Instructions
and
Operating Manual

SERIES X76ETM-4X
LEAK DETECTION SYSTEM
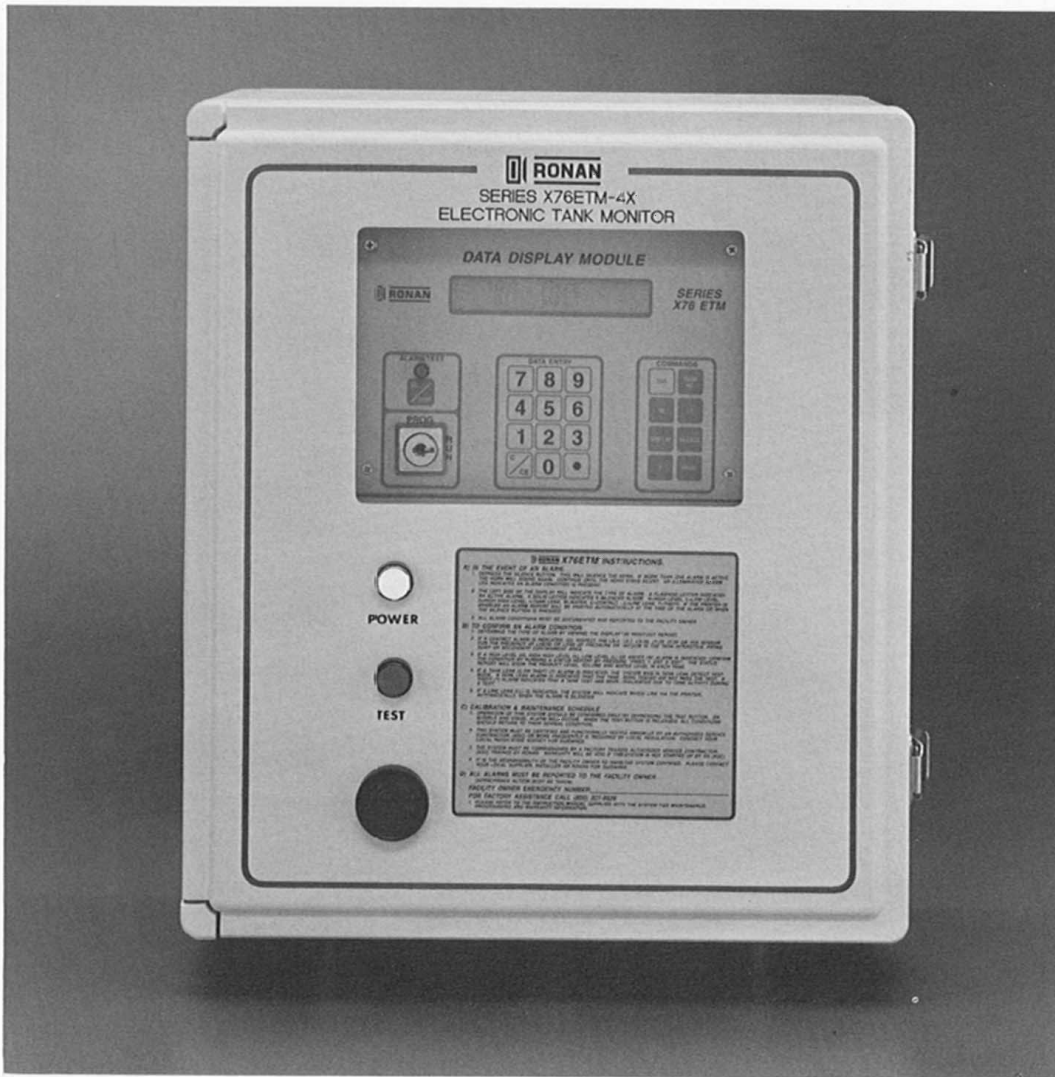

⫿ RONAN

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1.0 GENERAL DESCRIPTION

X76ETM-4X is a continuous electronic monitoring system, designed to tighten inventory control of fuels and other liquids stored in underground and above-ground tanks. The Probe, Controller and Sensors form a system that measures fuel height, fuel temperature, water height and leakage. It also provides information on gross and net fuel volume, leak alarms, time and date.

Information acquired automatically provides faster shift changes by eliminating the need to manually stick the tanks and generate manual reports. This reduces human error and makes it possible to spot losses by theft, leaks or meter miscalibration. The system provides a highly reliable tool for sound inventory management practice.

X76ETM-4X features a two line by 24 character alphanumeric LCD which provides instant information for each tank, including product volume and level, product temperature, water level, time and date. X76ETM-4X also provides reports and alarm warnings, utilizing the LCD display, an alarm LED, a printer, and output relays. The **PRINT** key allows the user to receive a printed copy of a variety of reports. By pressing the **PRINT** key and selecting choices 1 through 5 the user can receive the following reports: (1) "Status Report" providing Current Inventory, (2) "Shift Report" providing Current Inventory and throughput since the last Shift Report, (3) "Drop Report" providing A History of the Last Three Deliveries per Tank, (4) "Alarm Report" providing the last alarm for each tank for High Water Level, High Product Level, High High Product Level, Low Product Level, Theft Alarm, Contact Alarm, Line Leak Alarm and (5) The Last Tank Leak Detect Results. These reports are described in Section 6. See Section 4 for a review of the keyboard features.

X76ETM-4X also provides Tank Leak Detection Testing and alarm functions through a static test when the tank is inactive. (Tank Leak Detection Testing on active tanks is also available with the use of the Ronan X76ATM). For additional information on the X76ATM contact Ronan for details. The Tank Leak Test function must be programmed in order to be operational. The required programming includes **F-75**, the leak detect threshold and either **F-85** or **F-86**, for Manual Operations or **F-87** and **F-88** for Automatic Mode Operation. The Tank Leak Test is designed to invalidate individual test results if tank conditions are unstable, such as significant temperature variation due to recent product additions.

Once power-up and programming are complete, operation of the Controller is automatic. During operation, the Mode Key should be positioned in the Run mode with the key removed and stored in a safe place. With the key in the Run Mode, functions can be interrogated but set-up data can not be changed.

IMPORTANT: Information provided by X76ETM-4X should be used as part of a conscientious inventory control program. If routine inventory reconciliation reveals a loss of product, use the leak detect feature to take a closer look. If loss of product is further identifed by the Leak Detect Mode, call for a "precision test". Do not excavate tanks or take other remedy action based solely on X76ETM-4X inventory or leak detect reports. While the X76ETM-4X is capable of detecting leaks as small as 0.1 gallons per hour, the system is testing only that portion of the tank containing product at the time of the test. Call for a "precision test" to confirm a suspected leak!

NOTE: If an overfill tank tightness test Is performed to confirm a suspected tank leak, the 95040(x)B Gauge Probe must be removed from the tank. The system warranty will not cover damage to the Probe resulting from an overfill condition.

2.0 INTRINSIC SAFETY

Hazardous atmospheric mixtures include all explosive or ignitable air mixtures involving gases or vapor at an atmospheric pressure and with ambient temperatures between zero and 120°F. The order of ignitability of materials generally corresponds to the National Electric Code groupings. The workable categories and test materials used as typical for each are:

Group A: acetylene (8.7% by volume)
Group B: hydrogen (21.0% by volume)
Group C: ethylene (7.8% by volume)
Group D: methane (8.2% by volume)

The ignition capability of an electrical circuit is determined by the electrical energy available and the manner in which such energy is released. Energy may be released in the form of a spark, by resistive heating effects or a combination of the two. There are three basic mechanisms by which electrical energy may be released in the form of spark discharge: discharge of a capacitive circuit, interruption of current in an inductive circuit and make-break of a resistive circuit. The minimum ignition energy for any flammable mixture is the smallest amount of energy

released as a spark and sufficient to ignite the mixture at 0 psig.

The most easily ignited air mixture is that mixture of a flammable material in air, which requires the minimum amount of energy for ignition. The flammables are usually designated in percent by volume in air.

Normal operating conditions include maximum supply voltage and the extreme environmental conditions which fall within the ratings given for the specific equipment under investigation.

Abnormal operating conditions usually refer to any two mechanical or electrical faults occurring in combination. The faults are independent and include accidental damage to, and failure of, components or wiring.

Intrinsically safe electrical equipment and associated wiring are incapable of releasing sufficient electrical or thermal energy under normal or abnormal operating conditions to cause ignition of a specific hazardous mixture in its most easily ignited concentration in air. The flammable material may be a gas or vapor.

Underwriters Laboratory and Factory Mutual approvals are based on examination and tests of samples of production-quality equipment and inspection of manufacturing and quality-control facilities. Of particular consideration are the adequacy of design and workmanship, uniformity and dependability of production, effectiveness of quality control, functional suitability, assurance of availability of service and replacement of parts.

Installation of intrinsically safe monitors makes it mandatory to maintain complete isolation between the field contact wiring and any other potential source of voltage.

To be completely assured of an intrinsically safe installation, all equipment used must be approved by an agency, and the installation, including the wiring, plus all the contact inputs, must meet requirements of isolation to avoid any failures that may occur in the system.

CAUTION: The X76ETM-4X Monitor enclosure must be mounted in a general purpose area as defined by the National Electric Code.

Power input 115 VAC ±10%, 60 Hz.

All wiring to sensors (i.e. Level Gauge Probes 95040(x)B, 95140(x)B, Level Sensors LS-3, LS-7, LS-30, HVA, Pressure Switch JT-2P and Vacuum Switch JT-2V, Line Leak Sensors JT1-H2 & JT1-H3), must be installed in a separate,

dedicated conduit, to comply with the intrinsically safe requirements.

All wiring to auxiliary relays must be kept separate from probe and sensor input wiring.

All external equipment used with the system must comply with the National Electric Code for the area where the equipment is being installed. This is particularly important when selecting external horns, push buttons and relays to be used with the X76ETM-4X System.

The X76ETM-4X chassis must be properly grounded including the intrinsically safe ground.

NOTE: RONAN ENGINEERING COMPANY, INC. does not accept the responsibility for the installation of intrinsically safe equipment.

3.0 GENERAL SAFETY

Please read before beginning set-up.

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 serious injury, explosion, or electrical shock.

For safety reasons, we have taken particular care in the design of this product to limit power in the wiring to the fuel tanks and to keep that wiring physically separated from 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 and result in voiding all warranties connected with this product.

WARNING:

1. Conduits or wiring troughs from Probes and Sensors to Controller must not contain additional wires. No other wires are permitted in the same enclosure as Probe wires or leak sensors.

2. The conduit run from Probe to Controller must not exceed 2,500 feet. See installation diagram X76D517 for correct wire requirements.

3. All conduits must enter the Controller through the threaded hubs provided.

4. Do not install the Controller in a volatile, combustible, or explosive atmosphere.

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5. The X76ETM-4X system must be installed in an environment that is within the operating specifications of the system. **NOTE:** The controller must be located in a general purpose environment with a minimum temperature of 32°F. Check system specifications for further information or call Ronan for assistance.

6. Installation and use of this product must comply with the National Electric Code; Federal, State, and Local Codes; and any other applicable safety code.

Failure to comply with these warnings could result in serious injury, property loss, and equipment damage.

4.0 TANK SET-UP, WARRANTY & CHECK-OUT FORMS

Warranty and Check-Out Forms are enclosed with the X76ETM-4X when shipped. One copy of these forms must be completed and returned to Ronan to validate the warranty. Part 1 of the Warranty & Check-Out Form includes the Tank Set-Up Information Form. Attach a copy of the tank statistics printout **F-64** to this form before returning to Ronan.

Before starting, make sure the following material and information is available:

a) Warranty & Check-Out Forms.

b) Installation & Operation Manual.

c) Tank Specifications — Including Tank Material, Volume, Diameter, and Manufacturer's Height to Volume Conversion Chart.

d) Tank Tilt Information, if the Tank is Tilted.

e) Fuel height readings at fill Riser and Probe Riser, and their distances from the center of the tank, should have been taken at the time of Probe installation and recorded on the Warranty & Check-Out Form Part 1 Set-Up Information Sheet.

If tank tilt was indicated by a difference in fuel height readings, enter "YES" in the Set-Up Chart. The X76ETM-4X will calculate the tank tilt from the information you input from the Set-Up Information Sheet. **NOTE:** See Page 13 for Product Label Code Numbers.

5.0 INTRINSIC SAFTEY CHECK FOR WARRANTY REGISTRATION & CHECK-OUT

Refer to Installation Diagrams in the back of this manual for details.

1. Check to be sure Probe wires are contained in a separate, dedicated rigid Conduit. **WARNING:** Conduit wiring troughs from Probe or liquid sensors to Controller must not contain any other wires.

2. Make sure Probe to Controller wiring does not exceed 2,500 feet. See installation diagram for proper wiring requirements. All Conduits must enter Controller through the threaded hubs provided.

3. Locate the intrinsic safety barrier cover inside the Controller Cabinet, remove the screws and open the cover.

   A. Locate power supply terminals and verify that an Earth Ground has been provided, using a #12 AWG wire.

   B. Verify that the power supply terminals are wired correctly and are secure.

   C. Verify that the system power is properly wired to a separate, dedicated breaker, common phase with dispensers.

   D. Verify that all Probe and liquid sensor connections have been made properly and are secure.

   E. If any discrepancies are found in X76ETM-4X wiring or installation, refer to installation procedures and correct the discrepancies.

   F. Replace the intrinsic safety barrier cover and front cover of the Controller.

Do not apply power to the system until all aspects of the installation has been checked and found to be in accordance with the instructions outlined in this "Installation & Operation Manual"; The National Electrical Code, Federal, State, and Local Codes; and other applicable safety codes.

To validate the warranty, the system start-up must be completed by a certified ASC trained on the X76ETM-4X. The warranty and check-out forms must be completed, including certification number, tank statistics (**F-64** print out), and returned to:

RONAN ENGINEERING COMPANY, INC.
Warranty Department Manager
21200 Oxnard Street
Woodland Hills, CA 91367

6.0 SPECIFICATIONS

6.1 System, Model X76ETM-4X

Power Requirements: 115 Vac, 50/60 Hz ±10%.

Power Consumption: 50 VA.

Operating Temperature: 32 to 125°F (0 to 52°C).

Mounting: General purpose, indoor or outdoor area; wall mount.

Display: Alpha-numeric LCD, 2 lines x 24 characters per line.

Probe Inputs: One (1) to eight (8).

Auxiliary (Contact) Inputs: Eight (8) passive inputs 24 Vdc, 12 mA.

Remote Communication Ports: Two (2) RS232C serial interface ports.

Auxiliary Relay Outputs: Four (4) SPDT, 120 Vac Max., 7.5 A Max.

Data Entry Keypad: Three section membrane.

Printer: Alpha-numeric thermal, 5 Vdc, thermal paper - 2-1/4" wide x 75', (24 characters wide).

Dimensions: 13-7/32" W x 15-7/32" H x 7-3/32" D.

Alarms: LED & Sonalert; 80db @ 10'.

Listing: UL E153237.

6.2 Gauging Probe, Model 95040xB

Power Requirements: 24 Vdc Intrinsically Safe, pulsed, supplied by control chassis.

Operating Temperature: -40 to 130°F (-40 to 54°C). (Consult factory for other temperature ranges).

Probe Material: 316 stainless steel. (Consult factory for other material types).

Float Material: Ceon-D.

Repeatability: .02% of full range.

Accuracy: .05% of full range.

Resolution: ± .001".

Site Characteristics: 4" Schedule 40 riser.

Wiring: Two (2) conductor shielded cable, max. length 2500'.

Listing: UL Listed, Intrinsically Safe for use in hazardous locations:
Class I, Div. 1, Group C & D.
Class II, Div. 1, Group E, F & G.
Class III, Div. 1.

6.3 Leak Sensor, Model LS-3, LS-3s, LS-3ss

Housing: 304 stainless steel.

Mounting: 1/2" NPT male thread.

Switch:
Type: SPST, N.O., or N.C.
Rating: 10 VA.
Float Material: Buna-N, (LS-3, LS-3s) 316 stainless steel, (LS-3ss).
Pressure: 50 psi maximum.
Leads: 20 AWG.

Test Mechanism: Stainless steel cable (LS-3s).

Application: Vertical position liquid detection.

Listing: UL 48RO.

6.4 Tank Leak Sensor, Model LS-7, LS-7s

Housing: PVC (Geon 87241).

Liquid Specific Gravity: .70 minimum.

Switch:
Type: SPST, N.C.
Rating: 10 VA.
Float Material: PVC, (LS-7, LS-7s).
Pressure: 50 psi maximum.
Leads: 20 AWG.

Test Mechanism: Stainless steel cable (LS-7s).

Application: Horizontal position liquid detection.

Listing: UL 48RO.

6.5 Hydrostatic Leak Sensor, Model LS-30

Housing: 304 stainless steel.

Mounting: 1/2" NPT male thread.

Switch:
Type: DPDT, N.C. top, N.O. bottom.
Rating: 10 VA.
Float material: Polysulfone.
Pressure: 50 psi maximum.
Leads: 20 AWG.

Application: Vertical position High/Low level detection, 4" separation.

Listing: UL 48RO.

6.6 Tank Leak Sensor Models JT-2P, JT-2V; Line Leak Sensor Models JT-H2B, JT-H3B

Housing: Aluminum body with 1/4" stainless steel inlet, explosion proof, hermetically sealed, NEMA Types 7 and 9.

Manifold: Brass, 1" NPT male thread (JT-2P, JT-2V).

Classification:
Class I, Groups A, B, C and D.
Class II, Groups E, F and G.

Switch:
Type: SPDT, N.O. (shelf condition).
Rating: 10 VA.

Electrical Connection: 1/2" NPT with PVC insulated 18 AWG color coded leads.

Pressure:
Connection: 1/4" NPT.
Adjustment: Allen wrench through port.
Proof Pressure: 299 psi.

Gauge: 0-30 psi (JT-2P), 0-20" Hg (JT-2V).

Temperature Range: - 40 to 180°F (- 40 to 82°C).

Listing: UL 48RO.

7.0 KEYBOARD FUNCTIONS

The X76ETM-4X provides an alphanumeric LCD read-out that will display tank and alarm information. The Display and Data Entry Keypad is used to program the system and will prompt you through the initial set-up.

7.1 Data Entry Keys

0-9 Keys: Provide quick and easy numerical information input.

Clear/Clear Entry Key, C/CE: Will clear or correct data entry, is also used for alphabetical information input. Scrolls through the alpha characters from right to left.

Decimal Key, • : Is used to enter a decimal point, colon, slash and scroll through the alpha characters from left to right.

7.2 Command Keys

Enter Key, ENT: Used for data entry.

Tank Number Key, TANK NO: To advance LCD read-outs to the next tank on your system. Also used to advance through contact input and relay programming.

Low Level Key, LO: To display the set point, in gallons, of the Low Level Alarm for the tank number displayed.

High Level Key, HI: To display the set point, in gallons, of the Hi Level Alarm for the tank number displayed.

Display Key, DISPLAY: To change the LCD format from inches and gallons, to temperature and water level, to time and date.

Function Key, F: Depress prior to function command codes.

Print Key, PRINT: To select a printed copy of:
1) Status Report.
2) Shift Report.
3) Product Delivery Drop Report.
4) Alarm Report.
5) Leak Test Report.
Enter the number of the report requested and press **ENT**.

Silence Key - Silence/Test Key, SILENCE: To reset remote alarm relays and acknowledge alarms (reset). A flashing display on LCD indicates an unacknowledged alarm. An acknowledged alarm remains constant on the LCD display. If alarm is not acknowledged, scanning of other tanks will be inhibited. To test the internal audible and visual alarm press **SIL/TEST. NOTE:** To silence HI HI alarm, press **F, 52, ENT.**

Mode Program/Run Key, PROG/RUN: Provided with removable key to eliminate unauthorized program information entry. The key is positioned in the **PROG** Mode for system set-up and to enter function values. When the key is positioned in the **RUN** mode, all functions can be interrogated but no data entry values can be changed. It is recommended that the key is positioned in the **RUN** mode for normal operation, then removed and kept in the Manager's office until a program change is required.

Figure 1: Function Keys.

8.0 Tank & Probe Programming

(Refer to Section 6.0, Keyboard Functions, for information and description of LCD, Data Entry Keys, Command Keys, and Mode Key.)

Entering of system set-up information into the X76ETM-4X is accomplished by using the function codes listed below. **NOTE:** Depending on the software version purchased, some function codes may not be active on your system. Contact Ronan if you need assistance.

IMPORTANT:
The Mode Key must be switched to the **PROG** position in order to enter set-up information. All system input should be preceded by activating **F-290**. This will disable the printer and allow changes to set-up data without activating warning reports or product increase reports. When changes have been completed, activate **F-291** to restore the system to field operation.

When set-up information is complete, the Mode Key should be positioned in the Run Mode and the key removed. With the Mode Key positioned in the Run Mode, functions can be interrogated but no set-up data can be changed.

Data is entered into the X76ETM-4X by pressing the Function Key, **F**, pressing the correct Function Code (i.e., **290**), and then pressing the Enter Key, **ENT**. Data may then be entered via the Data Entry Keypad. The data entered will be displayed on the LCD. Press **ENT** to store the input to memory.

8.1 X76ETM-4X Function Codes

⒡ 7021, Beginning Initial Programming

Each X76ETM-4X is factory tested prior to shipping. During the testing process many of the systems functions are programmed. If this information is not erased or reprogrammed it may effect the performance of the system. It is suggested that the memory be cleared prior to programming the system for the first time or if making substantial changes to the system's programming.

NOTE: If an existing system needs to be reprogrammed, you should run a **F-64** print-out, a **F-89** print-out. View and take notes of Contact Inputs **F-65**, Aux. Relay programming **F-81** and Annunciator programming **F-82** prior to clearing the memory. This will greatly simplify reprogramming the system.

⒡ 290/291, Enter/Exit Calibration Mode

In order to use Function Keys, turn Mode Key to **PROG** and enter **F-290**. To exit Calibrate Mode, when finished programming, enter **F-291** and turn Mode Key to **RUN**.

⒡ 7021, Intialize System Memory

Use F-7021 to be sure that all memory is cleared and ready to be programmed. **WARNING:** Using F-7021 will erase all prior information. Press **F, 7021, ENT,** press **1, ENT** to clear all prior information.

⒡ 70, Number of Tanks

Press **F, 70, ENT** for number of tanks.
Message will display:

TANKS SELECTED 1
(8 TANK MAX.)

Enter the correct number of tanks to be monitored and press **ENT.**

⒡ 71, Speed of Wire

Press F, **71, ENT** for speed of wire.
Message will display:

ENTER TANK 1 SPEED OF
WIRE 9.300 µS/INCH

Enter the correct speed of wire for the Probe and press **ENT.**

Press **TANK NO** to advance to the next tank to be programmed and repeat. **NOTE:** The Speed of Wire is located on the top of the Probe and should be recorded on the set-up sheet. **WARNING:** Speed of Wire must be entered before initial product and initial

water levels, or incorrect temperatures and levels will result.

⒡ 45, Probe Serial Number

Press **F, 45, ENT** for Probe serial number.
Message will display:

ENTER PROBE 1 SERIAL #
> _

Enter Probe serial number and press **ENT.** Press **TANK NO** to advance to next probe.

⒡ 93, U.S. Units or Metric Display

The Controller is preprogrammed to read in U.S. units. If you require metric units press **F, 93, ENT.** Message will display:

US UNITS
ENTER 1 TO SWITCH>

Press **1, ENT.**
Message will display:

METRIC UNITS
ENTER 1 TO SWITCH>

⒡ 74, Tank Type, Size, Capacity and Tilt

Press **F, 74, ENT** for tank type, size, capacity and tilt. Message will display:

ENTER TANK NUMBER 1-8
>

Choose correct tank and press **ENT.**
Message will display:

ENTER TANK 1 SHELL
1=F.G. 2=STEEL 3=CHART>

NOTE: Creating Custom Tank Chart **F-50** must be programmed before choosing chart at this point. See Creating Custom Tank Chart function **(F-50)** later in this section.

Choose shell number and press **ENT.**

• **IF 1 (FIBERGLASS),** is selected, Press **1, ENT** when the correct tank appears, press **ENT.**

Xerxes 4'
Xerxes 6'
Xerxes 8'
Xerxes 10'
Xerxes 12'
OC D6
OC D5
OC G6
OC C3

OC D3 8'
OC D3 10'
OC D3 12'

Message will display:

(TANK TYPE SELECTED)

Message will display:

ENTER TOTAL VOLUME OF
TANK 1>   GALLONS

Enter the maximum capacity, in gallons, found on the certified tank chart and press **ENT. WARNING:** The actual tank capacity may be different than the tank model size (i.e., a XERXES DWT II 12,000 gallon tank actual capacity is 11,527 gallons).

Message will display:

ENTER .25 HEIGHT VOLUME
OF TANK 1>   GALLONS

Enter gallons and press **ENT.**

WARNING: Incorrect entry of the 1/4 height volume will effect the accuracy of the system. To calculate the 1/4 height volume: (O.C. tanks and XERXES single wall tanks; divide the tank diameter by 4 and enter the volume read at that level on the certified tank chart). (XERXES DWT II tanks; divide the tank diameter at the maximum volume level by 4 and enter the volume read at that level on the certified tank chart). The LCD may display:

1/4 VOLUME IS INCORRECT

If this message appears, check your calculations and try again.

IS TANK 1 TILTED
1=YES 2=NO>

Enter the correct response and press **ENT.** If yes, (See Figure 2).

Figure 2: Tank Tilt.

IF YES, message will display:

TANK 1 PROBE BETWEEN FILL & CENTER
1=YES 2=NO>

Enter the correct response and press **ENT.**
Message will display:

ENTER TANK 1 FUEL HGT.
AT PROBE RISER>   IN.

Enter the level, in inches, at the probe riser and press **ENT.** Message will display:

ENTER TANK 1 FUEL HGT.
AT FILL RISER>   IN.

Enter the level, in inches, at the fill riser and press **ENT.** Message will display:

TANK 1 DIST. BET. PROBE
AND FILL RISER>   IN.

Enter the distance, in inches, and press **ENT.**
Message will display:

DISPLAY PROBE TO CENTER
OF TANK1>   IN.

Enter inches and press **ENT.**
Repeat for tanks 2, 3, etc.

IF NO, continue programming other tanks (you will automatically return to the main menu).

• **IF 2 (STEEL)** is selected, message will display:

ENTER INSIDE DIAMETER
OF TANK 1>   IN.

Enter tank inside diameter, in inches, found on the certified tank charts and press **ENT.**
Message will display:

ENTER TANK VOLUME OF
TANK 1>   GALLONS

Enter the maximum capacity, in gallons, found on the certified tank chart and press **ENT.**
Message will display:

IS TANK 1 TILTED
1=YES 2=NO>

Enter the correct response and press **ENT.**
(See Figure 2).

If yes, see example following.

IF YES, message will display:

TANK 1 PROBE BETWEEN FILL & CENTER
1=YES 2=NO>

Enter the correct response and press **ENT.**

Message will display:

ENTER TANK 1 FUEL HGT.
AT PROBE RISER>   IN.

Enter the level, in inches, at the probe riser and press **ENT.**
Message will display:

ENTER TANK 1 FUEL HGT.
AT FILL RISER>   IN.

Enter the level, in inches, at the fill riser and press **ENT.** Message will display:

TANK 1 DIST. BET. PROBE
AND FILL RISER>   IN.

Enter the distance, in inches, and press **ENT.**
Message will display:

DISPLAY PROBE TO CENTER
OF TANK 1>   IN.

Enter inches and press **ENT.**
Repeat for tanks 2, 3, etc.

IF NO, continue programming other tanks (you will automatically return to the main menu).

• **IF 3 (CHART)** is selected, message will display:

TANK 1
CHOOSE CHART (1-8)>

Enter number of chart to be used and press **ENT.**
Message will display:

IS TANK 1 TILTED?
1=YES 2=NO

Enter the correct response and press **ENT.**
If yes, (See Figure 2).
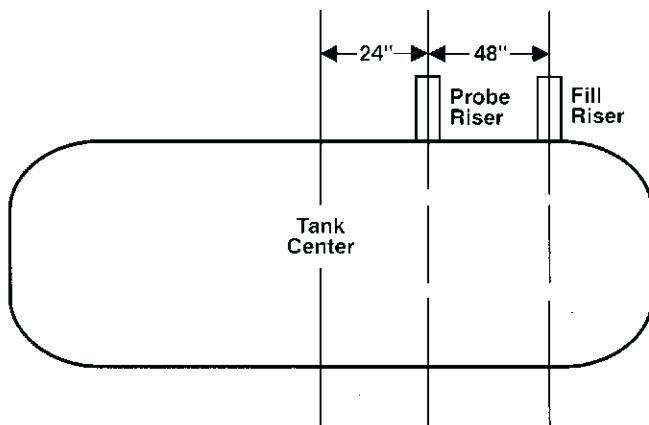
IF YES, message will display:

TANK 1 PROBE BETWEEN FILL & CENTER
1=YES 2=NO>

Enter the correct response and press **ENT.**
Message will display:

ENTER TANK 1 FUEL HGT.
AT PROBE RISER>   IN.

Enter the level, in inches, at the probe riser and press **ENT.**
Message will display:

ENTER TANK 1 FUEL HGT.
AT FILL RISER>   IN.

Enter the level, in inches, at the fill riser and press **ENT.**

Message will display:

TANK 1 DIST. BET. PROBE
AND FILL RISER>   IN.

Enter the distance, in inches and press **ENT.**
Message will display:

DISPLAY PROBE TO CENTER
OF TANK 1>   IN.

Enter inches and press **ENT.**
Repeat for tanks 2, 3, etc.

IF NO, continue programming other tanks (you will automatically return to the main menu).

⌐F⌐ 50, Create Custom Tank Chart

Press **F, 50, ENT** for create custom tank chart. This is used to program a tank chart into RAM.
Message will display:

CHART 1 ENTER # OF POINTS

Enter the number of points that you wish to program for this chart and press **ENT.**
Message will display:

I=?? V=??? PT=1

ENTER LEVEL>

Enter the first point's level in inches and press **ENT.**
Enter the first point's volume at this level and press **ENT. NOTE:** After the level and volume have been entered and these numbers appear on the LCD, press the **HI** Key on the keypad to foward you to the next point that you wish to pick. Repeat this procedure until all points are programmed. You must enter all the points that you indicate the chart will have, otherwise the system will not correctly convert level to volume.

⌐F⌐ 49, Edit Custom Tank Chart

Press **F, 49, ENT** for edit custom tank chart. This is used to edit a chart that has been previously programmed.
Message will display:

REPROGRAM WHICH CHART (1-8)>

Enter the number of chart that you wish to reprogram and press **ENT.**
Message will display:

CHART 1 HAS 2
PROGRAMMABLE POINTS!

NOTE: This message is reminding you that there are two points in this chart that you will be able to change. This message will disappear automatically after a short while and the following message will appear:

L=0.00 V=0 PT=1
ENTER LEVEL>

NOTE: This display is of the first point that was previously programmed. You can now change this information by entering over the information that is displayed and pressing **ENT**. Use the **HI** or **LO** keys to step up or down to the points to be edited.

F 51, Print Programmed Tank Chart

Press **F, 51, ENT** for a printout of programmed tank chart.
Message will display:

PRINT WHICH
CHART? (1-8) >

Press number of the chart you wish to print and press **ENT**. The chart will be printed.

F 72, Initial Product (Fuel)

Press **F, 72, ENT** for initial product (fuel).
Message will display:

ENTER TANK 1 PRODUCT
LEVEL> 00.0 INCHES

Enter the fuel level, in inches, and press **ENT**. Press **TANK NO** to advance to the next tank in the system.
NOTE: Use a gauge stick and Kolor Kut paste or similar to determine initial level. If tank is tilted enter the reading at the probe riser.

F 73, Initial Product (Water)

Press **F, 73, ENT** for initial product (water).
Message will display:

ENTER TANK 1 WATER
LEVEL> 0.00 INCHES

Enter inches of water and press **ENT**. Press Tank No to advance to the next tank in the system. **WARNING:** Before entering initial water level, take an accurate reading of the water level in the tank using Kolor Kut water finding paste or similar. Failure to do so will result in false or inaccurate water readings.

F 76, High Water Alarm Level

Press **F, 76, ENT** for high water alarm level.
Message will display:

ENTER TANK 1 HIGH WATER
LEVEL> 50.00 INCHES (DEFAULT)

Enter the number of inches at which the high water alarm is to activate, press **ENT**.

HI High Level Alarm

Press the **HI** key for high level alarm.
Message will display:

TANK 1
HIGH ALARM> 10000 GALLONS

Enter the number of gallons at which the high product alarm will be activated, press **ENT**. Press **TANK NO** to advance to the next tank to be programmed.

LO Low Level Alarm

Press the **LO** key for low level alarm.
Message will display:

TANK 1
LOW ALARM> 0 GALLON

Enter the number of gallons at which the low product alarm will be activated, press **ENT**. Press **TANK NO** to advance to the next tank to be programmed.

F 79, Theft Gallon Limit

Press **F, 79, ENT** for theft gallon limit.
Message will display:

TANK 1 THEFT ALARM
SETTING: 20 GALLONS

Enter the number of gallons decreased that will activate the theft gallon alarm (250 gallon limit) and press **ENT. NOTE:** This function is only active when in Leak Detect Mode.

F 80, Net vs. Gross Volume Display

Press **F, 80 ENT** for net to gross gallons.
Message will display:

NET GALLONS DISPLAYED
ENTER 1 FOR GROSS

Press **1, ENT.**
Message will display:

GROSS GALLONS DISPLAYED
ENTER 1 FOR NET

Press 1, **ENT** to change back to **NET. NOTE:** Gross gallons should be displayed if comparing the systems volume to the certified tank chart volume.

F 78, Product Label

Press **F, 78 ENT** for product label.
Message will display:

TANK 1 PRODUCT LABEL:
>PRODUCT

Enter the appropriate product label code and press **ENT**. Press **TANK NO** to advance to the next tank and repeat. When selecting a product code from the table, the coefficient of thermal expansion (CTE) is automatically set for that fuel. This value can be viewed or changed with **F-92**.

Product Label Codes
00	None (Defaults to Product 1, 2, etc.)
01	Gasoline
02	Lead Free
03	Leaded
04	Leaded Gasoline
05	Leaded Regular
06	No Lead
07	Premium
08	Premium Unleaded
10	Regular
11	Regular 1
12	Regular 2
13	Regular 3
14	Regular 4
15	Regular Leaded
16	Regular Unleaded
17	Super
18	Super 1
19	Super 2
20	Super Leaded
21	Super Unleaded
22	Unleaded
23	Unleaded 1
24	Unleaded 2
25	Unleaded 3
26	Unleaded 4
27	Unleaded Gasoline
28	Unleaded Premium
29	Unleaded Regular
30	Unleaded Super
31	XTRA
32	Toluene
33	Hydraulic Oil
34	#2 Heating Oil
35	Kerosene
36	Turbine Oil
37	Xylene
38	Diesel
39	Diesel 1
40	Diesel 2
41	Diesel 3
42	Diesel 4
43	Jet Fuel
44	Avgas

F 46, 24 Hour Clock (Optional)

Press **F, 46, ENT** for 24 hour clock option. **NOTE:** When the clock is changed to the 24 hour format the date will also change to a European format, (i.e., day/month/year).
Message will display:

CLOCK IS 12 HOUR
ENTER "1" TO CHANGE>

Press **1, ENT**.

F 47, Programmable Ullage (Optional)

Press **F, 47, ENT** for programmable ullage.
Message will display:

TANK 1 ENTER
PERCENT ULLAGE (1-99)>95 (DEFAULT)

Enter percent ullage and press **ENT**. Press **TANK NO** to select the next tank on the system and repeat.

F 58, Display Software Revision (Optional)

Press **F, 58, ENT** to display the software revision.
Message will display:

SOFTWARE REVISION
RONGMOO DATED 6/1/95 (or similar)

F 59, Display Thousandths (Optional)

Press **F, 59, ENT** for thousandths readout (inches of fuel).
Message will display:

HUNDREDTHS DISPLAYED
ENTER 1 TO SWITCH>

Press **1, ENT** to change.
Message will display:

THOUSANDTHS DISPLAYED
ENTER 1 TO SWITCH>

Press **1, ENT** to change.

F 60, Generator Tank (Optional)

Press **F, 60, ENT** for generator tank.
Message will display:

TANK 1 IS GENERATOR TANK
1=YES 2=NO>NO (DEFAULT)

If 1 (YES) is selected, message will display:

TANK 1 IS GENERATOR TANK
1=YES 2=NO>YES

Press **ENT.**
Message will display:

ENTER GENERATOR OFF
CONDITION 1=NC 2=NO>NO (DEFAULT)

If NC is selected, message will display:

ENTER GENERATOR OFF
CONDITION 1=NC 2=NO>NC

Press **ENT.**
Message will display:

GENERATOR PRINTOUTS?
1=YES 2=NO>YES (DEFAULT)

If 2 (NO) is selected, message will display:

GENERATOR PRINTOUTS?
1=YES 2=NO>NO

Press **ENT.**

[F] 62, Security Code (Optional)

Press **F, 62, ENT** for security code for RS232 communications.
Message will display:

ENTER SIX DIGIT SECURITY
CODE>??????

Enter six digits and press **ENT. NOTE:** To clear security code press 0, **ENT.**

[F] 63, Baud Rate and Parity (Optional)

Press **F, 63, ENT** for baud rate and parity for RS232 communications.
Message will display:

BAUD RATE=4800 PAR=EVEN
ENTER BAUD RATE>

NOTE: 4800 is the default. Enter the baud rate that you need to communicate with the other computer and press **ENT.** (75, 110, 134, 150, 300, 600, 1200, 2000, 2400, 4800, 9599, and 9600 are the baud rates acceptable).
Message will display:

BAUD=2400 PAR=EVEN
PARITY? 1=E 2=O 3=N

Enter 1 for even, 2 for odd, or 3 for none and press **ENT.**

[F] 65, Contact Inputs (Optional)

Press **F, 65, ENT** for program contacts. **NOTE:** Contact inputs may be programmed as Line Leak Inputs using **F-40** discussed later in this section. Message will display:

ENTER NUMBER OF CONTACTS
IN USE: 0
(0-8)

Enter number of contacts and press **ENT.**

[F] 44, Set Contact Input Logic

Press **F, 44, ENT** to change contact input logic. Message will display:

CONTACT 1 IS>> NC
ENTER "1" TO CHANGE>>

Press **1, ENT.**
Message will display:

CONTACT 1 IS>> NO
ENTER "1" TO CHANGE>>

Use the **TANK NO** key to select the next contact and repeat. **NOTE:** The default value is NC. If ENABLING Line Leak Mode, the odd numbered contact of each pair should be programmed as NO, or a jumper should be installed.

[F] 66, Display Contact Status

Press **F, 66, ENT** for contact status display. Message will display:

CONTACT STATUS: 1=0 2=C
3= 4= 5= 6= 7= 8=

Press **ENT. NOTE:** If contacts are programmed in **F-65**, status of each contact will be displayed as an "O" for open or "C" for closed. Contacts with a blank space after the equals sign are not programmed.

[F] 83, Label Contact Inputs (Optional)

Press **F, 83, ENT** to label contact inputs. Message will display:

ENTER CONTACT 1 NAME
>CONTACT 1 (DEFAULT)

The contact names are entered using the • key, the **C/CE** key, and the **ENT** as in **F-94.** The entered names are then printed when a contact alarm is activated. Press **TANK NO** to program the next contact.

F 40, Enable/Disable Line Leak Mode (Optional)

Press **F, 40, ENT** to enable or disable the Line Leak Mode.
Message will display:

LINE LEAK MODE DISABLED
ENTER 1 TO ENABLE>

Press **1, ENT**.
Message will display:

LINE LEAK MODE ENABLED
ENTER 1 TO DISABLE>

Press **1, ENT**.

NOTE: When the Line Leak Mode is enabled the following functions are disabled; **F-44, F-65, F-66, F-81, F-82** and **F-83**. When the Line Leak Mode is disabled the following functions are disabled; **F-100, F-101, F-102** and **F-103**. When switching from Line Leak Inputs and Contact Inputs or vice versa, the programmed data does not reset. *(On EPROM versions X76GA5 through X76GA9, F-40 is used to provide a constant voltage output to a selected probe for troubleshooting, **ASC USE ONLY**.)*

F 100, Line Leak Contact Pairs (Optional)

Press **F, 100, ENT** to program Line Leak Pairs.
Message will display:

LINE LEAK PAIR (1,2)
1-ENABLE> NOT PROGRAMMED

Press **1, ENT**.
Message will display:

LINE LEAK PAIR (1,2)
1-DISABLE> PROGRAMMED

Press **TANK NO** to program the next pair of inputs and repeat.

NOTE: If ENABLING Line Leak Mode, the even numbered contact of each input pair should have a jumper installed as shown on drawing X76C543, or programmed as N.O. with **F-44**.

F 101, Line Leak Timer (Optional)

Press **F, 101, ENT** to set the Line Leak Timer (Default 20 minutes).
Message will display:

LINE LEAK PAIR (1,2)
TIMER> 20 MINUTES (DEFAULT)

Enter the timer value required and press **ENT**. Press **TANK NO** to program the next set of Line Leak pairs

on the system. **NOTE:** This function has a range of; 5 to 25 minutes, default 20 minutes. This value is designed to detect leaks exceeding 0.1 gph and should not be changed unless required by local regulation. Line leak tests should never be programmed to start within two hours preceeding or during a tank test. Tank test failures may result.

F 102, Service Phone Number (Optional)

Press **F, 102, ENT** to program a service company phone number to be displayed when a Line Leak Alarm is silenced.
Message will display:

LINE LEAK ALARM ACTIVE
CALL-> (555)555-5555

Enter the service company phone number and press **ENT**.

F 103, Line Leak Mode Precision Test (Optional)

Press **F, 103, ENT** to program automatic line leak testing.
Message will display:

AUTO LINE LEAK
TESTED>NONE 1=D 2=W 3=M

Enter the frequency that the lines are to be tested. (1=Daily, 2=Weekly, 3=Monthly). Press **ENT**.

• **IF 1 (DAILY)** is selected, message will display:

AUTO LINE LEAK
START TIME: 12:00AM

Enter time to start and press **ENT**. **NOTE:** When entering a time into the system the • key is used to enter the colon. (Time is entered as in **F-90**). It is suggested that the test begin and end before or after the midnight hour.
Message will display:

AUTO LINE LEAK
TESTED>DAILY 1=D 2=W 3=M

NOTE: The line(s) enabled via **F-100** will start and stop Line Leak Mode, at the time set, everyday until disabled via **F-100**.

• **IF 2 (WEEKLY)** is selected, message will display:

ENTER

WEEKS BETWEEN LINE
TESTS>0

Enter one of the following: 1=weekly, 2=every 2nd week, 3=every 3rd week

Press **ENT**.
Message will display:

ENTER DAY FOR LINE TEST
>SUN: 1=S, 2=M, 3=TU, etc.

Enter number corresponding to day and press **ENT**.
Message will display:

AUTO LINE LEAK
START TIME: 12:00AM

Enter time to start and press **ENT**. **NOTE:** When enter-
ing a time into the system the • key is used to enter
the colon. (Time is entered as in **F-90**). It is suggested
that the test begin and end before or after the mid-
night hour. Message will display:

AUTO LINE LEAK
TESTED>WEEK 1=D 2=W 3=M

NOTE: The line(s) enabled will start and stop Line
Leak Mode as programmed until disabled via **F-100**.

• **IF 3 (MONTHLY)** is selected, message will display:

ENTER DATE FOR LINE TEST
>:

Enter the date for the line test and press **ENT**.
Message will display:

AUTO LINE LEAK
START TIME: 12:00AM

Enter time to start and press **ENT**. **NOTE:** When enter-
ing a time into the system the • key is used to enter
the colon. (Time is entered as in **F-90**). It is suggested
that the test begin and end before or after the mid-
night hour.
Message will display:

AUTO LINE LEAK
TESTED>MONTH 1=D 2=W 3=M

NOTE: The line(s) enabled will start and stop Line
Leak Mode as programmed until disabled via **F-100**.
AVOID PROGRAMMING A LINE LEAK TEST AFTER
THE 28TH OF THE MONTH.

⬚F⬚ 69, Display Tank Information (Optional)

Press **F, 69, ENT** for tank information (type and
capacity) display.
Message will display:

TANK 1 VOLUME 5000 G
STEEL TANK

NOTE: Display shows capacity and types of tanks as
programmed into the system. Press **TANK NO** to view
the next tank on the system.

⬚F⬚ 81, Program Aux. Relays (Optional)

Press **F, 81, ENT** to program aux. relays for Contact
and Tank Alarm conditions. **NOTE:** Only the Aux.
Relays which are not linked to line leak inputs, with
F-40 and **F-103** are available for programming with
this function.
Message will display:

ENTER RELAY NUMBER YOU
WISH TO PROGRAM>

Enter the relay number and press, **ENT**.
Message will display:

REL#1 TMR=120 C:- - - - - - - -
TIMER VALUE (0 - 255)>

Enter the timer value, 0-255 seconds, that the relay is
to remain triggered before automatically returning to
the normal state and press **ENT**. **NOTE:** 0 = Not
Timed and will require manual acknowledgement.
Message will display:

REL#1 TMR=0 C: - - - - - - - -
ENTER CONTACTS (1 - 8)

Enter the contact number(s) that will control this relay
and press **ENT**. **NOTE:** Contact inputs programmed as
line leak inputs will be indicated by LL in the C: string
and are not programmable. If contact inputs are not
active this message is skipped.
Message will display:

ENTER TANKS (1 - 8)
T: - - - - - - - -

Select or Deselect tanks by entering the tank
number(s) that will control this relay and press **ENT**.
NOTE: Only tanks programmed using **F-70** are
allowed. Pressing a tank number currently displayed
will Deselect that tank.
Message will display:

ALRM 1H 2L 3W 4T 5HH 6LK
T: - - - - - - - -   H, L, W, T, HH, LK

Select or Deselect alarm types for the tanks selected
by pressing the alarm number(s) and pressing **ENT**.
NOTE: This is the only function in which numbers 5
and 6 represent alarm conditions HH and LK.

(ALARM CONDITIONS)

1=H 2=L 3=W 4=T 5=HH 6=LK

(1=HIGH, 2=LO, 3=WATER 4=THEFT, 5=HI HI,
6=LEAK)

⌊F⌋ 82, Program Internal and External Annunciator (Optional)

Press **F, 82, ENT** for internal and external annunciator.
Message will display:

ANN IS NONE
1=H 2=L 3=W 4=T 5=C 6=HH 7=LK

Press the number(s) of the alarm(s) to be tied to the annunciator and press **ENT**. Example: For the annunciator to activate on High and Low Level Alarms, press **1, 2, ENT**. To eliminate an alarm, press the number of the alarm (i.e., 1, 2) you want to eliminate and press **ENT**. The number will disappear from the display. When an alarm condition has been met, the horn will sound and the light will illuminate. When the condition is silenced, a message will appear containing the tank number or contact number and the condition silenced. When the condition is corrected the alarm light will go off.

⌊F⌋ 97, Product Name (Optional)

Press **F, 97, ENT** to program a product name that is not one of the available product codes.
Message will display:

TANK 1 PRODUCT LABEL
   >_

Enter the name of the product using the • key and the **CE** key as described in **F-94**.

⌊F⌋ 92, Coefficient of Thermal Expansion (Optional)

NOTE: If F-97 (product name) has been entered a coefficient of thermal expansion will be needed for that product. **Press F, 92, ENT** to enter a coefficient of thermal expansion.
Message will display:

ENTER TANK 1 TEMPERATURE
COEFFICIENT>0.00065

Enter coefficient of expansion and press **ENT**. This is used to enter the thermal coefficient of expansion for each tank if the product name cannot be found in product codes. This value can be viewed or change with this function. Do not enter the decimal point in this function, the decimal point is understood.

⌊F⌋ 75, Tank Leak Detect Threshold

Press **F, 75, ENT** to enter a tank leak detect test threshold.
Message will display:

TANK 1 LEAK DETECT TEST
WARNING>0.20 GPH

Enter the gallons per/hour at which the leak warning alarm will activate (i.e., 0.20 gallons/hour). Press **ENT**. Press **TANK NO** to advance to the next tank on the system. **NOTE:** A 0.20 GPH leak rate will declare a leak at 0.10 GPH or greater. Contact your local regulating agency for the requirements in your area.

⌊F⌋ 85, Start Tank Leak Detect (Manual) .

Press **F, 85, ENT** for leak detect test to start.
Message will display:

START MANUAL LEAK DETECT
TANKS>

Enter the tank number of the tank(s) to be tested (Example: 1, 2, 3, etc.). Press **ENT**. The tank(s) selected is(are) now in Leak Detect Mode. **NOTE:** The minimum test duration accepted by the system is 4 hours. Any test duration less then 4 hours will be invalidated. Also, any test initiated within 2 hours of a significant product delivery may be invalidated due to temperature drift.

⌊F⌋ 86, Stop Tank Leak Detect (Manual)

Press **F, 86, ENT** for leak detect test to stop.
Message will display:

STOP MANUAL LEAK DETECT
TANKS>

Enter the tank number of the tank(s) to end the leak test (Example: 1, 2, 3, etc.). Press **ENT**. The selected tank(s) are now out of Leak Detect mode. **NOTE:** When the test is ended the system will automatically print the results of the test.

⌊F⌋ 87, Auto Tank Leak Detect Mode

Press **F, 87, ENT** for automatic tank leak detect mode.
Message will display:

SELECT TANKS AUTO LEAK
DETECT>

Enter the number of the tanks(s) to be tested. Press **ENT** (Example: To test tanks 1 and 3, press **1, 3, ENT**).
Message will display:

TANK 1+3
TESTED>NONE 1=D 2=W 3=M

Enter frequency that the tanks are to be tested. (1=Daily, 2=Weekly, 3=Monthly). Press **ENT**.

• **IF 1 (DAILY)** is selected, message will display:

TANKS 1+3
START TIME: 12:00 AM

Enter the time to start and press **ENT**. **NOTE:** When entering a time into the system the • key is used to enter the colon. (Time is entered as in **F-90**). It is suggested that the test begin and end before or after the midnight hour.
Message will display:

TANKS 1+3
STOP TIME: 12:00 AM

Enter the time to stop and press **ENT**.
Message will display:

SELECT TANKS AUTO LEAK
DETECT>

NOTE: The tank(s) selected will start and stop Leak Detect Mode, at the time set, everyday until reprogrammed or disabled using **F-88**.

• **IF 2 (WEELKY)** is selected, message will display:

TANKS 1+3
TESTED>WEEK 1=D 2=W 3=M

Press **ENT**.
Message will display:

ENTER WEEKS BETWEEN
TESTS>0 (DEFAULT)

Enter one of the following: 1=weekly, 2=every 2nd week, 3=every 3rd week

Press **ENT**.
Message will display:

ENTER DAY FOR LEAK TEST
>SUN 1=S 2=M 3=TU, etc.

Enter number corresponding to day and press **ENT**.
Message will display:

TANK 1+3
START TIME=12:00 AM

Enter time to start and press **ENT**. **NOTE:** When entering a time into the system the • key is used to enter the colon. (Time is entered as in **F-90**.)
Message will display:

TANK 1+3
STOP TIME=12:00 AM

Enter time to stop and press **ENT**.
Message will display:

SELECT TANKS AUTO LEAK
DETECT>

NOTE: If weekly testing is selected, enter the start time to begin Leak Mode (i.e.: 9, •, 23, • 0, for 9:23 AM; 0=AM, 1=PM). Press **ENT**. Enter the stop time and press **ENT**. The tank(s) selected will start a Leak Detect Test on the selected day and time until reprogrammed or disabled using **F-88**.

• **IF 3 (MONTHLY)** is selected, message will display:

ENTER DATE FOR LEAK TEST
>1

Enter date of month and press **ENT**. **NOTE:** When selecting the date consider that February has only 28 days, (29 on leap year).
Message will display:

TANK 1
START TIME=12:00 AM

Enter time to start and press **ENT**.
Message will display:

TANK 1
STOP TIME=12:00 AM

Enter time to stop and press **ENT**.
Message will display:

SELECT TANKS AUTO LEAK
DETECT>

Press **ENT**. **NOTE:** If monthly testing is selected, enter the date the test is to be run. Press **ENT**, (i.e., 15=the 15th of the month). Enter the time to begin Leak Mode (i.e.: 9, •, 23, • 0, for 9:23 AM; 0=AM, 1=PM). Press **ENT**. Enter the stop time. Press **ENT**. The tank(s) selected will now enter Leak Detect Mode on the date programmed every month until reprogrammed or disabled using **F-88**.

F 89, Print Leak Detect Set-Up Parameters

To print a copy of the Leak Detect set-up parameters press **F, 89, ENT**. The printout will show the tanks and times the tanks are programmed to be tested. **NOTE:** The Leak Detect Set-Up parameters report will not indicate tanks enabled or disabled.

F 88, Enable/Disable Auto Leak Mode

When tank(s) are programmed for Auto Leak Detect Mode the number(s) of those tank(s) are automatically entered into F-88. If for any reason you choose to suspend testing on one or all tank(s) use **F-88**. If, at a later date you choose to continue testing, use this function to activate the programmed Leak Test Mode.

Press **F, 88, ENT**.
Message will display:

TANKS ENABLED AUTO LEAK
DETECT 1>

Press the number of the tank(s) you want to enable or disable. Press **ENT**. Press the number until it clears the LCD, then press **ENT**. **NOTE:** This will not end a test already in progress, but only prevent a future test from starting.

F 61, Auto Report Print

Press **F, 61, ENT** for programming automatic report print.
Message will display:

ENTER 1=STAT 2=SHIFT TO BE
AUTO PRINTED>STAT

Enter number corresponding to desired report (1=inventory status, 2=shift report) and press **ENT**. Message will display:

ENTER AUTO PRINT TIME 1
> NOT PROGRAMMED

Enter time (i.e.: 12, •, 00, •, 0 =12:00 AM) and press **ENT**.

To enter the next auto print time, press **TANK NO.** Message will display:

ENTER AUTO PRINT TIME 2
> NOT PROGRAMMED

Enter the next time the report is to be printed and press **ENT**. **NOTE:** You can program the report to be printed up to four times a day. To deprogram the automatic report print, enter the time as 0, (0=Not Programmed).

F 99, Enable/Disable Printer

To Enable or Disable the system Printer. Press **F, 99 ENT**.

Message will display:

PRINTER IS> ENABLED
ENTER 0-DISABL: 1-ENABL

Press **0, ENT**
Message will display:

PRINTER IS> DISABLED
ENTER 0-DISABL: 1-ENABL

NOTE: When the printer is disabled all printouts will be written to a printer buffer. When the printer is ENABLED the buffer will be printed. The buffer will hold approximately 40 messages before writing over the oldest message. A "P" will be displayed on the left side of the display when the printer is disabled.

F 68, Manifolded Tanks

If tanks in the system are manifolded together, enter the following information. Press **F, 68, ENT**. Message will display:

MANIFOLDED TANKS GROUP 1
>

Press **ENT**. Press the numbers of the tanks manifolded (Example: 1, 2, 3, etc.) and press **ENT**. To program another group of tanks, press **TANK NO** and select the tanks to be manifolded and press **ENT**. **NOTE:** Tank information for each manifolded tank must be entered during set-up using **F-74**.

F 67, Set Probe Error Alarm

Press **F, 67, ENT** for probe error warning.
Message will display:

PROBE ERROR SIGNAL LEVEL
SAME (0=HI 1=LO 2=SAME)

Press **ENT**. If you select (0), the High Alarm will activate in the event of a Probe failure and the alarm report printed will indicate that the Alarm was activated due to a Probe error. **NOTE:** Choice of (2=SAME) will display a probe error message only. Alarms and printouts wil not occur.

F 77, Linear Scale (For Vertical Tanks Only)

Press **F, 77, ENT** for linear scale. **NOTE:** This function will override information entered in **F-74**.
Message will display:

ENTER TANK 1 LINEAR
SCALE VALUE: 0.00

Enter number of gallons per inch ratio for vertical tank and press **ENT, ENT**. Message will display:

ENTER TANK 1
TOTAL VOLUME>0

Enter total volume of tank and press **ENT, ENT**. Press **TANK NO** for next tank and repeat.

F 84, High High Alarm

Press **F, 84, ENT** for HI HI Alarm.
Message will display:

TANK 1
HI HI ALARM>20000 GALLON

Enter gallons and press **ENT** and press **TANK NO** for the next tank on the system. **NOTE:** The HI HI Alarm can only be silenced by using **F-52** and the program key must be in the **PROG** position.

F 52, Silence HI HI Alarm

Press **F, 52, ENT** to silence a HI HI alarm.
Message will display:

TO SILENCE HI HI ALARM,
ENTER 1>

Press **1, ENT. NOTE:** Press number of tanks in alarm condition and press **ENT**. The Program key must be in the **PROG** position.

F 90, Time

Press **F, 90, ENT** for time.
Message will display:

ENTER TIME: 12:00 AM
(HR., MIN., AM/PM; 0=AM, 1=PM)

Enter time (i.e.: 12, • 00, •, 0=12:00 AM) and press **ENT**.

F 91, Date

Press **F, 91, ENT** for date.
Message will display:

ENTER DATE: 6/24/95
(MO., DATE, YR.)

Enter Date: (i.e.: 6, •, 24, •, 95 and press **ENT**.)

Message will display:

ENTER DAY
>SUN 1=S 2=M 3=TU, etc.

Enter number corresponding to day and press **ENT**.

F 94, Site Name

Press **F, 94, ENT** for name.
Message will display:

RONAN (DEFAULT)

Enter the "station name" by using the Data Entry Key • to advance the alphabet, and Data Entry Key **C/CE** to reverse the alphabet. To move the active cell right for an entry, press the **LO** Key. To move the active cell left, press the **HI** Key. When the correct name has been entered, press **ENT**.

F 95, Site Address

Press **F, 95, ENT** for address.
Message will display:

21200 OXNARD ST.
(DEFAULT)
>_

Enter the correct "address" by using the keys described in **F-94** and press **ENT**.

F 96, Site City, State, and Zip

Press **F, 96, ENT** for City, State, and Zip.
Message will display:

WOODLAND HILLS, CA 91367
(DEFAULT)
>_

Enter correct city, state, and zip by using the keys described in **F-94** press **ENT**. Press **PRINT, 1, ENT** and check printout to verify the correct time, date, name, and address.

F 42, Print Hourly Averages

To print out the hourly Level, Volume and Temperature of the last tank leak test press **F, 42, ENT**.
Message will display:

ENTER "1" TO PRINT
HOURLY LEAK RESULTS>

Press 1, **ENT**
Message will display:

PRINTING HOURLY RESULTS
WAIT FOR BUFFER TO CLEAR.

F 43, Set Drop Report Threshold

To set the threshold which will trigger a drop report to be generated press **F, 43, ENT**.
Message will display:

TANK 1 ENTER DROP VALUE
(0-65,000)> 100

Enter the new drop threshold and press **ENT. NOTE:** The drop threshold should not be adjusted unless the tank being monitored is less then 1000 gallons and drops to the tank are expected to be <100 gallons.

9.0 REPORTS

The Ronan Model X76TEM-4X displays information to the user in one of two ways. The systems LCD display may be used to view inventory information and current status for tanks and contact inputs or reports may be printed manually or automatically using the **PRINT** key or several of the function codes. (See function codes on page 8). In addition to the displays and reports that can be generated by the X76ETM-4X, information may be transmitted to

remote sites via modem and computer interface using the Ronan CRC; (Compliance Reporting Center), ATM; (Automated Tank Monitor), TMS; (Tank Monitor Server) or X76-ComPro software. Contact your local distributor or Ronan for additional information.

9.1 Inventory Status Report, (PRINT, 1)

This report includes the station name and address, tank number, product label, gross volume, net volume, inches of fuel, inches of water, product temperature, ullage, gallons to full, (GTF) and gallons to 95% full, (95% GTF), time and date. This report is initiated by pressing the **PRINT** key. Message will display:

CHOICE? 1=STATUS 2=SHIFT
3=DROP 4=ALARM 5=LEAK>

Press the report choice and **ENT**.

If 1, message will display:

STATUS OF WHICH TANKS?
(1-8), (0=ALL)>

Press the tank number(s) and press **ENT**.
(See Figure 3).

If 2, message will display:

PRINT SHIFT REPORT

Press **ENT**. **NOTE:** In addition to the information on the inventory report, the shift report includes the net change, in gallons, since the last shift report was taken (See Figure 4).

If 3, message will display:

PRINTING INVENTORY
INCREASE

Press **ENT**. **NOTE:** Inventory increases, such as bulk deliveries, are automatically recorded and printed approximately 2 minutes after delivery. The report includes beginning inventory, inventory after delivery and net change in gallons. The last three increases for each tank are then stored in memory and can be printed.
(See Figure 5).

```
************************************

RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

STATUS REPORT

TANK 1
REGULAR
    4770   GROSS GALLONS
    4692   NET GALLONS
    49.50  INCHES FUEL
    0.00   INCHES WATER
    85.5   °F
    4793   GTF
    4314   TO 95% FULL

3:09 PM 211/95

************************************
```

Figure 3: Inventory Status Report.

```
************************************

RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

SHIFT REPORT

FROM:      5:54 AM 2/1/95
TO:        7:12 AM 2/1/95

TANK 1
REGULAR
    4770   GROSS GALLONS
    4692   NET GALLONS
    49.52  INCHES FUEL
    0.00   INCHES WATER
    85.5   °F
    4793   GTF
    4314   G TO 95% FULL

-100 GALLON CHANGE

TANK 2
SUPER UNLEADED
    4156   GROSS GALLONS
    4084   NET GALLONS
    45.29  INCHES FUEL
    0.00   INCHES WATER
    87.2   °F
    5407   GTF
    4929   G TO 95% FULL

-201 GALLON CHANGE

************************************
```

Figure 4: Shift Report.

```
************************************

RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

INVENTORY REPORT

AT:        3:45 AM 2/3/95

TANK 1
REGULAR

    6782          NET INCREASE
    6:51 PM       2/2/95

    4875          NET INCREASE
    5:20 PM       211/9

    5888          NET INCREASE
    5:55 PM       1/31/95

TANK 2
SUPER UNLEADED

    4498          NET INCREASE
    6:30 PM       2/2/95

    6745          NET INCREASE
    5:05 PM       2/1/95

************************************
```

Figure 5: Inventory Report.

If **4,** Alarm Report will print the last alarm for each input with time and date of alarm. (See Figure 6).

If **5,** Leak Detect Report is selected, the last Leak Detect Report will result (See Figure 7).

Leak Detect test results are printed automatically at the end of the test period. Results are printed only for the tank(s) selected. The reports include tank number, gal/hr threshold, pass/fail message, hourly gallonage, and gal/hr rate change (See Figure 8). The last leak test results for each tank, is stored in the system memory and can be printed using **PRINT, 5, ENT.** To print the hourly averages of level, volume and temperature for the last tank test press **F, 42, ENT**.

9.2 High Product Alarm

The high product alarm warns of potential overfill during bulk deliveries. It is indicated by a flashing "**H**" to the left of the tank number on the LCD. High product alarms can be programmed to an external output relay (See **F-81).** An alarm warning is printed at the time the alarm is activated, and a recall on the last alarm for each tank is stored in memory.

9.3 HI HI Product Alarm

The high high product alarm warns of critical overfill during bulk deliveries. It is indicated by a flashing "**h**" to the left of the tank number on the LCD. HI HI level alarms can be programmed to an external output relay (See **F-81).** An alarm warning is printed at the time the alarm is activated, and a recall on the last alarm for each tank is stored in memory.

9.4 Low Level Alarm

Low level alarm warns when inventory drops below a pre-set low limit. It is indicated with a flashing "**L**" to the left of the tank number on the LCD. Low level alarm can be programmed to an external output relay (See **F-81).** An alarm warning is printed at the time the alarm is activated, and a recall of the last alarm for each tank is stored in memory.

```
************************************
RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

ALARM REPORT
12:00 PM 2/1/95

       — LAST HIGH ALARM —

     TANK 1 8:26 AM 1/31/95

     TANK 2 7:19 PM 1/30/95

       — LAST LOW ALARM —

     TANK 2 9:23 AM 1/13/95

    — LAST WATER ALARM —

     TANK 1 7:22 AM 1/3/95

     TANK 2 8:32 AM 1/1/94

     TANK 3 7:55 AM 1/2/95

    — LAST THEFT ALARM —

     NO PREVIOUS ALARMS

  — LAST CONTACT ALARM —

         CONTACT 1
         9:20 PM 1/29/94

     — LAST HI HI ALARM —

     NO PREVIOUS ALARMS

    — LAST LEAK ALARM —

     NO PREVIOUS ALARMS
************************************
```

Figure 6: Alarm Report.

```
************************************
RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

LAST LEAK DETECT REPORT
3:45 PM 12/27/94

TANK 1
0 20 GPH LD PASSED

5:00 AM 12/25/94

GAL/HR CHANGE = -0.07

TANK 2
0.20 GPH LD FAILED

5:00 AM 12/25/93

GAL/HR CHANGE = 0.11

************************************
```

Figure 7: Last Leak Detect Report.

```
************************************
RONAN ENGINEERING
21200 OXNARD STREET
WOODLAND HILLS, CA 91367

      — LEAK DETECT —
      — AUTO MODE —

START: 1:00 AM 12/25/94

        — TANK 3 —

RONAN 21200
OXNARD ST.
WOODLAND HILL, CA 91367

       — LEAK DETECT —
       — AUTO MODE —

END: 5:00 AM 12/25/94

       — TANK 3 —

0.20 GPH LD PASSED

GAL/HR CHANGE = 0.05

TANK 3
REGULAR
```

HOUR	GALLONS
2:00 AM	5425.98
8:00 AM	5426.07
4:00 AM	5425.94
5:00 AM	5425.80

```
************************************
```

Figure 8: Leak Test Report.

9.5 High Water Alarm

The high water alarm warns when water level has exceeded a pre-set level. A copy of the warning is printed when the pre-set level is exceeded. A flashing "W" is displayed to the left of the tank number on the LCD until the high water condition has been corrected. High water alarm can be programmed to an external output relay (See F-81). Information on the last water alarm warning for each tank is stored in memory.

9.6 Theft Alarm

The theft alarm detects a rapid drop in inventory during a leak test. A flashing "T" is displayed to the left of the tank number on the LCD until the alarm has been silenced. The theft alarm prints an alarm message and can be programmed to an external output relay (See F-81).

9.7 Contact Input Alarm

Contact alarm reports are printed automatically at the time the alarm condition is activated. A flashing "C" is displayed to the left of the tank number on the LCD until the alarm condition has been corrected. This report prints the number of the contact activated including Time and Date and any name programmed for that contact. Contact alarms can be programmed to an external output relay (See F-81). The last alarm report for each contact is stored in memory.

9.8 Line Leak Alarm

Line Leak alarms are printed automatically at the time the alarm condition is activated. This report prints the contact number or contact name, if programmed via F-83, of the input activated including the Time, Date and Line Leak Test failed.

9.9 Tank Statistics

Press F, 64, ENT for a printout of tank statistics for every tank programmed in the X76ETM-4X. This printout must accompany the warranty check-out forms part 1 and 2, and an additional copy should remain with the unit (See Figure 9).

9.10 Probe Error Warning

When F-67 is programmed, this warning will activate in the event of a Probe failure (See Figure 10). When activated, a warning will be printed, and if an output relay is programmed, that relay will be activated.

```
*********************************

      — TANK STATISTICS —

Shell#204-3456-7892
1111 Studebaker Rd.
Long Island, CA 95678

12:27 PM 2/10/95
SOFTWARE REVISION
RONGMOO DATED 6/1/95
RELAY 1: NOT PROGRAMMED
RELAY 2: NOT PROGRAMMED
RELAY 3: NOT PROGRAMMED
RELAY 4: NOT PROGRAMMED
PROBE ERROR SIGNAL: SAME
2 TANKS IN SERVICE

          — TANK 1 —
STEEL
INSIDE DIAMETER          94.00 IN
TOTAL VOLUME          10000 GAL
TILT TO CENTER            0.00 IN
TILT TO HIGH END          0.00 IN
TILT TO LOW END           0.00 IN
PR SERIAL # 44294 E
WIRE SPEED           9.300 µS/IN
LINEAR SCALE                0.00
HI HI ALARM          20000 GAL
HIGH ALARM            9500 GAL
LOW ALARM              400 GAL
WATER ALARM             2.00 IN
LEAK DETECT           0.20 GPH
THEFT ALARM            20 GAL
FUEL        REGULAR UNLEADED

          — TANK 2 —
STEEL
INSIDE DIAMETER          94.00 IN
TOTAL VOLUME          10000 GAL
TILT TO CENTER            0.00 IN
TILT TO HIGH END          0.00 IN
TILT TO LOW END           0.00 IN
PR SERIAL # 44294 B
WIRE SPEED           9.326 µS/N
LINEAR SCALE                0.00
HI HI ALARM          20000 GAL
HIGH ALARM            9500 GAL
LOW ALARM              400 GAL
WATER ALARM             2.00 IN
LEAK DETECT           0.20 GPH
THEFT ALARM            20 GAL
FUEL          SUPER UNLEADED

*********************************
```

Figure 9: Tank Statistics Report.

```
            TANK 1
     NO PROBE CONNECTED
     HIGH ALARM ACTIVATED
        2:34 PM 2/01/95
```

Figure 10: Probe Error Report.

9.11 Leak Detect Mode

IMPORTANT: Leak test **F-85** or **F-87** and **F-75** leak threshold must be programmed in order for the leak test to function. The leak test can be started and stopped manually by using **F-85** and **F-86**. X76ETM-4X can also be pre-programmed to start and stop at a preset time; daily, weekly, or monthly. Each individual tank can be programmed separately using **F-87** and **F-88**. **F-89** will print the auto leak detect set-up information (See Figure 11). When the test frequency is set for weekly, or monthly testing, a notice will be printed 24 hours in advance of the test start time as a reminder (See Figure 12).

```
*********************************

AUTO LEAK
DETECT TIMES

3:07 PM 3/03/93

          — TANK 1 —

PROGRAMMED FOR MONTHLY
LEAK DETECT ON THE 4
1:00 AM TO 5:00 AM

          — TANK 2 —

PROGRAMMED FOR MONTHLY
LEAK DETECT ON THE 5
1:00 AM TO 5:00 AM

          — TANK 3 —

PROGRAMMED FOR MONTHLY
LEAK DETECT ON THE 6
1:00 AM TO 5:00 AM

*********************************
```

Figure 11: Leak Detect Report.

```
TANK 1
LEAK DETECT TO START ON
1 2:01 PM 2/01/95
```

Figure 12: Leak Detect Report.

9.12 Operation of Internal Annunciator Option

When the relay is tripped and an alarm condition has been met, the horn will sound and the light will illuminate. When the condition is silenced, a message will appear containing the tank number, contact number and the condition silenced.

A) **HI Alarm** = Relay is de-energized and the "H" stops flashing but remains on the display until the condition is cleared. The horn is silenced but the signal light remains lit until the condition is cleared.

B) **LO Alarm** = Relay is de-energized and the "L" stops flashing but remains on the display until the condition is cleared. The horn is silenced but the signal light remains lit until the condition is cleared.

C) **Water Alarm** = Relay is de-energized and the "W" stops flashing but remains on the display until the condition is cleared. The horn is silenced but the signal light remains lit until the condition is cleared.

D) **Contact Alarm** = Relay is de-energized and the "C" stops flashing but remains on the display until the condition is cleared. The horn is silenced but the signal light remains lit until the condition is cleared.

E) **Theft Alarm** = Relay is de-energized and the "T" is removed from the display entirely; both horn and signal light are silenced.

F) **Leak Alarm** = Relay is de-energized and the "l" is removed from the display entirely. Both horn and signal light are silenced.

G) **HI HI Alarm** = Must use **F-52** to silence! Relay is then de-energized and the "h" stops flashing but remains on the display until the condition is cleared. The horn is silenced but the signal light remains lit until the condition is cleared.

10.0 PRINTER PAPER REPLACEMENT

The RONAN X76ETM-4X uses Seiko thermal paper #TP201-211-25c 21/4" x 75'. Check with your local Ronan distributor or call Ronan for assistance at 1-818-883-5211 (See Figure 13).

1. Open controller door.

2. Remove the used paper roll and discard (save roll shaft).

3. Put the roll shaft in the new roll of paper.

4. Cut the end of the new roll to a point and insert paper between green board and the black printer mechanism, until the tip of the paper extends out of the printer on the front side of the controller. Pull

paper from front side until cut edges are free of machine.

5. Rest new paper roll in slot on bracket.

6. Select **PRINT** to check the printer operation. If there are no visible characters, then the paper is reversed Remove the paper by tearing the paper off at the back of the printer and removing the excess paper through the front of the printer. Repeat steps 1 to 5 with the paper turned around.

WARNING: Never tear the paper while the printer is running. Printer damage may occur.

Notes On Printer Operations:

1. To avoid paper jams, always tear printout down from right to left.

2. Repair any printer jam as soon as possible to avoid damage to the printer. Repair printer jams by removing all foreign objects from the printer area. DO NOT pry on or scratch the print head.

3. Always pull excess paper from the front of the printer only. Pulling paper out from the back may cause damage to the printer drive mechanism.
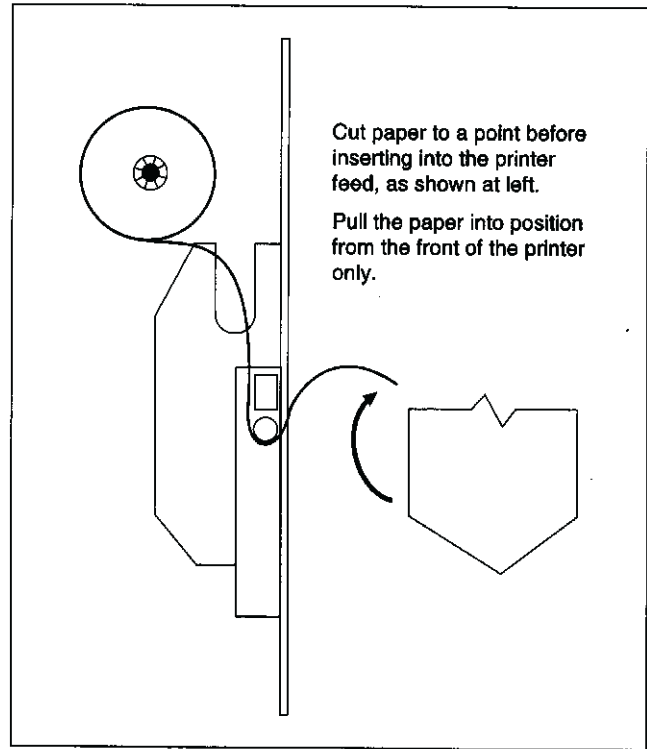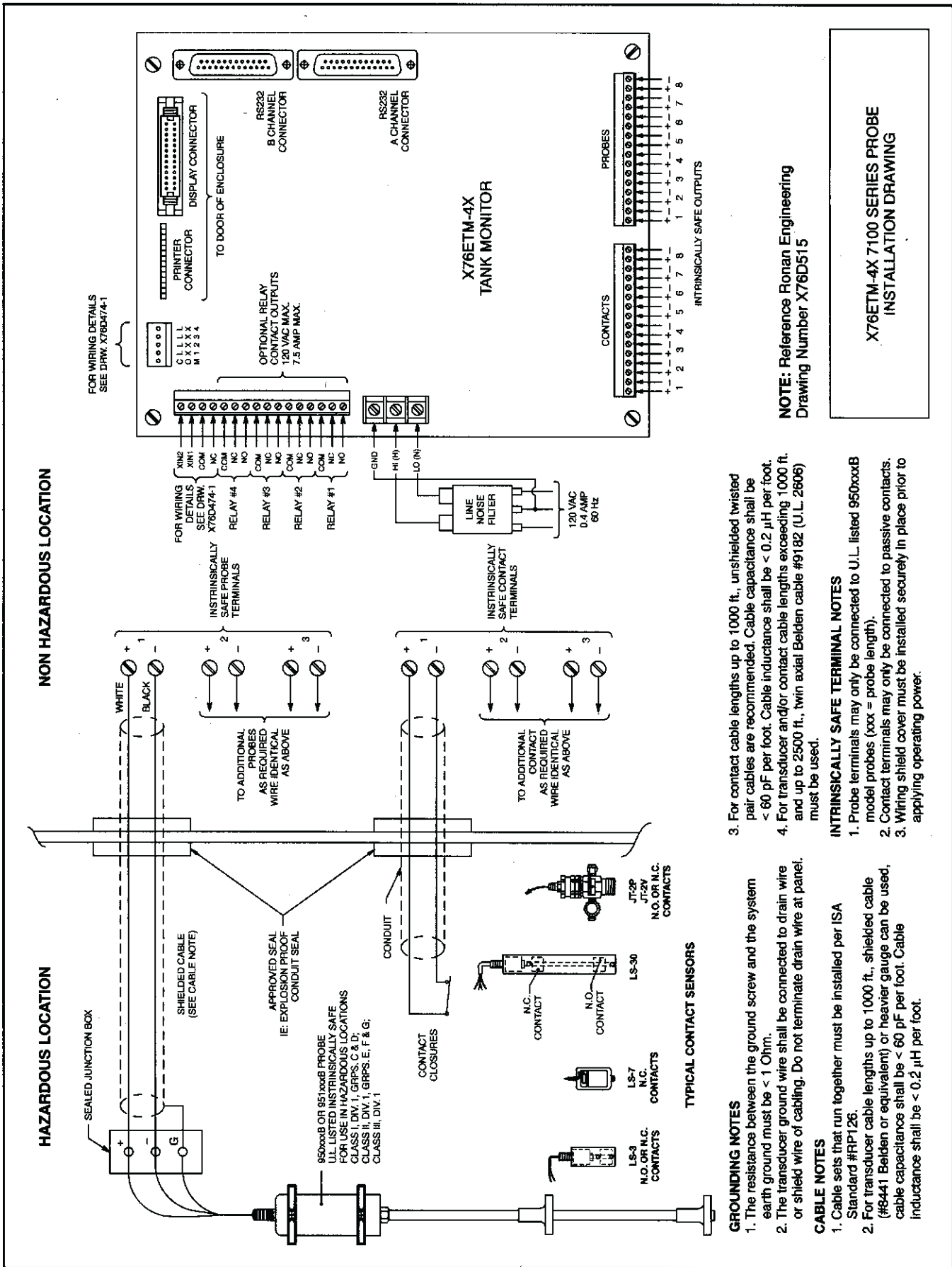
Cut paper to a point before inserting into the printer feed, as shown at left.

Pull the paper into position from the front of the printer only.

Figure 13: Printer Paper Replacement.

NON HAZARDOUS LOCATION

FOR WIRING DETAILS SEE DRW. X76D474-1

DISPLAY CONNECTOR

PRINTER CONNECTOR

TO DOOR OF ENCLOSURE

RS232 B CHANNEL CONNECTOR

RS232 A CHANNEL CONNECTOR

X76ETM-4X TANK MONITOR

PROBES

CONTACTS

INTRINSICALLY SAFE OUTPUTS

OPTIONAL RELAY CONTACT OUTPUTS 120 VAC MAX. 7.5 AMP MAX.

FOR WIRING DETAILS SEE DRAW. X76D474-1

XIN2 XIN1 COM
RELAY #4 — COM NC NO
RELAY #3 — COM NC NO
RELAY #2 — COM NC NO
RELAY #1 — COM NC NO

GND HI (H) LO (N)

LINE NOISE FILTER

120 VAC 0.4 AMP 60 Hz

INSTRINSICALLY SAFE PROBE TERMINALS

INSTRINSICALLY SAFE CONTACT TERMINALS

TO ADDITIONAL PROBES AS REQUIRED WIRE IDENTICAL AS ABOVE

TO ADDITIONAL CONTACT AS REQUIRED WIRE IDENTICAL AS ABOVE

HAZARDOUS LOCATION

WHITE
BLACK

SEALED JUNCTION BOX

SHIELDED CABLE (SEE CABLE NOTE)

APPROVED SEAL IE: EXPLOSION PROOF CONDUIT SEAL

CONDUIT

950xxxB OR 951xxxB PROBE U.L. LISTED INSTRINSICALLY SAFE FOR USE IN HAZARDOUS LOCATIONS CLASS I, DIV. I, GRPS. C & D; CLASS II, DIV. 1, GRPS. E, F & G; CLASS III, DIV. 1.

CONTACT CLOSURES

JT-2P JT-2V N.O. OR N.C. CONTACTS

LS-30 N.C. CONTACT N.O. CONTACT

LS-7 N.C. CONTACTS

LS-3 N.O. OR N.C. CONTACTS

TYPICAL CONTACT SENSORS

GROUNDING NOTES
1. The resistance between the ground screw and the system earth ground must be < 1 Ohm.
2. The transducer ground wire shall be connected to drain wire or shield wire of cabling. Do not terminate drain wire at panel.

CABLE NOTES
1. Cable sets that run together must be installed per ISA Standard #RP126.
2. For transducer cable lengths up to 1000 ft, shielded cable (#8441 Belden or equivalent) or heavier gauge can be used, cable capacitance shall be < 60 pF per foot. Cable inductance shall be < 0.2 μH per foot.
3. For contact cable lengths up to 1000 ft, unshielded twisted pair cables are recommended. Cable capacitance shall be < 60 pF per foot. Cable inductance shall be < 0.2 μH per foot.
4. For transducer and/or contact cable lengths exceeding 1000 ft. and up to 2500 ft., twin axial Belden cable #9182 (U.L. 2606) must be used.

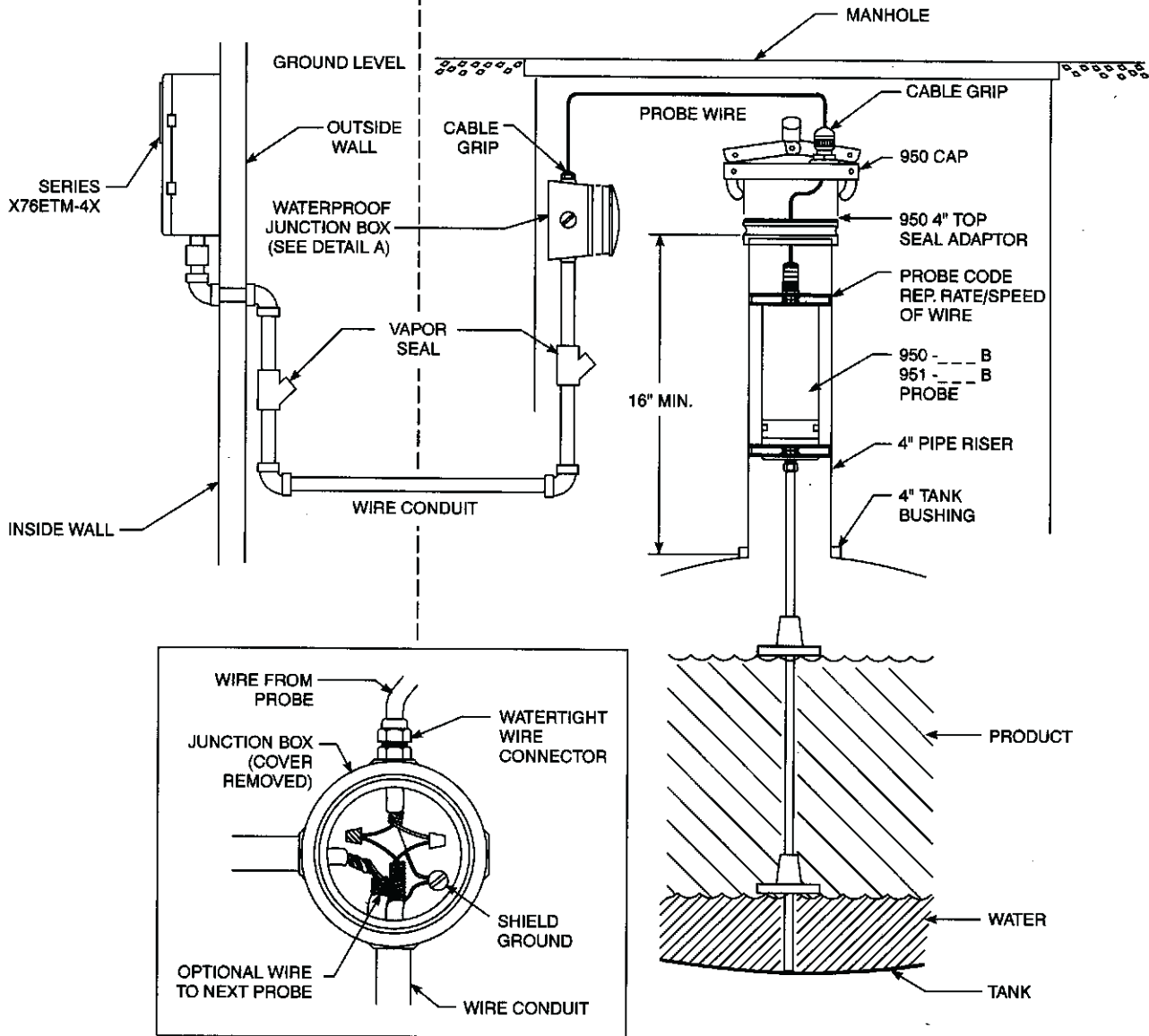### INTRINSICALLY SAFE TERMINAL NOTES
1. Probe terminals may only be connected to U.L. listed 950xxxB model probes (xxx = probe length).
2. Contact terminals may only be connected to passive contacts.
3. Wiring shield cover must be installed securely in place prior to applying operating power.

NOTE: Reference Ronan Engineering Drawing Number X76D515

X76ETM-4X 7100 SERIES PROBE INSTALLATION DRAWING

NON-HAZARDOUS

HAZARDOUS

MANHOLE

GROUND LEVEL

CABLE GRIP

PROBE WIRE

CABLE GRIP

950 CAP

OUTSIDE WALL

SERIES X76ETM-4X

WATERPROOF JUNCTION BOX (SEE DETAIL A)

950 4" TOP SEAL ADAPTOR

PROBE CODE REP. RATE/SPEED OF WIRE

VAPOR SEAL

16" MIN.

950 - _ _ _ B
951 - _ _ _ B
PROBE

4" PIPE RISER

4" TANK BUSHING

INSIDE WALL

WIRE CONDUIT

WIRE FROM PROBE

WATERTIGHT WIRE CONNECTOR

JUNCTION BOX (COVER REMOVED)

PRODUCT

SHIELD GROUND

OPTIONAL WIRE TO NEXT PROBE

WIRE CONDUIT

WATER

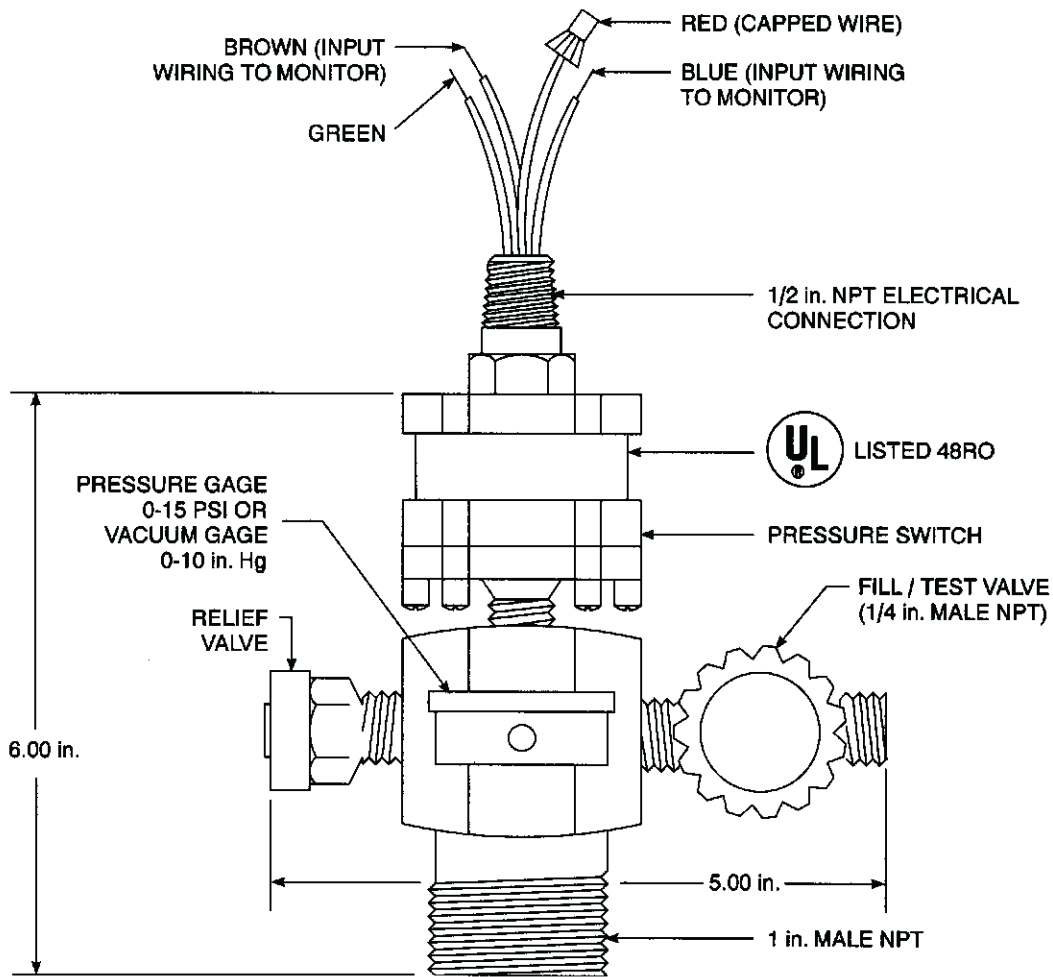TANK

**"WATERPROOF JUNCTION"
DETAIL A**

NOTE: Reference Ronan Engineering
Drawing Number X76D510.

X76ETM-4X
WIRING CONNECTION

BROWN (INPUT WIRING TO MONITOR)

GREEN

RED (CAPPED WIRE)

BLUE (INPUT WIRING TO MONITOR)

1/2 in. NPT ELECTRICAL CONNECTION

(UL) LISTED 48RO

PRESSURE GAGE 0-15 PSI OR VACUUM GAGE 0-10 in. Hg

PRESSURE SWITCH

FILL / TEST VALVE (1/4 in. MALE NPT)

RELIEF VALVE

6.00 in.

5.00 in.

1 in. MALE NPT

INSTALLATION INSTRUCTIONS

Install the JT-2P Positive Pressure Leak Sensor or JT-2V Positive Vacuum Leak Sensor on the tank interstice riser. All other tank ports must be sealed with #150 class pipe fittings. Teflon paste type sealer is suggested for all threaded joints.

Provide electrical conduit, two each #18 AWG wires to sensor input terminals of the Models X76-4X, X76ETM-4X, X76S, X76VS, X76LVC, X76LVCS or X76ETM Tank Monitor. Contact the brown and blue sensor wires (NO position). Intrinsically safe wiring must be in a dedicated conduit only. No 115 Vac or other wiring is allowed in the same conduit. Pressurize the tank interstice with

compressed air or nitrogen, (DO NOT USE OXYGEN), or evacuate the tank interstice through the JT-2P or V fill and relief valve manifold (provided with the sensor) to 2.9 psig or 10 inches Hg. When the pressure or vacuum has been applied, the system alarm will return to normal.

NOTE: When filling the tank annulus with compressed air or nitrogen, the sensor fill and relief manifold MUST be used. Never exceed 3 psig or the tank warranty may be voided.

WARNING: The red wire, (N.C. position) MUST be capped off to prevent a short circuit to ground.

NOTE: Reference Ronan Engineering Drawing Number X76B556.

POSITIVE PRESSURE / VACUUM TANK LEAK SENSOR ASSEMBLY MODEL JT-2P & JT-2V

BLACK ⟶

RED ⟶

3/4 NPT
CONNECTION ⟶

.875 in.

3.000 in.

SWITCH ⟶

FLOAT ⟶

(UL)
®

LISTED 48RO

1.310 in.
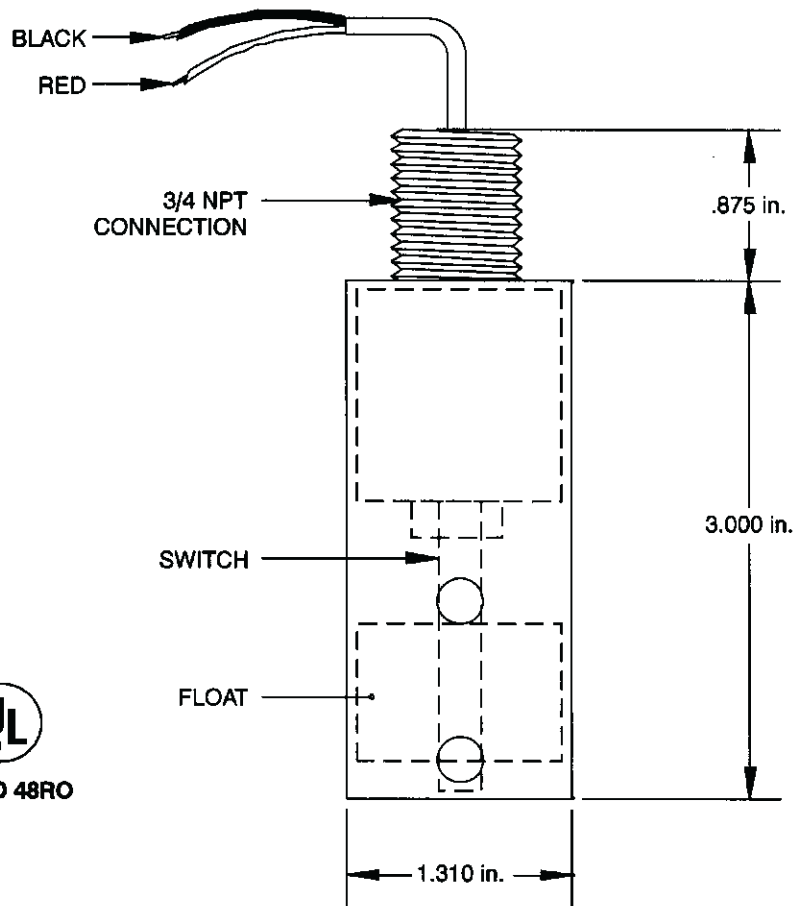
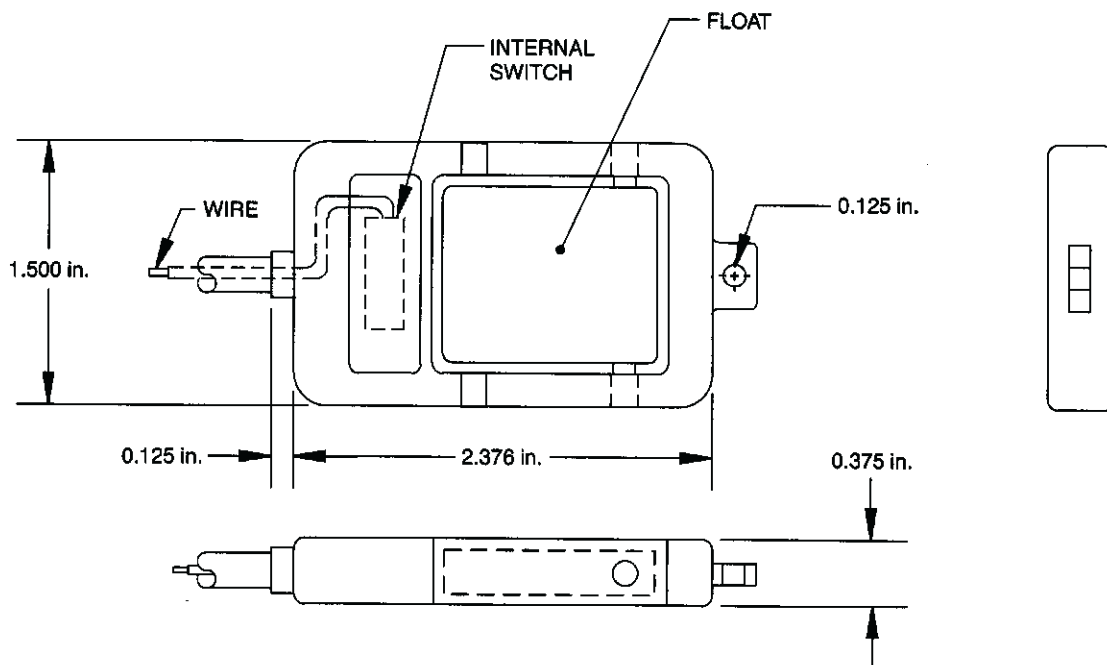## INSTALLATION INSTRUCTIONS
FOR STEEL DOUBLE-WALL TANKS

Lower sensor on cable until it rests on bottom of the tank annulus in a vertical
position. Pull the remaining cable into the junction box and cut off the excess
length. Secure cable to prevent slipping into the tank annulus. Connect leads to
wire from the tank monitor input terminal strip.

OTHER APPLICATIONS

High level alarm for overfill prevention in the tank. Sump leak sensor. Piping sump
leak sensor. Secondary containment liquid level monitor. Pump start/pump stop
level sensor.

NOTE: Reference Ronan Engineering
Drawing Number X76B545.

TANK LEAK SENSOR
MODEL LS-3

FLOAT

INTERNAL
SWITCH

WIRE

1.500 in.

0.125 in.

0.125 in.

2.376 in.

0.375 in.

INSTALLATION INSTRUCTIONS
FOR FIBERGLASS TANKS

1. Insert fish tape through annulus space.
2. Attach pull-string to LS-7.
3. Tag signal cable and pull string each 18 feet from LS-7. (Typical for 8 foot diameter tank).
4. Attach fish tape to pull string.
5. Pull LS-7 through tank annulus.
6. Match tag mark on signal cable and pull string.
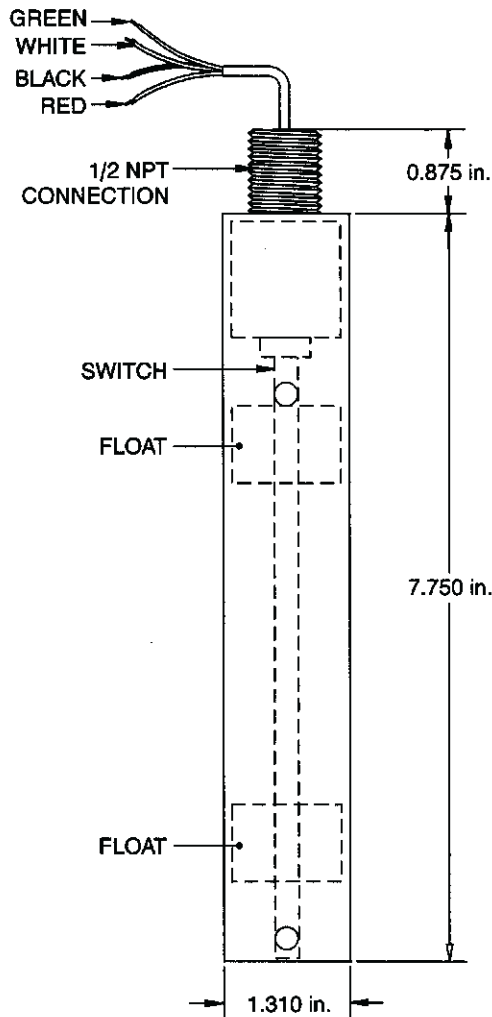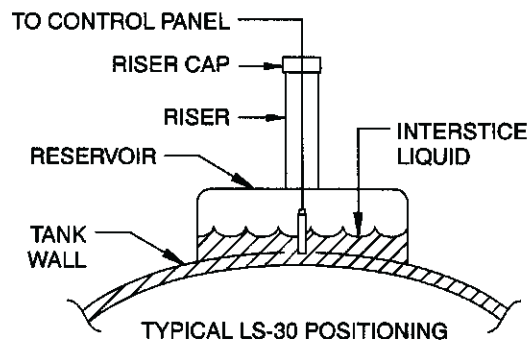7. LS-7 is now positioned at the tank bottom, centerline.

WIRE

INSTALLATION
CABLE
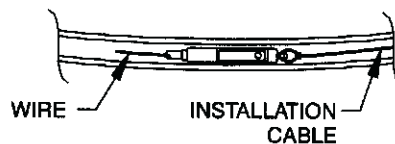
**TYPICAL INSTALLATION
IN DOUBLE-WALL TANK**

NOTE: Reference Ronan Engineering
Drawing Number X76B546.

TANK LEAK SENOR
MODEL LS-7

GREEN
WHITE
BLACK
RED

1/2 NPT
CONNECTION

0.875 in.

SWITCH

FLOAT

7.750 in.

(UL)

LISTED 48RO

TO CONTROL PANEL

RISER CAP

RISER

INTERSTICE
LIQUID

RESERVOIR

TANK
WALL

FLOAT

TYPICAL LS-30 POSITIONING

1.310 in.

INSTALLATION INSTRUCTIONS LS-30
FOR DOUBLE-WALL FIBERGLASS TANKS WITH INTEGRAL RESERVOIR

Lower sensor on cable until half* of sensor is submerged in liquid. Pull remaining cable into junction box and cut off excess cable length. Secure cable to prevent slipping into tank annulus. Connect leads to wire from tank monitor terminal strip.

OTHER APPLICATIONS

High/High, Low/Low or High/Low level sensor.

NOTE: Bottom float, Red and Black wires. Top float, White and Green wires. For single alarm return White and Black wires to panel, jump Green and Red. For dual alarm return all four wires to panel. Reference Ronan Drawing Number X76B542.

* The sensor position is dependent upon the product level. If the tank is 3/4 full the sensor should be submerged 3/4 of its range. If the tank is 1/4 full the sensor should be submerged 1/4 of its range. The interstice liquid should always be below the reservoir riser.

TANK LEAK SENSOR
MODEL LS-30

JUNCTION BOX

JT-H2B

COPPER TUBING

POWER TO SUB PUMP

SUBMERSIBLE PUMP CONTAINMENT

RED (CAPPED WIRE)

BROWN ⌐ INPUT WIRING TO MONITOR
BLUE ⌐

GREEN

1/2 in. NPT

JT-H2B

FLOW

GT4PP PLUG

"T" FITTING G4CM4 (AS8140)

(UL) LISTED 48RO

TEST VALVE HOKE 3812L4B

FITTING (1.4 in.) G4CM4 (AS8140)

FITTING (1/8 in. - 1/4 in.) G4CM2

PVC COATED 1/4 in. COPPER TUBING (3 SUPPLIED)
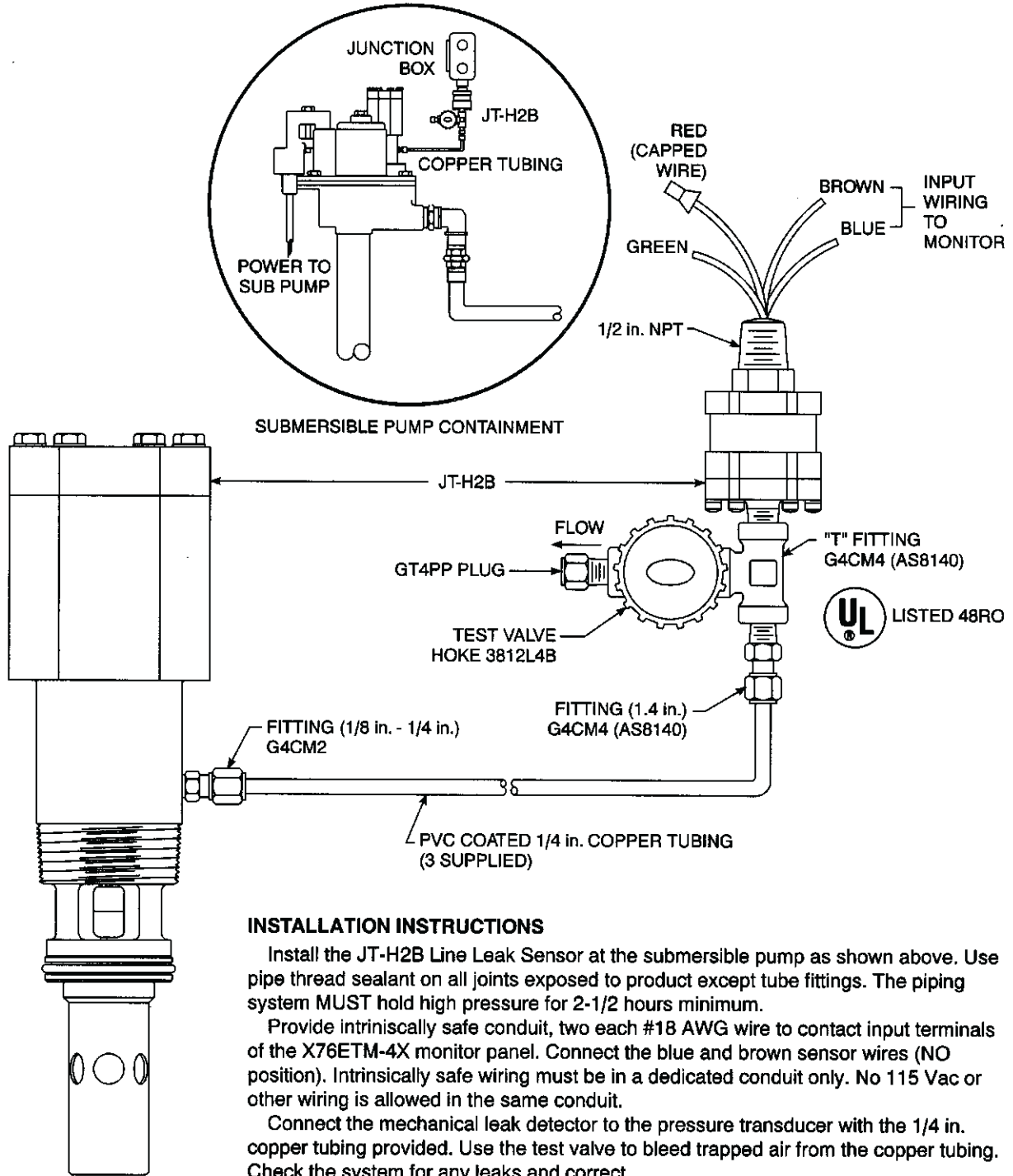
TO SUBMERSIBLE PUMP LEAK DETECTOR PORT

INSTALLATION INSTRUCTIONS

Install the JT-H2B Line Leak Sensor at the submersible pump as shown above. Use pipe thread sealant on all joints exposed to product except tube fittings. The piping system MUST hold high pressure for 2-1/2 hours minimum.
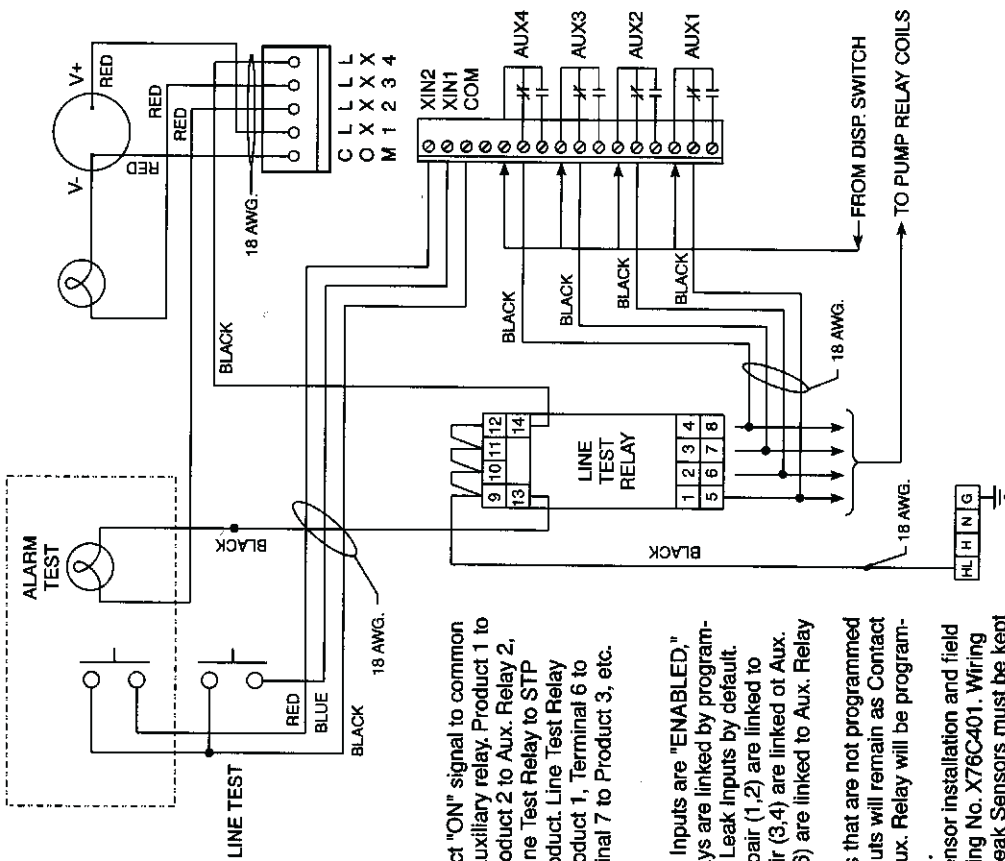
Provide intrinsically safe conduit, two each #18 AWG wire to contact input terminals of the X76ETM-4X monitor panel. Connect the blue and brown sensor wires (NO position). Intrinsically safe wiring must be in a dedicated conduit only. No 115 Vac or other wiring is allowed in the same conduit.

Connect the mechanical leak detector to the pressure transducer with the 1/4 in. copper tubing provided. Use the test valve to bleed trapped air from the copper tubing. Check the system for any leaks and correct.

WARNING: The red wire, (NC position) MUST be capped off to prevent short circuit to ground.

NOTE: Reference Ronan Engineering Drawing Number X76D509.

LINE LEAK SENSORS
MODELS JT-H2B & JT-H3B

LINE LEAK INPUT SYSTEM
INTERFACE WIRING

X76ETM-4X TANK MONITOR

PROBES

CONTACTS

INTRINSICALLY SAFE OUTPUTS

CONTACTS
1 2 3 4 5 6 7 8

PROD. PROD. PROD. PROD.
1 2 3 4

JT-H2B SENSOR INPUTS

TO DOOR OF ENCLOSURE

PRINTER CONNECTOR
DISPLAY CONNECTOR

RS232 B CHANNEL CONNECTOR

RS232 A CHANNEL CONNECTOR

OPTIONAL RELAY CONTACT OUPUTS
120 VAC MAX.
7.5 AMP MAX.

C L L L L
O X X X X
M 1 2 3 4

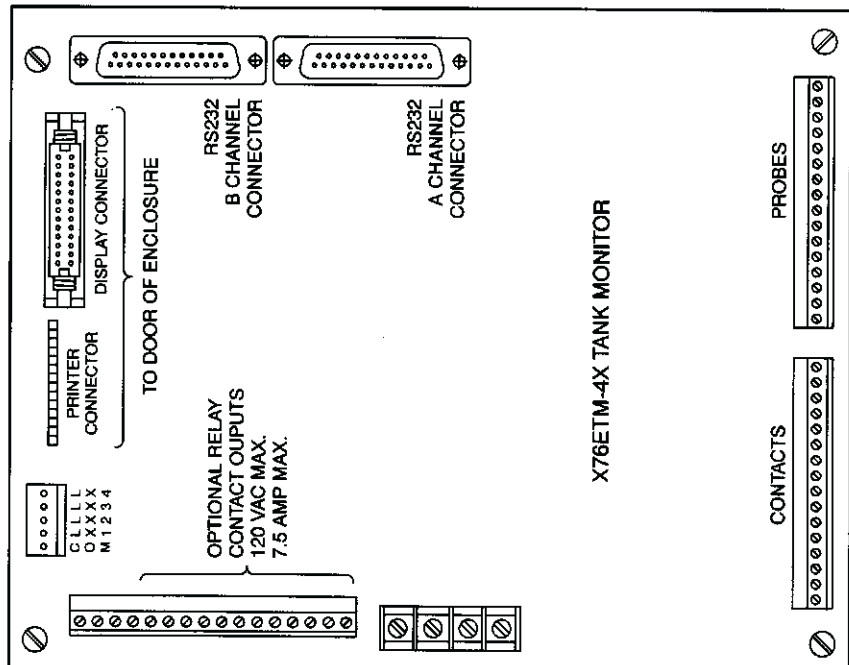**NOTE:** Reference Ronan Engineering
Drawing Number X7C543

WIRING

Wire final product "ON" signal to common terminal of the auxiliary relay. Product 1 to Aux. Relay 1, Product 2 to Aux. Relay 2, etc. Wire from Line Test Relay to STP relay coil per product. Line Test Relay Terminal 5 to Product 1, Terminal 6 to Product 2, Terminal 7 to Product 3, etc.
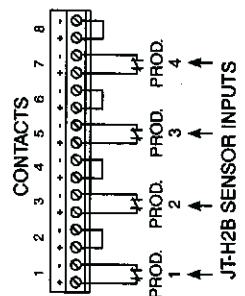
NOTES

When Line Leak Inputs are "ENABLED," the auxiliary relays are linked by programming to the Line Leak Inputs by default. Line Leak Input pair (1,2) are linked to Aux. Relay 1, pair (3,4) are linked ot Aux. Relay 2, pair (5,6) are linked to Aux. Relay 3, etc.

Contact inputs that are not programmed as Line Leak Inputs will remain as Contact Inputs and the Aux. Relay will be programmable as normal.

For JT-H2B sensor installation and field wiring, see drawing No. X76C401. Wiring to JT-H2B Line Leak Sensors must be kept separate from high voltage wires.

AUX4
AUX3
AUX2
AUX1

XIN2
XIN1
COM

C L L L L
O X X X X
M 1 2 3 4

V+
V-

RED
RED
RED
RED

18 AWG.

BLACK

BLACK
BLACK
BLACK
BLACK

FROM DISP. SWITCH

TO PUMP RELAY COILS

18 AWG.

9 10 11 12 13 14
LINE TEST RELAY
1 2 3 4 5 6 7 8

18 AWG.

HL H N G

BLACK

ALARM TEST

LINE TEST

RED
BLUE
BLACK

18 AWG.

BLACK

33

12.0 THIRD PARTY RESULTS

12.1 X76ETM-4X (Magnetostrictive Probe) Automatic Tank Gauging System (0.2 ghp Test) ATGS

Certification: Leak rate of 0.2 gallon per hour with $P_D > 99.9\%$ and $P_{FA} < 0.1\%$.

Leak Threshold: .01 gallon per hour (a leak is declared if the output of the measurement system exceeds this threshold).

Applicability: Gasoline, diesel, aviation fuel, and solvents.

Capacity: The maximum tank capacity is 15,000 gallons. The tank must be between 15 and 95% full.

Waiting Time: Minimum waiting time between product delivery and test data collection is 2 hours.

Test Period: The minimum data collection time must be 2 hours. The test data must be acquired and recorded by a computer. Leak rate is calculated from data determined to be statistically valid. There must be no dispensing or product delivery during the test.

Temperature: Minimum of 5 temperature sensors are used to determine the average temperature of the stored hazardous substance.

Water Sensor: A water sensor must be used to detect water incursion. Minimum water level detectable in the tank is 0.186 inches. Minimum detectable water level change is 0.0048 inches.

Calibration: Temperature sensors and probe must be checked and calibrated annually in accordance with manufacturer's instructions.

Comments:
1. The equipment was not evaluated using manifolded tanks.
2. This equipment tests the portion of the tank that contains product.
3. As the product level is lowered the actual leak rate in a leaking tank decreases (due to lower head pressure).

Evaluator: Ken Wilcox Associates.

12.2 X76ETM-4X (Magnetostrictive Probe) Automatic Tank Gauging System (0.1 gph Test) VTTT

Certification: Leak rate of 0.1 gallon per hour with $P_D < 99.8\%$ and $P_{FA} < 0.2\%$.

Leak Threshold: 0.05 gallon per hour (a leak is declared if the output of the measurement system exceeds this threshold).

Applicability: Gasoline, diesel, aviation fuel, and solvents.

Capacity: The maximum tank capacity must be 15,000 gallons. The tank must be at least 15% full.

Waiting Time: Minimum waiting time between product delivery and test data collection is 8 hours.

Test Period: The minimum data collection time must be 6 hours. The test data is acquired and recorded by a computer. Leak rate is calculated from data determined to be statistically valid. There must be no dispensing or product delivery during the test.

Temperature: Minimum of 5 temperature sensors are used to determine the average temperature of the stored hazardous substance.

Water Sensor: A water sensor must be used to detect water incursion. Minimum water level detectable in the tank is 0.1860 inches. Minimum detectable water level change is 0.0048 inches.

Calibration: Temperature sensors and probe must be checked and calibrated annually in accordance with manufacturer's instructions.

Comments:
1. The equipment was not evaluated using manifolded tanks.
2. This equipment tests the portion of the tank that contains product.
3. As the product level is lowered the actual leak rate in a leaking tank decreases (due to lower head pressure).

Evaluator: Ken Wilcox Associates.

WARRANTY AND CHECKOUT FORM, PART 1

Serial Number _____

Installation Location

Date _____
Facility Name _____
Street _____
City _____ State _____ Zip _____
Phone Number _____
Owner/Manager _____

Installed By

Date _____
Facility Name _____
Street _____
City _____ State _____ Zip _____
Phone Number _____
Installation Supervisor _____

Distributor

Date _____
Facility Name _____
Street _____
City _____ State _____ Zip _____
Phone Number _____

Tank/System Set-Up Information

	1	2	3	4	5	6	7	8
State								
Product Label								
Probe Serial Number								
Speed of Wire								
Tank Manufacture and Model								
Tank Wall - Steel or Fiberglass								
If Steel, Diameter in Inches								
Tank Capacity - Gallons Full								
If Fiberglass, 1/4 Height Gallons								
Tank Tilt								
Distance of Probe Riser to Center of Tank								
Distance Between Fill Riser and Probe Riser								
Product Height at Fill Riser								
Product Height at Probe Riser								
Manifolded Tanks								
Initial Water Level								
Initial Product Level								
High Level Alarm Limit (Gallons)								
Hi Hi Level Alarm Limit (Gallons)								
Low Level Alarm Limit (Gallons)								
High Water Alarm (Inches)								
Theft Gallon Limit								
Leak Detect Threshold (Tanks)								
Leak Detect Start Time (Tanks)								
Leak Detect Stop Time (Tanks)								
Leak Detect Theshold (Lines)								
Leak Detect Start Time (Lines)								
Leak Detect Stop Time (Lines)								
Relay #1								
Relay #2								
Relay #3								
Relay #4								
Contact Inputs								

To validate warranty, return one copy of Part 1 and one copy of WARRANTY REGISTRATION (Part 2) to: **RONAN ENGINEERING COMPANY**, 21200 Oxnard Street, Woodland Hills, CA 91367

WARRANTY REGISTRATION FORM, PART 2

WARNING! Failure to return the Warranty Registration Form will void any and all WARRANTY CLAIMS.

Installing Contractor (Company) _____

Company Address _____

Company Phone _____

Facility Type/Name _____

Site Address _____

Site Phone _____

Controller Serial No. _____ Date of Installation _____

PLEASE FILL OUT PROBE INFORMATION:

Number of Tank Level Probes _____

PROBE SERIAL OR MODEL NUMBERS:

Probe #1 _____ Channel #1 _____

Probe #2 _____ Channel #2 _____

Probe #3 _____ Channel #3 _____

Probe #4 _____ Channel #4 _____

Probe #5 _____ Channel #5 _____

Probe #6 _____ Channel #6 _____

Probe #7 _____ Channel #7 _____

Probe #8 _____ Channel #8 _____

INSTALLER:

I hereby certify that the system has been installed and set up in accordance with the procedures that are specified in Ronan's X76ETM-4X Instruction and Operations Manual. I have also read all the warnings and certify that there are no Instrinsic Safety Violations due to improper installation of this system. I have provided the facility owner with an Operations Manual and demonstrated the operation of this equipment to facility personnel on-site.

Company _____ Date _____

Signature _____

Comments _____

_____

_____

_____

WARRANTY: Ronan Engineering warrants equipment of its own manufacturing to be free from defects in material and workmanship under normal conditions of use and service, and will repair any component found to be defective, on its return, transportation charges prepaid, within one year of its original purchase. This warranty carries no liability, either expressed or implied, beyond our obligation to replace the unit which carries the warranty.

TO VALIDATE WARRANTY YOU MUST RETURN ORIGINAL COPY TO RONAN ENGINEERING COMPANY:
21200 Oxnard Street, Woodland Hills, CA 91367. Phone (800) 327-6626 (818) 883-5211 FAX (818) 992-6435

◫ RONAN

X76ETM-4X I & O / Rev. 0