



# EECO System®

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**1500 Series Console**  
*Operator's Manual*

# **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.

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# Contents

|                                                |              |
|------------------------------------------------|--------------|
| <b>General Information .....</b>               | <b>1</b>     |
| About the 1500 System .....                    | 1            |
| About the Tank Level Monitor .....             | 1            |
| About the Leak Sensor .....                    | 2            |
| <br><b>Features &amp; Specifications .....</b> | <br><b>3</b> |
| Console Components .....                       | 3            |
| Keyboard .....                                 | 5            |
| Cursor Control Keys .....                      | 5            |
| Menu Keys .....                                | 6            |
| Special Control Keys .....                     | 6            |
| <br><b>DISPLAY Functions .....</b>             | <br><b>7</b> |
| Display Status .....                           | 7            |
| Display History .....                          | 8            |
| Display Leak Test .....                        | 8            |
| Display Setup .....                            | 8            |
| <br><b>PRINT Functions .....</b>               | <br><b>9</b> |
| Print STATUS .....                             | 9            |

|                                               |    |
|-----------------------------------------------|----|
| Print HISTORY .....                           | 10 |
| Print LEAK TEST .....                         | 10 |
| Print SETUP .....                             | 10 |
| Print Automatic Reports .....                 | 11 |
| <i>Automatic Delivery Report</i> .....        | 11 |
| <i>Automatic Generator Usage Report</i> ..... | 12 |
| <i>Leak Test Report</i> .....                 | 12 |
| Print-On-Demand Reports .....                 | 13 |
| <i>Print Inventory Status</i> .....           | 13 |
| <i>Print Shift Report</i> .....               | 14 |
| <i>Print Delivery Status Report</i> .....     | 15 |
| <i>Print TLM Alarm Status</i> .....           | 15 |
| <i>Print Leak Sensor Status</i> .....         | 16 |
| <i>Print Generator Usage History</i> .....    | 17 |
| <i>Print Leak Test</i> .....                  | 18 |
| <i>Manifold Tank Inventory Reports</i> .....  | 19 |
| <i>Print Event History</i> .....              | 20 |

## **CHANGE Functions ..... 21**

|                                   |    |
|-----------------------------------|----|
| Change Date And Time .....        | 21 |
| Changing the Manager's Code ..... | 21 |
| Change Header Line .....          | 22 |
| Change Shift Reports .....        | 22 |

## **Tank Leak Test ..... 23**

|                                |    |
|--------------------------------|----|
| Change Leak Test (Menu) .....  | 23 |
| Run Manual Leak Test .....     | 23 |
| Set Daily Run Time .....       | 23 |
| Set Weekly Run Time .....      | 24 |
| Set Monthly Run Time .....     | 24 |
| Tank Leak Test Reports .....   | 24 |
| <i>About the Results</i> ..... | 24 |

|                                                                                                     |    |
|-----------------------------------------------------------------------------------------------------|----|
| <i>Leak Test FAILED Report</i> .....                                                                | 26 |
| <i>Leak Test PASSED Report</i> .....                                                                | 26 |
| <br>Manual Leak Test Reports .....                                                                  | 27 |
| <i>Waiting To Start</i> .....                                                                       | 27 |
| <i>Incorrect Volume</i> .....                                                                       | 27 |
| <i>System Troubles</i> .....                                                                        | 27 |
| <i>User-Aborted Test</i> .....                                                                      | 27 |
| <i>Aborted Test Due To</i> .....                                                                    | 28 |
| <i>Projected End Time</i> .....                                                                     | 28 |
| <i>Leak Test Inconclusive Codes (Software Versions 023K, 076 (all), 083F, 087B or earlier</i> ..... | 28 |

## **System Test ..... 31**

|                      |    |
|----------------------|----|
| Test Components..... | 31 |
|----------------------|----|

## **Setup Procedure ..... 33**

|                                           |    |
|-------------------------------------------|----|
| Parameter Locator Flowchart.....          | 34 |
| <br>Tank Level Monitor Setup .....        | 38 |
| <i>Probe Setup (TLM 5)</i> .....          | 38 |
| <i>Product Setup (TLM 6)</i> .....        | 41 |
| <i>Tank Setup (TLM 1)</i> .....           | 42 |
| <i>Manifold Tank Groups (TLM 2)</i> ..... | 44 |
| <i>Leak Test Setup (TLM 3)</i> .....      | 44 |
| <i>Alarm Setup (TLM 4)</i> .....          | 45 |
| <i>Tank Table Setup (TLM 7)</i> .....     | 47 |
| <i>Probe Specifications (TLM 8)</i> ..... | 47 |
| <i>Float Setup (TLM 9)</i> .....          | 47 |
| <br>Leak Sensor Setup (LS 1).....         | 48 |
| <br>General Site Setup (GS 1) .....       | 48 |
| <br>Auto Dial Alarm Setup (AA 1).....     | 50 |
| <br>Shift Reports Setup (SR 1).....       | 51 |
| <br>Multi Relay Setup (MR 1).....         | 51 |
| <br>Print Setup Parameters.....           | 52 |

## **Alarms and Trouble Codes ..... 57**

Definitions ..... 57

Alarm And Trouble Summary ..... 57

*System Trouble Codes* ..... 57

*Leak Sensor Trouble Codes* ..... 58

*TLM Trouble Codes* ..... 58

Detailed Diagnostic Trouble Codes ..... 59

*System Trouble Codes* ..... 59

*Tank Level Monitor Trouble Codes* ..... 61

## **Maintenance ..... 65**

Printer ..... 65

*EARLIER Printers - Changing Paper* ..... 65

*NEWER Printers - Changing Paper* ..... 66

Probe Maintenance ..... 68

Circuit Boards ..... 69

*Component layouts for the 1500's two PC boards are shown here.* ..... 69

*Display/Keyboard PC Board* ..... 69

*Main PC Board* ..... 70

Sensors ..... 71

# Figures

|                                                                        |    |
|------------------------------------------------------------------------|----|
| Figure 1: 1500 Console .....                                           | 3  |
| Figure 2: Keyboard .....                                               | 5  |
| Figure 3: Display Status Menu Options .....                            | 7  |
| Figure 4: Display History Menu .....                                   | 8  |
| Figure 5: Display Leak Test Menu .....                                 | 8  |
| Figure 6: Display Setup Menu .....                                     | 8  |
| Figure 7: Print Status Menu .....                                      | 9  |
| Figure 8: Print History options .....                                  | 10 |
| Figure 9: Print Leak Test options .....                                | 10 |
| Figure 10: Print Setup options .....                                   | 10 |
| Figure 11: Delivery Report (Automatic) .....                           | 11 |
| Figure 12: Generator Usage Report (Automatic) .....                    | 12 |
| Figure 13: Leak Test Report (Automatic) .....                          | 12 |
| Figure 14: Inventory Status Report .....                               | 13 |
| Figure 15: Shift Report .....                                          | 14 |
| Figure 16: Delivery Status Report .....                                | 15 |
| Figure 17: TLM Alarm Status Report .....                               | 15 |
| Figure 18: Leak Sensor Status Report .....                             | 16 |
| Figure 19: Generator Usage History Report .....                        | 17 |
| Figure 20: Leak Test Report .....                                      | 18 |
| Figure 21: Manifold Tank Inventory Status .....                        | 19 |
| Figure 22: Manifold Tank Delivery Report .....                         | 19 |
| Figure 23: Event History Report .....                                  | 20 |
| Figure 24: FAILED Leak Test Report .....                               | 26 |
| Figure 25: PASSED Leak Test Report .....                               | 26 |
| Figure 26: 1500 Printer Paper Supply Overview - Earlier Printers ..... | 65 |
| Figure 27: Printer Paper Path - Earlier Printers .....                 | 66 |
| Figure 28: Receipt Printer - New Style .....                           | 67 |
| Figure 29: Display-Keybaord PC Board .....                             | 69 |
| Figure 30: Main PC Board .....                                         | 70 |
| Figure 31: EECO Sensors .....                                          | 71 |



# General Information

The EECO System™ 1500 monitors up to four tanks equipped with magnetostrictive probes and up to eight EECO Choice sensors installed in dispenser pans, STP sumps, interstitial spaces of double wall tanks (both wet or dry) and monitoring wells.

The system also has a standby generator tank feature and two communication ports (local & modem).

## About the 1500 System

System operation is menu-driven for easy operation. Only installed and active system features appear on menus -- for example, if the Multi Relay option is not installed, only relay #1 information appears in a menu or report.

Choose a mode simply by pressing the [DISPLAY], [PRINT] or [CHANGE] key. Then, available options for your selection appear by pressing the [DISPLAY] [PRINT] or [CHANGE] key.

Use the [NEXT ] or [PREV ] keys to 'move to' (or display) the available selections and the [ENTER] key to make the selection. The [CANCEL] key returns you to the previous operation.

Like programming a mobile telephone, you select numeric and alpha characters by pressing a key on the keypad once, twice, 3 or 4 times while watching the display for the number or for one of three alpha characters, to appear.

Menus appear throughout this manual to give you an overview of the items that can be accessed for displaying, printing, or changing information or parameters.

## About the Tank Level Monitor

The EECO 1500 Tank Level Monitor (TLM) is designed to monitor underground storage tanks (USTs).

The 1500 gives you accurate and automatic product inventory control by continuously monitoring product and water levels, and product temperature. The TLM has a probe power supply located in the main console, and up to four electronic probes (sensing devices) in the monitored tanks.

The TLM is programmable through the main console and will indicate alarm/trouble conditions such as leaks, high/low fuel levels, high water level, theft, temperature and probe failure. When alarms or troubles occur, the main console sounds an alarm, displays the alarm or trouble code, and turns ON a red or yellow indicator LED.

## About the Leak Sensor

The EECO 1500 Leak Sensor (LS) feature detects fuel and water in secondary containment vessels at fuel storage sites. The LS provides accurate and automatic fuel sensing while simultaneously monitoring each sensor channel for abnormal conditions.

The LS monitors up to eight EECO Choice sensors. These sensors detect water and/or product in sumps, dispenser pans, interstitial spaces, and monitoring wells.

You program the LS through the main console -- it can indicate alarm and trouble conditions such as leaks in the tank interstitial walls or leaks in double wall piping runs.

When alarms/troubles occur, the main console sounds an alarm, displays the alarm or trouble name and lights a red or yellow LED. The event is also written to the history log.

# Features & Specifications



Figure 1: 1500 Console

## Console Components

The 1500 console (*Figure 1*) contains the following features:

- **Printer** - 24 column thermal printer.
- **Keypad** - The keypad incorporates 16 keys to control the functions of the system.
- **LED Indicators** - Three LEDs located on the front panel of the console indicate System Status.
  - Green LED - Normal Operation
  - Yellow LED - Hardware Trouble
  - Red LED - Alarm Condition

### Note

*It is possible for a red and a yellow LED to be on at the same time if trouble is detected in one section of the system and an alarm is active for another section not affected by the trouble.*

- **Auto-Dial Alarm Reporting** - You can set the 1500 to call a remote monitoring computer when alarms or troubles are active on the system. This report is sent immediately when the alarm or trouble occurs if dedicated phone line is used. If a shared phone line is used, report transmission occurs only when the line is free.
- **History** - Used for troubleshooting, the history event buffer stores up to 250 events. Event #251 overwrites Event #1 (the oldest).

- **Shift Reports** - The EECO 1500 can send up to three daily reports to the system printer, modem port, or local port.

---

## Note

*For the modem port, a report is sent at the programmed time, regardless of the auto-answer setting.*

- **Custom Labels** - At start-up, the contractor enters an up-to-10 character label to identify each input, for identifying the sensor or probe location. Examples: TANK #1, UNLEAD REG, WELL #1, PUMP #3.
- **Standard Relay** - One standard relay for alarm activation is included with the EECO 1500.
- **Relay Board** - You can install and program one OPTIONAL multi-relay board to respond to any alarm or combination of alarms. Each contact is rated for a maximum of 10 Amps, 277 VAC.
- **RS-232 Serial Communication** - Two serial ports (LOCAL and MODEM) provide access to the EECO 1500
- **Communication.** The **local port** connects to local devices like POS terminals and computers. The **modem port** provides connection and control for a 'Hayes' compatible modem.

---

## Note

*If you are not using a modem you can set the MODEM port to operate like a second LOCAL port.*

System diagnostics test the modem for proper operation and display alarm conditions if the modem is not operational. Both ports can be used simultaneously. The EECO 1500 controls the auto answer feature of the modem to share the local phone line by setting a block of time during off hours that the system will answer incoming calls.

- **Abbreviations** - These are alarm condition abbreviations:
  - **HI PRO** TLM High Product Alarm
  - **LO PRO** TLM Low Product Alarm
  - **HI WAT** TLM High Water Alarm
  - **LEAK** TLM Failed Leak Test
  - **THEFT** TLM Fuel Removed From Tank
  - **ALARM** Leak Sensor Alarm
  - **FUEL** Leak Sensor Fuel Detected
  - **WATER** Leak Sensor Water Detected
  - **HI WAT** LS High Water Float Detected

# Keyboard

Each key activates a series of menus and sub-menus to select the desired system function.



Figure 2: Keyboard

**1 DISPLAY ABC**...Press to activate the Display mode and allow selection of the Status, History, Leak Test, or Setup menus.

**2 PRINT DEF**...Press to activate the Print mode and allow selection of the Status, History, Leak Test, or Setup menus. Also enables two step printing of inventory or shift reports when used in combination with [INVENTORY] or [REPORTS] keys.

**3 CHANGE GHI**...Press to activate the Change mode and allow selection of the Leak Test or Setup menus.

**0 SYS TEST #**...Press once to activate System Test or press twice to activate the Field Service Tests (service only).

**STOP PRINTING**...Press to stop the printing and purge the print buffer. **Printing aborted** will be printed on the report.

## Cursor Control Keys

**PREV** and **NEXT** double as cursor UP/LEFT and cursor DOWN/RIGHT respectively. Press to move within the selections when changing parameters or making menu selections.

## Menu Keys

**4 STATUS JKL** - Press to show the status selections that are available in the first menu level of the Display, Print, or Change mode.

**5 HISTORY MNO** - Press to show the history selections that are available in the first menu level of the Display or Print mode.

**6 SETUP PQR** - Press to show the setup selections that are available in the first menu level of the Display, Print, or Change mode.

**7 INVENTORY STU** Press to select Print or Display mode for the inventory report.

**8 LEAKTEST VWX** - Press to show the leak test selections that are available in the first menu level of the Display, Print, or Change mode.

**9 REPORTS YZ** - Press to print a new shift report. The totals will be for the time period from the previous shift report to the present.

## Special Control Keys

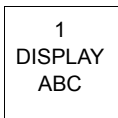
**- ACK (SPACE)** - Press to silence the local audible alarm. Pressing [ACK] does not clear the display. New alarms will activate the audible alarm again.

**CANCEL** - Press to exit from the selected menu level. When changing parameters, pressing this key before [ENTER] will leave memory unchanged.

**ENTER** - Press to select the displayed item. Use to select sub menu, start printing, or store new parameters in memory.

# DISPLAY Functions

## Note



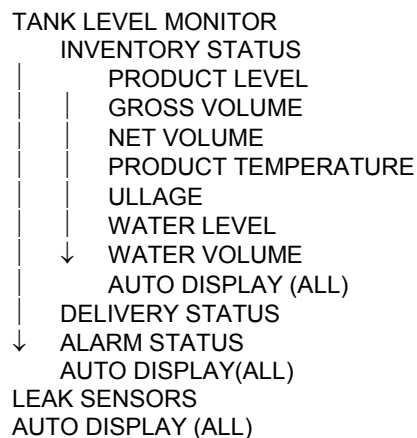
*If the alternate language is enabled, press [SYS TEST] [1] first to change to your primary language.*

Press the [**DISPLAY**] key.

The four options (Status, History, Leak Test or Setup) are shown on the display and correspond to the [STATUS] [HISTORY] [LEAK TEST] and [SETUP] keys.

Press [CANCEL] to go back a level.

## Display Status



*Figure 3: Display Status Menu Options*

Press [NEXT] or [ENTER] to choose TANK LEVEL MONITOR, LEAK SENSORS or AUTO DISPLAY (ALL) Press [ENTER] to choose your selection.

- If you select **TANK LEVEL MONITOR**, use [NEXT] or [ENTER] to move through INVENTORY STATUS (see *Figure 3* for sub-functions), DELIVERY STATUS, ALARM STATUS or AUTO DISPLAY (ALL).
- **LEAK SENSORS** and **AUTO DISPLAY (ALL)** contain no sub-menus.

Press [ENTER] to select any item.

## Display History

---

ALL EVENTS  
TLM EVENTS ONLY  
LS EVENTS ONLY  
SYSTEM EVENTS ONLY

*Figure 4: Display History Menu*

Press [NEXT] or [PREV] to move through the choices shown in *Figure 4*, then press [ENTER] to select the item.

## Display Leak Test

---

TANK LEVEL MONITOR

*Figure 5: Display Leak Test Menu*

Press [NEXT] or [PREV] to sequence through the active tanks (if any) that appear beneath the option shown in *Figure 5*.

## Display Setup

---

GENERAL SITE SETUP  
TANK LEVEL MONITOR  
LEAK SENSOR  
MULTI RELAY  
AUTO-DIAL ALARM REPORTS  
SHIFT REPORTS  
AUTO DISPLAY (ALL)

*Figure 6: Display Setup Menu*

# PRINT Functions

2  
PRINT  
DEF

Press the [**PRINT**] key.

Press the [**STATUS**], [**HISTORY**], [**LEAK TEST**] or [**SETUP**] keys for one of the four available submenus described in this section.

Press [**CANCEL**] to go back a level.

## Print STATUS

```

TANK LEVEL MONITOR
  INVENTORY STATUS
  | DELIVERY STATUS
  | ALARM STATUS
  | NEW SHIFT REPORT
  | LAST SHIFT REPORT
  ↓ PRINT ALL
    ABORT PRINTING
LEAK SENSOR
GENERATOR USAGE HISTORY
PRINT ALL
ABORT PRINTING
  
```

*Figure 7: Print Status Menu*

Press [**NEXT**] or [**PREV**] to move from TANK LEVEL MONITOR to LEAK SENSOR to GENERATOR USAGE HISTORY to PRINT ALL to ABORT PRINTING.

Press [**ENTER**] to select the desired (displayed) menu item.

- If you select **TANK LEVEL MONITOR**, use [**NEXT**] or [**PREV**] to move through INVENTORY STATUS, DELIVERY STATUS, ALARM STATUS, NEW SHIFT REPORT, LAST SHIFT REPORT, PRINT ALL or ABORT PRINTING.
- Then, press [**ENTER**] to select the desired (displayed) menu item.

## Print HISTORY

---

ALL EVENTS  
TLM EVENTS ONLY  
LS EVENTS ONLY  
SYSTEM EVENTS ONLY  
EVENTS BY DATE  
ABORT PRINTING

*Figure 8: Print History options*

- Press [NEXT] or [PREV] to move through the options shown in *Figure 8*. Press [ENTER] to select and print a report.

## Print LEAK TEST

---

PRINT ALL  
CURRENT TEST STATUS  
LAST PASSED TEST  
LEAK TEST HISTORY  
ABORT PRINTING

*Figure 9: Print Leak Test options*

---

### Note

*Leak testing is only available on underground tanks.*

- Press [NEXT] or [PREV] to move through the options shown in *Figure 9*. Press [ENTER] to select and print the report.

## Print SETUP

---

PRINT ALL  
GENERAL SITE  
TANK LEVEL MONITOR  
LEAK SENSOR  
MULTI RELAY  
AUTO-DIAL ALARM REPORTS  
SHIFT REPORTS  
ABORT PRINTING

*Figure 10: Print Setup options*

- Press [NEXT] or [PREV] to move through the options shown in *Figure 10*. Press [ENTER] to select and print the report.

# Print Automatic Reports

Automatic reports are printed at the conclusion of the event. These automatic reports include delivery reports, generator usage reports, and leak test results (if manual leak test is selected).

## Automatic Delivery Report

|                         |       |        |
|-------------------------|-------|--------|
| STATION NAME HERE       |       |        |
| STREET ADDRESS          |       |        |
| CITY, STATE, ZIP        |       |        |
| PHONE NUMBER            |       |        |
| V15.nn                  |       |        |
| 10-15-94 09:15:00       |       |        |
| TANK 1 REGULAR          |       |        |
| <b>DELIVERY REPORT:</b> |       |        |
| GROSS                   | 5201  | US GAL |
| NET                     | 5216  | US GAL |
| START:                  |       |        |
| 10-15-94 10:15:15       |       |        |
| PRODUCT LEVEL           | 28.02 | "      |
| GROSS                   | 2421  | US GAL |
| NET                     | 2411  | US GAL |
| TEMPERATURE             | 67.18 | °F     |
| ULLAGE                  | 6819  | US GAL |
| WATER LEVEL             | 0.00  | "      |
| WAT VOLUME              | 0     | US GAL |
| STOP:                   |       |        |
| 10-15-94 10:30:20       |       |        |
| PRODUCT LEVEL           | 66.57 | "      |
| GROSS                   | 7623  | US GAL |
| NET                     | 7627  | US GAL |
| TEMPERATURE             | 58.96 | °F     |
| ULLAGE                  | 1619  | US GAL |
| WATER LEVEL             | 0.00  | "      |
| WAT VOLUME              | 0     | US GAL |

Figure 11: Delivery Report (Automatic)

This report (*Figure 11*) is printed about two minutes after the end of the delivery. It includes the total gross and net volume added to the tank plus the starting and ending inventory report.

### Note

*This report does NOT account for any fuel that was dispensed during the delivery process.*

## Automatic Generator Usage Report

|                                |          |        |  |
|--------------------------------|----------|--------|--|
| STATION NAME HERE              |          |        |  |
| STREET ADDRESS                 |          |        |  |
| CITY, STATE, ZIP               |          |        |  |
| PHONE NUMBER                   |          |        |  |
| V15.nn                         |          |        |  |
| 09-09-94 09:15:00              |          |        |  |
| <b>GENERATOR USAGE REPORT:</b> |          |        |  |
| GENERATOR 1 DIESEL             |          |        |  |
| ON                             | 10-24-94 | 20:48  |  |
| OFF                            | 10-24-94 | 23:25  |  |
| GROSS USAGE                    | 125      | US GAL |  |
| NET USAGE                      | 124      | US GAL |  |
| TLM INVENTORY STATUS REPORT    |          |        |  |
| TANK 1 DIESEL                  |          |        |  |
| PRODUCT LEVEL                  | 24.73    | "      |  |
| GROSS                          | 5201     | US GAL |  |
| NET                            | 5216     | US GAL |  |
| TEMPERATURE                    | 65.99    | °F     |  |
| ULLAGE                         | 1487     | US GAL |  |
| WATER LEVEL                    | 0.01     | "      |  |
| WAT VOLUME                     | 1        | US GAL |  |

Figure 12: Generator Usage Report (Automatic)

If the standby generator is enabled, the report in *Figure 12* prints approximately 5 minutes after the generator and pump have stopped. *If a delivery occurs while the generator is running, DELIVERY OCCURRED is printed instead of usage.*

## Leak Test Report

|                                 |       |    |  |
|---------------------------------|-------|----|--|
| STATION NAME HERE               |       |    |  |
| STREET ADDRESS                  |       |    |  |
| CITY, STATE, ZIP                |       |    |  |
| PHONE NUMBER                    |       |    |  |
| V15.nn                          |       |    |  |
| 09-06-94 09:15:00               |       |    |  |
| LEAK TEST FOR TANK 2            |       |    |  |
| FINISHED. PASSED 0.2            |       |    |  |
| GPH LEAK TEST                   |       |    |  |
| 09-06-94 09:15:00               |       |    |  |
| PRODUCT LEVEL                   | 28.02 | "  |  |
| % VOLUME:                       | 54    | %  |  |
| TEMPERATURE                     | 67.18 | °F |  |
| CALCULATED RATE OF CHANGE: 0.01 |       |    |  |
| (VOLUME IS DECREASING.)         |       |    |  |

Figure 13: Leak Test Report (Automatic)

This report (*Figure 13*) prints automatically at the conclusion of a manually scheduled leak test. It shows either passed or failed results.

# Print-On-Demand Reports

Operators can choose to print any of the following reports at any time by pressing the keys shown with each example.

2  
PRINT  
DEF

## Print Inventory Status

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

09-06-94 09:15:00

TLM INVENTORY STATUS REPORT:

TANK 1 REGULAR
PRODUCT LEVEL      28.02  "
GROSS              2421 US  GAL
NET                2411  US GAL
TEMPERATURE        67.18  °F
ULLAGE             6819  US GAL
WATER LEVEL        0.06   "
WAT VOLUME         0     US GAL

(repeats for each tank)

```

*Figure 14: Inventory Status Report*

Press:

- [PRINT] [INVENTORY] or
- [INVENTORY] [PRINT] or
- [PRINT] [STATUS] [ENTER] [ENTER]

to print the Inventory Status report. The information shown for tank 1 in the illustration will be repeated for each tank.

## Print Shift Report

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

09-15-94 09:15:00

SHIFT REPORT:

TANK 1 REGULAR
BEGIN: 09-14-94 06:00:00
END: 09-15-94 06:00:00
BEGIN NET          3625  US GAL
END NET            4685  US GAL
BEG GROSS          3615  US GAL
END GROSS          4675  US GAL
NET DEL            8500  US GAL
GROSS DEL          8473  US GAL
NET USAGE          7440  US GAL
GROSS USAGE       7412  US GAL

NOTE: ESTIMATED USAGE
DOES NOT ACCOUNT FOR
PRODUCT DISPENSED DURING
DELIVERIES.
  
```

Figure 15: Shift Report

Press:

- [PRINT] [REPORTS] or
- [REPORTS] [PRINT] or
- [PRINT] [STATUS] [ENTER] [NEXT] [NEXT] [NEXT] [NEXT]  
[ENTER] to print a new shift report.

The information shown for tank 1 in the illustration will be repeated for each tank.

### Caution

*Printing a 'new' shift report starts a new time period for the next report, causing incomplete totals on a scheduled shift report.*

Press [↓] one more time before pressing [ENTER] to print the last shift report without starting a new time period.

## Print Delivery Status Report

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

09-09-94 09:15:00

TLM DELIVERY STATUS REPORT:

TANK 1 REGULAR

09-09-94 09:15:00
GROSS                5201  US GAL
NET                   5216  US GAL

09-06-94 17:25:00
GROSS                6507  US GAL
NET                   6523  US GAL
(up to 10 reports per tank, repeats for all tanks)

```

Figure 16: Delivery Status Report

Press [PRINT] [STATUS] [ENTER] [NEXT] [ENTER] to print a Delivery Status report. This report includes the summary of the last 10 deliveries for each tank.

## Print TLM Alarm Status

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

10-24-94      09:15:00

TLM ALARM STATUS REPORT:

TANK 1 REGULAR
NORMAL

TANK 2 PLUS
NORMAL

TANK 3 SUPER
LOW PRODUCT

```

Figure 17: TLM Alarm Status Report

This report gives the present alarm and trouble status for each tank.

Press [PRINT] [STATUS] [ENTER] [NEXT] [NEXT] [ENTER] to print a TLM alarm report.

## Print Leak Sensor Status

---

STATION NAME HERE  
STREET ADDRESS  
CITY, STATE, ZIP  
PHONE NUMBER  
V15.nn

10-24-94      09:15:00

LEAKSENSOR STATUS  
REPORT:

CHANNEL 1 IMO  
REG NL SMP  
WATER  
10-23-94    06:08:35

CHANNEL 2 IMO  
DIESEL  
GENERATOR OFF

CHANNEL 3 IMO  
DIESEL SMP  
NORMAL

*Figure 18: Leak Sensor Status Report*

This report gives the present alarm and trouble status for each sensor.

Press:

[PRINT] [STATUS] [NEXT] [ENTER] to print a Leak Sensor Status report.

## Print Generator Usage History

|                          |          |        |
|--------------------------|----------|--------|
| STATION NAME HERE        |          |        |
| STREET ADDRESS           |          |        |
| CITY, STATE, ZIP         |          |        |
| PHONE NUMBER             |          |        |
| V15.nn                   |          |        |
| 10-24-94                 | 09:15:00 |        |
| GENERATOR USAGE HISTORY: |          |        |
| DIESEL GENERATOR         |          |        |
| -----                    |          |        |
| ON                       | 10-24-94 | 19:22  |
| OFF                      | 10-24-94 | 20:50  |
| GROSS USAGE              | 46       | US GAL |
| NET USAGE                | 44       | US GAL |
|                          |          |        |
| ON                       | 10-19-94 | 10:24  |
| OFF                      | 10-19-94 | 11:06  |
| GROSS USAGE              | 36       | US GAL |
| NET USAGE                | 34       | US GAL |

*Figure 19: Generator Usage History Report*

This report gives the last 10 summary reports for each generator tank in the system.

Press:

[PRINT] [STATUS] [NEXT] [NEXT] [ENTER] to print a the Generator Usage History report.

## Print Leak Test

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

10-24-94      09:15:00

CURRENT TLM LEAK TEST
STATUS:

TANK 1 REG. NL
NOT RUNNING

TANK 2 DIESEL
RUNNING

*****

LAST SUCCESSFUL TLM
LEAK TEST:

TANK 1 REG NL

0.1 GPH TEST
NEVER PASSED

0.2 GPH TEST
10-21-94  16:19:00
PRODUCT LEVEL      14.63  "
% VOLUME           17    %
TEMPERATURE        76.97  °F
CALCULATED RATE OF
CHANGE:            -0.001
(VOLUME IS INCREASING.)

*****

TLM LEAK TEST HISTORY:

TANK 1 REGULAR

PASSED 0.1 LEAK TESTS
NEVER PASSED

PASSED 0.2 LEAK TESTS
10-20-94  15:20
10-13-94  14:33

*****
  
```

*Figure 20: Leak Test Report*

The selections available for printing leak test information include Current Test Status, Last Passed Test, Leak Test History, and Print All. A selection of each is listed here:

Print All, press [PRINT] [LEAK TEST] [ENTER]

Current TLM Leak Test Status

## Manifold Tank Inventory Reports

|             |         |        |
|-------------|---------|--------|
| TANK GROUP1 | REGULAR |        |
| GROSS       | 2421 US | GAL    |
| NET         | 2411    | US GAL |
| ULLAGE      | 6819    | US GAL |
| WAT VOLUME  | 0       | US GAL |

*Figure 21: Manifold Tank Inventory Status*

Activating Manifold Tank Groups causes additions and changes to the standard reports. The TLM Inventory Status Report is unchanged except that a combined inventory (*Figure 21*) appears for the tanks in the group.

The Automatic Delivery Report is changed so that a “tank group combined report” (*Figure 22*) is printed.

TANK GROUP 1 REGULAR

DELIVERY REPORT:

GROSS 5201 US GAL

NET 5216 US GAL

START:

10-15-03 10:15:15

GROSS 2421 US GAL

NET 2411 US GAL

ULLAGE 6819 US GAL

STOP:

10-15-03 10:30:20

GROSS 7623 US GAL

NET 7627 US GAL

ULLAGE 1619 US GAL

*Figure 22: Manifolded Tank Delivery Report*

## Print Event History

---

|                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STATION NAME HERE<br>STREET ADDRESS<br>CITY, STATE, ZIP<br>PHONE NUMBER<br>V15.nn<br><br>10-24-94      09:15:00<br><br>EVENT HISTORY<br>ALL EVENTS<br><br>LOCAL SETUP CHANGED<br>10-24-94   20:48:19<br><br>CH 1 REG NL SMP IMO<br>WATER<br>10-24-94   20:47:57<br><br>AC POWER ON<br>10-24-94   13:24:14 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

*Figure 23: Event History Report*

Print the System Event History to help in servicing the unit. Print All Events, TLM Events, Leak Sensor Events, System Events, or by Date. A sample report appears in *Figure 23*.

# CHANGE Functions

3  
CHANGE  
GHI

*You need a Manager Access Code (MAC) to make most system changes.*

The default manager access code is **12345**. Change this code as soon as possible to prevent unauthorized changes. Of course, the new code is then used in the following procedures instead of 12345.

When entering numbers or letters in the following procedures, press the key one time for the number, press a second time for the first letter on the key, press a third time for the second letter on the key, or press a fourth time for the third letter on the key. Example: to enter a 6 when a digit is flashing, press the [SETUP] key one time.

## Change Date And Time

To adjust time of day, or daylight savings time, *in 24-hour format*:

1. Press [CHANGE] [SETUP] [access code] [ENTER] [ENTER].

**12-23-02    08:24:56**

2. Press [CHANGE], the first digit of the date will flash. Press [NEXT] to move to the digit that is to be changed.
3. Press a number key. The flashing indication moves one position to the right.
4. Press [ENTER] to store the changes in memory or [CANCEL] to exit without storing changes to memory.

## Changing the Manager's Code

You must know the old code to change it.

1. Press [CHANGE] [SETUP] [old access code] [ENTER] [ENTER] [NEXT] [NEXT].

**ACCESS CODE**

2. Press [CHANGE].

**ENTER NEW CODE  
XXXXX**

3. Enter a new 5-digit code. XXXXX represents the new code.
4. Press [ENTER].

**REENTER NEW CODE TO VERIFY**

5. Enter the new code a second time and press [ENTER].

6. Press [NEXT] to continue or [CANCEL] twice to exit.

## Change Header Line

The header lines contain site identification included in all printed reports.

1. Press [CHANGE] [SETUP] [access code] [ENTER] [ENTER] [NEXT] [NEXT] [NEXT]
2. Press [CHANGE], the first digit of the header will flash.
3. Press the key for the desired value or press [NEXT] to move right to the digit that is to be changed. Note the [PREV] key moves the flashing indication one digit to the left.
4. Make needed changes to the header line then press [ENTER] to store the changes in memory or [CANCEL] to exit without saving.
5. Press [NEXT] to go to the next header line, [CANCEL] twice to exit.

## Change Shift Reports

1. Press [CHANGE] [SETUP] [access code] [ENTER].
2. Press [NEXT] [NEXT] [NEXT] [NEXT].
3. Press [ENTER] [CHANGE], **INACTIVE** flashes.
4. Press [NEXT] [ENTER], the first digit of the time will flash.
5. Enter current time. The flashing cursor moves to the right each time a number key is pressed for the desired time. Press [ENTER].
6. Press [NEXT]. If you are printing it, press [NEXT] to set shift report number 2 and then 3. If the report is to be sent to the local or modem port, press [CHANGE]. **PRINTER** flashes.
7. Press [NEXT] to display modem port or local port.
8. Press [NEXT]. If modem port was selected, enter the destination phone number (0 - 9 and ,).
9. Press [NEXT], then choose computer or viewable format.

---

### Note

*SMARTTALK requires **Computer** Format. Use Viewable Format for 3rd party computer packages.*

10. Press [CHANGE], **COMPUTER FORMAT** flashes.
11. Press [NEXT] [ENTER] to change to **VIEWABLE FORMAT**. Press [NEXT] to set shift report number 2 and then 3.

# Tank Leak Test

The EECO 1500 tank leak test may be set to run automatically after each dispensing action (Continuous or Segmented), started manually by the operator, or scheduled to run automatically daily, weekly, or monthly.

## Change Leak Test (Menu)

If Continuous or Segmented leak test mode is selected, the following 'change leak test' menu will be limited to 'START AND RUN LEAK TEST ONE TIME'.

Note: ↓ indicates pressing [NEXT ↓] to move (in a vertical column) from the item above the ↓ to the item below the ↓.

| DEFAULT                                                  | [OTHER CHOICES ] |
|----------------------------------------------------------|------------------|
| START LEAK TEST                                          |                  |
| START & RUN ONE TIME                                     |                  |
| ↓ START LEAK TEST ON TANK # <b>NO</b> [NOW ] [AT 00:00 ] |                  |
| SET DAILY RUN TIME                                       |                  |
| ↓ DO DAILY LEAK TEST ON TANK # <b>NO</b> [AT 00:00 ]     |                  |
| SET WEEKLY RUN TIME                                      |                  |
| ↓ DO WEEKLY LEAK TEST T# <b>NO</b> [ON SUN AT 00:00 ]    |                  |
| SET MONTHLY RUN TIME                                     |                  |
| DO MONTHLY LEAK TEST T# <b>NO</b> [01 AT 00:00 ]         |                  |
| ABORT LEAK TEST                                          |                  |

## Run Manual Leak Test

1. Press [CHANGE] [LEAK TEST].
2. Press [ENTER].
3. Press [ENTER].
4. Press [CHANGE]. **NO** flashes.
5. Press [NEXT] [ENTER] to start test now or continue to steps 5, 6, and 7 for additional selections.
6. Press [NEXT], **AT** flashes.
7. Press [ENTER], first digit of time flashes, set test start time.
8. Press [ENTER] to save time. Repeat for other tanks.
9. Press [CANCEL] three times to exit.

## Set Daily Run Time

1. Press [CHANGE] [LEAK TEST] [ENTER].
2. Press [NEXT].
3. Press [ENTER] [CHANGE], **NO** flashes.
4. Press [NEXT], **AT** flashes.
5. Press [ENTER], first digit of time flashes, set test start time.
6. press [ENTER] to save time. Repeat for other tanks.
7. Press [CANCEL] twice to exit.

## Set Weekly Run Time

1. Press [CHANGE] [LEAK TEST]
2. Press [ENTER]
3. Press [NEXT] [NEXT]
4. Press [ENTER] [CHANGE] **NO** flashes
5. Press [NEXT], **ON** flashes.
6. Press [ENTER], day flashes, Press [NEXT] to change day of the week.
7. Press [ENTER], first digit of time flashes, set test start time.
8. Press [ENTER] to save time. Repeat for other tanks.
9. Press [CANCEL] three times to exit.

## Set Monthly Run Time

1. Press [CHANGE] [LEAK TEST]
2. Press [ENTER]
3. Press [NEXT] [NEXT] [NEXT]
4. Press [ENTER] [CHANGE], **NO** flashes.
5. Press [NEXT], **ON** flashes,
6. Press [ENTER], first digit of date flashes, set day of the month to test.
7. Press [ENTER], first digit of time flashes, set test start time.
8. Press [ENTER] to save time. Repeat for other tanks.
9. Press [CANCEL] three times to exit.

# Tank Leak Test Reports

## About the Results

See *Figure 24* and *Figure 25* for sample FAILED and PASSED reports.

The EECO 1500 TLM leak test uses level and temperature measurements for compensated tank volumes. Tests start after a product delivery when the temperature and surface of the product have stabilized.

While the tested tank does not need to be shut down during the stabilization period, we suggest a minimum one-hour delay between tank shut down and the start of a manual leak test. To test, the product level in a trouble-free tank must be above 14% of the tank's capacity.

Actual test time varies due to product level in the tank and the tank capacity. You can:

- Manually start and run the test one time or...
- Program the system to run the test at a selected time daily, weekly, or monthly, or...
- Program the test to run in continuous mode (the test begins automatically after dispensing product).

If a manual leak test returns the message **INCONCLUSIVE TEST**, the system will restart the leak test after waiting 15 minutes to test a second time.

Successfully completed leak tests that are scheduled to run daily, weekly, monthly or on demand will end with one of the reports shown here. *These reports are not printed for continuous-mode tests.*

---

### Note

*A third-party test result summary of this unit's leak test capabilities appears in the back of this manual, just before the index.*

## Leak Test FAILED Report

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

10-27-01          03:32:00

LEAK TEST FOR TANK          2
FINISHED. FAILED          0.2
GPH LEAK TEST

10-27-01          03:32:00
PRODUCT LEVEL          28.02 "
% VOLUME:              54%
TEMPERATURE              67.18°F
CALCULATED RATE OF CHANGE: 0.15

(VOLUME IS DECREASING.)
  
```

Figure 24: FAILED Leak Test Report

## Leak Test PASSED Report

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.nn

10-26-01          02:15:00

LEAK TEST FOR TANK          2
FINISHED. PASSED          0.2
GPH LEAK TEST

10-26-01          02:15:00
PRODUCT LEVEL          28.02 "
% VOLUME:              54%
TEMPERATURE              67.18°F
CALCULATED RATE OF CHANGE: 0.01

(VOLUME IS INCREASING.)
  
```

Figure 25: PASSED Leak Test Report

A result summary leak test report is automatically generated and printed whenever a manual leak test finishes.

If you set a tank leak test to run in continuous mode (start automatically after dispensing product) the following events occur:

**If the test passes...**

- A record of the test is stored in the Leak Test History
- A “leak test PASS” report is NOT printed

**If the test fails...**

- Audible alarm sounds
- A LEAK TEST FAILED message displays
- Red alarm light illuminates
- The failed test is recorded in the Leak Test History

Note that the displayed alarm message and the red alarm LED will not clear until a subsequent leak test is completed with acceptable results.

## Manual Leak Test Reports

### Waiting To Start

This message prints if less than six hours have elapsed since the last delivery, the tank is not stable and RUN TEST NOW is selected. This message also appears during the 15-minute between-test waiting period.

### Incorrect Volume

The test cannot run because product level is below 14% of tank capacity.

### System Troubles

Hardware problems prevent the system from performing a leak test. Call for service.

### User-Aborted Test

The operator ended the test either before a scheduled test could start or during a scheduled test.

## Aborted Test Due To...

The system ended the test early because of the indicated condition (pump activity, product delivery, among others).

## Projected End Time

This message is printed as the test starts and the test length has been calculated for the tank volume and level.

## Leak Test Inconclusive Codes (Software Versions 023K, 076 (all), 083F, 087B or earlier)

These codes help you find the cause of inconclusive leak tests.

- CODE 1** Temperature Test 1 - Excessive temperature changes during test.
- CODE 2** Data quality check 1 fail. (requires factory interpretation)
- CODE 3** Data quality check 2 fail. (requires factory interpretation)
- CODE 4** Data quality check 3 fail. (requires factory interpretation)
- CODE 5** Product “Leaking” into tank (Product float level increasing, no increase in water level).
- CODE 6** Temperature change with no level change (Product float stuck).
- CODE 7** Test 1 and Test 2 leak test results do not agree.
- CODE 8** Temperature Test 2 - Bottom RTD temperature tracking.
- CODE F** Low volume in tank.
- CODE G** Incorrect float movement.
- CODE H** Product delivery during test.
- CODE I** Probe malfunction.
- CODE J** LLD testing during TLM leak test (LLD has priority)
- CODE K** Leak test aborted by user.

### The following list is for all other software versions:

- CODE 1** Standard deviation of the leak rate is excessive
- CODE 2** Excessive temperature changes during the test
- CODE 3** Excessive temperature deviation between the bottom of the tank and the overall temperature
- CODE 4** Temperature data quality check failure. (requires factory interpretation)
- CODE 5** Product “Leaking” into tank (Product float level increasing, no increase in water level).

**CODE 6** Height data quality check failure (requires factory interpretation)

**CODE 7** Temperature change with no level change

**CODE 8** Excessive product float movement during test

**CODE 9** Data quality test failure

External factors acting on the tank may cause the product level to change or the product temperature to be interpreted incorrectly (such as probe position in tank, wrong API Gravity specified). The system will interpret this erroneous data as a failed leak test.

The external factors working on the tank that may cause the 'failed leak test' must be evaluated to determine the actual cause. If this evaluation does not eliminate the cause of the failed leak test, additional testing should be done to determine the course of action.

### **Other factors that can cause leak test problems**

- Incorrect probe setup and calibration causing errors in height to volume conversion.
- Vent lines obstructed causing changes in tank ends and walls as vacuum or pressure equalizes.
- Fill caps leaking (or missing) along with flooded manway allowing water to leak into tank.
- Heavy gusting winds across vent lines causing fluctuating pressure in tank.
- Rapidly changing water table effecting temperature and mechanical stability of tank.



# System Test

An eight-second system self-test runs at power-up and on-demand from the front panel. You will see either **SYSTEM TEST PASSED** or **SYSTEM TEST FAILED** at the end of the test.

**AFTER POWER UP** -- After two seconds, the system enters standby mode.

**AFTER ON-DEMAND** -- The display remains until you press the [CANCEL] key or for one minute. Then, the display goes to the standby mode.

If anything fails, the diagnostic coded troubles, as well as a system test failed message are written to history and can be displayed or printed. Also, system or specific equipment troubles are logged and will flash in the standby screen.

No message is written to history if the test passes.

## Test Components

1. The display flashes all pixels ON and all pixels OFF for the full length of the test.
2. All LEDs flash on and off for the duration of the system test.
3. The horn is OFF for five seconds, then sounds for two seconds, and then is OFF for the duration of the test.
4. The clock is checked for valid date and time. If an invalid date or time is found, the date is set to 01-01-90, the time to 00:00:00. The clock will then be checked to make sure the seconds are updating.
5. All 82C55 control registers are checked.
6. The Serial DUART IC is checked for errors. If the test is being run at power-on, a simplified loop back test is performed.
7. Four pre-selected ram locations are checked for read and write capabilities.
8. At the test's end, the printer prints the date and time and either 'SYSTEM TEST PASSED' or 'SYSTEM TEST FAILED'.



---

# Setup Procedure

---

## Caution

*This Setup Procedure is used by trained service personnel to enter operational parameters into the EECO 1500 system.*

*Some procedures are unavailable to an operator.*

Obtain any site-specific information from the site manager to input into the system. Use the listing provided with this instruction to establish the desired information.

---

## Note

*Multiple alarms may occur when the system is first turned ON.*

Deactivate all unused input channels to eliminate trouble conditions.

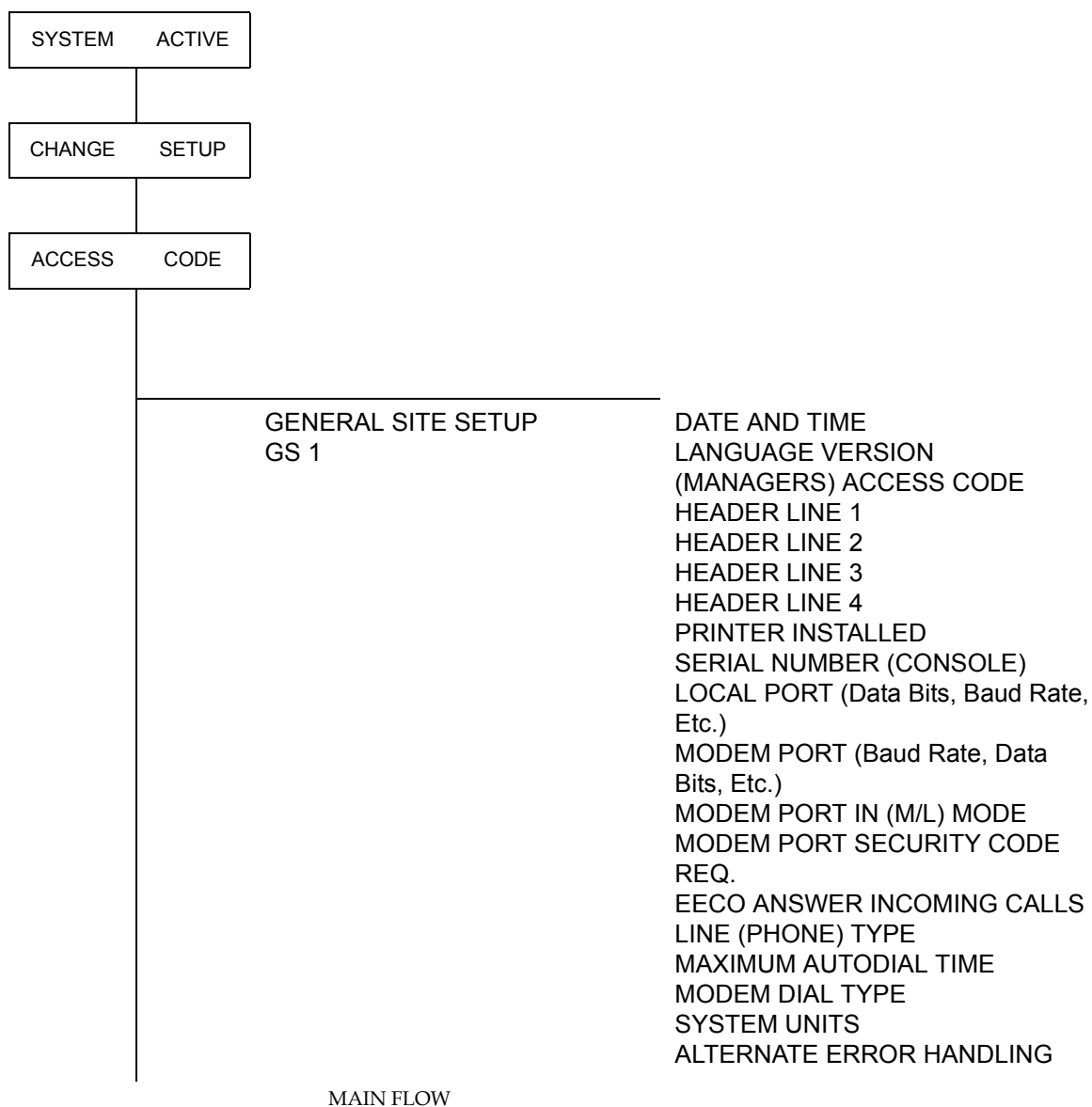
The EECO 1500 monitors all inputs and clears alarms and trouble conditions automatically without operator intervention.

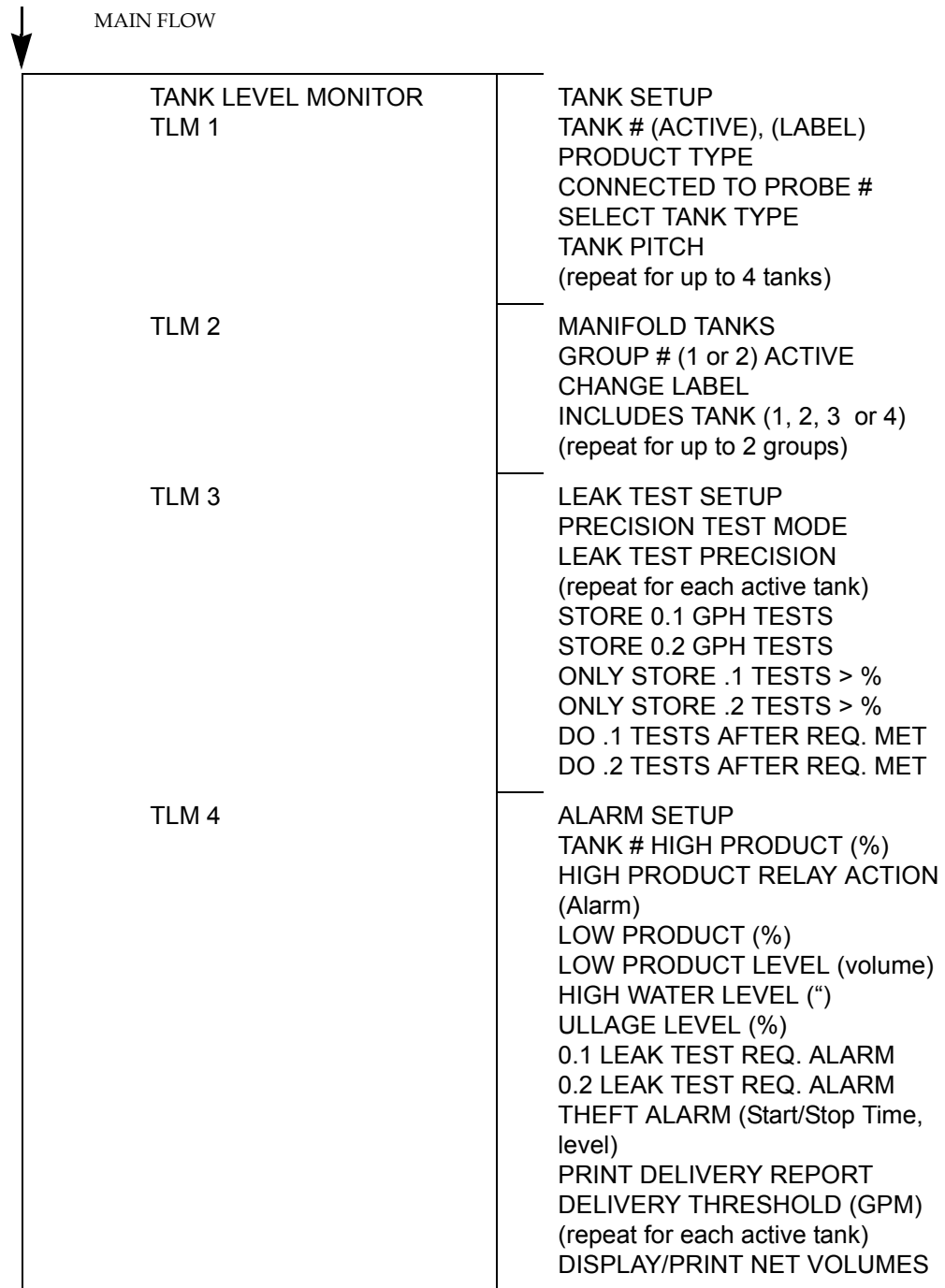
## Parameter Locator Flowchart

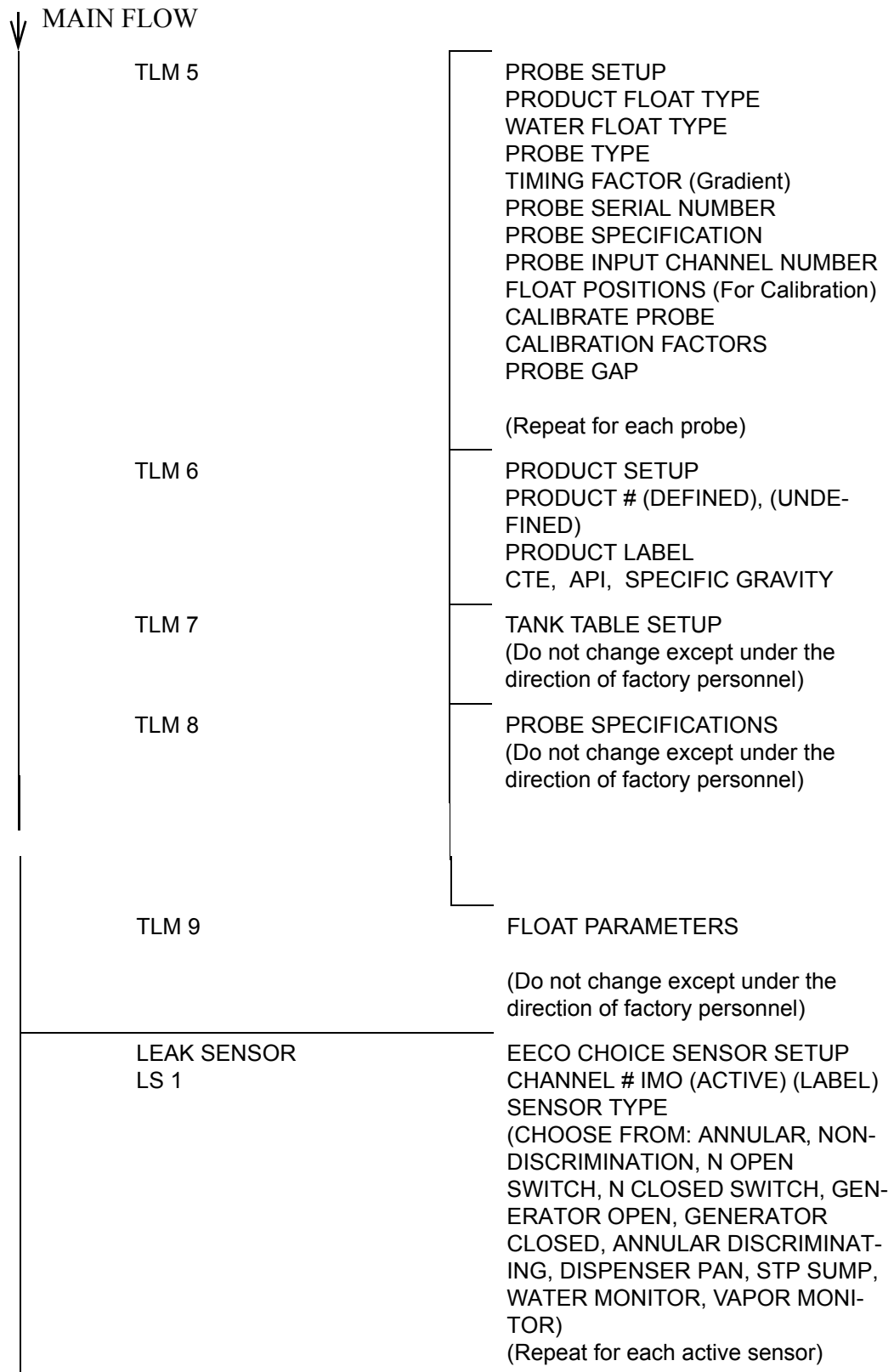
This flow chart shows menu selections and sub-menus. Use it as a guide to locate system, tank monitor, and leak sensor parameters. Items appear in the order they appear in the system.

To enter setup mode, press [CHANGE] [SETUP] [access code] [ENTER].

Each sub-menu is identified in the center column with a code (GS 1, TLM 5, etc.). This code is in the setup instructions that follow this flowchart to identify the sections.







|                                |                                                                                                                                                                                                                                                                                                            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAIN FLOW<br>↓                 |                                                                                                                                                                                                                                                                                                            |
| MULTI RELAY                    | RELAY MATRIX                                                                                                                                                                                                                                                                                               |
| MR 1                           | RELAY # ACTIVE (INACTIVE) FOR:<br>LS: (HIGH FUEL, WATER, HIGH<br>WATER), TLM: (LEAK, HIGH PROD,<br>THEFT, LOW PROD, .1 LT REQ, .2<br>LT REQ, HIGH WATER)<br>(repeat for 1 or 5 relays)                                                                                                                     |
| AUTODIAL ALARM<br>REPS<br>AA 1 | AUTODIAL ALARM REPORT<br>ALARM GROUP # (1-4) ENABLE,<br>TIME<br>GROUP # PHONE # (20 DIGITS)<br>FORMAT (COMPUTER/VIEWABLE)<br>(HIGH PRODUCT, LOW PRODUCT,<br>THEFT, HIGH WATER, TEST FAILS,<br>TEST REQ'D, SENSOR FUEL, SNSR<br>HI FUEL, SENSOR WATER, SENSR<br>HI WAT, SENSOR ALARM, AND ALL<br>TROUBLES,) |
| SHIFT REPORTS<br>SR 1          | SHIFT REPORT<br>REPORT # (1-3) ACTIVE, TIME<br>SEND TO (PRINTER, MODEM, OR<br>LOCAL)<br>PHONE # (20 DIGITS)<br>FORMAT (COMPUTER/VIEWABLE)                                                                                                                                                                  |

Set up the system in the following order:

1. Start at the Time/System Activated display:
2. Press [CHANGE] [SETUP] .
3. Press [XXXXXX] (factory access code) [ENTER]. This is the entry display for setup procedures Tank Level Monitor, Leak Sensor, General Site, Auto-Dial Alarm, Shift Reports, and Multi Relay.

## Tank Level Monitor Setup

The Tank Level Monitor Setup is divided into nine sections.

### **Caution**

*This procedure should only be performed by qualified service personnel.*

Install Probe #1 in the site tank #1. Connect the probe data cable to the TLM interface input connector #1.

You need to know:

- Probe serial number
- Timing factor (listed as gradient on the probe label)
- Probe length.

If the site has diesel tanks, the probes installed in that tank must have a 'diesel/water float' installed.

Follow the sequence listed below and complete each section for all probes before proceeding to the next section. You may deactivate the input channel while programming the Probe Setup.

- From General Site Setup display press [NEXT] until Tank Level Monitor appears.

### **Probe Setup (TLM 5)**

This section stores parameters unique to each probe into a table in memory. For example, if your site has three tanks, you should have three sets of probe parameters programmed into memory. The parameters include:

- Float types
- Temperature range
- Timing factor (gradient)
- Serial number

- Probe length
  - Physical input channel
  - Float calibration.
4. Press [ENTER] [↓] [↓] [↓] [↓] (from Tank Level Monitor display):
  5. **Product Float** Press [ENTER].

Use the standard 4" Nitrophyl Product float, except where chemicals would damage the float. Other selections are: Nitrophyl 2", Nitro. 1.48", Stainless (Steel), and Special Product floats.

6. **Water Float** Press [NEXT].

Use the standard 4" Nitrophyl *gas/wat* or *dsl/wat* float except where chemicals would damage the float. Other selections are: Nitrophyl 2" Gas/Wat, Nitrophyl 2" Dsl/Wat, Nitro. 1.48" Gas/Wat, Nitro. 1.48" Dsl/Wat, Stainless (Steel), Not Attached and Special water floats.

7. **Probe Type** Press [NEXT].

Set to Extended Range (temperature) for all stainless steel probes.

8. **Timing Factor** Press [NEXT].

The Timing Factor is listed as 'Gradient' on the probe label and will be about 9.020 microseconds per inch. This factor is used to accurately convert time to level. Change entry to the correct value.

9. **Probe Serial Number** Press [NEXT].

The Probe Serial Number is listed on the probe label. Enter the correct number for probe identification on the printed setup listing.

10. **Probe Specification** Press [NEXT].

The Probe Spec is the standard length of the probe. It will be 5" less than the stroke length (listed on the probe label). An 8' probe has a stroke length = 101" (96"+5" = 101"). The displayed standard lengths are from four feet to 12 feet in half-foot increments. The probe must be long enough to touch the tank bottom with the probe head into the riser above the top of the tank.

11. **Probe Input Channel** Press [NEXT].

The Probe Input Channel # is the probe connector number (TLM 1 to TLM 4). The desired condition is: Probe #1 is installed in tank #1, it's data cable is connected to TLM 1, and it's parameters setup as Probe #1.

12. **Float Position For Calibration** Press [NEXT].

Position the product and water float together with the bottom of the water float flush with the end of the probe (same as standing the probe vertically on the floor). Setting is 3.00" and 0.00" for normal calibration with 4" floats.

### 13. Calibrate Floats Press [NEXT].

Float calibration is required when installing a replacement probe or when installing a new system.

Press [ENTER] to read the position of the floats (as located in the step 8). The display will change to <ENTER> TO CONTINUE when the calibration has been completed.

### 14. Verify Calibration Value Press [ENTER] [NEXT].

The calibration factor is the measured length that is added to a predefined value for product and water float location. The predefined values are different for each probe length to allow all calibration values to be approximately +2.00" - +5.50" for every size probe (product and water float). A value drastically different from the above range indicates incorrect calibration or wrong length probe.

15. Press [NEXT] and repeat steps 1 through 10 for each tank or press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Product Setup (TLM 6)

Note that the label used here is not the fuel label that is used in the printed reports. The standard products are:

| # | Label      | CTEAPI        | Sp. Gr. |
|---|------------|---------------|---------|
| 1 | REG UNLEAD | 0.0006065059  | 0.74278 |
| 2 | DIESEL     | 0.0004540034  | 0.85498 |
| 3 | SUP UNLEAD | 0.0005852056  | 0.75467 |
| 4 | UNLEADED   | +0.0006136060 | 0.73890 |

Up to 4 products may be specified or the existing ones may be changed. You must know the correct CTE (Coefficient of Thermal Expansion) and either the API or Specific Gravity of the product. You must overwrite one of the 'defined' products that will not be used.

Accurate CTE and API parameters are mandatory to achieve your best leak test results. Contact OPW if additional instructions are needed.

Press [ENTER] [↓] [↓] [↓] [↓] [↓] (from Tank Level Monitor display):

### 1. Product Defined Press [ENTER].

A product must be defined (active) here to appear for selection in Tank Setup. Press [CHANGE] [ENTER] [ENTER] to modify the 10 digit label.

### 2. CTE (Coefficient of Thermal Expansion) Press [NEXT].

The pre-stored value is a national average for the specified fuel type. When changing predefined product type to a different product, enter the correct CTE for the new product type.

3. **API** Press [NEXT].

The pre-stored value is a national average for the specified fuel type. When changing predefined product type to a different product, enter the correct API for the new product. Sp. Gravity changes automatically.

4. **Sp. Gravity** Press [NEXT].

This value is used for chemicals. When changing predefined product type to a chemical product, enter the correct Specific Gravity for the new product. API value will be changed automatically.

5. Press [NEXT] and repeat steps 1 through 4 for each new product or press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Tank Setup (TLM 1)

Use this section to activate monitoring of each tank. Define parameters unique to each tank and store them into a table in memory. Input a 10 character label that will appear on all reports, select product type, link to probe parameters created in *Probe Setup (TLM 5)* on page 38, define the tank size, and input a pitch value.

Press [ENTER] (from Tank Level Monitor display):

1. **Tank Active and Label** Press [ENTER] [ENTER].

‘Active’ activates monitoring of the tank. Input a 10 character label that will identify the product on all reports. Press [CHANGE] [ENTER] to enable the label change process. Press [ENTER] to store the changes.

2. **Product Type** Press [NEXT].

Select one of the four product numbers that was established in *Product Setup (TLM 6)* on page 41 for the product in the tank.

3. **Connected to Probe** Press [NEXT].

Select the parameter group that was defined in *Probe Setup (TLM 5)* on page 38 for the probe that is installed in the tank (this is not the interface input channel number). Example:, Probe 1 is installed in Tank 1 and is connected to TLM Input 1 with parameters stored in Probe Setup 1.

4. **Select Tank Chart** Press [NEXT].

Select the tank type for fiberglass tanks or enter tank sizes for horizontal or vertical flat ended steel tanks.

Select from: Owens Corning Fiber, Xerxes Fiberglass, Corespan Fiberglass, CAE Fiberglass, ZCL Fiberglass, Other Fiberglass (Convault and

Lifetime), Horiz Steel Cylinder, Vert Steel Cylinder, and Special User Defined\*.

---

### \*Note

*“Special User Defined” must also be defined in “Tank Table Setup”.*

---

### Example 1

- Select OC G-3 9410 Gallon 8’ tank. Locate display:
- Press [ENTER] [↓] [↓] [↓] [↓] [↓]
- Press [ENTER] [↓].
- Press [ENTER] to select.

---

### Example 2

- Select a 72” X 205” Horiz. Steel tank. Locate display:
- Press [ENTER] [↓]
- Press [ENTER] to select.
- Input **72.000**.

---

### Note

*Input 6 numbers (72.000) for the diameter, filling the diameter field, followed by the actual length (205).*

- Press [ENTER]. Calculated FV (full volume), L, and D are displayed.

#### 5. **Tank Pitch** Press [NEXT].

Use Tank Pitch to set a product level adjustment or to change the TLM level reading to the reading in the center of the tank. The most accurate operation is obtained with the probe installed in the center of the tank and the pitch set to zero. Calculate the pitch change using the ‘desired level’ minus the TLM level and entering the result (including the sign) as the pitch.

---

### Example

Desired level = 51.5", TLM level = 50". Pitch = 51.5" - 50" = + 1.5"

#### 6. Repeat steps 1 through 5 for each tank in the system.

Press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Manifold Tank Groups (TLM 2)

This section is used to define manifold tank groups for reporting the total combined volume (inventory and delivery) for the group in addition to the normal tank volume. You can specify up to 2 tank groups.

Press [ENTER] [↓] (from Tank Level Monitor display):

### 1. Manifold Group 1 Press [ENTER]

‘Active’ activates monitoring of the tank. Input a 10 character label that will identify the product on all reports. Press [CHANGE] [ENTER] to enable the label change process. Press [ENTER] to store the changes.

### 2. Tanks Included in the Group Press [NEXT]

Select YES for the tanks that are linked by siphon connections. There must be at least 2 tanks selected to make a group.

- Press [NEXT]. Select the second tank in the tank group.
- Repeat steps 1 and 2 for each tank group in the system. Press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Note

*Isolate the tanks to perform a leak test -- do this by opening the siphon line to the pump or by closing a valve in the syphon line.*

## Leak Test Setup (TLM 3)

Press [ENTER] [↓] [↓] (from Tank Level Monitor display):

### 1. Precision Test Mode Press [ENTER]

Choose from Manual, Continuous, Disabled, and Segmented (optional).

- Manual: Schedule Daily, Weekly, Monthly, or On Demand.
- Continuous: Start standard test automatically when product is stable.
- Segmented: Data collected continually while product is stable.

### 2. Leak Test Precision (for Manual Leak Test) Press [NEXT]

Select 0.1 or 0.2 to select the manual leak test mode.

### 3. Store 0.1 Tests Press [NEXT]

Store passed leak tests Yearly or Monthly to save either 1 test (stored yearly) or 12 tests (stored monthly) in leak test history.

### 4. Store 0.2 Tests Press [NEXT]

Store passed leak tests Monthly, Weekly or Daily to save either 12 monthly tests, 52 weekly tests or 45 daily tests in leak test history.

**5. Store 0.1 Test Volume** Press [NEXT]

[Range: 14% to 90%] Store passed leak tests only if the tank volume is greater than the selected percentage. Example: California requires >50%.

**6. Store 0.2 Test Volume** Press [NEXT]

[Range: 14% to 90%] Store passed leak tests only if the tank volume is greater than the selected percentage.

**7. Continue 0.1 Testing** Press [NEXT]

Select NO to stop testing after passing the first leak test during the selected time period or YES to continue testing. Note that false leak test results can occur even with a Probability of False Alarm = 1%.

**8. Continue 0.2 Testing** Press [NEXT]

Select NO to stop testing after passing the first leak test during the selected time period or YES to continue testing. Note that false leak test results can occur even with a Probability of False Alarm = 1%.

**9. Repeat steps 1 through 8 for each tank in the system.** Press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Alarm Setup (TLM 4)

This section is used to establish the alarm characteristics of the system. Information must be obtained from the station owner or manager to customize the system to his requirements. The minimum and maximum values will be shown in ( ).

Press [ENTER] [↓] [↓] [↓] (from Tank Level Monitor display):

**1. High Product Level** Press [ENTER]

(0% - 95%) This alarm is set to 90% when an external overfill alarm is installed at the fill area to warn the transport driver that the tank level has reached 90% full, otherwise set to 95% to reduce operator alarms.

**2. High Product Alarm Action** Press [NEXT]

(Latch or 10 seconds and reset) This feature sets the relay action for a high product alarm. **Latch** keeps the relay activated until the condition clears, **10 seconds and Reset** clears the alarm and deactivates the relay after 10 seconds to allow the use of one relay to activate the high product alarm for multiple tanks.

**3. Low Product Level** Press [NEXT]

(0% TO 100%) Set Low Product as a percent of tank capacity or press [NEXT] and set as gallons. The alternate setting will adjust automatically. Use as an indication to order product delivery.

#### 4. **High Water Level** Press [NEXT]

(0 to Tank Height) Set to desired level (at least 2" below pump intake) for water alarm. Water level measured at the probe location will be different from level measured at another opening in a tank that is not level.

#### 5. **Ullage** Press [NEXT]

(0 - 95%) Ullage is the safe volume required to fill the tank. This entry is the value used in calculating safe ullage on inventory reports.

#### 6. **0.1 Leak Test Required Alarm** Press [NEXT]

(inactive or active) When set to Active, the system will alarm at 355/25 days if the 0.1 leak test has not passed during the selected yearly/monthly time. This feature should eliminate an 'out of compliance' condition.

#### 7. **0.2 Leak Test Required Alarm** Press [NEXT]

(inactive or active) When set to Active, the system will alarm on 25/5 days if the 0.2 leak test has not passed during the selected monthly/weekly time. This feature should eliminate an 'out of compliance' condition.

#### 8. **Theft Alarm** Press [NEXT]

(inactive or active) This feature is used on non 24-hour stations that want an alarm indication if product is removed from the tanks when the station is closed. If set to Active, select the Start and Stop time for the detection period, and the volume (number of gallons) for the alarm level.

#### 9. **Delivery Threshold** Press [NEXT]

Increasing volume in the tank is monitored for a rate of increase that exceeds the value selected here. 50 GPM is selected for gravity drop from a tank truck. This setting may be too great to detect filling using a small transfer pump.

#### 10. **Display and Print Net Volumes** Press [NEXT]

(no - yes) This feature is provided for export shipments where Net (temperature compensated) Volume is not used.

11. Repeat steps 1 through 10 for each tank in the system. Press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Tank Table Setup (TLM 7)

*This section requires special data provided by the factory after you submit a complete tank chart with one-inch increments.*

Press [ENTER] [↓] [↓] [↓] [↓] [↓] [↓] (from Tank Level Monitor display):

1. **Special Table Label** Press [ENTER]

Identify the table with a unique name up to 10 characters long.

2. **Order of Polynomial** Press [NEXT]

This is the order of polynomial that describes the tank.

3. **Tank Height (diameter)** Press [NEXT]

This value specifies the tank diameter.

4. **Calculated Maximum Height** Press [NEXT]

This value may be slightly different from the actual tank diameter.

5. **Full Volume** Press [NEXT]

Full Volume is the actual tank capacity in gallons.

6. **Table Coefficients** Press [NEXT]

Enter the actual coefficients listed starting with C1 through C20.

Repeat steps 1 through 8 for each different tank in the system. Press [CANCEL] [CANCEL] to return to the Tank Level Monitor display.

## Probe Specifications (TLM 8)

*Change only under the direction of factory service personnel.*

## Float Setup (TLM 9)

*Change only under the direction of factory service personnel.*

## Leak Sensor Setup (LS 1)

The Leak Sensor option provides continuous monitoring of dispenser pans, sumps, interstitial tank spaces, and monitoring wells. Each sensor must be activated, assigned a label up to 10 characters long and the sensor type selected from the following list.

| Sensor Type      | Sensor Description and Number         |
|------------------|---------------------------------------|
| ANNULAR-NONDIS   | Annular Non discriminating(Q0003-006) |
| N OPEN SWITCH    | Normally open switch (Q0003-005)      |
| N CLOSED SWITCH  | Normally closed switch (Q0003-009)    |
| GENERATOR OPEN   | Normally open input                   |
| GENERATOR CLOSED | Normally closed input                 |
| ANNULAR-DISCRM   | Annular discriminating (Q0003-003)    |
| DISPENSER PAN    | Dispenser pan (Q0003-001)             |
| STP SUMP         | STP sump sensor (Q0003-002)           |
| WATER MONITOR    | Ground water monitor (Q0003-xx4)      |
| VAPOR MONITOR    | Vapor dry monitoring well (Q0003-010) |

1. Go to the General Site Setup display.
2. Press [NEXT] [NEXT] until you see Leak Sensor display:
3. **Activate Sensor** Press [ENTER].
4. Set sensor channel to Active when there is a sensor attached, otherwise select Inactive.
5. **Sensor Type** Press [NEXT].
6. Select the sensor type from the table above to match the installed sensor.
7. Repeat steps 1 and 2 for all sensors.

## General Site Setup (GS 1)

General Site Setup is used to input site parameters that relate primarily to the console features.

See the indicated page if you need more help.

1. **Change Date and Time** (*page 21*). From General Site Setup display press [ENTER] [NEXT]
2. **Language Version** Select either English or Spanish. This selection can also be changed by pressing [SYS TEST] [DISPLAY].
3. **Change Manager's Code** (*page 21*)
4. **Change Header Line 1** (*page 22*, and below also)
5. **Change Header Line 2**
6. **Change Header Line 3**

**7. Change Header Line 4****8. Console Serial Number** , press [NEXT].

- Enter the console serial number from the console label.

**9. Printer Installed** , press [NEXT].

- Set to 'YES' when local internal printer is installed, otherwise set to 'NO'.

**10. Local Port** , press [NEXT]

- Select Protocol [CHANGE]. Choose RS232, PLLD Interface, Gasboy PC or Gasboy Site Controller.
- Press [ENTER]
- Select 7 or 8 Data Bits and 300, 1200, 2400, 4800, or 9600 Baud (select the same settings as the communicating device).
- Press [NEXT], select 1 or 2 Stop Bits and None, Even, or Odd Parity (select the same settings as the communicating device).
- Press [NEXT], select Yes or No. If Yes, input a 6 digit code that must precede every command that comes from the communicating device.

**11. Modem Port In LOCAL Mode** press [NEXT]

- Select 7 or 8 Data Bits and 300, 1200, 2400, 4800, or 9600 Baud (select the same settings as the communicating device).
- Press [NEXT], select 1 or 2 Stop Bits and None, Even, or Odd Parity. (select the same settings as the communicating device).
- Press [NEXT], select Yes or No. If Yes, input a 6 digit code that must precede every command that comes from the communicating device.

**12. Modem Port in Modem Mode**

- Press [NEXT], select Modem Mode if an external 'Hayes compatible' modem is attached. Trouble 21 will be displayed if no modem is attached. Select Local Mode for all other cases.
- Press [NEXT], additional information is required when port is set to Modem Mode. Yes, answer incoming calls or No, set for outgoing calls only.
- Press [NEXT], set line type to dedicated if there is no other device or phone on the line. Set to shared if the local phone is on the same line, then enter the beginning and ending time to answer incoming calls
- Press [NEXT], select 1, 2, 3, or 4 hours for the maximum auto dial time. The event will be recorded in history if the system is not successful in completing the call.

- Press [NEXT], select pulse or tone depending on the type of local phone system at the site. Most phone systems today use tone dialing. Note that the phone line must be the same 'analog' type used by fax machines or home phones as compared to 'digital' systems found in many office systems.

13. **System Units**, press [NEXT].

- Select Height in Inches or CM (Centimeters).
- Press [NEXT], select Volume in US Gallons, Imperial Gallons, or Liters.
- Press [NEXT], select Temperature in °F or °C.

14. **Alternate Error Handling**, press [NEXT].

Two methods are provided for the communication package to respond to invalid commands. Try YES or NO to select the one that works for this installation.

## Auto Dial Alarm Setup (AA 1)

Auto-Dial Alarm Setup (when modem port is in modem mode) is used to define up to 4 alarm groups with a phone number and destination type for each group.

Group examples:

- Fuel Order Alarm & Low Product Alarm go to the Fuel Manager
- System trouble codes go to the Service Manager
- Leak alarms go the Environmental Manager

When the groups have been established with phone numbers (up to 20 digits) and format (for computer destination), a matrix will be displayed with the possible alarm or trouble and each of the 4 groups. Set YES under a group to include the report or NO to omit the report. Each condition may be selected for any or all of the 4 groups or may be omitted.

1. Go to General Site Setup display.
2. Press [NEXT] until you see **Auto-Dial Alarm Reports**, then [ENTER].
3. **Alarm Group 1**, press [ENTER].
4. Set to Enabled to activate the report group.
5. Press [NEXT], record the monitoring computer modem phone number. Valid characters are 1-9, 0, and comma (.). The comma is used to insert a 'wait period' in the dialing string to allow local switching to outside line.

6. Press [NEXT], Select computer format (packed data string) or viewable (similar to printed report). SMARTTALK requires the setting to be computer format. Viewable format is used for 'off the shelf' computer packages.
7. Repeat settings for Alarm Groups 2, 3, and 4.
8. The (alarm condition) will be displayed in the following order for each tank, sensor and line:

| Alarm Condition  | Group 1 | Group 2 | Group 3 | Group 4 |
|------------------|---------|---------|---------|---------|
| 1 High Product   | NO      | NO      | NO      | NO      |
| 2 Low Product    | NO      | NO      | YES     | NO      |
| 3 Theft          | NO      | NO      | NO      | NO      |
| 4 High Water     | NO      | YES     | NO      | NO      |
| 5 Test Fails     | YES     | NO      | NO      | NO      |
| 6 Test Req'd     | YES     | NO      | NO      | NO      |
| 7 Sensor Fuel    | YES     | NO      | NO      | NO      |
| 8 Snsr Hi Fuel   | YES     | NO      | NO      | NO      |
| 9 Sensor Water   | NO      | YES     | NO      | NO      |
| 10 Snsr Hi Water | YES     | NO      | NO      | NO      |
| 11 Sensor Alarm  | YES     | NO      | NO      | NO      |
| 12 All Troubles  | NO      | YES     | NO      | NO      |

Numbers 1, 2, 3, and 4 correspond to Auto Dial Alarm Groups 1, 2, 3, and 4.

Set to YES to activate auto dial for the displayed alarm condition, NO to ignore. Repeat for all alarm conditions.

## Shift Reports Setup (SR 1)

Shift Reports Setup provides up to 3 selections during each 24 hour day. You select the destination (printer or modem). Example: Schedule Shift Report #1 for 6:00 AM, send it to the printer.

Refer to *Shift Report* on page 14 for samples.

## Multi Relay Setup (MR 1)

One internal relay is standard on all EECO 1500 consoles. The system may be equipped with one optional multi relay board for a maximum of 5 programmable relays. The wiring and intended function of each relay contact will determine which alarm conditions will be used to activate each relay.

The "standard" relay is always number 1.

*Do not perform this setup until all sensors and probes are activated.*

Print the Multi Relay setup to see the available matrix of alarms, troubles, and relays. Use the listing to identify the alarm/trouble conditions that will be used to activate each relay. Proceed with the multi relay setup.

1. Go to General Site Setup display.
2. Press [NEXT] until you see Multi Relay display:
3. Press [ENTER]
4. **Relay 1 Active.** Set to Active or Inactive for the alarm condition.  
Repeat for installed relays.
5. Alarm Conditions List.

|                                  |                                  |
|----------------------------------|----------------------------------|
| LS CH 1 FUEL                     | LS CH 1 HIGH FUEL                |
| LS CH 1 WATER                    | LS CH 1 HIGH WATER               |
| TLM TANK 1 LEAK                  | TLM TANK 1 HIGH PROD             |
| TLM TANK 1 THEFT                 | TLM TANK 1 LOW PROD              |
| TLM TANK 1 .1 LEAK TEST REQUIRED | TLM TANK 1 .2 LEAK TEST REQUIRED |
| TLM TANK 1 HIGH WATER            |                                  |

(Repeat for relays 2, 3, 4, & 5 if the optional multi relay board is installed.)

## Print Setup Parameters

The System Setup may be printed to record the parameter settings that have been programmed into the system during setup. The complete report can be printed by selecting PRINT ALL or by sections that include GENERAL SITE, TANK LEVEL MONITOR, TANK CHARTS, LEAK SENSOR, RELAY, AUTO-DIAL ALARM REPORTS, and SHIFT REPORTS.

Print two listings of the setup parameters after system programming has been completed by pressing [PRINT] [SETUP] [ENTER]. Place one copy inside the console for future reference and return one copy with the startup documentation.

The default setup parameter listing illustrates the system parameters before programming.

```

STATION NAME HERE
STREET ADDRESS
CITY, STATE, ZIP
PHONE NUMBER
V15.01
10-27-9416:48:47

GENERAL SITE SETUP

STATION HEADER:
  STATION NAME HERE
  STREET ADDRESS
  CITY, STATE ZIP
  PHONE NUMBER

SERIAL NUMBER:
  0000000-I00

```

DATE AND TIME:  
10-27-9416:48:55

LANGUAGE VERSION:  
ENGLISH

LOCAL PORT SETUP:  
2400 BAUD  
8 DATA BITS  
1 STOP BITS  
NO PARITY  
SECURITY CODE  
REQUIRED: NO

MODEM PORT SETUP:  
2400 BAUD  
8 DATA BITS  
1 STOP BITS  
NO PARITY  
USED IN LOCAL MODE

SECURITY CODE  
REQUIRED: NO

SYSTEM UNITS:  
HEIGHT: INCHES  
VOLUME: US GAL  
TEMPERATURE:  
FAHRENHEIT

USE ALTERNATE ERROR  
HANDLING: NO  
\*\*\*\*\*

TANK LEVEL MONITOR  
SETUP

TANK 1 - INACTIVE  
LABEL: LABEL TK 1

TANK 2 - INACTIVE  
LABEL: LABEL TK 2

TANK 3 - INACTIVE  
LABEL: LABEL TK 3

TANK 4 - INACTIVE  
LABEL: LABEL TK 4

STORE 0.1 GPH TESTS:  
YEARLY

STORE 0.2 GPH TESTS;  
MONTHLY

```

STORE 0.1 GPH
  TESTS > 14% FULL VOLUME
STORE 0.2 GPH
  TESTS > 14% FULL VOLUME
DO 0.1 TESTS AFTER
  STORE REQ'S MET: YES
DO 0.2 TESTS AFTER
  STORE REQ'S MET: YES
DISPLAY/PRINT NET
  VOLUMES: YES

```

```

MANIFOLDED TANK GROUP 1:
  INACTIVE
  LABEL: MAN TK GR1
MANIFOLDED TANK GROUP 2:
  INACTIVE
  LABEL: MAN TK GR2

```

\*\*\*\*\*

#### LEAK SENSOR SETUP:

```

CHANNEL 1 IMO
INACTIVE
LABEL: LABEL CH 1

```

```

CHANNEL 2 IMO
INACTIVE
LABEL: LABEL CH 2

```

```

CHANNEL 3 IMO
INACTIVE
LABEL: LABEL CH 3

```

```

CHANNEL 4 IMO
INACTIVE
LABEL: LABEL CH 4

```

```

CHANNEL 5 IMO
INACTIVE
LABEL: LABEL CH 5

```

```

CHANNEL 6 IMO
INACTIVE
LABEL: LABEL CH 6

```

```

CHANNEL 7 IMO
INACTIVE
LABEL: LABEL CH 7

```

```

CHANNEL 8 IMO
INACTIVE
LABEL: LABEL CH 8

```

DPAN SENSORS  
    SENSITIVITY:    HIGH  
SUMP SENSORS  
    SENSITIVITY:    HIGH  
\*\*\*\*\*

RELAY SETUP:

NO EQUIPMENT IS  
INSTALLED OR ACTIVE  
\*\*\*\*\*

SHIFT REPORT SETUP:

REPORT 1 DISABLED

REPORT 2 DISABLED

REPORT 3 DISABLED  
\*\*\*\*\*

# Alarms and Trouble Codes

## Definitions

**Alarms** Identify conditions that indicate release of product or levels in the tank that are outside preset limits. The red LED is on when an alarm condition has occurred.

**Troubles** Identify malfunctions in the monitoring system hardware. Two digit codes (TCxx) are displayed to assist in identifying the cause of the condition. The yellow LED is on when a trouble condition has occurred.

**System Troubles** There are several system troubles that can become active. Note that some of these troubles also affect individual TLM or LS operations.

**Tank Level Monitor** Tank Level Monitor gauges have several alarms and troubles that can become active. Once an alarm or trouble becomes active, the indication is latched into the system display and stored in memory. The displayed indication is cleared automatically only when the condition clears.

**Leak Sensors** Leak sensors have four alarms and several trouble conditions which can be active. Once an alarm or trouble becomes active, the indication is latched into the system display and stored in memory. The displayed indication is cleared automatically only when the condition clears.

## Alarm And Trouble Summary

### System Trouble Codes

- 08 - TLM 8255 problem
- 09 - TLM communications problem
- 10 - TLM processor not responding
- 11 - TLM can't send out command (8051)
- 12 - 8255 (display)
- 13 - 8255 (w/ keypad)
- 14 - Printer problem
- 15 - Real time clock invalid
- 16 - Real time clock not moving
- 17 - RAM problem

- 18 - Local port general problem
- 19 - Modem port general problem
- 20 - General external communications problem (modem startup problem)
- 21 - General external communications problem with modem dialing or disconnecting
- 22 - General external communications problem

## **Leak Sensor Trouble Codes**

- 30 - Open circuit
- 31 - Short circuit

## **TLM Trouble Codes**

- 50 - Failed to sync to probe or timing/protocol violated.
- 51 - Probe is missing sync pulse (no probe)
- 52 - Missing float pulse
- 53 - Missing interrogate pulse
- 54 - No product float detected, there should be one
- 55 - No water float detected, there should be one
- 56 - Water float detected, there should not be one
- 57 - Product float position exceeds probe length
- 58 - Product float is positioned above maximum height of tank
- 59 - Water float position greater than the probe length
- 60 - Water height above max height of tank
- 61 - Temperature error (bad values or outside of operating range)
- 62 - 8051 math errors
- 63 - General probe error
- 64 - Data appears incorrect for the probe
- 65 - General errors

# Detailed Diagnostic Trouble Codes

The EECO System internal diagnostics continually check the total system for correct operation. The following codes represent the possible system troubles and information to assist in isolating the cause of the problem.

## System Trouble Codes

### 08 TLM 8255 problem

- The contents of the 8255 mode registers do not agree with what was programmed into them.
- *Defective TLM circuit, replace main board.*

*Errors 09 through 11 must occur three passes in succession to result in an error code.*

### 09 TLM communications problem

- The data coming from the TLM processor is incorrect.
- *Defective TLM circuit, replace main board.*

### 10 TLM processor is not responding

- The TLM processor is not sending data back to the main processor. No data is coming into the main processor's input buffer.
- *Possible defective TLM circuit, replace main board.*

### 11 TLM can't send out command

- The output buffer of the main processor is staying full. The TLM processor is not reading the commands or does not realize they are there.
- *Possible defective TLM circuit, replace main board.*

### 13 Front Panel failed

- This appears after a front panel failure has occurred and was corrected.

### 14 Printer problem

- The main board cannot send characters to the printer.
- *Check the cable between the board and the printer*
- *Confirm the printer has paper*
- *Check that the printer is online*
- *Replace the printer assembly*

**15 Real time clock time is invalid**

- The time and date in the real time clock are not valid.
  - *Check main board battery voltage (minimum 3.0 VDC) (If problem is only after AC power was off). Do not short battery terminals.*
  - *Possible defective RTC IC, replace main board.*

**16 Real time clock not operating**

- The real time clock is not changing.
  - *Possible defective RTC IC, replace main board.*

**17 RAM problem**

- A RAM problem was found during self-test.
  - *Possible defective main board, replace main board.*

**19 Local port, general problem**

- There is a problem with the hardware for the serial communication local port on the main board.

**20 Modem port, general problem**

- There is a problem with the hardware for the modem port.

**21 General external communications problem**

- There is a problem when the modem port tries to work with an external modem.
  - *1 - Check the EECO to modem interconnect cable for correct wiring.*
  - *2 - Check that modem port is set to 'Local Port' for terminal use.*
  - *3 - Check that modem power is on.*

**22 General external communications problem**

- There is a problem in dialing, connections, or hang-up.
  - *1 - Verify the phone numbers programmed for reports.*
  - *2 - Verify modem is connected to an operational phone line that is not in use.*
  - *3 - Verify phone numbers being called are not busy.*
  - *4 - Verify that 'DTR' is not forced 'ON' by DIP switch setting in modem.*
  - *Leak Sensor Troubles*

**30 Open sensor circuit on active leak sensor channel**

- *1 - If no sensor connected to active channel, change channel setting to 'INACTIVE'.*
- *2 - Check wire connections at sensor input and at sensor junction box for 'OPEN CIRCUIT'.*
- *3 - Run FS test #200 (+ sensor #) to test for sensor values above the normal operating range.*
- *4- Possible defective sensor. Connect sensor direct to interface input connection and retest.*

**31 Sensor short circuit on active leak sensor channel**

- *1- Check wire connections at sensor input and at sensor junction box for 'Shorted Circuit'.*
- *2- Run FS test #220 (+ sensor #) to test for sensor values below the normal operating range.*
- *3- Possible defective sensor. Connect sensor direct to interface input connection and retest.*

**Tank Level Monitor Trouble Codes****50 Failed to sync to probe or timing/protocol violated.**

- The TLM processor is not able to sync to a specific probe. There is a sync pulse, but the timing is wrong or erratic or the wrong protocol for the probe type selected.
  - *1 - If problem occurs on one probe of a multi-probe installation, replace the probe.*
  - *2 - If problem occurs on all active probe channels, replace the main system board.*

**51 Probe is missing sync pulse**

- The TLM processor is not seeing any sync pulses from the probe.
  - *1 - Check that probe connections are correct and tight.*
  - *2 - Check that correct data cable was used.*
  - *3 - Possible defective probe connected to indicated active channel.*
  - *4 - Possible probe not connected to the indicated active channel.*

**52 Missing float pulse**

- The interrogate pulse is detected, but there are no float pulses.
  - *1 - Check that floats (and magnets) are installed on the probe.*

- 2 - Check that probe is installed and touching the tank bottom.
- 3 - Possible defective probe (after connecting directly to Interface input).

### **53 Missing interrogate pulse**

- There is no interrogate pulse detected.
  - 1 - If one probe in multi-probe installation, possible defective probe.
  - 2 - If failure on all probes in multi-probe installation, possible defective TLM circuit, replace the main system board..

### **54 No product float detected**

- Similar to 52. The TLM processor is not sending product float information to the MPU.
  - 1 - Check that floats (and magnets) are installed on the probe.
  - 2 - Possible defective TLM circuit., replace the main system board.

### **55 No water float detected when there should be one**

- No water float has been detected when the system has been set up to have one.
  - 1 - Check for correct water float set-up.
  - 2 - Check that probe is correctly installed and touching tank bottom.
  - 3 - Check that water float (and magnet) is installed on probe.

### **56 Water float detected when there should not be one**

- A water float has been detected when the probe was programmed for 'no water float'.
  - 1 - Check that water float is not installed.
  - 2 - Possible defective probe (probe sending extra pulses).

### **57 Product float displacement is greater than probe length**

- The product float displacement is less than zero, indicating the float bottom is past the end of the probe.
  - 1 - Check that correct probe length has been selected in tank setup.
  - 2 - Check product float calibration.

### **58 Product height is above max height of the tank per tank table**

- The product float height is greater than the tank diameter.

- *1 - Check that tank has not been overfilled causing float to be in riser pipe.*
- *2 - On installation or tank overfill, check that product float is not stuck in the riser pipe.*
- *3 - Check that correct tank table has been selected.*

#### **59 Water displacement is greater than the probe length**

- The water float position is less than zero (but not into the probe 'dead zone'), indicating the float bottom is past the end of the probe.
  - *1 - Check that probe is correctly installed and touching tank bottom.*
  - *2 - Check that water float calibration is correct.*
  - *3 - Check that correct probe length has been selected in tank set-up.*

#### **60 Water height is above max height of tank per tank table**

- The water float height is greater than the tank diameter.
  - *1 - Check that correct tank table (diameter) has been selected.*
  - *2 - Check that floats are not stuck in riser pipe.*

#### **61 Temperature error (bad values or outside operating range)**

- The temperature information from the probe is bad or out of range.
  - *1 - Product temperature may be out of measurement range.*
  - *2 - Check temperature data returned from probe using Field Service test.*
  - *3 - Possible defective probe (bad temperature data).*

#### **62 TLM processor math errors**

- The TLM processor had problems in its calculations of the pulse widths.
  - *Possible defective TLM circuit., replace the main system board.*

#### **63 General probe error**

- Intermittent errors occurring pertaining to a particular probe. This group includes errors 57 through 61 (listed above). The problem is most likely in the probe.

#### **64 Data incorrect for the probe**

- Intermittent errors occurring pertaining to a particular probe. This group includes errors 57 through 61 (listed above). The problem is most likely in the probe.

## **65 General errors**

- Intermittent errors occurring pertaining to the TLM circuit. This group includes errors 08 through 11 (listed above).
  - *The problem is most likely in the TLM circuit on the main board.*

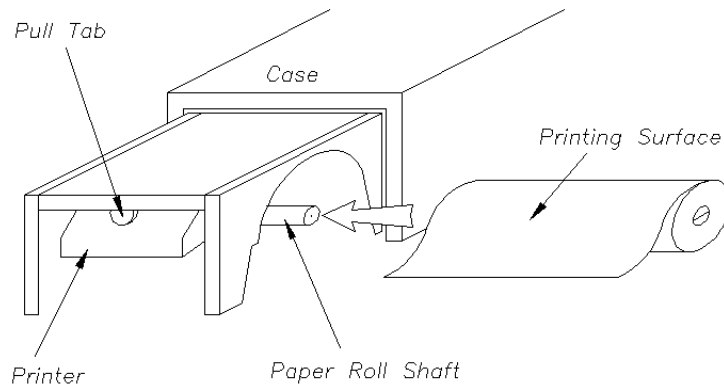
# Maintenance

The 1500 is an almost maintenance-free unit. However, the printer, backup battery, tank probes, and sensors require periodic inspection and if needed, replacement.

## Printer

There are earlier and newer models of receipt printers.

### EARLIER Printers - Changing Paper



*Figure 26: 1500 Printer Paper Supply Overview - Earlier Printers*

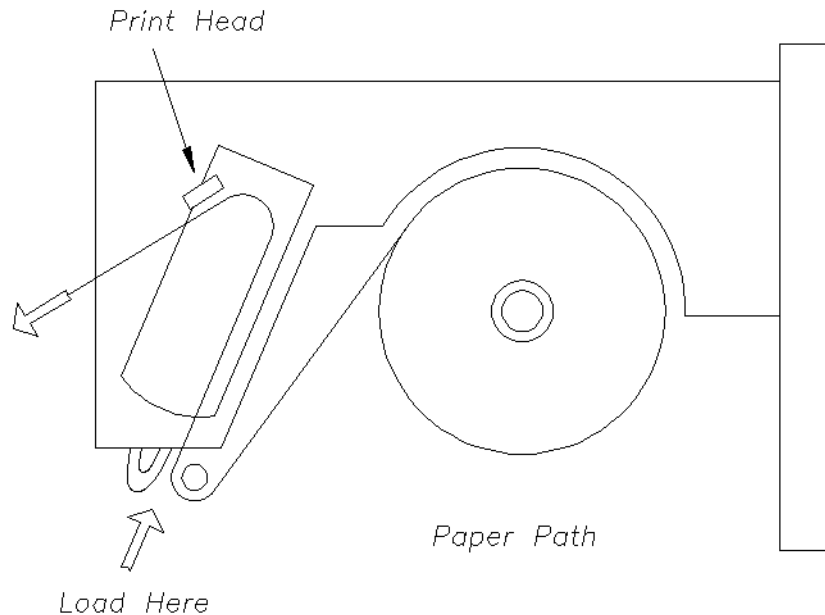
Use paper # **439445** (five-pack) Seiko part number TP058-18C..

1. See *Figure 26*. Press the sides of the printer bezel and lift it off.
2. Grip the half-moon pull tab located in the center of the printer circuit board and pull toward you.
3. Remove the empty paper spool from the spindle and slide on a new roll of paper.

### Note

*Be sure the paper feeds off the front of the roll next to the printer paper opening.*

4. See *Figure 27*. Bring the leading edge of the new paper roll into the paper feed slot below the printer..
- 



*Figure 27: Printer Paper Path - Earlier Printers*

5. While exerting a slight upward pressure on the paper, depress the paper feed to advance the paper into and through the printer.
6. Feed approximately 1/2" of paper out through the front of the printer.
7. Push the printer carriage back into the console.
8. Replace the printer bezel. Check that the end of the paper extends through the paper feed slot.

5. Replace the paper spool cover disc and close the printer door.

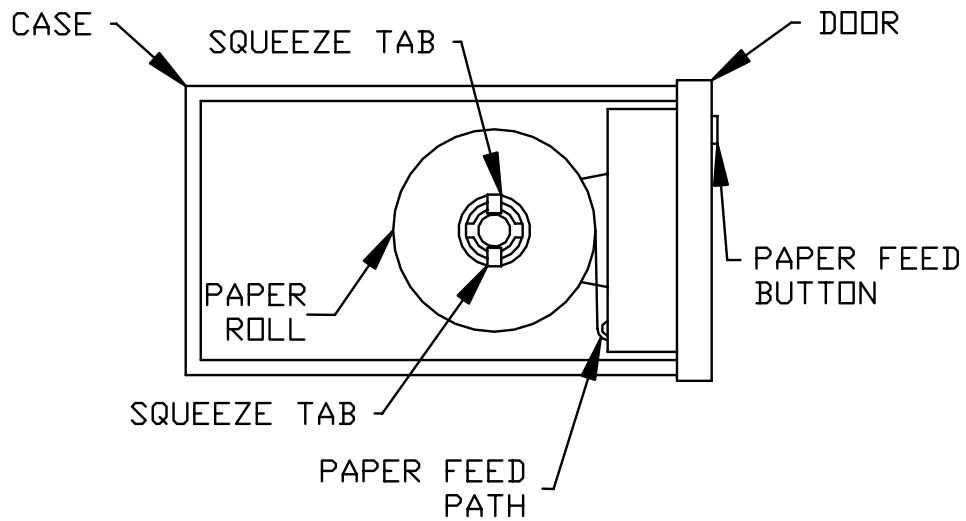


Figure 28: Receipt Printer - New Style

## Battery Backup

Check the Memory Backup Battery Voltage for a minimum of 3.0 VDC checked at battery leads (3.6 VDC Lithium Battery). Battery current is provided only when system AC power is off.

## Probe Maintenance

Periodic maintenance of the probes is needed to remove residues and build-up from the probe's precision surfaces. Frequency varies with the installation, but shouldn't be needed more than once every two or three years.

One indication that probe cleaning is needed is the appearance of failed leak tests interspersed with passed tests. Contamination on a probe shaft can very slightly impede the travel of a float over the shaft. This is rarely more than several thousandths of an inch -- not enough to affect volumetric measurements, but sufficient to exceed some leak test parameters.

1. Remove the probes from the tank.

---

### Note

*If you remove the probe tip, you will need a new rubber o-ring on the shaft tip before you replace the tip protector. The o-ring prevents the tip protector from slipping off the shaft. Sometimes you can re-use the old ring, but often it swells too much to be reused.*

2. Using an abrasive NON-METALLIC pad (like 3M's Scotch-Brite™), clean away any debris accumulated on the shaft surface and around the magnet above the floats. DO NOT use steel wool.
3. Stand the probe on the ground vertically.
4. Polish the probe using straight (along the axis) strokes. DO NOT use a twisting motion with the pad. Polishing is not needed on the top 10 or 12 inches of the probe. Stainless steel probes require heavy cleaning pressure.
5. While cleaning, stop often and inspect the surface for smoothness.
6. Inspect the top of the product float, in particular, the plastic spacer next to the magnet. The teeth of the spacer should be sharp and long enough to keep the magnet from touching the shaft's surface when assembling.

---

### Note

*If the spacer teeth are worn, replace the spacer.*

7. If you removed the probe tip, install a new o-ring above the threads at the top of the probe shaft. Make sure the old o-ring did not get stuck in the plastic tip protector.
8. Reinstall the floats and the screw-on tip (or the e-clip).
9. Calibrate the probe (see *page 38*).

# Circuit Boards

Component layouts for the 1500's two PC boards are shown here.

## Display/Keyboard PC Board

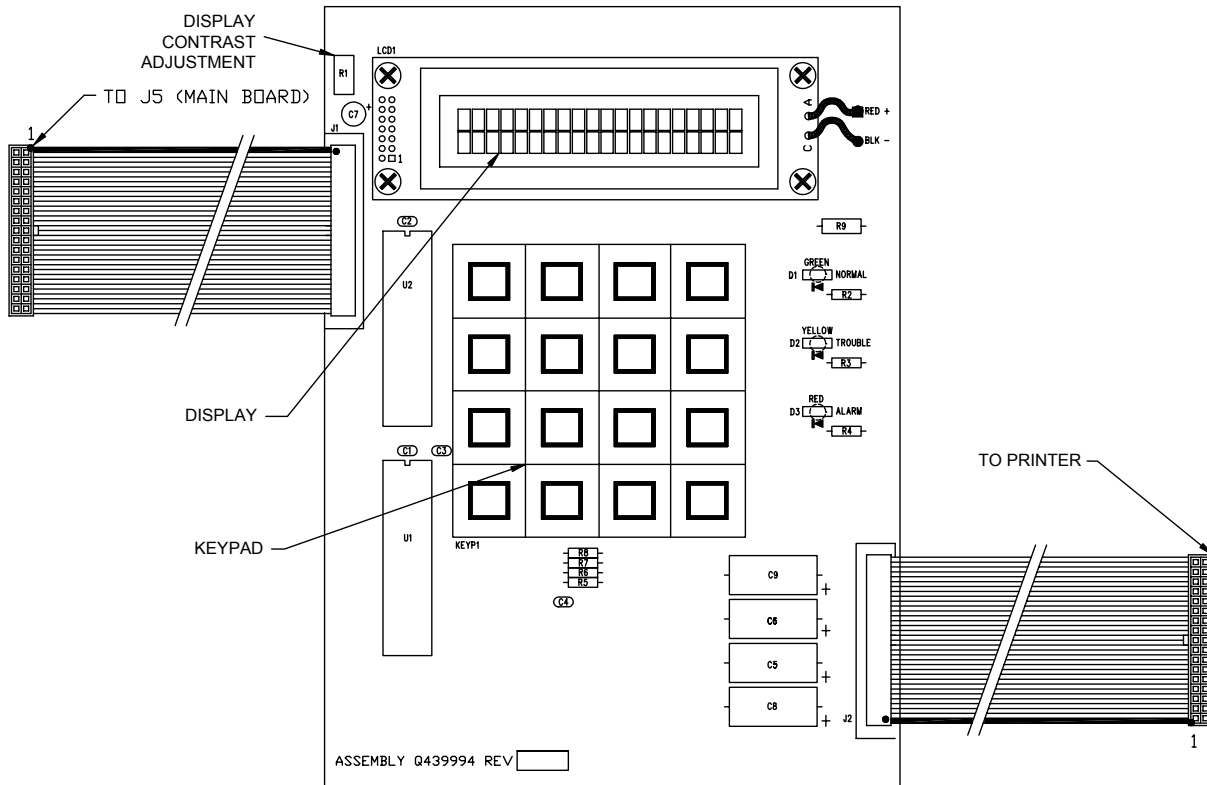
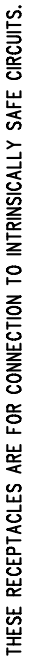


Figure 29: Display-Keybaord PC Board



# Sensors

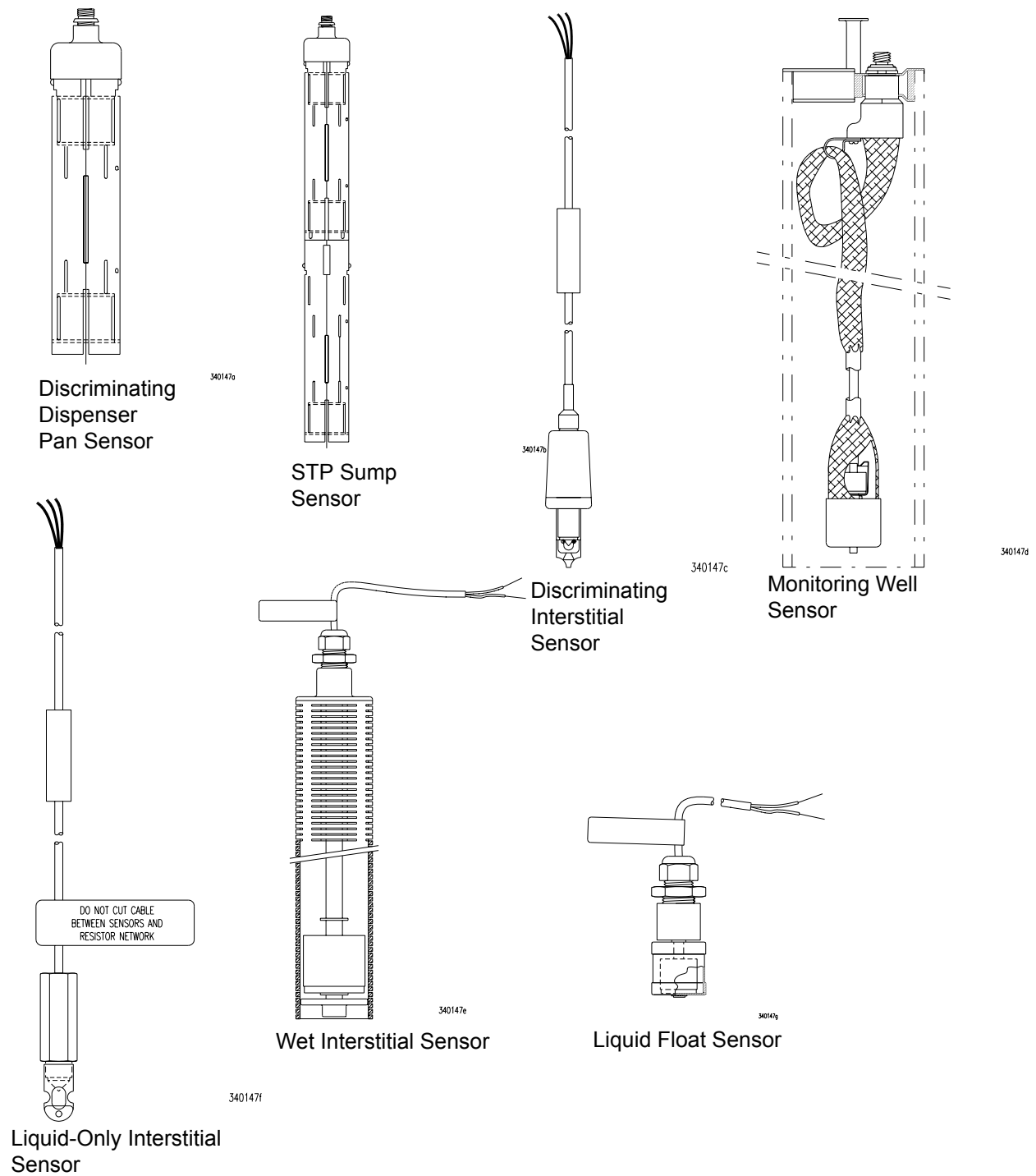


Figure 31: EECO Sensors



Issue Date: January 11, 2001

Revision Date: November 19, 2003

**OPW Fuel Management Systems**  
**(originally listed as Emco Electronics, Tuthill Transfer Systems)**  
**EECO System 1000, 1000EG, 1500, 2000, 3000 and Galaxy ATG Systems**  
**(Q0400-4xx Magnetostrictive Probe)**

**CONTINUOUS IN-TANK LEAK DETECTION METHOD**

**Certification  
Leak Threshold**

Leak rate of 0.2 gph with PD = 99.1% and PFA = 0.9%.

0.1 gph for single and manifolded tank systems.

A tank system should not be declared tight and a message printed for the operator, if the test results indicate a loss or gain that exceeds this threshold.

**Applicability**

Gasoline, diesel, aviation fuel.

The system is designed primarily for use with petroleum fuels.

Other liquids with known coefficients of expansion and density may be tested after consultation with the manufacturer.

**Tank Capacity  
Throughput  
Waiting Time  
Test Period**

Maximum of 35,000 gallons for single tanks and for up to 2 tanks manifolded together.

Monthly maximum of 130,000 gallons.

Minimum of 6 hours stabilization time is allowed between delivery and data collection.

Average data collection time is 12 days.

During evaluation, data collection time ranged from 1 to 31 days.

Data sampling frequency is at least once per minute.

System collects data at naturally occurring product levels without interfering with normal tank operation and discards data from unstable periods when system performs test.

**Temperature  
Water Sensor**

Average for product is determined by a minimum of 5 sensors.

Must be used to detect water ingress.

Minimum detectable water level in the tank is 0.66 inch.

Minimum detectable change in water level is 0.039 inch.

**Calibration**

Temperature sensors are factory calibrated.

Probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

**Comments**

System reports a result of "pass" or "fail."

Evaluated using both single and manifolded tank systems.

Data can be collected when the product level is between 9% and 94.9% of tank volume.

System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail".

For valid monthly testing, a conclusive test report must be produced for each tank every month.

System warns operator if there are no "passing" tests completed during the month.

For very active tanks, a tank shut down may become necessary in order for the system to collect enough quiet-time data for a test.

The 6-hour stabilization period after delivery may result in the system not testing the top portion of a very active tank. In this situation, a periodic test in the shut-down mode with a high product level should be used to test the entire portion of tank that routinely contains product.

Because the database for evaluation of the system did not include sites with vapor recovery, certification is limited to sites with no vapor recovery.

Evaluated using gasoline.

OPW Fuel Management Systems  
6900 Santa Fe Dr.  
Hodgkins, IL 60525  
Tel: (708) 485-4200

Evaluator: Ken Wilcox Associates  
Tel: (816) 443-2494  
Dates of Evaluation: 03/13/00

**Appearance on this list is not to be construed as an endorsement by any regulatory agency nor is it any guarantee of the performance of the method or equipment. Equipment should be installed and operated in accordance with all applicable laws and regulations.**

# Index

## A

ACK key, 6  
 Alarm  
   *Autodial*, 37  
   *Defined*, 57  
   *High Product*, 45  
   *High product*, 35  
   *High-Level*, 45  
   *Setup*, 45  
   *Water level*, 46  
 Alarm Status, 15  
 Alarms  
   *Autodial reporting*, 3  
   *Codes*, 4  
   *Indication on Console*, 2  
   *Relay for*, 4  
   *Report*, 15  
 Alternate error handling, 34  
 API, 36, 42  
 Auto, 3  
 Autodial, 3  
 Autodial time, 34

## B

Battery, checking, 67

## C

CANCEL key, 6  
 CHANGE functions, 21  
 CHANGE key, 5  
 Communication, 4  
 Console  
   *Components*, 3  
 CTE (Coefficient of Thermal Expansion), 41  
 Cursor, controlling, 5

## D

Daily reports, 4  
 Date and time  
   *Changing*, 21  
 Delivery status, 15  
 Delivery threshold, 35, 46  
 Display  
   *Setup*, 8  
 Display functions, 7  
 DISPLAY key, 5  
 Display menu, 7

DUARTs, 31

## E

EECOTALK, 51  
 EECOTalk, 22  
 ENTER key, 6  
 EPA information, 73

## F

Features, 1, 3  
 Float, 36  
   *Calibration of*, 41  
   *Number of*, 39  
   *Product*, 39  
   *Types*, 38  
   *Water*, 39

## G

Generator usage report, 12  
 Gradient, 38

## H

Header line, 22  
 Header lines, 34  
 High Product, 35  
 History  
   *Display*, 7  
   *Print*, 10  
 History buffer, 3  
 HISTORY key, 6  
 History log, 2

## I

Input channel, probe, 40  
 INVENTORY key, 6  
 Inventory status, 13

## K

Keypad  
   *How to use*, 1  
   *Key definitions*, 5  
   *Specs*, 3

## L

Labels  
   *Product*, 4  
 Language, alternate, 7  
 Leak Sensor, 48  
   *About*, 2  
   *Programming*, 2  
   *Trouble codes*, 58  
 Leak Sensor status, 16  
 Leak Test  
   *Changing*, 23  
   *Display*, 8  
   *Manual*, 23  
   *Manual test results*, 27  
   *Precision*, 35  
   *Printing*, 10  
   *Report*, 12  
   *Results*, 24  
   *Run time*, 23  
   *Setup*, 44  
   *Storing*, 35  
   *Volume*, 45  
 LEAKTEST key, 6  
 LEDs, 3

## M

Maintenance, 65  
 Managers Code, 21  
 Manifolded tanks, 35, 44  
 Menus  
   *How to use*, 1  
 Modem port, 34  
 Multi-Relay option, 1  
 Multi-relay Setup, 51

## N

Net volumes, 35, 46  
 NEXT key, 5

## P

PC board, diagrams, 69  
 Pitch, tank, 43  
 Polynomial order, 47  
 Port setup, 34  
 PREV key, 5  
 Print  
   *Leak Test*, 10  
   *Status*, 9

Print Functions, 9  
 Print functions, 9  
 PRINT key, 5  
 Printer  
     *Specs*, 3  
     *Stopping*, 5  
 Printing  
     *Paper used*, 65  
     *Setup parameters*, 52  
 Print-on-Demand report, 13  
 Probe  
     *Serial number*, 36  
     *Setup*, 36, 38  
 Product  
     *Setup*, 41  
 Product float, 39  
 Product labels, 4  
 Product setup, 36

## R

Relay  
     *Multi setup*, 51  
 Relays, 4  
     *Matrix*, 37  
 Reports  
     *Alarm*, 15  
     *Auto-Delivery*, 11  
     *Daily*, 4  
     *Delivery status*, 15  
     *Format of*, 37  
     *Generator usage*, 12

*Leak test*, 12  
     *Leak test failure*, 26  
     *Print-on-Demand*, 13  
     *Shift*, 4, 14, 22, 37  
 REPORTS key, 6  
 RS-232 Communication, 4  
 RTD, 39

## S

Security code, 34  
 Self-test, 31  
 Sensor  
     *Illustrations of*, 71  
 Serial port, 4  
 Setup  
     *Site*, 34  
 SETUP key, 6  
 Setup procedure, 33  
 Shift report, 4, 14  
 Site Setup, 48  
 Site setup, 34  
 Span, 39  
 Specific Gravity, 42  
 Specific gravity, 36  
 Specifications, 3  
     *Probe*, 36  
 Status  
     *Printing*, 9  
 STATUS key, 6  
 STOP PRINTING key, 5  
 SYS TEST key, 5

System test, 31

## T

Tank  
     *Chart*, 42  
     *Manifolded*, 35  
     *Pitch*, 35  
     *Setup*, 35, 42  
     *Table*, 36  
 Theft alarm, 46  
 Time  
     *Changing*, 21  
 Timing Factor, 39  
 Timing factor, 36  
 TLM  
     *Cleaning*, 68  
     *Trouble codes*, 58  
 TLM (Tank Level Monitor), 38  
     *About*, 1  
 Trouble  
     *Defined*, 57  
 Troubleshooting, 57

## U

Ullage, 46  
 Units of measure, 50

## W

Water float, 39

Notes:



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