OPW
FUEL MANAGEMENT SYSTEMS

SiteSentinel®

Automated Monitoring System

Model 2 and Model 3
Operator Manual
Software Version 1.12CUS

 Manual # **M56-01.12CUS**

OPW Fuel Management Systems -
System and Replacement Parts Warranty Statement

Effective September 1, 2002

System and Replacement Parts Warranty

OPW Fuel Management Systems warrants that all OPW Tank Gauge and Petro Vend Fuel Control systems supplied by OPW Fuel Management Systems to the Original Purchaser will be free from defects in material and/or workmanship under normal use and service for a period of 12 months from the date of installation or 15 months from the date of shipment. Additionally, OPW Fuel Management Systems warrants that all upgrades and replacement parts (new and remanufactured) supplied by OPW Fuel Management Systems will be free from defects in material and workmanship under normal use and service for a period of 90 days from the date of installation or for the remainder of the system's original warranty, whichever is greater, as set forth in the first sentence of this statement. The foregoing warranties will not extend to goods subjected to misuse, neglect, accident, or improper installation or maintenance or which have been altered or repaired by anyone other than OPW Fuel Management Systems or its authorized representative.

The buyer's acceptance of delivery of the goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

If a claim is made within the warranted time period that any equipment and/or remanufactured part is defective in material or workmanship under normal use and service, such equipment and/or remanufactured part shall be returned to OPW Fuel Management Systems, freight prepaid. If such equipment or remanufactured part is found by OPW Fuel Management Systems in its sole judgment, to be defective in material or workmanship under normal use and service, OPW Fuel Management Systems, shall, at its sole option, repair or replace such equipment and/or remanufactured part (excluding, in all instances, fuses, ink cartridges, batteries, other consumable items, etc.)

The warranties, as set forth above, are made expressly in lieu of all other warranties, either expressed or implied, including, without limitation, warranties of merchantability and fitness for any particular purpose and of all other obligations or liabilities on OPW Fuel Management Systems part. Further, OPW Fuel Management Systems neither assumes, nor authorizes any other person to assume for it, any other liability in connection with the sale of the systems, or any new/replacement part that has been subject to any damage from any act of nature or any *force majeure*.

The term "Original Purchaser" as used in these warranties shall be deemed to mean the authorized OPW Fuel Management Systems distributor to which the system or any new/replacement part was originally sold. These warranties may be assigned by the original purchaser to any of its customers who purchase any OPW Fuel Management Systems systems or new/replacement parts.

The sole liability of OPW Fuel Management Systems, for any breach of warranty, shall be as set forth above. OPW Fuel Management Systems does not warrant against damage caused by accident, abuse, faulty or improper installation or operation. In no event shall manufacturer's liability on any claim for damages arising out of the manufacture, sale, delivery or use of the goods exceed the original purchase price of the goods. In no event shall OPW Fuel Management Systems be liable for any direct, indirect, incidental or consequential damage or loss of product.

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Notes:

Chapter 1 - Introduction

This manual describes operation of both the Site Sentinel MODEL II and MODEL III. The functionality of both models is nearly identical - the differences are in the hardware.

The Site Sentinel II has a large keypad-equipped controller with a built-in LCD screen. The Model III controller is a small, desktop unit that is run completely from an outside terminal or PC.

Screens in this manual are illustrating either the built-in Model II display, or a CRT on a terminal or PC for Model III use.

Any other differences between Model II and Model III are explained in the appropriate sections.

The **SiteSentinel** Monitoring System is one of the most comprehensive tank management and leak detection systems ever devised.

Performance and reliability are guaranteed by independent testing and approvals from Underwriter's Laboratories, the Canadian Standards Association, and the U.S. EPA.

The SiteSentinel's **modular design** lets you buy the system you want now. And you can expand your system - on site, anytime - by adding what *you* need ... when *you* need it.

Each SiteSentinel system has one **controller** to manage operations. Inventory and system reports are available *anytime* - and can be scheduled to print *automatically*.

Built-in sound and light **alarms** can signal any system event (such as a tank overflow). Or, attach a **modem** for remote operation from a terminal or PC.Tank **probes and sensors** connect to intrinsically safe **Smart Modules**. As many as 16 probes and sensors connect to each module, in any combination. Up to eight Smart Modules can be connected for a total of 128 probes and sensors.

The **probe** used with the SiteSentinel is the *Model 613*, by Petro Vend. The 613 has its own microprocessor and data base for easy installation and accurate performance.

Petro Vend also makes available a wide variety of sensors for the **SiteSentinel**: liquid, vapor, sump, reservoir, liquid phase, interstitial, and Freon.

The optional **I/O Module** connects to as many four input devices and 12 output devices. Up to eight I/O Modules can be connected to the Controller for a total of 32 input and 96 output devices.

Programmers can write programs to control the SiteSentinel via an external computer. See the **Computer Access** appendix.

The I/O Module has not been evaluated by Underwriter's Laboratories. Interconnection of the I/O Module and the system covered in this manual has not been evaluated by Underwriter's Laboratories.

1.1 Specifications

1.1.1 MODEL II and MODEL III CONTROLLERS

MODEL II CONTROLLER	
Dimensions **Width:** **Height:** **Depth:**	 18" (46 cm) 15" (38 cm) 5" (13 cm)
Electrical Requirements **Standard Voltage Supply:** **Optional Voltage Supply:** **Power Consumption:**	 105 to 125 VAC, 60 Hz 220 to 240 VAC, 50 Hz 60 watts maximum
Temperature Range	32°F to 122°F (0°C to 50°C)
Module Capacity	8 Smart Modules and 8 I/O Modules
Display **Backlight:** **Viewing Area:** **Dot Matrix:** **Dot Color:**	 CCFT 5" x 3" (127 mm x 76 mm) 25 lines by 40 characters 320 x 200 dots blue characters, white background
Keypad	16 keys: 10 alphanumeric, 6 function
Optional Internal Printer	40 column plain paper
Optional Internal Modem (for remote operation)	model 224A; up to 2400 baud
Standard Alarms	one audible, one visible
Alarm Inputs (2 standard)	for use with closed contact type inputs rated at 12 VDC, 40 mA
RS-232 Ports (for remote operation)	up to 19,200 baud; VT100, VT52 or WYSE 50 emulation available; 7 data bits, even parity, 1 stop bit

MODEL III CONTROLLER	
Dimensions Width: Height: Depth:	 10" (25 cm) 2" (5 cm) 11" (28 cm)
Electrical Requirements Standard Voltage Supply: Optional Voltage Supply:	 120 VAC, 50/60 Hz 220 to 240 VAC, 50/60 Hz
Temperature Range	20°F to 100°F (-7°C to 38°C) *(indoors only)*
Module Capacity	8 Smart Modules and 8 I/O Modules
Serial Communication Ports	Petro-Net *(RS-485)* Printer *(proprietary)* Terminal *(RS-232)* Modem *(RS-232)* 3 Auxiliary Ports *(RS-232)*

1.1.2 SMART MODULE

Electrical Requirements **Standard Voltage Supply:** **Optional Voltage Supply:** **Power Consumption:**	 105 - 125 VAC, 60 Hz 220 - 240 VAC, 50 Hz 60 watts maximum
Dimensions **Width:** **Height:** **Depth:**	 18" (46 cm) 9.25" (38 cm) 5" (13 cm)
Temperature Range	32°F to 122°F (0°C to 50°C)
Module Capacity	up to 8 Smart Modules per Controller
Device Capacity **per I. S. Barrier:** **per Smart Module:** **per System:**	 up to 4 devices (probes and/or sensors) up to 16 devices (probes and/or sensors) up to 128 devices (probes and/or sensors)
Petro-Net Communication Wiring Requirement	18 AWG, twisted pair, oil & gas resistant (TFFN, THHN, or THWN)
Maximum Cable Extension to Controller	5000 feet (1.5 km)

1.1.3 I/O MODULE

Electrical Requirements **Standard Voltage Supply:** **Optional Voltage Supply:** **Power Consumption:**	 105 - 125 VAC, 60 Hz 220 - 240 VAC, 50 Hz 60 watts maximum
Dimensions **Width:** **Height:** **Depth:**	 8" (20 cm) 10" (25 cm) 4" (10 cm)
Module Capacity	up to 8 I/O Modules per Controller
Device Capacity	4 input devices 12 output devices
Output Relay Rating	20 amps @ 240 VAC (normally open) 10 amps @ 240 VAC (normally closed)
Input Rating	10 milliamps @ 5 VDC (sink)
Input Wiring Requirement	12 to 14 AWG
Petro-Net Communication Wiring Requirement	18 AWG, twisted pair, oil & gas resistant (TFFN, THHN, or THWN)
Maximum Cable Extension to Controller	5000 feet (1.5 km)

1.1.4 MODEL 613 PROBE

Power Requirements	Powered through intrinsically safe barrier in Smart Module only
Temperature Range, Probe or Product	-13°F to 131°F (-25°C to +55°C)
Cable Requirement	Belden #88760 or Alpha #55371 cable (shielded two-wire twisted pair)
Maximum Cable Extension	1000 feet (305 m)
Level Measurement **Product** **Water** **Temperature**	 Resolution of 0.0005 inch (0.01 mm) Resolution of 0.01 inch (0.3 mm) Resolution of 0.001° F (.0005° C)
Classification	Class I, Division 1, Group D hazardous locations

PV MODEL 613 PROBE LENGTHS

Probe Length	Tank Diameter (or Height)	Location of Temperature Sensors (Measured from Probe End)
36" (91 cm)	31" (79 cm)	5", 13" (13, 83 cm)
53" (135 cm)	48" (122 cm)	7", 12", 20", 28", 36" (18, 30, 51, 71, 91 cm)
69" (175 cm)	64" (163 cm)	10", 16", 27", 37", 48" (25, 41, 69, 94, 122 cm)
77" (196 cm)	72" (183 cm)	11", 18", 30", 42", 54" (28, 46, 76, 107, 137 cm)
89" (226 cm)	84" (213 cm)	13", 22", 36", 49", 63" (33, 56, 91, 124, 160 cm)
101" (257 cm)	96" (244 cm)	15", 25", 41", 55", 71" (38, 64, 104, 140, 180 cm)
105" (267 cm)	100" (254 cm)	16", 26", 42", 58", 74" (41, 66, 106, 147, 188 cm)
113" (287 cm)	108" (274 cm)	17", 28", 46", 62", 80" (43, 71, 117, 157, 203 cm)
125" (317 cm)	120" (305 cm)	19", 31", 51", 69", 89" (48, 79, 130, 175, 226 cm)
137" (348 cm)	132" (335 cm)	22", 35", 56", 76", 97" (56, 89, 142, 193, 246 cm)
149" (378 cm)	144" (366 cm)	24", 38", 61", 83", 106" (61, 97, 155, 211, 269 cm)

NOTE: The probe head also contains a temperature sensor.

1.2 Hardware Overview

1.2.1 MODEL II CONTROLLER

The Model II controller can monitor up to eight Smart Modules and eight I/O Modules. *See Page 10 for more terminal/PC info.*

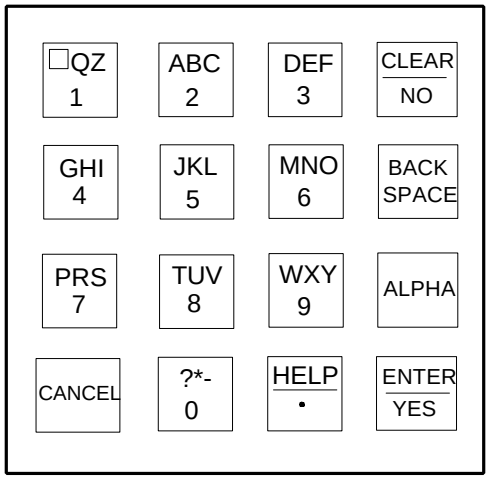
Model II controller operation is done:

- ☐ Via the built-in keypad and display
- ☐ Via an on-site terminal or PC
- ☐ With a modem, via an off-site terminal or PC

Menus. You'll see the same menus on the built-in display as on external computers or terminals. *In this manual, a "pathway" to the indicated menu is shown near each menu.*

Printer. An optional internal 40-column printer can be factory-installed in the controller to create hard copies of reports.

Model II Keypad



☐ Ten keys have a number and three letters (or punctuation). The "1" key shares its function with the letters "Q" and "Z", and a space.

☐ The **CLEAR/NO** key either erases an entry or field, or answers NO to a prompt. This key also "toggles" (displays in sequence) available options in multi-choice prompts.

☐ The **BACKSPACE** key moves the cursor back one space, erasing one character. It operates the same as the [BACKSPACE] key on a external terminal keyboard.

☐ The **ALPHA** key "shifts" the number/letter keys to enter letters. For example, to enter an "A", you would press the [2] key, and then the [ALPHA] key, and finally the [ENTER] key.

☐ The **ENTER/YES** key either finishes an entry or answers YES to a prompt. It functions the same as pressing the [ENTER/RETURN] key on an external terminal keyboard.

☐ *The **HELP** key is not functional in this release of software.* The **CANCEL** key backs you out of as menu, or cancels your previous command.

An auto-logout feature returns the system to an Idle Mode when no menu selection or data entry is made for 10 minutes.

Display Screen. The Model II controller *display* is a backlit LCD screen for showing inventory and system data. Print most displayed screens by pressing the **[?*-/0]** key on the keypad, or the terminal **[P]** key. Only screens with *Print* on the bottom can be printed.

You can set the SiteSentinel Model II to display graphs showing the status of the Smart and I/O Modules (opposite). The display shows each graph for 10 seconds. Pause the display at any time to review an individual graph. *See Page 49 for more information.*

Two types of status graph are available for each Smart Module. In the *Probe Level Graph*, a bar indicates the level of each product float as a percentage of its tank's diameter. In the *Tank Volume Graph*, a bar indicates the current gross product volume for each tank as a percentage of its total volume. Both types of graph also show immediate sensor status.

I/O module *status graphs* indicate module position: open, closed, energized, not energized or removed from operation.

```
SITE SENTINEL                      NOV 16, 1994                          7:45 AM

                          MANIFOLDED TANK INVENTORY REPORT


MANIFOLDED TANK GROUP: 1
MODULE: 1 POSITIONS : .B.D.....
PRODUCT: DIESEL

VOLUME                 IN        GAL
 PRODUCT           :   0.00     13168.99
 WATER             :   0.00        42.61
 TOTAL TANK        :   0.00     13211.60

TEMPERATURE CORRECTED
 PRODUCT           :    NA      13066.89
 WATER             :    NA         42.28
 TOTAL TANK        :    NA      13109.17

TO FILL TANK ADD   :    NA       7288.40
TO FILL TO 90% ADD:     NA          0.00

AVERAGE PRODUCT TEMPERATURE:  77.1
```

```
SiteSentinel v1.08A-USA-235  TERM IN USE
Smart Module #: 1, OKAY
                POSITION
        A B C D E F G H I J K L M N O P
  P  TOP644444444444444444444444444444447
R      5          U                      5
O      5          N U                    5
B  75%5 $         C N                    5
E      5 $        O I                    5
       5 $        N N                    5
L  50%5 $         F S                    5
E      5 $    N   I T N                  5
V      5 $    O A G A O A                5
E  25%5 $ D R L U L R L                  5
L      5 $ O M E R L M E                 5
       5 $ W A R E E A R                 5
BOTTOM5 $ N L T D D L T                  5
        944444444444444444444444444444448
        P P V W P P S H . . . . . . . . .
 .=NONE; P=PROBE; G=GENERIC; F=FREON
 V=VAPOR, L=LIQUID, S=SUMP, R=RESERVOIR
```

```
SiteSentinel v1.08A-USA-235  TERM IN USE
                I/O STATES
 PSTNS  A B C D E F G H I J K L M N O P
        644444444444444444444444444444447
  I M 5 O O O O N N N N N N N N N N N N5
  / O 5 NOT INSTALLED                   5
  0 D 5 NOT INSTALLED                   5
    U 5 NOT INSTALLED                   5
    L 5 NOT INSTALLED                   5
    E 5 NOT INSTALLED                   5
      5 NOT INSTALLED                   5
      5 NOT INSTALLED                   5
        944444444444444444444444444444448
         INPUT           OUTPUTS

 LEGEND:"O"=OPENED  "N"=NOT ENERGIZED
        "C"=CLOSED  "E"=ENERGIZED
        "R"=REMOVED FROM OPERATION



                  PAUSED
DIRECTIONS: Press [Enter] for Main Menu,
[ALPHA] to Pause, [CANCEL] to Resume.
```

1.2.2 MODEL III CONTROLLER

The Model III controller is a microprocessor-based device which can monitor up eight Smart Modules and eight I/O Modules. Because of its small size, the controller can conveniently be placed in a convenient-to-get-to convenient location.

The Model III controller is designed for INDOOR USE ONLY.

There are two methods of Model III controller operation: (1) an on-site terminal or PC, and (2) an off-site terminal or PC connected via modems. All setup and operating commands are listed on menus.

No commands need to be memorized and no computer expertise is required to program the controller. The same menus are used for all methods of controller operation. Help screens are available at each menu.

1.2.3 SMART MODULE

The Smart Module gathers probe and sensor data and routes it to the controller. Up to 16 probes or sensors can be connected to each Smart Module. Up to eight Smart Modules can communicate with the controller via the Petro-Net LAN.

1.2.4 I/O MODULE

The *optional* Input/Output Module expands I/O capacity, and allows connection of up to four input devices and 12 output devices to the controller. Up to eight I/O modules can be connected for a grand total of 32 input and 96 output devices.

The I/O Module communicates with the controller via Petro-Net.

1.2.5 PROBES

The **Petro Vend** Model 613 probe has a built-in computer. Setup data is stored in the probe, and downloaded to the controller, during configuration.

The Model 613 probes have diagnostic capabilities to assist trouble shooting.

1.2.6 SENSORS

The following sensors are available from **Petro Vend**. All these sensors connect to the Smart Module for intrinsically safe operation.

See your *Site Sentinel Installation Manual* for illustrations of these sensors.

☐ **Vapor Sensor**. You can place vapor sensors in monitoring wells around the tanks, near pipelines or between the walls of double containment systems. You can also locate this sensor above ground to detect most petroleum vapors.

☐ **Liquid Sensor.** These sensors determine if a liquid is covering the vapor sensor or if a liquid has entered the space between the walls of a double-wall tank, pipe or delivery system. The liquid sensor is *not* destroyed when activated.

☐ **Universal Sump Sensor**. These sensors go in an attached manway riser or an attached collar riser. They detect liquid in the piping sump.

☐ **Universal Reservoir Sensor**. The URS monitors the reservoir level in double-walled monitored tanks.

☐ **Liquid Phase Sensor**. This sensor detects liquid hydrocarbon in various types of installations; for example, wet inspection wells, wet monitoring wells, piping with or without secondary containment, and above or below grade vaulted tanks.

☐ **Interstitial Sensor**. This device detects liquid hydrocarbons and/or water within a tank's interstitial space. Two sensing elements are wired to separate terminals in the **SiteSentinel** Smart Module, so the system indicates hydrocarbon and water independently.

☐ **Freon Sensor**. These sensors continuously detect Freon gas caused by leaks or spills, typically from pipes and tanks in and around refrigeration equipment.

1.2.7 TERMINAL/PC OPERATION

Using a terminal to program your Site Sentinel is optional on the Model II, but required on the Model III.

Local Operation. The terminal can be connected *locally*, within six feet of the controller. Communication is through the RS232 port of the controller.

Remote (Modem) Operation. For modem information, see Page 143. Terminal emulation and PC connections are explained on Page 149.

If you intend to write a computer interface program to execute SiteSentinel commands, remember that the menu and command arrangements are subject to change in future software versions.

Appendix K, beginning on Page 189, is a comprehensive guide to writing programs for controlling your system.

Your terminal must be able to use one of the following operating standards

- □ VT52
- □ VT100
- □ WYSE 50.

If you are using a PC, use a software program that can emulate one of these terminal standards.

The baud rate for the terminal or emulation software must match the rate set in the controller - refer to the *SiteSentinel Installation Manual* for details.

The terminal or emulation software must be configured for the following features:

- ☐ Carriage Return only
- ☐ 40 or 80 columns
- ☐ 25 (or more) lines
- ☐ Full duplex
- ☐ 7 data bits, 1 stop bit, even parity

The Timed Auto-logout feature prevents unauthorized access to the **SiteSentinel** if the system is left unattended.

When *enabled*, auto logout exits current mode (privileged, restricted, or normal) and returns to Idle Mode whenever a key has *not* been pressed for 10 minutes.

The auto-logout feature cannot be disabled when you are accessing the system via a modem.

Refer to Page 37 for more information about the timed auto-logout feature.

Notes:

Chapter 2 - Functional Overview

2.1 Passwords

The SiteSentinel has three modes of operation: Privileged, Non-Privileged and Restricted.

Before you set or configure anything, enter the Privileged password: the default password is HELLO. Use the ***1. ENTER PASSWORD*** on the Main Menu (below).

```
SITESENTINEL   APR 29, 1996   8:36 AM
                MAIN MENU

1.ENTER PASSWORD:
2.TANK INVENTORY REPORT
3.REPORTS
4.SYSTEM COMMANDS
5.SCHEDULE COMMANDS & REPORTS
6.SYSTEM SETUP
7.I/O AND SMART MODULE DATA
8.QUICK SALE REPORT (PRINTER REQUIRED)
9.QUICK DELIVERY REPORT (PRINTER REQD)



DIRECTIONS:
-----------
AT ANY MENU YOU MAY ENTER THE FOLLOWING:
OPTION #        SELECTS OPTION
[C] OR [CANCEL] EXITS TO PREVIOUS MENU
[P] OR [0]      PRINTS DATA FROM SCREEN
```

To prevent unauthorized viewing of data, activate the restricted mode. In this mode you must enter a password to display and print reports.

In normal mode, reports can be displayed and printed *without* entering a password.

When the system is not being programmed or requested for data, it is in *Idle Mode*. In idle mode, status charts showing current probe and sensor readings can be shown on the display.

2.2 Tank Inventory Report

The ***2. TANK INVENTORY REPORT*** option on the Main Menu displays current readings of all positions in all modules. Simply press 2 to see current inventories of all your tanks.

Other reports are accessed with Option 3 in the Main Menu.

2.3 Other Reports

The ***3. REPORTS*** option in the Main Menu lets you generate and print the following current and saved reports.

Current:

- ☐ Controller Status
- ☐ Tank, Probe & Sensor Status Graphs
- ☐ Tank Inventory
- ☐ Sensor Levels
- ☐ Warnings In Progress

Saved Events:

- ☐ Sensor, Probe & Input Data
- ☐ Hardware Failures
- ☐ Individual Events

Other Reports:

- ☐ Saved Tank Inventories
- ☐ I/O Module Status Reports

Use the **8. QUICK SALES REPORTS** and the **9. QUICK DELIVERY REPORTS** options in the Main Menu for other report options.

2.4 System Commands

The ***4. SYSTEM COMMANDS*** option in the Main Menu displays a submenu with the following options:

- ☐ System State (OPEN or CLOSE)
- ☐ Clear History Buffer
- ☐ Timed Leak Test
- ☐ Save Tank Inventory
- ☐ Passthrough Port *
- ☐ Abort a Scheduled Report
- ☐ Red Light Switch (ON or OFF)**
- ☐ Buzzer Switch (ON or OFF)**
- ☐ Computer Reports*
- ☐ System Backup*
- ☐ System Restore*
- ☐ Change I/O Module State

* *Terminal-equipped systems only*

** *For Model III, the "Red Light" is the STATUS LED, and the "Buzzer" is an internal beeper.*

2.5 Scheduled Commands & Reports

Select ***5. SCHEDULE COMMANDS & REPORTS*** from the Main Menu to display a submenu with the following options:

System Commands

Open or Close
Clear History Buffer
Timed Leak Test
Save Tank Inventories

Reports

In Progress Warnings
Saved Events Reports
Inventory Reports
Delivery Reports

2.6 System Setup

The ***6. SYSTEM SETUP*** option in the Main Menu lets you set basic parameters for the controller, the modules, and alarms.

Most setup information must be entered before the **SiteSentinel** can take measurements and generate data for reports.
System setup is divided into the following groups:

- ☐ *Controller Setup*
- ☐ *Smart Module Setup*
- ☐ *I/O Module Setup*
- ☐ *Alarms*

2.6.1 CONTROLLER SETUP (Both Model II and III)

Setting the controller includes:

- ☐ Units of measure
- ☐ Security
- ☐ Time/date
- ☐ Printer options
- ☐ Event History buffer
- ☐ Hardware test
- ☐ Idle Mode Graphs*
- ☐ Red Button, Light & Buzzer
- ☐ External computer

** MODEL II ONLY*

2.6.2 SMART MODULE SETUP

Smart Module setup includes the following:

- ☐ Module position type assignment
- ☐ Sensors configuration
- ☐ Tank and probe configuration
- ☐ Tank manifolding
- ☐ Tank thresholds
- ☐ Sensor thresholds
- ☐ Module position install/remove
- ☐ Tank correction

2.6.3 I/O MODULE SETUP

I/O Module setup includes:

- ☐ I/O Configuration
- ☐ Event Output Setup
- ☐ Installing & Removing Modules

2.6.4 ALARM SETUP

The Alarm setup tells the system how to respond to conditions such as low product level in a tank or a sensor activation.

Sixteen alarm conditions can be defined: overflow, low product, high water, temperature, theft, delivery, sale, leaks, sensor (high or low), I/O module inputs, input 1 or 2 closed, failure of a probe or module, a printer failure or a power failure.

2.7 Module Data Overview

The **7. I/O AND SMART MODULE DATA** option in the Main Menu is divided into two groups of functions:

Smart Module Data:

- ☐ Tank Dip Charts
- ☐ Tank & Sensor Info
- ☐ Probe & Sensor Hardware & Diagnostics
- ☐ Module/Device Level Summaries

I/O Module Hardware Data

2.8 Quick Sale Report

Pressing ***8. QUICK SALE REPORT*** from the Main Menu prints out a list of sales either in progress or recently completed. This one-touch report eliminates the need for you to go through layers of menus.

2.9 Quick Delivery Report

Pressing ***9. QUICK DELIVERY REPORT*** from the Main Menu prints out a list of deliveries either in progress or recently completed. This one-touch report eliminates the need for you to go through layers of menus.

2.10 Menus-At-A-Glance

MAIN MENU

1. ENTER PASSWORD
2. TANK INVENTORY REPORT
3. REPORTS
4. SYSTEM COMMANDS
5. SCHEDULED COMMANDS/ REPORTS
6. SYSTEM SETUP
7 I/O & SMART MODULE DATA
8. QUICK SALE REPORT
9. QUICK DELIVERY REPORT

*Following are each sub-menu accessed from the Main Menu. Some functions only apply to the **Model II**, and are labeled as such.*

1. ENTER PASSWORD

2. TANK INVENTORY REPORT

3. REPORTS

1. REPORT OUTPUT SETUP
2. CONTROLLER STATUS
3. TANK, PROBE, SENSOR STATUS GRAPHS
4. TANK INVENTORY
5. SENSOR LEVELS
6. WARNINGS IN PROGRESS
7. SENSOR,PROBE,INPUT,HW FAILURE
8. SENSOR, PROBE, INPUT
9. HARDWARE FAILURE
10. INDIVIDUAL
    - Overflows
    - Low Products
    - High Waters
    - Bad Temperatures
    - Thefts
    - Deliveries
    - Sales
    - Timed Leak Tests
    - High Sensor Levels
    - Low Sensor Levels
    - I/O Module Input Contact Closures
    - Input #1 Contact Closures
    - Input #2 Contact Closures
    - Probe Failures
    - Module Failures
    - Printer Failures
    - Power Failures
11. SAVED TANK INVENTORY
12. I/O MODULE STATUS REPORT

4. SYSTEM COMMANDS

1. SYSTEM STATE
2. CLEAR HISTORY BUFFER
3. TIMED LEAK TEST
4. SAVE TANK INVENTORY
5. PASSTHROUGH PORT
6. ABORT SCHEDULED REPORT PRINTOUT
7. RED LIGHT SWITCH (Model II)
8. BUZZER SWITCH (Model II)
9. COMPUTER REPORTS
10. SYSTEM BACKUP
11. SYSTEM RESTORE
12. CHANGE I/O MODULE OUTPUT STATE

5. SCHEDULED COMMANDS & REPORTS

1. Open/Close System
2. Clear History Buffer
3. Timed Leak Test
4. Save Tank Inventory
5. In Progress Warning Report
6. Saved Event Report
7. Inventory Report
8. Delivery Report

6. SYSTEM SETUP

CONTROLLER

1. Security
2. Time/Date
3. Printer Options
4. Measurement Units
5. Event History Buffer
6. System Hardware Test
7. Idle Mode Graphs (Model II)
8. Red Button/Light & Buzzer
9. Protocol Options

SMART MODULE

1. Module Position Type Assign.
2. Probe & Sensor Configuration
3. Tank Manifolding
4. Tank & Sensor Thresholds
5. Install/Remove Modules & Positions
6. Tank and Sensor Correction

I/O MODULE

1. I/O Configuration
2. Event Output Setup
3. Install/Remove Modules & Positions

ALARMS

1. Overflow
2. Low Product
3. High Water
4. Bad Temperature
5. Theft
6. Delivery
7. Sale
8. Timed Leak Test
9. Sensor High
10. Sensor Low
11. I/O Module Inputs
12. Input #1 Closed
13. Input #2 Closed
14. Probe Failure
15. Module Failure
16. Printer Failure
17. Power Failure

7. I/O & SMART MODULE DATA

I/O DATA

1. TANK DIP CHART
2. TANK & SENSOR
3. PROBE & SENSOR HARDWARE
4. PROBE & SENSOR DIAGNOSTIC
5. **MODULE DEVICE LEVEL SUMMARY**

MODULE HARDWARE

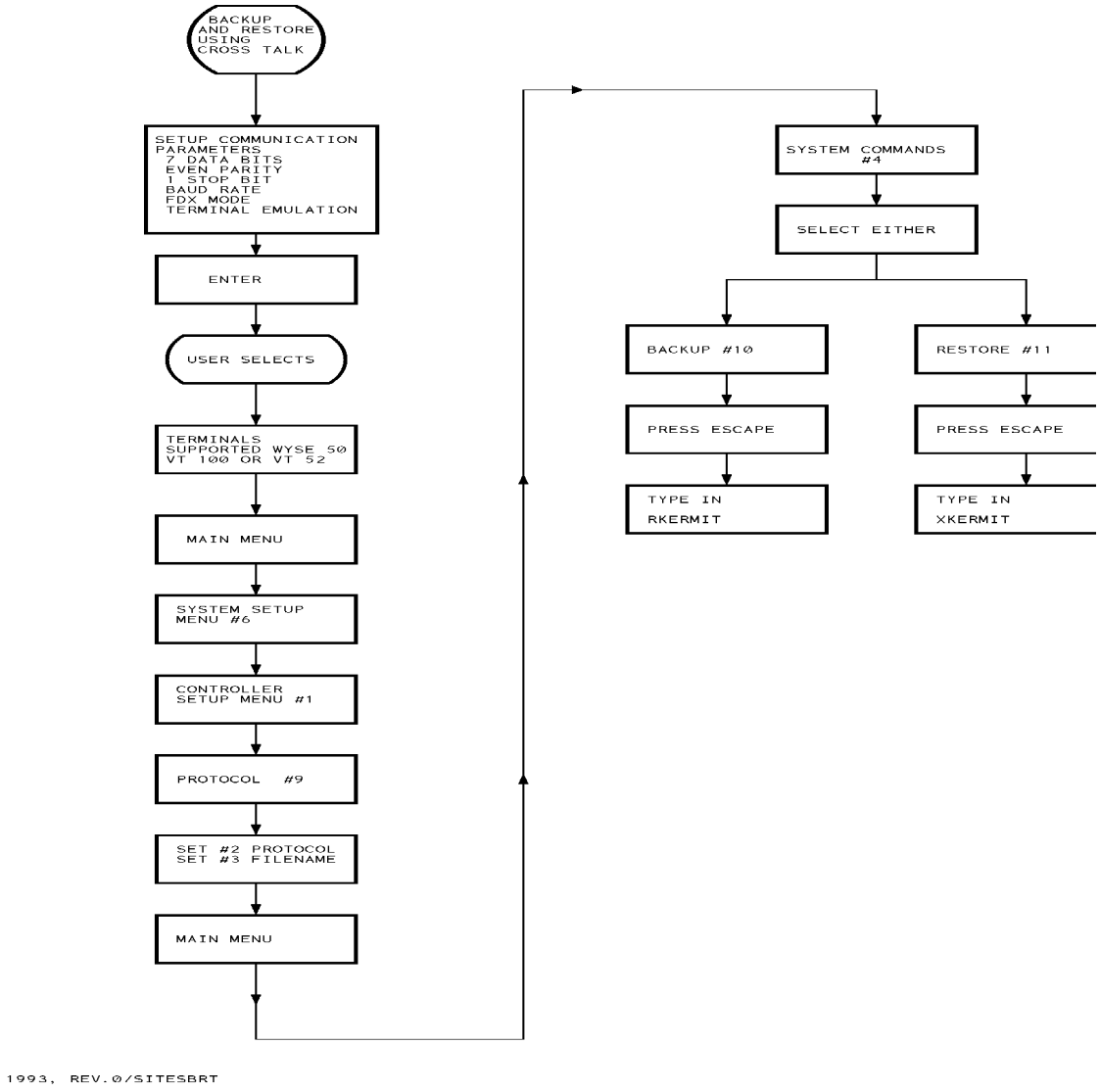
8. QUICK SALE REPORT

9. QUICK DELIVERY REPORT

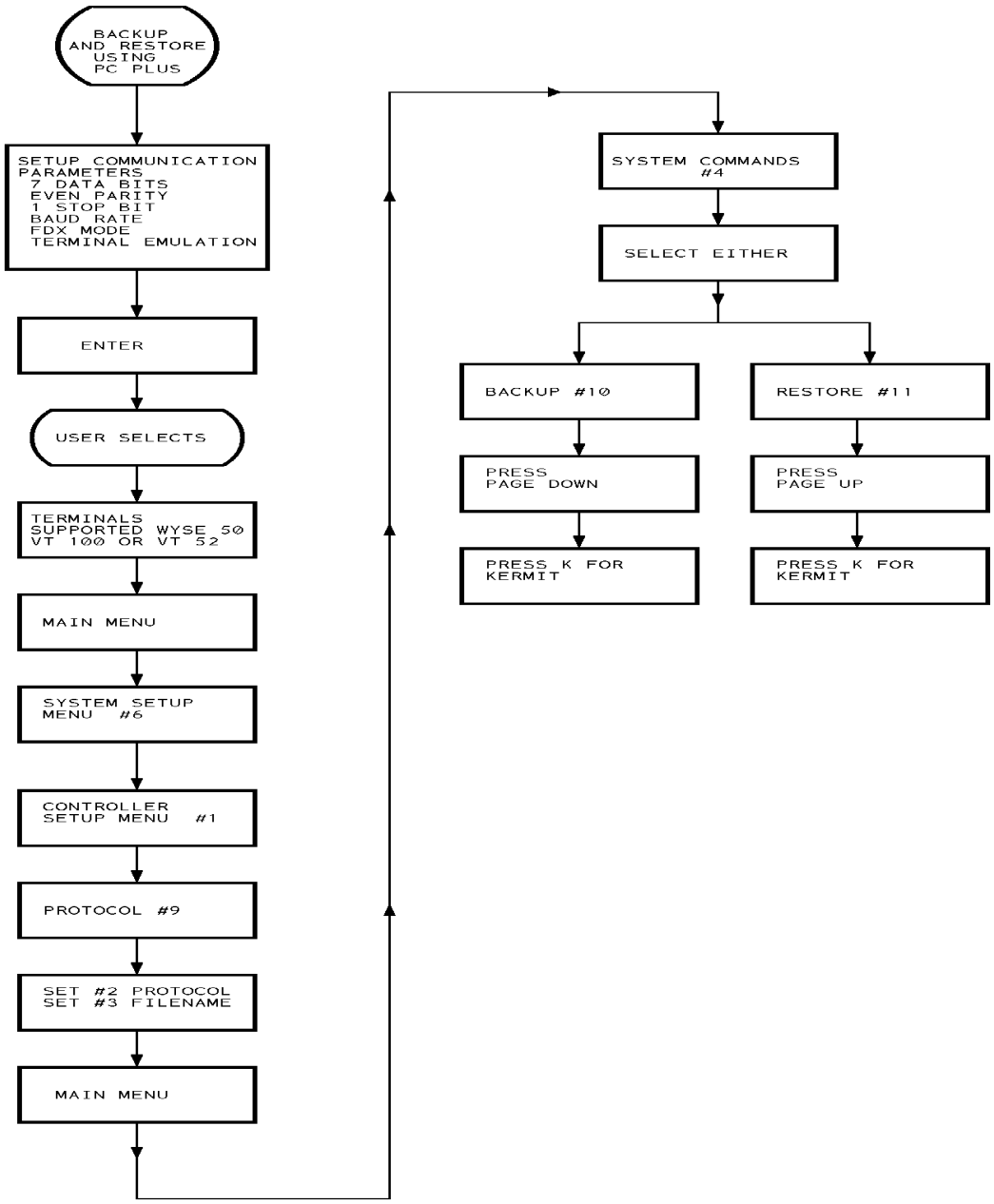
2.11 "How-To" Flowcharts

This section gives you graphical instructions for common SiteSentinel procedures: Timed Leak Test (immediate and scheduled), Print Out Individual Events, Time/Date Setup, Install/Remove Printer, Enable Probe Diagnostics, View Probe Diagnostics, Probe Test Setup, Probe Installation, Backup & Restore (with two types of software), a Cold-Start procedure, and Terminal Cable Assembly.

2.11.1 Backup/Restore Using CrossTalk Software *(For more info see Page 83)*.

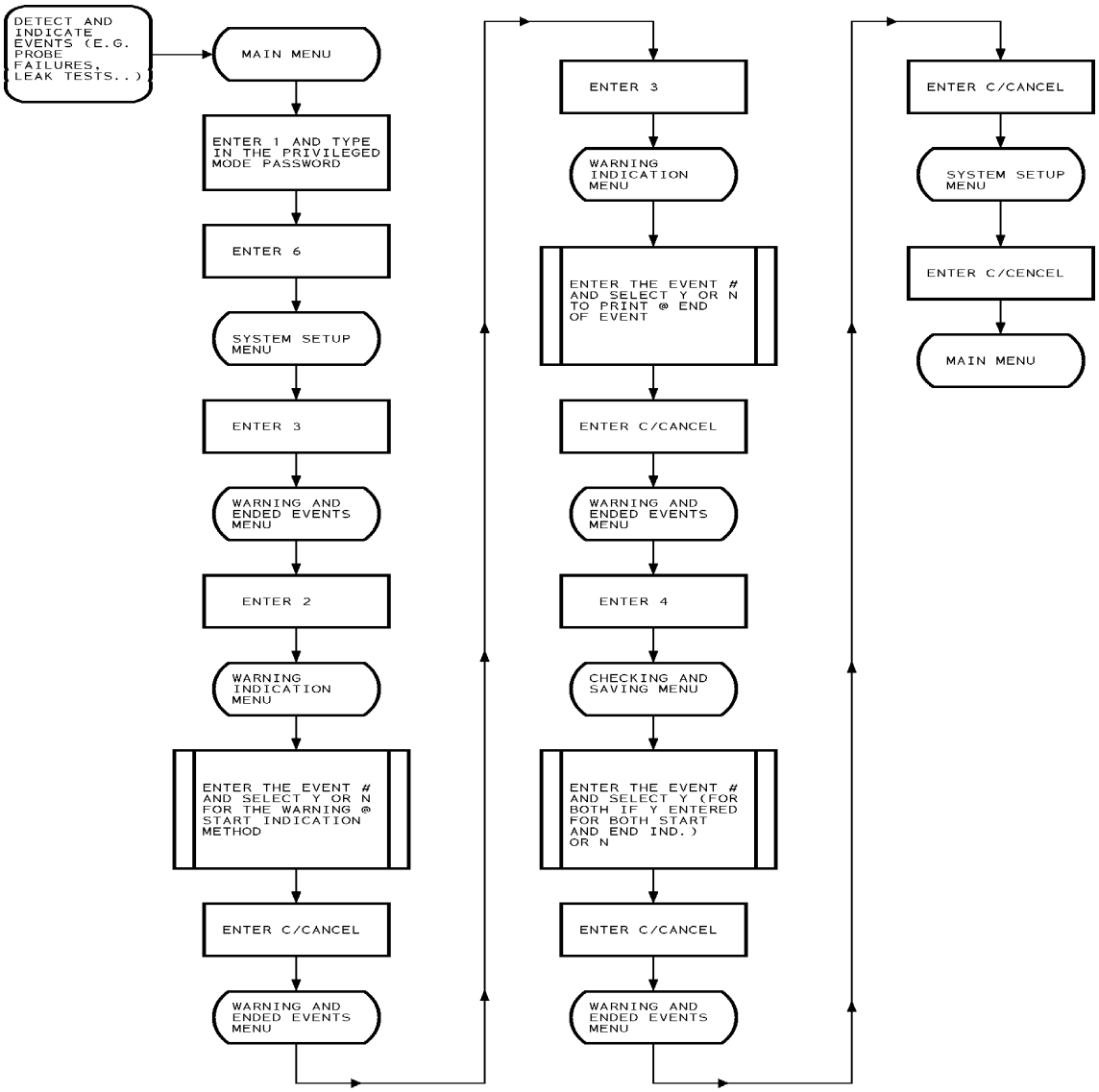


2.11.2 Backup/Restore Using ProComm Software *(For more info see Page 83)*

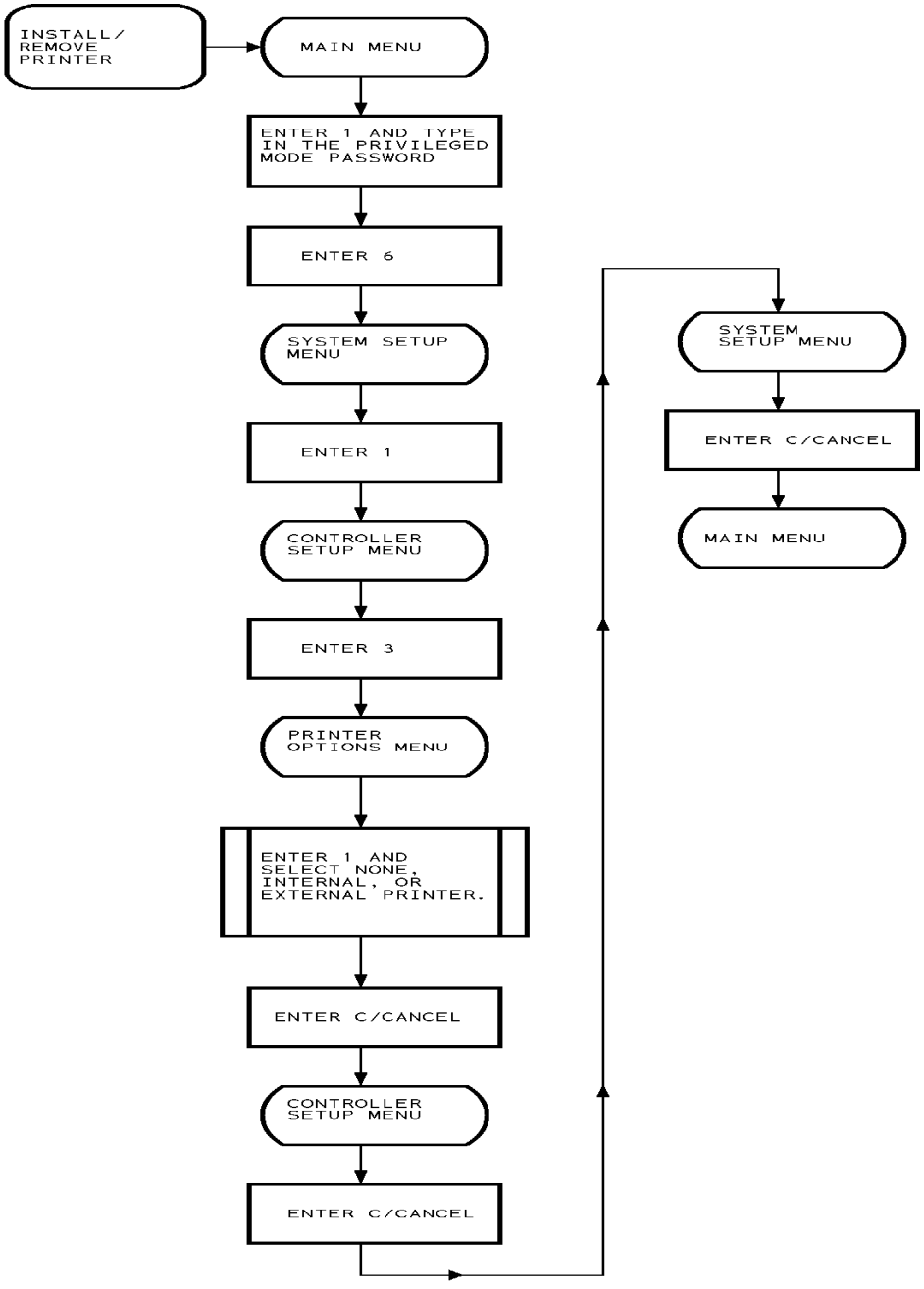


4, REV.1/SITESPCP

2.11.3 Event Detection/Indication *(more info on Pages 63 and 93)*

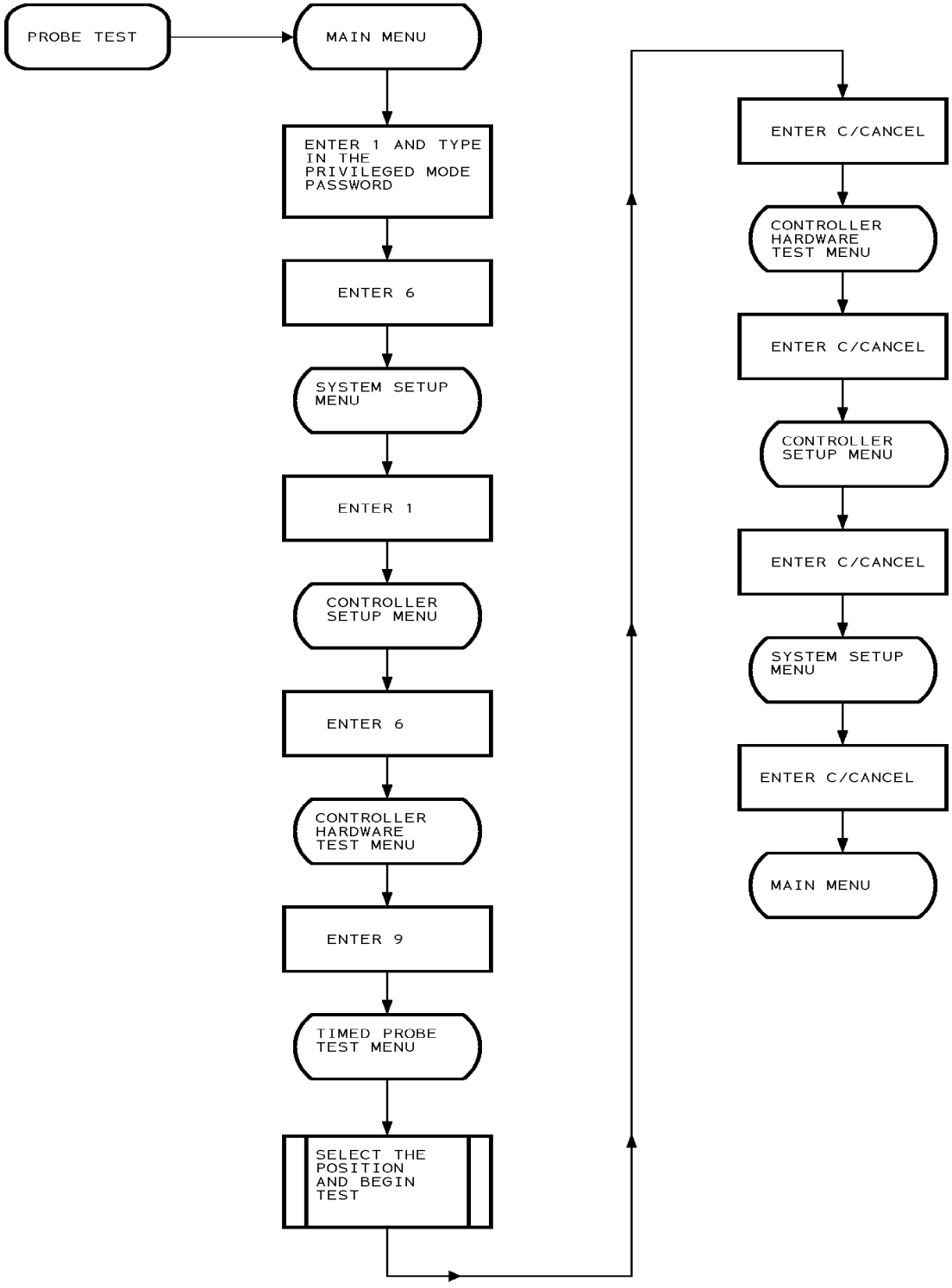


2.11.4 Install/Remove A Printer *(For more info see Page 41)*

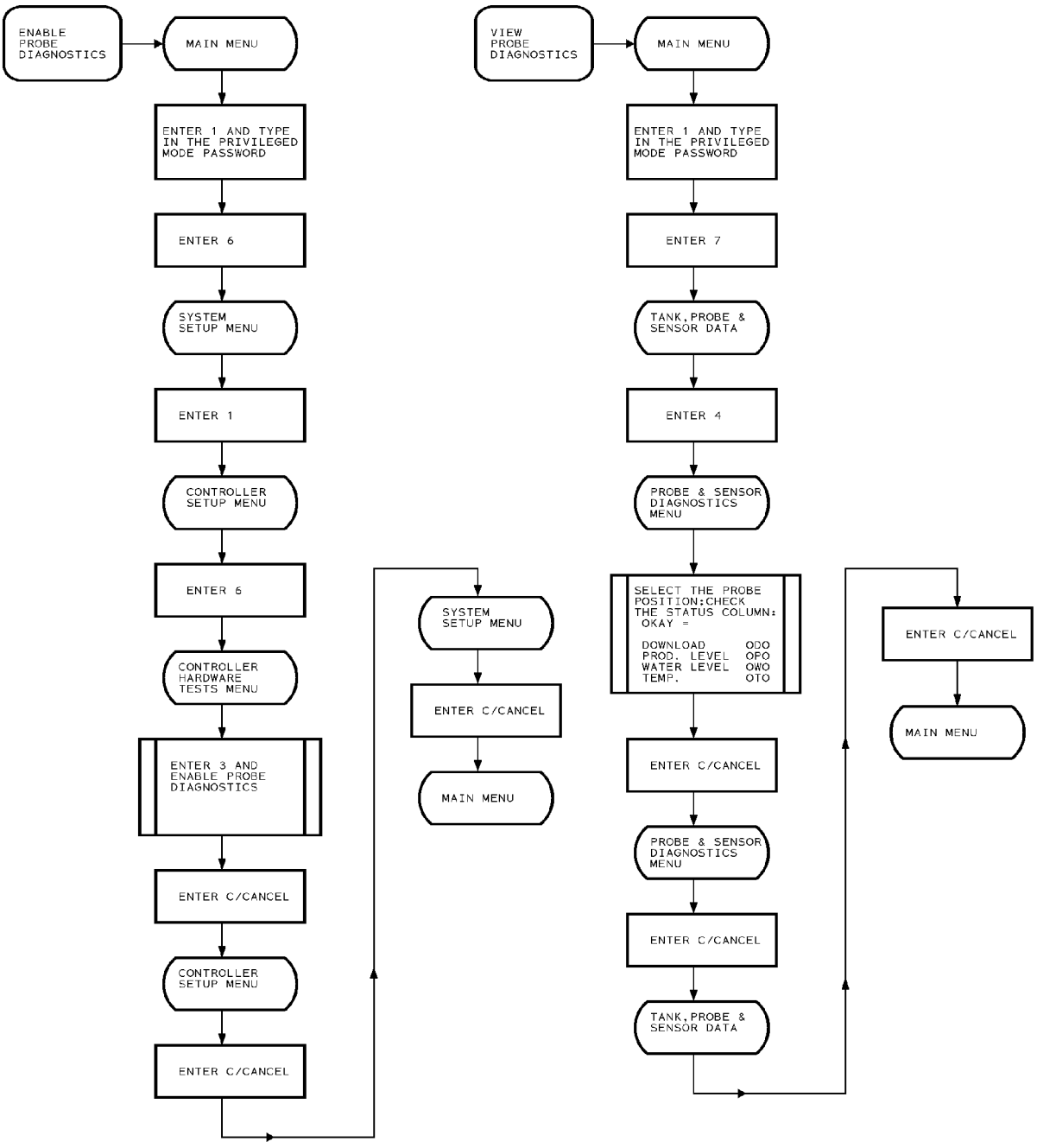


.0/SSTSIRPT

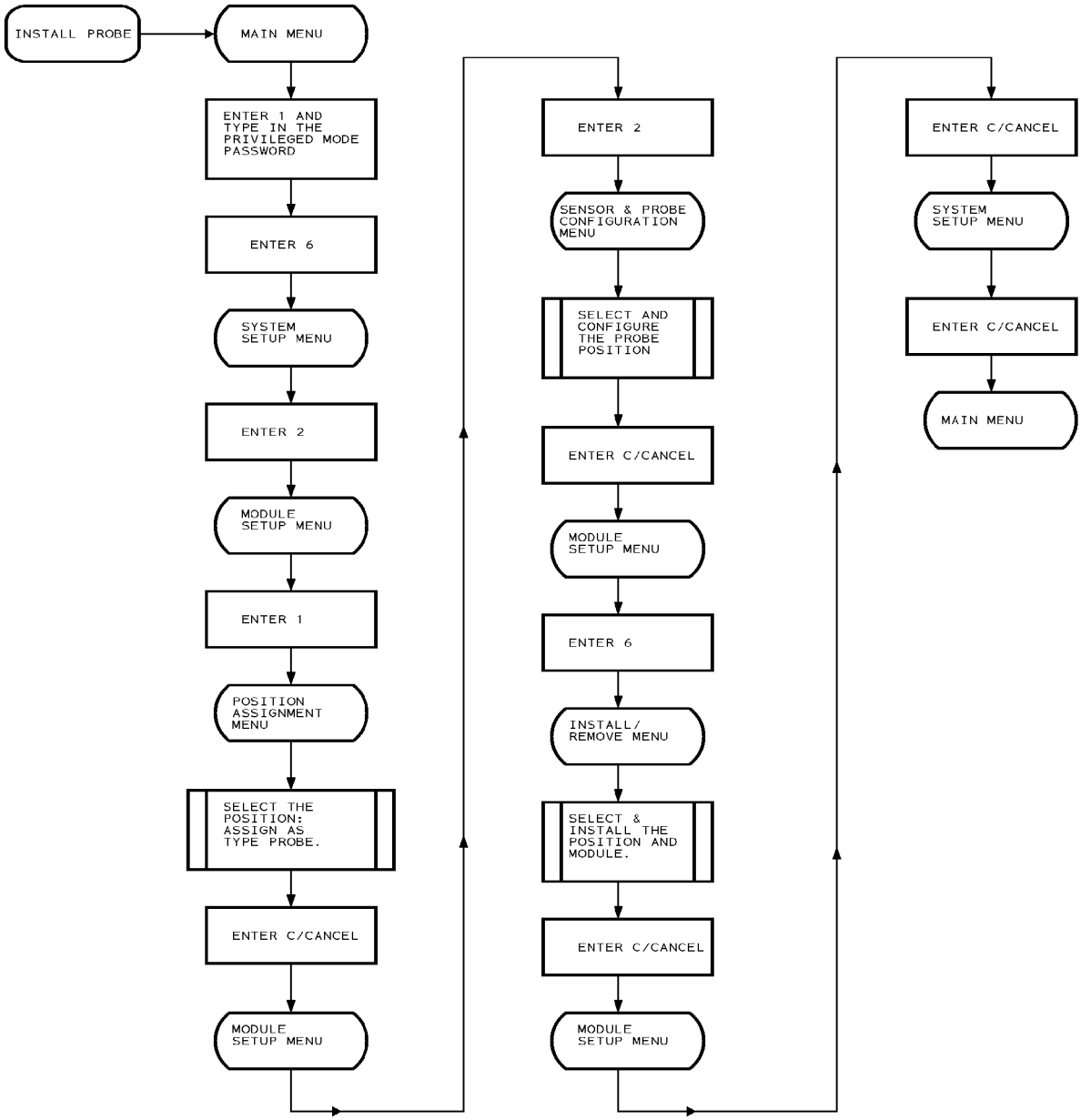
2.11.5 Probe Test Setup *(For more info see Page 96)*



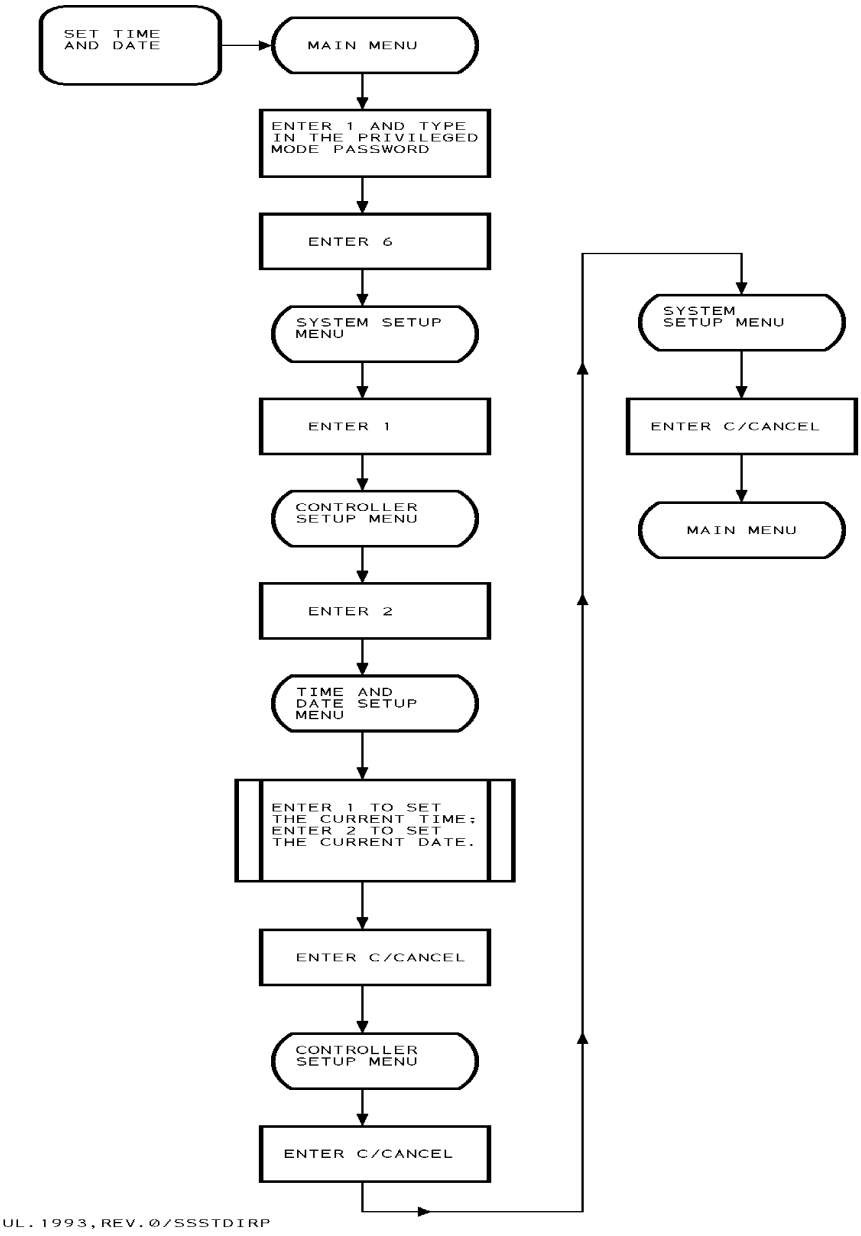
2.11.6 Probe Diagnostics *(For more info see Page 96)*



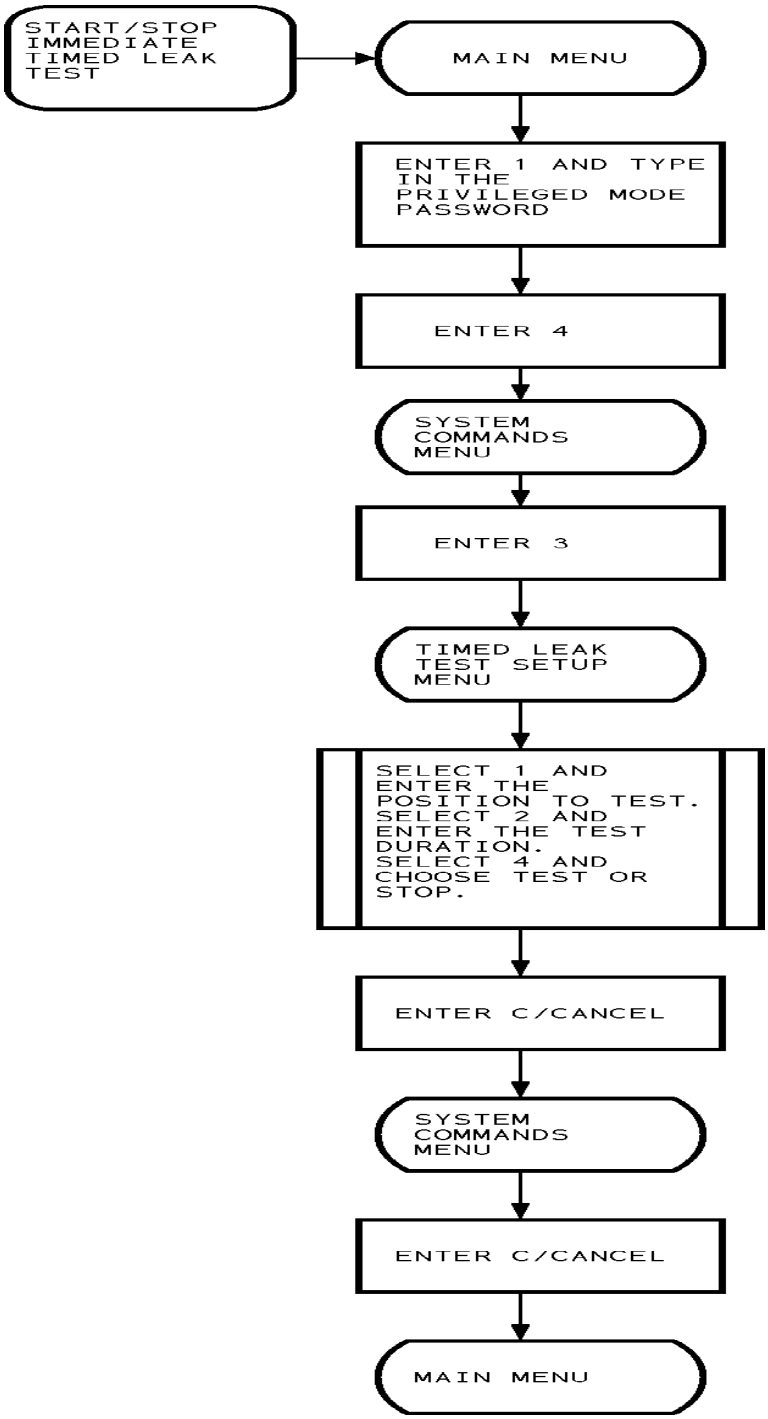
2.11.7 Probe Installation *(For more info see Pages 58 and 87)*



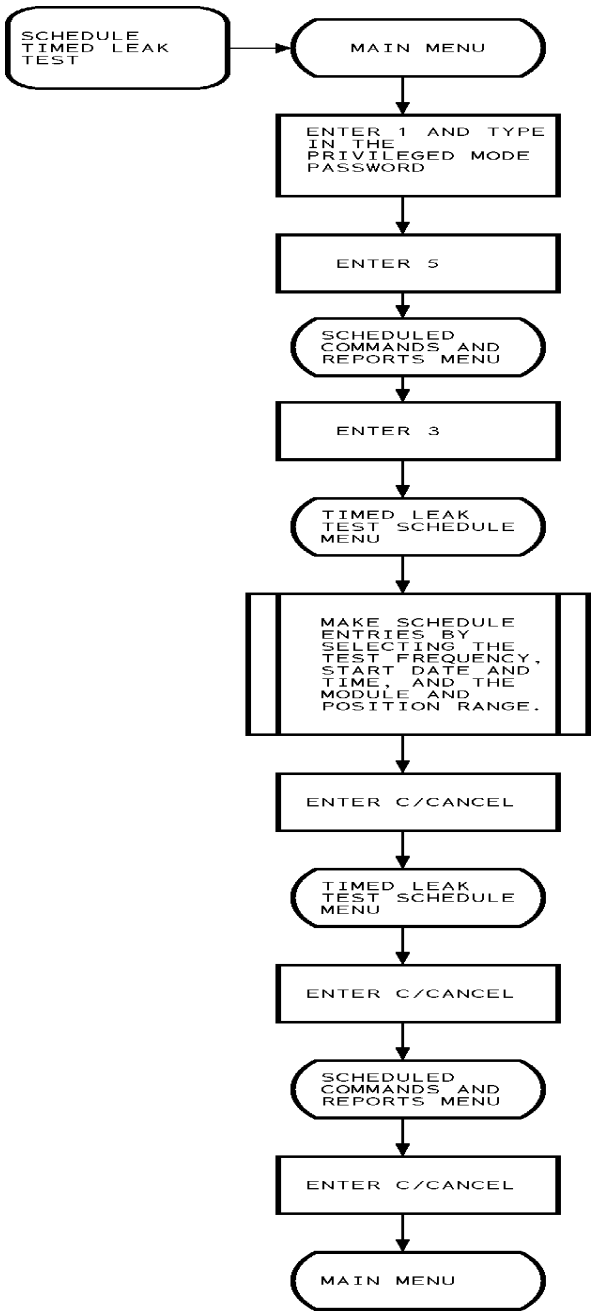
2.11.8 Time & Date Setup *(For more info see Page 39)*



2.11.9 Timed Leak Test - Immediate *(For more info see Page 78)*



2.11.10 Timed Leak Test - Scheduled *(For more info see Page 100)*



Chapter 3 - System Setup

MAIN MENU ☞ ⑥

```
PRIVILEGED MODE    APR 29, 1996    8:36 AM
                SYSTEM SETUP MENU

1.CONTROLLER
2.SMART MODULE (PROBES & SENSORS)
3.I/O MODULE
4.ALARMS



ENTER #, C/CANCEL, 0/PRINT:
```

After the **SiteSentinel** hardware has been installed, certain data must be entered to make the system operational. The System Setup menu (above) is where you access all setup functions.

After selecting an item from the menu, additional submenus are displayed, and are described in this section:

- ☐ **Controller Setup** *(Section 3.1)*
- ☐ **Smart Module Setup** *(Section 3.2)*
- ☐ **I/O Module Setup** *(Section 3.3)*
- ☐ **Alarm Setup** *(Section 3.4)*

BEFORE making any changes to settings, copy the Configuration Worksheet (Appendix A, Page 133) and record settings. Keep the master as a blank for future changes. You must be in Privileged mode to enter or change setup data. The default password is `**HELLO**'. If you are not already in Privileged mode, do the following:

1. From the Main Menu, press (1)

2. Enter HELLO (Model II users: Use the number keys and the (ALPHA) key to change the numbers to letters.

3. When HELLO is complete on the display line, press YES.

The unit is now in Privileged mode.

If you change any setup data for a module position, all measurement, warning, and event data for that position are erased. This prevents the possible misinterpretation of data that was recorded for a different setup.

INITIAL STARTUP

When you first start the system (or after a cold start), the **SiteSentinel** has no operational data.

Several features have "default" values that are installed automatically. The following is a basic startup sequence:

1. Select measurement units (U.S. or metric) *[Controller Setup]*

2. Set the current time and date *[Controller Setup]*

3. If a printer is connected, you must enter its setup data in order to use it *[Controller Setup]*

4. For Model II, enter data for the idle mode status graphs, the red button/light and the buzzer. For either model, enter data the red button/light and the buzzer *[Controller Setup]*

5. Enable probes, sensors, and alarms by following these steps *[Smart Module Setup]*

   - ❑ Assign devices to Smart Module positions
   - ❑ Configure Smart Module positions.
   - ❑ For *manifolded* tanks, assign module positions to a manifold group
   - ❑ Enter tank and sensor thresholds. Not all sensors require thresholds
   - ❑ Install Smart Module positions
   - ❑ Enter tank correction data (optional)
   - ❑ Enter data for the I/O modules (optional) *[I/O Module Setup]*
   - ❑ Enable alarms *[Alarm Setup]*

CONTROLLER SETUP OVERVIEW

Section 3.1, Page 35. Data can be entered for the following:

- ❑ Security
- ❑ Time/date
- ❑ Printer options
- ❑ Measurement units
- ❑ Event history buffer
- ❑ Status graphs
- ❑ Button & buzzer setup
- ❑ Computer protocol options.
- ❑ Probe diagnostics and system tests

SMART MODULE SETUP OVERVIEW

Section 3.2, Page 59. The Smart Module setup includes:

- ❑ Module position type assignment
- ❑ Sensor and probe configuration
- ❑ Tank correction and manifolding
- ❑ Tank and sensor thresholds
- ❑ Module position installation and removal

I/O MODULE SETUP OVERVIEW

Section 3.3, Page 81. The I/O module setup includes:

- ❑ I/O configuration
- ❑ Event output setup
- ❑ Module position installation and removal.

ALARMS SETUP OVERVIEW

Section 3.4, Page 88. You can program the **SiteSentinel** to respond to the start of an alarm event by printing a message. With Model II, alarms can be signaled by sounding its buzzer, and/or by lighting its red light.

Either model can respond to the end of an alarm event by printing a message.

Notes:

3.1 Controller Setup

MAIN MENU ☞ ⑥ ☞ ❶

```
PRIVILEGED MODE   APR 29, 1996   8:36 AM
              CONTROLLER SETUP MENU

1. SECURITY
2. TIME/DATE
3. PRINTER OPTIONS
4. MEASUREMENT UNITS: US
5. EVENT HISTORY BUFFER
6. SYSTEM HARDWARE TEST
7. IDLE MODE GRAPHS
8. RED BUTTON/LIGHT & BUZZER
9. PROTOCOL OPTIONS
10.VOLUME REFERENCE TEMP.: 15C


ENTER #, C/CANCEL, 0/PRINT:
```

SECURITY

Privileged/restricted passwords, enabling/disabling restricted mode. *(Page 37).*

TIME/DATE

Set or show current time and date, the date format and the time format *(Page 39).*

PRINTER OPTIONS

Define page headers, leading and trailing page form feed measurements *(Page 41).*

MEASUREMENT UNITS

Selects the system of measurement: (1) US - feet, gallons, and Fahrenheit degrees or (2) Metric - meters, liters, and Celsius degrees *(Page 43).*

EVENT HISTORY BUFFER

The event history buffer stores information generated by the **SiteSentinel** *(Page 44).*

SYSTEM HARDWARE TEST

Diagnoses the system in the event of hardware problems. Only used by authorized **Petro Vend** service personnel.

IDLE MODE GRAPHS (MODEL II ONLY)

Used to monitor the Model II's ongoing probe and sensor measurements *(Page 49)*.

RED BUTTON/LIGHT & BUZZER

Programs the red button/light and buzzer to show alarm events such as overflows, printer failures, or I/O module bugs *(Page 53)*.

PROTOCOL OPTIONS

Used for external computer system setup *(Page 55)*.

VOLUME REFERENCE TEMP

Selects one of two reference temperatures for volume correction. You shouldn't have to change this value in most systems *(Page 57)*.

3.1.1 Security Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞ ❶

```
PRIVILEGED MODE    APR 29, 1996    8:36 AM
               SECURITY SETUP MENU

1.PRIVILEGED PASSWORD:  HELLO
2.RESTRICTED PASSWORD:  HELLO
3.RESTRICTED MODE:      DISABLED
4.TIMED AUTO-LOGOUT:    ENABLED
5.SITE ID:              123456ABCDEF



ENTER #, C/CANCEL, 0/PRINT:
```

PRIVILEGED PASSWORD

You must first correctly enter the privileged password in order to enter or change any setup data. Factory-set password is **`HELLO'**.

RESTRICTED PASSWORD

Required when restricted mode is enabled. Factory-set password is **`HELLO'**.

RESTRICTED MODE

The restricted mode protects the system data from unauthorized viewing. When this mode is enabled, the restricted password must be entered before any data can be displayed or printed. Initially, this mode is *disabled*.

TIMED AUTO-LOGOUT

The timed auto-logout feature prevents unauthorized access to the **SiteSentinel** if the system is left unattended.When this feature is *enabled*, the system exits its current operational mode (privileged, restricted, or normal) and returns to idle status whenever a key has *not* been pressed for 10 minutes.
In the Model II, the timed auto-logout feature can be *disabled* to allow viewing of Smart Module data when on the status graphs. The timed auto-logout feature can be *disabled* to allow extended viewing of Smart Module data when displaying the status graphs. When you access the **SiteSentinel** via modems, the system *always* times out after 10 minutes when left unattended.

SITE ID

With this privileged command, you can enter a 12-character alphanumeric code to distinguish each site in a multi-site system.

SITE ID is identifies a site during system backup and restore operations with an external computer.

3.1.2 Time/Date Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    APR 29, 1996    8:36 AM
             TIME & DATE SETUP MENU

CURRENT TIME & DATE
 1.DATE:                OCT 31, 1994
 2.TIME:                8:36 AM

DATE FORMAT
 3.FORMAT:              LONG
 4.ORDER (LONG):        MMM DDD, YYYY
 5.ORDER (SHORT):       MDY
 6.SEPARATOR (SHORT):   /
 7.LEADING CHARACTER:   NONE

TIME FORMAT
 8.FORMAT:              12-HOUR
 9.BEFORE NOON SUFFIX:  AM
10.AFTER NOON SUFFIX:   PM
11.SEPARATOR:           :
12.LEADING CHARACTER:   NONE


ENTER #, C/CANCEL, 0/PRINT:
```

CURRENT TIME & DATE

The time and date are included on all menus and reports. You must be in privileged mode to set time or dat

DATE FORMAT

Date format can be *short* or *long*. Though it is easier to enter data using the *short* format; the *long* format is easier to read. Use the **[NO]** or **[N]** key to make your selection, and then press the **[ENTER]** key.

Separator: In short format, a separator distinguishes the parts of the date. The options are **`/'**, **`-'**, *space* a *none*. Use the **[NO]** or **[N]** key to make your selection, and then press the **[ENTER]** key.

Leading Character: can be either a *blank* or a *zero*. Use the **[NO]** or **[N]** key to toggle the options for this feature. When the appropriate option displays, press the **[ENTER]** key.

TIME FORMAT

The format can be 12-hour or 24-hour. Use the **[NO]** or **[N]** key to make your selection, and then press the **[ENTER]** key.

You can enter any three letters or numbers for the before and after noon suffixes. For example, to show central standard time, use **`CST'**.

Separator: The separator separates the parts of the date; options are **`:'**, *space* and *none*.

Leading Character: The leading character can be **`0'**, *space*, or *none*.

Use the **[NO]** or **[N]** key to make your selection, and then press the **[ENTER]** key.

3.1.3 Printer Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    APR 29, 1996    8:36 AM
               PRINTER SETUP MENU

1.PRINTER TYPE:  EXTERNAL

2.CLEAR PRINTER STATUS ERROR

3.TOP OF PAGE HEADER (4 LINES):
            SITESENTINEL
     INTEGRATED MONITORING SYSTEM
         BY PETRO VEND, INC.
            (708) 485-4200

4.LEADING PAGE FORM FEED:   DISABLED

5.TRAILING PAGE FORM FEED:  DISABLED




ENTER #, C/CANCEL, 0/PRINT:
```

PRINTER TYPE

The Model II SiteSentinel can use an optional *internal* or *external* printer, an *internal 8-bit* or *external 8-bit* printer, or *no* printer. The Model III can use either an *external printer*, an *external 8-bit printer* (a journal printer), or *NO* printer.

In the Model II, the *status* of the internal printer (if present) is also displayed.

CLEAR ERROR

The Model II internal printer will show an error if it runs out of paper, or jams. After paper is cleared, select to clear the error.

TOP OF PAGE HEADER

Enter up to four lines of 40 characters each for the page header. Headers can be names, addresses, telephone numbers, or other identification data for a site. After entering this selection, you are prompted for the first line. The entry is *not* "case-sensitive;" that is, upper and lower case letters are *not* distinguished.

Text is "left-justified" as you enter the characters. Use the backspace key to delete one or more characters in a line *before* pressing **[ENTER].**

To create a blank line, enter only a single space. To keep a line the same, press the **[ENTER]** key *without* making an entry.

Press the **[ENTER]** key to complete the line entry. The line centers on the display; this is how the line will actually be printed. After pressing the **[ENTER]** key, you are prompted for the next line. After the fourth line, the complete message is displayed, and you are returned to the menu.

To change a line *after* pressing **[ENTER]**, you must complete the entries for all four lines and re-select the command. To change one or more characters in a line *after* pressing **[ENTER]** , you must enter the entire correct line.

LEADING PAGE FORM FEED

MODEL II INTERNAL PRINTER - Before printing, the system first sends three blank lines to the printer. This allows some spacing between printed data.

EXTERNAL PRINTER - Before printing, the system first sends a form feed character to the printer. This allows the printer to begin at the top of a new page.

TRAILING PAGE FORM FEED

MODEL II INTERNAL PRINTER - The system sends three additional blank lines to the printer at the end of a printout. This make it easier to tear the paper from the printer.

EXTERNAL PRINTER - The system sends a form feed to the printer.

3.1.4 Measurement Units

MAIN MENU ☞ ⑥ ☞ ☞

There are two systems of measurements available: (1) US - feet, gallons, and Fahrenheit degrees and (2) Metric - meters, liters, and Celsius degrees.

The following data is altered by units of measurement:

(1) Data received by the controller from the Smart Module

(2) Calculated data

(3) Displayed data

Use the **[NO]** or **[N]** key to toggle the options for this feature. When the appropriate option displays, press the **[ENTER]** key.

You are prompted to verify your selection; this is to prevent you from accidentally clearing the history buffer and module position configurations.

3.1.5 Event History Buffer Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
SITE SENTINEL     APR 29, 1996     8:36 AM
            EVENT HISTORY BUFFER MENU

  TOTAL RECORDS:  6864
   FREE RECORDS:  6000
   USED RECORDS:  864

1.WRAP AROUND: ENABLED
2.CLEAR RECORD BUFFER



ENTER #, C/CANCEL, 0/PRINT:
```

Information for events such as a timed leak test or a hardware problem, is stored as a record in "buffers" inside the controller. The information in the buffers is used to generate the various reports.

Note that the total number of records that can be stored in the buffer may vary slightly between software versions.

WRAPAROUND

Enabling the wrap around causes new data to overwrite (and destroy) old data when the buffer is full.**RECORD BUFFER**

The record buffer can be cleared (that is, all data are erased).

*The erased data cannot be recovered from the **SiteSentinel** after its buffer is cleared.*

As a safeguard, you should print or copy to an external file (using a PC) any important data *before* clearing the record buffer.

3.1.6 System Hardware Test Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
SITE SENTINEL     APR 29, 1996     8:36 AM
          CONTROLLER HARDWARE TEST MENU

         ONLY TO BE ACCESSED BY QUALIFIED
         PETROVEND SERVICE PERSONNEL!!!!!

1.PROBE DIAGNOSTICS: DISABLED
2.PROBE FAILED TOLERANCE: 5
3.PROBE PRODUCT TO WATER/TEMP RATIO: 5
4.TANK ACTIVITY DETECTION PARAMETERS
5.CLEAR EPROM CHECKSUM ERROR
6.BATTERY TEST: PASSED
7.TIMED PROBE TEST
8.PROBE TEMP. DIFFERENTIAL ALLOWED: 5.0


ENTER #, C/CANCEL, 0/PRINT:
```

WARNING!

These features should be used only by qualified Petro Vend service personnel.

PROBE DIAGNOSTICS

A special mode can be enabled to test probe operation. *This feature should be <u>disabled</u> for normal system operation!*

The system defaults with probe diagnostics disabled.

PROBE FAILED TOLERANCE

This is how many consecutive probe error messages are required for the system to term a probe "down." *This feature should not be changed for normal operation.*

PROBE PRODUCT TO WATER/TEMP RATIO

This sets the ratio of product-to-water measurements of temperature. *This feature should <u>not</u> be changed for normal operation.*

TANK ACTIVITY

The various parameters to determine tank activity should be adjusted *only by qualified service personnel*.

CLEAR EPROM CHECKSUM ERROR

This feature is only required to clear an error that may be caused by a software upgrade.

BATTERY TEST

Use this feature to run a test on the battery inside the controller. This battery protects the system data in case of a power failure. When the system is operating, this battery is tested automatically every day, just after midnight. In addition, the system automatically tests the battery after an initial power up and after a power failure and recovery.

In the Model II, the condition of the battery is indicated with two LEDs on the controller board, just above the battery - a **`PASS'** (green) LED or **`FAIL'** (red) LED lights. The results of the latest automatic battery test can also be viewed in the status report menu - see Page 115.

Confirm that the battery is plugged in before you test it.

TIMED PROBE TEST

Use this feature to test probes via timed error monitoring. This feature requires a printer, and does not affect normal operation. The current configurations for the Smart Module positions are displayed. Use submenu selections #1 and #2 to specify which probe(s) to test and the duration of the test.

Selection #3 starts the test (and, if necessary, stops it before the end of the period). All test printouts indicate the following

- ☞ Starting and ending dates and times
- ☞ Test duration
- ☞ Software versions
- ☞ Probe serial number.

If an error message is received during the test period, the test is immediately aborted. The printout indicates "FAILED" and lists the specific error code received. When no error is received, the printout indicates "PASSED".

*If a Smart Module position is **assigned** as a probe position, but not yet **configured**, the probe test automatically installs the probe with a typical set of values when the test is started.*

PROBE TEMP. DIFFERENTIAL

This feature should be adjusted only by qualified service personnel. The PTD is the difference between the highest and lowest measurements from the active temperature sensors in each probe.

Temperature sensors are only active when they are submersed in product or water.

The default value is 5.0° for both °C and °F. When the temperature differential is exceeded, an alarm event ("bad temperature") occurs.

Notes:

3.1.7 Idle Mode Graph Setup Menu (Model II Only)

MAIN MENU ☞ ⑥ ☞ ☞

```
SITE SENTINEL     APR 29, 1996     8:36 AM
              IDLE MODE GRAPH SETUP

SMART MODULE
 1.DISPLAY FEATURE:          DISABLED
 2.GRAPH TYPE:               LEVEL & VOL.
 3.SENSOR STATUS DISPLAY:    TEXT & BAR

I/O MODULE
 4. DISPLAY FEATURE:         ENABLED



ENTER #, C/CANCEL, 0/PRINT:
```

OVERVIEW

The Site Sentinel Model II default operating mode is IDLE. In this mode the display shows the PetroVend/SiteSentinel logo screen.

You can program the system to instead display graphs showing the status of the Smart Modules (probes and sensors) and/or the I/O modules.

The *top line* of all status graphs shows the controller's current software version. When the system is being accessed via a modem or terminal, that is also indicated (**`TERM IN USE'**).

When enabled, the system displays each graph for five seconds. To review an individual graph, press the **[ALPHA]** key. Press the **[CANCEL]** key to resume the display cycle.

The status graphs may be *disabled* to prevent unauthorized viewing of system data.Two types of sensor graph are available for each Smart Module. A total of 16 status graphs may be displayed.

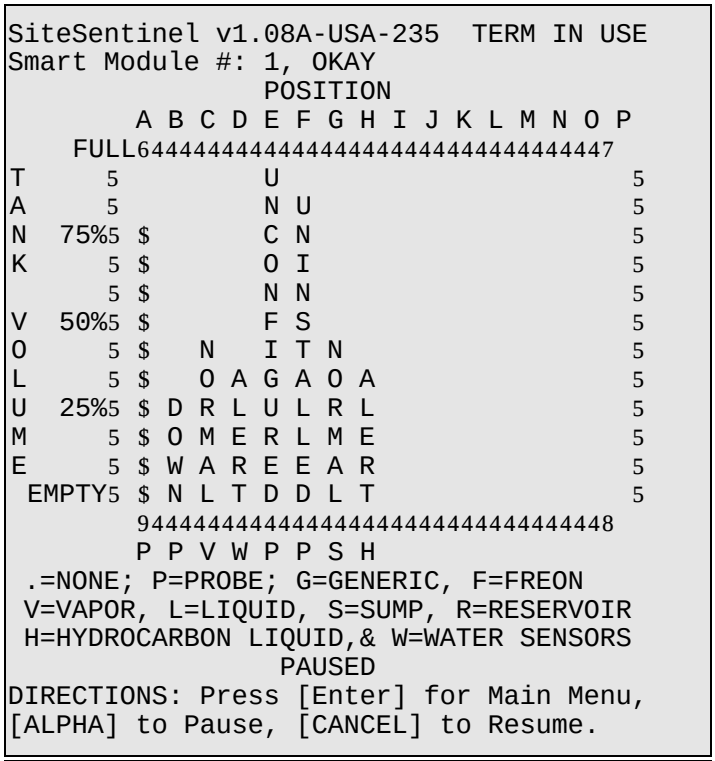
The *second line* indicates the Smart Module number and its operational status (**`OKAY'** or **`DOWN'**).

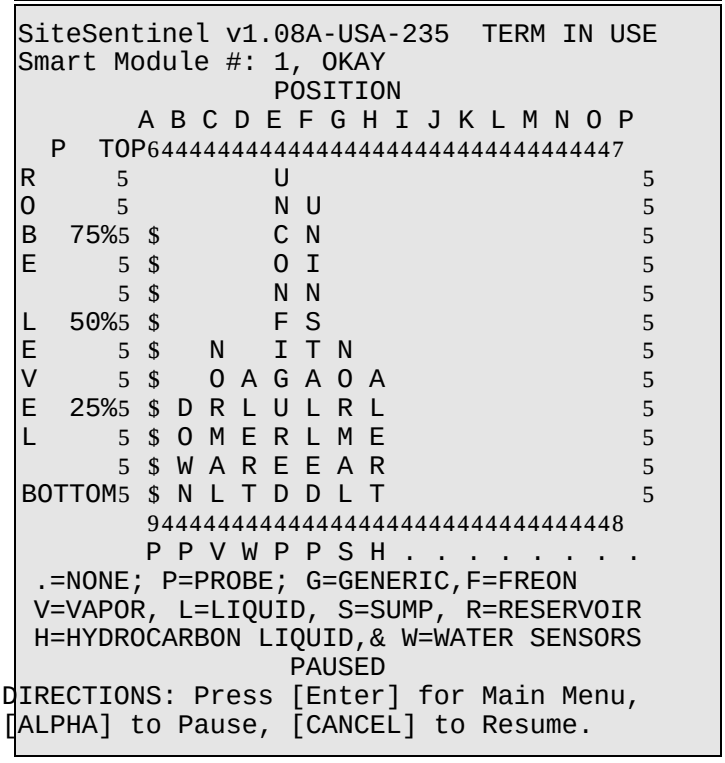
No information can be displayed from a module that is down.

Two graphs can be cyclically displayed for each active Smart Module. You can also display a graph to monitor the input and output devices that are connected to the optional I/O module(s).

SMART MODULE GRAPH TYPES

Two types of graph are available to display Smart Module Model II Site Sentinel data:





In the **`PROBE LEVEL'** graph, a bar indicates the level of each product float as a percentage of its corresponding tank's diameter. For example, a 12-foot tank with a level measurement of nine feet (measured from the bottom of the tank) would show a level of 75%.

In the **`TANK VOLUME'** graph, a bar indicates the current gross product volume for each tank as a percentage of its total volume. For example, a 10,000 gallon tank with 5000 gallons of product, would show a volume measurement of 50%. For cylindrical tanks, corresponding level and volume percentages should be equal only at 0%, 50%, and 100% readings.

You may program the system to display either or both types. Use the **[NO]** or [N] key to "toggle" (display in sequence) the options for this feature. Then press **[ENTER]**.

SENSOR STATUS DISPLAY

Both types of status graph for the Smart Module also show immediate sensor status. You can program the system for either or both of the following types of indication:

Bar Level. Present measurements as a percentage of the maximum possible measurement; for example, a sensor reading of 2.5 volts would be indicated by a bar level of 50%.

Text. A printed description showing a normal or alert status. For example, a liquid sensor configured with an alarm value of three volts would indicate **`NORMAL'** when its measurements are *less* than three volts and **`ALERT'** when its measurements are three volts or more.

Use the **[NO]** or **[N]** key to toggle the options for this feature. When the appropriate option displays, press the **[ENTER]** key.

```
SiteSentinel v1.08A-USA-235  TERM IN USE
              I/O STATES
 PSTNS  A B C D E F G H I J K L M N O P
        644444444444444444444444444444447
  I M 5 O O O O N N N N N N N N N N N N 5
  / O 5 NOT INSTALLED                   5
  0 D 5 NOT INSTALLED                   5
    U 5 NOT INSTALLED                   5
    L 5 NOT INSTALLED                   5
    E 5 NOT INSTALLED                   5
      5 NOT INSTALLED                   5
      5 NOT INSTALLED                   5
        944444444444444444444444444444448

         INPUT           OUTPUTS


 LEGEND:"O"=OPENED  "N"=NOT ENERGIZED
        "C"=CLOSED  "E"=ENERGIZED
        "R"=REMOVED FROM OPERATION



                 PAUSED
DIRECTIONS: Press [Enter] for Main Menu,
[ALPHA] to Pause, [CANCEL] to Resume.
```

Sensor positions can also be indicated as **`UNCONFIGURED'** *(no setup data),* **`UNINSTALLED'** *(set up, but not activated), and* **`DOWN'** *(malfunctioning).*

I/O MODULE GRAPH

The idle mode status graph for the I/O modules indicates whether each module position is currently "open," "closed," "energized," "not energized," or "removed from operation."

Notes:

3.1.8 Red Button/Light & Buzzer Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE   APR 29, 1996   8:36 AM
      RED BUTTON/LIGHT & BUZZER SETUP MENU

1.LIGHT TERM:      DURATION
   DAYS:            364
   HRS:             23
   MINS:            59
   SECS:            59
2.BUZZER TERM:     DURATION
   DAYS:            364
   HRS:             23
   MINS:            59
   SECS:            59
3.BUTTON TERMINATES: NOTHING


ENTER #, C/CANCEL, 0/PRINT:
```

Site Sentinel Model II uses a red illuminated button and buzzer. The Model III uses a STATUS lamp and beeper.

LIGHT TERM

When an alarm is triggered, the red light on the front of the controller can be programmed to illuminate in one of three ways:

DURATION' ON only while the event is in progress.

FOREVER Glows until terminated by the button on the front of the controller (or through the System Commands menu).

TIMED When `TIMED' is selected, you are prompted to enter the number of days, hours, minutes and seconds.

BUZZER TERM

When an alarm is triggered, the buzzer on the front of the controller can be programmed to sound in one of three ways:

DURATION. ON only while the event is in progress.

FOREVER. Sounds until terminated by the button on the front of the controller (or through the System Commands menu).

TIMED If selected, you are prompted to enter the number of days, hours, minutes and seconds.

BUTTON TERMINATES

The button can be programmed to turn off the light, the buzzer, both or neither.

When **NEITHER** is selected, the light and buzzer can ONLY be turned off through the System Commands menu (see Page 106).

3.1.9 Protocol Options Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM
            COMPUTER PROTOCOL SETUP

GENERAL COMMUNICATION OPTIONS
 1.INPUT FLOW CTRL (XON/XOFF): DISABLED
 2.PROTOCOL:                   ASCII
 3.FILE NAME:                  REPORT.TXT




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

IMPORTANT

Computer protocol setup applies only to the computer reports, system backup, and system restore options. These options require a system capable of ASCII transmission.

OVERVIEW

System report data can be downloaded to an external computer.

The **SiteSentinel** setup information can be transmitted to an external computer where it can be stored for safekeeping, then restored to that system or a similar system.

Refer to Page 107 for Backup/Restore information. Refer to *Appendix E* for information about connecting a PC and installing a terminal emulation program. Refer to *Appendix F* for details about the computer report protocols and data formats.

INPUT FLOW CONTROL

The `XON' and `XOFF' characters start and stop the flow of the data stream. This feature affects only data transmissions that are in the ASCII protocol.

PROTOCOL

The SiteSentinel can use one five protocols when transferring data. The proprietary Petro Vend *(`PV')* protocol is described in the *Appendix F*; this protocol is used by other Petro Vend products.

Xmodem and two versions of *Kermit* (7-bit, even parity and 8-bit, no parity) are also available; at least one of these protocols can be used with most terminal emulation software packages. Consult your terminal emulation manual before using any of these protocols. Data can also be transferred as *straight ASCII* files; `XON' and `XOFF' may be enabled or disabled for this protocol.

FILE NAME

Data will be sent from or received in a file with the name shown on the menu. The default name is **`REPORT.TXT'**.

Change the file name by selecting option 3, and entering up to eight numbers or letters before the period and up to three numbers or letters afterward.

For example:

`INVENTRY.ONE**', **`SITE1234.INV',

and

`REPORT.123'.

3.1.10 Volume Reference Temp Setup

MAIN MENU ☞ ⑥ ☞ ☞

OVERVIEW

Most liquids expand when warmed and contract when cooled. For example, a tank with 4,000 gallons of gasoline at 50°F has a level measurement of 60 inches. At 70°F the level measurement would be 61 inches because the product has expanded. The new volume would be 4010 gallons, even though no new product was added.

To prevent volume changes due to temperature fluctuation from being confused with volume changes due to leakage, the SiteSentinel calculates a "net corrected" volume for the product in each tank.

Net corrected volumes are NOT affected by changes in product temperature.

To calculate a net corrected volume, the SiteSentinel uses level and temperature measurements from the probe, along with a "volume correction factor" (VCF). For most petroleum products, the VCF is determined by the API number or density of the product, and a set of volume conversion tables. For products that are not covered by these tables (such as crude oil and lubricating oil), the thermal expansion coefficient - Alpha - must be determined.

VOLUME CONVERSION TABLES

When you enter an API number or density for a product, the SiteSentinel uses a set of tables to convert the measured (gross) volume into a corrected volume based on the reference temperature. The SiteSentinel uses two sets of tables for this purpose.

The first set of tables is based on a reference temperature of 60°F (15°C). This set of tables is used in most locations. The tables in this set are commonly referred to as 5b, 6b, 53b, 54b, and 54c, and are accepted by the ASTM, the API, the IP, and the ISO as standards ASTM D-1250, API-2540, IP200, and ISO DIS 91/1-1982, respectively.

The second set of tables is based on the reference temperature 68°F (20°C). This set includes tables commonly referred to as 59b and 60b. These tables are being approved by the IP and the ISO as IP250 and ISO-91/2 respectively.

API NUMBER

The API (American Petroleum Institute) number is a measure of product density. This number ranges from 0° API to 85° API. For API numbers, the SiteSentinel uses the 60°F table set for the reference temperature. THIS CANNOT BE CHANGED. Tables 5b and 6b within this set are used.

DENSITY

Density is the measure of a product's weight per volume. The range for density values is 654 - 1075 kg/m^3 (kilograms per cubic meter). For density values, the SiteSentinel can correct to either 15°C (using tables 53b and 54b) or to 20°C (using tables 59b and 60b).

The terminal options for changing the density reference temperature are in the Controller Setup menu, accessed from the Main menu. Once in the Controller Setup menu, enter [10] to change the VOLUME REFERENCE TEMP: field as desired.

Specific gravity is similar to density, but relates to the density of water instead of petroleum products. To convert a specific gravity value into a SiteSentinel compatible value, multiply specific gravity by 999.

ALPHA

Alpha is the direct measure of a product's thermal expansion. Alpha must be measured and calculated for products without effective API or density values. This is a complicated procedure that must be done by a commercial laboratory, based on the SiteSentinel table 54c.

The range for Alpha is 1,500 - 80,000, and are based on a reference temperature of 15°C (60°F).

When Alpha is measured in PPM/°F (parts-per-million, per degree F), multiply Alpha by 18 before entering the value. When Alpha is measured directly per degree F, multiply Alpha by 18,000,000 (eighteen million) before entering the data.

When Alpha is measured in PPM/°C, multiply Alpha by 10 before entering the value. When Alpha is measured directly per degree C, multiply Alpha by 10,000,000 (ten million) before entering the value.

PRODUCT VARIATION

To insure proper volume correction, the SiteSentinel must be programmed with accurate product information.

To enter API numbers, density values, or Alpha values, use the Probe Configuration menu, accessed from the Sensor And Probe Configuration menu (accessed from System Setup).
Because the API number or density often vary between shipments, the site operator should check these values after each delivery. Alpha values may or may not vary with deliveries, depending on the product. Check with the product's distributor to see how often to evaluate Alpha.

The API number or density (at the reference temperature) is available from most petroleum distributors. It is often printed on the delivery ticket. Or, you can measure the API number directly using a hydrometer.

3.2 Smart Module (Probes & Sensors) Setup

MAIN MENU ☞ ⑥ ☞

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM
         SENSOR, PROBE & TANK SETUP MENU

1.MODULE POSITION TYPE ASSIGNMENT
2.PROBE & SENSOR CONFIGURATION
3.TANK MANIFOLDING
4.TANK & SENSOR THRESHOLDS
5.INSTALL/REMOVE MODULES & POSITIONS
6.TANK & SENSOR CORRECTION


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

PROBE SETUP CHECKLIST

To make the probes, sensors and alarms operational, you must follow these steps in order:

(1) Assign devices to Smart Module positions.

(2) Configure Smart Module positions.

(3) For manifolded tanks only, assign module positions to a manifold group.

(4) Enter tank and sensor thresholds. Note that not all sensors require thresholds.

(5) Install Smart Module positions.

(6) Enter tank correction data. This step is optional.

(7) Enter data for the I/O Modules (if applicable). Note that the I/O Modules selection is on the SYSTEM SETUP MENU.

(8) Enable threshold alarms. Note that the alarms selection is on the SYSTEM SETUP MENU.

MODULE POSITION TYPE ASSIGNMENT

View or change module type assignment *(Page 61)*.

PROBE & SENSOR CONFIGURATION

View or change sensor and probe configuration via Smart Module *(Page 63)*.

TANK MANIFOLDING

For defining tanks that are connected together so that product can flow freely between them *(Page 70)*.

TANK & SENSOR THRESHOLDS

At this submenu, enter the Smart Module number and position you wish to configure. The prompts corresponding to the assigned device are displayed automatically.

Tank threshold data includes high water; overflow; low product; minimum theft, sales and delivery; and leak rate *(Page 72)*. The threshold data for sensors include high and low values for sensor voltage measurements and alarm delays

INSTALL/REMOVE MODULES & POSITIONS

This selection is used to activate or deactivate the modules and module positions *(Page 87).*

TANK & SENSOR CORRECTION

You can compensate for an irregularly shaped tank by entering up to 20 "correction factors," measured product volumes at known product levels.

When you select a position assigned to a probe, the current tank correction factors (if any) are displayed. You will be prompted to change or add any additional correction factors *(Page 79)*.

3.2.1 Module Position Type Assignment Menu

MAIN MENU ☞ ⑥ ☞ ☞ ❶

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM
           SENSOR & PROBE ASSIGNMENTS

1.MODULE & POSITION: 1A PROBE
2.ASSIGN POSITION

MOD #              POSITIONS

       A B C D E F G H I J K L M N O P
     +--------------------------------
   1 | . V . P . . . . . . S . . . .
   2 | G V L S R F H W . . . S . . . .
   3 | . . . . . . . . . . . . . . . .
   4 | . . . . . . . . . . . . . . . .
   5 | . . . . . . . . . . . . . . . .
   6 | . . . . . . . . . . . . . . . .
   7 | . . . . . . . . . . . . . . . .
   8 | . . . . . . . . . . . . . . . .

.=NONE; P=PROBE; G=GENERIC, F=FREON,
V=VAPOR, L=LIQUID, S=SUMP, R=RESERVOIR
H=HYDROCARBON LIQUID, & W=WATER SENSORS


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

MODULE & POSITION

Select this option to specify which module and position to assign a device type. Device types include the following:

- Probe
- Hydrocarbon Vapor Sensor
- Liquid Sensor *(stand-alone sensor or water-sensing element of interstitial sensor)*
- Universal Sump Sensor
- Universal Reservoir Sensor
- Hydrocarbon Liquid Sensor *(interstitial or liquid phase)*
- Water Sensor *(optional part of liquid phase sensor)*
- Freon
- Generic Sensor *(user-defined thresholds)*

IMPORTANT

(1) The interstitial sensor has two sensing elements, one for liquid hydrocarbon products and one for water. The liquid phase sensor, which also detects liquid hydrocarbon products, is available with and without a water-sensing element.

When a sensor has two sensing elements, each element must be wired to a separate terminal position in the same Smart Module. Both module positions must be assigned, configured, and installed. This enables the SiteSentinel to indicate the presence of hydrocarbon products and water independently.

(2) The water-sensing element for the interstitial sensor should be configured as a "liquid" sensor.

(3) The water-sensing element for the liquid phase sensor should be configured as a "water" sensor.

ASSIGN POSITION

This puts the cursor at the appropriate position. Press the **[NO]** or **[N]** key to "toggle" your choices, and then press **[ENTER]** to confirm your choice.

If you change a position from probe to sensor or from sensor to probe, a warning message is displayed. If you proceed to make the change, the old configuration data are destroyed.

The number for each Smart Module is determined by a small rotary switch, located on the PV242 board (inside the module cabinet). This switch has ten positions, marked "0" to "9". A small arrow on the switch points to the current position.

Positions #0 and #9 disconnect the module from the controller.

3.2.2 Probe & Sensor Configuration Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM

          SENSOR & PROBE CONFIGURATION

 1.MODULE: 1        POSITION: 1E VSENSOR
 2.RECONFIGURE

 3.SENSOR #:        5
 4.DESCRIPTION:     NORTHWEST VAPOR
 5.PRODUCT:         DIESEL



ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

MODULE & POSITION

Select this item to specify which module and position to configure. The menu above shows the prompts for a vapor sensor.

Before you enter configuration data for a sensor, you must assign a module and position to the device (see Page 61).

After you enter sensor configuration data, you must enter threshold data for liquid, hydrocarbon vapor, and Freon sensors. Alarm delay data can also be entered for each sensor (see Page 72). All sensor module positions must also be installed (see Page 61).

RECONFIGURE

This menu selection prompts you for the sensor number (`**SENSOR #**'), the sensor label (`**DESCRIPTION**'), and for a label for the monitored product (`**PRODUCT**'). For a vapor sensor, you are also prompted for the type of product (`**OPERATING VAPOR**').To select an individual menu item, enter the corresponding menu number.

SENSOR

The sensor number is a label that is used to identify sensors in the **SiteSentinel** reports. You are not required to match the sensor number to the module or position number.

IMPORTANT

Manifolded tanks are physically connected so that product can flow freely between them. A probe is required for each tank in the manifold group. All probes for a manifold group must be connected to the same Smart Module.

To set up a group of manifolded tanks, first use the SENSOR & PROBE CONFIGURATION MENU to configure each probe in the group. Items 5 and 6 can be entered for the group as a whole from the TANK MANIFOLDING MENU and do not need to be assigned individually. After the probes are configured, assign positions to a group.

Note that if you use the SENSOR & PROBE CONFIGURATION MENU to change items 5 and/or 6 for a position after it is assigned to a manifold group, all positions in the group are changed automatically.

DESCRIPTION

This is a label that can be used to describe the device at this module position. For example, **`SUMP SENSOR'** or **`NORTH SUMP'**.

PRODUCT

You can enter a label to *identify* the monitored product. This feature does *not* select the type of product to be monitored (see next section).

```
PRIVILEGED MODE    JUN 26, 1996   8:36 AM

          SENSOR & PROBE CONFIGURATION

 1.MODULE: 1        POSITION: A PROBE
 2.RECONFIGURE (3-12)

 3.TANK#:              1
 4.DESCRIPTION:        12-FOOT PROBE
 5.PRODUCT:            DIESEL
 6.API/DENSITY/ALPHA:  34.4
   TEMPERATURE:        60.0 F
   HYDROMETER:         NONE
 7.TANK SHAPE:         CYL-ROUND ENDS
 8.TANK DIAMETER:      92.0000 IN
 9.TANK VOLUME:        10000.0000 GAL
10.PRODUCT OFFSET:     0.0000 IN
11.WATER OFFSET:       0.0000 IN
12.WATER FLOAT:    USED-ENABLED FOR PROBE ERR
13.DELIVERY TIMER:     0 MIN.


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

PROBE CONFIGURATION

Whenever menu items 5 - 12 are reconfigured, the event history buffer is cleared.

MODULE & POSITION

Select this item to specify which module and position to configure. The menu above shows the prompts for a *probe*.

Before you enter configuration data for a probe, you must first assign it to a module and position.

After you enter probe configuration data, you must also enter tank threshold data. All probe module positions must also be installed.

RECONFIGURE

Select this item to specify data for *all* features. To prompt for a single feature, enter the corresponding number from the menu (3 - 12).

TANK

The number of a tank is *not* determined by the module or position number to which the corresponding probe is wired at the Smart Module. The tank number is only a label that is used to identify the tank for the reports.

DESCRIPTION

This is a label describing the device at this module position. For example, **`HYDROCARBON SENSOR'** or **`PV PROBE'**.

PRODUCT

This is the name that is used for the product on the reports. *This name is only a label.*

API/DENSITY/ALPHA

The API (American Petroleum Institute) number is a measure of a product's density. The **SiteSentinel** uses the API number to determine the product's expansion coefficient. This value is used to standardize the effect of product temperature on product volume. The API number for a product can usually be obtained from the product distributor. (The **SiteSentinel** accepts only API numbers between 0°API and 85°API).

API numbers for some common liquids are shown below:

Regular Gasoline	63.0
Unleaded Gasoline	60.0
Premium Unleaded Gasoline	66.0
Diesel	47.0
Kerosene	43.0

The product density can be substituted for the API number. The range for density values is 654 to 1075 kg/m^3. (The density of a product is equal to the specific gravity multiplied by 999.) The **SiteSentinel** automatically determines whether an entry is an API number or density value by the range in which it falls.

For products other than motor fuel, heating and diesel oils, jet fuels, kerosene and gasoline, a thermal expansion coefficient - Alpha - should be substituted for the API number.

For more information on API numbers, density, and Alpha values, see Page 57.

IMPORTANT

A standardized API or density value for a product must be calculated at a *reference* temperature.

For API numbers, the reference temperature is usually 60°F. For density, the reference temperature is 15°C or 20°C. Use the Controller Setup menu to change the reference temperature.

If you measure the API or density value directly (using a hydrometer), you must also determine the current product temperature.

Procedure

1. Enter an API, density, or Alpha value

If an Alpha value is entered, no further information is needed.

2. If an API or density value is entered, you'll be prompted for the temperature at which the reading was taken:

If no temperature is entered, the reference temperature is used.

3. If a temperature is entered, you are next prompted as to whether you used a glass hydrometer.

4. If a glass hydrometer was used, specify `**GLASS**'. If you did not use a hydrometer, specify `**NONE'**. Use the **[NO]** or **[N]** key to toggle the options. When the appropriate option displays, press the **[ENTER]** key.

TANK SHAPE

The **SiteSentinel** recognizes three tank types:

(1) Cylindrical with flat ends
(typical steel tank)

(2) Cylindrical with rounded ends
(typical fiberglass tank)

(3) Straight sides
(typical vertical tank)

Use the **[NO]** or **[N]** key to toggle the options. When the appropriate tank type displays, press the **[ENTER]** key.

To correct for tank variations, refer to Page 79.

TANK DIAMETER

Most tanks have a nominal diameter (or height for vertical tanks) listed in the manufacturer's specifications. The actual size of a tank can vary several inches from its supplied specification.

It is strongly recommended that the inside of each tank be measured carefully to ensure accurate system data.

TANK VOLUME

The tank volume is determined from the nominal volume supplied by the manufacturer or from a measured fill.

PRODUCT OFFSET

The product offset can be calculated and added to the probe offset to electronically "center" the probe in a tank. No compensation factor is required if a tank is perfectly level or if the probe is installed at or near the tank center.

To determine the product offset, it is necessary to make a few measurements and a few simple calculations. The measurements are easier to make during installation and should already have been done. If not, the procedure for determining the compensation value is described in the Installation Manual.

WATER OFFSET

To calculate the water offset, you should manually measure the amount of water (usually by sticking the tank). The system measurement is then subtracted from this value to yield the water offset.

For example, a tank has a stick measurement of 0.4" of water. The water level in the tank inventory report is 3.1". The water offset should be -2.7". After entering the offset, the inventory report will show the corrected water level and volume.

The magnet in the water float (which marks the float's position for the controller) is located about 2.7" (7 cm) from the bottom of the float. As a result, the system will show a water level even when there is no water in the tank, unless you enter a water offset value.

WATER FLOAT

Probes can be installed with or without a water float.

USED - ENABLED PROBE ERR The water float readings are based on actual float position and water offset value.

USED - DISABLED FOR PROBE ERR. The water level displayed is equal to the level just prior to the water float error. If during the time since the error, the product level has dropped below the last water level, then the water level displayed is equal to the product level.

NOT USED. The water level is unavailable.

DELIVERY TIMER

Enter a time to allow product in a tank to "settle down" after a delivery. Turbulence will occur during and shortly after product is pumped into a tank, sometimes causing erroneous readings. After this time expires, normal probe monitoring begins.

Enter a time in minutes from 1 to 59.

3.2.3 Tank Manifolding Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
SITE SENTINEL    OCT 31, 1994     8:36 AM

              TANK MANIFOLDING MENU

 1.MODULE:         1
 2.MANIFOLD GROUP:       1
 3.POSITIONS:            AB.............
 4.PRODUCT:        UNLEADED
 5.API/DENSITY:    60.0
   TEMPERATURE:    60.0 F
   HYDROMETER:           NONE
 6.MIN. THEFT:           10.0000 GAL
 7.MIN. SALE:            10.0000 GAL
 8.MIN. DELIVERY: 20.0000 GAL
   GROUP:  POSITIONS:
     1     AB.............
     2     ...D.F.........
     3     ..C.E..........
     4     ......GH.......
     5     .........KL...P
     6     ........IJ.....
     7     ............MNO.
     8     ...............

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

SETUP

Tanks can be physically connected together, or manifolded, so that product can flow freely between them. Each tank in a manifolded group must have its own probe.

All probes for a manifold group must be connected to the same Smart Module.

Module positions must be configured before they can be assigned to a manifold group.

To set up a manifold group, specify the module number, manifold group, and positions. At least two positions must be entered for a group to be valid. Positions do not need to be adjacent. Once a position has been assigned to a group, it cannot be entered in another group.

The product label, API/density, temperature, hydrometer, and volume-activated thresholds (minimum theft, sales, and delivery) are entered for the group as a whole. The level-activated tank thresholds values (low product, overflow, and high water) can be set up for each tank in a manifolded group, but not for the group as a whole (see next section).

DATA

Data from a manifolded tank group is reported in a manner slightly different than the data from single tanks.

The SiteSentinel generates saved and immediate inventory reports for both the manifolded group and each tank in the group. Sales, thefts, and deliveries are reported only for the manifolded group as a whole. Overflow, low product, high water, and bad temperature events are indicated for each individual tank in the group.

Whenever product is added or removed from one manifolded tank, the volumes of all the tanks in the group are affected for a period of several minutes to a half an hour.

3.2.4 Tank & Sensor Thresholds

MAIN MENU ☞ ⑥ ☞ ☞

```
SITE SENTINEL    JUN 26, 1996     8:36 AM
            TANK & SENSOR THRESHOLDS

 1.MODULE & POSITION: 1A PROBE
      PROBE #:
      DESCRIPTION:

 2.HIGH WATER:
 3.OVERFLOW:
 4.LOW PRODUCT
 5.MIN. THEFT:
 6.MIN. SALE:
 7.MIN. DELIVERY:
 8.LEAK RATE:
 9.COLD AVE. TEMP ON:
10.COLD AVE. TEMP OFF:
11.HIGH WATER TIMER:


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

Tank Thresholds

IMPORTANT

Whenever the minimum theft, sale, and/or delivery values (menu items 5, 6, and 7) are changed for a position that is part of a manifolded tank group, all positions in that group are changed automatically.

and enter tank configuration data.

All probe module positions must also be installed.

MODULE & POSITION

Select this item to specify the module and position for which to enter threshold data. The menu prompts are determined by which device was selected when the module and position type were assigned. The current threshold values, if any, are displayed.

Before you enter tank threshold data, you must first assign its probe to a module and position (Page 58)

HIGH WATER

Some water is present in most tanks due to condensation. Water also can leak into a tank if it is located below the water table. Water is more dense than most fuel products and sinks to the bottom of a tank. To prevent water from being pumped as product, the high water level should be set well below the suction tube or pump intake. The high water value typically is six inches (15 cm) or less.

OVERFLOW

To prevent spillage due to excessive product deliveries, you can specify an overflow level. This value should reflect both the size of the tank and the rate at which product is pumped.

This level should be set far enough below the actual point of overflow to allow for any delay between flagging the overflow (which happens when the level is reached) and the actual stopping of product flow. A typical value would be 90% of tank diameter (or height).

LOW PRODUCT

To prevent product shortages, you can specify a low product level to indicate when product is running low. The level set should be based on the rate of product dispensed from the tank and lead times for product delivery.

A typical value is 10% of tank diameter (or height).

IMPORTANT

The SiteSentinel can define two operational statuses for a system: "open" and "closed." When the system is open, product withdrawn is considered to be authorized and is defined as a "sale." When the system is closed, product withdrawn is considered unauthorized and is defined as a "theft." Refer to *System Commands* for opening and closing the system.

MIN. THEFT

Set the minimum theft level to a small volume, typically about five gallons (20 l).

MIN. SALE

The SiteSentinel is designed to report every sale for an active commercial site, such as a gas station.

MIN. DELIVERY

Unless deliveries occur with uncommon frequency, this level can be set low enough to flag each delivery. A typical value is ten gallons (40 liters). Sales, deliveries and thefts can not be distinguished if they occur simultaneously. Refer to the Reports Section for more details.

LEAK RATE

The Leak Threshold value is used by the Timed Leak Test. Typical values for the threshold range from 0.05 to 0.1 gallons per hour (0.2 to 0.4 liters per hour).

This range allows the Timed Leak Test to detect volume changes of 0.1 to 0.2 gallons per hour (0.4 to 0.8 liters per hour) in accordance with U.S. EPA standards. For more details about the Timed Leak Test. see Page 102.

COLD AVERAGE TEMP ON/OFF

Some fuels, particularly diesel, must be kept from “jelling” in cold climates.

Heaters are installed on some tanks for this purpose; the COLD AVERAGE settings control at what temperature this heater goes ON and OFF. Enter two temperatures to create a range in which the heater is ON:

When product temperature drops to the Cold Ave. Temp. ON setting, the heater goews ON. When product temperature reaches the Cold Ave. Temp. OFF setting, the heater goes OFF.

HIGH WATER TIMER

When product is added to a tank, water in the tank will rise temporarily, until the turbulance caused by delivery subsides.

This timer tells the water float to “ignore” a high water reading for a specific length of time you set. Enter a value from 0 minutes to 59 minutes.

Entering “0" disables the timer, producing an immediate high-level reading.

Sensor Thresholds

IMPORTANT

(1) The following require an upper threshold data entry:

Hydrocarbon Vapor: 0.1 volt above normal
Liquid (stand-alone sensor or water-sensing element of interstitial sensor): 0.1 volt above normal
Freon: 0.1 volt above normal

(2) The following have a fixed threshold (no threshold data entry required):

Universal Reservoir: 2.5 volts (upper threshold)
Hydrocarbon Liquid (interstitial and liquid phase): 1.0 volt (lower threshold)
Universal Sump: 2.5 volts (lower threshold)
Water (optional part of liquid phase sensor): 2.5 volts (lower threshold)

(3) A generic sensor must have both upper and lower threshold data entries. Either, neither, or both of these thresholds can be disabled.

(4) A "normal" present value requires most sensors to be installed and operating in an uncontaminated environment for at least two hours.

(5) To minimize false alarm indications, threshold alarm delays can be programmed for all types of sensors.

MODULE & POSITION

This choice specifies a module and position for which to enter threshold and/or alarm delay data. Menu prompts are determined by which sensor was selected when the module and position type were assigned; prompts for a vapor sensor are shown in the menu above.

Before entering threshold and/or alarm delay data, first assign a module and position to the sensor. After entering threshold and/or alarm delay data, sensor module positions must also be installed (Page 58).

After entering the module and position, configuration data (sensor number, description, and present measurement value from the sensor) is displayed.

IMPORTANT

(1) The hydrocarbon vapor, liquid, and Freon sensors must be allowed to "warm up" for a minimum of two hours after their physical installation. There must be no contamination of the sensor area during this period. After warmup, use the present value from the threshold menu for the "normal" value.

(2) When a liquid hydrocarbon sensor (interstitial or liquid phase) has two sensing elements, each element must be wired to a *separate* terminal position in the *same* Smart Module. Both module positions must be assigned, configured, and installed. This enables the **SiteSentinel** to indicate the presence of hydrocarbon products and water independently.

(3) The water-sensing element for the interstitial sensor should be configured as a "liquid" sensor. This type of sensor detects the *presence* of water, has an *upper* threshold, and is *dry* during normal operation.

(4) The water-sensing element for the liquid phase sensor should be configured as a "water" sensor. This type of sensor detects the *absence* of water, has a *lower* threshold, and is *submerged* during normal operation.

(5) For a generic sensor with a normal *low* operating voltage, set the *upper* threshold approximately 0.1 volt *above* normal and disable the lower threshold.

(6) For a generic sensor with a normal *high* operating voltage, set the *lower* threshold approximately 0.1 volt *below* normal and disable the upper threshold.

UPPER THRESHOLD

A hydrocarbon vapor sensor requires an upper threshold data entry of 0.1 volt above its normal operating measurement.

Liquid and Freon sensors require an upper threshold data entry of 0.1 volt above their normal operating measurement.

A generic sensor may have an upper threshold value from 0.0000 to 4.9999 volts. To disable the upper threshold value, set it to 5.0000 volts.

The universal reservoir and hydrocarbon liquid sensors have fixed upper thresholds. These thresholds do not have to be entered and can not be changed.

LOWER THRESHOLD

A generic sensor's lower threshold value can be from **0.0001** to **5.0000** volts. To disable the lower threshold value, set it to **0.0000** volts.

The universal sump and water sensors have fixed lower thresholds, which cannot be changed.

CAUTION

If a hydrocarbon liquid sensor (interstitial or liquid phase) comes in contact with a hydrocarbon product, refer to Appendix D for instructions on drying the sensor. This is especially important if the contact is with a hydrocarbon product other than gasoline (such as diesel fuel).

WARNING!

Federal, state, and/or local regulations may apply to the sensor threshold alarm delays.

IMPORTANT

(1) When a sensor measurement exceeds a fixed or configured threshold, an alarm event occurs. When at least one alarm method has been programmed to indicate the start of an alarm event, the SiteSentinel records the following: (1) the sensor type, module, and position; (2) the starting time and date of the alarm event; (3) the ending time and date of the alarm event; and (4) the "worst" sensor measurement during the alarm event (the measurement that most exceeds the threshold level).

(2) When the corresponding threshold alarm delay is programmed, the SiteSentinel postpones the alarm indication. To prevent false alarms, the threshold must be exceeded during the entire delay period. The threshold delay does not affect the starting and ending times and dates recorded by the SiteSentinel.

UT DELAY TO ALARM

The hydrocarbon vapor, liquid, Freon, universal reservoir, hydrocarbon liquid, and generic sensors can have an *upper* threshold delay of one to 999 minutes. A typical value for the delay is 180 minutes (3 hours).To indicate the alarm event immediately (that is, with no delay), enter a value of zero for the delay.

LT DELAY TO ALARM

The universal sump, water, and generic sensors can also have a *lower* threshold delay of one to 999 minutes. A typical value for the delay would also be 180 minutes. To indicate the alarm event immediately (that is, with no delay), enter a value of zero for the delay.

3.2.5 Install/Remove Modules & Positions Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    NOV 3, 1994   8:36 AM
              SENSOR & PROBE STATES

1.MODULE & POSITION:  1A  NONE
2.INSTALL/REMOVE THE POSITION
3.INSTALL/REMOVE THE MODULE
4.INSTALL/REMOVE ALL

MOD #              POSITIONS

    MOD  A B C D E F G H I J K L M N O P
   +-----------------------------------
 1 | I | I I I I I I . . . . . . . . .
 2 | C | C C C C A A A . . . . . . . . .
 3 | A | A A . . . . . . . . . . . . . .
 4 | D | I I . . . . . . . . . . . . . .
 5 | . | . . . . . . . . . . . . . . . .
 6 | . | . . . . . . . . . . . . . . . .
 7 | . | . . . . . . . . . . . . . . . .
 8 | . | . . . . . . . . . . . . . . . .
LEGEND: "."=NOT ASSIGNED "A"=ASSIGNED
        "C"=CONFIGURED   "I"=INSTALL(ED)
        "D"=DOWN         "R"=REMOVE(D)

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

MODULE & POSITION

Select to specify the module and position for which to install or remove a device (probe or sensor). Before you install a device, first assign a module and position to the sensor and enter configuration data (Page 61). You must enter threshold and alarm delay, before you install a device (Page 88). Enter tank correction data after its probe position is installed.

INSTALL/REMOVE THE POSITION

This feature installs (or removes) a position.

INSTALL/REMOVE THE MODULE

This feature installs (or removes) a module.

INSTALL/REMOVE ALL

This feature installs (or removes) all positions that are configured and all modules that have installed positions.

3.2.6 Tank & Sensor Correction Menu

MAIN MENU L Ĉ L Ą L Ē

```
PRIVILEGED MODE    SEP 18, 2000    8:36 AM

        TANK & SENSOR CORRECTION MENU

 1.MODULE: 1      POSITION: A  PROBE
  === LEVEL ==  ===== VOLUME =====
 2.   0.000 IN       0.0000 GAL
 3.   0.000 IN       0.0000 GAL
 4.   0.000 IN       0.0000 GAL
 5.   0.000 IN       0.0000 GAL
 6.   0.000 IN       0.0000 GAL
 7.   0.000 IN       0.0000 GAL
 8.   0.000 IN       0.0000 GAL
 9.   0.000 IN       0.0000 GAL
10.   0.000 IN       0.0000 GAL
11.   0.000 IN       0.0000 GAL
12.   0.000 IN       0.0000 GAL
13.   0.000 IN       0.0000 GAL
14.   0.000 IN       0.0000 GAL
15.   0.000 IN       0.0000 GAL
16.   0.000 IN       0.0000 GAL
17.   0.000 IN       0.0000 GAL
18.   0.000 IN       0.0000 GAL
19.   0.000 IN       0.0000 GAL
20.   0.000 IN       0.0000 GAL
```

MODULE & POSITION

Select to specify which module and position for which to enter correction data. The type of correction menu displayed is determined by what device was selected when the module and position type were assigned. After you enter the module and position, the correction data (if any) are displayed.

TANK CORRECTION

You can compensate for an irregularly shaped tank by entering up to 20 "correction factors," measured product volumes at known product levels. Correction factors are displayed in the order in which they have been entered. They are not resorted by level or volume.

Compensation factors do not need to be entered in ascending order.

Example: a SiteSentinel system is configured for a cylindrical tank with flat ends, a 96-inch diameter and a nominal volume of 10,000 gallons. A Tank Chart is generated.

Volumes for the tank are then carefully measured at four levels: 24", 48", 72" and 96". These values and the correspond-ing values from the Tank Chart are listed below:A correction factor cannot be entered at a level equal to the diameter (or height) of the tank (96" in the example).

MENU #	MEASURED	LEVEL	CHART
5	2000.0 gal	24"	1955.0 gal
10	5100.0 gal	48"	5000.0 gal
15	8200.0 gal	72"	8045.0 gal

The tank volume must be entered in the PROBE & SENSOR CONFIGURATION MENU (Page 63).

The system averages correction factors for all volumes at all levels. For example, before correction entry, the Tank Chart showed a volume of 5265.2 gallons at 50". *After* programming the correction factors, the Tank Chart shows a volume of 5369.8 gallons at 50".

Data from a manufacturer's Tank Chart can also be used for correction factors. *This data may not be as accurate as measured data.*

3.3 I/O Module Setup

MAIN MENU ☞ ⑥ ☞

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM
                 I/O SETUP MENU

1.I/O CONFIGURATION
2.EVENT OUTPUT SETUP
3.INSTALL/REMOVE I/O MODULES & POSTNS




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

The optional I/O Module lets you connect more external devices to the SiteSentinel. The first four positions (A to D) are for input devices. The last 12 positions (E to P) are for output devices.

To set up an I/O Module, follow these steps in order:

1. Enter ID info for (a) I/O number, (b) description, and (c) product name.
2. Define which output device(s) will be activated for each event.
3. Install I/O Modules and positions.
4. Define which alarms (printer, buzzer, etc.) will be activated for all input devices. Note that the alarms selection is on the SYSTEM SETUP MENU.

IMPORTANT

An alarm must be set to activate a corresponding I/O module relay position.

For all time critical applications, test the output devices and their reactions times.

I/O CONFIGURATION *(see Page 83)*

This selection displays the screen to view or change the following:

- ☐ Module and position assignment
- ☐ I/O Module number
- ☐ Device description
- ☐ Product name.

EVENT OUTPUT SETUP *(Page 84)*

Lets you view or change the following for each output device:

- ☐ I/O Module position assignment
- ☐ Energized/Non-energized
- ☐ Events to activate device
- ☐ Module positions affected

INSTALL/REMOVE I/O MODULES & POSITIONS

See Page 87. Activates or deactivates the I/O Modules and module positions, and shows status of each module position.

3.3.1 I/O Configuration Menu

MAIN MENU ☞ ⑥ ☞ ☞ ❶

```
PRIVILEGED MODE    OCT 31, 1994    8:36 AM
             I/O CONFIGURATION MENU

1.MODULE & POSITION: 1A INPUT
2.I/O #:              1
3.DESCRIPTION:        LINE LEAK DETECTOR
4.PRODUCT:            UNLEADED




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

MODULE & POSITION

Select this option to specify which I/O Module position to configure. For example, to specify the position for an alarm that is connected to the "J" relay of I/O Module #3, you would enter `3J'.

The "physical" number for each I/O Module is determined by a small, red rotary switch on the circuit board (inside the module cabinet). The switch has ten positions, marked "0" to "9". A small arrow on the switch points to the current position. Positions #0 and #9 disconnect the module from the Controller.

I/O

The I/O number is a label that is used to identify the I/O Modules in the SiteSentinel reports. *You are not required to match the I/O number to the module number.*

DESCRIPTION

Enter a description for each I/O Module position.

PRODUCT

Enter a product name for each I/O Module position.

3.3.2 Event Output Setup Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    NOV 3, 1994    8:36 AM
            EVENT OUTPUT SETUP MENU
1.OUTPUT MODULE & POSITION: 2E OUTPUT
2.SETUP POSITION
3.EVENT:       OVERFLOW
4.MODULE & POSITION: 1A PROBE
  DEVICE #     1
  DESCRIPTION: WEST TANK
  PRODUCT:  DIESEL
|MOD|              POSITIONS
|   |          |--------OUTPUTS--------|
| # |           E F G H I J K L M N O P|
|---|---------------------------------+
| 1 |           N N N N N N N N N N N N|
| 2 |           E N N N N N N N N N N N|
| 3 |           N N N N N N N N N N N N|
| 4 |           N N N N N N N N N N N N|
| 5 |           N N N N N N N N N N N N|
| 6 |           N N N N N N N N N N N N|
| 7 |           N N N N N N N N N N N N|
| 8 |           N N N N N N N N N N N N|
LEGEND:"N"=NOT ENERGIZED "E"=ENERGIZED
       "R"=REMOVED FROM OPERATION

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

OVERVIEW

Each output device (connected to an optional I/O Module) can be activated by one or more events (overflow, printer failure, etc.). Because most events are associated with module positions, you can also select which positions the SiteSentinel will monitor for each event.

For example, you can program the SiteSentinel to activate a light at each tank to signal an overflow. To signal a probe failure, you can also program the SiteSentinel to activate the corresponding tank light and to ring an office alarm bell.

IMPORTANT

An alarm must be set to activate an I/O module relay position.

EXAMPLE

Output Device	Setup	I/O Module Position	Input Device	Event	Smart Module Position
tank light	energize	2E	probe	failure & overflow	1A
tank light	energize	2F	probe	failure & overflow	1B
tank light	energize	2G	probe	failure & overflow	1C
office alarm	energize	2H	probes	probe failure	1A, 1B & 1C

In this example, you would first select #1 from the EVENT OUTPUT SETUP MENU to specify the I/O module position. Enter `2E' for the 1st light.

Next, select #3 and choose `OVERFLOW' as the event. Select #4 and enter `1A' for the Smart Module position of the first tank.

When the overflow occurs, the SiteSentinel closes the I/O Module relay and activates the tank light at the 2E position. Select #2 to set up the 2E position as `ENERGIZED'. Repeat this process for each of the remaining tanks, entering the appropriate Smart and I/O Module positions for each tank.

To set up the office alarm, select #1 from the EVENT OUTPUT SETUP MENU to specify the I/O Module position and enter `2H'.

Next, select #3 and choose `PROBE FAILURE' as the event. Select #4 and enter `1A' for the first tank module position; select #2 to set up the 2H position as `ENERGIZED'.

Re-select #4 and enter `1B' for the second tank; set up the 2H position as `ENERGIZED'.

Re-select #4 and enter `1C' for the third tank; set up the 2H position as `ENERGIZED'.

MODULE & POSITION

Select this option to specify which I/O Module position to set up for the output device. For example, to specify an alarm that is connected to the "J" relay of I/O Module #3, you would enter `3J'.

SET UP POSITION

Select this option to set up the specified I/O Module position. You are prompted with the options: `ENERGIZED' and `NOT ENERGIZED'. Press the [NO] or [N] key to toggle the options. Press the [ENTER] key when the appropriate option displays.

Each output relay can be wired as normally open ("N/O") or normally closed ("N/C"). When an N/O relay is energized, the contact closes; when an N/C relay is energized, the contact opens.

IMPORTANT

Output reaction times vary with the number of modules and devices connected to the system. For all time critical applications, test the output devices and their reaction times.

EVENT

This selection prompts you with the various SiteSentinel alarm events: Use the [NO] or [N] key to toggle the options for this feature. When the appropriate option displays, press the [ENTER] key.

MODULE & POSITION

Specifies which Smart Module position or I/O Module input position to monitor for the specified event. *To set up the SiteSentinel to monitor more than one position for an event, you must use option #4 to set up each position individually.*

3.3.3 Install/Remove I/O Modules & Positions Menu

MAIN MENU ☞ ⑥ ☞ ☞

```
PRIVILEGED MODE    NOV 2, 1994   8:36 AM
            INSTALL/REMOVE I/Os MENU

1.MODULE & POSITION:  1A   INPUT
2.INSTALL/REMOVE THE POSITION
3.INSTALL/REMOVE THE MODULE

|MOD|              POSITIONS
|   |-INPUTS-|---------OUTPUTS--------|
| # | A B C D E F G H I J K L M N O P |
+---+---------------------------------+
| 1 | I I I I I I I I I I I I I I I I
| 2 | NOT INSTALLED
| 3 | NOT INSTALLED
| 4 | NOT INSTALLED
| 5 | NOT INSTALLED
| 6 | NOT INSTALLED
| 7 | NOT INSTALLED
| 8 | NOT INSTALLED

LEGEND: "I"=INSTALLED
        "R"=REMOVED FROM OPERATION
          "."=NOT INSTALLED

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

MODULE & POSITION

Select this item to specify the module and position for which to install or remove a device.

INSTALL/REMOVE THE POSITION

This feature installs (or removes) a single position.

INSTALL/REMOVE THE MODULE

This feature installs (or removes) a module and all of the associated positions.

3.4 Alarm Setup

MAIN MENU ☞ ⑥ ☞

```
PRIVILEGED MODE    JUN 26, 1996   8:36 AM
                 ALARM SETUP MENU
   EVENT:               |---START---|END|
                         PRN BZR LIT PRN
                         --- --- --- ---
 1.OVERFLOW             : N   N   N   N
 2.LOW PRODUCT          : N   N   N   N
 3.HIGH WATER           : N   N   N   N
 4.BAD TEMPERATURE      : N   N   N   N
 5.THEFT                : N   N   N   N
 6.DELIVERY             : N   N   N   N
 7.SALE                 : N   N   N   N
 8.TIMED LEAK TEST      : N   N   N   N
 9.SENSOR HIGH (SENSOR
    TYPES G,L,V,R,F)    : Y   N   Y   N
10.SENSOR LOW  (SENSOR
    TYPES G,S,H,W)      : Y   N   Y   N
11.I/O MODULE INPUTS    : Y   N   Y   Y
12.INPUT #1 CLOSED      : N   N   N   N
13.INPUT #2 CLOSED      : N   N   N   N
14.PROBE FAILURE        : N   N   N   N
15.MODULE FAILURE       : N   N   N   Y
16.PRINTER FAILURE      :     N   N   N
17.POWER FAILURE        :             N
18.COLD AVE. TEMP       : N   N   N   N
19.HIGH WATER DURING DEL: ENABLED

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

EVENTS

Site Sentinel can detect and respond to 19 different “alarm events,” which are conditions either requiring attention or simply important enough to be made aware of immediately.

Alarm indication is made with a light (or LED in the Model III) a buzzer (or beeper in the Model III), a Model II internal printer, or a combination of these three.

The Alarm Setup Menu lists which indication methods are ON for each condition.

The HIGH WATER DURING DELIVERY is solely an enable/disable toggle. See Page 74.

ACTIVATION

When at least one alarm method has been programmed to indicate the start of an alarm event, the SiteSentinel records reason for alarm, and starting time and date.

IMPORTANT

For event data to be stored in the history buffer or included in reports, you must have *at least one* alarm set for the event's start.

An alarm must also be set to activate an I/O module relay position.

When the alarm event has ended (the level drops below threshold, the timed leak test ends, power is restored, etc.), the system records the time and date and, when applicable, the worst measurement during the alarm event. The end of the alarm event can be signalled by printing a message with this information on the internal printer.

In the Model II, the end of the alarm event can be signalled by printing a message with this information on the internal printer.

Manifolded Tanks: Sales, thefts, and deliveries are reported for the group as a whole; overflow, low product, high water, and bad temperature events are indicated for individual tanks.When the corresponding threshold alarm delay is programmed, the SiteSentinel postpones the alarm indication. To prevent false alarms, the threshold must be exceeded during the entire delay period. The threshold delay does not affect the starting time and date recorded by the SiteSentinel. *You can not signal the start or end of an alarm event with an external printer.*

ALARM SETUP

To enable indication of an alarm, enter the number from the menu.

You are prompted for each of the three methods to indicate the start of the alarm event, `PRN' (print alarm), `BZR' (sound buzzer), and `LIT' (activate red light); you are also prompted to print a message at the end of the alarm event. Enter `N' to answer "no;" enter `Y' to answer "yes."

You cannot program the system to print an alarm for printer failure. Power failures can only be indicated by having a message print when power is restored.

For the "sensor high" event, the sensor types are generic, liquid, hydrocarbon vapor, universal reservoir, and freon. For the "sensor low" event, the sensor types are generic, universal sump, hydrocarbon liquid, and water.

ALARM SETUP EXAMPLE

This is a High Water alarm set-up. The example uses Position 1E in the IO Module.

1. In Main Menu, press 1 (PASSWORD).
2. Enter Privileged password.
3. Press 6 (SYSTEM SETUP).
4. Press 3 (I/O MODULE).
5. Press 1 (I/O CONFIGURATION).
6. Press 1 (MODULE & POSITION).
7. Enter 1, 3. Then, press the ALPHA key twice.
8. Press 2 (I/O #).
9. Enter 1.
10. Press 3 (DESCRIPTION).
11. Enter HIGH WATER. Use (ALPHA) to shift numeric keys appropriately.
12. Press 4 (PRODUCT).
13. Enter a product name. Use (ALPHA) to shift numeric keys appropriately.
14. Press the (CANCEL) key to return to the I/O Setup Menu.
15. Press 2 (EVENT OUTPUT SETUP).
16. Press 4 (MODULE & POSITION).
17. Press 1, 1, 2 then press ALPHA key twice.
18. Press 1 (OUTPUT MODULE & POSITION).
19. Press 1, 3.
20. Press the ALPHA key until the position in the IOModule appears.
21. Press 3 (EVENT).
22. Press (NO) to toggle to HIGH WATER.
23. Press 2 (SETUP POSITION).
24. Press (NO) to choose ENERGIZED.
25. Press the (CANCEL) key to return to the I/O Setup Menu.
26. Press 3 (INSTALL & REMOVE I/O MODULE & POSITION).
27. Press 3 again to install the position and module.

Chapter 4 - SmartModule & I/O Module Data

MAIN MENU ☞

```
SITE SENTINEL   MAY 07, 1996    8:36 AM
             MODULE DATA MENU

1.SMARTMODULE (PROBE & SENSOR) DATA
2.I/O MODULE DATA




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

This section describes various reports that contain detailed technical data about the system's hardware. This information is primarily used for setup and diagnostics.

SMART MODULE (PROBE & SENSOR) DATA

This selection displays a submenu for the smart module data. This includes:

Tank dip chart

Current tank and sensor readings

Probe and sensor hardware

Probe and sensor diagnostics

Module device level summary.

I/O MODULE DATA

This selection displays a submenu for the I/O module data.

4.1 Smart Module Menu

MAIN MENU ☞ ☞ ❶

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
             SMART MODULE MENU


1.TANK DIP CHART
2.TANK & SENSOR
3.PROBE & SENSOR HARDWARE
4.PROBE & SENSOR DIAGNOSTIC
5.MODULE DEVICE LEVEL SUMMARY




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

TANK DIP CHART

A report that shows the volumes of product at sequential levels of a tank. *See Page 93*.

TANK & SENSOR

The current readings are shown. *See Page 94.*

PROBE & SENSOR HARDWARE

The operational information that is programmed into a module, a probe or a sensor can be displayed with this selection. *See Page 95.*

PROBE & SENSOR DIAGNOSTIC

The diagnostic information for a probe or sensor can be displayed with this feature. This information is used by service personnel when troubleshooting the system. *See Page 96.*

MODULE DEVICE LEVEL SUMMARY

The present measurements for the probes and sensors connected to each smart module. Voltages are shown for sensors; product level and net volume are shown for probes. *See Page 97.*

4.1.1 Tank Dip Chart

MAIN MENU ☞ ☞ ☞ ❶

```
SITE SENTINEL    OCT 25, 1994     8:36 AM

              TANK DIP CHART

1.MODULE & POSITION: 1A  PROBE
2.VIEW MORE VOLUMES

LEVEL             VOLUME
(IN.)             (GAL.)
   0         0.00       16.36      46.44
   3        85.72      132.52     185.85
   9       245.02      309.51     378.89
  12       452.82      531.00     611.27
  15       968.00     1065.32    1165.52
  18      1268.46     1373.99    1482.00
  21      1591.96     1704.15    1818.46
  24      1934.78     2053.00    2173.79
  27      2296.28     2420.38    2545.98
  30      2673.00     2802.11    2932.45
  33      3063.93     3196.48    3330.00
  36      3465.75     3602.31    3739.59
  39      3877.52     4016.00    4156.36


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

This report shows the volumes of product at various levels of a tank.

Tank Dip Charts can be printed before and after programming correction factors to show the effects of the additional data. If the probe length is greater than 41", all the levels and volumes cannot be viewed on the screen at one time. In this case, use option #2 to display the additional data.

Note that when a dip chart is *printed*, all volumes and levels are included.

4.1.2 Tank & Sensor Data

MAIN MENU ☞ ☞ ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
              TANK & SENSOR DATA

1.MODULE & POSITION: 1A PROBE
2.CONTINUOUS, ONE MINUTE UPDATES.

TANK #: 1
TANK DESCRIPTION: PV-UNDERGROUND
PRODUCT:DIESEL

LEVELS & AVG TEMP
 PRODUCT LEVEL:          53.3308 IN
 WATER LEVEL:             4.4820 IN
 AVG PRODUCT TEMP:       52.3878 F

VOLUMES
 NET CORRECTED PROD:   5759.1184 GAL
 GROSS MEASURED PROD:  5739.0255 GAL
 NET CORRECTED TANK:   5917.1305 GAL
 GROSS MEASURED TANK:  5896.4863 GAL
 VOLUME LEFT IN TANK:  3831.5137 GAL
 GROSS WATER:           157.4608 GAL


ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

Module & Position

Enter **`1'** to select a module and position; the screen below appears.

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
                 TANK & SENSOR DATA


1. MODULE & POSITION: 2C  SENSOR
2. CONTINUOUS ONE MINUTE UPDATES

SENSOR #: 3
SENSOR DESCRIPTION: VAPOR SENSOR

CURRENT VALUE:     0.1875 V


Enter #, C/CANCEL, H/HELP or 0/Print:
```

The present readings are shown.

One-Minute Updates

Enter **`2'** to update and display data at one minute intervals. If the auto-logout feature is *enabled*, or if the system is accessed via modems, the screen is updated only *five* times.

4.1.3 Probe & Sensor Hardware Data

MAIN MENU ☞ ☞ ☞

```
SITE SENTINEL     AUG 1, 1991     8:36 AM
       PROBE & SENSOR HARDWARE DATA


1. MODULE & POSITION: 1A  PROBE

MODULE SOFTWARE VERSION:     1.00
MODULE CRYSTAL FREQUENCY: 64000000 HZ

GENERAL PROBE INFORMATION
 SERIAL #:                1
 SOFTWARE VERSION:       1.00
 VELOCITY:          114238.8594 IN/SEC
 LENGTH:               104.0000 IN

PROBE TEMPERATURE SENSOR POSITIONS
 TOP:          71.0000 IN
 MIDDLE 3:     55.0000 IN
 MIDDLE 2:     41.0000 IN
 MIDDLE 1:     25.0000 IN
 BOTTOM:       15.0000 IN



Enter #, C/CANCEL, H/HELP or 0/Print:
```

The information programmed into a module or a probe can be displayed with this selection.

For each *module*, this includes software version and crystal frequency. For each *probe*, this includes the serial number, software version, velocity, length, and temperature sensor locations.

4.1.4 Probe & Sensor Diagnostics

MAIN MENU ☞ ☞ ☞

```
SITE SENTINEL     OCT 24, 1994     8:36 AM
     DIAGNOSTIC PROBE & SENSOR DATA

1.Module & Position: 1A  PROBE
2.Continuous, 4 Second Updates

Tank #: 1
Tank Description:
Product:
DIAGNOSTIC  LEVEL 1      STATUS: INFO:
PRODUCT LEVELS              0D0
 Rough:         77.5206 IN   0P0  773213
 Fine:          77.5209 IN

WATER LEVEL:    3.7194 IN   0W0  2850090
                            0T0  4601373
PROBE SENSOR TEMPS             15434982
 Head:          78.9150 F     9274807
 Top:           74.4083 F     9711680
 Middle 3:      74.5590 F     9722432
 Middle 2:      76.2366 F     9570955
 Middle 1:      77.4999 F     8939662
 Bottom:        78.6533 F     9286567


Enter #, C/CANCEL, H/HELP OR 0/PRINT:
```

The diagnostic data is used by service personnel to troubleshoot probes and sensors.

Enter **`1**' to select a module and position; the current data for device are displayed.

Enter **`2**' to update the data.

4.1.5 Module Device Level Summary

MAIN MENU ☞ ☞ ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
       MODULE DEVICE LEVEL SUMMARY

1.MODULE & POSITION: 1A  PROBE
2.CONTINUOUS, ONE MINUTE UPDATES

PSTN     LEVEL     NET QUANTITY
 A    NOT ASSIGNED
 B    NOT ASSIGNED
 C    NOT ASSIGNED
 D    NOT ASSIGNED
 E    CONFIGURED
 F      0.0055 V
 G     96.1040 IN  10052.02 GAL
 H     28.4084 IN  2787.488 GAL
 I    NOT ASSIGNED
 J    NOT ASSIGNED
 K    NOT ASSIGNED
 L    NOT ASSIGNED
 M    NOT ASSIGNED
 N    NOT ASSIGNED
 O    NOT ASSIGNED
 P    NOT ASSIGNED

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

This summary contains present measurements for the probes and sensors connected to each smart module.Voltages are shown for *sensors.* Product level and net volume are shown for *probes.*

Enter `**1**' to select a module and position; the current data for device are displayed.

Enter **`2'** to update the data.

Notes:

4.2 I/O Module Hardware Menu

MAIN MENU ☞ ☞

```
SITE SENTINEL   MAY 7, 1996     8:36 AM
                 I/O DATA

1.I/O MODULE HARDWARE



Enter #, C/CANCEL, H/HELP OR 0/PRINT:
```

This selection displays the current data for the I/O module hardware.

Press **1** for a summary (below).

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
         I/O MODULE HARDWARE MENU

1.MODULE & POSITION: 1D  INPUT

MODULE SOFTWARE VERSION:    1.01

  4 INPUTS   POSITIONS A TO D
 12 OUTPUTS  POSITIONS E TO P



ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

Notes:

Chapter 5 - System Commands

MAIN MENU ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
          SYSTEM COMMANDS MENU

1.SYSTEM STATE: OPENED
2.CLEAR HISTORY BUFFER
3.TIMED LEAK TEST
4.SAVE TANK INVENTORY (RANGE:    TO   )
5.PASSTHROUGH PORT (TERMINALS ONLY!)
6.ABORT SCHEDULED REPORT PRINTOUT
7.RED LIGHT SWITCH : ON
8.BUZZER SWITCH    : OFF
9.COMPUTER REPORTS (TERMINALS ONLY!)
10.SYSTEM BACKUP (TERMINALS ONLY!)
11.SYSTEM RESTORE (TERMINALS ONLY!)
12.CHANGE I/O MODULE OUTPUT STATE




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

5.1 System State

MAIN MENU ☞ ☞ ❶

Press **1** to show the current operational state of the system is displayed. When the system is opened, product withdrawn is defined by the system as a sale. When the system is closed, product withdrawn is defined as a theft.

To change the state, you must be in the privileged mode. Enter **`1'** and press the **[NO]** key (on the keypad) or the **[N]** key (on the keyboard) to change the display.

When the desired state is shown, press the **[YES]** key (on the keypad) or the **[Y]** key (on the keyboard).

5.2 Clear History Buffer

MAIN MENU ☞ ☞

The history buffer contains the data used in reports, ended events, and warnings. To clear the buffer, you must be in the privileged mode.

Enter **`2'** to clear the buffer. You will be prompted a second time for verification.

5.3 Timed Leak Test

MAIN MENU ☞ ☞

The timed leak test is designed to meet the EPA requirements for monthly leakage evaluation. A submenu is displayed (below).

```
SITE SENTINEL    DEC 08, 1995    8:36 AM
       TIMED LEAK TEST SETUP

1.MODULE & POSITION: 1A  PROBE
2.DURATION:      2 HR(S)
3.FREQUENCY (GLOBAL): ONLY ONCE
4.START/STOP TEST

MOD #               POSITIONS

      A B C D E F G H I J K L M N O P
    +--------------------------------
   1| S . . . . . . . . . . . . . . .
   2| . T . . . . . . . . . . . . . .
   3| . . . . . . . . . . . . . . . .
   4| . . . . . . . . . . . . . . . .
   5| . . . . . . . . . . . . . . . .
   6| . . . . . . . . . . . . . . . .
   7| . . . . . . . . . . . . . . . .
   8| . . . . . . . . . . . . . . . .

LEGEND: "."=NONE  "T"=TEST  "S"=STOP
ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

5.3.1 Overview

The timed leak test is designed to meet the EPA requirements for monthly leakage evaluation. A timed leak test should be performed (or scheduled) as often as possible to maximize the timeliness and reliability of test data. The following apply to the timed leak test:

- ☐ At least *three* temperature sensors must be submersed; this requires the tank to be more than 50% full (*EXCEPTION*: If your Timed Leak Test Setup menu has an asterisk in the title like this: - **`Timed Leak Test Setup*`** - only *one* temperature sensor must be submersed. For these Site Sentinels the tank needs only be 14% full).
- ☐ Nothing should be added to tank for previous 12 hours
- ☐ No deliveries or withdrawals to the tank during the test
- ☐ Test duration must be *at least* two hours
- ☐ Leak threshold must be set between 0.05 - 0.1 gal/hr (0.2 - 0.4 liters/hr)

When the test is over, results are evaluated and summarized in a report that can be printed. If the measured leak rate is *less* than the leak threshold, the report indicates that the tank has passed the test If the leak rate is *equal to or greater than* the threshold, the tank fails. *Test results are reliable only when the guidelines are strictly followed. These guidelines must be followed to comply with EPA standards - 95% probability of detection with 5% chance of false alarm.*

IMPORTANT

Anything that allows product to flow into or out of a tank must be sealed off before starting the timed leak test. This includes, but is not limited to, the drainback (or "check") valve.

For manifolded tanks, you must also physically isolate the tanks from each other. Close the siphon tube between the tanks. If the tube does not have a valve to seal off the tanks, install one. There often is a vacuum line from the pump to the siphon tube; this vacuum line also must be sealed off. *If the configuration data for the tank type, diameter or volume are incorrect, the test results will not be correct either!*

After the test is completed, the tank(s) can be unsealed for normal operation.

5.3.2 Test Setup

Press **`1'** to specify which module and position to test. You may specify only one module and position at a time.

Press **`2'** to specify the duration of the test. Four hours is the default value.

Press **`3'** to select the frequency of the test. The default value is once.

After you have specified the above values, press **`4'** to place the cursor on the module/position chart.

To start a test, enter **`T'**. The test will run for the selected duration or until it is aborted (see below).

To abort a test in progress, press **`4'** and then press **`S'**. The test is stopped immediately.

IMPORTANT

If the configuration data for the tank type, diameter or volume are *not* correct, the results of the timed leak test will *not* be correct.

If the timed leak test generates a "leak indicated" message, the tank should be retested as soon as possible.

Never excavate a tank based only on the evidence of the timed leak test.

5.3.3 Leak Test Results
EVALUATING TEST RESULTS

When the leak rate is negative, this usually indicates a net loss of product from the tank; when the leak rate is positive, this usually indicates water has leaked into the tank.

When the timed leak test is terminated, the SiteSentinel evaluates the data it collected. It then generates one of the following messages:

ACTIVITY DURING LEAK TEST - product was added to or withdrawn from tank at a rate greater than one gallon per minute; the test results are not valid

INVALID CORRECTED VOLUME - tank or probe setup may be incorrect, check tank report to ensure proper setup data; the test results are not valid

INSUFFICIENT THERMISTORS IMMERSED - less than two thermistors are properly placed in the product (or water); the test results are not valid.

A thermistor is a temperature-sensing device; there are typically five thermistors in each probe.

INSUFFICIENT VOLUME - the tank is less than half full; the test results are not valid

TEST TOO SHORT - the test period was less than one hour; the test results are not valid

TEST PASSED - the leak rate measured during the test was less than the leak threshold

LEAK INDICATED - the leak rate measured during the test was more than the leak threshold

IMPORTANT

If the configuration data for the tank type, diameter or volume are *not* correct, the results of the timed leak test will *not* be correct.

If the timed leak test generates a "leak indicated" message, the tank should be retested as soon as possible.

Never excavate a tank based only on the evidence of the timed leak test.

Refer to Page 72 for information on setting the thresholds for tank events (overflow, low product, minimum theft, sale, delivery, and leak rate).

For event data to be recorded in the SiteSentinel history buffer, you must have at least one alarm method programmed for activation at the event's start.

This condition must also be met for the data to be included in any report. Refer to Page 88 for information on the alarm setup. See Page 111 for setup information on the report output and range.

5.4 Save Tank Inventory

MAIN MENU ☞ ☞

This command saves the current inventory report in the system's memory for an *inclusive* range of modules and positions. This command does *not* display or print the data.

When you select this feature from the menu, you are prompted to enter a range of modules and positions. The cursor moves to the beginning range specifier in the menu; enter a module and position.

The cursor moves to the terminating range specifier; enter a module and position. The inventory data are then saved.

5.5 Passthrough Port

MAIN MENU ☞ ☞

TERMINAL USE ONLY. This option enables the Passthrough mode for your terminal or PC. This option is *not* available from the Model II keypad.

Passthrough lets you communicate with another device, such as a SYSTEM 2. When this mode is enabled, you can program the device in the usual manner. To exit, press the **[Ctrl]** and **[Z]** keys *simultaneously*.

IMPORTANT

The attached device must share the same communication parameters (baud rate, word size, etc) as the SiteSentinel controller.

5.6 Abort Scheduled Report Printout

MAIN MENU ☞ ☞

Reports can be scheduled to printout at various times and intervals. You may abort a scheduled printout that is in progress with this command.

It is <u>not</u> necessary to abort a report printout that is in progress in order to access the system.

5.7 Red Light Switch

MAIN MENU ☞ ☞

When the red Model II light button or Model III LED is programmed for the *duration* of an alarm condition, use option #7 of the SYSTEM COMMANDS MENU to turn it OFF.

5.8 Buzzer Switch

MAIN MENU ☞ ☞

When the buzzer (located on the front of the Model II controller, or inside the Model III) is programmed for the *duration* of an alarm condition, use option #8 of the SYSTEM COMMANDS MENU to turn it OFF.

5.9 Computer Reports

MAIN MENU ☞ ☞

TERMINALS ONLY. Report data can be downloaded to an external computer system in a concise computer format. See the menu below.
To maintain the same command arrangement as in other Reports Menus, options 1, 2, 3, and 11 in the menu above (which do not apply to computer reports) are left blank.

Download reports to an external computer system. The commands in this menu select which reports to send.

To specify the report range, refer to the REPORTS SETUP MENU. Note that you must select the range *before* selecting the report.

IMPORTANT

The `COMPUTER REPORTS' command must be executed from a terminal emulation program or similar computer interfacing software.

Before downloading report data, you must first select the input flow control, protocol, and file name.

5.10 System Backup

MAIN MENU ☞ ☞

The SiteSentinel setup information can be transmitted to an external computer where it can be stored for safekeeping.

When this command is executed, the SiteSentinel transmits the setup data, the site ID, and the version number of the system.

Setup data can be restored only to systems with controller software version 1.07A-USA (or later).

Backing up system setup data (tank parameters, alarm configuration, etc.) enables you to safeguard this information and to minimize downtime when modifying or repairing a SiteSentinel. You can also back up one system and restore the data to another to speed the setup of similar sites.

5.11 System Restore

MAIN MENU ☞ ☞ (11)

Use this option to restore data to the SiteSentinel from an external computer. The information can be restored to the system from which it was obtained or to another similar system.

When this command is executed, the SiteSentinel does the following:

Tests the restored controller software for compatibility

Clears the history buffer

Restores configuration data

Restarts all tasks

The controller software version MUST BE THE SAME for both the system that was backed up and the system that will be restored.

IMPORTANT

The `SYSTEM BACKUP' and `SYSTEM RESTORE' commands must be executed from a terminal emulation program or similar computer interfacing software. Before backing up or restoring data, you must first select the input flow control, protocol, and file name. Refer to the COMPUTER PROTOCOL SETUP MENU.

At present, the Kermit, Kermit-8, and PV protocols are supported.

5.12 Change I/O Module Output State

MAIN MENU ☞ ☞ (12)

```
SITE SENTINEL    OCT 24, 1994    8:36 AM
       OUTPUT STATE CHANGE MENU

1. MODULE & POSITION:
2. CHANGE THE POSITION OUTPUT STATE
3. CHANGE ALL MODULE OUTPUTS

MOD #              POSITIONS
                  -----OUTPUTS--------

               E F G H I J K L M N O P
    +--------------------------------
   1|          DOWN
   2|          NOT INSTALLED
   3|          NOT INSTALLED
   4|          NOT INSTALLED
   5|          NOT INSTALLED
   6|          NOT INSTALLED
   7|          NOT INSTALLED
   8|          NOT INSTALLED

LEGEND: "N"=  NOT ENERGIZED "E"=ENERGIZED
           "R" = REMOVED FROM OPERATION

ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

In non-Privileged mode, this menu indicates the current state of up to eight I/O modules with the following codes:

DOWN Installed, but not operating

NOT INSTALLED Not a defined module:

N	Not energized
E	Energized
R	Removed from operation

Use Privileged mode (the menu shown above) to do the following.

MODULE & POSITION

Press **1**, and then enter a position address (available addresses are shown on the bottom of the menu). Press [ENTER] to finish the entry.

CHANGE THE POSITION OUTPUT STATE

Press **2** to toggle the state of the output you specified in Option 1 *(Module & Position).*

CHANGE ALL MODULE OUTPUTS

Press **3** to change the states of ALL listed outputs.

Chapter 6 - Reports

MAIN MENU ☞

```
SITE SENTINEL     OCT 25, 1994     8:36 AM
                REPORTS MENU

 1.REPORT OUTPUT SETUP

CURRENT
 2.CONTROLLER STATUS
 3.TANK, PROBE & SENSOR STATUS GRAPHS
 4.TANK INVENTORY
 5.SENSOR LEVELS
 6.WARNINGS IN PROGRESS

SAVED EVENTS
 7.SENSOR, PROBE, INPUT, & HW FAILURE
 8.SENSOR, PROBE, & INPUT
 9.HARDWARE FAILURE
10.INDIVIDUAL

11.SAVED TANK INVENTORIES

12.I/O MODULE STATUS REPORT


Enter #, C/CANCEL, H/HELP or 0/Print:
```

For Quick Sale and Delivery Reports, see Chapter 8 of this manual.

REPORT OUTPUT SETUP

Use this function from the reports menu to define range settings (by module number and/or date) and output formats of your reports. See Page 111.

CURRENT REPORTS

Your SiteSentinel can print or display the following reports on data happening NOW:

☐ **Controller Status** (Page 115)

☐ **Tank, Probe, & Sensor Status Graphs** (Page 116)

☐ **Tank Inventory** (Page 117)

☐ **Sensor Levels** (Page 117)

☐ **Warnings in Progress** (Page 118)

You must have at least one alarm programmed for activation at the event's start. See Page 88 for alarm setup.

SAVED EVENTS

The system can also report on the following "stored events" (all are described on Page 119):

☐ **Sensor, Probe, Input, & Failure Events**

☐ **Sensor, Probe, & Input Events** *Overflow, low product, high water, bad temperatures, thefts, deliveries, sales, timed leak test, high & low sensor levels, input contact closures*

☐ **Hardware Failure Events** *Probe, module, printer & power failures*

For events to be "saved" you must have at least one alarm programmed for activation at the event's start. Refer to Page 88 for more information on the alarm setup.

Other reports include:

☐ **Individual Events** (Page 120)

☐ **I/O Module Status** (Page 122)

6.1 Report Output Setup Report

MAIN MENU ☞ ☞ ❶

```
PRIVILEGED MODE     OCT 25, 1994     8:36
             REPORT OUTPUT SETUP

RANGE SETTINGS
 1.MODULE & POSITION RANGE:  1A TO 8P
 2.STARTING:  JAN 1, 1993  12:00 AM
 3.ENDING  :  JAN 7, 1993  12:00 PM

OUTPUT OPTIONS
 4.ORDER               :  SEQUENTIAL
 5.OUTPUT              :  PRINTER
 6.PRINTOUT FORMAT     :  IN LINE
 7.SCREEN VIEWING RATE:  1 SECS/SCREEN




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

6.1.1 Range Settings

Range settings let you limit the **SiteSentinel** data base used to generate reports. Default settings for this feature include *all* information in the data base.

To specify *module and position range*, choose **1** from the menu.

Enter a range of modules and positions. The cursor moves to the beginning range specifier (**`1A'**) in the menu - enter a specific module and position. The cursor moves to the *terminating* range specifier; enter a module and position.

For example, to include probes and sensors connected to module 1, positions A, B, C and D, you would specify **`1A-1D'**.

You can also use a time/date range. Be sure to enter the time and date in the displayed format.

6.1.2 Output Options

Report order can be *sequential* (listed in the order in which they occur) or by *type* (reports are grouped by category). Press **[N]** or **[NO]** to toggle the choices; when the desired choice is displayed, press **[Enter]**.

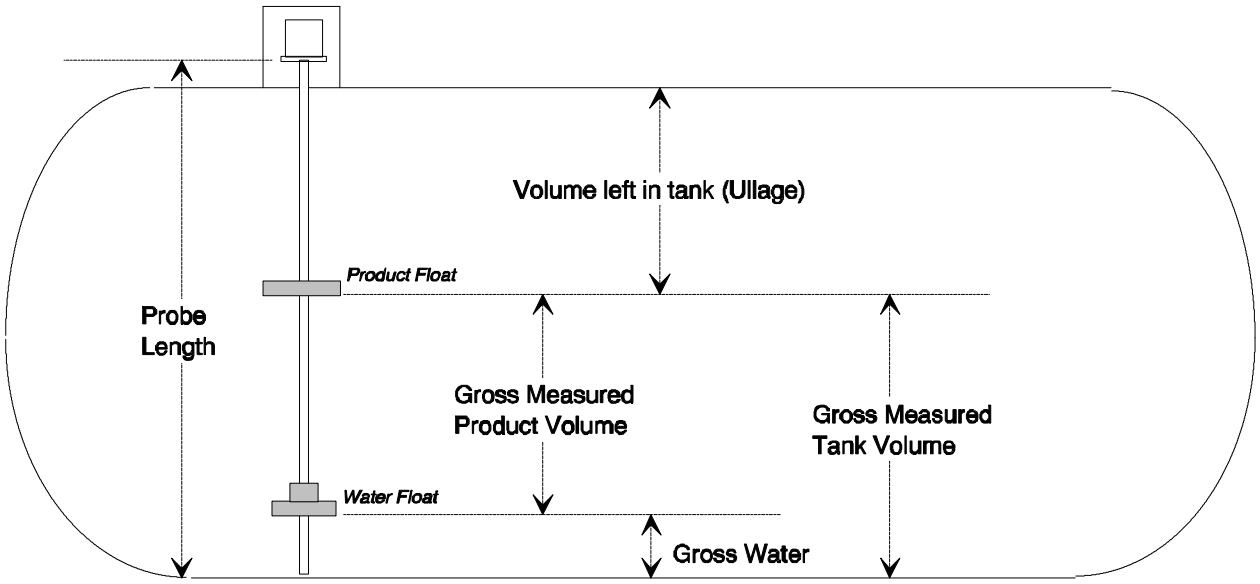
Output reports either to the screen (terminal and/or graphics display) or to the printer. Press **[N]** or **[NO]** to toggle the choices; when the desired choice is displayed, press **[Enter]**.

Scheduled reports are sent to the printer *only*. See Page 123 for scheduling reports.

To abort a report printout, press the **[Ctrl]** and **[X]** keys (or the **[Ctrl]** and **[C]** keys) *simultaneously*.

The printout format can be either in line or screen. (The report examples in this section are shown in both formats.) Press **[N]** or **[NO]** to toggle the choices; when the desired choice is displayed, press **[Enter]**.

When reports are shown on the screen, the viewing rate determines how long a report is displayed. You can enter a rate of one to 999 seconds.



6.1.3 Report Terms

Use these definitions, and the illustration above, to better understand the data presented in the various reports.

PRODUCT LEVEL

This is t
the position of the indicator on the probe.

WATER LEVEL

This is the distance of the water float from the bottom of the tank.

AVERAGE PRODUCT TEMPERATURE

This is the average of the readings from the probe temperature sensors that are submersed in product (or water). Any temperature sensors that are above the product level are ignored.

VOLUME LEFT IN TANK

The volume above product, or "ullage," is calculated by s
setup tank volume.

GROSS MEASURED TANK VOLUME

This volume is calculated from the position of the product float. This value includes water and product; it is not corrected for temperature.

NET CORRECTED TANK VOLUME

The gross measured tank volume is calculated and corrected with measurements from the temperature sensors. This value is the most accurate measure of a sale, delivery or inventory.

GROSS MEASURED PRODUCT VOLUME

This volum
corrected for temperature.

NET CORRECTED PRODUCT VOLUME

The gross measured tank volume is calculated. The water volume is calculated and subtracted from the gross measured tank volume. The remaining product volume is then corrected with measurements from the temperature sensors.

GROSS WATER

This is the volume of the water. *This* ***value is not corrected for temperature.***

6.2 Controller Status Report

MAIN MENU ☞ ☞

```
SITE SENTINEL      OCT 25, 1994      8:36 AM
                CONTROLLER STATUS


- EPROM VERSION      : 1.08B-USA-235
     CHECKSUM        : xxxxxxxxx
     STATUS          : OKAY

- SITE/SYSTEM STATE  : OPENED
- PRINTER TYPE       : INTERNAL
     STATUS          : OKAY

- HISTORY/BUFFER SIZE
     TOTAL RECORDS   : 1234
     FREE RECORDS    : 1234
     USED RECORDS    : 0

- BATTERY TEST RESULT   : PASSED
- LAST FOUR POWER FAILURE OCCURANCES
     NOV 4, 1994  10:32 AM
     NOV 8, 1994  2:54 PM
     NOV 8, 1994  3:17 PM
     NOV 8, 1994  11;55 PM

Enter #, C/CANCEL, H/HELP or 0/Print:
```

EPROM Version: This is the software version and "nationality" that is installed in the controller.

EPROM checksum is the result of a test of the ICs that store the operating system. If **Status** is okay, the operating system is functioning properly. If the checksum is not indicated as okay, contact your service representative.

Site/System State can be either OPEN or CLOSED. When open, product withdrawn is defined by the system as a sale. When closed, product withdrawn is defined as a theft. To change the operational state, see Page 101.**History/Buffer Size** is the amount of memory available to store data. The total number of records may vary slightly between software versions.

Battery Test Result. A "backup battery" protects the system data in case of a power failure. During operation, this battery is tested automatically every day, just after midnight. In addition, the system tests the battery after an initial powerup and after a power failure. The result of the most recent battery test is displayed.

Last Four Power Failure Occurrences. The date and time of the last four power failures are listed.

6.3. Tank, Probe & Sensor Status Graphs Report

MAIN MENU ☞ ☞

```
SITE SENTINEL     NOV 8, 1994     8:36 AM
   TANK, PROBE & SENSOR STATUS GRAPH MENU

1.MODULE
2.GRAPH TYPE:    PROBE LEVEL
3.CONTINUOUS, ONE MINUTE UPDATES


PSTNS: A B C D E F G H I J K L M N O P
     +--------------------------------
 TOP|   . . . . . . . . . . . . . . . .

  75| . . . . . . . . . . . . . . . . .
    | . . . . . . . . . . . . . . . . .
  50| . . . . . . . . . . . . . . . . .
    | . . . . . . . . . . . . . . . . .
  25| . . . . . . . . . . . . . . . . .
    | . . . . . . . . . . . . . . . . .
BOTTOM

LEGEND: "."=NONE  "T"=TEST  "S"=STOP
ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

To graphically monitor the system's ongoing probe and sensor measurements, you can print and display the Smart Module and I/O Module status graphs. For a complete description of the status graphs, see Page 50.

6.3.1 Graph Type

Two graphs are available for each active smart module; an additional graph displays for each active I/O Module. You may view either one from this menu. Press the **[NO]** or **[N]** key to toggle the options for this feature. When the appropriate option displays, press **[Enter]**.

The first Smart Module graph indicates the current level of each product float as a percentage of its tank diameter (**`PROBE LEVEL'**). The second Smart Module graph shows the current gross product volume for each tank as a percentage of its total volume (**`TANK VOLUME'**).

Sensors are indicated with either a bar level showing the voltage measurement as a percentage of five volts, text indicating a normal or alert status, or both. The status graph for the I/O modules indicates whether each module position is currently "open," "closed," "energized," "not energized," or "removed from operation."

6.3.2 Continuous, One Minute Updates

This feature lets you monitor the status of the Smart and I/O Modules. When the timed auto-logout feature is enabled, data is updated every minute for a period of five minutes. The auto-logout feature may be disabled to allow continuous viewing and updates. For more information about the timed auto-logout feature see Page 37.

6.4 Tank Inventory Report

MAIN MENU ☞ ☞

An inventory report can be printed and displayed for each tank, showing the current values of the following:

- ❑ Gross measured product, water, and tank levels and volumes
- ❑ Temperature-corrected product, water, and tank volumes
- ❑ Amount of product needed to fill the tank completely ("ullage"), and to 90% capacity
- ❑ Average product temperature.

Manifolded Tanks: An inventory report is generated for the group. The manifolded inventory report sums the product and water volumes for a group, but does not contain level or 90% ullage information.

Tank Inventory Reports can also be selected directly from the MAIN MENU. When you generate it in this way, you do not have to specify a tank range or position. The printed and displayed reports, though slightly different in format, contain the same information.

When a level reading is not applicable to a type of measurement, it is noted as `**NA**'.

A tank or manifolded group must be configured in order for the system to generate its inventory report. The terms used in this report are defined on Page 113.

Refer to Page 111 for setup information on the report output and range.

6.5 Sensor Levels Report

MAIN MENU ☞ ☞

This report lists the values for all sensors. Refer to Page 111 for setup information on the report output and range.

6.6 Warnings in Progress Report

MAIN MENU ☞ ☞

This report indicates all events (overflow, printer failure, sensor level high, etc.) that are currently in progress (except power failure). If several events have been programmed to trigger an alarm, this report can show which event is occurring.

Warnings can be printed in the sequence they occurred or grouped by category.

For the "screen" display, only one event can be viewed at a time.

The Warnings in Progress Report includes all events that are currently in progress.

For events that have ended (and are recorded in the event history buffer), there are four reports available; see Page 44 for Event History information.

For event data to be recorded in the SiteSentinel history buffer, you must have at least one alarm method programmed for activation at the event's start. Note that this condition must also be met for the data to be included in any report. Refer to Page 88 for information on the alarm setup.

Refer to Page 111 for setup information on the report output and range.

6.7 Sensor, Probe, Input, & HW Failure Events Report

MAIN MENU ☞ ☞

This report indicates all events (overflow, printer failure, sensor level high, etc.) that have ended and are stored in event history buffer.

Events can be printed in the sequence they occurred or grouped by categories. Note that for the "screen" display, only one event can be viewed at a time. Refer to Page 72 for information on setting the thresholds for tank and sensor events (overflow, low product, minimum theft, sale, and delivery).

For event data to be recorded in the SiteSentinel history buffer, you must have at least one alarm method programmed for activation at the event's start. Note that this condition must also be met for the data to be included in any report.

6.8 Sensor, Probe, & Input Events Menu

MAIN MENU ☞ ☞

This report indicates all events - except hardware failure - that have ended and are stored in event history buffer. These events include overflow, low product, high water, bad probe temperatures, thefts, deliveries sales, timed leak tests, high and low sensor levels, and external input closures.

Events can be printed in the sequence they occurred or grouped by categories.

Note that for the "screen" display, only one event can be viewed at a time.Refer to Page 72 for information on setting the thresholds for tank events (overflow, low product, minimum theft, sale, and delivery).

For event data to be recorded in the SiteSentinel history buffer, you must have at least one alarm method programmed for activation at the event's start. Note that this condition must also be met for the data to be included in any report. Refer to Page 88 for information on the alarm setup.

Refer to Page 44 for information about the event history buffer. Refer to Page 111 for setup information on the report output and range.

6.9 Hardware Failure Events Menu

MAIN MENU ☞ ③ ☞ ❾

This report indicates all hardware failure events that have ended and are stored in event history buffer. These events include: probe, Smart Module, Model II internal printer and power failures. Events can be printed in the sequence they occurred or grouped by categories.

For event data to be recorded in the SiteSentinel history buffer, you must have at least one alarm method programmed for activation at the event's start. Note that this condition must also be met for the data to be included in any report. Refer to Page 111 for setup information on the report output and range.

6.10 Individual Events Menu

MAIN MENU ☞ ☞

```
SITE SENTINEL    OCT 25, 1994     8:36 AM
       INDIVIDUAL REPORTS MENU

 1.OVERFLOW
 2.LOW PRODUCT
 3.HIGH WATER
 4.BAD TEMPERATURES
 5.THEFTS
 6.DELIVERIES
 7.SALES
 8.TIMED LEAK TEST
 9.HIGH SENSOR LEVELS
10.LOW SENSOR LEVELS
11.I/O MODULE INPUTS
12.INPUT #1 CONTACT CLOSURES
13.INPUT #2 CONTACT CLOSURES
14.PROBE FAILURES
15.MODULE FAILURES
16.PRINTER FAILURES
17.POWER FAILURES



Enter #, C/CANCEL, H/HELP or 0/Print:
```

This menu lets you report on the 17 listed specific events stored in event history buffer.

Refer to Page 44 for information about the event history buffer.

Events can be printed in the sequence they occurred or grouped by categories (see Page 111 for report output setup).

Manifolded Tanks. Thefts, sales, and deliveries can be reported both for each individual tank and for the manifolded group. Level information is not included in group reports.**Thresholds**. Refer to Page 72 for information on setting the thresholds for tank events (overflow, low product, minimum theft, sale, and delivery).

For events to be recorded in the history buffer, and for the data to be included in any report, you must have at least one alarm programmed for activation at the event's start.

6.11 Saved Tank Inventories Report

MAIN MENU ☞ ☞ (11)

```
                SAVED TANK INVENTORY

MODULE:
DESCRIPTION:
PRODUCT:


      MAR 09, 1995      3:30 PM

           TEMP  HEIGHT   VOLUMES (GAL)
           (F)   (IN)   MEASURED CORRECTED
-------------------------------------------------------

PRODUCT    NA     66.52    392.46    388.64
WATER      NA     28.65     69.22     68.48
TOTAL      74.0   92.16    461.66    457.18
ULLAGE     NA    907.84   9530.25        NA
```

This report shows inventories saved in system memory. Each position is checked in sequence.

6.12 I/O Module Status Report

MAIN MENU ☞ ☞ (12)

```
SITE SENTINEL    MAR 9, 1995    8:36 AM
       I/O MODULE STATUS REPORT MENU

 1.CONTINUOUS, FOUR SECOND UPDATES.

|MOD|             POSITIONS             |
|   |-INPUTS-|-------OUTPUTS----------|
| # | A B C D E F G H I J K L M N O P |
+---+-----------------------------------+
| 1 | O C O O E E E E E E E E E E E E |
| 2 | NOT INSTALLED                     |
| 3 | NOT INSTALLED                     |
| 4 | NOT INSTALLED                     |
| 5 | NOT INSTALLED                     |
| 6 | NOT INSTALLED                     |
| 7 | NOT INSTALLED                     |
| 8 | NOT INSTALLED                     |

LEGEND:"O"=OPENED  "N"=NOT ENERGIZED
       "C"=CLOSED  "E"=ENERGIZED
       "R"=REMOVED FROM OPERATION
```

This report shows the current operating condition of the optional I/O Module(s).

Press **1** for continuous (every four seconds) update.

Chapter 7 - Scheduled Commands & Reports

MAIN MENU ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM
     SCHEDULE COMMANDS & REPORTS MENU

SYSTEM COMMANDS:
 1.OPEN/CLOSE SYSTEM
 2.CLEAR HISTORY BUFFER
 3.TIMED LEAK TESTS
 4.SAVE TANK INVENTORY

REPORTS:
 5.IN PROGRESS WARNING REPORT
 6.SAVED EVENT REPORT
 7.INVENTORY REPORT
 8.DELIVERY REPORT




ENTER #, C/CANCEL, H/HELP OR 0/PRINT:
```

The commands and reports listed in this menu can be scheduled to execute at select dates and times. **Frequency**. You can specify events to occur as follows:

- ☐ Single occasion
- ☐ Daily
- ☐ Weekly
- ☐ Monthly

Each event can have up to 15 different frequencies.

SCHEDULED SYSTEM COMMANDS

The following system commands can be scheduled:

- ☐ Open/Close System (Page 125)
- ☐ Clear History Buffer (Page 126)
- ☐ Timed Leak Tests (Page 127)
- ☐ Save Tank Inventory (Page 128)

SCHEDULED REPORTS

The following reports can be scheduled (all are explained in one menu, on Page 129).

- ☐ In-Progress Warnings
- ☐ Saved Events
- ☐ Inventory
- ☐ Deliveries

EXAMPLE

A site could be programmed as follows:

Use OPEN/CLOSE scheduling:

Weekdays: Open 7:00 AM, and close at 9:00 PM.

Weekends: Open 6:00 AM, and close at 11:00 PM

Delivery reports can be saved every day after closing and inventory reports can be printed out at the end of the week.

7.1 Scheduled Open/Close System

MAIN MENU ☞ ☞ ❶

```
SITE SENTINEL    OCT 24, 1994     8:36 AM

      SYSTEM OPEN CLOSE SCHEDULE

   FREQ DATE          TIME       STATE
   ---- ------------ --------- ------
 1.1/DY MAR 2, 1993  7:00 AM   OPEN
 2.1/DY MAR 2, 1993  9:00 PM   CLOSE
 3.
 4.
 5.
 6.
 7.
 8.
 9.
10.
11.
12.
13.
14.
15.
```

PROCEDURE

1. Enter one of the following frequencies:

   ONCE - only one time
   1/DY - daily
   1/WK - weekly (same day each week)
   1/MO - monthly (same date each month)

   To clear a scheduled item, enter `CLR' for its frequency.

2. Enter the date to first execute the command.

3. Enter the time to execute the command.

4. Enter either `OPEN' or `CLOSE' for the state.

7.2 Scheduled Clear History Buffer

MAIN MENU ☞ ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM

          CLEAR HISTORY BUFFER

   FREQ DATE          TIME
   ---- ------------ ---------
 1.1/WK MAR 2, 1993  6:00 AM
 2.1/WK MAR 6, 1993  6:00 AM
 3.
 4.
 5.
 6.
 7.
 8.
 9.
10.
11.
12.
13.
14.
15.
```

PROCEDURE

1. Enter one of the following frequencies:

   ONCE - only one time
   1/DY - daily
   1/WK - weekly (same day each week)
   1/MO - monthly (same date each month)

   To clear a scheduled item, enter `CLR' for its frequency.

2. Enter the date to first execute the command.

3. Enter the time to execute the command.

7.3 Scheduled Timed Leak Test

MAIN MENU ☞ ☞

```
SITE SENTINEL    OCT 24, 1994     8:36 AM

        TIMED LEAK TESTS SCHEDULE

   FREQ DATE          TIME       POSTN DUR
                                 RANGE HRS
   ---- ------------ --------- ----- ---
 1.1/WK MAR 8, 1993   7:00 AM  1A-1P  2
 2.1/WK MAR 8, 1993   9:00 AM  2A-2P  2
 3.1/WK MAR 8, 1993  11:00 AM  3A-3P  2
 4.1/WK MAR 8, 1993   1 PM PM  4A-3P  2
 5.1/WK MAR 8, 1993   3:00 PM  1A-1P  2
 6.1/WK MAR 8, 1993   5:00 PM  2A-2P  2
 7.1/WK MAR 8, 1993   7:00 PM  3A-3P  2
 8.1/WK MAR 8, 1993   9:00 PM  4A-3P  2
 9.
10.
11.
12.
13.
14.
15.

16.SAVE HOURLY INTERMEDIATE RESULTS? N
```

PROCEDURE

1. Enter one of the following frequencies:

   ONCE - only one time
   1/DY - daily
   1/WK - weekly (same day each week)
   1/MO - monthly (same date each month)

   To clear a scheduled item, enter ***`CLR'*** *for its frequency.*

2. Enter a date and time to first execute the command.

Next, you are prompted for a range of modules and positions. The cursor moves to the beginning range specifier (**`1A'**) in the menu.

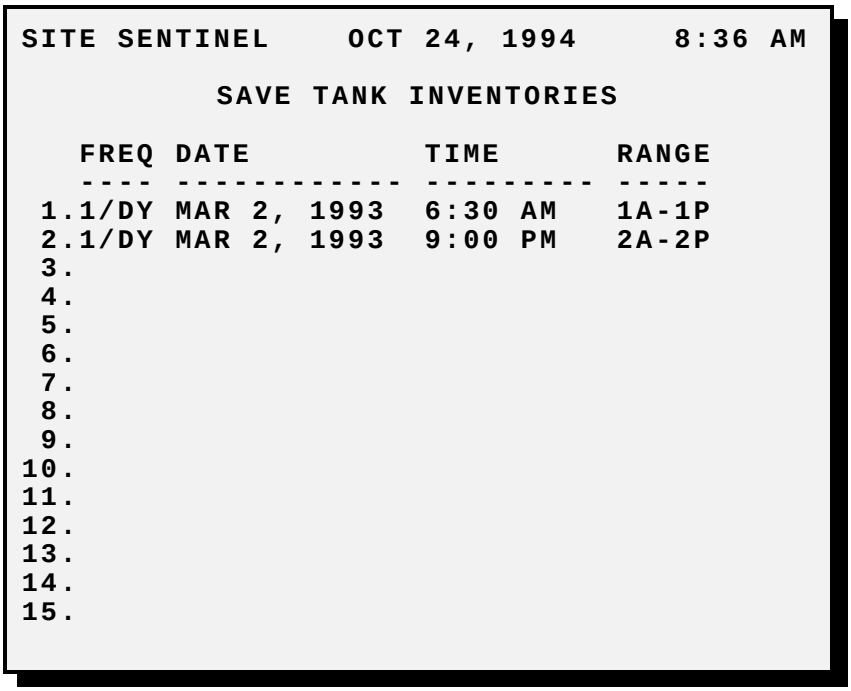
3. Enter a module and position. The cursor moves to the terminating range specifier; enter a module and position. For example, to test tanks connected to module 1, positions A, B, C and D, you would specify **`1A-1D'**.

4. Enter a duration for test. This entry must be a whole number; that is 1, 2, 3, etc. *The MINIMUM recommended duration for the timed leak test is two hours.*

5. Specify if you want to save intermediate hourly data from the test. Enter **`Y'** (for yes) or **`N'** (for no) as appropriate.

7.4 Scheduled Save Tank Inventory

MAIN MENU ☞ ☞



PROCEDURE

1. Enter one of the following frequencies:

   ONCE - only one time
   1/DY - daily
   1/WK - weekly (same day each week)
   1/MO - monthly (same date each month)

   To clear a scheduled item, enter ***`CLR'*** *for its frequency.*

2. Enter the date to first execute the command.

3. Enter the time to execute the command.

4. Enter a continuous range of module positions for inventory.

   For example, to inventory tanks connected to module 1, positions A, B, C and D, you would specify `1A-1D'.

7.5 Scheduled Reports

MAIN MENU ☞ ☞ , , , or

```
SITE SENTINEL    OCT 25, 1994     8:36 AM

   {      }  REPORT SCHEDULE

   FREQ DATE          TIME
   ---- ------------ ---------
 1.1/DY OCT 24, 1994  7:30 AM
 2.1/DY OCT 24, 1994  8:00 PM
 3.
 4.
 5.
 6.
 7.
 8.
 9.
10.
11.
12.
13.
14.
15.
```

The above menu is generic, which is why the Menu Path shows you can press 5, 6, 7 or 8 after accessing the *Scheduled Commands/Reports* submenu:

1. From the *Scheduled Reports* menu:

   Press to schedule In Progress Warnings
   Press to schedule Saved Events Reports
   Press to schedule Inventory Reports
   Press to schedule Delivery Reports

2. Enter one of the following frequencies:

   ONCE - only one time
   1/DY - daily
   1/WK - weekly (same day each week)
   1/MO - monthly (same date each month)

   To clear a scheduled item, enter `CLR' for its frequency.

3. Enter the date and time to first print the report.

Notes:

Chapter 8 - Quick Sale and Delivery Reports

8.1 Quick Sale Report

MAIN MENU ☞

This report can only be PRINTED, so you must have a printer attached to use this feature.

A Quick Sales Report shows sales in progress, or recently completed. Use this function to generate a "quick ticket".

This report is available for a tank only while product is withdrawn (and for several minutes thereafter, depending on the size of the sale). *If the report is no longer available, you can generate an End of Event Report.*

The report is selected directly from the MAIN MENU. You can be in either normal or privileged mode.

With a quick report you do not have to specify a tank range or position. The SiteSentinel automatically checks all its probe positions and prints a report for each one currently active. Because of product turbulence, the values in a quick report may not be exactly the same as those in the corresponding Individual Event Report.

Quick Reports do not have corresponding computer formats.

8.2 Quick Delivery Report

MAIN MENU ☞

This report can only be PRINTED, so you must have a printer attached to use this feature.

A Quick Delivery Report shows deliveries in progress, or recently completed. Use this function to generate a "quick ticket".

This report is available for a tank only while product is added (and for several minutes thereafter, depending on the size of the delivery). *If the report is no longer available, you can generate an End of Event Report.*

The report is selected directly from the MAIN MENU. You can be in either normal or privileged mode.With a quick report you do not have to specify a tank range or position. The SiteSentinel automatically checks all its probe positions and prints a report for each one currently active.

Because of product turbulence, the values in a quick report may not be exactly the same as those in the corresponding Individual Event Report.

Quick Reports do not have corresponding computer formats.

Notes:

Appendix A - System Setup Worksheet

SECURITY SETUP			
Privileged Password		Restricted Mode	Enabled Disabled
Restricted Password		Timed Auto Logout	Enabled Disabled

TIME/DATE SETUP			
Date Format		Time Format	
Format		Format	
Order (long)		Before Noon Suffix	
Order (short)		After Noon Suffix	
Separator (short)		Separator	
Leading Character		Leading Character	

PRINTER SETUP	
Printer Type	
Top of Page Header (four lines of up to 40 characters each)	
Leading Page Form Feed	Enabled Disabled
Trailing Page Form Feed	Enabled Disabled

MEASUREMENT UNITS			
US (feet, gallons, fahrenheit degrees)		Metric (centimeters, liters, Celsius degrees)	

EVENT HISTORY BUFFER		
Wrap Around	Enabled	Disabled

STATUS GRAPH SETUP (MODEL II ONLY)			
Smart Module Display Feature	Enabled		Disabled
Graph Type	Tank	Probe	Both
Sensor Status Display	Text	Bar	Both
I/O Module Display Feature	Enabled		Disabled

RED LIGHT/BUTTON & BUZZER SETUP				
Light Term	Days: _____	Hours: _____	Minutes: _____	Seconds: _____
Buzzer Term	Days: _____	Hours: _____	Minutes: _____	Seconds: _____
Button Terminates	Light	Buzzer	Both	Neither

SENSOR & PROBE ASSIGNMENTS

	POSITION															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3																
4																
5																
6																
7																
8																

PROBE & SENSOR CONFIGURATION	
MODULE: POSITION:	
Tank #	
Description	
Product	
API/Density/Alpha	
Tank Shape	
Tank Diameter	
Tank Volume	
Product Offset	

PROBE & SENSOR CONFIGURATION	
MODULE: POSITION:	
Tank #	
Description	
Product	
API/Density/Alpha	
Tank Shape	
Tank Diameter	
Tank Volume	
Product Offset	

TANK THRESHOLDS	
MODULE: POSITION:	
High Water	
Overflow	
Low Product	
Min. Theft	
Min. Sale	
Min. Delivery	
Leak Rate	

TANK THRESHOLDS	
MODULE: POSITION:	
High Water	
Overflow	
Low Product	
Min. Theft	
Min. Sale	
Min. Delivery	
Leak Rate	

TANK THRESHOLDS	
MODULE: POSITION:	
High Water	
Overflow	
Low Product	
Min. Theft	
Min. Sale	
Min. Delivery	
Leak Rate	

SENSOR THRESHOLDS	
MODULE: POSITION:	
Upper Threshold	
UT Delay to Alarm	
Lower Threshold	
LT Delay to Alarm	

SENSOR THRESHOLDS	
MODULE: POSITION:	
Upper Threshold	
UT Delay to Alarm	
Lower Threshold	
LT Delay to Alarm	

SENSOR THRESHOLDS	
MODULE: POSITION:	
Upper Threshold	
UT Delay to Alarm	
Lower Threshold	
LT Delay to Alarm	

SENSOR THRESHOLDS	
MODULE: POSITION:	
Upper Threshold	
UT Delay to Alarm	
Lower Threshold	
LT Delay to Alarm	

TANK CORRECTION	
MODULE: POSITION:	
Level	**Volume**

I/O CONFIGURATION				
I/O MODULE NUMBER:				
MODULE POSITION	**DEVICE TYPE**	**I/O #**	**DESCRIPTION**	**PRODUCT**
A	**INPUT**			
B	**INPUT**			
C	**INPUT**			
D	**INPUT**			
E	**OUTPUT**			
F	**OUTPUT**			
G	**OUTPUT**			
H	**OUTPUT**			
I	**OUTPUT**			
J	**OUTPUT**			
K	**OUTPUT**			
L	**OUTPUT**			
M	**OUTPUT**			
N	**OUTPUT**			
O	**OUTPUT**			
P	**OUTPUT**			

EVENT OUTPUT SETUP
EVENT:

DEVICE(S) THAT WILL BE MONITORED FOR THE EVENT																				
MODULE NUMBER	**I/O MODULE POSITION**				**SMART MODULE POSITION**															
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				

DEVICE(S) THAT WILL BE ACTIVATED FOR EVENT												
I/O MODULE NUMBER	**I/O MODULE POSITION**											
	E	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
1												
2												
3												
4												
5												
6												
7												
8												

ALARM SETUP				
Event	**Start**			**End**
	Printer	**Buzzer**	**Red Light**	**Printer**
Overflow				
Low Product				
High Water				
Bad Temperature				
Theft				
Delivery				
Sale				
Timed Leak Test				
Sensor High (Sensor types: G, L, V, R, F)				
Sensor Low (Sensor types: G, S, H, W)				
I/O Module Inputs				
Input #1 Closed				
Input #2 Closed				
Probe Failure				
Smart Module Failure				
Printer Failure				
Power Failure				

Notes:

Appendix B - Modem Use

B.1 Overview

The SiteSentinel system can be polled and programmed remotely using a pair is at the SiteSentinel site; the "remote" modem is located at the distant location.

Set baud rate as follows.

Baud Rate Setup			
Rate	*PV235 DIP Switch Position:*		
	1	2	3
110	OPEN	OPEN	OPEN
330	CLOSED	OPEN	OPEN
600	OPEN	CLOSED	OPEN
1200	CLOSED	CLOSED	OPEN
2400	OPEN	OPEN	CLOSED
4800	CLOSED	OPEN	CLOSED
9600	OPEN	CLOSED	CLOSED
19,200	CLOSED	CLOSED	CLOSED

Switch Position #4, Word Length:

OPEN 7-bit word, even parity
CLOSED 8 bit word length, NO parity*
* *Always use this setting for international systems*

Switch Positions #5 - #7:

Always OPEN

Switch Position #8:

Always CLOSED.

Set switches BEFORE power-up or reset! The switches are only "read" at power up.

Refer to the *Installation Manual* for more information.

IMPORTANT

Word length and parity must match for the COMM port, the local modem and the remote modem.

The communication parameters can only be changed with the system OFF!

DCD. A signal from the modem which tells the SiteSentinel a call has been received
DTR. A signal from the SiteSentinel to the modem which allows the modem to answer.

B.2 Local Modem Configuration

The modem connected to the SiteSentinel controller must have an "answer only" configuration. The following parameters must be set for any type of modem used locally with the SiteSentinel. Refer to your modem documentation for more information on setting the parameters.

Parameter	Command
Answers on 1st ring	ATS0=1
Monitors DCD	AT&C1
Result codes not returned	ATQ1
Reset when DTR is off	AT&D2

After entering the commands listed above for a Hayes® modem, enter **`AT&W'** to store the configuration permanently.

B.3 Remote Modem Configuration

For a PC-programmable Hayes® (or 100% compatible) modem, use `AT&F' command to load factory configuration. Refer to your modem documentation for more information on setting the parameters.

B.4 Calling a Site

The SiteSentinel system must be in the "idle" mode; that is, no one must be programming the system or requesting data from the controller or from another terminal or computer. When the call to the remote modem is successful, the SiteSentinel prompts for the type of terminal (or terminal emulation) you are using. Enter `1' for WYSE 50, `2' for VT100, or `3' for VT52. The MAIN MENU should display.

To terminate modem operation, enter `Q' (for quit) at the MAIN MENU. If you enter `4' for the type of terminal ("none of the above"), you will not be able to access the SiteSentinel. Refer to Appendix E for information about terminal emulation.

Appendix C - EPROM Replacement Procedure

C.1 Overview

Two EPROM chips on the **Model II** PV235 controller board or the **Model III** PV271 controller board contain the operating system for the **SiteSentinel** controller. The location of these chips is shown in your *Site Sentinel Installation Manual.*

The operating system for each *Smart Module* is contained in one microcontroller chip on the PV242 board. The location of this chip is also in your *Site Sentinel Installation Manual.*

CAUTION

Be very careful when handling the EPROM and microcontroller chips. Avoid applying excessive pressure when inserting a chip into its socket. The chips are also sensitive to electrostatic discharge and should be handled in only a static-free environment.

C.2 Controller EPROM Replacement

The controller software version is identified by both a number and a letter code; for example, **1.12A**. Replacement procedure depends on whether the entire number changed, or if only the letter changed.

C.2.1 New EPROM Number

If replacing EPROMs with an entirely new version number (for example, replacing a “1.12" with a “1.13"), *make sure the site and system data are written down*. When the EPROMs are replaced, this information will be lost and must be reentered.

1. Turn controller power OFF: In Model II, flip the switch inside the cabinet. In Model III, unplug the power pack from the back of the controller.

2. Using a chip replacement tool (or a small screwdriver), carefully remove the old chips.

3. Carefully plug the new chips into their sockets. The notch on the chip must face the socket screw. Make sure all metal contacts are properly inserted.

4. Power up the controller.

5. Perform the cold start procedure described on Page 165.

C.2.2 New EPROM Letter ONLY

Follow the same procedure, but MAKE SURE THE INTERNAL BATTERY in either the Model II or III is plugged in and operational. As long as the battery is connected and you are only updating with a new letter version of EPROM, data is retained.

C.3 Smart Module EPROMs

1. Turn the power switch in the Smart Module off.

2. Using a chip replacement tool (or small screwdriver), carefully remove the old chip.

3. Carefully plug the new chip into its socket. The notch on the chip must face the socket screw. Make sure all metal contacts are properly inserted.

4. Turn the Smart Module power switch on.

Appendix D - Liquid Sensor Drying Procedure

D.1 Overview

When a Petro Vend hydrocarbon liquid sensor (interstitial or liquid phase) comes in contact with a liquid hydrocarbon product, the sensor must be allowed to dry completely before it can be returned to normal operation.

D.2 Gasoline Activation

When the hydrocarbon liquid sensor comes in contact with gasoline, it should be removed from its operating environment and exposed to the air to facilitate the drying process. This process usually requires less than an hour. Do not return the sensor to a contaminated location.

D.3 Activation by Other Petroleum Products

Because denser petroleum products, such as diesel fuel, do not evaporate as readily as gasoline, a hydrocarbon liquid sensor that comes in contact with such a product must be cleaned with VM&P Naphtha. This is a paint solvent and additive that is available at most hardware and painting supply stores. To clean a sensor with VM&P Naphtha, please follow these steps:

1. Turn off the power to the Smart Module to which the sensor is connected.

2. Disconnect the sensor wires from the module and remove the sensor from its operating environment.

   *To return the Smart Module to normal operation, turn its power back on at this point.*3.Obtain a container made of a material that does not react with naphtha and that is large enough to hold the entire sensor.

4. In a well ventilated room, fill the container with naphtha and submerge the sensor for at least 12 hours.

   If the sensor has been thoroughly contaminated, this time should be extended.

5. Remove the sensor and allow it to dry for at least 12 hours.

6. After cleaning and drying, return the sensor to its operating environment; do not return the sensor to a contaminated location.

7. Turn off power to the Smart Module and reconnect the sensor wires. Turn on power to the module.

DANGER!

Naphtha is extremely flammable. Follow the safety precautions on the container.

Notes:

Appendix E - PC Connections

E.1 Introduction

These instructions explain how to connect an IBM® compatible personal computer ("PC") to the **SiteSentinel**. Also explained is the terminal emulation software your PC needs in order to talk with the **SiteSentinel**.

See *Appendix K, Computer Access,* on Page 189 for information on writing programs to control the system by external computer.

E.2 Local Vs. Remote

There are two ways a **SiteSentinel** can be installed.

Local. If the distance between the controller and the PC is less than 50 feet, the controller is wired to a junction box located near the PC ("direct connection").

Remote. When the distance is greater than 50 feet, modems are required and telephone lines are used to connect the two units. The following two sections describe connections for each of these types of installation. Follow the section which is appropriate for your system.

CAUTION

Before making any connections, be sure your computer and equipment (printer, converter, modem, etc.) are OFF.

E.3 Local Connection

Use a cable with a 25-pin connector. This cable plugs into the serial port of your PC. This port, also known as the Communications Adapter Connector (CAC), is usually on the back of the PC.

If the serial port is not clearly labeled, refer to the PC system reference guide; there may be other 25-pin sockets on the PC that are not the serial port and can not be used for communication.

If your serial port is a 9-pin socket, you will need to purchase a 25- to 9-pin converter plug (available at computer supply stores). Make sure the plug is securely in place.

If you are already using the serial port, you can purchase an additional serial port card for the PC at most computer supply stores. The card is a small circuit board that plugs into a slot inside the PC.

You are now ready to power up the PC and begin setting up the emulation software.

E.4 Modem Connection

A modem converts computer data into a format that can be sent over standard telephone lines. A second modem at the receiving site converts the data back to a computer format. A Hayes® modem, also available from Petro Vend, is preferred for the PC site. Because the **SiteSentinel** uses Hayes® commands, you must use Hayes® (or 100% compatible) modems.

Most modems have four sockets: (1) a wide 25-pin socket to connect to the PC, (2) a square 4-pin socket to connect to the telephone line, (3) a square 4-pin socket to connect to a telephone and (4) a 2-wire socket for the AC power adapter. The modem should have come with the cables you need to make the following connections. (If not, you can purchase what you need at most computer supply stores.)

Connect the 25-pin socket to the socket for the serial port of your PC. This socket, also known as the "Communications Adapter Connector," is located on the back of most PCs. Make sure the plug is securely in place.

Connect the 4-wire "line" socket to the telephone jack. The cable plugs should snap into position and fit snugly.

If you want the PC to share its line with a telephone, connect the 4-wire "phone" socket to the telephone. Note that you must use the telephone and computer alternately, not simultaneously.

Plug the power adapter into its socket on the modem and into a standard 115 VAC wall socket. You are ready to power up the PC and modem and to begin setting up your terminal emulation software.

E.5 Emulation Software

In order for a PC to communicate with the **SiteSentinel**, you must run a terminal emulation program such as ProComm®.

If you are using direct connection, you will need to set the software to "go local". If you are using a modem, you will need to set its program switches. You will also need to enter the telephone number of the **SiteSentinel** site.

IMPORTANT

The terminal emulator program must must be set for the same communication parameters (baud rate, word size, etc) as the SiteSentinel controller.

Appendix F - Report Protocols & Data Formats

IMPORTANT

The information in this appendix applies only to a system that is connected to an IBM®-compatible personal computer ("PC") or other system capable of ASCII transmissions.

To facilitate the creation of interface software for external computer systems (which automatically execute SiteSentinel commands), the menu structures and command names are identical in both SiteSentinel Models II and III. However, the menus and commands are subject to change in future software versions.

F.1 Introduction

Report data from the SiteSentinel can be downloaded to an external computer in a concise format. The SiteSentinel setup information also can be transmitted to an external computer where it can be stored for safekeeping. The setup data can be restored to the SiteSentinel from which it was obtained or to another similar system .

See *Appendix K, Computer Access*, on Page 189 for information on writing programs to control the system by external computer.

The SiteSentinel can use any of five protocols when transferring data. The proprietary Petro Vend ("PV") protocol is described below; this protocol is used by other Petro Vend products. The protocol for transferring data in straight ASCII files is explained in the next section.

The Data Formats section of this appendix explains how numbers, logical values, times and dates are represented in the computer format. The remaining sections indicate the various computer report formats.

Refer to Page 55 for information on setting up the computer protocol (input flow control, type of protocol, and file name). Refer to Page 111 for information about report formats. Refer to Page 107 for information about the backup and restore features.

F.2 Petro Vend File Transfer Protocol

This protocol is line oriented; each line is sent with `/[CHK][CHK][CR][LF]' appended at the end (where `[CHK][CHK]' indicates the "checksum." The checksum is a two-digit number that is calculated by adding the decimal values of the ASCII characters in a data string, adding 47, and truncating the sum. (Table F:1 lists the decimal values of standard ASCII characters.)

For example, in the data string `ABCD', the decimal values for each character are: A = 65, B = 66, C = 67, and D = 68. Their sum is 266. 266 + 47 = 313. Truncating the sum means removing all but the last two digits. In this case, the truncated sum is 13. The complete data line that would be is sent by the SiteSentinel (when using the PV protocol) is: `ABCD/13[CR][LF]'.

The following is an IBM® BASIC program to determine the checksum for a line of data:

```
010  CHKSUM% = 0
020 TRANSACTION$ = "LINE OF DATA 0123456789"
030  NUMCHARS% = LEN(TRANSACTION$)
040  FOR INDEX% = 1 TO NUMCHARS%

50 SINGLECHAR$ = MID$(TRANSACTION$,INDEX%,1)

060 CHKSUM% = CHKSUM% + ASC(SINGLECHAR$)
070  NEXT INDEX%
080  CHKSUM% = CHKSUM% + 47
090  TEMP$ = STR$(CHKSUM%)
100  TEMP$ = RIGHT$(TEMP$,2)
110  PRINT TEMP$
120  END
```

F.3 Decimal Values of Standard ASCII Characters

Decimal Value	ASCII Character	Decimal Value	ASCII Character	Decimal Value	ASCII Character	Decimal Value	ASCII Character
032	(space)	056	8	080	P	104	h
033	!	057	9	081	Q	105	i
034	"	058	:	082	R	106	j
035	#	059	;	083	S	107	k
036	$	060	<	084	T	108	l
037	%	061	=	085	U	109	m
038	&	062	>	086	V	110	n
039	'	063	?	087	W	111	o
040	(	064	@	088	X	112	p
041	)	065	A	089	Y	113	q
042	*	066	B	090	Z	114	r
043	+	067	C	091	[	115	s
044	,	068	D	092	\	116	t
045	-	069	E	093	]	117	u
046	.	070	F	094	^	118	v
047	/	071	G	095	_	119	w
048	0	072	H	096	'	120	x
049	1	073	I	097	a	121	y
050	2	074	J	098	b	122	z
051	3	075	K	099	c	123	{
052	4	076	L	100	d	124	|
053	5	077	M	101	e	125	}
054	6	078	N	102	f	126	~
055	7	079	O	103	g		

F.4 ASCII Protocol for File Transfer

The ASCII protocol is intended for use only when another protocol is unavailable.

When ASCII is selected, the SiteSentinel sends reports to the external computer as a straight ASCII file. The computer can control the flow using either hardware ('RTS') or software handshaking (`XON' and `XOFF').

For the 'RESTORE' command, the SiteSentinel displays a message requesting the file using ASCII. It then waits up to one minute for the external computer to start sending data.

Once the computer has started sending data, either hardware handshaking (`CTS'), or software handshaking (`XON' and `XOFF') must be used to prevent the SiteSentinel from losing data.

A pause of at least 10 seconds or a `CTRL-Z' in the data indicates to the SiteSentinel that the computer has reached the end of the file.

If software handshaking is to be used, it must be enabled on the SiteSentinel.

F.5 Data Formats

F.5.1 Number Format

The SiteSentinel reports probe and sensor measurements using "floating point numbers." Floating point numbers are rounded to three decimal digits and are assigned fields that are ten characters in width.

Negative values are preceded by a minus sign (`-').
If the value is too large for this field, digits to the right of the decimal (and the decimal point itself) are rounded as necessary. If the value is still too large, a blank field is assigned. See the following table:

ACTUAL VALUE	COMPUTER FORMAT
12345.12	12345.123
-12345.12	-12345.123
1234567.89	1234567.89
12345678.90	12345678.9
123456789.01	123456789
1234567890.12	1234567890
12345678900.12	

F.5.2 Logical Values

Logical values are represented by a `T' (for true) or an `F' (for false).

F.5.3 Time and Date

The time and date are represented in two adjacent fields. The format (explained in the table below) is:

`mmddyyyy/hhmmss'.

SYMBOL	DEFINITION	RANGE
mm	month	01 to 12
dd	day	01 to 31
yyyy	year	1990 to 2089
hh	hour	00 to 23
mm	minute	00 to 59
ss	second	00 to 59

F.5.4 Special Times

The following symbols define special times:

power up	00000000/000000
in progress	99999999/999999
not programmed	99999999/000000

F.6 Report Formats

F.6.1 General Report Format

GENERAL LINE FORMAT FOR REPORTS	
ttt/<field 1>/<field 2>/.../<field n-1>/<field n>	
ttt	Report or Line Title: always 3 characters exactly
/	Data Field Separator: "forward slash" character
<field n>	Data Field: the quantity and type of fields included depend on the particular line type; note that fields of the same type are always the same size, but different field types may have different sizes

STANDARD FIELD TYPES FOR REPORTS	
ttt	Report Title: INV - Tank Inventory Report or Sensor Levels Report WRN - Warnings in Progress Report ALR - Saved Event Report (sensor, probe, input, hardware failures, & individual) Line Title: M01 - Inventory Measurement Header Line M02 - Inventory Measurement Data Line #1 (individual tank) M03 - not implemented M04 - Inventory Measurement Data Line #1 (manifold group) M05 - Inventory Measurement Data Line #2 (individual tank) M06 - Inventory Measurement Data Line #2 (manifold group) M07 - not implemented M08 - not implemented M09 - Inventory Measurement Data Line (sensor levels) M10 - Volume Change Measurement Data Line M11 - Leak Test Measurement Data Line WR1 - Warning Header Line MSG - Alarm Header Line
mmddyyyy	Date of an Event: month, day, year
hhmmss	Time of an Event: hours, minutes, seconds
u	Units of Measure: F = U.S.; T = Metric
tnk/m/ps	Device Identification: Tank Number (0 to 999) - label only Smart Module (1 to 8) - specific hardware installation Module Position (1 to 16) - specific hardware installation
sen	Device Type: 0 - none 1 - Generic Sensor 2 - Probe 3 - Vapor Sensor 4 - Liquid Sensor 5 - Sump Sensor 6 - Reservoir Sensor 7 - Freon Sensor 8 - Hydrocarbon Liquid Sensor 9 - Water Sensor 200 - SiteSentinel Controller 201 - Smart Module 202 - Manifolded Group 203 - I/O Module
ffffffff	Flags: not implemented
dddddd.ddd	Measured & Calculated Data: floating point value; decimal point is explicit; if the value is too large for the field, digits to the right of the decimal point are rounded as necessary

F.6.2 Individual Tank Summary Report

MEASUREMENT HEADER LINE	
M01/u/tnk/m/ps/sen/ffffffff/mmddyyyy/hhmmss	
M01	Line Title
u	Units of Measurement: F = U.S.; T = Metric
tnk/m/ps/sen	Device Identification & Type: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
ffffffff	Flags: not defined
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds

MEASUREMENT LINE #1	
M02/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd	
M02	Line Title
dddddd.ddd	Net Corrected Tank Volume
dddddd.ddd	Gross Measured Tank Volume
dddddd.ddd	Volume Left in Tank (ullage)
dddddd.ddd	Product Level
dddddd.ddd	Average Product Temperature (average of temperature sensors which are currently submersed in product)
dddddd.ddd	Water Level

MEASUREMENT LINE #2	
M05/dddddd.ddd/dddddd.ddd	
M05	Line Title: always 3 characters exactly
dddddd.ddd	Net Corrected Product Volume
dddddd.ddd	Gross Water Volume

VOLUME CHANGE MEASUREMENT DATA LINE	
M10/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/	
M10	Line title
dddddd.ddd	Net Corrected Tank Volume Change
dddddd.ddd	Gross Measured Tank Volume Change
dddddd.ddd	Net Corrected Product Volume Change
dddddd.ddd	Gross Measured Water Volume Change
dddddd.ddd	Estimated Delivery Temperature

LEAK TEST MEASUREMENT DATA LINE	
M11/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/	
M11	Line title
dddddd.ddd	Net Corrected Leak Rate
dddddd.ddd	Water Volume Rate Of Change
dddddd.ddd	Test Duration in Minutes
dddddd.ddd	Temperature Change
dddddd.ddd	Leak Alarm Threshold

SAMPLE DATA STREAM	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' - carriage return & line feed)
Report Header	INV/01021993/123456[CR][LF]
Measurement Header	MO1/F/--1/1/-1/--2/FFFFFFFF/01021993/120000[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--2/1/-2/--2/FFFFFFFF/01021993/120000[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-2/--2/FFFFFFFF/01021993/120000[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]

F.6.3 Tank Summary Manifolded Group Report

MEASUREMENT HEADER LINE	
M01/u/tnk/m/ps/sen/ffffffff/mmddyyyy/hhmmss	
M01	Line Title
u	Units of Measurement: F = U.S.; T = Metric
tnk/m/ps/sen	Device Identification & Type: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / sensor type
ffffffff	flags: not defined
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds

MEASUREMENT DATA LINE #1 (`-' = blank space)	
M04/dddddd.ddd/dddddd.ddd/dddddd.ddd/----------/dddddd.ddd/----------	
M04	Line Title
dddddd.ddd	Net Corrected Tank Volume
dddddd.ddd	Gross Measured Tank Volume
dddddd.ddd	Volume Left in Tank (ullage)
----------	Blank: product level does not exist
dddddd.ddd	Average Product Temperature (average of temperature sensors which are currently submersed in product)
----------	Blank: water level does not exist

MEASUREMENT DATA LINE #2	
M06/dddddd.ddd/dddddd.ddd	
M06	Line Title: always 3 characters exactly
dddddd.ddd	Net Corrected Product Volume
dddddd.ddd	Gross Water Volume

SAMPLE DATA STREAM	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	INV/01021993/123456[CR][LF]
Measurement Header (Individual Tank)	MO1/F/--1/1/-1/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header (Individual Tank)	MO1/F/--2/1/-2/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header (Individual Tank)	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header (Manifold Group)	MO1/F/--0/1/-1/202/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO4/123456.123/123456.123/123456.123/----------/123456.123/----------[CR][LF]
Measurement Line #2	MO6/123456.123/123456.123[CR][LF]

Note that an Inventory Report data stream for a manifolded group includes both data for the individual tanks and for the group as a whole.

F.6.4 Sensor Levels Report

MEASUREMENT HEADER LINE	
M01/u/tnk/m/ps/sen/ffffffff/mmddyyyy/hhmmss	
M01	Line Title
u	Units of Measurement: F = U.S.; T = Metric
tnk/m/ps/sen	Device Identification & Type: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) /device type
ffffffff	Flags: not defined
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds

SENSOR DATA LINE	
M09/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd	
M09	Line Title: always 3 characters exactly
dddddd.ddd	Measured Sensor Values; up to 4 values, depending on type of sensor; floating point number

SAMPLE DATA STREAM	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	INV/010293/120000[CR][LF]
Measurement Header	MO1/F/--1/1/-4/--1/FFFFFFFF/010293/120000[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Measurement Header	MO1/F/--2/1/-5/--3/FFFFFFFF/01021993/120000[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-6/--4/FFFFFFFF/01021993/120000[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Measurement Header	MO1/F/--4/1/-7/--5/FFFFFFFF/01021993/120000[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]

F.6.5 Warnings In Progress Report

WARNING HEADER LINE	
WR1/typ/tnk/m/ps/sen/mmddyyyy/hhmmss	
WR1	Line Title
typ	Message Type: (see table below)
tnk/m/ps/sen	Device Identification & Type: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
mmddyyyy/hhmmss	Starting Date & Time of Warning: month, day, year / hours, minutes, seconds

MESSAGE TYPES			
SYMBOL	DEFINITION	SYMBOL	DEFINITION
HPL	High Product Level	LSL	Low Sensor Level
LPL	Low Product Level	IO1	External Input #1
HWL	High Water Level	IO2	External Input #2
TMP	Temperature	PRB	Probe Failure
TFT	Theft	MOD	Smart Module Failure
DEL	Delivery	PRN	Printer Failure
SAL	Sale	POW	Power Failure
TLT	Timed Leak Test	INV	Saved Inventory
HSL	High Sensor Level	IOM	I/O Module Input CLOSED
		IOF	I/O Module Failure

SAMPLE DATA STREAM	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; [CR][LF] = carriage return & line feed)
Report Header	WRN/010293/120000[CR][LF]
Warning	WR1/HPL/--1/1/-1/--1/01021993/090000[CR][LF]
Warning	WR1/LPL/--2/2/-2/--1/01021993/100000[CR][LF]
Warning	WR1/SAL/--3/3/-3/--1/01021993/110000[CR][LF]

F.6.6 Sensor, Probe, or Input Failure Report

ALARM HEADER LINE	
MSG/typ/tnk/m/ps/sen/mmddyyyy/hhmmss/mmddyyyy/hhmmss	
MSG	Line Title
typ	Message Types: (see table below)
tnk/m/ps/sen	Device Identification & Type: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / sensor type
mmddyyyy/hhmmss	Starting Date & Time of Alarm:
mmddyyyy/hhmmss	Ending date & time of alarm

MESSAGE TYPES

SYMBOL	DEFINITION	SYMBOL	DEFINITION
HPL	High Product Level	LSL	Low Sensor Level
LPL	Low Product Level	IO1	External Input #1
HWL	High Water Level	IO2	External Input #2
TMP	Temperature	PRB	Probe Failure
TFT	Theft	MOD	Smart Module Failure
DEL	Delivery	PRN	Printer Failure
SAL	Sale	POW	Power Failure
TLT	Timed Leak Test	INV	Saved Inventory
HSL	High Sensor Level	IOM	I/O Module Input CLOSED
		IOF	I/O Module Failure

SAMPLE DATA STREAM	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	ALR/01051993/120000[CR][LF]
Alarm Header	MSG/DEL/--1/1/-3/--1/01021993/040000/01021993/050000[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/060000[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/070000[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Delivery Data	M10/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Alarm Header	MSG/HSL/--1/1/-4/--1/12111992/080000/12151992/090000[CR][LF]
Measurement Header	MO1/F/--1/1/-4/--1/FFFFFFFF/01021993/120000[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Alarm Header	MSG/IO1/--0/0/-0/200/12111992/090000/12151992/100000[CR][LF]
Alarm Header	MSG/PRB/--1/1/-1/--2/12111992/100000/12151992/110000[CR][LF]
Alarm Header	MSG/POW/--0/0/-0/200/12151992/110000/12151992/120000[CR][LF]

Notes:

Appendix G - Cold Starting the System

The SiteSentinel II or III is "cold started" when it has no setup or report data. This usually occurs only when the system is first installed.After the SiteSentinel has been set up, you can clear the system memory and initiate a cold start with the following steps:

WARNING!

The following procedure erases all setup and report data from the system. The data can <u>not</u> be recovered after the cold start has been initiated.

Model II

(1) Disconnect the controller battery. This battery is located inside the controller cabinet, near the reset switch.

(2) Turn the power off and then on again. The following message displays:

BATTERY LOW OR DISCONNECTED!

(3) Press the red button to cold start.

This will clear RAM!

...or wait 20 seconds for a normal startup.

If you do not press the red button after this message appears, the system waits 20 seconds and then automatically continues with a normal startup (that is, the current data are retained).

(4) To initiate the cold start, press the red button. The following message displays:

RAM HAS BEEN CLEARED! Connect battery if applicable. Press reset button to restart.

(5) Reconnect the backup battery.

(6) Press the reset button. The system is ready to be reprogrammed.

If you do not press the reset button after reconnecting the backup battery, the system waits 10 seconds and then automatically resets.

Model III

(1) Disconnect the controller backup battery. This battery is located inside the controller box.

(2) While holding in the SILENCE button, turn the power *off* and then *on* again. A "**C**" appears on the STATUS indicator.

(3) Reconnect the backup battery.

(4) Press the RESET button.

Your Model III is now ready for reprogramming.

Notes:

Appendix H - Troubleshooting

H.1 Probe/Sensor Troubleshooting

The probe measures product levels and temperatures in a tank and sends the data to the controller.

Using the programmed tank and product information (size, density, etc.), the controller converts the measured data into temperature-corrected volumes. The probe also monitors water levels in the tank.

Various sensors are available to measure hydrocarbon vapors, water, freon, etc. All probes and sensors connect to an intrinsically safe barrier in a Smart Module.

The **SiteSentinel** reports the probe and data in several ways. The gross and corrected product volumes are reported in the Quick Sale, Quick Delivery, and Tank Inventory Reports. Product and water levels are also included. Sensor data appears in the Sensor Level Report (Page 119).

To view present measurements from probes and sensors, view the Tank & Sensor Data Report (see Page 94) This is part of the Smart Module data.

You can program the **SiteSentinel** to automatically monitor the probes and sensors. The system can trigger an alarm (buzzer, light, etc.) and/or to print a message when a failure occurs (also see Page 119):

```
                                   PROBE FAILURE
STATUS CODES: 10P2 5W2 0T0 0D0
MODULE : 1                          POSITION : D                          PROBE # : 2
DESCRIPTION: NORTHWEST
PRODUCT    : DIESEL
START  :  FEB 13, 1993         1:13 AM
END    :  IN PROGRESS
```

HARDWARE FAILURE EVENTS REPORT

If you are using a Model II, you can program the Idle Mode Status Graph to automatically monitor operation and to report a failure on the controller display.

H.1.1 Procedure

Problems usually result from one or more of the following:

(1) Improper Setup

(2) Incorrect Cable & Conduit Installation

(3) Hardware Failure

The following sections explain how to analyze these features of the **SiteSentinel**.

H.1.2 Setup

Incorrect sales, delivery, and inventory data are usually the result of an incorrect probe setup. Incorrect level data is caused by an incorrect sensor setup. The setup information must be precise for the report data to be accurate.

To check probe setup, display the PROBE & SENSOR CONFIGURATION MENU (Page 63).

Although an absence of any data usually indicates a hardware problem, it can also occur when the module position for the device was not installed.

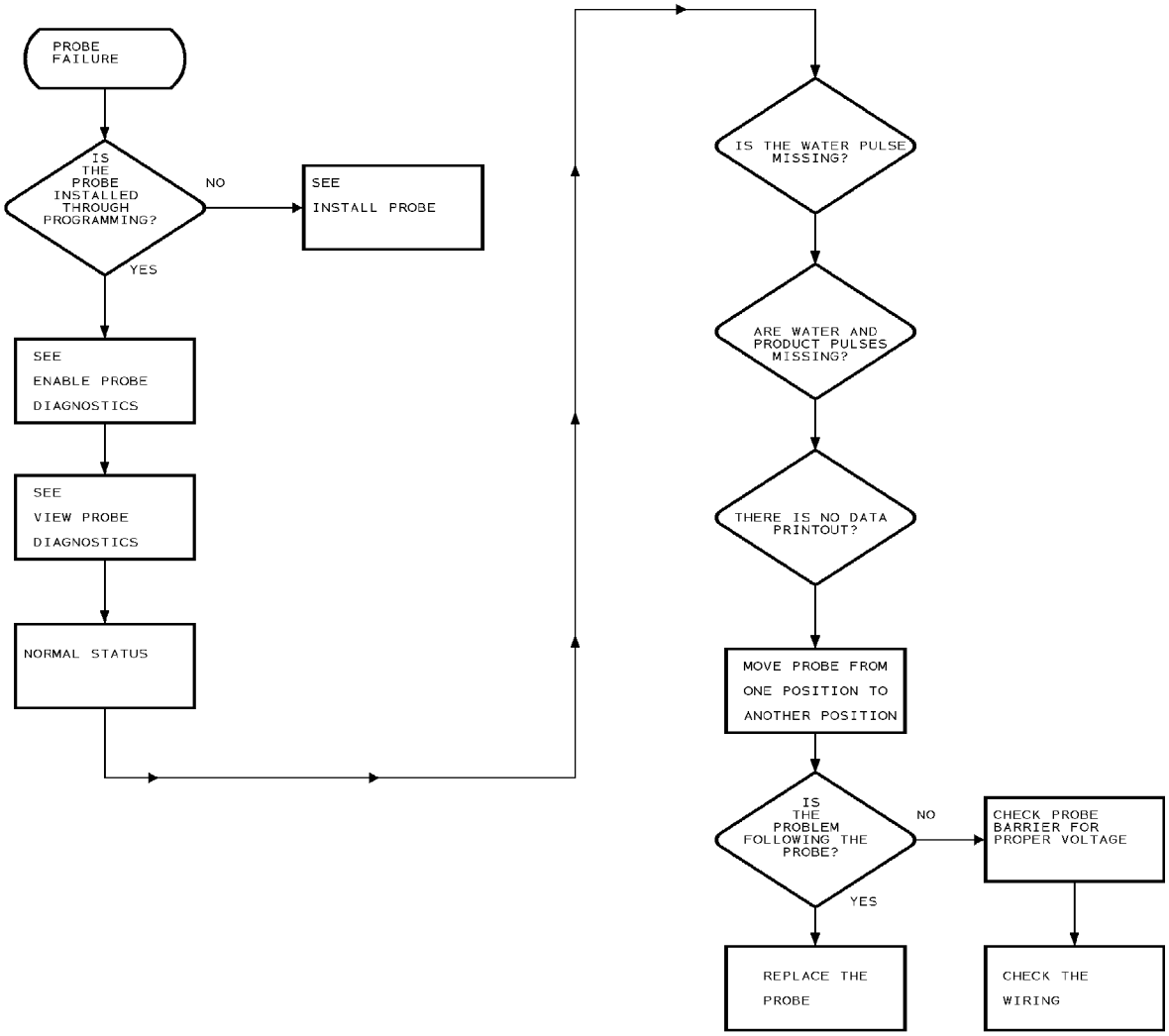
To check the status of a Smart Module or module position, use the INSTALL/REMOVE MODULE POSITIONS MENU (Page 58).

H.1.3 Probe Failure Report & Flowchart

Below is a sample PROBE FAILURE report:

```
PROBE FAILURE
      STATUS CODES: 10P2 5W2 0T0 0D0
      DESCRIPTION: 53
      PRODUCT:     DSL
      START:       10/19/93    12:01 AM
      END:         IN PROGRESS
```

Use the following flowchart to help find probe problems.



```
SITE SENTINEL     FEB 1, 1995     8:36 AM
     DIAGNOSTIC PROBE & SENSOR DATA

1.Module & Position: 1A  PROBE
2.Continuous, 4 Second Updates

Tank #: 1
Tank Description:
Product:
DIAGNOSTIC  LEVEL 1      STATUS: INFO:
PRODUCT LEVELS              0D0
 Rough:        77.5206 IN   6P2        0
 Fine:         77.5209 IN

WATER LEVEL:    3.7194 IN   4W2        0
                            0T0        0
PROBE SENSOR TEMPS                     0
 Head:         78.9150 F               0
 Top:          74.4083 F               0
 Middle 3:     74.5590 F               0
 Middle 2:     76.2366 F               0
 Middle 1:     82.4999 F               0
 Bottom:       78.6533 F               0
```

PROBE DIAGNOSTIC: PRODUCT & WATER MISSING

H.1.4 Sample Probe and Sensor Diagnostic Printouts

```
SITE SENTINEL     FEB 1, 1995     8:36 AM
     DIAGNOSTIC PROBE & SENSOR DATA

1.Module & Position: 1A  PROBE
2.Continuous, 4 Second Updates

Tank #: 1
Tank Description:
Product:
DIAGNOSTIC  LEVEL 1      STATUS: INFO:
PRODUCT LEVELS              0D0
 Rough:        77.5206 IN   0P0        0
 Fine:         77.5209 IN

WATER LEVEL:    3.7194 IN   0W0        0
                            0T0        0
PROBE SENSOR TEMPS                     0
 Head:         78.9150 F               0
 Top:          74.4083 F               0
 Middle 3:     74.5590 F               0
 Middle 2:     76.2366 F               0
 Middle 1:     82.4999 F               0
 Bottom:       78.6533 F               0
```

PROBE DIAGNOSTIC: NORMAL

```
SITE SENTINEL     FEB 1, 1995     8:36 AM
     DIAGNOSTIC PROBE & SENSOR DATA

1.Module & Position: 1A  PROBE
2.Continuous, 4 Second Updates

Tank #: 1
Tank Description:
Product:
DIAGNOSTIC  LEVEL 1      STATUS: INFO:
PRODUCT LEVELS              0D0
 Rough:        77.5206 IN   0P0        0
 Fine:         77.5209 IN

WATER LEVEL:    3.7194 IN   1W2        0
                            0T0        0
PROBE SENSOR TEMPS                     0
 Head:         78.9150 F               0
 Top:          74.4083 F               0
 Middle 3:     74.5590 F               0
 Middle 2:     76.2366 F               0
 Middle 1:     82.4999 F               0
 Bottom:       78.6533 F               0
```

PROBE DIAGNOSTIC: WATER MISSING

```
SITE SENTINEL     FEB 1, 1995     8:36 AM
     DIAGNOSTIC PROBE & SENSOR DATA

1.Module & Position: 1A  PROBE
2.Continuous, 4 Second Updates

Tank #: 1
Tank Description:
Product:
DIAGNOSTIC  LEVEL 1      STATUS: INFO:
PRODUCT LEVELS            15D2
 Rough:        77.5206 IN   5P1        0
 Fine:         77.5209 IN

WATER LEVEL:    3.7194 IN   0W0        0
                            1T2        0
PROBE SENSOR TEMPS                     0
 Head:         78.9150 F               0
 Top:          74.4083 F               0
 Middle 3:     74.5590 F               0
 Middle 2:     76.2366 F               0
 Middle 1:     82.4999 F               0
 Bottom:       78.6533 F               0
```

PROBE DIAGNOSTIC: NO DATA BEING RECEIVED

H.1.5 Cable/Conduit Problems

The recommended cable to connect the probe to the Smart Module is Belden #88760 or Alpha #55371. This type of cable is available from Petro Vend.

Note the following cable and conduit installation restrictions:

(1) Only probe cables and sensor wiring may share the same conduit to the Smart Module junction boxes and to the Smart Modules.

(2) Improper cables, wiring, and/or conduit allows electronic "noise" to interfere with the probe/sensor measurement data. This can cause measurement readings at the Controller that resemble hardware failure.

(3) The ground wire must be properly installed for the operation of the noise filtering circuitry. Do not rely on the conduit for the operation of the ground.

H.1.6 Other Hardware Problems

To isolate a hardware problem, rewire the device (probe or sensor) to a different terminal in the Smart Module; configure the probe in the usual manner.

If the device responds properly at the new terminal, check the setup, connections and voltages for the Smart Module and the Controller (see Section H.2).

WARNING!

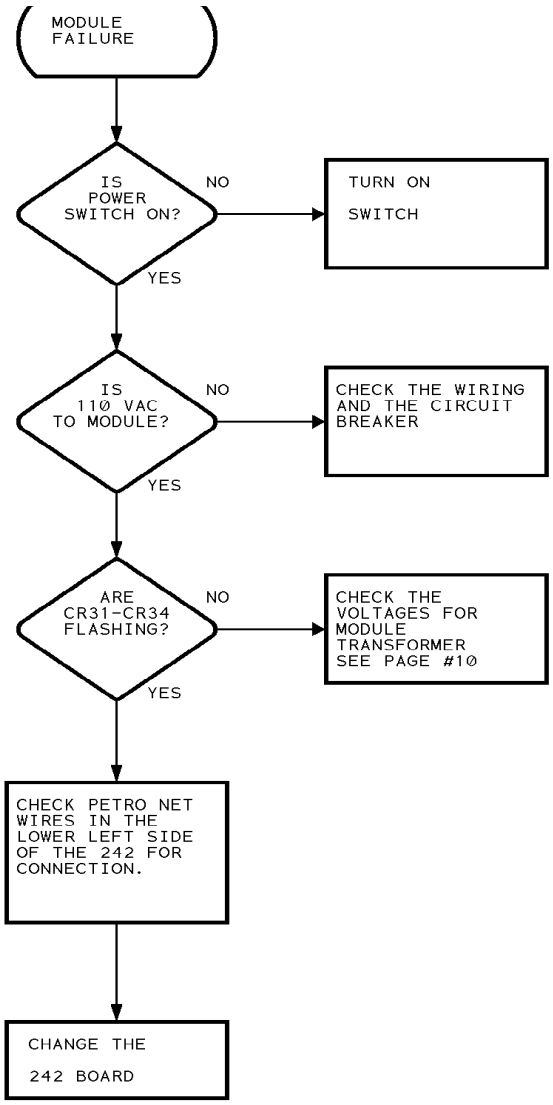
DO NOT violate the intrinsically-safe area!

H.2 Controller & Modules Troubleshooting

This section provides some basic troubleshooting procedures for the Site Sentinel Controller, Smart Module, and I/O module.

H.2.1 Smart Module Failure Flowchart

Use the following flowchart to help you diagnose a module failure.



H.2.2 Model II Controller PC Board Overview

Use Figure H1 below (Controller PC board) to assist in troubleshooting the unit. Note the location of test points and LEDs; they are referenced later in this appendix. Drawings of the Smart Module's PC board and the I/O Module PC board appear elsewhere in this appendix.

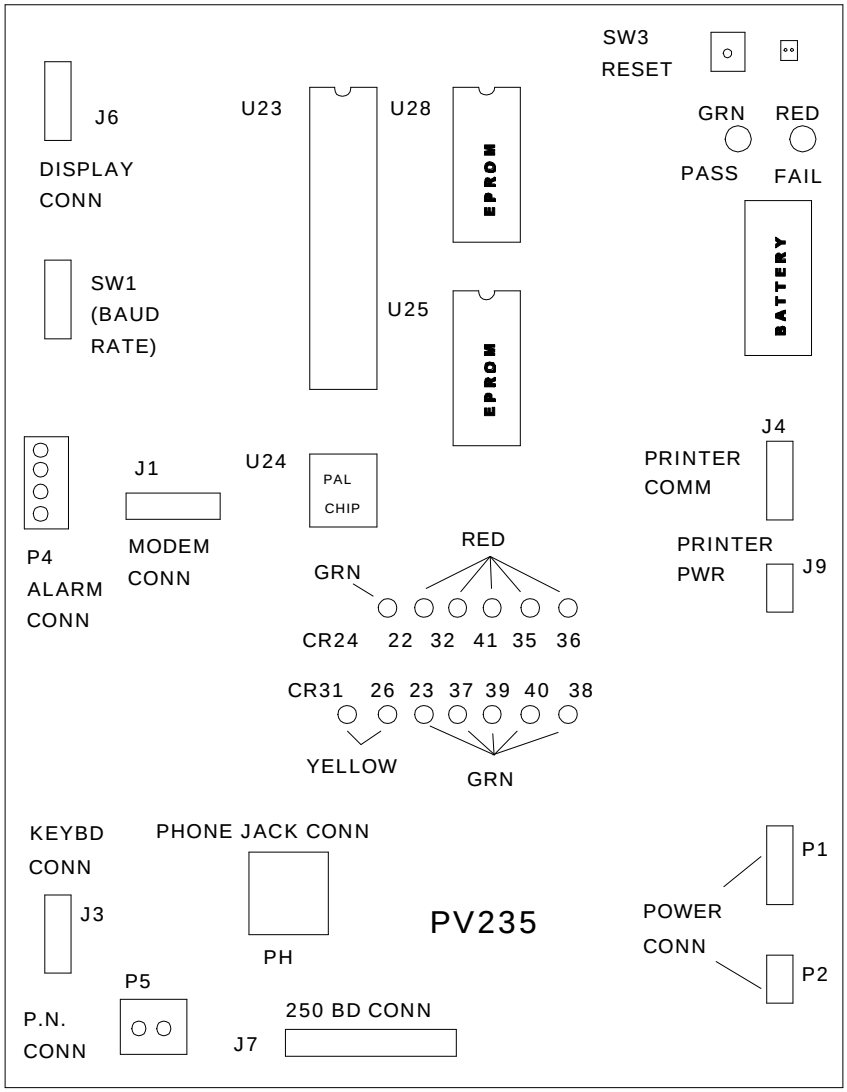
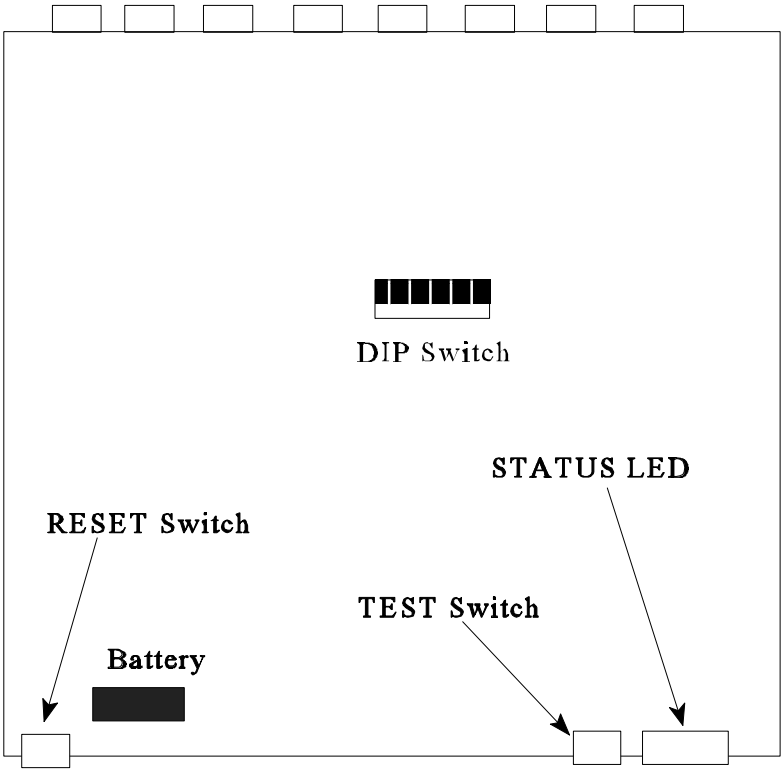


Figure H1 - CONTROLLER BOARD (PV235)

When the red Model II light button or Model III LED is programmed for the *duration* of an alarm condition, use option #7 of the SYSTEM COMMANDS MENU to turn it OFF.

H.2.3 MODEL III Controller PC Board Overview

Use the following drawing of the controller's PC board to assist in troubleshooting the unit. Note the location of test points and LEDs. A drawing of the Smart module's PC board and the I/O module PC board appear later in this appendix



H.2.4 Smart Module PC Board Overview

Use Figure H3 (the Smart Module's PC board) to assist in troubleshooting the unit. Note the location of test points and LEDs; they are referenced later in this appendix.

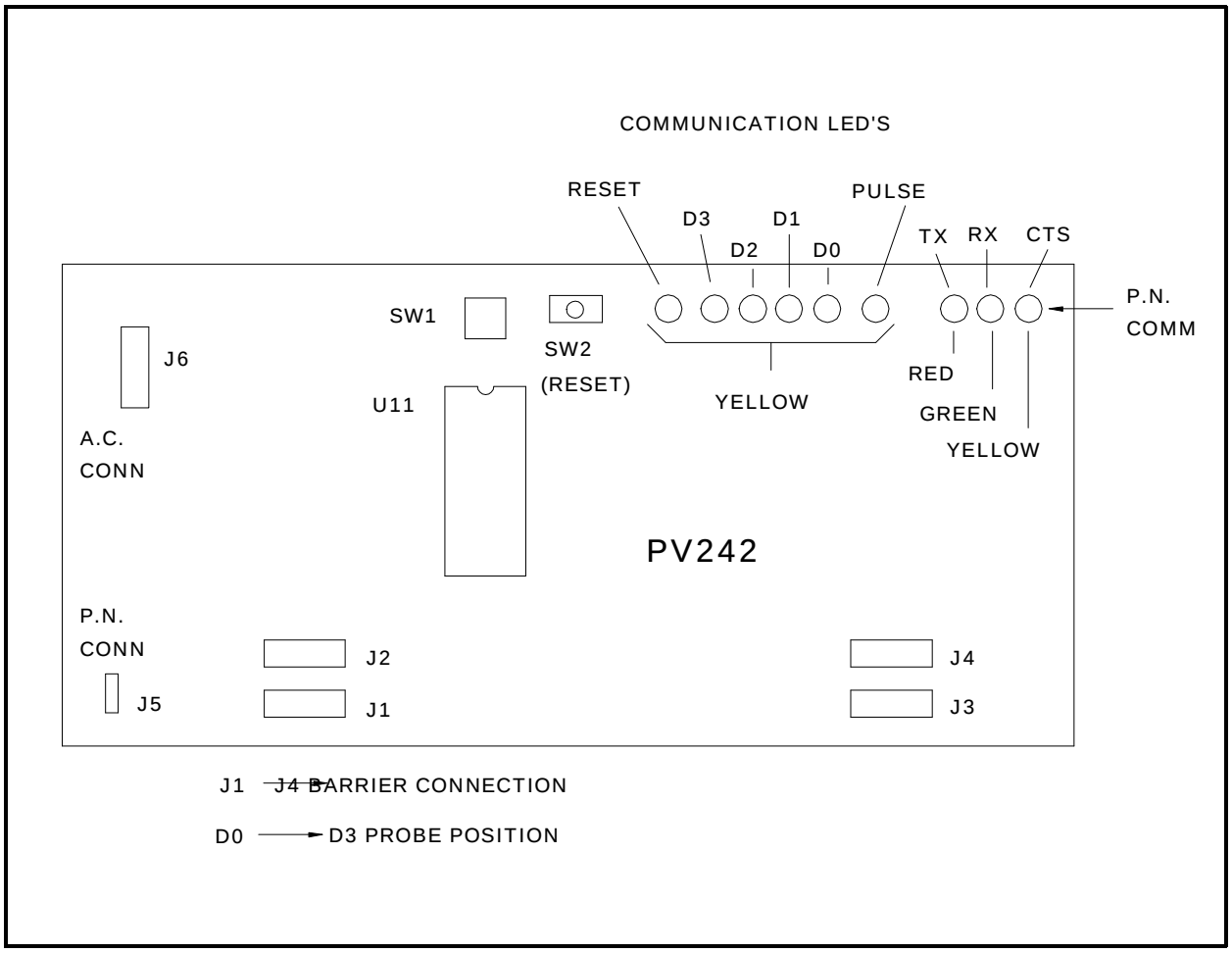


Figure H3 - SMART MODULE BOARD (PV242)

H.2.5 I/O Module PC Board Overview

Use Figure H4 below to assist you in troubleshooting the unit.

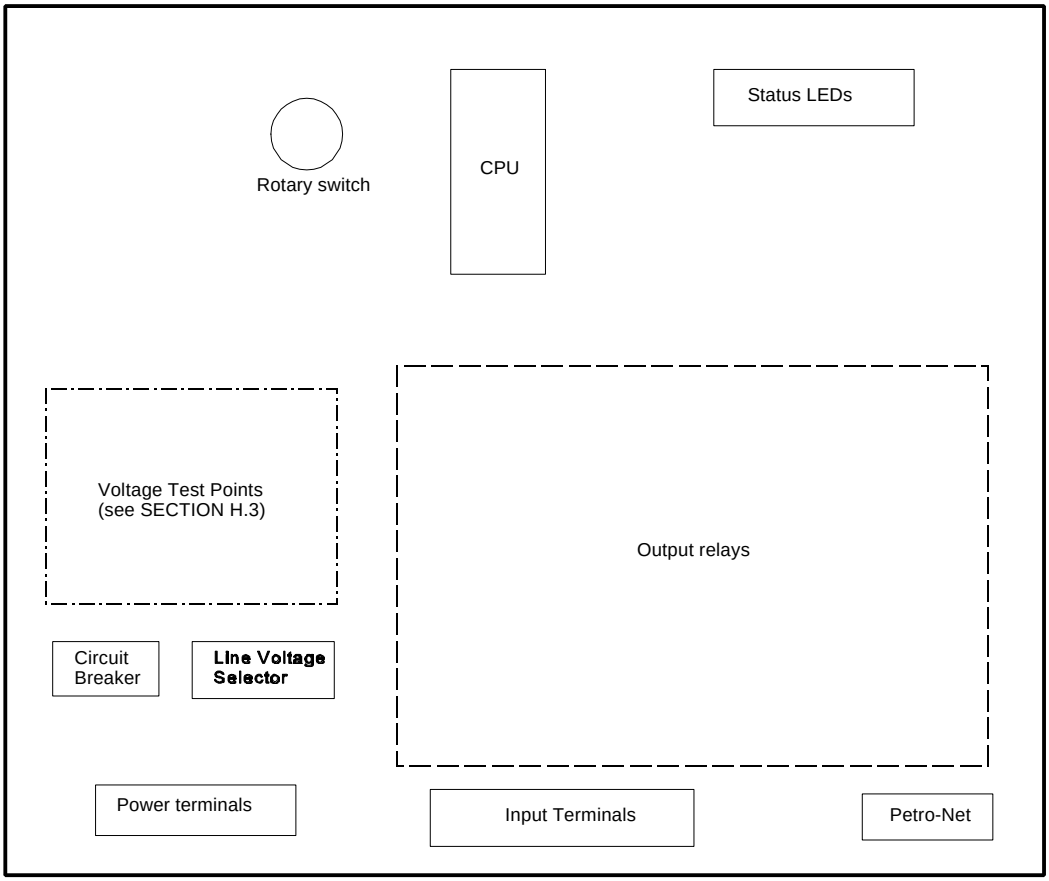


Figure H4 - I/O MODULE BOARD COMPONENT LOCATION

H.2.6 Smart Module Device Diagnostics

To check the devices attached to a Smart Module, use the Module Device Level Summary screen. Access this screen as follows:

1. From the Main menu, press [7] to display the Module Data menu.
2. From Module Data menu, press [1] to display the Tank, Probe, & Sensor Data menu.
3. Press [5] from the Tank, Probe, & Sensor Data menu.

These measurements include a position letter for each device attached to the Smart Module, the current level being generated by the device, and the net quantity being measured by the device (if programmed to display this attribute).

H.2.7 Smart Modules & Positions

An absence of all data usually indicates a hardware problem, though it can also indicate a module position for a device that was not installed.

To check the installation status of a Smart Module or module position, use the Install/Remove Modules & Positions menu, accessed as follows:

1. From the Main menu, press [6] to display the System Setup menu.
2. From the System Setup menu, press [2] to display the Sensor, Probe, and Tank Setup menu.
3. Press [5] to display the Install/Remove Modules & Positions menu.

H.2.8 Power Supply Checklist

☐ Check the power switch inside both the Smart Module and the Controller's cabinets

☐ Check that the power supply for both units has the proper voltage transformer installed (either 120 or 240V).

☐ The ground wire must be properly installed for noise filtering circuitry to operate properly. Do not rely on metal conduit to act as a ground.

☐ The Controller must have a dedicated power circuit.

For PC board and sensor voltage ratings, see Section H.3, Test Voltages.

H.3 Test Voltages

The following tables give test voltages for the Model II controller's PV235 board, the Smart Module's PV242 board, the Smart Module's probe/sensor terminal strip, sensor voltages, and the I/O module's PC board.

H.3.1 Model II Controller PV235 Voltages

Use the following table, and the illustration in Section H.2.2, to check voltages on the Controller PC board.

CONTROLLER PV235 BOARD VOLTAGES		
MEASURE: Transformer Terminals on PV235 Board		
PRINTER	ORANGE to ORANGE	18.6 VAC
LOGIC	RED to RED	18.6 VAC
PETRO-NET	BROWN to BROWN	8 VAC

The Model II controller xformer has two orange wires, two red wires, and two brown wires.

H.3.2 Smart Module PV242 Voltages

Use the following table, and the illustration in Section H.2.4, to check voltages on the Smart Module PC board.

SMART MODULE PV242 PC BOARD VOLTAGES	
MEASURE: Transformer Terminals on PV242 Board	
RED to RED	8 VAC
BROWN to BROWN	8 VAC
YELLOW to YELLOW	16 VAC

The Smart Module transformer has two red wires, two brown wires, and two yellow wires.

H.3.3 Smart Module Probe/Sensor Terminal Voltages

Use the following table, and the illustration in Section H.2.3, to check voltages on the device connection terminal strip. Proper sensor voltages are given in the next section, H.3.4.

The wire colors in the following table are the colors of the wires coming directly off the probe.

SMART MODULE PROBE BARRIER VOLTAGES		
MEASURE: Device Terminal in Smart Module		
PROBE CONNECTED	WHITE to GREEN	10.8 VDC
	BLACK to GREEN	O VDC
NO PROBE CONNECTED	POWER to GROUND	12 VDC
	SIGNAL to GROUND	2.4 VDC

H.3.4 Sensor Voltages

Use the following table to see if the sensors attached to the Smart Module's terminal strip are functional.

SENSOR TYPE	WIRE COLOR	VOLTAGE (VDC)
Liquid Phase Hydrocarbon Water	 Red-Black Red-White	 6.7 6.5
Interstitial Hydrocarbon Water	 Red-Black Red-White	 6.4 6.9
Sump Not Activated Activated	Red-Black	 0 6.9
Reservoir Activated HIGH Activated LOW Not Activated	Red-Black	 7.6 7.6 0
MSA Liquid	White-Black Red-Black	9.5 2.2
MSA Vapor	White-Black Red-Black	6.7 4.8

The wire colors in the following table are the colors of the wires coming directly off the sensor.

H.3.5 I/O Module Voltages

Use the table below, and the illustration in Section H.2.4, to check that I/O module voltages are OK. Place the voltmeter probe on the LEFT side of the indicated diodes.

I/O MODULE VOLTAGES	
MEASURE: Left side of component on board	
F2 to D4	8 VAC
F3 to D8	8 VAC
F4 to D12	12 VAC

The voltage across pins #20 (ground) and #40 of the microprocessor should be 5 VDC.

With the power off, you can check the fuses located at F2, F3, and F4.

H.4 LED Indicators

This section explains the function of the LEDs on the two different controller boards and the Smart Module board. The SiteSentinel is assumed to be in normal operating mode.

H.4.1 Controller LEDs

The following table explains what the various states of the LEDs on the PV235 board. For LED location, see Section H.2.2.

MODEL II Controller - PV235 Board LEDs

Label	Color	Status	Purpose	Label	Color	Status	Function
CR22	Red	flashing	Petro-Net Transmit	CR36	Red	off	not used
CR23	Green	flashing	Petro-Net Receive	CR37	Green	off	Modem Receive
CR24	Green	flashing	DIR Direction Comm	CR38	Green	off	not used
CR26	Yellow	off	68000 Microprocessor Status	CR39	Green	off	Passthrough Port Receive
CR31	Yellow	off	Reset	CR40	Green	off	Terminal Receive
CR32	Red	off	Modem Transmit	CR41	Red	off	Passthrough Port Transmit
CR35	Red	off	Terminal Transmit				

MODEL III Controller - PV271 Board LEDs

Label	Color	Function
CR31	Yellow	Reset
CR23	Red	RS-485 Petro-Net Transmit
CR22	Green	RS-485 Petro-Net Receive
CR24	Yellow	RS-485 Petro-Net TX Enable
CR81	Red	RS-232 Terminal Transmit
CR86	Green	RS-232 Terminal Receive
CR36	Red	RS-232 AUX 3 Transmit
CR38	Green	RS-232 AUX 3 Receive
CR32	Red	RS-232 Printer Transmit
CR37	Green	RS-232 Printer Receive
CR80	Red	RS-232 Modem Transmit
CR85	Green	RS-232 Modem Receive
CR35	Red	RS-232 AUX 1 Transmit
CR40	Green	RS-232 AUX 1 Receive
CR41	Red	RS-232 AUX 2 Transmit
CR39	Green	RS-232 AUX 2 Receive

H.4.2 Smart Module LEDs

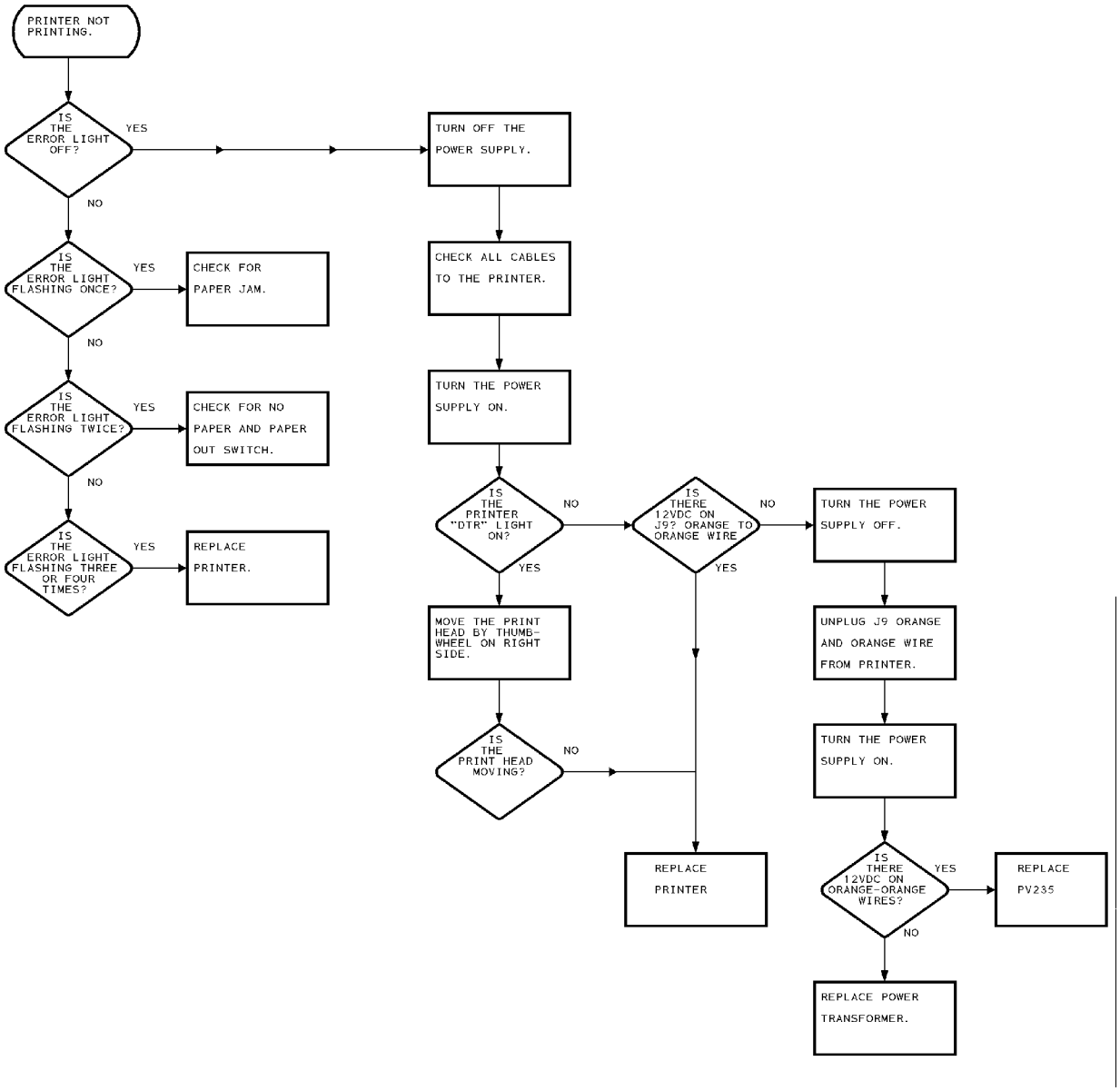
The following table explains what the various states of the LEDs on the PV242 board. For LED location, see Section H.2.3.

SMART MODULE PV242 LEDs			
Label	Color	Status	Function
D0, D1, D2, D3	Yellow	slow flash: polling data quick flash: unconfigured	indicates module position currently being polled
RESET	Yellow	off	Reset
TX	Red	off	Transmit
RX	Green	off	Receive
CTS	Yellow	off	Clear to Send

H.5 Internal Printer Troubleshooting (Model II ONLY)

Use the flowchart below to help find any problems in a Model II internal receipt printer..

Paper replacement instructions are in Appendix I on the following page.



Appendix I - Model II Printer Paper Replacement

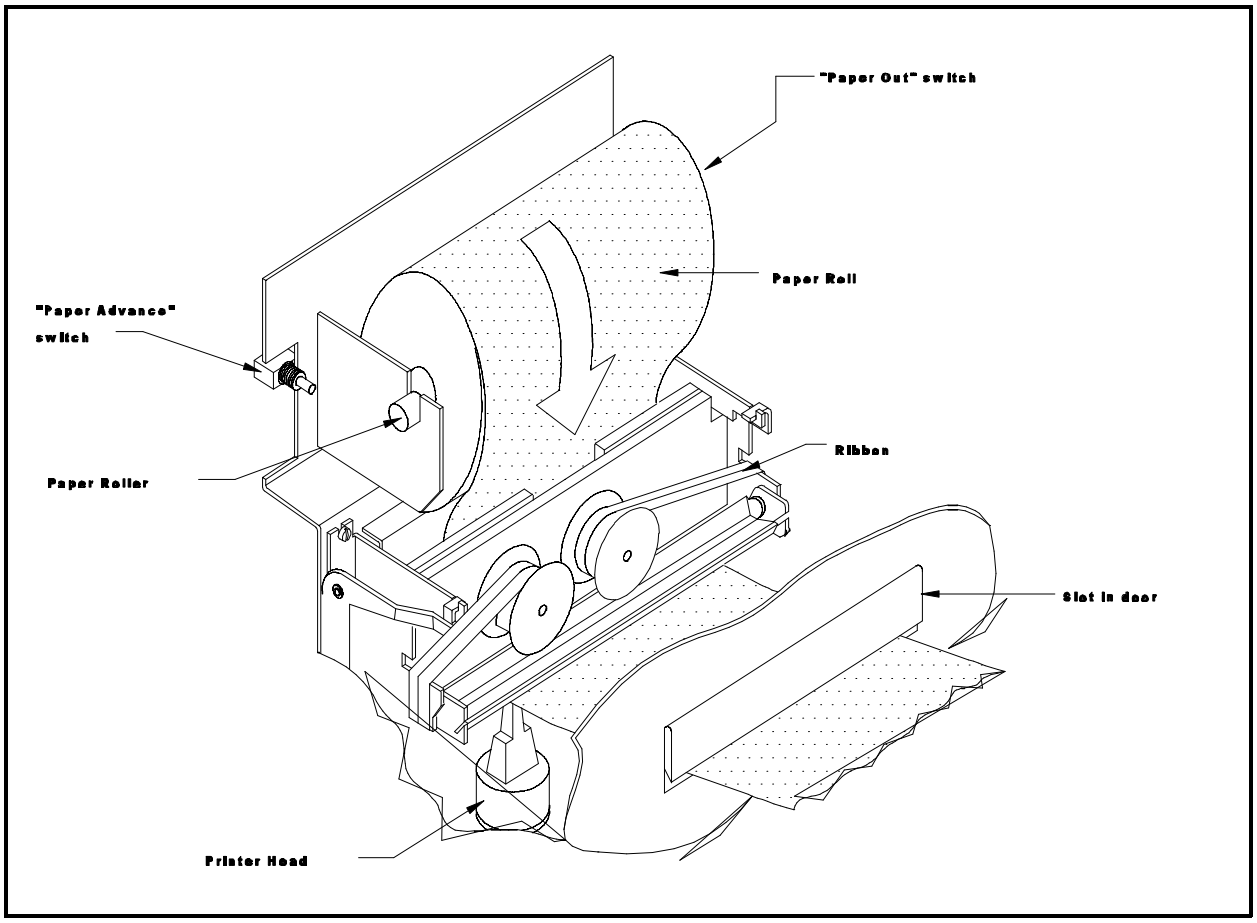


Figure I-1 - PRINTER PAPER REPLACEMENT

The printer for the **SiteSentinel II** requires a 4.5" x 3" roll of plain paper. The paper at the end of the roll is pink. The paper out switch (next to the roll) is how the system knows when the paper is gone.

Before replacing the paper roll, note the way in which the paper feeds into the printer (see Figure above). Then, do the following:

1. Cut the paper on the old roll just before it feeds into the printer. Pull the remaining paper through the printer, away from the roll.

2. Remove the remaining roll but do not throw away the paper roller.

3. Place the new paper roll on the old roller and set into position. The "paper out" switch activator may need to be moved. If so, push the activator (its a small piece of metal near the roller holder) down and to the right.

4. Keeping the paper tight on the roll, carefully slide the leading edge into the printer slot. The paper should feed in about an inch before stopping.

5. Press and hold the paper advance button (located just to the left of the paper holder) to advance

the paper. It may be necessary to continue feeding the paper manually for the first few inches.

Note that the paper must be positioned between the ribbon and the metal plate. The printer head does not come in direct contact with the paper.

6. Test the printer as follows:

a. Press both the paper advance and system reset buttons simultaneously.

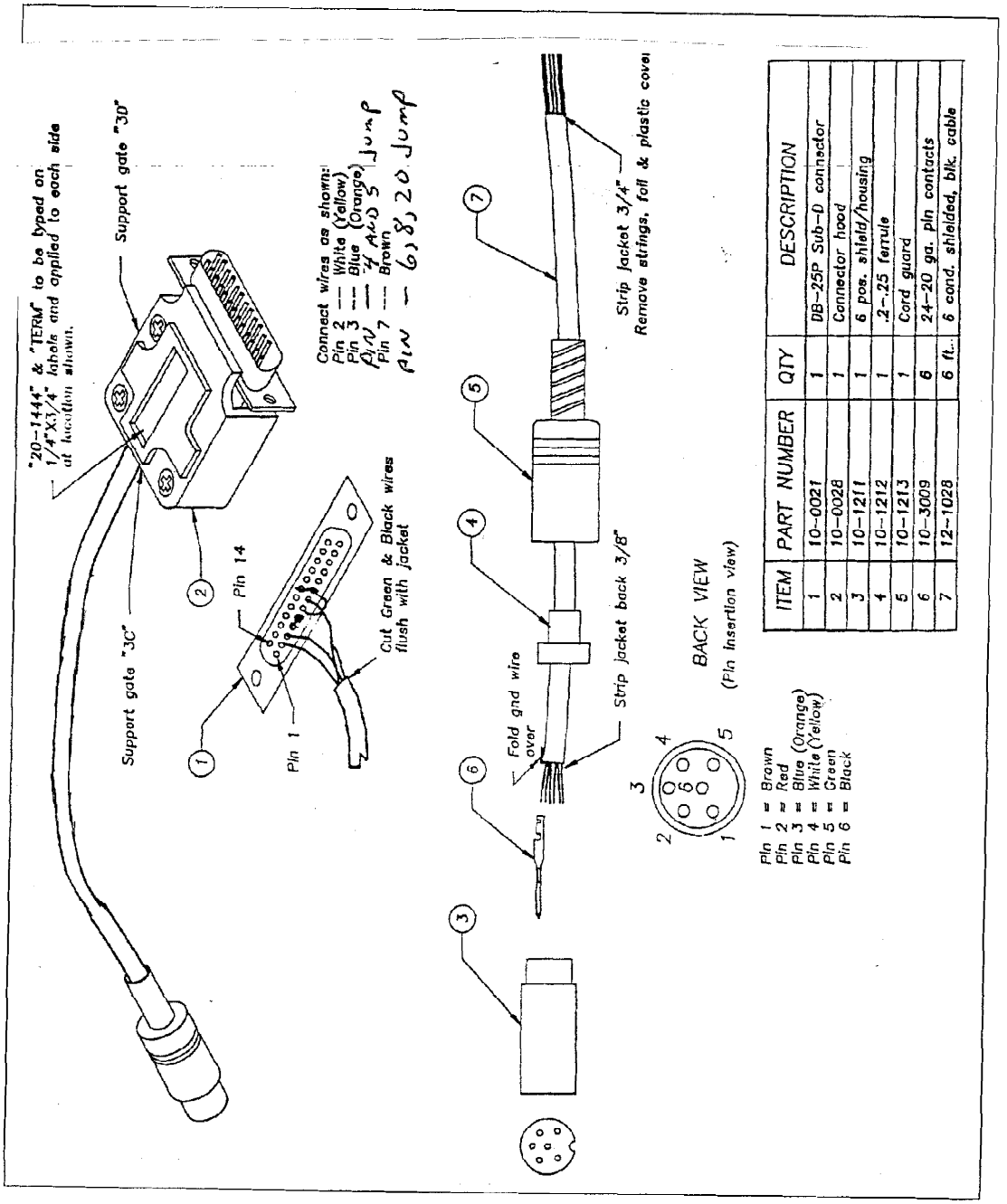
b. Release the reset button while continuing to hold the paper advance button.

After about five seconds, the printer should begin printing. Release the paper advance button after printing begins.

For more printer troubleshooting information, refer to Appendix H.

Appendix J - Assembling a Model III Terminal Cable

This appendix provides instructions for making your own DB-25-to-DIN cable assembly. This cable is used to connect the Site Sentinel Model III controller to an external computer or terminal. *Step-by-step instructions are on the next page.*



ITEM	PART NUMBER	QTY	DESCRIPTION
1	10-0021	1	DB-25P Sub-D connector
2	10-0028	1	Connector hood
3	10-1211	1	6 pos. shield/housing
4	10-1212	1	.2-.25 ferrule
5	10-1213	1	Cord guard
6	10-3009	6	24-20 ga. pin contacts
7	12-1028	6 ft.	6 cond. shielded, blk. cable

Model III Cable Assembly Instructions (Illustration on previous page)

1. Strip 3/8 of an inch of insulation jacket from one end of the cable, exposing the wires. Be careful not to nick the wires inside. Remove all strings and plastic covering from the inner wires.

2. Strip 1/8 inch of insulation from each end of each wire. Crimp a terminal on each wire.

3. Fold the stranded ground wire over the cable jacket.

4. Align all pins and insert them into the shield housing so that no bare conductor is visible beyond the housing. MAKE SURE ALL PINS "SEAT" THEMSELVES FULLY.

5. Slide ferrule over ground wire and shield housing until the ferrule stops.

6. Slide the cord guard over the housing.

Appendix K - Computer Access

K.1 Overview

This section describes how you can create programs that automatically execute SiteSentinel commands.

The information in this appendix applies *only* to a system connected to an IBM®-compatible PC, or other system capable of ASCII transmissions.

Note that menus and commands are subject to change in future software versions.

Report data from SiteSentinel can be downloaded to an external computer. System setup information can also be transmitted to an external computer for safe storage, and then restored to the same (or similar) system.

The SiteSentinel can use one of five protocols when transferring data. Each protocol is described in Section K.2, beginning on the following page.

The Data Formats section of this appendix explains how numbers, logical values, times and dates are represented in the computer format.

The remaining sections indicate the various computer report formats.

RELATED MATERIAL

The following topics can be found on the indicated pages.

☐ Setting up the computer protocol - input flow control, type of protocol, and file name. **Page 55.**

☐ Generating a report in the computer format. **Page 151.**

☐ Backup and restore features. **Page 107.**

☐ Modem operation. **Page 143.**

☐ PC connections and terminal emulation. **Page 149.**

☐ Computer report protocols and data formats**.** **Page 151.**

K.2 Computer Report Protocols

The SiteSentinel can use any of five protocols when transferring data. The proprietary **Petro Vend** ("PV") protocol is described below; this protocol is used by other **Petro Vend** products.

Xmodem and two versions of *Kermit* (7-bit, even parity; and 8-bit, no parity) are also available; at least one of these protocols can be used with most terminal emulation software packages. The 8-bit version of Kermit interfaces with some communication programs that incorrectly switch to 8-bit/NO PARITY for file transfer.

The choice of a protocol is usually a tradeoff between reliability and availability. (in other words, chose the most reliable protocol available). Kermit and Xmodem are the most reliable, followed by the PV protocol. If none are available, data can be transferred as straight ASCII files.

K.2.1 PV PROTOCOL

Petro Vend protocol is line oriented; each line is sent with **`/[CHK][CHK][CR][LF]'** appended at the end (where **`[CHK][CHK]'** indicates the "checksum," **`[CR]'** indicates "carriage return," and **`[LF]'** indicates "line feed."

The *checksum* is a two-digit number calculated by adding the decimal values of the ASCII characters in a data string, adding 47, and truncating the sum. Table 1 on Page lists the decimal values of standard ASCII characters.

For example, in the data string **`ABCD'**, the decimal values for each character are: **A** = 65, **B** = 66, **C** = 67, and D = 68. Their sum is 266. 266 + 47 = 313.

Truncating the sum means removing all but the last two digits. In this case, the truncated sum is 13.

The complete data line that would be sent by SiteSentinel (when using PV protocol) is therefore: **`ABCD/13[CR][LF]'**.The following is an IBM® BASIC program that determines the checksum for a line of data:

```
010  CHKSUM% = 0
020  TRANSACTION$ = "LINE OF DATA 0123456789"
030  NUMCHARS% = LEN(TRANSACTION$)
040  FOR INDEX% = 1 TO NUMCHARS%
050  SINGLECHAR$ = MID$(TRANSACTION$,INDEX%,1)
060  CHKSUM% = CHKSUM% + ASC(SINGLECHAR$)
070  NEXT INDEX%
080  CHKSUM% = CHKSUM% + 47
090  TEMP$ = STR$(CHKSUM%)
100  TEMP$ = RIGHT$(TEMP$,2)
110  PRINT TEMP$
120  END
```

K.2.2 KERMIT PROTOCOL

The Kermit protocol was developed to transfer files between a large variety of mainframe, mini, and micro-computers.

Since its introduction, Kermit has been extended to (1) implement common system commands in a portable way, (2) improve reliability, and (3) speed up file transfers.

It is *not* necessary to put the SiteSentinel into SERVER mode to receive Kermit server mode commands. The SiteSentinel automatically recognizes Kermit server mode commands, selects the Kermit protocol, and places itself into server mode for the duration of the command. After the server command has been processed, the SiteSentinel returns to the mode it was in before the command.

The commands beginning on the next page are presented as if they were typed at the Kermit command line on a PC using *MS-DOS Kermit* version 3.11.

The PC program sends the command and data packets to the SiteSentinel following the Kermit protocol. It is these command and data packets that are recognized by the SiteSentinel.

SEND file name

This command sends either a <*command file*> or backup file to the SiteSentinel.

RECEIVE

This command lets your PC receive reports from the SiteSentinel. Reports can be requested either from the command line, or from the Computer Format Reports menu. Also use RECEIVE to receive backup data.

REMOTE HOST command line

The PC sends a single <*command line*> to the SiteSentinel and waits for an acknowledgement, report, or error. If it receives a report, it normally is displayed on the computer's screen using the computer format.

REMOTE TYPE file name

This is equivalent to GET <*file name*>, except the report is displayed on-screen and not stored in a file.

GET file name

This command requests a report from the SiteSentinel, and then to receive the requested report. The SiteSentinel scans this file name for an embedded report name. The SiteSentinel then sends the report with the same <*file name*> that was requested.

Report names are scanned for starting with the longest report name ("**INVP**" is scanned before "**INV**"). Be careful not to use file names that may contain more than one report name of the same length, such as "**QINVP.1**" (**QINV** or **INVP**) or "**INV.BCK**" (**INV** or **BCK**).

The *entire* <*file name*> sent to the SiteSentinel is scanned, including the disk, directory, and extension.

LOGIN user name password

This command enters the privileged mode. The <*user name*> is ignored. The <*password*> is compared with either the restricted or privileged passwords and the privilege level is set accordingly.

BYE
LOGOUT

These two commands disconnect the SiteSentinel and hang up the modem.

FINISH

This command is accepted but *not* needed.

The SiteSentinel supports the following:

- 8-bit prefixing (8-bit characters are *not* currently used)
- Run-length encoding
- The use of one-, two-, or three-character block-checks.

These features are negotiated between the two protocol drivers at the start of each session.

If there is an error while Kermit protocol is used, an error packet is sent containing error numbers and an error message for the user.

Kermit server commands are accepted at the following prompts:

- `enter terminal type:' prompt
- Any **`enter menu selection:'** prompt
- The command line prompt.

When using Kermist server commands, you can protect the entire session from being corrupted by line noise by using the protocol. This includes all commands and data from when the immediately after connection with the **SiteSentinel** up until the moment of disconnection.

FILE NAMES & Kermit

File names are used with the Kermit protocol. References to file names should be ignored when using Xmodem, Petro Vend, or ASCII protocols.

When the SiteSentinel sends a report or receives a <*command file*>, it is sent with a file name.

For reports requested from a menu, the command line, or within a command file, the SiteSentinel uses the *default file name* from the computer protocol setup menu. This can also be accessed with **PROTO**.

Reports requested with the Kermit **REMOTE HOST** command are *not* accompanied by a file name, and display on the screen.

For reports requested with the Kermit GET <*file name*> command, the <*file name*> is the same as was used in the GET command.

The maximum length of the <file name> is 80 characters.

See the section on the Kermit GET command for how the <*file name*> is interpreted.

On <*command files*>, the file name is ignored. The content of the file determines if it is a backup file (along with the type of backup) or a regular command file.

A <*file name*> can be made up of any 7-bit ASCII characters, except CR and LF. If entered at a menu, only characters that appear on the keypad can be used.

Most operating systems require a certain format for the file name.

K.2.3 XMODEM PROTOCOL

Xmodem was created in the late 1970s to provide reliable file transfers between CP/M microcomputers over communication lines. It is included with many communication programs and function libraries.

Since its introduction, the protocol has been extended in order to improve the reliability and speed of file transfers.

The only extension supported by the SiteSentinel is XMODEM-CRC where the eight bit checksum has been replaced by a CRC.

K.2.4 ASCII PROTOCOL

The ASCII protocol is intended for use only if another protocol is unavailable. A table of ASCII values is on Page 153.

When selected, SiteSentinel sends reports to the computer as “straight” ASCII text. The computer controls the flow using either hardware handshaking (**'RTS'**) or software handshaking (**`XON'** and **`XOFF'**).

With a RESTORE, the SiteSentinel displays a message requesting the file using ASCII and then waits up to one minute for the computer to start sending data.

Once the computer is sending data, either hardware handshaking (**`CTS'**), or software handshaking (**`XON'** and **`XOFF'**) must be used to prevent SiteSentinel from losing data.

A pause of at least 10 seconds or a control **Z** in the data indicates to the SiteSentinel that the computer has reached the end of the file. If software handshaking (**`XON'** and **`XOFF'**) is used, it must be enabled.

For *reports*, the receiving computer should look for one of the following:

- A command line prompt (`**[CR][LF]>**') when the command line mode is used
- An error message
- An `**ESC**' (0x1b) which indicates the **SiteSentinel** is redrawing the menu screen.

K.3 Command Line Format

K.3.1 INTRODUCTION

There is both a menu interface and a *command line interface* for the SiteSentinel. Use the command line interface for all computer control.

Menu interfaces may change from one software version to the next, changing the keystrokes necessary to execute a command or request a report.

You can request a format report or send a command or information to the SiteSentinel in several ways:

- Go to the computer format reports menu and request a report;
- Enter command line mode and type a <*command line*>;
- On the host computer, use a Kermit `REMOTE HOST <command line>` command;
- On the host computer, use a Kermit `SEND <file name>` to send a <*command file*> containing one or more <*command line*>'s requesting the report or reports.
- On the host computer, use a Kermit `GET <file name>` command;
- Go to the backup/restore menu and request a system backup;
- Go to the backup/restore menu and "restore" a command file;

The `RESTORE' command is described on Page 107 as accepting a file produced by the `BACKUP' command. The backup file is really a <*command file*> containing a single <*command line*> followed by the data that was backed up.

K.3.2 COMMAND FILES

A *command file* is a text file stored on another computer containing SiteSentinel line mode commands. When this file is sent to the SiteSentinel using one of the file transfer protocols, the SiteSentinel interprets the commands contained in the file. This is done while the file is being sent.

<*command file*>:
    <*command line*>[<*CR*><*command file*>]
    <*report request*>

<*command line*>:
    'REM '{any text}
    'SET '[<*range*>]<*variable*>[<*range*>]'='<*value*>
    'SETV '[<*range*>]<*variable*>[<*range*>]'='<*value*>
    'SHOW '[<*range*>]<*variable*>[<*range*>]
    <*report name*> [<*range*>]
    <*command name*> [<*range*>]

Variables require a <*range*> sufficient to specify the particular variable. If the <*range*> is more than sufficient, the additional information is ignored; that is, if a <*variable*> is associated with a <*module*>, and a <*modpos*> or <*group*> is given, the module portion is used.

Also, if an <*index*> is specified for a <*variable*> and is *not* needed, it is ignored. If a <*range*> is specified, only the first location in the <*range*> is used.

A <*command name*>, <*report name*>, or <*variable*> is a short name, or anagram representing a command, report, or variable. It can *not* be abbreviated and case is ignored.

K.3.3 RANGE SPECIFICATION

Many
included in a report.

<range>:
' '*<range specifier>*[*<range>*]

<range specifier>:
<modpos range>
<index range>
<event group>

The *<modpos range>*, *<index range>*, and *<event group>* specifiers can be combined in any order.

<modpos range>:
'P'*<mod><pos>*['-'*<mod><pos>*]
'M'*<mod>*['-'*<mod>*]
'G'*<mod><grp>*['-'*<mod><grp>*]

The *<modpos range>* specifiers ('P', 'M', and 'G') are mutually exclusive and cannot be combined with one another. If multiple *<modpos range>* specifiers are used in a single *<range>*, only the last *<modpos range>* specifier is used.

<mod>:
'1'-'8'
<pos>:
'A'-'P'
<grp>:
'1'-'8'

<index range>:
'I'*<index>*['-'*<index>*]

<event group>:
<event>
'SPIF' (all spi and hfe events)
'SPI' (all spi events)
'HFE' (all hfe events)

<event>:
<spi events>
<hfe events>
'SIN' is Saved Inventory Report

<spi events>:
'HPL' | 'LPL' | 'HWL' | 'TMP' | 'TFT' |
'DEL' | 'SAL' | 'TLT' | 'HSL' | 'LSL' |
'I01' | 'I02'

<hfe events>:
'PRB' | 'MOD' | 'PRN' | 'POW'

<event>* and *<event group> specifiers are mutually exclusive and can *not* be combined with one another.

K.3.4 COMMAND TYPES

Comm

Reports

A report is data generated by the SiteSentinel. When requested, the SiteSentinel generates the report based on the data in memory while the report is being sent to the user. You can request reports in several ways, as shown below (further explained in Chapter 6):

Report Name	Description
INVP	Tank inventory
INVS	Sensor levels
INV	Combined tank inventory & sensor levels
QINV	Quick inventory report
WARN	Warnings in progress
EVENT	Combined events
BCK	System configuration backup

Setting or Showing Configuration Data (variables)

Variables store setup data, and can be modified either from the menus or from the command line using a SET or SETV command. Examine them either from the menus or from the command line with the with the SHOW command.

The data format required depends on the specific variable. Typically the same format printed in computer format could be entered. If a value is outside of the allowable range, an error is sent.

The SHOW command produces a computer format report containing the data in the variable. Each instance of a variable produces a separate line. Currently only one instance of a variable can be shown in a report, producing a single line report.

Miscellaneous

This category is a catch-all for commands that are not reports and do not show or modify configuration data.

K.4 Report Data Formats

K.4.1 INTRODUCTION

Reports consist of one or more lines. Each line consists of a <*line title*> followed by one or more data fields.

In general, by looking at the <*line title*>, the software parses the rest of the line assuming fixed field widths and data types. The fields are separated by slashes ('/').

K.4.2 FORMAT DESCRIPTION

Computer format reports generated by the SiteSentinel are generally sent as a separate file using one of the file transfer protocols (PV, Xmodem, Kermit, or ASCII). Each report starts with a report header line followed by zero or more data lines. The end of the file defines the end of the report. The reports are described with the following syntax:

On the first line of the syntax description block is the syntax type followed by one or two colons ("**:**" or "**::**").

One colon indicates that *any* of the following lines may be included, two colons indicate that *all* of the following lines in the block are included in the indicated order.

Then, a set of indented lines indicating text or further syntax types. Each of these indented lines represents text included in the report. The syntax "<<*type*> *line*>" represents a data line with a line title of <*type*>.

*Sections within braces ("**{**", "**}**") may be repeated one or more times.**INV, INVP, and INVS reports***

These reports are subsets of the INV report, limited to module positions that are programmed as either probes (INVP) or sensors (INVS).

The INV report is limited to modules and positions that are installed (variables MOD 1= INST, and POS 1=INST), and <*modpos*>'s that fall within range (as specified on the command line or in the RPT variable).

If a group range was specified, only the group measurements within the <*range*> are included in the report; individual inventory measurements are *not* included.

QINV report

The QINV report is designed for a quick turnaround where the computer is continuously polling the SiteSentinel in order to update a graphics screen.

WARN report

This is the "Warnings in Progress" report.

EVENT report

The "Event" report combines the "Save Events" selections (from the REPORTS MENU) and the selections from the INDIVIDUAL REPORTS MENU.

An individual <*event*> or <*event group*> should be specified in the <*range*> when requesting the report. A sample report appears on the next page.

Sample EVENT Report

```
<INV report>::                                                  (report header line)
    <INV line>                                                  (repeated for each module)
    {                                                           (repeated for each position)
        {                                                       (individual)
    <position measurement>
        }
        {                                                       (repeated for each group)
    <group measurement>                                         (group)
        }
    }
    <end of file>

<QINV report>::                                                 (Quick inventory report)
    {                                                           (repeated for each module)
        {                                                       (repeated for each position or group)
    <quick measurement>
        }
    }
    <end of file>

<measurement>:
    <position measurement>
    <group measurement>

<position measurement>:
    <probe measurement>
    <sensor measurement>

<quick measurement>:
    <M07 line>                                                  (for sensor postions)
    <M08 line>                                                  (for probe positons or groups)

<probe measurement>::
    <M01 line>
    <M02 line>
    <M05 line>

<sensor measurement>::
    <M01 line>
    <M09 line>

<group measurement>::
    <M01 line>
    <M04 line>
    <M06 line>


<WARN report>::
    <WRN line>                                                  (report header line)
    {                                                           (repeated for each module)
        {                                                       (repeated for each position)
            {                                                   (repeated for each event type)
    <WR1 line>
            }
        }
    }
    <end of file>

<EVENT report>:
    <ALR line>                                                  (report header line)
    {                                                           (repeated for each event)
    <MSG line>                                                  (event data header line)
    <EVENT data>                                                (only if there is additional data)
    }
    <end of file>

<EVENT data>:
    <limit event data>                                          (HPL, LPL, HWL, HSL, LSL)
    <sale event data>                                           (TFT, DEL, SAL)
    <inv event data>                                            (INV)
    <tlt event data>                                            (TLT)
    <hdw event data>                                            (TMP, I01, I02,
                                                                PRB, MOD, PRN, POW)
```

<*limit event data*>**::**
    <*position measurement*> (worst case)

<*sale event data*>**::**
    <*position measurement*> (start measurement)
    <*position measurement* *(end measurement)*
    ><*M10 line*> (change measurement)

<*inv event data*>**::**
    <*measurement*> (saved measurement)

<*tlt event data*>**::**
    <*position measurement*> (start measurement)
    <*position measurement*> (end measurement)
    <*M11 line*> (results measurement)

<*hdw event data*>**::** (no data)

REPORT LINE FORMATS *(Not all apply to both Model II and III)*

GENERAL LINE FORMAT FOR REPORTS	
`ttt/<field 1>/<field 2>/.../<field n-1>/<field n>`	
`ttt`	Report or Line Title: always 3 characters exactly
`/`	Data Field Separator: "forward slash" character
`<field n>`	Data Field: the quantity and type of fields included depend on the particular line type; note that fields of the same type are always the same size, but different field types may have different sizes

REPORT HEADER LINE	
`ttt/mmddyyyy/hhmmss`	
`ttt`	Line Title: always 3 characters exactly INV - Tank Inventory Report or Sensor Levels Report WRN - Warnings in Progress Report ALR - Saved Event Report (sensor, probe, input, hardware failures, & individual)
mmddyyyy/hhmmss	Date & Time of Report: month, day, year / hours, minutes, seconds

MEASUREMENT HEADER LINE	
`M01/u/tnk/m/ps/sen/ffffffff/mmddyyyy/hhmmss`	
`M01`	Line Title
u	Units of Measurement: F = English; T = Metric
`tnk/m/ps/sen`	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
`ffffffff`	Flags: *not defined*
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds

MEASUREMENT LINE #1 (individual tanks)	
`M02/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd`	
`M02`	Line Title
`dddddd.ddd`	Net Corrected Tank Volume
`dddddd.ddd`	Gross Measured Tank Volume
`dddddd.ddd`	Volume Left in Tank (ullage)
`dddddd.ddd`	Product Level
`dddddd.ddd`	Average Product Temperature (average of temperature sensors which are currently submersed in product)
`dddddd.ddd`	Water Level

RESERVED	
`M03`	
`M03`	Line Title

MEASUREMENT DATA LINE #1 (manifolded tanks)	
M04/dddddd.ddd/dddddd.ddd/dddddd.ddd/----------/dddddd.ddd/----------	
M04	Line Title
dddddd.ddd	Net Corrected Tank Volume
dddddd.ddd	Gross Measured Tank Volume
dddddd.ddd	Volume Left in Tank (ullage)
----------	Blank: product level does *not* exist
dddddd.ddd	Average Product Temperature (average of temperature sensors which are currently submersed in product)
----------	Blank: water level does *not* exist

MEASUREMENT LINE #2	
M05/dddddd.ddd/dddddd.ddd	
M05	Line Title
dddddd.ddd	Net Corrected Product Volume
dddddd.ddd	Gross Water Volume

MEASUREMENT DATA LINE #2	
M06/dddddd.ddd/dddddd.ddd	
M06	Line Title
dddddd.ddd	Net Corrected Product Volume
dddddd.ddd	Gross Water Volume

QUICK INVENTORY REPORT LINE (sensors)	
M07/u/tnk/m/ps/sen/mmddyyyy/hhmmss/dddddd.ddd/dddddd.ddd	
M07	Line Title
u	Units of Measurement: F = English; T = Metric
tnk/m/ps/sen	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds
dddddd.ddd	Measured Sensor Voltage; floating point number
dddddd.ddd	Reserved for additional measurement

QUICK INVENTORY REPORT LINE (tanks and groups)	
M08/u/tnk/m/ps/sen/mmddyyyy/hhmmss/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd	
M08	Line Title
u	Units of Measurement: F = English; T = Metric
tnk/m/ps/sen	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
mmddyyyy/hhmmss	Date & Time of Measurement: month, day, year / hours, minutes, seconds
dddddd.ddd	Net Corrected Tank Volume
dddddd.ddd	Product Level *(blank for groups)*
dddddd.ddd	Average Product Temperature (average of temperature sensors which are currently submersed in product)
dddddd.ddd	Water Level *(blank for groups)*

SENSOR DATA LINE	
M09/dddddd.ddd/dddddd.ddd	
M09	Line Title
dddddd.ddd	Measured Sensor Voltage; floating point number
dddddd.ddd	*Reserved for* Parts per million; floating point number

SALE/DELIVERY/THEFT VOLUMES	
M10/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd	
M10	Line Title
dddddd.ddd	Net Corrected Tank Volume Change
dddddd.ddd	Gross Measured Tank Volume Change
dddddd.ddd	Net Product Volume Change
dddddd.ddd	Gross Water Volume Change
dddddd.ddd	Estimated Delivery Temperature (blank for sale and theft)

TIMED LEAK TEST RESULTS	
M11/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/dddddd.ddd/resu	
M11	Line Title
dddddd.ddd	Measured Leak Rate
dddddd.ddd	Water Volume Rate of Change
dddddd.ddd	Duration of Timed Leak Test
dddddd.ddd	Temperature Change During Timed Leak Test
dddddd.ddd	Leak Threshold
resu	Test Results: **LEAK** -- "LEAK INDICATED" **ACTV** -- "ACTIVITY DURING TEST" **ICV** -- "INVALID CORRECTED VOLUME", **ITMP** -- "INSUFFICIENT THERMISTORS IMMERSED" **IVOL** -- "INSUFFICIENT VOLUME" **SHRT** -- "TEST TOO SHORT" **PASS** -- "TEST PASSED"

ALARM HEADER LINE	
MSG/typ/tnk/m/ps/sen/mmddyyyy/hhmmss/mmddyyyy/hhmmss	
MSG	Line Title
typ	Message Types: always 3 characters exactly *(see table below)*
tnk/m/ps/sen	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / sensor type
mmddyyyy/hhmmss	Starting Date & Time of Alarm: month, day, year / hours, minutes, seconds
mmddyyyy/hhmmss	Ending Date & Time of Alarm: month, day, year / hours, minutes, seconds

SHOW REPORT SHOWING DATA IN VARIABLES	
VAR/*<arv>*/*<variable>*/*<index>*/*<data>*	
VAR	Line Title
<arv>	**A**ssociation, **R**estriction, **V**ersion
<variable>	Variable Name
<index>	Index of the Variable
<data>	Data Contained in the Variable: the quantity and type of fields included depend on the particular variable type; note that fields of the same type are always the same size, but different field types may have different sizes

SHOW REPORT SHOWING DATA IN VARIABLES	
VRP/*<arv>*/*<variable>*/*<index>*/*<tnk/m/ps/sen>*/*<data>*	
VRP	Line Title
<arv>	**A**ssociation, **R**estriction, **V**ersion
<variable>	Variable Name
<index>	Index of the Variable
<tnk/m/ps/sen>	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / device type
<data>	Data contained in the variable: the quantity and type of fields included depend on the particular variable type; note that fields of the same type are always the same size, but different field types may have different sizes

WARNING HEADER LINE	
WR1/typ/tnk/m/ps/sen/mmddyyyy/hhmmss	
WR1	Line Title
typ	Message Type: always 3 characters exactly *(see table below)*
tnk/m/ps/sen	Device Identification: tank number (0 to 999) / smart module (1 to 8) / module position (1 to 16) / sensor type
mmddyyyy/hhmmss	Starting Date & Time of Warning: month, day, year / hours, minutes, seconds

SAMPLE REPORTS *(Not all apply to both Model II and III)*

SAMPLE TANK INVENTORY REPORT (INVP)	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	INV/01021993/123456[CR][LF]
Measurement Header	MO1/F/--1/1/-1/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--2/1/-2/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]

SAMPLE TANK INVENTORY REPORT FOR MANIFOLDED TANKS (INVP)	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space)
Report Header	INV/01021993/123456[CR][LF]
Measurement Header	MO1/F/--1/1/-1/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--2/1/-2/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Group. Header	MO1/F/--0/1/-1/202/FFFFFFFF/01021993/123456[CR][LF]
Measurement Line #1	MO4/123456.123/123456.123/123456.123/----------/123456.123/----------[CR][LF]
Measurement Line #2	MO6/123456.123/123456.123[CR][LF]

SAMPLE SENSOR LEVEL REPORT (INVS)	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	INV/01021993/123456[CR][LF]
Measurement Header	MO1/F/--1/1/-4/--1/FFFFFFFF/01021993/123456[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Measurement Header	MO1/F/--2/1/-5/--3/FFFFFFFF/01021993/123456[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]

Measurement Header	MO1/F/--3/1/-6/--4/FFFFFFFF/01021993/123456[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Measurement Header	MO1/F/--4/1/-7/--5/FFFFFFFF/01021993/123456[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]

SAMPLE WARNINGS IN PROGRESS REPORT (WARN)	
DESCRIPTION	DATA LINE (`/' = data separator; `.' = explicit decimal; `-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	WRN/01021993/120000[CR][LF]
Warning	WR1/HPL/--1/1/-1/--1/01021993/120000[CR][LF]
Warning	WR1/LPL/--2/2/-2/--1/01021993/120000[CR][LF]
Warning	WR1/SAL/--3/3/-3/--1/01021993/120000[CR][LF]

SAMPLE SENSOR, PROBE, INPUT, HARDWARE FAILURE REPORT (EVENT)	
DESCRIPTION	DATA LINE (`-' = blank space; `[CR][LF]' = carriage return & line feed)
Report Header	ALR/01021993/120000[CR][LF]
Alarm Header Line	MSG/DEL/--1/1/ 3/--1/01021993/064552/01021993/075336[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/064552[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Measurement Header	MO1/F/--3/1/-3/--2/FFFFFFFF/01021993/075336[CR][LF]
Measurement Line #1	MO2/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Measurement Line #2	MO5/123456.123/123456.123[CR][LF]
Delivery info.	M10/123456.123/123456.123/123456.123/123456.123/123456.123/123456.123[CR][LF]
Alarm Header Line	MSG/HSL/--1/1/-4/--1/12111992/134515/12151992/153723[CR][LF]
Measurement Header	MO1/F/--1/1/-4/--1/FFFFFFFF/01021993/123456[CR][LF]
Sensor Data	MO9/123456.123[CR][LF]
Alarm Header Line	MSG/IO1/--0/0/-0/200/12111992/134515/12151992/153723[CR][LF]
Alarm Header Line	MSG/PRB/--1/1/-1/--2/12111992/134515/12151992/153723[CR][LF]
Alarm Header Line	MSG/POW/--0/0/-0/200/12151992/150227/12151992/153614[CR][LF]

K.5 Configuration Variables

K.5.1 INTRODUCTION

Most of the variables have a one-to-one correspondence with the entries on the menus. This section explains the important differences between menu and command line operation.

K.5.2 SETTING THE VARIABLES

Change system configuration with the SET or SETV commands.

The *SETV* command combines the functions of the SET and SHOW commands. Variables are associated with one of the following

- ☐ The controller
- ☐ A Smart Module
- ☐ A module position
- ☐ A manifolded tank group.

The <*range*> specification must be sufficient to identify the item associated with the variable (refer to the section on range specification for details). *Some variables also require an <index> specification.*

For example, the command `SET TIME=12251994/233000' sets the system date to December 25, 1994 and the system time to 23:30 (11:30 PM).

If there is an error in parsing or setting a variable, or in any of the fields within the variable, none of the data for the variable is changed.

If a field is empty or *not* included, that field is *not* modified. It is *not* necessary to used "fixed format" fields for data entry.

K.5.3 SHOWING VARIABLES

The SHOW command displays SiteSentinel data. A short report consisting of a <*VPR line*> or <*VAR line*> for each instance of a variable is created.

<*VRP lines*> are used in variables requiring a <*tank/m/ps/sen*> specification, such as those associated with a smart module, module position, or a manifold tank group.

<*VAR lines*> are used for variables that do *not* require a such specification.

When the SiteSentinel outputs data, the field formats and sizes are fixed according to field type (as on other reports).

K.5.4 EXCHANGE VERSIONS

At the beginning of a session (that is, *before* performing any configuration or requesting any reports), your program should send the computer interface version to the SiteSentinel using the VERSION variable.

The version lets the program communicate with enhanced versions of the SiteSentinel.

If the version of your program is *higher* than that of the SiteSentinel, this command causes an error.

The VERSION variable is <u>not</u> the same as the EPROM version.

K.5.5 MODULE CONFIGURATIONS

Before you configure a smart module, *reset all data*. This makes sure you are starting from a known point.

The INIT command initializes setup data for a module; for example, `INIT M1' initializes configuration data for module #1.

Once a module is initialized, all previous configuration data associated with that module is lost.

The MOD variable assigns the module type; for example, the command string `SET MOD M1=BAIR' assigns module #1 as a "smart" module.

At present, the smart module is the only type available.

K.5.6 POSITION CONFIGURATION

Before configuring a module position, *reset all the data*. This ensures that you are starting from a known point.

The command INIT initializes setup data for a position; for example, INIT P1A initializes configuration data for position #1A.

Once a position is initialized, all previous configuration data associated with that position is lost.

The POS variable assigns the position type; for example, the command string `SET POS P1A=PROB' defines position #1A as being connected to a probe; the command string `SET POS P3G=VSEN' defines position 3G as being connected to a vapor sensor.

The history buffer data assumes the type of device connected to the position If this data is changed, previously stored data may be incorrect.

The command `CLRHST' clears the history buffer.

If a smart module position has *not* been previously configured or if the device type has been changed, the POSDAT variable must be initialized. If the position is assigned as a probe, the POSDEN and POSTNK variables must also be initialized.

For example, the *tank* setup command string `P1A=3/DIESEL/SOUTH TANK' selects tank #3, sets the product name to "DIESEL," and sets the description to "SOUTH TANK."

The command `SET POSDEN P1A=62.5' sets the API/density to 62.5°API (corrected to the base temperature).

The command `SET POSTNK P1A=9528/98.5/CYLR/1.2/2.7/T' (English units enabled) sets the tank volume to 9258.0 gallons, the tank diameter to 98.5 inches, the tank shape to cylindrical with round end caps, the product offset to 2.7 inches, and indicates a water float is on the probe.

For example, the *sensor* setup command string `SET POSDAT P1A=5/DIESEL/WEST WELL' selects sensor #5, sets the product name to "DIESEL," and sets the descriptions to "WEST WELL."

After device is assigned to a position and its data initialized, set the position state to CONF to indicate the position is configured.

For example, the command string `SET POS P1A=/CONF' sets the state of position 1A to "configured."

A *manifold* group can be defined for position on a module. Positions must be configured or installed *before* assigning them to a group.

When a manifold group is defined, the common group data are copies from the first position in the group to all other group positions.

Changing the product name, API/density, minimum theft, minimum sale, or minimum delivery value for a single group member changes that parameter for the entire group.

For example, the command string `SET GRP G11=ABD' defines manifold group #1 on smart module #1 to include positions A, B, and D.

The commands SET POSLIMP and SET POSMIN are used to set the thresholds for a probe.

For example, the command string `SET POSLIMP P1A=85.25/15.0/3.0' (English units enabled) sets the overflow level to 85.25 inches, the low product level to 15.0 inches, and the high water level to 3.0 inches.

The command string `P1A=5.0/10000.0/10.0' (English units enabled) sets minimum theft volume to 5.0 gallons, minimum sales volume to 10000.0 gallons, and minimum delivery volume to 10.0 gallons.

For a *sensor position*, the command to set thresholds is SET POSLIMS. For example, the command string `SET POSLIMS P3G=4.8/0.0/180' sets upper threshold to 4.8 volts, lower threhold to 0.0 volts, and upper threshold alarms delay to 180 minutes.

A position must be *installed* before the SiteSentinel will generate reports. The command to install a module is `SET MOD'.For example, the command string `SET MOD P1=/INST' installs module 1.

The command to install a position is `SET POS'; for example, the command string `SET POS 1A' installs position 1A.

The command to enter tank correction data is SET POSCORP. For example, the command string `SET POSCORP P1A=28.2/2.25' (English units enabled) sets the first correction entry (#2 on the menu) to 28.2 gallons at 2.25 inches.

The following example is a program needed to configure module #1 with position A as a probe and position B as a vapor sensor.

```
SET VERSION=1
INIT M1
SET MOD M1=BAIR
INIT P1A
SET POS P1A=PROB
SET POS P1A=0/ /
SET POSTNK
P1A=9528/98.5/CYLR/0.0/0.0/T
SET POS P1A=\CONF
SET POS P1A=\INST
INIT P1B
SET POS P1B=VSEN
SET POSDAT P1B=0/ /
SET POS P1B=/CONF
SET POS P1B=/INST
SET MOD M1=/INST
```

Set VERSION at the start of each session. Before configuring any position,. it should be initialized and the type should be set.

Once a module has been intialized and its type have been set, it is *not* necessary to uninstall it to configure additional positions.

The following example lists the commands needed to configure position C as a probe on module that has previously been configured.

```
SET VERSION=1
INIT P1C
SET POS P1C=PROB
SET POSDAT P1C=0/ /
SET POSTNK P1C=9528/98.5/CYLR/0.0/0.0/T
SET POS P1C=/CONF
SET POS P1C=/INST
```

Once a position has been configured, it is *not* necessary to change the position state to modify most of the variables associated with the position.

K.5.7 CONSOLE VARIABLES *(Not all apply to both Model II and III)*

CONSOLE VARIABLES		
VARIABLE NAME	**DATA <value> FORMAT**	
CONSOLE	*<choice>/<choice>/<choice>/<choice>*	
	0	Console protocol name: **NONE; MICRA; MICRB; GENRB; PVA;TMS ;PV2A**
	1	Baud rate: **NONE; 300; 1200; 2400; 4800; 9600; 19200**;
	2	Parity: **NONE; EVEN; ODD;**
	3	Word length: **N; 7; 8**;
SYSTEM	<choice>	
	0	'**OPEN**' open; '**CLOS**' closed -- system state.
POSINTF	<choice>/<choice>/<choice>/<choice>	
	0	Console protocol name - **NONE, SMITH, TIG, KIENZ, GILB, TMS** or **PV2**
	1	Baud rate - **NONE, 300, 1200, 2400, 4800, 9600** or **19200**
	2	Parity - **NONE**, **EVEN** or **ODD**
	3	Word length - **N, 7** or **8** bits
PASSW	<word:8>/<word:8>/<TF>/<TF>	
	0	System password
	1	Restricted password.
	2	'**T**' enable; '**F**' disable -- restricted mode.
	3	'**T**' enable; '**F**' disable -- Timed logout.
IDLE	<choice>/<choice>/<choice>	
	0	'**T**' enable; '**F**' disable -- idle graphs.
	1	'**LEV**' level; '**VOL**' volume; '**LV**' level & volume -- graph type.
	2	'**TEXT**' text; '**BAR**' bar; '**TB**' text and bar -- display mode
SYSID	<text:16>	
	0	System ID.

CONSOLE VARIABLES		
VARIABLE NAME	*DATA <value> FORMAT*	
TIME	<time>	
	0	Current system time.
DATEFMT	<choice>/<choice>/<choice>/<choice>/<choice>	
	0	'**L**' long; '**S**' short -- date format
	1	'**SLAS**' '/'; '**DASH**' '-'; '**SPAC**' space; '**NONE**' -- separator
	2	'**NONE**'; '**ZERO**'; '**SPAC**' space -- leading char
	3	'**MDCY**' 'mmm dd, yyyy'; '**DMCY**' 'dd mmm, yyyy'; '**DMY**' 'dd mmm yyyy'; '**DDMY**' -- long date order.
	4	'**MDY**'; '**DMY**'; '**YMD**' -- short date order
TIMEFMT	<choice>/<choice>/<choice>/<word:4>/<word:4>	
	0	'**12H**'; '**24H**' -- 12 or 24 hour clock.
	1	'**COL**' ':'; '**SPAC**' space; '**NONE**' -- separator
	2	'**NONE**'; '**ZERO**'; '**SPAC**' space -- leading char
	3	AM designator
	4	PM designator

CONSOLE VARIABLES			
VARIABLE NAME	MAX INDEX	DATA <*value*> FORMAT	
DCD		*<choice>/<choice>*	
		0	DCD module state: **NONE; INST; DOWN;**
		1	DCD display units: **US** (ft, gl, deg F); **SI** system international (metric).
DCDHDR	I0-I1	*<choice>*	
		0	I0 -- First line of DCD printer header. I1 -- Second line of DCD printer header.

CONSOLE VARIABLES

VARIABLE NAME	*<range>*	DATA *<value>* FORMAT
PTR		*<choice>*/*<TF>*/*<TF>*
		0 — Printer type: **NONE** no printer; **PV** internal printer; **EXT** external printer.
		1 — '**T**' -- insert leading <*FF*>; '**F**' no leading <*FF*>
		2 — '**T**' -- insert trailing <*FF*>; '**F**' no trailing <*FF*>
PTRHDR	I0-3	*<text:40>*
		0 — `I0` -- First line of printer header. `I1` -- Second line of printer header. `I2` -- Third line of printer header. `I3` -- Fourth line of printer header.
RPT		*<modpos>*/*<modpos>*/*<time>*/*<time>*/*<choice>*/*<choice>*/*<choice>*/*<int:4>*
		0 — Starting <*modpos*> of menu selected reports.
		1 — Ending <*modpos*> of menu selected reports.
		2 — Starting time of menu selected reports.
		3 — Ending time of menu selected reports
		4 — Report order: **SEQ** - list in sequential order; **TYPE** - list by event type.
		5 — Output location: **SCR** - list report on screen; **PTR** - list report on printer
		6 — Report format on printer: **LINE** - Inline format; **SCR** - same as on screen.
		7 — View rate in seconds.

CONSOLE VARIABLES

VARIABLE NAME	*<range>*	DATA *<value>* FORMAT
EVTIND	*<event>*	*<TF>*/*<TF>*/*<TF>*/*<TF>*
		0 — **T**/**F** - Print warning at start of event.
		1 — **T**/**F** - Sound buzzer at start of event.
		2 — **T**/**F** - Illuminate lamp at start of event.
		3 — **T**/**F** - Print message at end of event.
		<*event*> -- Any individual event.
EVTWRAP		
		0 — **ON/OFF** - Allow events to wrap around.
REFTEMP		*<choice>*
		0 — 15/20 - Volume Reference Temperature

CONSOLE VARIABLES			
VARIABLE NAME	*<range>*	DATA <value> FORMAT	
OUT	I0-1	<choice>/<int:8>/<choice>	
		0	Activation type: **DUR** - activate for duration; **EVER** - activate until terminated with button, menu selection, or OUT 2;**TIME** - for a programmed period of time (OUT 1)
		1	Activation duration in seconds (only when OUT 0 is **TIME**)
		2	Current state of output: **ON**; **OFF**.
		I0 -- Light. I1 -- Buzzer.	
BUTTON		<choice>	
		0	Button terminates: **NONE**; **LITE** Output 0 (light), **BUZZ** Output 1 (buzzer), **BZLT** Output 0 and 1 (both light and buzzer),

CONSOLE VARIABLES			
VARIABLE NAME	*<range>*	DATA <value> FORMAT	
VERSION		<int:4>	
		0	Computer interface version that the "computer" is expecting.
DEFPOS		<modpos>	
		0	modpos to use on position setup menus. (Usually menu selection # 1)
UNITS		<choice>	
		0	Measurement units: **US** (ft, gl, deg F); **SI** system international (metric).
PROTO		<choice>/<text:12>	
		0	Default protocol: **ASCI** Ascii; **PV**; **XMOD** Xmodem; **KERM** Kermit; **KER8** 8-bit Kermit.
		1	Default file name.
TERMOPT		<choice>/<choice>	
		0	Use input flow control: **T**/**F**
		1	Terminal type: **ASCI** ASCII; **WY50** Wyse-50; **VT10** VT-100; **VT52** VT-52. ASCII terminal are *not* useable with menus. If chosen, the "chose terminal type" screen is displayed when returning to the menus.

K.5.8 SCHEDULE VARIABLES *(Not all apply to both Model II and III)*

SCHEDULE VARIABLES			
VARIABLE NAME	<*index*>	DATA <value> FORMAT	
SCHCHST	I0-15	<time>/<choice>	
		0	Next time to clear history buffer
		1	Frequency: **CLR** clear schedule entry; **ONCE** do once; **DY** every day; **WK** every week; **MO** every month.
SCHOPEN	I0-15	<time>/<choice>/<choice>	
		0/1	time/frequency to open or close system.
		2	**OPEN**; or **CLOSE** the system according to schedule.
SCHTLT	I0-15	<time>/<choice>/<modpos>/<modpos>/<int:5>	
		0/1	time/frequency to perform timed leak tests.
		2	First <*modpos*> to test.
		3	Last <*modpos*> to test.
		4	Leak test duration in minutes.
SCHSAV	I0-15	<time>/<choice>/<modpos>/<modpos>	
		0/1	Time/frequency to save tank inventories.
		2	First <*modpos*> to save.
		3	Last <*modpos*> to save.
SCHWARN	I0-15	<time>/<choice>	
		0/1	time/frequency to print warning report.
SCHEVNT	I0-15	<time>/<choice>	
		0/1	time/frequency to print event report.
SCHINV	I0-15	<time>/<choice>	
		0/1	time/frequency to print inventory report.
SCHDEL	I0-15	<time>/<choice>	
		0/1	time/frequency to print delivery report.

K.5.9 POSITION VARIABLES *(Not all apply to both Model II and III)*

POSITION VARIABLES associated with a position			
VARIABLE NAME	*<index>*	DATA <value> FORMAT	
POS		<choice>/<choice>	
		0	Position type: **NONE**; **PROB** probe; **GSEN** generic sensor; **VSEN**; **LSEN**; **SSEN**; **RSEN**; **FSEN**; **HSEN**; **WSEN**.
		1	Position state: **NONE**; **ASG** assigned; **CONF** configured; **INST** installed; **DOWN** down.
POSDAT		<int:4>/<text:16>/<text:16>	
		0	Position number:
		1	Product name
		2	Position description.

POSITION VARIABLES - General			
VARIABLE NAME	*<index>*	DATA <value> FORMAT	
POSTLT		<int:4>/<choice>/<float:R>/<TF>	
		0	Duration of non scheduled leak test in minutes.
		1	Frequency: **ONCE** perform the test once; **REPT** repeat the test.
		2	Leak threshold.
		3	**T** - immediately start a timed leak test; **F** - immediately stop a timed leak test.
POSLEAK		<float:R>	
		0	Leak rate threshold
POSACT		<float:R>/<int:4>/<int:4>/<int:4>/<int:4>/<int:4>	
		0	Activity rate: vol/min
		1	Hist to use.
		2	Debounce on.
		3	Debounce on weight.
		4	Debounce off.
		5	Debounce off weight.

POSITION VARIABLES (Associated with a Tank)			
VARIABLE NAME	*<index>*	DATA <value> FORMAT	
POSTNK		<float:V>/<float:D>/<choice>/<float:D>/<float:D>/<TF>	
		0	Volume
		1	Diameter
		2	Shape: **CYLF** cylindrical with flat ends; **CYLR** cylindrical with flat ends; **LIN** Straight sides.
		3	Product offset.
		4	Water offset.
		5	Water float present: **T**/**F**
POSDEN		<float:F>/<float:T>/<TF>	
		0	API/Density.
		1	Temperature API/Density was measured.
		2	Correct for glass hydrometer: **T**/**F**
POSLIMP		<float:D>/<float:D>/<float:D>	
		0	Overflow.
		1	Low product
		2	High water
POSMIN		<float:V>/<float:V>/<float:V>	
		0	Minimum Theft
		1	Minimum Sale
		2	Minimum Delivery
POSCORT	I0-19	<float:D>/<float:V>	
		0	Level
		1	Volume
		I0 - first correction (menu # 2) I19 - last correction (menu # 21)	

POSITION VARIABLES (Associated with a Sensor)			
VARIABLE NAME	*<index>*	DATA <value> FORMAT	
POSLIMS		<float:VT>/<float:VT>/<int:10>/<int:10>	
		0	Upper threshold
		1	lower threshold
		2	upper threshold delay to alarm
		3	lower threshold delay to alarm
POSCORS	I0-19	<float:VT>/<float:F>	
		0	*Reserved*
		1	*Reserved*

K.5.10 GROUP VARIABLES *(Not all apply to both Model II and III)*

GROUP VARIABLES			
VARIABLE NAME	*<range>*	DATA <value> FORMAT	
GRP		<word:16>	
		0	Manifold positions. The positions in the group are specified by including the letter for that group ('**A**'-'**P**') in this field. Embedded spaces are NOT acceptable. Letters or numbers outside the range of allowable positions are ignored; that is, the following selects the group of positions '**A**', '**B**' and '**D**': "**ABD**", "**abd**", "**ABzD**", "**DBA**". The following are not acceptable: "**AB D**", "**AB.D**", "**ABD.....**". On output, the letter '**Z**' is substituted for all positions not in the group. I.E. "**ABZDZZZZZZZZZZZ**".
GRPDAT		<int:4>/<text:16>/<text:16>	
		0	*Reserved*
		1	Product name
		2	*Reserved*
GRPDEN		<float:F>/<float:T>/<TF>	
		0	API/Density.
		1	Temperature API/Density was measured.
		2	Correct for glass hydrometer: **T**/**F**.
GRPMIN		<float:V>/<float:V>/<float:V>	
		0	Minimum Theft
		1	Minimum Sale
		2	Minimum Delivery

K.5.11 MODULE VARIABLES *(Not all apply to both Model II and III)*

MODULE VARIABLES			
VARIABLE NAME	MAX INDEX	DATA <value> FORMAT	
MODUL		<choice>/<choice>	
		0	Module type: **BAIR** (smart module) is currently the only allowable value.
		1	Module state: **NONE**; **INST** installed; **DOWN**.

K.6 Data Formats

K.6.1 NUMBER FORMAT

See the table below. The SiteSentinel reports probe and sensor measurements using floating point numbers rounded to three digits, and assigned 10-char fields. For negative values, a — precedes the value. If the value is too large for the field, the value is rounded. If FAR too large, a blank field is assigned.

ACTUAL VALUE	COMPUTER FORMAT
12345.123	12345.123
-12345.123	-12345.123
1234567.891	1234567.89
12345678.901	12345678.9
123456789.012	123456789.
1234567890.123	1234567890
12345678900.123	

K.6.2 LOGICAL VALUES

Logical values are represented by a **`T'** (for true) or an **`F'** (for false).**K.6.3 TIME AND DATE**

Time and date are represented in two adjacent fields. Format **mmddyyyy/hhmmss**.

SYMBOL	DEFINITION	RANGE
mm	month	01 to 12
dd	day	01 to 31
yyyy	year	1990 to 2089
hh	hour	00 to 23
mm	minute	00 to 59
ss	second	00 to 59

K.6.4 SPECIAL TIMES

The following symbols define special times:

power up -- 00000000/000000
in progress -- 99999999/999999
not programmed -- 99999999/000000

K.6.5 STANDARD FIELD TYPES *(Not all apply to both Model II and III)*

STANDARD FIELD TYPES FOR REPORTS				
mmddyyyy	Date of an Event: month, day, year			
hhmmss	Time of an Event: hours, minutes, seconds			
u	Units of Measure: **F** = English; **T** = Metric			
tnk/m/ps/sen	Device Identification: Tank Number (0 to 999) - label only Smart Module (1 to 8) - specific hardware installation Module Position (1 to 16) - specific hardware installation Device Type (0 to ???) -			
	0	None	7	Fsensor
	1	Generic sensor	8	Hsensor
	2	Probe	9	Wsensor
	3	Vsensor		
	4	Lsensor	200	**SiteSentinel** console
	5	Ssensor	201	Smart Module
	6	Rsensor	202	Manifolded Group
ffffffff	Flags: *not implemented*			
dddddd.ddd	Measured & Calculated Data: floating point value; decimal point is *explicit*; if the value is too large for the field, digits to the *right* of the decimal point are rounded as necessary, negative values are preceded by a '-'			

STANDARD FIELD TYPES FOR REPORTS			
type	width	format	description
<*float:t*>	10	dddddd.ddd	Floating point value. There are several types of floating point values designated by the units of measure: **F** - generic; **D** distance (inches or centimeters); **V** volume (gallons or liters); **T** temperature (°F or °C); **R** rate (gallons or liters per period of time); or, **VT** voltage.

STANDARD FIELD TYPES FOR REPORTS AND VARIABLES			
type	width	format	description
<choice>	4	cccc	There is a list of choices for each field. The allowable choices is dependent on the variable.
<TF>	4	cccc	The *<TF>* field type is the same as the *<choice>* field type with the exception that the only two choices are: '**T**' (true) or '**F**' (false). There may be more choices in future releases.
<time>	15 (8/6)	mmddyyyy/hhmmss	The time and date are treated as one field, even though it contains a '/' that otherwise would be used as a field delimiter. If either the time or date are included, the other must also be included. If either the time or date portion is blank, its value is defaulted to the current time or date.
<modpos>	2	mp	The modpos is used to specify module and position. The '**m**' is used to specify the module number and could range from '**1**'-'**8**'. The '**p**' specifies the position and ranges from '**A**'-'**P**'.
<int:n>	n		Unsigned integer value. The maximum allowable number of digits and the field width is 'n'.
<word:n>	n		A word composed of up to 'n' letters ('**A**'-'**Z**') and/or numbers ('**0**'-'**9**'). The letters are be converted to upper case. Allowable combinations are: '**ABC123**', '**12345678**', '**ABCDEFGH**'.
<text:n>	n		A text string not containing control characters or field delimiters ('**/**'). The maximum length of the string (including leading, trailing, and embedded spaces) is 'n' characters.
<arv>	4	arvs	The field is used to show some information about a variable. The first character (**a**) shows variable association: **C**onsole; **M**odule; **P**osition; or **G**roup. The second character (**r**) indicates the variables restriction: **C**onsole; **M**odule; **P**osition; **G**roup; **T**ank; or **S**ensor. The third character (**v**) indicates the version of the variable.
<variable>	8	cccccccc	This represents the variable's name.
<index>	4	dddd	This field is used for indexed variables. If it is *not* needed, it contains a value of zero.
<tnk/m/ps/sen>	12	tnk/m/ps/sen	
<value>			This represents a group of values representing the data contained in a variable.

The width is the field width when the field is output by the **SiteSentinel**. The format is used for output by the **SiteSentinel**.

MESSAGE <*event*> TYPES			
SYMBOL	DEFINITION	SYMBOL	DEFINITION
HPL	High Product Level	HSL	High Sensor Level
LPL	Low Product Level	LSL	Low Sensor Level
HWL	High Water Level	IO1	External Input #1
TMP	Temperature	IO2	External Input #2
TFT	Theft	PRB	Probe Failure
DEL	Delivery	MOD	Smart Mod. Failure
SAL	Sale	PRN	Printer Failure
TLT	Timed Leak Test	POW	Power Failure
		INV	Saved Inventory

I/O MODULE VARIABLES		
VARIABLE NAME	MAX INDEX	DATA <Value> FORMAT
IOMOD		<Choice> 0 I/O Module State;NONE;INST Installed; DOWN
IOPOS		<Choice> 0 I/O Module State;NONE;INST Installed; DOWN
IOPCONF		<int:4>/<text;16>/<text;16> 0 I/O Position number 1 Product name 2 I/O Position description
IOPSTAT		SHOW <IO position>/<event name>/<position> 0 I/O Module Ouput setup DEEN - De-energize ENER - Energize (it keeps going...and going....)
IOEVOUT*		<choice>/<choice>/<position> 0 Event name: HPL, LPL, TMP, TFT, DEL, SAL, TLT, HSL, LSL, IOM, IO1, IO2, PRB, MOD, PRN 1 I/O Module output setup DEEN - De-energize ENER - Energize 2 Position number associated with event

* The syntax
name>/<position>FOR EXAMPLE: SHOW IOEVOUT P1E/HWL/P1C. For IOEVOUT The SETV commands work the same as the SET command.

When a command is received by the SiteSentinel, one of the following occurs:

Kermit Remote Host command line protocol:

☐ A <*report*> is sent to the host, showing the <*command line*> was successfully received and interpreted OR

☐ An <*error*> packet is sent by the SiteSentinel. This indicates that the packet was received correctly, but the <*command line*> could not be interpreted. Examine the error to determine the cause of failure.

If a <command file> is used

☐ A successful file transfer that indicates all <*command line*>in the file were successfully received and interpreted. This may immediately be followed by the SiteSentinel sending a <*report*> to the host if one was requested OR

☐ An <*error*> packet goes to SiteSentinel telling you packets were received, but one <*command line*> could not be interpreted. Examine error to determine the cause of failure.

If ASCII or other protocols are used:

☐ A <*report*> is sent to the host, followed by a prompt, showing that the <*command line*> was successfully received and interpreted OR

☐ An <*error*> is sent to the host, followed by a prompt. This indicates that the packet was received, but the <*command line*> could not be interpreted. Examine error to determine the cause of failure.

K.6.6 ERROR MESSAGES

Error messages are sent in one of several forms. If Kermit protocol is used, a Kermit error packet is sent containing the error message. Once the protocol has been exited, the message is sent again in a plain text form (either menu or command line). If ASCII or another protocol is used, the message is sent in a plain text.

The format of the message depends on the <*command file*> in use:

☐ Error occurred in a command file:

<*error #*>'**,**'<*line #*>' '<*system name*>' '<*ERROR*>' **--** '<*error text*> OR

☐ Error did *not* occur in a command file:

<*error #*>' '<*system name*>' '<*ERROR*>' **--** '<*error text*>

The <*system name*>, <*ERROR*>, and <*error text*> fields depend on the SiteSentinel version, and language, being used. Programs attempting to interpret or recover from an error should use <*error #*> and <*line #*> fields.

The <*system name*> is the product name ("**SiteSentinel II**").

The <*ERROR*> is the word "ERROR" in the language of choice.<*error text*> describes the error in plain text.

1) If a <*range format*> is specified for a command that does not require a <*range format*>, it is ignored.

2) If a <*range format*> is *not* specified, or specifies more than one tank or position for a command that requires a single tank or position, the variable DEFPOS is used. This is modpos that appears on the menus.

3) If there is any printable text following a <*command line*>, an error is generated.

Commands are split into three categories:

1. **Reports**. Inventory, show warnings, show events, tank chart, etc.

2. **Commands dealing with variables**. Set, initialize, examine, download information on, etc.

3. **Miscellaneous**. Hello (login), bye, do ram test, clear history buffer, pass-through, etc.

A <*variable*> is any user-adjustable item. It may be associated with a module, group, position, schedule entry, or other entity within the SiteSentinel (for example, tank diameter or group position string), or with the SiteSentinel itself (time and date, for example).

When set, the SiteSentinel checks the value entered and (if valid) sets the internal value.

K.6.7 OPERATING MODES

☐ **MENU Mode**. This is “normal” operation mode. This is the mode most non-programmers will use.

☐ **ASCII Prompt Mode**. To enter, type "LI" at a suitable prompt. The SiteSentinel displays a prompt. After you enter a command line, the command is performed, and then a new prompt appears.

To exit, type "EXIT" at the prompt, or use (CTRL) (C).

☐ **SERVER or REMOTE HOST Mode**. To enter, send a Kermit "I" packet (or other packet requiring server mode) at a suitable prompt.

The SiteSentinel enters Kermit server mode, then interprets the packet and contents. The command is performed. The SiteSentinel will stay in server mode until you exit.

To exit, have the host send a Kermit "FINISH", "BYE", or "EXIT" packet; or, the user can type one or more carriage returns without a Kermit packet; or, the user could type ctrl-C.

☐ **COMMAND FILE Mode**. Similar to **SERVER** mode, except that to enter, a Kermit "*S*" packet is sent at a suitable prompt.The SiteSentinel enters Kermit server mode, then interprets the packet and contents. The command is performed. The SiteSentinel will stay in server mode until you exit.

To exit, have the host send a Kermit "FINISH", "BYE", or "EXIT" packet; or, the user can type one or
more carriage returns without a Kermit packet; or, the user could type ctrl-C.

A “suitable” prompt is either the "Terminal type" prompt or any menu selection prompt (using the function MENU_SELECTION). When exiting any of the non-menu modes, the user is returned to the "suitable prompt" that had been left. If it is a menu, the menu is redisplayed.

Typing (CTRL) (C) at *any* time returns you to a menu prompt, or to the terminal type request.

A standard timeout releases the line in any mode as well.

The host system can do one or more of the following:

- ☐ **Replace the Entire User Interface**. This is done by entering SERVER or Command Line mode from the Terminal type prompt.

- ☐ **Replace the User Interface with the Exception of Any Menu**. Same as above. The "DOMENU" along with a terminal emulator executes the **SiteSentinel** menu.

- ☐ **Add Hot Key Features to Any Menu.** The host system jumps out of the **SiteSentinel** menu when a function key is pressed and jumps back into the menu when it is done.

A dynamic update is done by the host system by repeated interrogation of the **SiteSentinel**.

A graphics screen is entirely implemented on the host system.

Syntax Notes

RANGE SPECIFICATION

Many commands either require a range specification or use the range to limit the amount of information included in a report.

<range>*:*
' '<range specifier>*[*<range>*]*

<range specifier>*:*
<modpos range>
<index range>
<event group>

The <modpos range>*,* <index range>*, and* <event group> *specifiers can be combined in any order.*

<modpos range>*:*
'P'<mod><pos>*['*-'<mod><pos>*]*
'M'<mod>*['*-'<mod>*]*
'G'<mod><grp>*['*-'<mod><grp>*]*

The <modpos range> *specifiers (*'P', 'M', and 'G') are mutually exclusive and cannot be combined with one another. If multiple <modpos range> *specifiers are used in a single* <range>*, only the last* <modpos range> *specifier is used.*

<mod>*:*
'1'-'8'
<pos>*:*
'A'-'P'
<grp>*:*
'1'-'8'

<index range>*:*
'I'<index>*['*-'<index>*]*
<event group>*:*
<event>
'SPIF' (all spi and hfe events)
'SPI' (all spi events)
'HFE' (all hfe events)
'SIN' (saved invetory)
<event>*:*
<spi events>
<hfe events>

<spi events>*:*
'HPL' | 'LPL' | 'HWL' | 'TMP' | 'TFT' |
'DEL' | 'SAL' | 'TLT' | 'HSL' | 'LSL' |
'I01' | 'I02' | 'IOM' |

<hfe events>*:*
'PRB' | 'MOD' | 'PRN' | 'POW' |

Index

Notes:

Appendix - EPA Certifications

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 2-inch Floats, 30-Minute Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 2.2 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 97.8 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.75 inch.

The minimum change in water level that can be detected by the ATGS is 0.080 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 2-inch Floats, 30-Minute Test

COPY

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 30 minutes.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox
(signature)

Grain Valley, Missouri 64029
(city, state, zip)

November 6, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 2-inch Floats, 1-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 0.6 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 99.4 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.75 inch.

The minimum change in water level that can be detected by the ATGS is 0.080 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 2-inch Floats, 1-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 50 percent full.
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 1 hour.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

H. Kendall Wilcox
(signature)

November 6, 2000
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, Missouri 64029
(city, state. zip)

(816) 443-2494
(phone number)

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 2-inch Floats, 2-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 0.3 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 99.7 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.75 inch.

The minimum change in water level that can be detected by the ATGS is 0.080 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

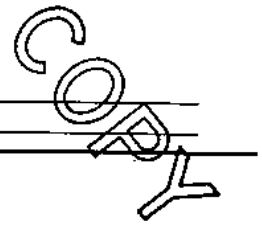
The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel.

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 2-inch Floats, 2-Hour Test



Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 2 hours.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox
(signature)

Grain Valley, Missouri 64029
(city, state, zip)

November 6, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 2-inch Floats, 3-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 0.1 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 99.9 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.75 inch.

The minimum change in water level that can be detected by the ATGS is 0.080 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

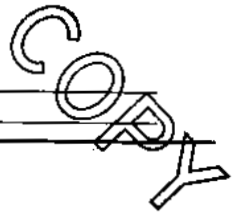
Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .



Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 2-inch Floats, 3-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 3 hours.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox
(signature)

Grain Valley, Missouri 64029
(city, state. zip)

November 6, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 4-inch Floats, 30-Minute Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 2.2 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 97.8 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.85 inch.

The minimum change in water level that can be detected by the ATGS is 0.0432 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 30-Minute Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 30 minutes.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox
(signature)

Grain Valley, Missouri 64029
(city, state. zip)

November 3, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 4-inch Floats, 1-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 1.1 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 98.9 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.85 inch.

The minimum change in water level that can be detected by the ATGS is 0.0432 inches (provided that the water level is above the threshold).

Therefore, this ATGS (X) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (X) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

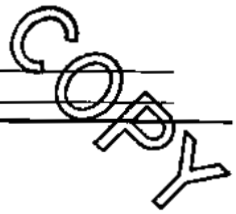
The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 1-Hour Test



Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 1 hour.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

H. Kendall Wilcox
(signature)

November 3, 2000
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, Missouri 64029
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Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 4-inch Floats, 2-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 0.7 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 99.3 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.85 inch.

The minimum change in water level that can be detected by the ATGS is 0.0432 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel .

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 2-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 2 hours.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox
(signature)

Grain Valley, Missouri 64029
(city, state, zip)

November 3, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

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Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data. Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version number Probe Model 924 with 4-inch Floats, 3-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.100 gallon per hour, has a probability of false alarms [P_{FA}] of 0.5 %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is 99.5 %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.85 inch.

The minimum change in water level that can be detected by the ATGS is 0.0432 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does ( ) does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -6.3 deg F to +7.5 deg F, with a standard deviation of ± 5.8 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was Diesel.

Name of ATGS Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 3-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The depth of the product in the tank is at least 14 percent full.[1]
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than ± 8.7 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least 3 hours.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

(X) standard EPA test procedure for ATGS
( ) alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

H. Kendall Wilcox

(signature)

Grain Valley, Missouri 64029
(city, state, zip)

November 3, 2000
(date)

(816) 443-2494
(phone number)

[1] The lowest temperature sensor on the Petro Vend probe is located 10% from the bottom of the probe. The procedures for determining the minimum product level limitation are specified in a letter from the ATGS and VTTT Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results of U.S. EPA Standard Evaluation
Volumetric Tank Tightness Testing Method

This form tells whether the tank tightness testing method described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Volumetric Tank Tightness Testing Methods." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

Method Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version Probe Model 924 with 4-inch Floats, 2-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This Method which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.053 gallon per hour, has a probability of false alarms [P_{FA}] of 1.9 %.

The corresponding probability of detection [P_D] of a 0.10 gallon per hour leak is 96.9 %.

Therefore, this Method (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.10 gallon per hour at P_D of 95% and P_{FA} of 5%).

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The tests were conducted with the tank 90 to 95 percent full.

The temperature difference between product added to fill the tank and product already in the tank ranged from -5.8 deg F to +7.9 deg F, with a standard deviation of ± 5.2 deg F.

The product used in the evaluation was diesel.

Volumetric TTT Method Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 2-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for using the method are followed.
- The tank is no larger than 20,000 gallons.
- The tank contains a product identified on the method description form.
- The tank is at least 90 percent full.
- The waiting time after adding any substantial amount of product to the tank is at least 12 hours.
- The temperature of the added product does not differ more than ± 7.9 degrees Fahrenheit from that already in the tank.
- The waiting time between the end of topping off, if any, and the start of the test data collection is at least N/A hours.
- The total data collection time for the test is at least 2 hours.
- Large vapor pockets are identified and removed (for methods that overfill the tank).
- This method (**X**) can ( ) cannot be used if the ground-water level is above the bottom of the tank.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the methods ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the volumetric tank tightness testing method was operated according to the vendor's instructions. I also certify that the evaluation was performed according to the standard EPA test procedure for volumetric tank tightness testing methods and that the results presented above are those obtained during the evaluation.

H. Kendall Wilcox, President
(printed name)

H. Kendall Wilcox
(signature)

October 12, 2000
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, Missouri 64029
(city, state. zip)

(816) 443-2494
(phone number)

Results of U.S. EPA Standard Evaluation
Volumetric Tank Tightness Testing Method

This form tells whether the tank tightness testing method described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Volumetric Tank Tightness Testing Methods." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

Method Description

Name Site Sentinel 1, Site Sentinel II, Site Sentinel III

Version Probe Model 924 with 4-inch Floats, 3-Hour Test

Vendor Petro Vend, Inc.

6900 Santa Fe Drive
(street address)

Hodgkins,	IL	60525	(708) 485-4200
(city)	(state)	(zip)	(phone)

Evaluation Results

This Method which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.05 gallon per hour, has a probability of false alarms [P_{FA}] of 1.0 %.

The corresponding probability of detection [P_D] of a 0.10 gallon per hour leak is 98.2 %.

Therefore, this Method (**X**) does ( ) does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.10 gallon per hour at P_D of 95% and P_{FA} of 5%).

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,700 gallon ( ) steel (X) fiberglass tank that was 120 inches in diameter and 323 inches in length.

The tests were conducted with the tank 90 to 95 percent full.

The temperature difference between product added to fill the tank and product already in the tank ranged from -5.8 deg F to +7.9 deg F, with a standard deviation of ± 5.2 deg F.

The product used in the evaluation was diesel .

Volumetric TTT Method Site Sentinel 1, Site Sentinel II, Site Sentinel III
Version Probe Model 924 with 4-inch Floats, 3-Hour Test

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for using the method are followed.
- The tank is no larger than 20,000 gallons.
- The tank contains a product identified on the method description form.
- The tank is at least 90 percent full.
- The waiting time after adding any substantial amount of product to the tank is at least 12 hours.
- The temperature of the added product does not differ more than ± 7.9 degrees Fahrenheit from that already in the tank.
- The waiting time between the end of topping off, if any, and the start of the test data collection is at least N/A hours.
- The total data collection time for the test is at least 3 hours.
- Large vapor pockets are identified and removed (for methods that overfill the tank).
- This method (X) can ( ) cannot be used if the ground-water level is above the bottom of the tank.
- Other limitations specified by the vendor of determined during testing:

  None

> **Safety disclaimer: This test procedure only addresses the issue of the methods ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the volumetric tank tightness testing method was operated according to the vendor's instructions. I also certify that the evaluation was performed according to the standard EPA test procedure for volumetric tank tightness testing methods and that the results presented above are those obtained during the evaluation.

H. Kendall Wilcox, President
(printed name)

H. Kendall Wilcox
(signature)

October 12, 2000
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, Missouri 64029
(city, state. zip)

(816) 443-2494
(phone number)

European Compliance

DEVICE	AGENCY	STANDARDS	MARKING	CERTIFICATE NUMBER
Model 924 Probe	BASEEFA	EN 50014 (1997) + Amds 1 & 2 EN 50020 (2002) EN 50284: 1999	 II (1) G EEx ia IIA T4	BASEEFA03ATEX0349X (See below for Conditions of Safe Use)
Model 4323 Intrinsically Safe Module	BASEEFA	EN 50014 (1997) + Amds 1 & 2 EN 50020 (2002)	 II (1) G [EEx ia] IIA	BASEEFA03ATEX0348X (See below for Conditions of Safe Use)

BASEEFA03ATEX0349X Conditions of Safe Use:

1.) The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to eliminate the risk of impact or friction with other metal surfaces.
2.) Items of the apparatus are made of plastic. The apparatus must not be installed in a position where it may be subjected to an excessive air/fluid flow or be subjected to rubbing that may cause an electrostatic build-up.

BASEEFA03ATEX0348X Conditions of Safe Use:

1.) When installed, the terminals must be afforded a degree of protection of at least IP20.

OPW
FUEL MANAGEMENT SYSTEMS
A DOVER COMPANY

ONE COMPANY.
ONE WORLD.
ONE SOURCE.

DECLARATION OF CONFORMITY

In accordance with ATEX Directive 94/9/EC, Annexes IV and VII Equipment intended for use in potentially explosive atmospheres.

Annex attached showing additional standards that have been applied.

Standard (s) to which conformity is declared:	EN 50014: 1997 +Amds 1 & 2 EN 50020: 2002 EN 50284: 1999
Manufacturers Name:	OPW Fuel Management Systems, Inc.
Manufacturers Address:	6900 Santa Fe Drive Hodgkins, IL. 60525 USA
Type of Equipment:	Integrated Tank Monitoring System
Model:	SiteSentinel II (Controller/924 Probe)
Notified Body:	Baseefa (2001) Ltd. Notified Body Number 1180 Buxton, Derbyshire UK
EC Type Certificates:	Baseefa03ATEX0348X Dated: 30 June 2003 Baseefa03ATEX0349X Dated: 30 June 2003

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive (s) and Standard (s).

Place: Hodgkins, IL.

Date: 22 December 2004

John G. Petrovich
Compliance Coordinator

OPW
FUEL MANAGEMENT SYSTEMS
A DOVER COMPANY

ONE COMPANY.
ONE WORLD.
ONE SOURCE.

Annex to the

DECLARATION OF CONFORMITY

The following harmonized European standards have been applied.

Standards:	Note:
EN 50081-1:1992	Electromagnetic compatibility - Generic emission standard - part 1: Residential, commercial, light industry" (Harmonized 1992)
EN 55022:1994	Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment"
CISPR 16	Specifications for Radio Interference Measuring apparatus and Measurement Method (1993)
EN 50081-1	Refers to EN 55022 as a Basic Standard. The tests were preformed in accordance with the basic standard. The EN 55022 document refers to the IEC CISPR 16 document for test site and equipment standards
EN 50082-1:1992	Electromagnetic compatibility - Generic immunity standard - part 1: Residential, commercial light industry" (Harmonized 1992)
IEC 801-2 1984 and 1991	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 2: Electrostatic discharge requirements
IEC 801-3	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 3: Radiated electromagnetic field requirements
IEC 801-4	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 4: Electrical fast transient/burst requirements
EN 50082-1	Refers to the IEC 801-2, 801-3 and 801-4 documents as "Basic Standards". The test procedures were performed in accordance with the basic standards

6900 SANTA FE DRIVE • HODGKINS, IL USA 60525 • www.opwfms.com • 708-485-4200 • (fax) 708-485-7137

OPW
FUEL MANAGEMENT SYSTEMS
A DOVER COMPANY

ONE COMPANY.
ONE WORLD.
ONE SOURCE.

DECLARATION OF CONFORMITY

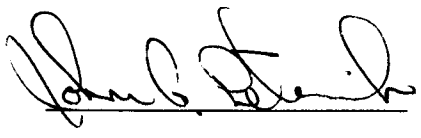
In accordance with ATEX Directive 94/9/EC, Annexes IV and VII Equipment intended for use in potentially explosive atmospheres.

Annex attached showing additional standards that have been applied.

Standard (s) to which conformity is declared:	EN 50014: 1997 +Amds 1 & 2 EN 50020: 2002 EN 50284: 1999
Manufacturers Name:	OPW Fuel Management Systems, Inc.
Manufacturers Address:	6900 Santa Fe Drive Hodgkins, IL. 60525 USA
Type of Equipment:	Integrated Tank Monitoring System
Model:	SiteSentinel III (Controller/924 Probe)
Notified Body:	Baseefa (2001) Ltd. Notified Body Number 1180 Buxton, Derbyshire UK
EC Type Certificates:	Baseefa03ATEX0348X Dated: 30 June 2003 Baseefa03ATEX0349X Dated: 30 June 2003

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive (s) and Standard (s).

Place: Hodgkins, IL.



Date: 22 December 2004

John G. Petrovich
Compliance Coordinator

OPW
FUEL MANAGEMENT SYSTEMS
A DOVER COMPANY

ONE COMPANY.
ONE WORLD.
ONE SOURCE.

Annex to the
DECLARATION OF CONFORMITY

The following harmonized European standards have been applied.

Standards:	Note:
EN 50081-1:1992	Electromagnetic compatibility - Generic emission standard - part 1: Residential, commercial, light industry" (Harmonized 1992)
EN 55022:1994	Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment"
CISPR 16	Specifications for Radio Interference Measuring apparatus and Measurement Method (1993)
EN 50081-1	Refers to EN 55022 as a Basic Standard. The tests were preformed in accordance with the basic standard. The EN 55022 document refers to the IEC CISPR 16 document for test site and equipment standards
EN 50082-1:1992	Electromagnetic compatibility - Generic immunity standard - part 1: Residential, commercial light industry" (Harmonized 1992)
IEC 801-2 1984 and 1991	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 2: Electrostatic discharge requirements
IEC 801-3	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 3: Radiated electromagnetic field requirements
IEC 801-4	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 4: Electrical fast transient/burst requirements
EN 50082-1	Refers to the IEC 801-2, 801-3 and 801-4 documents as "Basic Standards". The test procedures were performed in accordance with the basic standards

6900 SANTA FE DRIVE • HODGKINS, IL USA 60525 • www.opwfms.com • 708-485-4200 • (fax) 708-485-7137

Notes:

OPW Fuel Management Systems
6900 Santa Fe Drive
Hodgkins, IL 60525
708-485-4200