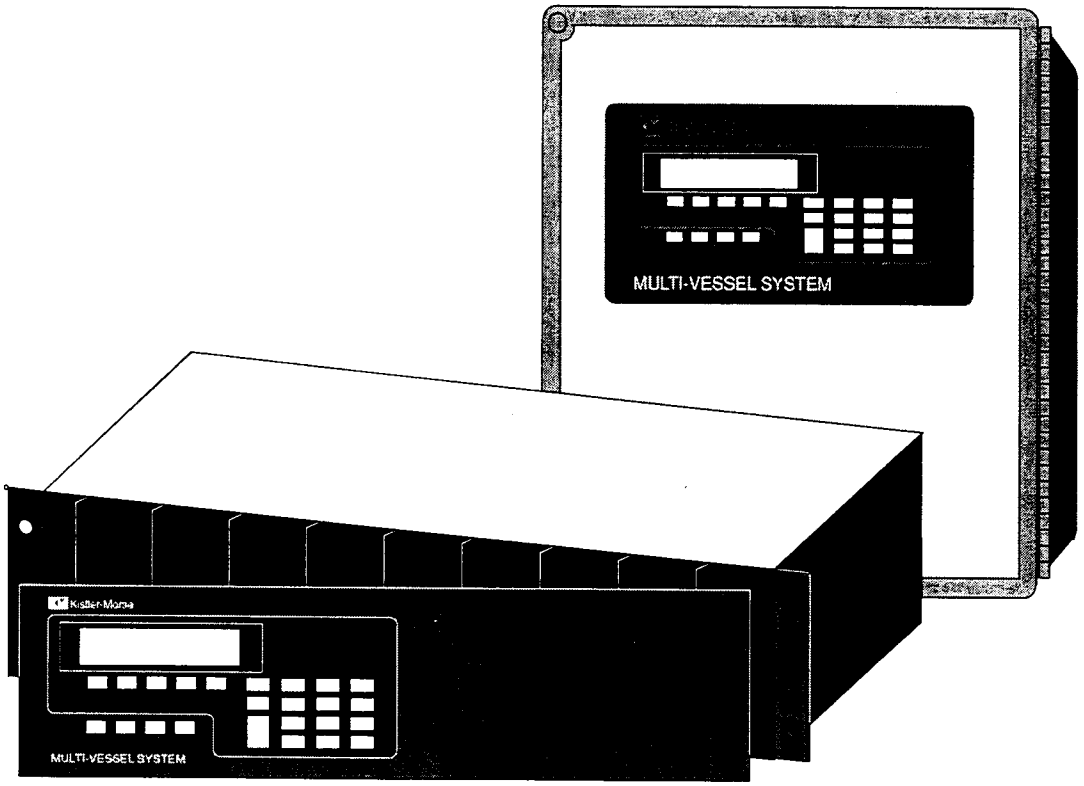
$25.00 U.S.

Multi-Vessel System Installation and Operator's Manual



Kistler-Morse®

97-1082-01, Rev. F
April 1996

NOTICE

CAUTION

Follow these rules if welding is done on the vessel. The electrical current of the welder may pass through the transducer causing damage to it and possibly to the signal processor if these precautions are not followed.

1. Disconnect the transducer cable from the signal processor. If possible, remove the transducers or insulate them electrically. (Transducers that have fabreeka pads only require removing the mounting bolts. The pads will act as insulation.)

2. Ground the welder as close to the welding joint as possible.

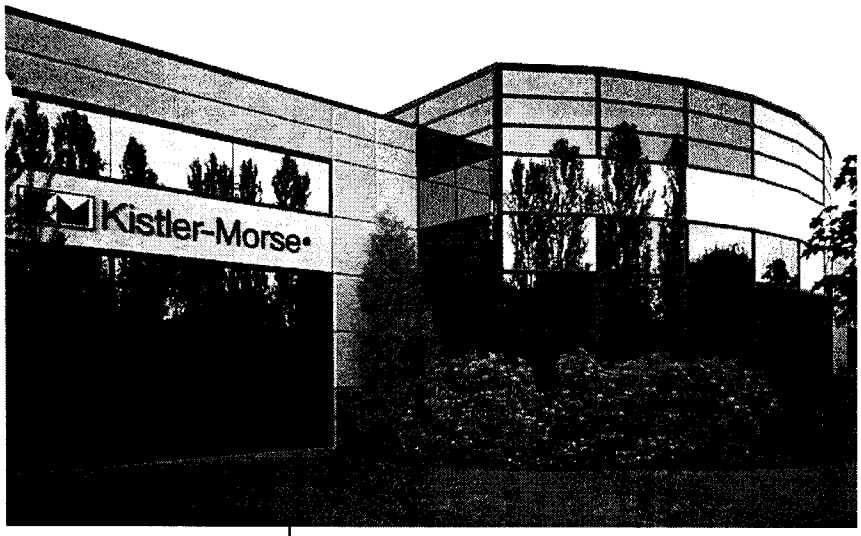
Kistler-Morse®

Technical Note
Manual Addendum

When connecting AC power to this unit, it is important that the following be adhered to:

Power wiring must comply with the national wiring requirements for the country in which the equipment is installed.

The ground conductor is to be connected to the Protective Earth (PE) terminal.



For models which do not incorporate a built-in AC power switch, the power wiring must include a switch or circuit breaker as the means for disconnecting power from the unit. The switch must be in close proximity to the unit and within easy reach of the operator, and must be marked as the disconnecting device for the unit.

For more information regarding this Technical Note, contact Kistler-Morse Service at (800) 426-9010.

Kistler-Morse®
19021 120th Avenue NE
Bothell, WA 98011 USA
Tel: 800-426-9010 • 425-486-6600
Fax: 425-402-1500

Kistler-Morse®

CE

Manufacturer's Declaration of Conformity

PRODUCT: Multi-Vessel System (MVS)

MODELS: (Based on Kistler-Morse Drawing 64-5087 Rev. X1)

MVS-8D-AC-XX-XN	MVS-8D-AC-12-XY	MVS-8D-AC-XX-HN	MVS-8D-AC-12-HY
MVS-8D-AC-XX-XY	MVS-8D-AC-F8-XN	MVS-8D-AC-XX-HY	MVS-8D-AC-F8-HN
MVS-8D-AC-12-XN	MVS-8D-AC-F8-XY	MVS-8D-AC-12-HN	MVS-8D-AC-F8-HY

Modules (for use in MVS models listed above):

Part Number	Description	Consisting of Circuit Boards:
73-0004-01A	8-Ch K-M Strain Input	63-1200-01B, 63-1205A
73-0009-03B	1-Ch K-M STX Input w/ 4-20 output	63-1218-43A, 63-1220-01NEW
73-0009-08B	1-Ch K-M STX Input w/o 4-20 output	63-1218-48A, 63-1220-01 NEW
73-0008-01A	Remote Tare 8-Input, 120 VAC	63-1197-02A, 63-1207-01NEW
73-0008-02A	Remote Tare 8-Input, 240 VAC	63-1197-02A, 63-1207-01NEW
73-0008-03A	Remote Tare 8-Input, DC	63-1197-02A, 63-1207-01NEW
73-0006-01A	8-Ch Current Output	63-1210-01NEW, 63-1211-01A
73-0006-04A	8-Ch Voltage Output	63-1210-01NEW, 63-1211-04A
73-0003-02B	8-Output Relay, AC	63-1197-01A, 63-1207-01NEW
73-0003-03B	8-Output Relay, DC	63-1197-01A, 63-1207-01NEW
73-0011-01XA	8-Ch Thermocouple Input	63-1252-01X2, 63-1253-01X1
73-0012-01XA	ITX Belt Scale Integrator	63-1226-01X3, 63-1244-01X3
73-0013-01XA	MVS-RIO	63-1228-01X3, 63-1229-01X2
73-0010-03XNEW	MODBUS RTU	63-1245-03X3, 63-1247-02X1
73-0005-01B	8-Ch Regulator, Half Bridge	63-1200-01B, 63-1201-02A, 63-1204-01B
73-0005-02B	8-Ch Regulator, Full Bridge	63-1200-01B, 63-1201-02A, 63-1204-02B

Note: Revision levels of the products shown or higher are certified to the directives noted.

MANUFACTURER:
Name: Kistler-Morse Corp.
Address: 19021 120th Ave. NE
Bothell, WA 98011
Country: USA

IMPORTER:
Name: Paul Janssens, K-M Europe
Address: Rucaplein 531
B-2610 Antwerp
Country: Belgium

APPLICATION of COUNCIL DIRECTIVES: 73/23/EEC, 89/336/EEC

STANDARDS USED: EN55011-A, EN50082-2:1995, EN61010-1

MEANS OF CONFORMITY:

The product is in conformity with Directive 89/336/EEC based on test results using harmonized standards in accordance with Article 10(1) of the Directive.

REPRESENTATIVE: Sesh Velamoor
FUNCTION: President
SIGNATURE: _____

Place: Bothell, WA USA **Date:** 12/31/96

Table of Contents

List of Figures

*** Figures 3-1 and 4-1 illustrate the menu trees for analog and Sonologic inputs. These trees are very helpful when trying to locate specific modes and functions.**

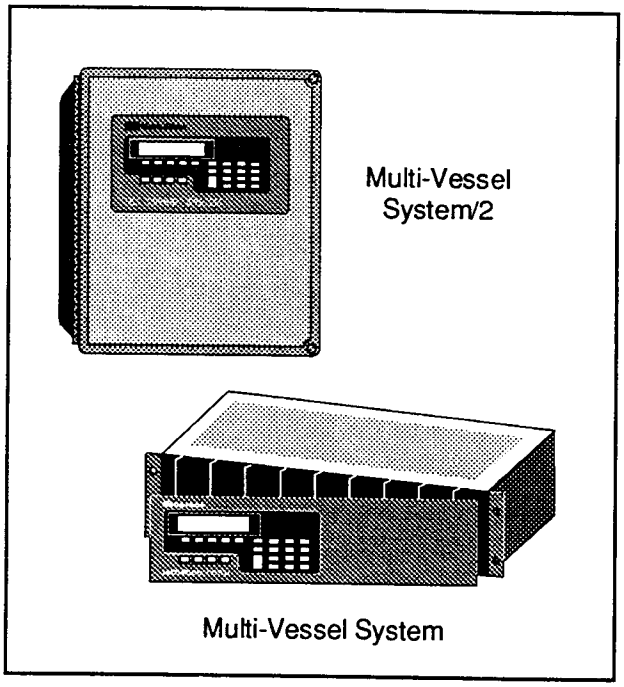


Figure 1-1. The Kistler-Morse Multi-Vessel Systems.

Chapter 1. Equipment Description

INTRODUCTION

The Kistler-Morse Multi-Vessel System (MVS) is a multichannel signal processing and display system that will receive analog and digital serial inputs. The MVS monitors and displays material information of vessels equipped with strain gage or full-bridge sensors/transducers. The MVS will also communicate serially with ultrasonic signal processors to display material information of vessels monitored by Kistler-Morse Intelligent Transceiver Units (ITUs) and/or Sensor Switching Units (SSUs).

PHYSICAL DESCRIPTION

There are two types of Multi-Vessel Systems available: The MVS with the industry-standard 19-inch rack and the Multi-Vessel System/2 that comes in a NEMA-rated enclosure for wall and panel mounting. Figure 1-1 Illustrates the two types of Multi-Vessel Systems.

The standard Multi-Vessel System consists of a rack(s) that holds up to nine interchangeable printed circuit boards (PCBs) and a power supply. The rack is designed to mount on a frame in a control room environment and has a Backplane PCB with connectors on the front and back. The modular PCBs slide into the rack and plug into connectors on the front of the backplane. Termination boards (PCBs) mate to each modular PCB and accept the wires from the sensors, peripheral equipment, etc. These boards plug onto the back of the MVS backplane, opposite its modular PCB mate. This feature avoids having to connect all of the wires directly to the MVS backplane. Instead, individual termination boards can be removed, wired, and plugged onto the backplane with relative ease.

The NEMA-rated enclosure of the Multi-Vessel System/2 is usually wall-mounted and is designed to be wired from the front. The rack inside the enclosure has fiv card slots and a Backplane PCB with connectors that extend below the rack and face forward. Termination boards plug onto these connectors and are accessed through the front of the enclosure. The modular PCBs slide into the rack and plug onto the backplane the same as the standard MVS.

The PCBs available to make up a Multi-Vessel System are:

- Microprocessor PCB with an RS-232/RS-422/RS485 serial port
- 8 Channel A/D Signal Processor PCB
- 8 Channel 4-20 mA Current Transmitter PCB
- 8 Channel Setpoint PCB

The modular PCBs are easily inserted and removed from the rack(s) so the Multi-Vessel System can be configured to address the specific needs of a particular application. This modular system also allows for easy expandability, e.g. if more 4-20 mA outputs and/or setpoints become necessary.

Every Multi-Vessel System must have a Microprocessor PCB, Signal Processor PCB, and a Keyboard/Display panel. 4-20 mA Current Transmitter PCBs and Setpoint PCBs can be added as needed, depending on the auxiliary equipment used with the system. Additional racks of 4-20 mA Current Transmitter PCBs and/or Setpoint PCBs can be interfaced to the rack with the Microprocessor PCB and Signal Processor PCB.

A Display/Keyboard panel is the same on both units. On the standard MVS, the Display/Keyboard panel is hinged to the front of the rack and swings down for easy access to the PCBs. The Display/Keyboard panel of the MVS/2 is on the hinged front door of the enclosure. The display is a digital, backlighted LCD and provides two lines of sixteen digits in an alpha-numeric format. The display will read out monitoring information in a bar graph format as well as in alpha-numeric values. The keyboard is used to access functions during operation and to input parameter values during setup and calibration. The following section explains in detail the use of the display and keyboard.

USING THE DISPLAY AND KEYBOARD

The Multi-Vessel System Display/Keyboard Panel has a liquid crystal display (LCD) made up of two sixteen-character lines. The LCD displays the vessel I.D., material weight numerically or in a bar graph format, menu selections, and error messages.

The keyboard is used to access the different menus, scroll through the vessel monitoring display screens, input set-up and calibration parameters, label the vessels for easy identification, etc. The function of each key on the panel is described in the following sections.

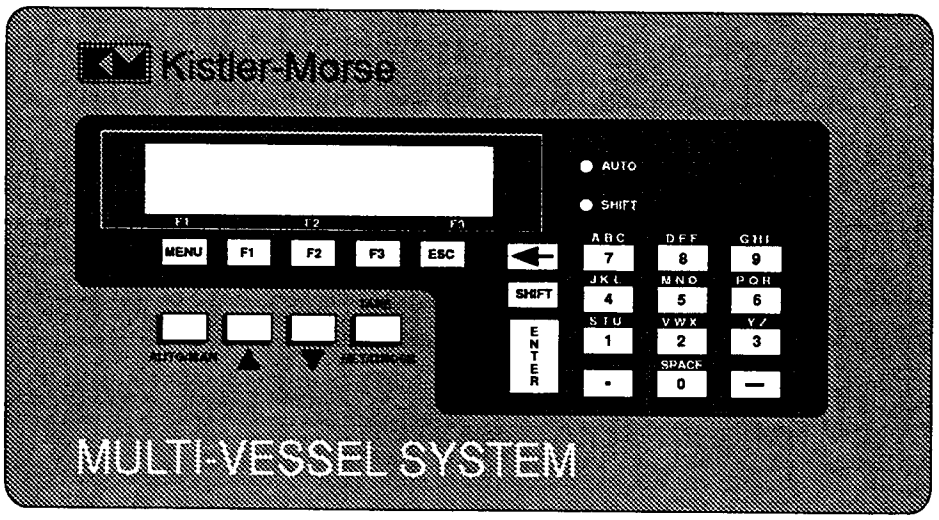


Figure 1-2. The Multi-Vessel System Display and Keyboard.

AUTO/MAN Key

The MVS display can be set up to scroll automatically through the vessel monitoring display screens or remain fixed on a selected vessel. The AUTO/MAN key (Figure 1-2) toggles between automatic and manual scrolling.

When in the Auto Mode, the vessel number, I.D. label, and material weight are displayed for a preset period of time before scrolling to the next vessel. The AUTO LED to the right of the LCD will be illuminated when the MVS is in the Auto Mode.

When the MVS is in the Manual Mode, the display will remained fixed on a selected vessel and must be scrolled manually with the UP ARROW and DOWN ARROW keys. The AUTO LED is off when the MVS is in this mode.

UP ARROW and DOWN ARROW Keys

The UP ARROW and DOWN ARROW keys are used to manually scroll the display through the vessels when the MVS is in the Manual Mode. These keys are also used to select values when entering set up and calibration parameters. For example, when setting the Lo Span and Hi Span values in the AUTO CAL MENU, the UP ARROW and DOWN ARROW keys can be used to scroll to a desired value.

TARE, NET/GROSS Key

When the SHIFT Key is activated (SHIFT LED on), pressing this key will tare the vessel on the display, setting the net value to zero. Pressing the SHIFT Key again or pressing the ESC Key will turn the SHIFT LED off. When the SHIFT LED is off, this key will toggle the display between the net and gross values of the vessel contents.

MENU Key

NOTE

The MVS must be in the Manual Mode to access the menus.

Pressing the MENU key will access the MAIN MENU. If there are multiple pages to the menu, pressing the MENU key again will scroll the display to the next page. For example, the MAIN MENU has two pages. Page 1 shows:

Disp I/O Cal ⇒

The ⇒ signifies there is a following page. Pressing the MENU key again will display the second page:

Service ⇒

Press the MENU key again to return to the first page.

The same is true when a submenu is accessed. Pressing the MENU key will scroll through the different pages of the submenu. (Press the ESC key to back through the submenus and return to the material weight monitoring display.)

F1, F2, and F3 Keys

The F1, F2, and F3 Keys are used to select the items on the menus. The faceplate has F1, F2, and F3 labeled underneath the LCD. When a menu is displayed, the menu items are located above these labels. Press the 'F' key that corresponds to the desired selection. For example, when the MAIN MENU is displayed, the selections are:

Disp I/O Cal ⇒

The 'Disp' is above the F1 label on the faceplate, the 'I/O' above F2, and the 'Cal' above F3. If you want to access the 'Cal' submenu, press the F3 key.

ESC Key

The ESC Key is used to back through the submenus one page at a time. Use this key to leave the MAIN MENU and return the display to material monitoring.

Pressing the ESC Key while in the Manual Mode (AUTO LED off) will display the MVS ID (vessel) number which is referenced in the MVS Termination Wiring Table in Appendix E. The MVS arrives from the factory with a displayed number assigned to each vessel. If you replace the number with a label (performed in the Display Mode), pressing the ESC Key will briefly display the original MVS ID (vessel) number.

⇐ Key

The ⇐ Key is used to back up the cursor on the display.

SHIFT Key

The SHIFT key is used in conjunction with the alphanumeric key pad and the TARE, NET/GROSS Key. When the SHIFT Key is on, the key pad will type the letters shown above each key. When the SHIFT Key is off, the key pad will type the numbers labeled on each key. The SHIFT LED located below the AUTO LED on the faceplate will illuminate when the SHIFT Key is on.

ENTER Key

The ENTER Key is used to save in memory any parameter set up in the MAIN MENU. For example, if you enter a Lo Span value in the Cal Menu, pressing the ENTER key will save it to memory. The value will remain in memory until a new value is entered. When typing in a vessel ID, the ENTER Key will advance the cursor one space to the right. When the MVS is displaying vessel GROSS value monitoring information in the Manual Mode, pressing the ENTER Key will toggle the display from numerical format to bar graph format. The display will not toggle to bar graph format if NET value monitoring information is being displayed. The display will remain in the bar graph format (even when the MVS is turned off and back on again) until the ENTER Key is pressed to toggle back to the numerical format.

"." (Period) Key

Pressing the "." Key will briefly display the current MVS microprocessor card software revision letter and the date of the revision.

ALPHANUMERIC Keys

The ALPHANUMERIC keys are used to type in numeric parameters during setup and calibration. Also, when the SHIFT Key is on, the letters above the keys are accessed. Pressing a key repeatedly toggles the display through the three letters listed above the key. When the desired letter is displayed, pressing the ENTER Key or a different ALPHANUMERIC Key will advance the cursor one space to the right.

Chapter 2. Hardware Installation

GENERAL INFORMATION

This chapter provides instructions on how to install the rack-mount Multi-Vessel System and the Multi-Vessel System/2. Instructions are also provided for wiring external power to the power supply.

Installing sensors and transducers are treated separately. The installation manual is shipped in the shipping container with the sensors.

UNPACKING AND INSPECTION

Carefully remove the components of the Multi-Vessel System from the shipping container(s) and place them on a flat surface. Inspect for damage that may have occurred during shipment. If any damage is evident, note it on the shipping receipt. Report the damage to the carrier and to Kistler-Morse immediately. Store the shipping container(s) and packing material for later use in the event the Multi-Vessel System must be shipped back to the factory.

MOUNTING INSTRUCTIONS FOR THE RACK-MOUNT MVS

The rack-mount Multi-Vessel System can be mounted on a frame with other rack-mounted equipment to provide consolidation of equipment and efficiency of space, or it can be installed in an enclosure and mounted in any convenient location. See Appendix A for temperature ranges as well as other environmental, electrical, and mechanical specifications before beginning.

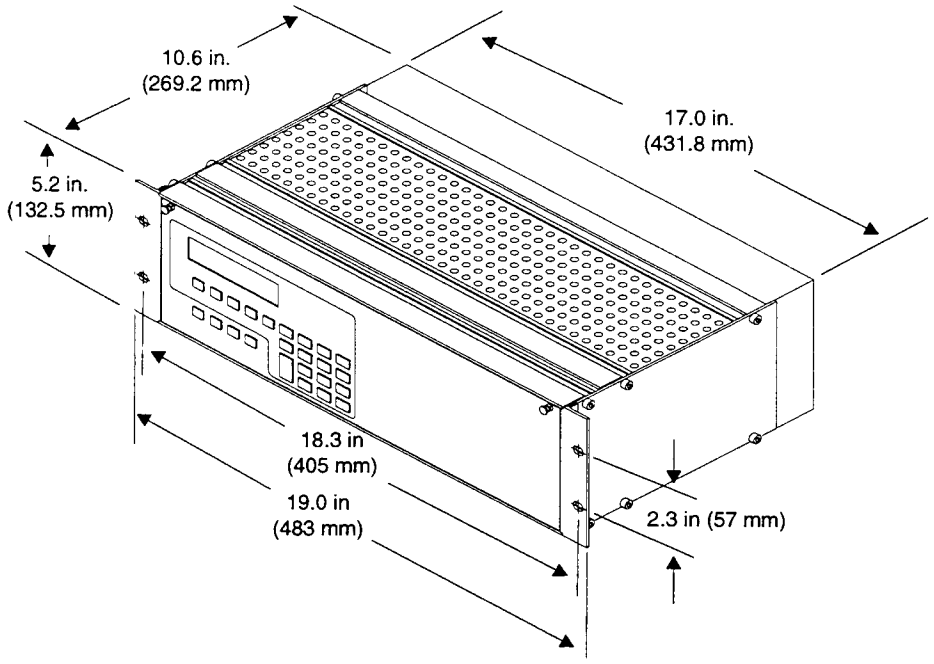


Figure 2-1. Multi-Vessel System Rack Dimensions.

Mounting the Multi-Vessel System Rack on a Frame

If you are mounting a Multi-Vessel System rack on a frame with other rack-mounted equipment, be sure there is enough clearance between the Keyboard/Display Panel and the nearest object. The panel swings down on hinges to allow removal and insertion of the modular PCBs.

Cables from the sensor junction boxes and other peripheral equipment connect to termination boards on the back of the rack. There must be enough room behind the rack to route and attach the cables.

The hardware used to attach an MVS rack to a frame is provided by the customer. The rack mounting dimensions are shown in Figure 2-1. The frame to which an MVS rack is mounted must be in a temperature range between 32° and 122° F (0° and 50° C) to ensure proper operation of the system.

Follow these instructions to mount a Multi-Vessel System rack on a frame.

1. If you have more than one MVS rack in your system, stack the racks on top of each other in the desired order. Typically, the MVS rack with the Display/Keyboard is stacked on top.
2. If drilling mounting holes is necessary, hold each rack in place on the frame and mark the positions of the rack mounting slots.
3. Place the racks in a safe place and drill the mounting holes in the frame. Tap the holes if necessary.
4. Secure the racks to the frame with the proper hardware. If you are mounting multiple racks to the frame, continue with Step 5 If you are mounting just one rack, skip Steps 5 through 7 and proceed to **Wiring AC Power to the Rack-Mounted MVS**.
5. Connect the eight ground plane connectors provided by the factory between MVS Racks #1 and #2 as shown in Figure 2-2.
6. Plug one end of the factory-provided ribbon cable into J10 on the backplane of MVS Rack #1 and the other end into J10 of MVS Rack #2 (Figure 2-2).
7. Connect four jumpers from J13 of the rack with the power supply to J12 of the rack directly below it as shown in Figure 2-2.

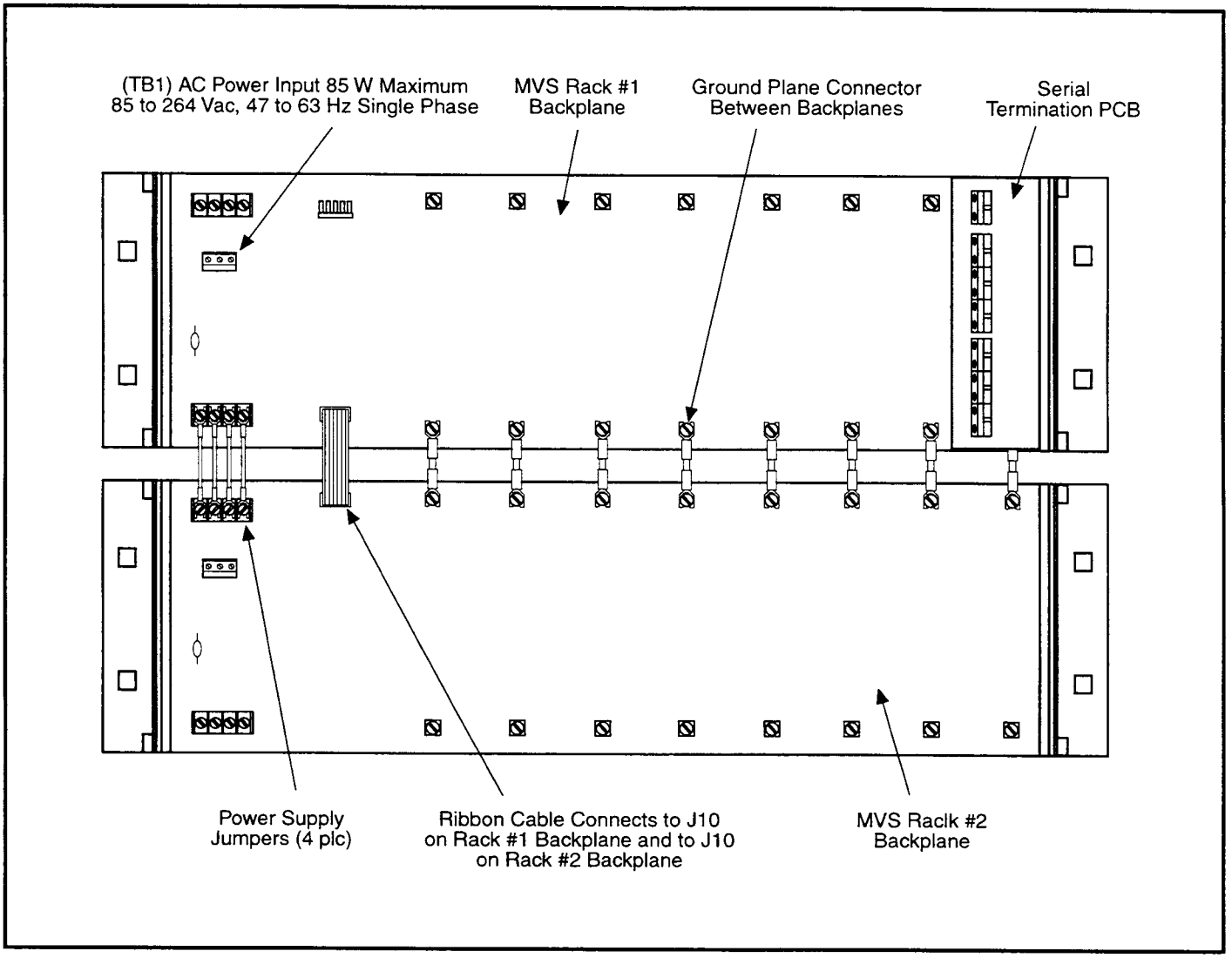


Figure 2-2. Connecting Multi-Vessel System Racks Together.

Wiring AC Power to the Rack-Mount MVS

Multi-Vessel System power is supplied by a universal input voltage power supply. The specifications of the power supply are as follows:

- Voltage Range: 85 to 264 Vac
- Frequency: 47 to 63 Hz
- Inrush Current: 20 Amps maximum,
  1 cycle @ 110 Vac 40 Amps maximum, 1 cycle @ 220 Vac

NOTE

Route the AC power cable and the AC setpoint cables separate from the low-level signal cables. Doing so will avoid electrical interference in the analog sensor/transducer signal and the communication signals.

The wiring procedure for connecting the external power source to the MVS power supply is as follows:

1. Route the cable from the power source to TB1 on the Backplane PCB of MVS Rack #1. (Refer to Figure 2-2 for TB1 location.)
2. Connect the ground (green) lead to the 'G' terminal, line (black) lead to the 'L' terminal, and the neutral (white) lead to the 'N' terminal.
3. Turn on the ON/OFF switch on the front of the power supply faceplate and verify that the digital display activates.

MOUNTING INSTRUCTIONS FOR THE MVS/2

When mounting the MVS/2, be sure there is enough clearance to open the front door. Removal and insertion of the modular PCBs and wiring the sensor cables to the backplane PCBs are done through the front of the unit.

The hardware used to mount the MVS/2 is provided by the customer. MVS/2 enclosure dimensions are shown in Figure 2-3. Refer to Appendix A for environmental specifications before mounting the unit.

Follow these instructions!

1. Hold the MVS/2 enclosure against the wall in the desired location and mark the positions of the mounting holes.
2. Place the MVS/2 in a safe place and drill the mounting holes in the wall.
3. Attach the MVS/2 to the wall using hardware that will secure it firmly in place.

Proceed to **Wiring AC Power to the MVS/2** once installation is complete.

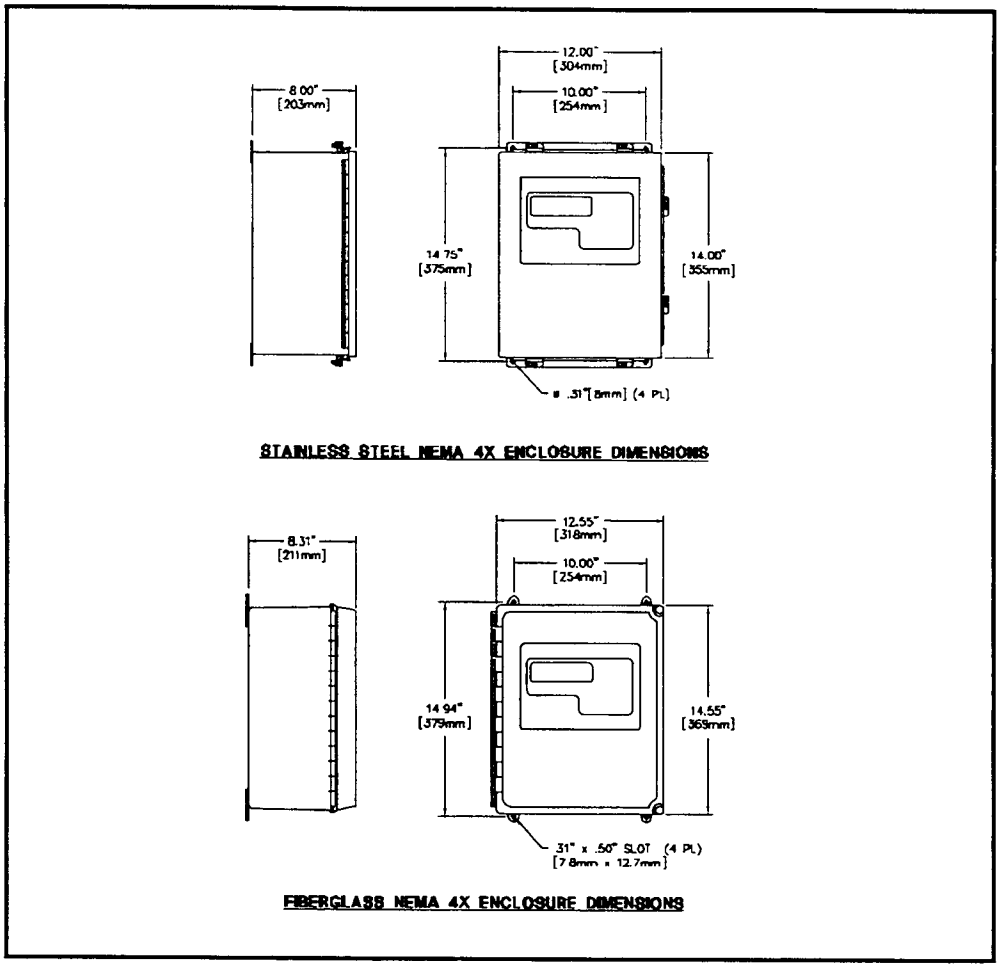


Figure 2-3. Multi-Vessel System/2 Mounting Dimensions.

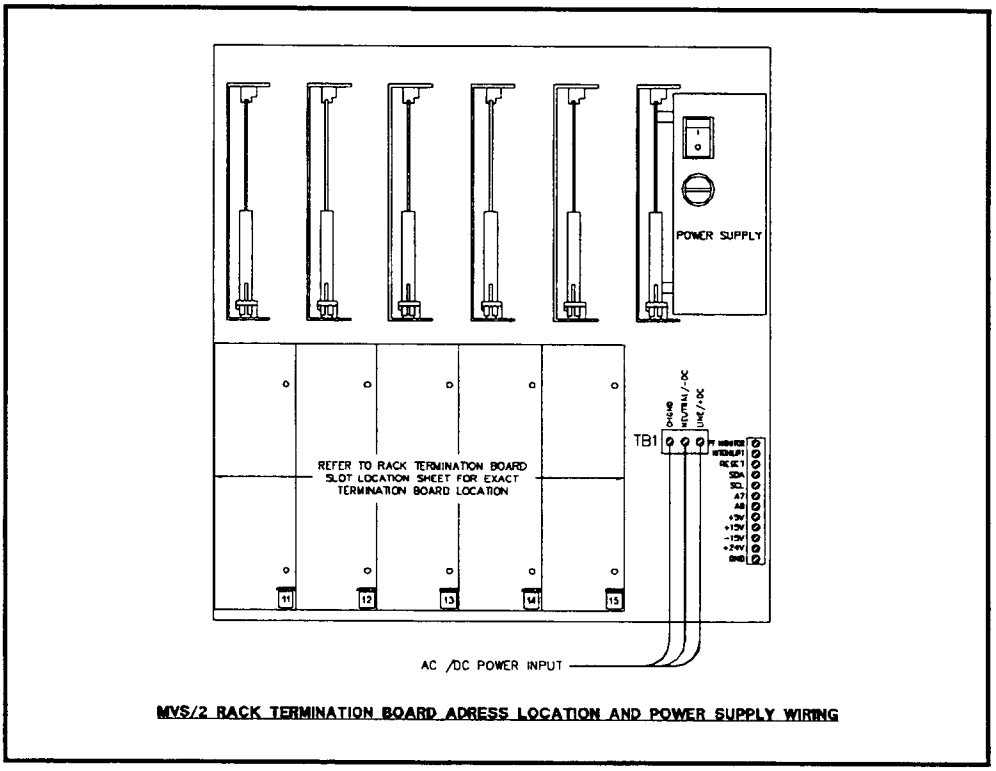


Figure 2-4. Wiring AC Power to the Multi-Vessel System/2.

Wiring AC Power to the MVS/2

The MVS/2 enclosure has no openings through which to route cables or install conduit. You can drill entry holes through the enclosure where it is most convenient to route your conduit or cables.

NOTE

Kistler-Morse recommends drilling the holes through the bottom or through the side of the enclosure. Avoid drilling holes through the top if possible. Doing so may allow moisture to seep in.

Multi-Vessel System/2 power is supplied by a universal input voltage power supply. The specifications of the power supply are as follows:

- Voltage Range: 85 to 264 Vac
- Frequency: 47 to 63 Hz
- Inrush Current: 20 Amps maximum,
  1 cycle @ 110 Vac 40 Amps maximum, 1 cycle @ 220 Vac

NOTE

Route the AC power cable and the AC setpoint cables separate from the low-level signal cables. Doing so will avoid electrical interference in the analog sensor/transducer signal and the communication signals.

The wiring procedure for connecting the external power source to the MVS power supply is as follows:

1. Route the cable from the power source to TB1 on the Backplane PCB. (Refer to Figure 2-4 for TB1 location.)
2. Connect the ground (green) lead to the 'G' terminal, line (black) lead to the 'L' terminal, and the neutral (white) lead to the 'N' terminal.
3. Turn on the ON/OFF switch on the front of the power supply faceplate and verify that the digital display activates.

POWER FUSE INFORMATION

There are three different power fuse locations in the Multi-Vessel System. The power supply has a fuse on the faceplate as well as an internal fuse on the Power Supply PCB. The third fuse is located on the backplane of each rack. Refer to Table 2-1 for specific information on each fuse.

NOTE

Refer to Appendix E for system input and output wiring.

Fuse	Fuse Part No.	Purpose	Voltage	Current
F2	18-1015-01	AC Power	100	250 mA
F2	18-1015-01	AC Power	120	250 mA
F2	18-1026-01	AC Power	240	125 mA

Table 2-1. Power Fuse Information.

INSTALLING PCBs INTO THE MVS AND MVS/2 RACK

The Kistler-Morse Multi-Vessel System arrives from the factory with the PCBs installed. However, you can expand your system by buying additional PCBs and installing them into vacant slots in the rack. This section describes how to install a PCB into the rack.

When you receive a new PCB from K-M, you should have the following items in the shipping kit:

- PCB
- Termination PCB
- Two 4-40 x 1/4 PHS screws to secure the Termination PCB to the MVS backplane
- Strip of alignment keys for MVS backplane connector
- PCB identification label

Microprocessor			A/D Converter/(STC)			ITX		
Key	Backplane	Module	Key	Backplane	Module	Key	Backplane	Module
A	1	-	A	1	-	A	-	1
B	-	1	B	1	-	B	-	1
C	-	1	C	1	-	C	-	1
D	1	-	D	1	-	D	-	1
E	-	1	E	1	-	E	1	-
F	1	-	F	1	-	F	1	-
G	1	-	G	1	-	G	1	-
H	-	1	H	1	-	H	1	-
I	1	-	I	-	1	I	1	-
K	1	-	K	-	1	K	1	-
L	1	-	L	-	1	L	1	-
M	1	-	M	-	1	M	1	-

Regulator			STX			Current Transmitter		
Key	Backplane	Module	Key	Backplane	Module	Key	Backplane	Module
A	1	-	A	-	1	A	1	-
B	1	-	B	1	-	B	-	1
C	1	-	C	1	-	C	1	-
D	-	1	D	-	1	D	-	1
E	1	-	E	1	-	E	-	1
F	1	-	F	1	-	F	1	-
G	1	-	G	1	-	G	1	-
H	1	-	H	-	1	H	-	1
I	-	1	I	-	1	I	1	-
K	-	1	K	-	1	K	1	-
L	-	1	L	-	1	L	1	-
M	-	1	M	-	1	M	1	-

Table 2-2. Location of the Alignment Keys in the PCBs and the Backplane Connectors.

Alignment Key Placement

The J1 connector on the PCB and its mating MVS backplane connector accept removable alignment keys. The alignment keys are installed as a safeguard to prevent PCBs from being inserted into the wrong rack position. If the keys in the connectors do not align, the connectors cannot be plugged together.

NOTE

Damage to the MVS may occur if a PCB is installed incorrectly.

The PCB and backplane connectors have 12 positions (labeled 'A' through 'H', 'I' through 'M') that accept alignment keys. The PCB arrives from the factory with its alignment keys in place. The placement of the keys in positions A through H in the PCB connector represents the binary equivalent of the last two digits of the PCB part number.

The backplane connector must have alignment keys installed from the strip of keys provided in the shipping kit. Locate your specific PCB in Table 2-2. The table shows the positions of the keys for each type of PCB and its mating backplane connector. Break off as many keys as needed and insert the keys into the

R I/O			Modbus			Thermocouple		
Key	Backplane	Module	Key	Backplane	Module	Key	Backplane	Module
A	-	1	A	-	1	A	-	1
B	1	-	B	-	1	B	-	1
C	1	-	C	1	-	C	-	1
D	1	-	D	-	1	D	1	-
E	1	-	E	-	1	E	-	1
F	1	-	F	-	1	F	-	1
G	-	1	G	1	-	G	1	-
H	1	-	H	-	1	H	-	1
I	1	-	I	-	1	I	1	-
K	1	-	K	-	1	K	1	-
L	1	-	L	-	1	L	1	-
M	1	-	M	1	-	M	1	-

I/O AC/DC Output			I/O AC/DC Tare/Relay Input		
Key	Backplane	Module	Key	Backplane	Module
A	1	-	A	1	-
B	-	1	B	-	1
C	-	1	C	-	1
D	-	1	D	-	1
E	-	1	E	-	1
F	1	-	F	1	-
G	1	-	G	1	-
H	-	1	H	-	1
I	1	-	I	1	-
K	1	-	K	1	-
L	1	-	L	1	-
M	1	-	M	-	1

Table 2-2. Location of the Alignment Keys in the PCBs and the Backplane Connectors (cont'd).

connector positions as shown in the table. A '1' indicates a key is in place, a '0' indicates an empty slot.

PCB Installation

The PCBs can go into any open rack position regardless of whether you have a standard MVS (9-position rack) or an MVS/2 (5-position rack). However, keeping the Setpoint PCBs to the right of the rack and the MVS-RIO and A/D Converter PCBs to the left side is good policy.

If you are installing an A/D Converter PCB with a Regulator PCB, they must be next to each other in the rack. In addition, the A/D Converter PCB must be positioned to the left of the Regulator PCB. The Termination PCB that works with these two cards occupies two positions on the backplane. Two connectors on the Termination PCB plug into the backplane connectors opposite the A/D and Regulator PCBs in a standard MVS or below the A/D and Regulator PCBs in an MVS/2. If the A/D and Regulator PCBs are not positioned properly in the rack, the Termination PCB will not make the proper electrical connections.

Follow this procedure to install the PCB in the MVS rack.

1. Open the front of the MVS or MVS/2.
2. Slide the PCB into the designated rack position. Be sure the PCB connector inserts completely into the backplane connector. Use the card extractor on the front of the PCB to secure it in place.
3. Plug the Termination PCB onto the MVS backplane opposite the PCB, or underneath the PCB if you have an MVS/2.
4. Secure the Termination PCB in place with the two 4-40 x 1/4 PHS screws supplied in the shipping kit.
5. Place the self-adhesive label from the shipping kit (PCB identification) on the rack underneath the PCB.
6. Close the front panel. Installation is complete.
7. When you add a new PCB to the MVS or MVS/2, you must perform the RScn (rescan) procedure to bring the new PCB on-line with the rest of the system. Refer to Page 3-24 in Chapter 3 for an explanation of the RScn procedure. Then follow the procedure in the section titled SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES on Page 3-25 to perform the procedure.

Chapter 3. Setup and Calibration Using the Main Menu

INTRODUCTION

The MAIN MENU is used to set up and calibrate systems with sensors or transducers that send an analog signal to the Multi-Vessel System, e.g. Microcell sensors, Load Stand transducers, and Load Disc transducers. Procedures for setting up and calibrating Ultrasonic systems are described in **Chapter 4. Setup and Calibration Using the SONIC MAIN MENU**.

Procedures for setting up the MVS for material monitoring are found in the **ENTERING SET-UP PARAMETERS** section. However, it is a good idea to read all of the information in this chapter first before proceeding. Explanations of MVS modes and functions are provided as well as set-up information and procedures. Having a better understanding of the Multi-Vessel System will be beneficial during setup.

If just changing one or two parameters that have been previously set up, follow the procedures in the subsections pertaining to those specific parameters.

KISTLER-MORSE FACTORY CODES

The Multi-Vessel System has two factory code numbers. Certain MVS functions require that one of these two code numbers be entered before access to the function is permitted. The following sections describe the codes and explain how they are used.

KM MFG Code

The KM MFG Code number is:

9111

This number must be entered first before you can access certain high-priority functions, e.g. adding and deleting setpoints and/or 4-20 outputs. Once this number is entered, you have access to all functions including functions that require the KM Service Code. All functions remain accessable until the MVS is put back into Auto Scanning Mode (AUTO LED illuminated). Once in Auto Scanning Mode, it will be necessary to reenter the KM MFG Code to reaccess any high-prority function.

Some functions will prompt you to enter the code as you try to gain access. In those cases, just enter the code and continue. Other functions, such as adding and deleting setpoints and 4-20 outputs (performed in the I/O Menu), will not allow you to do so because the 'Add' and 'Delete' screen will not display if the number has not been entered. To activate these functions you must enter the KM MFG Code number (performed in the SERVICE Menu) by following this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the MENU Key again to access the second page of the MAIN MENU. The display will look like this:

MAIN MENU
Service ⇒

4. Press the F1 Key to access the SERVICE ROUTINES. The display will look like this:

SERVICE ROUTINES
ADC Setpt 4/20⇒

5. Press the MENU Key to access the second page of the SERVICE ROUTINES menu. The display will look like this:

SERVICE ROUTINES
Micro Access⇒

6. Press the F3 Key. The display will look like this:

ACCESS FUNCTIONS
USER KM

7. Press the F3 Key to get the KM MFG Code menu. The display will look like this:

KM MFG CODE?

8. Use the keypad to enter:

9 1 1 1

An 'X' will display in place of each digit in the code.

9. Press the ENTER Key. The display will flash:

FUNCTION ENTERED

and return to:

SERVICE ROUTINES
Micro Access⇒

10. Press the ESC Key to return to the MAIN MENU.

KM Service Code

The KM Service Code number is:

9 0 1 0

Where the KM MFG Code allows access to all functions, the Service Code (9010) allows access to specific functions. For example, if you want to access "Enabe" under "Sono" in the Service menu, the MVS will first prompt you to enter the KM Service Code (9010) before displaying the "Enabe" screen. Punch in 9 0 1 0. The display will show 'Xs' instead of the numbers you press. Press the ENTER Key to enter the number and the "Enabe" screen will display. After you have entered the KM Service Code once, you'll have access to all of the functions requiring this code. You will not have access to functions requiring the KM MFG Code.

SETTING UP AN ACCESS CODE

The Multi-Vessel System arrives from the factory with no access code in place. This allows you to access any function in the system at will. If you want to limit access to the set-up and calibration functions, the MVS allows you to set up an access code which will have to be entered first before a parameter change can be made.

NOTE

Be sure to write the access code down and store it in a safe place. If you set up an access code and forget the number, you will have to call the factory for instructions on how to bypass the code.

Follow this procedure to set up an access code.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the MENU Key again to access the second page of the MAIN MENU. The display will look like this:

MAIN MENU
Service ⇒

4. Press the F1 Key to access the SERVICE ROUTINES. The display will look like this:

SERVICE ROUTINES
ADC Setpt 4/20⇒

5. Press the MENU Key to access the second page of the SERVICE ROUTINES menu. The display will look like this:

SERVICE ROUTINES
Micro Access⇒

6. Press the F3 Key. The display will look like this:

ACCESS FUNCTIONS
User KM

7. Press the F1 Key to get the User ACCESS NUMBER Menu. The display will look like this:

ACCESS NUMBER:
>

8. Use the keypad to enter a 1-, 2-, 3-, or 4-digit number.

9. Press the ENTER Key. The display will flash a message acknowledging the new number and return to:

ACCESS FUNCTIONS
User KM

10. Press the ESC Key twice to return to the MAIN MENU or the AUTO/MAN Key to return the display to vessel monitoring.

THE MAIN MENU

There are four modes in the MAIN MENU of the Multi-Vessel System:

Disp I/O Cal Service ⇒

The menu tree in Figure 3-1 shows the MAIN MENU in Menu Level 1 and all of the submenus in Menu Levels 2 - 5. The menu tree is a quick-reference guide to help you find the functions you want to perform. For example, if you want to change setpoint parameters, the menu tree shows you that setpoints are set up in the I/O Menu. Level 2 shows the submenus that are displayed when I/O is selected. Level 3 shows the submenus that are displayed when a selection is made from Level 2, etc.

The sections that follow will describe the submenus and the function they perform.

NOTE

While in the MENU mode, pressing the ESC key backs the Multi-Vessel System through the MENU mode one submenu at a time. Pressing the AUTO/MAN key will take the system out of the MENU mode from any point in the menu and resume displaying material monitoring information.

Disp Mode

There are eleven submenus that can be accessed when in the Disp (Display) Mode. They are:

Avg Cntby Units ID Form Scan T BarS Cont Brite Time Zclmp

Avg

This mode is used to set the number of individual readings (from 1 to 128) the MVS will average for each readout. (See Appendix C. Glossary of Set-Up and Calibration Terms.) The number shown upon entry into this mode shows the vessels current averaging factor. Modification of this number can be performed by direct entry (pressing numbered keys) or scrolled (arrow keys). When the desired number is shown, pressing the ENTER key saves the new averaging factor in the memory of the micro card.

Cntby

This mode is used to set up the display to count by increments of 1, 2, 5, 10, 20, 50, 100, 200, 500, or 1000. For example, a countby factor of 100 would show the display changing by increments of 100 units. Note that setpoints and current outputs (0-20 mA, 4-20 mA) are always implemented with a countby of one.

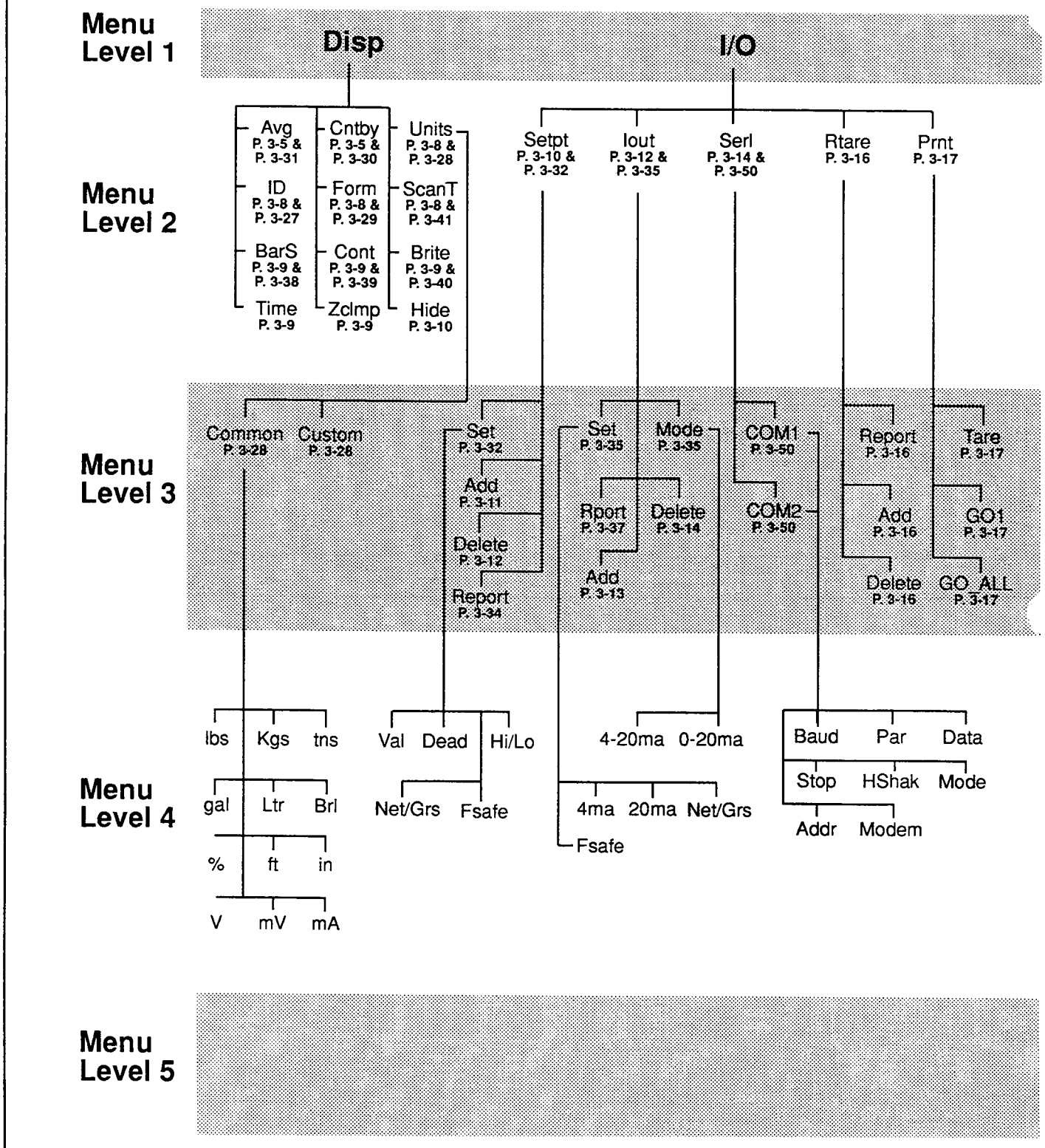
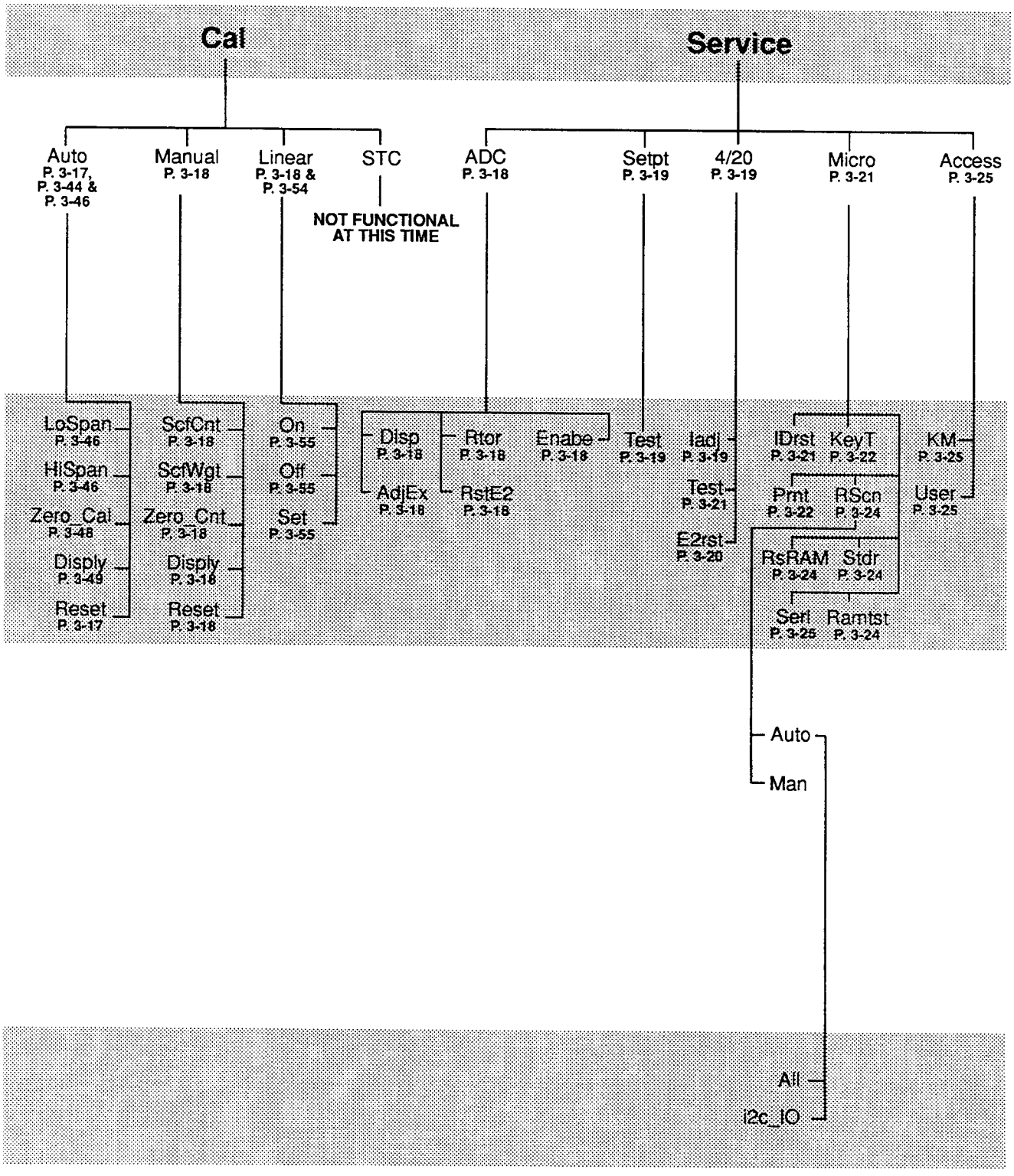


Figure 3-1. Multi-Vessel System MAIN MENU Tree.


Cal
Service
Auto
P. 3-17, P. 3-44 & P. 3-46
Manual
P. 3-18
Linear
P. 3-18 & P. 3-54
STC
NOT FUNCTIONAL AT THIS TIME
ADC
P. 3-18
Setpt
P. 3-19
4/20
P. 3-19
Micro
P. 3-21
Access
P. 3-25
LoSpan
P. 3-46
HiSpan
P. 3-46
Zero_Cal
P. 3-48
Disply
P. 3-49
Reset
P. 3-17
ScfCnt
P. 3-18
ScfWgt
P. 3-18
Zero_Cnt
P. 3-18
Disply
P. 3-18
Reset
P. 3-18
On
P. 3-55
Off
P. 3-55
Set
P. 3-55
Disp
P. 3-18
AdjEx
P. 3-18
Rtor
P. 3-18
RstE2
P. 3-18
Enabe
P. 3-18
Test
P. 3-19
Iadj
P. 3-19
Test
P. 3-21
E2rst
P. 3-20
IDrst
P. 3-21
KeyT
P. 3-22
Prnt
P. 3-22
RScn
P. 3-24
RsRAM
P. 3-24
Stdr
P. 3-24
Serl
P. 3-25
Ramtst
P. 3-24
KM
P. 3-25
User
P. 3-25
Auto
Man
All
i2c_IO

Units

Labeling the unit of measure that is used when calibrating the MVS is done in this mode. (See the CALIBRATING THE MULTI-VESSEL SYSTEM section in this chapter.) In the "common" submenu, you can select lbs (pounds), kgs (kilograms), tns (tons), gal (gallons), ltr (liters), brl (barrels), % (percent), ft (feet), in (inches), V (volts), mV (millivolts), and mA (milliamps). In the "Custom" submenu, you can type in a custom three-character unit of measure.

ID

This mode allows you to type in a 16-character alphanumeric title on the display for each vessel.

Form

This mode is used to choose the display format. The following are the six different formats available:

XXXXX00

XXXXX0

XXXXX (default)

XXXX.X

XXX.XX

XX.XXX

Note: X is a place holder.

An asterisk is displayed next to the format that is currently being used.

ScanT

This mode allows you to choose the amount of time the MVS will display the monitoring information of a vessel when in AUTO mode before scrolling to the next vessel. Scan time can be set to 1 second, 2 seconds or 5 seconds.

BarS

The maximum span for the bar graph is set in this mode. The 100 percent point of the bar graph display is set by direct entry using the alphanumeric keys or by scrolling to the desired value with the scroll keys. For example, if a vessel's maximum capacity is 15,000 pounds, 15000 would be entered as the BarS value. When the bar graph is displayed, the 100 percent level would be 15,000 pounds. The bar graph shows only the gross levels between zero and the value set in this mode. The default value for this function is 9999. To display the bar graph, the MVS must be in Manual Mode (AUTO LED off). Pressing the ENTER Key toggles the display between bar graph and numerical display.

Cont

The contrast of the display is adjusted in this mode. The scroll keys are used to make fine adjustments while the F2 and F3 keys perform coarse adjustments. The displayed number ranges from 0 (darkest) to 255 (lightest). The default value is 127.

Brite

The brightness of the display is adjusted in this mode. Adjustments are made the same way as described above in ***Cont***.

Time

Time and date are set and/or displayed in this mode. Accuracy is better than +\- 1 minute/month while timekeeping is maintained for more than 10 years without power. The number/character displayed directly to the right of the flashing cursor is modified with the arrow keys. Pressing the ENTER Key will advance the cursor to the next number/character field.

ZcImp

The ZcImp Mode allows the user to set a window around zero engineering units of the gross display. When the gross value falls within the window, the display is forced to zero. This mode only affects the value seen on the front panel display in the gross mode. Setpoints, current, and serial outputs are unaffected. Two choices are available when "Hi" or "Lo" is entered in this mode. Each of these subfunctions can have values of three active digits that range from 0 to 255. "Hi" modifies values that are above zero. "Lo" modifies values that are below zero and are shown as negative numbers. Values may be scrolled to or entered directly.

Hide

This function allows you to 'hide' a vessel(s) from the scanning sequence on the display. The MVS continues to monitor the vessel(s) that is hidden, it just does not display it. The Hide function is useful if you want to observe specific vessels without taking the other vessels in the system off line. In the Hide menu, press the F1 Key to select ON or the F3 Key to select OFF. Then press the SHIFT Key (SHIFT LED illuminated) and the '9' Key to enable and disable the function.

I/O Mode

The I/O mode is used to enter setpoint parameters, current output parameters (4-20 mA, 0-20 mA), remote tare, printer functions, and serial port configuration. The I/O Menu looks like this:

INPUT/OUPUT MENU
SetPt Iout Serl Rtare Prnt

SetPt

The setpoint set-up functions for each vessel are accessed in this mode. They include selecting activation levels, high or low activation, deadband values, fail-safe parameters, and net or gross weight.

Set. This mode is used to select the setpoint to be set up for the displayed vessel. Eight setpoints can be assigned and are labeled SP1 for setpoint 1 through SP8 for setpoint 8.

Once you have selected a setpoint to set up, the activation value (**Val**), the point where the setpoint relay changes state, can be entered. This value can be entered directly with the Alphanumeric Keys or scrolled to with the arrow keys. The "-" Key is used to toggle between the positive and negative value of the number entered. Setpoint relays can be configured to change state either above or below (**Hi/Lo**) the setpoint value.

The deadband (**Dead**) value, when other than zero, determines the point at which a setpoint relay returns to its normal on/off state. The deadband value can be greater than or less than the setpoint value and has a default value of 2. A value (0 to 9999) can be entered directly or scrolled to with the arrow keys. The ESC or AUTO/MAN Keys will abort the function without changing any values.

EXAMPLE: A vessel with a 10,000 lb capacity has setpoint 1 (SP1) set at 9,000 lbs. The Hi/Lo function is set to "Hi" and the deadband is set at 1,000 lbs. When the contents exceeds 9,000 lbs, the setpoint energizes, activating a pump. The pump will continue to operate until the setpoint de-energizes at a material weight of 8,000 lbs (9,000 lbs minus the 1,000 lb deadband).

The setpoint relays can be set to activate from the net weight or the gross weight (**Net/Grs**) of the material in the vessel. Measuring the gross weight is the default mode of the MVS.

If the Microprocessor PCB detects a problem with a signal processor (Analog to Digital Converter [ADC] channel, Sonologic device, slave MVS, model 1000, etc.,) one of three fail-safe (**Fsafe**) conditions can be applied to a setpoint:

1. ON
2. OFF (Default)
3. NC

The ON setting will energize the setpoint in a fail-safe condition. The OFF setting will de-energize the setpoint in a fail-safe condition. The NC setting means no action will be taken in a fail-safe condition. A fail-safe condition will remain in effect until the problem has been corrected.

The following are examples of conditions of fail-safe conditions:

1. ADC overrange/underrange condition.
2. Communication error with an ADC card within an MVS.
3. Communication error with serial device.
4. Echo loss condition of a Sonologic device.
5. Engineering units overrange

Report. When this mode is accessed, the display will show all setpoints assigned to the current vessel. The top line shows an assigned setpoint number within the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned setpoints channels.

Add. This function is used to add setpoint channels (up to eight) to the current vessel. The KM MFG Code must be entered first to gain access. The **Add** Function will not display until the code is entered. (See Page 3-1.) The top line shows the first available setpoint number, the rack/slot number, and the channel number on the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other unassigned setpoints channels. This function requires the KM MFG code to be entered before setpoint channels can be added.

Delete. This function allows previously added setpoint channels to be removed from the current vessel. The KM MFG Code must be entered first to gain access The **Delete** Function will not display until the code is entered. (See Page 3-1.) The top line shows an assigned setpoint number, the rack/slot number, and the channel number on the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned setpoints channels. To delete a setpoint channel, cycle through the channels until the one you want is displayed and then press the ENTER Key. **I/O CHANNEL DELETED** will display to confirm the deletion. This particular channel is now available for use again. This function requires the KM MFG code to be entered before setpoint channels can be deleted.

Iout

The current output set-up functions are accessed in this mode. The functions include adding and deleting outputs, selecting fail-safe, net/gross, and operating modes.

Mode. The current transmitter can be set up to output 0 to 20 milliamps or 4 to 20 milliamps. This function is used to select one of the two operating modes. The MVS default current operating mode is 4-20 mA.

Set. This mode is used to select the current output to be set up. Low current operation point is set up with the **4ma/0ma** function. The value entered will determine the point where the transmitter outputs the minimum current. For example, if 1,000 lbs is entered as the low current operation parameter and the Mode function is set to 4-20ma operation, when the displayed gross weight is less than or equal to 1,000 lbs, the current output will transmit 4 milliamps. In the gross mode, the range of raw values is from 0 to 65,535. In the net mode, the range of raw values is from -65,535 to +65,535, with the default being 0. The "-" Key toggles between negative and positive.

The **20ma** function sets the high current (20 mA) operation point. The value entered will determine the point where the transmitter outputs the maximum current. If 20,000 lbs is entered as the high current operation point, the current output will transmit 20 milliamps when the gross weight is greater than or equal to 20,000 lbs.

Current outputs may be set to transmit either the net or gross value (**Net/Grs**). An asterisk indicated the current net or gross condition of the output. Measuring the Gross weight is the default mode of the MVS.

If the Microprocessor PCB detects a problem with a signal processor (Analog to Digital Converter [ADC] channel, Sonologic device, slave MVS, model 1000, etc.,) one of three fail-safe (**Fsafe**) conditions can be applied to a current transmitter:

1. LO
2. HI (Default)
3. NC

The LO setting would force the current output to be 0 (in 0-20 mA operating mode) or 4 mA (in 4-20 mA operating mode) in a fail-safe condition. The HI setting would force the output to be 20 mA. The NC setting means no action will be taken in a fail-safe condition. A fail-safe condition will remain in effect until the problem has been corrected.

The following are examples of conditions of fail-safe conditions:

1. ADC overrange/underrange condition.
2. Communication error with an ADC card within an MVS.
3. Communication error with serial device.
4. Echo loss condition of a Sonologic device.

Rprt. When this mode is accessed the display will show the current transmitters assigned to the displayed vessel. The top line of the display shows an assigned output number along with its rack/slot number and channel number within the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to toggle between the two output channels (if assigned).

Add. This function requires the KM MFG code to be entered before current output channels can be added. The **Add** Function is used to add current output channels (up to two) to the displayed vessel. The top line of the display shows the first available current transmitter, the rack/slot number, and the channel number on the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other unassigned current output channels and stop at the desired channel. Press the ENTER Key to add the channel. I/O CHANNEL ENTERED will display to confirm the channel addition.

Delete. This function requires the KM MFG code to be entered before current output channels can be deleted. The **Delete** Function is used to delete previous added current output channels from the displayed vessel. The top line of the display shows an assigned current transmitter number, the rack/slot number, and the channel number on the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned current output channels and stop at the channel you want to delete. Press the ENTER Key to delete the channel. I/O CHANNEL DELETED will display to confirm the channel deletion. This particular channel is now available for use again. This function requires the KM MFG code to be entered before current output channels can be added.

Serl

This mode is used to configure the two serial ports (COM1 and COM2) on the Microprocessor PCB. Both ports can be hardware configured to operate with three standard communications interfaces: RS-232, RS-422, and RS-485. (Refer to Table B-1 in Appendix B for the dipswitch settings used to configure the serial ports on the microprocessor PCB.)

There are six standard BAUD rates (bits per second) that can be set in the BAUD Mode for MVS serial communication:

1. 300
2. 1200
3. 2400
4. 4800
5. 9600 (default setting)
6. 19200

An asterisk indicates the current BAUD rate selection of the serial port.

The serial port parity is configured ODD, EVEN, or NONE (default setting) in the Par Mode. An asterisk indicates the current parity selection.

The number of data bits that make up a transmitted character is configured in the Data Mode. The choices are:

1. SEVEN
2. EIGHT (default setting)

The number of stop bits used to end an character field is configured in the Stop Mode. The choices are:

1. ONE (default setting)

2. TWO

An asterisk indicates the current setting.

Handshaking is set up for each serial port in the Hshak Mode. Setting handshaking parameters is necessary when a large amount of data is transmitted and the receiving device, such as a printer, cannot process the data quickly enough. In this case, the receiving device can force the "Clear to Send" (CTS) handshake control line low. This causes the MVS to pause until the device is ready to receive for more data. The handshaking default setting is OFF. (Refer to the serial port wiring drawing in Appendix E.)

The serial port mode of operation is set up in the Mode function. The choices are:

COM1	**COM2**
1. MASTER	1. PRINTER
2. SLAVE (default setting)	2. SLAVE (default setting)

The slave mode of an MVS can only respond to serial commands from a talking device, such as a PC running a Kistler-Morse ROPE system or another MVS configured as a master. An MVS operating in the MASTER setting will initiate all serial communications with other slave serial devices. These other slave devices can be any of Kistler-Morse's signal processors or other manufacturers' signal processors that support serial communications. Only one master device can exist on a serial port at one time. All printer functions have their outputs directed to COM2. Be sure to use COM2 and select PRINTER when connecting a printer to the MVS.

The base address of the serial port is set up in the Addr Mode. Upon entry into the function, two number fields can be seen on the lower line of the display. The first number is the numerical address with the second number being the hexidecimal equivalent. The alphanumeric keys are used to input a number directly or the arrow keys can be used to scroll to a number. Only the numerical address can be altered with the keypad. The hexidecimal number will change automatically once the numerical value is entered. Addresses can range in value from 0 to 255 (0 to FF Hexidecimal), with 01 being the default setting. The serial address of any MVS signal processor can be calculated by using the following formula:

Serial Address = Base Address + MVS ID # - 1

If an RF modem is used on COM1, it may be necessary to enable the Modem function. A longer serial communication timeout may be necessary when using RF modem to keep "COM ERRORS" from occurring. Enabling this function will lengthen the communications timeout.

Rtare

This mode is used to access remote tare functions. The remote tare capabilities are implemented through the Remote Tare PCB. Each card contains eight individual input channels. These input channels are activated by applying AC or DC voltage, depending on the type of input module used. An input channel that has been properly activated and has been assigned to a vessel (one remote tare channel per vessel) will cause that vessel to be tared. The vessel will have its NET value set to zero. If the print on tare function is enabled (Prnt Mode) a time/date stamped printout of gross (level/range) and net values will be generated and output to a printer through COM2.

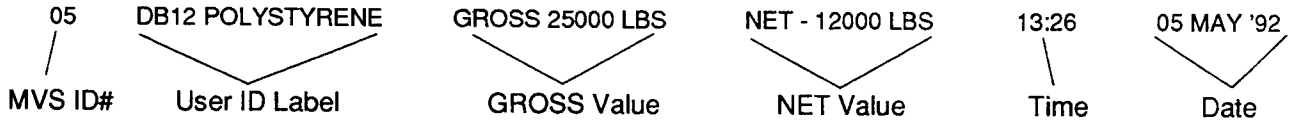
Deleting previously added remote tare input channels is done in the Del Mode. When this mode is accessed, the bottom line of the display shows the rack/slot number and the channel number on the Remote Tare PCB. Pressing the ENTER Key will delete the channel. The display will show REMOTE TARE DELETED to confirm the deletion. The channel is available to be used again. Pressing the ESC or AUTO/MAN Key will exit the function. Accessing this function requires the KM MFG code to be entered first.

Adding a remote tare input channel is done in the Add Mode. When this mode is accessed, the bottom line of the display shows the first available remote tare input channel with its rack/slot number and the channel number on the Remote Tare PCB. Pressing the ESC or AUTO/MAN Key will exit the function. Pressing any other key will cycle through all unassigned remote tare channels that are available for use. To add a remote tare channel, cycle to a desired channel. Press the ENTER Key to add the channel. The display will show REMOTE TARE ENTERED confirming the channel addition. Accessing this function requires entering the KM MFG code first.

The Report Mode is used to see which vessels in the system have a remote tare. When you first access this mode, the display will briefly show the vessel number and then change to show the address and channel number of the remote tare if it exists. If the vessel does not have a remote tare, a message stating so will display. Pressing the ESC or AUTO/MAN Key will exit the function.

Prnt

Outputting gross and net data to a printer from the current vessel is done in this mode using the GO1 function. (Pressing the "-" Key in Manual Mode will do the same thing as the GO1 function.) Data from signal processors communicating serially with the MVS is also output with this function. A typical printout looks like this:



Outputting gross and net data to a printer from all enabled vessels is done using the GO_All function. The printout will look the same as that shown above.

Print-on-Tare is enabled and disabled with the Tare function in the Prnt Mode. When enabled, any tare operation of a vessel (using the front panel TARE, NET/GROSS Key, serial tare, or remote tare) will cause the net/gross data of that vessel to be output to a printer. A typical printout looks the same as that shown above. (Note: An asterisk is printed with the channel being tared.)

Cal Mode

Calibrating the Multi-Vessel System to monitor the contents of each vessel is done in this mode. The Cal Menu has three submenus: Auto, Manual, and Linear.

Auto

This mode is used to set the lo span, hi span, and zero calibration. When in the **Disply** Mode, pressing the ENTER key repeatedly allows you to view the values that have been entered for the following parameters: hi span weight, lo span weight, hi span counts, lo span counts, zero weight, zero counts, scale factor (SCF) weight, and scale factor counts. The **Reset** mode allows you to reset all of the calibration data to the factory-set default values. You must enter a code before the MVS will perform the reset function. The code is set up in the Service Mode and is explained later.

Manual

This mode is used to manually set the scale factor counts, scale factor weight, and zero counts. When in the **Disply** Mode, pressing the ENTER key repeatedly allows you to view the values that have been entered for the following parameters: hi span weight, lo span weight, hi span counts, lo span counts, zero weight, zero counts, scale factor (SCF) weight, and scale factor counts. (Note: After a Manual Calibration is performed, only the scale factor weight and counts, and zero counts are displayed. Hi span weight and counts, and lo span weight and counts are blanked with "*".)

The **Reset** mode allows you to reset all of the calibration data to the factory-set default values. You must enter a code before the MVS will perform the reset function. The code is set up in the Service Mode and is explained later.

Linear

This mode is used to turn on and turn off the linearization table. The table can also be set up in this mode, however, the data in the table is determined by testing the sensors at the factory. Therefore, most systems that require linearization arrive from the factory with the table already set up.

Service Mode

This mode is used to troubleshoot the MVS. There are five submenus in the Service Mode: ADC, Setpt, 4/20, Micro, and Access.

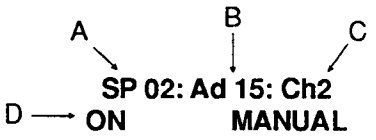
ADC

When in the ADC mode, you can display material weight of each vessel and equivalent A/D counts. The UP ARROW and DOWN ARROW keys cycles the display through the vessels. If an A/D card is replaced, the calibration information can be downloaded from the Microprocessor card to the new A/D card in the **Rtor** mode eliminating the need to re-enter the calibration parameters individually. The same can be done if the Microprocessor card is replaced. The calibration information on each A/D card in the system can be downloaded to the Microprocessor card. And, vessels can be taken off line or put on line in this mode.

Setpt

This mode allows you to turn the setpoints on and off for test purposes. When performing the Test function, a message will be displayed warning of the transfer of automatic control of the setpoints assigned to the currently selected vessel to manual control. Pressing the ESC Key or AUTO/MAN Key will terminate the function.

A typical setpoint test function display looks like this:



A. "SP 02" is the current setpoint reference number. A maximum of 960 setpoints can be assigned.

B. "Ad 15" represents the address of a particular Setpoint PCB. The '1' refers to the rack number where the Setpoint PCB resides. The '5' refers to the slot number in the rack. Addresses range in hexadecimal from 01 to 7F.

C. "Ch2" refers to the relay channel number of the setpoint on the Setpoint PCB. Each Setpoint PCB is has 8 individual relay channels.

D. "ON" indicates the current ON/OFF status of the setpoint. Pressing the F1 Key toggles the setpoint between ON and OFF.

4/20

In this mode, you can calibrate the 0, 4, and 20 mA output points, reset the EEPROM to the default parameters, and set the current transmitter output to specific values for test purposes.

ladj. When you access the ladj function, the display will show a current output screen similar to this:

A. "ADDR 14" is the address of the 4-20 PCB shown in hexadecimal. The '1' refers to the rack number where the PCB resides. The '4' refers to the slot number in the rack. If more than one 4-20 PCB exists in the system, pressing the F1 Key will cycle through all of the PCB addresses.

B. "CHAN 06" is the channel number on the 4-20 PCB. Each 4-20 PCB has 8 multiplexed current output channels so "CHAN 06" represents the sixth channel on the PCB residing in the fourth slot in rack one. The F3 Key will cycle through all channels within the given 4-20 PCB.

C. "20ma" indicates the point to be calibrated. There are three possible calibration points: 20ma, 4ma, and 0ma.

D. This number represents the value output to the 4-20 PCB to cause its output to match the point being calibrated. Calibration is performed by manipulating the arrow keys while monitoring the current output of the selected 4-20 channel. When the measured output current is reached, pressing the ENTER Key will record the calibration counts in the 4-20 PCB's EEPROM. At the same time, the display is advanced to the next calibration point.

E2rst. This function resets the nonvolatile (EEPROM) memory of the displayed 4-20 PCB. When "YES" is selected, the function will be initiated followed by "FUNCTION ENTERED". The display will automatically advance to the address of the next 4-20 PCB. The following are the default settings to which the 4-20 PCB will be reset:

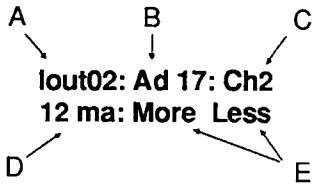
1. All channels are set to 4-20ma Mode.

2. The 4-20 high value is set to 9999 (stored in the Microprocessor PCB).

3. The 4-20 low value is set to 0 (stored in the Microprocessor PCB).

4. The calibration values are set as follows:
   20 mA value = 14329
   4 mA value = 3738
   0 mA value = 1096

Test. This function allows manual activation of current output channels outside of normal control. A message is issued warning that the automatic control of 4-20 outputs assigned to the currently selected vessel is transferred to manual control. Pressing the ESC Key or AUTO/MAN Key will terminate the function. After the warning message, if more than one 4-20 has been assigned, a selection of the two 4-20 channels is offered. A typical 4-20 test function display looks like this:



A. "Iout02" is the current 4-20 reference number. All actions performed are with respect to this number. This number can range from 1 to 240.

B. "Ad 17" is the address (hexadecimal) of the 4-20 PCB. Addresses can range from 01 to 7F. The first number in the example (1) indicates the rack number and the second number (7) indicates the slot in the rack where the 4-20 PCB resides.

C. "Ch2" is the channel number of the 4-20 PCB. Each 4-20 PCB has eight multiplexed current output channels.

D. "12ma" represents a value that has been sent to the 4-20 channel being tested. If the current mode selected is 0/20ma, the output will range from 0 mA to 20 mA in 2 mA steps. If in the 4/20ma mode the output will range from 4 mA to 20 mA in 2 mA steps.

E. "More" or "Less" refers to the increase ("More") or decrease ("Less") of the output. Pressing the F2 Key increases the output in 2 mA steps and the F3 Key decreases the output in 2 mA steps.

Micro

This mode allows you to clear the 16-character vessel ID, test the keyboard, print out the set-up and calibration parameters (if a serial printer is connected to the MVS), scan the addresses in the system, test the non-volatile RAM in the Microprocessor PCB, monitor the serial port, and set up an access code.

IDrst. This function resets the top line (user defined) of the current vessel. Once this function is used, only the MVS ID (vessel) number will be on the top line of the display.

KEY	NUMBER
1 (STU)	01
2 (VWX)	02
3 (YZ)	03
4 (JKL)	04
5 (MNO)	05
6 (PQR)	06
7 (ABC)	07
8 (DEF)	08
9 (GHI)	09
0 (SPACE)	10
. (PERIOD)	11
- (MINUS)	12
MENU	13
F1	14
F2	15
F3	16
*ESC	17
*AUTO/MAN	18
(UP ARROW)	19
(DOWN ARROW)	20
BLANK	21
(BACK SPACE)	22
SHIFT	23
ENTER	24

*Note: These keys will abort the function

Table 3-1. List of Keys and Corresponding Numbers.

KeyT. This function will display the number of the last key that was pressed Table 3-1 lists all the keys and their corresponding reference number:

Prnt. This function prints information about current setups for every enabled vessel. A typical print-out is shown below:

MULTI-VESSEL SYSTEM (MVS) PARAMETERS

NO- IDENTIFICATION - ADDR-CH-EXT-ENB-LIN/ON-TYPE

02 02 TEST LABEL 12 02 N Y N MI

CALIBRATION PARAMETERS

HI SPAN CNT - LO SPAN CNT - HI SPAN WT - LO SPAN WT

497689 count 30768 count 39999 lbs 0 lbs

DELTA CNT	DELTA WT	ZERO CNT	ZERO WT
19000 count	39999 lbs	30768 count	0 lbs

LINEARIZATION PARAMETERS

POINT	RAW INPUT COUNTS	CORRECT OUTPUT COUNTS
01	32768	32768
02	35768	35768
03	38768	38768
04	41768	41768
05	44768	44768

I^2C PCB Type	Action Taken By Micro PCB
ADC PCB in MVS Rack	1. 8 vessels are allocated in the Microprocessor PCB's memory. 2. Each vessel is initialized with 1 of 8 channels. 3. Each channel is assigned the I^2C address of the responding ADC PCB. 4. Enable status for each channel is collected from the ADC PCB. 5. Averaging for each channel is collected from the ADC PCB. 6. Linearization is disabled for each channel.
Setpoint PCB	1. 8 setpoint references are allocatd in the Microprocessor PCB's memory. 2. Each setpoint is initialized with 1 of 8 channels. 3. Each setpoint channel is assigned the I^2C address of the respoinding Setpoint PCB.
4-20 PCB	1. 8 4-20 references are allocated in the Microprocessor PCB's memory. 2. Each 4-20 is initialized with 1 of 8 channels. 3. Each 4-20 channel is assigned the I^2C address of the responding 4-20 PCB.

Table 3-2. Actions Perfomed by the Address Polling Microprocessor PCB.

SETPOINT PARAMETERS

SETPT	ADDR	CH	EXT	SWTCH VALUE	DEADBAND	HI/ON
01	19	04	N	1000 lbs	2 lbs	N
02	19	05	N	2000 lbs	50 lbs	N
03	19	06	N	3000 lbs	780 lbs	Y
04	19	07	N	4500 lbs	2 lbs	N
05	19	08	N	9500 lbs	1350 lbs	N
06	24	01	N	17600 lbs	2 lbs	Y
07	24	02	N	25225 lbs	6150 lbs	Y
08	24	03	N	35000 lbs	208 lbs	N

CURRENT OUTPUT PARAMETERS

IOUT#	ADDR	CH	EXT	HI VALUE	LO VALUE	MODE
01	18	01	N	12000 lbs	1000 lbs	4/20
02	18	02	N	1000 lbs	12000 lbs	0/20

REMOTE TARE PARAMETERS

RTARE	ADDR	CH
	16	03

RScn. This function allows the MVS to automatically rescan all of the addresses in the system or allows you to manually rescan and modify selected addresses. In the Auto Mode, selecting **All** automatically rescans all addresses including the internal integrated circuit (I^2C) bus and external serial bus through COM1 port. The COM1 port is scanned ONLY if the MVS is set up to be a MASTER. If set up to be a SLAVE, only the I^2C bus is scanned. The Microprocessor PCB starts the polling process with an "identify" command, beginning with address 1 to 7F Hex in the internal I^2C bus. Each PCB (Setpoint, 4-20, etc.) has a unique coded response. The Microprocessor PCB initializes its nonvolatile memory in accordance to these responses. Note that prior to any address polling, all references to vessels, setpoints, 4-20 current outputs, etc. are erased. Once the I^2C polling is done, external addresses through the COM1 serial port are examined. Table 3-2 lists actions performed by the address polling Microprocessor PCB. Refer to SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES on Page 3-25

The **I2c_I/O** Function does the same as the "All" function except only the internal I2C I/O PCBs (Setpoint, 4-20, etc.) are polled. Any internal signal processors, such as the ADC PCB, remain unchanged in memory and the serial port (COM1) is not scanned.

The **Man** Function allows the modification of the internal (I^2C) and external (COM1) address parameters. This function requires the KM Service Code to be entered before gaining access.

Stdr. This function provides the ability to standardize each A/D channel of an internal ADC PCB. Standardizing makes all A/D channels the same and is initially performed at the factory. This function allows backup ADC PCBs to perform identically to functioning ADC PCBs without having to recalibrate.

RsRAM. This function resets the NVRAM on the Microprocessor PCB to default parameters and requires the MVS service code to be entered first before gaining access.

Ramtst. This function performs an internal, nondestructive test on the Microprocessor PCB NVRAM. Upon completion of the test, this message should display:

MICRO NVRAM TEST
PASSED!

Serl. This function monitors the COM1 serial port when the MVS is set up as the MASTER unit. The information displayed in this function is the vessel number (MVS ID), the information in the transmit (TX) buffer and the information in the receive (RX) buffer.

Access

This mode allows you to enter the KM MFG Code and to set up a user Access Code. The KM MFG Code must be entered first before additional setpoints and 4-20 mA outputs can be added. The section titled *KM MFG Code* on Page 3-1 describes how to enter the code. A user-selected Access Code can also be set up in this mode. Once in place, the Access Code will have to be entered first before setup and calibration parameters can be changed.

SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES

When the MVS first arrives from the factory, it has already been set up to recognize the addresses of the ADC PCBs. However, the address(es) of any slave unit(s) connect to the serial port of the MVS have not been brought on line in the communication network. Follow this procedure to enable the MVS to communicate with the slave unit(s) through the serial port.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal ⇒

3. Press the MENU Key again to display the second page of the menu. The display will look like this:

MAIN MENU
Service ⇒

4. Press the F1 Key to access the Service Mode. The display will look like this:

SERVICE ROUTINES
ADC Setpt 4/20 ⇒

5. Press the MENU Key to display the second page of the menu. The display will look like this:

SERVICE ROUTINES
Micro Access ⇒

6. Press the F1 Key to access the Micro Mode. The display will look like this:

MICRO FUNCTIONS
IDrst KeyT Prnt⇒

7. Press the MENU Key to display the second page of the menu. The display will look like this:

MICRO FUNCTIONS
RScn RsRAM Stdr⇒

8. Press the F1 Key to access the RScn Mode. The display will look like this:

RE-SCAN MENU
Auto Man

9. Press the F1 Key to access the Auto Mode. The display will look like this:

AUTO SCAN MENU
All i2c_IO

10. Press the F1 Key to access the All function. The display will look like this:

RE-SCAN SYSTEM?
YES NO

11. Press the F1 Key to select YES. The display will look like this:

SCANNING...
EXTERNAL ADDR 'XX'

Addresses will scroll in place of the 'XX'. The MVS will scan the entire network and bring on line all of the units whose addresses it finds. This includes all ADC PCBs in the MVS as well as the slave units connected to the MVS serial port. When the MVS is through scanning, The following message will be displayed:

'XX' SIGNAL
PROCESSORS FOUND

The actual number of signal processors in your system will be displayed in place of the 'XX'

12. Press the ESC Key to scroll backwards through the menus or the AUTO/MAN Key to return the display to vessel monitoring.

SETTING UP THE MULTI-VESSEL SYSTEM

This section describes the procedures to set up the Multi-Vessel System. If you set up an access code as described in the previous section, enter the code when prompted by the display. Otherwise, follow the procedures as described in the following sections.

Vessel Identification (MVS ID)

This mode allows you to type in a title to identify each vessel on the display.

NOTE

The MVS arrives from the factory with a default number (MVS ID) assigned for each vessel in the system. Pressing the ESC Key when the MVS is in the Manual Mode will display the default MVS ID number even if the number is excluded when the vessel is retitled.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.
3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the menu:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F1 Key to access the ID Function. The display will look like this:

01
ALPHA-NUM LABELS

The SHIFT LED will be illuminated indicating that the letters can be typed with the keypad. Press the SHIFT Key if you want to type numbers. The LED will turn off.

7. Pressing a key will cycle through the three letters labeled above it. Select a character and press the ENTER key to move the cursor to the next space. Press the ARROW key to back space.

NOTE

When the SHIFT LED is on, the F1, F2, F3, AUTO/MAN, UP ARROW, DOWN ARROW, and Punctuation Keys can be used to type in a variety of Greek and Spanish characters.

8. Press the ESC key to return to the DISPLAY MENU, again to return to the MAIN MENU, a third time to return to vessel monitoring.

Defining the Unit of Measure

This mode is used to define the unit of measure in which you want the MVS to display the contents of the vessel. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F3 Key to access the Units of Measure Function. The display will look like this:

UNITS OF MEASURE
Common Custom

Press F1 to select **Common** or F2 to select **Custom**.

6. Selecting **Common** allows you to choose the contents to be displayed in pounds (Lbs), kilograms (Kgs), tons (Tns), gallons (Gal), liters (Ltr), barrels (Brl), percentage (%), feet (ft), inches (in), volts (V), millivolts (mV), or milliamps (mA). The display will look like this:

PRE-DEFINED UNIT
lbs Kgs tns⇒

7. Press the MENU Key to cycle the display through the selections.

8 Press the F1, F2, or F3 Key that corresponds to the desired unit of measure. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

9. If you select **Custom**, the unit of measure last chosen will display in the right-hand corner of the display. For example:

UNITS OF MEASURE
> lbs

Use the keyboard to type in any three characters to replace lbs as the unit of measure. (Refer to **USING THE DISPLAY AND KEYBOARD**.)

10. Press the ESC key to return to the DISPLAY MENU, and again to return to the MAIN MENU.

Setting Up the Display Format

This mode is used to set up the display format. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the DISPLAY MENU:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F2 Key to access the Format Function. The display will look like this:

CHOOSE FORMAT
999900* 99990

An asterisk will follow the current format.

7. Press the MENU Key to cycle the display through the selections.

8 Press the F1, F2, or F3 Key that corresponds to the desired display format. The display will flash a message acknowledging the new entry and return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Count By Function

This mode is used to set up the display to count by increments of 1, 2, 3, 10, 20, 50, 100, 200, 500, or 1000. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F2 Key to access the Count By Function. The display will look like this:

CHOOSE COUNTBY
***1 2 5⇒**

The asterisk indicates the number the MVS is currently counting by.

6. Press the MENU Key to cycle the display through the selections.

7. Press the F1, F2, or F3 Key that corresponds to the number you want the system to count by. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Averaging Function

This mode is used to set the number of individual readings the MVS will average for each readout. (See Appendix C. Glossary of Set-Up and Calibration Terms.) Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F1 Key to access the Averaging Function. The display will look like this:

ENTER AVERAGING
> 01 FACTOR

6. Use the UP ARROW or DOWN ARROW Keys to scroll to a value or use the keyboard to enter a specific value between 1 and 128. (The system will not accept zero as an averaging factor.)

7. Press the ENTER Key. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Setpoints

The Setpt Mode in the I/O Menu is used to set up the setpoints for each vessel. The setpoint value is the weight or level of material in a vessel that you wish a device (e.g. an alarm) to activate or deactivate. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the setpoints you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F1 Key to access the SetPt Mode. The display will look like this:

SETPOINTS
Set Report

6. Press the F1 Key to select **Set** and set up a setpoint. If only one setpoint has been assigned, the display will look like this:

SELECT SETPOINT
SP1

If more than one setpoint has been assigned, the display will list them. An arrow at the end of the line indicates there are more setpoints listed on the next page.

7. Press F1, F2, or F3 to select the desired setpoint. The display will look like this:

SELECT FUNCTION
Value Dead Hi/Lo

8. Press F1 to select **Value**. The display will look like this:

SP1 VALUE
> 0 lbs

9. Use the keypad or the ARROW Keys to input a value at which the setpoint is to activate.

10. Press the ENTER Key to save the value in memory. The display will return to:

SELECT FUNCTION
Value Dead Hi/Lo

11. Press F2 to select **Dead**. This function allows you to set up a deadband for the setpoint. The display will look like this:

SP1 DEADBAND
> 0 lbs

The deadband value, when other than zero, determines the point at which a setpoint relay returns to its normal on/off state. The deadband value can be greater or less than the setpoint value, depending on whether the ENERGIZE level has been set for "Hi" or "Lo" (Step 13).

EXAMPLE: In a pump-down application for a 10,000-pound capacity vessel, Setpoint 1 is set at 9,000 lbs, ENERGIZE is set at "Hi", and the deadband is set at 1,000 lbs. When the contents exceed 9,000 lbs, the setpoint activates a pump which continues to operate until the setpoint is de-energized at 8,000 lbs (9,000 lbs less the 1,000 lb deadband).

Use the keypad or ARROW Keys to input the deadband value at which the setpoint is to return to its normal state.

12. Press the ENTER Key to save the value in memory. The display will return to:

SELECT FUNCTION
Value Dead Hi/Lo

13. The setpoint relays can be configured to change state either above (**Hi**) or below (**Lo**) the setpoint value. Press F3 to select **Hi/Lo**. The display will look like this:

ENERGIZE HI/LO?
Hi *Lo

An asterisks indicates the current selection.

14. Press F1 to select **Hi** or F3 to select **Lo**. The display will acknowledge your selection and then return to:

SELECT FUNCTION
Value Dead Hi/Lo

15. Press the ESC Key. The display will return to:

SELECT SETPOINT
SP1

If applicable, select another 'F' Key and follow Steps 7 through 15 to set up another setpoint

Setpoint Report

The MVS allows you to view the address and channel number of the setpoints assigned to the current vessel. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with thr setpoints information you want to view.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F1 Key to access the SetPt Mode. The display will look like this:

SETPOINTS
Set Report

6. Press F3 to access the Report Mode. The display will flash a message stating:

SETPOINTS
REPORT ON VES:__

The vessel number you previously scrolled to will be displayed after **VES:**. The display will then change to:

SP1 Output Chan
Addr __ Chan# __

In the blanks after **Addr** and **Chan#** will be the address number and channel number of Setpoint 1.

7. Press any key other than the ESC Key to toggle between the two setpoints to view their address and channel numbers.

8. Press the ESC Key to return the display to:

SETPOINTS
Set Report

9. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the 4-20 mA Current Transmitter

The Iout Mode in the I/O Menu is used to set up the 4-20 mA current transmitter for each vessel that has this option. The current transmitter can be set up for 4-20 mA operation or 0-20 mA operation. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the 4-20 mA current transmitter you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F2 Key to access the Iout Mode. The display will look like this:

CURRENT OUTPUT
Set Mode Rport

6. Press the F2 Key to access the **Mode** function. The display will look like this:

Addr _ Chan# _
4-20ma* 0-20ma

In the blank after **Addr** will be the address number of the current transmitter assigned to the vessel chosen in Step 2. After **Chan#** will be the channel number on the 4-20 PCB where the peripheral equipment is connected. An asterisk will indicate which mode (4-20ma or 0-20ma) is currently enabled.

NOTE

Refer to the section titled **ADDRESS ASSIGNMENTS** in Appendix E for detailed information on how address and channel numbers are determined for each vessel.

7. The minimum current output by the current transmitter is 4 mA when **4-20ma** is selected. When **0-20ma** is selected, the minimum current output by the current transmitter is 0 mA. Press F1 to select 4-20ma or F3 to select 0-20ma. The display will flash a message acknowledging your selection and return to:

CURRENT OUTPUT
Set Mode Rport

8. Press the F1 Key to access the **Set** Mode. The display will look like this:

SET:
4ma 20ma

(If you selected 0-20ma in Step 7, the display will show 0ma in place of 4ma.)

9. Press the F1 Key to access **4ma**. The display will look like this:

4/20#1 LO VALUE
> 0 lbs

(The unit of measure you set up in Units Mode in the Disp Menu will show in place of lbs.)

10. Use the keypad to input a value representing the material weight (level, volume, etc) in the vessel where you want the current transmitter to output 4 mA (0 mA if applicable).

11. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging the selection and return to:

SET:
4ma 20ma

12. Press the F3 Key to access **20ma**. The display will look like this:

4/20#1 HI VALUE
> 0 lbs

(The unit of measure you set up in Units Mode in the Disp Menu will show in place of lbs.)

13. Use the keypad to input a value representing the material weight (level, volume, etc) in the vessel where you want the current transmitter to output 20 mA.

14. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging the selection and return to:

SET:
4ma 20ma

15. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

4-20 mA Current Output Report

The MVS allows you to view the address and channel number of the 4-20 mA current outputs of the current vessel. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the 4-20 mA current output information you want to view.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F2 Key to access the Iout Mode. The display will look like this:

CURRENT OUTPUT
Set Mode Rport

6. Press F3 to access the Rport Mode. The display will flash a message stating:

CURRENT OUTPUT
REPORT ON VES:__

The vessel number you previously scrolled to will be displayed after **VES:**. The display will then change to:

ONLY Output Chan
Addr __ Chan# __

In the blanks after **Addr** and **Chan#** will be the address number and channel number of current output.

7. Press the ESC Key to return the display to:

CURRENT OUTPUT
Set Mode Rport

8. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Defining the Bar Graph

NOTE

Perform the procedures in this mode only if the vessel is to be calibrated in the Auto Mode. (See the CALIBRATION MENU.) If the Manual Mode is used to calibrate the vessel, the MVS calculates the maximum span automatically.

This mode is used to set the maximum span which is the total capacity of the vessel. The MVS calculates the difference between the hi span and lo span entered in the Auto Mode. It compares this figure with the maximum span entered in this mode to produce a bar graph representing the percentage of the vessel filled with material. Pressing the ENTER Key will toggle the display between bar graph and numerical display.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

DISPLAY MENU
BarS Cont Brite⇒

6. Press the F1 Key to access the BarS Function. The display will look like this:

SET MAXIMUM SPAN
0 lbs

The unit of measure you set up in **Unit** Mode will be shown in place of lbs.

7. Use the keypad to type in a number for the maximum span. (The UP ARROW and DOWN ARROW keys can be used to scroll to a number if desired.)

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Contrast of the Display

This mode allows you to adjust the contrast of the display. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

DISPLAY MENU
BarS Cont Brite⇒

6. Press the F2 Key to access the **Cont** Function. The display will look like this:

CONTRAST CONTROL
128:LiteΔ DarkV

7. Press the UP ARROW Key to gradually lighten the display characters or the DOWN ARROW Key to gradually darken the characters. The number will increase as the characters gets lighter and decrease as the characters gets darker.

   The F2 Key lightens the characters at a quicker pace (8 increments at a time). The F3 Key darkens the characters at a quicker pace.

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to retu to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Brightness of the Display

This mode allows you to adjust the brightness of the display. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

DISPLAY MENU
BarS Cont Brite⇒

6. Press the F3 Key to access the **Brite** Function. The display will look like this:

BACKLITE CONTROL
128:LiteΔ DarkΔ

7. Press the UP ARROW Key to gradually increase the backlight or the DOWN ARROW Key to gradually decrease the backlight. The number will increase as the display gets lighter and decrease as the display gets darker.

   The F2 Key increases the backlight at a quicker pace (8 increments at a time). The F3 Key decreases the backlight at a quicker pace.

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Scan Time of the Display

This mode allows you to choose the amount of time the MVS will display the vessel monitoring information before scrolling to the next vessel. Scan time can be set to 1 second, 2 seconds or 5 seconds. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the DISPLAY MENU:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F3 Key to access the Scan Time Function. The display will look like this:

SELECT SCAN TIME
1sec* 2sec 5sec

An asterisk will follow the current format.

7 Press the F1, F2, or F3 Key that corresponds to the desired scan time. The display will flash a message acknowledging the new entry and return to the DISPLAY MENU.

8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

CALIBRATING THE MULTI-VESSEL SYSTEM

If you set up an access code as described in the SETTING UP AN ACCESS CODE section, enter the code when prompted by the display. Otherwise, follow the procedures as described in the following sections.

High-Accuracy Calibration

The high-accuracy calibration procedure provides the highest accuracy but requires that the vessel be completely empty.

The principle is this: The vessel is completely emptied, and the Lo Span is set to zero [point (1) in Figure 3-2]. A known quantity of material representing at least 25% of the vessel's total capacity is then added to the vessel That quantity is entered as the Hi Span value [point (2) in Figure 3-2]. The Multi-Vessel System will set zero automatically relative to the Hi Span and Lo Span values.

The degree of accuracy improves with greater percentages of the known quantity added. For example, adding 50% of the vessel's total capacity results in greater accuracy than adding 25% of the total capacity.

NOTE

If at any time during the calibration procedure a warning or error message displays, refer to Appendix D for an explanation of how to correct the problem.

Follow this procedure.

1. Completely empty the vessel.
2. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
3. Press the MENU Key to display the MAIN MENU. The display will look like this:

   MAIN MENU
   Disp I/O Cal⇒

4. Press the F3 Key to access the Cal Menu. The display will look like this:

   CALIBRATION MENU
   Auto Manual⇒

5. Press the F1 Key to access the Auto Mode. The display will look like this:

   AUTO CAL MENU
   LoSpan HiSpan⇒

6. Press the F1 Key to access **LoSpan**. The display will look like this:

   LO SPAN AUTO CAL
   > lbs

   (The unit of measure you set up in the Units Mode will show in place of **lbs**.)

7. Use the keypad to input zero as the Lo Span value.
8. Press the ENTER Key to save the value in memory. Lo Span is now set [point (1) in Figure 3-2]. The display will flash a message acknowledging your selection and return to:

   AUTO CAL MENU
   LoSpan HiSpan⇒

9. Add a known quantity of material to the vessel that represents at least 25% of the vessel's total capacity.

10. Press the F3 Key to access **HiSpan**. The display will look like this:

HI SPAN AUTO CAL
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

11. Use the keypad to input a value that represents the quantity of material added to the vessel.

12. Press the ENTER Key to save the value in memory. Hi Span is now set [point (2) in Figure 3-2]. The display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

The Multi-Vessel System is now calibrated for the highest accuracy for the selected vessel.

13. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Calibration by Adding a Known Quantity of Material

This method provides a calibration that is accurate enough for most applications and does not require the vessel to be completely empty.

The principle is this: A value estimated to be the quantity of material in the vessel is entered as the Lo Span value [point (1) in Figure 3-3]. A known quantity of material representing at least 25% of the vessel's total capacity is then added to the vessel. The known quantity plus the estimated quantity is entered as the Hi Span value [point (2) in Figure 3-3]. This establishes the scale factor. Zero is manually adjusted as described in the following procedure. If zero is not adjusted, the Multi-Vessel System will set zero automatically relative to the Hi Span and Lo Span values.

The degree of accuracy improves with greater percentages of the known quantities. Adding 50% of the total capacity results in greater accuracy than adding 25% of the total capacity.

NOTE

If at any time during the calibration procedure a warning or error message displays, refer to Appendix D for an explanation of how to correct the problem.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F3 Key to access the Cal Menu. The display will look like this:

CALIBRATION MENU
Auto Manual⇒

4. Press the F1 Key to access the Auto Mode. The display will look like this:

AUTO CAL MENU
LoSpan HiSpan⇒

5. Press the F1 Key to access **LoSpan**. The display will look like this:

LO SPAN AUTO CAL
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

6. Use the keypad to input a value that represents the estimated quantity of material in the vessel.

7. Press the ENTER Key to save the value in memory. Lo Span is now set [point (1) in Figure 3-3]. The display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

9. Add a known quantity of material to the vessel that represents at least 25% of the vessel's total capacity.

10. Press the F3 Key to access **HiSpan**. The display will look like this:

HI SPAN AUTO CAL
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

11. Using the keypad, input the value equal to the sum of the known quantity (Step 9) and the estimated quantity (Step 6).

12. Press the ENTER Key to save the value in memory. Hi Span is now set. Th display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

13. Shifting the scale factor line from the dotted line to the solid line in Figure 3-3 is accomplished by setting zero calibration. The procedures to do so are in the **Setting Zero** section. If both Lo Span and Hi Span weights are accurate values, setting zero is not necessary. Memory values of Lo Span and Hi Span weight remain unchanged. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Calibration by Subtracting a Known Quantity of Material

This method of calibration is appropriate when it is easier to remove material from the vessel than to add it. As with the other calibration methods, the degree of accuracy improves with greater percentages of the known quantities. Removing 50% of the total capacity results in greater accuracy than removing 25% of the total capacity.

The principle is this: A value estimated to be the quantity of material in the vessel is entered as the Hi Span value [point (2) in Figure 3-3]. A known quantity representing no less than 25% of the total capacity of the vessel is removed. The estimated Hi Span value minus the known quantity that is removed is entered as the Lo Span value [point (1) in Figure 3-3]. This establishes the scale factor. Zero is adjusted as described in the section titled **Setting Zero**. If Zero is not adjusted, the Multi-Vessel System will set zero automatically relative to the Hi Span and Lo Span values.

NOTE

If at any time during the calibration procedure a warning or error message displays, refer to Appendix D for an explanation of how to correct the problem.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F3 Key to access the Cal Menu. The display will look like this:

CALIBRATION MENU
Auto Manual⇒

4. Press the F1 Key to access the Auto Mode. The display will look like this:

AUTO CAL MENU
LoSpan HiSpan⇒

5. Press the F3 Key to access **HiSpan**. The display will look like this:

HI SPAN AUTO CAL
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

6. Use the keypad to input a value that represents the estimated quantity of material in the vessel.

7. Press the ENTER Key to save the value in memory. Hi Span is now set [point (1) in Figure 3-3]. The display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

8. Remove a known quantity of material from the vessel that represents at least 25% of the vessel's total capacity.

9. Press the F1 Key to access **LoSpan**. The display will look like this:

LO SPAN AUTO CAL
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

10. Using the keypad, input a value equal to the estimated quantity (Step 6) minus the known quantity (Step 9).

11. Press the ENTER Key to save the value in memory. Lo Span is now set. The display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

12. Shifting the scale factor line from the dotted line to the solid line in Figure 3-3 is accomplished by setting zero calibration. The procedures to do so are in the **Setting Zero** section. If both Lo Span and Hi Span weights are accurate values, setting zero is not necessary. Memory values of Lo Span and Hi Span weight remain unchanged. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Zero

The Zero_Cal function is used to allow the Multi-Vessel System to establish the zero live load point of the vessel. Setting zero translates the scale factor line of Figure 3-3 from the dotted line to the solid line position. Entering a weight value in Zero_Cal establishes point (3) in the figure. This weight value must be entered only when there is material in the vessel that equals the entered value. The MVS retains the corresponding sensor/transducer signal value when the weight value is entered.

The Zero_Cal function may be used to compensate for the following circumstances:

- The estimated weight value used during a Lo Span and Hi Span calibration is off by a greater margin than can be tolerated.
- The vessel was not completely emptied during a high-accuracy calibration procedure.
- The vessel was in fact emptied completely, but a non-zero number was displayed.

NOTE

The Zero_Cal function cannot "repair" a calibration in which the known quantity added or subtracted was actually incorrect.

Follow this procedure to set the zero calibration.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F3 Key to access the Cal Menu. The display will look like this:

CALIBRATION MENU
Auto Manual⇒

4. Press the F1 Key to access the Auto Mode. The display will look like this:

AUTO CAL MENU
LoSpan HiSpan⇒

5. Press the MENU Key to access the second page of the AUTO CAL MENU. The display will look like this:

AUTO CAL MENU
Zero_Cal Disply⇒

6. Press the F1 Key to access **Zero_Cal**. The display will look like this:

ZERO CALIBRATION
> lbs

(The unit of measure you set up in the Units Mode will show in place of **lbs**.)

7. Use the keypad to input a value that represents the known quantity of material (usually zero) in the vessel.

8. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging your selection and return to:

AUTO CAL MENU
LoSpan HiSpan⇒

The MVS automatically makes all of the necessary corrections, however, the entered values of Lo Span and Hi Span weight remain in memory even though the scale factor of Figure 3-3 no longer passes through those two points. The two points are used only to establish the slope of the calibration line.

9. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Displaying the Auto Calibration Parameters

The second page of the AUTO CAL MENU has a display function. Accessing this function allows you to view the following values that have been entered for the selected vessel: HI SPAN WT, LO SPAN WT, HI SPAN CT, LO SPAN CT, ZERO WGT, ZERO CNT, SCF WGT, and SCF CNT. (Note: After a Manual Calibration is performed, only scale factor weight and counts, and zero counts are displayed. Hi span weight and counts and lo span weight and counts are blanked with "*".) Follow this procedure.

1. While in the AUTO CAL MENU, access the second page by pressing the MENU Key. The display will look like this:

AUTO CAL MENU
Zero_Cal Disply⇒

2. Press the F3 Key to access Disply. The display will look like this:

HI_SPAN_WT XX
LO_SPAN_WT XX

(The Hi Span and Lo Span weight values will display in place of the XX.)

3. Press the ENTER Key to cycle through the parameters.

4. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

SETTING UP SERIAL COMMUNICATIONS

The **Serl** Mode in the I/O Menu is used to set up serial communications between the Multi-Vessel System and external equipment, such as a printer, a PLC, a ROPE system, etc. These parameters are set up at the factory to match the equipment that is shipped, so in most cases it is unnecessary to alter them. Refer to Appendix E for information on how to serially connect the MVS to various external equipment.

If additional equipment is added to the MVS, you must know the serial information about the equipment in order to enter it in the **Serl** Mode.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off. If necessary, use the UP Arrow and DOWN Arrow keys to scroll the display to the desired vessel.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

4. Press the F3 Key to access the Serl Mode. The display will look like this:

SELECT COM PORT
COM1 COM2

NOTE

If you are connecting a printer to the Multi-Vessel System, you must connect it to the COM2 port on the Microprocessor PCB.

5. Press F1 to set up COM1 or F3 to set up COM2. The display will look like this:

SELECT FUNCTION
BAUD PAR DATA⇒

6. Press F1 to access the BAUD Mode. The display will look like this:

SELECT BAUD RATE
300 1200 2400⇒

Press the MENU Key to display the second page of the menu:

SELECT BAUD RATE
4800* 9600 19k2⇒

An asterisk will indicate the current selection.

7. Press the 'F' Key that corresponds to the desired baud rate. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

8. Press the F2 Key to select the **PAR** Mode. The display will look like this:

SELECT PARITY
NONE* EVEN ODD⇒

An asterisk will indicate the current selection.

9. Press the 'F' Key that corresponds to the desired parity setting. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

10. Press the F2 Key to select the DATA Mode. The Menu will look like this:

SELECT DATA BITS
SEVEN *EIGHT

An asterisk will indicate the current selection.

11. Press F1 to select seven data bits or F3 to select eight data bits. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

12. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

13. Press the F1 Key to select the STOP Mode. The display will look like this:

SELECT STOP BITS
ONE* TWO

An asterisks will indicate the current selection.

14. Press F1 to select one stop bit or F3 to select two stop bits. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

15. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

16. Press the F2 Key to select the HShak Mode. The display will look like this:

HANDSHAKING?
YES *NO

An asterisks will indicate the current selection.

17. Press F1 to select YES or F3 to select NO. The display will flash a messagr acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

18. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

19. Press the F3 Key to select the MODE Function. The display will look like this:

SELECT FUNCTION
MASTER *SLAVE

An asterisks will indicate the current selection.

20. Press F1 to select MASTER or F3 to select SLAVE. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

21. Press the MENU Key twice to display the third page of the menu. The display will look like this:

SELECT FUNCTION
ADDR ⇒

22. Press the F1 Key to select the ADDR Mode. The display will look like this:

ENTER BASE ADDRS
> 01 Dec= 01 Hex

23. Use the keypad to input a base address for the serial device. The equivalent Hex number will display automatically.

24. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

25. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Point	Raw Counts	Corrected Counts
1	32768	32768
2	35768	35768
3	38768	38768
4	41768	41768
5	44768	44768

Table 3-3. Linearization Raw Counts and Corrected Counts Values.

LINEARITY

NOTE

Changing the values in the linearization table can cause the MVS to display incorrect sensor data.

The linearization function can be used to correct nonlinearities from a vessel's sensor/transducer output. The algorithm uses a five-point piece-wise linearization method with linear interpolation between points. Table 3-3 is a linearization table consisting of five raw A/D count values as inputs and five corrected A/D count values as outputs. The A/D counts range is 0 to 65,535. The first column of numbers represents the raw input A/D counts. The second column of numbers is the corresponding corrected output A/D counts. The linearization numbers are stored in the nonvolatile memories of the Microprocessor PCB and the ADC PCB. The actual calculations are performed by the ADC PCB. Figure 3-4 illustrates the linearization operation.

On/Off

This function turns on and off the linearization function of the current vessel. An asterisk shows the current condition of the function with OFF being the default parameter.

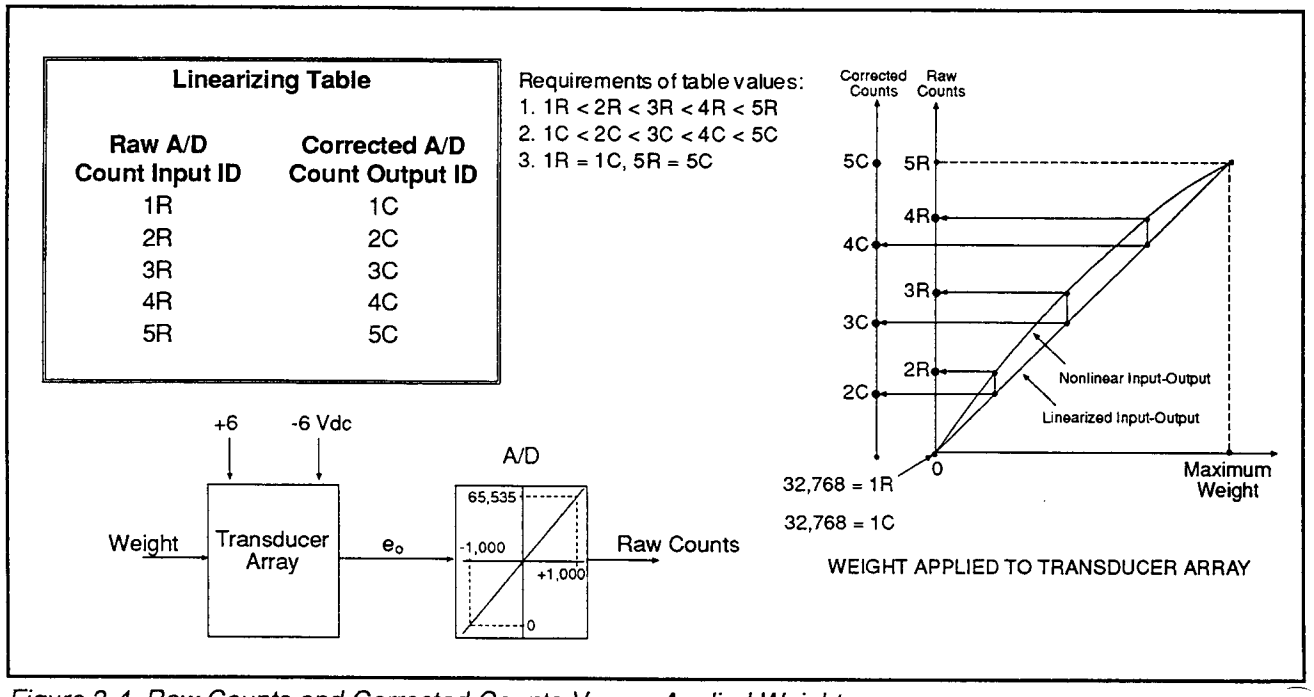
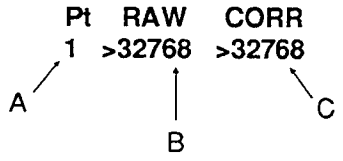


Figure 3-4. Raw Counts and Corrected Counts Versus Applied Weight.

Set

This function allows the raw count and corrected count values to be displayed. A typical display looks like this:



A. This field shows the table-point number. This number can range from 1 to 5. This number is incremented by pressing the F1 key.

B. This is the RAW counts input value and can range from 0 to 65,535. This field is selected by pressing the F2 Key. The number may be changed by direct entry using the alphanumeric keys or the arrow keys can be used to scroll to a number. The value is registered in the nonvolatile memories of the ADC PCB and the Microprocessor PCB when the ENTER Key is pressed.

C. This is the corrected counts output value and can range from 0 to 65,535. This field is selected by pressing the F3 Key. The number may be changed by direct entry using the alphanumeric keys or the arrow keys can be used to scroll to a number. The value is registered in the nonvolatile memories of the ADC PCB and the Microprocessor PCB when the ENTER Key is pressed.

Follow this procedure to enable, disable, and set up the linearization table.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F3 Key to access the Cal Menu. The display will look like this:

CALIBRATION MENU
Auto Manual⇒

4. Press the MENU Key again to display the second page of the menu. The display will look like this:

CALIBRATION MENU
Linear ⇒

5. Press the F1 Key to access **Linear**. The display will look like this:

LINEARITY MENU
ON OFF* SET

An asterisk will indicate the current selection.

6. Press the F1 Key to turn the linearization table on or the F2 Key to turn the table off. The display will flash a message acknowledging your selection and return to:

LINEARITY MENU
ON* OFF SET

An asterisk will indicate the new selection.

If you want to set up the linearization table, continue with Step 7. If not, cycle the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

7. Press the F3 Key to access the Set function. The display will look like this:

Pt	RAW	CORR
1	>32768	>32768

The cursor will be flashing next to the value that can be changed.

8. Press the F1 Key to cycle through the five table selections.

9 Press the F2 Key to select the RAW column or the F3 Key to select the CORR column.

10. Use the alphanumeric keys to directly enter a new value or the arrow keys to scroll to a new value in the selected column.

11. Press the ENTER Key to save the new value(s) in memory. The display will flash a message acknowledging your selection.

12. Cycle the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

STANDARDIZING ADC CHANNELS

Follow this procedure to standardize the channels of an ADC PCB. The KM Manufacturing Code must be entered first before gaining access.

1. Apply zero volts to all input channels of the ADC PCB under test.
2. Use the arrow keys to scroll to vessel #1.
3. Press F1 Key to select ZERO. The offset number displayed is irrelevant the first time and should be ignored.
4. Press the ENTER Key. FUNCTION ENTERED should appear indicating a successful operation.
5. Press the F1 Key to select ZERO again. This time note the zero offset number. A number between 80 and FF Hex has an offset below (negative) the nominal A/D count of 32768. Numbers between 00 and 7F Hex are above (positive) the nominal count value.
6. Apply 950 mV DC to the channel 1 input. This assumes a 12 Vdc excitation.
7. Press the F3 Key to select SPAN. The span number displayed is irrelevant the first time and should be ignored.
8. Press the ENTER Key. FUNCTION ENTERED should appear indicating a successful operation.
9. Press the F3 Key to select SPAN again. This time note the span number. A nominal number would be 10000. Numbers between 10255 and 9744 are allowed. Any number outside this range will be ignored and therefore the standardizing function would be ineffective.
10. Repeat this procedure for the remaining 7 channels. Use the arrow keys to scroll to each channel.

Chapter 4. Setup and Calibration Using the SONIC MAIN MENU

INTRODUCTION

The SONIC MAIN MENU is used to set up and calibrate Ultrasonic systems. Systems with sensors or transducers that send an analog signal to the signal processor are set up using the MAIN MENU described in Chapter 3.

The procedures for setting up the MVS and the Sonologic signal processors for material monitoring are found in the **ENTERING SONOLOGIC SET-UP PARAMETERS** section. When troubleshooting a Sonologic system, Monitor Mode and Manual Mode parameters are accessed using the Sys function located in the Service Mode/Sono Mode. Refer to Page 4-21 on how to use the Sys function and to the troubleshooting procedure on Page 4-61 **MANUALLY SETTING THE POWER AND GAIN TO FIXED VALUES**. More importantly, refer to the Sonologic signal processor operator's manual and/or the troubleshooting manual for specific troubleshooting procedures. It is a good idea to read all of the information in this chapter first before proceeding. Explanations of MVS modes and functions are provided as well as set-up information and definitions specific to Sonologic signal processor(s). Having a better understanding of the MVS and Sonologic signal processor(s) will be beneficial during setup. If just changing one or two parameters that have been previously set up, follow the procedures in the section(s) pertaining to those specific parameters.

KISTLER-MORSE FACTORY CODES

The Multi-Vessel System has two factory code numbers. Certain MVS functions require that one of these two code numbers be entered before access to the function is permitted. The following sections describe the codes and explain how they are used.

KM MFG Code

The KM MFG Code number is:

9 1 1 1

This number must be entered first before you can access certain high-priority functions, e.g. adding and deleting setpoints and/or 4-20 outputs. Once this number is entered, you have access to all functions including functions that require the KM Service Code. All functions remain accessable until the MVS is put back into Auto Scanning Mode (AUTO LED illuminated). Once in Auto Scanning Mode, it will be necessary to reenter the KM MFG Code to reaccess any high-priority function.

Some functions will prompt you to enter the code as you try to gain access. In those cases, just enter the code and continue. Other functions, such as adding and deleting setpoints and 4-20 outputs (performed in the I/O Menu), will not allow you to do so because the 'Add' and 'Delete' screen will not desplay if the number has not been entered. To activate these functions you must enter the KM MFG Code number (performed in the Service Menu) by following this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED on), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED turns off.
2. Press the MENU Key to display the MAIN MENU. The display looks like this:

   MAIN MENU
   Disp I/O Cal ⇒

3. Press the MENU Key again to access the second page of the MAIN MENU. The display will look like this:

   MAIN MENU
   Service ⇒

4. Press the F1 Key to access SERVICE ROUTINES. The display looks like this:

   SERVICE ROUTINES
   Sono Setpt 4/20 ⇒

5. Press the MENU Key to access the second page of the SERVICE ROUTINES menu. The display will look like this:

   SERVICE ROUTINES
   Micro Access ⇒

6. Press the F3 Key. The display will look like this:

   ACCESS FUNCTIONS
   USER KM

7. Press the F3 Key to get the KM MFG Code menu. The display will show

KM MFG CODE?

8. Use the keypad to enter:

9 1 1 1

An 'X' will display in place of each digit in the code.

9. Press the ENTER Key. The display will flash:

FUNCTION ENTERED

and return to:

SERVICE ROUTINES
Micro Access ⇒

10. Press the ESC Key to return to the MAIN MENU.

KM Service Code

The KM Service Code number is:

9 0 1 0

Where the KM MFG Code allows access to all functions, the Service Code (9010) allows access to specific functions. For example, if you want to access "Enabe" under "Sono" in the Service Menu, the MVS will first prompt you to enter the KM Service Code before displaying the "Enabe" screen. Punch in 9 0 1 0. The display will show 'Xs' instead of the numbers you press. Press the ENTER Key to enter the number and the "Enabe" screen will display. After you have entered the KM Service Code once, you'll have access to all of the functions requiring this code. You will not have access to functions requiring the KM MFG Code.

SETTING UP AN ACCESS CODE

The Multi-Vessel System arrives from the factory with no access code in place. This allows you to access any function in the system at will. If you want to limit access to the set-up and calibration functions, you can set up an access code which will have to be entered first before a parameter change can be made.

NOTE

Write down the access code and store it in a safe place. If you forget the number, call the factory for instructions on how to bypass the code.

Follow this procedure to set up an access code.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

3. Press the MENU Key again to access the second page of the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Service ⇒

4. Press the F1 Key to access the SERVICE ROUTINES. The display will look like this:

SERVICE ROUTINES
Sono Setpt 4/20 ⇒

5. Press the MENU Key to access the second page of the SERVICE ROUTINES menu. The display will look like this:

SERVICE ROUTINES
Micro Access ⇒

6. Press the F3 Key. The display will look like this:

SERVICE ROUTINES
User KM

7. Press the F1 Key to get the User ACCESS NUMBER Menu. The display will look like this:

SERVICE ROUTINES
>

8. Use the keypad to enter a 1-, 2-, 3-, or 4-digit number.

9. Press the ENTER Key. The display will flash a message acknowledging the new number and return to:

SERVICE ROUTINES
Micro Access ⇒

10. Press the ESC Key to return to the SONIC MAIN MENU or the AUTO/MAN Key to return the display to vessel monitoring.

THE SONIC MAIN MENU

There are four modes in the SONIC MAIN MENU of the Multi-Vessel System:

Disp I/O Cal Service ⇒

The menu tree in Figure 4-1 shows the SONIC MAIN MENU in Menu Level 1 and all of the submenus in Menu Levels 2 - 5. The menu tree is a quick-reference guide to help you find the functions you want to perform. For example, if you want to change setpoint parameters, the menu tree shows you that setpoints are set up in the I/O Menu. Level 2 shows the submenus that are displayed when I/O is selected. Level 3 shows the submenus that are displayed when a selection is made from Level 2, etc.

The sections that follow will describe the submenus and the function they perform.

NOTE

While in the MENU mode, pressing the ESC key backs the Multi-Vessel System through the MENU mode one submenu at a time. Pressing the AUTO/MAN key will take the system out of the MENU mode from any point in the menu and resume displaying material monitoring information.

Disp Mode

There are eleven submenus that can be accessed in the Disp (Display) Mode. They are:

Avg Cntby Units ID Form Scan T BarS Cont Brite Time Zclmp

Avg

This mode is used to set the number of individual readings (from 1 to 50) the Sonologic signal processor will average for each readout. (See Appendix C. Glossary of Set-Up and Calibration Terms.) The number shown upon entry into this mode shows the vessels current averaging factor. Modification of this number can be performed by direct entry (pressing numbered keys) or scrolled (arrow keys). When the desired number is shown, pressing the ENTER key saves the new averaging factor in the memory of the micro card.

Cntby

This mode is used to set up the display to count by increments of 1, 2, 5, 10, 20, 50, 100, 200, 500, or 1000. For example, a countby factor of 100 would show the display changing by increments of 100 units. Note that setpoints and current outputs (0-20 mA, 4-20 mA) are always implemented with a countby of one.

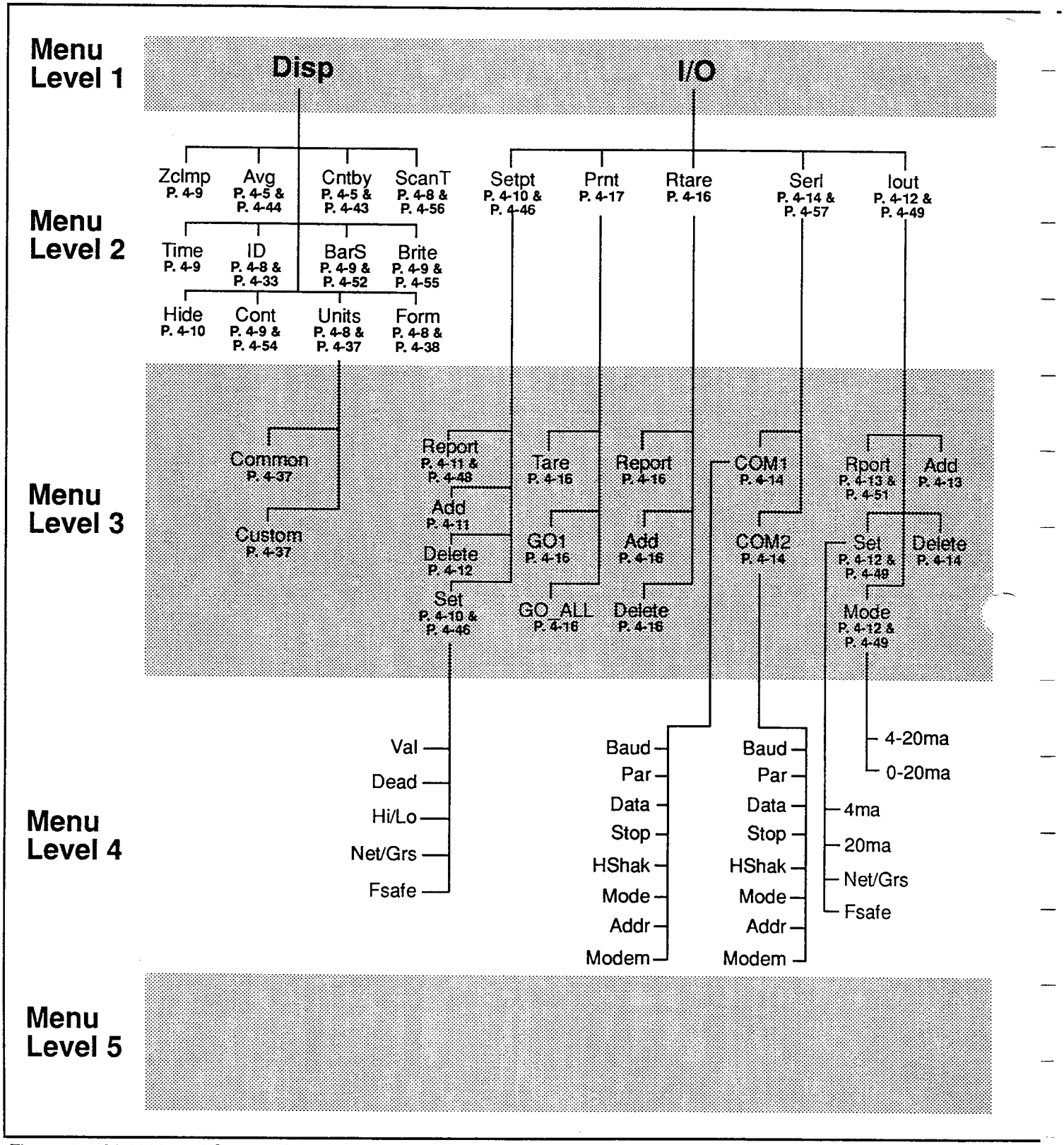
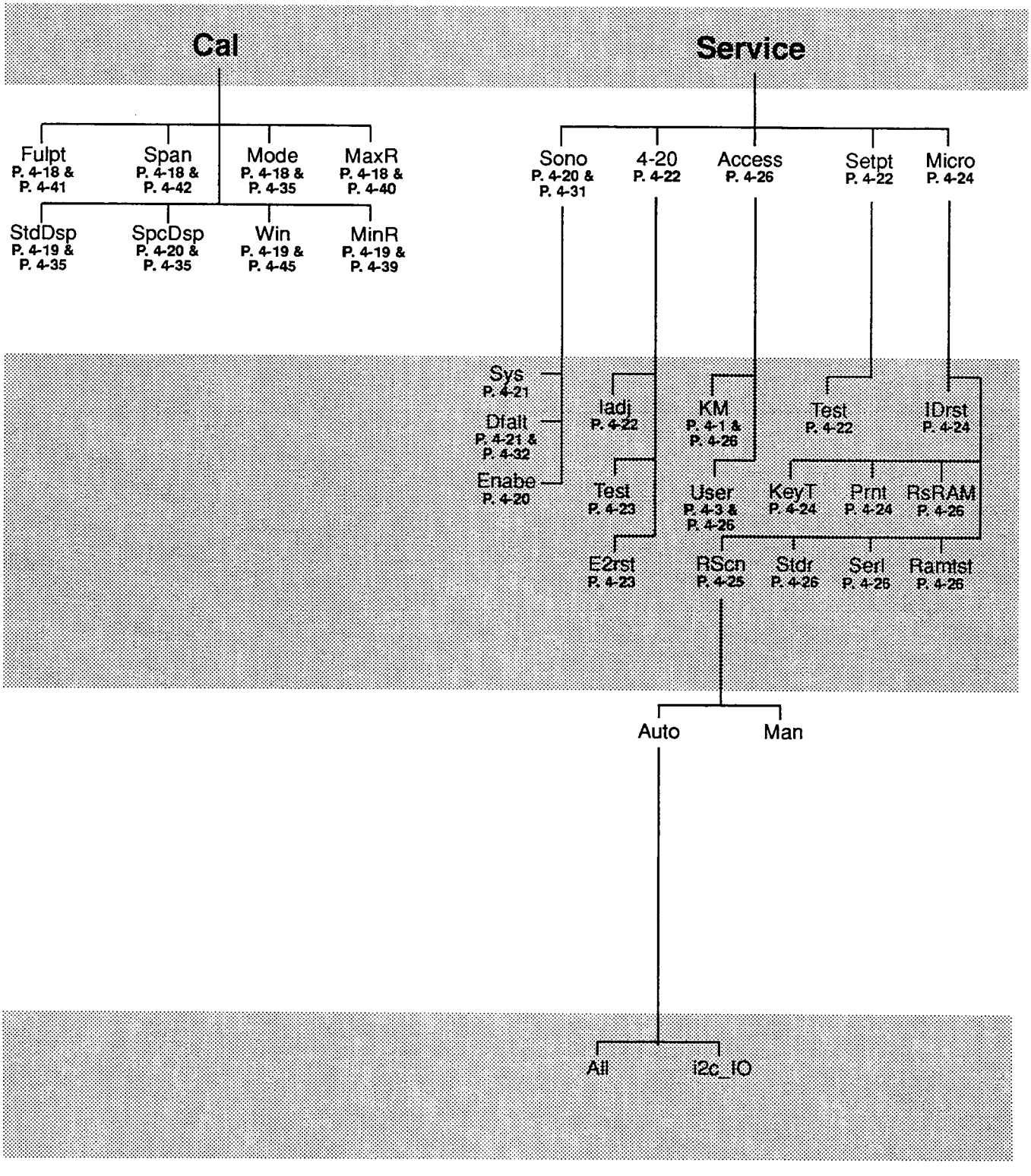


Figure 4-1. Multi-Vessel System SONIC MAIN MENU Tree.


Cal
Service
Fulpt
P. 4-18 &
P. 4-41
Span
P. 4-18 &
P. 4-42
Mode
P. 4-18 &
P. 4-35
MaxR
P. 4-18 &
P. 4-40
StdDsp
P. 4-19 &
P. 4-35
SpcDsp
P. 4-20 &
P. 4-35
Win
P. 4-19 &
P. 4-45
MinR
P. 4-19 &
P. 4-39
Sono
P. 4-20 &
P. 4-31
4-20
P. 4-22
Access
P. 4-26
Setpt
P. 4-22
Micro
P. 4-24
Sys
P. 4-21
Dfalt
P. 4-21 &
P. 4-32
Enabe
P. 4-20
Iadj
P. 4-22
Test
P. 4-23
E2rst
P. 4-23
KM
P. 4-1 &
P. 4-26
User
P. 4-3 &
P. 4-26
RScn
P. 4-25
Test
P. 4-22
KeyT
P. 4-24
Stdr
P. 4-26
IDrst
P. 4-24
Prnt
P. 4-24
Serl
P. 4-26
RsRAM
P. 4-26
Ramtst
P. 4-26
Auto
Man
All
I2c_IO

Units

This mode is used to label the unit of measure that you set up in the Selecting the Unit of Measure section. In the "common" submenu, you can select lbs (pounds), kgs (kilograms), tns (tons), gal (gallons), ltr (liters), brl (barrels), % (percent), ft (feet), in (inches), V (volts), mV (millivolts), and mA (milliamps). In the "Custom" submenu, you can type in a custom three-character unit of measure.

ID

This mode allows you to type in a 16-character alphanumeric title on the display for each vessel.

Form

This mode is used to choose the display format. The following are the six different formats available:

XXXXX00

XXXXX0

XXXXX (default)

XXXX.X

XXX.XX

XX.XXX

Note: The maximum number that can be entered or displayed is 65535 irrespective of decimal point location. The Xs shown above are place holders.

An asterisk is displayed next to the format that is currently being used.

ScanT

This mode allows you to choose the amount of time the MVS will display the monitoring information of a vessel when in AUTO mode before scrolling to the next vessel. Scan time can be set to 1 second, 2 seconds or 5 seconds.

BarS

The maximum span for the bar graph is set in this mode. The 100 percent point of the bar graph display is set by direct entry using the alphanumeric keys or by scrolling to the desired value with the scroll keys. For example, if a vessel's maximum capacity is 15,000 pounds, 15000 would be entered as the BarS value. When the bar graph is displayed, the 100 percent level would be 15,000 pounds. The bar graph shows only the gross levels between zero and the value set in this mode. The default value for this function is 9999. To display the bar graph, the MVS must be in Manual Mode (AUTO LED off). Pressing the ENTER Key toggles the display between bar graph and numerical display.

Cont

The contrast of the display is adjusted in this mode. The scroll keys are used to make fine adjustments while the F2 and F3 keys perform coarse adjustments. The displayed number ranges from 0 (darkest) to 255 (lightest). The default value is 127.

Brite

The brightness of the display is adjusted in this mode. Adjustments are made the same way as described above in **Cont**.

Time

Time and date are set and/or displayed in this mode. Accuracy is better than +\- 1 minute/month while timekeeping is maintained for more than 10 years without power. The number/character displayed directly to the right of the flashing cursor is modified with the arrow keys. Pressing the ENTER Key will advance the cursor to the next number/character field.

Zclmp

The Zclmp Mode allows the user to set a window around zero engineering units of the gross display. When the gross value falls within the window, the display is forced to zero. This mode only affects the value seen on the front panel display in the gross mode. Setpoints, current, and serial outputs are unaffected. Two choices are available when "Hi" or "Lo" is entered in this mode. Each of these subfunctions can have values of three active digits that range from 0 to 255. "Hi" modifies values that are above zero. "Lo" modifies values that are below zero and are shown as negative numbers. Values may be scrolled to or entered directly.

Hide

This function allows you to 'hide' a vessel(s) from the scanning sequence on the display. The MVS continues to monitor the vessel(s) that is hidden, it just does not display it. The Hide function is useful if you want to observe specific vessels without taking the other vessels in the system off line. In the Hide menu, press the F1 Key to select ON or the F3 Key to select OFF. Then press the SHIFT Key (SHIFT LED illuminated) and the '9' Key to enable and disable the function.

I/O Mode

The I/O mode is used to enter setpoint parameters, current output parameters (4-20 mA, 0-20 mA), remote tare, printer functions, and serial port configuration. The I/O Menu looks like this:

INPUT/OUPUT MENU
SetPt Iout Serl Rtare Prnt

SetPt

The setpoint set-up functions for each vessel are accessed in this mode. They include selecting activation levels, high or low activation, deadband values, fail-safe parameters, and net or gross weight.

Set. This mode is used to select the setpoint to be set up for the displayed vessel. Eight setpoints can be assigned and are labeled SP1 for setpoint 1 through SP8 for setpoint 8.

Once you have selected a setpoint to set up, the activation value (**Val**), the point where the setpoint relay changes state, can be entered. This value can be entered directly with the Alphanumeric Keys or scrolled to with the arrow keys. The "-" Key is used to toggle between the positive and negative value of the number entered. Setpoint relays can be configured to change state either above or below (**Hi/Lo**) the setpoint value.

The deadband (**Dead**) value, when other than zero, determines the point at which a setpoint relay returns to its normal on/off state. The deadband value can be greater than or less than the setpoint value and has a default value of 2. A value (0 to 9999) can be entered directly or scrolled to with the arrow keys. The ESC or AUTO/MAN Keys will abort the function without changing any values.

EXAMPLE: A vessel has an operating span of 50 feet and has setpoint 1 (SP1) set at 40 feet. The Hi/Lo function is set to "Hi" and the deadband is set at 10 feet. When the material level exceeds 40 feet, the setpoint energizes, activating a pump. The pump will continue to operate until the setpoint deenergizes when the material level falls below 30 feet (40 feet minus the 10-foot deadband).

The setpoint relays can be set to activate from the net or gross measurement (**Net/Grs**) of material in the vessel. Gross (Grs) measurement is the default mode of the MVS.

If the Microprocessor PCB detects a problem with a signal processor (Analog to Digital Converter [ADC] channel, Sonologic device, slave MVS, model 1000, etc.,) one of three fail-safe (**Fsafe**) conditions can be applied to a setpoint:

1. ON
2. OFF (Default)
3. NC

The ON setting will energize the setpoint in a fail-safe condition. The OFF setting will deenergize the setpoint in a fail-safe condition. The NC setting means no action will be taken in a fail-safe condition. A fail-safe conditon will remain in effect until the problem is corrected.

The following are examples of conditons of fail-safe conditions:

1. ADC overrange/underrange conditon.
2. Communication error with an ADC card within an MVS.
3. Communication error with serial device.
4. Echo loss condition of a Sonologic device.
5. Engineering units overrange

Rprt. When this mode is accessed, the display will show all setpoints assigned to the current vessel. The top line shows an assigned setpoint number within the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned setpoints channels.

Add. This function is used to add setpoint channels (up to eight) to the current vessel. The KM MFG Code must be entered first to gain access. The **Add** Function will not display until the code is entered. (See Page 4-1.) The top line shows the first available setpoint number, the rack/slot number, and the channel number on the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other unassigned setpoints channels. This function requires the KM MFG code to be entered before setpoint channels can be added.

Delete. The KM MFG Code must be entered first to gain access. The **Delete** Function will not display until the code is entered. (See Page 4-1.) This function allows previously added setpoint channels to be removed from the current vessel. The top line shows an assigned setpoint number, the rack/slot number, and the channel number on the setpoint card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned setpoints channels. To delete a setpoint channel, cycle through the channels until the one you want is displayed and then press the ENTER Key. **I/O CHANNEL DELETED** will display to confirm the deletion. This particular channel is now available for use again. This function requires the KM MFG code to be entered before setpoint channels can be deleted.

Iout

The current output set-up functions are accessed in this mode. The functions include adding and deleting outputs, selecting fail-safe, net/gross, and operating modes.

Mode. The current transmitter can be set up to output 0 to 20 milliamps or 4 to 20 milliamps. This function is used to select one of the two operating modes. The MVS default current operating mode is 4-20 mA.

Set. This mode is used to select the current output to be set up. Low current operation point is set up with the **4ma/0ma** function. The value entered will determine the point where the transmitter outputs the minimum current. For example, if 1,000 lbs is entered as the low current operation parameter and the Mode function is set to 4-20ma operation, when the displayed gross weight is less than or equal to 1,000 lbs, the current output will transmit 4 milliamps. In the gross mode, the range of raw values is from 0 to 65,535. In the net mode, the range of raw values is from -65,535 to +65,535, with the default being 0. The "-" Key toggles between negative and positive.

The **20ma** function sets the high current (20 mA) operation point. The value entered will determine the point where the transmitter outputs the maximum current. If 50 feet is entered as the high current operation point, the current output will transmit 20 milliamps when the gross material level is greater than or equal to 50 feet.

Current outputs may be set to transmit either the net or gross material measurement (**Net/Grs**). An asterisk indicates the current net or gross condition of the output. Gross (Grs) material measurement is the default mode of the MVS.

If the Microprocessor PCB detects a problem with a signal processor (Analog to Digital Converter [ADC] channel, Sonologic device, slave MVS, model 1000, etc.,) one of three fail-safe (**Fsafe**) conditions can be applied to a current transmitter:

1. LO
2. HI (Default)
3. NC

The LO setting would force the current output to be 0 (in 0-20 mA operating mode) or 4 mA (in 4-20 mA operating mode) in a fail-safe condition. The HI setting would force the output to be 20 mA. The NC setting means no action will be taken in a fail-safe condition. A fail-safe conditon will remain in effect until the problem has been corrected.

The following are examples of conditons of fail-safe conditions:

1. ADC overrange/underrange conditon.
2. Communication error with an ADC card within an MVS.
3. Communication error with serial device.
4. Echo loss condition of a Sonologic device.

Rprt. When this mode is accessed the display will show the current transmitters assigned to the displayed vessel. The top line of the display shows an assigned output number along with its rack/slot number and channel number within the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to toggle between the two output channels (if assigned).

Add. This function requires the KM MFG code to be entered before current output channels can be added. The **Add** Function is used to add current output channels (up to two) to the displayed vessel. The top line of the display shows the first available current transmitter, the rack/slot number, and the channel number on the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other unassigned current output channels and stop at the desired channel. Press the ENTER Key to add the channel. I/O CHANNEL ENTERED will display to confirm the channel addition.

Delete. This function requires the KM MFG code to be entered before current output channels can be deleted. The **Delete** Function is used to delete previous added current output channels from the displayed vessel. The top line of the display shows an assigned current transmitter number, the rack/slot number, and the channel number on the 4/20 card. Pressing the ESC or AUTO/MAN Key will exit this function. Press any other key to cycle through all other assigned current output channels and stop at the channel you want to delete. Press the ENTER Key to delete the channel. I/O CHANNEL DELETED will display to confirm the channel deletion. This particular channel is now available for use again.

Serl

This mode is used to configure the two serial ports (COM1 and COM2) on the Microprocessor PCB. Both ports can be hardware configured to operate with three standard communications interfaces: RS-232, RS-422, and RS-485. (Refer to Table B-1 in Appendix B for the dipswitch settings used to configure the serial ports on the microprocessor PCB.)

There are six standard BAUD rates (bits per second) that can be set in the BAUD Mode for MVS serial communication:

1. 300
2. 1200
3. 2400
4. 4800
5. 9600 (default setting)
6. 19200

An asterisk will indicate the current BAUD rate selection of the serial port.

The serial port parity is configured ODD, EVEN, or NONE (default setting) in the Par Mode. An asterisk indicates the current parity selection.

The number of data bits that make up a transmitted character is configured in the Data Mode. The choices are:

1. SEVEN
2. EIGHT (default setting)

Throughput rates can be improved slightly by configuring the entire serial network for seven data bits. Note that any true ASCII character can be described with seven data bits. An asterisk indicates the current data bit selection.

The number of stop bits used to end an character field is configured in the Stop Mode. The choices are:

1. ONE (default setting)

2. TWO

An asterisk indicates the current setting.

Handshaking is set up for each serial port in the Hshak Mode. Setting handshaking parameters is necessary when a large amount of data is transmitted and the receiving device, such as a printer, cannot process the data quickly enough. In this case, the receiving device can force the "Clear to Send" (CTS) handshake control line low. This causes the MVS to pause until the device is ready to receive for more data. The handshaking default setting is OFF. (Refer to the serial port wiring drawing in Appendix E.)

The serial port mode of operation is set up in the Mode function. The choices are:

COM1	COM2
1. MASTER	1. PRINTER
2. SLAVE (default setting)	2. SLAVE (default setting)

The slave mode of an MVS can only respond to serial commands from a talking device, such as a PC running a Kistler-Morse ROPE system or another MVS configured as a master. An MVS operating in the MASTER setting will initiate all serial communications with other slave serial devices. These other slave devices can be any of Kistler-Morse's signal processors or other manufacturers' signal processors that support serial communications. Only one master device can exist on a serial port at one time. All printer functions have their outputs directed to COM2. Be sure use COM2 and select PRINTER when connecting a printer to the MVS.

The base address of the serial port is set up in the Addr Mode. Upon entry into the function, two number fields can be seen on the lower line of the display. The first number is the numerical address with the second number being the hexidecimal equivalent. The alphnumeric keys are used to input a number directly or the arrow keys can be used to scroll to a number. Only the numerical address can be altered with the keypad. The hexidecimal number will change automatically once the numerical value is entered. Addresses can range in value from 0 to 255 (0 to FF Hexidecimal), with 01 being the default setting. The serial address of any MVS signal processor can be calculated by using the following formula:

Serial Address = Base Address + MVS ID # - 1

If an RF modem is used on COM1, it may be necessary to enable the Modem function. A longer serial communication timeout may be necessary when using a RF modem to keep "COM ERRORS" from occurring. Enabling this function will lengthen the communications timeout.

Rtare

This mode is used to access remote tare functions. The remote tare capabilities are implemented through the Remote Tare PCB. Each card contains eight individual input channels. These input channels are activated by applying AC or DC voltage, depending on the type of input module used. An input channel that has been properly activated and has been assigned to a vessel (one remote tare channel per vessel) will cause that vessel to be tared. The vessel will have its NET value set to zero. If the print on tare function is enabled (Prnt Mode) a time/date stamped printout of gross (level/range) and net values will be generated and output to a printer through COM2.

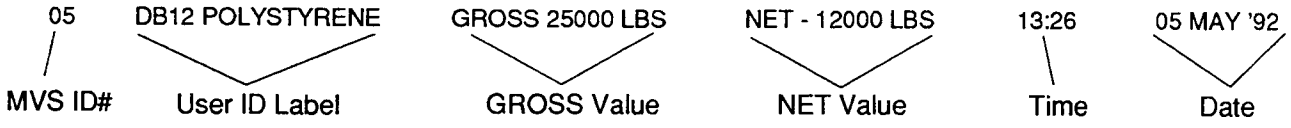
The Report Function is used to see which vessels in the system have a remote tare. When you first access this function, the display will briefly show the vessel number and then change to show the address and channel number of the remote tare if it exists. If the vessel does not have a remote tare, a message stating so will display. Pressing the ESC or AUTO/MAN Key will exit the function.

Adding a remote tare input channel is done using the Add Function in the Rtare Mode. When this function is accessed, the bottom line of the display shows the first available remote tare input channel with its rack/slot number and the channe number on the Remote Tare PCB. Pressing any key other than the ESC or AUTO/MAN Key will cycle through all unassigned remote tare channels that are available for use. Pressing the ESC or AUTO/MAN Key will exit the function. To add a remote tare channel, cycle to a desired channel. Press the ENTER Key to add the channel. The display will show REMOTE TARE ENTERED confirming the channel addition. Accessing this function requires entering the KM MFG code first. (See Page 4-1 for information on the KM MFG Code.)

Deleting previously added remote tare input channels is done using the Delete Function in the Rtare Mode. When this function is accessed, the bottom line of the display shows the rack/slot number and the channel number on the Remote Tare PCB. Pressing the ENTER Key will delete the channel. The display will show REMOTE TARE DELETED to confirm the deletion. The channel is available to be used again. Pressing the ESC or AUTO/MAN Key will exit the function. Accessing this function requires the KM MFG code to be entered first.

Prnt

Outputting gross and net data to a printer from the current vessel is done in this mode using the GO1 function. (Pressing the "-" Key in Manual Mode will do the same thing as the GO1 function.) Data from signal processors communicating serially with the MVS is also output with this function. A typical printout looks like this:



*If caused by Print on Tare

Outputting gross and net data to a printer from all enabled vessels is done using the GO_All function. The printout will look the same as that shown above.

Print-on-Tare is enabled and disabled with the Tare function in the Prnt Mode. When enabled, any tare operation of a vessel (using the front panel TARE, NET/GROSS Key, serial tare, or remote tare) will cause the net/gross data of that vessel to be output to a printer. A typical printout looks the same as that shown above. (Note: An asterisk is printed with the channel being tared.)

Cal Mode

Setup and calibration of Sonologic signal processors (ITUs, SSUs, 5000s, etc.) with the Multi-Vessel System is done in this mode. Keep the Operator's Manual for the Sonologic signal processor(s) handy and use it for reference as needed.

The Cal Menu has eight submenus. When accessed, the first page of the Cal Menu looks like this:

SONOLOGIC SETUP
Fulpt Span Mode⇒

the second page:

SONOLOGIC SETUP
MaxR MinR Win⇒

the third page:

SONOLOGIC SETUP
StdDsp SpcDsp ⇒

Fulpt

The "Full Point" is the maximum fill level in the vessel and is 100% of span when operating in Material Mode. The full point of the current Sonologic vessel (Sonologic Function '1') is displayed and modified by the MVS in this mode. The number shown upon entry into this mode shows the current full point number for the displayed vessel. Modification of the full point number can be performed by direct entry using the alphanumeric keys or using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new full point number in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

Span

The operating "Span" of the current Sonologic vessel (Sonologic Function '2') is displayed and modified by the MVS in this mode. The operating span is the area within the vessel where the material level is continuously monitored and is set up relative to the full point. The number shown upon entry into this mode shows the current span for the displayed vessel. Modification of the span number can be performed by direct entry using the alphanumeric keys or using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new span number in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

Mode

This function allows the selection of either Air Space or Material Mode of Sonologic operation (Sonologic Function 4). In Material Mode, the Sonologic system will measure the amount of material in the vessel. In Air Space Mode, the Sonologic system measures the distance from the face of the transducer to the material surface.

Once the Mode Menu is displayed, the F1 Key is pressed to select Air Space Mode and the F3 Key is pressed to select Material Mode. An asterisk is displayed to denote the current mode of operation.

MaxR

The maximum range of the Sonologic transducer (Sonologic Function F) is displayed and set up in this mode. The maximum range is the farthest point from the transducer face where the signal processor will stop recognizing the return signal. The maximum range is usually set up to extend past the bottom of the vessel.

Modification of the maximum range can be done by direct entry using the alphanumeric keys or using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new maximum range number in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

MinR

The minimum range of the Sonologic transducer (Sonologic Function E) is displayed and set up in this mode. The minimum range is the point from the transducer face where the signal processor will start recognizing the return signal (echo). The minimum range should be set past the Sonologic transducer's blind space. If there are obstructions near the face of the transducer, the minimum range can be extended past the obstructions to eliminate the possibility of interference.

A minimum range value can be entered directly using the alphanumeric keys or by using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new minimum range number in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

Win

This mode (Sonologic Function d) sets the size of the window around the target (material level) from 1 to 240 inches or centimeters. Signals will be recognized for measurement only within the window in order to minimize interference from external noise. Signals outside the window are ignored. The window is maintained around the target even as the target moves up and down inside the vessel.

The size of the window is displayed and set up in this mode . The window size can be entered directly using the alphanumeric keys or by using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new window size in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

StdDsp

This mode allows one of the six standard display units (Sonologic Function 3) to be selected. When displaying standard units, the MVS will display material level in feet, tenths of feet, inches, tenths of inches, percent, or tenths of percent. When displaying metric units, the MVS will display material level in meters, tenths of meters (decimeters), centimeters, tenths of centimeters (millimeters), percent, and tenths of percent.

Pressing the function key (F1, F2, or F3 Key) directly below your desired selection on the display will register it in the Sonologic signal processor's nonvolatile memory. An asterisk is displayed to denote the current display units.

SpcDsp

This mode converts the operating span unit of measure to a custom unit of measure. A number up to 9999 can be entered. The operating span must be set up first before setting up special display units

EXAMPLE. The operating span is set up to be 100 feet when full and zero when empty. You want the display to indicate gallons instead of feet. When the vessel is full, it holds 5000 gallons. Enter 5000 in the SpcDsp Mode. The MVS/Sonologic signal processor figures the ratio of 0 to 100 feet to 0 to 5000 gallons. Now when the material level is at 100 feet, 5000 will be displayed; 50 feet - 2500 displayed; 25 feet - 1250 displayed, etc. Once you have entered the special display units, go to the Units function in the Disp Mode and change the display to show gallons instead of feet.

A number can be entered directly using the alphanumeric keys or entered by using the arrow keys to scroll to a number. When the desired number is shown, pressing the ENTER key registers the new number in the Sonologic signal processor's nonvolatile memory. Note that the number initially displayed is received directly from the Sonologic signal processor and is not stored in the MVS Microprocessor PCB.

Service Mode

This mode is used to troubleshoot the MVS when monitoring Sonologic signal processors over the serial communications network. There are five submenus in the Service Mode: Sono, Setpt, 4/20, Micro and Access.

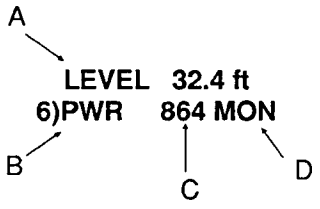
Sono

This mode allows you to display and modify the monitor/manual parameters of the Sonologic signal processor.

NOTE

The Enab Function that appears in the Sono Mode menu is not yet implemented and will be available in a later revision of the MVS.

Sys. This function is used to access the monitor/manual mode parameters. A typical display looks like this:



A. The top line is material monitoring information shown in real time. This information is identical to the bottom line of the MVS display when material is monitored in the Auto or Manual Mode. Since this information is shown in real time, the value may fluctuate to reflect changes of the material level in the vessel.

B. This number and the three characters that follow reflect the specific Sonologic parameter function. The parameter function can be scrolled forward or backwards with the F1 and F2 Keys.

C. This number is the current parameter value. It can be changed when the cursor (>) is flashing by direct entry using the alphanumeric keys or scrolled with the arrow keys. Pressing the ENTER Key saves the changes in the Sonologic signal processor's nonvolatile memory. Pressing the ESC or AUTO/MAN Key will exit the function.

The cursor (>) may change to a "W" (Working) when the ENTER Key, or the F1 or F2 Keys are pressed. This indicates that serial communications are active between the MVS and the Sonologic signal processor.

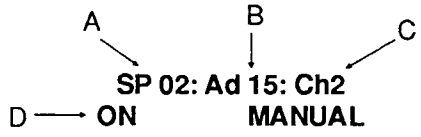
D. This field represents the current mode of the Sonologic signal processor. There are two modes available: Monitor Mode (MON) and Manual Mode (MAN). The Monitor Mode monitors the various system parameters. The parameters can also be updated in this mode. Dynamic parameters such as power (6 PWR) can be changed but will eventually return to a stable value. The second mode available is the Manual Mode. This mode differs from the Monitor Mode in that all dynamic parameters are frozen when the mode is accessed. Any parameter that is modified will remain so until either the monitor mode is selected or the function is aborted. The modes are toggled by pressing the F3 Key. Note that the Manual Mode is not available through the MVS with multiplexed Sonologic signal processors such as the SSU and 5100 models.

Dfalt. This function clears ALL Sonologic set up parameters and allows you to choose English or Metric units as the Sonologic signal processor default. An asterisk will indicate the current selection. The units selected will remain as the default units until this function is accessed again and the units changed.

Setpt

This mode allows you to turn the setpoints on and off for test purposes. When performing the Test function, a message will be displayed warning of the transfer of automatic control of the setpoints assigned to the currently selected vessel to manual control. Pressing the ESC Key or AUTO/MAN Key will terminate the function.

A typical setpoint test function display looks like this:



A. "SP 02" is the current setpoint reference number. A maximum of 960 setpoints can be assigned.

B. "Ad 15" represents the address of a particular Setpoint PCB. The '1' refers to the rack number where the Setpoint PCB resides. The '5' refers to the slot number in the rack. Addresses range in hexadecimal from 01 to 7F.

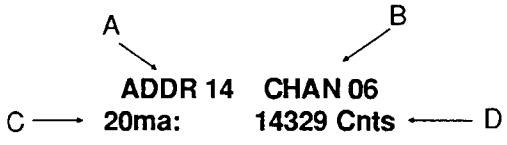
C. "Ch2" refers to the relay channel number of the setpoint on the Setpoint PCB. Each Setpoint PCB is has 8 individual relay channels.

D. "ON" indicates the current ON/OFF status of the setpoint. Pressing the F1 Key toggles the setpoint between ON and OFF.

4/20

In this mode, you can calibrate the 0, 4, and 20 mA output points, reset the EEPROM to the default parameters, and set the current transmitter output to specific values for test purposes.

Iadj. When you access this function, the display will show a current output screen similar to this:



A. "ADDR 14" is the address of the 4-20 PCB shown in hexadecimal. The '1' refers to the rack number where the PCB resides. The '4' refers to the slot number in the rack. If more than one 4-20 PCB exists in the system, pressing the F1 Key will cycle through all of the PCB addresses.

B. "CHAN 06" is the channel number on the 4-20 PCB. Each 4-20 PCB has 8 multiplexed current output channels so "CHAN 06" represents the sixth channel on the PCB residing in the fourth slot in rack one. The F3 Key will cycle through all channels within the given 4-20 PCB.

C. "20ma" indicates the point to be calibrated. There are three possible calibration points: 20ma, 4ma, and 0ma.

D. This number represents the value output to the 4-20 PCB to cause its output to match the point being calibrated. Calibration is performed by manipulating the arrow keys while monitoring the current output of the selected 4-20 channel. When the measured output current is reached, pressing the ENTER Key will record the calibration counts in the 4-20 PCB's EEPROM. At the same time, the display is advanced to the next calibration point.

E2rst. This function resets the nonvolatile (EEPROM) memory of the displayed 4-20 PCB. When "YES" is selected, the function will be initiated followed by "FUNCTION ENTERED". The display will automatically advance to the address of the next 4-20 PCB. The following are the default settings to which the 4-20 PCB will be reset:

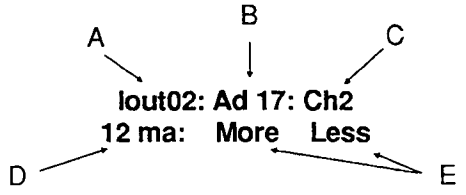
1. All channels are set to 4-20ma Mode.

2. The 4-20 high value is set to 9999 (stored in the Micropressor PCB).

3. The 4-20 low value is set to 0 (stored in the Micropressor PCB).

4. The calibration values are set as follows:
   20 mA value = 14329
   4 mA value = 3738
   0 mA value = 1096

Test. This function allows manual activation of current output channels outside of normal control. A message is issued warning that the automatic control of 4-20 outputs assigned to the currently selected vessel is transferred to manual control. Pressing the ESC Key or AUTO/MAN Key will terminate the function. After the warning message, if more than one 4-20 has been assigned, a selection of the two 4-20 channels is offered. A typical 4-20 test function display looks like this:



KEY	NUMBER
1 (STU)	01
2 (VWX)	02
3 (YZ)	03
4 (JKL)	04
5 (MNO)	05
6 (PQR)	06
7 (ABC)	07
8 (DEF)	08
9 (GHI)	09
0 (SPACE)	10
. (PERIOD)	11
- (MINUS)	12
MENU	13
F1	14
F2	15
F3	16
*ESC	17
*AUTO/MAN	18
(UP ARROW)	19
(DOWN ARROW)	20
BLANK	21
(BACK SPACE)	22
SHIFT	23
ENTER	24

*Note: These keys will abort the function.

Table 4-1. List of Keys and Corresponding Numbers.

A. "Iout02" is the current 4-20 reference number. All actions performed are wi' respect to this number. This number can range from 1 to 240.

B. "Ad 17" is the addess (hexadecimal) of the 4-20 PCB. Addresses can range from 01 to 7F. The first number in the example (1) indicates the rack number and the second number (7) indicates the slot in the rack where the 4-20 PCB resides.

C. "Ch2" is the channel number of the 4-20 PCB. Each 4-20 PCB has eight multiplexed current output channels.

D. "12ma" represents a value that has been sent to the 4-20 channel being tested. If the current mode selected is 0/20ma, the output will range from 0 mA to 20 mA in 2 mA steps. If in the 4/20ma mode the output will range from 4 mA to 20 mA in 2 mA steps.

E. "More" or "Less" refers to the increase ("More") or decrease ("Less") of the output. Pressing the F2 Key increases the output in 2 mA steps and the F3 Key decreases the output in 2 mA steps.

Micro

This mode allows you to clear the 16-character vessel ID, test the keyboard, print out setpoint and 4-20 parameters (if a serial printer is connected to the MVS), scan the addresses in the system, test the non-volatile RAM in the Microproces. PCB, monitor the serial port, and set up an access code.

IDrst. This function resets the top line (user defined) of the current vessel. Once this function is used, only the MVS ID (vessel) number will be on the top line of the display.

KeyT. This function will display the number of the last key that was pressed. Table 4-1 lists all the keys on the MVS keypad and their corresponding reference number.

Prnt. This mode is only partly functional. Currently, only setpoint and 4-20 information will be printed out. Other characters will also be printed but have no meaning and should be disregarded. A future revision of the MVS will provide a fully functional Print Mode.

I^2C PCB Type	Action Taken by Microprocessor PCB
ADC PCB in MVS Rack	1. 8 vessels are allocated in the Microprocessor PCB's memory. 2. Each vessel is initialized with 1 of 8 channels. 3. Each channel is assigned the I^2C address of the responding ADC PCB. 4. Enable status for each channel is collected from the ADC PCB. 5. Averaging for each channel is collected from the ADC PCB. 6. Linearization is disabled for each channel.
Setpoint PCB	1. 8 setpoint references are allocated in the Microprocessor PCB's memory. 2. Each setpoint is initialized with 1 of 8 channels. 3. Each setpoint channel is assigned the I^2C address of the responding Setpoint PCB.
4-20 PCB	1. 8 4-20 references are allocated in the Microprocessor PCB's memory. 2. Each 4-20 is initialized with 1 of 8 channels. 3. Each 4-20 channel is assigned the I2C address of the responding 4-20 PCB.

Table 4-2. Actions Performed by the Address Polling Microprocessor PCB.

RScn. This function allows the MVS to automatically rescan all of the addresses in the system or allows you to manually rescan and modify selected addresses. In the Auto Mode, selecting **All** automatically rescans all addresses including the internal integrated circuit (I^2C) bus and external serial bus through COM1 port. The COM1 port is scanned ONLY if the MVS is set up to be a MASTER. If set up to be a SLAVE, only the I^2C bus is scanned. The Microprocessor PCB starts the polling process with an "identify" command, beginning with address 1 to 7F Hex in the internal I^2C bus. Each PCB (Setpoint, 4-20, etc.) has a unique coded response. The Microprocessor PCB initializes its nonvolatile memory in accordance to these responses. Note that prior to any address polling, all references to vessels, setpoints, 4-20 current outputs, etc. are erased. Once the I^2C polling is done, external addresses through the COM1 serial port are examined. Table 4-2 lists actions performed by the address polling Microprocessor PCB. Refer to SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES on Page 4-26 when adding or removing addressed equipment.

The **I2c_I/O** Function does the same as the **All** Function except only the internal I^2C I/O PCBs (Setpoint, 4-20, etc.) are polled. Any internal signal processors remain unchanged in memory and the serial port (COM1) is not scanned.

The **Man** Function allows the modification of the internal (I^2C) and external (COM1) address parameters. This function requires the KM Service Code to be entered before gaining access.

Stdr. This function provides the ability to standardize each A/D channel of an internal ADC PCB and is not used with Sonologic equipment.

RsRAM. This function requires the MVS Service Code to be entered first before gaining access. This function resets the NVRAM on the Microprocessor PCB to default parameters.

Ramtst. This function performs an internal, nondestructive test on the Microprocessor PCB NVRAM. Upon completion of the test, this message should display:

MICRO NVRAM TEST
PASSED!

Serl. This function monitors the COM1 serial port when the MVS is set up as the MASTER unit. The information displayed in this function is the vessel number (MVS ID), the information in the transmit (TX) buffer and the information in the receive (RX) buffer.

Access

This mode allows you to enter the KM MFG Code and/or set up a user Access Code. The KM MFG Code must be entered first before additional setpoints and 4-20 mA outputs can be added. The section titled *KM MFG Code* on Page 4-1 describes how to enter the code. If you set up a user-selected Access Code, you will have to enter it first before set-up and calibration parameters can be changed. The section titled SETTING UP AN ACCESS CODE on Page 4-3 describes how to set up an access code.

SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES

When the MVS first arrives from the factory, it must be set up to recognize the address(es) of the slave unit(s) communicating with the MVS through its serial port. This includes all Sonologic signal processors. Once your system is up and running, it is not necessary to perform this procedure to make future Sonologic parameters changes. However, if you add additional Sonologic signal processors to your MVS at a later date, follow this procedure to enable the MVS to recognize the address(es) of the new unit(s).

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the MENU Key again to display the second page of the menu. The display will look like this:

MAIN MENU
Service ⇒

4. Press the F1 Key to access the Service Mode. The display will look like this:

SERVICE ROUTINES
ADC Setpt 4/20⇒

5. Press the MENU Key to display the second page of the menu. The display will look like this:

SERVICE ROUTINES
Micro Access⇒

6. Press the F1 Key to access the Micro Mode. The display will look like this:

MICRO FUNCTIONS
IDrst KeyT Prnt⇒

7. Press the MENU Key to display the second page of the menu. The display will look like this:

MICRO FUNCTIONS
RScn RsRAM Stdr⇒

8. Press the F1 Key to access the RScn Mode. The display will look like this:

RE-SCAN MENU
Auto Man

9. Press the F1 Key to access the Auto Mode. The display will look like this:

AUTO SCAN MENU
All i2c_IO

10. Press the F1 Key to access the All function. The display will look like this:

RE-SCAN SYSTEM?
YES NO

11. Press the F1 Key to select YES. The display will look like this:

SCANNING...
EXTERNAL ADDR XX

Addresses will scroll in place of the XX

The MVS will scan the entire network and bring on line all of the units whose addresses it finds. This includes any ADC PCBs in the MVS as well as the slave units connected to the MVS serial port.

When the MVS is through scanning, The following message will be displayed:

XX SIGNAL
PROCESSORS FOUND

The actual number of signal processors in your system will be displayed in place of the XX.

12. Press the ESC Key to scroll backwards through the menus. Now when you set up a Sonologic signal processor, the main menu will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

The main menu to set up the ADC PCBs looks like this:

MAIN MENU
Disp I/O Cal⇒

ENTERING SONOLOGIC SET-UP PARAMETERS

If you are setting up an MVS/Sonologic system for the first time, follow the procedures in the SETTING UP THE MVS TO RECOGNIZE SERIAL ADDRESSES section first before performing the procedures in this section. If you set up an access code as described in the SETTING UP AN ACCESS CODE section, enter the code when prompted by the display. Otherwise, follow the procedures as described in the following sections.

NOTE

If at any time during setup a warning or error message displays, refer to Appendix D for an explanation of how to correct the problem.

Overview

This section provides a general overview of how to set up a Sonologic system to monitor material in a typical vessel. This section is not intended to be specific to any one application but provides a general idea of how to set up your system before you begin entering parameter values in the set-up procedures.

Hardware Setup

The operating range of the transducer is the area in which the signal processor will recognize return signals and should be set up first. The operating range is set up by entering parameter values for minimum and maximum ranges. It should begin above the maximum fill level (full point) of the vessel and extend past the bottom of the vessel. Figure 4-2 illustrates this principle.

Every transducer has a blind space, which is an area extending out from the transducer face where return signals are not recognized. For example, a 20-foot Sonocell transducer has a blind space that extends 12 inches from the transducer face. The signal processor will not recognize return signals or any other noise within that 12 inches. The minimum range should be set at least at the transducer's blind space but can be extended out farther if there are obstructions (ceiling braces, baffles, etc.) near the transducer that might interfere with the transducer's signal. The minimum range should not extend past the full point, which is the point where the vessel is considered full. The maximum range must be set beyond any possible target at the bottom of the tank (Figure 4-2).

Display Data Setup

Sonologic signal processors (ITUs and SSUs) have two operating modes in which to measure and display the contents of a vessel: Material Mode and Air Space Mode. When operating in Material Mode, the Sonologic system measures the amount of material in the vessel. In Air Space Mode, the system measures the empty (air) space in the vessel. For example, if the vessel is 40% full of material, the reading on the display will reflect the 60% of empty space in the vessel. The measurements are displayed in the unit of measure you set up, and are not necessarily shown as percentages.

The most commonly used mode is the Material Mode since most people want to know how much inventory they have. The area within the vessel where material is monitored is called the operating span. When Sonologic signal processors operate in Material Mode, the level of the material in the vessel is measured relative to zero percent of operating span, i.e. the point where the vessel is considered empty (Figure 4-3). One hundred percent of operating span represents the maximum fill level (full vessel).

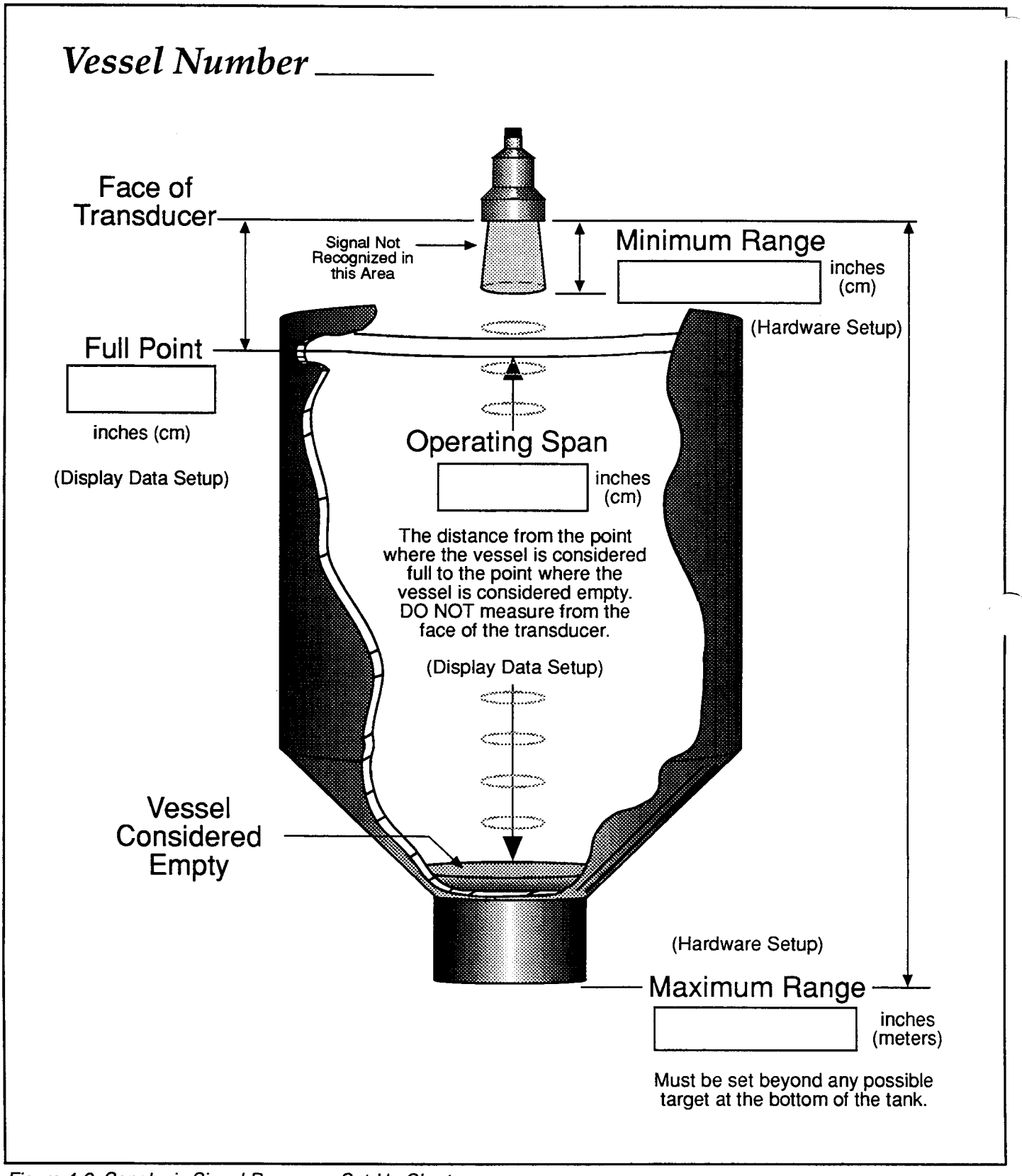


Figure 4-2. Sonologic Signal Processor Set-Up Chart.

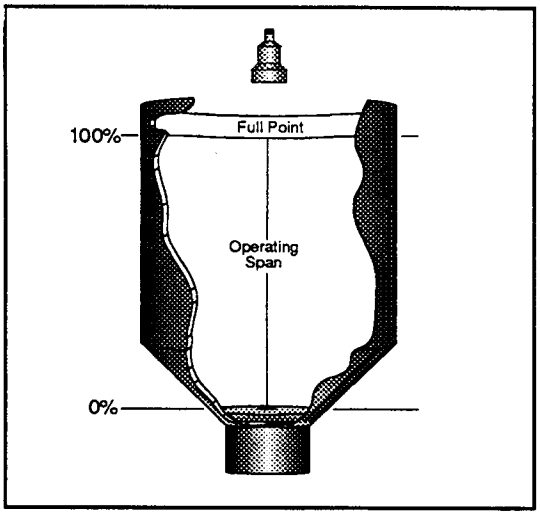


Figure 4-3. Material Mode.

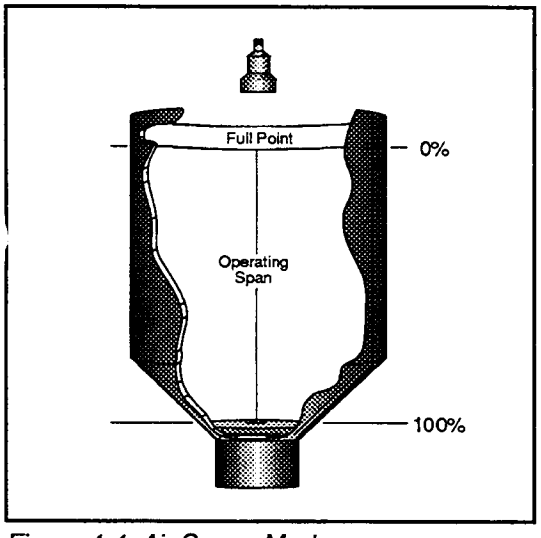


Figure 4-4. Air Space Mode.

In Air Space Mode, the signal processor measures the space between the maximum fill level (full point) and the top surface of the material in the vessel. In this operating mode, zero percent of operating span occurs at the maximum fill level because that is when there is the least amount of air space in the vessel. One hundred percent represents the minimum fill level (empty vessel) and therefore the largest amount of air space. (See Figure 4-4.)

The operating span is the area within the vessel where the material will be monitored. The value entered as the full point is the distance from the face of the transducer to the point in the vessel where the material level is at its maximum height. This value should be greater than the value entered as the minimum range. Measure the distance from the highest point in the vessel the material will reach to the lowest point in the vessel that is considered empty. In most cases the lowest point will be the bottom of the vessel. Enter that value as the operating span. DO NOT measure from the transducer face to the bottom of the vessel.

Before you begin setting up your Sonologic signal processors with the MVS, make one copy of Figure 4-2 for each signal processor. Write the vessel number in the top left corner. Calculate the minimum range, maximum range, full point, and operating span for each vessel and write the values in the squares provided. Enter these values when performing the set up procedures.

Loading Factory Set Default Parameter Values

Every Kistler-Morse Sonologic signal processor has a set of English default set-up parameters and a set of metric default set-up parameters stored in nonvolatile memory. When a Sonologic signal processor arrives from the factory, the English or metric default parameters specified in the sales order are in place. Table 4-3 lists the default parameters.

If your Sonologic signal processor does not work properly after following the set up procedures, reload the default parameters and begin again. Having the default parameters in place is a good place to start when setting up your system. It is important to remember that ALL set-up parameters that have been entered manually will be changed to the parameters listed in Table 4-3.

The following is the procedure to load the factory set default parameters in the Sonologic signal processor using the MVS.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the MENU Key again to display the second page of the menu. The display will look like this:

SONIC MAIN MENU
Service ⇒

5. Press the F1 Key to access the Service Mode. The display will look like this:

SERVICE ROUTINES
Sono Setpt 4/20 ⇒

6. Press the F1 Key to access the Sono Mode. The display will look like this:

SONIC SERVICE
Sys Dfalt Enab ⇒

7. Press the F2 Key to access the Dfalt Function. The display will look like this:

DEFAULT SONIC
English* Metric

An asterisk will indicate the current selection.

8. Press F1 to select English or F3 to select Metric. The Sonologic signal processor will download the default parameters shown in Table 4-3. The display will flash a message of acknowledgement and return to:

SONIC SERVICE
Sys Dfalt Enab ⇒

9. Make a new selection from the SONIC SERVICE MENU, press the ESC key once to return to the SERVICE ROUTINES MENU, twice to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Function Parameter	15/20-Foot Systems	30/50-Foot Systems	100/200-Foot Systems
(1) Full Point	0	0	0
(2) Operating Span	240 in. (6 m)	600 in. (15 m)	1200 in. (30 m)
(3) Standard Display Units	Feet/tenths (Meters/tenths)	Feet/tenths (Meters/tenths)	Feet/tenths (Meters/tenths)
(4) Mode	[1] Air Space	[1] Air Space	[1] Air Space
(5) Setpoint 1 ON	90%	90%	90%
(6) Setpoint 1 OFF	88%	88%	88%
(7) Setpoint 1 Fail-Safe	2 = Hold last valid status	2 = Hold last valid status	2 = Hold last valid status
(8) Setpoint 2 ON	10%	10%	10%
(9) Setpoint 2 OFF	12%	12%	12%
(A) Setpoint 2 Fail-Safe	2 = Hold last valid status	2 = Hold last valid status	2 = Hold last valid status
(b) 4-20 mA Fail-Safe	2 = Hold last valid status	2 = Hold last valid status	2 = Hold last valid status
(C) Averaging Factor	1 = None	1 = None	1 = None
(d) Window Size	0 = None	0 = None	0 = None
(E) Minimum Range	12 in. (30 cm)	24 in. (60 cm)	36 in. (90 cm)
(F) Mixiumum Range	300 in. (7.6 m)	720 in. (18 m)	1440 in. (36 m)
(H) Special Display Units	0	0	0
(J) Display Format	Digit 1 - 0	Digit 1 = 0	Digit 1 = 0

Table 4-3. Factory Set Default Parameter Values for All English and Metric Sonologic Signal Processors.

Vessel Identification (MVS ID)

This mode allows you to type in a title to identify each vessel on the display.

NOTE

The MVS arrives from the factory with a default number (MVS ID) assigned for each vessel in the system. Pressing the ESC Key when the MVS is in the Manual Mode will display the default MVS ID number even if the number is excluded when the vessel is retitled.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the menu:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F1 Key to access the ID Function. The display will look like this:

01-ITU 01/01
ALPHA-NUM LABELS

The "ITU" on the display represents the type of ultrasonic signal processor. Yours may be something other than an ITU, e.g. an SSU. The 01/01 represents the address where it resides. The first '01' is the numeric (base) value and can be up to 3 characters. The second 01 is the hexadecimal equivalent of the numeric value.

NOTE

The SHIFT LED will be illuminated indicating that letters can be typed with the keypad. Also, the F1, F2, F3, AUTO/MAN, UP ARROW, and DOWN ARROW keys can be used to type in a variety of Greek and Spanish characters. Press the SHIFT Key if you want to type numbers. The LED will turn off.

7. Pressing a key will cycle through the three letters labeled above it. Select a character and press the ENTER key to move the cursor to the next space. Press the ARROW key to back space.

8. Press the ESC key to return to the DISPLAY MENU, again to return to the SONIC MAIN MENU, a third time to return to vessel monitoring.

Selecting the Operating Mode

This function is used to select the desired operating mode: Material or Air Space. Material Mode will measure the amount of material in the vessel. Air Space Mode will measure the amount of empty (air) space in the vessel. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.
3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
FulPt Span Mode ⇒

5. Press the F3 Key to access the Mode Function. The display will look like this:

SELECT FUNCTION
Air* Matrl ⇒

An asterisk will indicate the current operating mode.

6. Press the F1 or F3 Key to select the desired operating mode. The display will flash a message acknowledging the new entry and return to:

SONOLOGIC SETUP
FulPt Span Mode ⇒

7. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Selecting the Unit of Measure

This procedure allows you to select a unit of measure in which the Sonologic signal processor will measure the material in the vessel. You can select one of twelve standard display units (StdDsp Mode) or set up a custom unit of measure (SpcDsp Mode). Refer to sections StdDsp and SpcDsp on page 4-15 and 4-16 for a detailed explanation of these two modes. The default English unit of measure is tenths of feet. The default Metric unit of measure is tenths of meters.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode⇒

5. Press the MENU Key twice to access the third page of the menu. The display will look like this:

SONOLOGIC SETUP
StdDsp ScpDsp⇒

6. Press the F1 Key to select StdDsp or the F3 Key to select SpcDsp.

   Selecting StdDsp allows you to choose the following units of measure: English Units - feet, tenths of feet, inches, tenths of inches, percent, or tenths of percent. Metric Units - meters, tenths of meters, centimeters, tenths of centimeters, percent, or tenths of percent. The display will look like this:

3)STD DISP UNITS
0.0% % 0.0in⇒

7. Press the MENU Key to cycle the display through the selections.

8. Press the F1, F2, or F3 Key that corresponds to the desired unit of measure. The display will flash a message acknowledging the new value entered and return to:

SONOLOGIC SETUP
StdDsp ScpDsp⇒

9. If you choose SpcDsp, the display will look like this:

H)SPECIAL DISPLY
> 0

10. Use the alphanumeric keys to type in a specific number or the arrow keys to scroll to a number up to 9999.

11. Press the ENTER Key. The display will flash a message acknowledging the new value entered and return to

SONOLOGIC SETUP
StdDsp ScpDsp⇒

12. Press the ESC Key to cycle the display to a different menu or the AUTO/MAN Key to return the display to vessel monitoring.

Labeling the Unit of Measure

This procedure is used to label the unit of measure selected in the previous section. If you chose one of the selections in the StdDsp Mode, the MVS will display the unit of measure automatically so following this procedure is unnecessary. If you set up a special unit of measure in the SpcDsp Mode or want to change the label for any other reason, follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F3 Key to access the Units of Measure Function. The display will look like this:

UNITS OF MEASURE
Common Custom

Press F1 to select Common or F2 to select Custom.

6. Selecting Common allows you to choose one of the following labels: lbs (pounds), Kgs (kilograms), tns (tons), Gal (gallons), Ltr (liters), Brl (barrels), % (percentage), ft (feet), in (inches),
V (volts), mV (millivolts), and mA (milliamps). The display will look like this:

PRE-DEFINED UNIT
lbs Kgs tns⇒

7. Press the MENU Key to cycle the display through the selections.

8 Press the F1, F2, or F3 Key that corresponds to the desired unit of measure. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

9. If you select Custom, the unit of measure last chosen will display in the right-hand corner of the display. For example:

UNITS OF MEASURE
> lbs

Use the keyboard to type in any three characters to replace 'lbs' as the unit of measure. (Refer to **USING THE DISPLAY AND KEYBOARD** in Chapter 1 for keyboard instructions.)

10. Press the ESC key to return to the DISPLAY MENU, and again to return to the SONIC MAIN MENU.

Setting Up the Display Format

This mode is used to set up the display format. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the DISPLAY MENU:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F2 Key to access the Format Function. The display will look like this:

CHOOSE FORMAT
XXXXX00* XXXXX0 ⇒

An asterisk will indicate the current format.

7. Press the MENU Key to cycle the display through the selections.

8 Press the F1, F2, or F3 Key that corresponds to the desired display format. The display will flash a message acknowledging the new entry and return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Minimum Range

This mode is used to determine the closest point from the face of the transducer that the return signals will be recognized. This point must be greater than or equal to the blind space of the transducer. Refer to Table 4-3 for the minimum range default values of the different types of Kistler-Morse Sonocell transducers. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

5. Press the MENU Key again to display the second page of the menu. The display will look like this:

SONOLOGIC SETUP
MaxR MinR Win ⇒

6. Press the F2 Key to access the Minimum Range Function. The display will look like this:

E)MINIMUM RANGE
> 12 in ⇒

In place of the '12 in' will be the parameter that was previously set up in your unit. If your MVS is set up for metric display, 'cm' will show in place of the 'in'.

7. Use the arrow keys to scroll to a new value or the alphanumeric keys to enter a value directly. Press the ENTER Key. The display will flash a message acknowledging the new entry and return **to:**

SONOLOGIC SETUP
Fulpt Span Mode ⇒

8. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Maximum Range

This mode is used to determine the farthest point from which the transducer will recognize a return signal. This point must be greater than or equal to the full point value added to the operating span value. For example, if the full point value is 40 inches and the operating span value is 1200 inches, set the maximum range at 1240 inches or greater. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

5. Press the MENU Key again to display the second page of the menu. The display will look like this:

SONOLOGIC SETUP
MaxR MinR Win ⇒

6. Press the F1 Key to access the Maximum Range Function. The display will look like this:

F)MAXIMUM RANGE
> 1000 in ⇒

In place of the '1000 in' will be the parameter that was previously set up in your unit. If your MVS is set up for metric display, 'cm' will show in place of the 'in'.

7. Use the arrow keys to scroll to a new value or the alphanumeric keys to enter a value directly. Press the ENTER Key. The display will flash a message acknowledging the new entry and return to:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

8. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Full Point

This mode is used to determine the highest point in the vessel (full point) that the material level is not to exceed. This point should be no closer to the face of the transducer than the value entered as the minimum range. The signal processor will not recognize the return signal inside the minimum range so to be safe set the full point a little past the minimum range. For example, if the minimum range is set at 36 inches, set the full point at 40 inches. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

5. Press the F1 Key to access the Fulpt Function. The display will look like this:

1)FULL POINT
> 36 in ⇒

In place of the '36 in' will be the parameter that was previously set up in your unit. If your MVS is set up for metric display, 'cm' will show in place of the 'in'.

6. Use the arrow keys to scroll to a new value or the alphanumeric keys to enter a value directly. Press the ENTER Key. The display will flash a message acknowledging the new entry and return to:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

7. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Operating Span

This mode is used to determine the area within the vessel where the material will be monitored. The full point is one end of the operating span. The bottom of the vessel is usually the other end of the operating span. Use the Sonologic Set-Up Chart in Figure 4-2 to calculate the distance between the full point and the bottom of the vessel and enter that value as the operating span. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

5. Press the F2 Key to access the Span Function. The display will look like this:

2)OPERATING SPAN
> 1000 in ⇒

In place of the '1000 in' will be the parameter that was previously set up in your unit. If your MVS is set up for metric display, 'cm' will show in place of the 'in'.

6. Use the arrow keys to scroll to a new value or the alphanumeric keys to enter a value directly. Press the ENTER Key. The display will flash a message acknowledging the new entry and return to:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

7. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Count By Function

This mode is used to set up the display to count by increments of 1, 2, 5, 10, 20, 50, 100, 200, 500, or 1000. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F2 Key to access the Count By Function. The display will look like this:

CHOOSE COUNTBY
***1 2 5⇒**

The asterisk indicates the number the MVS is currently counting by.

6. Press the MENU Key to cycle the display through the selections.

7. Press the F1, F2, or F3 Key that corresponds to the number you want the system to count by. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Averaging Function

This mode is used to set the number of individual readings the MVS will average for each readout. (See Appendix C. Glossary of Set-Up and Calibration Terms.) Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the F1 Key to access the Averaging Function. The display will look like this:

C)AVERAGING FACTOR
> 10

The current averaging factor will be displayed in place of the '10'.

6. Use the UP ARROW or DOWN ARROW Keys to scroll to a value or use the keyboard to enter a specific value between 1 and 50. (The system will not accept zero as an averaging factor.)

7. Press the ENTER Key. The display will flash a message acknowledging the new value entered and return to the DISPLAY MENU.

8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Window Function

This mode is used to set up a window around the target in which the return signal will be recognized. Any noise made by other equipment, material entering the vessel, etc. that are outside the window will be ignored by the signal processor. The window will move with the material level to maintain the parameter set up with this function.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F3 Key to access the CAL MENU. The display will look like this:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

5. Press the MENU Key again to display the second page of the menu. The display will look like this:

SONOLOGIC SETUP
MaxR MinR Win ⇒

6. Press the F3 Key to access the Window Function. The display will look like this:

D)WINDOW SIZE
> 20 in ⇒

In place of the '20 in' will be the parameter that was previously set up in your unit. If your MVS is set up for metric display, 'cm' will show in place of the 'in'.

7. Use the arrow keys to scroll to a new value or the alphanumeric keys to ent a value directly. Press the ENTER Key. The display will flash a message acknowledging the new entry and return to:

SONOLOGIC SETUP
Fulpt Span Mode ⇒

8. Make a new selection from the SONOLOGIC SETUP MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the Setpoints

The Setpt Mode in the I/O Menu is used to set up the setpoints for each vessel. The setpoint value is the weight or level of material in a vessel that you wish a device (e.g. an alarm) to activate or deactivate. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the setpoints you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F1 Key to access the SetPt Mode. The display will look like this:

SETPOINTS
Set Report

6. Press the F1 Key to select Set and set up a setpoint. The display will look like this:

SELECT SETPOINT
SP1 SP2

7. Press F1 to select SP1 or F2 to select SP2. The display will look like this:

SELECT FUNCTION
Value Dead Hi/Lo

8. Press F1 to select Value. The display will look like this:

SP1 VALUE
> 0 gal

9. Use the keypad to input the value you want the setpoint to activate.

10. Press the ENTER Key to save the value in memory. The display will return to:

SELECT FUNCTION
Value Dead Hi/Lo

11. Press F2 to select Dead. This function allows you to set up a deadband for the setpoint. The display will look like this:

SP1 DEADBAND
> 0 lbs

The deadband value, when other than zero, determines the point at which a setpoint relay returns to its normal on/off state. The deadband value can be greater or less than the setpoint value, depending on whether the ENERGIZE level has been set for "Hi" or "Lo" (Step 13).

EXAMPLE: In a pump-down application for a 10,000-gallon capacity vessel, Setpoint 1 is set at 9,000 gal, ENERGIZE is set at "Hi", and the deadband is set at 1,000 gal. When the contents exceed 9,000 gal, the setpoint activates a pump which continues to operate until the setpoint is deenergized at 8,000 gal (9,000 gal less the 1,000 gal deadband).

12. Use the keypad to input the deadband value you want the setpoint to return to its normal state. Press the ENTER Key to save the value in memory. The display will return to:

SELECT FUNCTION
Value Dead Hi/Lo

13. The setpoint relays can be configured to change state either above (Hi) or below (Lo) the setpoint value. Press F3 to select Hi/Lo. The display will look like this:

ENERGIZE HI/LO?
Hi *Lo

An asterisk indicates the current selection.

14. Press F1 to select Hi or F3 to select Lo. The display will acknowledge your selection and then return to:

SELECT FUNCTION
Value Dead Hi/Lo

15. Press the ESC Key. The display will return to:

SELECT SETPOINT
SP1 SP2

Select F2 and follow Steps 7 through 15 to set up Setpoint 2

Setpoint Report

The MVS allows you to view the address and channel number of the setpoints of any vessel in the system. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the setpoints information you want to view.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F1 Key to access the SetPt Mode. The display will look like this:

SETPOINTS
Set Report

6. Press F3 to access the Report Mode. The display will flash a message stating:

SETPOINTS
REPORT ON VES:__

The vessel number you previously scrolled to will be displayed after VES:. The display will then change to:

SP1 Output Chan
Addr __ Chan# __

In the blanks after Addr and Chan# will be the address number and channel number of Setpoint 1.

7. Press any key other than the ESC Key to toggle between the two setpoints to view their address and channel numbers.

8. Press the ESC Key to return the display to:

SETPOINTS
Set Report

9. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting Up the 4-20 mA Current Transmitter

The Iout Mode in the I/O Menu is used to set up the 4-20 mA current transmitter for each vessel that has this option. The current transmitter can be set up for 4-20 mA operation or 0-20 mA operation. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the 4-20 mA current transmitter you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F2 Key to access the Iout Mode. The display will look like this:

CURRENT OUTPUT
Set Mode Rport

6. Press the F2 Key to access the Mode function. The display will look like this:

Addr _ Chan# _
4-20ma* 0-20ma

In the blank after Addr will be the address number of the current transmitter assigned to the vessel chosen in Step 2. After Chan# will be the channel number on the 4-20 PCB where the peripheral equipment is connected. An asterisk will indicate which mode (4-20ma or 0-20ma) is currently enabled.

NOTE

Refer to the section titled ADDRESS ASSIGNMENTS in Appendix E for detailed information on how address and channel numbers are determined for each vessel.

7. The minimum current output by the current transmitter is 4 mA when 4-20ma is selected. When 0-20ma is selected, the minimum current output by the current transmitter is 0 mA. Press F1 to select 4-20ma or F3 to select 0-20ma. The display will flash a message acknowledging your selection and return to:

CURRENT OUTPUT
Set Mode Rport

8. Press the F1 Key to access the Set Mode. The display will look like this:

SET:
4ma 20ma

(If you chose 0-20ma in Step 7, the display will show 0ma in place of 4ma.)

9. Press the F1 Key to access 4ma. The display will look like this:

4/20#1 LO VALUE
> 0 gal

(The unit of measure you set up in Units Mode in the Disp Menu will show in place of gal.)

10. Use the keypad to input a value representing the material weight (level, volume, etc) in the vessel where you want the current transmitter to output 4 mA (0 mA if applicable).

11. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging the selection and return to:

SET:
4ma 20ma

12. Press the F3 Key to access 20ma. The display will look like this:

4/20#1 HI VALUE
> 0 gal

(The unit of measure you set up in Units Mode in the Disp Menu will show in place of gal.)

13. Use the keypad to input a value representing the material weight (level, volume, etc) in the vessel where you want the current transmitter to output 20 mA.

14. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging the selection and return to:

SET:
4ma 20ma

15. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

4-20 mA Current Output Report

The MVS allows you to view the address and channel number of the 4-20 mA current outputs of any vessel in the system. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel with the 4-20 mA current output information you want to view.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

5. Press the F2 Key to access the Iout Mode. The display will look like this:

CURRENT OUTPUT
Set Mode Rport

6. Press F3 to access the Rport Mode. The display will flash a message stating:

CURRENT OUTPUT
REPORT ON VES:__

The vessel number you previously scrolled to will be displayed after VES:. The display will then change to:

ONLY Output Chan
Addr __ Chan# __

In the blanks after Addr and Chan# will be the address number and channel number of current output.

7. Press the ESC Key to return the display to:

CURRENT OUTPUT
Set Mode Rport

8. Press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

DEFINING THE BAR GRAPH

This mode is used to set up the bar graph to display material measurement. The bar graph indicates the material in the vessel as a percentage of the operating span. The value entered for the operating span in the Setting the Operating Span section is the value you need to enter in Step 6 of this procedure. If necessary, access the Operating Span Mode to find out the number entered as the operating span and return to this procedure. Once the bar graph is set up, pressing the ENTER Key will toggle the display between bar graph and numerical display.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.

3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

DISPLAY MENU
BarS Cont Brite⇒

6. Press the F1 Key to access the BarS Function. The display will look like this:

SET MAXIMUM SPAN
0 gal

The unit of measure you set up in the Unit Mode will be shown in place of gal.

7. Use the keypad to type in the same number as the operating span. (The UP ARROW and DOWN ARROW keys can be used to scroll to a number if desired.)

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.

9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Press the ENTER Key to toggle the display between the bar graph and the numerical indication.

ADJUSTING THE MVS DISPLAY

This section describes the procedures to adjust the Multi-Vessel System display. If you set up an access code, enter the code when prompted by the display. Otherwise, follow the procedures as described in the following sections.

Setting the Contrast of the Display

This mode allows you to adjust the contrast of the display. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.
3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

   SONIC MAIN MENU
   Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

   DISPLAY MENU
   Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

   DISPLAY MENU
   BarS Cont Brite⇒

6. Press the F2 Key to access the Cont Function. The display will look like this:

   CONTRAST CONTROL
   128:Lite△ Dark▽

7. Press the UP ARROW Key to gradually lighten the display characters or the DOWN ARROW Key to gradually darken the characters. The number will increase as the characters gets lighter and decrease as the characters gets darker.

   The F2 Key lightens the characters at a quicker pace (8 increments at a time). The F3 Key darkens the characters at a quicker pace.

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.
9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Brightness of the Display

This mode allows you to adjust the brightness of the display. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.
3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

   SONIC MAIN MENU
   Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

   DISPLAY MENU
   Avg Cntby Units⇒

5. Press the MENU key twice to get the third page of the DISPLAY MENU:

   DISPLAY MENU
   BarS Cont Brite⇒

6. Press the F3 Key to access the Brite **Function**. The display will look like this:

   BACKLITE CONTROL
   128:Lite△ Dark▽

7. Press the UP ARROW Key to gradually increase the backlight or the DOWN ARROW Key to gradually decrease the backlight. The number will increase as the display gets lighter and decrease as the display gets darker.

   The F2 Key increases the backlight at a quicker pace (8 increments at a time). The F3 Key decreases the backlight at a quicker pace.

8. Press the ENTER Key to save the value in memory. The display will return to the DISPLAY MENU.
9. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

Setting the Scan Time of the Display

This mode allows you to choose the amount of time the MVS will display the vessel monitoring information before scrolling to the next vessel. Scan time can be set to 1 second, 2 seconds or 5 seconds. Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Use the UP ARROW or DOWN ARROW Keys to scroll to the vessel you want to set up.
3. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

SONIC MAIN MENU
Disp I/O Cal⇒

4. Press the F1 Key to access the DISPLAY MENU. The display will look like this:

DISPLAY MENU
Avg Cntby Units⇒

5. Press the MENU key to get the second page of the DISPLAY MENU:

DISPLAY MENU
ID Form ScanT⇒

6. Press the F3 Key to access the Scan Time Function. The display will look like this:

SELECT SCAN TIME
1sec 2sec* 5sec

An asterisk will indicate the current format.

7. Press the F1, F2, or F3 Key that corresponds to the desired scan time. The display will flash a message acknowledging the new entry and return to the DISPLAY MENU.
8. Make a new selection from the DISPLAY MENU, press the ESC key to return to the SONIC MAIN MENU, or press the AUTO/MAN Key to return the display to vessel monitoring.

SETTING UP SERIAL COMMUNICATIONS

The Serl Mode in the I/O Menu is used to set up serial communications between the Multi-Vessel System and Sonologic signal processors, as well as other external equipment, such as a printer, a PLC, a ROPE system, etc. These parameters are set up at the factory to match the equipment that is shipped, so in most cases it is unnecessary to alter them. Refer to Appendix E for information on how to serially connect the MVS to various external equipment.

If additional equipment is added to the MVS, you must know the serial information about the equipment in order to set it up in the Serl Mode. Refer to Appendix B for detailed information on MVS serial communications.

Follow this procedure.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off. If necessary, use the UP Arrow and DOWN Arrow keys to scroll the display to the desired vessel.

2. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

   SONIC MAIN MENU
   Disp I/O Cal⇒

3. Press the F2 Key to access the I/O MENU. The display will look like this:

   INPUT/OUPUT MENU
   SetPt Iout Serl

4. Press the F3 Key to access the Serl Mode. The display will look like this:

   SELECT COM PORT
   COM1 COM2

   NOTE

   If you are connecting a printer to the Multi-Vessel System, you must connect it to the COM2 port on the Microprocessor PCB.

5. Press F1 to set up COM1 or F3 to set up COM2. The display will look like this:

   SELECT FUNCTION
   BAUD PAR DATA⇒

6. Press F1 to access the BAUD Mode. The display will look like this:

SELECT BAUD RATE
300 1200 2400⇒

Press the MENU Key to display the second page of the menu:

SELECT BAUD RATE
4800 9600 19k2⇒

7. Press the 'F' Key that corresponds to the desired baud rate. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

8. Press the F2 Key to select the PAR Mode. The display will look like this:

SELECT PARITY
NONE* EVEN ODD⇒

An asterisk will indicate the current selection.

9. Press the 'F' Key that corresponds to the desired parity setting. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

10. Press the F2 Key to select the DATA Mode. The Menu will look like this:

SELECT DATA BITS
SEVEN *EIGHT

An asterisk will indicate the current selection.

11. Press F1 to select seven data bits or F3 to select eight data bits. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

12. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

13. Press the F1 Key to select the STOP Mode. The display will look like this:

SELECT STOP BITS
ONE* TWO

An asterisk will indicate the current selection.

14. Press F1 to select one stop bit or F3 to select two stop bits. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

15. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

16. Press the F2 Key to select the HShak Mode. The display will look like this:

HANDSHAKING?
YES *NO

An asterisk will indicate the current selection.

17. Press F1 to select YES or F3 to select NO. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

18. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

19. Press the F3 Key to select the MODE Function. The display will look like this:

SELECT FUNCTION
MASTER *SLAVE

An asterisk will indicate the current selection.

20. Press F1 to select MASTER or F3 to select SLAVE. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

21. Press the MENU Key twice to display the third page of the menu. The display will look like this:

SELECT FUNCTION
ADDR Modem ⇒

22. Press the F1 Key to select the ADDR Mode. The display will look like this:

ENTER BASE ADDRS
> 01 Dec= 01 Hex

23. Use the keypad to input a base address for the serial device. The equivaler Hex number will display automatically.

24. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
ADDR Modem ⇒

25. If you are not using a modem, press the ESC Key to select a different menu or press the AUTO/MAN Key to return the display to vessel monitoring.

If you are using a modem, continue with Step 26.

26. Press the F2 Key to select the Modem Mode. The display will look like this:

USING MODEM?
YES *NO

An asterisk will indicate the current selection

27. Press the F1 Key to select YES. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
ADDR Modem ⇒

28. Press the ESC Key to select a different menu or press the AUTO/MAN Key return the display to vessel monitoring.

MANUALLY SETTING THE POWER AND GAIN TO FIXED VALUES

The Kistler-Morse Sonologic signal processors are designed to automatically adjust the power and gain relative to the level of the target in the vessel. The power level determines the loudness of the signal the transducer sends at the target. A target at the bottom of the vessel requires a louder signal than a target at the top. The gain is the sensitivity of the signal processor to receive the return echo. As the material in the vessel fluctuates, the signal processor constantly adjusts the point within the operating span where the gain reaches its highest sensitivity.

Sometimes, however, due to conditions in the vessel it is necessary to manually set the power and gain to fixed values in order to reduce interfering factors. Satisfactory results will be achieved on a trial and error basis, by optimizing power and gain values, observing the effects, and returning to this procedure to readjust the settings. The values you set for power and gain will stay in the memory of the Sonologic signal processor even after the power to the unit has been turned off.

Follow this procedure to manually set the power and gain to fixed values.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.

2. Press the MENU Key to display the SONIC MAIN MENU. The display will look like this:

   SONIC MAIN MENU
   Disp I/O Cal⇒

3. Press the MENU Key again to display the second page of the menu. The display will look like this:

   SONIC MAIN MENU
   Service ⇒

4. Press the F1 Key to access the Service Mode. The display will look like this:

   SERVICE ROUTINES
   Sono Setpt 4/20⇒

5. Press the MENU Key to display the second page of the menu. The display will look like this:

   SERVICE ROUTINES
   Sys Dfalt Enabe ⇒

6. Press the F1 Key to access the Sys Mode. An example of what the display might look like is this:

LEVEL 32.4 ft
6)PWR 864 MON

NOTE

Your display will differ depending on the parameters you have entered. Refer to the **Sys** section on Page 4-21 for a complete explanation of this mode and definitions of the parameters shown on the display.

7. Press the F1 key to scroll forward (or the F2 Key to scroll backwards) to get to the Function F) Fixed Mode.

8. Enable the Fixed Mode by setting the value to zero using the alphanumeric keys or the UP ARROW/DOWN ARROW Keys.

9. Press the ENTER Key to save the value in memory.

10. Scroll to Function H to set the gain. Use the UP ARROW/DOWN ARROW Keys to scroll to the desired value. The range is 0 to 40. Entering 0 will keep the gain low through the entire operating span. Entering 40 increases the gain to maximum at a point between the transducer and the end of the operating span. Decreasing this value moves the point of maximum gain farther out from the transducer.

11. Press the ENTER Key to save the value in memory.

12. Scroll to Function L to set the power level. Use the UP ARROW/DOWN ARROW Keys to scroll to the desired value. 40 is the lowest power setting, 1023 highest power setting.

13. Press the ENTER Key to save the value in memory.

14. Cycle the ESC Key to return to return to vessel monitoring.

Appendix A. Product Specifications

Electrical

Voltage Rating: 85 to 270 Vac, 50 to 60 Hz

Inputs

Up to 120 inputs per system:
- Kistler-Morse strain sensor/transducer inputs
- Kistler-Morse Sonologic
- Foil gage full-bridge inputs

Serial network from other K-M digital products (Sonologic)

Interface with barriers for intrinsic safety

Five-point linearizing

16-bit A/D resolution

Input range (semiconductor gages): ± 1.0 Vdc

Input range (foil gages): ± 50 mV

Other transducer voltage or current inputs:
0-20 mA, 4-20 mA,
0 - ±1V, 0 - ±5V, 0 - ±10V,
0.2 - ±1V, 1 - ±5V, 2 - ±10V

Excitation voltage supplied: Programmable between 5 and 13 volts
@ 114 mA per channel maximum

Non-linearity: 0.003% maximum

Temperature coefficient: Zero: ± 5 ppm/° C
Span: ± 25 ppm/° C

Analog Outputs

14-bit resolution

Industry standard outputs:
0-20 mA, 4-20 mA (internal or external loop supply),
0 - ±1V, 0 - ±5V, 0 - ±10V, 0.2 - ±1V, 1 - ±5V, 2 - ±10V

Isolation voltage: 500 Vdc

Non-linearity: 0.021% maximum

Temperature coefficient: Zero: ± 25 ppm/ °C, Span: ± 25 ppm/ °C

Up to 2 analog outputs may be assigned to each input measurement channel.

Setpoint Outputs (Optional)

Programmable activation: Above or below selected

Up to 8 setpoint outputs may be assigned to each input

Fully isolated (500 Vac) solid-state relays

Industry standard voltage ranges (both AC and DC)

Relay output rating: 2A, resistive load

Display

Five digits with up to two fixed zeros if desired

Decimal point format: none, one, two, or three digits right of decimal point

Maximum display value: 65,535 (plus fixed zeros or decimal points)

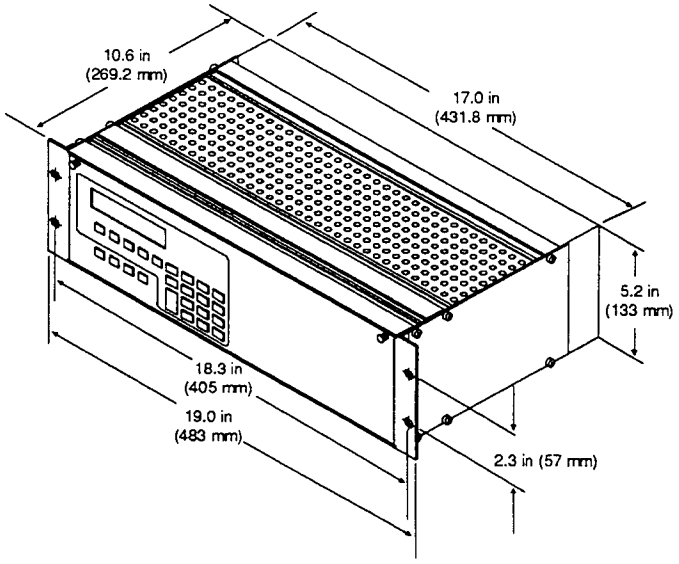
Digital Serial Outputs (Optional)

RS-232C, RS-422A, or RS-485

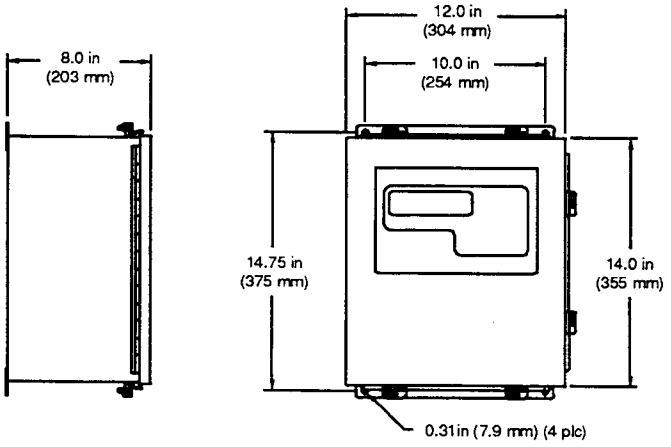
Environmental

Operating temperature 14° to 122° (0° to 50° C)

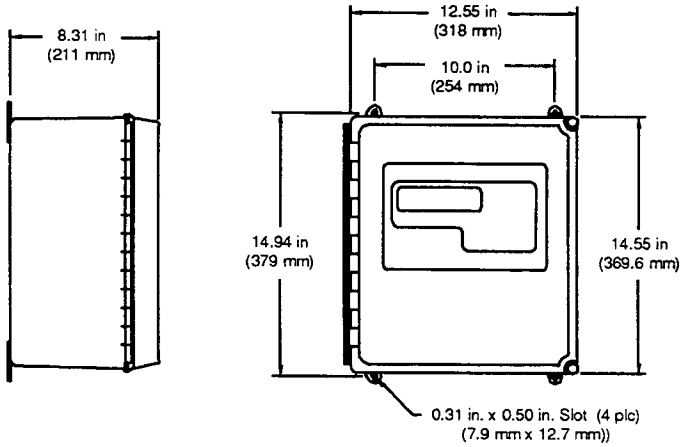
Multi-Vessel System, 19-Inch Rack



Multi-Vessel System/2



Stainless Steel NEMA 4X Enclosure Dimensions



Fiberglass NEMA 4X Enclosure Dimensions

Appendix B. Serial Communications

INTRODUCTION

Serial communications between the host or Master (ROPE, PC, MVS, etc.) and the slave MVS is explained in this appendix. Table B-1 shows the dipswitch settings used to configure the serial ports on the Microprocessor PCB. Table B-2 lists the available commands with the protocol syntax. More detailed explanations of the commands along with examples follow.

COM 1 RS-422				
	S1	S3	S4	S5
1		0	1	0
2	1	0	1	0
3		0	1	0
4	0	0	1	0
5	0			
6	1			
7	1			
8	1			

COM 1 RS-232				
	S1	S3	S4	S5
1		0	0	1
2	0	0	0	1
3		0	0	1
4	1	0	0	1
5	0			
6	1			
7	1			
8	1			

COM 1 RS-485				
	S1	S3	S4	S5
1		1	1	0
2	1	1	1	0
3		0	1	0
4	0	0	1	0
5	0			
6	1			
7	1			
8	1			

COM 2 RS-422				
	S1	S3	S4	S5
1	1			
2				
3	0			
4				
5	0	0	1	0
6	1	0	1	0
7	1	0	1	0
8	1	0	1	0

COM 2 RS-232				
	S1	S3	S4	S5
1	0			
2				
3	1			
4				
5	0	0	0	1
6	1	0	0	1
7	1	0	0	1
8	1	0	0	1

COM 2 RS-485				
	S1	S3	S4	S5
1	1			
2				
3	0			
4				
5	0	0	1	0
6	1	1	1	0
7	1	1	1	0
8	1	0	1	0

1 = ON, 0 = OFF

NOTES

1. Factory Default Settings: COM 1 = RS422, COM 2 = RS-232.
2. S1 positions 5, 6, 7, 8 set the boot sequence.
3. Do not set switches that are left blank. Doing so may affect a different COM port.

Table B-1. Setting the Dipswitches on the Microprocessor PCB for Serial Communications and Com Port Selection.

COMMAND HEX	ASCII	FUNCTION	TRANSMITTED BY MASTER TO SLAVE	RECEIVED BY MASTER FROM SLAVE
23	#	KM product identification number	>aa#ssr	Addssr
57	W	Request engineering units (Gross wt)	>aaWssr	A±ddd.ddssr
42	B	Request net weight	>aaBssr	A±ddd.ddssr
45	E	Request Sonologic engineering units	>aaEssr	A±ddddddd*ssr
54	T	Tare addressed vessel	>aaTssr	Ar
2E	.	Misc ADC vessel data	>aa.ssr	Add..ddssr
72	r	Requests calibration data	>aa'r'ssr	Add..ddssr
61	a	Update averaging factor	>aa'a'dddssr	Ar
7A	z	Update scale factor, zero wt/cnt data	>aazdd..ddssr	Ar
73	s	Update hi/lo span wt/cnt data	>aa's'dd..ddssr	Ar
4B	K	Send a key/code command	>aaKdd..ssr	Ar
49	I	Update ID, units, average, bar, format	>aaIdd..ddssr	Ar

DEFINITIONS:

>	Start of message character
aa	Two digit ASCII HEX character address of unit
dd	Two digit ASCII number data
ddd	Three digit ASCII number data
dd..	Two digit ASCII number data, possibly more
ddd.dd	Five digit ASCII BCD number data
dd..dd	Multiple ASCII characters
hh	Two digit HEX number, upper nibble, lower nibble
hh..hh	Multiple 2 digit HEX numbers
ss	Two digit ASCII HEX checksum of characters added between " and checksum characters. Note that the'?' character in place of the checksum characters is a wildcard and therefore ignores the checksum.
r	Carriage return (0x0D)
A	Acknowledge character (0x41)
N	Not acknowledge character (0x4E)
±	Polarity/error character
*	For Sonologic, 0 is normal, 1 means the channel is in echo loss For all products other than Sonologic, this character will always be 0

Table B-2. Multi-Vessel System Serial Commands.

1. 'W': This command requests engineering units be returned. If polarity data is 'X', error has been detected (overrange, etc.).

ERROR CODE

'1' ADC channel has been disabled.

'6' ADC converter is overranged.

'7' Engineering Units Overflow

'9' Communications error (i^2c or serial).

EXAMPLE:

A host device request gross weight data from vessel 15 (MVS ID 15). The MVS responds by sending back +1564 tons. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST Host to MVS	RESPONSE MVS to Host
>15WBDr	**A+015642Br**

2. 'B': This command requests that NET weight be returned. If polarity data is 'X', an error has been detected:

ERROR CODE

'1' ADC channel has been disabled.

'6' ADC converter is overranged

'7' Engineering Units Overflow

'9' Communications error (i^2c or serial).

EXAMPLE:

A host device request NET weight data from vessel 07 (MVS ID 07). The MVS responds by sending back -22000 lbs. Note that a "N" response implies that the MVS received an invalid checksum or command.

REQUEST Host to MVS	RESPONSE MVS to Host
07BA9r	**A-2200021r**

3. 'T': This command causes the vessel addressed to be tared.

EXAMPLE:

A host device request that vessel 43 (MVS ID 43) be tared. The MVS responds by sending back "Ar" if the operation was successful. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST Host to MVS	RESPONSE MVS to Host
>43TBBr	**Ar**

4. '.': This command requests the user defined vessel ID, units of measure, averaging factor, display format code, and the barograph span number be downloaded to the host.

Format received from MVS:

```
      A              B C  D    E    F
      |              |  |  |    |    |
A ddddddddddddddd ddd d ddd ddddd d ssr
```

A - User ID
B - Units of measure
C - Display format code:

Format Code	Displayed Format
0	9999
1	999900
2	99990
3	999.9
4	99.99
5	9.999

D - Averaging factor
E - Bar graph 100% calibration (bar span)
F - Display type (GROSS/bar graph display)

EXAMPLE

A host device request that vessel 04 (MVS ID 04) send all display formatting information. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST Host to MVS	RESPONSE MVS to Host
>04.92r	**AVAT 04A TURKEY'sLbs20091200010Br**

5. 'r': This command requests that calibration data be returned from an MVS to the host device:

```
      A     B     C     D     E     F     G     H     I     J    K  L
      |     |     |     |     |     |     |     |     |     |    |  |
>A ddddd ddddd ddddd ddddd ddddd ddddd ddddd ddddd ddddd ddddd ss r
```

A - hi span count
B - lo span count
C - delta count
D - hi span weight
E - lo span weight
F - delta weight
G - zero count
H - zero weight
I - raw ADC count
J - stand counts
K - checksum: sum of all ASCII characters between "A" and "ss"
L - carriage return

EXAMPLE:

A host device request that vessel 04 (MVS ID 04) send all display formatting information. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST
Host to MVS

>20rD4r

RESPONSE
MVS to Host

>A120000000012000099990000009999327680000038770061 29F3r

6. "a" command causes the averaging factor to be updated in the addressed signal processor.

EXAMPLE:

A host device request that vessel 07 (MVS ID 07) have its averaging factor modified to 15. The MVS responds by sending back "Ar" if the operation was successful. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST	**RESPONSE**
Host to MVS	MVS to Host
>07a0155Er	**Ar**

7. 'z' or 's' command over write the calibration data of an addressed ADC channel. The serial ports base address plus the MVS ID # minus 1 form the serial address of the target ADC channel.

```
          A     B     C     D     E     F     G     H   I J
          |     |     |     |     |     |     |     |   | |
>aa z ddddd ddddd ddddd ddddd ddddd ddddd ddddd ddddd ss r
```

A - hi span count
B - lo span count
C - delta count
D - hi span weight
E - lo span weight
F - delta weight
G - zero count
H - zero weight
I - checksum: sum of all ASCII characters between "" and ?ss?
J - carriage return

EXAMPLE:

A host device request that vessel 04 (MVS ID 04) have all calibration data information updated. Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST
Host to MVS

>04z12000000001200009999000000999932768000000C6r

RESPONSE
MVS to Host

Ar

8. 'K' command receives a "key" or code byte from the serial port. This command can be used to simulate "key" strokes through the serial port configured as a slave. Note that some key stroke combinations may require various delays to comply with MVS software timing.

>aa K dd dd ss r

A - base address of the MVS serial port.
B - command character 'K' (4B HEX).
C - contains the "key" number that simulates a key press from the keyboard. This number is a two digit ASCII decimal number that ranges from 00 to 99. for example, if the enter key is to be sent, the key number is "24". The two ASCII number to be sent are 32 ('2') and ('4') 34. The common key numbers are displayed below:

Key	Number	Key	Number
1 (STU)	01	MENU	13
2 (VWX)	02	F1	14
3 (YZ)	03	F2	15
4 (JKL)	04	F3	16
5 (MNO)	05	ESC	17
6 (PQR)	06	AUTO/MAN	18
7 (ABC)	07	(UP ARROW)	19
8 (DEF)	08	(DOWN ARROW)	20
9 (GHI)	09	BLANK	21
0 (SPACE)	10	(BACK SPACE)	22
. (PERIOD)	11	SHIFT	23
-(MINUS)	12	ENTER	24

Table B-3. List of Keys and Corresponding Numbers.

Other subcommand numbers that can be used that are not keys are described below:

50 - This number forces the MVS into manual mode. Two ASCII hexadecimal characters following is the vessel nimber. for example, vessel 12 is to be placed into manual mode. the command string will be as follows:

>01K500B82r

Note that the vessel number ranges from 00 to 78 in hexadecimal notation. Therefore, the 12th vessel of the system is vessel 11 decimal or 0B hexadecimal, where the first vessel is "0".

51 - This subcommand forces the MVS into Auto Mode. Note that there is no serial response to this command.

52 - This subcommand forces COM1 into Master Mode if the following character is '1'. If the following character is '0', COM1 is configured as a SLAVE. The following demonstrates the use of this command:

COM1 to a MASTER	**COM1** to a SLAVE
>01K520175r	**>01K520074r**

53 - This subcommand forces COM2 to Printer Mode with handshaking ON. It then initiates a print of all active channel parameters. When complete, COM2 is forced to Slave Mode and handshaking is restored to original condition. And "Ar" is transmitted when the command is complete.

D - This field is optional depending upon the number of field A.
E - Checksum: Sum of all ASCII characters between "" and "ss"
F - carriage return

9. 'I' - Ths command overwrites the following data of the addressed Slave MVS.

Transmitted to Slave from Master:

```
          A                B  C  D    E    F  G H
          |                |  |  |    |    |  | |
>aaI ddddddddddddddd ddd d ddd ddddd d ss r
```

A - 16 ASCII character user ID label.
B - 3 ASCII character unit of measure.
C - Display format code:

Format Code (ASCII)	Displayed Format
0	9999
1	999900
2	99990
3	999.9
4	99.99
5	9.999

D - 3 ASCII decimal characters forming the averaging factor.
The range is 000 to 127
E - Bar graph 100% calibration (bar span)
F - Display type (GROSS/bar graph display)
G - Checksum: sum of all ASCII characters between "" and "ss"
H - Carriage return

EXAMPLE

A host device request that vessel 04 (MVS ID 04) have all display data information updated. Note that a "Nr" response implied that the MVS received an invalid checksum or command.

REQUEST
Host to MVS

>04IVAT 04A TURKEY's Lbs 20091200010Br

RESPONSE
MVS to Host

Ar

10. '#' - This command, sent by a master, i.e. ROPE, master MVS, etc., requests the slave to send its KM identification code:

IDENTIFICATION CODE
'30' Identifier for MVS

EXAMPLE

A host device request a slave to return its KM identification ode from a device at serial address 56 (MVS ID 56). Note that a "Nr" response implies that the MVS received an invalid checksum or command.

REQUEST	RESPONSE
Host to MVS	MVS to Host
>56#8Er	**A3063r**

Appendix C. Glossary of Set-Up and Calibration Terms

INTRODUCTION

This appendix contains the definitions of the principal terms used in memory value functions.

ACCESS CODE. The access code is a one- or two-digit number that must be entered before any parameters can be changed. This code is used to limit access of the memory value functions to designated personnel.

AVERAGING FACTOR. This is a value set to correspond to the number of individual readings the Multi-Vessel System (or Sonologic signal processor) will average for each readout. This function is useful where there are rapid fluctuations in the amount of material in the vessel making the digital display difficult to read.

CURRENT TRANSMITTER. The 4-20 mA current transmitter module generates a current from 4 mA to 20 mA proportional to the indicated weight. This feature is useful for driving remote monitors, recorders, or control devices.

4 mA POINT. The lowest current generated by the current transmitter. This is normally set to correspond to zero (no material in vessel).

20 mA POINT. The highest current generated by current transmitter. This is normally set to correspond to total weight of material in a full vessel.

4-20 mA GROSS OR NET. The analog current transmitter may be set to transmit either gross or net weight, independent of any gross or net setting of the main display or either setpoint.

DEADBAND. See **SETPOINT DEADBAND**.

DISPLAY FORMAT. The format in which weight readouts are to be displayed. Six formats are available: no fixed zero, one fixed zero, two fixed zeroes, and up to three decimal places: 999900, 99990, 9999, 999.9, 99.99, and 9.999.

DISPLAY INCREMENT. The increment in which the Multi-Vessel System display registers changes in weight. Nine increments are available: 1, 2, 5, 10, 20, 50, 100, 200, and 500. This is a good way to match the display resolution with the system accuracy. (See the example under **Set Display Increments** section.)

ENERGIZED HI OR LO. See **SETPOINT ENERGIZED HI OR LO**.

FORMAT. (See **DISPLAY FORMAT.**)

GROSS WEIGHT. The total weight of the live-load material in the vessel.

HI SPAN. When calibrating the Multi-Vessel System, Hi Span is an arbitrary point chosen to correspond to the present weight of material in a vessel that is not completely empty. Ideally, the Hi Span would be set to the weight of material in a vessel that is completely full. Ideally, too, the Lo Span would be set to a presently known weight of material, but may be estimated if the spread between the Lo Span and Hi Span is a positively known quantity.

INCREMENT. (See DISPLAY INCREMENT.)

LO SPAN. When calibrating the Multi-Vessel System, Lo Span is an arbitrary point chosen to correspond to the present weight of material in a vessel that is not completely full. Ideally, the Lo Span would be set to zero in a vessel that is completely empty. Ideally, too, the Lo Span would be set to a presently known weight of material, but may be estimated if the spread between the Lo and Hi Span is a positively known quantity.

NET WEIGHT. Pushing the NET key causes the Tare weight to be subtracted from the current gross weight of the material in the vessel. The displayed weight value represents the current gross weight less the live-load weight in the vessel when the TARE key was last pushed. (See Appendix F, Figure F-2 for more details.)

SCALE FACTOR. Slope of the calibration line that passes through the zero indicated weight, zero live load point. The scale factor has units of weight/counts where weight is the difference between Hi Span and Lo Span weight. 'Counts' is the difference between the weight signal digital values at the vessel's Hi Span condition and the Lo Span condition.

SETPOINT. The point at which a relay is set to change state (open or close). Setpoints are used to activate equipment or alarms at specified weights within a vessel.

SETPOINT DEADBAND. The value used to specify a weight at which a setpoint relay will return to its normal state - if this is other than the setpoint value itself. The deadband value equals the amount that will be added or removed before the setpoint relay is energized or de-energized. This function is most often employed in pump-up or pump-down operations or to prevent relays from oscillating.

SETPOINT ENERGIZED HI OR LO. Designation to specify whether a setpoint relay is energized above or below the chosen setpoint value.

SETPOINT GROSS OR NET. This function permits a setpoint to be further designated to activate at either gross or net weight as desired.

TARE. Pushing the front-panel TARE key stores the current value of the gross weight, or live-load weight. (See Appendix F, Figure F-2.)

ZERO. When calibrating the Multi-Vessel System, the Zero function is used to establish the zero live load point of the vessel. Typically, the vessel is emptied completely and the Zero point is set to zero weight, but any known weight will do as well.

NOTE

A non-zero weight value is likely to be only an estimate of the live load. For highest accuracy, the vessel needs to be emptied and zero entered for the weight value.

Appendix D. Error and Warning Messages

SIGNAL PROCESSOR NOT AVAILABLE

This error indicates that there are no internal ADC card(s) and/or external signal processors (serial devices) active or enabled in the system.

CONDITION

An ADC card(s) (63-1200) is installed in the MVS.

SOLUTIONS

1. Rescan the MVS system through the Service/Micro/RScn/Auto/All function. (See Page 3-19.)

2. All channels of the ADC card(s) are disabled. Enable the channels through Service/ADC/Enabe menu. (See Page 3-14.)

3. The ADC card is not properly installed. Ensure that the card is inserted into the card guides and is mated fully with the backplane connector.

4. The ADC card is malfunctioning. Replace the non-functional card. Restore the ADC card parameters through the Service/ADC/Rtor/ADC function. (See Page 3-14.)

CONDITION

External signal processors installed in MVS (i.e. Sonologic, 10XX, 12XX, MVS, etc.,).

SOLUTIONS

1. Ensure that the external signal processors are connected to COM1 and that COM1 is set to "MASTER" through the I/O/Serl/COM1/Mode function. (See Page 4-10.)

2. Ensure that the dipswitches on the Microprocessor card (63-1196) are set properly. (See Table B-1 in Appendix B.)

3. The Microprocessor card is not properly installed. Ensure that the card is inserted into the card guides and is fully mated with thebackplane connector.

4. Rescan the MVS through the Service/Micro/RScn/Auto function.

5. The Microprocessor card is malfunctioning. Replace non-functional card.

OVERRANGE ERROR

This error occurs when an accessive input voltage signal is applied to an ADC channel, causing the analog-to-digital converter on the ADC card to overrange.

CONDITION

The sensor/transducer(s) sends a voltage signal to the MVS that exceeds the normal range of ±1.0 volt. This is caused by a malfunctioning sensor/transducer.

SOLUTION

Kistler-Morse has a number of troubleshooting documents available to customers that help isolate a malfunctioning sensor/transducer. Contact the K-M Technical Service Department for consultation on your specific problem.

COM ERROR Adr:XX

This error indicates that an external serial address, represented by the "XX" (Hexidecimal), has stopped responding to the Microprocessor card (63-1196).

CONDITION

The two top LED indicators on the Microprocessor card will flash when serial communications are functioning normally. If the lower of the two LEDs is the only one flashing, the Microprocessor card is attempting communications with no response from the external device.

SOLUTIONS

1. Ensure that power is applied to the external signal processor in question.
2. Verify that all hard-wired connections between the MVS and external signal processor are in tact.
3. Verify that the address dipswitches of the external signal processor are correct.
4. Verify that no serial parameters of the Microprocessor card have changed. Re-enter each parameter in the "Serl/COM1" menu. (See Page 4-10.)

ADC ERROR Adr:XX

This error indicates that an ADC card (63-1200) has stopped responding to the Microprocessor card (63-1196).

CONDITION

The number corosponding to "XX" represents the rack/slot address of the card in question.

SOLUTIONS

1 Rescan the MVS system through the Service/Micro/RScn/Auto/All function. (See Page 3-19.)

2 All channels of the ADC card(s) are disabled. Enable the channels through the Service/ADC/Enabe menu. (See Page 3-14.)

3 The ADC card is not properly installed. Ensure that the card is inserted into the card guides and is fully mated with the backplane connector.

4 The ADC card is malfunctioning. Replace the non-functional card and restore the ADC card parameters through the Service/ADC/Rtor/ADC function. (See Page 3-14.)

I/O ERROR Adr:XX

This error indicates that an input/output card such as the setpoint card (63- 1197) or current output (4/20) card (63-1195) has stopped responding.

CONDITION

The number corosponding to "XX" represents the rack/slot address of the card in question.

SOLUTIONS

1. Rescan the MVS system through the Service/Micro/RScn/Auto/i2c_IO function. (See Page 3-19.)

2. The Setpoint or 4/20 card is not properly installed. Ensure that the card is inserted into card guides and is fully mated with the backplane connector.

3. The Setpoint or 4/20 card is malfunctioning. Replace the non-functional card.

WARNING:ADD OR SUBTRACT MORE MATERIAL

This warning occurs when the difference between the hi span counts and lo span counts (scale factor counts) is less than 800. With a scale factor count less than 800, the calibration may not be very accurate. To increase the calibration accuracy, more material needs to be moved into or out of the vessel causing the scale factor counts to be greater than 800. Note that the hi span value is still entered regardless of this warning.

WARNING:AMBIGUOUS ERROR..HI SPAN WILL BE ENTERED..NEED NEW LO SPAN

This warning occurs when the hi span counts are less than the lo span counts, causing an ambiguous condition. Material must be moved out of the vessel to cause the lo span counts to be less than the hi span counts. Note that the hi span value is still entered, regardless of this warning.

WARNING:AMBIGUOUS ERROR..LO SPAN WILL BE ENTERED..NEED NEW HI SPAN

This warning occurs when the lo span counts are greater than the hi span counts, causing an ambiguous condition. Material must be moved into the vessel to cause the hi span counts to be greater than the lo span counts. Note that the lo span value is still entered, regardless of this warning.

UNITS OVERRANGE

This error occurs when the displayed engineering unit of measure exceeds 65,535.

CONDITION

The maximum number the MVS can display is 65,535. Therefore, if material is added to (or subtracted from) the vessel to cause the display to exceed this number, UNITS OVERRANGE will appear on the display.

SOLUTION

To correct this problem, follow one of the calibration procedures beginning on page 3-39. When adding material to the vessel, enter a hi span value that represents one-tenth the weight. For example, if 25% of the vessel's total capacity equals 50,000 lbs, enter 5,000 as the hi span. When calibrating by subtracting material, enter one-tenth the weight as a lo span value.

NOTE

One-hundredth, one-thousandth, etc. the hi or lo span value will also work if one-tenth the value is not suitable for your application.

During normal operation, the value displayed by the MVS will be one-tenth the actual measurement of the material in the vessel.

Appendix E. System Wiring

INTRODUCTION

A Multi-Vessel System and all the equipment that makes up a vessel monitoring system will vary from customer to customer. The MVS Installation and Operator's manual covers the basic installation of the equipment, setup and operation of the MVS, and other pertinent information. Each MVS manual is accompanied by computer-generated documents that contain the MVS termination wiring diagrams, the MVS Termination Wiring Table, and PCB rack assignments that are specific only to your system.

The Wiring Table is compiled by inputting information about your system into a computer program designed by Kistler-Morse. The program automatically configures the information and prints it out in the form of the MVS Termination Wiring Table. (Figure E-1 shows the column headings of the MVS Termination Wiring Table and explains what the information in each column means.) The program also configures the PCBs and power supply(ies) required, assigns them to a rack, and prints out a diagram.

ADDRESS ASSIGNMENTS

Before wiring the sensors/transducers and peripheral equipment to the Multi-Vessel System, it is important to understand the addressing system used to identify the different racks and PCBs. The address and title of each PCB is printed on the front and back of the rack. (Rack #1 has the Display/Keyboard attached which must be lowered to see the addresses and titles.)

The address number on each PCB identifies the rack and the position in the rack where the PCB resides. For example, if the address of a PCB is "17", the "1" refers to rack #1 and the "7" refers to the 7th position in the rack. Address 26 would be rack #2, position #6.

Addresses are assigned at the factory and are in place when you receive your system. The address of each PCB is also hand-written in permanent ink in the corner of each card.

NOTE

Use Tables E-1 and E-2 for reference. Your system will differ from the information in the tables.

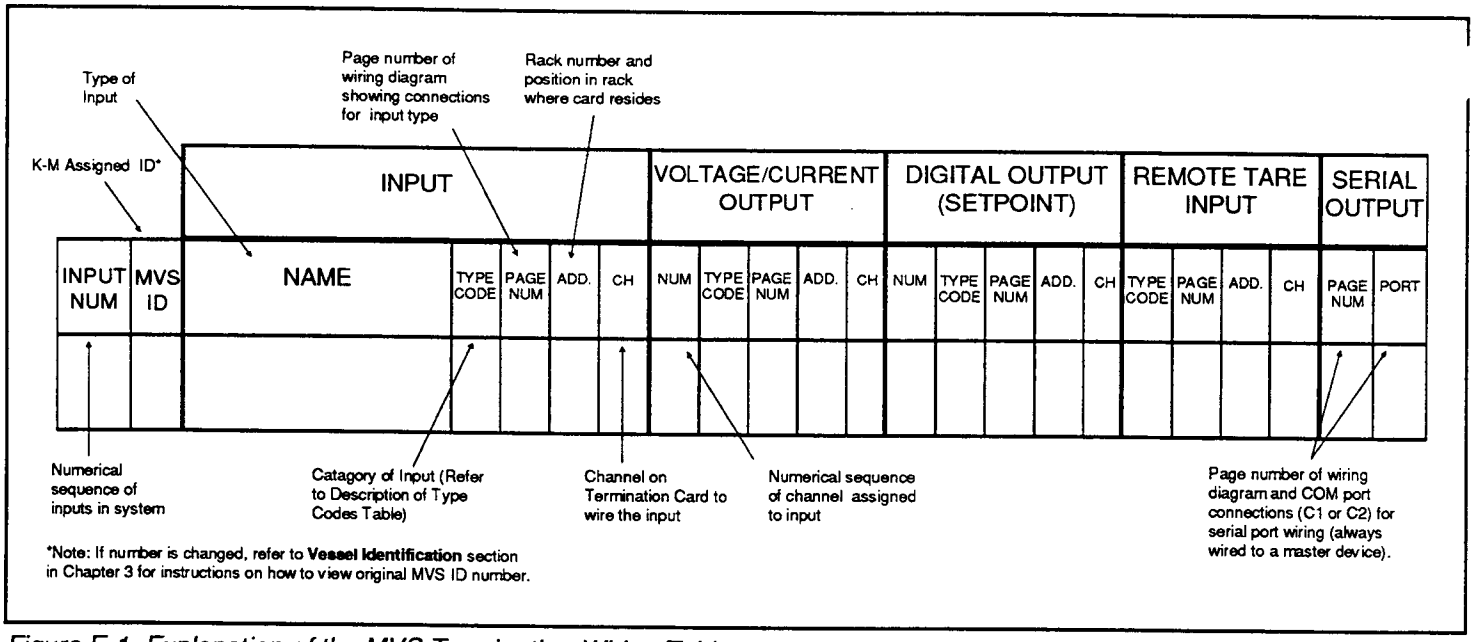


Figure E-1. Explanation of the MVS Termination Wiring Table.

DIGITAL OUTPUT (SETPOINT)				
NUM	**TYPE CODE**	**PAGE NUM**	**ADD.**	**CH**
1	6-1	E-5	17	1
	6-1	E-5	17	2
2	6-1	E-5	17	3
	6-1	E-5	17	4
3	6-1	E-5	17	5
	6-1	E-5	17	6
4	6-1	E-5	17	7
	6-1	E-5	17	8
5	6-1	E-5	18	1
	6-1	E-5	18	2
6	6-1	E-5	18	3
	6-1	E-5	18	4
7	6-1	E-5	18	5
	6-1	E-5	18	6
8	6-1	E-5	18	7
	6-1	E-5	18	8
9	6-2	E-5	19	1
	6-2	E-5	19	2
10	6-2	E-5	19	3
	6-2	E-5	19	4
11	6-2	E-5	19	5
	6-2	E-5	19	6

Table E-1. Sample Digital Output (Setpoint) Assignments.

DIGITAL OUTPUT (SETPOINT)

The Setpoint PCBs slide into the front of the MVS rack and plug into the MVS Backplane PCB. A Setpoint Termination Board (shown on the Setpoint Wiring drawing, Page E-5) connects with the Setpoint PCB when plugged into the opposite side of the MVS backplane. This design allows for easy wiring because the termination board can be removed, wired, and then plugged back into place.

Table E-1 shows information about the Setpoint PCBs in a sample system as would be found in the "MVS Termination Wiring Table" (Figure E-1). NUM refers to the numerical sequence of channels assigned to the input. TYPE CODE refers to the type of digital output and is cross-referenced with the computer-generated Type Code Table. PAGE NUM is the page number in this appendix of the drawing containing the wiring diagram for that particular PCB. ADD is the address of the PCB and CH refers to the channel on the PCB to which the controlled device is wired. The Setpoint Wiring Diagram is found on the Setpoint Wiring drawing, Page E-5.

VOLTAGE/CURRENT (OUTPUT)				
NUM	TYPE CODE	PAGE NUM	ADD.	CH
1	5-2	E-4	15	1
1	5-2	E-4	15	2
1	5-2	E-4	15	3
1	5-2	E-4	15	4
1	5-2	E-4	15	5
1	5-2	E-4	15	6
1	5-2	E-4	15	7
1	5-2	E-4	15	8

Table E-2. Sample Voltage/Current Output Assignments.

Creating a Power Bus

If the Setpoint PCB is going to control more than one piece of equipment that has the same power requirements, a power bus can be created on the Setpoint Termination Board(s) to easily accommodate this. The purpose of doing so is to use one power cable to power all of the peripheral equipment instead of having to use individual power cables for each unit.

All of the TB1 'A' terminals are wired together through the circuitry of the termination board. All of the 'B' terminals are wired similarly. (See Page E-5 Setpoint Wiring.) A power cable can then be connected to the 'A' and 'B' terminals of TB3. Through the circuitry of the termination board, the TB1 'A' and 'B' terminals are connected to that power, creating a power bus. Add jumpers from the TB1 'A' or 'B' terminals to the '+' or '-' terminals to power the peripheral equipment.

VOLTAGE/CURRENT (ANALOG) OUTPUT

The 4-20/0-20 mA PCBs slide into the front of the MVS rack and plug into the MVS Backplane PCB. A 4-20 Termination Board (shown on the Analog Output Wiring drawing, Page E-4) connects with the Current Transmitter PCB when plugged into the opposite side of the MVS backplane. This design allows for easy wiring because the termination board can be removed, wired, and then plugged back into place.

Table E-2 shows the voltage/current output assignments in a sample system. The 4-20/0-20 mA PCB has eight outputs and eight channels. Each vessel in the sample system has been assigned one 4-20 output and one channel as shown in the table.

Table E-2 provides information as would be found in the "MVS Termination Wiring Table" (Figure E-1). NUM refers to the numerical sequence of channels assigned to the input. TYPE CODE refers to the type of voltage or current output and is cross-referenced with the Type Code Table. PAGE NUM is the page number in this appendix of the drawing containing the wiring diagram for that particular PCB. ADD is the address of the PCB and CH refers to the channel on the PCB to which the controlled device is wired.

SYSTEM WIRING

The MVS Termination Wiring Table (accompanying this manual) are computer-generated at the factory and are specific to your system. All of the information needed to wire the equipment in your monitoring system to the MVS is provided in this table.

ALIGNMENT KEY PLACEMENT

The PCB connectors and the connectors on the backplane in which they install have removable alignment keys. The keys are configured at the factory so that each PCB must be installed in the correct rack position in order to mate with the proper backplane connector. If a PCB is installed in the wrong rack position, the keys in the connectors will not align and connection cannot be made. This safeguard eliminates possible damage to the MV System caused by inserting the wrong PCB in the wrong rack position.

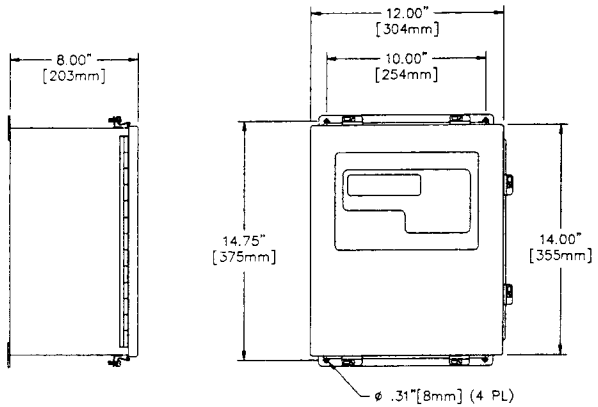
The PCB connector and the backplane connector have 12 positions (labeled 'A' - 'I', 'K' - 'M') in which keys can be inserted or left empty. Table E-3 shows the positions of the keys for each PCB connector and its mating backplane connecto. A '1' indicates a key is in place, a '0' indicates an empty slot.

Current Transmitter PCB (63-1195)			Microprocessor PCB (63-1196)			Setpoint PCB (63-1197-01)			Setpoint/Tare Relay PCB (63-1197-02)		
KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB
A	1	0	A	1	0	A	1	0	A	1	0
B	0	1	B	0	1	B	0	1	B	0	1
C	1	0	C	0	1	C	0	1	C	0	1
D	0	1	D	1	0	D	0	1	D	0	1
E	0	1	E	0	1	E	0	1	E	0	1
F	1	0	F	1	0	F	1	0	F	1	0
G	1	0	G	1	0	G	1	0	G	1	0
H	0	1	H	0	1	H	0	1	H	0	1
I	1	0	I	1	0	I	1	0	I	1	0
K	1	0	K	1	0	K	1	0	K	1	0
L	1	0	L	1	0	L	1	0	L	1	0
M	1	0	M	1	0	M	1	0	M	0	1

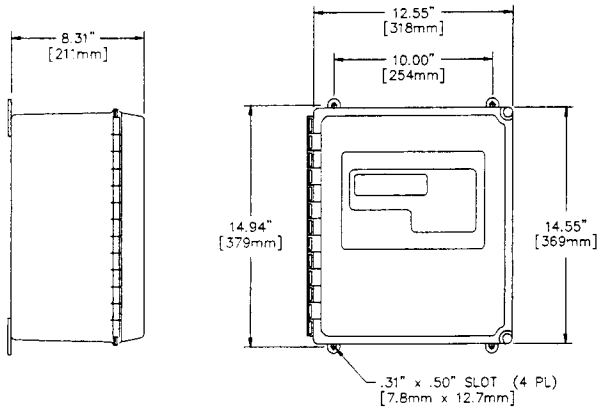
A/D Converter PCB (63-1200)			Regulator PCB (63-1201)			STX Signal Xmitter PCB (63-1218)			MVS-RIO PCB (63-1228)		
KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB	KEY	BACK-PLANE	PCB
A	1	0	A	1	0	A	0	1	A	0	1
B	1	0	B	1	0	B	1	0	B	1	0
C	1	0	C	1	0	C	1	0	C	1	0
D	1	0	D	0	1	D	0	1	D	1	0
E	1	0	E	1	0	E	1	0	E	1	0
F	1	0	F	1	0	F	1	0	F	1	0
G	1	0	G	1	0	G	1	0	G	0	1
H	1	0	H	1	0	H	0	1	H	1	0
I	0	1	I	0	1	I	0	1	I	1	0
K	0	1	K	0	1	K	0	1	K	1	0
L	0	1	L	0	1	L	0	1	L	1	0
M	0	1	M	0	1	M	0	1	M	1	0

Table E-3. Location of the Alignment Keys in the PCBs and the Backplane Connectors.

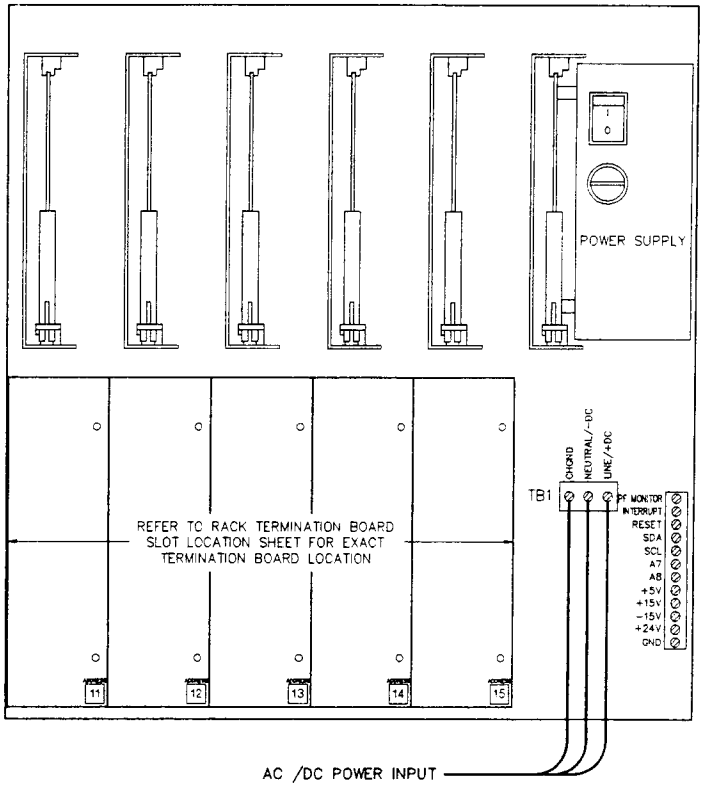
REVISIONS					
LTR	DESCRIPTION	INCORP.	CHECKED	APPROVED	DATE
NEW	Initial Release	R.M. Collado	C. Garcia	D. Hanson	03-13-92
A	Per DCN No. C425	R.M. Collado	Randy Quayle	Randy Quayle	12-04-92
B	Per DCN No. C465	R.M. Collado	T.K.M.	D. Hanson	6-16-93
C	Added Pages 8 thru 11.	R.M. Collado	MC		



STAINLESS STEEL NEMA 4X ENCLOSURE DIMENSIONS



FIBERGLASS NEMA 4X ENCLOSURE DIMENSIONS



MVS/2 RACK TERMINATION BOARD ADRESS LOCATION AND POWER SUPPLY WIRING

APPROVALS	DATE
DRAWN: Raul M. Collado	06-03-93
CHECKED: Carlos Garcia	03-13-92
PROJ. ENGR.: Don Hanson	03-13-92
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL .X± -- .XX± -- .XXX± --
ANGULAR ±--°
DO NOT SCALE DRAWING
SCALE NONE
FINISH --
USED ON: (REF ONLY) --

Kistler-Morse Corp.
Redmond, Wa 98073

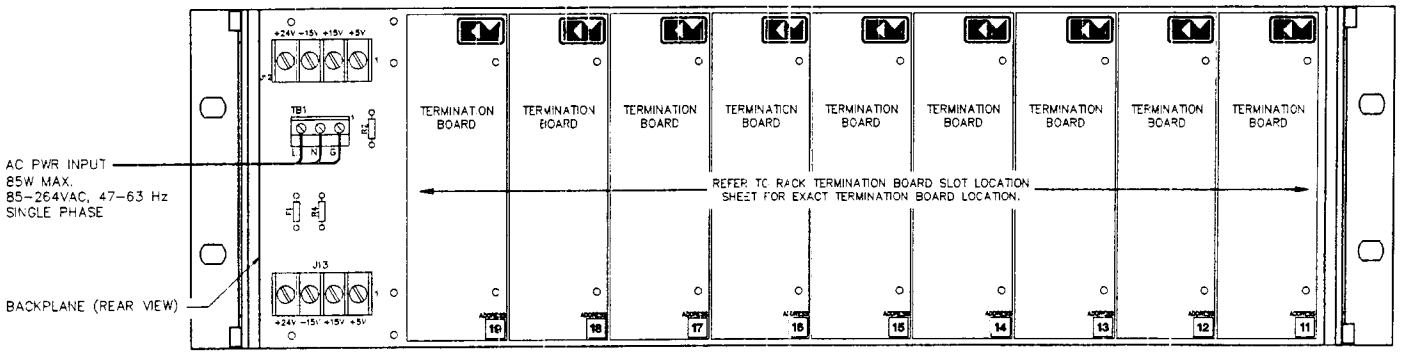
TITLE
INSTALLATION
MULTI VESSEL SYSTEM (MVS/2)
PAGE E-1A

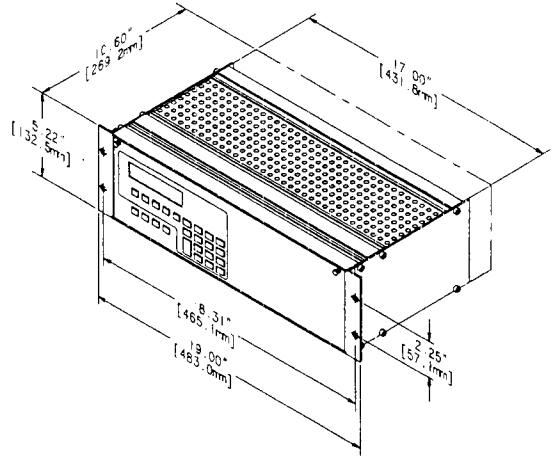
SIZE	DWG. NO.	REV
B	CSK-0047	C

ACAD # CSK0047A | DATE: 11/29/94 | SHT. 1 OF 11

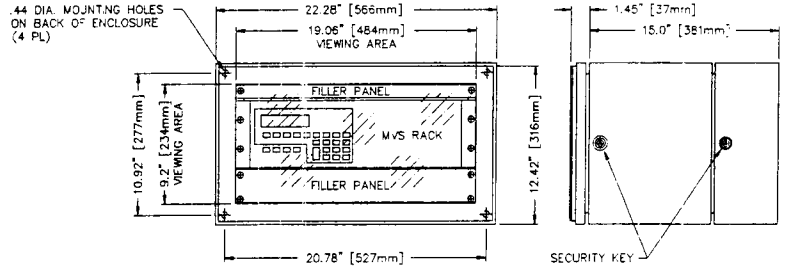
FILE COPY

MVS RACK TERMINATION BOARD ADDRESS LOCATION AND POWER SUPPLY WIRING
(REAR VIEW)





TYPICAL 19" RACK DIMENSIONS



DOUBLE HINGED NEMA 12 ENCLOSURE DIMENSION

APPROVALS	DATE
DRAWN: Raul M. Collado	03-04-32
CHECKED:	
PROJ. ENGR.	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.Xx ±
.XXx ± ° ′ ″
.XXXx ±
DO NOT SCALE DRAWING
SCALE NONE
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

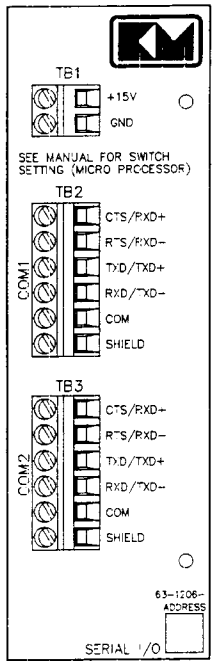
TITLE
INSTALLATION
MULTI VESSEL SYSTEM (MVS)
PAGE E-1B

SIZE B | DWG No. CSK-0047 | REV. C

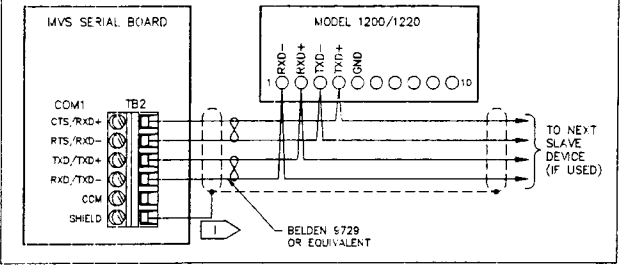
ACAD # CSK0047B | DATE: 11/29/94 | SHT. 2 OF 11

FILE COPY

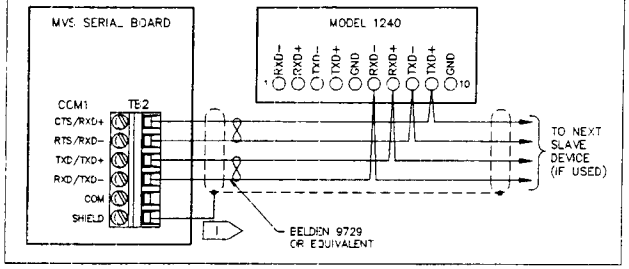
SERIAL TERMINATION BOARD



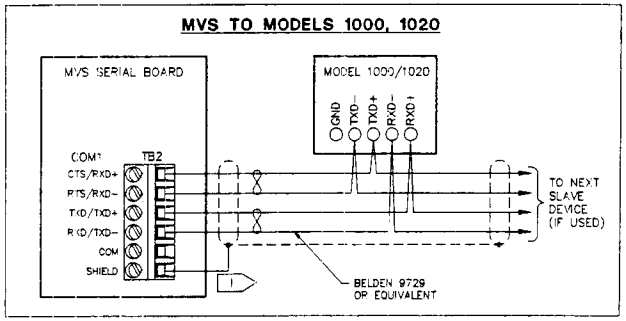
MVS TO MODELS 1200, 1220



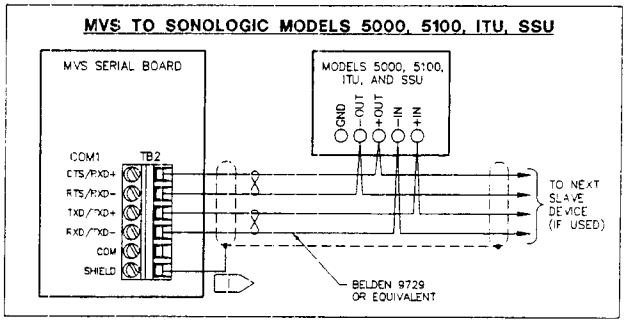
MVS TO MODEL 1240



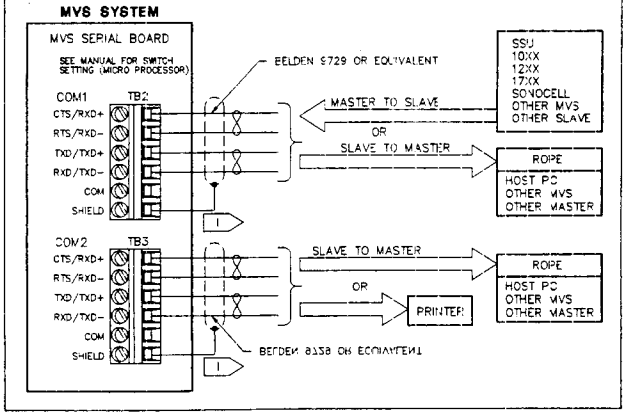
MVS TO MODELS 1000, 1020



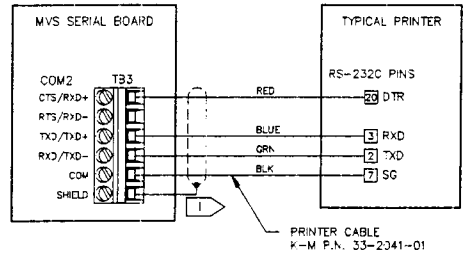
MVS TO SONOLOGIC MODELS 5000, 5100, ITU, SSU



SERIAL BOARD BLOCK DIAGRAM

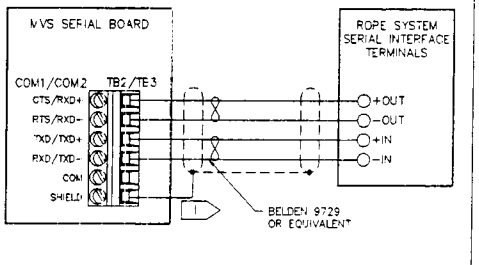


MVS TO SERIAL PRINTER



NOTE: COM2 OF MVS MUST HAVE "MODE" SET TO "PRINTER" WITH HANDSHAKING "YES"(ON).

MVS TO ROPE (MASTER)



NOTE:

1 CONNECT CABLE SHIELD AT THIS END OF CABLE ONLY.

APPROVALS	DATE
DRAWN: Raul M. Collado	03-05-92
CHECKED:	
PROJ. ENGR:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
X± --
XX± --
XXX± --
DO NOT SCALE DRAWING
SCALE FULL
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

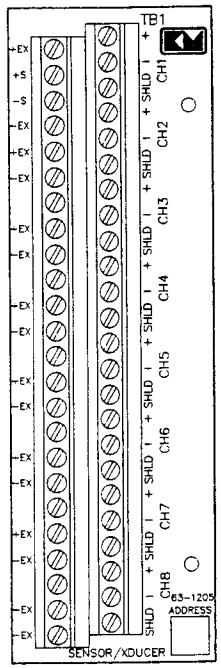
TITLE
SERIAL PORT WIRING
PAGE E-2

SIZE	DWG No	REV
B	CSK-0047	C

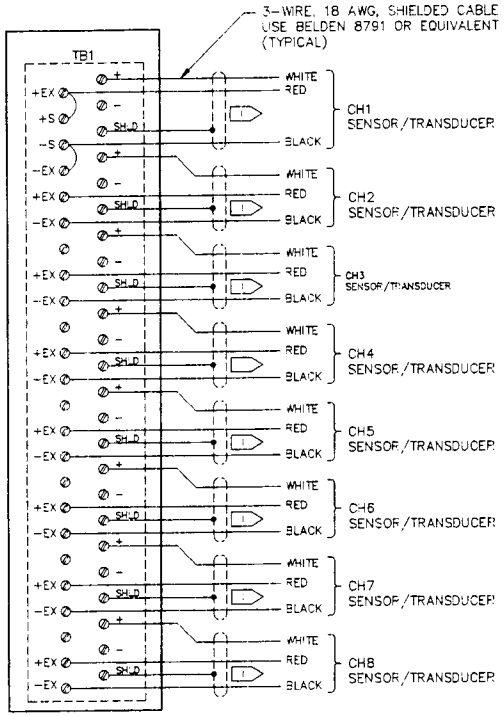
ACAD # CSK0047C | DATE: 11/29/94 | SHT. 3 OF 11

FILE COPY

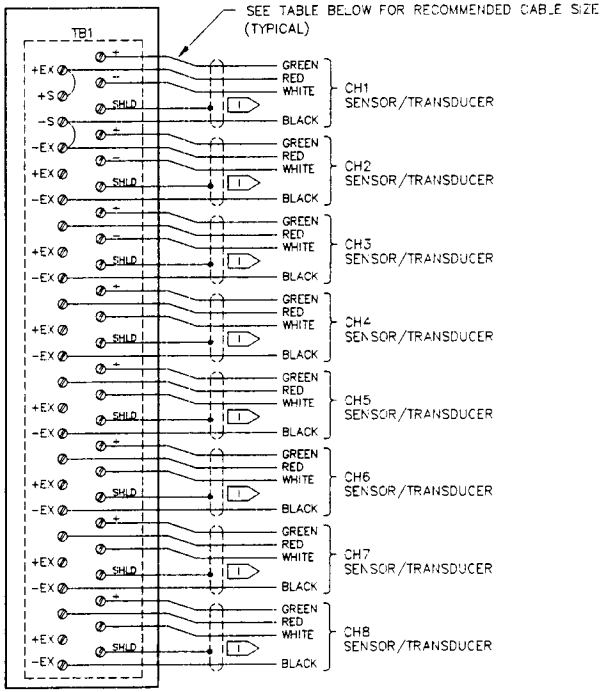
SENSOR/TRANSDUCER TERMINATION BOARD



SENSOR WIRING DIAGRAM
(KM HALF BRIDGE STRAIN GAGE)



SENSOR WIRING DIAGRAM
(FOIL GAGE FULL BRIDGE)



NOTE:

1 CONNECT CABLE SHIELD WIRE AT THIS END OF CABLE ONLY.

RECOMMENDED CABLE SIZE:

	LESS THAN 500'	500' OR MORE
WITH REMOTE SENSE CONNECTION	BELDEN #8723 (22 AWG)	BELDEN #9368 (18 AWG)
WITHOUT REMOTE SENSE CONNECTION	BELDEN #8777 (22 AWG)	BELDEN #9773 (18 AWG)

APPROVALS	DATE
DRAWN: Raul M. Collado	03-04-92
CHECKED:	
PROJ ENGR:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± -- ± --°
.XX± --
.XXX± --
DO NOT SCALE DRAWING
SCALE FULL
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

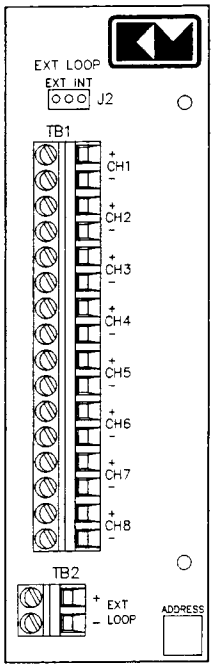
TITLE
SENSOR/TRANSDUCER WIRING
PAGE E-3

SIZE	DWG NO.	REV
B	CSK-0047	C

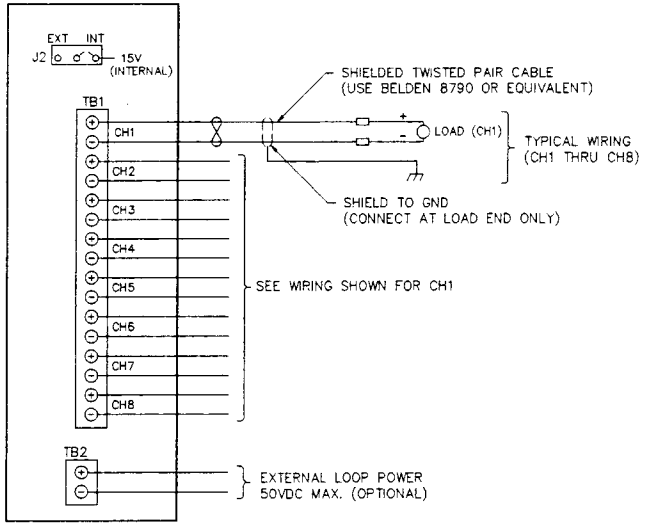
ACAD # CSK0047D | DATE: 11/26/94 | SHT. 4 OF 11

FILE COPY

4-20 TERMINATION BOARD



CURRENT/VOLTAGE WIRING DIAGRAM



NOTE: THE MAXIMUM LOAD RESISTANCE FOR CURRENT OUTPUTS WHEN USING INTERNAL LOOP POWER (15V) IS 600 OHMS.

THE MAXIMUM LOAD RESISTANCE WHEN EXTERNAL LOOP POWER IS PROVIDED CAN BE CALCULATED AS FOLLOWS:

MAXIMUM LOAD RESISTANCE = (MINIMUM LOAD VOLTAGE − 2) ÷ .02

APPROVALS	DATE
DRAWN: Raul M. Collado	03-04-32
CHECKED:	
PROJ ENGR:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± --
.XX± --
.XXX± --
± -- °
DO NOT SCALE DRAWING
SCALE FULL
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

TITLE
ANALOG OUTPUT WIRING
PAGE E-4

SIZE	DWG No.	REV.
B	CSK-0047	C

ACAD # CSK0047E | DATE 11/29/94 | SHT. 5 OF 11

FILE COPY

NOTES:

1. BUS A AND BUS B ARE USER DEFINED. THERE IS NO CONNECTION TO THE INTERNAL ELECTRONICS.
2. SOLID STATE RELAY OUTPUT RATING:
   LOAD VOLTAGE RANGE: 24VAC TO 280VAC
   MAX. CURRENT: 3A @ ≤ 25°C 1.25A @ 70°C
   MAX. OFF-STATE LEAKAGE: 4mA
3. POWER INPUT MUST AGREE WITH MODULE TYPE, i.e. AC POWR REQUIRES AN AC OUTPUT MODULE.

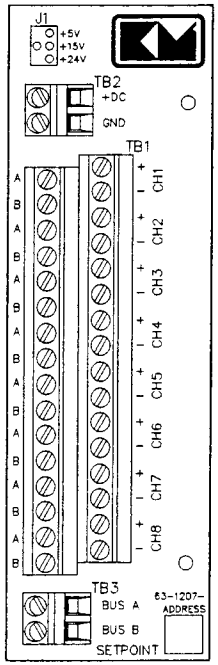
SPECIFICATIONS FOR AC OUPUT MODULE:

Output Circuit:	All AC Output Modules are normally open and have zero voltage switching.	
Model Number	OAC5	OAC5A
Nominal Line Voltage (Vac)	120	240
Load Voltage Range (Vac, rms)	24–140	24–280
Min. Peak Blocking Voltage (Volts)	400	600
Max. Zero Voltage Offset (Volts, peak)	8	8
Max. Off State Leakage Current 60 Hz.(mA rms)	2	4
Load Current Range (rms)	3 Amps at ambient temperature less than or equal to 25°c. Derate linearly to .03 Amps at 100°c.	
Max. Surge Current (peak)	80 Amps at 60 Hz 1 cycle; 25 Amps at 60 Hz 60 cycles.	
Static dV/dT	3000 volts per microsecond typical measured under open circuit conditions; not to exceed peak blocking voltage.	
Turn-on Time (60 Hz)	8.3 mS max.	
Turn-off Time (60 Hz)	8.3 mS max.	
On State Voltage Drop (peak)	1.5 volts max.	
Power Dissipation	1.0 Watt/Amp typical	
Load Power Factor	0.4 min.	
Frequency Range	25 to 70 Hz	

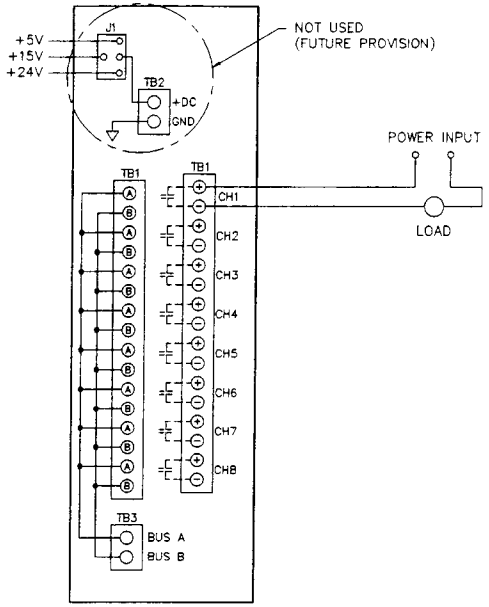
SPECIFICATIONS FOR DC OUPUT MODULE:

Output Circuit Load Current Range	For ODC5A, 0.1 to 1 Amp; contact factory for derating. For ODC5, 3A at ambient temperatures less than or equal to 25°C. .02A at ambient temperature of 100°C.	
Model Number	ODC5	ODC5A
Load Voltage Nominal	60	200
Load Voltage Range (Vdc)	3–60	4–200
Power Dissipation In watt/Amp	1W/A	1.5W/A
Clamping Voltage (Vdc Max.)	80	360
Turn-on Time (Max.)	20uS	75uS
Turn-off Time (Max. By Load): 1 Amp + / < 1Amp / All	40uS / 50uS	750uS
Off State Leakage Current (Max.)	1.5mA	10uA
On State Voltage Drop (Vdc Max.)	1.2	1.6
Transient Power Dissipation	400 Watt at 1mS non-recurring	
Surge Current	5 Amps for 1 second	

SETPOINT TERMINATION BOARD



SETPOINT WIRING DIAGRAM



APPROVALS	DATE
DRAWN: Raul M. Collado	03-04-32
CHECKED:	
PROJ. ENGR:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X ±
.XX ±
.XXX ±
DO NOT SCALE DRAWING
SCALE FULL
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

TITLE
SETPOINT WIRING
PAGE E-5

SIZE	DWG. No	REV
B	CSK-0047	C

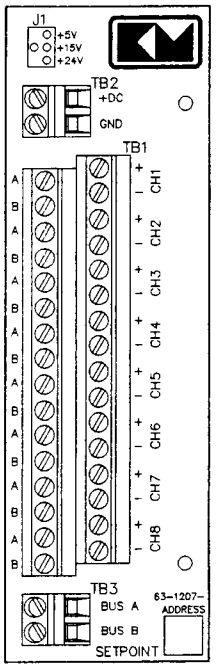
ACAD # CSK0047F | DATE: 11/29/94 | SHT. 6 OF 11

FILE COPY

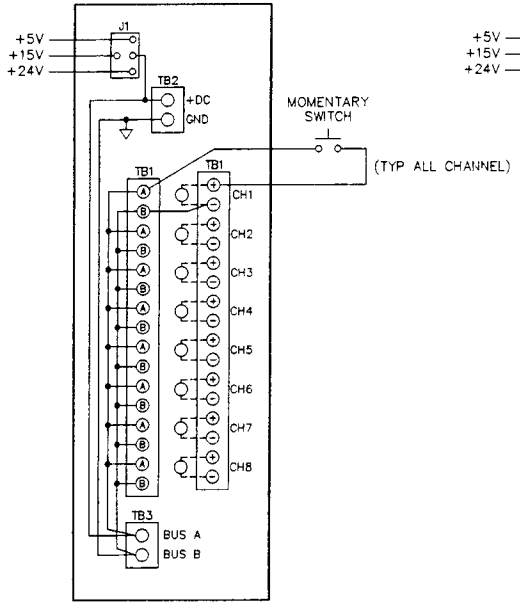
NOTES:

1. BUS A AND BUS B ARE USER DEFINED. THERE IS NO CONNECTION TO THE INTERNAL ELECTRONICS.
2. SOLID STATE INPUT RELAY RATING:
   VOLTAGE RANGE = 3-32VDC
   INPUT CURRENT = 50mA

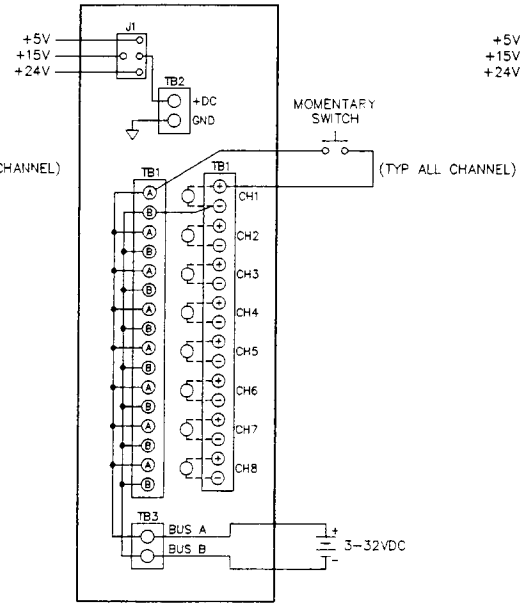
SETPOINT TERMINATION BOARD
(USED FOR REMOTE TARE)



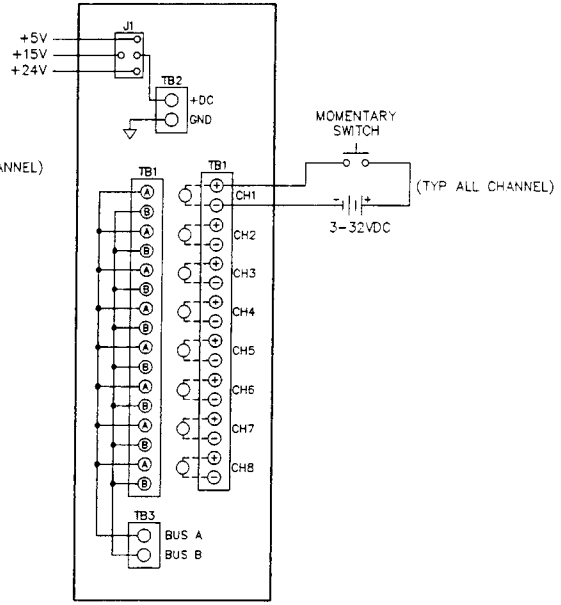
REMOTE TARE WIRING DIAGRAM
(STANDARD)



REMOTE TARE WIRING DIAGRAM
(OPTION 1)



REMOTE TARE WIRING DIAGRAM
(OPTION 2)



APPROVALS	DATE
DRAWN: Raul M. Collado	03-04-32
CHECKED:	
PROJ ENGR.:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± --
.XX± --
.XXX± --
DO NOT SCALE DRAWING
SCALE FULL
FINISH --
USED ON (REF ONLY)

Kistler-Morse Corp.
Redmond, Wa 98073

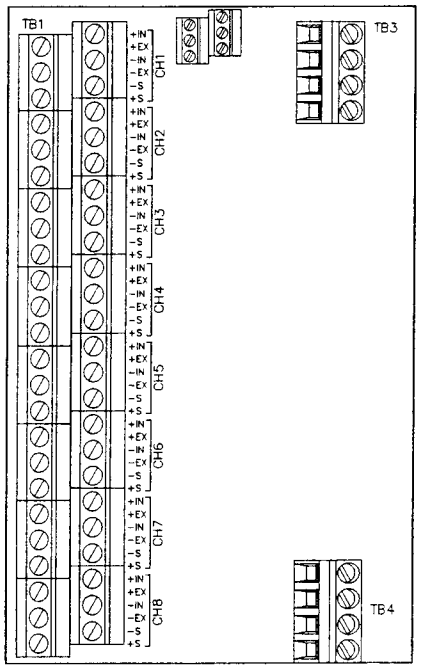
TITLE
REMOTE TARE WIRING
PAGE E-6

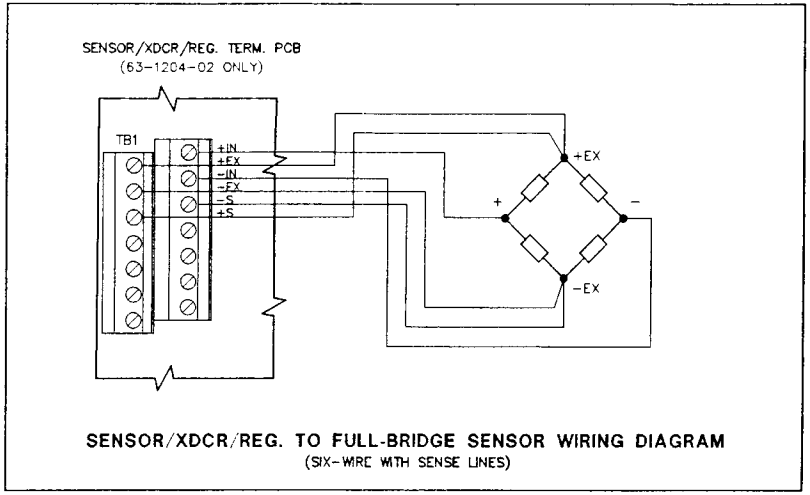
SIZE	DWG No	REV
B	CSK-0047	C

ACAD # CSK0047G | DATE: 11/29/94 | SHT. 7 OF 11

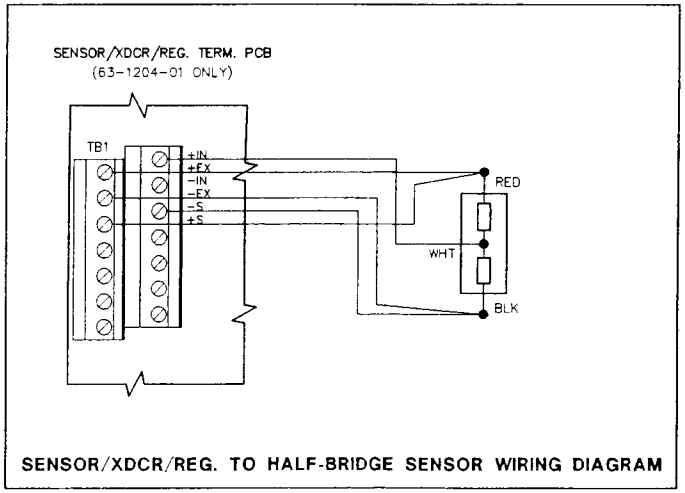
FILE COPY

SENSOR/XDCR/REGULATOR TERM. BOARD





SENSOR/XDCR/REG. TO FULL-BRIDGE SENSOR WIRING DIAGRAM
(SIX-WIRE WITH SENSE LINES)



SENSOR/XDCR/REG. TO HALF-BRIDGE SENSOR WIRING DIAGRAM

NOTE:

1. FOR APPLICATION WITH INTRINSIC SAFETY BARRIERS, REFER TO K-M TECHNICAL ILLUSTRATION DRAWING No. TI-0106.

APPROVALS	DATE
DRAWN: Raul M. Collado	11-23-94
CHECKED:	
PROJ. ENGR.:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± -- ±--°
.XX± --
.XXX± --
DO NOT SCALE DRAWING
SCALE --
FINISH --
USED ON: (REF ONLY) MVS

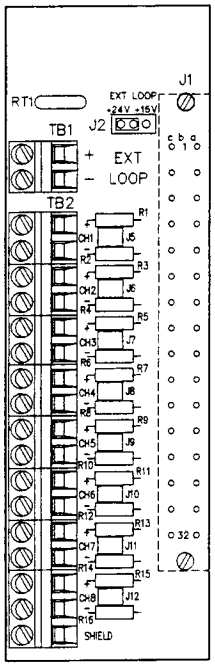
Kistler-Morse Corp.
Redmond, Wa 98073

TITLE
SENSOR/XDCR/REG. WIRING
PAGE E-7

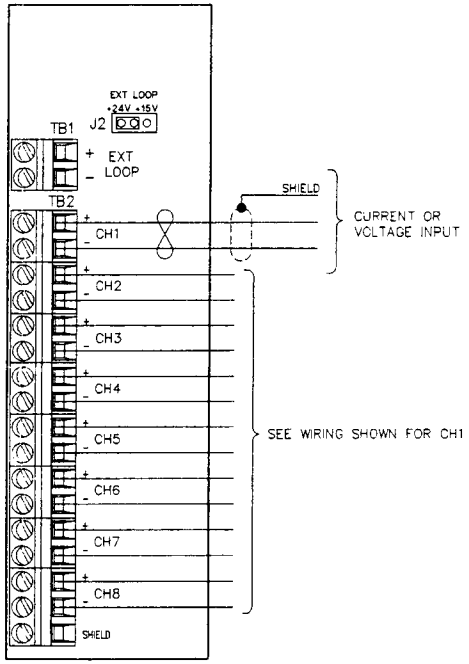
SIZE	DWG No	REV
B	CSK-0047	C

ACAD # CSK0047H | DATE: 11/29/94 | SHT. 8 OF 11

VOLTAGE/CURRENT INPUT TERM. BOARD



VOLTAGE/CURRENT INPUT WIRING DIAGRAM



APPROVALS	DATE
DRAWN: Raul M. Collado	11-25-94
CHECKED:	
PROJ. ENGR.:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± -- ±--°
.XX± --
.XXX± --
DO NOT SCALE DRAWING
SCALE --
FINISH --
USED ON: (REF ONLY) MVS

Kistler-Morse Corp.
Redmond, Wa 98073

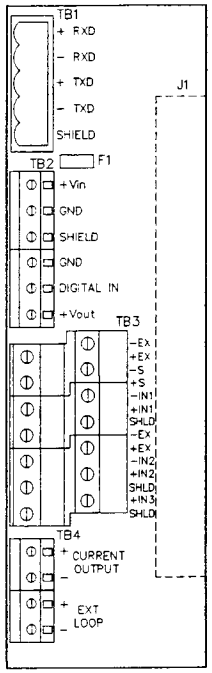
TITLE
VOLTAGE/CURRENT INPUT WIRING
PAGE E-8

SIZE	DWG No	REV.
B	CSK-0047	C

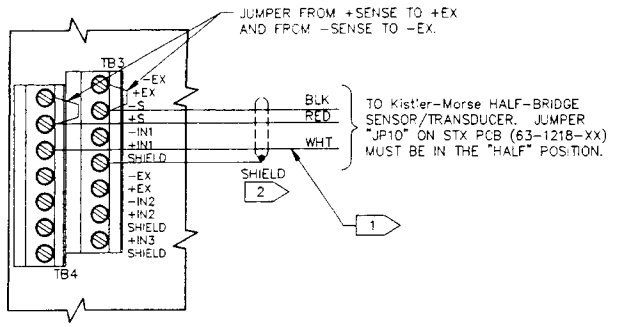
ACAD # CSK0047I | DATE: 11/29/94 | SHT. 9 OF 11

FILE COPY

STX TERMINATION PCB

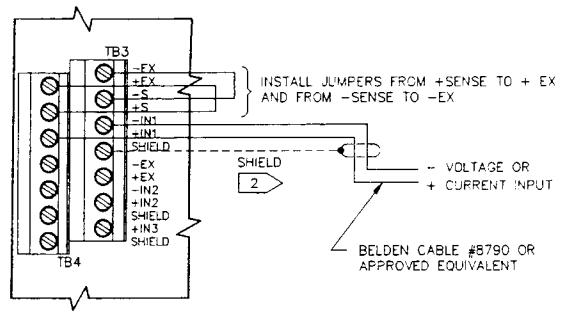


MODEL STX TERMINATION PCB



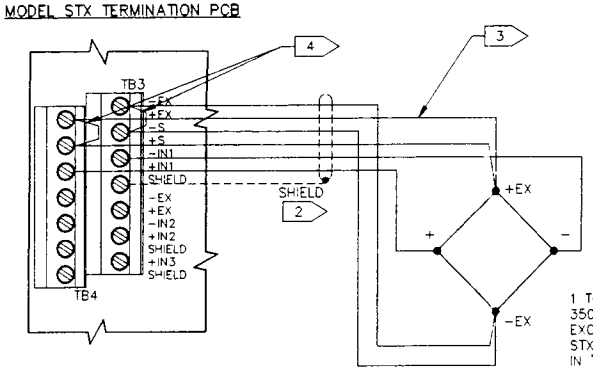
K-M HALF-BRIDGE SENSOR/TRANSDUCER CONNECTION

MODEL STX TERMINATION PCB



VOLTAGE AND CURRENT CONNECTION

MODEL STX TERMINATION PCB



FULL BRIDGE SENSOR CONNECTION
(SIX-WIRE WITH SENSE LINES)

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. FOR TRANSDUCER/SIGNAL PROCESSOR SEPARATION DISTANCES UP TO 1,000 FEET, USE 18-AWG, THREE-CONDUCTOR SHIELDED CABLE, (BELDEN 8791 OR EQUIVALENT) AT INTERCONNECT JUNCTION BOXES AND THE MODEL STX. DISTANCES UP TO 2,000 FEET REQUIRES 16-AWG, THREE-CONDUCTOR SHIELDED CABLE, (BELDEN 8618 OR EQUIVALENT) AS THE INTERCONNECT SIGNAL CABLE.
2. TO PREVENT GROUND LOOPS, CONNECT SIGNAL WIRE SHIELDS AT ONE END ONLY.
3. RECOMMENDED CABLE FOR FULL-BRIDGE SENSORS:

	LESS THAN 500ft (150m) (22 GAUGE)	MORE THAN 500ft (150m) (18 GAUGE)
WITHOUT REMOTE SENSE CONNECTIONS	BELDEN 8723	BELDEN 9368
WITH REMOTE SENSE CONNECTIONS	BELDEN 8777	BELDEN 9773

4. FOR 4-WIRE CONNECTION, JUMPER FROM +SENSE TO +EX AND FROM –SENSE TO –EX. JUMPER JP10 MUST BE IN THE "FULL" POSITION. JUMPER JP8 IS CURRENTLY NOT IN USE.

APPROVALS	DATE
DRAWN: Raul M. Collado	11-23-94
CHECKED:	
PROJ. ENGR.:	
PRODUCTION:	
PURCHASING:	

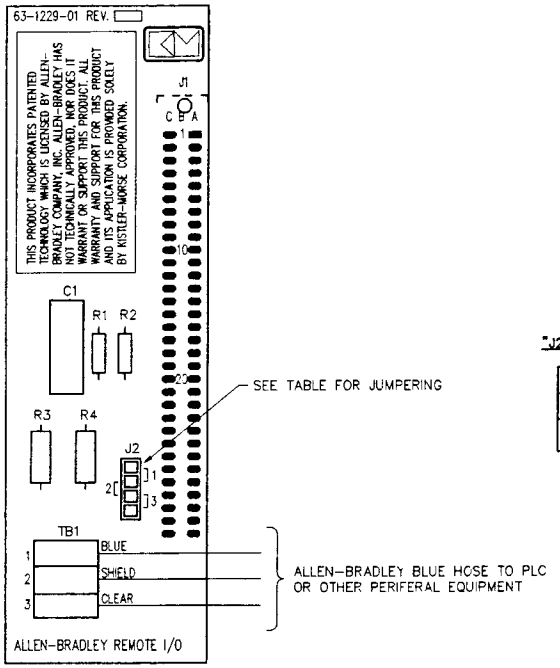
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL .X± -- .XX± -- .XXX± --
ANGULAR ±--°
DO NOT SCALE DRAWING
SCALE --
FINISH --
USED ON (REF ONLY) MVS

Kistler-Morse Corp.
Redmond, Wa 98073

TITLE
STX TERMINATION PCB WIRING
PAGE E-9

SIZE	DWG No	REV
B	CSK-0047	C

ACAD # CSK0047J | DATE 11/29/94 | SHT 10 OF 11



"J2" JUMPER TABLE

1 = NC
2 = 150R
3 = 82R

APPROVALS	DATE
DRAWN: Raul M. Collado	11-23-94
CHECKED:	
PROJ. ENGR.:	
PRODUCTION:	
PURCHASING:	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL ANGULAR
.X± -- ±--°
.XX± --
.XXX± --
DO NOT SCALE DRAWING
SCALE --
FINISH --
USED ON: (REF ONLY) MVS

Kistler-Morse Corp.
Redmond, Wa 98073

TITLE
ALLEN-BRADLEY REMOTE I/O
TERMINATION BOARD WIRING
PAGE E-10

SIZE	DWG No	REV
B	CSK-0047	C

ACAD # CSK0047K | DATE: 11/29/94 | SHT. 11 OF 11

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Appendix F. Wiring Regulator Intrinsic Safety Barrier Racks to the MVS

GENERAL INFORMATION

This chapter provides general instructions on how to wire a Regulator Intrinsic Safety Barrier Rack to an MVS and sensor junction box cables to the barrier rack. Instructions for installing the sensors/transducers are treated separately. The appropriate manual is shipped with the sensors when they leave the factory.

MOUNTING INSTRUCTIONS

The procedure for mounting all Multi-Vessel System racks to a frame is described in Chapter 2. Mount the Regulator Intrinsic Safety Barrier Rack(s) by following that procedure and return to this appendix for wiring instructions.

WIRING THE REGULATOR INTRINSIC SAFETY BARRIER RACK

NOTE

This section describes wiring a Regulator Intrinsic Safety Barrier Rack in a sample system. Your particular system will differ from the one described. Use this section for reference and refer to Appendix E for complete system wiring of your Multi-Vessel System.

Before wiring the sensor junction boxes to the barrier rack, the junction boxes should already be mounted, conduit installed (if applicable), and the

sensors/transducers wired to the junction boxes. Instructions on how to do this are contained in the sensor and transducer installation manuals.

A cable harness is used to wire the barrier rack to the MVS Rack. The cable harness is provided by the factory but must be connected on site by the customer.

One end of the cable harness connects to terminal strips (E, F, G, and H) on the barrier rack (Figure F-1). The other end connects to the Regulator Intrinsic Safety Termination Boards on MVS Rack #2 (in a two-rack senario). The wiring diagram in Figure F-2 shows the electrical connections.

When connecting the sensor/transducer junction boxes to the barrier rack A, B, C, and D terminal strips (Figure F-1), Kistler-Morse recommends using Belden 8791 three-wire, 18 gage shielded cable or equivalent. Refer to Figure F-2 for the electrical connections.

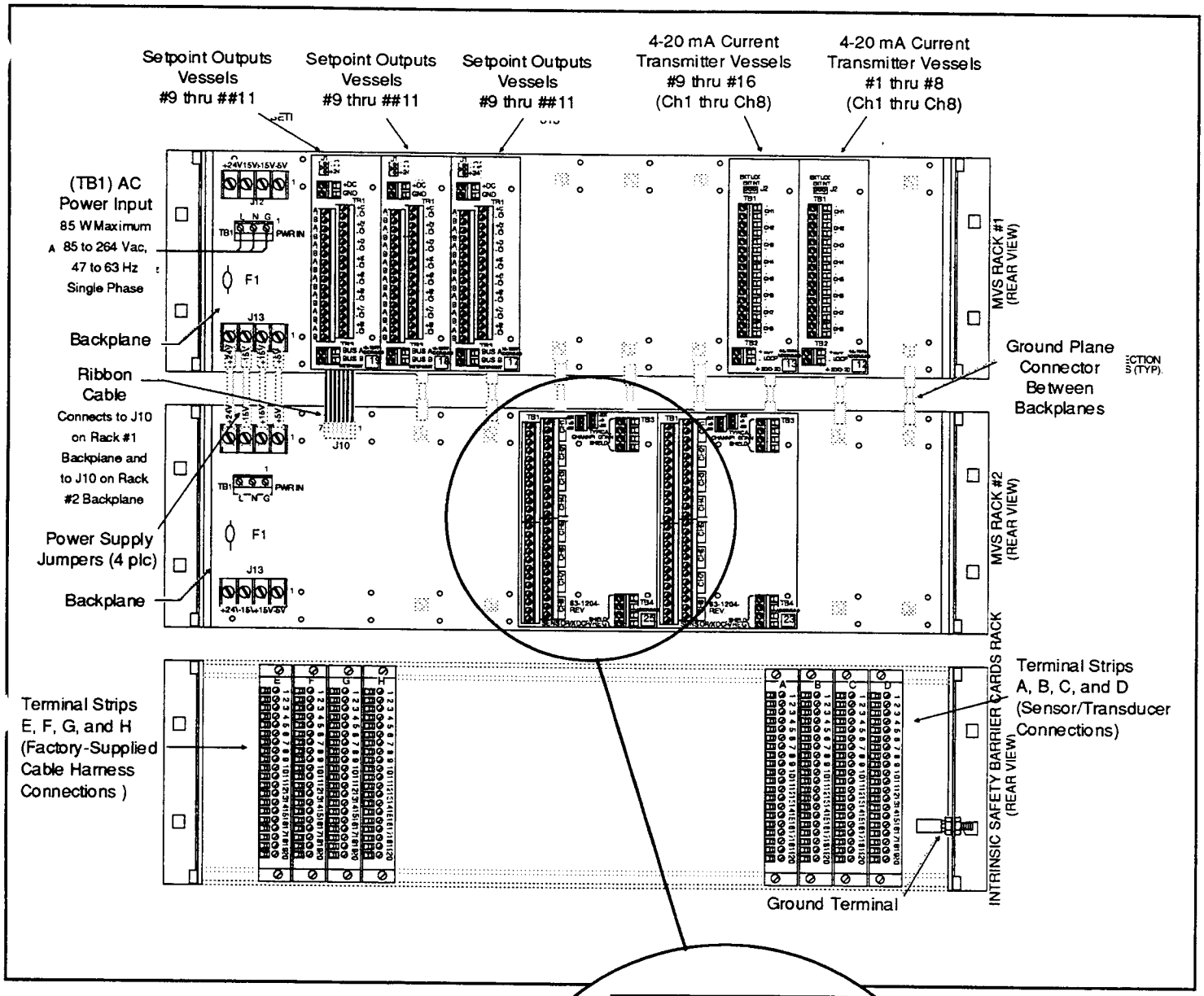

Figure F-1. Connecting the Regulator Intrinsic Safety Barrier Rack to the MVS.

Enlarged View of the Regulator Intrinsic Safty Termination Board

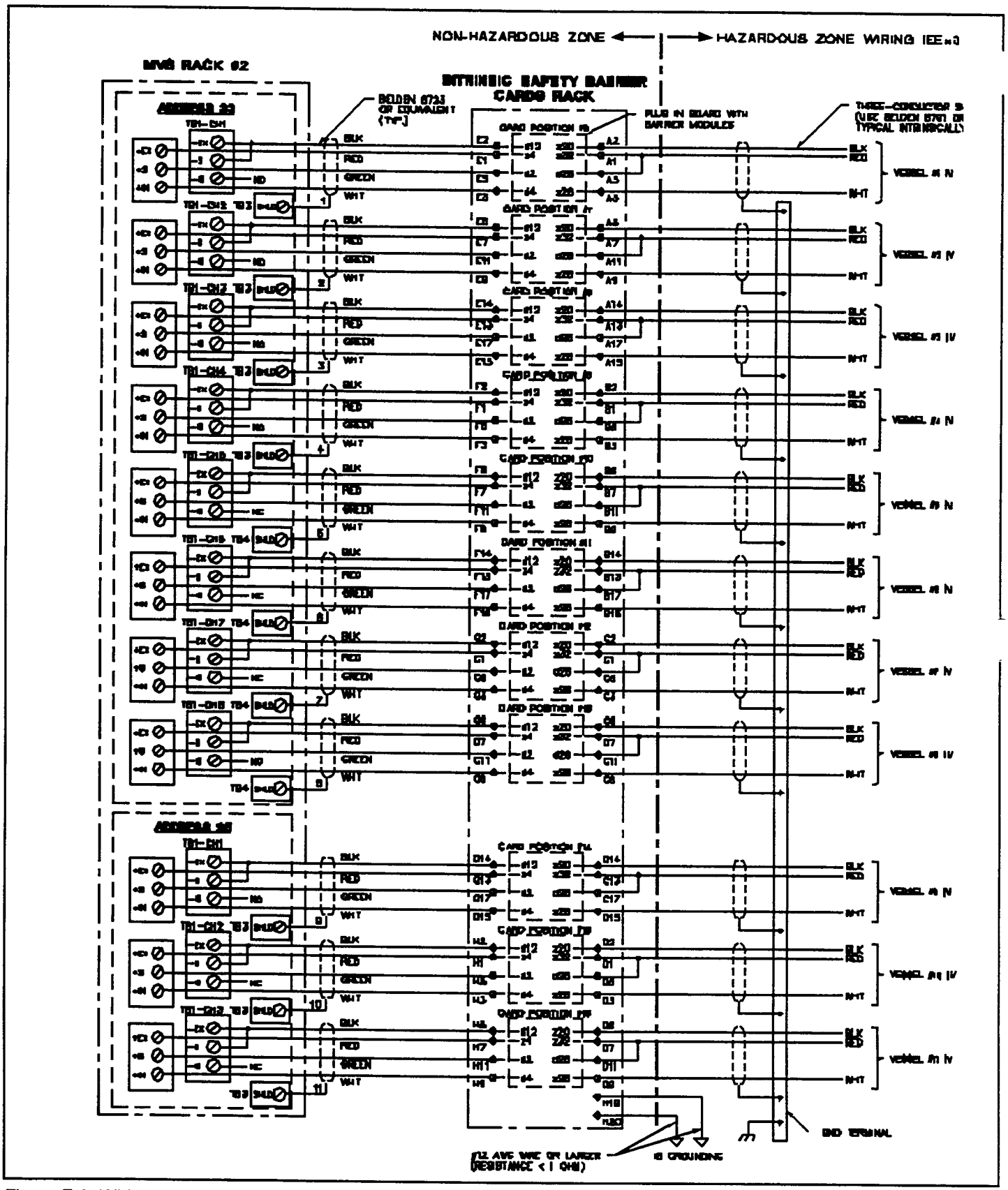

Figure F-2. Wiring Diagram for Connecting the MVS Rack and the Sensor/Transducers to the Regulator Intrinsic Safety Barrier Rack.

Appendix G. Kistler-Morse Service

Kistler-Morse (K-M) maintains a fully trained staff of field service personnel who are capable of providing you with complete product assistance. Based in offices located in Bothell, Washington (corporate headquarters) and Antwerp, Belgium (European office) our Field Service staff can provide:

Technical assistance by telephone via our toll free number.

Application assistance on-site or by telephone.

Start-up assistance on-site.

Troubleshooting on-site or by telephone.

Warranty (replacement) or spare parts assistance.

Training on-site or at our corporate K-M service center.

Equipment updates to our latest configuration.

START-UP AND TRAINING

The customer must install the Sonocell transducers and perform all field wiring and conduit installation. The signal processor should be mounted with AC power connected but not energized. The junction boxes should also be mounted.

Kistler-Morse will check all field wiring for errors. The system will be powered up and checked out for proper electrical operation.

Calibration will be performed in those cases where actual material or weight devices can be moved. Simulated calibration will be introduced in the case where weight cannot be added or removed.

Recommendations for the optimum performance of the system will be given. Instruction to plant personnel will be offered to cover maintenance and operation of the system.

TROUBLESHOOTING

Our staff will troubleshoot systems for mechanical, electrical, calibration, and wiring errors. Normal component repair and wiring errors will be corrected, including replacement of nonrepairable printed circuit boards.

RETURN MATERIAL AUTHORIZATION

If a part needs to be sent to the factory for repair, contact Kistler-Morse and ask for an RMA (Return Material Authorization) number. The RMA number identifies the part and its owner and must be included with the part when it is shipped to the factory.

SERVICE CALLS

Service calls by a qualified Kistler-Morse Field Service person can be scheduled but are not covered in the product warranty. Contact Kistler-Morse at the corporate office or the European office for scheduling and rate information.

PRODUCT WARRANTY

Kistler-Morse warrants equipment of its own manufacture to be free from defects in material and workmanship for three years from date of shipment to original user, subject to the terms and conditions of this warranty. Kistler-Morse will replace or repair, at our option, any part found to be defective. Buyer must return any part claimed defective to Kistler-Morse, transportation prepaid.

A complete, unabridged explanation of our product warranty is available from Kistler-Morse on request.

ADDRESS AND TELEPHONE NUMBERS

Corporate Office

All mail sent to the corporate office should be addressed:

Kistler-Morse Corporation
19021 120th Avenue N.E.
Bothell, WA 98011-9513

Telephone: 206/486-6600
Toll Free: 800/426-9010
Fax: 206/402-1500
Internet: KMCorp@AOL.Com

European Office

Kistler-Morse Europe
Rucaplein 531
B2610 Antwerp, BELGIUM

Phone: 32.3.218.99.99
Fax: 32.3.230.78.76

Appendix H. Connecting the MVS to a ROPE System

INTRODUCTION

This appendix is dedicated specifically to setting up a Multi-Vessel System to be monitored by a Kistler-Morse ROPE system. Set up and install the ROPE serial interface first by following the procedure in the ROPE SERIAL INTERFACE SETUP AND INSTALLATION section. Next, make the cable connections to the MVS and ROPE system by following the procedure in the CONNECTING MVS TO ROPE section. Prepare the MVS to be monitored by ROPE by following the procedures in SETTING UP THE MVS. After the MVS is set up, follow the procedures in SETTING UP THE ROPE SYSTEM to set up ROPE for MVS monitoring.

NOTE

The purpose of this appendix is to get your MVS/ROPE system up and running. Consult the MVS and ROPE manuals for more detailed and specific information on setup and operation.

ROPE SERIAL INTERFACE SETUP AND INSTALLATION

The ROPE serial interface consists of two interconnecting pcbs: the Serial Interface PCB and the Connector PCB. The Serial Interface PCB contains the electronics necessary for ROPE to communicate with the sensor signal processors. The Connector PCB contains the terminal blocks where the cables from the signal processors are connected. The Connector PCB disconnects from the Serial Interface PCB for easy installation and connections of cables.

JP4 COMPORT	JP3 IRQ SELECT	JP2	JP1
1	4	ON	ON
2	3	ON	ON

Table H-1. Jumper Placement on the Serial Interface PCB.

Jumper Placement on the ROPE Serial Interface PCB

There are four jumpers on the Serial Interface PCB that must be positioned before ROPE can communicate with the MVS. These jumpers are JP1, JP2, JP3, and JP4. The various positions in which each jumper can be placed are labeled on the PCB. Use Table H-1 to determine where to place the jumpers.

NOTE

Jumpers JP1 and JP2 must always be in the ON position.

JP4 selects either COM1 or COM2 as the port the ROPE will use for serial communications. COM3 and COM4 are not used and should not be selected. On an IBM bus, COM1 must be used first before using COM2.

Once you have selected COM 1 or COM2, place the jumper on JP3 in the proper position as shown in Table H-1. This jumper chooses the COMport Interrupt Request (IRQ) line. If you are using COM1, place this jumper on position 4. If you are using COM2, place this jumper on position 3.

Installing the ROPE Serial Interface PCB

The serial interface is designed as two interconnecting cards to allow easy installation into the computer: the Serial Interface PCB and the Connector PCB. Follow this procedure to install the Serial Interface PCB.

1. Remove the cover from your computer to access the circuit boards inside. Usually removing five or six screws from the back is all that is required, however, the procedure on how to do this may differ depending on the type of computer you have. Refer to the manual that came with your computer for proper instructions.
2. Find a port on the back of the computer that isn't being used and remove the metal bracket that covers it.
3. Unplug the connector card from the serial interface card and plug the interface card into the connector on the mother board adjacent to the empty port.

4. Slide the connector card through the port and plug it into the interface card.
5. Reattach the cover to the computer.

MVS TO ROPE RS-422 SERIAL CABLE CONNECTIONS

The ROPE Connector PCB disconnects from the Serial Interface PCB to allow for easy wiring. The terminal blocks on the Connector PCB have four terminals labeled +OUT, -OUT, +IN, -IN. The computer (master) transmits data to the MVS through the +OUT and -OUT terminals. ROPE receives data from the MVS through the +IN and -IN terminals on the connector card.

When connecting the RS-422 cable to ROPE and the MVS, connect the wires of the cable to like-polarities. For example, the (negative) -OUT terminal connects to the (negative) -IN terminal, the (positive) +OUT to the (positive) +IN, etc.

Follow this procedure.

1. Strip back the shielding at both ends of the RS-422 cable to expose the four wires.
2. Strip 1/4-inch of the insulation from each of the wires at both ends of the cable. Be careful not to break or cut any of the wire strands.
3. Insert the four wires into one of the terminal blocks on the ROPE connector card and tighten the terminal screws to secure them.

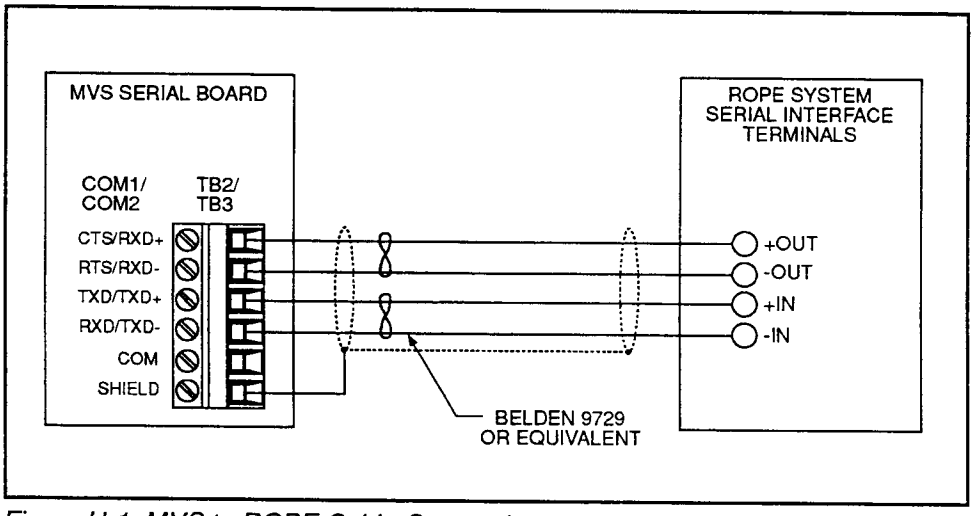

Figure H-1. MVS to ROPE Cable Connections.

4. Write down on a piece of paper the color of the wires connected to each of the terminals on the terminal block. This will help you connect the wires to the proper terminals on the MVS Serial PCB at the other end of the cable.
5. Route the RS-422 cable to the MVS.
6. Connect the four wires of the cable to the MVS Serial PCB as shown in Figure H-1.

Proceed to the next section once all cable connections have been made.

SETTING UP THE MVS

The **Serl** Mode in the I/O Menu is used to set up serial communications between the Multi-Vessel System and the ROPE system. When monitored by a ROPE system, the MVS is set up as a SLAVE with the ROPE as the MASTER.

If the MVS will be communicating serially with other devices (such as Sonologic signal processors), set up communications with those devices first before setting up ROPE. MVS is set up as MASTER and the serial device(s) as SLAVE.

Perform this procedure for each vessel monitored by the MVS.

1. If the Multi-Vessel System is auto-scanning (AUTO LED illuminated), press the AUTO/MAN Key to put the system in manual scan. The AUTO LED will turn off.
2. Press the MENU Key to display the MAIN MENU. The display will look like this:

MAIN MENU
Disp I/O Cal⇒

3. Press the F2 Key to access the I/O MENU. The display will look like this:

INPUT/OUPUT MENU
SetPt Iout Serl

4. Press the F3 Key to access the Serl Mode. The display will look like this:

SELECT COM PORT
COM1 COM2

5. Press F1 to select COM1. If COM1 is being used, e.g. if MVS is monitoring a Sonologic system or another serial device, then select COM2 by pressing F3. The display will look like this:

SELECT FUNCTION
BAUD PAR DATA⇒

6. Press F1 to access the BAUD Mode. The display will look like this:

SELECT BAUD RATE
300 1200 2400⇒

Press the MENU Key to display the second page of the menu:

SELECT BAUD RATE
4800 *9600 19k2⇒

An asterisk will indicate the current selection.

7. Press the F2 Key to select 9600 baud. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

8. Press the F2 Key to select the PAR Mode. The display will look like this:

SELECT PARITY
NONE* EVEN ODD⇒

An asterisk will indicate the current selection.

9. Press the F1 Key to select NONE. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

10. Press the F3 Key to select the DATA Mode. The Menu will look like this:

SELECT DATA BITS
SEVEN *EIGHT

An asterisk will indicate the current selection.

11. Press F3 to select eight data bits. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
BAUD PAR DATA⇒

12. Press the MENU Key to display the second page of the menu. The display will look like this:

SELECT FUNCTION
STOP HShak MODE⇒

13. Press the F1 Key to select the STOP Mode. The display will look like this:

SELECT STOP BITS
ONE* TWO

An asterisk will indicate the current selection.

14. Press F1 to select one stop bit. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
STOP HShak MODE⇒

15. Press the F2 Key to select the HShak Mode. The display will look like this:

HANDSHAKING?
YES *NO

An asterisks will indicate the current selection.

16. Press F3 to select NO. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
STOP HShak MODE⇒

17. Press the F3 Key to select the MODE Function. The display will look like this:

SELECT FUNCTION
MASTER *SLAVE

An asterisks will indicate the current selection.

18. Press F3 to select SLAVE. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
STOP HShak MODE⇒

19. Press the MENU Key to display the third page of the menu. The display will look like this:

SELECT FUNCTION
ADDR Modem⇒

20. Press the F1 Key to select the ADDR Mode. The display will look like this:

ENTER BASE ADDRS
> 01 Dec= 01 Hex

21. Use the keypad to input a base address for the serial device. The equivalent Hex number will display automatically. Write down the address. You will need to enter this number on the Data Display Page when setting up ROPE.

NOTE

Sonologic SSUs can have as many as eight addresses.

22. Press the ENTER Key to save the value in memory. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
ADDR Modem⇒

23. Press the F2 Key to select Modem Mode. The display will look like this:

USING MODEM?
YES *NO

An asterisk will indicate the current selection.

24. Press the F3 Key to select NO if the asterisk is next to YES. The display will flash a message acknowledging your selection and return to:

SELECT FUNCTION
ADDR Modem⇒

25. Press the AUTO/MAN Key to return the display to vessel monitoring.

SETTING UP THE ROPE SYSTEM

NOTE

During this set-up procedure, ROPE requires information about the MVS that must already be entered. If you haven't set up the MVS yet, follow the procedures in the **SETTING UP THE MVS** section and return to this section to set up ROPE.

Starting ROPE

In order to start ROPE from a hard disk, all of the files on the ROPE Program Disk and the installation Utilities Disk must be copied onto the computer's hard disk. If you have not yet done this, follow the procedures in the section titled ***Installing ROPE Onto a Hard Disk*** in Chapter 3 of the ROPE manual before proceeding.

Follow this procedure to start ROPE.

1. Turn on the computer.
2. To boot the program, type ROPE at the DOS (>) prompt and press ENTER.

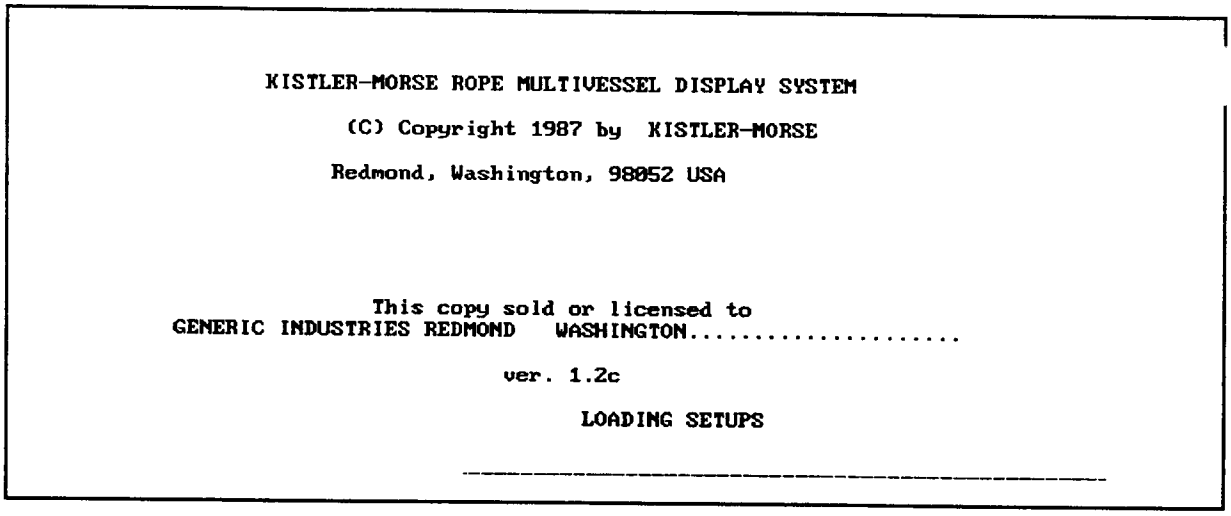

Figure H-2. ROPE Title Page.

The first screen to appear will be the ROPE Title Page *(Figure H-2).* The name of the customer, program version number, and copyright date are included on this page.

The second screen to appear will be the Disabled Sensors Page *(Figure H-3).* ROPE will automatically disable sensors that are set up incorrectly, list them on this page, and wait for you to press the ENTER key before proceeding. Note which sensors are disabled and check their setup parameters. ROPE must be able to communicate with these sensors before they can be enabled.

If ROPE can communicate with all of the sensors in the system when the program is booted, the Disabled Sensors Page will appear briefly before page A of the data display pages appears on the screen.

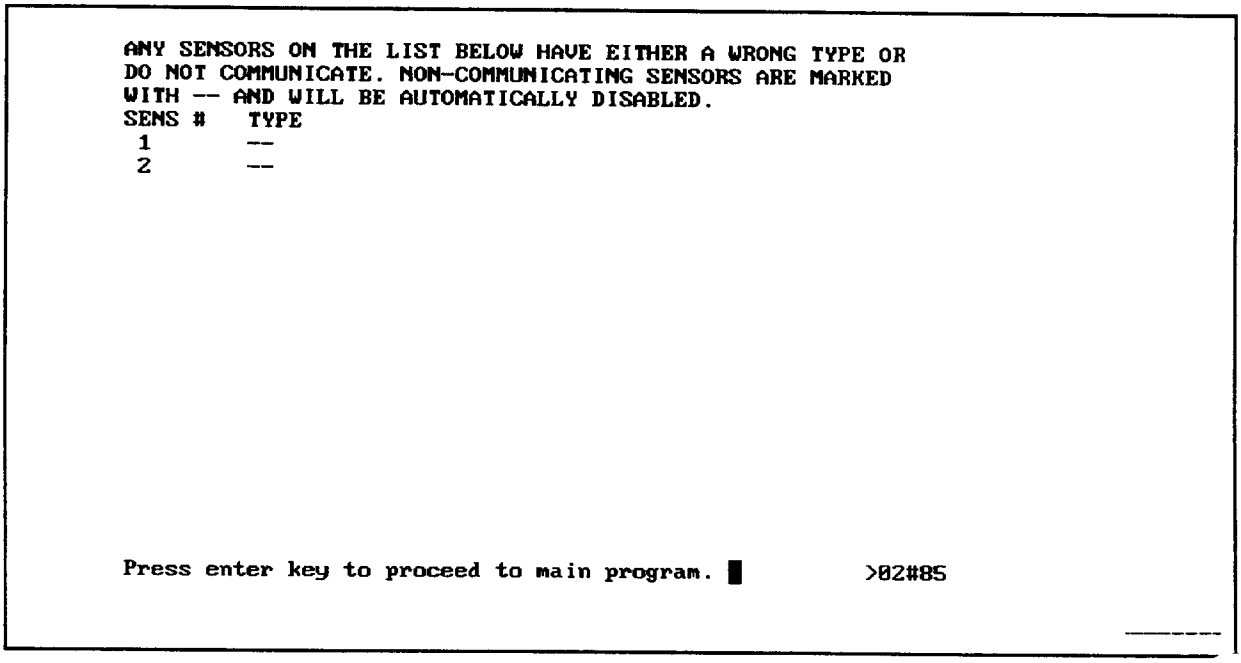

Figure H-3. Disabled Sensors Page.

F2 Display Setups

This mode is used to assign all of the sensors in the ROPE system to display positions on the Data Display Pages. There are twenty pages (labeled A through T) with eight display positions on each page.

A sensor can be assigned to any position on any page and can also be assigned to multiple positions. It is recommended that you organize a logical plan of assigning sensors to pages as opposed to assigning them randomly.

Follow this procedure to set up the Data Display Pages.

1. Press the F2 key to display the first screen of the Display Setup mode (*Figure H-4*).

NOTE

If you have your setup parameters password-protected (a function performed in the **F10 - System Options** mode) and you have not previously entered the password to access one of the function modes, a string of asterisks will appear at the bottom, left corner of the Data Display Page. Enter the number representing the amount of characters in your password and then enter the password. Press the ENTER key and the first screen of the mode will be displayed.

The first screen shows pages A through T and the sensor number assigned to each display position on each page. Referring to *Figure H-4*, page A has sensors number 31, 32, 12, 11, 25, 27, 26, and 23 assigned to positions 1 through 8 respectively. If no sensor is assigned to a display position, a dot will be displayed.

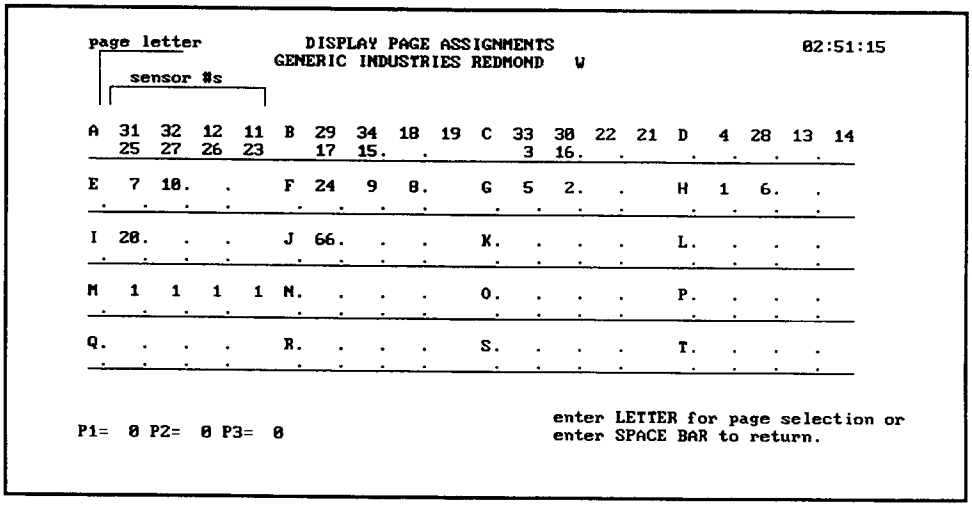

Figure H-4. First Screen of F2 Display Setup Mode.

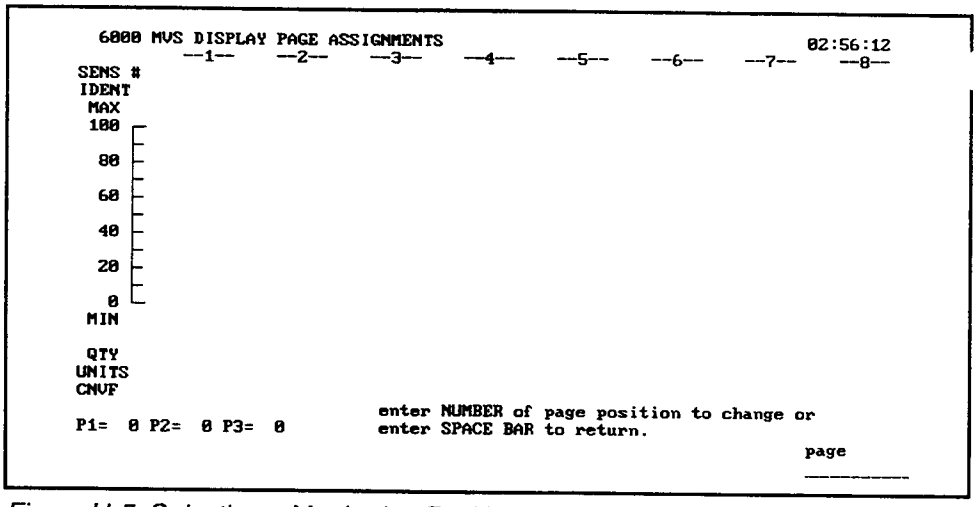

Figure H-5. Selecting a Monitoring Position.

2. To assign sensors to a page, type the letter of the page you want to set up. The screen will display eight display positions as shown in *Figure H-5.* Instructions at the bottom of the screen will state:

enter NUMBER of page position to change or enter SPACE BAR to return.

3. Enter the number (1 through 8) of the display position where you want a sensor to be assigned. The instructions on the screen will ask:

enter SENSOR # to use (0=DELETE POSITION) ?

4. Enter the number of the sensor you wish to assign to the position selected in step 3 and press the ENTER key. The instructions on the screen will ask:

enter MAXIMUM display value?

5. Enter the number that will represent the maximum value when the vessel's fill level is at 100 percent and press the ENTER key. The instructions on the screen will ask:

enter MINIMUM display value?

6. Enter the number that will represent the minimum value when the vessel's fill level is at 0 percent and press the ENTER key. The instructions on the screen will ask:

enter UNITS of display
(7 char max) ?

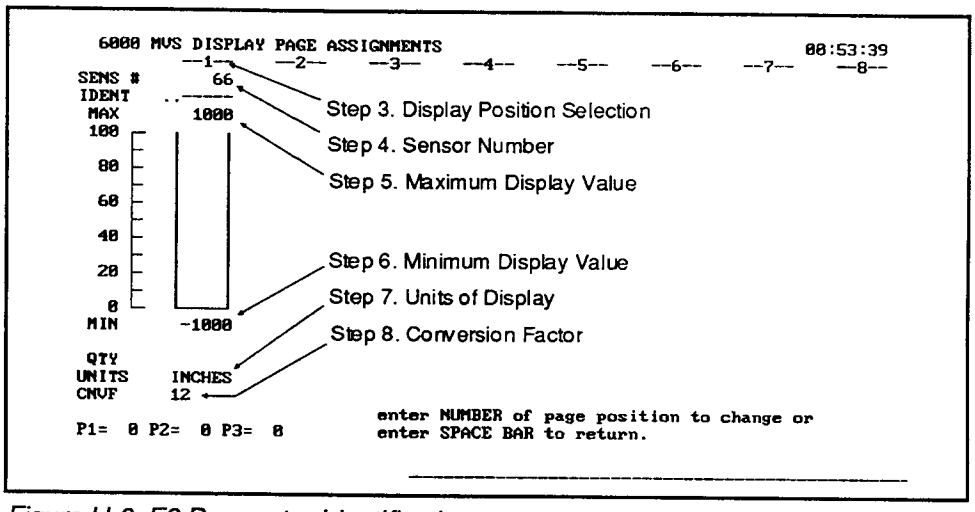

Figure H-6. F2 Parameter Identification.

7. Enter the unit of measure (pounds, feet, etc.) in which the screen is to display the contents of the vessel and press the ENTER key. You can type in a maximum of seven characters. The instructions on the screen will ask:

enter CONVERSION FACTOR ?

The FACTOR number in the ***F6 - Sensor Setup*** section converts the raw data from the sensing station to a desired unit of measure. This is the data that the conversion factor number entered in Step 8 will convert to a different unit of measure at the display position. You must therefore set up sensor parameters in the **F6** section first before a conversion factor other than 1 can be entered.

8. Enter a conversion factor of 1. (The number 1 tells ROPE that no conversion is needed.) After setting up sensor parameters in the **F6 - Sensor Setup** mode, return to this step. Enter a number that will convert the unit of measure determined in **F6** to the desired unit of measure for this display position, e.g., enter 12 to convert feet to inches.

9. Use the SAVE function in the **F10 - System Options** mode to save parameters to memory.

This completes the sensor assignment and setup of one display position on the page. The screen goes back to the beginning of the setup cycle and displays all newly entered parameters. *Figure H-6* identifies the different parameters on the display page and references them to the step number where they were assigned. Your parameters will differ from the values shown in the figure but will be located in the same place.

F6-Sensor Setup

The **F6 - Sensor Setup** mode is used to set up the display parameters for each of the sensors in the ROPE system. *Figure H-7* shows the Sensor Setup Page, which is the first page of the **F6** mode. The following is the list of all the parameters on the page and an explanation of their function.

NUMBER

This refers to the number of the sensor that you want to set up and is the same number as the address of the unit on the RS422 serial data bus. If the sensor has been set up previously, all of its parameters will be displayed on the screen when the sensor number is entered *(Figure H-8)*. If the sensor has never been set up, blanks and zeros will be in the columns and the sensor will be disabled.

IDENT

This parameter allows you to type up to seven characters to identify the material in the vessel that the sensor is monitoring The identifier will be displayed below the sensor number at the data display position on the page to which the sensor is assigned.

TYPE

This parameter identifies the type of sensor that is monitoring the material in the vessel. It is important to assign the correct sensor type to the actual sensor. For example, if the sensor that you are setting up is an ITU, select SONOLOGIC as the sensor TYPE. The format of the data content is different for each type of sensor, so if you assign an incorrect sensor type to a sensor, the screen will not display properly.

Selecting TEST allows you to test the setpoints and other parameters you have set up for any of the sensors. After returning to the Data Display Page, the up and down arrow keys will simulate material level rising and falling and will trip the setpoints at the parameters you have set up. The setpoints can then be adjusted if necessary before actually putting them into use.

EN/DIS

This function enables or disables the sensor. If you set up all of the parameters for the sensor it will not operate until it is enabled with this function. Disabling the sensor will turn it off but will not affect the setup parameters.

RAW TARE

When using Microcell-based equipment, the number in the RAW TARE column refers to the weight of the vessel that contains the material being monitored. The raw tare must be subtracted from the total weight to give you the true weight of the material.

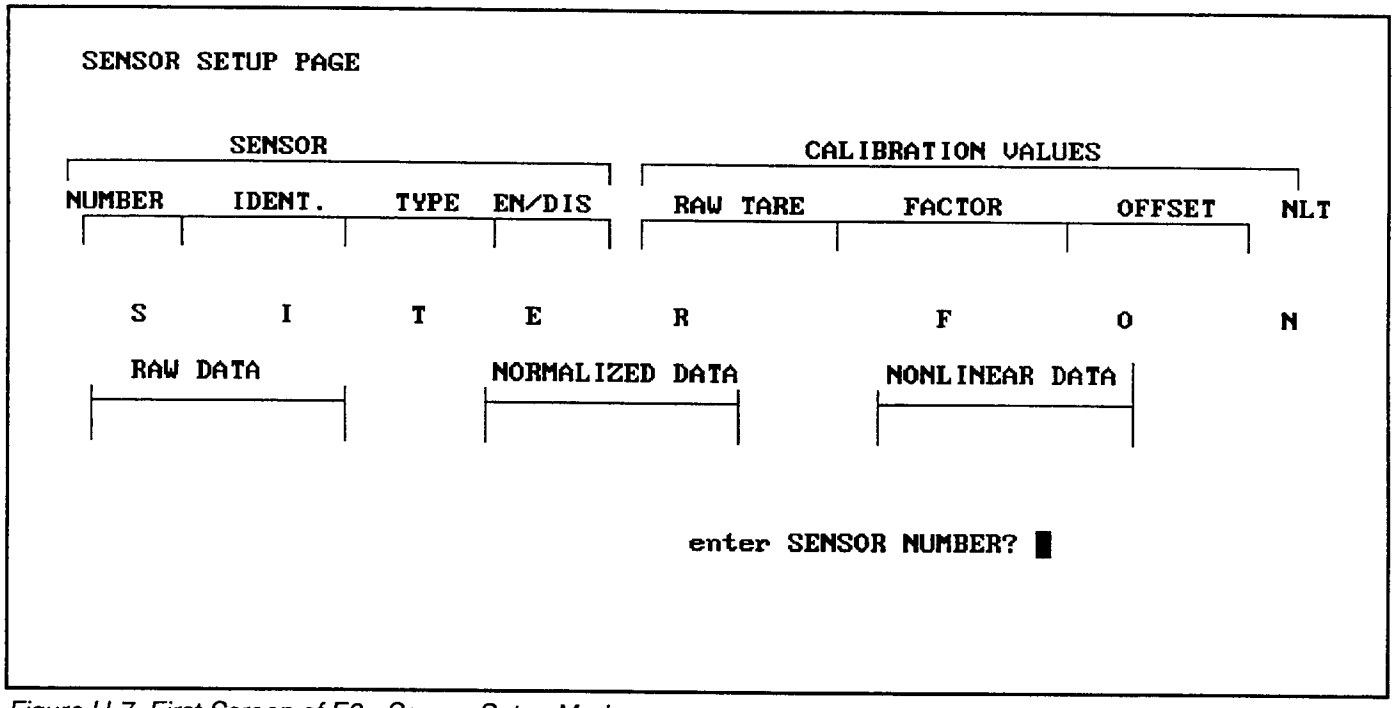

Figure H-7. First Screen of F6 - Sensor Setup Mode.

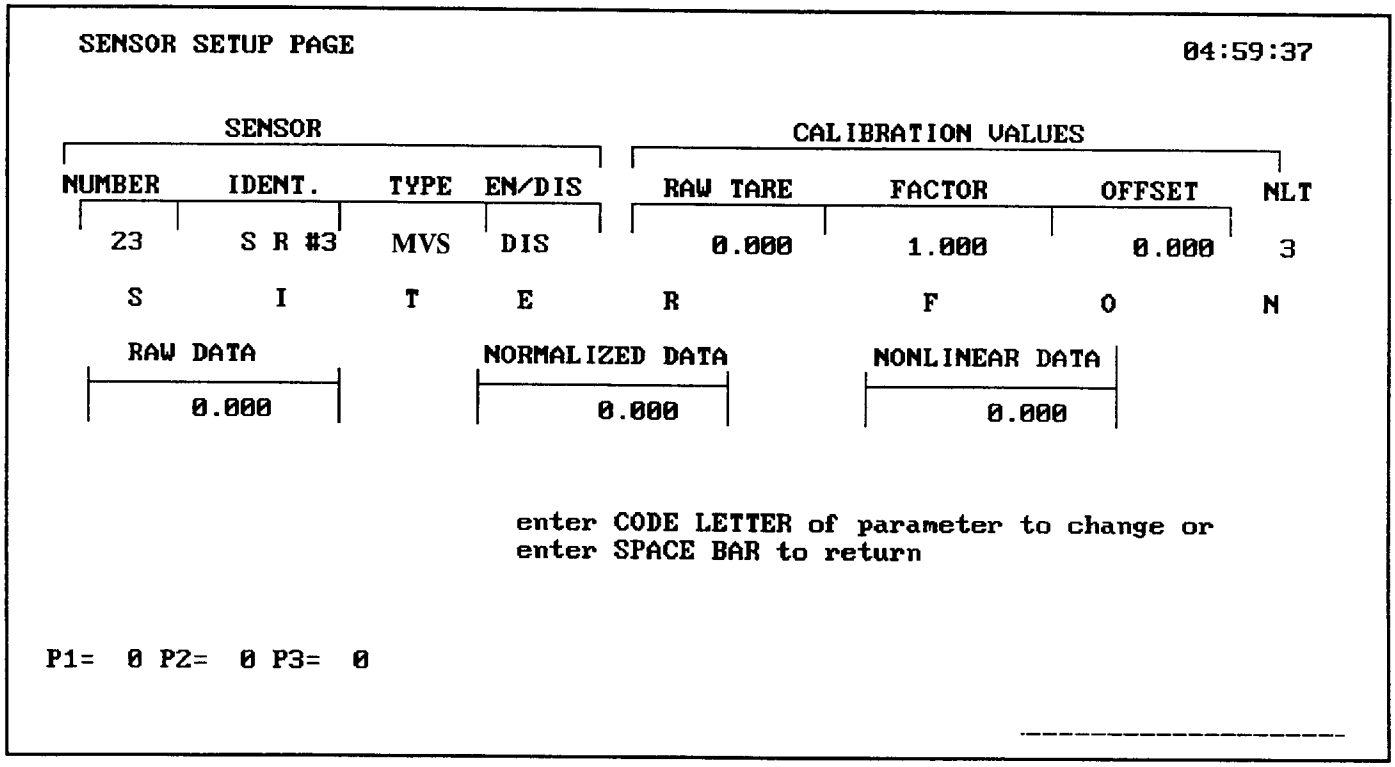

Figure H-8. Sensor Setup Page After Sensor Number Has Been Entered.

NOTE

If the sensor electronics are set up to send material monitoring data to ROPE with the tare already subtracted from the raw data, the raw tare parameter will be zero.

FACTOR

The number in the FACTOR column is a conversion factor. ROPE automatically multiplies the raw data coming in from the sensor by the conversion factor number to convert it to the desired unit of measure. For example, if an ITU is measuring material level in feet and you want to convert it to inches, you would enter a conversion factor number of twelve. If you want the display to show the level in the same unit of measure as the sensor electronics, enter 1 as the conversion factor number.

NOTE

If your sensor is assigned to multiple positions on a display page(s), the FACTOR applies to the sensor data at all of the positions. To display the sensor data in different units of measure at each display position, enter a different conversion factor for each position in Step 8 in the ***F2 - Display Setup*** section.

OFFSET

The number in the OFFSET column is the raw tare number multiplied by the conversion factor. This number is subtracted from the normalized data just as the raw tare is subtracted from the raw data to compensate for vessel weight.

NLT

The number in the NLT column identifies which nonlinear table is being applied to the data coming in from the sensor. Nonlinear tables are applied to data from Sonologic sensors that monitor material in nonlinear vessels. These tables must be custom built and applied to a specific nonlinear application. (See the ***F8 - Nonlinear Tables*** section for a detailed explanation of how to build nonlinear tables.) If your vessels are linear or you are using Microcell-based equipment to monitor material, a nonlinear table is not necessary. (Microcells measure weight, so the nonlinear shape of a vessel does not affect monitoring data.) Enter zero if nonlinear tables do not apply to your application.

RAW DATA

This is the data coming in from the sensor before any of the parameter values on the Sensor Setup Page have been applied. The numbers in the RAW DATA column will change continuously as the material in the vessel fluctuates.

NORMALIZED DATA

The normalized data is the raw data from the sensor multiplied by the conversion factor. This is the data that is graphically depicted on the Data Display Pages if a nonlinear table is not applied. The numbers in the NORMALIZED DATA column will change continuously as the material in the vessel fluctuates.

NONLINEAR DATA

The nonlinear data is the normalized data after a nonlinear table has been applied. If a nonlinear table is being used, the numbers in the NONLINEAR DATA column will change continuously as the material in the vessel fluctuates. If a nonlinear table is not being used, the numbers in the NONLINEAR DATA column will remain as zeros.

Entering Parameters

Follow this procedure to enter setup parameters for each sensor.

1. Press the F6 key to display the first screen of the Sensor Setup mode (*Figure H-7*). A message at the bottom of the screen will ask:

   enter SENSOR NUMBER?

   NOTE

   If you have your setup parameters password-protected (a function performed in the **F10 - System Options** mode) and you have not previously entered the password to access one of the function modes, a string of asterisks will appear at the bottom, left corner of the Data Display Page. Enter the number representing the amount of characters in your password and then enter the password. Press the ENTER key and the first screen of the mode will be displayed.

2. Type in the number of the sensor you want to set up and press the ENTER key. The sensor number will appear in the NUMBER column on the page and the message will disappear. Other parameters may also appear on the screen if the sensor was set up previously.

3. Press the I key. A message will appear on the screen asking:

   enter 7 character IDENTIFIER ?

4. Type in up to seven characters to identify the contents of the vessel that this sensor is monitoring and press the ENTER key. The identifier will appear in the IDENT column and the message will disappear.

5. Press the T key. A menu with five selections will appear on the screen.

enter 1 for SONOLOGIC
enter 2 for MVS
enter 3 for 10X0
enter 4 for 12X0
enter 5 for TEST

The first four selections are sensor types and the fifth selection is used for testing setpoint parameters of any given sensor.

6. Enter 2 to select MVS. When the number is entered, the MVS will appear in the TYPE column and the message will disappear.

7. Press the E key to enable and disable the sensor. The sensor is enabled when ENB is displayed in the EN/DIS column and disabled when DIS is displayed. Pressing the E key will change the status presently shown on the screen to the opposite status.

8. Press the R key. A message will appear on the screen asking:

enter RAW TARE value ?

9. Enter a number representing the raw tare if applicable or enter zero if not. Press the ENTER key. The number will appear in the RAW TARE column and the message will disappear.

10. Press the F key. A message will appear on the screen asking:

enter ENGINEERING CONVERSION FACTOR ?

11. Enter a number that will convert the sensor data to the desired unit of measure, e.g., enter 12 to convert feet to inches. If you are not using a conversion factor, enter 1. The number will appear in the FACTOR column and the message will disappear.

NOTE

You must enter 1 in Step 11 if you are not going to use a conversion factor. All of the data from the sensing station will be displayed as zeros on the screen if this parameter is left blank or if zero is entered.

12. If you entered a raw tare number in step 9, you must also enter an offset number, which is used by ROPE to figure the normalized data. Press the O key. A message will appear on the screen asking:

enter ENGINEERING OFFSET ?

13. Multiply the number entered for the RAW TARE by the number entered for the FACTOR in Step 11. Type in that number and press the ENTER key. The number will appear in the OFFSET column and the message will disappear.

14. If you have created a nonlinear table in the **F8 - Nonlinear Tables** mode and want to apply it to this sensor, press the N key. A message will appear on the screen asking:

enter NONLINEAR TABLE number ?

15. Enter the number of the nonlinear table and press the ENTER key. The table number will appear in the NLT column and the message will disappear.

16. Use the SAVE function in the **F10 - System Options** mode to save parameters to memory.

If you enabled the sensor in Step 7, the numbers in the RAW DATA, NORMALIZED DATA, and (if applicable) NONLINEAR DATA columns will be fluctuating to represent the actual material level or weight in the vessel. (If the material in the vessel is stationary, then these numbers will also be stationary.)