

SVS 2000™ Installation and Operation Manual

CAUTION

It is essential that all instructions in this manual be followed precisely to ensure proper operation of the equipment.

Gather this information for *Quick Config*— see Chapter 3 for details

K-M Bolt-On Sensor?

Units? lbs or kg

Sensor type?¹ L-Cells or Microcells

If Microcells:^{1,2}

Installed on horizontal beams?

Installed on vertical legs?

Rosette Arrays?

Vertical Microcells?

Vessel working capacity?¹

_____ lbs or kg

Vessel working stress?¹

_____ psi or kg/mm²

Current material weight? _____ lbs or kg

¹ See the Application Data Form for sensor type and configuration, capacity, and stress. A copy of the form was returned to you with your order. If you cannot locate the form, contact K-M to get another copy before you proceed.

² Internal calculations in the SVS 2000 for Microcells are based on 3-inch Microcells on carbon steel. Modify the calibration after *Quick Config* is complete if the application is for installation on stainless steel or aluminum or uses 2-inch Microcells. See Appendix C, Calculation of Manual Calibration Parameters, for details.

Direct Support load cell?

Units? lbs or kg

Rated Load per load cell?¹

_____ lbs or kg

Sensitivity?¹

_____ mV/V

Number of supports for vessel _____

Current live load? _____ lbs or kg

¹ See the load cell label or the sensor manual for rated load and sensitivity.



NOTICE

The content of this document is the intellectual property of Kistler-Morse Corporation. Any reproduction or translation of this document without the written authorization of a Kistler-Morse corporate officer is prohibited.

CAUTION

Follow these rules if welding is done on the vessel after installation of Kistler-Morse sensors/transducers. The electrical current of the welder may pass through the sensor/transducer, causing damage to it and possibly to the signal processor. To avoid damage, follow these precautions.

1. Disconnect the sensor/transducer cables from the signal processor.
2. Ground the welder as close to the welding joint as possible. The welding ground must be between the sensor/transducer and the weld joint to prevent the welding current from going through the sensor/transducer to earth ground.

Note

High temperatures can damage sensors/transducers. If you are welding in the vicinity of a sensor/transducer, monitor the temperature of the metal adjacent to the sensor/transducer. If it becomes too hot to touch, stop welding immediately and remove the sensor/transducer before continuing. Prior to reinstalling the sensor/transducer, verify that no damage has occurred.

This manual reflects SVS 2000 software revision 'C.'

Table of Contents

Chapter 1. SVS 2000 Introduction	1-1
Introduction	1-1
Manual Conventions	1-2
Chapter 2. Hardware Installation	2-1
General Information	2-1
Unpacking and Inspection	2-1
Mounting the SVS 2000	2-1
Wiring the SVS 2000	2-1
Power Fuse	2-2
Installing PCBs	2-3
Chapter 3. Quick Config.....	3-1
Introduction	3-1
Quick Config	3-1
Chapter 4. Run Mode, Function Mode Menu Tree, and Keyboard	4-1
Introduction	4-1
Run Mode Display	4-1
Toggling Between Run Mode and Function Mode	4-2
Function Mode Menu Tree	4-3
Keyboard	4-6
Chapter 5. Display Menu [10].....	5-1
Introduction	5-1
11 Disp (display) Format	5-1
12 Disp (display) Countby	5-2
13 Disp (display) Units	5-2
14 Bargraph Span	5-3
Modifying Disp (display) Format and Disp (display) Units	5-4
Chapter 6. Cal (calibration) Menu [20]	6-1
Introduction	6-1
21 Auto Cal (automatic calibration)	6-1
22 Manual Cal (calibration)	6-6
23 Linearization	6-7
24 Zero Tolerance (tolerance)	6-8
29 Cal (calibration) Display	6-9
Chapter 7. Setpoint Menu [30]	7-1
Introduction	7-1
31-32 Slct (select) Relay and 33-38 Slct Digtl (select digital)	7-1
Descriptions	7-2
Setpoint Example	7-3
Setting Up the Setpoints	7-3
39 Digtl (digital) Status	7-4
Setpoint Test	7-5

Chapter 8. I-Output (current output) Menu [40]	8-1
Introduction	8-1
41-46 Current Output Setup Parameters	8-1
Descriptions	8-1
Current Output Examples	8-2
Setting Up Current Output	8-2
48 Current Adjst (adjust)	8-4
49 Test Current	8-4
Chapter 9. Com (communications) Menu [50]	9-1
Introduction	9-1
51 Serial Address (address)	9-1
52 Serial Baud	9-2
53 PLC Menu	9-2
Chapter 10. Sensor Menu [60]	10-1
Introduction	10-1
61 Sensor Adj Ex (adjust excitation)	10-1
62 Resolution	10-2
63 Sensor Gain	10-2
69 Sensor Disply (display)	10-3
Chapter 11. Filter Menu [70]	11-1
Introduction	11-1
71 Averaging	11-1
72-75 DSP Filter Parameters	11-2
Descriptions	11-2
Setting Up the DSP Filter	11-3
79 DSP Step Mon (monitor)	11-4
Chapter 12. Tracking Menu [80]	12-1
Introduction	12-1
81-85 Tracking Parameters	12-1
Descriptions	12-1
Setting Up Tracking	12-3
Rate Monitor [89]	12-3
Chapter 13. Service Menu [90]	13-1
Introduction	13-1
91 User Access	13-1
Initial Setup of User Access Code	13-1
Change User Access Code	13-2
92 Keyboard Lock	13-2
Setup/Change Keyboard Lock Code	13-2
Unlocking Keyboard with Keyboard Lock Code	13-3
93 Keyboard Test	13-3
94 Default System (system)	13-3
99 Diagnostics	13-4
Appendix A. Product Specifications	A-1
Appendix B. Serial Commands	B-1
Introduction	B-1
Command Table	B-1
Checksum Calculation	B-3
Examples	B-4

Appendix C. Calculation of Manual Calibration Parameters	C-1
Introduction	C-1
Refining the Calibration	C-1
Stainless Steel, Aluminum, or 2-inch Microcells	C-2
Appendix D. Kistler-Morse Service and Warranty	D-1
Product Warranty	D-1
Service	D-1
Return Material Authorization	D-2
Address and Telephone Numbers	D-2
Appendix E. Technical Drawings	E-1
Appendix F. Error Messages	F-1
Warning: Add Or Subtract More Material	F-1
Are You Sure? (in Auto Cal)	F-1
Warning: Ambiguous Error .. Hi Span Will Be Entered .. Need New Lo Span	F-2
Warning: Ambiguous Error .. Lo Span Will Be Entered .. Need New Hi Span	F-2
Gross Units Over	F-2
Net Units Over	F-2
Grs Under Range	F-3
ADC Overrange +	F-3
ADC Overrange -	F-3
NVRAM Failed #1	F-4
NVRAM Failed #2	F-4
Com Error #1	F-4
Com Error #2	F-4
Voltage Error #1	F-4
Voltage Error #2	F-4
Voltage Error #3	F-5
Current Error #1	F-5
Current Error #2	F-5
Excite Error #1	F-5
Excite Error #2	F-5
Excite Error #3	F-6
Excite Error #4	F-6
Excite Error #5	F-6
High Temp Error	F-6
Appendix G. Menu Tree, Defaults, and Hot Keys	G-1
Introduction	G-1
Menu Tree	G-1
Hot Keys	G-1
Parameter Defaults	G-4
Setup Table	G-5

Chapter 1.

SVS 2000 Introduction



Figure 1-1. Kistler-Morse
SVS 2000™ Signal Processor

Introduction

The Single Vessel System 2000 (SVS 2000) is a single channel signal processing and display system. The SVS 2000 can monitor a vessel instrumented with K-M bolt-on sensors (L-Cells or Microcells), K-M direct support sensors (Load Stand IIs, Load Disc IIs, or Load Links), or with full bridge, foil gage sensors from other manufacturers.

The SVS 2000 has an integral, weather-sealed membrane keyboard and a 16-character liquid crystal display (LCD) panel, providing easy access for viewing and modifying parameters. The LCD displays material weight numerically or in a bar graph format, menu selections, and error messages. The ABS enclosure is designed to meet NEMA-4X, and can be either panel-mounted or wall-mounted. The stainless steel (type 304L) enclosure is a UL approved and also designed to meet NEMA-4X.

Modular Design

The SVS 2000's modular design provides for easy system configuration to the specific needs of your application and allows for expansion to meet future requirements. K-M's flexible system allows easy interconnection to a variety of Programmable Logic Controllers (PLCs). The SVS 2000 is Allen-Bradley Enabled.

The Printed Circuit Boards (PCBs) available to make up a SVS 2000 are:

Standard PCBs —

- Power Supply PCB with 2 setpoint relays and 6 digital output relays
- Microprocessor/Display PCB

Optional, Modular PCBs —

- 1-channel Current Output PCB — 0-20 mA or 4-20 mA
- Serial Communication PCB with RS-422/RS-485 serial port
- Allen-Bradley RIO PCB
- DeviceNet PCB

The SVS 2000 accepts up to two optional PCBs. These optional PCBs mount to the Power Supply PCB and are accessed through the front of the enclosure for wiring.

Easy Startup

The SVS 2000's easy *Quick Config* procedure is designed to get you up and running quickly once the system is installed. Your responses to the simple *Quick Config* questions provide the SVS 2000 with the information needed to calibrate the system for your application. Within minutes, you can use the system to provide material weight. Later, when scheduling permits, a live load calibration can be performed while moving material into or out of the vessel, to obtain the highest accuracy.

Sentry™

Vibrations in a vessel can cause changes in a signal processor's weight display, even though no material is moved, because the vibrations affect the vessel's structural response. The SVS 2000's unique Sentry™ feature digitally filters and processes those vibrations, minimizing their effect on the weight readings.

Modes of Operation

The SVS 2000 has two modes of operation:

- **Run Mode — Monitoring**
The SVS 2000 displays material weight or other indication of vessel contents.
- **Function Mode — Menu Tree**
The SVS 2000 accesses the menu tree to allow the user to view and/or modify setup parameters. Parameters like setpoints, current output and serial communication all continue to operate while in Function Mode.

Note

Throughout this manual, the term "weight" is used to refer to an indication of the quantity of material in the vessel. However, the SVS 2000 can be set up to display weight, level, volume, percentage, or voltage associated with the material quantity (see Chapter 5, Display Menu). If you are using some measure other than weight, all inputs must be consistent with your chosen measure.

Manual Conventions

Three kinds of special explanations appear throughout the manual — **WARNING**, **CAUTION**, and *Note*. The format and significance of each is defined below:

WARNING

**Possible danger to people.
Injury may result if this
information is ignored.**

CAUTION

Possible risk to the product. The SVS 2000 or other equipment may be damaged if this information is ignored.

Note

Contains additional information about a step or feature critical to the installation or operation of the SVS 2000.

Chapter 2. Hardware Installation

General Information

This chapter provides instructions on how to install and wire the SVS 2000.

WARNING

To prevent equipment damage or personal injury once the SVS 2000 has been connected to power:

- **Disconnect power before wiring anything to the SVS 2000, adding or removing PCBs, or mounting the SVS 2000.**
- **Deactivate power to the controlled devices.**

Read all instructions before beginning installation. It is important that all instructions are followed carefully to ensure that the equipment is properly mounted and wired.

Unpacking and Inspection

Carefully remove the components of the SVS 2000 from the shipping container and place them on a flat surface. Visually 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 K-M immediately. Store the shipping container and packing material for later use in the event the SVS 2000 must be returned to the factory.

Mounting the SVS 2000

The hardware used to mount the SVS 2000 is provided by the customer. (Including suggested torque wrench Sturtevant-Richmond with torque range 4-12 lbf-in.)

The SVS 2000 ABS enclosure dimensions are shown in TI-SVS-01 in Appendix E, Technical Drawings. Refer to Appendix A, Product Specifications, for Stainless Steel dimensions, and also product environmental specifications before mounting the SVS 2000.

Follow this procedure to mount the SVS 2000 (ABS and SS versions):

1. (SS version) Remove electronics by unscrewing baseplate screws (4). Baseplate and electronics are removed together.
2. Hold the SVS 2000 in the desired location and mark the positions of the mounting holes.
3. Drill the mounting holes.
4. Install the SVS 2000 using hardware that will secure it firmly in place.
5. (SS version) Make entry holes in the bottom of the enclosure for cables and conduit. Hole location is critical for proper PCB re-installation. Check clearances to ensure fittings and wire routing will not interfere with the PCB.
6. (SS version) Re-install baseplate with electronics.

CAUTION

Only use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

Wiring the SVS 2000

This section describes how to wire the SVS 2000. Installation of sensors is described in the applicable sensor installation manuals.

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

1. Connect sensor wiring.
2. Connect relay output, digital output, analog output, serial output, and remote input wiring, as applicable.
3. Connect AC power.
4. Apply power and check display.
5. Seal openings in enclosure, using Sikaflex 1A or Dow Corning RTV 739 or 738 sealant.
6. Tighten set screws that secure wires to the terminal boards to 8 lbf/in. of torque.

General (ABS enclosure)

The bottom of the SVS 2000 ABS enclosure has eight openings for wiring sensors, power, setpoints, etc. Refer to TI-SVS-01 for fitting sizes. Prepare the enclosure for wiring by installing a fitting in each desired hole. Seal all fittings against water entry. If applicable, install conduit drains at conduit's lowest elevation(s) to allow condensation to drain.

Wiring Power

WARNING

When connecting power to the SVS 2000, adhere to the following:

- **Power wiring must comply with the national wiring requirements for the country in which the equipment is installed.**
- **The ground conductor must be connected to the Protective Earth (PE) terminal.**
- **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.**

The SVS 200 power supply is 115/230 VAC switch selectable.

Refer to TI-SVS-02 in Appendix E for details on wiring the external power source to the SVS 2000.

Wiring Sensors

Refer to TI-SVS-02 in Appendix E for details on wiring the sensors to the SVS 2000. The wiring between the junction box and SVS 2000 must be continuous (no splices).

Note

If the voltage decreases as weight is added to the vessel during operation, check wiring for polarity errors.

Wiring Relays, Digital Outputs, and Remote Tare

Refer to TI-SVS-02 in Appendix E for details on wiring the relays, digital outputs, and remote tare input.

Wiring Optional PCBs

The SVS 2000 accepts up to two optional PCBs, stacked out from the Power Supply PCB with standoffs. The SVS 2000 arrives from K-M with the specified PCBs installed. Refer to the following for wiring details:

- Current Output PCB — TI-SVS.XOUT-01 in Appendix E
- Serial Communication PCB — TI-SVS.SER-01 in Appendix E
- Allen-Bradley RIO PCB — *A-B RIO Interface Manual for SVS 2000*
- DeviceNet PCB — *DeviceNet Interface Manual for SVS 2000*

Sealing Openings in Enclosure

See Figure 2-1. After you complete wiring installation, seal the openings in the SVS 2000 enclosure to prevent moisture seepage. Spread a generous bead of sealant around the threads of each K-M supplied plug. Screw a plug into each opening in the enclosure not being used for wiring.



Figure 2-1. Preparing K-M Supplied Plug for Unused Openings

CAUTION

Only use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

Power Fuse

There is one power fuse in the SVS 2000. See Table 2-1 for fuse specifications.

Fuse	Part No.	Purpose	Voltage	Current
F1	18-1002-01	AC	250 V	1.0 A

Table 2-1. Power Fuse Information

Installing PCBs

The SVS 2000 arrives from K-M with the specified PCBs installed. However, you can expand your system by purchasing optional PCBs and installing them into vacant positions. The SVS 2000 accepts up to two optional PCBs, stacked out from the Power Supply PCB with standoffs. Each optional PCB is wired to terminal J2 of the PCB behind it with ribbon cable. The PCB closest to the Power Supply attaches to terminal J2 of the Power Supply PCB.

A new PCB from K-M comes with the following items:

- PCB
- Four 6-32 PH screws and standoffs to secure the PCB to the unit

Refer to Appendix E, Technical Drawings, and follow this procedure to install an optional PCB into the SVS 2000:

Note

If you are installing a PLC Interface PCB (A-B RIO, DeviceNet, etc.), it must be placed in the position closest to the Power Supply PCB.

4. Slide the end of the optional PCB's ribbon cable onto the J2 pins of the PCB behind it.
 5. Place the optional PCB in position on the standoffs.
 6. Secure the new PCB in place with:
 - The supplied screws, or
 - The supplied standoffs (if installing another PCB above this one)
 7. Repeat Steps 4 through 6 to install another optional PCB, if applicable.
 8. Connect the field wiring to the PCB(s).
 9. Restore power to the SVS 2000. Replace the cover. Installation is complete.
1. Disconnect power to the SVS 2000.
 2. Remove the cover of the SVS 2000.
 3. If one optional PCB is already installed in the SVS 2000:
 - A. Remove the screws attaching the PCB to the fixed standoffs on the Power Supply PCB.
 - B. Screw the supplied standoffs into the fixed standoffs.

Chapter 3. Quick Config

Introduction

This chapter describes the SVS 2000's *Quick Config* (configuration) procedure to begin operation of the system.

Quick Config

The SVS 2000 is designed to get you up and running quickly once the system is installed. The SVS 2000 guides you through the *Quick Config* questions. Your responses provide the SVS 2000 with the information needed to pre-calibrate the system for your application.

Before you begin *Quick Config*, gather the information shown in Table 3-1 and illustrated in Figure 3-1.

When performing *Quick Config*, do not worry if you make an error. You can make changes by backing up through *Quick Config* using the Func Key. Alternatively, parameters can be changed in the menu tree after you complete *Quick Config*, or the entire *Quick Config* can be repeated by defaulting the system.

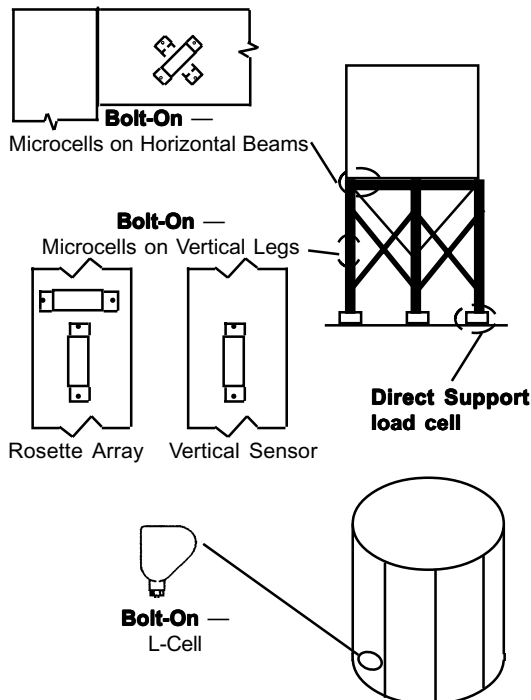


Figure 3-1. Quick Config Terminology

Note

Defaulting the system is accomplished using one of the following methods:

- Cycle power while pressing the Enter Key, or
- Use the *Default System* Menu (see Chapter 13, Service Menu)

K-M Bolt-On Sensor?

Units? lbs or kg

Sensor type?¹ L-Cells or Microcells

If Microcells:^{1, 2}

Installed on horizontal beams?

Installed on vertical legs?

Rosette Arrays?

Vertical Microcells?

Vessel working capacity?¹

_____ lbs or kg

Vessel working stress?¹

_____ psi or kg/mm²

Current material weight? _____ lbs or kg

¹ See the Application Data Form for sensor type and configuration, capacity, and stress. A copy of the form was returned to you with your order. If you cannot locate the form, contact K-M to get another copy before you proceed.

² Internal calculations in the SVS 2000 for Microcells are based on 3-inch Microcells on carbon steel. Modify the calibration after *Quick Config* is complete if the application is for installation on stainless steel or aluminum or uses 2-inch Microcells. See Appendix C, Calculation of Manual Calibration Parameters, for details.

Direct Support load cell?

Units? lbs or kg

Rated Load per load cell?¹

_____ lbs or kg

Sensitivity?¹

_____ mV/V

Number of supports for vessel _____

Current live load? _____ lbs or kg

¹ See the load cell label or the sensor manual for rated load and sensitivity.

Table 3-1. Information Needed for Quick Config

Quick Config Keyboard Use

Enter Key

Press the Enter Key to save in memory any selection you make or any value entered. Each time the Enter Key is pressed, the SVS 2000 briefly acknowledges the entry before proceeding to the next display.

Up and Down Arrow Keys

Press an Arrow Key to scroll the display through the selections at a given level. Press the Up Arrow Key when the display shows the last selection in the menu to 'roll over' the display to the first selection.

Numeric Keys

Press the Numeric Keys to type in numbers. If you make an error while typing a number but have not pressed the Enter Key yet, do one of the following:

- Use the Arrow Keys to increase or decrease the number before you press the Enter Key.
- Press the key for the first (left-most) digit in the number until the display 'rolls over' and that digit appears as the only digit on the display. Then proceed to enter the remainder of the number and press the Enter Key.

Func Key

Press the Func Key to back up through *Quick Config* to review and/or correct an entry.

Gross or Net Key

Press the Gross or Net Key to abort *Quick Config* and go to the gross or net display in Run Mode. The SVS 2000 operates with factory defaults if you abort.

Quick Config Procedure

Note

Round numeric values to match the displayed format. For example, the display has two 'dummy' zeroes for a bolt-on application working capacity. Round the working capacity to the nearest 100 lbs or 100 kg and enter the digits that are to the left of the dummy zeroes.

See Figure 3-2. Perform *Quick Config*.

1. Apply power to the unit while pressing the Enter Key. The display shows:

```

QUICK CONFIG
-----
PRESS ENTER...
-----
...TO CONTINUE
-----
    
```

2. Press the Enter Key. The display shows:

```

UNITS?      lbs
-----
UNITS?      kg
-----
    
```

The choices for units are lbs or kg. For kg, press the Up Arrow Key; the display shows:

Note

You can change units after *Quick Config* is complete (see *Disp Units* in Chapter 5, Display Menu, for a list of available units).

3. When the display shows the desired units, press the Enter Key. The display acknowledges the selection and shows:

```

KM BOLT-ON?
-----
DIRECT SUPPORT?
-----
    
```

The choices for sensor type are K-M bolt-on or direct support. For direct support sensors, press the Up Arrow Key; the display shows:

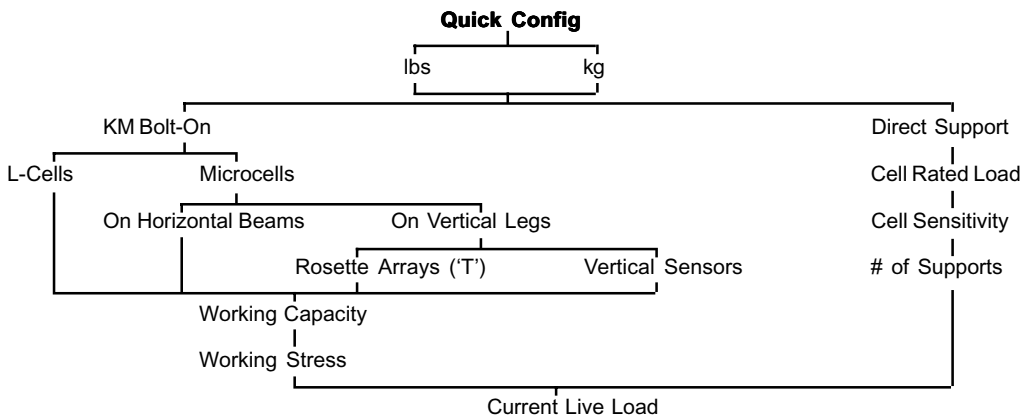


Figure 3-2. Quick Config Diagram

4. When the display shows the desired sensor type, press the Enter Key. The display acknowledges the selection.
- For K-M bolt-on sensors, proceed to Step 5.
 - For direct support sensors, proceed to Step 16.
5. If you selected *KM Bolt-On*, the display shows:
- ```

L-CELLs?

```
- The choices for K-M bolt-on sensor are L-Cells or Microcells. For Microcells, press the Up Arrow Key; the display shows:
- ```

_____
MICROCELLs?
_____

```
6. When the display shows the desired bolt-on sensor, press the Enter Key. The display acknowledges the selection.
- For L-Cells, proceed to Step 11.
 - For Microcells, proceed to Step 7.
7. If you selected *Microcells*, the display shows:
- ```

HORIZONTAL BEAMS?

```
- The choices for location are horizontal beams or vertical legs. For vertical legs, press the Up Arrow Key; the display shows:
- ```

_____
VERTICAL LEGS?
_____

```
8. When the display shows the desired Microcell location, press the Enter Key. The display acknowledges the selection.
- For Microcells on horizontal beams, proceed to Step 11.
 - For Microcells on vertical legs, proceed to Step 9.
9. If you selected *Vertical Legs*, the display shows:
- ```

ROSETTE ARRAYS?

```
- The choices for Microcell configuration are rosette arrays ('T' configuration) or vertical sensors. For vertical sensors, press the Up Arrow Key; the display shows:
- ```

_____
VERTICL SENSORS?
_____

```
10. When the display shows the desired Microcell configuration, press the Enter Key. The display acknowledges the selection.
11. The display shows:
- ```

WORKNG CAPACITY:

```
12. Press the Enter Key. The display looks like this:
- ```

_____
> 000 lbs
_____

```
- If you selected kg, the display shows *kg*.
13. Use the Numeric Keys to input the working capacity. Press the Enter Key. The display acknowledges the entry and shows:
- ```

WORKING STRESS:

```
14. Press the Enter Key. The display looks like this:
- ```

_____
> 0 psi
_____

```
- If you selected kg, the display shows stress units of *kg/mm²*.
15. Use the Numeric Keys to input the working stress. Press the Enter Key. The display acknowledges the entry. Proceed to Step 23.
- Note*
- If you input a stress that is outside the range of typical values, the SVS 2000 requests verification by showing *Stress Too Low?* or *Stress Too High?* for a few seconds. The SVS 2000 returns to the stress input screen and allows you to re-enter the stress if desired.
16. If you selected *Direct Support*, the display shows:
- ```

CELL RATED LOAD:

```
17. Press the Enter Key. The display looks like this:
- ```

_____
> 00 lbs
_____

```
- If you selected kg, the display shows *kg*.
18. Use the Numeric Keys to input the rated load per load cell. Press the Enter Key. The display acknowledges the entry and shows:
- ```

CELL SENSITIVTY:

```
19. Press the Enter Key. The display shows:
- ```

_____
> .000 mV/V
_____

```
- Note: Cell sensitivity is input in millivolts/volt. For example, if the sensitivity is 26.7 millivolts/volt, the display should look like this after you input the value:

```

_____
> 26.700 mV/V
_____

```
20. Use the Numeric Keys to input the load cell sensitivity. Press the Enter Key. The display acknowledges the entry and shows:
- ```

OF SUPPORTS:

```

21. Press the Enter Key. The display shows:

```
> 0 SUPPORTS
```

22. Use the Numeric Keys to input the number of vessel supports. Press the Enter Key. The display acknowledges the entry.

23. The display shows:

```
 CURRNT LIVE LOAD
```

24. Press the Enter Key. The display looks like this:

```
> 0 lbs
```

If you selected kg, the display shows *kg*.

25. Use the Numeric Keys to input the weight of material currently in the vessel. Press the Enter Key. The display acknowledges the entry and shows:

```
 CONFIG COMPLETE!
```

| Menu Item                                         | Function Number     |
|---------------------------------------------------|---------------------|
| Disp (display) Format <sup>1</sup>                | 11                  |
| Disp (display) Countby <sup>1</sup>               | 12                  |
| Disp (display) Units <sup>1</sup>                 | 13                  |
| Bargraph Span <sup>1</sup>                        | 14                  |
| Scale Factor Wgt (weight) <sup>2</sup>            | (under function 22) |
| Scale Factor Cts (counts) <sup>2</sup>            | (under function 22) |
| Zero Counts <sup>2</sup>                          | (under function 22) |
| Sensor Adj Ex <sup>3</sup><br>(adjust excitation) | 61                  |
| Sensor Gain <sup>3</sup>                          | 63                  |

<sup>1</sup> See Chapter 5, Display Menu.  
<sup>2</sup> See Chapter 6, Cal Menu.  
<sup>3</sup> See Chapter 10, Sensor Menu.

Table 3-2. Parameters Set by Quick Config

*Quick Config* is complete. The parameters shown in Table 3-2 were directly entered or calculated by the SVS 2000 based on your responses. The system is monitoring the vessel contents using a calculated calibration based on your inputs.

Note that *Quick Config* calibration does not take into account the *actual* structural response to changes in load. We theoretically expect a change in load to result in a proportional change in digital counts, but the structure's actual response to load and interaction with piping, catwalks, a roof, discharge chutes, etc. prevent the system from achieving the theoretically expected values. Additionally, *Quick Config* calibration could be inaccurate if your estimate of the current material weight was off. When scheduling permits you to move material into or out of the vessel, perform a live load calibration (*Auto Cal*) to obtain the highest accuracy.

# Chapter 4. Run Mode, Function Mode Menu Tree, and Keyboard

## Introduction

This chapter describes the Run Mode displays, Function Mode menu tree structure, and keyboard functions.

## Run Mode Display

When *Quick Config* is complete, the SVS 2000 automatically switches the display to Run Mode. In Run Mode, the SVS 2000 displays material weight or other indication of vessel contents. While in Run Mode, toggle between the displays for gross weight, net weight, total weight, and relay status by pressing an Arrow Key. Pressing the Gross Key or Net Key causes the SVS 2000 to go directly to the respective displays. The displays look like this:

```
GRS 12345600 lbs
```

```
NET 12345600 lbs
```

```
TOT 12345600 lbs
```

```
RLY1ON RLY2OFF
```

If you selected kg as the unit of measure in *Quick Config*, the displays show *kg*.

### Note

If you set up a Keyboard Lock Code, the SVS 2000 will not respond to any keys if more than 3 minutes has elapsed since the last time you pressed a key. Enter the Keyboard Lock Code to 'unlock' the keyboard (see Chapter 13, Service Menu).

## Gross Weight Display Bar Graph Display

### Note

Immediately after *Quick Config*, the SVS 2000 uses the default value for the Bar Graph Span to determine the value for the bar graph display. Enter the correct *Bar Graph Span* in the *DisplayMenu* (see Chapter 5, Display Menu).

You can choose to view a bar graph of the gross weight. To toggle between numerical and bar graph gross weight:

1. Use an Arrow Key to scroll to the gross weight display. The display looks like this:

```
GRS 12345600 lbs
```

2. Press the Enter Key. The display looks like this:

```
75% | ||||| |
```

3. Press the Enter Key again to return to the numerical gross weight display.

## Zero Gross Weight Display

Zeroing the gross weight quickly adjusts an empty vessel's calibration by setting the gross weight to zero. Follow this procedure:

1. Use an Arrow Key to scroll to the gross weight display. The display looks like this:

```
GRS 12345600 lbs
```

2. Press the Zero Key. The display shows:

```
ZERO GRS DISPLY?
```

3. Press the Enter Key to zero the gross weight. Press any other key to abort this function.

4. If you set up a User Access Code (see Chapter 13, Service Menu) the display shows:

```
USER CODE?
```

Enter the User Access Code. Press the Enter Key.

5. The display briefly shows:

```
GROSS ZEROED
```

Notes

1. The SVS 2000 verifies the gross weight is within user-set tolerance limits, to prevent accidental zeroing of a vessel that is not empty. If the gross weight is not within tolerance, the display shows *Outside Zero Tol* and does not zero the gross weight. See *Zero Tolerance* in Chapter 6, Cal Menu, to set the tolerance limit.
2. *Disp Val Correct* can also zero the vessel. However, *Disp Val Correct* has no tolerance limits and allows the current gross weight to be set to a non-zero value. See *Refining the Calibration with the Display Value Correction* in Chapter 6, Cal Menu.

### Net Weight Display

The net weight is the change in weight since the last tare. To tare the vessel:

1. While in Run Mode, press the Tare Key for 1 second.
2. If you set up a User Access Code (see Chapter 13, Service Menu) the display shows:

USER CODE?

Enter the User Access Code. Press the Enter Key.

3. The display briefly shows:

TARE IMPLEMENTED

### Total Weight Display

The total weight is the algebraic sum of the net weights. It is updated each time the vessel is tared.

### Zero Total Weight

To reset the total weight to zero:

1. Use an Arrow Key to scroll to the total weight display. The display looks like this:
- TOT 12345600 lbs
2. Press the Zero Key. The display shows:
- ZERO TOTALIZER?
3. Press the Enter Key to zero the totalizer. Press any other key to abort this function.

4. If you set up a User Access Code (see Chapter 13, Service Menu) the display shows:

USER CODE?

Enter the User Access Code. Press the Enter Key.

5. The display briefly shows:

TOTALIZER CLEARD

### Display Number of Tares

To display the number of tares that have occurred since the total weight was reset:

1. Use an Arrow Key to scroll to the total weight display. The display looks like this:

TOT 12345600 lbs

2. Press the Enter Key. The display briefly looks like this:

#TAREs: 21

## Toggling Between Run Mode and Function Mode

After *Quick Config* is complete, the SVS 2000 has two modes of operation:

- **Run Mode — Monitoring**  
The SVS 2000 displays material weight or other indication of vessel contents.
- **Function Mode — Menu Tree**  
The SVS 2000 accesses the menu tree to allow the user to view and/or modify setup parameters.

Toggle between Function and Run Modes as described below:

- In Run Mode —
  - Press the Func Key to access the first item in the main menu, or
  - Press the function number for a menu and then press the Enter Key to go directly to a particular menu.
- In Function Mode, press the Gross or Net Key while in any function in the menu tree to return to the gross or net display in Run Mode.

## Function Mode Menu Tree

The menu tree, shown in Figure 4-1, is used to view and modify setup parameters and to troubleshoot the system. There are nine numbered main headings in the menu tree:

- *Display* Menu — set up display units, format, countby, and bargraph span
- *Cal* Menu — calibrate the system
- *Setpoint* Menu — set up relay and digital output parameters, view digital output status, and test relays and digital outputs
- *I-Output* Menu — set up, adjust, and test current output
- *Com* Menu — enter serial port configuration and PLC interface parameters
- *Sensor* Menu — adjust excitation, resolution, and gain; and display raw, filtered, and output sensor data
- *Filter* Menu — set up and monitor filtering functions to reduce the effect of 'noise'
- *Tracking* Menu — set up and monitor tracking functions to reduce the effect of 'noise' and drift
- *Service* Menu — set up user access and keyboard lock codes, troubleshoot, and default the system

Each of the nine main headings has numbered submenus beneath it. Some of these submenus have additional, unnumbered submenus beneath them. Chapters 5 through 13 provide detailed information on the function and use of the menus.

### Menu Tree Navigation

Menu tree navigation is simple:

- Use the Func Key to access the menu tree or use the function number and Enter Key to go to a particular menu.
- Use the Arrow Keys to move among menus at the same level.
- Use the Enter Key to select a menu and access its submenus.

Following are two examples illustrating how to navigate to the *Relay1 Deadband* Menu:

#### Example 1. Go directly to nearest numbered menu —

1. In Run Mode, press the '3' Key and '1' Key. The display shows:

```
FUNCTION: 31
```

Press the Enter Key. The display shows:

```
31 SLCT RELAY #1
```

2. Press the Enter Key to select this menu. The display shows:

```
RELAY1 VALUE
```

3. Press the Up Arrow Key to go to the next menu at this level. The display shows:

```
RELAY1 DEADBAND
```

4. Press the Enter Key to select this menu.

#### Example 2. Navigate through menus —

1. In Run Mode, press the Func Key. The display shows:

```
10 DISPLAY MENU
```

2. Press the Up Arrow Key to go to the next menu at this level. The display shows:

```
20 CAL MENU
```

3. Press the Up Arrow Key to go to the next menu at this level. The display shows:

```
30 SETPOINT MENU
```

4. Press the Enter Key to select this menu. The display shows:

```
31 SLCT RELAY #1
```

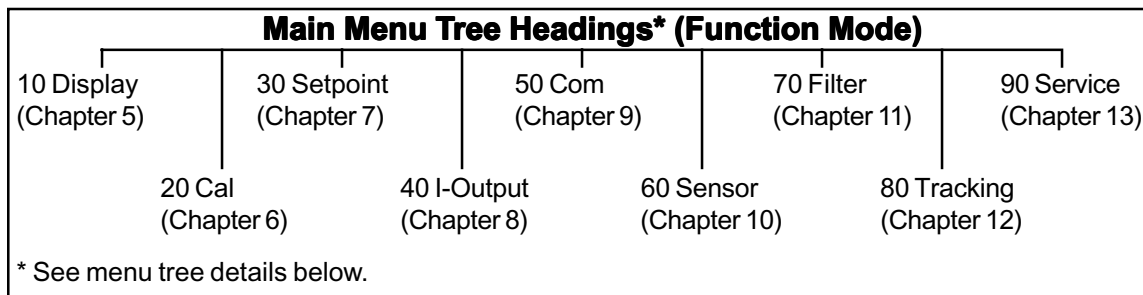
5. Press the Enter Key to select this menu. The display shows:

```
RELAY1 VALUE
```

6. Press the Up Arrow Key to go to the next menu at this level. The display shows:

```
RELAY1 DEADBAND
```

7. Press the Enter Key to select this menu.



### **Detailed Menu Tree**

#### **10 Display Menu**

- 11 Disp Format  
xxxxxx xxxxx.x xxxx.xx xxx.xxx  
xx.xxxx xxxxxxo xxxxxxxoo
- 12 Disp Countby  
1 2 5 10 20 50 100 200  
500 1000 5000 10,000
- 13 Disp Units  
lbs kg CWT tns gal Ltr bbl  
bu % ft m mV (none)
- 14 Bargraph Span

#### **20 Cal Menu**

- 21 Auto Cal  
Lo Span Cal  
Hi Span Cal  
Disp Val Correct
- 22 Manual Cal  
Scale Factor Wgt  
Scale Factor Cts  
Zero Counts
- 23 Linearization  
Linearize Set  
Linearize Enable  
Linearize Off  
Linearize On
- 24 Zero Tolerance
- 29 Cal Display  
Cnt/mV  
ScfWgt  
ScfCnt  
ZeroCnt  
DispVCW  
HiSpanW  
LoSpanW  
HiSpanC  
LoSpanC  
0mV\_Cnt

#### **30 Setpoint Menu**

- 31 Slct Relay #1  
Relay1 Value  
Relay1 Deadband  
Relay1 Hi/Lo  
Hi Lo  
Relay1 Track  
Grs Net  
Tot Flt  
Relay1 Fail-Safe  
On Off NC  
Relay1 Preact
- 32 Slct Relay #2  
(submenus similar to relay 1)
- 33 Slct Digtl #1  
DigOut1 Value  
DigOut1 Deadband  
DigOut1 Hi/Lo  
Hi Lo  
DigOut1 Track  
Grs Net  
Tot Flt  
DigOut1 Failsafe  
On Off NC  
DigOut1 Preact
- 34 Slct Digtl #2  
(submenus similar to digital output 1)
- 35 Slct Digtl #3  
(submenus similar to digital output 1)
- 36 Slct Digtl #4  
(submenus similar to digital output 1)
- 37 Slct Digtl #5  
(submenus similar to digital output 1)
- 38 Slct Digtl #6  
(submenus similar to digital output 1)

Figure 4-1. SVS 2000 Menu Tree (continued on next page)

**Detailed Menu Tree (continued)**

- 39 Digtl Status
  - Setpoint Test <sup>(1)</sup>
    - Select Relay #1
      - Off On
    - Select Relay #2
      - Off On
    - Select Digtl #1
      - Off On
    - Select Digtl #2
      - Off On
    - Select Digtl #3
      - Off On
    - Select Digtl #4
      - Off On
    - Select Digtl #5
      - Off On
    - Select Digtl #6
      - Off On
- 40 I-Output Menu**
  - 41 IOut Range
    - 4-20mA      0-20mA
  - 42 IOut: 4/0mA
  - 43 IOut: 20mA
  - 44 IOut Track
    - Grs Net
  - 45 IOut Failsafe
    - Hi Lo NC
  - 46 IOut Enable
    - On Off
  - 48 Current Adjst
    - 0mA Point
    - 4mA Point
    - 20mA Point
  - 49 Test Current
    - 4/0mA    6/2mA    8/4mA
    - 10/6mA   12/8mA   14/10mA
    - 16/12mA   18/14mA   20/16mA
    - /18mA   -/20mA
- 50 Com Menu**
  - 51 Serial Address
  - 52 Serial Baud
    - 1200 2400 4800 9600 19200
  - 53 PLC Menu <sup>(2)</sup>
    - A-B RIO Menu
    - DeviceNet Menu (release 1st quarter 1999)
    - Profibus Menu (release in 1999)
    - Modbus Menu (release in 1999)
- 60 Sensor Menu**
  - 61 Sensor Adj Ex
    - 13V 12V 11V 10V 9V 8V 7V 6V 5V
  - 62 Resolution
    - 16bt 17bt 18bt 19bt 20bt 21bt
  - 63 Sensor Gain
    - 1 2 4 8 16 32 64 128
  - 69 Sensor Disply
    - Raw Weight
    - Ftr Weight
    - Out Weight
    - Raw Counts
    - Ftr Counts
    - Sensout
- 70 Filter Menu**
  - 71 Averaging
  - 72 DSP Enable
    - On Off
  - 73 DSP Step
  - 74 DSP Qualify
  - 75 DSP Factor
  - 79 DSP Step Mon
- 80 Tracking Menu**
  - 81 Rate Threshld
  - 82 Sample Intrvl
  - 83 Zero Trak Win
  - 84 Drift Limit
  - 85 Mat Trak Enab
    - On Off
  - 89 Rate Monitor
- 90 Service Menu**
  - 91 User Access
  - 92 Keyboard Lock
  - 93 Keyboard Test
  - 94 Default Systm
  - 99 Diagnostics

**Notes:**

<sup>(1)</sup> Setpoint Test is at the same menu level as 31-39, but does not have a menu number.

<sup>(2)</sup> Submenus are functional for PLC Menu only if your SVS 2000 includes a PLC interface PCB. See the applicable manual for detailed information: *A-B RIO Interface Manual for SVS 2000*, *DeviceNet Interface Manual for SVS 2000*, *Profibus Interface Manual for SVS 2000*, or *Modbus Interface Manual for SVS 2000*.

Figure 4-1. SVS 2000 Menu Tree (continued from previous page)

---

## Keyboard

---

The SVS 2000 keyboard (Figure 4-2) is used to input setup parameters during *Quick Config*, access Run Mode display screens, and access Function Mode menus to input setup parameters and troubleshoot. The function of each key is described below.

### Func Key

The Func Key is used in Run Mode only. Press the Func Key to switch to Function Mode and access the first item in the menu tree.

#### Note

---

To go directly to a particular menu in the menu tree while in Run Mode, press the function number for the menu and then press the Enter Key.

---

### Arrow Keys

The Arrow Keys have several functions:

- Run Mode — Press an Arrow Key to scroll through the gross weight, net weight, total weight, and relay status display screens.
- Function Mode —
  1. Press an Arrow Key to scroll through the menu selections at a given level.
  2. Press an Arrow Key to scroll to a desired value when entering parameters. For example, when setting *Hi Span Cal*, the Arrow Keys can be used to scroll to a desired value instead of entering the number with the Numeric Keys.

Pressing the Up Arrow Key when the display shows the last menu selection at a given level 'rolls over' the display to the first selection.

### Net Key

Press this key to change the display to net weight (weight added to or removed from the vessel since the last time the Tare Key was used):

- Run Mode — press the Net Key to go to the net weight display.
- Function Mode — press the Net Key to exit the menu tree and go to the net weight display in Run Mode.

### Gross Key

Press the Gross Key to change the display to gross weight (total weight of material in vessel):

- Run Mode — press the Gross Key to go to the gross weight display.
- Function Mode — press the Gross Key to exit the menu tree and go to the gross weight display in Run Mode.

### Tare Key

The Tare Key is used in Run Mode only. Press the Tare Key for 1 second to 'tare' the vessel, setting the net weight value to zero. The SVS 2000 briefly shows *Tare Implemented* and then switches to the net weight display. The tare function is useful when you want to monitor how much material is added to or removed from the vessel from a given point.

Note that the total weight display is updated each time the vessel is tared.

#### Note

---

The SVS 2000 also has a remote tare function. See TI-SVS-02 in Appendix E, Technical Drawings, for wiring details. To tare the vessel from the remote station, hold the remote tare push button for 1 second.

---

### Zero Key

The Zero Key is used in Run Mode:

- On the gross weight display — Press the Zero Key to change the calibration for the vessel, setting the gross weight value to zero. The Zero Key is useful when you want to quickly adjust the calibration for an empty vessel without entering the menu tree. See the *Run Mode Display* section in this chapter for details.
- On the total weight display — Press the Zero Key to reset the total weight to zero. See the *Run Mode Display* section in this chapter for details.

## Enter Key

The Enter Key has several functions:

- In Run Mode —
  - Gross weight display: Press the Enter Key to toggle from numerical format to bar graph format. The display remains in the bar graph format (even if the SVS 2000 is turned off and back on again) until the Enter Key is pressed to toggle back to the numerical format.
  - Total weight display: Press the Enter Key to briefly display the number of tares since the last time the totalizer was reset.
- In Function Mode —
  - Press the Enter Key to access submenus. For example, if the display shows:

21 AUTO CAL

pressing the Enter Key advances to the first Auto Cal submenu:

LO SPAN CAL

Pressing the Enter Key again advances to the display where the value for the Lo Span is entered:

> lbs

- Press the Enter Key to save in memory any parameter set up in the menus. For example, when setting *Lo Span Cal*, pressing the Enter Key saves it to memory. The value remains in memory until a new value is entered.

## Numeric Keys

The Numeric Keys have several functions:

- Run Mode — Press Numeric Keys to enter the function number for the desired menu in the menu tree (press the Enter Key after the number is entered).
- Function Mode — Press Numeric Keys to type in numbers to set up the SVS 2000. If you make an error while typing a number but haven't pressed the Enter Key yet, do one of the following:
  - Use the Arrow Keys to increase or decrease the number before you press the Enter Key.
  - Press the key for the first (left-most) digit in the number until the display 'rolls over' and that digit appears as the only digit on the display. Then proceed to enter the remainder of the number and press the Enter Key.
  - Or, press the Gross or Net Key to return to Run Mode and then come back into the menu to try again.

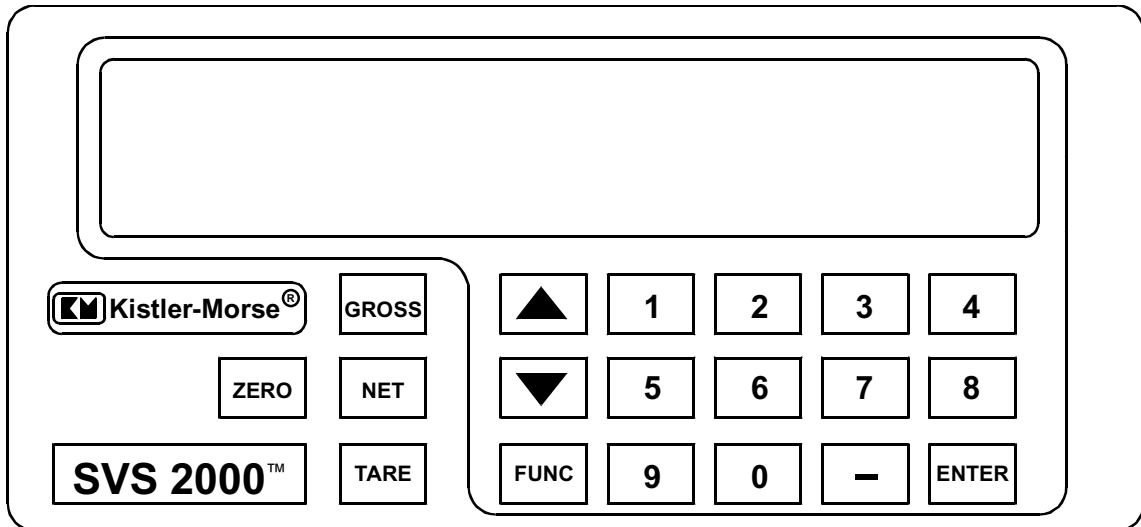
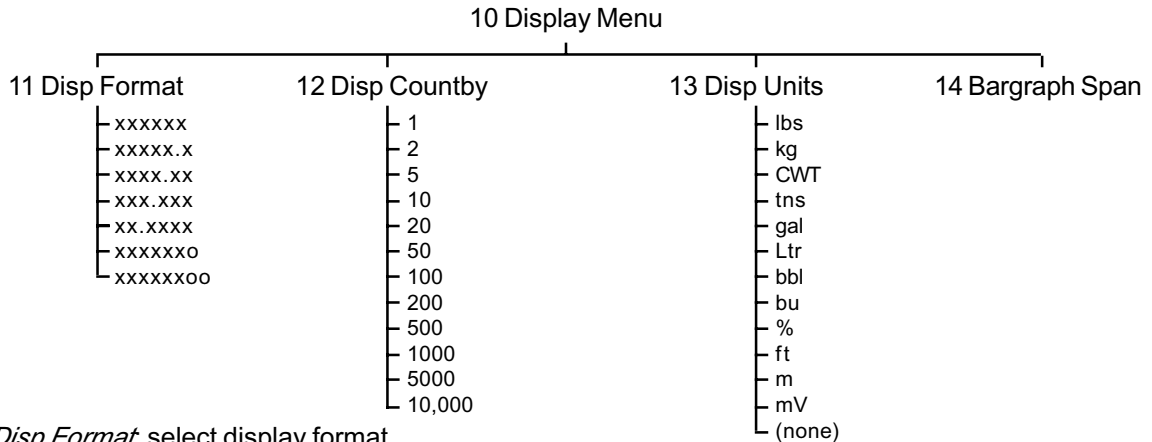


Figure 4-2. SVS 2000 Keyboard



# Chapter 5. Display Menu [10]



*Disp Format:* select display format

*Disp Countby:* select display countby increment

*Disp Units:* select display units

*Bargraph Span:* set up bar graph

Figure 5-1. Display Menu

## Introduction

The *Display Menu* is used to set up the parameters that govern the display functions when in Run Mode. This chapter provides explanations of the display parameters and detailed navigation procedures through the menu tree.

As shown in Figure 5-1, the *Display Menu* has four submenus.

## 11 Disp (display) Format

### Note

*Disp Format* was set by the SVS 2000 based on your entries in *Quick Config*. In the *Disp Format* Menu you can change the format. However, if you change *Disp Format* you must also change other setup parameters. See *Modifying Disp Format and Disp Units* in this chapter for details.

This menu allows you to set up the numerical format by selecting the number of digits to be displayed to the left and right of the decimal point while in Run Mode. Listed below are the seven formats available (x is a place holder and 0 is a 'dummy' zero):

```

xxxxxx xxxxx.x xxxx.xx xxx.xxx
xx.xxxx xxxxxxo xxxxxxoo

```

*Disp Format* is used with *Disp Countby* to provide a stable display, and to provide meaningful results consistent with system accuracy. For example, you do not want to have the display showing weights like 1000.01 lbs if system accuracy is +/- 20 lbs.

Follow this procedure to modify *Disp Format*:

1. If the SVS 2000 is in Run Mode, press the '1' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```

11 DISP FORMAT

```

2. Press the Enter Key to access this menu. The display looks like this:

```

FORMAT: *xxxxxxx

```

3. (Asterisk indicates the current selection.) If the displayed menu does not have the desired format, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired format (there are seven pages to the *Disp Format* Menu).
3. When the display shows the desired format, press the Enter Key. The display acknowledges the selection and returns to:

```

11 DISP FORMAT

```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 12 Disp (display) Country

### Note

*Disp Country* was set by the SVS 2000 based on your entries in *Quick Config*. In the *Disp Country* Menu you can change the country.

This menu is used to set up the display to count by increments of 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 5000, or 10000. A *Disp Country* of 1 causes the rightmost active digit on the display to change in increments of 1. A *Disp Country* of 100 causes the rightmost three active digits on the display to change in increments of 100. Use *Disp Country* to adjust the display to a resolution consistent with the accuracy of the system and reduce display flickering.

Note that the selection for *Disp Format* affects how the SVS 2000 interprets the *Disp Country* value. Table 5-1 shows some examples of how these are related.

**Example:** For a 10,000 lb maximum weight and *Disp Format* of xxxxxx, a *Disp Country* of 1 is meaningful only if the system accuracy is  $\pm 0.01\%$  of maximum load. A more typical accuracy for a bolt-on strain gage application might be  $\pm 1\%$ . Since 1% of 10,000 lbs is 100 lbs, a more realistic *Disp Country* for this system is 100.

| <i>Disp Format</i> | <i>Disp Country</i> | Example Value<br>(incremented digit underlined) |
|--------------------|---------------------|-------------------------------------------------|
| xxxx.xx            | 1                   | 397. <u>25</u>                                  |
| xxxx.xx            | 100                 | 39 <u>7</u> .00                                 |
| xxxxxx             | 1                   | 397 <u>25</u>                                   |
| xxxxxx             | 100                 | 39 <u>7</u> 00                                  |
| xxxxxx00           | 1                   | 3972 <u>5</u> 00                                |
| xxxxxx00           | 100                 | 39 <u>7</u> 0000                                |

Table 5-1. Interaction of Format and Country

*Disp Country* only affects the value on the display. Setpoints, current outputs, and serial outputs are unaffected by *Disp Country*.

Follow this procedure to modify *Disp Country*.

1. If the SVS 2000 is in Run Mode, press the '1' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```
12 DISP COUNTRY
```

2. Press the Enter Key to access this menu. The display looks like this:

```
COUNTRY: *1
```

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired country, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired country (there are twelve pages to the *Disp Country* Menu).

3. When the display shows the desired country, press the Enter Key. The display acknowledges the selection and returns to:

```
12 DISP COUNTRY
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 13 Disp (display) Units

### Note

In *Quick Config* you selected *lbs* or *kg* as the unit of measure. In the *Disp Units* Menu you can choose from a larger selection of units. However, if you change *Disp Units* you must also change other setup parameters. See *Modifying Disp Format and Disp Units* in this chapter for details.

This menu allows you to select the unit of measure for the Run Mode. Listed below are the units available:

|                             |                        |
|-----------------------------|------------------------|
| <i>lbs</i> (pounds)         | <i>kg</i> (kilograms)  |
| <i>CWT</i> (hundred-weight) | <i>tns</i> (tons)      |
| <i>gal</i> (gallons)        | <i>Ltr</i> (liters)    |
| <i>bbl</i> (barrels)        | <i>bu</i> (bushels)    |
| % (percent)                 | <i>ft</i> (feet)       |
| <i>m</i> (meters)           | <i>mV</i> (millivolts) |
| (none)                      |                        |

Follow this procedure to modify *Disp Units*:

1. If the SVS 2000 is in Run Mode, press the '1' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

```
13 DISP UNITS
```

2. Press the Enter Key to access this menu. The display looks like this:

```
UNITS: *lbs
```

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired units, press the Up Arrow Key to display the next page of the menu.

Continue to press an Arrow Key until you see the desired units (there are thirteen pages to the *Disp Units* Menu).

3. When the display shows the desired units, press the Enter Key. The display acknowledges the selection and returns to:

```
13 DISP UNITS
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 14 Bargraph Span

### Note

*Bargraph Span* was set by the SVS 2000 based on your entries in *Quick Config*. In the *Bargraph Span* Menu you can change the value.

You can choose to view a numerical display or a bar graph of the gross weight while in Run Mode. The maximum span for the bar graph is set with this menu.

The bar graph displays the vessel contents as a numerical percentage to the left of the graph, as shown below:

```
75% | ||||| |
```

The 0% point of the bar graph is always 0. The 100% point of the bar graph is set with the *Bargraph Span*. For example, entering the vessel's maximum capacity of 5000 lbs as the *Bargraph Span* results in a bar graph with 0% corresponding to 0 lbs and 100% corresponding to 5000 lbs. If the gross weight in the vessel falls outside the range, the bar graph display does the following:

- Gross weight falls below 0 (caused by inaccuracies in the calibration, vibration, drift, etc.) — The graph remains at 0% and the numerical percentage remains at 0%.
- Gross weight goes above the *Bargraph Span* value — The graph remains at 100% and the numerical percentage reflects the actual weight. For example, if *Bargraph Span* is 5000 lbs and the gross weight is 7500 lbs, the numerical percentage displayed is 150% while the graph remains at 100%.

While viewing the gross weight in Run Mode, pressing the Enter Key toggles the display between bar graph and numerical display.

Follow this procedure to modify *Bargraph Span*.

1. If the SVS 2000 is in Run Mode, press the '1' Key, '4' Key, and Enter Key to access the menu tree. The display shows:

```
14 BARGRAPH SPAN
```

2. Press the Enter Key to access this menu. The display looks like this:

```
> 9999 lbs
```

(Units are consistent with *Disp Units*.)

3. Use the Numeric or Arrow Keys to enter the desired value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
14 BARGRAPH SPAN
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## Modifying Disp (display) Format and Disp (display) Units

If you modify *Disp Format* and/or *Disp Units*, you may need to modify other parameters as well. Changing *Disp Format* moves the decimal place for all parameters based on it. Changing *Disp Units* changes the units for all parameters based on it. **The SVS 2000 does not 'convert' parameter values based on changes in units — it simply changes the name of the unit.** Table 5-2 lists all parameters that are affected by changes to *Disp Format* or *Disp Units*. If you are not using or have not yet set up a function (for example, you have not set up digital outputs yet), the changes will not affect the operation of the system. Before you change *Disp Format* and/or *Disp Units*, record the values for each of the parameters in Table 5-2 that are in use.

### Example 1. Change *Disp Format* from xxxxxx00 to xxxxxx

Record current parameter values:

*Disp Format* = xxxxxx00  
*Scale Factor Weight* = 100,000  
*Relay1 Value* = 90,000  
 (dummy zeroes underlined)

Change *Disp Format*. As a result of the change, the parameter values change to:  
*Scale Factor Weight* = 1,000  
*Relay1 Value* = 900

Re-enter parameter values:  
*Scale Factor Weight* = 100,000  
*Relay1 Value* = 90,000

Bargraph Span [14]  
 Scale Factor Weight [22]  
 Linearize Set [23]  
 Zero Tolerance [24]  
 Relay and Digout Value, Deadband, and Preact [31 through 38]  
 IOut 4/0 mA [42] and 20 mA [43]  
 DSP Step [73]  
 Rate Threshold [81]  
 Zero Trak Win [83]  
 Drift Limit [84]

Table 5-2. Parameters Affected by Changes to *Disp Format* and/or *Disp Units*

### Example 2. Change *Disp Units* from lbs to tns and *Disp Format* from xxxxxx00 to xxxxxx.x

Record current parameter values:

*Disp Format* = xxxxxx00  
*Scale Factor Weight* = 100,000 lbs  
*Relay1 Value* = 90,000 lbs  
 (dummy zeroes underlined)

Change *Disp Units* and *Disp Format*. As a result of the changes, the parameter values change to:

*Scale Factor Weight* = 100.0 tns  
*Relay1 Value* = 90.0 tns

Re-enter parameter values:

*Scale Factor Weight* =  
 $100,000 \text{ lbs} \div 2000 \text{ lbs/ton} = 50.0 \text{ tns}$   
*Relay1 Value* =  
 $90,000 \text{ lbs} \div 2000 \text{ lbs/ton} = 45.0 \text{ tns}$

### Example 3. Change *Disp Units* from lbs to % and *Disp Format* from xxxxxx00 to xxxxxx

When changing *Disp Units* to %, you must calculate the current parameter values in terms of the full scale (100%) load:

New Value (in %) =  
 $\text{Old Value} \div \text{Full Scale Load}$

where:

Full scale load = vessel working capacity  
 (from Application Data Form)

Current parameter values:

*Disp Format* = xxxxxx00  
*Scale Factor Weight* = 100,000 lbs  
*Relay1 Value* = 90,000 lbs  
 (dummy zeroes underlined)

Change *Disp Units* and *Disp Format*. As a result of the changes, the parameter values change to:

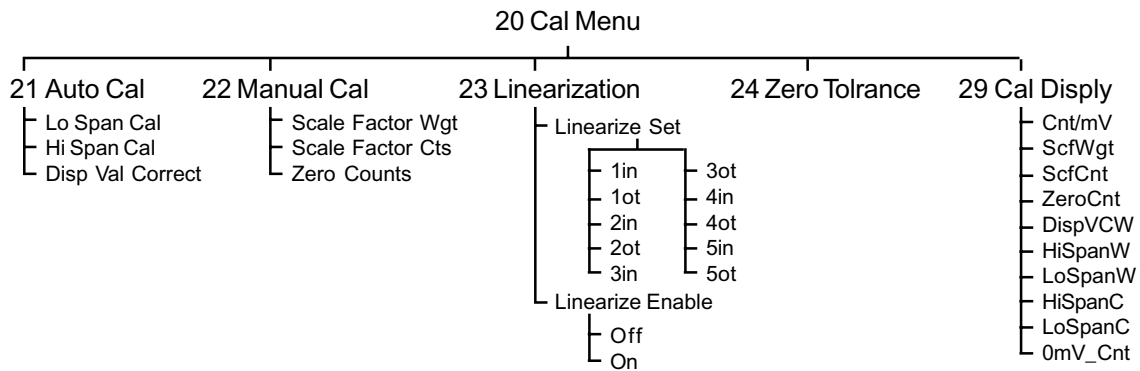
*Scale Factor Weight* = 1000 %  
*Relay1 Value* = 900 %

The vessel working capacity is 150,000 lbs.

Re-enter parameter values:

*Scale Factor Weight* =  
 $100,000 \text{ lbs} \div 150,000 \text{ lbs} = 75\%$   
*Relay1 Value* =  
 $90,000 \text{ lbs} \div 150,000 \text{ lbs} = 60\%$

# Chapter 6. Cal (calibration) Menu [20]



*Auto Cal:* set Lo Span, Hi Span, and Display Value Correction values while moving material

*Manual Cal:* manually set scale factor weight, scale factor counts, and zero counts

*Linearization:* set up and enable linearization table

*Zero Tolerance:* set the range within which the Zero Key can be used to zero the gross weight

*Cal Display:* display input and internally calculated calibration parameters

Figure 6-1. Cal Menu

## Introduction

*Quick Config* got your system up and running with a calibration based on system and sensor characteristics. The *Ca/Menu* is used to refine and improve the calibration. This chapter provides explanations of each of the calibration parameters and detailed navigation procedures through the menu tree for each type of calibration.

As shown in Figure 6-1, the *Ca/Menu* has five submenus, described below:

- *Auto Cal*— sets Lo Span, Hi Span, and Display Value Correction values while moving material into or out of the vessel. **Auto calibration will result in the highest system accuracy.**
- *Manual Cal*— manually sets Scale Factor Weight, Scale Factor Counts, and Zero Counts. Use manual calibration to fine-tune the calibration or re-enter previous calibration data.
- *Linearization*— sets up and turns on and off the linearization table. Use this function if the vessel's structure responds non-linearly, but consistently, to changes in load, resulting in consistent, incorrect weight readings after the system has been correctly calibrated.

- *Zero Tolerance*— sets the range within which the Zero Key can be used to zero the gross weight.
- *Cal Display*— displays input and internally calculated calibration parameters.

## 21 Auto Cal (automatic calibration)

There are three methods for performing automatic calibration:

- High-Accuracy Calibration
- Calibration by Adding a Known Quantity of Material
- Calibration by Subtracting a Known Quantity of Material

Each method requires moving a known quantity of material, representing at least 25% of the vessel's total capacity, into or out of the vessel. The latter two methods do not provide as high accuracy calibration as the first method. However, these lower accuracy calibrations can be later refined to increase the accuracy (see *Refining the Calibration with the Display Value Correction* in this section).

### Note

See Appendix F, Error Messages, for an explanation of error messages you may encounter while performing an Auto Calibration.

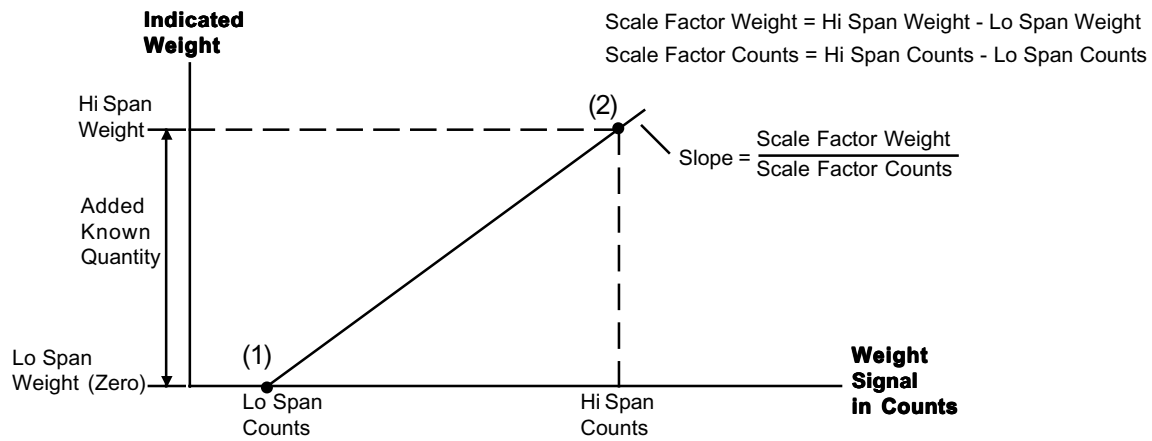


Figure 6-2. High-Accuracy Calibration

### High-Accuracy Calibration

This procedure provides the highest accuracy, but requires that the vessel be completely empty to start. The principle behind the calibration follows.

The vessel is completely emptied, and the Lo Span weight is set to zero [point (1) in Figure 6-2]. 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 weight [point (2) in Figure 6-2]. The SVS 2000 saves in memory the entered Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the straight line shown in Figure 6-2. The slope of the line is called the Scale Factor, which is calculated internally.

The accuracy of the calibration improves the greater the known quantity of material added during the calibration procedure. For example, adding 50% of the vessel's total capacity results in greater accuracy than adding 25% of the total capacity.

Follow this procedure to perform a high-accuracy calibration:

1. Completely empty the vessel.
2. If the SVS 2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```

21 AUTO CAL

```

3. Press the Enter Key to access this menu. The display shows:

```

LO SPAN CAL

```

4. Press the Enter Key to access the *Lo Span Cal*/Menu. The display looks like this:

```

> ----- lbs

```

(Units are consistent with *Disp Units*.)

5. Use the Numeric or Arrow Keys to input zero. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

LO SPAN CAL

```

6. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

HI SPAN CAL

```

7. Add a known quantity of material, representing at least 25% of the vessel's total capacity, to the vessel.
8. Press the Enter Key to access the *Hi Span Cal*/Menu. The display looks like this:

```

> ----- lbs

```

(Units are consistent with *Disp Units*.)

9. Use the Numeric or Arrow Keys to input a value that represents the quantity of material added to the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

HI SPAN CAL

```

10. Press the Gross or Net Key to return to Run Mode.

The SVS 2000 is now calibrated to the highest accuracy.

## Calibration by Adding a Known Quantity of Material

This calibration method does not require the vessel to be completely empty. The principle behind the calibration follows.

A weight estimated to be the quantity of material in the vessel is entered as the Lo Span weight [point (1) in Figure 6-3]. A known quantity of material, representing at least 25% of the vessel's total capacity, is added to the vessel. The sum of the known quantity plus the estimated quantity is entered as the Hi Span weight [point (2) in Figure 6-3]. The SVS 2000 saves in memory the Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the dashed straight line and the calculated Zero Counts shown in Figure 6-3. The slope of the line is called the Scale Factor, which is calculated internally.

The slope of the line is reasonably accurate, because it is calculated based on the known difference between the Lo Span and Hi Span weights and counts. However, if the estimated Lo Span weight is incorrect, the actual 'location' of the line is incorrect, resulting in errors in monitoring. The greater the error in the estimated Lo Span, the greater the resulting error. The 'location' of the line can be adjusted to the solid line by entering a Display Value Correction [point (3) in Figure 6-3] (see *Refining the Calibration with the Display Value Correction* in this section).

The greater the known quantity of material added during the calibration procedure, the greater the accuracy of the calibration. Adding 50% of the total capacity results in greater accuracy than adding 25% of the total capacity.

Follow this procedure to calibrate by adding a known quantity of material:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```

21 AUTO CAL

```

2. Press the Enter Key to access this menu. The display shows:

```

LO SPAN CAL

```

3. Press the Enter Key to access the *Lo Span Cal*/Menu. The display looks like this:

```

> ----- lbs

```

(Units are consistent with *Disp Units*.)

4. Use the Numeric or Arrow Keys to input a value that represents the estimated quantity of material in the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

LO SPAN CAL

```

5. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

HI SPAN CAL

```

6. Add a known quantity of material, representing at least 25% of the vessel's total capacity, to the vessel.

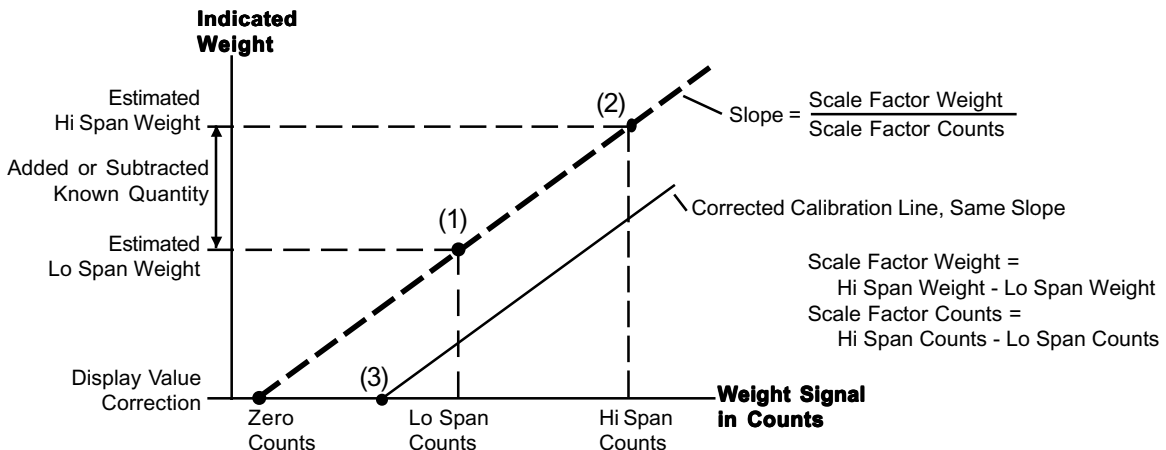


Figure 6-3. Calibration by Adding or Subtracting a Known Quantity of Material

- Press the Enter Key to access the *Hi Span Cal*/Menu. The display looks like this:

```

> ----- lbs

```

(Units are consistent with *Disp Units*.)

- Use the Numeric or Arrow Keys to input a value equal to the sum of the known quantity (Step 6) and the estimated quantity (Step 4). Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

HI SPAN CAL

```

- Press the Gross or Net Key to return to Run Mode.

#### Note

Shifting from the dashed to the solid line in Figure 6-3 is accomplished by entering a Display Value Correction when the vessel contains a known quantity of material (usually none) at a later date. This procedure is described in *Refining the Calibration with the Display Value Correction* in this section.

## Calibration by Subtracting a Known Quantity of Material

This calibration method does not require the vessel to be empty. This method of calibration is appropriate when it is easier to remove material from the vessel than to add it. The principle behind the calibration follows.

A weight estimated to be the quantity of material in the vessel is entered as the Hi Span weight [point (2) in Figure 6-3]. A known quantity of material, representing at least 25% of the vessel's total capacity, is removed from the vessel. The estimated Hi Span weight minus the known quantity that is removed is entered as the Lo Span weight [point (1) in Figure 6-3]. The SVS 2000 saves in memory the Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the dashed straight line and the calculated Zero Counts shown in Figure 6-3. The slope of the line is called the Scale Factor, which is calculated internally.

The slope of the line is reasonably accurate, because it is calculated based on the known difference between the Lo Span and Hi Span weights and counts. However, if the estimated Hi Span value is incorrect, the actual 'location' of the line is incorrect, resulting in errors in vessel monitoring. The greater the error in the estimated Hi Span, the greater the resulting error. The 'location' of the line can be adjusted to the solid line by entering a Display Value Correction [point (3) in Figure 6-3] (see *Refining the Calibration with the Display Value Correction* in this section).

Similarly to the other calibration methods, the greater the known quantity of material moved during the calibration procedure, the greater the accuracy. Removing 50% of the total capacity results in greater accuracy than removing 25% of the total capacity.

Follow this procedure to calibrate by subtracting a known quantity of material:

- If the SVS 2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```

21 AUTO CAL

```

- Press the Enter Key to access this menu. The display shows:

```

LO SPAN CAL

```

- Press the Up Arrow Key to proceed to the next menu. The display shows:

```

HI SPAN CAL

```

- Press the Enter Key to access the *Hi Span Cal*/Menu. The display looks like this:

```

> ----- lbs

```

(Units are consistent with *Disp Units*.)

- Use the Numeric or Arrow Keys to input a value that represents the estimated quantity of material in the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

HI SPAN CAL

```

- Press the Down Arrow Key to return to the previous menu. The display shows:

```

LO SPAN CAL

```

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

8. Press the Enter Key to access the *Lo Span Cal*/Menu. The display looks like this:

```
> ----- lbs
```

(Units are consistent with *Disp Units*.)

9. Use the Numeric or Arrow Keys to input a value equal to the estimated quantity (Step 5) minus the known quantity (Step 7). Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
LO SPAN CAL
```

10. Press the Gross or Net Key to return to Run Mode.

#### Note

Shifting from the dashed to the solid line in Figure 6-3 is accomplished by entering a Display Value Correction when the vessel contains a known quantity of material (usually none) at a later date. This procedure is described in *Refining the Calibration with the Display Value Correction* in this section.

## Refining the Calibration with the Display Value Correction

The *Disp Val Correct* Menu is used to allow the SVS 2000 to establish a known live load. *Disp Val Correct* translates the calibration line of Figure 6-3 from the dashed line to the solid line position. Entering a weight for *Disp Val Correct* establishes point (3) in the figure. This weight must be entered only when there is a known quantity of material in the vessel (**usually** zero material, but it can be a known, non-zero quantity). *Disp Val Correct* is often entered at some time after the initial installation and calibration of the SVS 2000, when it is practical to empty the vessel and refine the calibration.

*Disp Val Correct* may be used to compensate for the following circumstances:

- The estimated weight used when performing a calibration by adding or subtracting a known quantity of material is off by a greater margin than can be tolerated.
- The vessel was not completely empty at the start of a high-accuracy calibration procedure.

#### Notes

1. *Disp Val Correct* cannot 'repair' a calibration in which the known quantity added or subtracted was actually incorrect, because the slope of the line is not affected by *Disp Val Correct*. If necessary, recalibrate.
2. If the known material weight is zero, you can also use the Zero Key while on the gross weight display in Run Mode to refine the calibration. See the *Zero Tolerance* section in this chapter.

Follow this procedure to refine the calibration by entering a Display Value Correction:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
21 AUTO CAL
```

2. Press the Enter Key to access this menu. The display shows:

```
LO SPAN CAL
```

3. Press the Down Arrow Key to proceed to the previous menu. The display shows:

```
DISP VAL CORRECT
```

4. Press the Enter Key to access the *Disp Val Correct* Menu. The display looks like this:

```
> 0 lbs
```

(Units are consistent with *Disp Units*.)

5. Use the Numeric or Arrow Keys to input a value that represents the known quantity of material (usually zero) in the vessel. Press the Enter Key to save the value in memory. The display acknowledges your entry and returns to:

```
DISP VAL CORRECT
```

The SVS 2000 automatically makes all of the necessary corrections.

7. Press the Gross or Net Key to return to Run Mode.

## 22 Manual Cal (calibration)

See Figure 6-4. For Manual Cal, you calculate and input directly Scale Factor Weight, Scale Factor Counts, and Zero Counts for the calibration line. There are two reasons for performing a manual calibration:

- Refining the calibration — You performed an Auto Cal. Later, you moved material into an empty vessel and kept an accurate record of actual material weight (based on a truck weight or some other accurate information) and indicated material weight (from the SVS 2000). However, you did not perform an Auto Cal at the time. You want to use this information now to refine the calibration.
- Re-entering calibration data — You performed an Auto Cal and recorded the results (Scale Factor Weight, Scale Factor Counts, and Zero Counts). Later you performed another Auto Cal to try to improve accuracy, but an error was made. You want to re-enter the data from the previous calibration.

### Note

Calculation of manual calibration parameters for refining a calibration is covered in Appendix C, Calculation of Manual Calibration Parameters.

Follow the procedure below to perform a manual calibration:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```

22 MANUAL CAL

```

2. Press the Enter Key to access this menu. The display shows:

```

SCALE FACTOR WGT

```

3. Press the Enter Key to access the *Scale Factor Wgt* Menu. The display looks like this:

```

> 9999 lbs

```

(Units are consistent with *Disp Units*.)

4. Use the Numeric or Arrow Keys to input a value for the scale factor weight. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

SCALE FACTOR WGT

```

5. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

SCALE FACTOR CTS

```

6. Press the Enter Key to access the *Scale Factor Cts* Menu. The display looks like this:

```

> 250000 cnts

```

7. Use the Numeric or Arrow Keys to input a value for the scale factor counts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

SCALE FACTOR CTS

```

8. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

ZERO COUNTS

```

9. Press the Enter Key to access the *Zero Counts* Menu. The display looks like this:

```

> 1048576 cnts

```

10. Use the Numeric or Arrow Keys to input a value for the zero counts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

ZERO COUNTS

```

11. Press the Gross or Net Key to return to Run Mode.

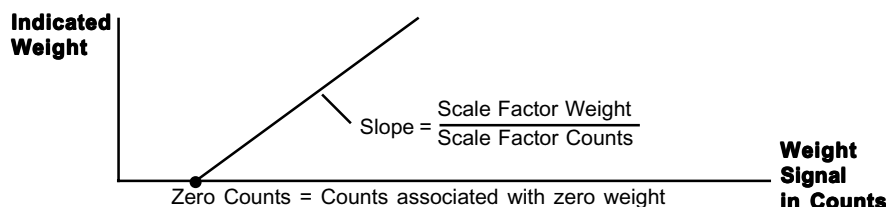


Figure 6-4. Manual Calibration

## 23 Linearization

The linearization function is used to correct nonlinearities from a vessel's sensor/transducer output. Linearization may be required if you notice one of the following after the system is correctly calibrated (using Auto Cal):

- The SVS 2000 gives accurate results when the live load is close to 0 and close to the full scale (maximum live load) value, but is **consistently** inaccurate between those values.
- The SVS 2000 gives accurate results over some of the live load range, but is **consistently** inaccurate in one area.

The word 'consistent' refers not only to an error occurring, but that the error is approximately the same each time. This type of error may be caused by a non-linear response of the vessel's structure to changes in load. This type of error can also result from layering of multiple types of material in the vessel, with differing densities, in distinct, consistently defined layers.

*Note*

Changing the linearization table incorrectly can cause the SVS 2000 to display incorrect sensor data. Do not change the linearization table unless one of the above problems has been noted.

The SVS 2000's linearization algorithm uses a five-point piece-wise linearization method with linear interpolation between points. Figure 6-5 illustrates the linearization operation. The linearization table consists of five raw weights as inputs and five corrected weights as outputs. The default for *Linearization* is *Off*. Additionally, the raw and corrected default values are identical, so the default linearization table has no effect on the SVS 2000, even if linearization is *On*.

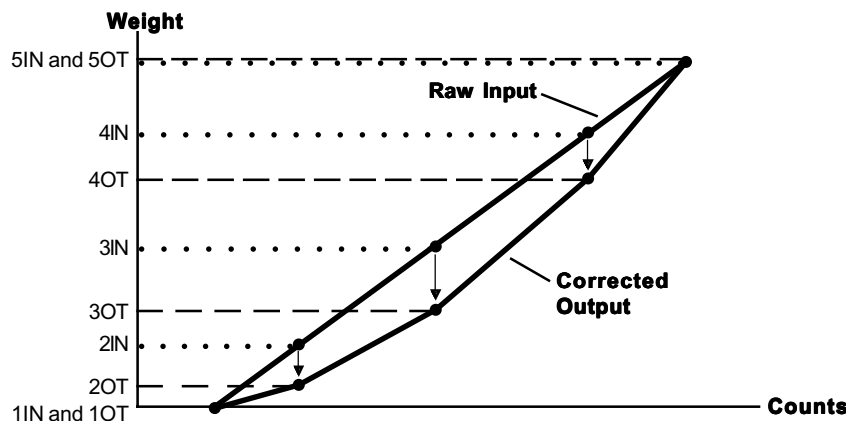
Following is an example of a situation where use of the linearization table may be required:

**Example:** When the vessel is empty, the SVS 2000 correctly shows approximately 0 lbs. You start putting truckloads of material into the vessel, and notice the following pattern:

| Truck | Total Indicated Load | Total Actual Load |
|-------|----------------------|-------------------|
|       | 0                    | 0                 |
| 1     | 6,000                | 5,000             |
| 2     | 11,500               | 10,000            |
| 3     | 16,000               | 15,000            |
| 4     | 20,000               | 20,000            |

After the fourth truckload, the indicated load from the SVS 2000 is reasonably accurate. You notice this same pattern and magnitude of errors every time you start with an empty vessel. To correct for the non-linear response, you input the following values in the *Linearization Set* Menu:

|                  |                 |
|------------------|-----------------|
| 1IN = 0 lbs      | 1OT = 0 lbs     |
| 2IN = 6000 lbs   | 2OT = 5000 lbs  |
| 3IN = 11,500 lbs | 3OT = 10000 lbs |
| 4IN = 16000 lbs  | 4OT = 15000 lbs |
| 5IN = 20000 lbs  | 5OT = 20000 lbs |



**Linearizing Table**

| Raw Input | Corrected Output |
|-----------|------------------|
| 1IN       | 1OT              |
| 2IN       | 2OT              |
| 3IN       | 3OT              |
| 4IN       | 4OT              |
| 5IN       | 5OT              |

Requirements of table values:  
 1IN = 1OT  
 5IN = 5OT  
 1IN < 2IN < 3IN < 4IN < 5IN  
 1OT < 2OT < 3OT < 4OT < 5OT

Figure 6-5. Linearization Curve

Follow this procedure to set up and enable the linearization table:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

```

23 LINEARIZATION

```

2. Press the Enter Key to access this menu. The display shows:

```

LINEARIZE SET

```

3. Press the Enter Key to access the *Linearize Set* Menu. The display looks like this:

```

1IN 0 lbs

```

(Units are consistent with *Disp Units*.)

4. Use the Numeric or Arrow Keys to enter a value for the raw input for this point in the linearization table. Press the Enter Key to save the value in memory. The display acknowledges the entry and proceeds to a display that looks like this:

```

10T 0 lbs

```

5. Use the Numeric or Arrow Keys to enter a value for the corrected output for this point in the linearization table. Press the Enter Key to save the value in memory. The display acknowledges the entry and proceeds to a display that looks like this:

```

2IN 2500 lbs

```

6. Repeat Steps 4 and 5 until the linearization table setup is complete. After the corrected output for point 5 is entered, the display returns to:

```

LINEARIZE SET

```

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

LINEARIZE ENABLE

```

8. Press the Enter Key to access the linearization enable function. The display looks like this:

```

LINEARIZE *OFF

```

(Asterisk indicates the current selection.)  
 If the displayed menu does not show *Linearize On*, press the Up Arrow Key to display the next page of the menu:

```

LINEARIZE ON

```

9. When the display shows *Linearize On*, press the Enter Key. The display acknowledges the selection and returns to:

```

LINEARIZE ENABLE

```

10. Press the Gross or Net Key to return to Run Mode.

## 24 Zero Tolerance (tolerance)

The Zero Key is used on the gross weight display in Run Mode to establish a known live load when the vessel is empty. Similar to the use of the *Disp Val Correct*, pressing the Zero Key translates the calibration line of Figure 6-3 from the dashed line to the solid line position, establishing point (3) in the figure at zero weight. Unlike the use of *Disp Val Correct*, you can set a tolerance limit (*Zero Tolerance*) for the Zero Key.

*Zero Tolerance* establishes a tolerance limit to prevent accidental zeroing of a vessel that is not empty. When you press the Zero Key while on the gross weight display in Run Mode, the SVS 2000 verifies that:

- Gross weight is negative, or
- Gross weight is less than *Zero Tolerance*

If the gross weight does not meet this criteria, the display shows *Outside Zero Tol* and does not zero the gross weight. The default for *Zero Tolerance* is 100, with decimal point/dummy zeroes consistent with *Disp Format*.

### Note

Pressing the Zero Key cannot 'repair' a calibration in which the known quantity added or subtracted was actually incorrect, because the slope of the line is not affected by zeroing the gross weight. If necessary, recalibrate.

Follow this procedure to set *Zero Tolerance*:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '4' Key, and Enter Key to access the menu tree. The display shows:

```

24 ZERO TOLRANCE

```

2. Press the Enter Key to access this menu. The display looks like this:

```

> 100 lbs

```

(Units are consistent with *Disp Units*.)

3. Use the Numeric or Arrow Keys to input a value for the zero tolerance. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

24 ZERO TOLRANCE

```

4. Press the Gross or Net Key to return to Run Mode.

## 29 Cal (calibration) Display

Accessing this menu allows you to view the calibration values that have been entered or internally calculated, as shown in Table 6-1.

Follow this procedure to display the calibration parameters:

1. If the SVS 2000 is in Run Mode, press the '2' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```

29 CAL DISPLAY

```

2. Press the Enter Key to access this menu. The display looks like this:

```

Cnt /mV 699

```

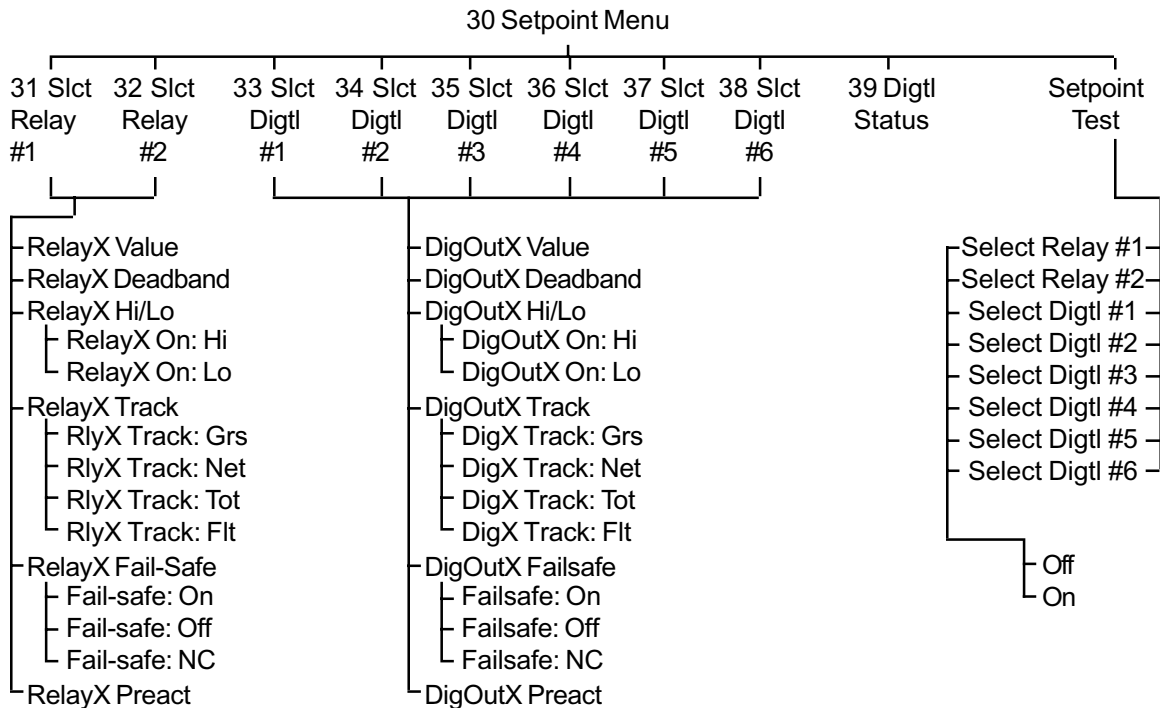
3. Press the Arrow Keys to scroll through the other calibration display parameters.
4. Press the Gross or Net Key to return to Run Mode.

| Calibration Parameter                                                                                                                                  | Description                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <i>Cnt/mV</i>                                                                                                                                          | digital counts per millivolt of signal                                                                                               |
| <i>ScfWgt</i> <sup>1</sup>                                                                                                                             | scale factor weight<br>[entered scale factor weight from Manual Cal<br><b>or</b><br>(hi span weight - lo span weight) from Auto Cal] |
| <i>ScfCnt</i> <sup>1</sup>                                                                                                                             | scale factor counts<br>[entered scale factor counts from Manual Cal<br><b>or</b><br>(hi span counts - lo span counts) from Auto Cal] |
| <i>ZeroCnt</i>                                                                                                                                         | zero counts = digital counts corresponding to zero weight                                                                            |
| <i>DispVCW</i> <sup>2</sup>                                                                                                                            | entered display value correction weight                                                                                              |
| <i>HiSpanW</i> <sup>2,3</sup>                                                                                                                          | entered hi span weight                                                                                                               |
| <i>LoSpanW</i> <sup>2,3</sup>                                                                                                                          | entered lo span weight                                                                                                               |
| <i>HiSpanC</i> <sup>2,3</sup>                                                                                                                          | hi span counts = digital counts corresponding to hi span weight                                                                      |
| <i>LoSpanC</i> <sup>2,3</sup>                                                                                                                          | lo span counts = digital counts corresponding to lo span weight                                                                      |
| <i>0mV_Cnt</i>                                                                                                                                         | digital counts corresponding to 0 millivolts of signal                                                                               |
| <i>Notes:</i>                                                                                                                                          |                                                                                                                                      |
| <sup>1</sup> These values are entered in a Manual Cal or are calculated from the Auto Cal data; the display reflects the most recent calibration.      |                                                                                                                                      |
| <sup>2</sup> These values are blanked out with '- - -' if the most recent calibration entry was a Manual Cal parameter.                                |                                                                                                                                      |
| <sup>3</sup> These values are blanked out with '- - -' if the most recent calibration entry was a Display Value Correction or the use of the Zero Key. |                                                                                                                                      |

Table 6-1. Calibration Display Parameters



# Chapter 7. Setpoint Menu [30]



For both Relays (#1 - #2) and Digital Outputs (#1 - #6):

*Value:* establish weight value associated with setpoint energizing

*Deadband:* establish point at which setpoint returns to normal state after setpoint is energized

*Hi/Lo:* establish whether energizing occurs above (*Hi*) or below (*Lo*) *Value*

*Track:* establish whether energizing is based on gross, net, or total weight, or a fault condition

*Fail-Safe:* establish setpoint operation in fail-safe condition

*Preact:* establish point before *Value* at which setpoint is energized

*Digtl Status:* monitor the status of the six digital outputs

*Setpoint Test:* manually energize setpoints for testing

Figure 7-1. Setpoint Menu

## Introduction

The *Setpoint* Menu is used to enter parameters for relays and digital outputs, review digital output status, and test relays and digital outputs. This chapter provides explanations of each of the setpoint parameters and detailed navigation procedures through the menu tree.

As shown in Figure 7-1, the *Setpoint* Menu has ten submenus.

## 31-32 Slct (select) Relay and 33-38 Slct Digtl (select digital)

The *Descriptions* section defines each of the parameters. The *Setpoint Example* section provides an example with two relays. The *Setting Up the Setpoints* section provides the procedure for using the SVS 2000.

## Descriptions

The relay value is the weight measurement in a vessel where you wish a device (for example, a pump or a valve) to energize or de-energize. Up to two relays can be set up for the SVS 2000.

The digital output value is the weight measurement in a vessel where you wish to control the output. When the setpoint energizes, the output is driven low. When it de-energizes, the output is driven high. Up to six digital outputs can be set up for the SVS 2000. Refer to TI-SVS-02 for details on use.

The relay and digital output setup functions are similar and are accessed in these menus. They include selecting energizing levels, high or low energizing, deadband values, preact values, fail-safe parameters, and track mode for energizing.

## Value

*Value* establishes the energizing value, the point where the setpoint changes state. The '-' Key toggles between positive and negative for the value entered. The default is 0.

## Deadband

*Deadband* determines the point at which a setpoint returns to its normal on/off state **after** the setpoint has been energized.

*Deadband* equals the amount of material that will be added to or removed from the vessel before the setpoint is de-energized. K-M recommends the use of a non-zero *Deadband* to prevent setpoints from oscillating. The default is 10, with decimal point/dummy zeroes consistent with *Disp Format*.

## Hi/Lo

Setpoints can be configured to change state either above (*Hi*) or below (*Lo*) the setpoint *Value*. The default is *Lo*.

## Track

Setpoints can be set to energize based on tracking the gross weight (*Grs*), net weight (*Net*), total weight (*Tot*), or a system fault (*Flt*). Energizing based on the gross weight is the default.

### Note

---

If *Track* is set to *Flt*, the setpoint remains energized except in a fault condition or if power is turned off.

---

## Failsafe

If the SVS 2000 detects a problem, one of three fail-safe conditions can be applied to a setpoint:

- *On*
- *Off*— default
- *NC* (no change)

*On* energizes the setpoint in a fail-safe condition. *Off* de-energizes the setpoint in a fail-safe condition. *NC* makes no change to the setpoint in a fail-safe condition (i.e., if it was energized before the problem was detected it will continue to be energized).

A fail-safe condition remains in effect until the problem has been corrected.

The following are examples of fail-safe conditions:

- ADC (analog-to-digital converter) overrange/underrange condition
- Engineering units overrange
- Communication error with a serial device

## Preact

*Preact* determines the point **before** *Value* is reached at which a setpoint is energized.

*Preact* provides the ability to take into account the time required for the setpoint and associated control equipment to respond.

*Preact* equals the amount of material that will be added to or removed from the vessel after the setpoint is energized. The default is 0.

## Setpoint Example

See Figure 7-2. A vessel with a 9,100 lb capacity has Relay 1 *Value* set at 9,000 lbs gross weight (*Track* is *Grs*). The *Hi/Lo* function is set to *Hi*. This relay controls the closure of a valve to stop material flow into the vessel. However, after the valve closes, the material still in the inclined pipe continues to flow into the vessel. *Preact* is set to 20 lbs to take account of the material in the pipe, so the maximum material weight in the tank will not exceed 9,000 lbs. (Note that the same operational effect can be achieved by setting *Value* to 8,980 lbs and *Preact* to 0 lbs.) *Deadband* is set at 1,000 lbs. When the contents exceed 8,980 lbs (9,000 lbs minus the 20 lb *preact*), the relay energizes, closing the valve to stop material flow into the vessel. The valve remains closed until the relay de-energizes at a material weight of 7,980 lbs (8,980 lbs minus the 1,000 lb deadband).

This vessel has Relay 2 *Value* set at 2,000 lbs gross weight (*Track* is *Grs*). The *Hi/Lo* function is set to *Lo* and the *Deadband* is set at 500 lbs. When the contents falls below 2,000 lbs, the relay energizes, activating a pump to fill the vessel. The pump continues to operate until the relay de-energizes at a material weight of 2,500 lbs (2,000 lbs plus the 500 lb deadband).

## Setting Up the Setpoints

Follow this procedure to set up relay 1. The procedure for the other relay and for the digital outputs is similar.

1. If the SVS 2000 is in Run Mode, press the '3' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
31 SLCT RELAY #1
```

2. Press the Enter Key to access this menu. The display shows:

```
RELAY1 VALUE
```

3. Press the Enter Key to access the *Relay1 Value* Menu. The display looks like this:

```
> 0 lbs
```

(Units are consistent with *Disp Units*.)

4. Use the Numeric or Arrow Keys to input a value where you want the relay to energize. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
RELAY1 VALUE
```

5. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
RELAY1 DEADBAND
```

6. Press the Enter Key to access the *Relay1 Deadband* Menu. The display looks like this:

```
> 10 lbs
```

(Units are consistent with *Disp Units*.)

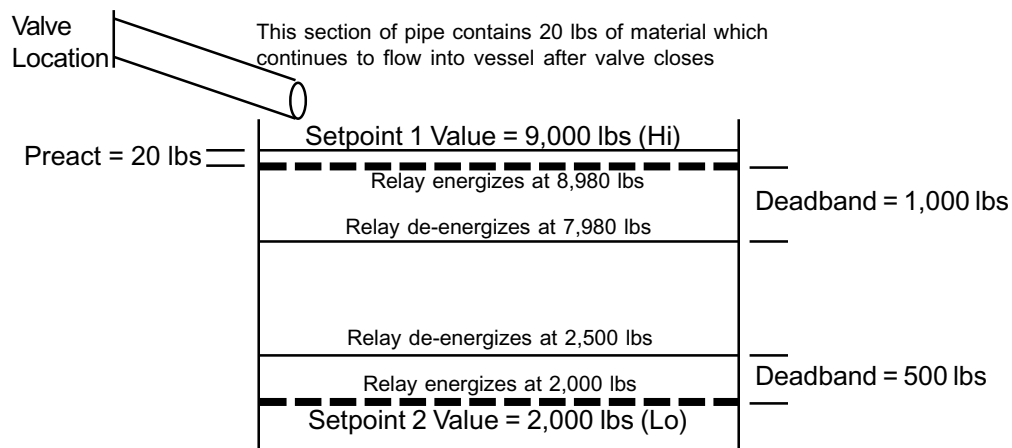


Figure 7-2. Setpoint Example

- Use the Numeric or Arrow Keys to input the deadband. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
RELAY1 DEADBAND
```

- Press the Up Arrow Key to proceed to the next menu. The display shows:

```
RELAY1 HI/LO
```

- Press the Enter Key to access the *Relay1 Hi/Lo* Menu. The display looks like this:

```
RELAY1 ON: *LO
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired selection, press the Up Arrow Key to display the second page of the menu (there are two pages to the *Relay Hi/Lo Menu*).

- When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

```
RELAY1 HI/LO
```

- Press the Up Arrow Key to proceed to the next menu. The display shows:

```
RELAY1 TRACK
```

- Press the Enter Key to access the *Relay1 Track* Menu. The display looks like this:

```
RLY1 TRACK: *GRS
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are four pages to the *Rly1 Track* Menu).

- When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

```
RELAY1 TRACK
```

- Press the Up Arrow Key to proceed to the next menu. The display shows:

```
RELAY1 FAIL-SAFE
```

- Press the Enter Key to access the *Relay1 Fail-Safe* Menu. The display looks like this:

```
FAIL-SAFE: *OFF
```

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are three pages to the *Fail-Safe* Menu).

- When the display shows the desired fail-safe, press the Enter Key. The display acknowledges the selection and returns to:

```
RELAY1 FAIL-SAFE
```

- Press the Up Arrow Key to proceed to the next menu. The display shows:

```
RELAY1 PREACT
```

- Press the Enter Key to access the *Relay1 Preact* Menu. The display looks like this:

```
> 0 lbs
```

(Units are consistent with *Disp Units*.)

- Use the Numeric or Arrow Keys to input the preact. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
RELAY1 PREACT
```

- Press an Arrow Key to scroll to another menu for this setpoint or press the Gross or Net Key to return to Run Mode.

## 39 Digtl (digital) Status

This menu allows you to view the status of each of the digital outputs.

### Note

The status of relays 1 and 2 can be viewed in Run Mode by pressing the Arrow Keys to toggle between gross weight, net weight, total weight, and relay status displays.

Follow this procedure to view the digital output status:

- If the SVS 2000 is in Run Mode, press the '3' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```
39 DIGTL STATUS
```

2. Press the Enter Key to access this menu. The display looks like this:

```
DIG:1*2*3 4 5 6*
```

An asterisk indicates that the digital output is energized. In the example screen shown, digital outputs 1, 2, and 6 are energized.

3. When done viewing the digital output status display, press the Enter Key. The display returns to:

```
39 DIGTL STATUS
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

---

## Setpoint Test

---

This menu allows you to turn the setpoints on and off for test purposes. *Setpoint Test* is at the same level as menus 31 through 39, but does not have a menu number. Follow this procedure to test the setpoints:

### CAUTION

Manually activating setpoints may cause damage if control equipment is connected. Disconnect control equipment before proceeding.

1. If the SVS 2000 is in Run Mode, press the '3' Key, '9' Key, and Enter Key to access the menu tree. The display shows:
 

```
39 DIGTL STATUS
```
2. Press the Up Arrow Key to proceed to the next menu. The display shows:
 

```
SETPOINT TEST
```
3. Press the Enter Key to access this menu. The display shows:
 

```
SELECT RELAY #1
```

If the displayed menu does not have the desired setpoint, press the Up Arrow Key until the display shows the desired setpoint.

4. Press the Enter Key to select the setpoint. The display scrolls this message: *Warning: Test changes setpoint control from auto to manual. Press Enter to continue test.* If you press any key other than the Enter Key, the SVS 2000 returns to the *Setpoint Test* display. If you press the Enter Key, the SVS 2000 proceeds to the testing function. The display looks like one of the following:

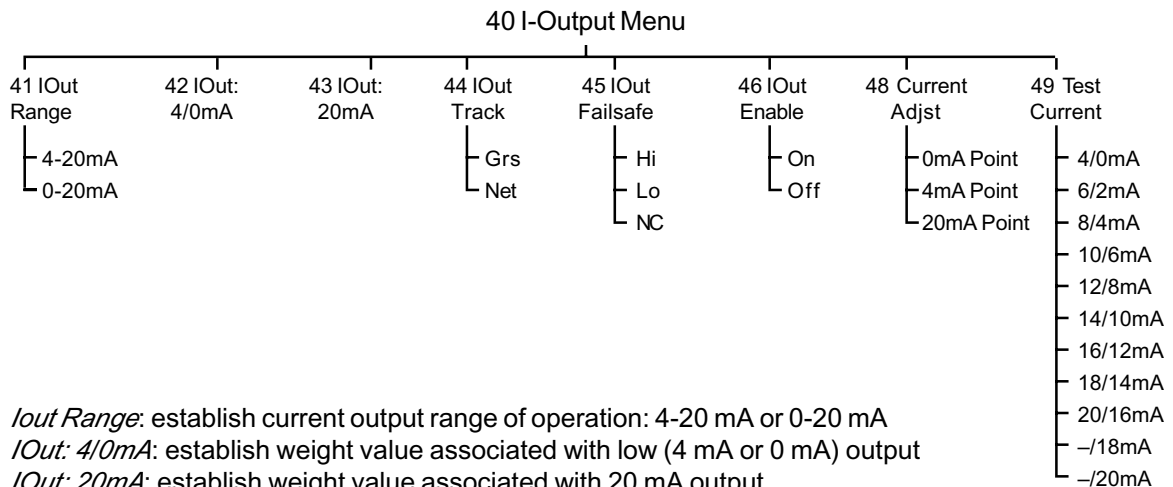
```
RELAY #X: OFF
```

```
DIGITAL #X: OFF
```

5. Press an Arrow Key to toggle the setpoint between *On* and *Off*.
6. To test another setpoint:
  - A. Press the Enter Key to exit the test for this setpoint.
  - B. Press an Arrow Key until the display shows the next desired setpoint.
  - C. Repeat Steps 4 and 5.
7. Press the Gross or Net Key to terminate the test and return to Run Mode. Once the test is terminated, the setpoints return to automatic control.



# Chapter 8. I-Output (current output) Menu [40]



*Iout Range*: establish current output range of operation: 4-20 mA or 0-20 mA

*IOut: 4/0mA*: establish weight value associated with low (4 mA or 0 mA) output

*IOut: 20mA*: establish weight value associated with 20 mA output

*IOut Track*: establish whether current output is based on gross or net weight

*IOut Failsafe*: establish current output operation in fail-safe condition

*IOut Enable*: enable and disable the current output function

*Current Adjst*: calibrate the current output to another device

*Test Current*: manually activate current output for testing

Figure 8-1. I-Output (current output) Menu

## Introduction

The *I-Output* Menu is used to enter parameters for current output, calibrate the current output to the receiving device, and set the current output to specific values for test purposes. This chapter provides explanations of each of the current output parameters and detailed navigation procedures through the menu tree.

Current output is typically used to retransmit continuous weight data to a remote display or PLC/Distributed Control System (DCS). One current output can be assigned to the vessel using the Current Output PCB (optional) with your SVS 2000.

As shown in Figure 8-1, the *I-Output* Menu has eight submenus.

## 41-46 Current Output Setup Parameters

The *Descriptions* section defines each of the parameters. The *Current Output Examples* section provides two examples. The *Setting Up Current Output* section provides the procedure for using the SVS 2000.

### Descriptions

These menus are used to assign values to determine the points where the transmitter outputs the current; designate those values as net or gross weights; define a fail-safe condition for the current output; and enable and disable the current output. There are six current output setup parameters:

#### 41 IOut Range

The current transmitter can be set up to output 4-20 mA or 0-20 mA. This menu is used to select one of the two operating ranges. The default is 4-20 mA.

**42 IOut: 4/0mA**

This menu sets the low current (4 mA or 0 mA) operation point. The value entered determines the weight where the transmitter outputs the minimum current. The '-' Key toggles between positive and negative for the value entered. The default value is 0.

**43 IOut: 20mA**

This menu sets the high current (20 mA) operation point. The value entered determines the weight where the transmitter outputs the maximum current. The '-' Key toggles between positive and negative for the value entered.

*Notes*

1. *IOut: 20mA* was set by the SVS 2000 based on your entries in *Quick Config*. In this menu you can change the value.
2. The value entered for the 4/0 mA operation point can be smaller than **or** larger than the value entered for the 20 mA operation point.

**44 IOut Track**

The current transmitter can be set to interpret the value entered for the low current and high current operation points as gross or net weight. Transmitting current based on gross weight is the default.

**45 IOut Failsafe**

If the SVS 2000 detects a problem, one of three fail-safe conditions can be applied to a current output:

- *Hi*
- *Lo* — default
- *NC* (no change)

*Lo* forces the current output to be 0 (in 0-20 mA range) or 4 mA (in 4-20 mA range) in a fail-safe condition. *Hi* forces the output to be 20 mA in a fail-safe condition. *NC* makes no change to the current output in a fail-safe condition (i.e., what was being transmitted before the problem was detected will continue to be transmitted). A fail-safe condition remains in effect until the problem has been corrected.

The following are examples of fail-safe conditions:

- ADC overrange/underrange condition
- Engineering units overrange
- Communication error with a serial device

**46 IOut Enable**

This menu enables and disables the current transmitter. If you are not using the current transmitter, disabling it increases the processing speed of the SVS 2000. The factory default for *IOut Enable* is *Off*. However, if you enter a value for one or more current output functions (41 through 45), the SVS 2000 automatically changes *IOut Enable* to *On*.

***Current Output Examples***

**Example 1:** You want an early warning via a current output to a PLC/DCS that a 20,000 lb capacity vessel is nearly full or empty. You enter 3,000 lbs as the low current value and 17,000 lbs as the high current value, both as gross values, for a 4-20 mA operation. When the gross weight is 3,000 lbs, 4 mA current is transmitted, providing an early warning that the vessel is close to being empty. When the gross weight is 17,000 lbs, 20 mA is transmitted, providing an early warning that the vessel is close to being full.

**Example 2:** You want to monitor how much material is being added to or removed from a vessel, and transmit a current output to a remote display. You enter -5,000 lbs as the low current value and 7,000 lbs as the high current value, both as net values, for a 0-20 mA operation. When the net weight is -5,000 lbs (5,000 lbs has been removed since you last tared the vessel), 0 mA current is transmitted. When the net weight is +7,000 lbs (7,000 lbs has been added since you last tared the vessel), 20 mA current is transmitted.

***Setting Up Current Output***

Follow this procedure to set up current output:

1. If the SVS 2000 is in Run Mode, press the '4' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

---

41 IOUT RANGE

---

2. Press the Enter Key to access this menu. The display looks like this:

```
RANGE: *4-20mA
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired range, press the Up Arrow Key to display the next page of the menu. The display looks like this:

```
RANGE: 0-20mA
```

3. When the display shows the desired range, press the Enter Key. The display acknowledges the selection and returns to:

```
41 IOUT RANGE
```

4. Press the Up Arrow Key to proceed to the next menu. The display looks like this:

```
42 IOUT: XmA
```

('4' or '0' is in place of 'X,' depending on selection for *IOut Range*.)

5. Press the Enter Key to access the *IOut:4/0mA* Menu. The display looks like this:

```
> 0 lbs
```

(Units are consistent with *Disp Units*.)

6. Use the Numeric or Arrow Keys to input a value for the weight where you want the current transmitter to output 4/0 mA. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
42 IOUT: XmA
```

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
43 IOUT: 20mA
```

8. Press the Enter Key to access the *IOut:20mA* Menu. The display looks like this:

```
> 9999 lbs
```

(Units are consistent with *Disp Units*.)

9. Use the Numeric or Arrow Keys to input a value for the weight where you want the current transmitter to output 20 mA. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
43 IOUT: 20mA
```

10. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
44 IOUT TRACK
```

11. Press the Enter Key to access the *IOut Track* Menu. The display looks like this:

```
IOUT TRACK: *GRS
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. The display looks like this:

```
IOUT TRACK: NET
```

12. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

```
44 IOUT TRACK
```

13. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
45 IOUT FAILSAFE
```

14. Press the Enter Key to access the *IOut Failsafe* Menu. The display looks like this:

```
FAIL-SAFE: *LO
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired fail-safe, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are three pages to the *Fail-Safe* Menu).

15. When the display shows the desired fail-safe, press the Enter Key. The display acknowledges the selection and returns to:

```
45 IOUT FAILSAFE
```

16. The SVS 2000 automatically enabled the current output (46 *IOut Enable*) when you entered values for functions 41 through 45 above. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 48 Current Adjst (adjust)

This menu manually assigns counts-to-milliamps outputs for 0 mA, 4 mA, and 20 mA outputs to calibrate to another device. Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '4' Key, '8' Key, and Enter Key to access the menu tree. The display shows:

```
48 CURRENT ADJUST
```

2. Press the Enter Key to access this menu. The display shows:

```
ADJUST 0mA POINT
```

If the current output range is 4-20 mA, press the Up Arrow Key to display the second page of the menu. The display shows:

```
ADJUST 4mA POINT
```

3. When the display shows the low current output for your application, press the Enter Key. The display looks like this:

```
> 3600 cnts
```

### Note

If you set up 4-20 mA output, the SVS 2000 ignores entries for 0 mA. Similarly, if you set up 0-20 mA output, the SVS 2000 ignores entries for 4 mA.

4. Use the Numeric or Arrow Keys to change the counts assigned to the current output if desired. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
ADJUST XmA POINT
```

('4' or '0' is in place of 'X'.)

5. Press the Up Arrow Key once or twice to proceed to *Adjst 20mA Point*. The display shows:

```
ADJUST 20mA POINT
```

6. Repeat Steps 3 and 4 for the 20 mA current output. After you adjust the 20 mA current output, the display returns to:

```
ADJUST 20mA POINT
```

7. Press the Gross or Net Key to return to Run Mode.

## 49 Test Current

This function allows manual activation of current output outside of normal control. Follow this procedure to test current output:

### CAUTION

Manually activating current output can cause damage if control equipment is connected. Disconnect control equipment before proceeding.

1. If the SVS 2000 is in Run Mode, press the '4' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```
49 TEST CURRENT
```

2. Press the Enter Key to access this menu. The display scrolls this message: *Warning: Test changes output control from auto to manual. Press Enter to continue test.* If you press any key other than the Enter Key, the SVS 2000 returns to the *Test Current* display. If you press the Enter Key, the SVS 2000 proceeds to the testing function. The testing display looks like this:

```
I-OUTPUT: XmA
```

('4' or '0' is in place of 'X,' depending on selection for *IOut Range*.)

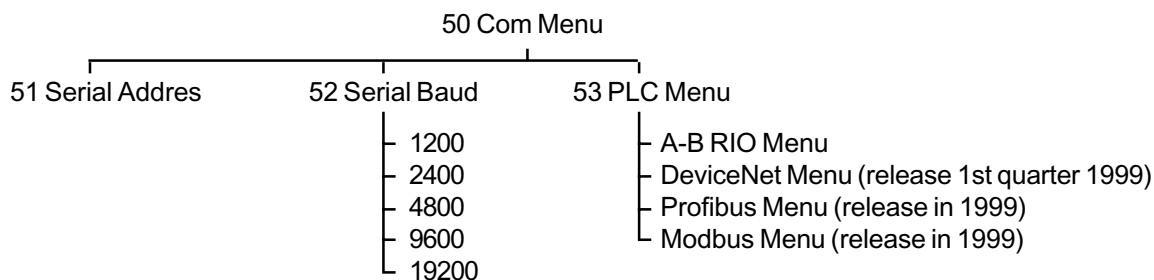
*XmA* is the current transmitted. If the *IOut Range* is 0-20mA, the test current output ranges from 0 mA to 20 mA in 2 mA steps. If the *IOut Range* is 4-20mA, the test current output ranges from 4 mA to 20 mA in 2 mA steps.

3. Press the Up Arrow Key to increase the current output in 2 mA steps. Press the Down Arrow Key to decrease the current output in 2 mA steps.
4. Press the Enter Key to terminate the test. Once the test is terminated, the current output returns to automatic control. The display returns to:

```
49 TEST CURRENT
```

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

# Chapter 9. Com (communications) Menu [50]



*Serial Address:* enter serial address for this device

*Serial Baud:* select baud rate

*PLC Menu:* set up interface for PLC device

Figure 9-1. Com Menu

## Introduction

The *Com* Menu is used to enter parameters for serial port configuration and PLC interface (both are available as options). This chapter provides explanations of each of the parameters.

The *Com* Menu sets up serial communications between the SVS 2000 and external equipment, such as a PLC, K-M MVS, K-M ROPE system, etc. The SVS 2000 is the slave to all external equipment. The SVS 2000 has one COM port for serial communications. Refer to TI-SVS.SER-01 in Appendix E, Technical Drawings, for information on how to serially connect the SVS 2000 to external equipment.

The SVS 2000's built-in serial communications settings are 8 data bits, 1 stop, no parity. These values are fixed, and cannot be modified by the user. The adjustable serial communications settings — address and baud rate — can be modified by the user, as described below under those menu items. When connecting the SVS 2000 to external equipment, all of the serial communications settings must match for the equipment to communicate. As necessary, modify the default settings for address and baud rate of the SVS 2000. Modify the data bits, stop, and parity settings in the external equipment to match the SVS 2000's built-in settings.

As shown in Figure 9-1, the *Com* Menu has three submenus.

## 51 Serial Address (address)

External equipment may have many signal processors daisy chain wired to it. The serial address of the signal processor identifies the signal processor and the associated vessel to the external equipment. Each device on the same serial connection must have a different address. The address of the SVS 2000's serial port is set up in the *Serial Address* Menu. The address is expressed in two forms — decimal (ranging from 0 to 255) and hexadecimal (ranging from 0 to FF). The default setting is 255 in decimal form (FF in hexadecimal form).

Follow this procedure to input the address:

1. If the SVS 2000 is in Run Mode, press the '5' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
51 SERIAL ADDRESS
```

2. Press the Enter Key to access this menu. The display looks like this:

```
>255 DEC FF HEX
```

The display shows two number fields. The first number is the decimal address. The second number is the hexadecimal equivalent. Only the decimal form of the address can be altered by the user; the hexadecimal form changes automatically to correspond to the decimal form.

3. Use the Numeric or Arrow Keys to input the decimal address. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
51 SERIAL ADDRES
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

---

---

## 52 Serial Baud

---

---

The baud rate (bits per second) is set up in the *Serial Baud* Menu. The baud rate determines the speed with which the SVS 2000 communicates with the PLC, MVS, etc. There are five baud rates available:

1200 2400 4800 9600 (default) 19200

Follow this procedure to select the baud rate:

1. If the SVS 2000 is in Run Mode, press the '5' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```
52 SERIAL BAUD
```

2. Press the Enter Key to access this menu. The display looks like this:

```
BAUD RATE: *9600
```

(Asterisk indicates the current selection.)  
If the displayed menu does not have the desired baud rate, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired baud rate (there are five pages to the *Serial Baud* Menu).

3. When the display shows the desired baud rate, press the Enter Key to save the selection in memory. The display acknowledges the selection and returns to:

```
52 SERIAL BAUD
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

---

---

## 53 PLC Menu

---

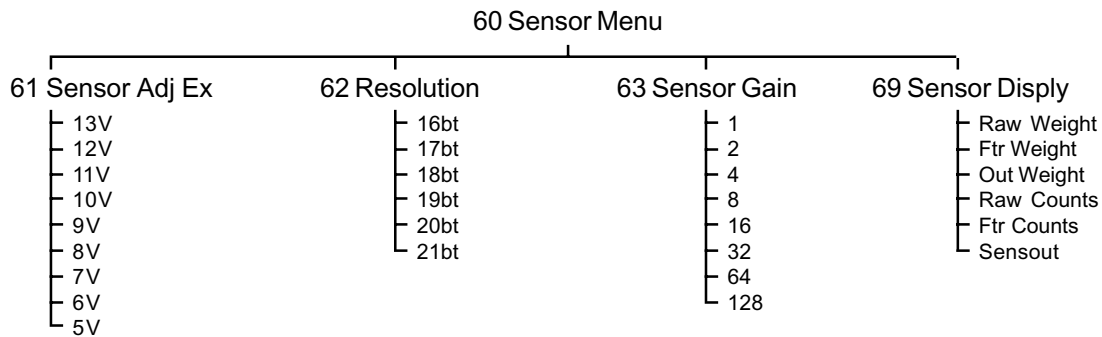
---

The SVS 2000 can provide direct serial communications to the following PLCs through optional PCBs:

- Allen-Bradley PLC — Refer to the *A-B RIO Interface Manual for SVS 2000* for wiring and programming details.
- DeviceNet PLC — (release first quarter 1999) Refer to the *DeviceNet Interface Manual for SVS 2000* for wiring and programming details.
- Profibus PLC — (release in 1999) Refer to the *Profibus Interface Manual for SVS 2000* for wiring and programming details.
- Modbus PLC — (release in 1999) Refer to the *Modbus Interface Manual for SVS 2000* for wiring and programming details.

The SVS 2000 can also provide serial communications to an Allen-Bradley PLC through a K-M KM-RIO or a K-M Multi-Vessel System MVS-RIO. Refer to the *KM-RIO Interface Operator's Manual* or the *MVS-RIO Installation and Operation Manual*, as applicable.

# Chapter 10. Sensor Menu [60]



*Sensor Adj Ex.*: adjust excitation

*Resolution*: establish effective resolution

*Sensor Gain*: adjust sensor gain

*Sensor Disply*: display raw, filtered, and output weight and counts, and voltage

Figure 10-1. Sensor Menu

## Introduction

The *Sensor Menu* is used to adjust the excitation, resolution, and gain, and display raw, filtered, and output values. This chapter provides explanations of each of the sensor parameters and navigation procedures through the menu tree.

As shown in Figure 10-1, the *Sensor Menu* has four submenus.

## 61 Sensor Adj Ex (adjust excitation)

This function is used to adjust the SVS 2000's voltage output, which is used to excite the sensors. The excitation can range from 5 to 13 Volts. The SVS 2000 set the excitation based on your entries in *Quick Config*:

- Direct support products with sensitivity typical of silicon sensors and all K-M bolt-on products — 12 Volts, appropriate for K-M silicon sensors without Intrinsically Safe (IS) Barriers
- Direct support products with sensitivity typical of foil gage sensors — 10 Volts

### Notes

1. If using IS Barriers, it may be necessary to lower the excitation voltage.
2. If using foil gage sensors, refer to the manufacturer's data sheet for recommended excitation.

Follow this procedure to adjust the excitation:

1. If the SVS 2000 is in Run Mode, press the '6' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
61 SENSOR ADJ EX
```

2. Press the Enter Key to access this menu. The display looks like this:

```
EXCITATION: *12V
```

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired excitation, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired excitation (there are nine pages to the *Sensor Adj Ex Menu*).

3. When the display shows the desired excitation, press the Enter Key to save the value in memory. The display acknowledges the selection and returns to:

```
61 SENSOR ADJ EX
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 62 Resolution

This function controls effective resolution by changing the conversion rate of the 21-bit A/D converter. In general, the higher the resolution, the slower the conversion time, but the greater the stability. Table 10-1 shows the effective resolution and associated conversion times. The default is 21 bit.

| Effective Resolution (bits) | Conversion Time (mS) |
|-----------------------------|----------------------|
| 16                          | 17                   |
| 17                          | 20                   |
| 18                          | 25                   |
| 19                          | 34                   |
| 20                          | 50                   |
| 21                          | 100                  |

Table 10-1. Effective Resolution

Follow this procedure to adjust the effective resolution:

1. If the SVS 2000 is in Run Mode, press the '6' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```
62 RESOLUTION
```

2. Press the Enter Key to access this menu. The display looks like this:

```
RESOLUTION: *21bt
```

(Asterisk indicates the current selection.) If the displayed menu does not have the desired resolution, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired resolution (there are six pages to the *Resolution* Menu).

3. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

```
62 RESOLUTION
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 63 Sensor Gain

Adjusting the gain increases or decreases system sensitivity. The type of sensors connected to the SVS 2000 determines the required gain. For example, for a nominal excitation output of 12 volts, the reference voltage is one quarter of the excitation voltage, or 3 volts. At a gain of 1, the A/D converter spreads 2,097,152 counts over a range of  $\pm 3$  volts. A gain of 2 spreads the counts over a range of  $\pm 1.5$  volts, doubling the sensitivity. A gain of 4 spreads the counts over a range of  $\pm 0.75$  volts, doubling the sensitivity again, etc.

The SVS 2000 set the gain based on your entries in *Quick Config*:

- K-M bolt-on sensors (Microcells and L-Cells) — 2
- Direct support products with sensitivity typical of silicon sensors (K-M Load Disc II, Load Stand II, and Load Link I and II) — 4
- Direct support products with sensitivity typical of foil gage sensors — 16 or 32

Table 10-2 shows the available gain settings and corresponding sensor input voltages.

| Sensor Gain | Sensor Input Voltage |
|-------------|----------------------|
| 1           | $\pm 3.0$            |
| 2           | $\pm 1.5$            |
| 4           | $\pm 0.75$           |
| 8           | $\pm 0.375$          |
| 16          | $\pm 0.1875$         |
| 32          | $\pm 0.09375$        |
| 64          | $\pm 0.046875$       |
| 128         | $\pm 0.0234375$      |

Table 10-2. Sensor Gain at 12 V Excitation

Follow this procedure to adjust the gain:

1. If the SVS 2000 is in Run Mode, press the '6' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

```
63 SENSOR GAIN
```

2. Press the Enter Key to access this menu. The display looks like this:

```
ADC GAIN: *2
```

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired gain, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired gain (there are eight pages to the *ADC Gain* Menu).

3. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

```
63 SENSOR GAIN
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 69 Sensor Disply (display)

This function allows you to display the raw and filtered A/D counts; raw, filtered, and output weight; and voltage. Figure 10-2 illustrates the relationship between raw, filtered, and output values.

Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '6' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```
69 SENSOR DISPLY
```

2. Press the Enter Key to access this menu. The display looks like this:

```
RAW 12345600 lbs
```

Press the Up Arrow Key to toggle to the other pages of the display, which look like this:

```
FTR 12345600 lbs
```

```
OUT 12345600 lbs
```

```
RAW 1234567 Cts
```

```
FTR 1234567 Cts
```

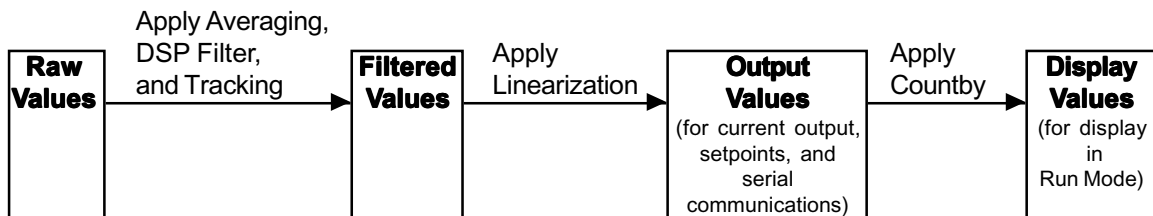
```
SENSOUT -123 mV
```

(Units are consistent with *Disp Units*.)

3. Press the Enter Key to return to:

```
69 SENSOR DISPLY
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.



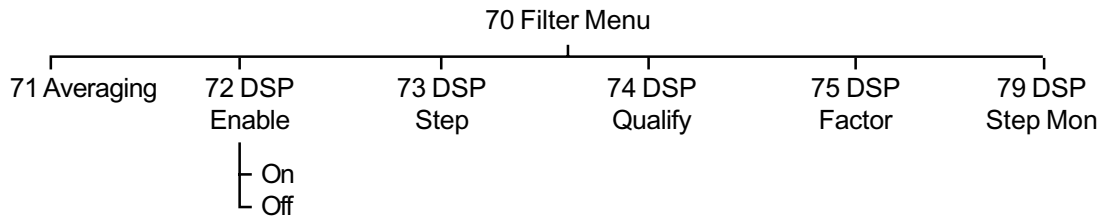
Notes:

- Averaging and DSP Filter — see Chapter 11, Filter Menu
- Tracking — see Chapter 12, Tracking Menu
- Linearization — see Chapter 6, Cal Menu
- County — see Chapter 5, Display Menu

Figure 10-2. Raw, Filtered, Output, and Display Values



# Chapter 11. Filter Menu [70]



*Averaging*: set number of readings to average  
*DSP Enable*: turn DSP Filter on and off  
*DSP Step*: adjust DSP Filter window  
*DSP Qualify*: adjust number of triggering signals for DSP Filter  
*DSP Factor*: adjust magnitude of change for DSP Filter  
*DSP Step Mon*: display the maximum variation in the filtered weight

Figure 11-1. Filter Menu

## Introduction

The *FilterMenu* is used to set up the SVS 2000's filters — Averaging and the DSP Filter. Additionally, the *FilterMenu* allows you to monitor the DSP Filter. This chapter provides explanations of each of the filtering functions and navigation procedures through the menu tree.

As shown in Figure 11-1, the *FilterMenu* has six submenus.

## 71 Averaging

This menu is used to set the number of individual readings (from 1 to 255) the SVS 2000 averages for each display reading while in Run Mode. The SVS 2000 calculates a running average. The larger the number of individual readings in the running average, the smaller effect a variation in signal will have on the average. This results in fewer variations on the display reading and an easier to read display. *Averaging* affects the value seen on the display as well as setpoints, current outputs, and serial outputs. The default value for *Averaging* is 1.

Follow this procedure to set the *Averaging* value:

1. If the SVS 2000 is in Run Mode, press the '7' Key, '1' Key, and Enter Key to access the menu tree. The display shows:
 

```

 71 AVERAGING

```
2. Press the Enter Key to access this menu. The display looks like this:
 

```

 > 1

```
3. Use the Numeric or Arrow Keys to enter the desired value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:
 

```

 71 AVERAGING

```
4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

## 72-75 DSP Filter Parameters

### Descriptions

Vibrations in a vessel can cause changes in the SVS 2000's weight display and outputs, even though no material is moved, because the vibrations affect the vessel's structural response. The **Sentry™** DSP filter helps to reduce display and output changes that can result from vibration. The principle behind the filtering follows.

The ADC converter digitizes the signal coming from a sensor and the SVS 2000 converts the signal to a 'raw' weight. The SVS 2000 picks the first raw weight as a reference median; this is the value that is used in calculating the filtered weight. As shown in Figure 11-2, the SVS 2000 then compares following raw weights to the reference median, and recalculates the reference median when either of the following happen:

- the number of successive weights above or below the median exceeds a triggering number
- a weight falls outside of a user-defined window around the reference median

When the SVS 2000 recalculates the reference median, the filtered weight changes to correspond to the new reference median. Note that the DSP Filter affects setpoints, current output, and serial output as well as the weight shown on the display.

The DSP Filter has four parameters:

### 72 DSP Enable

DSP Enable turns the DSP filter function on and off. The default is *On*.

### 73 DSP Step

*DSP Step* is a window of equal weight above and below the reference median. As shown in Figure 11-2, example 1, if a large signal change is detected that falls outside of the window, the SVS 2000 immediately moves the location of the reference median to that point. This allows the SVS 2000 to adjust quickly to rapid material movement in the vessel.

The default is calculated by the SVS 2000 based on a default step of 10,000 counts and the calibration parameters. Note that the SVS 2000 recalculates *DSP Step* if the system is recalibrated.

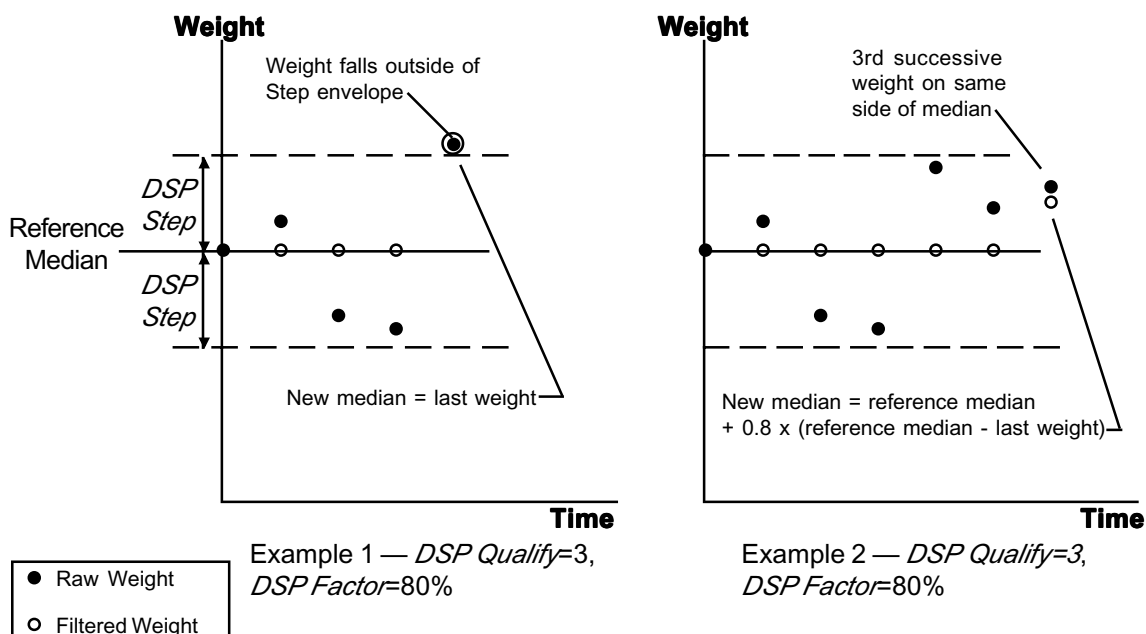


Figure 11-2. DSP Filter Function Examples

## 74 DSP Qualify

*DSP Qualify* is the triggering number of successive weights above or below the median signal value, but within the *DSP Step* window. In example 2 shown in Figure 11-2, *DSP Qualify* is 3. When the third successive signal above the median value (but within the *DSP Step* window) is detected, the SVS 2000 moves the location of the median value to that point (or a percentage of the distance from the old median as determined by *DSP Factor*). This allows the SVS 2000 to respond to definite trends in weight changes. The default for *DSP Qualify* is 3.

## 75 DSP Factor

*DSP Factor* determines the magnitude of change from the old reference median to the new reference median, for change triggered by the *DSP Qualify* parameter. In example 2 in Figure 11-2, the SVS 2000 moves the reference median 80% of the distance from the old median to the last weight (which triggered the change), based on a *DSP Factor* of 80%. A value of 100% sets the new median to the last weight value; a value of 50% sets the new median halfway between the old median and the last weight value. Note that *DSP Factor* does not affect the change caused by a signal falling outside of the *DSP Step* window, as shown in example 1 in Figure 11-2. The default for *DSP Factor* is 100%.

## Setting Up the DSP Filter

Follow this procedure to set up the DSP Filter:

1. If the SVS 2000 is in Run Mode, press the '7' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```

72 DSP ENABLE

```

2. Press the Enter Key to access this menu. The display looks like this:

```

DSP FILTER *ON

```

(Asterisk indicates the current selection.)  
If the displayed menu does not show *DSP Filter On*, press the Up Arrow Key to display the next page of the menu.

3. When the display shows *DSP Filter On*, press the Enter Key. The display acknowledges the selection and returns to:

```

72 DSP ENABLE

```

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

73 DSP STEP

```

5. Press the Enter Key to access the *DSP Step* Menu. The display looks like this:

```

> 400 lbs

```

(Units are consistent with *Disp Units*.)

6. Use the Numeric or Arrow Keys to input a value for *DSP Step*. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

73 DSP STEP

```

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

74 DSP QUALIFY

```

8. Press the Enter Key to access the *DSP Qualify* Menu. The display looks like this:

```

> 3

```

9. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

74 DSP QUALIFY

```

10. Press the Up Arrow Key to proceed to the next menu. The display shows:

```

75 DSP FACTOR

```

11. Press the Enter Key to access the *DSP Factor* Menu. The display looks like this:

```

> 100 %

```

12. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```

75 DSP FACTOR

```

13. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

---

## 79 DSP Step Mon (monitor)

---

*DSP Step Mon* monitors the maximum variation in the raw weight while you are in the function. Follow this procedure to view this display:

1. If the SVS 2000 is in Run Mode, press the '7' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```

79 DSP STEP MON
```

2. Press the Enter Key to access this menu. The display looks like this:

```

> 0 lbs
```

(Units are consistent with *Disp Units*.)  
The number on the display is the maximum difference in the raw weight since the last reset of the monitor.

3. To reset the monitor to zero while remaining in the *DSP Step Mon*, press the Zero Key. The display acknowledges the entry and shows:

```

> 0 lbs
```

(Units are consistent with *Disp Units*.)

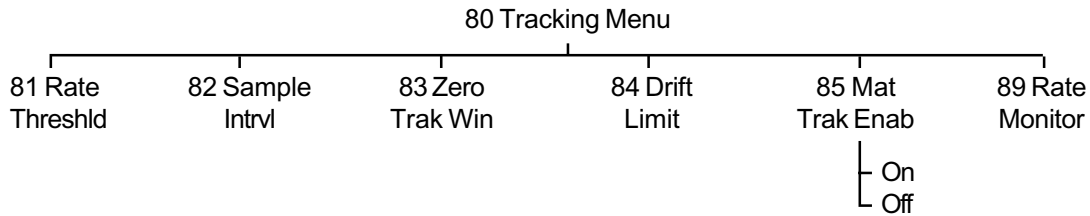
4. Press the Enter Key to exit the monitor and return to:

```

79 DSP STEP MON
```

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

# Chapter 12. Tracking Menu [80]



*Rate Threshld:* set threshold for rate of change in weight for zero and material tracking  
*Sample Intrvl:* set the time between calculations of rate of change for zero and material tracking  
*Zero Trak Win:* adjust zero tracking window and turn zero tracking on and off  
*Drift Limit:* set maximum offset for material tracking  
*Mat Trak Enable:* turn material tracking on and off  
*Rate Monitor:* display the rate of change in weight

Figure 12-1. Tracking Menu

## Introduction

The *Tracking* Menu is used to set up and monitor the SVS 2000's zero tracking and material tracking functions. This chapter provides explanations of each of the tracking parameters and navigation procedures through the menu tree.

As shown in Figure 12-1, the *Tracking* Menu has six submenus.

## 81-85 Tracking Parameters

### Descriptions

Tracking provides the ability to reject sensor drift and other related long-term errors while preserving the displayed and output weight's stability and accuracy. Discrimination between material movement and sensor drift is accomplished by calculating the rate of change of the sensor input signal, and comparing this rate to a user-defined threshold rate. The SVS 2000 stops tracking when the rate of change exceeds the threshold rate, indicating that material is actually moving. Additionally, discrimination between slow material loss (such as from a leak in the vessel) or gain and sensor drift is accomplished by comparing the total drift to a user-defined limit. The SVS 2000 limits the maximum correction to this user-defined limit, so the tracking function does not

mask real material losses or gains. There are two aspects to the tracking function. See Figure 12-2:

- **Zero tracking** establishes a user-defined window around the zero live load. When the raw weight falls inside of the window (usually indicating a negligible amount of material in the vessel) and the rate of change is below the threshold rate, the corrected weight remains constant at zero. The correction is done by the algebraic addition of a correction offset value. If the raw weight falls outside the window on the negative side, the SVS 2000 resets the zero calibration point to that raw weight and sets the window around the new zero calibration point.
- **Material tracking** establishes a reference when material movement within a vessel has become stable (rate of change is below the threshold) during filling and batching processes. This reference is then used to maintain and hold steady the outputs. When the change in raw weight falls within the drift limit, the corrected weight remains constant. The correction is done by the algebraic addition of a correction offset value. If the accumulated drift exceeds the drift limit threshold, the SVS 2000 begins tracking the material movement, which may be caused by a slow leak in the vessel.

Zero and material tracking affect setpoints, current output, and serial output as well as the vessel monitoring display.

Tracking can be used in any of the following combinations:

- No zero or material tracking
- Zero tracking only
- Material tracking only
- Zero tracking and material tracking

There are five submenus for setting *Tracking* parameters:

### 81 Rate Threshold (threshold)

This function sets the threshold rate for both zero and material tracking. The rate is expressed in *Disp Units/minute* (for example, lbs/m). When the rate of change exceeds this value, indicating that material is actually moving, the SVS 2000 stops tracking until the rate of change again falls below this value. The default rate is calculated by the SVS 2000 based on a voltage rate threshold of  $\pm 10 \mu\text{V}/\text{sec}$  and the initial calibration parameters.

### 82 Sample Intrvl (interval)

This function sets the amount of time between calculations of the sensor input signal rate of change for both zero and material tracking. The default is 10 seconds.

### 83 Zero Trak Win (zero tracking window)

This function sets the maximum plus or minus offset value for zero tracking. *Zero Trak Win* is expressed in *Disp Units* (for example, lbs). If the minus offset value is exceeded, the SVS 2000 resets the zero calibration point. The default value is 0 — at this value, zero tracking is turned off.

*Note*

The SVS 2000 recalculates *Zero Trak Win* if the system is recalibrated (if *Zero Trak Win* has a non-zero value).

### 84 Drift Limit

This function sets the maximum plus or minus offset value for material tracking. The drift limit is expressed in *Disp Units* (for example, lbs). The default is calculated by the SVS 2000 based on a voltage limit of  $\pm 5 \text{ mV}$  and the initial calibration parameters.

### 85 Mat Trak Enab (material tracking enable)

This function turns material tracking on and off. The default is *Off*.

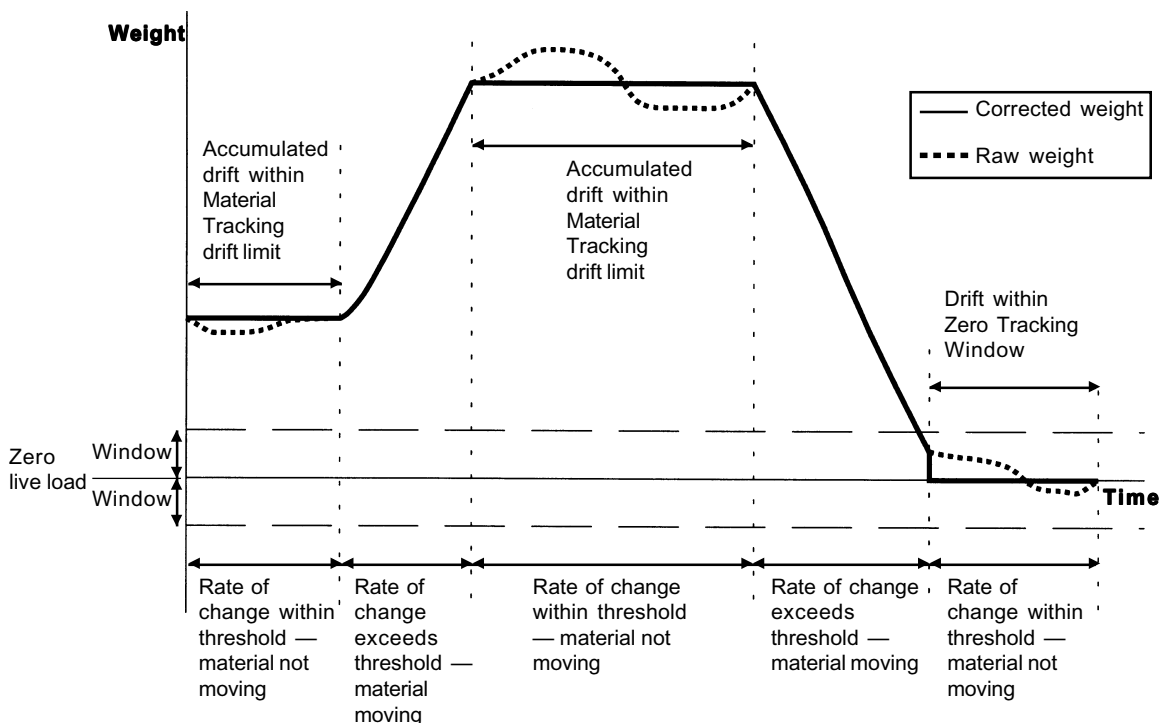


Figure 12-2. Material and Zero Tracking Example

## Setting Up Tracking

Follow this procedure to set up zero and material tracking:

1. If the SVS 2000 is in Run Mode, press the '8' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
81 RATE THRESHLD
```

2. Press the Enter Key to access this menu. The display looks like this:

```
> 18.0 lbs/m
```

(Units are consistent with *Disp Units*.)

3. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
81 RATE THRESHLD
```

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
82 SAMPLE INTRVL
```

5. Press the Enter Key to access the *Sample Intrvl* Menu. The display shows:

```
> 10 sec
```

6. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
82 SAMPLE INTRVL
```

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
83 ZERO TRAK WIN
```

8. Press the Enter Key to access the *Zero Trak Win* Menu. The display looks like this:

```
> 0 lbs
```

(Units are consistent with *Disp Units*.)

9. Use the Numeric or Arrow Keys to input a value for *Zero Trak Win*. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
83 ZERO TRAK WIN
```

10. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
84 DRIFT LIMIT
```

11. Press the Enter Key to access the *Drift Limit* Menu. The display looks like this:

```
> 140.0 lbs
```

(Units are consistent with *Disp Units*.)

12. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
84 DRIFT LIMIT
```

13. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
85 MAT TRAK ENAB
```

14. Press the Enter Key to access the *Mat Trak Enab* Menu. The display looks like this:

```
MATRL TRACK: *OFF
```

(Asterisk indicates the current selection.)

If the displayed menu does not show *Matrl Track: On*, press the Up Arrow Key to display the next page of the menu:

```
MATRL TRACK: ON
```

15. When the display shows *Matrl Track: On*, press the Enter Key. The display acknowledges the selection and returns to:

```
85 MAT TRAK ENAB
```

16. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

---



---

## Rate Monitor [89]

---



---

This is a monitor only function. It displays the rate of change in the weight. Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '8' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```
89 RATE MONITOR
```

2. Press the Enter Key to access this menu. The display looks like this:

```
. 2.0 lbs/m
```

(Units are consistent with *Disp Units*.)

If the rate of change is greater than *Rate Threshld*, the bullet is replaced by a rotating line.

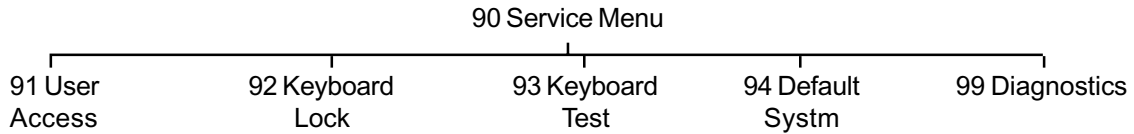
3. Press the Enter Key to exit the monitor and return to:

```
89 RATE MONITOR
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.



# Chapter 13. Service Menu [90]



*User Access:* set up or change the User Access Code  
*Keyboard Lock:* set up or change the Keyboard Lock Code  
*Keyboard Test:* test the keyboard  
*Default System:* reset all system parameters to default values  
*Diagnostics:* test the nonvolatile RAM

Figure 13-1. Service Menu

## Introduction

The *Service Menu* is used to set up a user-defined access code and user-defined keyboard lockout code, test the keyboard, test the nonvolatile RAM (NVRAM), and reset the NVRAM to default parameters. This chapter provides explanations of each of the service parameters and navigation procedures through the menu tree.

As shown in Figure 13-1, the *Service Menu* has five submenus.

## 91 User Access

The SVS 2000 arrives from the factory without a user-defined access code in place, allowing the operator to change any parameters in the system at will. The *User Access* function allows you to set up and/or change a User Access Code.

Once a Code is in place and activated, the operator(s) will be able to go into the menu tree to view parameters, but will not be able to change parameters. If the operator attempts to change a parameter, the SVS 2000 prompts the operator to enter the User Access Code. Once the Code is entered, the operator can change any parameter while remaining in the Function Mode (i.e., the Code is entered once per Function Mode session, regardless of the number of parameters changed).

### Note

Record the Code and store it in a safe place. If misplaced, call K-M for instructions on how to bypass the Code.

## Initial Setup of User Access Code

Follow this procedure to set up the User Access Code for the first time:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

```
91 USER ACCESS
```

2. Press the Enter Key to access this menu. The display shows:

```
NEW CODE? 0000
```

3. Use the Numeric Keys to enter a one-, two-, three-, or four-digit number. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

```
91 USER ACCESS
```

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

### Note

The Access Code is 'activated' 3 minutes after you leave Function Mode. If you return to Function Mode after 3 minutes, you will be prompted to enter the code if you attempt to change a parameter. The **tare key continues to function** without an Access Code.

## Change User Access Code

Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

91 USER ACCESS

2. Press the Enter Key to access this menu. The display shows:

USER CODE?

3. Use the Numeric Keys to enter the current User Access Code. The number displays as 'XXXX' to prevent anyone else from seeing the Code. Press the Enter Key. The display acknowledges the entry and proceeds to:

NEW CODE?

4. Use the Numeric Keys to enter a one-, two-, three-, or four-digit number for the new Code. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

91 USER ACCESS

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

### Note

The Access Code is 'activated' 3 minutes after you leave Function Mode. If you return to Function Mode after 3 minutes, you will be prompted to enter the code if you attempt to change a parameter.

---

---

## 92 Keyboard Lock

---

---

The SVS 2000 arrives from the factory without a Keyboard Lock Code in place, allowing the operator to tare the system, zero the calibration, zero the totalizer, change the Run Mode display, and go into the menu tree at will. The *Keyboard Lock* function allows you to set up and/or change a Keyboard Lock Code.

The Code operates with a 3-minute timer. After 3 minutes has elapsed since the last time a key was pressed in Run Mode, the Keyboard Lock activates. **Once a Code is in place and activated, the SVS 2000 will not respond to the pressing of any keys on the keypad while in Run Mode until the Code is entered.**

### Note

Record the Code and store it in a safe place. If misplaced, call K-M for instructions on how to bypass the Code.

## Setup/Change Keyboard Lock Code

Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

92 KEYBOARD LOCK

2. Press the Enter Key to access this menu. The display shows:

NEW CODE?

3. Use the Numeric Keys to enter a one-, two-, three-, or four-digit number. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

92 KEYBOARD LOCK

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

### Note

The Keyboard Lock Code is 'activated' in Run Mode, 3 minutes after the last key press. After 3 minutes, the SVS 2000 will not respond to the pressing of any keys until the Code is entered.

## Unlocking Keyboard with Keyboard Lock Code

Follow this procedure:

1. While the SVS 2000 is in lockout in the Run Mode, press any key. The display shows:
 

```

KEY CODE?

```
2. Enter the Keyboard Lock Code. When the Code has been completely entered, press the Enter Key. The display briefly shows:
 

```

KEYS UNLOCKED

```
3. The display then returns to the Run Mode display screen.

## 93 Keyboard Test

This function displays the last key that was pressed, to test for proper keyboard functioning. Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '3' Key, and Enter Key to access the menu tree. The display shows:
 

```

93 KEYBOARD TEST

```
  2. Press the Enter Key to access this menu. The display shows:
 

```

KEY : ENTER

```
  3. To test the keypad, press any key except for the Gross or Net Key. For example, if you press the Tare Key, the display shows:
 

```

KEY : TARE

```
- Note*
- If you press the Gross or Net Key while in the *Keyboard Test* function, the display briefly shows *Key:Gross* or *Key:Net* and then returns to Run Mode.
4. Repeat Step 3 as desired to test all the keys.
  5. When the test is complete, press the Gross or Net Key to return to Run Mode.

## 94 Default System (system)

This function defaults the non-volatile RAM (NVRAM) on the Microprocessor/Display PCB. This resets **all** parameters to the factory-set default values (i.e., calibration parameters, setpoint parameters, display parameters, etc.). The SVS 2000 requests verification before it defaults the NVRAM, to prevent accidental reset. Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '4' Key, and Enter Key to access the menu tree. The display shows:
 

```

94 DEFAULT SYSTEM

```
2. Press the Enter Key to access this menu. The display shows:
 

```

DEFAULT NVRAM?

```
3. Respond to the verification request:
  - To prevent the SVS 2000 from continuing with the default, press the Gross or Net Key to exit this function and return to the Run Mode.
  - To continue with the default, press the Enter Key. The display shows:
 

```

ARE YOU SURE?

```
4. Respond to the second verification request:
  - To prevent the SVS 2000 from continuing with the default, press the Gross or Net Key to exit this function and return to Run Mode.
  - To continue with the default, press the Enter Key. The SVS 2000 resets all parameters to default values. The display acknowledges the entry and the SVS 2000 starts the *Quick Config* procedure. Refer to Chapter 3, *Quick Config*, for details.

## 99 Diagnostics

---

This function performs an internal, nondestructive test on the NVRAM on the Microprocessor/Display PCB. This test does not reset any parameters. Follow this procedure:

1. If the SVS 2000 is in Run Mode, press the '9' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

```

99 DIAGNOSTICS

```

2. Press the Enter Key to access this menu. Upon completion of the test, the display should briefly show:

```

DIAGNOSTC PASSED

```

If it does not, contact K-M.  
The display then returns to:

```

99 DIAGNOSTICS

```

4. Press the Gross or Net Key to return to Run Mode.

# Appendix A. Product Specifications

## Integral Display and Operator Interface

**Display.** Backlit alphanumeric liquid crystal; one line of 16 characters; selectable bar graph or engineering units format

**Data Entry.** Integral 19-key alphanumeric sealed membrane tactile keypad

**Setup.** Menu-driven prompts

**Memory.** NVRAM (non-volatile RAM)

## Transducer/Sensor Input

**Transducers/Sensors.** All Kistler-Morse half-bridge sensors; full-bridge foil gage

**Excitation.** Programmable between 5 and 13 volts at 250 mA

**Resolution.** Selectable 16 bit (1 part in 65,536) to 21 bit (1 part in 2,097,152) in 1-bit increments

**Conversion Speed.** 16 bit—17 mSec (60 Hz), 19 bit—33 mSec (30 Hz), 20 bit—50 mSec (20 Hz), 21 bit—100 mSec (10 Hz)

**(Update Speed).** 16 bit—60 updates/sec, 19 bit—30 updates/sec, 20 bit—20 updates/sec, 21 bit—10 updates/sec

**Span.** Programmable between  $\pm 3.0V$  at 12 V excitation, Gain = 1;  $\pm 19.5$  mV at 10V Excitation, Gain = 128

**Temperature Stability.** Zero 1 ppm/ $^{\circ}C$ ; Span 5 ppm/ $^{\circ}C$

**Common Mode Rejection.** 92 db min at DC; 150 db min at 60 Hz

**Normal Mode Rejection.** 100 db min at 60 Hz

## Inputs/Outputs/Communications

### Standard.

Remote Tare Input

Relay Output: 2 relay outputs; Form 'C' SPDT, programmable, 10 A 110 VAC, 8 A 230 VAC non-inductive; for motors and other large inductive loads, contactors rated for the load are required

Digital Output: 6 TTL level outputs — sink 25 mA, source 300 uA at 5V

### Optional PCBs.

Serial RS-422 or RS-485: optical isolated; baud rate 1200, 2400, 4800, 9600, or 19,200

PLC Interface:

Allen-Bradley™ Remote I/O

DeviceNet®

Analog Output: 0-20 or 4-20 mA, 14 bit resolution, 500 VAC isolation, maximum load 600 ohms with internal loop supply

## Electrical

**AC Power.** 115 VAC  $\pm 10\%$  50/60 Hz; 230 VAC  $\pm 10\%$  50/60 Hz 30 VA

## Environmental

**Operating Temperature.**  $-4^{\circ}$  to  $122^{\circ}$  F ( $-20^{\circ}$  to  $50^{\circ}$  C)

**Enclosures.** Designed to meet NEMA 4X; ABS or UL Approved, Type 304L Stainless Steel

**Humidity.** 1% to 95% (non-condensing)

**Storage.**  $-4^{\circ}$  to  $140^{\circ}$  F ( $-20^{\circ}$  to  $60^{\circ}$  C)

## Physical

### Overall Dimensions.

**ABS:** 6.375" H x 11" W x 5.68" D (16.2cm x 27.9cm x 14.4cm)

**Weight.** 6 lbs (2.6kg)

**Stainless Steel:** 7.87" H x 9.84" W x 5.91" D (20cm x 25cm x 15cm) **Weight:** 11.3 lbs (5.1 kg)

*(Stainless Steel enclosure dimensions on Appendix E-9.)*



# Appendix B. Serial Commands

## Introduction

This appendix contains the serial commands and protocol syntax used for serial communications between the host or Master (ROPE, PC, MVS, etc.) and the SVS 2000. Detailed explanations and examples of the commands are included.

## Command Table

| Command |       | Function                          | Transmitted by<br>Master to<br>SVS 2000 | Received by<br>Master from<br>SVS 2000 |
|---------|-------|-----------------------------------|-----------------------------------------|----------------------------------------|
| Hex     | ASCII |                                   |                                         |                                        |
| 23      | #     | K-M product identification number | >aa#ssr                                 | Addssr<br>(A4064r for<br>SVS 2000)     |
| 57      | W     | Request engineering units (gross) | >aaWssr                                 | A±dddddddssr                           |
| 42      | B     | Request engineering units (net)   | >aaBssr                                 | A±dddddddssr                           |
| 54      | T     | Tare vessel                       | >aaTssr                                 | Ar                                     |
| 75,31   | u1    | Request raw counts                | >aaU1ssr                                | Addddddssr                             |

*Note:* See Table B-2 for definitions of the characters in the command strings.

Table B-1. Serial Commands

| Character | Definition                                                                                                                                                                                                                                                                                                                                       |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| >         | Start of message character                                                                                                                                                                                                                                                                                                                       |
| aa        | Two-digit ASCII HEX character address of channel                                                                                                                                                                                                                                                                                                 |
| d         | One-digit ASCII decimal number data                                                                                                                                                                                                                                                                                                              |
| dd        | Two-digit ASCII decimal number data                                                                                                                                                                                                                                                                                                              |
| dd..      | Two-digit or more ASCII decimal number data                                                                                                                                                                                                                                                                                                      |
| dd.dd     | Multiple ASCII decimal numbers                                                                                                                                                                                                                                                                                                                   |
| hh        | Two-digit ASCII HEX number, upper nibble, lower nibble                                                                                                                                                                                                                                                                                           |
| hh..hh    | Multiple two-digit ASCII HEX numbers                                                                                                                                                                                                                                                                                                             |
| ss        | Two-digit ASCII HEX checksum of characters added between '>' or 'A' and checksum characters. See <i>Checksum Calculation</i> in this chapter for an explanation of how checksum is calculated. 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)                                                                                                                                                                                                                                                                                                                 |
| ±         | Normally indicates polarity. If an error is present, an 'X' displays with an error code (ASCII character) immediately following. Possible error codes and definitions are listed below: <ul style="list-style-type: none"> <li>1 — Unit disabled</li> <li>6 — ADC overrange error</li> <li>7 — Net or gross engineering unit overflow</li> </ul> |

*Table B-2. Definitions of Characters in Command Strings*

---

## Checksum Calculation

---

The one-byte checksum is calculated by adding the Hex values of all ASCII characters between the start of message character '>' or acknowledge character 'A' and the checksum character 'ss.' Overflows from the addition are ignored.

### Example:

#### *Request*

To request gross engineering units (such as weight) from a SVS 2000, the command is:

```
>aaWssr
```

If the SVS 2000's address is '3', the command is:

```
>03Wssr
```

Calculating the checksum 'ss' as the sum of the Hex values of all characters between '>' and 'ss':

```
03W ASCII = 30 Hex + 33 Hex + 57 hex = BA Hex
 '0' '3' 'W'
```

Therefore, the ASCII string transmitted to the SVS 2000 is:

```
> 0 3 W B A CR
3E 30 33 57 42 41 0D Hex
```

#### *Response*

The response to a request for gross engineering units is:

```
A±dddddddssr
```

If the weight is +6384, the response is:

```
A+0006384ssr
```

Calculating the checksum 'ss' as the sum of the Hex values of all characters between 'A' and 'ss':

```
+0006384 ASCII = 2B Hex+30 Hex+30 Hex+30 Hex+36 Hex+33 Hex+38 Hex+34 Hex = 190 Hex
 '+' '0' '0' '0' '6' '3' '8' '4'
```

Ignoring the overflow, the checksum is 90 Hex. Therefore, the ASCII string transmitted back to the master is:

```
A + 0 0 0 6 3 8 4 9 0 CR
41 2B 30 30 30 36 33 38 34 39 30 0D Hex
```

---



---

## Examples

---



---

For each command below, the general format of the command is shown above the example.

### ***'#' Command — K-M Product Identification Number***

This command is sent by the master to request the SVS 2000 to send its K-M product identification code (code is 40 for the SVS 2000). For this example, the master requests the code from an SVS 2000 at address 01, which returns a code of 40 and a checksum of 64.

| <b>Request from Master</b> | <b>Response from SVS 2000</b> |                |
|----------------------------|-------------------------------|----------------|
| >aa#ssr                    | Addssr                        | <i>Format</i>  |
| >01#84r                    | A4064r                        | <i>Example</i> |

### ***'W' Command — Engineering Units (gross)***

This command is sent by the master to request the SVS 2000 to send the gross engineering units (weight, level, etc.). For this example, the master requests the gross weight from an SVS 2000 at address 01, which returns a gross weight of +7103 and a checksum of 86.

| <b>Request from Master</b> | <b>Response from SVS 2000</b> |                |
|----------------------------|-------------------------------|----------------|
| >aaWssr                    | A±dddddddssr                  | <i>Format</i>  |
| >01WB8r                    | A+000710386r                  | <i>Example</i> |

### ***'B' Command — Engineering Units (net)***

This command is sent by the master to request the SVS 2000 to send the net engineering units (weight, level, etc.). For this example, the master requests the net weight from an SVS 2000 at address 01, which returns a net weight of -4466 and a checksum of 91.

| <b>Request from Master</b> | <b>Response from SVS 2000</b> |                |
|----------------------------|-------------------------------|----------------|
| >aaBssr                    | A±dddddddssr                  | <i>Format</i>  |
| >01BA3r                    | A-000446691r                  | <i>Example</i> |

### ***'T' Command — Tare Addressed Vessel***

This command is sent by the master to request the SVS 2000 to tare the vessel. For this example, the master requests the tare for an SVS 2000 at address 01.

| <b>Request from Master</b> | <b>Response from SVS 2000</b> |                |
|----------------------------|-------------------------------|----------------|
| >aaTssr                    | Ar                            | <i>Format</i>  |
| >01TB5r                    | Ar                            | <i>Example</i> |

### ***'u1' Command — Request Raw Counts***

This command is sent by the master to request the SVS 2000 to send the raw counts. For this example, the master requests the raw counts from an SVS 2000 at address 01, which returns a raw count of 1147226 and a checksum of 67.

| <b>Request from Master</b> | <b>Response from SVS 2000</b> |                |
|----------------------------|-------------------------------|----------------|
| >aau1ssr                   | A±dddddddssr                  | <i>Format</i>  |
| >01u107r                   | A114722667r                   | <i>Example</i> |

# Appendix C. Calculation of Manual Calibration Parameters

## Introduction

For manual calibration, you calculate and directly input the scale factor weight, scale factor counts, and the zero counts. There are three reasons for performing a manual calibration with the SVS 2000:

1. Refining the Calibration — After performing an Auto calibration, you kept an accurate record of actual material weight and indicated material weight. You want to use this information now to 'refine' the calibration.
2. Stainless Steel, Aluminum, or 2-inch Microcells — Your application is for Microcells installed on stainless steel or aluminum or uses 2-inch Microcells. However, the calibration parameters resulting from *Quick Config* are based on 3-inch Microcells installed on carbon steel. The scale factor counts (*Scale Factor Cts*) should be modified to reflect the actual sensitivity of the application.
3. Re-entering Calibration Data — You want to re-enter data from a previous calibration that provided better accuracy than the current calibration.

This Appendix explains and provides an example of the calculation of *Manual Cal* parameters for items 1 and 2 above.

## Refining the Calibration

While moving material into the vessel, you kept an accurate record of the actual material weight and the indicated material weight (from the SVS 2000). Now you want to use this information to refine the calibration.

Follow this procedure to refine the calibration:

1. Define the recorded material weights as Indicated High Load, Indicated Low Load, Actual High Load, and Actual Low Load (Actual Low Load is 0, because you started with an empty vessel). Calculate the change in indicated and actual weight:

**IW** = Change in Indicated Weight = Indicated High Load - Indicated Low Load

**AW** = Change in Actual Weight = Actual High Load - Actual Low Load

2. If the SVS 2000 is in Run Mode, press the '2' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

```
22 MANUAL CAL
```

3. Press the Enter Key to access this menu. The display shows:

```
SCALE FACTOR WGT
```

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

```
SCALE FACTOR CTS
```

5. Press the Enter Key to access the *Scale Factor Cts* Menu. The display looks like this:

```
> 123456 cnts
```

6. Calculate Corrected *Scale Factor Cts*:  
Corrected *Scale Factor Cts*  
= Old *Scale Factor Cts* x (IW ÷ AW)
7. Use the Numeric or Arrow Keys to input the Corrected *Scale Factor Cts*. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

```
SCALE FACTOR CTS
```

8. Press the Gross or Net Key to return to Run Mode.
9. Enter the current actual weight as the Display Value Correction. See *Refining the Calibration with the Display Value Correction* in Chapter 6, Cal Menu, for details.

**Example:** When the vessel was empty, the display indicated 500 lbs. You added 9,000 lbs of material, and noted the display indicated 10,000 lbs in the vessel. You want to refine the calibration. You go to the *Manual Cal*/Menu and write down the existing scale factor counts. Summarizing the data:  
 Indicated High Load = 10,000 lbs  
 Indicated Low Load = 500 lbs  
 Actual High Load = 9,000 lbs  
 Actual Low Load = 0 lbs  
*ScfCnt* = 250,000

Calculate the change in indicated and actual weight:  
 $IW = \text{Change in Indicated Weight} = \text{Indicated High Load} - \text{Indicated Low Load} = 10,000 \text{ lbs} - 500 \text{ lbs} = 9,500 \text{ lbs}$   
 $AW = \text{Change in Actual Weight} = \text{Actual High Load} - \text{Actual Low Load} = 9,000 \text{ lbs} - 0 \text{ lbs} = 9,000 \text{ lbs}$

Calculate the corrected *Scale Factor Cts*:  
 $\text{Corrected } Scale \text{ Factor } Cts = \text{Old } Scale \text{ Factor } Cts \times (IW \div AW) = 250,000 \text{ counts} \times (9,500 \text{ lbs} \div 9,000 \text{ lbs}) = 263,889 \text{ counts}$

$Disp \text{ Val } Correct = \text{Current Actual Load} = 9,000 \text{ lbs}$

## Stainless Steel, Aluminum, or 2-inch Microcells

Your application is for K-M Microcells installed on stainless steel or aluminum or uses 2-inch Microcells. However, the calibration parameters resulting from *Quick Config* are based on 3-inch Microcells installed on carbon steel. Modify the scale factor counts (*Scale Factor Cts*) to reflect the actual sensitivity of the installed Microcells.

**Note**

Do not modify scale factor counts if you already performed a live load calibration (*Auto Cal*). A live load calibration is more accurate.

The scale factor count correction follows:

1. See Table C-1. Select the Sensitivity Factor that matches your installation.

2. If the SVS 2000 is in Run Mode, press the '2' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

22 MANUAL CAL

3. Press the Enter Key to access this menu. The display shows:

SCALE FACTOR WGT

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

SCALE FACTOR CTS

5. Press the Enter Key to access the *Scale Factor Cts* Menu. The display looks like this:

> 123456 cnts

6. Calculate the corrected *Scale Factor Cts* as follows:

$$\text{Corrected } Scale \text{ Factor } Cts = Scale \text{ Factor } Cts \times \text{Sensitivity Factor}$$

7. Use the Numeric or Arrow Keys to input the Corrected *Scale Factor Cts*. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

SCALE FACTOR CTS

8. Press the Gross or Net Key to return to Run Mode.

**Example:** The application uses Microcells installed on stainless steel. You performed *Quick Config* and need to modify the scale factor counts to match the application. Looking at Table C-1, the Sensitivity Factor for Microcells on stainless steel is 0.83. You go to the *Scale Factor Cts* Menu and record the existing scale factor counts, which is 100,000 for this example. Summarizing the data:

$Scale \text{ Factor } Cts = 100,000$   
 $Sensitivity \text{ Factor} = 0.83$

Calculate and input the corrected scale factor counts:

$$\begin{aligned} \text{Corrected } Scale \text{ Factor } Cts &= Scale \text{ Factor } Cts \times \text{Sensitivity Factor} \\ &= 100,000 \times 0.83 = 83,000 \text{ counts} \end{aligned}$$

| Installation Type       | Sensitivity Factor |
|-------------------------|--------------------|
| <b>3-inch Microcell</b> |                    |
| Aluminum                | 2.2                |
| Stainless Steel         | 0.83               |
| <b>2-inch Microcell</b> | 0.80               |

Table C-1. Microcell Sensitivity Factors

# Appendix D. Kistler-Morse Service and Warranty

---

---

## Product Warranty

---

---

A complete, unabridged copy of our product warranty is available upon request from Kistler-Morse. A summary of the warranty, *subject to the terms and conditions listed fully in the warranty*, follows:

Kistler-Morse warrants equipment of its own manufacture to be free from defects in material and workmanship for one year from date of shipment to original user. 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.

---

---

## Service

---

---

Kistler-Morse maintains a fully trained staff of field service personnel who are capable of providing you with complete product assistance. Our field service staff is based in Bothell, Washington USA (corporate headquarters) and Antwerp, Belgium (European office).

### **Phone Consultation**

Our Field Service staff provides the following services by telephone, via our regular and toll free number (toll free in USA and Canada only), *at no charge*:

- Technical, application, and troubleshooting assistance
- Spare parts assistance
- Warranty (replacement) assistance

### **On-Site Consultation**

Kistler-Morse's Field Service staff can provide additional services at your request. Contact Kistler-Morse at the closest office for rate and scheduling information for the following services:

- Technical, application, startup, and troubleshooting assistance on-site
- Training on-site or at our corporate office
- Service calls
- Equipment updates to our latest configuration

General descriptions of some of these standard services follow. Of course, if your service needs vary from those described, we are available to discuss them with you.

### **Installation, Startup Assistance, and On-Site Training**

#### *Notes*

1. For vessels to be instrumented with Microcells or L-Cells, the customer may contract to have K-M install the sensors. For all other sensors and transducers, installation must be performed by the customer.
2. Field wiring, conduit installation, junction box mounting, and signal processor mounting must be performed by the customer. The AC power must be connected to the signal processor, but not energized, prior to K-M beginning work.

All field wiring will be checked for errors. The system will be powered up and checked out for proper electrical operation. The *Quick Config* procedure will be performed. For best results, Kistler-Morse requires moving a known amount of material, such as a truck-load, for Live Load calibration. Live load calibration will be performed if actual material or weight devices can be moved. Recommendations for the optimum performance of the system will be provided.

On-site training will include simulation of the Live Load calibration process (if Live Load calibration could not be performed while Kistler-Morse is on site) and instruction covering operation and maintenance of the system.

### **Troubleshooting**

Kistler-Morse will troubleshoot systems for mechanical, electrical, calibration, and wiring errors. Normal component repairs will be made and wiring errors will be corrected, including replacement of non-repairable printed circuit boards.

### **Service Calls**

Kistler-Morse will perform on-site repair/replacement services.

---

## **Return Material Authorization**

---

If a part needs to be sent to the factory for repair, contact Kistler-Morse's corporate office and request a Return Material Authorization (RMA) number. The RMA number identifies the part and the owner and must be included with the part when it is shipped to the factory.

---

## **Address and Telephone Numbers**

---

### ***Corporate Office***

**Kistler-Morse Corporation**  
19021 120th Avenue NE  
Bothell, WA 98011-9511 USA

Phone: 425-486-6600  
Toll Free (U.S.A. and Canada): 800-426-9010  
Fax: 425-402-1500  
www.kistler-morse.com

### ***European Office***

**Kistler-Morse Corporation**  
Rucaplein 531  
B2610 Antwerp, Belgium

Phone: 32-3-218-99-99  
Fax: 32-3-230-78-76

# ***Appendix E. Technical Drawings***

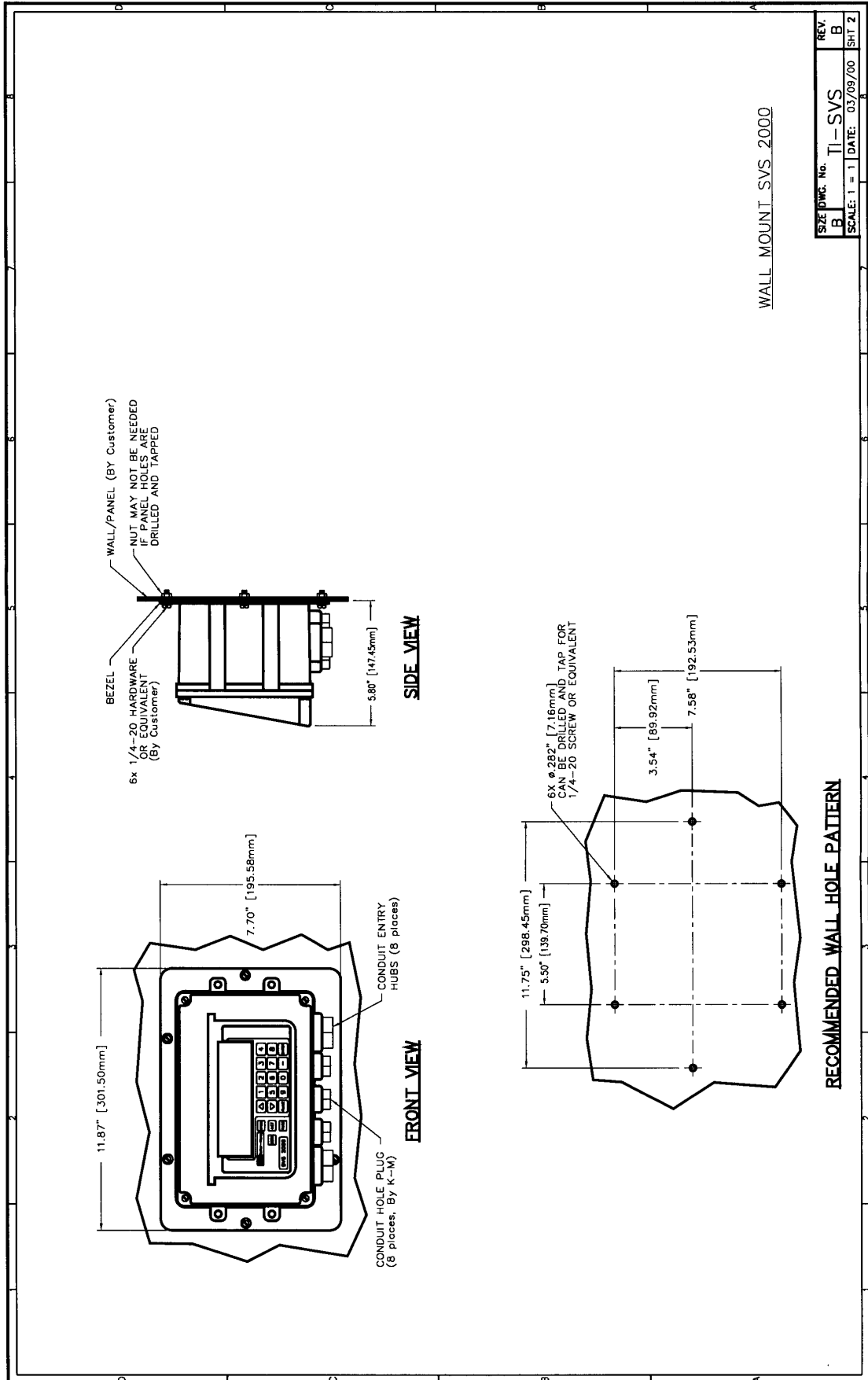
This appendix contains the following technical drawings for the SVS 2000:

| <b>Drawing No.</b> | <b>Drawing Title</b>                                    |
|--------------------|---------------------------------------------------------|
| TI-SVS-01          | Enclosure Dimension and Mounting Specification SVS 2000 |
| 36-4102            | Bezel, Panel Mount SVS 2000                             |
| TI-SVS-02          | Wiring Diagram                                          |
| TI-SVS-03          | Installation Guide, SVS 2000 PCBA's and Firmware        |
| TI-SVS.SER-01      | Wiring Diagram, Isolated Serial Card                    |
| TI-SVS.XOUT-01     | Wiring Diagram, Current Output Card                     |









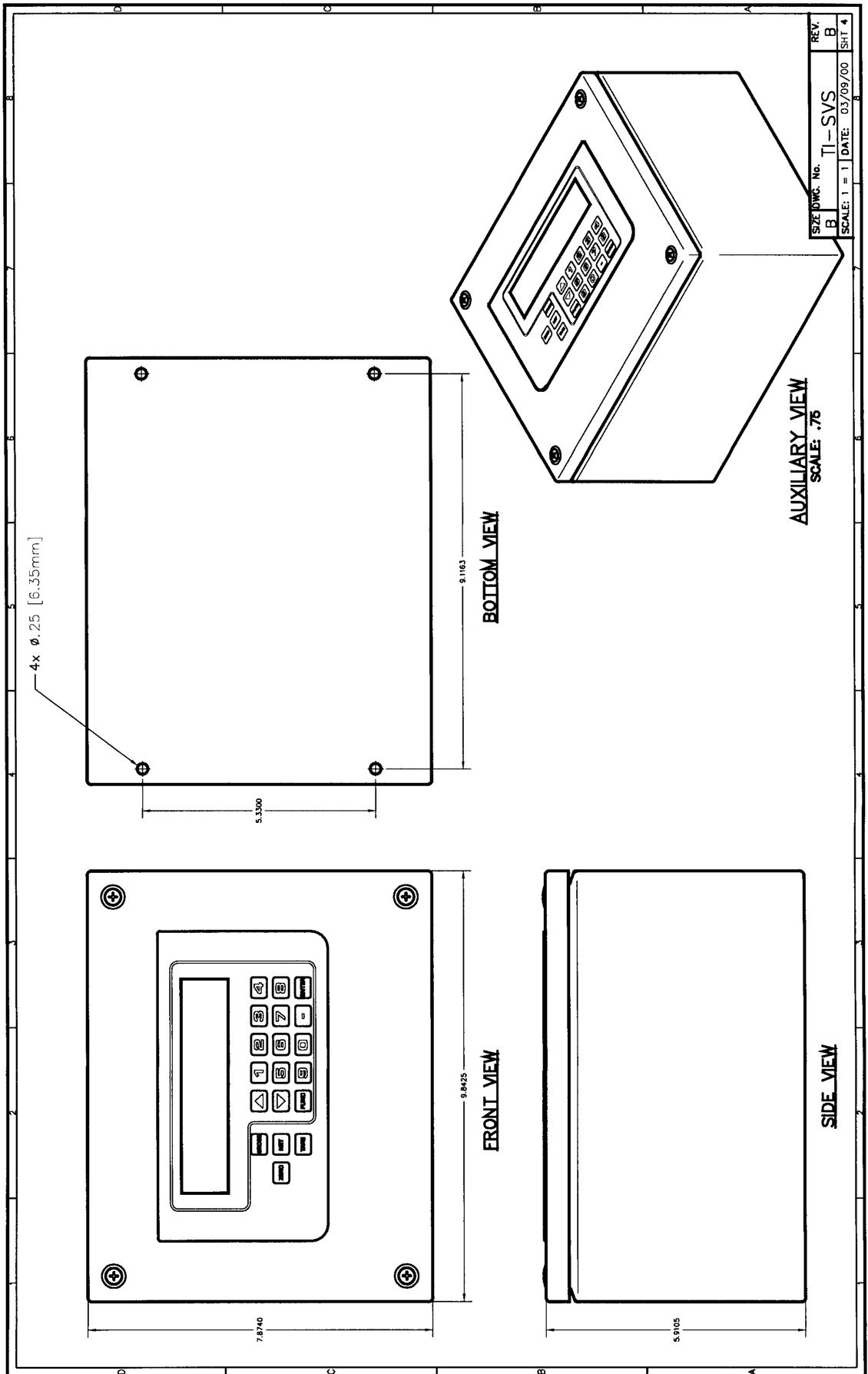
WALL MOUNT SVS 2000

|              |          |                |
|--------------|----------|----------------|
| SIZE         | DWG. No. | REV.           |
| B            | T1-SVS   | B              |
| SCALE: 1 = 1 |          | DATE: 03/09/00 |
|              |          | SHT 2          |

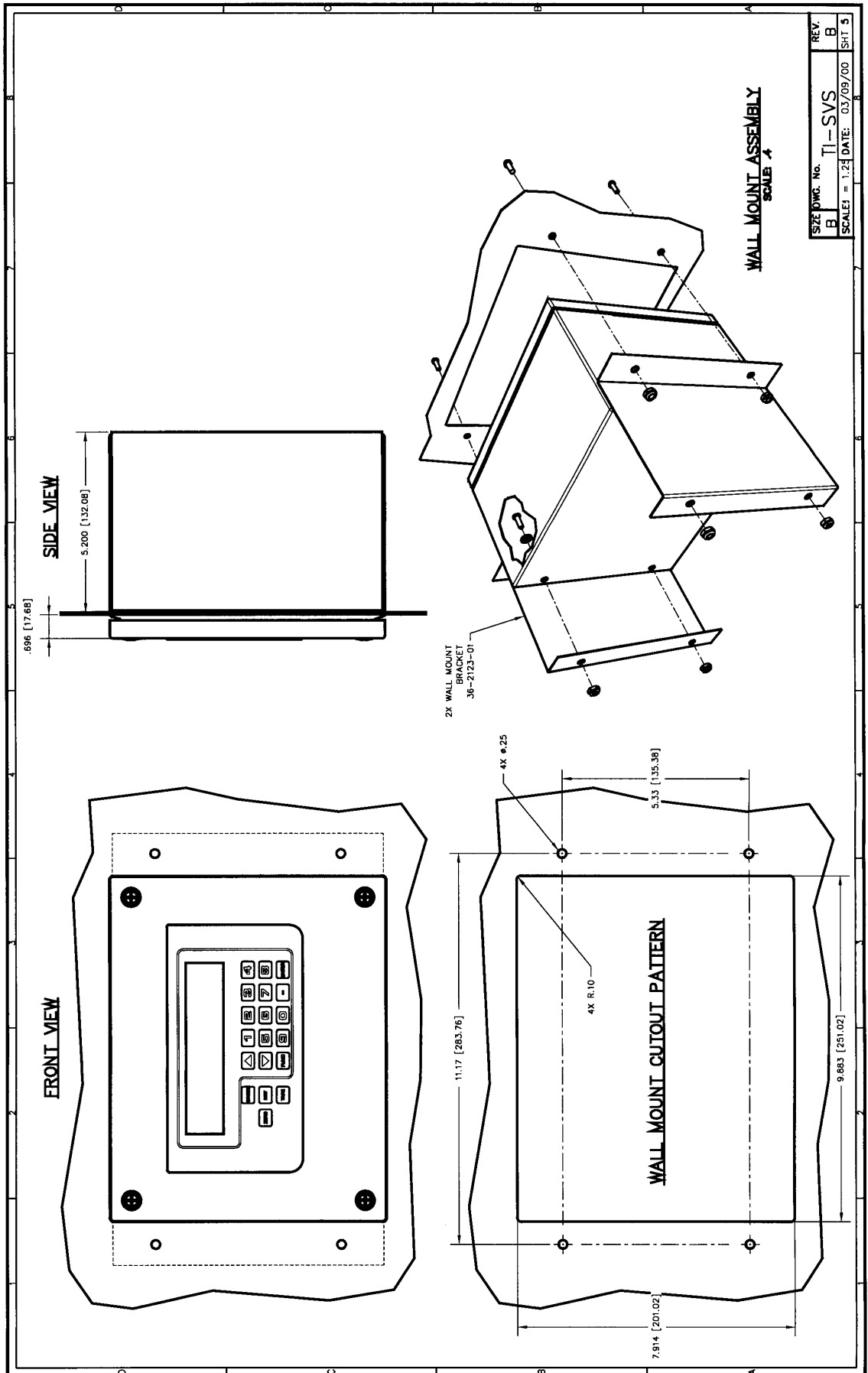








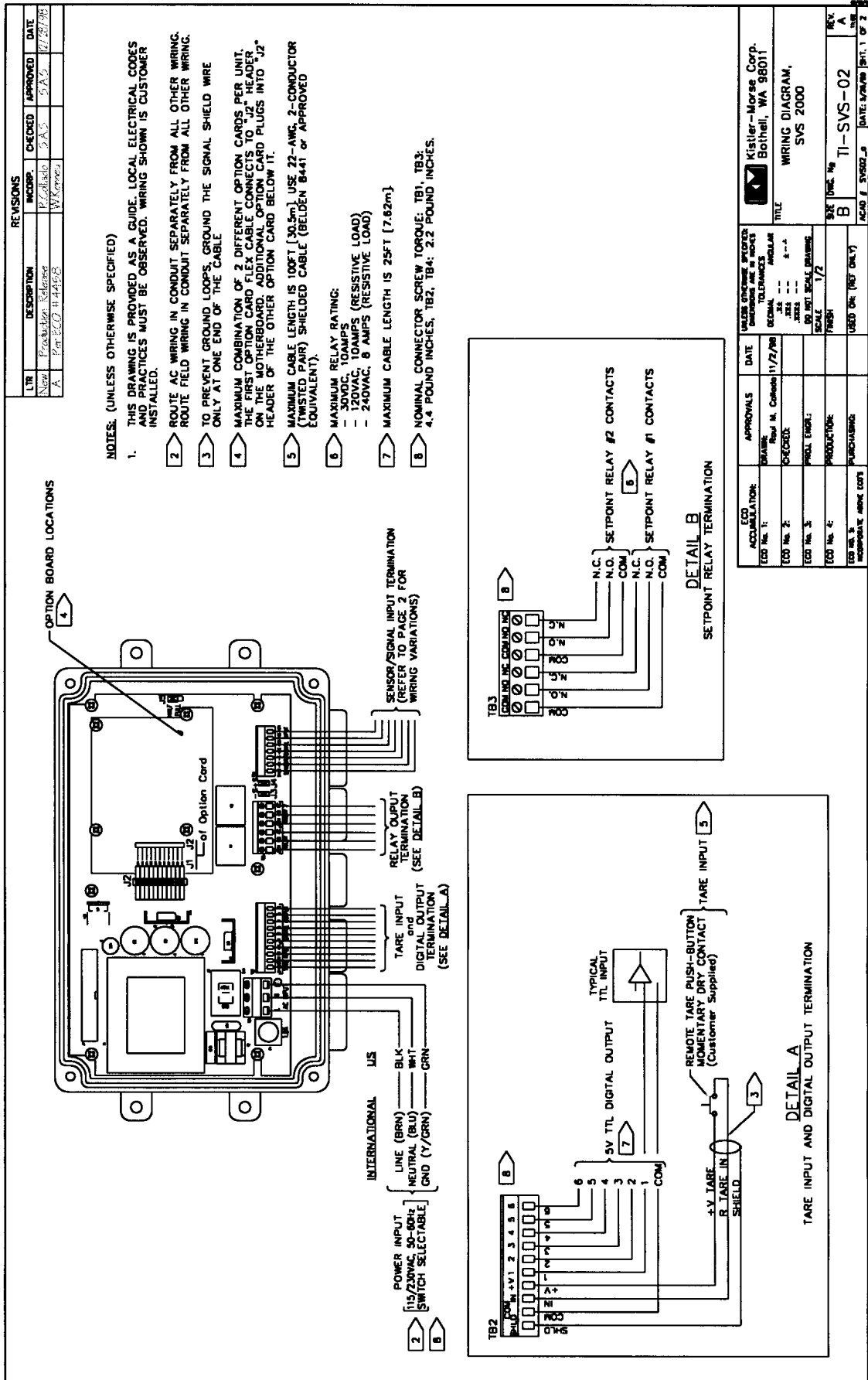




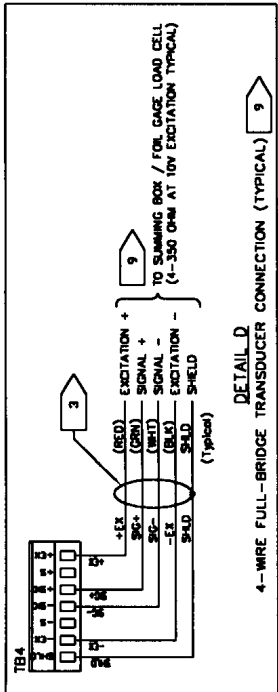
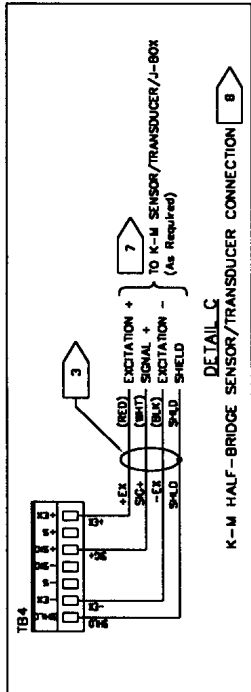
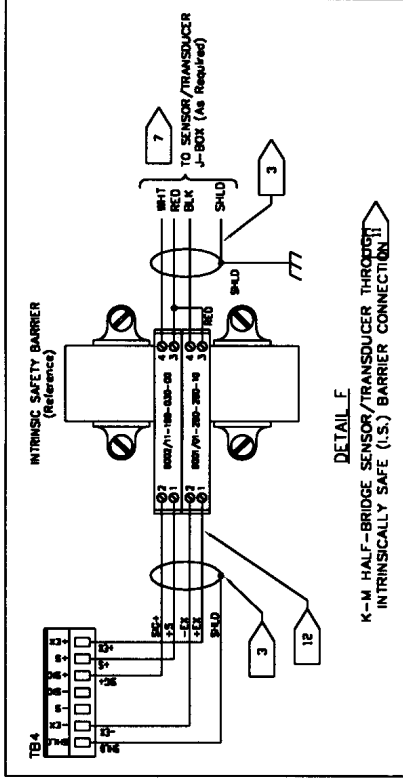
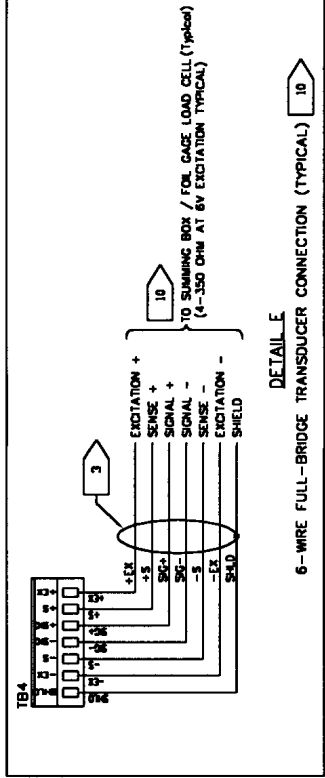
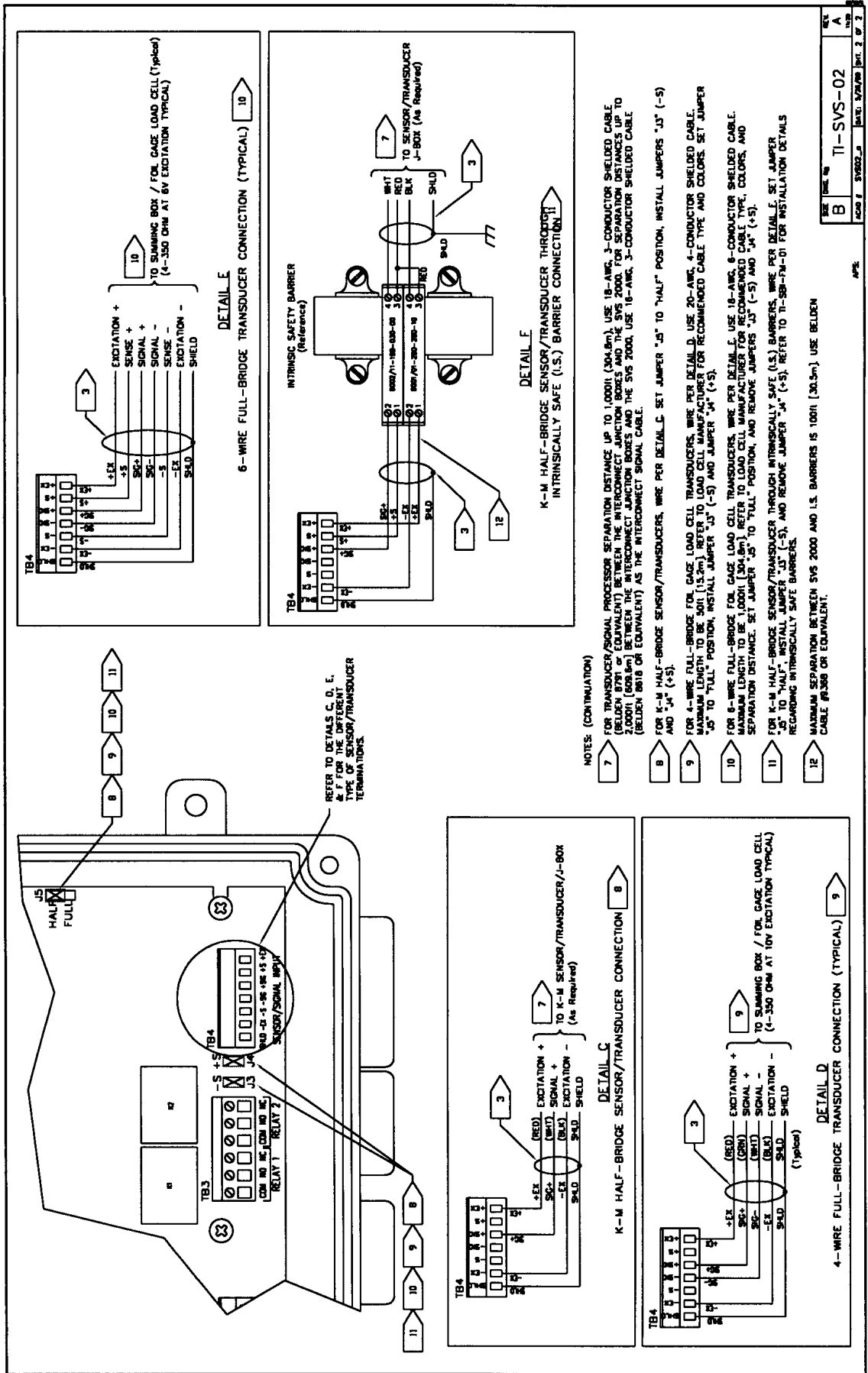










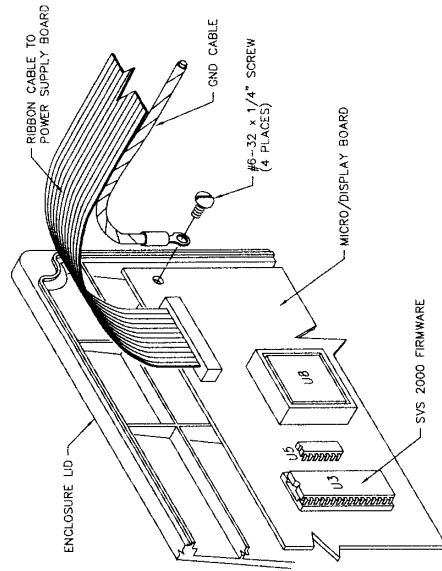
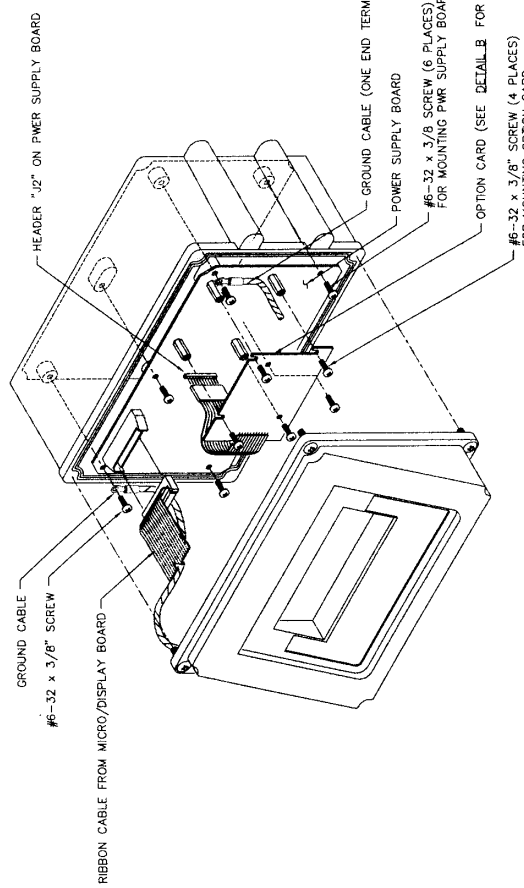


- NOTES: (CONTINUATION)
- 7 FOR TRANSDUCER/SIGNAL PROCESSOR SEPARATION DISTANCE USE 1.000H (100.0mm) USE 18-AWG, 3-CONDUCTOR SHIELDED CABLE (BELEN 8701 OR EQUIVALENT) BETWEEN THE INTERCONNECT JUNCTION BOXES AND THE SYS 2000 FOR SEPARATION DISTANCES UP TO 2.000H (200.0mm) BETWEEN THE INTERCONNECT JUNCTION BOXES AND THE SYS 2000, USE 16-AWG, 3-CONDUCTOR SHIELDED CABLE (BELEN 8618 OR EQUIVALENT) AS THE INTERCONNECT SIGNAL CABLE.
  - 8 FOR K-M HALF-BRIDGE SENSOR/TRANSDUCERS, WIRE PER DETAIL C. SET JUMPER "J5" TO "HALF" POSITION, INSTALL JUMPERS "J3" (-S) AND "J4" (+S).
  - 9 FOR 4-WIRE FULL-BRIDGE FOR GAGE LOAD CELL TRANSDUCERS, WIRE PER DETAIL D. USE 20-AWG, 4-CONDUCTOR SHIELDED CABLE. MAXIMUM LENGTH TO BE 50H (15.2m). REFER TO LOAD CELL MANUFACTURER FOR RECOMMENDED CABLE TYPE AND COLORS. SET JUMPER "J5" TO "FULL" POSITION, INSTALL JUMPER "J3" (-S) AND JUMPER "J4" (+S).
  - 10 FOR 6-WIRE FULL-BRIDGE FOR GAGE LOAD CELL TRANSDUCERS, WIRE PER DETAIL E. USE 18-AWG, 6-CONDUCTOR SHIELDED CABLE. MAXIMUM LENGTH TO BE 1.000H (100.0mm). REFER TO LOAD CELL MANUFACTURER FOR RECOMMENDED CABLE TYPE, COLORS, AND SEPARATION DISTANCE. SET JUMPER "J5" TO "FULL" POSITION, AND REMOVE JUMPERS "J3" (-S) AND "J4" (+S).
  - 11 FOR K-M HALF-BRIDGE SENSOR/TRANSDUCER THROUGH INTRINSICALLY SAFE (I.S.) BARRIERS, WIRE PER DETAIL F. SET JUMPER "J5" TO "HALF", INSTALL JUMPER "J3" (-S), AND REMOVE JUMPER "J4" (+S). REFER TO TI-SB-PN-01 FOR INSTALLATION DETAILS REGARDING INTRINSICALLY SAFE BARRIERS.
  - 12 MAXIMUM SEPARATION BETWEEN SYS 2000 AND I.S. BARRIERS IS 100H (100.5m). USE BELDEN CABLE #3368 OR EQUIVALENT.

|     |          |    |     |
|-----|----------|----|-----|
| REV | DATE     | BY | APP |
| B   | 11-19-02 | JL | APL |
| A   |          |    |     |



| REVISIONS |                                             |           |             |          |         |
|-----------|---------------------------------------------|-----------|-------------|----------|---------|
| LTR       | DESCRIPTION                                 | INCCRP.   | CHECKED     | APPROVED | DATE    |
| New       | Production Release                          | R.Collado | S.A.S       |          |         |
| A         | Per ECO #4392                               | W.Kennedy | K.Mesterion |          |         |
| B         | CO #4593; ADD SHT 2 & OPTION CARD (TABLE 1) | VCN       | R.S.        | R.S.     | 2/29/00 |



**DETAIL A**  
MICRO/DISPLAY BOARD INSTALLATION  
FOR PLASTIC ENCLOSURE

TABLE 1: OPTION CARD PLACEMENT

| OPTION CARD                | DESCRIPTION                       | ELECTRICAL RATING | OPTION CARD POSITION | NOTES                              | TERMINAL SCREW TORQUE |
|----------------------------|-----------------------------------|-------------------|----------------------|------------------------------------|-----------------------|
| 63-1278-01                 | 4-20mA/O-20mA OUTPUT CARD         | 30V               | #1, #2, #3           | REFER TO TI-SVS.XOUT-01 FOR WIRING | 2.2 LB/IN             |
| 63-1279-01                 | ISOLATED SERIAL OUTPUT CARD       | 5V                | #1, #2, #3           | REFER TO TI-SVS.SER-01 FOR WIRING  | 2.2 LB/IN             |
| [63-1280-01<br>63-1277-01] | BUS CPU<br>A-B RIO INTERFACE CARD | 5V                | #1 ONLY<br>#2 ONLY   | REFER TO TI-SVS.RIO-01 FOR WIRING  | 2.2 LB/IN<br>7 LB/IN  |
| [63-1281-01<br>63-1280-01] | DEVICE NET<br>BUS CPU             | 24V               | #2 ONLY<br>#1 ONLY   | REFER TO TI-SVS.DNET-01 FOR WIRING | 2.2 LB/IN             |

MODEL NUMBER DESIGNATION:  
SVS2000- [c] [b] [c] [dd]

[c] MODE  
A- BASE UNIT

[b] SUPPLY VOLTAGE  
A- 110-120/230VAC, 50/60Hz

[c] ENCLOSURE  
A- NEMA 4X FIBERGLASS  
B- BEZEL FOR PANEL MOUNT (factory installed)  
S- S.S. UL LISTED

[dd] OPTION CARDS (Up to 2)  
A- ISOLATED 4-20mA OUTPUT  
B- ISOLATED SERIAL  
C- ISOLATED ANALOG RIO (One Per Unit)  
D- DEVICE NET  
N- NONE

UNLESS OTHERWISE SPECIFIED:  
DATE DIMENSIONS ARE IN INCHES:  
DECIMAL ANGULAR  
XX.X ± .1  
XX.X ± .05  
DO NOT SCALE DRAWING  
SCALE FINISH  
USED ON: (REF ONLY)

APPROVALS:  
DRAWN: \_\_\_\_\_  
CHECKED: \_\_\_\_\_  
PROJ. ENGR: \_\_\_\_\_  
PRODUCTION: \_\_\_\_\_  
PURCHASING: \_\_\_\_\_

ECCO ACCUMULATION: \_\_\_\_\_

INCORPORATE ABOVE ECO: \_\_\_\_\_

ACAD # \_\_\_\_\_ DATE: \_\_\_\_\_

REV. B

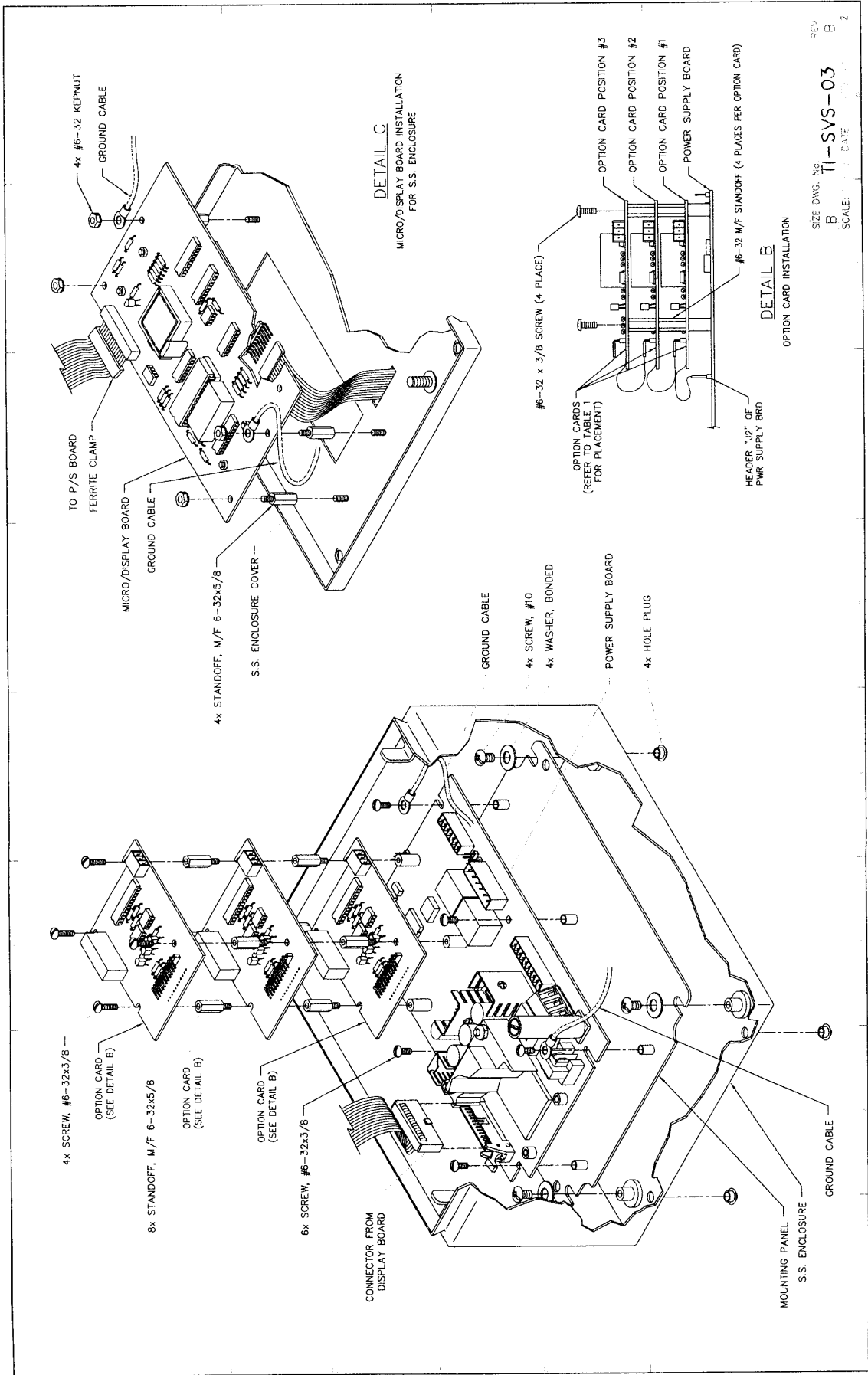
SHT. 1 OF 2

Kistler-Morse Corp.  
Bethell, WA 98011

INSTALLATION GUIDE,  
SVS2000 PCBAS  
AND FIRMWARE

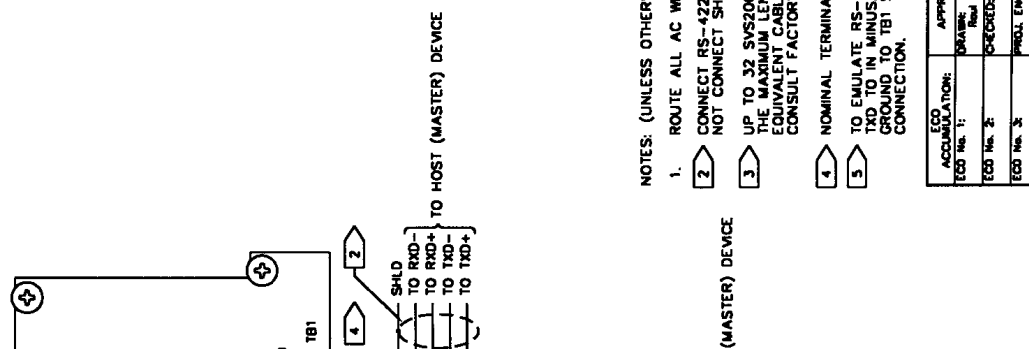
SIZE DWG. No. B  
REV. B  
TI-SVS-03





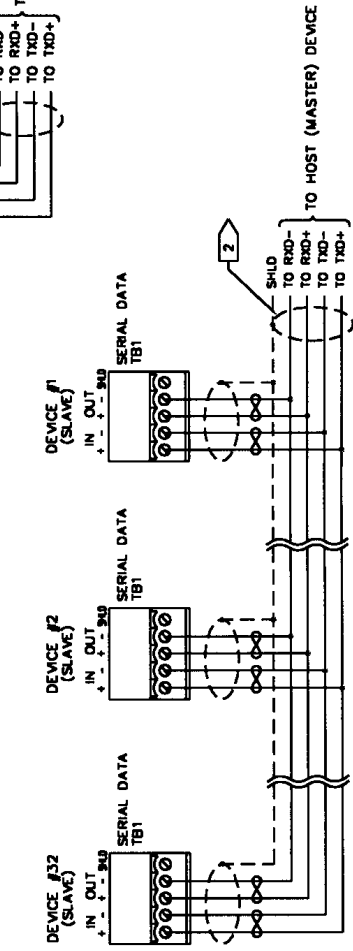


| REVISIONS |                    |             |                       |         |
|-----------|--------------------|-------------|-----------------------|---------|
| LTN       | DESCRIPTION        | INCOMP.     | CHECKED APPROVED DATE |         |
| New       | Production Release | 3/1/84      | S.A.S.                |         |
| A         | Per ECD # 42972    | W. Scoville | W. Scoville           |         |
| B         | Per ECD # 446959   | None        | None                  | 5/27/84 |

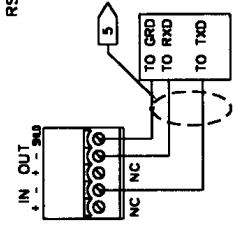


TO "J2" ON SVS2000  
PWR SUPPLY MOTHERBOARD  
OR  
TO "J2" ON SVS2000  
BUS CPU INTERFACE  
CARD SE1

CONNECTION FROM OTHER OPTION CARD  
DATA RECEIVE STATUS LED  
DATA TRANSMIT STATUS LED



RS422 SERIAL CONNECTION 3



TO EMULATE RS-232 CONNECTION 5

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ROUTE ALL AC WIRING SEPARATELY FROM ALL OTHER WIRING.
2. CONNECT RS-422 SHIELD WIRE AT ONE END ONLY TO THE ISOLATED GROUND. DO NOT CONNECT SHIELD WIRE TO CHASSIS GROUND.
3. UP TO 32 SVS2000'S CAN BE CONNECTED TO THE SAME RS-422 SERIAL CABLE. THE MASTER DEVICE MUST USE SERIAL ADDRESS 0. ALL OTHER DEVICES MUST USE EQUIVALENT CABLE EACH DEVICE MUST HAVE A DIFFERENT SERIAL ADDRESS. CONSULT FACTORY FOR CONNECTION TO OTHER RS-422 DEVICES.
4. NOMINAL TERMINAL SCREW TORQUE: 2.2 POUND INCHES.
5. TO EMULATE RS-232, PLACE JUMPER ACROSS POSITION 1-3. CONNECT RS-232 TXD TO IN MINUS. CONNECT RS-232 RXD TO OUT MINUS. CONNECT RS-232 GROUND TO T81 SHIELD. ONLY ONE DEVICE CAN BE CONNECTED WITH AN RS-232 CONNECTION.

| ECD ACCUMULATION: |  | APPROVALS             |                 | DATE       |                       | UNLESS OTHERWISE SPECIFIED: |         |
|-------------------|--|-----------------------|-----------------|------------|-----------------------|-----------------------------|---------|
| ECD No. 1:        |  | DATE:                 | Rev. M. Calahan | 11/9/80    | DESIGN:               | Rev. M. Calahan             | 11/9/80 |
| ECD No. 2:        |  | CHECKED:              |                 |            | SCALE:                | 1" = 1"                     | 1" = 1" |
| ECD No. 3:        |  | DRAWN:                |                 |            | DO NOT SCALE DRAWING: |                             |         |
| ECD No. 4:        |  | PRODUCTION:           |                 |            | FINISH:               |                             |         |
| ECD No. 5:        |  | PURCHASED:            |                 |            | USED ON: (REF ONLY)   |                             |         |
| ECD No. 6:        |  | EQUIVALENT: none cost |                 | PURCHASED: |                       |                             |         |

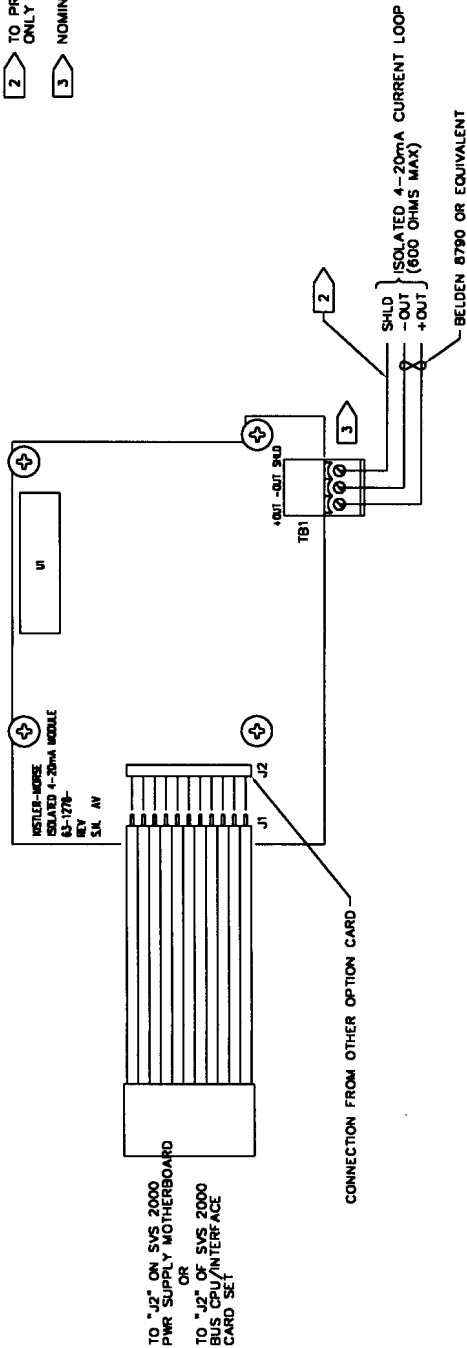
  

|                                                             |                      |
|-------------------------------------------------------------|----------------------|
| Kistler-Morse Corp.<br>Bothell, WA 98011                    |                      |
| TITLE<br>WIRING DIAGRAM<br>ISOLATED SERIAL CARD,<br>SVS2000 |                      |
| SIZE: (INDIC. NO.)                                          | REV.                 |
| B                                                           | T1-SVS.SER-01        |
| ACAD # SVS2000                                              | DATE/REV (INT.) OF 1 |



| REVISIONS |                                          |                           |                 |      |
|-----------|------------------------------------------|---------------------------|-----------------|------|
| LTR       | DESCRIPTION                              | CHECKED                   | APPROVED        | DATE |
| A         | New Production Release<br>Per ECO # 4592 | R. Collins<br>W. Kormanik | S.A.S.<br>Mason |      |

- NOTES: (UNLESS OTHERWISE SPECIFIED)
1. ROUTE ALL AC WIRING SEPARATELY FROM ALL OTHER WIRING.
  - 2 TO PREVENT GROUND LOOPS, GROUND SIGNAL SHIELD WIRE ONLY AT ONE END OF THE CABLE.
  - 3 NOMINAL TERMINAL SCREW TORQUE: 2.2 POUND INCHES.



| ECO ACTION:             | APPROVALS             | DATE    | VALUES OVERLINE SPECIFY TOLERANCES ARE IN INCHES |
|-------------------------|-----------------------|---------|--------------------------------------------------|
| ECO No. 1:              | DRAWN: Row M. Collins | 11/9/98 | DECIMAL ANGULAR                                  |
| ECO No. 2:              | CHECKED:              |         | .XXX -- 1/16                                     |
| ECO No. 3:              | PROL. ENGR.:          |         | DO NOT SCALE DRAWING                             |
| ECO No. 4:              | PRODUCTION:           |         | SCALE                                            |
| ECO No. 5:              | PURCHASING:           |         | PRINT                                            |
| INCORPORATE ABOVE ECO'S |                       |         | USED ONLY (REF ONLY)                             |

| ECO No. 1: | ECO No. 2: | ECO No. 3: | ECO No. 4: | ECO No. 5: |
|------------|------------|------------|------------|------------|
|            |            |            |            |            |

| DATE    | BY             | REV. |
|---------|----------------|------|
| 11/9/98 | Row M. Collins | 1    |
|         |                | 2    |
|         |                | 3    |
|         |                | 4    |
|         |                | 5    |

| DATE    | BY             | REV. |
|---------|----------------|------|
| 11/9/98 | Row M. Collins | 1    |
|         |                | 2    |
|         |                | 3    |
|         |                | 4    |
|         |                | 5    |

| DATE    | BY             | REV. |
|---------|----------------|------|
| 11/9/98 | Row M. Collins | 1    |
|         |                | 2    |
|         |                | 3    |
|         |                | 4    |
|         |                | 5    |



# Appendix F. Error Messages

This Appendix contains descriptions of the error messages displayed by the SVS 2000:

1. Warning: Add Or Subtract More Material
2. Are You Sure? (in *Auto Cal*)
3. Warning: Ambiguous Error .. Hi Span Will Be Entered .. Need New Lo Span
4. Warning: Ambiguous Error .. Lo Span Will Be Entered .. Need New Hi Span
5. Gross Units Over
6. Net Units Over
7. Grs Under Range
8. ADC Overrange +
9. ADC Overrange –
10. NVRAM Failed #1
11. NVRAM Failed #2
12. Com Error #1
13. Com Error #2
14. Voltage Error #1
15. Voltage Error #2
16. Voltage Error #3
17. Current Error #1
18. Current Error #2
19. Excite Error #1
20. Excite Error #2
21. Excite Error #3
22. Excite Error #4
23. Excite Error #5
24. High Temp Error

For each error message:

- Information is provided on whether fail-safe conditions go into effect when the error message appears. (Fail-safe conditions affect setpoints and current outputs.)
- One or more possible explanations and suggested solutions are provided. The solutions start with the easiest to check for or the most likely to correct the problem. Work through the solutions in the order given.

## 1. Warning: Add Or Subtract More Material . .

### ***Explanation***

While performing *Auto Cal*, the material moved into or out of vessel produced a change of less than 10,000 counts. SVS 2000 calibrates with entered values, but larger change in counts/movement of material is recommended for good accuracy. To exit the scrolling message, press any key.

### ***Fail-Safe Applies?***

No.

### ***Solution***

Verify correct amount of material was actually moved. Recalibrate when possible with a larger movement of material.

## 2. Are You Sure? (in *Auto Cal*)

### ***Explanation***

While performing *Auto Cal*, you entered a *Hi Span Cal* weight that is less than the existing *Lo Span Cal* weight **or** a *Lo Span Cal* weight that is greater than the existing *Hi Span Cal* weight. **This could be an error, or you could be recalibrating the system in a range that does not overlap with the existing calibration.** The SVS 2000 flashes *Are You Sure?* to request verification and returns to the input screen to allow you to try again.

### ***Fail-Safe Applies?***

No.

### ***Solution***

Verify number on the input screen display is correct weight:

- If it is incorrect, reenter weight or press Gross or Net Key to abort re-calibration and return to Run Mode.
- If it is correct, press Enter Key again. SVS 2000 will scroll error message 3 or 4, as applicable.

### 3. Warning: Ambiguous Error .. Hi Span Will Be Entered .. Need New Lo Span

#### **Explanation**

While performing *Auto Cal*, you entered a *Hi Span Cal* weight that is less than the *Lo Span Cal* weight **or** SVS 2000 calculates that Hi Span counts are less than Lo Span counts. SVS 2000 accepts the new *Hi Span Cal* and blanks out the *Lo Span Cal*. SVS 2000 continues to operate with the previous values for scale factor counts and scale factor weight until you complete calibration by performing another *Lo Span Cal*. To exit the scrolling message, press any key.

#### **Fail-Safe Applies?**

No.

#### **Solution**

- Verify that you entered correct weight for *Hi Span Cal* and reenter *Hi Span Cal* if necessary, **and**
- Remove material from vessel and perform a *Lo Span Cal* to complete calibration.

### 4. Warning: Ambiguous Error .. Lo Span Will Be Entered .. Need New Hi Span

#### **Explanation**

While performing *Auto Cal*, you entered a *Lo Span Cal* weight that is higher than the *Hi Span Cal* weight **or** SVS 2000 calculates that Lo Span counts are greater than Hi Span counts. SVS 2000 accepts the new *Lo Span Cal* and blanks out the *Hi Span Cal*. SVS 2000 continues to operate with the previous values for scale factor counts and scale factor weight until you complete calibration by performing another *Hi Span Cal*. To exit the scrolling message, press any key.

#### **Fail-Safe Applies?**

No.

#### **Solution**

- Verify that you entered correct weight for *Lo Span Cal* and reenter *Lo Span Cal* if necessary, **and**
- Add material to vessel and perform a *Hi Span Cal* to complete calibration.

### 5. Gross Units Over

#### **Explanation**

Calculated gross weight (or selected engineering unit) exceeds seven active digits (9999999).

#### **Fail-Safe Applies?**

Yes.

#### **Solutions**

##### *Note*

---

Write down all existing system parameters before you change *Disp Format* or *Disp Units*. If you change *Disp Format* or *Disp Units*, you must adjust system parameters to correspond to new *Disp Format* or *Disp Units*.

---

1. Check *Disp Format* [11]. Ensure format is consistent with maximum expected value. For example, xxxx.xx format yields maximum value of 99999.99, while xxxxxx00 format yields maximum value of 999999900.
2. Check *Disp Units* [13]. Ensure units are consistent with maximum expected value. For example, a number in tons represents 2000 times more weight than the same number in pounds; a number in barrels represents 42 times more volume than the same number in gallons.
3. Check calibration. Recalibrate if required.

### 6. Net Units Over

#### **Explanation**

Calculated net weight (or selected engineering unit) exceeds seven active digits (9999999).

#### **Fail-Safe Applies?**

Yes.

#### **Solutions**

##### *Note*

---

Write down all existing system parameters before you change *Disp Format* or *Disp Units*. If you change *Disp Format* or *Disp Units*, you must adjust system parameters to correspond to new *Disp Format* or *Disp Units*.

---

1. Check *Disp Format* [11]. Ensure format is consistent with maximum expected value. For example, xxxx.xx format yields maximum value of 99999.99, while xxxxxx00 format yields maximum value of 999999900.
2. Check *Disp Units* [13]. Ensure units are consistent with maximum expected value. For example, a number in tons represents 2000 times more weight than the same number in pounds; a number in barrels represents 42 times more volume than the same number in gallons.
3. Check calibration. Recalibrate if required.

## 7. Grs Under Range

### **Explanation**

Calculated gross weight (or selected engineering unit) is negative and exceeds four active digits (9999).

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. Check calibration. Recalibrate if required.
2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.

## 8. ADC Overage +

### **Explanation**

Sensor input is causing counts to go above 2,097,151.

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. Check wiring of sensors to junction box and junction box to SVS 2000. Correct loose, damaged (shorted), or incorrect wiring.
2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
3. Check power supply by measuring across +Ex and -Ex on Power Supply PCB.
  - If SVS 2000 is wired to K-M half-bridge sensors with no IS Barriers, verify voltage is approximately 12 V.

- If SVS 2000 is wired to foil-gage sensors, verify voltage meets sensor manufacturer's requirements. If voltage is incorrect, replace Power Supply PCB.

### **Note**

If system includes IS Barriers, check power supply by measuring across +Sense and -Sense.

4. Measure voltage across +Sig and -Sig terminals on Power Supply PCB. This reading is actual signal coming back from sensor. For K-M sensors, reading should be less than 1 V:
  - If reading is less than 1 V, verify that *Sensor Gain* [63] is set as described in Chapter 10, Sensor Menu. If *Sensor Gain* is set correctly, A/D converter may be damaged. Contact K-M.
  - If reading is greater than 1 V, recheck wiring, sensors, and power supply as described in Steps 1 through 3.

## 9. ADC Overage -

### **Explanation**

Sensor input is causing counts to go to 0.

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. Check wiring of sensors to junction box and junction box to SVS 2000. Correct loose, damaged (shorted), or incorrect wiring.
2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
3. Check power supply by measuring across +Ex and -Ex on Power Supply PCB.
  - If SVS 2000 is wired to K-M half-bridge sensors with no IS Barriers, verify voltage is approximately 12 V.
  - If SVS 2000 is wired to foil-gage sensors, verify voltage meets sensor manufacturer's requirements. If voltage is incorrect, Power Supply PCB may be damaged — contact K-M.

### **Note**

If system includes IS Barriers, check power supply by measuring across +Sense and -Sense.

## 10. NVRAM Failed #1

### ***Explanation***

Non-volatile RAM on Microprocessor/Display PCB failed 'wake-up' test at power-up of SVS 2000.

### ***Fail-Safe Applies?***

NA — This error message can occur only at power-up.

### ***Solution***

NVRAM may be damaged — contact K-M.

## 11. NVRAM Failed #2

### ***Explanation***

Non-volatile RAM on Microprocessor/Display PCB failed 'read/write' test at power-up of SVS 2000.

### ***Fail-Safe Applies?***

NA — This error message can occur only at power-up.

### ***Solution***

NVRAM may be damaged — contact K-M.

## 12. Com Error #1

### ***Explanation***

Communication with setpoint controller or PLC PCB in SVS 2000 has failed.

### ***Fail-Safe Applies?***

Yes for current output.

NA for setpoints — setpoints not operational because communication has failed.

### ***Solutions***

Contact K-M after identifying the damaged PCB as described below:

1. Disconnect ribbon cable between PLC PCB Module and Power Supply PCB. If error message disappears, PLC PCB Module may be damaged.
2. Setpoint controller chip on Power Supply PCB may be damaged.

## 13. Com Error #2

### ***Explanation***

Communication with PLC PCB Module in SVS 2000 has failed.

### ***Fail-Safe Applies?***

No.

### ***Solutions***

1. Check ribbon cable connection between PLC PCB Module and Power Supply PCB. Correct a loose or incorrect connection.
2. PLC PCB Module may be damaged — contact K-M.

## 14. Voltage Error #1

### ***Explanation***

AC input voltage is too low.

### ***Fail-Safe Applies?***

Yes.

### ***Solutions***

1. Verify that AC input switch on Power Supply PCB is set in correct position.
2. Check AC input voltage (115/230 VAC) and verify it is within specifications.

## 15. Voltage Error #2

### ***Explanation***

A PCB is damaged.

### ***Fail-Safe Applies?***

Yes.

### ***Solutions***

Contact K-M after identifying damaged PCB as described below:

1. Disconnect ribbon cable between the Power Supply PCB and optional PCBs. If there is no error message, an optional PCB may be damaged. If there are multiple optional PCBs in SVS 2000:
  - A. Disconnect ribbon cables between optional PCBs.
  - B. Reconnect ribbon cable between Power Supply PCB and one optional PCB. If there is an error message, this is damaged optional PCB.
  - C. Repeat Step B for other optional PCB until damaged PCB is identified.

2. Disconnect ribbon cable between Power Supply PCB and optional PCBs. Disconnect ribbon cable between Microprocessor/Display PCB and Power Supply PCB. Check voltage from bottom pin of J2 on Power Supply PCB:
  - If voltage is less than 11.5 V or greater than 12.5 V, Power Supply PCB may be damaged.
  - If voltage is between 11.5 V and 12.5 V, Microprocessor/Display PCB may be damaged.

### 16. Voltage Error #3

#### ***Explanation***

A/D converter circuit reference voltage is out of tolerance.

#### ***Fail-Safe Applies?***

Yes.

#### ***Solutions***

1. Check ribbon cable connection between Power Supply PCB and Microprocessor/Display PCB. Correct a loose or incorrect connection.
2. Power Supply PCB may be damaged — contact K-M.

### 17. Current Error #1

#### ***Explanation***

There is an excitation short circuit.

#### ***Fail-Safe Applies?***

Yes.

#### ***Solutions***

1. Check wiring of sensors to junction box and junction box to SVS 2000. Correct loose, damaged (shorted), or incorrect wiring.
2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.

### 18. Current Error #2

#### ***Explanation***

Excitation current is too high.

#### ***Fail-Safe Applies?***

Yes.

#### ***Solutions***

1. Check for shorts between White and Black or White and Red on the sensor wiring to the SVS 2000.
2. Check sensor specifications and the number of sensors to verify that total current draw is within SVS 2000's specifications.
3. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.

### 19. Excite Error #1

#### ***Explanation***

Excitation voltage is too high and sense voltage is out of tolerance.

#### ***Fail-Safe Applies?***

Yes.

#### ***Solutions***

1. If not using Sense lines, verify that -Sense and +Sense jumpers are in place on J3 and J4 on Power Supply PCB.
2. If using Sense lines:
  - A. Check +Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.
  - B. Check -Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.

### 20. Excite Error #2

#### ***Explanation***

Excitation voltage is too low and sense voltage is normal.

#### ***Fail-Safe Applies?***

Yes.

#### ***Solutions***

1. If not using Sense lines, verify that -Sense and +Sense jumpers are in place on J3 and J4 on the Power Supply PCB.
2. If using Sense lines:
  - A. Check -Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.
  - B. Check +Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.

## 21. Excite Error #3

### **Explanation**

Excitation voltage is out of tolerance.

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. Excitation settings may be out of tolerance. Write down all existing system parameters. Default SVS 2000 to reset excitation settings. Reenter all other system parameters.
2. Power Supply PCB may be damaged — contact K-M.

## 22. Excite Error #4

### **Explanation**

There was a **sudden** shift in excitation current.

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
2. Check wiring of sensors to junction box and junction box to SVS 2000. Correct loose, damaged (shorted), or incorrect wiring.

### *Note*

---

Turn power off and then on again to clear this error message after problem is fixed. **Do not** cycle power until problem is fixed; the problem, which is probably causing errors in output, does not disappear even though error message is gone.

---

## 23. Excite Error #5

### **Explanation**

Excitation voltage is too high and sense voltage is too low.

### **Fail-Safe Applies?**

Yes.

### **Solution**

Check Sense wiring. +Sense and -Sense wires may be reversed.

## 24. High Temp Error

### **Explanation**

SVS 2000 is sensing a temperature inside enclosure that is above SVS 2000's specified operating temperature (see Appendix A, Product Specifications).

### **Fail-Safe Applies?**

Yes.

### **Solutions**

1. Check temperature just outside the enclosure. If temperature is greater than 122° F (50° C), application does not meet the SVS 2000's specifications.
2. Check inside enclosure to see if a component failed and is dissipating heat. If component failure is causing error message you may notice an unusual smell, a hot component, and/or a charred component. Contact K-M.
3. If temperature inside and outside unit meet specifications, temperature sensor on Microprocessor/Display PCB in SVS 2000 may be damaged — contact K-M.

### **CAUTION**

---

Turn off power to SVS 2000 and let it cool down.

---

# Appendix G. Menu Tree, Defaults, and Hot Keys

---



---

## Introduction

---



---

This appendix contains a copy of the SVS 2000 menu tree, a summary of the parameter default values, and a summary of commands used in Run Mode. Note that the menu tree is also presented in Chapter 4, Run Mode, Function Mode Menu Tree, and Keyboard.

---



---

## Menu Tree

---



---

See Figure G-1.

---



---

## Hot Keys

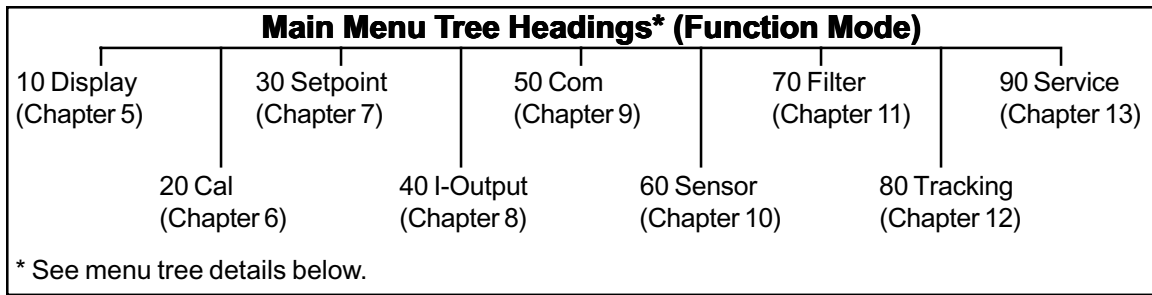
---



---

Following is a summary of the keyboard functions (hot keys) used in Run Mode:

- **Switch from gross weight Numerical display to Bar Graph display or vice versa** —  
Press the Enter Key while on the gross weight display to toggle between numerical and bar graph display.
- **Zero Gross Weight** (refine the calibration when the vessel is empty) —  
Press the Zero Key while on the gross weight display. When the display requests verification that you want to zero the gross weight, press the Enter Key. Press any other key to abort the operation.
- **Zero Total Weight** —  
Press the Zero Key while on the total weight display. When the display requests verification that you want to zero the total weight, press the Enter Key. Press any other key to abort the operation.
- **Display Number of Tares** —  
Press the Enter Key while on the total weight display. The display briefly shows the number of tares that have occurred since the total weight was zeroed.
- **Tare Vessel** —  
Press the Tare Key for 1 second, until the display flashes *Tare Implemented*.
- **Display SVS 2000 Serial Address in hexadecimal form** —  
Press the '-' Key and then the '1' Key.
- **Display Current SVS 2000 Software Revision letter and Date of Release** —  
Press the '-' Key and then the '2' Key.
- **Switch from Run Mode to Function Mode (menu tree)** —  
Press the Func Key.
- **Switch from Run Mode to a particular menu item in Function Mode** —  
Press the two-digit function number and then press the Enter Key.
- **Switch from Function Mode to Run Mode** —  
Press the Gross or Net Key.
- **Scroll through the Run Mode display screens (gross, net, total, and relay status)** — Press the Up Arrow or Down Arrow Key.
- **Switch from Gross to Net Weight** —  
Press the Net Key.
- **Switch from Net to Gross Weight** —  
Press the Gross Key.



### **Detailed Menu Tree**

#### **10 Display Menu**

- 11 Disp Format  
  - xxxxxx xxxxx.x xxxx.xx xxx.xxx
  - xx.xxxx xxxxxxo xxxxxxoo
- 12 Disp Countby  
  - 1 2 5 10 20 50 100 200
  - 500 1000 5000 10,000
- 13 Disp Units  
  - lbs kg CWT tns gal Ltr bbl
  - bu % ft m mV (none)
- 14 Bargraph Span

#### **20 Cal Menu**

- 21 Auto Cal  
  - Lo Span Cal
  - Hi Span Cal
  - Disp Val Correct
- 22 Manual Cal  
  - Scale Factor Wgt
  - Scale Factor Cts
  - Zero Counts
- 23 Linearization  
  - Linearize Set
  - Linearize Enable  
    - Linearize Off
    - Linearize On
- 24 Zero Tolerance
- 29 Cal Display  
  - Cnt/mV
  - ScfWgt
  - ScfCnt
  - ZeroCnt
  - DispVCW
  - HiSpanW
  - LoSpanW
  - HiSpanC
  - LoSpanC
  - 0mV\_Cnt

#### **30 Setpoint Menu**

- 31 Slct Relay #1  
  - Relay1 Value
  - Relay1 Deadband
  - Relay1 Hi/Lo  
    - Hi Lo
  - Relay1 Track  
    - Grs Net
    - Tot Flt
  - Relay1 Fail-Safe  
    - On Off NC
  - Relay1 Preact
- 32 Slct Relay #2  
  - (submenus similar to relay 1)
- 33 Slct Digtl #1  
  - DigOut1 Value
  - DigOut1 Deadband
  - DigOut1 Hi/Lo  
    - Hi Lo
  - DigOut1 Track  
    - Grs Net
    - Tot Flt
  - DigOut1 Failsafe  
    - On Off NC
  - DigOut1 Preact
- 34 Slct Digtl #2  
  - (submenus similar to digital output 1)
- 35 Slct Digtl #3  
  - (submenus similar to digital output 1)
- 36 Slct Digtl #4  
  - (submenus similar to digital output 1)
- 37 Slct Digtl #5  
  - (submenus similar to digital output 1)
- 38 Slct Digtl #6  
  - (submenus similar to digital output 1)

Figure G-1. SVS 2000 Menu Tree (continued on next page)

**Detailed Menu Tree (continued)**

- 39 Digtl Status
  - Setpoint Test <sup>(1)</sup>
    - Select Relay #1
      - Off On
    - Select Relay #2
      - Off On
    - Select Digtl #1
      - Off On
    - Select Digtl #2
      - Off On
    - Select Digtl #3
      - Off On
    - Select Digtl #4
      - Off On
    - Select Digtl #5
      - Off On
    - Select Digtl #6
      - Off On
- 40 I-Output Menu**
  - 41 IOut Range
    - 4-20mA      0-20mA
  - 42 IOut: 4/0mA
  - 43 IOut: 20mA
  - 44 IOut Track
    - Grs Net
  - 45 IOut Failsafe
    - Hi Lo NC
  - 46 IOut Enable
    - On Off
  - 48 Current Adjst
    - 0mA Point
    - 4mA Point
    - 20mA Point
  - 49 Test Current
    - 4/0mA    6/2mA    8/4mA
    - 10/6mA   12/8mA   14/10mA
    - 16/12mA   18/14mA   20/16mA
    - /18mA   -/20mA
- 50 Com Menu**
  - 51 Serial Address
  - 52 Serial Baud
    - 1200 2400 4800 9600 19200
  - 53 PLC Menu <sup>(2)</sup>
    - A-B RIO Menu
    - DeviceNet Menu (release 1st quarter 1999)
    - Profibus Menu (release in 1999)
    - Modbus Menu (release in 1999)
- 60 Sensor Menu**
  - 61 Sensor Adj Ex
    - 13V 12V 11V 10V 9V 8V 7V 6V 5V
  - 62 Resolution
    - 16bt 17bt 18bt 19bt 20bt 21bt
  - 63 Sensor Gain
    - 1 2 4 8 16 32 64 128
  - 69 Sensor Disply
    - Raw Weight
    - Ftr Weight
    - Out Weight
    - Raw Counts
    - Ftr Counts
    - Sensout
- 70 Filter Menu**
  - 71 Averaging
  - 72 DSP Enable
    - On Off
  - 73 DSP Step
  - 74 DSP Qualify
  - 75 DSP Factor
  - 79 DSP Step Mon
- 80 Tracking Menu**
  - 81 Rate Threshld
  - 82 Sample Intrvl
  - 83 Zero Trak Win
  - 84 Drift Limit
  - 85 Mat Trak Enab
    - On Off
  - 89 Rate Monitor
- 90 Service Menu**
  - 91 User Access
  - 92 Keyboard Lock
  - 93 Keyboard Test
  - 94 Default Systm
  - 99 Diagnostics

**Notes:**

- <sup>(1)</sup> Setpoint Test is at the same menu level as 31-39, but does not have a menu number.
- <sup>(2)</sup> Submenus are functional for PLC Menu only if your SVS 2000 includes a PLC interface PCB. See the applicable manual for detailed information: *A-B RIO Interface Manual for SVS 2000*, *DeviceNet Interface Manual for SVS 2000*, *Profibus Interface Manual for SVS 2000*, or *Modbus Interface Manual for SVS 2000*.

Figure G-1. SVS 2000 Menu Tree (continued from previous page)

## Parameter Defaults

### 10 Display Menu

- 11 Disp Format<sup>1</sup> — xxxxxx
- 12 Disp Countby<sup>1</sup> — 1
- 13 Disp Units<sup>1</sup> — (none)
- 14 Bargraph Span<sup>1,2</sup> — 9999

### 20 Cal Menu

- 21 Auto Cal
  - Lo Span Cal — ---- (no value)
  - Hi Span Cal — ---- (no value)
  - Disp Val Correct — ---- (no value)
- 22 Manual Cal
  - Scale Factor Wgt<sup>1,2</sup> — 9999
  - Scale Factor Cts<sup>1</sup> — 250,000
  - Zero Counts<sup>1</sup> — 1,048,576
- 23 Linearization
  - Linearize Set<sup>2</sup> —
 

|              |              |
|--------------|--------------|
| 1In — 0      | 1Ot — 0      |
| 2In — 2,500  | 2Ot — 2,500  |
| 3In — 5,000  | 3Ot — 5,000  |
| 4In — 7,500  | 4Ot — 7,500  |
| 5In — 10,000 | 5Ot — 10,000 |
  - Linearize Enable — Off
- 24 Zero Tolerance<sup>2</sup> — 100

### 30 Setpoint Menu

- 31-38
  - Relay #1 and #2,
  - Digital Outputs #1 through #6
    - Value — 0
    - Deadband<sup>2</sup> — 10
    - Hi/Lo — Lo
    - Track — Grs
    - Fail-Safe — Off
    - Preact — 0

### 40 I-Output Menu

- 41 IOut Range — 4-20mA
- 42 IOut: 4/0mA<sup>2</sup> — 0
- 43 IOut: 20mA<sup>1,2</sup> — 9999
- 44 IOut Track — Grs
- 45 IOut Failsafe — Lo
- 46 IOut Enable — Off
- 48 Current Adjst
  - 0mA Point — 910 cts
  - 4mA Point — 3,600 cts
  - 20mA Point — 14,516 cts

### 50 Com Menu

- 51 Serial Address — 255 decimal/FF hex
- 52 Serial Baud — 9600

### 60 Sensor Menu

- 61 Sensor Adj Ex<sup>1</sup> — 12 V
- 62 Resolution — 21bt
- 63 Sensor Gain<sup>1</sup> — 2

### 70 Filter Menu

- 71 Averaging — 1
- 72 DSP Enable — On
- 73 DSP Step<sup>2</sup> — (based on 10,000 counts)
- 74 DSP Qualify — 3
- 75 DSP Factor — 100%

### 80 Tracking Menu

- 81 Rate Threshld<sup>2</sup> — (based on  $\pm 10$  uV/sec)
- 82 Sample Intrvl — 10 seconds
- 83 Zero Trak Win<sup>2</sup> — 0
- 84 Drift Limit<sup>2</sup> — (based on  $\pm 5$  mV)
- 85 Mat Trak Enab — Off

### 90 Service Menu

- 91 User Access — (no code needed)
- 92 Keyboard Lock — (no code needed)

#### Notes:

<sup>1</sup> Values for these parameters may have changed as a result of *Quick Config* entries and/or internal calculations based on those entries.

<sup>2</sup> Values for these parameters are consistent with *Disp Format*. For example, if *Disp Format* is xxxxxx, *Zero Tolerance* is 100. If *Disp Format* is xxxxxx00, *Zero Tolerance* is 10,000. If *Disp Format* is xxxxx.x, *Zero Tolerance* is 10.0.

## Setup Table

For your records, fill in the following with the parameters for your SVS 2000:

### 10 Display Menu

- 11 Disp Format \_\_\_\_\_
- 12 Disp Countby \_\_\_\_\_
- 13 Disp Units \_\_\_\_\_
- 14 Bargraph Span \_\_\_\_\_

### 20 Cal Menu

- 21 Auto Cal
  - Lo Span Cal \_\_\_\_\_
  - Hi Span Cal \_\_\_\_\_
  - Disp Val Correct \_\_\_\_\_
- 22 Manual Cal
  - Scale Factor Wgt \_\_\_\_\_
  - Scale Factor Cts \_\_\_\_\_
  - Zero Counts \_\_\_\_\_
- 23 Linearization
  - Linearize Set
    - 1In \_\_\_\_\_
    - 1Ot \_\_\_\_\_
    - 2In \_\_\_\_\_
    - 2Ot \_\_\_\_\_
    - 3In \_\_\_\_\_
    - 3Ot \_\_\_\_\_
    - 4In \_\_\_\_\_
    - 4Ot \_\_\_\_\_
    - 5In \_\_\_\_\_
    - 5Ot \_\_\_\_\_
  - Linearize Enable \_\_\_\_\_
- 24 Zero Tolrance \_\_\_\_\_

### 30 Setpoint Menu (see table below)

### 40 I-Output Menu

- 41 IOut Range \_\_\_\_\_
- 42 IOut: 4/0mA \_\_\_\_\_
- 43 IOut: 20mA \_\_\_\_\_
- 44 IOut Track \_\_\_\_\_
- 45 IOut Failsafe \_\_\_\_\_
- 46 IOut Enable \_\_\_\_\_
- 48 Current Adjst
  - 0mA Point \_\_\_\_\_
  - 4mA Point \_\_\_\_\_
  - 20mA Point \_\_\_\_\_

### 50 Com Menu

- 51 Serial Address \_\_\_\_\_
- 52 Serial Baud \_\_\_\_\_
- 53 PLC Menu \_\_\_\_\_

### 60 Sensor Menu

- 61 Sensor Adj Ex \_\_\_\_\_
- 62 Resolution \_\_\_\_\_
- 63 Sensor Gain \_\_\_\_\_

### 70 Filter Menu

- 71 Averaging \_\_\_\_\_
- 72 DSP Enable \_\_\_\_\_
- 73 DSP Step \_\_\_\_\_
- 74 DSP Qualify \_\_\_\_\_
- 75 DSP Factor \_\_\_\_\_

### 80 Tracking Menu

- 81 Rate Threshld \_\_\_\_\_
- 82 Sample Intrvl \_\_\_\_\_
- 83 Zero Trak Win \_\_\_\_\_
- 84 Drift Limit \_\_\_\_\_
- 85 Mat Trak Enab \_\_\_\_\_

### 90 Service Menu

- 91 User Access \_\_\_\_\_
- 92 Keyboard Lock \_\_\_\_\_

### 30 Setpoint Menu

|                   | Value | Deadband | Hi/Lo<br>(Hi, Lo) | Track<br>(Grs, Net, Tot, Flt) | Failsafe<br>(On, Off, NC) | Preact |
|-------------------|-------|----------|-------------------|-------------------------------|---------------------------|--------|
| <b>31 Relay1</b>  |       |          |                   |                               |                           |        |
| <b>32 Relay2</b>  |       |          |                   |                               |                           |        |
| <b>33 DigOut1</b> |       |          |                   |                               |                           |        |
| <b>34 DigOut2</b> |       |          |                   |                               |                           |        |
| <b>35 DigOut3</b> |       |          |                   |                               |                           |        |
| <b>36 DigOut4</b> |       |          |                   |                               |                           |        |
| <b>37 DigOut5</b> |       |          |                   |                               |                           |        |
| <b>38 DigOut6</b> |       |          |                   |                               |                           |        |

