TLS-250i AND TLS-250i *Plus!* FOUR-TANK SYSTEMS INVENTORY MONITOR AND INTERSTITIAL LEAK SENSOR

Manual Number 576013-578

This manual contains start-up and operating instructions for the following systems:

- TLS-250i Four-Tank System
  - 794191-102 (without printer)
  - 794191-122 (with printer)

- TLS-250i Metric Four-Tank System
  - 794171-202 (without printer)
  - 794171-222 (with printer)

- TLS-250i *Plus!* Four-Tank System
  - 794195-102 (without printer)
  - 794195-122 (with printer)
The Veeder-Root TLS-250i Four-Tank System Tank Level Sensor, when properly installed, complies with the technical standards for inventory control in Section 280.43 of U.S. E.P.A. Regulation 40 CFR Part 280. The TLS-250i Four-Tank System is capable of measuring the level of product over the full range of each tank's height to within 0.1 inches.

The above performance claims were determined in the following manner:

1) Testing over a five-year period in each of two test facilities located at the Veeder-Root Engineering building in Hartford, CT. First is an outdoor instrumented underground tank test facility consisting of one 6,000 gallon fiberglass tank and one 5,000 gallon steel tank with the capability of automatic, around-the-clock testing. Second is an instrumented test tank located inside in which the product level can be controlled to 0.001 inch and the product temperature can be varied over the range of 20°F to 120°F and maintained to within 0.01°F.

2) Testing over a four-year period in a commercial service station located in Hartford, CT, containing four underground tanks and purchased by Veeder-Root for the sole purpose of testing TLS systems.

3) Engineering analysis of numerous inventory records obtained from hundreds of customer-owned underground tanks. On a regular basis, Veeder-Root engineers obtain data via direct phone lines and mailed-in printouts from a large number of the more than 30,000 tanks in which the TLS was installed at the time of this statement. The data are regularly analyzed to monitor the long term performance of the TLS system.

Summaries of results of the above testing are available at Veeder-Root Company in Simsbury, Connecticut.

The TLS-250i, when properly installed, complies with the technical standards for interstitial monitoring for tanks and piping in Sections 280.43(g), 280.44(a) when used with the Veeder-Root sump sensor switch, and 280.44(c) of U.S. E.P.A. Regulation 40 CFR Part 280. The TLS-250i, when used in the interstitial space of a double-walled underground storage tank, can detect a release through the inner wall in any portion of the tank that routinely contains product. The TLS-250i, when used in the interstitial space of double-walled piping, can detect a release from any portion of the underground piping that routinely contains regulated substances.

The above performance claims were determined in the following manner:

1) Laboratory testing of interstitial sensors by the Veeder-Root Company Engineering Department and Quality Assurance Department to verify compliance with Federal regulations.

2) Field testing at numerous service stations under actual operating conditions by Veeder-Root Company.

Summaries of results of the above testing are available at Veeder-Root Company in Simsbury, Connecticut.
ATTENTION

READ THIS IMPORTANT SAFETY INFORMATION BEFORE STARTING UP OR OPERATING A TLS-250i OR TLS 250i Plus! SYSTEM

This product has been installed and will operate in the highly combustible environment of a gasoline storage tank. It is essential that you carefully read and follow the warnings and instructions in this manual to protect yourself and others from death, serious injury, explosion or electrical shock.

For safety reasons, we have taken particular care in the design of this product to limit the power in the wiring to the fuel tanks and to keep wiring physically separated from any other wiring. It is your responsibility to maintain the effectiveness of these safety features by starting up and operating this product in accordance with the instructions and warnings which follow. Failure to do so could create danger to life and property.

Leaking underground tanks can create serious environmental and health hazards. It is your responsibility to operate the product in accordance with the instructions and warnings found in this manual.

Failure to start-up and operate this product in accordance with the instructions and warnings found in this manual will result in voiding all warranties connected with this product (see Section 8).

WARNINGS: EXPLOSION COULD OCCUR IF OTHER WIRES SHARE TLS-250i PROBE AND SENSOR WIRE CONDUITS OR WIRING TROUGHS. CONDUITS AND WIRING TROUGHS FROM PROBES AND SENSORS TO THE MONITOR MUST NOT CONTAIN ANY OTHER WIRES.

IMPROPER SYSTEM OPERATION COULD RESULT IN INACCURATE INVENTORY CONTROL OR UNDETECTED POTENTIAL ENVIRONMENTAL AND HEALTH HAZARDS IF PROBE AND SENSOR-TO-MONITOR WIRE RUNS EXCEED 1,000 FEET. RUNS OVER 1,000 FEET ARE NOT UL APPROVED FOR THIS APPLICATION. PROBES AND SENSOR-TO-MONITOR WIRING MUST NOT EXCEED 1,000 FEET.

EXPLOSION AND/OR EQUIPMENT DAMAGE COULD OCCUR IF CONDUITS DO NOT ENTER THE MONITOR THROUGH THEIR DESIGNATED PREFORMED KNOCKOUTS.

EXPLOSION COULD OCCUR IF THE MONITOR IS INSTALLED IN A VOLATILE, COMBUSTIBLE OR EXPLOSIVE (CLASS I, DIVISION I OR DIVISION II) ATMOSPHERE. DO NOT INSTALL MONITOR IN A VOLATILE COMBUSTIBLE OR EXPLOSIVE ATMOSPHERE.

IN INSTALLATION AND USE OF THIS PRODUCT, COMPLY WITH THE NATIONAL ELECTRICAL CODE; FEDERAL, STATE AND LOCAL CODES; AND OTHER APPLICABLE SAFETY CODES.

TO AVOID ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY, BE SURE AC POWER TO THE MONITOR IS OFF DURING INSTALLATION.

CAREFULLY READ THE OPERATING INSTRUCTIONS AND WARNINGS FOUND IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN UNDETECTED ENVIRONMENTAL AND HEALTH HAZARDS.

FAILURE TO COMPLY WITH THESE REQUIREMENTS COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY LOSS, EQUIPMENT DAMAGE, AND UNDETECTED ENVIRONMENTAL AND HEALTH HAZARDS.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

CIRCUITRY WITHIN THE PROBE, SENSOR AND CONSOLE BARRIER FORM AN INTRINSICALLY SAFE, ENERGY-LIMITED SYSTEM. THIS SYSTEM MAKES THE TLS PROBE AND SENSOR INTRINSICALLY SAFE FOR USE IN A CLASS I, GROUP D HAZARDOUS LOCATION. THE TLS-250i PROBE AND SENSOR WIRING IS INTRINSICALLY SAFE ONLY WHEN CONNECTED TO VEEDEER-ROOT'S MONITOR FORM NUMBER 7941.

DO NOT APPLY POWER TO THE SYSTEM UNTIL ITS INSTALLATION HAS BEEN CHECKED AND FOUND TO BE IN ACCORDANCE WITH THE INSTRUCTIONS OUTLINED IN THE VEEDEER-ROOT "SITE PREPARATION AND INSTALLATION INSTRUCTIONS," MANUAL NO. 576013-579; THE NATIONAL ELECTRICAL CODE; FEDERAL, STATE AND LOCAL CODES; AND OTHER APPLICABLE SAFETY CODES.
INTRODUCTION

This manual describes system start-up and operating procedures for TLS-250i Standard, TLS-250i Metric, and TLS-250i Plus/ Four-Tank Series UST Monitoring Systems.

U.S. versions of the TLS-250i use gallons, inches and degrees Fahrenheit for the calculation and display of information. The Metric version follows the same set-up procedures, but all information is in millimeters, liters and degrees Celsius.

Where procedures or displays differ from U.S. standard systems, the differences will be shown or explained.

The TLS-250i Plus/Four-Tank System can operate with Veeder-Root Series 8472 Capacitance and Series 8473 Magnetostriective probes for improved temperature sensing and inventory accuracy, and the Magnetostriective probe can measure many fluids other than fuels. All TLS-250i Four-Tank Systems can operate with the standard Veeder-Root Series 7842 Capacitance Probes.

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Note: Vertical bars adjacent to text indicate information added or changed during issue date on the front cover.
SECTION 1 — PREPARATION CHECKLIST

Before you start checkout and setup procedures for the TLS-250i or TLS-250i Plus! Four-Tank System, be sure you have the materials and information shown on this checklist.

MANDATORY

☐ Epoxy sealant kit (one per probe and sensor, furnished with each probe and sensor).

☐ Warranty Registration and Checkout Form.

☐ TLS-250i or TLS-250i Plus! Four-Tank System Site Preparation and Installation Instructions, Manual No. 576013-579.

☐ Tank specifications including material, diameter, volume.

☐ Tank height-to-volume conversion chart

OPTIONAL

Listed below are optional setup parameters. Enter desired values in the appropriate spaces. Having this information established will save time and inconvenience during setup.

Shutdown Mode

Start Time: ________: ________ (AM/PM)

Stop Time: ________: ________ (AM/PM)

Auto Print Time #1: ________: ________ (AM/PM)

Auto Print Time #2: ________: ________ (AM/PM)

Auto Print Time #3: ________: ________ (AM/PM)

++ Fuel height readings at the fill riser and probe riser should have been taken for each tank at the time of probe installation and recorded in the TLS-250i and TLS-250i Plus! Four-Tank System "Site Preparation and Installation Instructions," Manual No. 576013 570.

☐ Security Code ____________________ (up to six digits).

SECTION 2 — WARRANTY REGISTRATION AND CHECKOUT

A. Intrinsic Safety Check

Be sure power is OFF before starting this intrinsic safety check.

1. Check to be sure probe and sensor wires are contained in a separate, dedicated rigid conduit.

WARNING: EXPLOSION COULD OCCUR IF OTHER WIRES SHARE TLS-250i AND TLS-250i Plus! PROBE AND SENSOR WIRE CONDUITS OR WIRING TROUGHS. CONDUITS AND WIRING TROUGHS FROM PROBES AND SENSORS TO THE MONITOR MUST NOT CONTAIN ANY OTHER WIRES.

For wiring diagrams, see the TLS-250i and TLS 250i Plus! Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579.

2. Check to be sure probe- or sensor-to-monitor wiring does not exceed 1,000 feet.

WARNING: IMPROPER SYSTEM OPERATION COULD RESULT IN INACCURATE INVENTORY CONTROL OR UNDETECTED POTENTIAL ENVIRONMENTAL AND HEALTH HAZARDS IF PROBE-OR SENSOR-TO-MONITOR WIRE RUNS EXCEED 1,000 FEET. RUNS OVER 1,000 FEET ARE NOT UL APPROVED FOR THIS APPLICATION. PROBE- OR SENSOR-TO-MONITOR WIRING MUST NOT EXCEED 1,000 FEET.

For wiring diagrams, see the TLS-250i Four-Tank System “Site Preparation and Installation Instructions”, Manual No. 576013-579.
3. Verify that all conduits enter the monitor through preformed conduit knockouts.

**WARNING: EXPLOSION AND/OR EQUIPMENT DAMAGE COULD OCCUR IF CONDUITS DO NOT ENTER THE MONITOR THROUGH THEIR DESIGNATED PREFORMED KNOCKOUTS.**

For wiring diagrams, see the TLS-250i and TLS 250i Plus/ Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579.

4. Open the monitor cover by removing the two screws on the right side of the cover and swing the door open. (It may be necessary to loosen the two screws in the left cover to open the right door.) Locate the power supply terminal strip in the lower left-hand corner of the cabinet.

5. Verify that #12AWG (or larger) conductor has been connected between the barrier ground (terminal 5 on the power supply wiring strip) and the earth ground bus on the power panel being used to supply AC line voltage to the monitor. (See the TLS-250i and TLS 250i Plus/ Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579 for correct wiring diagram.)

6. Verify that power supply terminals are correctly wired. (See the TLS-250i and TLS 250i Plus/ Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579 for correct wiring diagram.)

7. Verify that system power is properly wired to a separate, dedicated breaker.

8. Locate the intrinsically-safe barrier cover inside the monitor cabinet, remove the two screws and open the cover.

9. Verify that all probe and sensor connections have been made properly using color-coded wires and that the proper color code designations have been maintained throughout the probe- or sensor-to-monitor wiring hook-ups.

10. If any discrepancies are found in TLS-250i wiring or installation, refer to the TLS-250i and TLS 250i Plus/ Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579 for the correct procedures.

11. Close the barrier strip cover and fasten its two screws. Close the monitor cover and replace the locking screws (2) on the right side of the cabinet.

---

**PUSHBUTTON FUNCTIONS**

![PUSHBUTTON FUNCTIONS](image)

**CURSOR — SETUP mode only**
Depress button to move cursor (flashing digit) to digit to be changed.

**INCREMENT — SETUP mode only**
After cursor is set, depress **INCREMENT** button to advance digit to desired number.

**LEAK ALERT RESET**
Depress once to shut off and reset audible alarm (will not shut off alarm LEDs). **NORMAL MODE** — When audible alarm is inactive, depress once to test LEDs and audible alarm. **SETUP MODE** — When on the -A or -B setup codes, depress to reset sensor configuration. **DIAG MODE** — Depress to set the system in Sensor Checkout Mode.

**PRINT**
Set display to information to be printed using keyswitch. **FUNCTION, TANK** buttons. Depress **PRINT** button once for printout.

**FUNCTION**
Depress button to advance display function.

**TANK**
Depress button to advance displayed tank/sensor number.
OPERATING MODES

The Operating Mode keyswitch provides access to the various modes required to set up, operate and service the TLS-250i.

In the NORMAL mode, all inventory and sensor status may be viewed on the display and, using the PRINT button, printed by the optional printer. In the SETUP mode, all setup parameters may be entered, viewed on the display and changed if required. The DIAGNOSTIC mode reveals important information about the system which is helpful while servicing the equipment.

Turning the keyswitch to the ALARM RESET position will reset the flashing display and alarm relays after an alarm condition has been detected. The ALARM RESET position will only reset the ALARM CAUSE LEDs for those sensors which have been corrected or which have returned to a NORMAL condition.

The following is an explanation of the inventory, setup and diagnostic information accessible using the Operating Mode keyswitch.

### KEYSWITCH POSITION

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<tr>
<td>0B</td>
<td>MM-DD Month and Day</td>
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<tr>
<td>29</td>
<td>n</td>
<td>9AC</td>
</tr>
<tr>
<td>30</td>
<td>n</td>
<td>GGGGG</td>
</tr>
<tr>
<td>31</td>
<td>n</td>
<td>HHH</td>
</tr>
<tr>
<td>32</td>
<td>n</td>
<td>HH:HH</td>
</tr>
<tr>
<td>33</td>
<td>n</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>—</td>
<td>—C</td>
</tr>
<tr>
<td>35</td>
<td>—</td>
<td>—AB</td>
</tr>
</tbody>
</table>

*Some formats may differ for metric versions. In all cases, G (Gallons) will be L (Liters), I (Inches) will be mm (millimeters) and F (°Fahrenheit) will be C (°Celsius).

**Optional inventory report feature selectable in Setup Mode.
C. System Power-Up and Checkout

DO NOT APPLY POWER TO THE SYSTEM UNTIL ITS INSTALLATION HAS BEEN CHECKED AND FOUND TO BE IN ACCORDANCE WITH THE INSTRUCTIONS OUTLINED IN THE VEEDEER-ROOT TLS-250i and TLS-250i Plus! FOUR-TANK SYSTEM “SITE PREPARATION AND INSTALLATION INSTRUCTIONS,” MANUAL NO. 576013-579; THE NATIONAL ELECTRICAL CODE; FEDERAL, STATE AND LOCAL CODES; AND OTHER APPLICABLE SAFETY CODES.

IMPORTANT: Read this information before proceeding with system power-up and checkout!

The TLS-250i is programmed by entering desired values for various setup and operating parameters. It uses procedures similar to those used to set the time in a digital watch. Displays are selected and values entered or changed using specified buttons.

The FUNCTION button on the TLS-250i is used to advance the display from one function to the next (i.e., to advance from “Time-of-Day” to “Month/Date”). When using the FUNCTION button, be sure the display shown on the LCD actually represents the desired information BEFORE you enter or change any values. Confirm this by observing the Function Code that appears in the display. The FUNCTION button is sensitive and the display can easily jump beyond the desired display if the button is held down.

If you inadvertently pass the desired function, simply turn the keyswitch to any other position and then back to setup. The display will return to Time-of-Day and you may index to the desired function using the FUNCTION button.

NOTE: Although the TLS-250i can monitor up to four tanks with one console, if fewer than four tank probes are connected, the system skips the unused tank positions (except when in “SETUP” mode). For example, if only three probes are connected, depressing the TANK button will advance the display through 1, 2, 3 and then return to 1. The same is true for sensors in the system.

If a system with three tanks only displays information for two, this would indicate that the missing probe is improperly connected.

To power up the TLS-250i systems:

1. Set the Operating Mode keyswitch to “DIAG” (diagnostic) position.
2. Apply system power by setting the station power panel breaker to the “ON” position.
   a. The LCD should show the error code E00.
   b. If any other error code appears, refer to the TLS-250i troubleshooting manual for an explanation.
   c. TLS systems with the optional integral printer will print an error code interpretation.
3. Set the Operating Mode keyswitch to “NORMAL” position.
   a. A random time value will appear in the display.
4. Depress the FUNCTION button twice to display fuel height for tank #1 in inches to two decimal places.
   a. A proper display indicates the wiring to probe #1 is correct.
5. Depress the TANK button to display fuel height for tank #2. Again, a display in inches to two decimal places indicates proper probe wiring.
6. Repeat this procedure for each tank in the system until the display returns to tank #1.
7. Depress the FUNCTION button to display water height for tank #1 in inches to one decimal place.
   a. A proper display indicates the water sensor in the probe is functioning.

   **NOTE:** If there is less than 3/4 inches of water in the tank, the TLS will show 0.0 inches on the display. Water is displayed in inches to tenths from 3/4 inches and up.

8. Depress the TANK button to display water height in tank #2 in inches to one decimal place.

9. Repeat step 8 for each tank until the display returns to tank #1.

10. Depress the FUNCTION button to display fuel temperature for tank #1 in degrees Fahrenheit to one decimal place.
    a. A proper display indicates the temperature sensor is working.

11. Depress the TANK button to display the fuel temperature in tank #2 in degrees Fahrenheit to one decimal place.

12. Repeat step 11 for each tank until the display returns to tank #1.

13. Perform the Sensor Learn procedure.
    a. Set the Operating Mode Keyswitch to “SETUP”.
    b. Depress the FUNCTION button until Function Code A or B appears on the display.
    c. Depress the LEAK ALERT RESET button.
    d. Return the Operating Mode Keyswitch to “NORMAL”.

   **NOTE:** On systems equipped with a printer, a sensor configuration report will be printed automatically after you depress the LEAK ALERT RESET button.

14. Place the system in Sensor Checkout Mode.
    a. Set the Operating Mode Keyswitch to the “DIAG.” (diagnostic) position.
    b. Depress the LEAK ALERT RESET button. The “DIAG” annunciator in the LC display will begin to flash.

   **NOTE:** In the “NORMAL” operating mode, sensor status is polled every 15 minutes. The Sensor Checkout Mode provides immediate access to the current sensor status.
    c. Return the Operating Mode Keyswitch to the “NORMAL” position.

15. Depress the FUNCTION button six times to display the sensor status for sensor #1A.
    a. A three-digit display of all zeros indicates no alarm conditions exist and the sensor is connected. A “1” in any digit means an alarm condition has been detected or a sensor is out.

16. Depress the TANK button to display the sensor status for sensor #2A.

17. Repeat step 16 for all sensors in the system until the display returns to Sensor #1A.

   **NOTE:** Be sure the number of sensors accessed using the TANK button is the same as the number of sensors in the system. If the number of sensors shown is less than the number installed, a sensor may be connected improperly or a defective sensor may exist.

18. Exit the Sensor Checkout Mode.
    a. Turn the Operating Mode Keyswitch to the “DIAG.” position.
    b. Depress the LEAK ALERT RESET button.
    c. Return the Operating Mode Keyswitch to the “NORMAL” position.

19. Remove the probe junction box cover in probe manhole #1.

20. Check the conduit-to-box seals for watertightness.

21. Seal the probe wiring connections in the probe junction box using the epoxy sealant furnished with each probe.

22. Replace the probe junction box cover. BE SURE the cover seal is watertight.

23. Seal the probe wiring connections for all other probes in the system, following the same instructions described for probe #1.

24. Seal the sensor wiring connections for all sensors in the system, following the same procedures described for the probes.
A. TLS-250i, TLS-250i Metric and TLS-250i Plus! Systems

These TLS-250i Systems are electronic continuous monitoring devices designed to offer improved business management through detailed inventory information and provide compliance with regulations governing liquids stored in underground tanks.

1. Inventory Monitoring Capabilities

TLS-250i Systems can display full inventory information for all tanks in the system and, when equipped with the integral printer, provide a printed inventory report as well. The following inventory data is available by tank:

- Date and Time
- Product Type
- Ullage
- Water Height
- Tank #
- Fuel Volume
- Fuel Height
- Fuel Temperature
- Temperature-Compensated Fuel Volume

2. Automatic Inventory Increase Report

After a bulk delivery has been made to a tank, an Inventory Increase Report will be generated automatically.
3. Alarm Capabilities

During the setup process, alarm limits can be entered to identify certain conditions. These include:

- High Water
- Low Inventory Level
- Potential Overfill
- Losses Due to Theft

When any of these conditions is detected, the system will alert you with a printed alarm report (if equipped with a printer) and, for most conditions, a display indicator.

In addition, any of these alarm limits can trigger one or both of the two relays built into the TLS System to activate other external alarm devices.

4. Leak Detection Capabilities

The TLS-250i Interstitial Leak Sensors monitor the annular space and piping sumps in double-wall tanks for the presence of liquids. Up to eight sensors can be connected to a single console.

An audible alarm and flashing LEDs indicate the type of leak — fuel or water — and identify which sensor in the system has detected the condition.

TLS-250i leak sensors can also be installed in piping sumps to monitor the area for liquids.

In addition, the front-panel LEDs and audible alarm will indicate, if a sensor fails or is disconnected, a "Sensor Out" condition and identify the sensor.
SECTION 4 — SYSTEM SET-UP

IMPORTANT: This manual describes system start-up, setup and operating procedures for the TLS-250i Four-Tank System. Where procedures or displays are different for the TLS-250i Metric, the differences will be shown or explained.

The TLS-250i requires that certain parameters be set prior to operation. Some apply to the system as a whole while others apply to specific tanks and sensors.

NOTE: “System” setup parameters are values that apply to the monitor only. It is not necessary to set individual values for each tank using the tank selector button.

System setup parameters include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Format†</th>
<th>Function</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>0A</td>
<td>HH:MM</td>
<td>Time of Day</td>
<td>MANDATORY</td>
</tr>
<tr>
<td>0D</td>
<td>MM-DD</td>
<td>Month-Date</td>
<td>MANDATORY</td>
</tr>
<tr>
<td>0C</td>
<td>YYYY</td>
<td>Year</td>
<td>MANDATORY</td>
</tr>
<tr>
<td>1A</td>
<td>HH:MM</td>
<td>Shutdown Mode Start Time</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>1B</td>
<td>HH:MM</td>
<td>Shutdown Mode Stop Time</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>2A</td>
<td>HH:MM</td>
<td>Auto Print Time #1</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>2B</td>
<td>HH:MM</td>
<td>Auto Print Time #2</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>2C</td>
<td>HH:MM</td>
<td>Auto Print Time #3</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9</td>
<td>nnnnnn</td>
<td>System Security Code</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9A</td>
<td>RRRRRR</td>
<td>Relay #1 Configuration</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9B</td>
<td>RRRRRR</td>
<td>Relay #2 Configuration</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9C</td>
<td>n</td>
<td>Auto-Transmit Message Mode</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9AB</td>
<td>MMM</td>
<td>Auto-Transmit Repeat Time</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9BC</td>
<td>SSS</td>
<td>Auto-Transmit Delay Time</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>9AC</td>
<td>n</td>
<td>Temperature-Compensated Volume</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>-C</td>
<td>nnnnnn</td>
<td>Relay #1 Sensor Alarm Function</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>-AB</td>
<td>nnnnnn</td>
<td>Relay #2 Sensor Alarm Function</td>
<td>OPTIONAL</td>
</tr>
</tbody>
</table>

NOTE: “Tank” setup parameters are values which apply to the individual tanks or sensors. It will be necessary to use the tank button to select each specific tank or sensor for which a value is being entered.

Tank setup parameters are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Format†</th>
<th>Function</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>I:D</td>
<td>High Water Alarm Limit</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>3A</td>
<td>GGGGGG</td>
<td>Overfill Alarm Limit</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>3B</td>
<td>GGGGGG</td>
<td>Low Level Alarm Limit</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>3C</td>
<td>GGGGGG</td>
<td>Theft Alarm Limit</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>3ABC</td>
<td>MM</td>
<td>Delivery Report Delay Time</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>4</td>
<td>GGGGGG</td>
<td>1.00 Height Volume Capacity</td>
<td>MANDATORY</td>
</tr>
<tr>
<td>H</td>
<td>GGGGGG</td>
<td>0.95 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>HA</td>
<td>GGGGGG</td>
<td>0.90 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>HB</td>
<td>GGGGGG</td>
<td>0.85 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>HC</td>
<td>GGGGGG</td>
<td>0.80 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>4A</td>
<td>GGGGGG</td>
<td>0.75 Height Volume Capacity</td>
<td>MANDATORY*</td>
</tr>
<tr>
<td>E</td>
<td>GGGGGG</td>
<td>0.70 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>EA</td>
<td>GGGGGG</td>
<td>0.65 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>EB</td>
<td>GGGGGG</td>
<td>0.60 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>EC</td>
<td>GGGGGG</td>
<td>0.55 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>4B</td>
<td>GGGGGG</td>
<td>0.50 Height Volume Capacity</td>
<td>MANDATORY*</td>
</tr>
<tr>
<td>L</td>
<td>GGGGGG</td>
<td>0.45 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>LA</td>
<td>GGGGGG</td>
<td>0.40 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>LB</td>
<td>GGGGGG</td>
<td>0.35 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>1C</td>
<td>GGGGGG</td>
<td>0.30 Height Volume Capacity</td>
<td>OPTIONAL</td>
</tr>
</tbody>
</table>
The following instructions describe the proper methods of entering "system" and "tank" setup parameters.

A. **Time and Date (MANDATORY)**

1. Turn the Operating Mode keyswitch to "SETUP" position.

2. Set the time of day using the following instructions.

   a. The display will show a random time value in hours and minutes (HH:MM). Code 0A will appear in the display. A code number is assigned for each function. Be sure that the proper code number for the function being set is shown in the display. Otherwise, incorrect information could be entered.

   b. The hours digits (HH:MM) will be flashing indicating that their value may be changed.

   c. Depress the **INCREMENT** button to select the desired value for the hours digits (HH:MM). Be sure to increment to AM or PM, whichever is correct.

   d. Depress the **CURSOR** button to activate the minutes digits (HH:MM). They will flash indicating that their value may be changed.

   e. Depress the **INCREMENT** button to select the desired value for the minutes digits.

   f. Depress the **FUNCTION** button to complete the time set and advance the display to the next function — Month and Date (MM:DD), Code 0B.
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3. Set the month and day using the following instructions.
   a. The month digits (MM:DD) of the display will be flashing indicating that their value may be changed. Depress the INCREMENT button to select the desired value for these digits.
   b. Depress the CURSOR button to activate the date display (MM:DD). Repeat the procedures in Step 3.a. to set the values for the date display. Depress the FUNCTION button to complete the month and date set and advance the display to the next function — Year (YYYY), Code 0C.

4. Set the year by following the same procedures used to set the month and date. The years digits will flash in this order: first two digits (YYYY), the decades digit (YYYY) and the year digit (YYYY). When all values have been entered, press the FUNCTION button to complete the year set and advance the display to the next function — Leak Start Time (HH:MM), Code 1A.

B. Shutdown Mode Start and Stop Times (OPTIONAL)

The TLS-250i system may be programmed, using the following procedures, to automatically start and stop its shutdown mode. Once these times have been set, the TLS system will start and stop the shutdown mode daily.

IMPORTANT: If a Shutdown Mode Start Time is set and no Shutdown Mode Stop Time is entered, the Shutdown Mode will run for 24 hours. At the end of this time, the TLS will begin another 24-hour period automatically. This cycle will continue until a stop time is entered or the start time is removed.

It is recommended that the start time be set for at least 1 hour after closing time, and the stop time be set for at least 30 minutes prior to opening time. Providing this time buffer will also help avoid dispensing fuel while in the shutdown mode and setting off the theft alarm.

If the Shutdown Mode Start and Stop Time feature is not to be used, simply leave the “EE” display showing by depressing the FUNCTION button to advance to the next function. If a value is shown in the display and you wish to “disable” this feature, depress the INCREMENT button until the “EE” appears in the hours position.
1. Set the shutdown mode start time using the following instructions.
   a. Code 1A will be shown in the display and the hours digits (HH:MM) will be flashing indicating that their values may be changed. Depress the INCORRECT button to select the desired value for these digits. Be sure the desired time is properly set for AM or PM.
   b. Depress the CURSOR button and repeat this procedure to set the minutes digits (HH:MM) of the shutdown mode start display. When all values have been entered, depress the FUNCTION button to complete the Shutdown Mode Start Time and advance the display to the next function — Shutdown Mode Stop Time (HH:MM), Code 1B.

2. Set the Shutdown Mode Stop Time by repeating the instruction procedures for Shutdown Mode Start Time, paragraphs 5a. to 5b. Depress the FUNCTION button to complete the Shutdown Mode Stop Time and advance the display to the next function — Auto Print Time #1 (HH:MM), Code 2A.

C. Automatic Print Times (OPTIONAL)

TLS-250i systems having the optional integral printer can be programmed, using the following procedures, to automatically print or store in memory inventory status reports at three separate times during a 24-hour period. Once the times have been set, the reports will be printed or stored at those times every day.

Automatic Print Times are optional. If any or all of them are not to be used, leave the “EE” showing in the display and advance to the next function by depressing the FUNCTION button. If a value is shown in the display and you wish to “disable” the feature, use the CURSOR button to activate the appropriate hours digits and depress the INCORRECT button until the “EE” appears in the hours position.

1. Set Auto Print Time #1 using the following instructions.
   a. The hours digits (HH:MM) of the Auto Print Time #1 will be flashing indicating that its value may be changed. Depress the INCORRECT button to select the desired value for these digits.
   b. Depress the CURSOR button and repeat this procedure to set the minutes digits (HH:MM) of the Auto Print Time #1 display. When all values have been entered, depress the FUNCTION button to complete the Auto Print Time #1 and advance the display to the next function — Auto Print Time #2 (HH:MM), Code 2B.

2. Set Auto Print Time #2 by repeating the instructions for Auto Print Time #1. When the desired values have been entered, depress the FUNCTION button to complete the Auto Print Time #2 and advance the display to the next function — Auto Print Time #3 (HH:MM), Code 2C.

3. Set Auto Print Time #3 by repeating the instructions for Auto Print Time #1. When the desired values have been entered, depress the FUNCTION button to complete the Auto Print Time #3 and advance the display to the next function — High Water Indicator (IU), Code 3.

D. High Water Limit (OPTIONAL)

The TLS-250i measures water in the bottom of a tank and will show the amount up to five inches to tenths of an inch on the monitor’s display and in an inventory report.

The High Water Limit lets you set a water level value which when reached, will activate a High Water Indicator in the display. In addition, the High Water Limit may be programmed to trigger one or both alarm relays in the TLS system (see Section 4.0, Alarm Relay Configuration).
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NOTE: Two alarm relays are built into each TLS-250i monitor. Consult the TLS-250i and TLS-250i Plus Four-Tank System "Site Preparation and Installation Instructions," Manual No. 576013-579, for power specifications and proper installation when wiring to an optional customer-supplied alarm system.

NOTE: The High Water Limit cannot be set at a value over 5.0 inches (or 199 mm). This is the maximum water height that the TLS-250i probe can detect. In practice, it is advisable to set this value at a height lower than the pickup for the submersible pump or suction line. This will help to avoid the possibility of delivering water to a vehicle.

NOTE: To "disable" the High Water Limit in any tank, set its value at 5.0.

1. Set High Water Limit in inches to one decimal place (ID), Code 3.
   a. The first digit of the High Water Limit display (ID) for tank #1 will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit.
   c. Depress the CURSOR button to activate the Decimal digit (ID) of the display and depress the INCREMENT button to select the desired value.
   d. Depress the TANK button to advance the display to tank #2.
   e. Repeat the procedures outlined for tank #1 to enter the High Water Limit for tank #2. Depress the TANK button to advance the display to tank #3.
   f. Continue to follow these procedures to set the High Water Limit values for each tank in the system.
   g. Once the limits have been set and the tank indicator in the display is returned to tank #1, depress the FUNCTION button to advance the display to the next function — Overfill Limit in gallons for tank #1 (GGGGGG), Code 3A.

E. Overfill Limit (OPTIONAL)
The Overfill Limit feature will warn of a potential overfill condition during a bulk delivery from a tank truck. It is a gallon value which when reached, will trigger a printout showing alarm type, tank number, product, date and time. In addition, the Overfill Limit can be programmed to trigger one or both alarm relays in the TLS system (see Section 4.O. Alarm Relay Configuration).

NOTE: Two alarm relays are built into each TLS-250i monitor. Consult the TLS-250i and TLS-250i Plus Four-Tank System "Site Preparation and Installation Instructions," Manual No. 576013-579, for power specifications and proper installation when wiring to an optional customer-supplied alarm system.

Assuming an accurate tank chart, the Overfill Limit should be no greater than a value 200 gallons less than the tank's capacity.

If no Overfill limit is desired for a tank, set its limit value at 999999.

1. Set Overfill Limit in gallons (GGGGGG), Code 3A.
   a. The first digit of the Overfill Limit display in gallons (GGGGGG) for tank #1 will be flashing.
b. Depress the **INCREMENT** button to select the desired value for this digit.

**NOTE:** Zeros must be set in the leading digits to enter a limit value under six digits.

c. Depress the **CURSOR** button to activate the second digit of the display and depress the **INCREMENT** button to select the desired value.

d. Repeat these procedures for each digit of the Overfill Limit for tank #1 and depress the **TANK** button to advance the display to tank #2.

e. Set the Overfill Limits for each tank in the system using the same procedures outlined in tank #1.

f. Once the limits have been entered and the tank indicator in the display has been returned to tank #1, depress the **FUNCTION** button to advance the display to the next function — Low Level Limit in gallons for tank #1 (GGGGGG), Code 3B.

F. Low Level Limit (OPTIONAL)

The Low Level Limit feature of TLS-250i is designed to warn of low inventory in any of the system’s tanks. When the preset low limit is reached, a signal is sent to the monitor. The electronic label “LOW LIMIT” will flash indicating the low level limit has been exceeded.

TLS-250i systems with the optional integral printer will also automatically print a low limit report showing the product, date and time of day.

In addition, the Low Level Limit may be programmed to trigger one or both alarm relays in the TLS system (see Section 4.0, Alarm Relay Configuration).

**NOTE:** Two alarm relays are built into each TLS-250i monitor. Consult the TLS-250i and TLS-250i Plus! Four-Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-570, for power specifications and proper installation when wiring to an optional customer supplied alarm system.

If no Low Level Limit is desired for a tank, set its limit at 0.000000 gallons.

1. Set Low Level Limits in gallons (GGGGGG), Code 3B.

   a. The first digit of the Low Level Limit display (GGGGGG) for tank #1 will be flashing.

   b. Depress the **INCREMENT** button to select the desired value for this digit.

   c. Depress the **CURSOR** button to activate the second digit of the display and depress the **INCREMENT** button to select the desired value.

   d. Repeat these procedures for each digit of the Low Level Limit for tank #1 and depress the **TANK** button to advance the display to tank #2.

   e. Set the Low Level Limits for each tank in the system following the same procedures outlined for tank #1.

   f. Once the Low Level Limits have been entered and the tank indicator in the display has been returned to tank #1, depress the **FUNCTION** button to advance the display to the next function — Theft Limit in gallons for tank #1 (GGGGGG), Code 3C.
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G. Theft Limit (OPTIONAL)

The Theft Limit feature will warn of a sudden loss of fuel during the shutdown mode. It is a gallon value which, when reached, will trigger a printout showing alarm type, tank number, date and time. In addition, the Theft Limit can be programmed to trigger one or both alarm relays in the TLS system (see Section 4.0, Alarm Relay Configuration).

**NOTE:** Two alarm relays are built into each TLS-250i monitor. Consult the TLS-250i and TLS-250i Plus! Four Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579, for power specifications and proper installation when wiring to an optional customer-supplied alarm system.

In addition, TLS systems with the integral printer will print a theft report which shows the product and date and time of theft.

If no Theft Limit is desired for a tank, set its limit value at 999999.

1. Set Theft Limit, Code 3C.
   a. The first digit of the Theft Limit display in gallons (GGGGGG) for tank #1 will be flashing.
   b. Depress the **INCREMENT** button to select the desired value for this digit.
   **NOTE:** Zeros must be set in the leading digits to enter a limit value under six digits.
   c. Depress the **CURSOR** button to activate the second digit of the display and depress the **INCREMENT** button to select the desired value.
   d. Repeat these procedures for each digit of the Theft Limit for tank #1 and depress the **TANK** button to advance the display to tank #2.
   e. Set the Theft Limits for each tank in the system following the same procedures outlined for tank #1.
   f. Once the Theft Limits have been entered and the tank indicator in the display has been returned to tank #1, depress the **FUNCTION** button to advance the display to the next function — Inventory Increase Report Delay Time (MM), Code 3ABC.

H. Inventory Increase Report Delay Time (OPTIONAL)

The Inventory Increase Report Delay Time is an OPTIONAL tank parameter. It will delay the Automatic Inventory Increase Report up to 99 minutes after the completion of a fuel delivery.

**IMPORTANT:** The Inventory Increase Report records only the starting and ending fuel volumes to calculate net increase. It does not compensate for fuel dispensed during the bulk delivery or the **DELAY PERIOD**.

This delay time will prevent separate inventory increase reports from being generated during intervals between multi-compartment bulk deliveries to one tank. It also allows fuel to “settle out” and helps prevent false inventory increase reports from being generated as a result of fuel movement. This is especially important for manifolded tank installations.
If, at the end of this delay period, the increase has been less than 25 gallons, no inventory increase report will be issued.

1. Set Inventory Increase Report Delay Time, Code 3ABC.
   a. The first digit of the Inventory Increase Report Delay Time display (GG) for tank #1 will be flashing.
   b. Depress the **INCREMENT** button to select the desired value for this digit.
   c. Depress the **CURSOR** button to activate the second digit of the display and depress the **INCREMENT** button to select the desired value.
   d. Depress the **TANK** button to advance the display to tank #2 and follow the same procedures outlined for tank #1.
   e. Set the Inventory Increase Report Delay Time for all tanks in the system.
   f. Once the delay times have been entered for all tanks and the tank indicator has been returned to tank #1, depress the **FUNCTION** button to advance the display to the next function — Tank Volume, Code 4 through Code PC.

### 1. Tank Volume (MANDATORY)

Tank Volume is a MANDATORY tank parameter. It MUST be entered for every tank in the system. Refer to the manufacturer's tank volume chart for volume specifications.

**For flat-ended cylindrical steel tanks:** The 1.00 height volume capacity (Code 4) MUST be entered for all tanks.

**For fiberglass tanks:** The volume capacities at 1.00 height (Code 4), 0.75 height (Code 4A), 0.50 height (Code 4B) and 0.25 height (Code 4C) capacities MUST be entered for all tanks.

**IMPORTANT:** It is recommended that all 20 height volume capacities (see the following chart for function codes) be entered for tanks where reconciliation differences have shown distortion in the tank shape. This will help improve inventory accuracy at all levels of the tank.

The TLS system will assume a 10,000 gallon, 90°, flat-ended, cylindrical tank if no height volume capacities are entered and default to a 010000 value for the 1.00 height volume capacities. All other capacities will default to 000000.

1. Enter tank volumes in gallons (GGG GGGG) for all capacities.
   a. The first digit of the 1.00 height volume display (GGG GGG) for tank #1 will be flashing.
   b. Depress the **INCREMENT** button to select the desired value for this digit.

**NOTE:** Zeros must be set in the leading digits to enter a limit value under six digits.
c. Depress the CURSOR button to activate the second digit of the display and depress the INCREMENT button to select the desired value.

d. Repeat these steps for each digit of the 1.00 height volume capacity for tank #1 and depress the TANK button to advance the display to tank #2.

e. Enter the 1.00 height volume capacities for all tanks in the system following the same procedures outlined for tank #1.

f. Once the 1.00 height volume capacities for all tanks have been entered, depress the FUNCTION button to advance the display to the next desired function. If all 20 capacities are being entered for all tanks, the next function will be 0.95 height volume capacity, Code H. If the next capacity is to be at 0.75 height, continue to depress the FUNCTION button until function Code 4A is displayed.

g. Enter the desired height volume capacities for all tanks in the system using the procedures described for Code 4.

<table>
<thead>
<tr>
<th>Function Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1.00 Height Volume Capacity</td>
</tr>
<tr>
<td>H</td>
<td>0.95 Height Volume Capacity</td>
</tr>
<tr>
<td>HA</td>
<td>0.90 Height Volume Capacity</td>
</tr>
<tr>
<td>HB</td>
<td>0.85 Height Volume Capacity</td>
</tr>
<tr>
<td>HC</td>
<td>0.80 Height Volume Capacity</td>
</tr>
<tr>
<td>4A</td>
<td>0.75 Height Volume Capacity</td>
</tr>
<tr>
<td>E</td>
<td>0.70 Height Volume Capacity</td>
</tr>
<tr>
<td>EA</td>
<td>0.65 Height Volume Capacity</td>
</tr>
<tr>
<td>EB</td>
<td>0.60 Height Volume Capacity</td>
</tr>
<tr>
<td>EC</td>
<td>0.55 Height Volume Capacity</td>
</tr>
<tr>
<td>4B</td>
<td>0.50 Height Volume Capacity</td>
</tr>
<tr>
<td>L</td>
<td>0.45 Height Volume Capacity</td>
</tr>
<tr>
<td>LA</td>
<td>0.40 Height Volume Capacity</td>
</tr>
<tr>
<td>LB</td>
<td>0.35 Height Volume Capacity</td>
</tr>
<tr>
<td>LC</td>
<td>0.30 Height Volume Capacity</td>
</tr>
<tr>
<td>4C</td>
<td>0.25 Height Volume Capacity</td>
</tr>
<tr>
<td>P</td>
<td>0.20 Height Volume Capacity</td>
</tr>
<tr>
<td>PA</td>
<td>0.15 Height Volume Capacity</td>
</tr>
<tr>
<td>PB</td>
<td>0.10 Height Volume Capacity</td>
</tr>
<tr>
<td>PC</td>
<td>0.05 Height Volume Capacity</td>
</tr>
</tbody>
</table>

h. Once all desired capacities have been entered and the tank indicator in the display has been returned to tank #1, depress the FUNCTION button to advance the display to the next function.
—Tank Diameter in inches (H.D.D) for tank #1, Code 5.
J. Tank Diameter (MANDATORY)

Tank Diameter is a MANDATORY tank setup parameter. It is the inside diameter of the tank. This dimension can usually be found on the tank chart.

1. Enter Tank Diameter, Code 5, in inches to two decimal places (or millimeters to one decimal place).
   a. The first digit of the Tank Diameter display in inches (III.DD) for tank #1 will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit.

   **NOTE:** A zero must be set in the leading digit if the tank diameter is less than 100 inches.
   c. Depress the CURSOR button to activate the second digit of the display and depress the INCREMENT button to select the desired value.
   d. Repeat these steps for each digit of the Tank Diameter for tank #1 and depress the TANK button to advance the display to tank #2.
   e. Enter the Tank Diameter for each tank in the system, using the same procedures outlined for tank #1.
   f. Once the diameters for all tanks have been entered and the tank indicator in the display has been returned to tank #1, depress the FUNCTION button to advance the display to the next function — Tank Tilt in inches for tank #1, Code 6.

K. Tank Tilt (OPTIONAL)

The Tank Tilt adjustment allows you to enter a value which will adjust for a discrepancy between TLS-250i probe and the center of the tank height caused by the tilt of the tank. Fuel height readings at the fill riser and the TLS probe riser should have been taken at the time of probe installation and recorded in the appropriate section of the “Site Preparation and Installation Instructions.” From these readings, a tilt value (the figure can be a positive or negative value) may be determined.

The Tank Tilt adjustment is an optional value. It is easily calculated by subtracting the fuel height in inches at the fill riser from the fuel height in inches at the probe riser then dividing the difference by the distance in inches between the two points. This equals slope in inches. Multiply the slope by the distance from the probe to the tank center to obtain your tilt factor.

**NOTE:** For best results, the TLS probe should be installed in the center of the tank and the tilt factor should be set at 000.00.

**NOTE:** When using 2' floats with a TLS-250i System, 2.25° must be added to the tank tilt value.

If no Tank Tilt value is desired for a tank, set its tank tilt value at 000.00 inches.

1. Enter Tank Tilt in inches to two decimal places (III.DD) (or millimeters to one decimal place) for tank #1, Code 6.
   a. The first digit of the display (III.DD) for tank #1 will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit. If the Tank Tilt adjustment is a negative value, enter a minus sign (-) in the digit.
NOTE: Zeros must be set in the leading digits to enter a tank tilt value under three whole digits.

c. Depress the CURSOR button to activate the second digit of the display and depress the INCREMENT button to select the desired value.

d. Repeat these procedures for each digit of the Tank Tilt value for tank #1 and depress the TANK button to advance the display to tank #2.

e. Enter the Tank Tilt values for each tank in the system following the same procedures outlined for tank #1.

f. Once the Tank Tilt values have been entered and the tank indicator in the display has been returned to tank #1, depress the FUNCTION button to advance the display to the next function — Manifolded Tank Configuration, Code 7.

L. Manifolded Tank Configuration (MANDATORY if applicable)

The Manifolded Tank Configuration feature lets you tell TLS which tanks in the system have been manifolded together. With this information, TLS is able to provide information for total product inventory automatically.

This entry is MANDATORY for systems with manifolded tanks.

It is necessary to enter manifold information for one tank in a group only. Corresponding information for the other tanks in the manifolded group is automatically entered by TLS.

EXAMPLE: In a system with tanks 1 and 2 manifolded and 3 and 4 manifolded, you need only to enter information for tanks 1 and 3. For tank 1, enter 2; for tank 3, enter 4. The system automatically recognizes that tank 2 is manifolded with 1, and 3 is manifolded with 4.

NOTE: If there are no manifolded tanks in the system, depress the FUNCTION button to advance the display to the next function.

1. Enter Manifolded Tank Configurations, Code 7.

   a. The first digit of the display (NNNNNN, N = 0-8) for tank #1 will be flashing.

   NOTE: If tank #1 is not part of a manifolded group, but other tanks in the system are, depress the TANK button to advance the display to the first tank in the first manifolded group.

   b. Using the INCREMENT button, enter the number of the first tank manifolded to tank #1.

   c. If another tank is manifolded to the first two, depress the CURSOR button to activate the second digit in the display and use the INCREMENT button to enter its tank number.

   d. Be sure the rest of the digits in the display are "0" before using the TANK button to advance the display to the next tank.

   e. If the next tank is part of a manifolded group that has already been entered under another tank, its corresponding tank numbers will automatically appear in the display. Simply skip over this tank by depressing the TANK button to advance the display to the first tank in the next manifolded group.

   f. Once the manifolding configurations for each tank group have been entered, depress the FUNCTION button to advance the display to the next function — Product Code and Product Label Code, Code 8.
M. Product Code and Product Label Code (OPTIONAL)

The Product Code and Product Label Code features allow you to assign a name or number designation to fuel stored in the tanks of your system. These codes are used only in TLS systems having an integral printer or those that interface with external reporting devices such as computers and point-of-sale terminals.

The Product Label Code is an **OPTIONAL** tank parameter.

When no product labels are desired, a “0” in the Product Label Code will cause the TLS to automatically default to a PRODUCT 1, PRODUCT 2... label system.

There are two types of product codes shown in the Product Label Code display. At the far left is a single-digit External Communications Interface Product Code. It is designed to match product codes used by a point-of-sale terminal or other external device to the product/tank configuration of a system. Using the front-panel keys, it may be set only to a numeric value from 0 to 9 (i.e., Product 1 to tanks 1 and 2, Product 2 to tanks 3 and 4). If this product code has been set to a non-numeric value via an external device, a dash (—) will be displayed in this location.

**IMPORTANT:** If a flashing dash is displayed during setup and the **INCREMENT** button pushed on the front panel, the alpha code will be replaced by a numeric code. The alpha code **CANNOT BE REENTERED** except through an external input device.

In the center of the display is a two-digit Internal Product Label Code. These codes are stored within the TLS-250i and may be used to assign product designations by tank. Internal Product Label Codes may be entered using the front-panel keys or through the external interface. A list of the codes follows.

When assigning Product Label Codes to manifolde tanks, it is advisable to use the “generic” product label for the first tank in the manifolded group. When an inventory report is printed, manifolded tank inventories are grouped under the heading of the first tank.

**EXAMPLE:** For a manifolded group, tanks 1, 2 and 3 containing unleaded, it is advisable to assign the labels as follows:

- Tank 1 — Code 27 UNLEADED
- Tank 2 — Code 28 UNLEADED 1
- Tank 3 — Code 29 UNLEADED 2

The following is a list of Internal Product Label Codes contained in the TLS.

<table>
<thead>
<tr>
<th>Product Label Code</th>
<th>Product Label</th>
<th>Fuel Coefficient of Thermal Expansion Standard and Generator Versions</th>
<th>Metric Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>None (Defaults to PRODUCT 1, 2, etc.)</td>
<td>-070</td>
<td>-126</td>
</tr>
<tr>
<td>01</td>
<td>DIESEL</td>
<td>-047</td>
<td>-085</td>
</tr>
<tr>
<td>02</td>
<td>DIESEL 1</td>
<td>-047</td>
<td>-085</td>
</tr>
<tr>
<td>03</td>
<td>DIESEL 2</td>
<td>-047</td>
<td>-085</td>
</tr>
<tr>
<td>04</td>
<td>DIESEL 3</td>
<td>-047</td>
<td>-085</td>
</tr>
<tr>
<td>05</td>
<td>DIESEL 4</td>
<td>-047</td>
<td>-085</td>
</tr>
<tr>
<td>06</td>
<td>GASOLINE</td>
<td>-070</td>
<td>-126</td>
</tr>
</tbody>
</table>

(Continued on next page)
Fuel Coefficient of Thermal Expansion
Standard and Generator

<table>
<thead>
<tr>
<th>Product Label Code</th>
<th>Product Label</th>
<th>Standard Version</th>
<th>Metric Version</th>
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<tr>
<td>07</td>
<td>LEAD FREE</td>
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<tr>
<td>08</td>
<td>LEADED</td>
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</tr>
<tr>
<td>09</td>
<td>LEADED GASOLINE</td>
<td>-070</td>
<td>-126</td>
</tr>
<tr>
<td>10</td>
<td>LEADED REGULAR</td>
<td>-070</td>
<td>-126</td>
</tr>
<tr>
<td>11</td>
<td>NO LEAD</td>
<td>-070</td>
<td>-126</td>
</tr>
<tr>
<td>12</td>
<td>PREMIUM</td>
<td>-070</td>
<td>-126</td>
</tr>
<tr>
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<td>PREMIUM LEADED</td>
<td>-070</td>
<td>-126</td>
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<td>PREMIUM UNLEADED</td>
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</tr>
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<td>REGULAR</td>
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</tr>
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<tr>
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<td>-126</td>
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<td>070</td>
<td>-126</td>
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<td>-070</td>
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<td>32</td>
<td>UNLEADED GASOLINE</td>
<td>-070</td>
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<tr>
<td>33</td>
<td>UNLEADED PREMIUM</td>
<td>070</td>
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<td>34</td>
<td>UNLEADED REGULAR</td>
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<td>36</td>
<td>XTRA</td>
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<td>37</td>
<td>TOluene</td>
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<td>38</td>
<td>HyDRAULIC OIL</td>
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<td>AVGAS</td>
<td>-075*</td>
<td>-130*</td>
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<td>#2 HEATING OIL</td>
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<td>Kerosene</td>
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<td>43</td>
<td>TURBINE OIL</td>
<td>-047</td>
<td>-085</td>
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</tr>
<tr>
<td>46</td>
<td>MID GRADE UNLEADED</td>
<td>-070</td>
<td>-126</td>
</tr>
</tbody>
</table>

*Must be entered manually.

External Communications Interface Product Codes

1. Enter Product Codes, Code 8.
   a. The first digit of the Product Label Code display, the External Communications Interface Product Code (N, where N = 0-9) for tank #1 will be flashing.
   b. Depress the INCREMENT button to select the desired value for tank #1.
   c. Depress the TANK button to advance the display to tank #2 and use the INCREMENT button to select the desired value.
   d. Repeat the procedures for each tank in the system.
Internal Product Label Codes

a. The first digit of the Product Label Code display (N...NN) for tank #1 will be flashing.

b. Depress the CURSOR button to activate the first digit of the Internal Product Label Code display (N...NN, where N = 0-9).

c. Depress the INCREMENT button to select the desired value for this digit.

**NOTE:** A zero must be set in the leading digit to enter product codes 0-9.

d. Depress the CURSOR button to activate the second digit of the display and depress the INCREMENT button to select the desired value.

e. Depress the TANK button to advance the display to tank #2 and repeat the procedures outlined for tank #1.

f. Once the Product Label Codes for all tanks have been entered and the tank indicator has been returned to tank #1, depress the FUNCTION button to advance the display to the next function — Security Code, Code 9.

N. Security Code (OPTIONAL)

The Security Code is a six-digit number designed to prevent unauthorized access to the system through its external interface. Any six digits may be selected making the code unique to this system. When less than six digits are to be used, leading zeros must be entered to fill the six digits allowed for the security code.

**NOTE:** The Security Code may contain alphanumeric characters when entered using an external keyboard through the TLS system's external interface. These characters will appear as dashes (-----) on the display.

**IMPORTANT:** Do not change externally entered security codes without the proper authority! Depressing the INCREMENT button while on this setup code will overwrite the alpha characters.

The Security Code is a “system” setup parameter and is **OPTIONAL.** Only one code may be entered.

   a. The first digit of the Security Code display (NNNNNN) will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit.
   c. Depress the CURSOR button to activate the second digit of the display and depress the INCREMENT button to select the desired value.
   d. Repeat this procedure to enter values for the remaining four digits of the Security Code.

O. Alarm Relay Configuration (OPTIONAL)

The Alarm Relay Configuration feature allows you to program any or all alarm indicators to trigger one or both of the TLS-250i internal alarm relays.

For example, Alarm Relay #1 could be connected to an on-site audible alarm while Relay #2 is connected to a central security monitoring service. Using the Alarm Relay Configuration feature you would be able to tie the overfill and theft alarm indicators to the on-site alarm and any other or all alarm indicators to the monitoring service alarm.

In addition, this feature lets you integrate external devices such as hydrocarbon monitoring wells into the TLS alarm relay system.
There is an Alarm Relay Configuration display (NNNNNN, where N = 0 for “OFF” or 1 for “ON”) for each alarm relay — Code 9A for Relay #1 and Code 9B for Relay #2. Each digit represents the ON/OFF status of an alarm indicator or external input for that particular relay.

- 1st digit: Reserved
- 2nd digit: High Water Indicator
- 3rd digit: Overfill Indicator
- 4th digit: Low Limit Indicator
- 5th digit: Theft Indicator
- 6th digit: External Input

If no Alarm Relay Configuration values are set, the system will default to:

- Relay #1 = 000010 (Thief Indicator enabled)
- Relay #2 = 001000 (Overfill Indicator enabled)

1. Set the Alarm Relay Configuration for Relay #1, Code 9A.
   a. The first digit in the Alarm Relay Configuration display (NNNNNN) will be flashing.
   b. Depress the CURSOR button to activate the second digit of the display (High Water Indicator) and depress the INCREMENT button to select the desired OFF (0) or ON (1) status.
   c. Repeat these procedures for each indicator and external input OFF/ON status in the display and depress the FUNCTION button to advance the display to set the Alarm Relay Configuration for Relay #2, Code 9B.
   d. Repeat the procedures outlined for Relay #1 to set the Alarm Relay Configuration for Relay #2.
   e. Depress the FUNCTION button to advance the display to the next function — Auto-Transmit Message Mode, Code 9C.

P. Auto Transmit Message Mode (OPTIONAL)

The Auto-Transmit Message Mode feature lets the TLS-250i transmit or transmit and repeat automatically any or all alarm indications, delivery and external input messages through the RS-232 communications port to an external device. The repeat interval may be programmed to any time in minutes from 001 to 240 (see Section 4.Q, Auto Transmit Repeat Time).

If no Auto-Transmit Message Mode is selected, the TLS will default to a “0” value (both transmit and repeat disabled).

IMPORTANT: If the Auto-Transmit Message Mode feature is desired, a Message Mode must be set for each Message Type (shown by TANK display).

NOTE: In this function code, the TANK display becomes the Message Type display. The TANK button is used to select the Message Type to be transmitted.

The available message modes (first digit of the display N 9 C N) for each message type are:

- N = 0: Transmit and Repeat disabled
- N = 1: Transmit enabled, Repeat disabled
- N = 2: Transmit and Repeat enabled

The available message types (last digit of the display N 9 C N) which can be transmitted or repeated are:

- N = 1: Reserved
- N = 2: High Water Indicator Message
- N = 3: Overfill Indicator Message
- N = 4: Low Limit Indicator Message
N = 5 Theft Indicator Message  
N = 6 Delivery Start Message  
N = 7 Delivery End Message  
N = 8 External Input On Message  
N = 9 External Input Off Message  
N = E Sensor Fuel Message  
N = I Sensor Water Message (Water Message not active at this time.)  
N = L Sensor Out  
N = P Reserved  
N = 0

1. Set the Auto-Transmit Message Mode, Code 9C.
   a. The Message Mode digit of the display (N 9 C N) will be flashing for Message Type #1 (shown in the tank number display).
   b. Depress the TANK button to advance the display to Message Type #2 and depress the INCREMENT button to select the desired Message Mode.
   c. Depress the INCREMENT button to select the desired Message Mode (0, 1 or 2) for Message Type #2.
   d. Repeat this procedure for each Message Type.
   e. After a Message Mode has been set for each Message Type, depress the FUNCTION button to advance the display to the next function — Auto-Transmit Repeat Time, Code 9AB.

Q. Auto-Transmit Repeat Time (OPTIONAL)

The Auto-Transmit Repeat Time feature enables you to set the length of time in minutes the TLS-250i will wait before it repeats the Auto-Transmit Message if the Repeat mode is enabled (see Section 4.P.). The message will continue to repeat at this interval until the alarm indicator has been reset either manually using the front-panel keyswitch or automatically through the external communications interface.

The interval time in minutes may be set from 001 to 240. The selected time will apply to all Auto-Transmit Messages.

IMPORTANT: If an Auto-Transmit Message is being repeated at a regular interval and a second message occurs, it will be transmitted immediately (unless a delay time has been set). After its initial transmission, the second message will then be repeated at the same time as the first.

1. Set the Auto-Transmit Repeat Time, Code 9AB.
   a. The first digit in the Auto-Transmit Repeat Time display (MMM) will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit.
   c. Depress the CURSOR button to activate the second digit and depress the INCREMENT button to select the desired value.
   d. Repeat the procedures outlined above to set the desired value for the third digit.
   e. Once the Auto-Transmit Repeat Time has been set, depress the FUNCTION button to advance the display to the next function — Auto-Transmit Delay Time, Code 9BC.
R. Auto-Transmit Delay Time (OPTIONAL)

The Auto-Transmit Delay Time lets you set an interval between the time any external communication takes place with the TLS and time TLS sends an Auto-Transmit Message.

This feature permits inventory reporting programs to be completed in the host computer before Auto-Transmit messages are sent. The delay time should take into consideration the time required for a computer to finish its program cycle.

The delay in seconds can be set from 001 to 240 and will apply to all Auto-Transmit Messages.

1. Set the Auto-Transmit Delay Time, Code 9BC:
   a. The first digit of the Auto-Transmit Delay Time display (MMM) will be flashing.
   b. Depress the INCREMENT button to select the desired value for this digit.

   **NOTE:** A zero or zeros must be set in the leading digit(s) if the repeat time is less than 100 minutes.

   c. Depress the CURSOR button to activate the second digit and depress the INCREMENT button to select the desired value.
   d. Repeat the procedures outlined above to set the desired value for the third digit.
   e. Once the Auto-Transmit Delay Time has been set, depress the FUNCTION button to advance the display to the next function External Input Alarm Enable, Code 9ABC.

S. Temperature-Compensated Volume in Inventory Report (OPTIONAL)

This option adds temperature compensated volume to the TLS-250i Inventory Report in addition to gross volume. If this feature is enabled, the temperature-compensated volume will appear on each printed report and can be shown on the front panel display.

1. To select Temperature-Compensated Volume in Inventory Report:
   a. The Temperature-Compensated Volume Display (n) will be flashing.
   b. Press the INCREMENT button to set the value at either 0 or 1.

         0 = option disabled
         1 = option enabled

c. Once the Temperature-Compensated Volume Option has been set, press the FUNCTION button to advance the display to the next function — Generator OFF Mode, Code 9ABC.

T. External Input Alarm Enable

An input from external monitoring devices such as line leak detectors and monitoring wells can be wired directly to the TLS-250i console. When this is done, the TLS-250i recognizes an "External Input ON" and "External Input OFF" signal from the external device and can integrate this signal into its own alarm and reporting functions.

The External Input Alarm Enable function lets you assign electronically the input from an external monitoring device to the alarm cause feature in the TLS-250i. When this function is enabled, a signal from the external device will activate the alarm cause LED for sensor #8D and trigger the audible alarm.
1. Set the External Alarm Input Enable, Code —.
   a. The single digit in the display (N) will be flashing.
   b. Depress the **INCREMENT** button to select the desired status (1 = enabled, 0 = disabled).
   c. Once this status has been set, depress the **FUNCTION** button to advance the display to the next function — Audible Water Alarm Disable and Water Alarm Delay Time for “A” Sensors, Code —A.

U. **Audible Water Alarm Disable (OPTIONAL), Sensor Type Selection (MANDATORY) and Water Alarm Delay Time for “A” Sensors (OPTIONAL)**

Three setup functions are available in this display.

The **Audible Water Alarm Disable feature is not active in this system.**

The **Sensor Type Selection** function is used with switch-type liquid sensors and lets you select NO or NC as the normal (non-alarm) condition.

**NOTE:** The system defaults to a Veeder-Root Normally Open sensor.

The **Water Alarm Delay Time feature is not active in this system.**

1. Enter the Sensor Type Selection, Code —A.
   a. The first digit of the display (Sensor Type Selection) (N HH.H) for sensor #1A will be flashing.
   b. Depress the **INCREMENT** button to select the desired condition:
      0 = (Inactive)
      1 = (Inactive)
      2 = Switch-Type Sensor Normally Open
      3 = Switch-Type Sensor Normally Closed

**NOTE:** The system reacts to the presence of any liquid with a fuel alarm.

c. Once the Sensor Type Selection for all sensors has been set, press the **FUNCTION** button to advance the display to the next function — Relay #1 Sensor Alarm Function, Code —C.

V. **Relay #1 Sensor Alarm Function (OPTIONAL)**

This feature allows you to assign the fuel leak, water leak or sensor out alarms to internal alarm relay #1. When an assigned alarm condition is detected by a sensor, the alarm relay will be triggered.

1. Assign Sensor Alarm Functions for Relay #1, Code —C.

**NOTE:** If no values are set, the system will default to 000000 (disabled).
   a. The first digit of the display (NNNNNN) will be flashing.

**NOTE:** Only the first three digits of the display are used. The remaining three are inactive and reserved for future use.
   b. Depress the **INCREMENT** button to select the desired status (1 = assigned, 0 = disabled) for the fuel leak alarm.
   c. Depress the **CURSOR** button to activate the second digit and, using the **INCREMENT** button, select the status for the water leak alarm.
   d. Depress the **CURSOR** button again and select the status for the sensor out alarm.
   e. Once the status for each alarm has been set, depress the **FUNCTION** button to advance the display to the next function — Relay #2 Sensor Alarm Function, Code —AB.
W. Relay #2 Sensor Alarm Function (OPTIONAL)

This feature allows you to assign the fuel leak, water leak or sensor out
alarms to internal alarm relay #2. When an assigned alarm condition is
detected by a sensor, the alarm relay will be triggered.

1. Assign Sensor Alarm Functions for Relay #2, Code — AB.
   a. Repeat the procedures outlined for Relay #1.

SETUP PROCEDURES ARE COMPLETE. ALL DESIRED SYSTEM AND
TANK PARAMETERS SHOULD HAVE BEEN ESTABLISHED. TURN THE
OPERATING MODE KEYSWITCH TO "NORMAL".

X. External Interface to Enter Station Header (OPTIONAL)

A four-line custom station header may be entered into the TLS system
using an external keyboard. This header will appear on Inventory Status
and Automatic Delivery Reports each time they are printed.

Each line of the header may contain up to 20 characters, and the header
typically includes information such as station name, address and
telephone.

NOTE: The TLS-250i has factory-set conditions that must be matched
by the keyboard device. They are:

Baud Rate ............. 300
Parity .................... Odd
Security Code ........ Disabled

1. Connect a Keyboard Device
   a. Connect an RS-232 null cable (not a straight-through cable) from
      the keyboard device to the front RS-232 plug on the underside of
      the TLS-250i monitor.
   b. Set the baud rate of the keyboard to match TLS (factory set at 300
      baud).
   c. Set the terminal for 10 bit character transmission: 1 start bit; 7
      data bits; 1 odd parity bit; 1 stop bit.

2. Enter Station Header.
   a. Using the keyboard, depress "CONTROL A".
   b. Enter code 7 3 1 (this accesses first line of header).
   c. Enter the first line of header. (All 20 characters must be filled.
      Blanks MUST be filled using space bar.) the TLS-250i will echo
      back the setup command after the 20th header line character.
   d. Depress "CONTROL A".
   e. Enter code 7 3 2 to access the second line of header.
   f. Enter the second line of header (all spaces must be filled).
   g. Depress "CONTROL A".
   h. Enter code 7 3 3 to access the third line of header.
   i. Enter the third line of header (all spaces must be filled).
   j. Depress "CONTROL A".
   k. Enter code 7 3 4 to access the fourth line of header.
   l. Enter the fourth line of header (all spaces must be filled).

NOTICE: THE OWNER OF THIS PRODUCT SHOULD RE-
MOVE THE FRONT PANEL KEY TO PREVENT MISUSE
OF THE PRODUCT. UNAUTHORIZED CHANGES IN THE SETUP
PARAMETERS COULD RESULT IN INACCURATE INVEN-
TORY CONTROL OR UNDETECTED POTENTIAL ENVIRON-
MENTAL AND HEALTH HAZARDS.
SECTION 5 — OPERATING INSTRUCTIONS

A. Button Functions

TLS-250i Systems features front-mounted pushbuttons that let you review all inventory information, tank by tank, and call for inventory reports.

These buttons are also used to enter or change system and tank setup parameters and reset audible sensor alarms as required (refer to Section 4).

The following is a brief description of each button’s function.

CURSOR — (Setup mode only) Depress CURSOR button to select digit to be changed. Digit will flash.

INCREMENT — (Setup mode only) Used to select desired value for a displayed digit.

LEAK ALERT RESET — Depress once to shut off and reset audible alarm (will not shut off alarm LEDs). NORMAL MODE — When audible alarm is inactive, depress once to test LEDs and audible alarm. SETUP MODE — When on the —A or —B setup codes, depress the reset sensor configuration.

DIAG MODE — Press to set the system in Sensor Checkout Mode.

PRINT — Used to print inventory, setup and diagnostic information. First select the desired information using the keyswitch, FUNCTION and TANK buttons.

FUNCTION — Depress FUNCTION button to advance display to next function.

TANK — Used to select tank or sensor for which information is to be entered, displayed or printed (except during Auto-Transmit Message mode setup where the TANK button is used to select message type).

B. Alarm Cause Indicator Functions

The TLS-250i has on its front panel eleven Alarm Cause LED indicators that will flash when an alarm condition is detected. Three of the LEDs — Fuel Leak, Water Leak and Sensor Out — indicate the type of alarm condition sensed. The LEDs labeled 1-8 will show which sensor in the system has detected the condition.

In addition, an audible alarm will beep when any sensor alarm condition is detected.

The audible alarm can be reset immediately using the Leak Alert Reset button. However, the LED Alarm Cause indicators and LCD Annunciators cannot be reset until the alarm condition has been corrected and the Operating Mode keyswitch turned to the Alarm Reset position and back to Normal.

C. Operating Mode Keyswitch Functions

The TLS-250i Operating Mode keyswitch is a management feature that lets you select system operating modes — Normal, Setup, Diagnostic and Alarm Reset. It also limits access to the Setup, Diagnostic and Alarm Reset modes so that only authorized personnel can enter or change system, sensor and tank parameters.

NOTICE: THE OWNER OF THIS PRODUCT SHOULD REMOVE THE FRONT PANEL KEY TO PREVENT MISUSE OF THE PRODUCT. UNAUTHORIZED CHANGES IN THE SETUP PARAMETERS COULD RESULT IN INACCURATE INVENTORY CONTROL OR DETECTED POTENTIAL ENVIRONMENTAL AND HEALTH HAZARDS.
There are four positions on the switch. The following is a brief description of their functions.

NORMAL — For daily system operation. Displays inventory and sensor status information, provides automatic and programmed operating reports, monitors limit values for indicator features.

Normal display functions include:

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of Day</td>
<td>Hours/Minutes</td>
</tr>
<tr>
<td>Fuel Volume</td>
<td>Gallons</td>
</tr>
<tr>
<td>Temperature-</td>
<td>Gallons</td>
</tr>
<tr>
<td>Compensated Volume</td>
<td>Gallons</td>
</tr>
<tr>
<td>Fuel Height</td>
<td>Inches/Hundredths</td>
</tr>
<tr>
<td>Water Height</td>
<td>Inches/Tenths</td>
</tr>
<tr>
<td>Fuel Temperature</td>
<td>Degrees F/Tenths</td>
</tr>
<tr>
<td>Delivery Volume</td>
<td>Gallons</td>
</tr>
<tr>
<td>(Last delivery to</td>
<td>Status Indicator for</td>
</tr>
<tr>
<td>tank)</td>
<td>Each Alarm Cause</td>
</tr>
<tr>
<td>&quot;A&quot; Sensor Status</td>
<td>0 = OFF, 1 = ON</td>
</tr>
</tbody>
</table>

SETUP — Provides access to system, sensor and tank parameters. Used to enter and change setup values. The keyswitch limits the setup mode to authorized personnel.

See Section 4 for System Setup procedures.

DIAGNOSTIC — The Diagnostic function provides a means of accessing certain information regarding system identification, capacitance values, and calibration variables and constants. It also permits printing of the Alarm History Report.

ALARM RESET — Used to reset LCD indicator functions after theft and overfill alarms have been triggered. Will also reset alarm relays after alarm indications.

NOTE: When an alarm condition is eliminated (i.e., excessive water has been removed from inside the tank), the alarm will reset itself automatically.

IMPORTANT: The Alarm Reset will NOT reset Alarm Cause LEDs. These LEDs will shut off only after the cause of the alarm indication has been corrected and the sensor detects no other alarm condition.

D. Operator's Instructions

1. To display inventory and sensor status information:
   a. With the Operating Mode keyswitch in the NORMAL mode, depress the FUNCTION button to select the desired display function (i.e., Fuel Volume, Water Height, Sensor Status, etc.).
   b. Depress the TANK button to select the desired tank or sensor for which the information is to be displayed.

2. To print inventory information:
   a. With Operating Mode keyswitch in the NORMAL mode, depress the PRINT button. An inventory report will be printed for all tanks in the system.

3. To print sensor status information:
   a. With the Operating Mode keyswitch in the NORMAL mode, depress the FUNCTION button until the "A" annunciator appears in the display.
   b. Depress the PRINT button. A sensor status report will be printed for all sensors in the system.
4. To print “System” Setup Information:
   There are two reports showing system setup parameters not related to individual tanks.
   a. The first report shows all system setup parameters except the auto-transmit parameters. To print this report:
      1. Turn the Operating Mode keyswitch to SETUP position.
      2. Using the FUNCTION button, select the function code for any system setup parameter (except auto-transmit parameters).
      3. Depress the PRINT button. All setup parameters shown on the report will be printed.
   b. The second report shows the auto-transmit parameters. To print this report:
      1. Turn the Operating Mode keyswitch to SETUP position.
      2. Using the FUNCTION button, select the function code for any auto-transmit parameter.
      3. Depress the PRINT button. All auto-transmit setup parameters will be printed.

5. To print “Sensor” Setup Information:
   a. Turn the Operating Mode keyswitch to SETUP position.
   b. Using the FUNCTION button, advance the display to function -A or -B.
   c. Depress the TANK button to select the desired sensor.
   d. Depress the PRINT button. All setup information for the sensor location indicated by the tank number in the display will be printed.
   **NOTE:** If the tank number shows 1, setup information for sensor #1 in a four-tank system will be printed.
   e. Depress the TANK button to select other sensors in the system and use the PRINT button to obtain reports.

6. To print “Tank” Setup Information:
   *TANK SETUP INFORMATION IS PRINTED ONLY FOR TANK NUMBER SHOWN IN THE DISPLAY.*
   a. Turn the Operating Mode keyswitch to SETUP position.
   b. Depress the FUNCTION button to advance display to any tank setup function.
   c. Depress the TANK button to select the desired tank.
   d. Depress the PRINT button. A report showing all tank setup information for the desired tank will be printed.
   e. Depress the TANK button to select other tanks in the system and use the PRINT button to request printed reports.

7. To print Tank Alarm History Report:
   **NOTE:** The tank alarm history report is an operational report rather than diagnostic. It is included in the Diagnostic Mode for security reasons.
   a. Turn the Operating Mode keyswitch to “DIAG” (diagnostic) position.
   b. Depress the FUNCTION button to advance the display to Tank Alarm History Report (Code 8). The display will show dashes (-----).
   c. Depress the TANK button to select the desired tank.
   d. Depress the PRINT button. A report showing the dates and times of the last three occurrences of each type of alarm for this tank will be printed.
   e. Depress the TANK button to select other tanks in the system and use the PRINT button to request printed reports.
8. To Print Sensor Alarm History Report:

   **NOTE:** The Sensor Alarm History Report is an operational report rather than diagnostic. It is included in the Diagnostic Mode for security reasons.
   
   a. Turn the Operating Mode key switch to “DIAG” (diagnostic) position.
   
   b. Depress the **FUNCTION** button to advance the display to Sensor Alarm History Report (Code 8A). The display will show dashes (•••••). 
   
   c. Depress the **PRINT** button. A report showing the dates and times of the last three occurrences of each type of sensor alarm for all sensors will be printed.

9. To Enter Shutdown Mode:

   a. The **Shutdown Mode** can be initiated only by programmed **Shutdown Mode Start and Stop times** (see Section 4.3).

E. **Alarm Type Recognition**

There are two types of alarm indications in a TLS-250i. The first is based on programmed alarm limits sensed by an in-tank inventory probe indicated by a flashing display and/or annunciators in the display and an alarm report printout (in systems equipped with a printer).

The other is based on alarm conditions detected by an interstitial or piping sump sensor and indicated by an audible alarm, flashing alarm cause LEDs, a flashing “A” or “B” annunciator, and an alarm report printout (in systems equipped with a printer). 

In addition, an external monitoring device wired to the TLS-250i can trigger an **External Input Alarm indication**.

Any alarm condition can be programmed to activate one or both of the TLS-250i internal alarm relays to trigger external alarms.
1. Alarm Indications and Causes

<table>
<thead>
<tr>
<th>ALARM</th>
<th>INDICATIONS</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INVENTORY PROBE LIMIT ALARMS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Theft | Flashing display  
Theft Alarm printout | Cumulative product loss during a leak test has exceeded the programmed Theft Limit at any time in the test period |
| Overfill | Flashing display  
Overfill Alarm printout | Fuel volume in a tank has exceeded the programmed Overfill Limit during a bulk delivery. **This alarm will be triggered only if the inventory increase is sufficient to activate the Automatic Inventory Increase Report feature.** |
| Low Limit | Flashing display  
“Low Limit” annunciator  
Low Limit Alarm printout | The volume in a tank has dropped below the programmed Low Level Limit. |
| Low Limit  
(Magnetostrictive Probes only) | Flashing display  
“Low Limit” annunciator  
“Diag” annunciator  
Low Limit Alarm printout | The Fuel and Water floats on a Magnetostrictive Probe are less than eight inches apart. Until a sufficient amount of fuel is added to the tank to eliminate this condition, inventory, inventory increase and leak test reports for the affected tank are considered invalid. |
| High Water | Flashing display  
“Water” annunciator  
High Water Alarm printout | Water collected in the bottom of a tank has exceeded the programmed High Water Limit. |
| **LIQUID SENSOR ALARMS** | | |
| Liquid Leak | Flashing Fuel Leak LED  
Flashingsensor Location LED  
Flashingsensor “A” or “B” annunciator  
“Leak Detect” annunciator  
Audible alarm  
Fuel Alarm printout | A liquid sensor located in a tank annulus or piping sump has detected the presence of a liquid. |
| Sensor Out | Flashing Sensor Out LED  
Flashingsensor Location LED  
Flashingsensor “A” or “B” annunciator  
Audible alarm  
Sensor Out printout | The system has detected a disconnected or failed sensor in the system. |
| **EXTERNAL INPUT ALARM** | | |
| External Input | External Input ON or OFF printout | An external monitoring device wired to the TLS-250 has turned on or off. |
F. Alarm Operation and Reset

1. Inventory Probe Alarm Limits.
   A flashing display indicates an alarm limit condition. When an alarm limit is reached, the related annunciator on the display starts flashing to indicate the type of alarm. If the system has a printer, a printout will also occur.
   a. To find which tank has an alarm limit condition:
      1. Depress the **TANK** button to advance the display through the tank numbers until a flashing number is shown. This indicates that this tank has an alarm condition.
   b. To identify the event that has triggered the alarm:
      1. Depress the **FUNCTION** button to advance the display through the functions.
      2. When the entire display is shown, the quantity shown is the amount that has triggered the alarm.
   The Overfill and Theft Indicators will not cause a display annunciator to flash.
   When the Overfill Limit is exceeded, a printout shows the type of alarm, time and date it occurs. However, when the affected tank is displayed, the tank number will flash. In addition, when the gallons of fuel is displayed, the tank number AND gallons quantity will flash.
   When the Theft Indicator is triggered, the display is not affected. A printout will occur showing the type of alarm, the date and time.
   To reset the flashing display and alarm relays turn the mode keyswitch to the ALARM RESET position and then back to the NORMAL position.
   If the high water or low inventory alarm condition still exists, the display will continue to flash.

2. Leak Sensor Alarms.
   Flashing alarms cause LEDs and a beeping audible alarm indicate an alarm condition detected by a leak sensor and, if programmed, an input from an external monitoring device such as a line leak detector. For liquid alarm conditions, a “Leak Detect” display annunciator will flash.
   a. To reset the beeping audible alarm:
      1. Depress the **LEAK ALERT RESET** button. (This will not reset any visual alarm indications.)
   b. To reset the alarm relays (if triggered):
      1. Turn the Operating Mode keyswitch to the ALARM RESET position and back to NORMAL.
   c. To reset the flashing Alarm Cause LEDs and LCD annunciators:
      1. Correct the cause of the alarm condition.

IMPORTANT: Do not excavate tanks or take any other remedial action based solely on TLS-250i Leak Alarm indications. The TLS-250i is not a precision leak test device. Call for a “precision” test to confirm a suspected leak!
   a. Liquid Leak. Confirm the type of liquid that has caused the alarm. Correct the cause and re-install sensor. (See the TLS-250i and TLS-250i Plus’ Four Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579, for installation procedures.)
   b. Sensor Out: Correct the sensor problem or replace the defective sensor (see TLS-250i and TLS-250i Plus’ Four Tank System “Site Preparation and Installation Instructions,” Manual No. 576013-579, for installation procedures).
2. Place the system in Sensor Checkout Mode.
   a. Set the Operating Mode keyswitch to the “DIAG.” (diagnostic) position.
   b. Depress the **LEAK ALERT RESET** button. The DIAG annunciator in the LC display will begin to flash.
3. Turn the Operating Mode keyswitch to the ALARM RESET position and back to NORMAL.
4. Exit the Sensor Checkout Mode.
   a. Depress the **LEAK ALERT RESET** button.
   b. Return the Operating Mode keyswitch to the “NORMAL” position.

When a sensor is removed from the system or moved to another channel, the Sensor Out LED and Sensor Location LED will flash since the TLS-250i expects to see a sensor on that channel. Only after resetting the Sensor Out condition will the LEDs turn off.

d. To reset Leak Sensor LEDs after a sensor has been removed from the system or moved to another channel:
   1. Place the system in Sensor Checkout Mode.
      a. Set the Operating Mode keyswitch to the “DIAG.” (diagnostic) position.
      b. Depress the **LEAK ALERT RESET** button. The DIAG annunciator in the LC display will begin to flash.
   2. Turn the Operating Mode keyswitch to the SETUP position.
   3. Depress the **FUNCTION** button to access function code -A.
   4. Depress the **LEAK ALERT RESET** button to reset the Sensor Configuration.
   5. Exit the Sensor Checkout Mode.
      a. Turn the keyswitch to the DIAG mode.
      b. Depress the **LEAK ALERT RESET** button.
      c. Return the Operating Mode keyswitch to the NORMAL position.

### G. Changing Printer Paper Roll

**NOTE:** It is NOT necessary to open the printer compartment door to change the paper roll.

TLS-250i uses a 2" x 2 inch thermal paper. To order from Veece Root, specify: PN 576008-124, TLS-250i Printer Paper.

1. Lift paper roll cover and remove empty core.
2. Switch roll shaft to new roll and insert the new roll into the printer.
3. Snap the ends of the roll shaft into the slots.
4. Feed the end of the paper downward into the rollers. Depress the **PAPER FEED** button to advance the paper through the rollers and into the print position.
SECTION 6 — LEAK DETECTION

THE TLS-250i WILL FUNCTION ACCURATELY WITH ONLY CERTAIN APPROVED FLUIDS. See Section 4.M. of this manual for the list of approved fluids.

A. Inventory Control

Good inventory control practices are the first line of defense against the problems that can be caused by leaking underground tanks. TLS-250i Systems can, through their inventory reports, provide the required information for stored products to help an operator accurately prepare inventory control records. The American Petroleum Institute publication, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," provides guidance to operators of underground tanks on the requirements for maintaining control of inventories.

B. Leak Sensing

The TLS-250i Leak Sensors monitor the annular space and piping sumps in double wall tanks for the presence of liquid. Up to eight sensors may be connected to a single console.

The front-panel LEDs and audible alarm will indicate a "Sensor-Out" condition if a sensor fails or is disconnected.

When a liquid or sensor-out condition is detected, an audible alarm and flashing alarm-cause LED indicators are triggered. The flashing LEDs indicate the type of alarm — liquid or sensor-out — and identify which sensor in the system has detected the condition.

A Sensor Alarm printout will occur (in systems equipped with the optional printer) showing the sensor location, alarm type, and date and time of the occurrence.

The audible alarm can be reset immediately using the LEAK ALERT RESET button. However, the flashing LED Alarm Cause indicators and display annunciators cannot be reset until the alarm condition has been corrected and the Operating mode keyswitch turned to the ALARM RESET position and back to NORMAL.

If a secondary condition exists after the cause of the primary indication has been corrected, the alarm indicators for that condition will be triggered.

1. Alarm Causes.

Two types of alarm causes can be detected by the system.

- **Liquid Leak** — Liquid has been detected by the sensor in the annular space or piping sump. The "Fuel Leak" LED will flash.

- **Sensor Out** — The system has detected an open sensor circuit indicating a failed or disconnected sensor.

2. Alarm Indicator Rates.

The rate at which the LEDs flash and the audible alarm beeps varies according to the type of alarm. A liquid leak indication will cause the rapid flash and beep. A sensor out indication will be slower.

3. Alarm Indication Priorities.

Alarm indications are prioritized by the TLS-250i according to their degree of severity. If more than one alarm condition is detected by a single sensor, the more serious condition will supersede all others. The order of alarm priority is: 1) Liquid Leak, 2) Sensor Out.

If a secondary condition exists after the cause of the primary indication has been corrected, the alarm indicators for that condition will be triggered.
SECTION 7 — SYSTEM REPORTS

A. General

TLS-250i provides printed reports on inventory status and bulk deliveries that can help speed shift changes and aid in detecting inventory losses. The TLS also features reports and indicators that add extra security to your fueling operation.

The following is a brief description of these reports.

B. Report Descriptions

1. Inventory Status Report.

   The Inventory Status Report can be printed by depressing the PRINT button while the system is in the NORMAL mode. The printout provides complete information on all tanks and includes station header, date and time, tank number and product, gallons of fuel, ullage, inches of fuel, inches of water, and temperature of fuel.

   This report may also be printed automatically, three times a day, using the programmable Auto-Print Time feature.


   The Sensor Status Report can be printed while the system is in the NORMAL mode by depressing the FUNCTION button until the “A” annunciator appears in the display and depressing the PRINT button. The report will show the status of each sensor in the system and the external input.

3. Automatic Inventory Increase Report.

   The Automatic Inventory Increase Report is printed within one minute (unless an Inventory Increase Delay Time has been entered — see Section 4.1) of the completion of a bulk delivery to a tank. Information shown on the report is: station header, tank number and product label, starting and ending dates; times, volumes and temperatures; and net inventory increase.

   IMPORTANT: The Automatic Inventory Increase feature measures beginning and ending volumes to calculate net volume increase. IT DOES NOT COMPENSATE FOR FUEL DISPENSED DURING EITHER THE BULK DELIVERY OR THE INVENTORY INCREASE DELAY TIME.

   The last Inventory Increase Report can be reprinted by depressing the PRINT button while the system is in the NORMAL mode and the Delivery Volume FUNCTION is selected.
4. Indicator Reports.

The TLS-250i system has programmable indicator limits that can warn of sudden losses due to theft, of a potential overfill during bulk delivery, low fuel inventory, and a high water condition in a tank. In addition, its leak sensors will detect a fuel leak, water leak or sensor out condition.

When an indicator limit is exceeded or a leak sensor alarm is triggered, an automatic printout occurs showing the type of indicator or alarm, date and time.

a. Theft Indicator detects a rapid drop in inventory during the shutdown mode.

b. Overfill Indicator warns of a potential overspill during bulk delivery by a tank truck.

c. Low Limit Indicator warns when inventory drops below preset low limit amounts.

d. High Water Indicator warns when water level exceeds a preset limit.

e. External Input On warns that an external device, such as a line leak detector, has alarmed.

f. External Input Off warns that an external device, such as a line leak detector, has returned to its normal state.

g. Sensor Alarm shows the sensor number and type of alarm condition.
5. Tank Alarm History Report.

The Tank Alarm History Report is an operational report that includes the last three occurrences of each type of indicator for each tank. The report shows the date and time of each occurrence for each tank.

The Tank Alarm History Report is included in the Diagnostic mode for security reasons.


The Sensor Alarm History Report includes the dates and times of the last three occurrences of each type of sensor alarm for all sensors in the system.

The Sensor Alarm History Report is included in the Diagnostic Mode for security reasons.

There are two reports showing setup parameters not related to individual tanks.

a. The first report shows all system setup parameters except auto-transmit parameters. To print this report:

1. Turn Operating Mode keyswitch to SETUP position.
2. Using the FUNCTION button, select the function code for any system setup parameter shown on the report.
3. Depress the PRINT button. All setup parameters shown on the report will be printed.

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CALENDAR CLOCK:
JUL 4, 1991
8:31 PM

LEAK DETECT START:
11:00 PM

LEAK DETECT STOP:
6:00 AM

AUTO PRINT 1:
8:00 AM

AUTO PRINT 2:
4:00 PM

AUTO PRINT 3:
12:00 AM

SECURITY CODE:
000000

RELAY CONFIGURATION:
RLY 1 RLY 2
LEAK ALM YES YES
HI WATER NO NO
OVERFILL NO YES
LO LIMIT NO NO
THEFT ALM YES NO
EXT. INPUT NO NO
SEN FUEL YES YES
SEN OUT NO YES

EXTERNAL INPUT ALARM
DISABLED

SENSOR CONFIGURATION

SENSOR 2A
SENSOR 4A
SENSOR 6A
SENSOR 8A
b. The second report shows auto-transmit parameters. To print this report:

1. Turn the Operating Mode keyswitch to SETUP position.

2. Using the **FUNCTION** button, select the function code for any auto-transmit parameter.

3. Depress the **PRINT** button. All auto-transmit setup parameters will be printed.

<table>
<thead>
<tr>
<th>AUTO-TRANSMIT PARAMS:</th>
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<tbody>
<tr>
<td>MESSAGE</td>
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<tr>
<td>$RESEV$:</td>
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<tr>
<td>$WATR###$:</td>
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<tr>
<td>$OVFL###$:</td>
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<td>$LOLV###$:</td>
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<td>$THFT###$:</td>
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</tbody>
</table>

**AUTO-REPEAT TIME:**
60 MINUTES

**TRANSMIT DELAY TIME:**
5 SECONDS

Sensor Setup Parameters Report.

The Sensor Setup Parameters Report reveals the status of the water audible alarm and water alarm delay time for each sensor in the system.

a. Turn the Operating Mode keyswitch to SETUP position.

b. Using the **FUNCTION** button, select function code -A.

c. Depress the **PRINT** button. The sensor setup parameters for all sensors in the system will be printed.

**SENSOR SETUP PARAMS:**

**WATER AUDIBLE ALARM:**
SENSOR 1A DISABLED

**WATER ALM DELAY TIME**
SENSOR 1A 0.5 HRS

Tank Setup Parameters Report includes all setup information related to specific tanks. The report is printed by tank and includes: Product Label and Product Code; High Water Limit; Overfill Limit; Low Volume Limit; Theft Limit; Thermal Coefficient; Delivery Report Delay Time; Tank Capacities; Tank Diameter; Tank Tilt Adder; and Manifolded Tank Configuration.

To print the Tank Setup Parameters report:

a. Turn Operating Mode keyswitch to SETUP position.

b. Depress the FUNCTION button to select any tank setup parameter function code.

c. Depress the TANK button to select the desired tank.

d. Depress the PRINT button. All setup information for that tank will be printed.
SECTION 8. WARRANTY CONDITIONS AND LIMITATIONS OF LIABILITY

A. LIMITATIONS OF LIABILITY. We warrant that this product will be free from defects in material and workmanship for a period of one (1) year from the date of installation or fifteen (15) months from the date of invoice, whichever occurs first. During the warranty period, we or our representative will repair or replace the product, if determined by us to be defective, at the location where the product is in use and at no charge to the purchaser.

We shall not be responsible for any expenses incurred by the user.

This warranty applies only when the product is installed in accordance with Veeder-Root's specifications, and a Warranty Registration and Checkout Form has been filed with Veeder-Root by an Authorized Veeder-Root Distributor. This warranty will not apply to any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions, or warnings; or modified or repaired by unauthorized persons; or improperly installed.

B. INSPECTION. You shall inspect the product promptly after receipt and shall notify us in writing at our Simsbury office of any claims, including claims of breach of warranty, within thirty days after you discover or should have discovered the facts upon which the claim is based. Your failure to give written notice of a claim within the time period shall be deemed to be a waiver of such claim.

C. LIMITATION OF REMEDY AND WARRANTY. The provisions of Paragraph 1 are our sole obligation and exclude all other remedies or warranties, express or implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, whether or not purposes or specifications are described herein. We further disclaim any responsibility whatsoever to you or to any other person for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions, or warnings; or modified or repaired by unauthorized persons; or improperly installed.

D. LIMITATION OF DAMAGES. Under no circumstances shall we be liable for any incidental, consequential or special damages, losses or expenses arising from this contract or its performance or in connection with the use of, or inability to use, our product for any purpose whatsoever.

E. LIMITATION OF ACTIONS. No action regardless of form arising out of this contract may be commenced more than one year after the cause of action has accrued, except an action for nonpayment.

F. COLLATERAL PROMISES. There are no representations, warranties, or conditions express or implied, statutory or otherwise except those herein contained, and no agreements or waivers collateral hereto shall be binding on either party unless in writing and signed by you and accepted by us at our Simsbury office.

G. INTERPRETATION. Rights and liabilities arising out of any contract with us shall be determined under the Uniform Commercial Code as enacted in Connecticut.

Warranty revised January 1, 1992