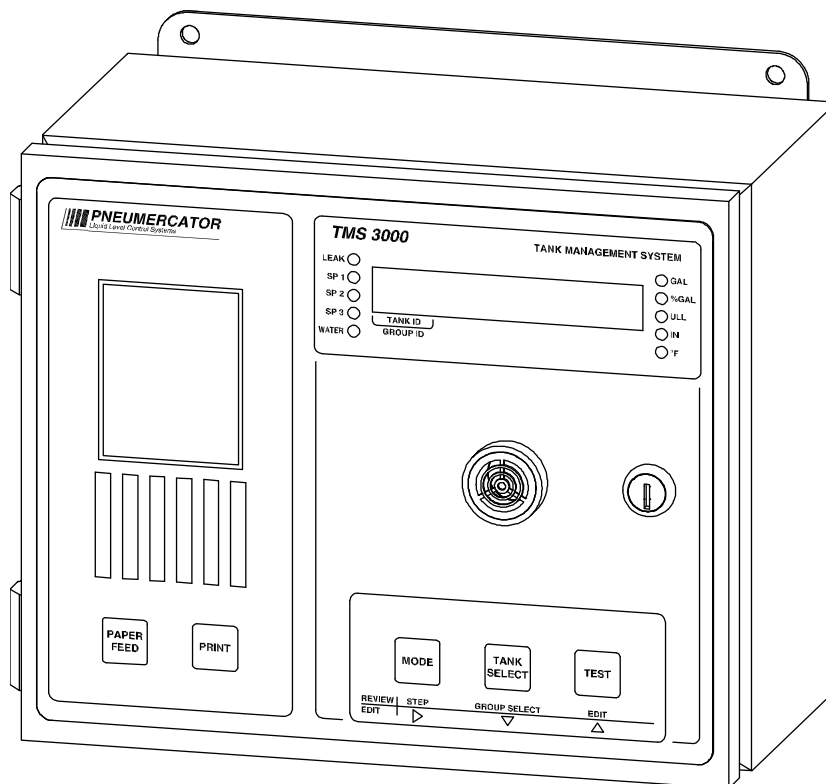


OPERATION & MAINTENANCE MANUAL



DRAWING NO. 20001 REV. A

MODEL TMS2000 and TMS3000

(Covers Firmware versions Vxx.99.xx, Vxx.00.xx, and Vxx.01.xx)
(Vxx.00.64 and Vxx.01.21 firmware versions referenced for manual)

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Note: Refer to the model-specific INSTALLATION MANUAL for complete installation details.

TABLE OF CONTENTS

Page		
Section	1	SYSTEM OVERVIEW
	1.1	Front Panel Description 5
	1.2	Display 6
	1.3	Audible Annunciator 6
Section	2	OPERATION
	2.1	Power-Up Sequence 7
	2.2	Overview of Operating Modes/System Function Tree 8
	2.3	View Mode Details 9
	2.4	Access Mode 11
	2.4.1	Logs 16
	2.4.1.1	Shift Inventory 17
	2.4.1.2	Delivery 18
	2.4.1.3	Bulk Sales 19
	2.4.1.4	Thefts 20
	2.4.1.5	Product Reordering Report 21
	2.4.1.6	Bottom Water Removal 22
	2.4.1.7	In-Tank Leak Test Results – Detailed 23
	2.4.1.8	In-Tank Leak Test Results – History 24
	2.4.1.9	LS300 Line Leak Test Results 25
	2.4.1.10	Alarms 26
	2.4.1.11	Events 27
	2.4.2	In-Tank Leak Test Scheduling 29
	2.4.3	Configuration 33
	2.4.3.1	Header 34
	2.4.3.2	Tank 38
	2.4.3.3	Probe 45
	2.4.3.4	Relay Outputs – Tank/Probe Triggers 48
	2.4.3.5	Relay Outputs – Contact Closure Input Triggers 49
	2.4.3.6	Relay Outputs – Leak/Point Level Sensors (ISCC) Triggers 50
	2.4.3.7	Relay Outputs – LS300 Line Leak Test Failure Triggers 51
	2.4.3.8	Relay Outputs – Site-Specific Triggers 52
	2.4.3.9	Relay Mode 53
	2.4.3.10	Contact Closure Inputs 55
	2.4.3.11	Leak/Point Level Sensor (ISCC) Inputs 57
	2.4.3.12	Inventory 59
	2.4.3.13	Theft 61
	2.4.3.14	Modem 62
	2.4.3.15	Dial-Out 64
	2.4.3.16	In-Tank Leak Test Configuration 66
	2.4.3.17	Analog Outputs 69
	2.4.4	Clock (Date/Time) 70
	2.4.5	Initialize Data 71
Section	3	PRINTER SERVICING
	3.1	Ribbon Replacement (900438-x, Impact Printer) 72
	3.2	Paper Replacement (900438-1/900438-3/900438-5, Receipt-Style Impact Printer) 72
	3.3	Paper Replacement (900438-2/900438-4/900438-6, Autowinder Impact Printer) 73
Appendix A		DESCRIPTION OF SYSTEM MESSAGES (ALARMS/EVENTS/WARNINGS) 74
Appendix B		MAINTENANCE 80
Appendix C		DIP SWITCH SETTINGS (900430-1/900461-x) 82

SECTION 1 – SYSTEM OVERVIEW

1.1 FRONT PANEL DESCRIPTION

The front panel of the TMS is available in four different configurations as listed below:

- 1... Console without LED display, without internal printer
- 2... Console with LED display, without internal printer
- 3... Console with display and internal impact receipt printer
- 4... Console with display and internal impact printer w/ autowinder

This manual describes operational procedures pertaining to -2, -3, and -4 consoles. Refer to TMS Communicator Instruction Manual for operating the TMS via TMS Communicator software.

As illustrated in Figure 1.1 below, the TMS front panel consists of an LED data display presented in either English or Metric units, depending on the site's requirements, with visual alarm and mode annunciators, audible alarm annunciator, user-friendly pushbutton controls, security lock, and optional impact printer with or without autowinder.

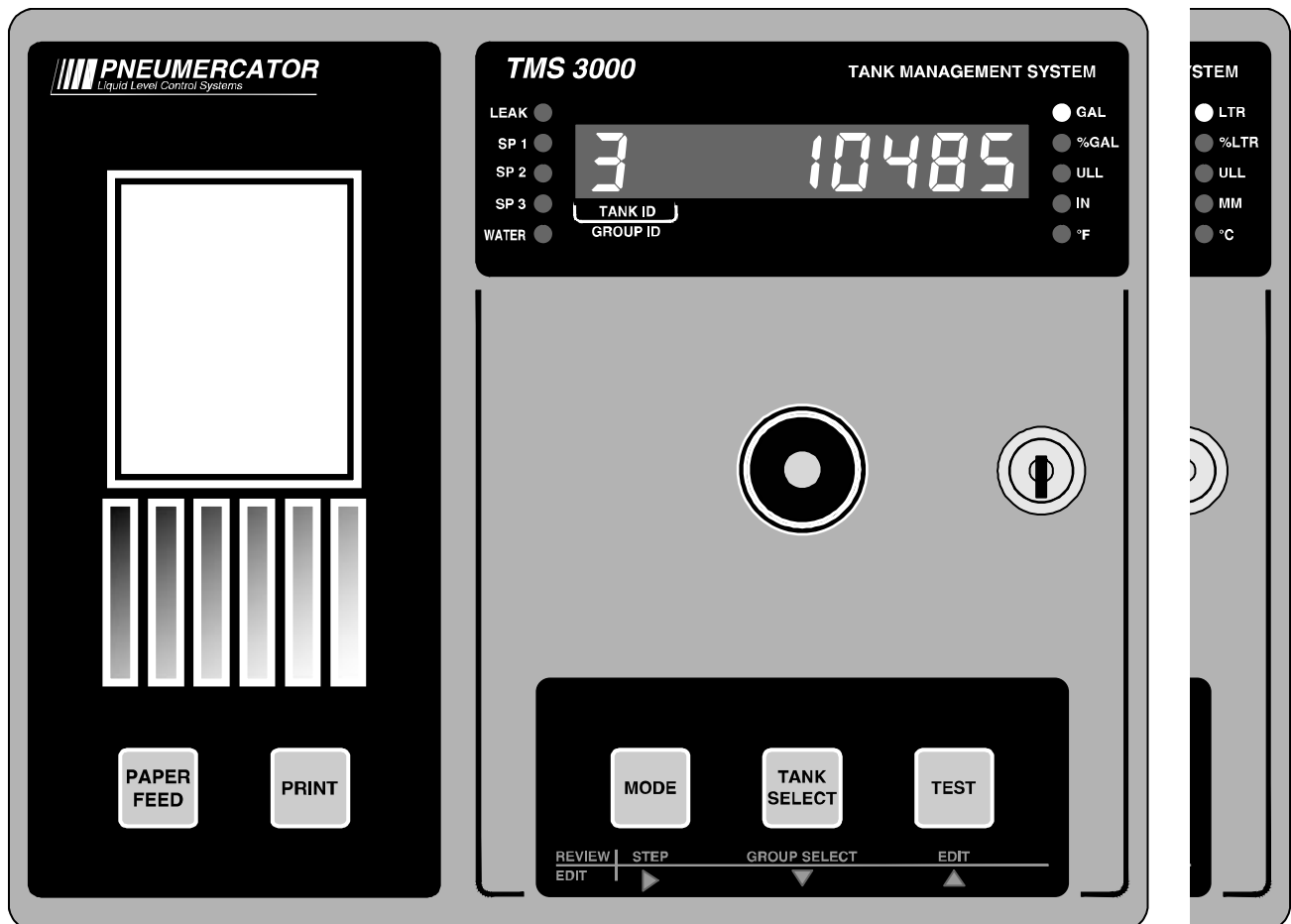


Figure 1-1 – Front Panel Overview

1.2 DISPLAY

The front panel display consists of a nine-digit, seven-segment, quasi-alphanumeric super bright LED display, providing on site viewing of current inventory data, alarms, errors, report logs, as well as, set-up and configuration data. Five high intensity point LEDs annunciate alarm conditions visible up to 75 feet or 25 meters away from console. Five additional LED annunciators provide indication of units of measure of the currently selected display data. See Figure 1.2 below.



Figure 1.2: TMS Display Layout

1.3 AUDIBLE ANNUNCIATOR

A front panel horn is provided to annunciate both user-selectable alarms as well as communications failures. The horn can be silenced manually by pressing ANY pushbutton, automatically by eliminating the alarm condition, or by programming an audible alarm shutoff. Under alarm conditions, the beep rate of the annunciator varies with the alarm type as follows:

Alarm Group	Alarm Type	Beep Rate
Tank	Failed In-Tank LeakTest	Fast (50ms)
	3SP Firmware: SP1 6SP Firmware: Critical High, Critical Low	Medium Fast (100ms)
	3SP Firmware: SP2 6SP Firmware: High High, Low Low	Medium Slow (200ms)
	3SP Firmware: SP3 6SP Firmware: High, Low	Slow (400ms)
	Bottom Water	Slow (400ms)
Sensor	Leak	Fast (50ms)
	Point Level (High, Low, etc)	Slow (400ms)
	Fault	Slow (400ms)
Contact Closure	All	Slow (400ms)
System	All	Slow (400ms)
		ms = milliseconds

SECTION 2 – OPERATION

2.1 POWER-UP SEQUENCE

Upon application of AC power, the TMS performs a series of tasks prior to normal operation. These include the following:

1. A self-test to verify integrity of both system program and data memories, system I/O, and data acquisition interface electronics. Display is blank during this process.
2. Retrieval and verification of configuration and set-up data.
Display shows "rEAd inG / CoNF iG" (Reading / Configuration).
3. System initialization, including pre-start-up calculations.
Display shows "SYStEm / In It" (System / Initialization).
4. Visual display and audible alarm check.
Display activates all LEDs including numeric display, Alarm and Units LEDs, and audible alarm beeps twice.
5. Begin normal operation, display any error messages. For a description of system error, warning and info messages, refer to **Appendix A**.

Note: In cases where the TMS power has been turned off for more than one to two minutes, a power-up sequence will generate the following warning message on the display and a similar message on the optional front panel impact printer, "URrn2 1 / Pur FR il" Warning 21, Power Failure.

This message is normal, and is just informing the user that the TMS has detected a power failure. This condition can be acknowledged by the user by holding the MODE button until the TMS beeps once while the message is displayed.

2.2 OVERVIEW OF OPERATING MODES/SYSTEM FUNCTION TREE

TMS front panel operation is defined by three user-selectable modes, View, Test, and Access, all selected using the MODE and TEST pushbuttons. See Figure 2.2, System Function Tree below.

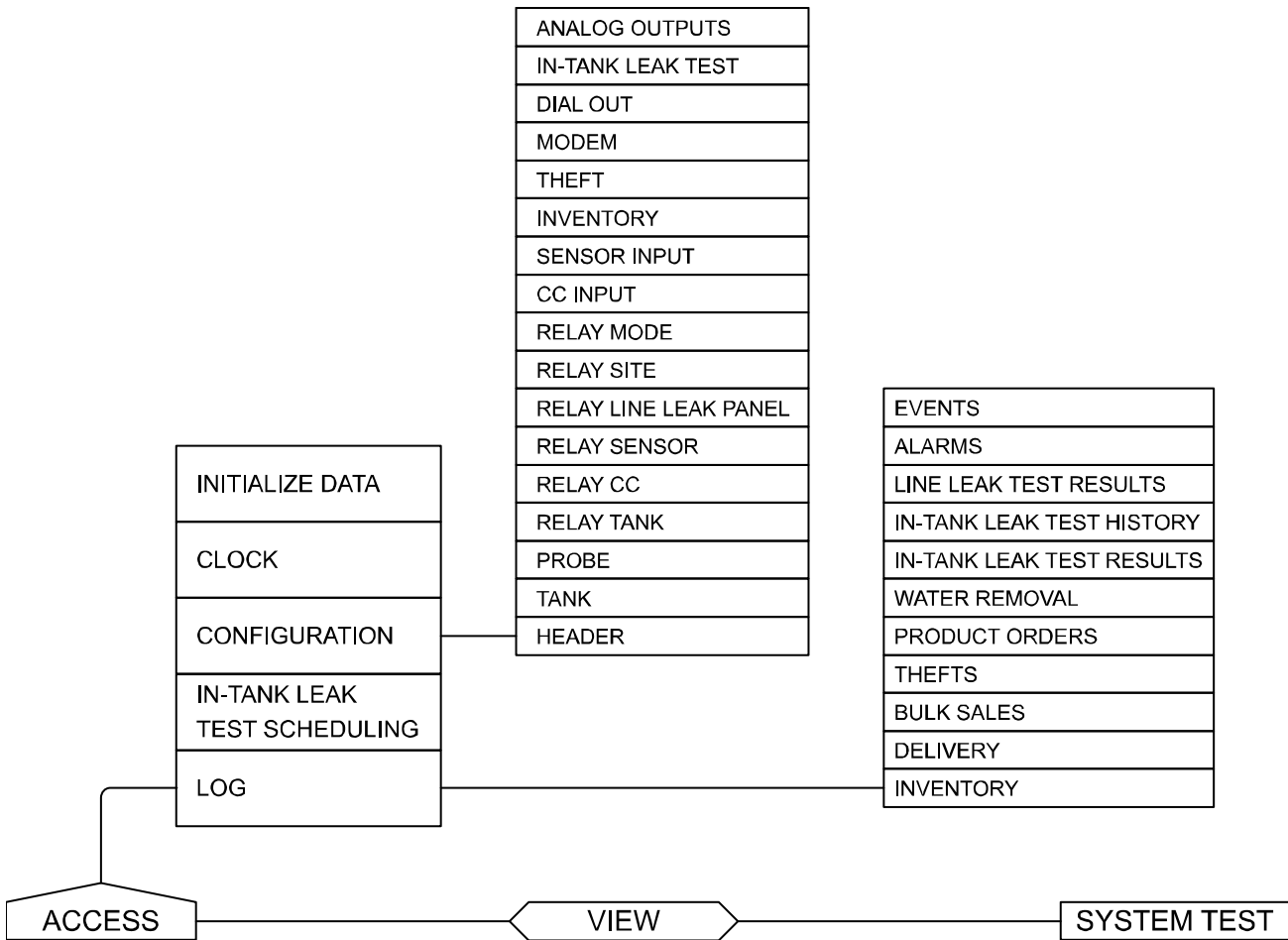


Figure 2.2: System Function Tree

VIEW: View mode is the most frequently used and the default mode of operation for the console. The View mode displays current tank data, which includes product gross and net (temperature compensated) volumes, percent of capacity, ullage, product and bottom water levels, product temperature, and product name. In addition, alarm and error conditions are annunciated in the View mode. If the system includes the optional impact printer, on demand printed inventory reports including complete tank/sensor alarm statuses can be generated. See Section 2.3 for complete details.

ACCESS: Access mode provides access to all of the menus shown in Figure 2.2. In this mode the user can review and print report logs; review, edit and print system configuration data; enable or schedule in-tank leak tests; perform initialization functions; read or set the system clock. See Section 2.4 for complete details.

TEST: Test mode allows visual verification of display operation, audible verification of the audible annunciator, and self-verification of critical system hardware.

2.3 VIEW MODE DETAILS

Looking at the names assigned to the console front panel pushbuttons and display field, note that some appear in white lettering, others in orange. Only the **black** or **white**-lettered name assignments apply to the **VIEW** mode.

The seven-segment data display is formatted so that the currently selected data item appears on the right-hand side, with the corresponding tank ID to the left, as indicated on the front panel. The LED annunciators on the left-hand side indicate alarm conditions. An alarm indicator corresponds to the displayed tank when the particular LED is on steady. If the LED is blinking, this indicates that an alarm has occurred on a tank other than the one being displayed.

Pushbutton Operation:

MODE: The MODE pushbutton functions both as a Display Mode Select (i.e. STEP) and a Product Name Recall. If the user depresses and holds MODE until an Audible beep is heard, the display will STEP to the next display item. See following page for examples of the TMS Display showing varied information. Display items include, in order of appearance:

Display Item	English		Metric	
	Units	Resolution	Units	Resolution
Gross Volume (uncompensated)	Gallons	x1	Liters	x1
Net Volume (temperature compensated)	Gallons	x1	Liters	x1
Percent Volume	% Gallons	x0.1	% Liters	x0.1
90% Ullage	Gallons	x1	Liters	x1
Product Level	Inches	x0.1	Millimeters	x1
Water Level	Inches	x0.1	Millimeters	x1
Product Temperature	°F	x+/-0.1	°C	x+/-0.1

To recall the name of the product stored in the selected tank, depress and immediately release MODE. The product name will appear for two seconds, then the display will revert back to displaying the currently selected data item.

TANK SELECT: The TANK SELECT pushbutton is used to select a desired tank for display. Each time TANK SELECT is depressed, the console advances to the next enabled tank and its corresponding tank ID appears on the data display. This is called MANUAL tank selecting. An automatic tank select or **AUTO SCAN** mode is also available. In the AUTO SCAN mode, the display automatically and continuously scans through each enabled tank, holding the display for five seconds before advancing to the next tank. This mode is useful for hands-free operation. AUTO SCAN is enabled by depressing and holding TANK SELECT until an audible beep is heard. To turn off the AUTO SCAN feature, again depress and hold TANK SELECT until an audible beep is heard. The system is now in the manual mode.

TEST: Test mode allows visual verification of display operation, audible verification of the audible annunciator, and self-verification of critical system hardware.

PRINT: Depressing the PRINT pushbutton while in the VIEW mode generates an on-demand inventory report followed by an alarm status report for Tanks and Sensors.

PAPER FEED: The PAPER FEED pushbutton is used to advance paper through the printer mechanism.

NOTE: Alarms, errors or warning conditions, which occur during VIEW mode, will activate the front panel visual and audible annunciators. The user can silence the audible annunciator by momentarily pressing **any** front panel pushbutton. The visual annunciator will remain active until the alarm or error condition is eliminated. If subsequent alarms, errors, or warnings occur, the audible annunciator will again be activated.

See below: Actual TMS Visual representation of Front Panel displayed items, in order of appearance:

GAL
 %GAL
 ULL
 IN
 °F

GAL
 %GAL
 ULL
 IN
 °F

Gross Volume = 10679 Gallons, Tank 2

LTR
 %LTR
 ULL
 MM
 °C

LTR
 %LTR
 ULL
 MM
 °C

Net Volume = 10596 Liters, Tank 2

GAL
 %GAL
 ULL
 IN
 °F

LTR
 %LTR
 ULL
 MM
 °C

Percent Volume = 79.7% of Capacity, Tank 2

LTR
 %LTR
 ULL
 MM
 °C

LTR
 %LTR
 ULL
 MM
 °C

90% Ullage = 1380 Liters, Tank 8
(90% is default)

GAL
 %GAL
 ULL
 IN
 °F

LTR
 %LTR
 ULL
 MM
 °C

Product Level = 106.8 Inches, Tank 2

LTR
 %LTR
 ULL
 MM
 °C

LTR
 %LTR
 ULL
 MM
 °C

Bottom Water Level = 24 Millimeters, Tank 12

GAL
 %GAL
 ULL
 IN
 °F

LTR
 %LTR
 ULL
 MM
 °C

Product Temperature = 72.1°F, Tank 9

Pressing the MODE button until the TMS BEEPS, will advance through the above list

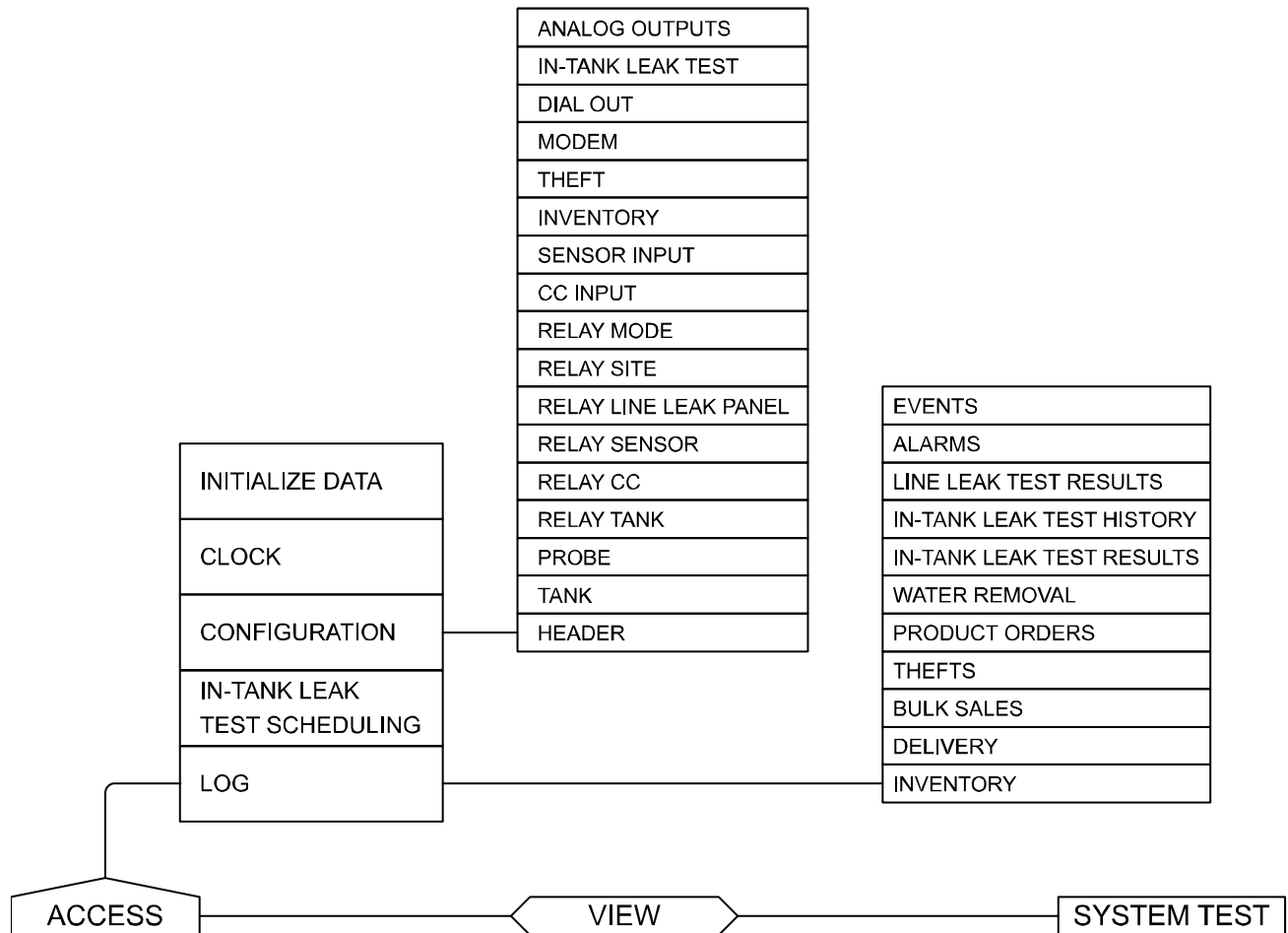
GAL
 %GAL
 ULL
 IN
 °F

LTR
 %LTR
 ULL
 MM
 °C

Product Type = Diesel

Press and release MODE to reveal Tank Name

2.4 ACCESS MODE DETAILS



Within the **ACCESS** mode there are several levels of menus, as illustrated in the above figure. The main menus include **LOG** reports, **LEAK TEST**, **CONFIGURATION**, **CLOCK** read/set, and **INITIALIZATION** of **DATA** including logs and Configuration memory. Note: that the LOG and CONFIG main menus contain numerous submenus. These submenus will be described in detail later in this section. The main menus are as follows:

- LOG** The LOG menu is used to review and print any of the various log reports generated by the TMS. The system does not allow the user to edit any of these reports.
- LEAK TEST** The LEAK Test menu is used to select, schedule, and enable in-tank leak tests.
- CONFIG** The CONFIGuration menu is used to review, edit, or print system configuration data.
- CLOCK** The CLOCK menu is used to edit system date, time, and day.
- INIT DATA** The INITialize DATA menu is used to initialize all or selected log report groups, or configuration memory.

ENTERING ACCESS MODE

The ACCESS mode is entered by first pressing and holding TEST, and then, while still holding TEST, simultaneously pressing and holding MODE. After approximately two seconds, the TMS will enter ACCESS mode. The display will appear as follows:

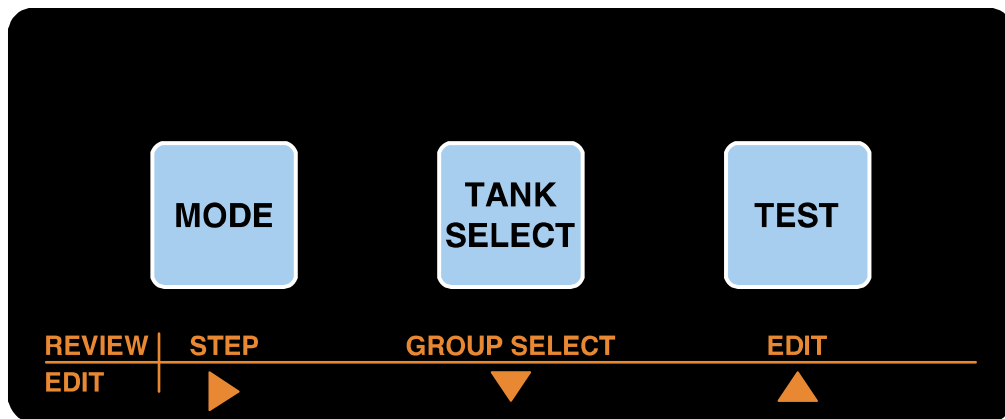


PUSHBUTTON OPERATION:

The TMS front panel contains both black or white text, and orange text. Where present, the **orange** name assignments apply while in the ACCESS mode.

Within the ACCESS mode there are three basic types of operations that the user can perform, REVIEW, EDIT and PRINT, and as seen on the TMS front panel, the three right-hand pushbuttons have different functions assigned to them for REVIEW and EDIT operations.

REVIEW: REVIEW is the normal mode of operation within the ACCESS mode, and is used to examine or review log, configuration, or clock data within the system. REVIEW is available in all menus and sub-menus.



DWG NO. 20043 REV. N/C

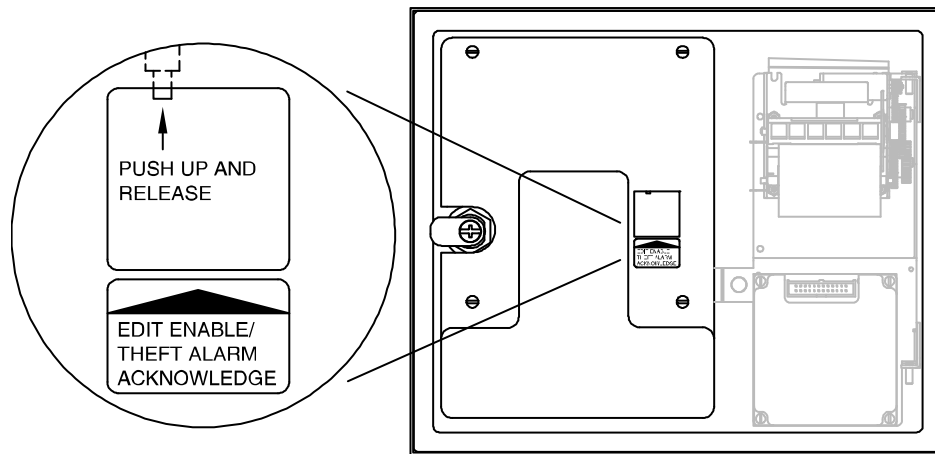
Figure 2.4.1: TMS3000 Pushbutton Layout

STEP: The STEP pushbutton functions both as a STEP-to-the-next-item and a Data Name Recall. If the user depresses and holds STEP until an audible beep is heard, the display will step to the next menu data item. To recall the name of the menu data item the user momentarily depresses STEP. The menu data item name will appear for two seconds, and then the display will revert back to displaying the currently selected data item.

GROUP SELECT: The GROUP SELECT pushbutton functions in the same manner as manual tank selecting in the VIEW mode, except that GROUP is more generic, and refers to the fact that, depending upon which menu the user has entered, GROUP SELECT will select the next tank, probe, relay, leak sensor, log record, etc.

EXAMPLE: If the user enters a relay setup menu, GROUP SELECT will select the next relay, and the GROUP ID display field will indicate the relay number rather than a tank ID. If the user enters the INVENTORY LOG menu, which stores up to 36 records, depressing GROUP SELECT will step to the next inventory record and the GROUP ID display field will represent the inventory record number 1 through 36.

EDIT: The EDIT pushbutton is used to edit or change the value of the currently displayed data item. If the displayed item is a menu or sub-menu name, EDIT allows the user to change the menu. If the displayed item is system data, for example, configuration or clock data, the EDIT function is inhibited unless enabled by the **EDIT ENABLE** pushbutton located on the inside of the front panel. See Figure 2.4.2 for button location. To enable editing, an authorized user would first unlock and open the front panel, press EDIT ENABLE, and then re-lock the enclosure. This prevents unauthorized persons from modifying stored data since the front panel would normally be locked. An audible beep informs the user when editing is inhibited. Once EDIT ENABLE has been pressed, editing is enabled for as long as the user remains in the ACCESS mode. For additional security, if the TMS is in the ACCESS mode for more than four minutes and detects no user activity on the front panel pushbuttons, the system will time out and revert back to VIEW mode. Entry back into the ACCESS mode will again require pressing EDIT ENABLE to re-enable editing.



DWG NO. 20045 REV. N/C

Figure 2.4.2: Edit Enable/Theft Alarm Acknowledge button location

The names associated with pushbutton functions during edit operations are labeled in **orange** on the front panel as ► (right arrow), ▼ (down arrow), and ▲ (up arrow), as shown in Figure 2.4.1.

►: Functions as an ENTER key for blinking data. For numeric data, advances the blinking cursor to the right to the next digit to be changed. Pressing right arrow while at the right-most digit performs the function of ENTER, and causes the new or changed entry to be stored.

▼: Decrements the content of the blinking portion of the display. For numeric data this button is used to decrement the value of the selected digit. For alphanumeric names, ▼ decrements through a list of name selections.

▲: Increments the content of the blinking portion of the display. For numeric data this button is used to increment the value of the selected digit. For alphanumeric names, ▲ increments through a list of name selections.

WARNING

This product installed in hazardous, explosive environments. Initial application of AC power to this system should occur only after complete verification of safe, proper installation by authorized Pneumercator certified service personnel. Failure to do so may result serious injury and/or property damage.

POWER-UP SEQUENCE: Upon application of AC power, the TMS performs a series of tasks prior to normal operation. These include in the following sequence:

- 1) A self-test to verify integrity of both system program and data memories, system I/O, and data acquisition interface electronics. Display is blank during this process.
- 2) Retrieval and verification of configuration and set-up data.

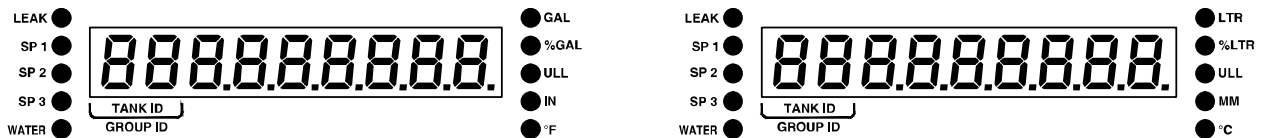
Display shows rERd in9 [onF 19

- 3) System initialization, including reasonableness checking of user-entered configuration data, and pre-startup calculations.

Display shows SYStEn In It

- 4) Visual display and audible alarm check.

Display shows



with all LEDs on, audible alarm beeps twice.

- 5) Begin normal operation, display any error messages. For a description of system error, warning, and info messages, refer to Appendix A.

NOTE: In cases where TMS power has been turned off for more than one to two minutes, a power-up sequence will generate the following warning message on the display and a similar message on the optional front panel printer:

URrn2 1 Pur FR IL Warning 21, Power Failure

This message is normal, and is just informing the user that the TMS has recovered from a power failure of at least 1-2 minutes in duration. This may be acknowledged by holding MODE until the TMS beeps once WHILE the message is displayed.

2.4.1 LOG MENU

ACCESS

LoG	System reports
LEAK TEST	Leak test setup
CONF IG	System configuration
C lock	Set system clock
INIT DATA	Resets data to initialized values
rEturn	Exits access menu

LoG System Logs/Reports: The LOG menu contains various Logs/Reports that are primarily a grouping of historical recorded events that have been captured and stored in the TMS memory. Once the Log capacity has been reached, the oldest record will be discarded to allow the new entry to be stored. Each Log may be viewed or printed from within each respective submenu. The records may also be retrieved with a Windows-based computer equipped with TMS Communicator software. Logs may NOT be altered by any user or supervisor to maintain the integrity and accuracy of the system Logs. A brief description of each submenu is provided below. The pages that follow contain complete details for each Log submenu.

Inventory (Inventory. Max records :36): A scheduled Shift Inventory report as configured in the Inventory submenu of the Configuration menu.

DELIVERY (Delivery. Max records: 12): Addition of Product to the storage tank.

SALES (Bulk Sales. Max records: 24): Withdrawal of Product from the storage tank recorded only if the Bulk Sales feature is enabled in the Configuration menu, Header submenu. If Theft is enabled for the specified Tank Channel, the transaction would only be considered a Bulk Sale if the withdrawal occurs during normal business hours as defined in the Configuration menu, Thefts submenu.

THEFTS (Thefts. Max records: 6): Withdrawal of Product from the tank outside of normal business hours. Thefts are only recorded if Theft monitoring is enabled for the specified Tank Channel (Tanks submenu/Configuration menu).

OrderS (Product Order. Max records: 12): The Product Reorder Log is the only Log that is NOT historical but is an on-demand report that provides an estimate of usable Product remaining based on the amount of Product used since the time of the last Delivery.

Water (Water Removal. Max records: 12): The removal of bottom water, typically from a petroleum storage tank.

Tank LEAK (Tank Leak. Max records: 12): Detailed In-Tank Leak Test results for qualifying petroleum underground storage tanks (USTs).

LEAK HIST (Leak History. Max records: 14 per Tank): Summary In-Tank Leak Test results for each qualifying Tank Channel providing up to 14 months of history by storing the latest passing test per month per tank channel.

LINE LEAK (Line Leak. Max records: 8): Report is based on the results communicated to the TMS via RS-232 by an external LS300 Line Leak console.

ALARMS (Alarms. Max records: 24): System Alarms including High, Low and Leak conditions.

Errors (Errors. Max records: 8): System Errors and Warnings that may represent a critical problem with the TMS.

Terms used throughout the LOG submenus are as follows:

Gross Volume: The volume of liquid within the storage tank measured in Gallons [Liters].

Net Volume: Temperature-Compensated Volume. The Gross Volume is adjusted to the Volume that would be occupied at 60 °F [15.6 °C]. This is used for Inventory reconciliation due to the fact that liquids expand and contract with temperature. The Product Type defined in the Tank submenu of the Configuration menu is used to determine the rate of expansion for a given liquid.

Height: Liquid level measured in Inches [Millimeters].

Note: The Volumes and Levels reported will be the TOTAL liquid level unless otherwise indicated. If the Tank Channel is equipped and configured with a MP452 probe, the Volumes and Levels reported will include PRODUCT ONLY.

2.4.1.1 SHIFT INVENTORY LOG

LOG

			Max
<i>Inventory</i>	Inventory	Scheduled inventory snapshots	36
<i>DELIVERIES</i>	Deliveries	Product delivered to storage tank	12
<i>SALES</i>	Bulk Sales	Product sold from storage tank	24
<i>THEFTS</i>	Thefts	Unauthorized withdrawal from tank	6
<i>OrderS</i>	Product Reordering Report	Product reordering report	1x12
<i>Water</i>	Bottom Water Removal	Removal of bottom water	1x12
<i>TANK LEAK</i>	In-Tank Leak Test – Detailed Results	Detailed In-Tank Leak Test Results	12
<i>LEAK HIST</i>	In-Tank Leak Test – History	In-Tank Leak Test Summary Results	14x12
<i>LINE LEAK</i>	LS300 Line Leak Test	LS300 Line Leak Test Results	1x8
<i>ALARMS</i>	Alarms	Alarms	24
<i>EVENTS</i>	Events	Events/Errors	8
<i>RETURN</i>	Return	Exits LOG menu	

Inventory **Inventory**: A scheduled Inventory data capture typically used as a Shift Report.

Record Storage Capacity: 36. 1 Tank Channel per record.

TMS Configuration Prerequisites:

Configuration menu, Inventory submenu: Defines Times and Days of Week.

Group ID: Record Number.

Record Identification Data:

- nn-dd* **Date (Month-Day)**: Date the scheduled Inventory Snapshot was recorded.
Note: an empty record will show 00-00.
- HH' nn* **Time (Hour' Minute)**: Time the scheduled Inventory Snapshot was recorded.
Note: time stored in 24 hr. format
Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
- TANK NAME* **Tank Name**: As Assigned in the Configuration menu, Tank submenu.
- Prod TYPE* **Product Type**: As Assigned in the Configuration menu, Tank submenu.
- TANK ID* **Tank ID Number**: As Assigned in the Configuration menu, Tank submenu.

Captured Data:

- Prod Ht* **Product Height**: Total Liquid Level.
Note: MP452 reports Oil Level.
- Gr Vol* **Gross Volume**: Total Liquid Volume.
Note: MP452 reports Oil Volume.
- Net Vol* **Net Volume**: Total Net (Temperature-Compensated) Liquid Volume.
Note: MP452 reports Net Oil Volume.
- P Vol* **Percent Volume**: Gross Volume/Tank Capacity displayed as a percentage.
- ULLAGE* **Ullage**: Gross Volume required to fill tank to defined Ullage Threshold. See Configuration menu, Header submenu, Ullage Limit
- h2o Ht* **Bottom Water Height**: Bottom Water Level.
- TEMP* **Temperature**: Average Liquid Temperature.

Exit Inventory submenu:

- RETURN* **Return**: Press EDIT (TEST) to exit Inventory submenu.
Note: Press STEP (MODE) to return to top of Inventory submenu showing *nn-dd* (Month-Day)

2.4.1.2 DELIVERY LOG

Log

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
URATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
RETURN	Return

DELIVERIES Deliveries: A Transaction Log representing the addition or delivery of the primary liquid or Product to the tank. All transactions depend on the TMS Clock functionality to be recognized.

Record Storage Capacity: 12. 1 Tank Channel per record.

TMS Configuration Prerequisites:

- Configuration menu, Probe submenu, Motion Height Band: Defines Transaction recognition
- Configuration menu, Probe submenu, Minimum Logged Volume: Defines Transaction Logging

Group ID: Record Number.

Record Identification Data:

mm-dd	<u>Date (Month-Day)</u> : Date the Delivery was recorded. Note: an empty record will show 00-00.
HH' mm	<u>Time (Hour' Minute)</u> : Time the Delivery was recorded. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
TANK NAME	<u>Tank Name</u> : As Assigned in the Configuration menu, Tank submenu.
Prod TYPE	<u>Product Type</u> : As Assigned in the Configuration menu, Tank submenu.
TANK ID	<u>Tank ID Number</u> : As Assigned in the Configuration menu, Tank submenu.

Captured Data:

bEG in Ht	<u>Beginning Height</u> : Total Liquid Level at the Beginning of the Delivery.
End Ht	<u>Ending Height</u> : Total Liquid Level at the End of the Delivery.
bEG tEnP	<u>Beginning Temperature</u> : Average Product Temperature at the Beginning of the Delivery.
End tEnP	<u>Ending Temperature</u> : Average Product Temperature at the End of the Delivery.
Gr End	<u>Gross Ending Volume</u> : Total Gross Volume at the End of the Delivery.
Gr bEG in	<u>Gross Beginning Volume</u> : Total Gross Volume at the Beginning of the Delivery.
Gr dIFF	<u>Gross Difference</u> : Total Gross Volume Delivered to tank. Calculated as: (Gross Ending Volume) – (Gross Beginning Volume).
NEt End	<u>Net End Volume</u> : Total Net Volume at the End of the Delivery.
NEt bEG in	<u>Net Begin Volume</u> : Total Net Volume at the Beginning of the Delivery.
NEt dIFF	<u>Net Difference</u> : Total Net Volume Delivered to tank. Calculated as: (Net Ending Volume) – (Net Beginning Volume).

Exit Delivery submenu:

RETURN	<u>Return</u> : Press EDIT (TEST) to exit Delivery submenu. Note: Press STEP (MODE) to return to top of Delivery submenu showing mm-dd (Month-Day)
---------------	--

2.4.1.3 BULK SALES LOG**Log**

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
URLEr	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
return	Return

SALES Bulk Sales: An optional transaction log that represents the withdrawal or sale of the primary liquid or Product from the tank. If Theft monitoring is enabled, a Sale can only occur during defined hours of operation. See Thefts Log on following page for Theft-specific Configuration settings that define a loss of Product as either a Theft or Bulk Sale. All transactions depend on the TMS Clock functionality to be recognized.

Record Storage Capacity: 24. 1 Tank Channel per record.

TMS Configuration Prerequisites:

Configuration menu, Header submenu, Sales Enable: Enables Bulk Sales tracking
 Configuration menu, Probe submenu, Motion Height Band: Defines Transaction recognition
 Configuration menu, Probe submenu, Minimum Logged Volume: Defines Transaction Logging

Group ID: Record Number.

Record Identification Data:

nn-dd	<u>Date (Month-Day)</u> : Date the Bulk Sale was recorded. Note: an empty record will show 00-00.
HH'nn	<u>Time (Hour' Minute)</u> : Time the Bulk Sale was recorded. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
TANK NAME	<u>Tank Name</u> : As Assigned in the Configuration menu, Tank submenu.
Prod TYPE	<u>Product Type</u> : As Assigned in the Configuration menu, Tank submenu.
TANK ID	<u>Tank ID Number</u> : As Assigned in the Configuration menu, Tank submenu.

Captured Data:

bEG in Ht	<u>Beginning Height</u> : Total Liquid Level at the Beginning of the Bulk Sale.
End Ht	<u>Ending Height</u> : Total Liquid Level at the End of the Bulk Sale.
bEG tEnP	<u>Beginning Temperature</u> : Average Product Temperature at the Beginning of the Bulk Sale.
End tEnP	<u>Ending Temperature</u> : Average Product Temperature at the End of the Bulk Sale.
Gr bEG in	<u>Gross Beginning Volume</u> : Total Gross Volume at the Beginning of the Bulk Sale.
Gr End	<u>Gross Ending Volume</u> : Total Gross Volume at the End of the Bulk Sale.
Gr d iFF	<u>Gross Difference</u> : Total Gross Volume Sold from tank. Calculated as: (Gross Beginning Volume) – (Gross Ending Volume).
NEt bEG in	<u>Net Beginning Volume</u> : Total Net Volume at the Beginning of the Bulk Sale.
NEt End	<u>Net Ending Volume</u> : Total Net Volume at the End of the Bulk Sale.
NEt d iFF	<u>Net Difference</u> : Total Net Volume Sold from tank. Calculated as: (Net Beginning Volume) – (Net Ending Volume).

Exit Sales submenu:

return Return: Press EDIT (TEST) to exit Sales submenu.
 Note: Press STEP (MODE) to return to top of Sales submenu showing **nn-dd** (Month-Day)

2.4.1.4 THEFTS LOG

Log

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
WATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
Return	Return

THEFTS Thefts: An optional transaction log that represents the withdrawal or theft of the primary liquid from the tank during hours when the facility is not in operation. Theft monitoring may be enabled for individual tanks in the Tank submenu of the Configuration menu. The hours of operation are defined in the Theft submenu of the Configuration menu. All transactions depend on the TMS Clock functionality to be recognized.

Record Storage Capacity: 6. 1 Tank Channel per record.

TMS Configuration Prerequisites:

- Configuration menu, Tank submenu, Theft Enable: Enables Theft monitoring for specified Tank Channel.
- Configuration menu, Theft submenu: Defines Hours of Operation for facility
- Configuration menu, Probe submenu, Motion Height Band: Defines Transaction recognition
- Configuration menu, Probe submenu, Minimum Logged Volume: Defines Transaction Logging

Group ID: Record Number.

Record Identification Data:

mm-dd	<u>Date (Month-Day)</u> : Date the scheduled Inventory Snapshot was recorded. Note: an empty record will show 00-00.
HH' mm	<u>Time (Hour' Minute)</u> : Time the scheduled Inventory Snapshot was recorded. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
TANK NAME	<u>Tank Name</u> : As Assigned in the Configuration menu, Tank submenu.
Prod TYPE	<u>Product Type</u> : As Assigned in the Configuration menu, Tank submenu.
TANK ID	<u>Tank ID Number</u> : As Assigned in the Configuration menu, Tank submenu.

Captured Data:

bEG in Ht	<u>Beginning Height</u> : Total Liquid Level at the Beginning of the Theft.
End Ht	<u>Ending Height</u> : Total Liquid Level at the End of the Theft.
bEG tEMP	<u>Beginning Temperature</u> : Average Product Temperature at the Beginning of the Theft.
End tEMP	<u>Ending Temperature</u> : Average Product Temperature at the End of the Theft.
Gr bEG in	<u>Gross Beginning Volume</u> : Total Gross Volume at the Beginning of the Theft.
Gr End	<u>Gross Ending Volume</u> : Total Gross Volume at the End of the Theft.
Gr dIFF	<u>Gross Difference</u> : Total Gross Volume Stolen from tank. Calculated as: (Gross Beginning Volume) – (Gross Ending Volume).
NEt bEG in	<u>Net Beginning Volume</u> : Total Net Volume at the Beginning of the Theft.
NEt End	<u>Net Ending Volume</u> : Total Net Volume at the End of the Theft.
NEt dIFF	<u>Net Difference</u> : Total Net Volume Stolen from tank. Calculated as: (Net Beginning Volume) – (Net Ending Volume).

Exit Thefts submenu:

Return	<u>Return</u> : Press EDIT (TEST) to exit Thefts submenu. Note: Press STEP (MODE) to return to top of Thefts submenu showing mm-dd (Month-Day)
---------------	--

2.4.1.5 PRODUCT REORDERING REPORT

Log

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
WATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
RETURN	Return

OrderS Product Reordering Report: An on-demand report for each tank is automatically created upon accessing this menu. This report is used to determine the number of days remaining of usable product in the tank based on the information logged for the last Delivery. These reports are not stored in the TMS historically. See Delivery Log for details regarding the Logging of Deliveries.

Record Storage Capacity: N/A

TMS Configuration Prerequisites:

Configuration menu, Tank submenu, Unusable Product: Defines a quantity of Product as unusable.

Group ID: Tank Channel.

Record Identification Data:

mm-dd	<u>Date (Month-Day)</u> : Date the Product Reordering Report was generated. Note: an empty record will show 00-00.
HH' mm	<u>Time (Hour' Minute)</u> : Time the Product Reordering Report was generated. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
TANK NAME	<u>Tank Name</u> : As Assigned in the Configuration menu, Tank submenu.
Prod TYPE	<u>Product Type</u> : As Assigned in the Configuration menu, Tank submenu.
TANK ID	<u>Tank ID Number</u> : As Assigned in the Configuration menu, Tank submenu.

Captured Data:

dEL dATE	<u>Delivery Date</u> : Date of Last Delivery recorded in the Delivery Log.
dEL Amt	<u>Delivery Amount</u> : Gross Difference (Gross Volume delivered) recorded in the Delivery Log.
Gr BEG in	<u>Gross Beginning Volume</u> : Gross Beginning recorded in the Delivery Log.
Gr End	<u>Gross Ending Volume</u> : Gross Ending recorded in the Delivery Log.
total USE	<u>Total Usage</u> : Gross product used since last delivery calculated as: (Gross Ending Volume) – (Current Gross Volume)
dAYS	<u>Days</u> : Number of Days since the last Logged Delivery.
dR ILY USE	<u>Daily Use</u> : Average daily usage in Gross Volume calculated as: (Total Usage) ÷ (Days)
USEABLE	<u>Usable</u> : Current Usable Gross Volume calculated as: (Current Gross Volume) – (Unusable Volume)
dAYS LEFT	<u>Days Left</u> : Estimated number of days of Usable Gross Volume calculated as: (Usable) ÷ (Daily Use)
ULLAGE	<u>Ullage</u> : Gross Volume required to fill tank to defined Ullage Threshold. See Configuration menu, Header submenu, Ullage Limit.

Exit Orders submenu:

RETURN	<u>Return</u> : Press EDIT (TEST) to exit Orders submenu. Note: Press STEP (MODE) to return to top of Orders submenu showing mm-dd (Month-Day)
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2.4.1.6 BOTTOM WATER REMOVAL LOG

Log

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
URLEr	Bottom Water Removal
tRnT LEAT	In-Tank Leak Test – Detailed Results
LEAT HIST	In-Tank Leak Test – History
LINE LEAT	LS300 Line Leak Test
ALARMS	Alarms
Events	Events
rEturN	Return

URLEr Bottom Water Removal: A transaction log that represents the withdrawal of bottom water from the tank. All transactions depend on the TMS Clock functionality to be recognized.

Record Storage Capacity: 12, 1 per Tank Channel

TMS Configuration Prerequisites:

- Configuration menu, Probe submenu, Motion Height Band: Defines Transaction recognition
- Configuration menu, Probe submenu, Minimum Logged Volume: Defines Transaction Logging

Group ID: Tank Channel Number.

Record Identification Data:

nn-dd	<u>Date (Month-Day)</u> : Date the Bottom Water Removal was recorded. Note: an empty record will show 00-00.
HH' nn	<u>Time (Hour' Minute)</u> : Time the Bottom Water Removal was recorded. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight
tRnT nRnE	<u>Tank Name</u> : As Assigned in the Configuration menu, Tank submenu.
Prod tYPE	<u>Product Type</u> : As Assigned in the Configuration menu, Tank submenu.
tRnT id	<u>Tank ID Number</u> : As Assigned in the Configuration menu, Tank submenu.

Captured Data:

Prod bE9 i	<u>Product Begin Volume</u> : Gross Product Volume at the Beginning of the Water Removal.
h2o bE9 in	<u>Water Beginning Volume</u> : Gross Volume of Bottom Water at the Beginning of the Water Removal.
bE9 totAL	<u>Gross Beginning Volume</u> : Total Gross Volume at the Beginning of the Water Removal.
Prod End	<u>Product Ending Volume</u> : Gross Product Volume at the End of the Water Removal.
h2o End	<u>Water Ending Volume</u> : Gross Volume of Bottom Water at the End of the Water Removal.
End totAL	<u>Gross Ending Volume</u> : Total Gross Volume at the End of the Water Removal.
P UoL	<u>Percent Ending Volume</u> : Gross Volume/Tank Capacity displayed as a percentage.
ULLAGE	<u>Ending Ullage</u> : Gross Volume required to fill the storage tank to defined Ullage Threshold. See Configuration menu, Header submenu, Ullage Limit.

Exit Water submenu:

rEturN	<u>Return</u> : Press EDIT (TEST) to exit Water submenu. Note: Press STEP (MODE) to return to top of Water submenu showing nn-dd (Month-Day)
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2.4.1.7 IN-TANK LEAK TEST – DETAILED RESULTS

Lo9

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
WATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
RETURN	Return

TANK LEAK In-Tank Leak Test: detailed In-Tank Leak Test results showing the average change at the end of each hour. The settings for In-Tank Leak Testing are found both in the Tank Leak submenu of the Configuration menu and in the Leak Test menu.

Record Storage Capacity: 12, 1 per Tank Channel

TMS Configuration Prerequisites:

Leak Test menu: Scheduling, duration, and other test controls.

Configuration menu, Tank Leak submenu: Test configuration including Test Type and Leak Rate.

Group ID: Tank Channel Number.

Record Identification Data:

mm-dd Date (Month-Day): Date the In-Tank Leak Test completed.

Note: an empty record will show 00-00.

START TIME Start Time: Time the In-Tank Leak Test began.

Note: time stored in 24 hr. format

Examples 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

END TIME End Time: Time the In-Tank Leak Test completed.

Note: time stored in 24 hr. format

TANK NAME Tank Name: As Assigned in the Configuration menu, Tank submenu.

PRODUCT TYPE Product Type: As Assigned in the Configuration menu, Tank submenu.

TANK ID Tank ID Number: As Assigned in the Configuration menu, Tank submenu.

Captured Data:

NET BEG IN Beginning Net Volume: Total Net Volume at the Beginning of the In-Tank Leak Test.

NET END Ending Net Volume: Total Net Volume at the End of the In-Tank Leak Test.

BEG TEMP Beginning Temperature: Average Product Temperature at the Start of the In-Tank Leak Test.

END TEMP Ending Temperature: Average Product Temperature at the End of the In-Tank Leak Test.

LEAK LIMIT Leak Limit: Leak Threshold for determining Pass/Fail. See Configuration menu, Tank Leak submenu, Leak Limit setting.

LEAK RATE GPH/LPH Leak Rate GPH/LPH: Observed average hourly gain/loss of Gross Volume.

TEST RESULT Test Result: PASS or FAIL. In-Tank Leak Test result.

LEAK RATE HR 1 Leak Rate Hour-1: Observed average gain/loss of Gross Volume at the end of the first hour.

LEAK RATE HR 2-8 Leak Rate Hour-2-8: same as above averaging in each additional hour 2-8 inclusive.

Exit Tank Leak submenu:

RETURN Return: Press EDIT (TEST) to exit Tank Leak submenu.

Note: Press STEP (MODE) to return to top of Tank Leak submenu showing mm-dd (Month-Day)

2.4.1.8 IN-TANK LEAK TEST – HISTORY LOG

Log

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
WATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
RETURN	Return

LEAK HIST In-Tank Leak Test History: A summarized version of the In-Tank Leak Test Results Log. The Leak History Log may be modified at the completion of any given test. All data contained in this Log is copied from the Tank Leak Log detailed on the previous page. For each Tank Channel, the Leak History Log stores the latest passing test result for each of 14 months (the current month and 13 months prior). If there is no passing test for a given month, the latest completed test is stored. See Tank Leak Log for details regarding the Logging of Detailed In-Tank Leak Tests.

Record Storage Capacity: 168. 14 per Tank Channel.

TMS Configuration Prerequisites: N/A

Group ID: Record Number.

Record Identification Data:

TANK ID Tank ID Number: As Assigned in the Configuration menu, Tank submenu.

TANK NAME Tank Name: As Assigned in the Configuration menu, Tank submenu.

PROD TYPE Product Type: As Assigned in the Configuration menu, Tank submenu.

MONTH Month.Day.Year: Date the scheduled Inventory Snapshot was recorded.

Note: an empty record will show 00.00.00.

START TIME Start Time: Time the In-Tank Leak Test began.

Note: time stored in 24 hr. format

Examples 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

END TIME End Time: Time the In-Tank Leak Test completed.

Note: time stored in 24 hr. format

Examples 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

Captured Data:

LEAK LIMIT Leak Limit: Leak Threshold for determining Pass/Fail. See Configuration menu, Tank Leak submenu, Leak Limit setting.

LEAK RATE Leak Rate GPH/LPH: Observed average hourly gain/loss of Gross Volume.

RESULT Test Result: PASS or FAIL. In-Tank Leak Test result.

Exit Leak History submenu:

RETURN Return: Press EDIT (TEST) to exit Leak History submenu.

Note: Press STEP (MODE) to return to top of Leak History submenu showing **mm-dd** (Month-Day)

2.4.1.9 LS300 LINE LEAK TEST LOG**Log**

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
WATER	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
EVENTS	Events
RETURN	Return

LINE LEAK LS300 Line Leak Test: Contains the Date and Time of the latest Pass and Fail for each of the three supported Line Leak Rates. The TMS does NOT perform the Line Leak Test. An external LS300 Line Leak Console connects to the TMS via RS-232 in support of this Log.

Record Storage Capacity: 8

TMS Configuration Prerequisites:

Configuration menu, Header submenu, Serial Format settings: Selects RS-232 port for LS300 support.

Group ID: LS300 Line Leak Channel Number.

Record Identification Data:

Prod NAME Product Name: Tank Name assigned by user to the associated Tank Channel.

Captured Data:

PASS 3GPH Pass 3 GPH: Date and Time of the latest passing 3 GPH [12 LPH] test.

FAIL 3GPH Fail 3 GPH: Date and Time of the latest failing 3 GPH [12 LPH] test.

PASS 0.2GPH Pass 0.2 GPH: Date and Time of the latest passing 0.2 GPH [0.8 LPH] test.

FAIL 0.2GPH Fail 0.2 GPH: Date and Time of the latest failing 0.2 GPH [0.8 LPH] test.

PASS 0.1GPH Pass 0.1 GPH: Date and Time of the latest passing 0.1 GPH [0.4 LPH] test.

FAIL 0.1GPH Fail 0.1 GPH: Date and Time of the latest failing 0.1 GPH [0.4 LPH] test.

Exit Line Leak submenu:

RETURN Return: Press EDIT (TEST) to exit Line Leak submenu.

Note: Press STEP (MODE) to return to top of Line Leak submenu showing **mm-dd** (Month-Day)

2.4.1.10 ALARMS LOG

Log

Inventory	Inventory
Deliveries	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
URLEr	Bottom Water Removal
tAnT LEAr	In-Tank Leak Test – Detailed Results
LEAr H iSt	In-Tank Leak Test – History
LiNE LEAr	LS300 Line Leak Test
ALARMS	Alarms
EventS	Events
rEturN	Return

ALARMS Alarms: Records all alarm conditions detected by the TMS. Alarm conditions typically include High or Low liquid or detected Leaks. See list below for a basic list of Alarms or Appendix A for a detailed list.

Record Storage Capacity: 24

TMS Configuration Prerequisites:

- Configuration menu, Tank submenu: Configure Product and Bottom Water SetPoints.
- Configuration menu, CC Input submenu: Configure CC Input as an Alarm.
- Configuration menu, Sensor Input submenu: Configure Leak/Point Level Sensor as an Alarm.

Group ID: Record Number.

Record Identification Data:

nn-dd	<u>Date (Month-Day)</u> : Date the Alarm occurred. Note: an empty record will show 00-00.		
HH' nn	<u>Time (Hour' Minute)</u> : Time the Alarm occurred. Note: time stored in 24 hr. format Examples 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight		

Captured Data:

ALARn	<u>Alarm</u> : The Name of the Alarm that occurred. i.e. Sump or High
Group Num	<u>Group Number</u> : Group number name changes to reflect hardware in alarm.
tAnT id	<u>Tank ID</u> : Tank ID configured in TMS.
inPut id	<u>Input ID</u> : Hardware Input Number for CC or Sensor Input
ALARn id	<u>Alarm ID</u> : The Category of Alarm that occurred. i.e. Sensor or SP2
dEtR iL	<u>Detail</u> : Additional Details that further clarify the combined meaning of Alarm and Alarm ID. i.e. Open or Level

Exit Alarms submenu:

rEturN	<u>Return</u> : Press EDIT (TEST) to exit Alarms submenu. Note: Press STEP (MODE) to return to top of Alarms submenu showing nn-dd (Month-Day)
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ALARM CONDITIONS INCLUDE:

- Leak (Failed In-Tank Leak Test)
- Product SetPoints (SP1, SP2, SP3, Critical High, High High, High, Low, Low Low, Critical Low)
- Bottom Water SP
- CC (Non-Hazardous Contact Closure Input)
- Sensor

***For detailed definitions of TMS Alarms, see Appendix A.**

2.4.1.11 EVENTS LOG**Log**

Inventory	Inventory
DELIVERIES	Deliveries
SALES	Bulk Sales
THEFTS	Thefts
OrderS	Product Reordering Report
Water	Bottom Water Removal
TANK LEAK	In-Tank Leak Test – Detailed Results
LEAK HIST	In-Tank Leak Test – History
LINE LEAK	LS300 Line Leak Test
ALARMS	Alarms
Events	Events
Return	Return

Events Events: Contains System Errors that represent a possible hardware problem with the system including probes, sensors, and field cabling. Select Non-Alarm Warnings are also recorded in this Log. See list on following page for a basic list of Events or Appendix A for a detailed list.

Record Storage Capacity: 8

TMS Configuration Prerequisites: N/A

Group ID: Record Number.

Record Identification Data:

nn-dd	<u>Date (Month-Day)</u> : Date the Error/Warning occurred. Note: an empty record will show 00-00.	
HH' nn	<u>Time (Hour' Minute)</u> : Time the Error/Warning occurred. Note: time stored in 24 hr. format Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight	

Captured Data:

Error Num	<u>Error Number</u> : A 2-digit numeric Error Number.
Warn Num	<u>Warning Number</u> : A 2-digit numeric Warning Number.
TANK ID	<u>Tank ID</u> : As Assigned in the Configuration menu, Tank submenu.
Input ID	<u>Input ID</u> : As Assigned in the Configuration menu, CC Input or Sensor Input submenu
Event ID	<u>Event ID</u> : Category of the Event including Probe, Sensor, or Power.
Detail IL	<u>Detail</u> : Provides additional details for the reported Error or Warning

Exit Events submenu:

Return	<u>Return</u> : Press EDIT (TEST) to exit Events submenu. Note: Press STEP (MODE) to return to top of Events submenu showing nn-dd (Month-Day)
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Event log reports may contain any combination of the following data:

EVENT CONDITIONS

Errors: Codes:

System

Boot Prom Checksum (U4 socket)	01
Flash Prom Checksum (U5 socket)	02
Flash Prom Write (U5 socket)	03
Flash Prom Erase (U5 socket)	04
Serial Prom (CM1)	05

Probe

Probe Sync	10
Probe Timeout	11

Fault detecting sensors

Sensor Short Circuit	20
Sensor Open Circuit	21
Sensor Wiring Fault	22

Warnings: Codes:

Modem Initialization	01
Modem Command	02
Modem Timeout	03
Modem Carrier	04
Modem Communication	05
Modem No dial tone	06

Tank Configuration Checksum	07
Probe Configuration Checksum	08
Header Configuration Checksum	09
Relay Tank Configuration Checksum	10
Relay CC Configuration Checksum	11
Relay Sensor Configuration Checksum	12
Relay Status Configuration Checksum	14
CC Configuration Checksum	15
Sensor Configuration Checksum	16
Inventory Configuration Checksum	17
Theft Configuration Checksum	18
Modem Configuration Checksum	19
Dial out Configuration Checksum	20

Power Failure	21
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Information Messages: Codes:

Change of SP Units	01
Low Product, Ungaugeable Level	02

*For detailed definitions of TMS Events, Warnings, and Information Messages, see Appendix A.

2.4.2 IN-TANK LEAK TEST SCHEDULING

ACCESS

- Lo9
- LEAK TEST
- CONF
- Control
- In-Tank Leak
- Return

LEAK TEST In-Tank Leak Test Scheduling: Provides access to setting the duration of the In-Tank Leak Test as well as the scheduling of Timed Tests. The TMS must have the In-Tank Leak Test parameters configured prior to addressing the settings in this menu to ensure a complete and accurate system configuration in support of the required In-Tank Leak Tests. Review and configure these settings in the Tank Leak submenu of the Configuration menu. The available In-Tank Leak Test scheduling options apply to each Test Type as shown on the Table below

	Manual	Time	Auto	Relay
Test Length	X	X	X	X
Start Time		X		X
Schedule Type		X		X
Schedule Rate		X		X
Schedule Day		X	X	X
Control	X	X		X

TEST LEN Test Length: Choose a Test Length that is appropriate to the tank size, Leak Rate, and local regulations. Current third-party certifications support the following EPA Approved In-Tank Leak Test Lengths:

- 2 hour, 0.2 GPH [0.8 LPH] Test for USTs up to 20,000 Gallons [75,700 Liters] with a Minimum Percent of used volume of 20%
- 8 hour, 0.1 GPH [0.8 LPH] Test for USTs up to 20,000 Gallons [75,700 Liters] with a Minimum Percent of used volume of 20%
- 8 hour, 0.2 GPH [0.8 LPH] Test for USTs up to 75,000 Gallons [283,900 Liters] with a Minimum Percent of used volume of 50%

Refer to the National WorkGroup website, www.nwglide.org, or contact Pneumercator for up to date information.

Entry Type: select list

Range Limits: N/A

Default/Initialized value: **8 hr**

START TIME Start Time: This entry allows the user to select an appropriate starting time to begin the in-tank leak test. Applies to configured Test Type of Timed and Timed-Relay and is used in conjunction with Schedule Type, Schedule Rate, and Schedule Day to define the complete schedule. Examples of how these settings interact are provided at the end of this section

Entry Type: 4 digit numeric hours, minutes

Range Limits: 00'00 – 23'59. (24-hour clock format)

Default/Initialized value: **0000**

Example 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

Sched TYPE Schedule Type: Applies to configured Test Type of Timed and Timed-Relay and is used in conjunction with Start Time, Schedule Rate, and Schedule Day to define the complete schedule. Examples of how these settings interact are provided at the end of this section

Entry Type: select list

Range Limits: N/A

Default/Initialized value: **th 15**

- Schd rATE** Schedule Rate: Applies to configured Test Type of Timed and Timed-Relay and is used in conjunction with Start Time, Schedule Type, and Schedule Day to define the complete schedule. Examples of how these settings interact are provided at the end of this section
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **Sun**
- Schd dd** Schedule Day: Applies to configured Test Type of Timed and Timed-Relay and is used in conjunction with Start Time, Schedule Type, and Schedule Rate to define the complete schedule. Examples of how these settings interact are provided at the end of this section
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **DAY 00**
- Control** Control: This entry allows the user to select the in-tank leak test control functions Stop, Start. Additional details are provided at the end of this section.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **Stop**
- rEturn** Return: Press EDIT (TEST) to exit Leak Test menu.
Note: Press STEP (MODE) to return to top of Leak Test menu showing **LESt LEN** (Test Length)

Scheduling the leak test

The leak test scheduling can be found in the LEAK TEST menu. This allows you to determine how long to run the test, as well as, when the test will start. The scheduling features are used with the **TIME** and **RELAY** modes of operation. The **MANUAL** mode does not use any scheduling features. The **AUTO** mode only makes use of the **SCHEDULE** Day of the Month (**DD**) setting. This setting determines when an alarm log is generated by the TMS for not completing a leak test. If you set this to fifteen, the alarm will be generated on the fifteenth of the month at midnight if a leak test has not been satisfactorily been completed for the month. The following are examples of how to setup the scheduling for the **TIME** and **RELAY** modes.

1) Perform a

TEST LENGTH
2 HOUR
4 HOUR
8 HOUR

test at

START TIME
22:30

SCHEDULE TYPE
THIS
EVERY
PERCENT VOLUME
ON 1 ST
ON 2 ND
ON 3 RD
ON 4 TH

SCHEDULE RATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DAY
MONTH
MINUTE

Perform a 2-hour test at 10:30pm this Saturday.

2) Perform a

TEST LENGTH
2 HOUR
4 HOUR
8 HOUR

test at

START TIME
17:00

SCHEDULE TYPE
THIS
EVERY
PERCENT VOLUME
ON 1 ST
ON 2 ND
ON 3 RD
ON 4 TH

SCHEDULE RATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DAY
MONTH
MINUTE

Perform a 4-hour test at 5:00pm every Wednesday.

3) Perform a

TEST LENGTH
2 HOUR
4 HOUR
8 HOUR

test at

START TIME
12:00

SCHEDULE TYPE
THIS
EVERY
PERCENT VOLUME
ON 1 ST
ON 2 ND
ON 3 RD
ON 4 TH

SCHEDULE RATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DAY
MONTH
MINUTE

on the

SCHEDULE DD (Day of the Month)
28th

Perform an 8-hour test at 12:00 noon every month on the 28th.

4) Perform a

TEST LENGTH
2 HOUR
4 HOUR
8 HOUR

test at

START TIME
00:00

SCHEDULE TYPE
THIS
EVERY
PERCENT VOLUME
ON 1 ST
ON 2 ND
ON 3 RD
ON 4 TH

SCHEDULE RATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DAY
MONTH
MINUTE

Perform a 4-hour test at 12:00AM midnight every day when the percent volume is at least the value in threshold.

5) Perform a

TEST LENGTH
2 HOUR
4 HOUR
8 HOUR

test at

START TIME
09:30

SCHEDULE TYPE
THIS
EVERY
PERCENT VOLUME
ON 1 ST
ON 2 ND
ON 3 RD
ON 4 TH

SCHEDULE RATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DAY
MONTH
MINUTE

Perform an 8-hour test at 9:30am on the third Saturday of every month.

Once all of the settings have been reviewed in Configuration/Tank Leak as well as the above In-Tank Leak Test scheduling, the TMS can be configured to start the test.

CONTROL
START – In Manual mode, this starts the test. In Timed and Timed-Relay mode, this starts the scheduler for the TMS to run the In-Tank Leak Test based on the defined schedule.
STOP – In Manual, Timed, and Timed-Relay modes, the test will never run with this set.
PAUSE – This is an unused feature at this time
RUN – This is not a setting but is a status that represents an In-Tank Leak Test is currently running on the selected tank.

2.4.3 SYSTEM CONFIGURATION

ACCESS

- Lo9
- LEAK TEST
- CONF IG
- C lock
- In tk dATA
- rEturn

In view mode depressing **Test** button first, then **Mode** and holding both buttons momentarily will increment the TMS into the **ACCESS MODE** displaying the main menu beginning as follows with **Lo9**. Pressing the **Test** button again will increment to the **LEAK TEST** menu and then to the **CONF IG** menu. Once in **CONF IG** pressing the **MODE** button will open the **HEAdEr** submenu.

The CONF IG menu is used to review, edit, or print system configuration data.

Three types of entries require the user to input programming data when configuring the TMS menus. It is mentioned here, to help the user interpret data displayed in the CONFIG menus. This information below will be explained again in the CLOCK section of the manual.

The **Entry Type**: User programs either a numeric value or chooses from a predefined list of terms.

The **Range Limits**: User selects and enters a numeric value within a fixed boundary, set by the system.

The **Default/Initialized value**: If not user programmed, this entry, value or term, will be set by the system.

The user may increment through the following submenus in CONFIG to review data in the following categories.

CONF IG

- HEAdEr** Header – General System Settings
- tAnk** Tank – Tank Channel specific including geometry and SetPoints
- PrObE** Probe – Level Gauging Probe settings
- rELY tAnk** Relay Tank – Relay Assignments to Tank Channel Specific conditions
- rELY cc** Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
- rELY SEnS** Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
- rELY LLP** Relay LLP – Relay Assignments to external LS300 Line Leak failures
- rELY S itE** Relay Site – Relay Assignments to Site-Specific conditions
- rELY ModE** Relay Mode – Relay-specific behavior settings
- cc inPut** Non-Hazardous Contact Closure (CC) Inputs
- SEnSr inP** Leak/Point Level Sensor Inputs
- InuEntorY** Shift Inventory Report Schedule
- tHEFT** Theft – Detection (Hours of operation)
- ModErn** Modem/Serial C Communications
- d iAL out** Auto-Dial out - Setup for selected Alarms or Tank information
- tAnk LEAK** In-Tank Leak Test – Setup
- AnALo9out** Analog Outputs

2.4.3.1 SYSTEM CONFIGURATION – HEADER

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY S itE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEm	Modem/Serial C Communications
d iAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

HEAdEr Header: A collection of General Use and Global Settings for the TMS. It is recommended that these settings are configured prior to configuring other TMS features to ensure the TMS is configured properly and completely.

Acc Code Access Code: A six-digit numeric value.

- used in conjunction with the Communications Security feature to restrict Serial, Network, and Modem communication to the TMS.
See Appendix C for configuring TMS DIP Switches to enable security feature.
- Required with Site ID and Unit ID for firmware upgrades to prevent unauthorized changes

Entry Type: 6-digit numeric
Range Limits: 000000-999999
Default/Initialized value **000000**

SECur itY Security: specifies the communications interfaces where the security feature is enforced. See Appendix C for configuring TMS DIP Switches to enable security feature.

Entry Type: select list
Range Limits: **Serial**: Affects all serial and network interfaces
Modem: Affects all modem interfaces
Both: Affects all communications interfaces including serial, network, and modem.

Default/Initialized value **SEr iAL**

Un it id Unit ID: serves several purposes as follows:

- Printed on all reports created on TMS printer
- Required with Access Code and Site ID for firmware upgrades to prevent unauthorized changes
- Identifies TMS with Site ID when Dialing Out to computer with Autopolling application

Entry Type: 2-digit numeric
Range Limits: 00-99
Default/Initialized value: **00**

- Site ID** Site ID: serves several purposes as follows:
- Printed on all reports created on TMS printer
 - Required with Access Code and Unit ID for firmware upgrades to prevent unauthorized changes
 - Identifies TMS with Unit ID when Dialing Out to computer with Autopolling application
- Entry Type: 5-digit numeric
Range Limits: 00000-99999
Default/Initialized value: **00000**
- dSP Mode** Default Display Mode: The TMS will return to the Default Display Mode when no buttons are pressed for approximately four minutes.
- Entry Type: select list
Range Limits: **Gr Vol**: Gross Volume in Gallons/Liters
Level: Level in Inches/Millimeters
PctVol: Product Gross Volume as a percentage of Total Tank Capacity
NetVol: Net (Temperature-Compensated) Volume in Gallons/Liters
Default/Initialized value: **Gr Vol**
- baud rate** Baud Rate (Port A): This entry allows the user to select the baud rate for the Primary RS-232 serial communications port in the TMS.
- Entry Type: select list
Range Limits: 1.2K, 2.4K, 4.8K, 9.6K, 38.4K (K = 1,000. i.e 9.6K =9600)
Default/Initialized value: **960**
- Serial Format** Serial Format (Port A): This entry allows the user to select the serial format for the Primary RS-232 serial communications port in the TMS. Additional settings are available to support the external LS300 Line Leak Panel.
- Entry Type: select list
Range Limits: **n,8,1**: No Parity, 8 Data Bits, 1 Stop Bit
e,7,1: Even Parity, 7 Data Bits, 1 Stop Bit
o,7,1: Odd Parity, 7 Data Bits, 1 Stop Bit
LS3-4: LS300 4-channel
LS3-8: LS300 8-channel
E Prn: External Printer (Future Use)
Default/Initialized value: **n-8-1**
- baud rate** Baud Rate (Port B): This entry allows the user to select the baud rate for the Auxiliary RS-232 serial communications port in the TMS.
- Entry Type: select list
Range Limits: 1.2K, 2.4K, 4.8K, 9.6K, 38.4K (K = 1,000. i.e 9.6K =9600)
Default/Initialized value: **960**
- Serial Format** Serial Format (Port B): This entry allows the user to select the serial format for the Auxiliary RS-232 serial communications port in the TMS. Additional settings are available to support the external LS300 Line Leak Panel.
- Entry Type: select list
Range Limits: **n,8,1**: No Parity, 8 Data Bits, 1 Stop Bit
e,7,1: Even Parity, 7 Data Bits, 1 Stop Bit
o,7,1: Odd Parity, 7 Data Bits, 1 Stop Bit
LS3-4: LS300 4-channel
LS3-8: LS300 8-channel
E Prn: External Printer (Future Use)
Default/Initialized value: **n-8-1**
- Tank Quantity** Tank Quantity: OBSOLETE. Previously used to define the number of Tank Channels being used.
- Entry Type: 2-digit numeric
Range Limits: 0-19
Default/Initialized value: **0**

- SP Units** Product SetPoint Units: (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx). Establishes the units used to define the Product SetPoints. If this setting is changed, all Product SetPoint thresholds need to be reviewed and properly set for the application.
Entry Type: select list
Range Limits: **PVol:** Percent of Total Tank Capacity
GrVol: Gross Volume in Gallons/Liters
Level: Level in Inches/Millimeters
Default/Initialized value: **PUoL**
- SP1 LED**
SP2 LED
SP3 LED Product SetPoint LED assignment: (6 Product SetPoint Firmware Only: Vxx01xx). Selects which of the six Product SetPoints are mapped to which of the three SP LEDs on the TMS Display. A Product SetPoint is considered to be an Alarm condition when it is associated with an LED. The remaining three Product SetPoints may be used to control Relay Outputs and are represented across all communications interfaces.
Entry Type: select list
Range Limits: Critical High, High High, High, Low, Low Low, Critical Low
Default/Initialized value: SP1 LED: **H ,H ,9h:** High High
SP2 LED: **H ,9h:** High
SP3 LED: **Lo:** Low
- SALE En** Bulk Sales Enable: Enables tracking of Product Sales from the tanks being monitored. A sale is defined as a loss of Product during normal hours of operation. Sales are logged in the Sales Log provided they meet the Minimum Log Volume requirements defined in the Configuration/Probe submenu
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- HornDelay** Horn Autosilence Delay: The integrated horn can be automatically acknowledged after a time delay ranging from 1-9 minutes. This feature is disabled by selecting NONE.
Entry Type: select list
Range Limits: None, 1-9
Default/Initialized value: **none**
- AutoPrint** Auto Print Enable: Allows the TMS to generate automatic printouts for Alarms, Events, liquid transactions, and other optional reports enabled in the TMS. Disabling this feature prevents ALL system-generated printouts from occurring. Manual printing is unaffected by this feature.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **YES**
- LeakPrint** Leak Print Mode: Determines when a completed In-Tank Leak Test generates an automatic printout. The default of Pass-Fail generates a printout for ANY completed test.
Entry Type: select list
Range Limits: Pass-Fail, Fail Only
Default/Initialized value: **PASS-FAIL**
- Monthly** Monthly Status Report Enable: An automatic printout generated at midnight on the first of every month that contains a complete alarm status report for all Tanks/Probes and Leak/Point Level Sensors.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- ULL Limit** Percent Ullage Limit: The maximum fill point defined as a percentage of total tank capacity. The Ullage displayed on the real-time display and contained in system logs will be calculated based on this threshold and is displayed using volume units of gallons/liters
Entry Type: select list
Range Limits: 90, 95, 100, 85
Default/Initialized value: **90**

- dSt EnAbL** Daylight Savings Time Enable: The TMS can automatically adjust its internal clock based on the 2007 U.S. Daylight Savings Time rules.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- LnS Proto** TMS Protocol: Current TMS systems report Water Volume via all communications interfaces (N2 Protocol). Select third-party systems that are not compatible with this revision to the response require the TMS to respond as was originally designed to exclude water volume (N1 Protocol).
Entry Type: select list
Range Limits: N2, N1
Default/Initialized value: **n2**
- rEturn** Return: Press EDIT (TEST) to exit Header submenu.
Note: Press STEP (MODE) to return to top of Header submenu showing **Acc Code** (Access Code)

2.4.3.2 SYSTEM CONFIGURATION – TANK

Conf ID

HEAdEr	Header – General System Settings
tAnT	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnT	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SENs	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEr	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnT LEAK	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

tAnT Tank: Contains Tank Channel specific settings including tank geometry, alarm setpoints, tank identification, and other tank customization options. The Group ID shown corresponds to the hardware Tank Channel and NOT the Tank ID.

tAnT En Tank Channel Enable: Requires level-gauging probe connected to the specific tank channel to be enabled.
 Entry Type: select list
 Range Limits: No, Yes
 Default/Initialized value: **no**

tAnT nAmE Tank Name: Select a name from a predefined list. If a User-Defined name is assigned to the Tank Channel via TMSComm, the Tank Name is shown as **USEr**.
 Entry Type: select list
 Range Limits: See below table
 Default/Initialized value: **9AS**

9AS	Gas
2 OIL	#2 Fuel Oil
5 OIL	#5 Fuel Oil
WASTE	Waste Oil
Av 100	AvGas 100
JET A	Jet A
JP8	JP8
rd d5L	Red Diesel
PrEn	Premium
rEgULr	Regular
rEg 3	Regular 3
SuPER 1	Super 1
SuPER 4	Super 4
HydO IL	Hydraulic Oil
LubE	Lube Oil
OU SEP	O/W Separator
XyLEnE	Xylene
Isobut	Isobutyraldehyde
MEthnL	Methanol
MoGAS	Mogas
Eth 15	Ethanol 15%
OUSrEP	O/W Separator Repair
GenrEr	Generator

dIESEL	Diesel
3 OIL	#3 Fuel Oil
6 OIL	#6 Fuel Oil
KEro	Kerosene
100 LL	100 Low Lead
JP4	JP4
LoSuLF	Low Sulfur
CL d5L	Clear Diesel
PLUS	Plus
rEg 1	Regular 1
rEg 4	Regular 4
SuPER 2	Super 2
SPUnL	Super Unleaded
TurbOIL	Turbine Oil
TrAnS	Transmission Oil
GLYcol	Glycol
NAPtHA	Naphtha
WATER	Water
RECYcd	Recycled
ETHANL	Ethanol
Eth 20	Ethanol 20%
OUSnR 1	O/W Separator Maintenance
USEr	User-Defined Name

FUEL	Fuel
4 OIL	#4 Fuel Oil
OIL	Oil
Av 9AS	AvGas
JET	Jet Fuel
JP5	JP5
H SuLF	High Sulfur
NoLEAD	No Lead
MidGrd	Mid-Grade
rEg 2	Regular 2
SuPER	Super
SuPER 3	Super 3
ToLuEn	Toluene
UStH2o	Waste Water
Motor	Motor Oil
MEK	MEK
Ar 100	Aromatic 100
OIL-PL	Oil – Plasticizer
VirGin	Virgin
Eth 10	Ethanol 10%
Eth 85	Ethanol 85%
HEtOIL	Heating Oil

USER NAME User-Defined Tank Name: A 6-character alphanumeric name entered via TMSComm. Note that this is a context sensitive setting that only appears if the Tank Name is set for **USER**
 Entry Type: select list
 Range Limits: 6-character alphanumeric. Must be entered via TMSComm.
 Default/Initialized value: **Product**

Tank ID Tank ID Number: A unique two-digit numeric ID number assigned to the Tank Channel that is recorded in all reports and tank printouts.
 Entry Type: 2-digit numeric
 Range Limits: 01-99
 Default/Initialized value: 2-digit number corresponding to Tank Channel Number.
 i.e. Tank ID 01 for Tank Channel 1, Tank ID 12 for Tank Channel 12

VOL Mode Volume Mode: Toggles between support for small to medium sized tanks (less than 1 million gallons/liters) and support for large tanks (1 million gallons/liters and higher).
 Entry Type: select list
 Range Limits: **by 1**: Supports tanks less than 1 million gallons/liters. Displayed volume rounded off to the nearest 1 gallon/liter
by 10: Supports tanks 1 million gallons/liters and higher. Displayed volume rounded off to the nearest 10 gallons/liters. **Note**: All volume settings for a Tank Channel configured with a Volume Mode “by 10” must be divided by 10 from the actual value. i.e. a 2 million gallon/liter tank would have the Tank Capacity entered as 200,000 gallon/liter
 Default/Initialized value: **by 1**

Prod TYPE Product Type: The Product Type selected corresponds to a predefined thermal coefficient of expansion value for the named liquid. This is used to calculate the Net (Temperature-Compensated) Volume as well as for performing In-Tank Leak Tests.
 Entry Type: select list
 Range Limits: See below table
 Default/Initialized value: **87 oct**
Note: For products not listed - Consult Factory

87 oct	87 Octane	89 oct	89 Octane	91 oct	91 Octane
92 oct	92 Octane	93 oct	93 Octane	94 oct	94 Octane
95 oct	95 Octane	dIESEL	Diesel	KERO	Kerosene
No 2	#2 Fuel Oil	No 4	#4 Fuel Oil	No 6	#6 Fuel Oil
WASTE	Waste Oil	Av GAS	Aviation Gas	Av 100	AvGas 100
100 LL	100 Low Lead	JET A	Jet A Fuel	JP4	JP4
JP5	JP5	JP8	JP8	ToluEn	Toluene
LubE	Lube Oil	TRAN5	Transmission Oil	Motor	Motor Oil
GLYCOL	Glycol	MEK	MEK	XYLENE	Xylene
NAPHTHA	Naphtha	Ar 100	Aromatic 100	Isobut	Isobutyraldehyde
WATER	Water	Oil-PL	Oil – Plasticizer	METHANL	Methanol
Chem	Chemical	ETHANL	Ethanol	ETH 10	Ethanol 10%
ETH 15	Ethanol 15%	ETH 20	Ethanol 20%	ETH 85	Ethanol 85%

Prod Code Product Code: Used to support alternate protocols including V300 and V200. These protocols are typically used to support third-party interfaces including POS and card reader systems.
 Entry Type: 2-digit numeric
 Range Limits: 00-99
 Default/Initialized value: **00**

The next group of settings pertain to 3 Product SetPoint Firmware Only (Vxx99xx or Vxx00xx) and are used to configure the numbered Product SetPoints.

SP1 P UoL Product SetPoint (Percent Volume): A Product SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the percent volume that must be met or exceeded to be considered in alarm and (2) the direction of over (O) or under (U) determines whether the range includes everything above or below the threshold. For example, a value of Over 90% means the alarm will activate when the product volume increases to 90% of tank capacity and remains in alarm when above 90% tank capacity. Setting the threshold to zero disables the SetPoint.
 Entry Type: 3 digit numeric as a percent of total Tank Capacity.
 Range Limits: Over, Under 0.0-99.9%
 Default/Initialized value: **SP1: O950**: 95% Gross Volume of Tank Capacity and higher
SP2: O900: 90% Gross Volume of Tank Capacity and higher
SP3: U200: 20% Gross Volume of Tank Capacity and lower

SP1 G UoL Product SetPoint (Gross Volume): A Product SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the percent volume that must be met or exceeded to be considered in alarm and (2) the direction of over (O) or under (U) determines whether the range includes everything above or below the threshold. For example, a value of Over 9000 Gallons/Liters means the alarm will activate when the product volume increases to 9000 Gallons/Liters and remains in alarm when above 9000 Gallons/Liters. Setting the threshold to zero disables the SetPoint.
 Entry Type: 3 digit numeric as a percent of total Tank Capacity.
 Range Limits: Over, Under 0-999,999
 Default/Initialized value: **O000000**

SP1 LEUEL Product SetPoint (Level): A Product SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the percent volume that must be met or exceeded to be considered in alarm and (2) the direction of over (O) or under (U) determines whether the range includes everything above or below the threshold. For example, a value of Over 90 inches/2300 mm means the alarm will activate when the product level increases to 90 inches/2300 mm and remains in alarm when above 90 inches/2300 mm. Setting the threshold to zero disables the SetPoint.
 Entry Type: 3 digit numeric as a percent of total Tank Capacity.
 Range Limits: Over, Under 0.0-1999.9
 Default/Initialized value: **O000000**

SP1 NANE SetPoint Name: The selected name is used to identify the purpose of the Product SetPoint and is documented in the Alarm Log and visible through Serial A-D, Modem, and Network Communications interfaces
 Entry Type: select list
 Range Limits: See below table
 Default/Initialized value: **SP1: H .H .9h**
SP2: H .9h
SP3: Lo

LEUEL	Level	H .9h	High	H .H .9h	High-high
OvErFL	Overfill	Lo	Low	Lo Lo	Low-Low
Cr tH i	Critical High	Cr tLo	Critical Low		

SP1 Horn SetPoint Horn: Indicates whether the integrated horn activates for the specified Product SetPoint. Logging and Printing are unaffected by this setting.
SP2 Horn Entry Type: select list
 Range Limits: Yes, No
 Default/Initialized value: **YES**

This ends the group of settings that pertain to 3 Product SetPoint Firmware Only (Vxx99xx or Vxx00xx). All settings that follow pertain to all firmware versions unless otherwise noted.

The next group of settings pertain to 6 Product SetPoint Firmware Only (Vxx01xx) and are used to configure the numbered Product SetPoints.

Cr tL H,9h Product SetPoint Activation Thresholds: A Product SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the percent volume that must be met or exceeded to be considered in alarm and (2) the direction implied by the base name of High and Low. A base name of High includes the range at and above the defined threshold while the base name of Low includes the range at and below the defined threshold.
SP H,H
SP H,9h
SP Lo
LoLo
Cr tL Lo Setting the threshold to zero disables the SetPoint.
 Entry Type: 3 digit numeric as a percent of total Tank Capacity.
 Range Limits: Over, Under 0.0-99.9%
 Default/Initialized value: **Critical High: 98.0**
High High: 95.0
High: 90.0
Low: 20.0
Low Low: 15.0
Critical Low: 12.0

Cr tLHorn SetPoint Horn: Indicates whether the integrated horn activates for the specified Product SetPoint. The Horn will only activate if the Product SetPoint is assigned to an SP Alarm LED.
H,H Horn
H,9h Horn See above setting regarding mapping Product SetPoints to an SP Alarm LED. Logging and Printing are unaffected by this setting.
Lo Horn
LoLo Horn Entry Type: select list
Cr tLHorn Range Limits: Yes, No
 Default/Initialized value: **Critical High: no**
High High: YES
High: YES
Low: YES
Low Low: no
Critical Low: no

This ends the group of settings that pertain to 6 Product SetPoint Firmware Only (Vxx01xx). All settings that follow pertain to all firmware versions unless otherwise noted.

h2o EnAbl H2O Enable: Bottom water may be monitored using a dual float probe. If this setting is disabled, the Bottom Water Level displayed will be fixed at zero inches/millimeters.
 Entry Type: select list
 Range Limits: No, Yes
 Default/Initialized value: **no**

SP h2o Water Setpoint: A Bottom Water SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the level that must be met or exceeded to be considered in alarm and (2) the direction of over (**^**) or under (**u**) determines whether the range includes everything above or below the threshold. For example, a value of Over 2 inches/50 mm means the alarm will activate when the product level increases to 2 inches/50 mm and remains in alarm when above 2 inches/50 mm. Setting the threshold to zero disables the SetPoint.
 Entry Type: 5-digit numeric
 Range Limits: Over, Under 0 – 1999.9 inches [0 – 49,999 millimeters]
 Default/Initialized value: **^0000.0**

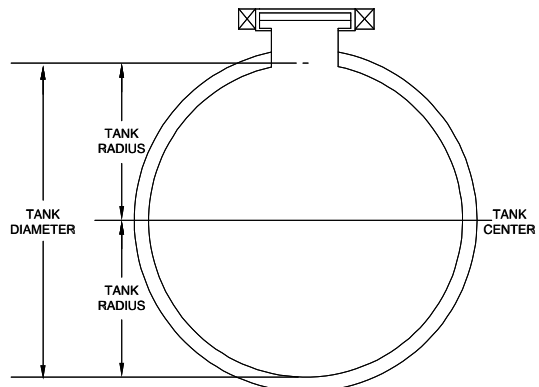
TANK TYPE Tank Type: Select between the various Tank shapes supported by the TMS. Select Virtual to use the Tank Channel for either replication or combination or other Tank Channels.
 Entry Type: Select List
 Range Limits: **Flat (FLAT)**: Flat-ended horizontal cylinder, typically steel
Vertical (VERT): Tank with Vertical walls like vertical cylinders and rectangular and cubical
Custom 3 (CUSTOM 3): Symmetrical horizontal cylindrical tanks, typically with dished ends (fiberglass), with volume calculated using three volumes at predetermined heights provided by TMS.
Custom 8 (CUSTOM 8): Assymmetrical vertical tanks including trapezoid and L-shaped tanks (not common)
Cone (CONE): Vertical Cylindrical tanks with a Conical floor.
Virtual (VIRTUAL): Combines up to 6 Tank Channels (1-9) by setting the User-Defined Name to include the number of each channel in the set. This is done to provide Product SetPoints for the combined volumes of the tanks in the set. Tank Replication is also available to provide additional Product SetPoints for a Tank Channel. Contact Pneumercator for additional documentation on the Virtual Tank feature.

Default/Initialized value: **FLAT**

TANK CAP Tank Capacity: The maximum actual capacity of the tank being monitored. In general, if the capacity ends in zeroes, it is the marketing capacity. For example, a tank manufacturer may identify a tank as a 10,000 gallon tank but the manufacturer’s calibration chart reveals the actual capacity is 9,841 gallons. **Note**: If the actual Tank Capacity is 1 million Gallons/Liters or greater, divide the actual Tank Capacity by 10 and enter here. Also change the Volume Mode to “by 10”.
 Entry Type: 6-digit numeric
 Range Limits: 0 – 999,999 gallons [0 – 999,999 liters]
 Default/Initialized value: **0**

TANK FOLD Manifold Factor: Primarily used to specify the number of manifolds connecting tanks of equal size using a single probe. The tanks are assumed to be level with each other. For example, two tanks would be connected by one manifold (volume calculation doubled), three tanks would be connected by two (volume calculation tripled), etc. Selecting None would identify the tank as an isolated tank. This setting is also used as part of a Pump Auto Select feature where the TMS would select the pump associated with the tank with the greatest volume. Contact Pneumercator for a separate application document for the Pump Auto Select feature.
 Entry Type: select list
 Range Limits: None, 1-6, (Comp-A – Comp-F)
 Default/Initialized value: **none**

TANK RAD Tank Radius: The inside Radius of either a Flat, Custom 3, or Cone Tank Type. See illustration at right for inside Radius shown on Flat or Custom 3 tank types. The inside Radius of a tank is calculated by dividing the inside Tank Diameter by two.
 Entry Type: 4-digit numeric
 Range Limits: 999.9” [9999 mm]
 Default/Initialized value: **0.0 [0]**

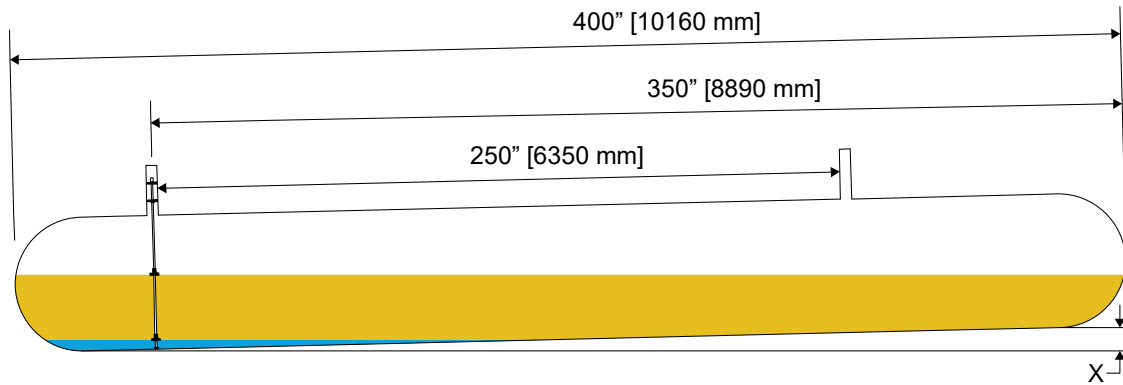


TANK RISE Tank Rise: Represents the degree of tilt over the entire length of the tank. Applies to Flat and Custom 3 Tank Types. This value is entered in Level units (inches/millimeters) and represents the difference between the low and high end of the tank. See below illustration for complete details.

Entry Type: 2-digit numeric

Range Limits: 0-9.9" [0-99 millimeters]

Default/Initialized value: 00 [0]



The user sticks and records fuel level in the probe riser opening and also in another tank riser, (E.G. "Fill") and preferable at the opposite end of the tank. The fuel height difference is divided by the distance between the two risers.

See the above figure and following Examples:

English

User Measured values:

Fuel Level in Left Riser = 49.5" Fuel Level in Right Riser = 47"

D = Distance between the risers = 250" L = Total Tank Length = 400"

User Calculations:

S = Difference in fuel level between risers = 49.5" - 47" = 2.5"

Tank Rise (S x L ÷ D): 4" (2.5" x 400" ÷ 250")

Metric

User Measured values:

Fuel Level in Left Riser = 1250 mm Fuel Level in Right Riser = 1200 mm

D = Distance between the risers = 6350 mm L = Total Tank Length = 10160 mm

User Calculations:

S = Difference in fuel level between risers = 1250 mm - 1200 mm = 50 mm

Tank Rise (S x L ÷ D): 80 mm (50 mm x 10160 mm ÷ 6350 mm)

TANK HT Tank Height: The inside height in inches/millimeters. Applies to Vertical, Custom 8, and Cone Tank Types.

Entry Type: 5-digit numeric

Range Limits: 0 - 1999.9 inches [0 - 49,999 millimeters]

Default/Initialized value: 00 [0]

TANK LEN Tank Length: The inside length of a tilted tank in inches/millimeters. Applies to Flat and Custom 3 Tank Types. This context sensitive menu item only appears if Tank Rise is NOT zero.

Entry Type: 5-digit numeric

Range Limits: 0 - 1999.9 inches [0 - 49,999 millimeters]

Default/Initialized value: 00 [0]

CONE HT Cone Height: The inside height of the conical bottom of the Cone Tank Type.

Entry Type: 3-digit numeric

Range Limits: 0 - 99.9 inches [0 - 999 millimeters]

Default/Initialized value: 00 [0]

- Height** Height #: Applies to Custom 3 and Custom 8 Tank Types. For Custom 3, Heights 1-3 are calculated by the TMS from the Tank Radius and are NOT editable. The corresponding Volumes from the Tank Manufacturer's calibration chart should be entered in the Volume # menu item that follows. For Custom 8, Heights must be entered from lowest (1) to highest (8) with volumes entered in the corresponding Volume # menu item. Evenly spacing the heights may result in accurate readings for tank with minor symmetry problems. For more substantial differences, contact Pneumercator for guidance.
Entry Type: 5-digit numeric
Range Limits: 0 – 1999.9 inches [0 – 49,999 millimeters]
Default/Initialized value: **00 [0]**
- VOLUME** Volume #: Applies to Custom 3 and Custom 8 Tank Types. The Volumes entered must correspond to the Height # from the previous menu item.
Entry Type: 6-digit numeric
Range Limits: 0 – 999,999 gallons [0 – 999,999 liters]
Default/Initialized value: **0**
- Theft Enable** Theft Enable: Enables Theft monitoring for the specified Tank Channel. The Hours of Operation for the Site must be defined in the Thefts submenu within the Configuration menu. A Theft is defined as a loss of Product during a time when the facility should be Closed. Thefts meeting the Logged Minimum Volume requirement defined in the Probe submenu of the Configuration menu will be recorded in the Thefts Log.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- Unusable** Unusable Volume: Excluded from the Total Tank Volume to create Usable Fuel Volume used in the Product Reordering (Orders) Log.
Entry Type: 6-digit numeric
Range Limits: 0 – 999,999 gallons [0 – 999,999 liters]
Default/Initialized value: **0**
- Unusable Level** Unusable Level: The amount of liquid that remains in the tank after the Product float has dropped to the bottom of the probe stem. In most cases this would be a minimal amount of liquid below the siphon which is typically considered to be of no consequence. In cases where this point would be above the siphon, the TMS can provide an Low Product Information Message at the bottom of the Product Float travel.
Entry Type: 5-digit numeric
Range Limits: 0 – 9,999.9" [0 – 99,999 millimeters]
Default/Initialized value: **00 [0]**
- Generator Tank Leak Test Mode** Generator Tank Leak Test Mode: Enables monitoring of a Generator Tank for a Sudden Loss. This is performed via a static In-Tank Leak Test comparable to Auto Leak Test Mode except that testing continues throughout the month regardless of whether a Leak Test has been successfully completed for the month. The generator would be monitored for activity via CC Input and the In-Tank Leak Test would be performed during periods of inactivity. Typical Leak Test settings include 2 hour Test Length and 0.7 GPH [2.8 LPH] Leak Limit.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- LL SELECT** LS300 Line Leak Select: Provides the means for a LS300 Line Leak Channel to be associated with a Tank Channel for the purpose of reporting Line Leak statuses properly.
Entry Type: select list
Range Limits: No. 1 – 8
Default/Initialized value: **no**
- Return** Return: Press EDIT (TEST) to exit Tank submenu.
Note: Press STEP (MODE) to return to top of Tank submenu showing **Enable** (Tank Enable)

2.4.3.3 SYSTEM CONFIGURATION – PROBE

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntory	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAK	In-Tank Leak Test – Setup
AnALogout	Analog Outputs

PrObE Probe: Provides probe-specific settings that, when combined with the configuration in the Tanks submenu, allow the TMS to provide the highest degree of accuracy available. The Group ID shown corresponds to the hardware Tank Channel and NOT the Tank ID.

PrObE CF Probe Calibration Factor: Required for providing accurate tracking of the float movement on the probe stem of all MP4xx probes. Found at the top of the probe on a label around the probe head (MP45x) or secured to the probe cable (MP46x).
 Entry Type: 4-digit numeric
 Range Limits: 8.000 – 9.999
 Default/Initialized value: **9.000**

PrObE tYP Probe Type: The model number of the level gauging probe must be entered for accurate results. An incorrect selection may result in Probe Errors or inaccurate information. Found at the top of the probe on a label around the probe head (MP45x) or secured to the probe cable (MP46x).
 Entry Type: select list
 Range Limits: See below table.
 Default/Initialized value: **MP450**

MP450	MP450	MP440	MP440	MP452	MP452
MP460	MP460	MP451	MP451	MP461	MP461
MP462	MP462	MP463	MP463	2-412	2-412
2-501	2-501	UP420	UP420		

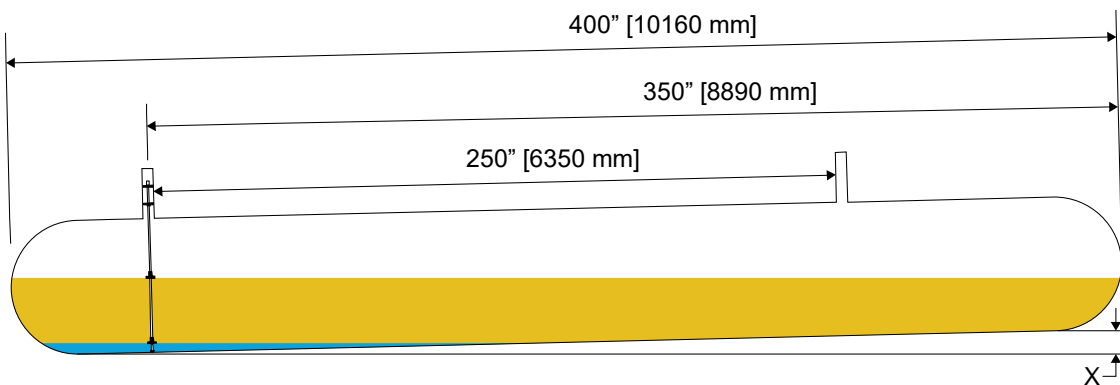
UP420/2-412/2-501 Note: TMS2000A Models Only.

PrObE LEn Probe Length: Determines the location of the temperature sensors within the probe stem of the MP4xx.
 Entry Type: 5-digit numeric
 Range Limits: Up to 1999.9 inches [Up to 49,999 millimeters]
 Default/Initialized value: **00 [0]**

Prod H0 Product Height Float Offset: Represents the adjustment to the raw probe level required to compensate for both the float depth in the liquid and mounting height of the probe. Required to provide accurate volume calculations and In-Tank Leak Test results. Calculated by taking the difference between the raw probe level and a manual stick reading of the total liquid level.
 Entry Type: 4-digit numeric
 Range Limits: +/- 0.0 - 299.9 inches [+/- 0 – 7,999 millimeters]
 Default/Initialized value: **00 [0]**

h2o HO Bottom Water Height Float Offset: Represents the adjustment to the raw probe level required to compensate for both the float depth in the liquid and mounting height of the probe. Required to provide accurate bottom water volume calculations. Calculated by taking the difference between the raw probe level and a manual stick reading of the bottom water level.
Note: Adjust the MP45x to read 0.2" [5mm] or MP46x to read 1.0" [50mm] to avoid false alarms caused by a negative bottom water reading due to material thermal expansion.
 Entry Type: 4-digit numeric
 Range Limits: +/- 0.0 - 299.9 inches [+/- 0.0 – 7,999 millimeters]
 Default/Initialized value: **00 [0]**

ProbE Loc Probe Location Offset: Represents the distance from the high end of the tank to where the probe is located in the tank. This context sensitive menu item appears if the Tank Rise is NOT zero. The below example shows the offset value would be 350" [8890 mm].
 Entry Type: 4-digit numeric
 Range Limits: 0.0 – 599.9 inches [0 – 5,999 millimeters]
 Default/Initialized value: **00 [0]**



ProbE rEP Probe Rep Rate: OBSOLETE. This value was required for the currently obsolete MP440 and MP460 level gauging probes to provide accurate data to the TMS.
 Entry Type: 4-digit numeric
 Range Limits: 0 – 29.99
 Default/Initialized value: **0**

tEnP En Temperature Enable: Required to view both Product Temperature and Net (Temperature-Compensated) Volume. Must be enabled to perform an In-Tank Leak Test. Both Net Volume and Product Temperature are shown as zero when disabled.
 Entry Type: select list
 Range Limits: Yes, No
 Default/Initialized value: **YES**

Not bRnd Motion Height Band: Used to identify both the beginning and ending of a liquid transaction (Delivery, Sale, Theft, Water Removal). Value entered as level units (inches/millimeters) representing the minimum change over one minute to mark the beginning of a transaction. When the Motion Height Band is NOT exceeded for three consecutive minutes, the transaction is completed provided it meets or exceeds the Logged Minimum Volume shown below.
 Entry Type: 2-digit numeric
 Range Limits: 0 - 0.99 inches or [0 – 99 millimeters]
 Default/Initialized value: **020 [5]**

Lo9 Min Logged Minimum Volume: Represents the smallest transaction stored in the Logs.
 Entry Type: 3-digit numeric
 Range Limits: 0 – 999 gallons [0 – 999 liters]
 Default/Initialized value: **50 [200]**

- rISEr 9P** Riser GPI (LPI): Represents the collective volume of the riser pipes above the O/W Separator. This context sensitive setting is only visible if the Probe Type is set for MP452.
Entry Type: 5-digit numeric
Range Limits: 0 – 9.9 inches [0 – 99 millimeters]
Default/Initialized value: **0**
- rEturN** Return: Press EDIT (TEST) to exit Probe submenu.
Note: Press STEP (MODE) to return to top of Probe submenu showing **PrObE CF**
(Probe Calibration Factor)

2.4.3.4 SYSTEM CONFIGURATION – RELAY TANK

Conf :

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY StE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEr	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAK	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

rELY tAnk Relay – Tank Triggers: Each tank alarm condition can affect up to three relay outputs. These are generally used to support select remote alarms or provide signal outputs for third party systems. The TMS3000 currently supports up to 32 Relay Outputs and the TMS2000 systems currently support up to 18 Relay Outputs. The Group ID shown corresponds to the hardware Tank Channel and NOT the Tank ID.

LEAK tr : Leak Trigger: A failed In-Tank Leak Test.
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnnn**

SP1 tr : Product SetPoint Triggers: (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx).
SP2 tr : Product SetPoints. Generally represent High and/or Low Product.
SP3 tr : Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnnn**

Crth tr : Product SetPoint Triggers: (6 Product SetPoint Firmware Only: Vxx01xx).
HHi tr : Product SetPoints. Generally represent High and/or Low Product.
HSh tr : Entry Type: numeric list
Lo tr : Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
LoLo tr : **Note:** Each assignment separated by decimal point.
CrL tr : Default/Initialized value: **nnnnnn**

hZo tr : Water SetPoint Trigger: Bottom Water SetPoint Alarm
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnnn**

rEturn Return: Press EDIT (TEST) to exit Relay Tank submenu.
 Note: Press STEP (MODE) to return to top of Relay Tank submenu showing **LEAK tr** (Leak Trigger)

2.4.3.5 SYSTEM CONFIGURATION – RELAY CC

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELy tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELy cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELy SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELy LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELy S itE	Relay Site – Relay Assignments to Site-Specific conditions
rELy ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
inventorY	Shift Inventory Report Schedule
tHEft	Theft – Detection (Hours of operation)
ModEm	Modem/Serial C Communications
d iAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALogout	Analog Outputs

rELy cc Relay – Non-Hazardous Contact Closure (CC) Input Triggers: Each Non-Hazardous Contact Closure (CC) Input can affect up to three relay outputs. These are generally used to support select remote alarms or provide signal inputs from third party systems. The TMS3000 currently supports up to 32 Relay Outputs and the TMS2000 systems currently support up to 18 Relay Outputs. The Group ID shown corresponds to the Non-Hazardous Contact Closure (CC) Input Number.

cc tr Non-Hazardous Contact Closure (CC) Input Trigger: A CC Input can affect up to three relays in a variety of ways that depend on how the CC Input has been configured. See the Contact Closure Inputs submenu for further details.
Entry Type: numeric list
Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
Default/Initialized value: **nnnnn**

rEturN Return: Press EDIT (TEST) to exit Relay CC submenu.
Note: Press STEP (MODE) to return to top of Relay CC submenu showing **cc tr** (CC Trigger)

2.4.3.6 SYSTEM CONFIGURATION – RELAY SENSOR

CONF :

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY S itE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEr	Modem/Serial C Communications
d iAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAr	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

rELY SEnS Relay – Sensor (ISCC) Input Triggers: Each Leak/Point Level Sensor (ISCC) Input can affect up to three relay outputs. The TMS3000 currently supports up to 32 Relay Outputs and the TMS2000 systems currently support up to 18 Relay Outputs. The Group ID shown corresponds to the Leak/Point Level Sensor Input Number. **Note:** The Relay Sensor submenu was formerly identified as the Relay ISCC (Intrinsically Safe Contact Closure) submenu.

SEnS tr : Sensor (ISCC) Input Trigger: A Sensor Input can affect up to three relays.
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **000000**

rEturN Return: Press EDIT (TEST) to exit Relay Sensor submenu.
 Note: Press STEP (MODE) to return to top of Relay Sensor submenu showing **SEnS tr :** (Sensor Trigger)

2.4.3.7 SYSTEM CONFIGURATION – RELAY LLP (LS300 Line Leak Panel)**CONF**

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

rELY LLP Relay – LS300 Line Leak Test Failure Triggers: Each failed line leak test reported by the external LS300 Line Leak Panel (LLP) can affect up to three relay outputs. The TMS3000 currently supports up to 32 Relay Outputs and the TMS2000 systems currently support up to 18 Relay Outputs. The Group ID shown corresponds to the hardware channel for the LS300 Line Leak Panel.

FRIL 01 LS300 Line Leak Test Failure Trigger: Any of the three possible LS300 Leak Rates can have its failure affect up to three relays. The LS300 supports Leak Rates of 3.0 GPH, 0.2 GPH, and 0.1 GPH [12.0 LPH, 0.8 LPH, 0.4 LPH].
FRIL 02
FRIL 30
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nanana**

rEturN Return: Press EDIT (TEST) to exit Relay LLP submenu.
 Note: Press STEP (MODE) to return to top of Relay LLP submenu showing **FRIL 01** (Fail 0.1 GPH)

2.4.3.8 SYSTEM CONFIGURATION – RELAY SITE

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY StE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEr	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

rELY StE Relay – Site-Specific Conditions: The TMS can report select conditions are specific to the Site and not necessarily a specific probe or sensor. Each site-specific condition can affect up to three relay outputs. The TMS3000 currently supports up to 32 Relay Outputs and the TMS2000 systems currently support up to 18 Relay Outputs.

tHEFt Theft Trigger: A loss of Product during hours that the facility should be closed is defined as a Theft. This is configured in the Configuration menu in both the Tanks and Theft submenus. A Theft can affect up to three relays.
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnn**

PowerFRIL Power Fail Trigger: A past Power Failure of a duration of at least 1-2 minutes resulting in a Warning 21 can affect up to three relays. The Warning 21 is also recorded in the Events Log.
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnn**

SYS Error System Error Trigger: Any System Error including Probe, Sensor, and Memory Errors can affect up to three relays. These Errors would also be recorded in the Events Log.
 Entry Type: numeric list
 Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)
Note: Each assignment separated by decimal point.
 Default/Initialized value: **nnnnn**

rEturN Return: Press EDIT (TEST) to exit Relay Site submenu.
 Note: Press STEP (MODE) to return to top of Relay Site submenu showing **tHEFt** (Theft)

2.4.3.9 SYSTEM CONFIGURATION – RELAY MODE**CONF ID**

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY S itE	Relay Site – Relay Assignments to Site-Specific conditions
rELY Mode	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEm	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAK	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

rELY Mode Relay Mode: The behavior of each relay can be modified to support a variety of applications. These include valve and indirect pump control as well as positive shutdown. Other modifications can be made to a relays behavior to support remote horns. See below for complete details. The Group ID shown corresponds to the Relay Output Number.

NormalLY Normal Contact State: A relay can be configured as Normally ON to support positive shutdown applications. In the non-alarm, non-action state, the relay output is energized resulting in the Normally Open (NO) contacts closing and Normally Closed (NC) contacts opening. When an alarm or other programmed action occurs that is assigned to the relay output, it is de-energized resulting in NO contacts opening and NC contacts closing. ALL Relay Outputs are de-energized when the TMS loses power or is powered off. Any external equipment monitoring the TMS or being controlled by the TMS would behave as though the Relay Output was in the Alarm State.
Entry Type: select list
Range Limits: Off, On
Default/Initialized value: **OFF**

FP Act Front Panel Acknowledgment: Primarily used to support remote horns. When an alarm condition occurs that activates the relay output, the user would typically press any button on the TMS to Acknowledge the Alarm. When enabled, this setting allows that acknowledgment to also return the Relay Output to its Normal Contact State.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**

dELAY Delay: Primarily used to support remote horns. When an alarm condition occurs that activates the relay output, the specified time delay determines when the Relay Output returns to normal, effectively acknowledging the remote horn. Choosing NONE disables this feature.
Entry Type: select list
Range Limits: **None**: Disabled
1-9 minutes: Auto-Acknowledged after defined time delay.
Default/Initialized value: **none**

- LAtch En** Latch Enable: A latching relay is useful for manipulating external valves or for providing indirect pump control for the purpose of automatically filling (supply pump) or emptying (return pump) a tank. Once the feature is enabled, the Latch Off condition must be defined in the settings that follow. The Latch On condition is defined elsewhere in the Configuration menu, most commonly in either the Relay Tank or Relay Sensor submenus.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: **no**
- SP1 OFF** Product SetPoint # Latch Off: (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx).
SP2 OFF Identifies the Tank Channel number (NOT Tank ID) whose corresponding Product SetPoint will
SP3 OFF return the Relay Output to its Normal Contact State. The Latch On condition would most likely be defined in the Relay Tank submenu in this instance.
Entry Type: select list
Range Limits: **Tank NO**: Specified Latch Off condition NOT selected
Tank 1-12 (TMS3000), Tank 1-2 (TMS2000)
Default/Initialized value: **not no**
- CrLch OFF** Product SetPoint Latch Off: (6 Product SetPoint Firmware Only: Vxx01xx). Identifies the Tank
H.H. OFF Channel number (NOT Tank ID) whose corresponding Product SetPoint will return the Relay
H.Lh OFF Output to its Normal Contact State. The Latch On condition would most likely be defined in the
Lo OFF Relay Tank submenu in this instance.
LoLo OFF Entry Type: select list
CrLl OFF Range Limits: **Tank NO**: Specified Latch Off condition NOT selected
Tank 1-12 (TMS3000), Tank 1-2 (TMS2000)
Default/Initialized value: **not no**
- SEnSr OFF** Sensor Latch Off: Specifies the Leak/Point Level Sensor used to return the Relay Output to its
Normal Contact State. The Latch On condition would most likely be defined in the Relay Sensor
submenu in this instance.
Entry Type: select list
Range Limits: **Input NO**: Specified Latch Off condition NOT selected
Input 1-40 (TMS3000), Input 1-8 (TMS2000)
Default/Initialized value: **inP no**
- rEturN** Return: Press EDIT (TEST) to exit Relay Mode submenu.
Note: Press STEP (MODE) to return to top of Relay Mode submenu showing **NormalLY**
(Normally)

2.4.3.10 SYSTEM CONFIGURATION – CC INPUT

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY S itE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
d iAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

cc inP Non-Hazardous Contact Closure (CC) Input: The behavior of each CC Input can be configured to support a variety of applications. These include remote Testing and Acknowledgment of remote Alarms as well as more advanced Logic AND Gate functions. See below for complete details. The Group ID shown corresponds to the CC Input Number.

cc EnABLE CC Input Enable: A variety of options are available for enabling a CC Input to support a number of different applications. Each choice is described below.

Entry Type: Select list (See table below)

Range Limits: **Off:** Disabled

Relay: Used as a control input for manipulating Relay Outputs or to support Auto In-Tank Leak Test Mode

Gate: AND Logic Gate created from both the CC Input and another system condition that are assigned to affect the same Relay Output.

Alarm: Displays an Alarm on TMS and is recorded in the Alarm Log.

Acknowledge: Returns assigned Relay Outputs to their Normal Contact State.

Line Pass: Accepts signals from LS300 (2nd Generation) to report a passing Line Leak Test.

Front Panel Ack: An external signal, typically from an automation system, used to acknowledge the integrated horn on the front panel of the TMS.

Trigger Groups: Part of a Pump Auto Select feature where the TMS would select the pump associated with the tank with the greatest volume. Contact Pneumercator for a separate application document for the Pump Auto Select feature.

Default/Initialized value: **OFF**

OFF	Off
ALARn	Alarm
FPAck	Front Panel Ack
tr iG-C	Trigger Group C
tr iG-F	Trigger Group F

rELAY	Relay
Act	Acknowledge
tr iG-A	Trigger Group A
tr iG-d	Trigger Group D

GALE	Gate
LPA55	Line Pass
tr iG-b	Trigger Group B
tr iG-E	Trigger Group E

INP NAME Input Name: Name of CC Input specified to identify function of CC Input. The name **USER** indicates a User-Defined CC Input Name. See next setting for User-Defined Name.
 Entry Type: select list
 Range Limits: See table below
 Default/Initialized value: **USER**

USER	User-Defined	GENER	Generator	RES 1	Reserve 1
RES 2	Reserve 2	RES 3	Reserve 3	RES 4	Reserve 4
L1PASS	Line 1 Pass	L1FAIL	Line 1 Fail	L2PASS	Line 2 Pass
L2FAIL	Line 2 Fail	L3PASS	Line 3 Pass	L3FAIL	Line 3 Fail
L4PASS	Line 4 Pass	L4FAIL	Line 4 Fail	Pump	Pump

USER NAME User-Defined Input Name: A 6-character alphanumeric name entered via TMSComm. Note that this is a context sensitive setting that only appears if the CC Input Name is set for **USER**
 Entry Type: select list
 Range Limits: 6-character alphanumeric. Must be entered via TMSComm.
 Default/Initialized value: **Input**

NORMALLY Normal Contact State: The normal state of the signal wired to the CC Input. Commonly connected devices include the RS2 (Test/Reset buttons) and CS-10 Current Sensor which are both Normally Open.
 Entry Type: select list
 Range Limits: Open, Close
 Default/Initialized value: **CLOSE**

LOGIC EN Logic Enable Group: Creates a Logic Group containing two or more CC Inputs defined by which CC Inputs are assigned to a specific letter group. ALL inputs in the group must be active to affect any Relay Outputs assigned to any of the CC Inputs in the group.
 Entry Type: select list
 Range Limits: Off, AND A – AND H
 Default/Initialized value: **OFF**

TIMEDELAY Time Delay: A Time Delay applied to a condition going active or inactive may be applied to any CC Input. For example. If a CC Inputs is used to monitor an external system, a Time Delay may be applied to considering the CC Input in alarm to allow time for the external system to be repowered without causing a false alarm.
 Entry Type: select list
 Range Limits: **00 SEC** : Feature disabled.
 -02 SEC : Delay reacting to condition activating for 2 seconds
 -05 SEC : Delay reacting to condition activating for 5 seconds
 -10 SEC : Delay reacting to condition activating for 10 seconds
 -20 SEC : Delay reacting to condition activating for 20 seconds
 02 SEC : Delay reacting to condition deactivating for 2 seconds
 05 SEC : Delay reacting to condition deactivating for 5 seconds
 10 SEC : Delay reacting to condition deactivating for 10 seconds
 20 SEC : Delay reacting to condition deactivating for 20 seconds
 Default/Initialized value: **00 SEC**

RETURN Return: Press EDIT (TEST) to exit CC Input submenu.
 Note: Press STEP (MODE) to return to top of CC Input submenu showing **CC ENABLE** (CC Enable)

2.4.3.11 SYSTEM CONFIGURATION – SENSOR INPUT

CONF

- HEAdEr** Header – General System Settings
- tAnk** Tank – Tank Channel specific including geometry and SetPoints
- PrObE** Probe – Level Gauging Probe settings
- rELY tAnk** Relay Tank – Relay Assignments to Tank Channel Specific conditions
- rELY cc** Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
- rELY SErS** Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
- rELY LLP** Relay LLP – Relay Assignments to external LS300 Line Leak failures
- rELY StE** Relay Site – Relay Assignments to Site-Specific conditions
- rELY ModE** Relay Mode – Relay-specific behavior settings
- cc inPut** Non-Hazardous Contact Closure (CC) Inputs
- SEnSr inP** **Leak/Point Level Sensor Inputs**
- InvEntorY** Shift Inventory Report Schedule
- tHEFt** Theft – Detection (Hours of operation)
- ModEn** Modem/Serial C Communications
- dIAL out** Auto-Dial out - Setup for selected Alarms or Tank information
- tAnk LEAK** In-Tank Leak Test – Setup
- AnALogout** Analog Outputs

SEnSr inP Sensor (ISCC) Input: Configuration for each Sensor Input Channel to support the sensor model connected including identification and TMS behavior. The Group ID shown corresponds to the Sensor Input Number.

SEnSr En Sensor Enable: Enables each Sensor Input Channel to use the sensor for Alarm purposes or to exclusively use the Sensor to control of TMS functions like Relay Outputs.
 Entry Type: Select list
 Range Limits: **Off**: Disabled Sensor Input
Alarm: Used primarily for Alarm purposes resulting in an Alarm message being displayed and an Alarm Log being generated. May also be used to control Relay Outputs
Relay: Used exclusively to control Relay Outputs and will NOT generate an Alarm on the TMS.
 Default/Initialized value: **OFF**

tYPE Sensor Type: The Model number of the Sensor connected to the Input.
 Entry Type: select list
 Range Limits: See Below Table
 Default/Initialized value: **ES820**

ES820	ES820
LS600	LS600
rSU801	RSU801 (Future Use)
ES8251	ES825-100F

ES8252	ES825-200F
LS610	LS610
rSU802	RSU802 (Future Use)

HS100	HS100
rSU800	RSU800
Other	Other (3 rd party float switch)

ModE Sensor Mode: Specifies purpose of sensor as a Leak Sensor which lights up the Leak LED or Other non-leak Sensor. This difference is also identified in the real-time interfaces as well as the TMS Alarm Log.
 Entry Type: select list
 Range Limits: Leak, Other
 Default/Initialized value: **LEAK**

INP NAME Input Name: Name of Sensor Input specified to identify function of Sensor. The name USER indicates a User-Defined Sensor Name. See next setting for User-Defined Name.
 Entry Type: select list
 Range Limits: See Below Table
 Default/Initialized value: **USER**

USER	User-Defined	Sump	Sump	Piping	Piping
Contn	Containment	dbuALL	Double-Wall	dike	Dike
LEAK	Leak	rESuor	Reservoir	WELL	Well
GENtr	Generator	WATER	Water	Oil	Oil
Vault	Vault	Hi rES	High Reservoir	Lo rES	Low Reservoir
High	High	High High	High-High	Lo	Low
LoLo	Low-Low	turbine	Turbine	dSPAn	Dispenser Pan

USER NAME User-Defined Input Name: A 6-character alphanumeric name entered via TMSComm. Note that this is a context sensitive setting that only appears if the Sensor Input Name is set for **USER**
 Entry Type: select list
 Range Limits: 6-character alphanumeric. Must be entered via TMSComm.
 Default/Initialized value: **Input**

FAULT En Fault Enable: Must be enabled for sensors with a -F suffix in the model number. The Fault-Detection feature, also referred to as Supervised Wiring, enables the TMS to monitor the field wiring for open or short circuits, preventing the TMS from determining the alarm state of the sensor.
 Entry Type: select list
 Range Limits: No, Yes
 Default/Initialized value: **no**

normALLY Normal Contact State: The normal state of the Sensor wired to the Sensor Input.
 Entry Type: select list
 Range Limits: Close, Open
 Default/Initialized value: **CLOSE**

ASSoc iATE Associate with Tank: Supplements the Sensor Name for the purpose of locating the sensor by identifying the Tank Channel the sensor is supporting. Leak Sensors enabled as Alarms that are Associated with a Tank Channel may be represented on the ETD1000 by activating the Leak light and integrated horn.
 Entry Type: select list
 Range Limits: **Tank NO**: Sensor NOT Associated with Tank Channel
 Tank 1-12 (TMS3000), Tank 1-2 (TMS2000)
 Default/Initialized value: **not no**

ASSoc iATE Associate with Dispenser: Supplements the Sensor Name for the purpose of locating the sensor by identifying the Dispenser Pan the sensor is installed in.
 Entry Type: select list
 Range Limits: **Dispenser NO**: Sensor NOT Associated with Dispenser Pan
 Dispenser 1-40
 Default/Initialized value: **dSP no**

rEturN Return: Press EDIT (TEST) to exit Sensor Input submenu.
 Note: Press STEP (MODE) to return to top of Sensor Input submenu showing **SEnSr En** (Sensor Enable)

2.4.3.12 SYSTEM CONFIGURATION – INVENTORY

CONF 19

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALogOut	Analog Outputs

InvEntorY Shift Inventory Report Schedule: Schedules up to three Inventory Snapshots per day for each of the seven days of the week. The Snapshots are recorded in the Inventory Log and are optionally printed on the TMS printer. The 36-record capacity of the Inventory Log allows for one day of Snapshots for the 12-tank maximum supported by the TMS3000.

Hour 1 Hour 1: The TMS will record an Inventory Snapshot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. For example, if the TMS had HOUR 1 and HOUR 2 set for 00'00 (Midnight) and HOUR 3 set for 12'00 (Noon), the TMS would record TWO Inventory Snapshots for each enabled Day of the Week, one at midnight and one at noon.
 Entry Type: 4 digit numeric hours, minutes
 Range Limits: 00'00 – 23'59. (24-hour clock format)
 Default/Initialized value: **0000**
 Example 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

Hour 1 Prt Hour 1 Print: TMS will print the Inventory Snapshot from the TMS printer at the time defined in Hour 1, when enabled.
 Entry Type: Select
 Range Limits: No, Yes
 Default/Initialized value: **no**

Hour 2 Hour 2: The TMS will record an Inventory Snapshot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. See Hour 1 example.
 Entry Type: 4 digit numeric hours, minutes
 Range Limits: 00'00 – 23'59. (24-hour clock format)
 Default/Initialized value: **0000**
 Example 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

Hour 2 Prt Hour 2 Print: TMS will print the Inventory Snapshot from the TMS printer at the time defined in Hour 2, when enabled.
 Entry Type: Select
 Range Limits: No, Yes
 Default/Initialized value: **no**

Hour 3 Hour 3: The TMS will record an Inventory Snapshot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. See Hour 1 example.
 Entry Type: 4 digit numeric hours, minutes
 Range Limits: 00'00 – 23'59. (24-hour clock format)
 Default/Initialized value: **0000**
 Example 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

Hour 3 Prt Hour 3 Print: TMS will print the Inventory Snapshot from the TMS printer at the time defined in Hour 3, when enabled.
 Entry Type: Select
 Range Limits: No, Yes
 Default/Initialized value: **no**

Sun EnAbL Days of the Week: The TMS will record an Inventory Snapshot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. Enable
Mon EnAbL each Day of the Week desired by choosing Yes.
TuE EnAbL Entry Type: select list
WEd EnAbL Range Limits: No, Yes
thu EnAbL Default/Initialized value: **no**
Fr i EnAbL
SAT EnAbL

rEturN Return: Press EDIT (TEST) to exit Inventory submenu.
 Note: Press STEP (MODE) to return to top of Inventory submenu showing **Hour 1** (Hour 1)

2.4.3.14 SYSTEM CONFIGURATION – MODEM

Conf 19

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SENs	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

ModEn Modem/Serial C Communications: Enables and configures the optional modem types (P/N 900433-x or 900503-1) or optional Serial C (P/N 900571-x) Interfaces.

ModEn Modem/Serial C Interface Option Enable: Select the interface currently installed in the TMS.
 Entry Type: select list
 Range Limits: **nonE** (None): No Communications option installed
IntErnAL (Internal): 900433-x Modem installed
FCS Mod (Facsimile Modem): 900503-1 Faxmodem installed
Port Mod (Port Modem): Third-Party RS-232 modem connected to Serial A
SERIAL C (Serial C): 900571-x Serial option installed
CELL Mod (Cell Modem): PCO Cell Modem installed (Future Use)
RS485 Mod (RS-485 Mode): 900571-3 or 900571-4 installed AND using RS-485
 Default/Initialized value: **nonE**

FCS LOCAL Fax Sender ID Phone Number: Up to 14 digits used to identify the origin of the fax transmission on the leading edge of the fax as currently required by federal regulations. Complete 14-digit value formed as FCS Area + FCS Local, each with a 7-digit maximum.
 Entry Type: 7-digit numeric each
 Range Limits: 0-9, _ (Blank)
 Default/Initialized value: -----

Note: The Current Federal Communications Commission regulation part 68, Section 68.318 (c) (3) states that it is illegal to transmit a fax in the United States which does not contain the following sender information: "...in a margin on the top or bottom of each transmitted page or on the first page of the transmission, the date and time it was sent and an identification of the business, other entity, or individual sending the message and the telephone number of the sending machine of such business, other entity or individual."

baud rAtE Baud Rate: For modems, this defines the Maximum Baud Rate allowed by the modem when negotiating connection speed. For 900571-x, defines the baud rate for Serial C.
 Entry Type: Select list
 Range Limits: 1.2K, 2.4K, 4.8K, 9.6K, 14.4K, 38.4K (K = 1,000. i.e 9.6K =9600)
 Default/Initialized value: **24**

dIAL TYPE Dial Type: Select TONE (Touch-Tone) for phone lines that support pushbutton phones or PULSE for phone lines that only support rotary dial phones
 Entry Type: Select list
 Range Limits: Tone, Pulse
 Default/Initialized value: **tonE**

- PAUSE** Pause Length: Supports the Dial-Out function. Defines the number of seconds a single Pause or comma represents in the dial-out string.
Entry Type: 1-digit numeric, seconds
Range Limits: 1-9 Seconds
Default/Initialized value: **1 SEc**
- TELE LINE** Telephone Line Mode: Supports the Dial-Out function. Indicates whether the phone line is Dedicated to the TMS or being Shared with other devices. If the phone line is Shared, a dial tone must be detected prior to any Dial Out attempt.
Entry Type: Select list
Range Limits: Dedicated, Shared
Default/Initialized value: **dedicated**
- RETURN** Return: Press EDIT (TEST) to exit Modem submenu.
Note: Press STEP (MODE) to return to top of Modem submenu showing **Modem** (Modem)

2.4.3.15 SYSTEM CONFIGURATION – DIAL OUT

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY S tE	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEft	Theft – Detection (Hours of operation)
ModEr	Modem/Serial C Communications
d iAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAt	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

d iAL out Auto-Dial out – Setup for selected Alarms or Tank information: The TMS can initiate contact using an internal modem or faxmodem to provide notifications of Alarm conditions and scheduled inventory updates. Up to five sets of conditions may be defined, each with a different phone number and destination device. The Group ID indicates the set number. The TMS will make a total of five dialout attempts per condition. The dialout sequence may be aborted by clearing the Dialout memory in the Init Data submenu.

tEL LOCAL Telephone Number: Up to 21 digits available for defining the dial-out sequence including the telephone number and any required prefix or suffix details. Complete 21 digit value formed as Tel Area 2 + Tel Area + Tel Local, each with a 7 digit maximum.
tEL ArEA
tEL ArEA2
 Entry Type: 7-digit numeric each
 Range Limits: 0-9, P (Pause), _ (Blank)
 Default/Initialized value: - - - - -

LiNE tYPE Line Type: The type of receiving device connected to the telephone line that the TMS will be communicating with.
 Entry Type: Select list
 Range Limits: **dAtA** (Data): Transfer data to computer running Autopolling
FCS (Facsimile): Send a fax to a fax machine (requires faxmodem)
tTy (TTY): TeleType text only transmission.
nPAGEr (NPager): Numeric Pager
 Default/Initialized value: **dAtA**

Dialout Conditions: The TMS will attempt to contact the Receiving Device defined in Line Type above for any of the conditions selected below:

LEAK d,AL Failed In-Tank Leak Test
SP1 d,AL Product SetPoint 1 Alarm (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx).
SP2 d,AL Product SetPoint 2 Alarm (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx).
SP3 d,AL Product SetPoint 3 Alarm (3 Product SetPoint Firmware Only: Vxx99xx or Vxx00xx).
Cr tHd,AL Critical High Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
H H, d,AL High High Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
H Gh, d,AL High Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
Lo d,AL Low Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
LoLo d,AL Low Low Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
Cr tLd,AL Critical Low Product Alarm (6 Product SetPoint Firmware Only: Vxx01xx).
h2o d,AL Bottom Water SetPoint Alarm
thft d,AL Theft Alarm
cc d,AL Non-Hazardous Contact Closure (CC) Input Alarm
SENS d,AL Sensor (ISCC) Alarm
Err d,AL System Error
 Entry Type: Select List
 Range Limits: No, Yes
 Default/Initialized value: **no**

inu d,AL Inventory Dialout: Enables the TMS to initiate a dialout contact at the time scheduled below when there are new Inventory Logs created since the last Inventory Dialout.
 Entry Type: Select List
 Range Limits: No, Yes
 Default/Initialized value: **no**

inu Hour Inventory Dialout Time: Defines the time at which the Scheduled Inventory Dialout occurs. This context sensitive menu is only visible if the Inventory Dialout is set to YES.
 Range Limits: 00'00 – 23'59. (24-hour clock format)
 Default/Initialized value: **0000**
 Example 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

rEturn Return: Press EDIT (TEST) to exit Dial Out submenu.
 Note: Press STEP (MODE) to return to top of Dial Out submenu showing **tEL LOCAL** (Tel Local)

2.4.3.16 SYSTEM CONFIGURATION – TANK LEAK

CONF ID

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SENS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
inventorY	Shift Inventory Report Schedule
tHEFT	Theft – Detection (Hours of operation)
ModEm	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAK	In-Tank Leak Test – Setup
AnALogOut	Analog Outputs

tAnk LEAK In-Tank Leak Test – Setup: The configuration of the In-Tank Leak Test is defined in this submenu in conjunction with scheduling/time related settings in the Leak Test menu. The Group ID references the Tank Channel being configured.

Prerequisites for running a valid In-Tank Leak Test are as follows (Refer to the National Workgroup website, www.nwglde.org, or contact Pneumercator for up-to-date information):

- Tank requirements
 - Single-Wall Underground Storage Tank
 - Isolated (Not Manifolder)
 - Not Heated or Pressurized
 - Up to 75,000 Gallon [283,900 Liter] capacity
 - 0.2 GPH [0.8 LPH] in 2 hours for tanks up to 20,000 Gallons [75,700 Liters]
 - 0.1 GPH [0.8 LPH] in 8 hours for tanks up to 20,000 Gallons [75,700 Liters]
 - 0.2 GPH [0.8 LPH] in 8 hours for tanks up to 75,000 Gallons [283,900 Liters]
- Qualifying Petroleum Product as defined by the Federal EPA.
- MP450S
 - Riser Mounted
 - 4-inch Urethane or Buna-N floats
 - 5 Temperature Sensors

After enabling a test, the following front panel display characteristics may appear while in View Mode.

- When the Mode button is pressed and released, the TMS will normally display the Tank Name. In addition, if an In-Tank Leak Test is scheduled, a short letter L (L) will appear on the far-left directly above Tank ID number.
- The TMS will show a blinking short letter L (L) to the right of the Tank ID number if the In-Tank Leak Test is Paused.
- When an In-Tank Leak Test is actively running, a short letter L (L) will appear to the right of the Tank ID number.

tEST En In-Tank Leak Test Enable: Enable the In-Tank Leak Test for the specified Tank Channel.
 Entry Type: select list
 Range Limits: No, Yes
 Default/Initialized value: **no**

- TEST Mode** Test Mode: Choose between four different In-Tank Leak Test Modes to best suit the combined needs of the operator and tank requirements.
Entry Type: select list
Range Limits: **MANUAL (Manual)**: an on-demand test manually started each time by authorized site personnel.
TIME (Timed/Scheduled): a scheduled test including monthly, weekly and even daily test options. The scheduling is defined in the Leak Test menu.
AUTO (Auto): generally used to support a twenty-four hour facility where the usage is unpredictable making a scheduled test difficult to complete within the month. The TMS monitors site pump or generator activity using a CC Input (enabled as Relay) that is typically wired to a CS-10 current sensor. The TMS determines the optimum time to start a test and will continue to attempt to complete a test until the monthly testing requirements have been satisfied.
RELAY (Timed Relay): a scheduled test typically used to support a manifolded tank set. The TMS can isolate a tank by changing the state of up to three relay outputs at the scheduled start time of the test. The actual test begins fifteen minutes later to allow the tank contents to stabilize.
Default/Initialized value: **MANUAL**
- LEAK Limit** Leak Limit: The Leak Limit is used to select the leak threshold of the test performed. Most States typically require either a 0.2 GPH [0.8 LPH] or 0.1 GPH [0.4 LPH] for a regulated UST. Check with the local regulators to determine what the local leak threshold requirements are prior to configuring the In-Tank Leak Test.
Entry Type: 1-digit numeric
Range Limits: 0.0 - 0.9 GPH [0.0, 0.4, 0.8 LPH]
Default/Initialized value: **00**
- ThRESHold** Threshold: Represents the minimum percent volume required to perform an In-Tank Leak Test. The TMS is capable of performing an In-Tank Leak Test on tanks up to 20,000 Gallons with as little as 20% of the tank capacity filled with liquid. Tanks up to 75,000 Gallons currently require 50% of the tank be filled with liquid. Refer to the National Workgroup website, www.nwglde.org, or contact Pneumercator for up to date information on testing requirements.
Entry Type: 2-digit numeric
Range Limits: 20-99
Default/Initialized value: **20**
- AUTO mode** Auto Mode Pass/Fail Select: Defines the required test result that qualifies to satisfy the monthly requirements. Once the requirements have been satisfied, no further tests are performed for the duration of the month. This context-sensitive menu is only visible when the Test Mode is set to AUTO.
Entry Type: select list
Range Limits: Pass: The first test with a Passing result satisfies the monthly requirement
P-F: Any completed test, Pass or Fail, satisfies the monthly requirement
Default/Initialized value: **PASS**
- Pump-Gen** Pump/Generator: The CC Input number that represents the pump or generator activity. The activity is monitored by the TMS in support of an Auto Leak Test. The TMS determines the best opportunity to begin the leak test based on this information. This is typically provided by the CS-10 current sensor but may be provided from a third-party source. This context-sensitive menu is only visible when the Test Mode is set to AUTO.
Entry Type: 1 digit numeric
Range Limits: **CC NO**: No CC Input selected
CC 1-16 (TMS3000), CC 1-10 (TMS2000)
Default/Initialized value: **no**

RELAY Control Relay Control: Defines the Relay Outputs used to isolate a tank from a manifolded set to support a Scheduled In-Tank Leak Test. The Relay Outputs change state at the defined start time of the test. The actual test begins fifteen minutes afterward. The Relay Outputs return to their defined Normal Contact State when the test is no longer running. This context-sensitive menu is only visible when the Test Mode is set to RELAY (Timed Relay).

Entry Type: numeric list

Range Limits: Each Relay: No (No Relay Assignment), 1-32 (TMS3000), 1-18 (TMS2000)

Note: Each assignment separated by decimal point.

Default/Initialized value: **000000**

Return Return: Press EDIT (TEST) to exit Tank Leak submenu.

Note: Press STEP (MODE) to return to top of Tank Leak submenu showing **TEST En** (Test Enable)

2.4.3.17 SYSTEM CONFIGURATION – ANALOG OUTPUT

CONF

HEAdEr	Header – General System Settings
tAnk	Tank – Tank Channel specific including geometry and SetPoints
PrObE	Probe – Level Gauging Probe settings
rELY tAnk	Relay Tank – Relay Assignments to Tank Channel Specific conditions
rELY cc	Relay CC – Relay Assignments to individual Non-Hazardous CC Inputs
rELY SEnS	Relay Sensor – Relay Assignments to individual Leak/Point Level Sensor Inputs
rELY LLP	Relay LLP – Relay Assignments to external LS300 Line Leak failures
rELY Site	Relay Site – Relay Assignments to Site-Specific conditions
rELY ModE	Relay Mode – Relay-specific behavior settings
cc inPut	Non-Hazardous Contact Closure (CC) Inputs
SEnSr inP	Leak/Point Level Sensor Inputs
InvEntorY	Shift Inventory Report Schedule
tHEFt	Theft – Detection (Hours of operation)
ModEn	Modem/Serial C Communications
dIAL out	Auto-Dial out - Setup for selected Alarms or Tank information
tAnk LEAk	In-Tank Leak Test – Setup
AnALoGout	Analog Outputs

AnALoGout Analog Outputs: Enable individual Analog Output Channels, most commonly used as 4-20 mA Outputs, to represent a specific Tank Channel and a volume, level, or temperature option. The Group ID identifies the specific Analog Output Channel being configured.

AnALoG En Analog Output Enable: Enable the Analog Output Channel by selecting the Tank Channel to be represented on the selected output.

Entry Type: numeric list

Range Limits: Tank Channel 1-12. Select NO to disable the output.

Default/Initialized value: **tnt no**

dALtA SEL Data Select: Choose the data from the selected Tank Channel being represented on the specific Analog Output Channel.

Entry Type: select list

Range Limits: **Gr Vol**: Gross Volume

NetVol: Net Volume

PrdLvl: Product Level

h2oLvl: Bottom Water Level

tEnP F: Temperature. Shows TEMP C for Metric firmware TMS systems.

Default/Initialized value: **Gr Vol**

gR in Gain: Adds support for 0-1 mA Output Mode by selecting a 0.05 (1/20) multiplier. DIP Switches must be set for 0-20 mA Mode AND Gain set to 0.05 for this feature to work properly. All other output modes must have the Gain set to the default of 1.00.

Entry Type: select list

Range Limits: 1.00, 0.05

Default/Initialized value: **100**

rEturN Return: Press EDIT (TEST) to exit Analog Out submenu.

Note: Press STEP (MODE) to return to top of Analog Out submenu showing **AnALoG En** (Analog Enable)

2.4.4 SYSTEM CLOCK**ACCESS****Lo9****LEAF TEST****CONF 9****Clock****In tk dATA****rEturn**

Clock System Clock: The system Clock includes the Date, Time, and Day of the Week. This information is used to support the Logging of system information and the execution of In-Tank Leak Tests. It is also used to recognize transactions, liquid additions and removals from the tank. See Configuration menu, Header submenu to enable automatic time adjustments to follow 2007 U.S. Daylight Savings Time rules.

nn-dd-yy Date (Month-Day-Year):
Entry Type: Valid numeric dates.
Range Limits: 01-12, 01-31, 00-99

HHmmSS Time (Hours' Minutes' Seconds): User enters current time of the day in Hours, Minutes, and Seconds of the day into the TMS in 24-hour scale.
Entry Type: Valid numeric time in 24-hour format
Range Limits: 1-23, 1-59, 1-59.
Examples: 12'00 = 12 Noon 23'59 = 11:59 PM 00'00 = Midnight

day Day of the Week: User enters current day of the week.
TMS listed options include:
Entry Type: select list
Range Limits: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

rEturn Return: Press EDIT (TEST) to exit Clock menu.
Note: Press STEP (MODE) to return to top of Clock submenu showing **nn-dd-yy** (Date)

2.4.5 INITIALIZE DATA**ACCESS**

LoG
LEAK TEST
CONF IG
Exit
Init DATA
Return

Init DATA Initialize Data: Initialize or erase select sections of memory. This is typically only done to restore a TMS to its factory initialized state or to eliminate memory corruption from Logs. This process is NOT reversible.

Init Initialize: A description of each section that can be initialized is provided below:

Entry Type: select list

Range Limits: **none**: Do not initialize any Data.

Inventory: Inventory Log

DELIVERY: Delivery Log

SALES: Bulk Sales Log

THEFTS: Thefts Log

Order: Product Reordering Report

Water Rem: Bottom Water Removal Log

Init LEAK: In-Tank Leak Test – Detailed Results Log.

Note: Initializing this Log also Initializes the In-Tank Leak Test Scheduling memory as defined in the Leak Test menu.

LINE PASS: Clears the history from all CC Inputs enabled as Line Pass.

ALARMS: Alarms Log

Events: Events Log

dial out: Clears the Dial-Out queue. Once the queue is cleared, no further Dial-Out attempts will be made until a new condition occurs.

LEAK HIST: In-Tank Leak Test – History Log

LINE LEAK: LS300 Line Leak Test Log

ALL LOGS: All Logs

CONF IG: Configuration. All system programming is returned to factory defaults.

ALL: All: Initialize All Logs and System Configuration.

Return: Return: Exits Initialize Data menu

Return Return: Press EDIT (TEST) to exit Init Data menu.

Note: Press STEP (MODE) to return to top of Init Data submenu showing **Init** (Initialize)

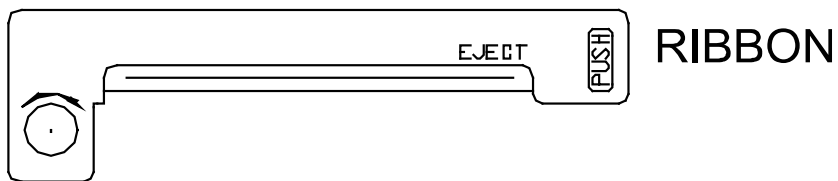
SECTION 3 – PRINTER SERVICING

3.1 RIBBON REPLACEMENT

PRINTER RIBBON REPLACEMENT

1. Remove knob and swing open the printer assembly to access the ribbon. Push on the right side of the ribbon to eject. Insert the new ribbon in its place and push it into place.

REPLACEMENT RIBBON P/N 183501-1

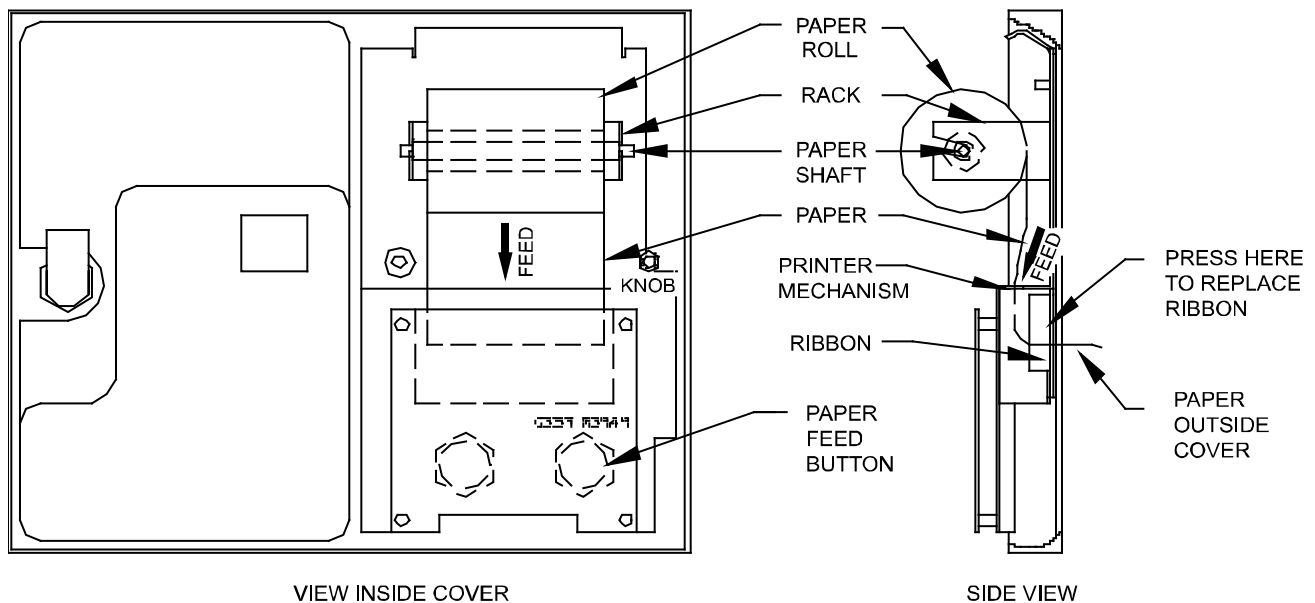


3.2 RECEIPT PRINTER (900438-1/900438-3/900438-5)

PRINTER PAPER REPLACEMENT (NO WINDER)

1. Lift the used paper roll from the rack and remove the roll from the shaft.
2. Insert the shaft into the new paper roll and return it to the rack.
3. Feed the paper into the printer mechanism and press the paper feed button until paper feeds through to the outside of the cover.

REPLACEMENT PAPER ROLL P/N 183601-1

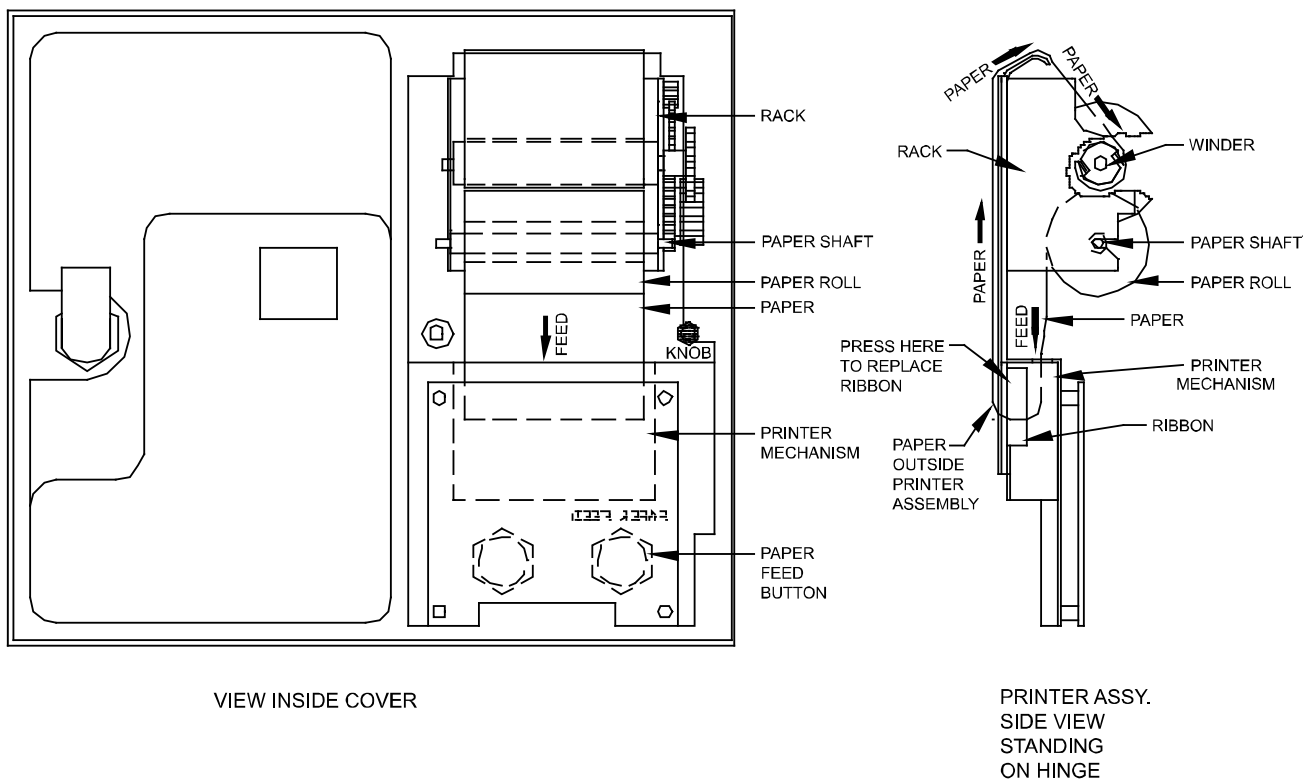


3.3 AUTOWINDER PRINTER (900438-2/900438-4/900438-6)

PRINTER PAPER REPLACEMENT (WITH WINDER)

1. Lift the used paper roll from the rack and remove the roll from the shaft.
2. Insert the shaft into the new paper roll and return it to the rack.
3. Remove the knob and swing open the printer assembly.
4. Feed the paper into the printer mechanism and press the paper feed button until paper feeds through to the outside of the printer assembly.
5. Bend the end of the paper over 1/4" and route the paper as shown below.
6. Insert the paper into the winder and wind the paper in 2 or 3 times.

REPLACEMENT PAPER ROLL P/N 183601-1



APPENDIX A – TMS CONSOLE ALARM & EVENT CONDITIONS TABLES

Alarm Conditions:

The following alarm conditions are recorded in the **Alarm Log** and are printed automatically if printer is enabled. Alarm conditions are also user programmable to auto-dial out upon alarm.

Leak and SetPoint alarms will produce both audible and visual LED annunciators until acknowledged via Front panel or Edit enable buttons. Visual LED conditions will continue until the specific leak or SetPoint conditions are corrected.

Theft alarms will produce an audible annunciator and appear on the TMS display showing a theft message across the display. Theft alarms can only be acknowledged via the **Edit Enable/Theft Alarm Acknowledge** button located on the back of the TMS door. The displayed message will continue until the condition is corrected.

CC and Leak/Pt. Level Sensor alarms will produce an audible annunciator and appear on the TMS display showing a CC or Leak/Pt. Level Sensor alarm message across the display. The audible annunciator can be acknowledged via Front panel or Edit Enable/Theft Alarm Acknowledge buttons. The CC or Leak/Pt. Level Sensor displayed message will continue until the condition is corrected.

LED	Display Message		Alarm Description Printout				Description
	Line 1		Item	Alarm ID	Detail		
	Line 1	Line 2					
Leak	N/A	N/A	Tank ID	Leak	Level		Failure of an In-Tank Leak Test 3SP Firmware (Vxx.99.xx OR Vxx.00.xx)
SP1				SP1			Product SetPoint Alarm. Factory defaults are as follows: SP1: 95% Gr. Volume and higher (High High)
SP2	N/A	N/A	Tank ID	SP2	Level		SP2: 90% Gr. Volume and higher (High)
SP3				SP3			SP3: 20% Gr. Volume and lower (Low)
SP1				CritH			6SP Firmware (Vxx.01.xx)
				HIHI			Product SetPoint Alarm. Factory defaults are as follows: Critical High: 98% Gr. Volume and higher
				High	Level		High High: 95% Gr. Volume and higher
SP2	N/A	N/A	Tank ID	Lo			High: 90% Gr. Volume and higher
				LoLo			Low: 20% Gr. Volume and lower
SP3				CritL			Low Low: 15% Gr. Volume and lower Critical Low: 12% Gr. Volume and lower
Water	N/A	N/A	Tank ID	H2O	Level		Bottom Water SetPoint Alarm: Factory default value is 2 inches [51 millimeters] or higher.
N/A	Theft (Tank ID)	(Tank Name)	Tank ID	Detailed Theft Printout			Theft of product from the tank
N/A	CC (Input #)	(CC Input Name)	Input #	CC	Open Closed		Device wired to CC Input is in alarm
N/A	Sensr (Input #)	(Sensor Input Name)	Input #	Sensr	Open Closed		Point level (High, Low, etc.) sensor is in alarm
Leak	Sensr (Input #)	(Sensor Input Name)	Input #	Sensr	Open Closed		Non-discriminating leak sensor is in alarm
Leak	Sensr o(Input #) Sensr w(Input #)	(Sensor Input Name)	Input #	Sensr	Oil Water		Discriminating leak sensor (ES825-200F) is in alarm

Note: ISCC or Intrinsically Safe Contact Closure is synonymous with Leak/Pt. Level Sensor

Note: Product SetPoint Names are also identified on the top of the TMS Alarm Printout.

Error Conditions:

All Error conditions are recorded in the Event Log and are printed automatically if printer is enabled. Error conditions are also user programmable to auto-dial out upon alarm. Errors will produce an audible alarm and appear on the TMS display showing the specific error condition and code number. Error conditions can only be silenced by acknowledging the Front panel or Edit Enable/Theft Alarm Acknowledge buttons. The displayed error message will continue until the condition is corrected.

Error	Display Message		Event Description for Errors		Description
	Line 1	Line 2	Item	Printout	

Firmware Chipset						
1	BPROM Sum	Err01	N/A	Boot	Chksum	Boot PROM (U4 socket) Checksum Error
2	FPROM Sum	Err02	N/A	Flash	Chksum	Flash PROM (U5 socket) Checksum Error
3	FPROM Wr	Err03	N/A	Flash	Write	Flash PROM (U5 socket) Write Error
4	FPROM Era	Err04	N/A	Flash	Erase	Flash PROM (U5 socket) Erase Error

Location:
TMS2000 Series: 900461-x Main Board
TMS3000: 900430-1 Processor Card

Troubleshooting:
Reset affected PROM.
Replace affected PROM.
Repair/Replace Board containing affected PROM. (P/N 900430-1 for TMS3000; P/N 900461-x for TMS2000 Series)

Configuration Memory (CM1) Chip					
5	EEPROM	Err05	EEPROM	Fail	Checksum Error

Identification:
TMS2000 Series: 900461-x Main Board: U14 socket
TMS3000: 900431-x Power Supply Board: U2 socket

Troubleshooting:
Reset CM1 Chip.
Replace CM1 Chip.
Repair/Replace Board containing CM1 Chip. (P/N 900431-x for TMS3000; P/N 900461-x for TMS2000 Series)

Magnetostrictive Probe						
10	ProbeSync	(Tank ID) Err10	Probe ID (Tank ID)	Probe	Sync	Probe Sync Error: Unintelligible signal being received from probe
11	ProbeTime	(Tank ID) Err11	Probe ID (Tank ID)	Probe	Time	Probe Timeout Error: No signal being detected from probe

Troubleshooting:
Power off TMS and check/repair all cable connections/splices.
Confirm and correct TMS configuration for proper probe model number.
Connect probe directly to TMS, if possible, to eliminate field wiring problem.
Use test probe to eliminate probe problem.

Event Description for Errors (Continued)

Error	Display Message		Printout		Description
	Line 1	Line 2	Item	Event ID	
Leak/Point Level Sensor					
20	SensShort	(Sensor #) Err20	Input # (Sensor #)	Sensor	Short
Sensor Fault – Short Circuit: Wiring fault with all sensors except ES825-200F					
21	Sens Open	(Sensor #) Err21	Input # (Sensor #)	Sensor	Open
Sensor Fault – Open Circuit: Wiring fault with all sensors except ES825-200F					
22	SensFault	(Sensor #) Err22	Input # (Sensor #)	Sensor	Fault
Sensor Fault: Wiring fault with ES825-200F					
Troubleshooting:					
Power off TMS and check/repair all cable connections/splices.					
Confirm and correct TMS configuration for proper sensor model number and supporting configuration settings.					
Connect sensor directly to TMS, if possible, to eliminate field wiring problem.					
Use alternate sensor to eliminate sensor problem.					
Use alternate Sensor Interface Card to eliminate Interface Card.					

Note: ISCC or Intrinsically Safe Contact Closure is synonymous with Leak/Pt. Level Sensor

Warning Conditions:

With the exception for a Power Failure, Warning 21 (Power Failure), warning conditions are not logged in the Event Log. All warning conditions are printed automatically if printer is supplied. Warnings will produce an audible alarm and appear on the TMS display showing the specific warning condition and code number. Warning conditions may be user acknowledged via Front panel or Edit enable buttons.

Event Description for Warnings						
Warning	Display Message		Item	Printout		Description
	Line 1	Line 2		Event ID	Detail	
Modem						
1	Mdm Init	Warn 1	N/A	Modem	Init	Initialization Error
2	Mdm Cmd	Warn 2	N/A	Modem	Cmd	Command Error
3	Mdm Time	Warn 3	N/A	Modem	Time	Response Timeout Error
4	Mdm DCD	Warn 4	N/A	Modem	DCD	No Carrier
5	Mdm Comm	Warn 5	N/A	Modem	Comm	Communications Error
Troubleshooting:						
Use alternate Modem Card to eliminate Modem.						
6	Dialtone	Warn 6	N/A	Modem	Tone	No Dial Tone
Troubleshooting:						
Confirm phone line complies with POTS standard.						
Test phone line using known good telephone.						
Use alternate Modem Card to eliminate Modem.						
Configuration Checksum Error						
7	Tank Sum	Warn 7	Tank ID	Config	TnkSum	Tank
7	Cfg Tank	Warn 7	Tank ID	Config	Tank	Tank
8	Cfg Probe	Warn 8	Probe ID	Config	Probe	Probe
9	Header	Warn 9	N/A	Config	Header	Header
10	Rly Tank	Warn 10	Tank ID	Relay	Tank	Relay Tank
11	Rly CC	Warn 11	Input #	Relay	CC	Relay CC
12	Rly Sensr	Warn 12	Input #	Relay	Sensor	Relay Sensor
13	Rly Site	Warn 13	N/A	Relay	Site	Relay Site
14	Rly Mode	Warn 14	N/A	Relay	Mode	Relay Mode
15	CC Inp	Warn 15	Input #	Config	CC Inp	CC Input
16	Sensr Inp	Warn 16	Input #	Config	SensIn	Sensor Input
17	Inventory	Warn 17	N/A	Config	Invent	Inventory
18	Cfg Theft	Warn 18	N/A	Config	Theft	Theft
19	Cfg Modem	Warn 19	N/A	Config	Modem	Modem
20	Dialout	Warn 20	Dial #	Config	Dial	Dial Out
Troubleshooting:						
Power off TMS for two seconds to determine if problem is persistent.						
Review configuration in affected area and correct any invalid data.						
Restore configuration from a known good source.						
Repair/Replace Board containing System Memory. (P/N 900430-1 for TMS3000; P/N 900461-x for TMS2000 Series)						

Event Description for Warnings (Continued)						
Warning	Display Message		Item	Printout		Description
	Line 1	Line 2		Event ID	Detail	
Miscellaneous						
21	Pwr Fail	Warn21	N/A	Power	Fail	Power Fail Detected
Note: Reported after a 1-2 minute loss of power when the power has been restored.						
22	Dup TnkID	Warn22	Tank #	Dup	TankID	Duplicate Tank ID
Corrective Action: Reconfigure TMS so each Tank Channel has a unique Tank ID Number assigned.						
23	TnkID Len	Warn23	Tank ID	TankID	Length	Single Digit Tank ID Only
Corrective Action: Reconfigure TMS so each Tank Channel supporting a 7-digit maximum capacity has a single digit (1-9) Tank ID Number assigned						
24	Leak Abtrt	Warn24	Tank ID	Del IP	LkAbtrt	Leak Test Abort/Delivery
Note: Aborted in-tank leak test due to a delivery to the tank during the test. TMS will begin a new test as configured						
25	No Test	Warn25	Tank ID	MMTest	NoTest	No Monthly Test
Note: A warning associated with Auto Leak test mode alerting the owner that no monthly test has been completed.						
26	Pump(Line #) On	Warn26	N/A	Pump(#)	On	Pump Run on Line Test Failure
Note: The TMS has detected a pump is running that is associated with a pressurized line that failed its last leak test.						

Note: ISCC or Intrinsically Safe Contact Closure is synonymous with Leak/Pt. Level Sensor

Information Messages:

Information messages convey statuses generally considered to be advisory. These types of messages appear only on the TMS display until acknowledged via Front panel or Edit Enable/Theft Alarm Acknowledge buttons. They do not generate audible/visual alarms, are not captured in any of the system logs and do not generate printed reports.

Event Description for Information Messages		
Info #	Display Message	
	Line 1	Line 2
1	SP Units	Info01
<p>Note: TMS informs user in the TMS VIEW menu that the globally programmed Product SetPoint units for all enabled tanks have been changed in the Config Header menu AND Product SetPoint values have NOT been defined using the new units in the Config Tank menu. Corrective Action: Define Product SetPoints in the Config Tank menu.</p>		
2	Low Prod	(Tank ID) Info02
<p>Note: TMS informs user that the product float for the indicated tank has reached a float collar stop or its minimum gaugeable level some distance above the actual tank bottom. This condition is usually associated with probes requiring "Special Tank TOP mounting". The Ungaugeable Level may be configured for all enabled tanks in the Config Tank Menu.</p>		

APPENDIX B – MAINTENANCE

This maintenance documentation presumes that the system to be tested has been installed in accordance with all current documentation for the system and has been started up by a factory certified technician. If you feel that this service has not been performed, adequately or otherwise, please contact your local authorized Pneumercator service provider to make the necessary arrangements.

The TMS Series will be able to detect many conditions, including memory failure within the system, probe communication issues, and sensor wiring faults (when equipped with a Pneumercator fault detecting sensor). Reviewing and addressing any Alarm or Event conditions displayed on the TMS would be the best place to start for determining the proper functioning of the system. Inspection of all cabling for cracking or swelling and evaluating the condition of the splices will help to maintain a properly working system.

Before connecting or disconnecting ANY cables, power off the system. Once the cabling changes are complete, the system can be powered on.

While annual inspection is considered to be a good general practice, it may be required by regulation or application to perform inspections more frequently.

The following table includes a model specific list of additional points of inspection.

Model(s)	Check points
All TMS Systems	<ol style="list-style-type: none"> 1. If equipped with a printer, verify there is adequate paper. Press PRINT to verify the operation of the printer. If the printout is light or blank, verify the ribbon is seated properly. If so, replace the ribbon. Note: the printout generated will include a Full Inventory and Alarm Status report which can be used for further identification of problems. 2. Press the TEST button to verify all integrated lights and horn are functioning 3. Take a stick reading of each tank for both Product and Water and confirm that the TMS Level Reading matches the stick reading. If there is a discrepancy, perform the float height offset procedure as outlined in the Quick Startup Guide. 4. If In-Tank Leak Testing is required, confirm the results show passing tests and verify the schedule.
Rigid Probes (MP45xS)	Remove the probe to verify there is no damage or residue buildup on the floats or probe shaft. Clean as necessary. No annual calibration required. Recalibration required only if probe or floats are replaced.

<p>ES825-100F (non-discriminating)</p>	<p>Remove and inspect the sensor for physical damage. Test the sensor by placing in a nonreflective water-filled container shielded from ambient light. Verify the alarm received on the system display is as expected. Clean sensor to remove any contaminants.</p>
<p>ES825-200F (discriminating)</p>	<p>Remove and inspect the sensor for physical damage. Test the sensor by placing in a nonreflective water-filled container shielded from ambient light. Verify the alarm received on the system display is as expected. Repeat using a container filled with product. Clean sensor to remove any contaminants.</p>
<p>Float switch sensors: Includes: LS600, LS600LD, LS610, RSU800</p>	<p>Remove and inspect the sensor for physical damage or debris that may obstruct the movement of the float. Test the sensor by manipulating the float. Verify the alarm received on the system display is as expected. Clean sensor to remove any contaminants, as necessary.</p>
<p>HS100, HS100D</p>	<ol style="list-style-type: none"> 1. Flip the bottom cap upside-down to confirm the operation of the float switch 2. Refer to the documentation supplied with the sensor for proper testing procedures for the hydrocarbon sensing polymer strip. Contact Pneumercator for additional information.
<p>HS100ND</p>	<p>Refer to the documentation supplied with the sensor for proper testing procedures. Contact Pneumercator for additional information.</p>
<p>Remote Alarms: Includes all RA and select LC1000 systems</p>	<p>Press the Test button associated with the remote alarm. It is also recommended to simulate an alarm on the controlling system to verify the operation of the remote alarm.</p>
<p>Remote Displays: Includes TD1000 and ETD1000</p>	<p>Confirm the display of the TMS matches what is displayed on the Remote Display. Press the Test button to confirm proper operation of the display and integrated horn.</p>

APPENDIX C – DIP SWITCH SETTINGS (900430-1/900461-x)

The TMS 3000 is equipped with a modular processor board and the TMS 2000 is equipped with a Main System board located in the (left side) electrical non-intrinsically safe compartment of the console where power and control devices are handed. These boards are supplied with DIP Switches that have been factory set. Switches are centrally located near bottom of the processor card housed in a small rectangular Red enclosure (**marked S1**). The switches are numbered 1-4.

Note: Switch positions should not be field modified unless the TMS is first powered-down. All switches are set CLOSED at the factory and would rarely need to be changed.

DIP Switch Function/Condition:

Switch # 1: With the rocker arm in the OPEN position, this switch activates the System Error Handler and will produce an audible annunciator and a visual intermittent flashing display for variety of TMS system alarms, warnings, or error conditions. The TMS continuously scans for system faults. Errors may be printed automatically if printer is enabled. The audible annunciator and visual intermittent flashing Error message may be acknowledged via Front panel or Edit enable buttons.

Note: If a printer is not supplied with the TMS, a hardcopy of the condition(s) will not be available. The user may choose to CLOSE the rocker arm switch, which will allow the intermittent Error messages to continue until the condition is corrected.

Switch # 2 With the rocker arm in the OPEN position, this switch activates the System Motion Band Symbol, producing a lower case horizontal line to the right of the Tank I D #. This visual display represents movement of product in the tank for either Deliveries, Sales, or Thefts. Any of these conditions will be logged as a function of the motion band sensitivity setting, which is user programmed in the CONFIG menu, PROBE submenu. This symbol will disappear from the display within 3 minutes after the tank contents has settled and stopped moving. The motion band symbol will also be present on system power up. The audible annunciator will not be activated during this condition.

Switch # 3 With the rocker arm in the OPEN position, this switch activates the TMS Communication Security feature. This feature is used when a pass code is desired to prevent unauthorized access when communicating with the TMS. This switch works in conjunction with the Security setting found in the Header menu.

Switch # 4 With the rocker arm in the CLOSED position, this switch activates the System Watch Dog feature. This switch is utilized for factory servicing only and should not be changed in the field. In the CLOSED position, neither the audible annunciator nor a visual intermittent flashing message is activated by the Watch Dog condition.

PNEUMERCATOR TMS SERIES

LIMITED WARRANTY

TMS Series

Pneumercator, here and after referred to as **PCO**, warrants its **TMS Series** family of products to be free of defects in material and workmanship for a period of **Twelve (12) months** from date of installation or **Fifteen (15) months** from date of invoice, whichever comes first.

During the warranty period on the **TMS Series**, **PCO**, or factory third party independent representatives will repair or replace the product at the location where it is installed at no additional cost to the customer.

Packages must be inspected upon receipt for damage, missing parts, and/or manuals. **PCO** must be contacted by telephone immediately with a description of damaged or missing parts so replacements can be sent. Written details must be sent within **thirty (30) days**.

Pneumercator will not be responsible for shipping charges incurred by the customer.

Warranty repair coverage invoices will be paid if **all** the following conditions are met:

- PCO has acknowledged and authorized warranty work to be done by issuing a *Warranty Repair Number*.
- Start-up Service technician has been trained by PCO
- Warranty start-up form has been submitted to PCO
- Technician fills out and submits a PCO "Service Report"
- Parts (if any) used are returned to PCO with a proper WRGA (*Warranty Return Goods Authorization*)
- Return parts are defective.

Repair time will be paid according to PCO document "Standard Warranty Labor Charge Schedule"

If the Warranty Registration/Start up Check List has been completed and returned on file with the factory and the product is installed in accordance with the specific PCO Installation Product Manual, PCO will activate and meet warranty criteria as described above. Warranty criteria shall be voided if any product has been subjected to misuse, negligence, damage from acts of nature (lightning, wind, rain, etc.) or is in violation of the products design intent, disregard to warnings, instructions, modified or repaired by unauthorized personnel or improperly installed. Given that the third party independent contractor has installed the equipment in accordance with the specific product instruction manual, and followed all precautions, PCO will fulfill the terms stated in our warranty obligation.

Under no circumstances does the warranty provide a remedy in excess of the equipment. No other expressed or implied warranty is given by PCO. PCO shall not be liable for consequential damages or any expenses incurred by the user.



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