V R VEEDER-ROOT
SYSTEM UPGRADE INSTRUCTIONS

TLS-250 and 250i
Tank Level Sensing System
Manual Number 576013-981

VEEDER-ROOT V R
Environmental Products

ATTENTION!

READ THIS IMPORTANT SAFETY INFORMATION BEFORE SERVICING, STARTING UP OR OPERATING A TLS-250, TLS-250i or TLS-250i *Plus!* SYSTEM.

This product has been installed and operates in the highly combustible environment of a gasoline storage tank. It is essential that you read and follow carefully 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 that wiring physically separated from any other wiring. Failure to start up, operate or service this product in accordance with the instructions warnings found in this manual could create danger to life and property and will result in voiding all warranties connected with this product.

IMPORTANT

WARNINGS:

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

IMPROPER SYSTEM OPERATION COULD RESULT IN INACCURATE INVENTOR CONTROL OR UN-DETECTED POTENTIAL ENVIRONMENTAL AND HEALTH HAZARDS IF PROBE-TO MONITOR WIRING RUNS EXCEED 1,000 FEET. RUNS OVER 1,000 FEET ARE NOT UL APPROVED FOR THIS APPLICATION. PROBE-TO-MONITOR WIRING RUNS 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) 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.

READ CAREFULLY THE OPERATING INSTRUCTIONS AND WARNINGS FOUND IN THIS MANUAL AND ON THE WARNING LABEL AFFIXED TO THE FRONT PANEL OF THE SYSTEM MONITOR. FAILURE TO DO SO COULD RESULT IN UNDETECTED ENVIRONMENTAL AND HEALTH HAZ-ARDS.

FAILURE TO COMPLY WITH THESE REQUIREMENTS COULD RESULT IN SERIOUS PERSONAL INJURY, PROPERTY LOSS, EQUIPMENT DAMAGE, AND UNDETECTED POTENTIAL ENVIRON-MENTAL AND HEALTH HAZARDS

IMPORTANT

WARNINGS:

SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

CIRCUITRY WITHIN THE PROBE AND CONSOLE BARRIER FORM AN INTRINSICALLY SAFE, EN-ERGY-LIMITED SYSTEM. THIS SYSTEM MAKES THE TLS PROBE INTRINSICALLY SAFE FOR USE IN A CLASS I, GROUP D HAZARDOUS LOCATION. THE TLS-250i AND TLS-250i Plus! PROBE WIR-ING IS INTRINSICALLY SAFE ONLY WHEN CONNECTED TO VEEDER-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 VEEDER-ROOT "SITE PREPARATION AND INSTALLATION INSTRUCTIONS," MANUAL NO. 576013-579 OR 576013-577; THE NATIONAL ELECTRICAL CODE; FEDERAL, STATE, AND LOCAL CODES; AND OTHER APPLICABLE SAFETY CODES.

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SECTION 1. INTRODUCTION

A. GENERAL INFORMATION.

The instructions contained in this manual are intended for upgrading the TLS-250 and TLS-250i (eight-tank and four-tank) Tank Level Sensors manufactured by the Veeder-Root Company, 125 Power Forest Drive, Simsbury, Connecticut 06070-2003. The purpose of the upgrade is to bring these sensors into compliance with specifications for the TLS-250(i) *Plus!* Tank Level Sensing Systems.

IMPORTANT: THIS MANUAL IS INTENDED FOR USE BY EXPERIENCED SERVICE TECHNICIANS POSSESSING A THOROUGH KNOWLEDGE OF THE TLS-250, TLS-250i, AND TLS-250i *Plus!* TANK LEVEL SENSOR AND OF PROPER AND SAFE SERVICE TECHNIQUES FOR ELECTRONIC EQUIP-MENT.

Prior to servicing the TLS-250 or TLS-250i, the information contained in the following Veeder-Root technical manuals relating to the TLS-250(i) should be reviewed and thoroughly understood.

"VEEDER-ROOT SITE PREPARATION AND
INSTALLATION INSTRUCTIONS,"
Manual No. 576013-577 & -579

"VEEDER-ROOT SYSTEM START-UP AND
OPERATING INSTRUCTIONS,"
Manual No. 576013-578 & -583

"VEEDER-ROOT SERIAL INTERFACE MANUAL,"
Manual No. 576013-693

These manuals should be available during a service call for use as reference if required.

When a vertical bar **|** appears adjacent to text or illustrations, information has been added or changed at the last issue date.

B. MANUAL ORGANIZATION.

This manual contains information to establish proper upgrade procedures to be followed during a service call, including detailed instructions for the removal and installation of parts and components. Section 4 contains upgrade procedures that are specific to the console (TLS-250, TLS-250i Eight-Tank, and TLS-250i Four-Tank) being upgraded. ALL OTHER SECTIONS IN THIS MANUAL APPLY TO ALL SENSOR MODELS AND SHOULD BE THOROUGHLY UNDERSTOOD BY THE SERVICE TECHNICIAN BEFORE ANY UPGRADE PROCEDURE IS PERFORMED.

SECTION 2. BEFORE YOU START!

A. BASIC PROCEDURES.

To help ensure proper and safe upgrade procedures for the TLS-250(i), the following steps should be taken IN THE ORDER THEY APPEAR, PRIOR TO SERVICING THE SYSTEM:

1. Review and thoroughly understand the safety warnings on page i of this manual.

   FAILURE TO HEED THESE WARNINGS CAN RESULT IN DEATH, SERIOUS PERSONAL INJURY AND EQUIPMENT DAMAGE CAUSED BY EXPLOSION OR ELECTRICAL SHOCK.

2. Review SECTION 2.B., "SYSTEM PARTS IDENTIFICATION".

3. Print out all system and tank setup parameters (see Manual No. 576013-578, Section 5.D.4. through 5.D.6. or Manual No. 576013-583, Section 5.D.6. through 5.D.8.), and save the tape.

   SETUP PARAMETERS CAN BE LOST DURING SOME SERVICE PROCEDURES! THIS PRINTOUT WILL ALLOW YOU TO RE-PROFILE THE SYSTEM WITH THE SAME PARAMETERS WHEN SERVICE IS COMPLETE.

B. SYSTEM PARTS IDENTIFICATION
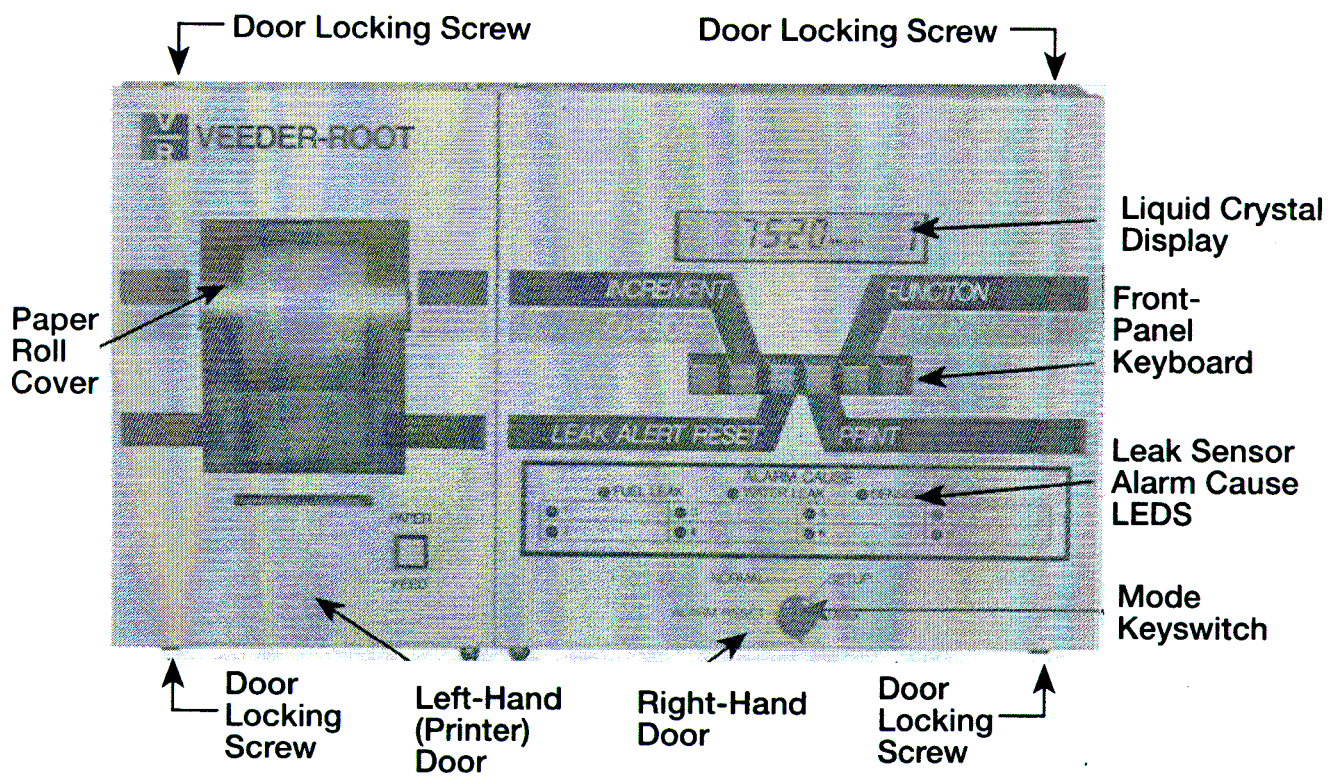
Figure 1. TLS-250(i) Front Panel Features

Figure 2. TLS-250(i) Internal Components

C. MONITOR FUNCTION

The TLS-250(i) monitor is the main controlling unit for the TLS-250(i) system. The TLS-250(i) monitor contains the main circuit board, the option board and an optional 20 column printer.

The main board is located within the body of the monitor. Contained on this board are system power supplies, the intrinsic safety barrier, all terminal strips for field connections; alarm relays; and AC power. In addition, the main measurement data into fuel height, water height and fuel temperature.

The option board is located on the back of the right-hand monitor door. Contained on this board are the LCD display, leak sensor alarm cause LEDs, the operating push buttons, the computing logic to convert fuel height to volume, all logic to control alarm threshold, system features, and setup parameters.

An optional 20 column printer includes its own logic and power supply attached to a thermal print head as one assembly. The printer connects to the main board and does not require a separate external power source. The printer provides reports of all TLS data, diagnostics, and alarms.

The monitor is equipped with a serial data communications port which allows all TLS-250(i) information to be retrieved remotely.

The main board receives digital information from the probes and processes it into height of fuel, temperature of fuel and height of water. In addition, the status of the leak sensors is monitored. This information is received through the barrier section on the main board. The main board transmits this information serially at 9600 baud to the option board via an interconnecting ribbon cable. Printer information is transmitted from, the option board via the main board in a Serial format to the printer.

All stored information including setup functions, inventory information, stored reports and historical data should be printed out before attempting to service the TLS-250(i) monitor (see "System Start-Up and Operating Instructions", Manual 576013-578 or 576013-583).

SECTION 3. COMMON PROCEDURES FOR UPGRADING ALL CONSOLES

This section contains common procedures that you will need to perform on all TLS-250(i) consoles as part of the system upgrade. Specific topics covered are:

- Important preliminary information

- Opening the monitor

- Removing and replacing the option board

These common procedures are referenced in SECTION 4. "CONSOLE-SPECIFIC PARTS REPLACEMENT PROCEDURES", which describes the specific parts replacement procedures you must follow to upgrade a particular console to a corresponding TLS-250(i) *Plus!* system. You should be familiar with the procedures in this section before attempting to perform any of the console specific parts replacement procedures described in SECTION 4.

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250 WHILE SERVICING, REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250 BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

A. IMPORTANT PRELIMINARY INFORMATION

1. Print out all system and tank setup parameters, inventory information, stored reports, and historical data (see Manual No. 576013-578 or 576013-583, section 5.D.) and save the tape.

   SETUP PARAMETERS AND ALL OTHER DATA STORED IN THE TLS-250(i) CAN BE LOST DURING SOME SERVICE PROCEDURES! THIS PRINTOUT WILL PROVIDE A RECORD FOR THE CUSTOMER'S INVENTORY MANAGEMENT PROGRAM AND ALLOWS YOU TO RE-PROFILE THE SYSTEM WITH THE SAME PARAMETERS WHEN SERVICE IS COMPLETE.

2. Turn off AC power to the TLS-250(i) monitor by switching the AC power circuit breaker at the service panel to the "OFF" position before servicing monitors or probes.

   CAUTION: DISCONNECT AC POWER TO THE TLS-250 BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

3. Directions for opening the monitor are in SECTION 3.B., "OPENING THE MONITOR", below.

4. Directions for replacing and removing the option board are in SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD", below.

5. Component identification information for each console will be found with the console-specific parts replacement procedure in SECTION 4.

6. Carefully follow the instructions in this section when removing and replacing components in the TLS system.

7. If required after servicing the monitor, re-profile the system to its original system and tank parameters. Verify all operating functions.

8. Print a copy of the newly-entered system and tank setup parameters, compare them to those shown on the previous report, and place the new copy in the bottom of the monitor for future reference.

9. Be sure the monitor is closed and all screws secured when service is complete.

B. OPENING THE MONITOR

1. Open the right-hand door of the monitor to gain access to the main and option boards. Open the left-hand door of the monitor to gain access to the printer.

2. To open the right-hand door: remove the two screws located on the upper and lower right side (or top and bottom on some monitors) of the right-hand door; carefully open the door.

   NOTE: It may be necessary to loosen the screws located on the upper and lower left side of the left-hand door so that the right-hand door can be shifted slightly to the right to aid in opening.

3. To open the left-hand door: remove the two screws located on the upper and lower side (or top and bottom on some monitors) of the left-hand door; carefully open the door.

   NOTE: It may be necessary to loosen the screws located on the upper and lower right side of the monitor so that the left-hand door can be shifted slightly to the left to aid in opening.

C. REMOVING AND REPLACING THE OPTION BOARD

Whether you are replacing a whole option board or adding/replacing IC's modules (EPROM or RAM) on an existing option board, you will need to remove and replace the option board as follows:

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250(i) SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250(i) BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

1. Print out all system and tank setup parameters, inventory information, stored reports and historical data (see Manual No. 576013-578 or 576013-583, Section 5.D.), and save the tape.

   SETUP PARAMETERS AND ALL OTHER DATA STORED IN THE TLS-250(i) WILL NOT REMAIN IN MEMORY ON THE OPTION BOARD AND WILL BE LOST DURING THESE SERVICE PROCEDURES! THIS PRINTOUT WILL PROVIDE A RECORD FOR THE CUSTOMER'S INVENTORY MANAGEMENT PROGRAM AND ALLOW YOU TO RE-PROFILE THE SYSTEM WITH THE SAME PARAMETERS WHEN SERVICE IS COMPLETE.

2. Disconnect AC power to the TLS-250(i) monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

3. Open the right-hand door of the TLS-250(i) monitor (see SECTION 3.B., "OPENING THE MONITOR").

4. Remove the ten (10) Phillips-head screws that attach the option board to the door.

   NOTE: Hold the option board in place when removing screws.

5. Lift the option board away from the door.

6. Carefully remove the J2 keyswitch connector from the option board (see Figure 3).

   NOTE: The ribbon cable plugged into the J1 connector on the option board is still connected.

7. Position the option board so that the ribbon cable plugged in to the J1 socket on the option board can be removed. Take care not to bend or break the pins on the connector when removing (see Figure 4). Remove the option board.

8. If only replacing the option board, proceed to Step 9. If replacing the option board software, follow those steps outlined in Sections 4.B. and 4.C.

9. Install the new option board by first connecting the ribbon cable to J1 connector socket on the option board. Ensure that the pin 1 designation on the ribbon cable plug lines up with pin 1 of the J1 socket on the option board.

10. Plug the keyswitch connector to the J2 connection on the option board.

11. Line up the option board with the mounting studs on the door and re-install the ten (10) phillips screws.

    NOTE: Check to make sure the green ground jumper connector is installed under the mounting screw located on the upper right-hand side of the option board (see Figure 5).

12. Set the baud rate switch S7 to match the setting on the original option board.

13. Close the monitor door and replace the screws.

14. Re-apply AC power to the monitor.

15. Re-profile the system using the set-up parameters printed out in step A.

16. Verify system operation (see "System Start-up and Operating Instructions," Manual No. 576013-578 or 576013-583 for procedures).

J1 Connector
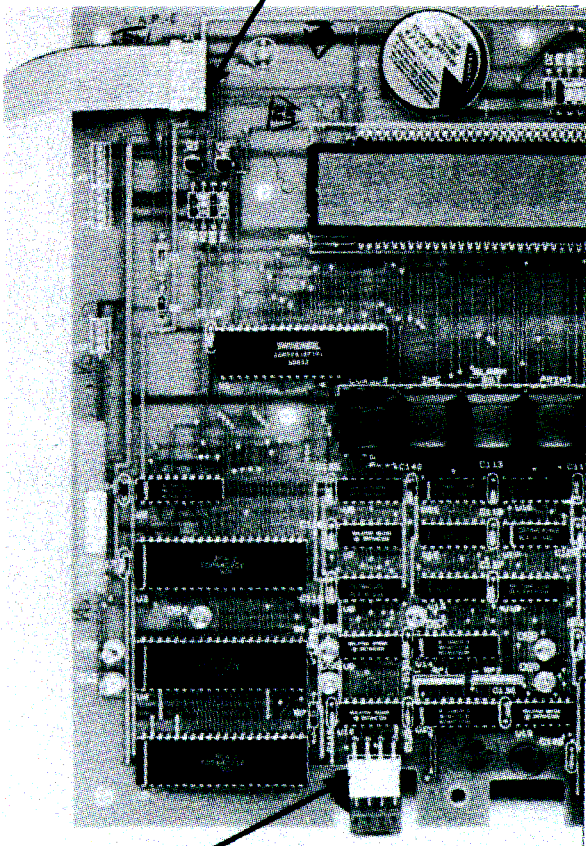
J2 Keyswitch Connector

Figure 3.   Removal of J2 Keyswitch Connector from Option Board
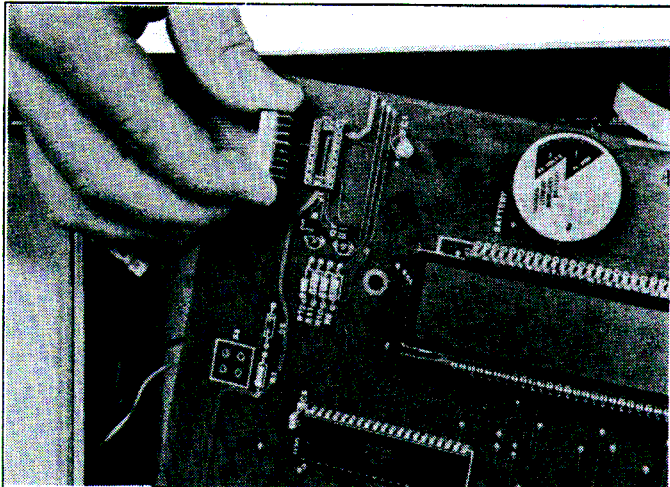
Figure 4. Removal of Ribbon Cable from J1 Socket

Ground Wire

Figure 5. Ground Jumper Connector

SECTION 4. CONSOLE-SPECIFIC PARTS REPLACEMENT PROCEDURES

This section contains console-specific parts replacement procedures for upgrading the following TLS systems:
- TLS-250 (Eight-Tank)
- TLS-250i (Eight-Tank)
- TLS-250i (Four-Tank)

NOTE: The instructions in this section reference the common procedures described in the previous section, SECTION 3. "COMMON PROCEDURES FOR UPGRADING ALL CONSOLES". You should be familiar with these procedures before attempting to replace parts in a particular console.

A. TLS-250 EIGHT-TANK PARTS REPLACEMENT PROCEDURES

The following paragraphs contain console-specific parts replacement procedures for upgrading a TLS-250 Eight-Tank Level Sensing System to a TLS-250 *Plus!* Eight-Tank system.

CAUTION: The instructions in this section (SECTION 4.A.) are for upgrading TLS-250 Eight-Tank Level Sensing Systems only. If you are upgrading a TLS-250i Eight-Tank System, you must follow the procedures in SECTION 4.B. If you are upgrading a TLS-250i Four-Tank System, you must follow the procedures in SECTION 4.C. Failure to follow the correct procedures could result in damage to your system.

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250i WHILE SERVICING, REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

The parts replacement kit (330020-250, 330020-251, or 330020-252) for the TLS-250 Eight-Tank system contains:
- One EPROM (labeled 329687-003), which replaces U3 on the existing main board.
- One complete option board, which replaces the existing option board.

To upgrade the TLS-250 Eight-Tank console:

1. **Prepare Console.** Refer to SECTION 3.A., "IMPORTANT PRELIMINARY INFORMATION".

2. **Open the Monitor.** Refer to SECTION 3.B., "OPENING THE MONITOR".

3. **Replace Option Board.** Remove existing option board and replace with new option board provided in parts replacement kit. Refer to SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD"

4. **Identify and Replace Main Board Software.** The main board software is contained in one EPROM located in the U3 position on the Eight-Tank main board (see Figure 6). To replace the software, proceed as follows:

   WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250 SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.

   CAUTION: DISCONNECT AC POWER TO THE TLS-250 BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

   a. Disconnect AC power to the TLS-250 monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

   b. Open the right-hand door of the monitor (see SECTION 3.B., "OPENING THE MONITOR").

c. Locate U3 on the main board (see Figure 6).

d. Carefully remove EPROM with an integrated circuit (I.C.) puller.

e. When installing the replacement EPROM, be certain to orient the notch on the EPROM with the silk-screened notch on the printed circuit board. Be sure that EPROM is inserted into the correct socket designation on the main board. Take care to line up pins properly and firmly press the EPROM into the socket on the main board.

f. Close the monitor door and replace screws.

g. Apply AC power to he monitor.

h. Verify system operations (see "System Start-Up and Operating Instructions," Manual No. 76013-578 or 576013-583).
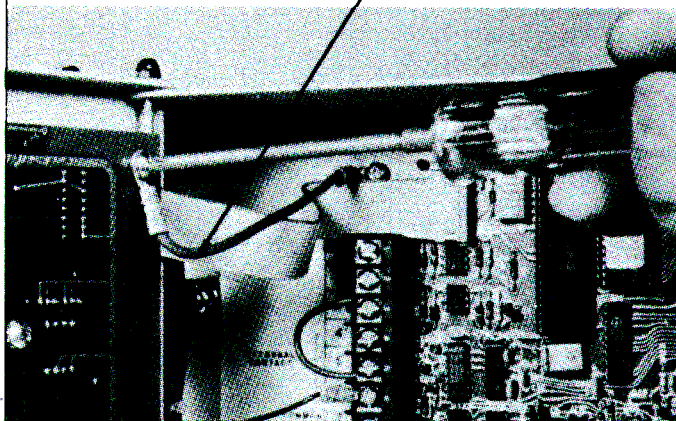

Figure 6.   Main Board Software and Memory Identification for TLS-250 Eight-Tank Monitors

B.   TLS-250i EIGHT-TANK PARTS REPLACEMENT PROCEDURES

This section contains console-specific parts replacement procedures for upgrading a TLS-250i Eight-Tank Level Sensing System to a TLS-250i *Plus!* Eight-Tank system.

CAUTION: The instructions in this section (SECTION 4.B.) are for upgrading TLS-250i Eight-Tank Level Sensing Systems only. If you are upgrading a TLS-250 Eight-Tank System, you must follow the procedures in SECTION 4.A. If you are upgrading a TLS-250i Four-Tank System, you must follow the procedures in SECTION 4.C. Failure to follow the correct procedures could result in damage to your system.

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY, OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250i SYSTEM WHILE SERVICING, REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250 BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

The parts replacement kit (330020-253, 330020-254, or 330020-255) for the TLS-250i Eight-Tank system contains:
- One EPROM (329687-001), which replaces U3 on the existing main board.
- One RAM (576001-417), which is installed in either U4 or U5 on the existing main board (both U4 and U5 must have RAM installed).
- Two EPROMs (labels vary with software version), which replace U40 and U41 on the existing option board.
- One RAM (576001-417), which is installed in U44 on the existing option board (U42, U43, and U44 must have RAM installed).

To upgrade the TLS-250i Eight-Tank console:

1. **Prepare Console.** Refer to SECTION 3.A., "IMPORTANT PRELIMINARY INFORMATION"

2. **Open the Monitor.** Refer to SECTION 3.B., "OPENING THE MONITOR"

3. **Identify and Replace Option Board Software.** The option board software is contained in two EPROMS, located at positions U40 and U41, and one RAM, to be installed at position U44 (see Figure 7).

   In this procedure, you will remove the option board from the monitor, replace the existing EPROMS (U40 and U41) with the EPROMS supplied in your parts replacement kit, install the RAM supplied in your parts replacement kit at position U44, then re-install the option board inside the monitor.

   To remove and replace the option board software, proceed as follows:

   WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250 SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.

   CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.
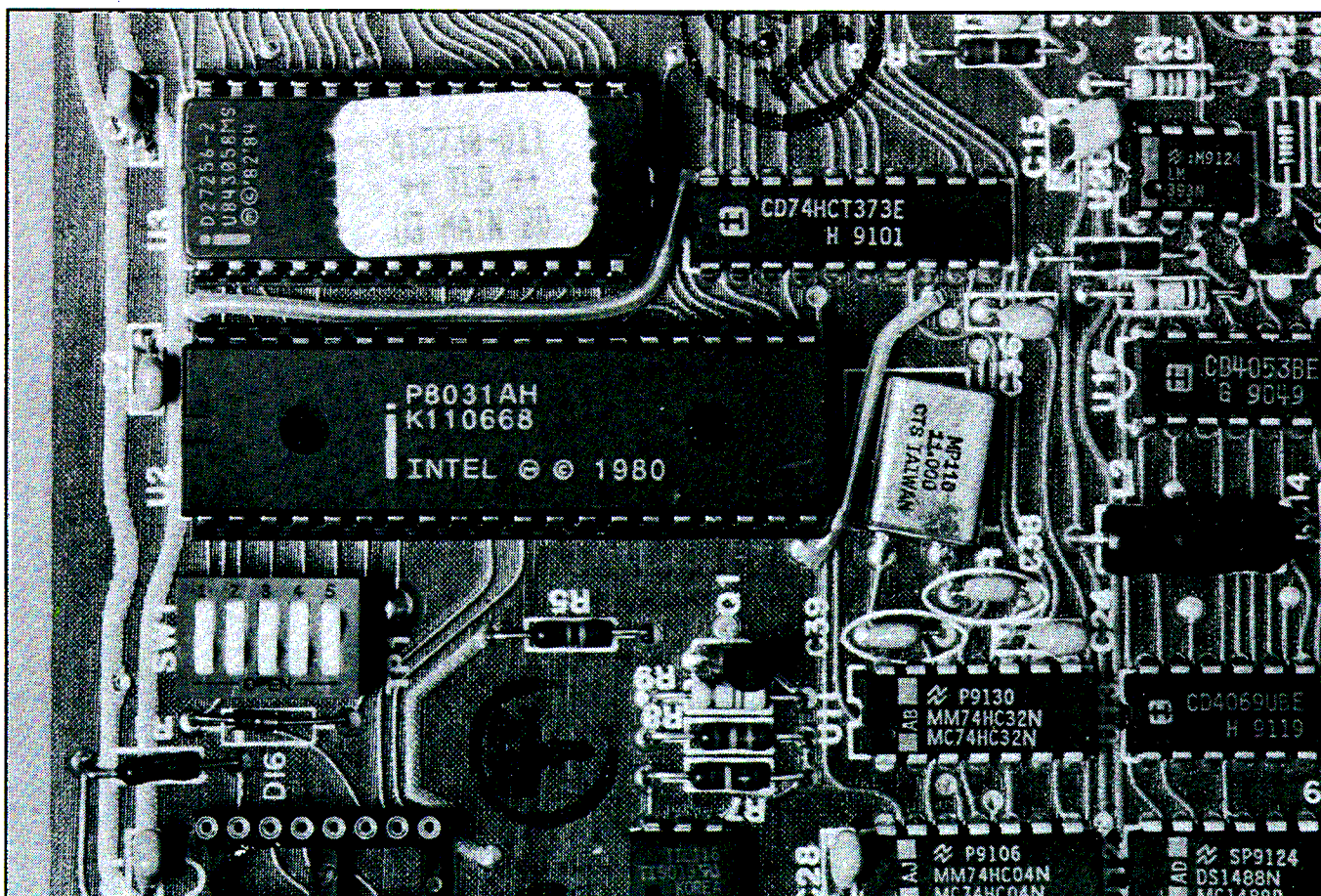
   a. Print out all system and tank setup parameters, inventory information, stored reports and historical data (see Manual No, 576013-578 or 576013-583, Section 5.D.) and save the tape.

      SETUP PARAMETERS AND ALL OTHER DATA STORED IN THE TLS-250i WILL NOT REMAIN IN MEMORY ON THE OPTION BOARD AND WILL BE LOST DURING THESE SERVICE PROCEDURES! THIS PRINTOUT WILL PROVIDE A RECORD FOR THE CUSTOMER'S INVENTORY MANAGEMENT PROGRAM AND ALLOW YOU TO RE-PROFILE THE SYSTEM WITH THE SAME PARAMETERS WHEN SERVICE IS COMPLETE.

   b. Turnoff AC power to the TLS-250i monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

   c. Open the right-hand door of the monitor (see SECTION 3.B., "OPENING THE MONITOR")

   d. Remove the option board (see steps 1–7 in SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD").

   e. Locate U40 and U41 on the option board (see Figure 7).

   f. Carefully remove the EPROMS at U40 and U41 with an Integrated Circuit (I.C.) puller.

Figure 7. TLS-250i Option Board Software Identification

g. Install replacement EPROMS at U40 and U41 on option board.

NOTE: When installing replacement EPROMS, be certain to orient the notch on the EPROM with the silk-screened notch on the printed circuit board. Be sure EPROM U41 is inserted into socket designated as U41 and EPROM U40 is inserted into socket designated as U40 on the option board. Take care to line up the pins properly and firmly press EPROMS into their sockets on the option board.

h. Locate U44 on the option board (see Figure 7).

i. Replace or install RAM (Part Number 576001-417) at U44 on option board. (U42 and U43 must also have RAM I.C.'s installed.)

j. Reinstall the option board (see steps 9–12 in SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD").

4. **Identify and Replace Main Board Software.** The main board software is contained in one EPROM, located at position U3, and one RAM, which is installed in either U4 or U5 (see Figure 6).

In this procedure, you replace the existing EPROM (U3) with the EPROM supplied in your parts replacement kit and install the RAM supplied in your parts replacement kit at position U4 or U5. (Both U4 and U5 must have RAM I.C.'s installed.)

To replace the main board software, proceed as follows:

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250i SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.
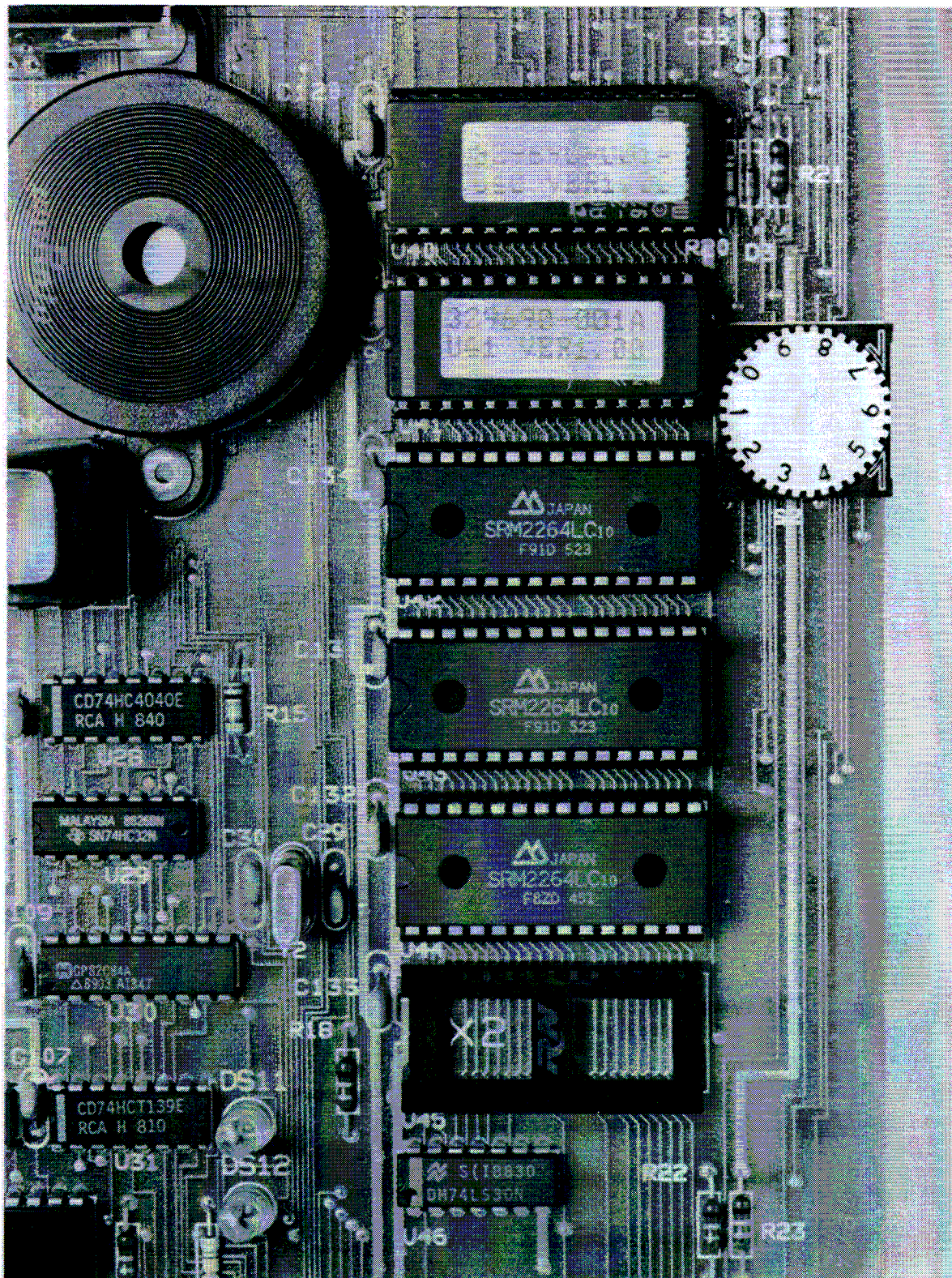
CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

a. Disconnect AC power to the TLS-250i monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

b. Open the right-hand door of the monitor (see SECTION 3.B., "OPENING THE MONITOR").

c. Locate U3 on the main board (see Figure 6).

d. Carefully remove EPROM at U3 with an integrated circuit (I.C.) puller.

e. Install replacement EPROM at U3 on the main board.

When installing the replacement EPROM, be certain to orient the notch on the EPROM with the silk-screened notch on the printed circuit board. Be sure that EPROM is inserted into the correct socket designation on the main board. Take care to line up pins properly and firmly press the EPROM into the socket on the main board.

f. Locate U4 and U5 on the main board (see Figure 6).

g. Replace or install RAM (part number 576001-417) in U4 or U5 (both locations must have RAM).

h. Close the monitor door and replace screws.

i. Apply AC power to the monitor.

j. Verify system operations (see "System Start-Up and Operating Instructions," Manual No. 76013-578 or 576013-583).

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C. TLS-250i FOUR-TANK PARTS REPLACEMENT PROCEDURES

This section contains console-specific parts replacement procedures for upgrading a TLS-250i Four-Tank Level Sensing System to a TLS-250i *Plus!* Four-Tank system.

CAUTION: The instructions in this section (SECTION 4.C.) are for upgrading TLS-250i Four-Tank Level Sensing Systems only. If you are upgrading a TLS-250 Eight-Tank System, you must follow the procedures in SECTION 4.A. If you are upgrading a TLS-250i Eight-Tank System, you must follow the procedures in SECTION 4.B. Failure to follow the correct procedures could result in damage to your system.

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250i WHILE SERVICING, REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

The parts replacement kit (330020-256 or 330020-257) for the TLS-250i Four-Tank system contains:

• One EPROM (labeled 329688-002), which replaces U4 on the existing main board.

• One RAM (part number 576001-539), which replaces U3 on the existing main board.

• Two EPROMs (labels vary with software version), which replace U40 and U41 on the existing option board.

• One RAM (part number 576001-417), which is installed in U44 on the existing option board (U42, U43, and U44 must have RAM installed).

To upgrade the TLS-250i Four-Tank console:

1. **Prepare Console.** Refer to SECTION 3.A., "IMPORTANT PRELIMINARY INFORMATION".

2. **Open the Monitor.** Refer to SECTION 3.B., "OPENING THE MONITOR".

3. **Identify and Replace Option Board Software.** The option board software is contained in two EPROMS, located at positions U40 and U41, and one RAM, to be installed at position U44 (see Figure 7).

   In this procedure, you will remove the option board from the monitor, replace the existing EPROMS (U40 and U41) with the EPROMS supplied in your parts replacement kit, install the RAM supplied in your parts replacement kit at position U44, then re-install the option board inside the monitor.

   To remove and replace the option board software, proceed as follows:

   WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250 SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.

   CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

   a. Print out all system and tank setup parameters, inventory information, stored reports and historical data (see Manual No, 576013-578 or 576013-583, Section 5.D.) and save the tape.

      SETUP PARAMETERS AND ALL OTHER DATA STORED IN THE TLS-250i WILL NOT REMAIN IN MEMORY ON THE OPTION BOARD AND WILL BE LOST DURING THESE SERVICE PROCEDURES! THIS PRINTOUT WILL PROVIDE A RECORD FOR THE CUSTOMER'S INVENTORY MANAGEMENT PROGRAM AND ALLOW YOU TO RE-PROFILE THE SYSTEM WITH THE SAME PARAMETERS WHEN SERVICE IS COMPLETE.

b. Turnoff AC power to the TLS-250i monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

c. Open the right-hand door of the monitor (see SECTION 3.B., "OPENING THE MONITOR")

d. Remove the option board (see steps 1–7 in SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD").

e. Locate U40 and U41 on the option board (see Figure 7).

f. Carefully remove the EPROMS at U40 and U41 with an Integrated Circuit (I.C.) puller.

g. Install replacement EPROMS at U40 and U41 on option board.

NOTE: When installing replacement EPROMS, be certain to orient the notch on the EPROM with the silk-screened notch on the printed circuit board. Be sure EPROM U41 is inserted into socket designated as U41 and EPROM U40 is inserted into socket designated as U40 on the option board. Take care to line up the pins properly and firmly press EPROMS into their sockets on the option board.

h. Locate U44 on the option board (see Figure 7).

i. Replace or install RAM (part number 576001-417) at U44 on option board. (U42 and U43 must also have RAM I.C.'s installed.)

j. Reinstall the option board (see steps 9–12 in SECTION 3.C., "REMOVING AND REPLACING THE OPTION BOARD").

4. **Identify and Replace Main Board Software.** The main board software is contained in one EPROM, located at position U4, and one RAM, located at position U3 (see Figure 6).

In this procedure, you replace the existing EPROM (U4) with the EPROM supplied in your parts replacement kit and replace the existing RAM (U3) with the RAM supplied in your parts replacement kit.

To replace the main board software, proceed as follows:

WARNING: TO AVOID ELECTRICAL SHOCK WHICH COULD RESULT IN DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE, DISCONNECT AC POWER TO THE TLS-250i SYSTEM WHILE REMOVING OR INSTALLING WIRING OR COMPONENTS.

CAUTION: DISCONNECT AC POWER TO THE TLS-250i BEFORE REMOVING, DISCONNECTING, INSTALLING OR CONNECTING ANY WIRES OR COMPONENTS IN THE SYSTEM. FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE.

a. Disconnect AC power to the TLS-250i monitor by switching the AC power circuit breaker at the service panel to the "OFF" position.

b. Open the right-hand door of the monitor (see SECTION 3.B., "OPENING THE MONITOR").

c. Locate U4 on the main board (see Figure 6).

d. Carefully remove EPROM at U4 with an integrated circuit (I.C.) puller.

e. Install replacement EPROM at U4 on the main board.

When installing the replacement EPROM, be certain to orient the notch on the EPROM with the silk-screened notch on the printed circuit board. Be sure that EPROM is inserted into the correct socket designation on the main board. Take care to line up pins properly and firmly press the EPROM into the socket on the main board.

f. Locate U3 on the main board (see Figure 6).

g. Carefully remove RAM at U3 with an integrated circuit (I.C.) puller.

h. Install replacement RAM (part number 576001-539) at U3 on the main board.

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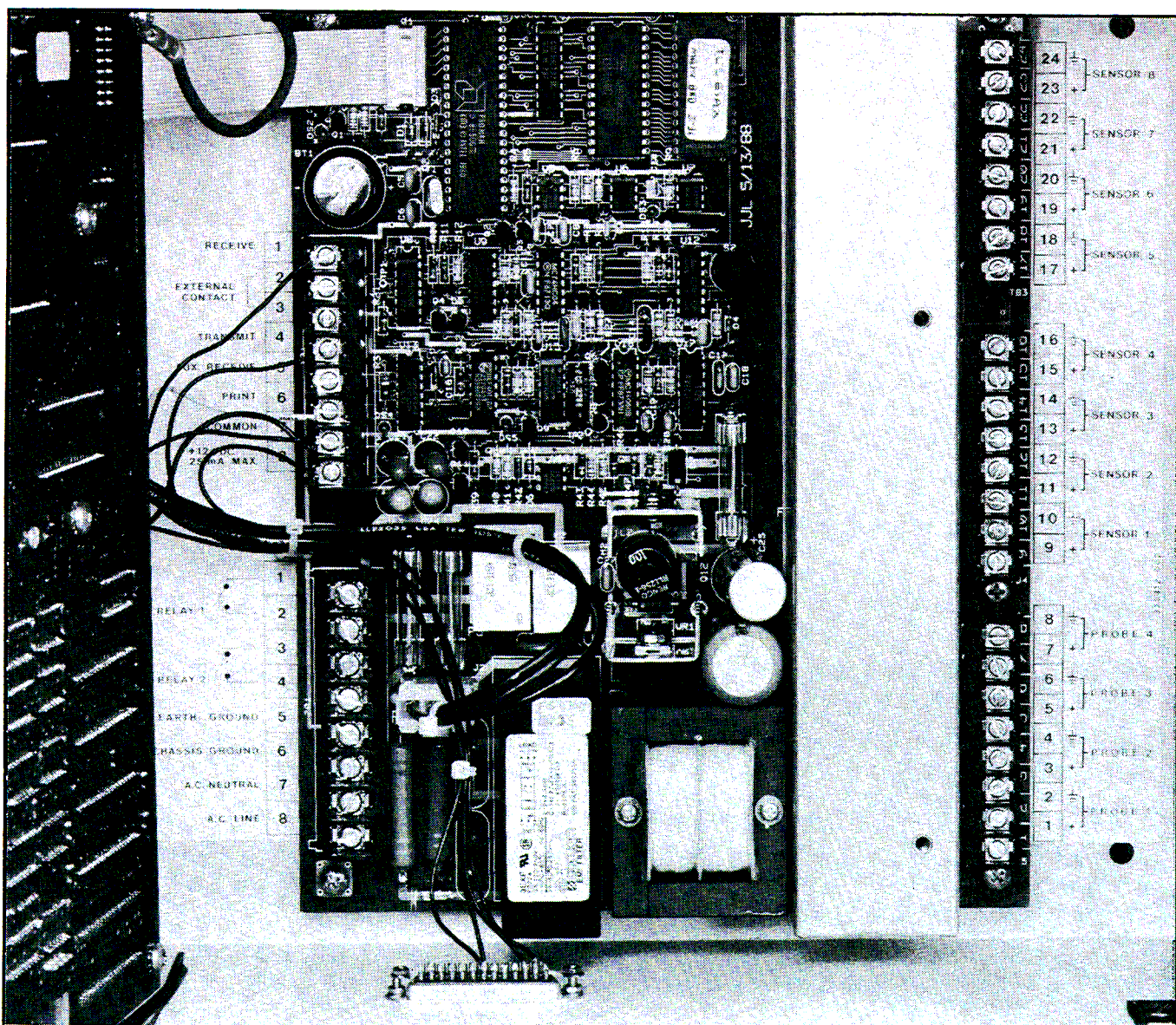
Figure 8. Main Board Connections for TLS-250i Four-Tank Monitors

i. Close the monitor door and replace screws.

j. Apply AC power to the monitor.

k. Verify system operations (see "System Start-Up and Operating Instructions," Manual No. 76013-578 or 576013-583).

SECTION 5. FACTORY SERVICE

A. REPAIR

No attempt to repair the TLS-250(i) or TLS-250i Plus! System should be made beyond the scope of these instructions.

B. SHIPMENT

If circuit boards or other parts of the TLS-250(i) or TLS-250i Plus! System must be returned for factory repair, perform the following:

5. Completely fill out the Red Tag attached to the replacement board. Please provide a written, accurate explanation of the failure. List the persons to be contacted if communication is required.

6. Attach the Red Tag to the defective board.

7. Pack parts being returned for repair using sufficient shock absorbing material to prevent damage. Be sure circuit boards are packed in the anti-static bag.

8. Be sure to include your Purchase Order authorizing repair in the box with the parts being returned. All shipments must be PREPAID

9. Return all boards and other parts to:

    Service Department
    Environmental Products
    Veeder-Root Company
    6th Avenue at Burns Crossing
    Altoona, PA 16603

SECTION 6. WARRANTY AND LIMITATIONS

A. WARRANTY

We warrant that our products shall 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 date of invoice, whichever occurs first. During the first ninety (90) days of this warranty period, we or our representative will repair or replace the product, if it is returned to our factory, transportation prepaid, within the warranty period and is determined by us to be defective. We will not be responsible for any shipping expenses incurred by the user.

This warranty applies only if the product is installed in accordance with our specifications, and a **Warranty Registration and Checkout Form** has been filed with us by an authorized Veeder-Root distributor and the user has maintained all inventory reconciliation records from date of installation. 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 at out Simsbury office in writing, 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. LIMITATIONS 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 contact with us shall be determined under the Uniform Commercial Code as enacted in Connecticut.

SECTION 7. APPENDIX—REFERENCE INFORMATION

A. OPERATING MODE—EIGHT-TANK MONITOR

The Operating Mode keyswitch provides access tot he 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 rest the flashing display and alarm relays after an alarm condition has been detected. **The ALARM RESET position will only reset the SENSOR ALARM CAUSE LEDs for those sensors which have been corrected or which have returned to a NORMAL condition.**

Figure 9 illustrates the pushbutton functions for the eight-tank monitor. These functions are described below. Table 1 summarizes the inventory, setup and diagnostic information accessible by using the Operating Mode keyswitch.
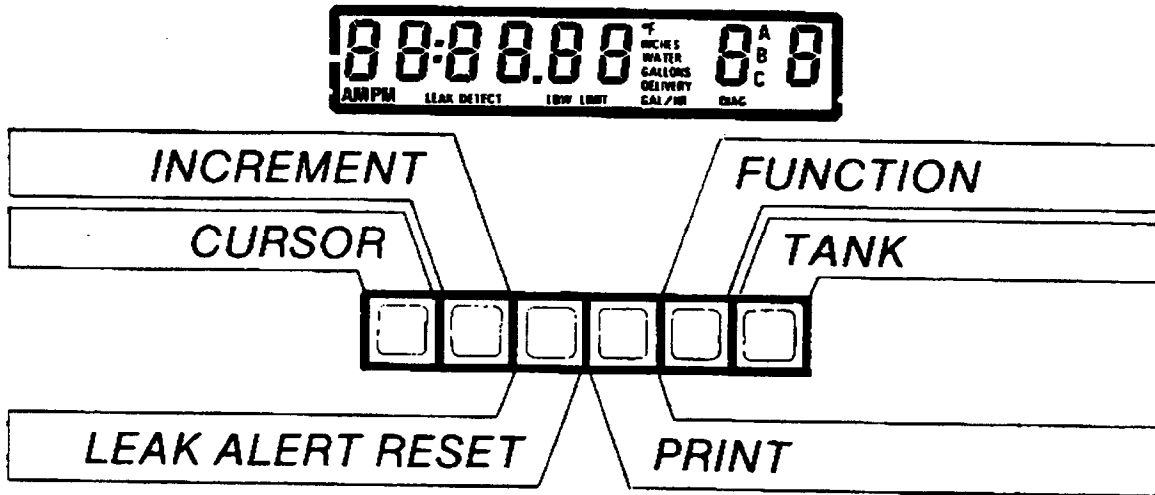
Figure 9. Pushbutton Functions—Eight-Tank Monitor

CURSOR - SETUP mode only. Press button to move cursor (flashing digit) to digit to be changed.

INCREMENT - SETUP mode only. After the cursor is set, press **INCREMENT** button to change digit to desired value.

LEAK ALERT RESET.

👆 NOTE: The **LEAK ALERT RESET** button is a multipurpose button whose functions change depending on keyswitch position and display information.

NORMAL MODE. Press once to shut off and reset audible alarm (will not shut off alarm LEDs) except when displaying the Leak Rate function. When audible alarm is inactive, press once to test LEDs and audible alarm, except when displaying the Leak Rate function. When Leak Rage shown on display, press twice to start leak detect test for all tanks, or press once, then select tank # and press again for single tank test. *SETUP MODE* - When on -A or -B setup codes, press to reset sensor configuration. *DIAG MODE* - Press to set the system in Sensor Checkout Mode.

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

FUNCTION. Press button to advance display function.

TANK. Press button to advance displayed tank.

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NOTE: For the purposes of this explanation, the display (above right) shows all the LCD characters displayed at once. At no time† during the actual operation will this condition exist.

†The full display will appear for the first second after power is applied to the system. It will switch immediately to proper display for function selected.

Table 1.   Eight-Tank Operating Mode Keyswitch Functions

KEYSWITCH POSITION								
NORMAL		**SETUP**				**SETUP**		
Format*	Function	Code	Format*	Function		Code	Format*	Function
HH:MM	Time of Day	0A	HH:MM	Time of Day		0	IIRRRRR	Product ID. Rev. Level
		0M	MM-DD	Month and Day		1	XXXXX	Probe Serial Number
GGGGGG	Fuel Volume	0C	YYYY	Year		2	XXX	Probe Circuit Bd. Code
		1A	HH:MM	Leak Detect Mode Start Time		3	XXX.XX	Probe Length
GGGGGG	Temperature-	1B	HH:MM	Leak Detect Mode Stop Time		3A	XXXX	Probe Date Code
	Compensated	1C	0.n	Leak Report Type		4	XXX.XX	10† Standard Capacitance Values +
	Fuel Volume**	2A	HH:MM	Auto Print Time #1				# of samples
		2B	HH:MM	Auto Print Time #2		5	XXXX	8† Dry Calibration Constants
GGGGGG	Ullage	2C	HH:MM	Auto Print Time #3		6	XXXX	8† Wet Calibration Constants
		3	I.D.	High Water Alarm Limit		7	XXXX.XX	Updated Dry Variables
ILL.DD	Fuel Height	3A	GGGGGG	Overfill Alarm Limit		7A	XXXX.XX	Updated Wet Variables
		3B	GGGGGG	Low Level Alarm Limit		8	—	No Display, Used for Tank Alarm
I.D.	Water Height	3C	GGGGGG	Theft Alarm Limit				History Report Printout
		3AB	GG.0	Leak Alarm Limit		8A	—	No Display, used for Sensor Alarm
FFFF.D	Fuel Temperature	3BC	SNNN.0	Thermal Coefficient				History Report Printout
		3ABC	GG.0	Inventory Increase Report Delay Time		9	XXXX.XX	10 Slow Capacitance Values + # of
GGGGGG	Delivery Volume	4	GGGGGG	1.00 Height Volume Capacity				samples
		H	GGGGGG	0.95 Height Volume Capacity		Use **INCREMENT** button to advance through Capacitance and		
GGG.DD	Leak Rate	HA	GGGGGG	0.90 Height Volume Capacity		Calibration Values for Functions 4.9.		
		HB	GGGGGG	0.85 Height Volume Capacity				
NNN	"A" Sensor Status	HC	GGGGGG	0.80 Height Volume Capacity		†These numbers may vary up to 33 for 0.1 Capacitance probe.		
	(for each	4A	GGGGGG	0.75 Height Volume Capacity				
	active sensor)	E	GGGGGG	0.70 Height Volume Capacity				
		EA	GGGGGG	0.65 Height Volume Capacity				
NNN	"B" Sensor Status	EB	GGGGGG	0.60 Height Volume Capacity				
	(for each	EC	GGGGGG	0.55 Height Volume Capacity				
	active sensor)	4B	GGGGGG	0.50 Height Volume Capacity				
		L	GGGGGG	0.45 Height Volume Capacity				
		LA	GGGGGG	0.40 Height Volume Capacity				
		LB	GGGGGG	0.35 Height Volume Capacity				
		LC	GGGGGG	0.30 Height Volume Capacity				
		4C	GGGGGG	0.25 Height Volume Capacity				
		P	GGGGGG	0.20 Height Volume Capacity				
		PA	GGGGGG	0.15 Height Volume Capacity				
		PB	GGGGGG	0.10 Height Volume Capacity				
		PC	GGGGGG	0.05 Height Volume Capacity				
		5	III.DD	Tank Diameter				
		6	SII.DD	Tank Tilt				
		7	nnnnnn	Manifolded Tank Configuration				
		8	C CC	Product Code and Product Label				
		9	nnnnnn	System Security Code				
		9A	RRRRRR	Relay #1 Configuration				
		9B	RRRRRR	Relay #2 Configuration				
		9C	n	Auto-Transmit Message Mode				
		9AB	MMM	Auto-Transmit Repeat Time				
		9AC	n	Temperature-Compensated Volume				
		9BC	SSS	Auto-Transmit Delay Time				
		9ABC	n	Generator OFF Mode and				
				Leak Report Enable				
				(Emergency Generator Versions only)				
		—	n	External Input Alarm Enable				
		—A	n HH.H	Audible Water Alarm Disable/Sensor				
				Type Selection and Water Alarm Delay				
				Time - "A" Sensors				
		—B	n HH.H	Audible Water Alarm Disable/Sensor				
				Type Selection and Water Alarm Delay				
				Time - "B" Sensors				
		—C	nnnnn	Relay #1 Sensor Alarm Function				
		—AB	nnnnn	Relay #2 Sensor Alarm Function				
		—BC	RS-232	End of Message Character				

*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.

B. OPERATING MODE—FOUR-TANK MONITOR

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 SENSOR ALARM CAUSE LEDs for those sensors which have been corrected or which have returned to a NORMAL condition.**

Figure 9 illustrates the pushbutton functions for the four-tank monitor. These functions are described below. Table 2 summarizes the inventory, setup and diagnostic information accessible by using the Operating Mode keyswitch.
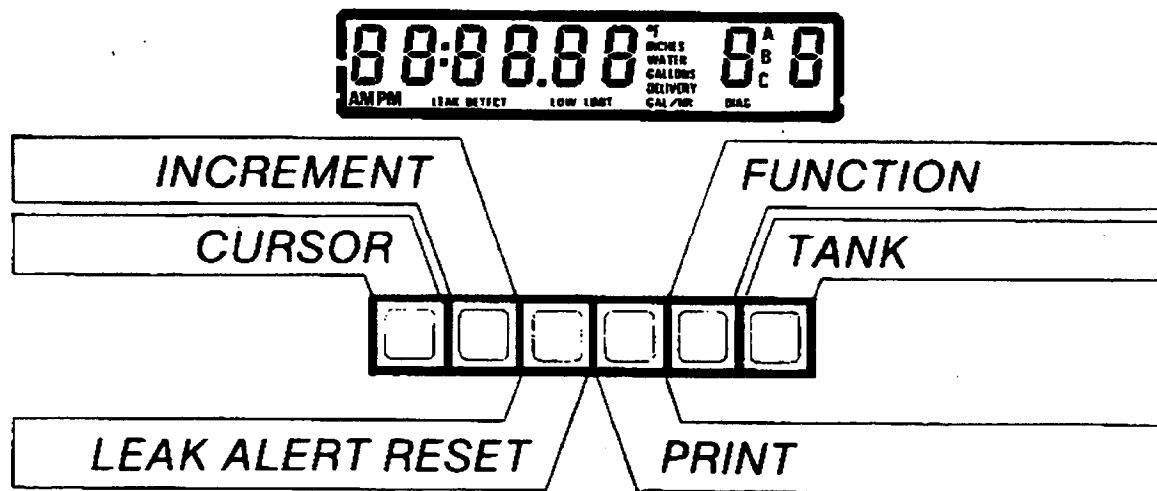
Figure 10. Pushbutton Functions—Four-Tank Monitor

CURSOR - SETUP mode only. Press button to move cursor (flashing digit) to digit to be changed.

INCREMENT - SETUP mode only. After the cursor is set, press INCREMENT button to change digit to desired value.

LEAK ALERT RESET.

☞ NOTE: The **LEAK ALERT RESET** button is a multipurpose button whose functions change depending on key-switch position and information.

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

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

FUNCTION. Press button to advance display function.

TANK. Press button to advance displayed tank.

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NOTE: For the purposes of this explanation, the display (above right) shows all the LCD characters displayed at once. At no time† during the actual operation will this condition exist.

†The full display will appear for the first second after power is applied to the system. It will switch immediately to proper display for function selected.

Table 2. Four-Tank Operating Mode Keyswitch Functions

KEYSWITCH POSITION							
NORMAL		**SETUP**			**SETUP**		
Format*	Function	Code	Format*	Function	Code	Format*	Function
HH:MM	Time of Day	0A	HH:MM	Time of Day	0	IIRRRRR	Product ID. Rev. Level
		0M	MM-DD	Month and Day	1	XXXXXX	Probe Serial Number
GGGGGG	Fuel Volume	0C	YYYY	Year	2	XXX	Probe Circuit Bd. Code
		1A	HH:MM	Shutdown Mode Start Time	3	XXX.XX	Probe Length
GGGGGG	Temperature-Compensated Fuel Volume**	1B	HH:MM	Shutdown Mode Stop Time	3A	XXXX	Probe Date Code
		2A	HH:MM	Auto Print Time #1	4	XXX.XX	10† Standard Capacitance Values + # of samples
		2B	HH:MM	Auto Print Time #2			
		2C	HH:MM	Auto Print Time #3	5	XXXX	8† Dry Calibration Constants
GGGGGG	Ullage	3	I.D.	High Water Alarm Limit	6	XXXX	8† Wet Calibration Constants
		3A	GGGGGG	Overfill Alarm Limit	7	XXXX.XX	Updated Dry Variables
III.DD	Fuel Height	3B	GGGGGG	Low Level Alarm Limit	7A	XXXX.XX	Updated Wet Variables
		3C	GGGGGG	Theft Alarm Limit	8	—	No Display, Used for Tank Alarm History Report Printout
I.D.	Water Height	3ABC	MM	Inventory Increase Report Delay Time			
		4	GGGGGG	1.00 Height Volume Capacity	8A	—	No Display, used for Sensor Alarm History Report Printout
FFFF.D	Fuel Temperature	H	GGGGGG	0.95 Height Volume Capacity			
		HA	GGGGGG	0.90 Height Volume Capacity	9	XXXX.XX	10 Slow Capacitance Values + # of samples
GGGGGG	Delivery Volume	HB	GGGGGG	0.85 Height Volume Capacity			
		HC	GGGGGG	0.80 Height Volume Capacity			
NNN	"A" Sensor Status (for each active sensor)	4A	GGGGGG	0.75 Height Volume Capacity			
		E	GGGGGG	0.70 Height Volume Capacity			
		EA	GGGGGG	0.65 Height Volume Capacity			
		EB	GGGGGG	0.60 Height Volume Capacity			
		EC	GGGGGG	0.55 Height Volume Capacity			
		4B	GGGGGG	0.50 Height Volume Capacity			
		L	GGGGGG	0.45 Height Volume Capacity			
		LA	GGGGGG	0.40 Height Volume Capacity			
		LB	GGGGGG	0.35 Height Volume Capacity			
		LC	GGGGGG	0.30 Height Volume Capacity			
		4C	GGGGGG	0.25 Height Volume Capacity			
		P	GGGGGG	0.20 Height Volume Capacity			
		PA	GGGGGG	0.15 Height Volume Capacity			
		PB	GGGGGG	0.10 Height Volume Capacity			
		PC	GGGGGG	0.05 Height Volume Capacity			
		5	III.DD	Tank Diameter			
		6	SII.DD	Tank Tilt			
		7	nnnnnn	Manifolded Tank Configuration			
		8	C CC	Product Code and Product Label			
		9	nnnnnn	System Security Code			
		9A	RRRRRR	Relay #1 Configuration			
		9B	RRRRRR	Relay #2 Configuration			
		9C	n	Auto-Transmit Message Mode			
		9AB	MMM	Auto-Transmit Repeat Time			
		9BC	SSS	Auto-Transmit Delay Time			
		9AC	n	Temperature-Compensated Volume			
		—	n	External Input Alarm Enable			
		—A	n HH.H	Audible Water Alarm Disable/Sensor Type Selection and Water Alarm Delay Time - "A" Sensors			
		—B	n HH.H	Audible Water Alarm Disable/Sensor Type Selection and Water Alarm Delay Time - "B" Sensors			
		—C	nnnnnn	Relay #1 Sensor Alarm Function			
		—AB	nnnnnn	Relay #2 Sensor Alarm Function			
		—BC	RS-232	End of Message Character			

Use **INCREMENT** button to advance through Capacitance and Calibration Values for Functions 4-9.

†These numbers may vary up to 33 for 0.1 Capacitance probe.

*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. REMOTE SETUP CODES

Table 3.   Command Series 7XX (Display Format)

Function Code & Data Field	Description	Front Panel Switch-Settable
700YYMMDDHHmm	Set Calendar Clock	Y
71THHmm	Set Tank T Leak Test Start Time	Y
719HHmm	Set Leak Test Stop Time	Y
721HHmm	Set Auto-Print Time 1	Y
722HHmm	Set Auto-Print Time 2	Y
723HHmm	Set Auto-Print Time 3	Y
731aaaaaaaaaaaaaaaaaaaaa	Set Print Header Line 1	N
732aaaaaaaaaaaaaaaaaaaaa	Set Print Header Line 2	N
733aaaaaaaaaaaaaaaaaaaaa	Set Print Header Line 3	N
734aaaaaaaaaaaaaaaaaaaaa	Set Print Header Line 4	N
74Taaaaaaaaaaaaaaaaaaaaa	Set Tank T Product Label	Y
75T	Set Tank T Product Code	Y
76TMMM	Set Tank T High Water Alarm Limit	Y
77TLLLLLL	Set Tank T Overfill Alarm Limit	Y
78TLLLLLL	Set Tank T Low Limit Alarm Limit	Y
79TLLLLLL	Set Tank T Theft Alarm Limit	Y
7ATLLL	Set Tank T Leak Alarm Limit	Y
7BTCCCC	Set Tank T Temperature Coefficient	Y
7CTdd	Set Tank T Delivery Report Delay	Y
7DMaaaaaaaa	Set Message M ASCII Field	N
7 EO	Set External Input Alarm Enable	Y

Table 4.   Command Series 8XX (Display Format)

Function Code & Data Field	Description	Front Panel Switch-Settable
80TGGGGGG	Set Tank T Full Height Volume (Clear 0.80 - 0.95 Volume)	Y
81TGGGGGG	Set Tank T 1/4 Height Volume (Clear 0.05 - 0.20 Volume)	Y
82TGGGGGG	Set Tank T 1/2 Height Volume (Clear 0.30 - 0.45 Volume)	Y
83TGGGGGG	Set Tank T 3/4 Height Volume (Clear 0.55 - 0.70 Volume)	Y
84TIIIhh	Set Tank T Diameter	Y
85TIIIhh	Set Tank T Tilt	Y
86Tpppppp	Set Tank T Manifolded Partners	Y
870cccccccc	Set Channel Configuration	N
880aaaaaa	Set Security Code	Y
89TGGGGGGGggggggGGGGGGggggggGGGGGG	Set Tank T 1.00 - 0.80 Height Volume	Y
8ATGGGGGGGggggggGGGGGGggggggGGGGGG	Set Tank T 0.75 - 0.55 Height Volume	Y
8BTGGGGGGGggggggGGGGGGggggggGGGGGG	Set Tank T 0.50 - 0.30 Height Volume	Y
8CTGGGGGGGggggggGGGGGGggggggGGGGGG	Set Tank T 0.25 - 0.05 Height Volume	Y
8DRrrrrr	Set Relay R Configuration	Y
8EMm	Set Message M Auto-Transmit Mode	Y
8ENttt	Set Auto-Transmit Timer N	Y
8FO	Set Generator Off Mode (Emergency Generator Versions only)	Y
8 GS	Set Audible Water Alarm Disable Delay Time	Y

D. RS-232 REMOTE REPORT CODES

Table 5. Operational Reports (Display Format)

Code	Description
20T	Inventory Report
21T	Leak Report
22T	Turn ON Leak Test (Shutdown Mode*)
230	Turn OFF Leak Test (Shutdown Mode*)
24T	Alarm History Report
25T	Delivery Report
260	Clear Stored Delivery Reports
27T	Stored Inventory Report 1
28T	Stored Inventory Report 2
29T	Stored Inventory Report 3
2AT	Alarm Status Report
2BT	Auto-Transmit Flag Status Report
2CT	Stored Leak Test Analysis Report
2DT	Present Leak Test Analysis Report
2ES	Sensor Alarm Status
2FS	Sensor Auto-Transmit Flag Status
2GS	Sensor Alarm History

E. RS-282 DIAGNOSTIC REPORT CODES

Table 6. Diagnostic Reports (Display Format)

Code	Description
90T	Tank Chart Volume, Single Point
91T	Full Tank Chart
920	Send Message to Printer
930	System Setup Parameters
93T	Tank Setup Parameters
94T	Standard Capacitance Data
95T	Calibration Values
96T	Probe Serial Numbers
970	Self-Diagnostic Results
980	ID, Revision Level Request
990	Auto-Transmit Parameters
9AT	Long Term Capacitance Data
9BS	Sensor Data Report
9C0	Sensor Setup Parameters
9DS	Sensor Setup Report

* Four-tank monitor consoles only

F. RS-232 REMOTE REPORT CODES—PLUS! CONSOLES

Table 7. *Plus!* Operational Reports (Display Format)

Code	Description
20T	Inventory Report
21T	Leak Report
22T	Turn ON Leak Test (Shutdown Mode*)
230	Turn OFF Leak Test (Shutdown Mode*)
24T	Alarm History Report
25T	Delivery Report
260	Clear Stored Delivery Reports
27T	Stored Inventory Report 1
28T	Stored Inventory Report 2
29T	Stored Inventory Report 3
2AT	Alarm Status Report
2BT	Auto-Transmit Flag Status Report
2JT	Stored Leak Test Analysis Report
2KT	Present Leak Test Analysis Report
2LT	0.10 Gallon Per Hour Leak Report
2NT	Temperature Compensated Inventory Report
2ES	Sensor Alarm Status
2FS	Sensor Auto-Transmit Flag Status
2GS	Sensor Alarm History

G. RS-232 DIAGNOSTIC REPORT CODES—*PLUS!* CONSOLES

Table 8. *Plus!* Diagnostic Reports (Display Format)

Code	Description
90T	Tank Chart Volume, Single Point
91T	Full Tank Chart
920	Send Message to Printer
930	System Setup Parameters
93T	Tank Setup Parameters
9JT	Standard Capacitance Data
9NT	Calibration Values - Dry
9ST	Probe Serial Numbers
970	Self-Diagnostic Results
980	ID, Revision Level Request
990	Auto-Transmit Parameters
9KT	Long Term Channel Count Data
9MT	Calibration Values - Wet
9PT	Calibration Values - Updated Dry
9RT	Updated Sensitivity Ratios
9BS	Sensor Data Report
9C0	Sensor Setup Parameters
9DS	Sensor Setup Report

* Four-tank monitor consoles only

H. TLS-250 *PLUS!* UPGRADE KITS

Table 9 lists the TLS-250 *Plus!* upgrade kits and their contents

Table 9.   TLS-250 *Plus!* Upgrade Kits and Contents

Console being Upgraded	New Kit Number	Product Type	Version	Item 1 Main Board Software	Item 2 Main Board RAM	Item 3 Option Board Group	Item 4 Option Board Software	Item 5 Option Board RAM
7841c0-1x2	330020-250	TLS-250 (8)	Standard	329687-002	—	328416-003	329689-001	—
7841c0-2x2	330020-251	TLS-250 (8)	Metric	329687-002	—	328416-004	329697-001	—
7841c0-3x2	330020-252	TLS-250 (8)	Back-gen	329687-002	—	328416-003	329693-001	—
7841c0-2x4	330020-251	TLS-250 (8)	Metric	329687-002	—	328416-004	329697-001	—
7941c0-1x2	330020-253	TLS-250i (8)	Standard	329687-001	576001-417	—	329690-001	576001-417
7941c0-2x2	330020-254	TLS-250i (8)	Metric	329687-001	576001-417	—	329698-001	576001-417
7941c0-3x2	330020-255	TLS-250i (8)	Back-gen	329687-001	576001-417	—	329694-001	576001-417
7941c1-1x2	330020-256	TLS-250i (4)	Standard	329688-002	576001-539	—	329690-001	576001-417
7941c1-2x2	330020-257	TLS-250i (4)	Metric	329688-002	576001-539	—	329698-001	576001-417

Note:
c = 6 for BASEEFA
c = 7 for CSA
c = 9 for UL

x = 0 for console with no printer
x = 2 for console with printer

I.   PART NUMBERS FOR NEW AND OLD ARTWORK CIRCUIT BOARDS

TLS-250i Eight-Tank & Eight-Tank Plus! Systems:
OPTION BOARD   328851-001 (New)
MAIN BOARD   328415-016 (New)
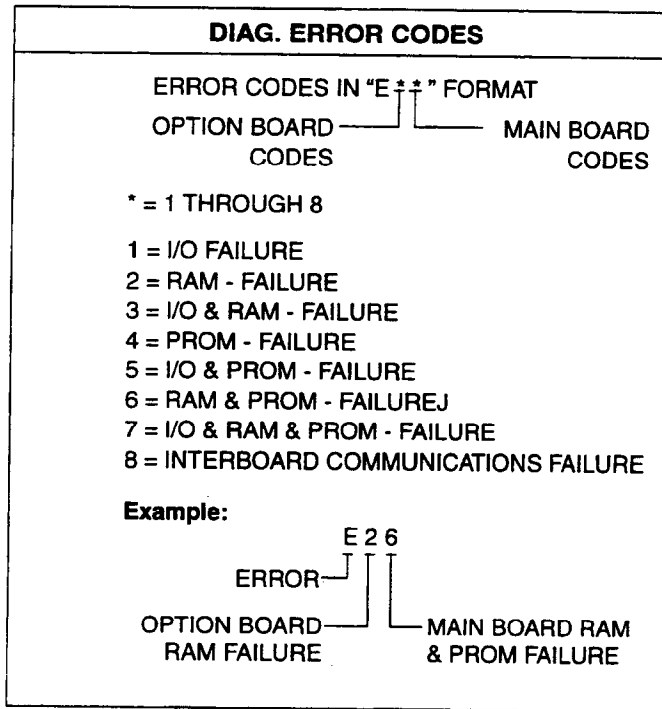   328415-009 (Old)

TLS-250i Four-Tank & Four-Tank Plus! Systems:
OPTION BOARD   328851-001 (New)
MAIN BOARD   328868-001 (New)

J. SELF-TEST ERROR CODES

DIAG. ERROR CODES

ERROR CODES IN "E‡‡" FORMAT

OPTION BOARD ————┘└———— MAIN BOARD
          CODES   CODES

* = 1 THROUGH 8

1 = I/O FAILURE
2 = RAM - FAILURE
3 = I/O & RAM - FAILURE
4 = PROM - FAILURE
5 = I/O & PROM - FAILURE
6 = RAM & PROM - FAILUREJ
7 = I/O & RAM & PROM - FAILURE
8 = INTERBOARD COMMUNICATIONS FAILURE

Example:

E 2 6

ERROR ┘

OPTION BOARD ———┘   └— MAIN BOARD RAM
   RAM FAILURE   & PROM FAILURE

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Environmental Products

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