System Help Screen* will return the display to the *System Setup Menu Screen*. Review the applicable section in this manual for more information on the lock out codes for those options.

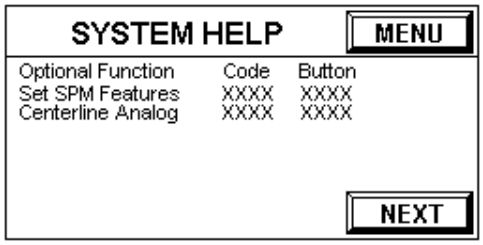

Figure ZD.2-30: Optional Lock Out Codes & Functions System Help Screen

Screen Contrast Adjustment

The Level 4 interface is usually viewable in most lighting conditions, but sometimes may need to have the contrast adjusted. The *Contrast Adjustment Screen* {Figure ZD.2-31} allows the operator to lighten or darken the screens for use in different lighting environments. Press the "DARKER" arrow to reduce the contrast and the "LIGHTER" to increase. Press "SETUP" to return to the *System Setup Menu Screen*.

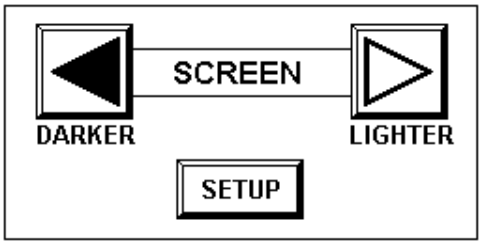

Figure ZD.2-31: Contrast Adjustment Screen

Serial Communications

The Model MPPU Level 4 interface has one available serial communications port (RS-232-2) to output measurement readings to a serial device (such as Level 1 RS-232 Customer Interface, a host computer or optional serial printer) as a standard feature. The serial communications protocol is based upon the *DEC VT-100 (ANSI) terminal emulation for the IBM PC*® for RS-232 communications. The RS-232 output communications port operates as the DCE, with the host computer as the DTE. Any ANSI terminal emulator will probably function with the Model MPPU as a terminal emulator, as well as many commercial communications software packages (such as PROCOMM®).

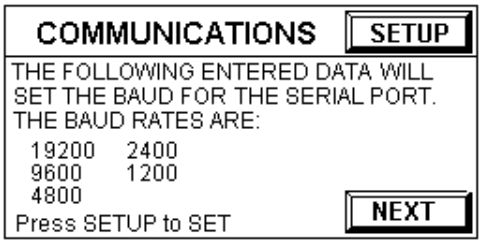

Figure ZD.2-32: Communications Screen

Whenever the Level 4 interface is displaying the *Readings Screen,*, the communications port is sending measurement readings (similar to the Measurement Window on the *Readings Screen*). When in the *System Setup Menu Screen*, the serial communications output is stopped until the unit is returned to *Readings Screen*.

Communications protocol for the serial output are RS-232C ASCII, six-characters with a decimal point, space padded with a carriage-return and line feed in a **10-bit frame** running:

No Parity, Eight Data Bits and One Stop Bit (N,8,1) with One Start Bit.

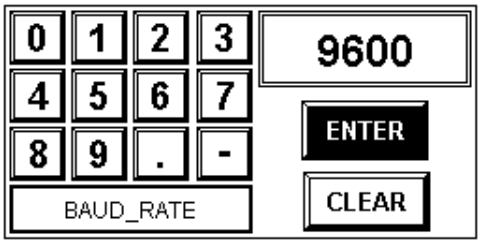

Figure ZD.2-33: Baud Rate Numeric Entry

The communications can be set for a baud rates of (underlined is factory default):

1200bps, 2400bps, 4800bps, <u>9600bps</u>, 19200bps.

Data output is approximately 10Hz when the baud rate is set at 9600.

Serial communications port RS-232-1 and RS-232-2 are available via an Engineering Variance Order (EVO) for various protocols, output formats and devices (such as a serial printer). Contact Harris Instrument Corporation Sales or Engineering for more information.

The baud rate is selectable with the "COMM" button in the *System Setup Menu Screen*. The Level 4 interface (and the Level 3 – LED Display/Keypad) operate at 57600bps and cannot be changed. The Set System Baud function only affects the host computer communications port (RS-232-2).

To set the system baud rate from the *System Setup Menu Screen*:

1) Press "COMM" to begin the Set Baud Rate routine.

The *Numeric Entry Screen* is displayed for the lock out (or pass) code to change the communications baud rate.

2) Enter the lock out code **(9876)** and press "ENTER".

The *Communications Screen* is displayed with instructions on setting the baud rate{Figure ZD.2-32}. Applicable baud rates are 1200bps to 19200bps. Pressing the "NEXT" button will exit the *Communications Screen* and return the display to the *System Setup Menu Screen.*

3) Press "SETUP" to change the current baud rate.

The *Numeric Entry Screen* is displayed again, this time with the BAUD_RATE label in the Title Window {Figure ZD.2-33}. The current baud rate is shown in the Display Window. To accept this baud rate, press "ENTER" to return to the *System Setup Menu Screen*. or to change the baud rate, continue with the next steps.

4) Press “CLEAR” to clear the Display Window of the current baud rate setting.

5) Enter in the new baud rate (1200, 2400, 4800, 9600 or 19200) with the numeric buttons.

6) Press “ENTER” to accept the new baud rate.

The RS-232-2 communications port is now set for operation at the new baud rate. The display returns to the *System Setup Menu Screen*.

NOTE:

When the Model MPPU experiences an extended VIDEO or SYNC FAULT from the sensors (100 sequential FAULTS), the communications output will switch to one or a combination of the following:

a) Sensor Fault: A

b) Sensor Fault: B

c) Sensor Fault: SYNC.

This output will continue until the sensor system FAULT is alleviated or until readings output is halted.

Extended Serial Communications

Typically, all Model MPPU serial communications are limited to fifty linear cable feet [15.2m] from the Model MPPU. Operations greater than fifty linear cable feet [15.2m] (up to 3000 linear cable feet [914.4m]) require the installation of two short-haul modems (MSH Option), one at the processing unit end and one at the host computer or serial panel meter end. Contact Harris Instrument Corporation Sales or Engineering for more information. Short-haul modems are covered in the MSH Option section of this manual [Section ZG], if applicable.

Exiting System Setup Menu Screen

To exit the *System Setup Menu Screen*, press the “MENU” button. The *Main Menu Screen* will then be displayed.

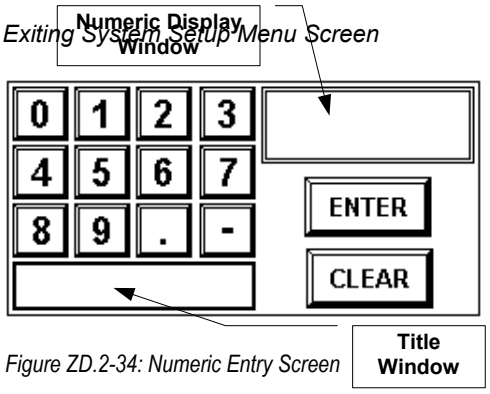

Figure ZD.2-34: Numeric Entry Screen

ZD.2.d Data Entry Screens

Many of the functions accessible by the Level 4 interface require entry of data from the operator. Two screens are generally used for data entry – the *Numeric Entry Screen* {Figure ZD.2-34} and *ASCII Character Entry Screen* {Figure ZD.2-35}.

The *Numeric Entry Screen* contains:

a) Number buttons 0 through 9,

b) Decimal point button,

c) Minus button (for negative values),

d) Numeric Display Window (upper-right corner) with six characters maximum,

e) Title Window (Lower-left corner).

The Title Window in the lower-left corner displays the function that is currently being performed by the operator. A “CLEAR” button is available to erase the current value in the numeric display window and an “ENTER” button is used to accept the current value in the numeric display window. Pressing the “ENTER” button without any data entry but before the “CLEAR” button is pushed will accept the current value in the numeric display window. The “CLEAR” button must be pushed BEFORE any data can be entered. If the “CLEAR” button and then the “ENTER” button is pushed, a value of zero will be stored in the system for that function.

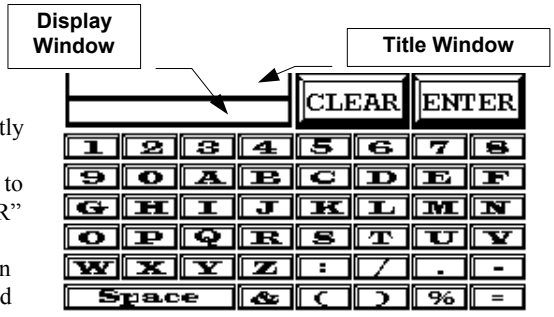

Figure ZD.2-35: ASCII Character Entry Screen

The *ASCII Character Entry Screen* is used in the Calibration procedure and in the Graph setup procedure. This screen has:

a) English 26 letter alphabet buttons,
b) The number buttons 0 through 9,
c) A series of extra character buttons (such as &, /, %, etc.),
d) A space bar button,
e) A Title Window (upper-left corner).
f) A Display Window (below the Title Window) with thirteen characters maximum

The Title Window above the Display Window shows the function that is currently being performed by the operator. A "CLEAR" button is also available to erase the current value in the numeric Display Window and an "ENTER" button is used to accept the current value in the numeric Display Window. Pressing the "ENTER" button without any data entry but before the "CLEAR" button is pushed will accept the current value in the numeric Display Window. The "CLEAR" button must be pushed BEFORE any data can be entered. If the "CLEAR" button and then the "ENTER" button is pushed, a value of zero will be stored in the system for that function.

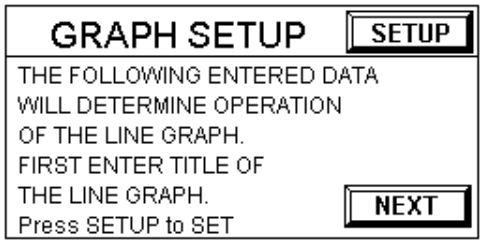

Figure ZD.2-36: Graph Setup Screen

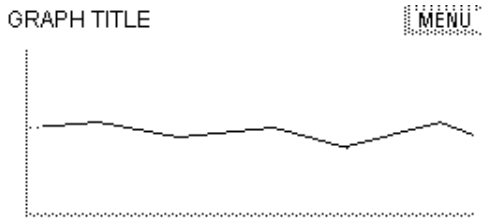

Figure ZD.2-37: Graph Title Location

Figure ZD.2-38: Graph Title Entry Screen

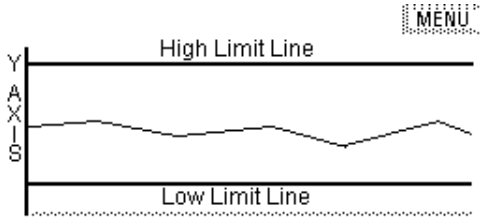

Figure ZD.2-39: Y Axis Label & Location

ZD.2.e Graph Setup Screen *Functions*

The *Line Graph Screen* has several customizable features:

a) Graph Title
b) Y axis Min. & Max. Limits
c) Update Factor,
d) X axis label,
e) Y axis label.

The following sub-sections relate to each of these features individually. Of course, the Graph Screen Setup routine can by performed in one operation consecutively.

Graph Setup Screen

The *Graph Setup Screen* {Figure ZD.2-36} displays step by step directions on setting up the *Line Graph Screen*. Pressing the "SETUP" button proceeds with the particular setup function displayed on the screen. Pressing the "NEXT" button will skip that particular setup function and move on to the next setup function.

Graph Title

The Graph Title is simply that, a title describing the graph screen {Figure ZD.2-37}. This title is an ASCII string up to 12 characters long and is customizable by the operator.

To customize the Graph Title from the *System Setup Menu Screen*:

1) Press "GRAPH" to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.
2) Press "SETUP" to set the Graph Title.

The *ASCII Character Entry Screen* is shown with the Graph Title label in the Title Window {Figure ZD.2-38}. Enter in a Graph Title of twelve characters or less (including spaces). Pressing "CLEAR" will clear the Display Window for re-entry if a mistake was made.

3) Press "ENTER" to accept the Graph Title.

The *Graph Setup Screen* then displays with the next step in the Graph Setup Routine. Either continue with the Graph Setup Routine or press "NEXT" five times to return to the *System Setup Menu Screen*.

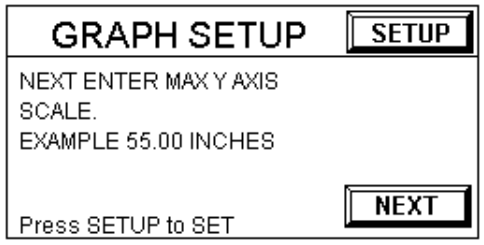

Figure ZD.2-40: Maximum Y Axis Setup

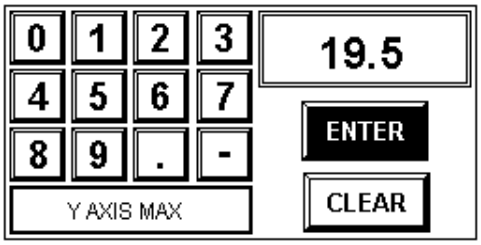

Figure ZD.2-41: Numeric Entry for Y Axis Max

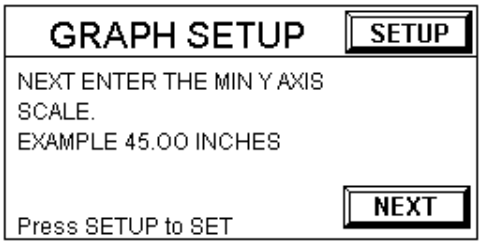

Figure ZD.2-42: Minimum Y Axis Setup

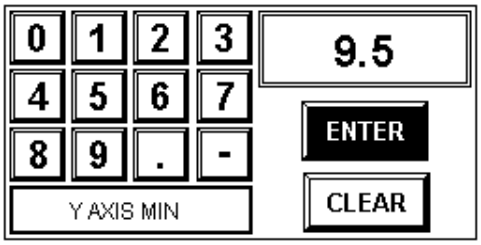

Figure ZD.2-43: Numeric Entry for Y Axis Min

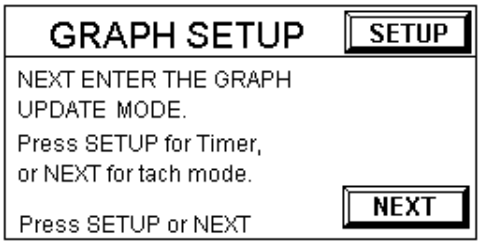

Figure ZD.2-44: Enter Graph Update Screen

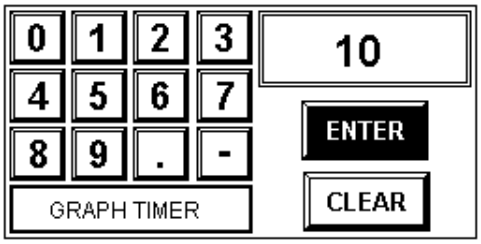

Figure ZD.2-45: Numeric Entry for Update

Y Axis Settings

The Y axis of the graph {Figure ZD.2-39} displays the measurement of the product along the graph line. The Y axis values are the maximum measurement and the minimum measurement that the operator wants to be displayed on the screen. The Upper Limit and Lower Limit values set in Limit Sensing will also appear on the graph as horizontal lines.

If the Upper Limit is set above the maximum Y axis scale, then the horizontal line on the graph will appear at the maximum Y axis. If the Lower Limit is set below the minimum Y axis scale, then the horizontal line on the graph will appear at the minimum Y axis.

The Y axis minimum and maximum limits are customizable by the operator. This function is performed right after the Graph Title function in the Graph Setup Routine.

To set the Y axis limit scaling from the *System Setup Menu Screen*:

1) Press "GRAPH" to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.
2) Press "NEXT" to skip the Graph Title setup. The *Graph Setup Screen* changes to describe the setting of the maximum Y axis scale {Figure ZD.2-40}.
3) Press "SETUP" to configure the graph maximum Y axis scale.

The *Numeric Entry Screen* is displayed with Y AXIS MAX label in the Title Window {Figure ZD.2-41}.

4) Press "CLEAR" to clear current value in the Display Window.
5) Enter the maximum Y Axis value in six digits or less with decimal points as necessary.
6) Press "ENTER" to accept the newly entered maximum Y axis value.

The *Graph Setup Screen* then displays with the next step in the Graph Setup Routine, the setting of the minimum Y axis scale {Figure ZD.2-42}.

7) Press "SETUP" to configure the graph minimum Y axis scale.

The *Numeric Entry Screen* is displayed with Y AXIS MIN label in the Title Window {Figure ZD.2-43} for entry of the Y Axis minimum value.

8) Press "CLEAR" to clear current value in the Display Window.
9) Enter the minimum Y Axis value in six digits or less with decimal points as necessary.
10) Press "ENTER" to accept the newly entered minimum Y axis value.

Either continue with the Graph Setup Routine or press "NEXT" three times to return to the *System Setup Menu Screen*.

Update Mode

The X axis on the *Line Graph Screen* is based upon either time or line speed encoder (tachometer) input. The measurement of the material is displayed by the line and is updated at a frequency that is customizable by the customer for time or by the tachometer.

Timer Update

Setting the timer for the update of the graph line to a very short time (3.5 seconds) will cause the graph display to be updated very frequently. Setting the timer for update to a very long time (3600 seconds) will update the graph display only once in one hour. Depending upon the customer requirements for the graph update, the update time factor can be set from 3.0 seconds up to 999999 seconds.

To set the Update Mode – Time Factor from the *System Setup Menu Screen*:

1) Press "GRAPH" to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.
2) Press "NEXT" three times to skip to the Set update time factor function. The *Graph Setup Screen* changes to describe the setting of the update time factor {Figure ZD.2-44}.

3) Press “SETUP” to set the graph update by timer.

The *Numeric Entry Screen* is displayed with the GRAPH TIMER label in the Title Window {Figure ZD.2-45} for entry of the timer value.

4) Press “CLEAR” to clear current value in the Display Window.
5) Enter the graph update time value in six digits or less with decimal points as necessary.
6) Press “ENTER” to accept the graph update time value.

Either continue with the Graph Setup Routine or press “NEXT” two times to return to the *System Setup Menu Screen*.

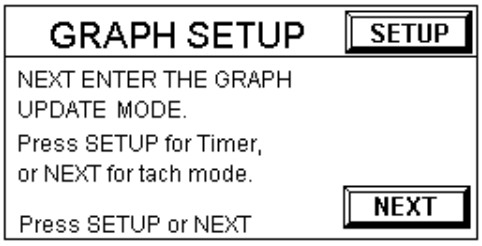

Figure ZD.2-46: Enter Graph Update Screen

Tachometer Update

Setting the Graph Display for tachometer (line speed encoder) input to update the graph screen requires the knowledge of the number of pulses per unit of second that will come from the tachometer during operation. This value can then be used for updating the *Graph Screen*.

To set the Update Mode – Encoder from the *System Setup Menu Screen*:

1) Press “GRAPH” to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.
2) Press “NEXT” three times to skip to the Set update time factor function. The *Graph Setup Screen* changes to describe the setting of the update time factor {Figure ZD.2-46}.
3) Press “NEXT” to set the graph update by encoder (tachometer) input.

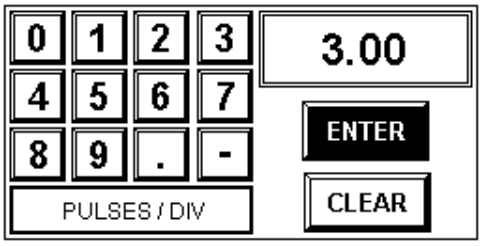

Figure ZD.2-47: Numeric Entry for Update

The *Numeric Entry Screen* is displayed with the PULSES/DIV label in the Title Window {Figure ZD.2-47}.

4) Press “CLEAR” to clear current value in the Display Window.
5) Enter the graph update time value in six digits or less with decimal points as necessary. This value should be no less than one pulse per update.
6) Press “ENTER” to accept the graph encoder update value.

Either continue with the Graph Setup Routine or press “NEXT” two times to return to the *System Setup Menu Screen*.

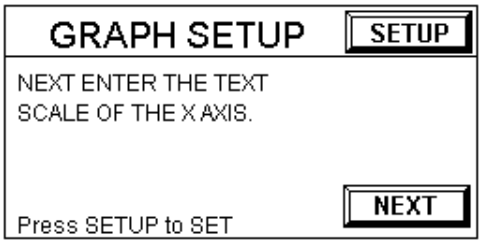

Figure ZD.2-48: X Axis Text Screen

X Axis Label

The X axis, for the amount of time before each graph update, can be customized to whatever the customer needs. For example, if the update time was set to one update per ten seconds, the label for the X axis could be:

10 SEC./DIV

To set the X axis label from the *System Setup Menu Screen*:

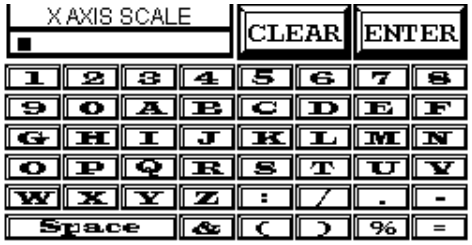

Figure ZD.2-49: Text Entry for X Axis Scale

1) Press “GRAPH” to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.
2) Press “NEXT” four times to skip to the set X axis label function. The *Graph Setup Screen* changes to describe the setting of the graph X axis label {Figure ZD.2-48}.
3) Press “SETUP” to set the X axis label.

The *ASCII Character Entry Screen* is displayed with the X Axis Scale label in the Title Window {Figure ZD.2-49}. Enter in a X axis label of twelve characters or less (including spaces). Pressing “CLEAR” will clear the Display Window for re-entry if a mistake was made.

4) Enter the X axis scale label in twelve characters or less including spaces.
5) Press “ENTER” to accept the X axis scale label.

Either continue with the Graph Setup Routine or press “NEXT” one time to return to the *System Setup Menu Screen*.

Y Axis Label

Similar to the X axis label, the Y axis label represents the material measurement range displayed on the graph. It can also be customized to whatever the operator requires. For example, if the maximum Y axis value was 19.5 inches and the minimum Y axis value was 9.5 inches, the label for the X axis could be:

9.5-19.5 IN

To set the Y axis label from the *System Setup Menu Screen*:

1) Press “GRAPH” to enter the Graph Setup Routine. The *Graph Setup Screen* is displayed.

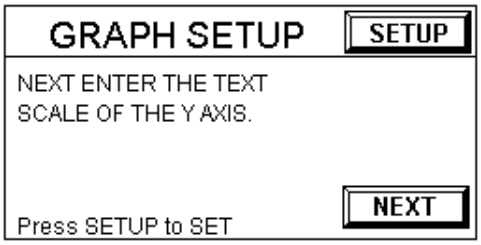

Figure ZD.2-50: Y Axis Text Screen

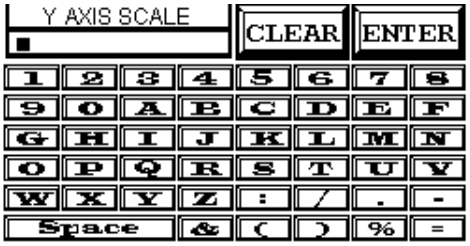

Figure ZD.2-51: Text Entry for Y Axis Scale

2) Press “NEXT” five times to skip to the set Y axis label function. The *Graph Setup Screen* changes to describe the setting of the graph Y axis label {Figure ZD.2-50}.
3) Press “SETUP” to set the Y axis label.

The *ASCII Character Entry Screen* is displayed with the Y Axis Scale label in the Title Window {Figure ZD.2-51}. Enter in a Y axis label of twelve characters or less (including spaces). Pressing “CLEAR” will clear the Display Window for re-entry if a mistake was made.

4) Enter the Y axis scale label in twelve characters or less including spaces.
5) Press “ENTER” to accept the Y axis scale label.

The Graph Setup Routine now ends and the *System Setup Menu Screen* appears.

ZD.3 Set-up Procedures

There several system set-up routines available from the CAL button in the *System Setup Menu Screen* {Figure ZD.3-1}. Procedures such as:

a) Data & Time: Setting the system internal date and time;

b) Sensor Setup: Setting the type and size of the sensors;

c) Digital Filter Snap: Setting the digital snap filter value;

d) Diagnostic Display: A screen for viewing the Model MPPU diagnostic values;

e) System Calibration: Calibrating the sensors to the current passline and installation as well as setting the units of measure on units built prior to 15 December 1996. System Calibration can be performed both automatically by the Model MPPU, or entered manually by the operator (useful for recalibration when necessary).

All of these functions are available with the "CAL" button on the *System Setup Menu Screen.* They can be accessed by entering a special lock out (or pass) code for that particular function.

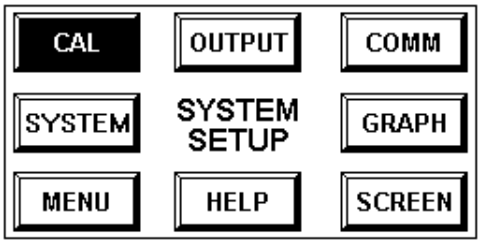

Figure ZD.3-1: CAL Button

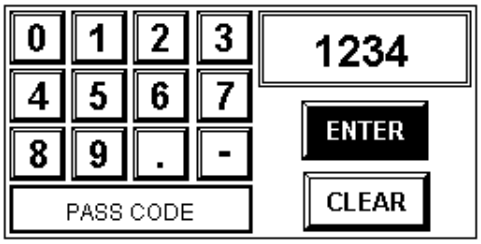

Figure ZD.3-2: Lock Out Code Entry Screen

ZD.3.a Changing Date & Time

The system date and time may have to be set when the Model MPPU first arrives. The date and time are usually set at the factory, but if the processing unit is not powered for over 30 days, the battery-backed RAM may not be valid because of current drain. The time is entered in military standard time (i.e.

15:00:00 is 3:00PM) but displayed in standard time.

The lock out code for changing the date and time is:

1234

To set the system date and time from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Calibration procedure.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-2}.

2) Enter the Time & Date lock out code **(1234)** with the numeric buttons and press "ENTER".

Figure ZD.3-3: Set Date Character Entry

The *ASCII Character Entry Screen* is displayed with the Set Date label in the Title Window {Figure ZD.3-3}.

3) Enter in the new date with this format:

MM/DD/YY

4) Press "ENTER" to accept the new date.

The date is set and the *ASCII Character Entry Screen* label changes to Set Time in the top-left corner window {Figure ZD.3-4}.

Figure ZD.3-4: Set Time Character Entry

5) Enter in the new time with this format:

HH:MM:SS

The time is entered in military format (i.e. 12:00PM is 00:00:00 and 12:00AM is 12:00:00) but is displayed on the *Readings Screen* in standard (AM/PM) format.

6) Press "ENTER" to accept the new time and return to the *System Setup Menu Screen*.

The date and time values MUST BE ENTERED PROPERLY. If they are not entered properly, an error screen will be displayed {Figure ZD.3-5}. Press "MENU" on the error screen to return to the *System Setup Menu Screen*.

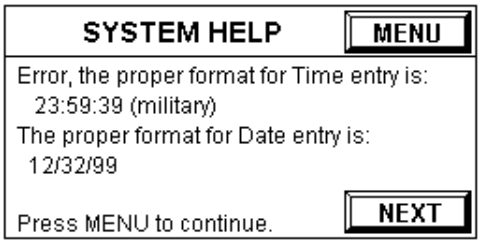

Figure ZD.3-5: Date/Time Error Screen

Pressing the "ENTER" button without changing the date or time will also display the *System Help Screen* for entering the proper date or time. Pressing the "NEXT" button will proceed to the *Set Time Entry Screen*. Pressing the

"NEXT" button will also return to the *System Setup Menu Screen*. The previous date and time stored in system RAM will be preserved.

ZD.3.b Sensor Setup

The Model MPPU Level 4 can operate with 10XAS-Series or 10XBR-Series sensors in single- or dual-sensor configurations. The sensor sizes are from 10 inches [254mm] to 40 inches [1016mm]. Both the sensor type and sensor size are operator selectable in the Model MPPU.

The Model MPPU must also be calibrated to the current product passline, emitter-to-receiver separation and sensor spacing for dual-sensor systems with the 10XAS-Series sensors and for emitter-to-receiver separation and sensor spacing for dual-sensor systems with the 10XBR-Series sensor. See System Calibration for more information. It is important to determine the specific sensor size and type BEFORE proceeding with the setup procedure. Refer to the sensor manual shipped with the sensors, 10XAS-Series Sensors [Section C] or 10XBR-Series Sensors [Section G] for more information.

NOTE:

The 10XBR-Series sensor in dual-sensor applications requires a special setup procedure [Section ZD.3.c]. The dual-sensor 10XBR-Series requires the spacing between the outside-end emitter LEDs to function properly.

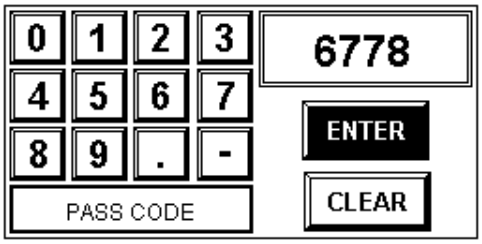

Figure ZD.3-6: Lock Out Code Entry Screen

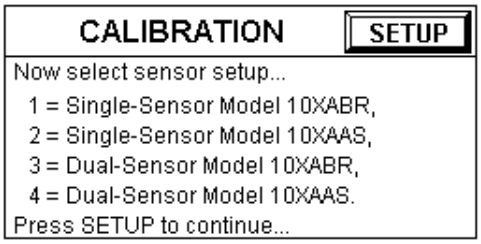

Figure ZD.3-7: Sensor Type Screen

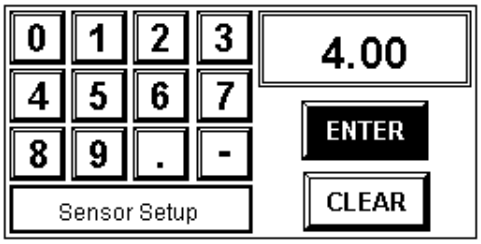

Figure ZD.3-8: Sensor Type Entry Screen for Dual-Sensor Model 10XAAS Sensors

The lock out code for setting sensor type and size is:

6778

To set the sensor type from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Calibration procedure.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-6}.

2) Enter the Set Sensor Type and Size lock out code **(6778)** with the numeric buttons and press "ENTER".

The *Calibration Screen* for sensor type is displayed {Figure ZD.3-7}. The options for the sensor type are:

1 = Single-Sensor 10XBR-Series;
2 = Single-Sensor 10XAS-Series;
3 = Dual-Sensor 10XBR-Series *;
4 = Dual-Sensor 10XAS-Series.

* See for Dual-Sensor 10XBR-Series sensor setup.

3) Press "SETUP" to continue the sensor type setup.

The *Numeric Entry Screen* is displayed for the entry of the appropriate sensor type number {Figure ZD.3-8}. The current sensor type is shown in the Display Window. If the value in the Display Window is the correct value for the sensor, just press "ENTER" and skip to the setting of the sensor size. Otherwise, continue with step 4.

4) Press "CLEAR" to clear the current entry in the Display Window.
5) Enter the proper sensor type by the number (1, 2, 3, or 4) and press the "ENTER" button.

The sensor type has been set to a single 10XAS-Series sensor.

The display returns to the *System Setup Menu Screen*.

SPC Options Screens

If one of the SPC Options is provided with this Model MPPU, right after the sensor type is set, the *Numeric Entry Screen* is displayed again for the configuration of the encoder {Figure ZD.3-9}. Refer to SPC Options [Section ZJ] for more information.

6) Press "ENTER" on these three screens to bypass the SCP Options setup.

The display returns to the *System Setup Menu Screen*.

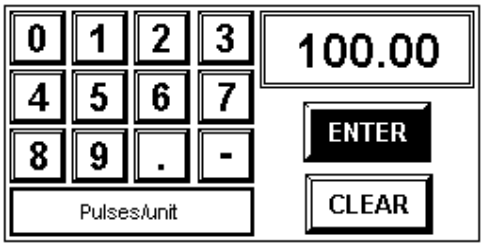

Figure ZD.3-9: SPC Options Data Entry Screen

ZD.3.c 10XBR-Series Dual-Sensor Setup

The Binocular-Receiver Sensor – 10XBR-Series is designed for passline independent or thickness independent measurement. To perform the complex calculations required for such applications, the Model MPPU must have the spacing between the outside-end emitter LEDs as a portion of these calculations. Perform a rough measurement (maximum resolution two decimal places - XX.XX) and record this information on the Configuration Form. This value MUST BE MEASURED IN INCHES.

The lock out code for setting 10XBR-Series dual-sensor type and size is:

6778

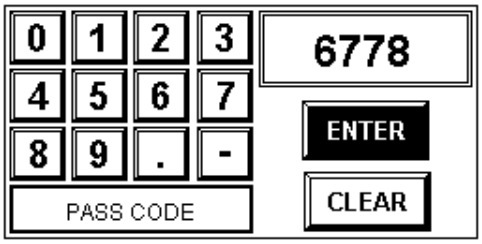

Figure ZD.3-10: Lock Out Code Entry Screen

To set the 10XBR-Series dual-sensor type from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Calibration procedure.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-10}.

2) Enter the Set Sensor Type and Size lock out code **(6778)** with the numeric buttons and press "ENTER".

The *Calibration Screen* for sensor type is displayed {Figure ZD.3-11}.

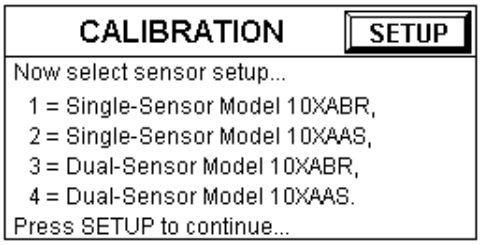

Figure ZD.3-11: Sensor Type Screen

3) Press "SETUP" to continue the 10XBR-Series dual-sensor type setup.

The *Numeric Entry Screen* is displayed for the entry of the appropriate sensor type number {Figure ZD.3-12}. The current sensor type in RAM memory is shown in the Display Window.

4) Press "CLEAR" to clear the current entry in the Display Window.

5) Enter the Dual-Sensor 10XBR-Series as sensor type by the number (3) and press the "ENTER" button to accept.

The sensor type has been set to a dual-sensor 10XBR-Series system.

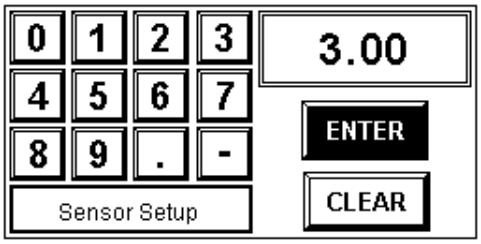

Figure ZD.3-12: Sensor Type Entry Screen for Dual-Sensor Model 10XABR Sensors

The touchscreen then changes to the *Calibration Screen* for the entry of the spacing between the emitters{Figure ZD.3-13}.

9) Press "SETUP" to display the *Numeric Entry Screen* for entry of the spacing value.

The *Numeric Entry Screen* is displayed for the entry of the emitter spacing with the title "E SPACING". The current emitter spacing value is shown in the Display Window. If the value in the Display Window is the correct value for the spacing, just press "ENTER" and the touchscreen returns to the *System Setup Menu Screen*.

10) Press "CLEAR" to clear the current entry in the Display Window.

11) Enter the proper emitter spacing value (value should be in INCHES only with a maximum resolution of two decimal places - XX.XX) and press the "ENTER" button.

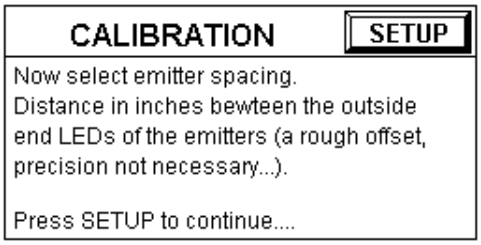

Figure ZD.3-13: Emitter Spacing Screen

SPC Options Screens

If one of the SPC Options is provided with this Model MPPU, right after the sensor type is set, the *Numeric Entry Screen* is displayed again for the configuration of the encoder {Figure ZD.3-9}. Refer to SPC Options [Section ZJ] for more information.

6) Press "ENTER" on these three screens to bypass the SPC Options setup.

The display returns to the *System Setup Menu Screen*.

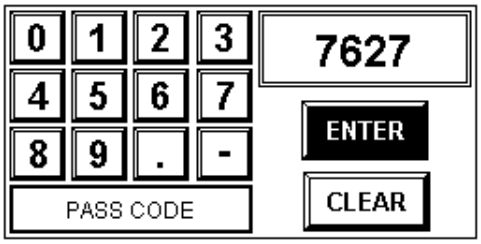

Figure ZD.3-14: Filter Snap Lock Out Code Screen

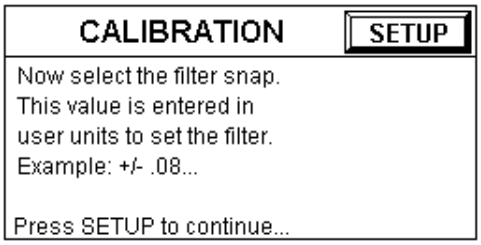

Figure ZD.3-15: Filter Snap Screen

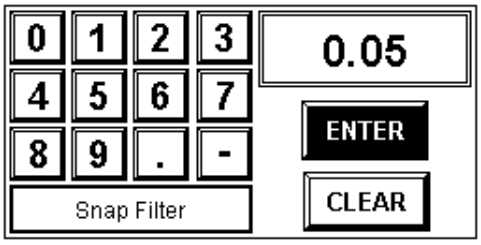

Figure ZD.3-16: Filter Snap Entry Screen

ZD.3.d Digital Filter Snap

The Model MPPU contains a resolution enhancing feature called a Digital Filter Snap. The Digital Filter Snap is a self-adjusting, exponential averaging tolerance system that takes averages of the sensor readings and creates a tolerance factor for the sensor video signals. This helps the system display a steady output on the LCD Touchscreen customer interface and the serial communications measurement readings serial output. The Filter Snap is a useful tool to fine-tune the overall display performance.

NOTE:

The Digital Filter Snap should be adjusted when the Model MPPU is dithering measurement readings of a known size material. Adjusting the Filter Snap too low may cause fluctuating measurements on materials. Care should be taken in adjusting the Filter Snap. Please contact Harris Instrument Service for assistance in setting the Filter Snap.

The Filter Snap and Exponential Averaging value [Sections Z.6] are customer adjustable. The Filter Snap can be set as zero (0) for no filtering or any inch or millimeter tolerance band for fifty readings filtering. The Exponential Averaging value must be a positive number. Refer to the Model MPPU Main Manual Section [Section Z.6] for more information on the functionality and requirements for the Filter Snap and Exponential Averaging value.

The pass code for setting the Digital Filter Snap is:

7627

To set the Digital Filter Snap from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Digital Snap Filter Calibration routine.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-14}.

2) Enter the set Digital Filter Snap lock out code **(7627)** with the numeric buttons and press "ENTER".

The *Calibration Screen* for Digital Filter Snap is displayed {Figure ZD.3-15}. This value must be a positive number.

3) Press "SETUP" to continue the Digital Filter Snap setup.

The *Numeric Entry Screen* is displayed for the entry of the appropriate filter snap {Figure ZD.3-16}. The current filter snap value is shown in the Display Window. If the value in the Display Window is the correct value, just press "ENTER" and return to the *System Setup Menu Screen*. Otherwise, continue with step 4.

4) Press "CLEAR" to clear the current entry in the Display Window.

5) Enter the proper snap filter value and press the "ENTER" button.

The Digital Filter Snap value is set. The setting of the Digital Filter Snap is dependent upon the display requirements of the system operator. The Factory Default System Setting for the Digital Filter Snap is 0.05 (±0.05 inches [±1.3mm] for an overall tolerance band of 0.1 inches [2.5mm]).

ZD.3.e Exponential Averaging

As a function of the Digital Filter Snap, the Exponential Averaging value helps to smooth out the display and serial communications measurement output when a small Filter Snap tolerance band is activated.

The pass code for setting the Exponential Averaging value is:

3976

To set the Exponential Averaging value from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Exponential Averaging routine.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-17}.

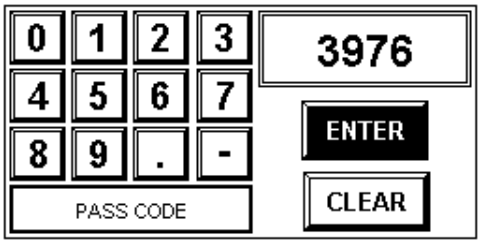

Figure ZD.3-17: Averaging Lock Out Code Screen

2) Enter the set Exponential Averaging value lock out code **(3976)** with the numeric buttons and press "ENTER".

The *Calibration Screen* for Exponential Averaging is displayed {Figure ZD.3-18}. This value must be a positive number.

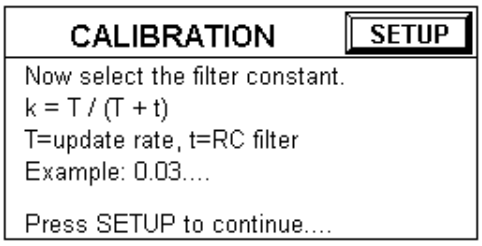

Figure ZD.3-18: Averaging Setup Screen

3) Press "SETUP" to continue the Exponential Averaging setup.

The *Numeric Entry Screen* is displayed for the entry of the appropriate averaging value {Figure ZD.3-19}. The current averaging value is shown in the Display Window. If the value in the Display Window is the correct value, just press "ENTER" and return to the *System Setup Menu Screen*. Otherwise, continue with step 4.

4) Press "CLEAR" to clear the current entry in the Display Window.

5) Enter the proper averaging value and press the "ENTER" button.

The Exponential Averaging value is set. The setting of the Exponential Averaging [Section Z.6.a] is dependent upon the display requirements of the system operator. The Factory Default System Setting for the Exponential Averaging is 0.025.

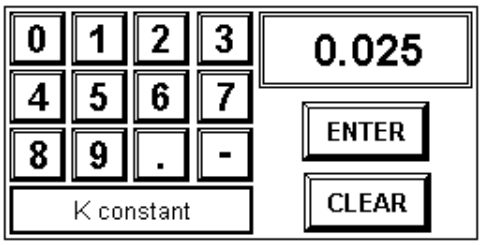

Figure ZD.3-19: Averaging Entry Screen

ZD.3.f Diagnostic Display Screen

The Level 4 interface has a *Diagnostic Display Screen* for fine tuning and trouble shooting of the unit {Figure ZD.3-20}.

This display shows the following features of the processing unit:

a) Counters 1 through 8: Depending upon the configuration of the unit (EVO if applicable), the *Diagnostic Display Screen* will show the raw counts of the PIC board. Up to eight PIC counters may be available;

b) Standard & Raw Calibration Values: These are the used for the calibration of the sensors. The raw measurement values from the sensors are in mils (0.01 inches [0.254mm]). When the operator needs to recalibrate the system (from power failure, etc.), these values can be entered manually, bypassing the standard calibration routine (Manual Calibration);

c) ABS & DEV ANLG: These are the approximate current values of the analog output from the Model MPPU based upon the analog scaling values entered during Analog Output Setup;

d) Maximum, Current and Minimum Readings: Displays the maximum, minimum and current readings from the sensors;

e) Software Version: The current software version stored in the EPROM. The software version for this particular manual is 2196146C.

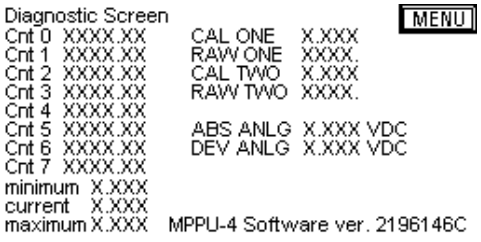

Figure ZD.3-20: Diagnostic Display Screen

The *Diagnostic Display Screen* is accessible from the "CAL" button with a lock out code. The lock out (or pass) code for the *Diagnostic Display Screen* is:

5678

To access the *Diagnostic Display Screen* from the *System Setup Menu Screen*:

1) Press "CAL" to begin the Diagnostic Display Routine:

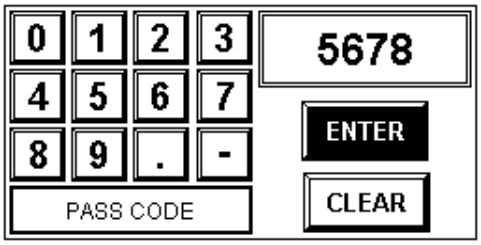

Figure ZD.3-21: Diagnostics Entry Screen

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.3-21}.

2) Enter the view Diagnostic Display lock out code **(5678)** with the numeric buttons and press "ENTER".

The *Diagnostic Display Screen* is displayed {Figure ZD.3-20}. The screen will refresh every time there is an update to the information on the screen.

3) Press "MENU" to return to the *System Setup Menu Screen*.

It would be helpful for technical support, and for the Manual Calibration of the Model MPPU, if the values listed in the *Diagnostic Screen* are recorded on the Configuration Form.

ZD.4 System Calibration

The calibration procedure varies for the Model MPPU depending upon which customer interface was purchased (Level 1, 3 or 4). The following calibration procedure pertains only to the Model MPPU Level 4 LCD Touchscreen interface. For information on calibrating the other Model MPPU customer interfaces, please refer to the applicable interface [Section ZA].

ZD.4.a Why Calibrate?

Calibration of the Model MPPU determines the sensor height correction factor (HCF) for 10XAS-Series sensors and the sensor offset (SO) for both 10XBR-Series and 10XAS-Series sensors. Generally, two "standards", of which the width (or length) is known, are used to calculate the HCF and SO. These standards are typically samples of the widest and the narrowest (or longest and shortest) materials that will be run on the process line where the system is installed. These samples should be carefully and accurately measured ***in inches*** (as possible) for the calibration routine.

When measuring materials with SCAN-A-LINE™ 10XAS-Series sensors, the emitter-to-product spacing (product passline) *will* affect the detected measurement value. The greater the product is spaced from the emitter calibrated position, the greater the detected measurement appears from the actual measurement {Figure ZD.4-1}.

NOTE:

If the emitter-to-receiver separation, the emitter-to-product spacing (product passline) or the receiver positioning changes anytime after system calibration, the calibration MUST BE performed again to take into account the changes in positioning.

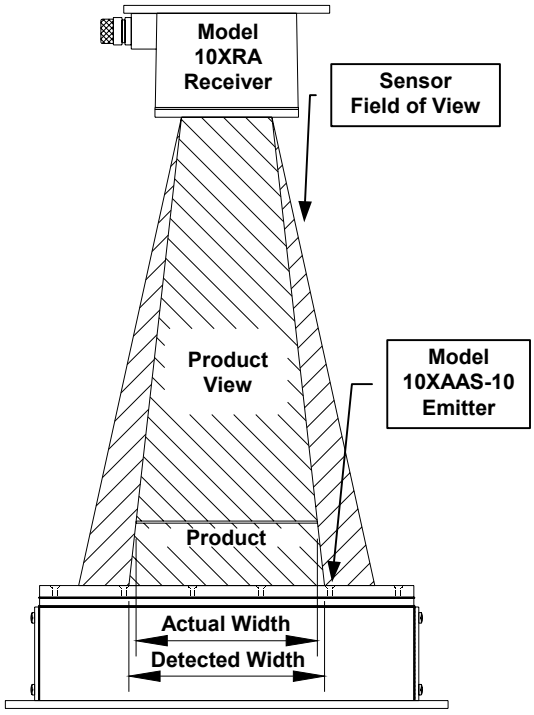

Figure ZD.4-1: Sensor and Product Views with Model 10XAAS-10 Sensor

With 10XAS-Series single-sensor systems, the calibration routine detects and calculates the height correction factor (HCF – sometimes referred to as sensor gain) and the emitter-to-receiver separation. The HCF is calculated from the results of the detected measurement of the sample materials by the sensor(s) and the actual physical measurement values (***in inches***) entered during calibration of the sensor system with those materials.

Especially with 10XAS-Series dual-sensor systems, the calibration routine not only determines the HCF and emitter-to-receiver separation, but also calculates the sensor offset (SO). This is the value, calculated from the sample material dimensions and the sensor positioning determined by the calibration scans, that the Model MPPU uses to determine the actual material width.

NOTE:

The accurate measurement of the sample materials (standards) and the steady position of the product passline ensures the accuracy of the Model MPPU height correction factor and sensor separation offset.

Calibration standards are available from Harris Instrument Corporation (CS Option) that are traceable for the National Bureau of Standards.

See the Sensor Section of this manual (10XAS-Series [Section C] sensors or 10XBR-Series [Section G] sensors) for more information on the product passline and it's effect on the entire sensor system.

ZD.4.b Model MPPU Calibration Procedure

Prepare for the calibration by obtaining two material samples (or calibration standards) that closely represent the maximum and minimum of the materials that will be measured by the SCAN-A-LINE™ system. These samples should be ***premeasured in inches*** as accurately as possible for the Model MPPU Level 4 calibration.

Be sure to have the SCAN-A-LINE™ system completely installed, fully fixtured on-line and operational up to the point of calibration (sensors and processing unit functioning properly, power on to the system, etc.).

All system and sensor setup procedures except Analog Scaling and Limit Sensing MUST BE finished before calibrating the Model MPPU (i.e. sensor size, sensor type and decimal point position should all be set prior to calibration).

The Calibration routine is accessible from the "CAL" button on the *System Setup Menu Screen* with a lock out (or pass) code. The lock out code for the Calibration routine is:

9876

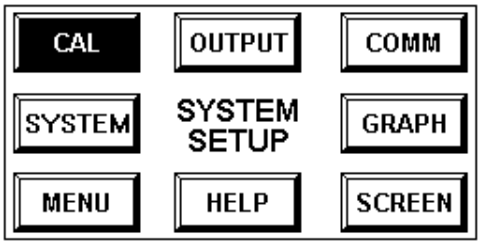

Figure ZD.4-2: Calibration Routine Start

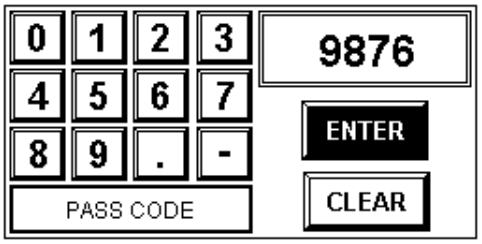

Figure ZD.4-3: Lock Out Code Entry Screen

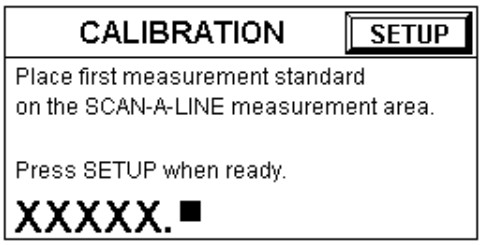

Figure ZD.4-4: First Calibration Screen

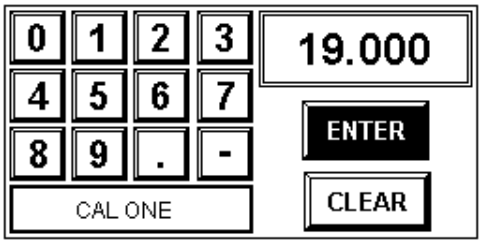

Figure ZD.4-5: Calibration Entry Screen for the First Standard Calibration

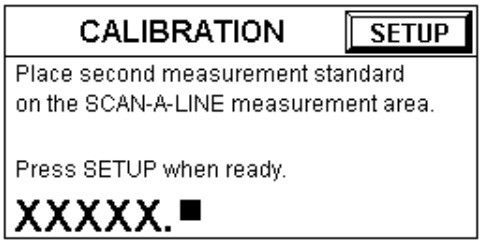

Figure ZD.4-6: Second Calibration Screen

To calibrate the Model MPPU Level 4 with the current sensor installation:

1) Apply power to the Model MPPU.
2) Press "MENU" to display the *Main Menu Screen*.
3) Press "SETUP" to display the *System Setup Menu Screen*.
4) Press "CAL" to start the Calibration routine {Figure ZD.4-2}.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for the particular calibration function {Figure ZD.4-3}.

5) Enter the Calibration routine lock out code **(9876)** with the numeric buttons and press "ENTER".

The *Calibration Screen* is displayed with instructions for performing the first measurement standard calibration {Figure ZD.4-4}. The numeric display in the bottom-left corner of the screen is the raw counts from the sensor(s), also called RAW ONE in the *Diagnostic Screen*.

6) Place the maximum material sample in the sensor measurement area.
7) With the maximum material sample in the sensor measurement area, press "SETUP" to begin calibration with that standard.

In the bottom-right corner of the *Calibration Screen*, a counter is displayed. When this counter counts to ten, the maximum material sample has been measured by the sensors.

The *Numeric Entry Screen* appears after the counter is finished for the entry of the actual premeasured size of the maximum sample {Figure ZD.4-5}.

8) Clear the current reading in the *Numeric Entry Screens* Display Window by pressing the "CLEAR" button.
9) Enter the exact premeasured size (***in inches***) of the maximum material sample. Use any decimal points as necessary (typically up to three digits past the decimal point - i.e. 0.001).

NOTE:

Entry of the decimal point at this time will define the resolution of the Model MPPU (i.e. tenths, hundredths or thousandths) on units built prior to 15 December 1996. All numeric displays will use the decimal point position entered during the Calibration Routine with these units.

10) Press "ENTER" to accept the measurement value and to proceed to the second phase of the Calibration routine.

The *Calibration Screen* is again displayed with instructions for performing the second standard calibration {Figure ZD.4-6}. The numeric display in the bottom-left corner of the screen is the raw counts from the sensor(s), also know as RAW TWO.

11) Place the minimum material sample in the sensor measurement area.
12) With the minimum material sample in the sensor measurement area, press "SETUP" to begin calibration with that standard.

In the bottom-right corner of the *Calibration Screen*, a counter is displayed. When this counter counts to ten, the minimum material sample has been measured by the sensors.

The *Numeric Entry Screen* appears after the counter is finished for the entry of the actual premeasured size of the minimum sample {Figure ZD.4-7}.

13) Clear the current reading in the *Numeric Entry Screens* Display Window by pressing "CLEAR".
14) Enter the exact premeasured size ***(in inches)*** of the minimum material sample. Use any decimal points as necessary (up to three digits past the decimal point - i.e. 0.001).
15) Press "ENTER" to accept the value and proceed to third phase of the Calibration routine.

For Model MPPUs built prior to 15 December 1996, the final phase of the Calibration routine is the setting of the Units of Measure. Upon pressing "ENTER" in step 10, the *ASCII Character Entry Screen* appears with the title in the Title Window of DISPLAY UNITS {Figure ZD.4-8}. The units entered here are displayed on the *Readings Screen* during measurement readings.

16) Enter the units of measure label for the *Readings Screen*. with the alpha-numeric buttons.

17) Press "ENTER" to accept the label.

The Calibration routine is finished. The *System Setup Menu Screen* appears.

18) Press "MENU" to return to the *Main Menu Screen*.

19) Press "READ" to return to the *Readings Screen*.

NOTE:

Model MPPUs built after 15 December 1996 have a separate units of measure and decimal point position setup routine [Section ZD.2.a].

The Model MPPU is now calibrated for measurement with the product passline of the current sensors. Any change in product passline or the sensor positioning will affect the calibration (changes in passline have no affect on 10XBR-Series sensors unless it is over specification).

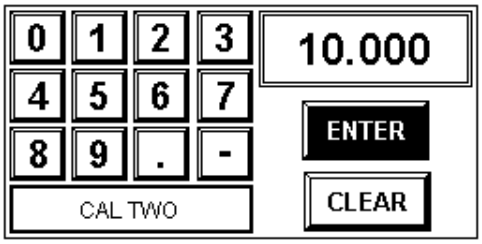

Figure ZD.4-7: Calibration Entry Screen

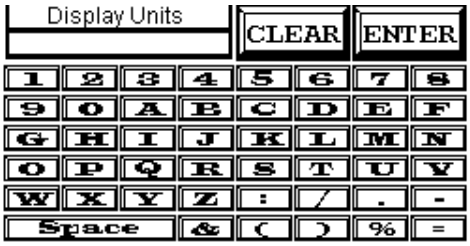

Figure ZD.4-8: Units of Measure Entry

ZD.4.c Manual Calibration Procedure

The values displayed in the Diagnostic Screen for calibration (CAL ONE, CAL TWO, RAW ONE, RAW TWO) can be entered manually for the recalibration of the Model MPPU with the system sensors. Recalibration should be performed when:

1) Sensor have been replaced BUT NOT REPOSITIONED;
2) Model MPPU has been powered down for thirty days or more and the battery-backed RAM has been lost;
3) The EPROM has been replaced;
4) Any other components of the Model MPPU have been replaced.

These value are derived from the initial Model MPPU calibration with calibration standards.

DO NOT MANUALLY CALIBRATE THE MODEL MPPU IF THE SENSORS HAVE BEEN REPOSITIONED OR MOVED. The calibration values will not be valid for the repositioned sensors and the system will not operate properly.

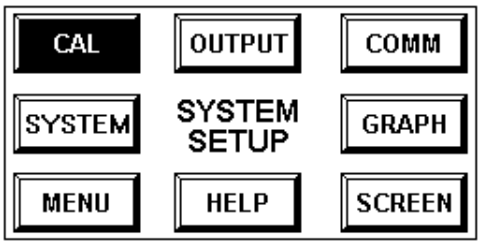

Figure ZD.4-9: Calibration Routine Start

1) Apply power to the Model MPPU.
2) Press "MENU" to display the *Main Menu Screen*.
3) Press "SETUP" to display the *System Setup Menu Screen*.
4) Press "CAL" to start the Calibration routine {Figure ZD.4-9}.

The *Numeric Entry Screen* is displayed, requesting the lock out (or pass) code for Manual Calibration routine {Figure ZD.4-10}.

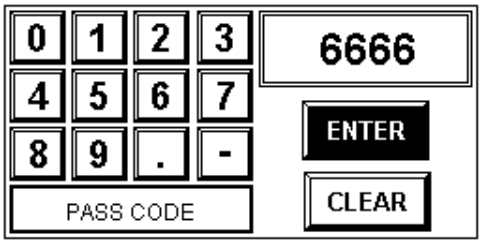

Figure ZD.4-10: Lock Out Code Entry Screen

5) Enter the Manual Calibration routine lock out code with the numeric buttons and press the "ENTER" button. The lock out code is:

6666

The *Calibration Screen* is displayed with instructions for performing Manual Calibration {Figure ZD.4-11}.

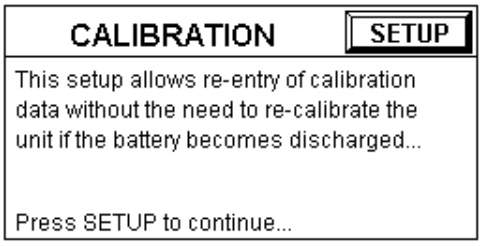

Figure ZD.4-11: Manual Calibration Screen

The Manual Calibration Screen provides for the entry of the CAL ONE, CAL TWO, RAW ONE and RAW TWO calibration values found on the Diagnostic Screen and/or recorded on the Configuration Form.

6) Press "SETUP" to display the *Numeric Entry Screen* for the entry of the calibration and raw values from the *Diagnostic Screen*.

The *Numeric Entry Screen* appears with the current CAL ONE value in the Display Window {Figure ZD.4-12} and the CAL ONE title.

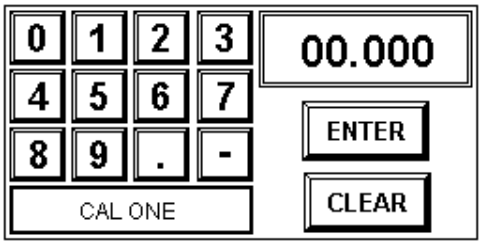

Figure ZD.4-12: Current CAL ONE Value

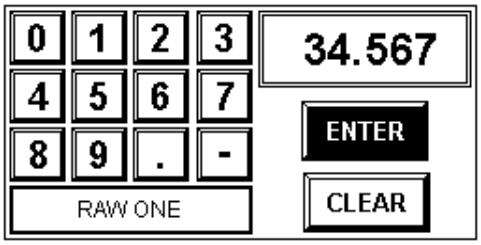

Figure ZD.4-13: New RAW ONE Value

7) Press the "CLEAR" button to clear the current entry and enter the new value, followed by the "ENTER" button.

The CAL ONE value has been entered and the *Numeric Entry Screen* reappears for the entry of the RAW ONE value.

8) Press the "CLEAR" button to clear the current RAW ONE value and enter the new value, followed by the "ENTER" button {Figure ZD.4-13}.

The RAW ONE value has been entered and the *Numeric Entry Screen* reappears for the entry of the CAL TWO value.

9) Press the "CLEAR" button to clear the current CAL TWO value and enter the new value, followed by the "ENTER" button.

The CAL TWO has been entered and the *Numeric Entry Screen* reappears for the final entry of the RAW TWO value.

10) Press the "CLEAR" button to clear the current RAW TWO value and enter the new value, followed by the "ENTER" button.

The touchscreen returns to the *System Setup Menu Screen*. Manual calibration of the Model MPPU is finished.

ZD.4.d Absolute Analog Output Scaling

The Absolute Analog Output provides a unipolar analog voltage (0VDC to 10VDC) of the absolute measurement of the strip material. The following instructions are a basic guide for scaling the absolute analog output. The 10VDC analog scaling is called the high absolute analog and the 0VDC analog scaling is called the low absolute analog. Values must be entered for both. The high absolute analog represents the maximum material width to be represented by 10VDC output while the low absolute analog represents the minimum material width to be represented by 0VDC output.

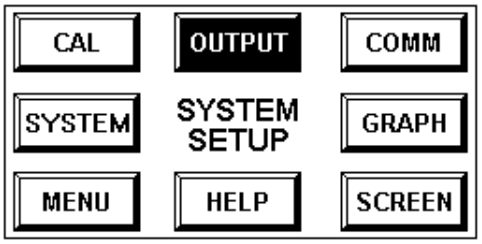

Figure ZD.4-14: Analog Output Scaling Start

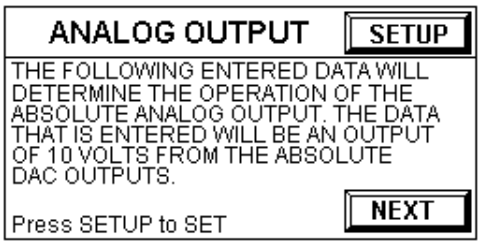

Figure ZD.4-15: High Absolute Analog Setup

The values entered are not constant, but are dependent upon the application. Size values and voltages will vary from application to application. Be sure that the entire SCAN-A-LINE™ system (sensors and Model MPPU) is completely installed, fully functioning and powered on. Perform the set-up routines for sensor size, type and system calibration BEFORE beginning the setting of the absolute analog scaling value.

The Analog Output Scaling routine is accessible from the "OUTPUT" button on the *System Setup Menu Screen* with a lock out (or pass) code. The lock out code for this routine is:

9876

To scale the absolute analog output from the *Readings Screen*:

1) From the *Readings Screen*, press the "MENU" button.
2) Press "SETUP" on the *Main Menu Screen*.
3) Press "OUTPUT" on the *System Setup Menu Screen* to begin the Analog Output Scaling routine {ZD.4-14}.

The *Numeric Entry Screen* appears requesting the lock out code for the Analog Output Scaling routine.

4) Enter the Analog Output Scaling routine lock out code with the numeric buttons and press "ENTER".

The *Analog Output Screen* is displayed with instructions for performing the scaling of the high absolute analog output {Figure ZD.4-15}. Pressing the "NEXT" button will skip the high absolute analog setup function and go to the low absolute analog setup function.

5) Press "SETUP" to scale the high absolute analog output voltage.

The *Numeric Entry Screen* is displayed for the entry of the value for the high absolute analog scaling {Figure ZD.4-16}. The current high absolute analog scaling value is shown in the Display Window. If the value in the Display Window is the proper value for scaling the high absolute analog, just press "ENTER" and the Analog Output Scaling routine will continue to the scaling of the low absolute analog. Otherwise, continue with step 6.

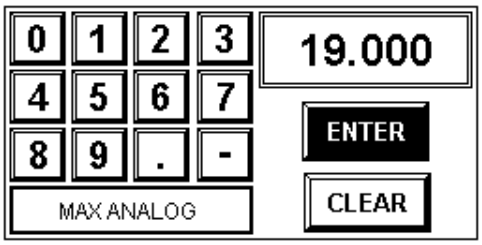

Figure ZD.4-16: High Absolute Analog Entry

6) Press "CLEAR" to clear the current value in the Display Window.

7) Enter the maximum size value that you wish to be represented by 10VDC with the numeric buttons. This value corresponds to the maximum absolute analog output (10VDC). Press "ENTER" to accept the value.

The *Analog Output Screen* is again displayed with instructions for performing the scaling of the low absolute analog output {Figure ZD.4-17}. Pressing the "NEXT" button will skip the low absolute analog setup function and go to the deviation analog setup function.

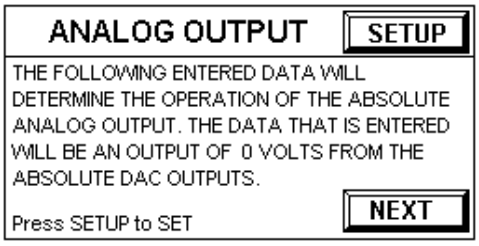

Figure ZD.4-17: Low Absolute Analog Setup

8) Press "SETUP" to scale the low absolute analog output voltage.

The *Numeric Entry Screen* is displayed for the entry of the value for the low absolute analog scaling {Figure ZD.4-18}. The current low absolute analog scaling value is shown in the Display Window. If the value in the Display Window is the proper value for scaling the low absolute analog, just press "ENTER" and the Analog Output Scaling routine will continue to the scaling of the deviation analog. Otherwise, continue with step 9.

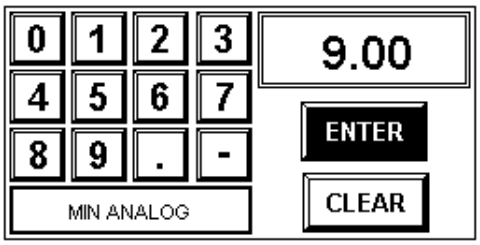

Figure ZD.4-18: Low Absolute Analog Entry

9) Press "CLEAR" to clear the current value in the Display Window.

10) Enter the minimum size value that you wish to be represented by 0VDC with the numeric buttons. This value corresponds to the minimum absolute analog output (0VDC). Press "ENTER" to accept the value.

11) Press "NEXT" to exit the Analog Output Scaling routine. The *System Setup Menu Screen* appears.

12) Press "MENU" to return to the *Main Menu Screen*.

13) Press "READ" to return to the *Readings Screen*.

The Absolute Analog Output has been scaled.

ZD.4.e Deviation Analog Output Scaling

The Deviation Analog Output provides a bipolar analog voltage (-10VDC to +10VDC) proportional to the deviation of the detected measurement from the target value. The target and deviation scaling value is set with the Level 4 Customer Interface. The maximum analog output voltage will be ±10 volts for a deviation of X operator selected units (inches, millimeters, feet, meters, etc.) from the target value.

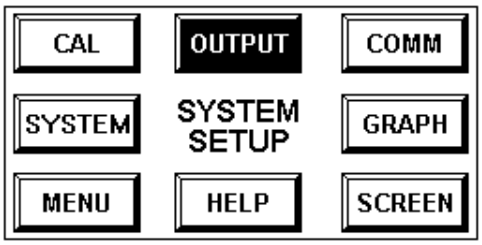

Figure ZD.4-19: Analog Output Scaling Start

The following instructions are a basic guide for scaling deviation analog output to the target value and the deviation from target value. The values entered are not constant, but are dependent upon the application. Size values and voltages will vary from application to application. Be sure that the entire SCAN-A-LINE™ system (sensors and Model MPPU) is completely installed, fully functioning and powered on. Perform the set-up routines for sensor size, type and system calibration BEFORE beginning the setting of the deviation analog scaling value. Also be sure that the Set Target function has been performed.

The Analog Output Scaling routine is accessible from the OUTPUT button on the *System Setup Menu Screen* with a lock out (or pass) code. The lock out code for this routine is:

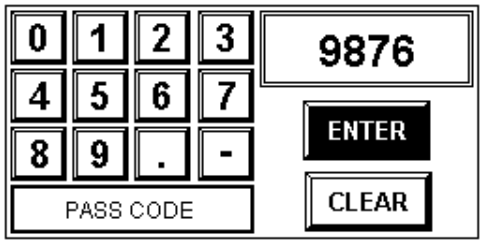

Figure ZD.4-20: Lock Out Code Entry for Analog Output Scaling Routine

9876

To scale the deviation analog output from the *Readings Screen*:

1) From the *Readings Screen*, press the "MENU" button.

2) Press "SETUP" on the *Main Menu Screen*.

3) Press "OUTPUT" on the *System Setup Menu Screen* to begin the Analog Output Scaling routine {ZD.4-19}.

The *Numeric Entry Screen* appears for the lock out code for the Analog Output Scaling routine {Figure ZD.4-20}.

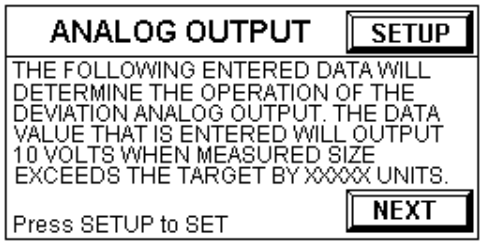

Figure ZD.4-21: Deviation Analog Setup

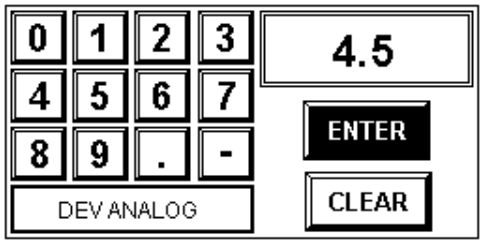

Figure ZD.4-22: Deviation Analog Entry

4) Enter the Analog Output Scaling routine lock out code with the numeric buttons and press "ENTER".

The *Analog Output Screen* for absolute scaling is displayed. Skip this *Analog Output Screen* and proceed to the *Analog Output Screen*.

5) Press "NEXT" to continue to the *Analog Output Screen* for scaling.

The *Analog Output Screen* for deviation scaling appears with instructions for performing the scaling of the deviation analog output {Figure ZD.4-21}. Pressing the "NEXT" button will skip the deviation analog setup function and return to the *System Setup Menu Screen*.

6) Press "SETUP" to scale the deviation analog output voltage.

The *Numeric Entry Screen* is displayed requesting the entry of the value for the deviation analog scaling {Figure ZD.4-22}. The current deviation analog scaling value is shown in the Display Window. If the value in the Display Window is the proper value for scaling the deviation analog, just press "ENTER" and the Analog Output Scaling routine will end. Otherwise, continue with step 7.

7) Press "CLEAR" to clear the current value from the Display Window.

8) Enter the deviation value (the value that represents the difference between the target value and the maximum size material - i.e. four inches of deviation from target equals 10VDC) with the numeric buttons. This value corresponds to the maximum deviation analog output (10VDC) for that difference. Press "ENTER" to accept the deviation value.

The scaling of the deviation analog output is finished and the *System Setup Menu Screen* appears.

9) Press "MENU" to return to the *Main Menu Screen*.

10) Press "READ" to return to the *Readings Screen*.

The deviation analog output has been scaled.

ZD.5 Remote Interface Operation

The Model MPPU Level 4 interface is optionally available as a remote interface (Level 4/50 Option) as the primary interface or as a secondary, remote interface to the local unit. The Level 4 interface is mountable with the template – Drawing # 1396175 Pg. 2 [Section ZD.9]. The cable connection for the Level 4 interface is detailed in Drawing # 3496182 Rev. A [Section ZD.9].

Remote operation of the Level 4 interface is applicable up to *fifty linear cable feet [15.2m]* from the Model MPPU processing unit. If operating one remote display without a local display, the remote display cable connects to the RS-232-0 communications port. Cable access for the remote display to the RS-232 communication ports is available through the spare access hole in the bottom panel of the processing unit.

ZD.5.a Secondary Interface

The Level 4/50 Option also provides operation with a local Level 4 display and a secondary, remote-mounted Level 4 display. If a local Level 4 interface is to be used in conjunction with a remote-mounted secondary Level 4 interface, the local display attaches to RS-232-0 communications port and the secondary display attaches to RS-232-1 communications port (See drawing # 3695172 Rev. A [Section Z.9] for communication port connections). The JP6 jumper pins 13 and 14 on the micro-controller board must be closed for the secondary interface to operate properly.

ZD.5.b Remote or Secondary Display Cable

The Level 4/50 Option cable (Part # 3496182 Rev. A) has an 8-position connector on the end that attaches to the RS-232-0 communications machined socket port (or a 6-position connector that attaches to RS-232-1 machined socket port for a secondary Level 4 interface) in the processing unit. The end that attaches to the Level 4 interface has a 6-pin connector that attaches to a 6-pin machined socket on the back of the display board with direct wire connections.

The power for the Remote Display Cable is +4.8VDC to 5.2VDC 0.5Amps Max continuous with a ±5% Maximum Line or Load. Be sure to utilize 18 gauge shielded wire if running both the power and the communications lines in one cable. The data wires are 24 gauge. A sample cable for testing and demonstration purposes is available from Harris Instrument Corporation Sales (Harris Instrument Part #3496182 Rev A).

ZD.6 Trouble Shooting

The Model MPPU Level 4 interface has two routines for verifying the analog outputs. There is limited trouble shooting that can be performed on the Level 4 interface. For further trouble shooting, refer to the Model MPPU Main Manual [Section Z.8] for more troubleshooting assistance.

ZD.6.a Verify the Deviation Analog Output

To verify the deviation analog output, be sure that the entire SCAN-A-LINE™ system (sensors and Model MPPU) is completely installed, fully functioning and powered on. Perform the set-up routines for sensor size, type and system calibration BEFORE beginning the verification of the deviation analog output voltage.

Make sure the material currently on the line is at full line tension and at the proper product passline for the system calibration.

To verify the deviation analog output:

1) Attach the digital voltmeter PLUS VOLTS lead to the ANALOG OUTPUT 2 terminal (Y4-2) and the COMMON lead to the COM terminal (Y4-1).

2) Check the measurement of the material currently on the line using the Model MPPU measurements on the *Readings Screen*.
3) Press "MENU" on the *Readings Screen* to display the *Main Menu Screen*.
4) Press "TARGET" on the *Main Menu Screen* to display the *Set Target Screen*.
5) Press "TARGET" on the *Set Target Screen* to start the Set Target routine.

The *Numeric Entry Screen* appears for the entry of the target size value. The current target size value is displayed in the top-right display window.

6) Press "CLEAR" to erase the current target size value.
7) Enter the size of the material currently on the line as the target value (for example, 14.5 inches).
8) Press "ENTER" to accept the new target value.
9) Press "MENU" to return to the *Main Menu Screen*.
10) Press "READ" to return to the *Readings Screen*.

The Target is now set to the material currently on the process line.

11) Check the voltmeter for its current reading. The voltmeter should read 0VDC ±0.025VDC. If the voltmeter is off more than ±0.025VDC, the bipolar DAC must be adjusted:

a) Locate potentiometer R5 on the main board inside the Model MPPU [Section Z.6.d].

b) With a small blade screwdriver, turn the potentiometer adjustment screw clockwise and view the reading on the voltmeter. Adjust the screw in the direction necessary to cause the bipolar analog voltage to read 0VDC with the target material.

Once the voltmeter reads 0VDC ±0.025VDC, set the deviation scaling value.

12) Press "MENU" to exit the *Readings Screen*.
13) Press "SETUP" to display the *System Setup Screen*.
14) Press "OUTPUT" to begin the Analog Output routine.

The *Numeric Entry Screen* appears for the entry of the lock out code for scaling the analog output.

15) Enter the lock out code **(9876)**.

The *Analog Output Screen* appears for setting the absolute analog scaling value. Skip this screen and go to the deviation analog output scaling function.

16) Press "NEXT" to skip to the deviation analog output scaling function.

The *Analog Output Screen* is displayed for setting the deviation analog scaling value.

17) Press "SETUP" to begin the deviation analog scaling function.

The current analog scaling value stored in memory is displayed in the upper-right display window on the *Numeric Entry Screen*.

18) Press "CLEAR" to erase the current value.
19) Enter a deviation scaling value (for example, 4.5 inches for 10VDC).
20) Press "ENTER" to accept the new deviation scaling value.

The System Setup Menu Screen appears.

21) Press "MENU" to return to the *Main Menu Screen*.

Now, reset the Target value to verify the full operation of the deviation analog output.

22) Press “TARGET” on the *Main Menu Screen*.
23) Press “TARGET” on the *Set Target Screen* to reset the target value.
24) Press “CLEAR” to erase the current target value on the *Numeric Entry Screen* and enter a new target value that is one unit (i.e. inch, centimeter, etc.) larger that the previous target value (for example, 15.5 inches).
25) Press “ENTER” to accept the new target value.
26) Press “MENU” to return to the *Main Menu Screen*.
27) Press “READ” to return to the *Readings Screen*.

Check the voltmeter for a change in reading from 0VDC. The reading should be lower by a value equal to the volts per inch of deviation (For example, since the current material on the line is 14.5 inches and the deviation scaling value is 4.5 inches equals 10VDC and the current target value is 15.5 inches, the current material deviates from target minus one inch or -2.2VDC.).

Repeat this procedure with a target value smaller than the current material on the line to verify if necessary.

If the voltages are correct, the deviation analog output is verified. If the voltages are not correct, repeat the setup procedure and re-verify the voltages. If the voltages are still not correct, contact Harris Instrument Corporation Service for assistance.

ZD.6.b Verify the Absolute Analog Output

To verify the absolute analog output, be sure that the entire SCAN-A-LINE™ system (sensors and Model MPPU) is completely installed, fully functioning and powered on. Perform the set-up routines for sensor size, type and system calibration BEFORE beginning the verification of the absolute analog output voltage. Make sure the material currently on the line is at full line tension and at the proper product passline for the system calibration.

To verify the absolute analog output voltages:

1) Attach the digital voltmeter PLUS VOLTS lead to the ANALOG OUTPUT 4 ABS terminal (Y4-5) and the COMMON lead to the COM terminal (Y4-6).

2) Check the measurement window on the Readings Screen for the current measurement of the material on the line.

Use the current measurement value of the material on the line as a basis for the scaling of the absolute analog (for example, the current measurement of the material on the line is 14.5 inches).

3) Press “MENU” to exit the *Readings Screen*.
4) Press “SETUP” to display the *System Setup Screen*.
5) Press “OUTPUT” to begin the Analog Output routine.

The *Numeric Entry Screen* appears for the entry of the lock out code for scaling the analog output.

6) Enter the lock out code **(9876)**.

The *Analog Output Screen* appears for setting the absolute analog scaling value.

7) Press “SETUP” to display the *Numeric Entry Screen* for the entering of the absolute analog scaling value.

Since the absolute analog output is 0VDC to 10VDC, the maximum size to be run on the line should be used to scale the absolute analog (for example, the maximum material to be run on this line is 19 inches).

8) Press “CLEAR” to erase the current absolute analog value in the display window on the *Numeric Entry Screen*.
9) Enter the new absolute scaling value (for example, 19 inches equals 10VDC).
10) Press “ENTER” to accept the new absolute scaling value.
11) Press “NEXT” to skip the deviation analog set up. The *System Setup Menu Screen* appears.
12) Press “MENU” to display the *Main Menu Screen*.
13) Press “READINGS” to display the *Readings Screen*.

Check the voltmeter for its current reading. The voltmeter should read the result of the volts per unit multiplied by the size of the current material on the line (For example, since 19 inches equals 10VDC, absolute voltage output is 0.526VDC per inch. Since the current material on the line is 14.5 inches, the absolute voltage output should be 7.627VDC±0.025VDC.).

If the voltages are correct, the absolute analog is verified. If the voltages are not correct, repeat the setup procedure (Section ZD.10.a) and re-verify. If the voltages are still not correct, contact Harris Instrument Corporation Service for assistance.

ZD.6.c LCD Touchscreen Operation

The Level 4 LCD Touchscreen operation can be verified by checking for power to the unit. On the back of the touchscreen, locate the 6-position miniature terminal block. The top position is pin 6 and the bottom is pin 1 {Figure ZD.6-1}. With a digital voltmeter, this pin should read +5VDC ±0.25VDC when power is applied to the unit.

A "secret" function of the Touchscreen is the ability to adjust the screen contrast directly from the *Readings Screen*. There are two special, hidden buttons on the Readings Screen for adjusting the screen contrast lighter or darker as required by the operator {Figure ZD.6-2}. It is similar to the *Contrast Adjustment Screen*, but operates much slower than the *Contrast Adjustment Screen* buttons. Changes in the screen contrast made with the "secret" buttons are very small and should only be used when absolutely necessary. Typical screen contrast adjustment should be performed with the *Contrast Adjustment Screen*.

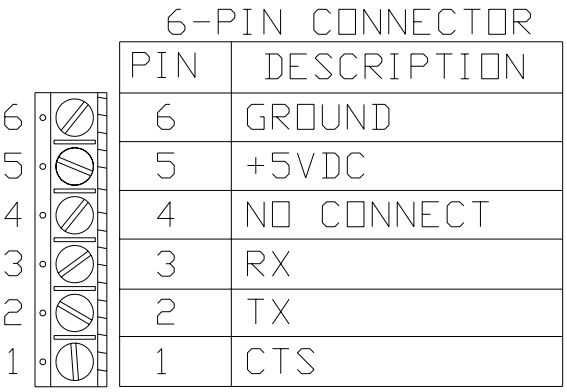

Figure ZD.6-1: LCD Touchscreen Connections

To darken the screen:

1) Press in the bottom-left corner of the screen {Figure ZD.6-2}, leaving the pressure on the screen for approximately five to ten seconds.

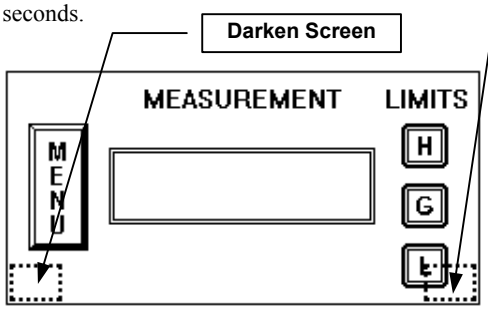

Figure ZD.6-2: Screen Contrast Secret Buttons

The screen contrast will shift darker the longer the "secret" button is held.

To lighten the screen:

1) Press in the bottom-right corner of the screen {Figure ZD.6.-2}, leaving the pressure on the screen for approximately five to ten seconds.

The screen contrast will shift lighter the longer the "secret" button is held.

ZD.7 Configuration Form

This form is to be filled out by the operator to record the system settings for the Model MPPU, no matter which customer interface is installed. Many of the system settings of the Model MPPU can be entered manually, bypassing the need for re-calibration of the system.

Once a complete installation of the Model MPPU Level 4 is performed and the unit is functioning properly, record here the system settings via the Level 1 RS-232 Customer Interface or the Level 4 interface Diagnostic Screen. Recording of some of the values listed below must occur during the setup of the system. Note that the values in parentheses is the Factory Default System Settings that are stored in the EPROM.

Units of Measure (INCHES):__ Decimal Point Position (XX.XX):___.

Baud Rate (9600bps):_____ Filter Snap (0.05):_____ Exponent Average (0.025): _____.

Upper Limit (80"):_____ Lower Limit (20"):_____ Target (50"):_.

Absolute Analog (100=10VDC):_____ Deviation Analog (4 = 10VDC):___.

Sensor Size (10):_____. Sensor Type (AS):_____.

Dual-10XABR Sensor Separation (100.00"):_____.

RAW ONE:_____. CAL ONE:_.

RAW TWO:_____. CAL TWO:_.

EPROM Software Version:_____.

Display Software Version:_____.

PIC Software Version:_____.

ZD.8 Set-up Procedure Sequence

The set-up of the Model MPPU with a sensor system is fairly straight forward. The following listing shows the suggested sequence of events for setting up the system. Note that the sensors must be installed on-line and functioning properly and that power must be applied to the Model MPPU. A host computer is also necessary for communication with the Model MPPU.

1) Verify all jumper settings for the Main Board [Section Z.5.d], Micro-Controller Board [Section Z.5.a] and Video Pre-Processor [Section Z.3.e] before performing any set-up functions.
2) Set Communications [Section ZD.2.c].
3) Set Decimal Point Position for data output [Section ZD.2.a].
4) Set Units of Measure [Section ZD.2.a].
5) Set the Type of Sensor [Section ZD.3.b].
6) Calibrate the sensor system [Section ZD.4].
7) Set the Limit Sensing – either Absolute Limit Sensing [Section ZD.2.b] or Tolerance Limit Sensing [Section ZD.2.b].
8) Scale the Deviation Analog Output, if required [Section ZD.4.e].
9) Scale the Absolute Analog Output, if required [Section ZD.2.d].
10) Set the Digital Filter Snap [Section ZD.3.d].
11) Record System Settings [Section ZD.7] for future use.
12) Review any other manual sections (such as Centerline Analog Output [Section ZK]) for other information pertaining to system set-up.
13) Review any included Engineering Variance Order (EVO) documentation for other information pertaining to system set-up.

ZD.9 Related Drawings

The following pages contain various drawings for the components used in and with the Model MPPU Level 4. For drawings of other configurations, please contact Harris Instrument Corporation Engineering. All mechanical drawings are available as AutoCAD® .DWG files for a minimal charge. Please contact Harris Instrument Corporation Sales.

Drawing #	Description	Drawing Format
1298179	*Model MPPU Level 4 Exterior Dimensions*	*AutoCAD LT Rel. 3*
1398179 Rev D Pg. 1	*Model MPPU Level 4 Interior View*	*AutoCAD LT Rel. 3*
1398179 Rev D Pg. 2	*Interior View Legend*	*AutoCAD LT Rel. 3*
1296175 Pg. 1	*Remote Mount Panel Cutout Dimensions*	*AutoCAD LT Rel. 3*
3496182 Rev. B	*Remote Mount Cable Wire Diagram*	*AutoCAD LT Rel. 3*
Table ZD.9-1: Drawing Information		