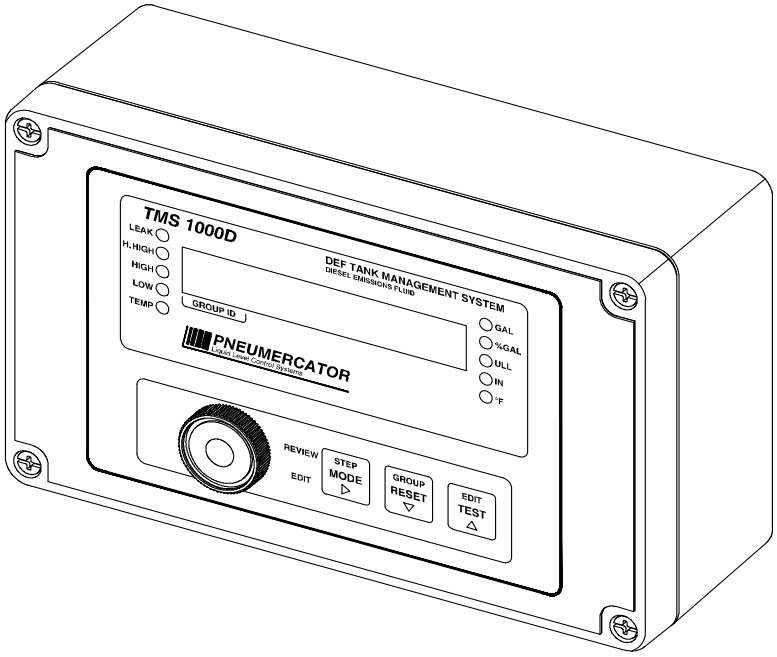
PNEUMERCATOR
Liquid Level Control Systems

SINGLE
DEF TANK
MONITORING
SYSTEM

OPERATION & MAINTENANCE MANUAL



DRAWING NO. 20156 REV. N/C

MODEL TMS1000D

1785 EXPRESSWAY DRIVE NORTH
HAUPPAUGE, NY 11788

TEL: (631) 293-8450
FAX: (631) 293-8533
http://www.pneumercator.com

Note: A separate INSTALLATION MANUAL is available, but NOT required for TMS1000D operation.

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SECTION 1 – SYSTEM OVERVIEW

1.1 FRONT PANEL DESCRIPTION

As illustrated in Figure 1-1 below, the TMS1000D 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, and user-friendly pushbutton controls.

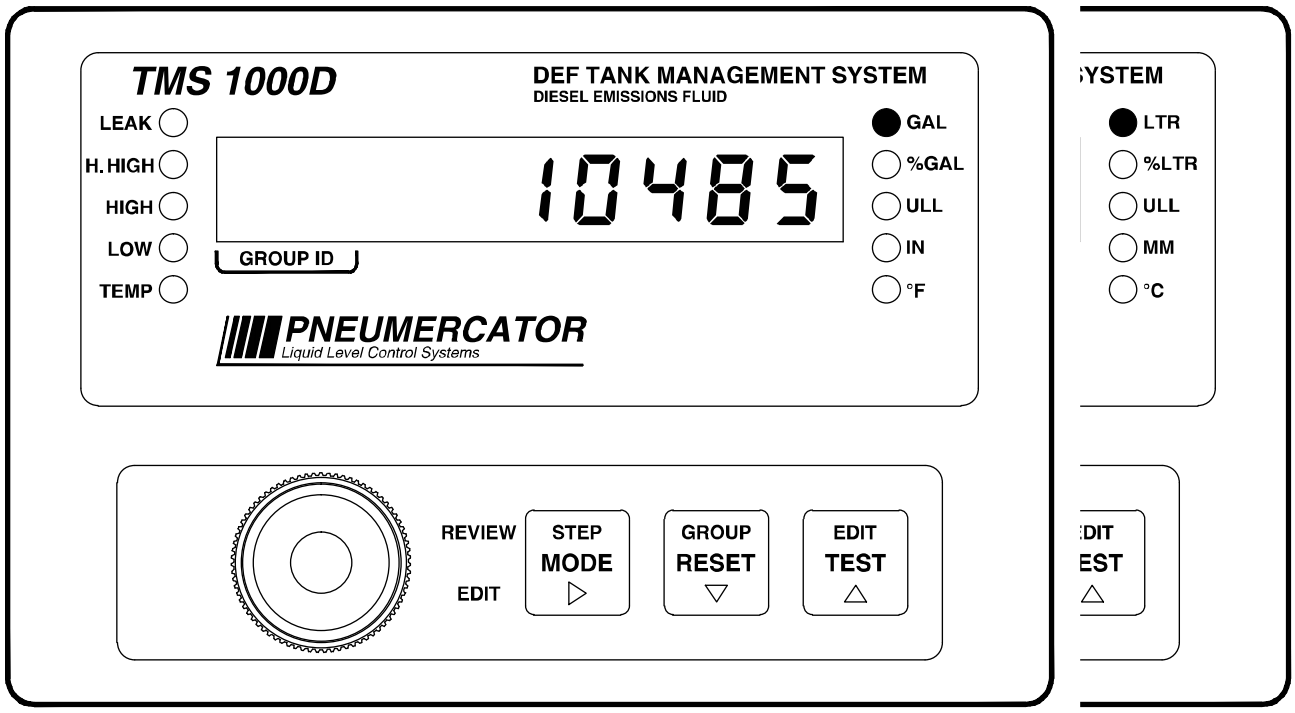

Figure 1-1 – Front Panel Overview

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 away from console. Five additional LED annunciators provide indication of units of measure of the currently selected display data. See Figure 1-2 below.

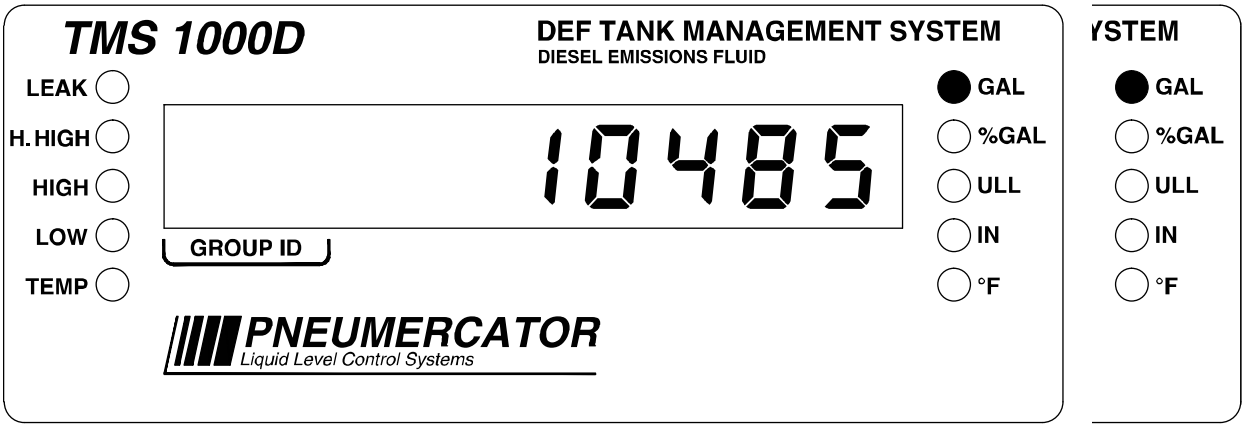

Figure 1-2 – Front Panel Display

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 the Reset 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	Critical High, Critical Low	Medium Fast (100ms)
	High High, Low Low	Medium Slow (200ms)
	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 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 "rEAd inG/ConF iG" (Reading/Configuration).

3. System initialization, including pre-start-up calculations.
   Display shows "SYStEn/ in it" (System/Initialization).

4. Firmware version identification. The TMS displays the current firmware versions installed in the system. This information may be requested by Pneumercator's Technical Support department for troubleshooting purposes.

5. Visual display and audible alarm check.
   Display shows "88888888" (88888888) with all LEDs on, audible alarm beeps **twice**.

6. 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, "WArn2 I/Pwr FA iL" Warning 21, Power Failure. This message is normal, and is just informing the user that the TMS has detected a power failure. Once acknowledged by the user by pressing the Mode pushbutton, this message will disappear from the display.

2.2 OVERVIEW

TMS front panel operation is defined by three user-selectable modes, View, Access, and Test, all selected using the MODE and TEST pushbuttons. See Figure 2-1, System Function Tree below.

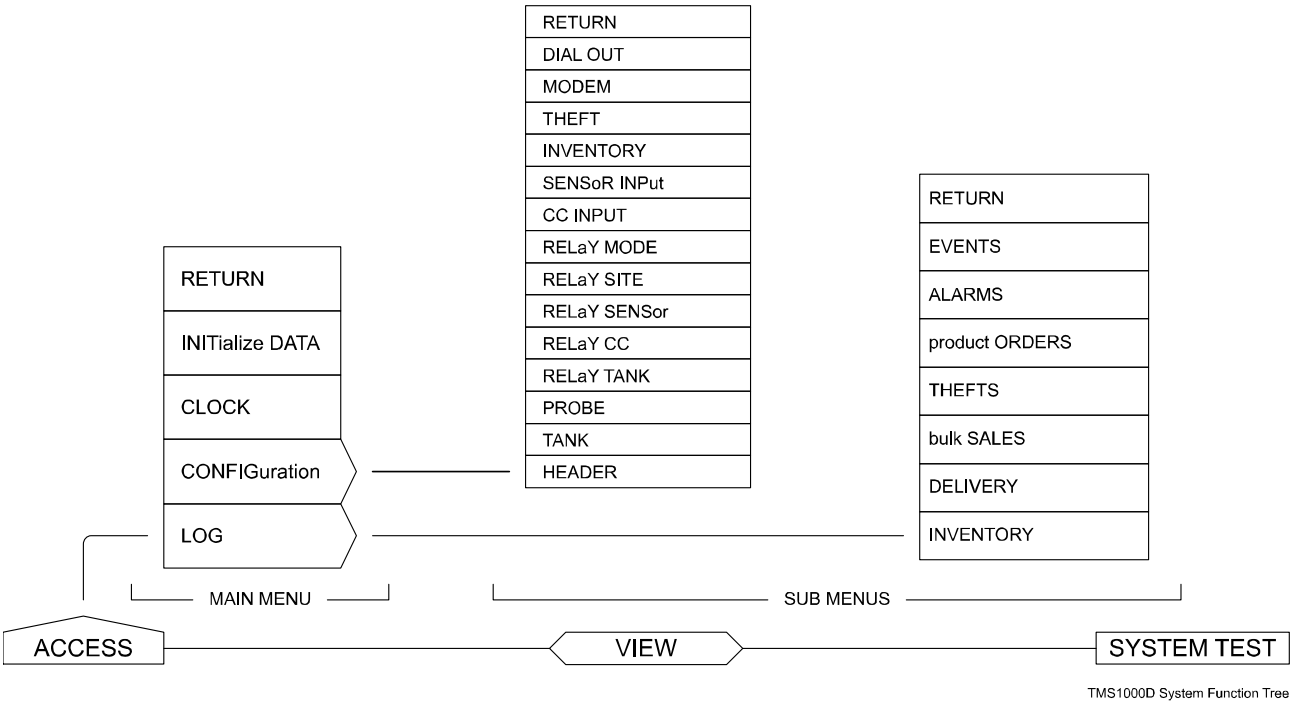

Figure 2-1 – System Function Tree

View: The 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, net (temperature compensated) volumes, percent of capacity, 90% ullage, product and water levels, product temperature, and product type. In addition, alarm and error conditions are annunciated in the View mode.

Access: The access mode provides access to all of the menus and submenus shown in Figure 2-1. In this mode the user can review report logs; review and edit system configuration data; perform initialization functions; and read or set the system clock.

Test: The 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

Looking at the names assigned to the console front panel pushbuttons and display field, note that some appear in black lettering, others in orange. Only the **black**-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 as indicated on the front panel. The LED annunciators on the left-hand side indicate alarm conditions. An alarm indicator is active when the particular LED is on.

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. Display items include, in order of appearance;

	English		Metric	
Display Item	**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, depress and immediately release MODE. The product name will appear for two seconds, and then the display will revert back to displaying the currently selected data item.

RESET: The RESET pushbutton is used to provide an acknowledgement of the integrated audible annunciator. The RESET button will have no effect on the Alarm LEDs.

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

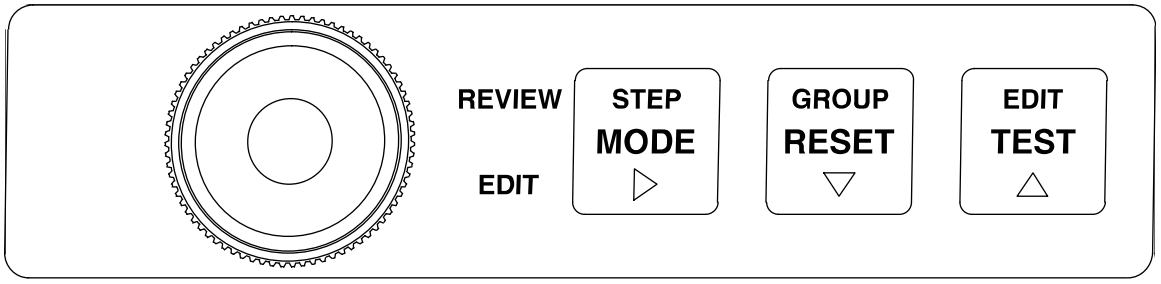

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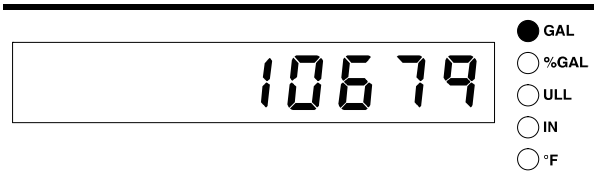
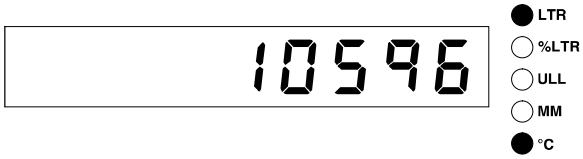
Figure 2-2 – Front Panel Buttons

Front Panel Alarm Acknowledgment:
Alarm, error or warning conditions, which occur during VIEW mode, will activate the front panel visual and audible annunciators. Depending upon user configuration programming, 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 alarm errors, or warnings occur, the audible annunciator will again be activated.

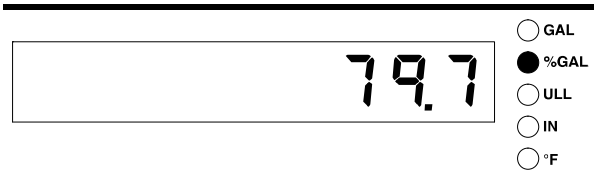
See below: Actual TMS Visual representation of Front Panel displayed items, in order of appearance:



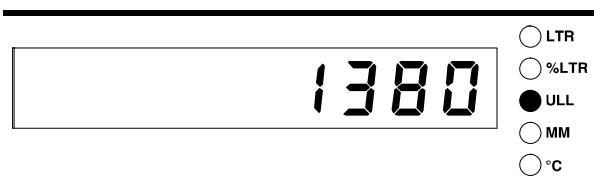
Gross Volume = 10679 Gallons



Net Volume = 10596 Liters

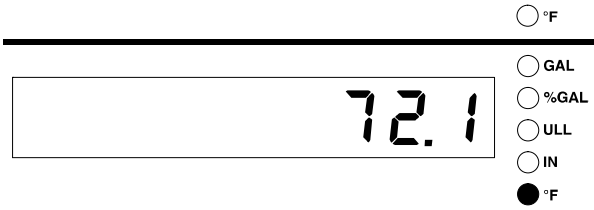


Percent Volume = 79.7% of Capacity



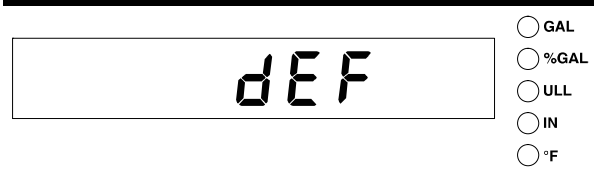
90% Ullage = 1380 Liters
(90% is default)

Product Level = 106.8 Inches



Product Temperature = 72.1°F

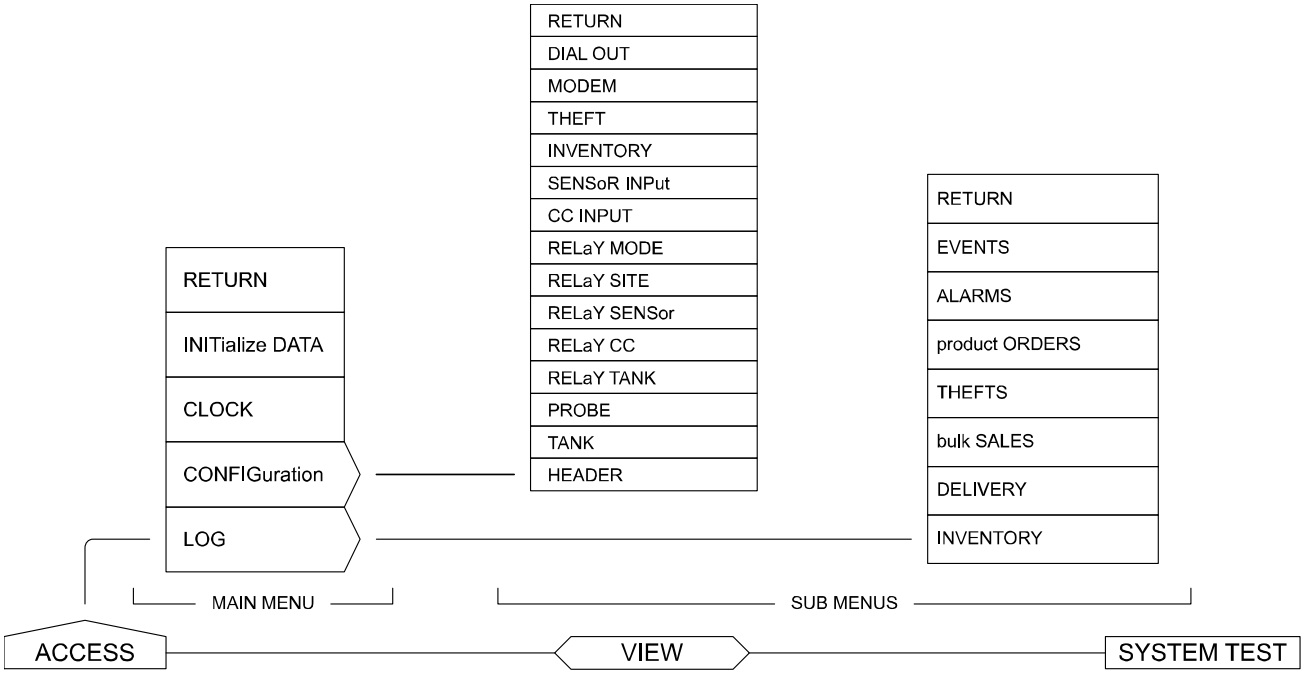
Pressing the MODE button until the TMS BEEPS, will advance through the above list



Product Type = DEF

Press and release MODE to reveal Tank Name

2.4 ACCESS MODE



TMS1000D System Function Tree

Within the **ACCESS** mode there are several levels of menus and sub-menus, as illustrated in Figure 2-1. The main menus include **LOG** reports, **CONFIG**uration, **CLOCK** read/set, and Log/Configuration memory **INIT**ialization. Note: that the LOG and CONFIG main menus contain numerous sub-menus. These sub-menus will be described in detail later in this section. The main menus are as follows:

LoG The LOG menu is used to review any of the various log reports generated by the TMS. The system does not allow the user to edit any of these reports.

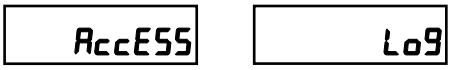
ConF iG The CONFIGuration menu is used to review or edit system configuration data.

C lock The CLOCK menu is used to edit system date, time, and day of the week.

In it dAtA The INITialization menu is used to initialize all or selected log report groups, or configuration memory.

How to enter the 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 the **ACCESS** mode. The display will appear as follows:



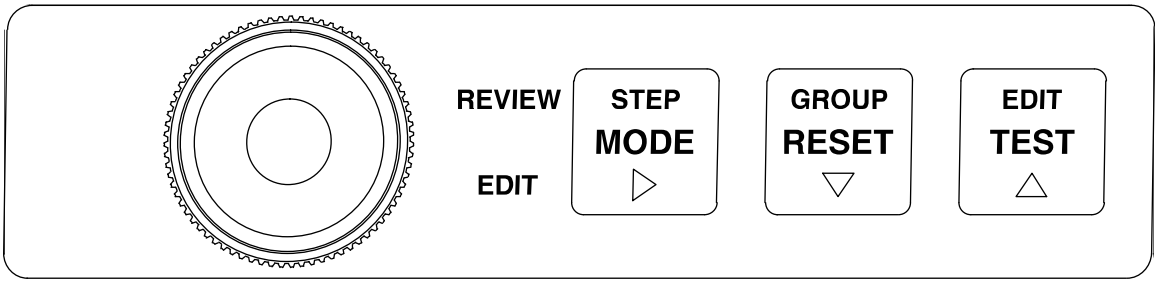
where LOG is the first main menu

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

Pushbutton Operation:

Within the **ACCESS** mode there are two basic types of operations that the user can perform: REVIEW and EDIT. 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 MODE is available in all menus and sub-menus.



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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: The GROUP pushbutton selects from a list of numbered menu items. This selection is generic, and refers to the fact that, depending upon which menu the user has entered, GROUP will select the next relay, leak sensor, log record, etc.

EXAMPLE: If the user enters a relay setup menu, GROUP will select the next relay, and the GROUP ID display field will indicate the relay number. If the user enters the INVENTORY LOG menu, which stores up to 6 records, depressing GROUP will step to the next inventory record and the GROUP ID display field will represent the inventory record number 1 through 6.

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 opening the **EDIT ENABLE** DIP switch 1 located on the main board. An audible beep informs the user when editing in inhibited. Once **EDIT ENABLE** has been opened, editing is enabled for as long as the user remains in the ACCESS mode even if the switch is returned to the closed position. 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 opening **EDIT ENABLE** to re-enable editing.

EDIT MODE: EDIT is the mode of operation within the **ACCESS** mode used to modify configuration or clock data within the system. EDIT MODE is available in the CONFIG, CLOCK, and INIT DATA sub-menus.

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 2-2.

▶: 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.

2.5 TEST MODE

The TEST mode is initiated by depressing the TEST pushbutton. This action activates all of the front panel display LED segments and LED annunciators for visual verification, and will produce a double beep from the audible annunciator for audible verification.

SECTION 3 – ACCESS MODE MENUS

3.1 LOG

ACCESS

LoG	System reports
ConF iG	System configuration
C lock	Set system clock
In it dAtA	Resets select data to initialized values
rEturn	Exits access menu

The LOG menus listed below are a grouping of historical or on-demand records.

			Max records
InvEntorY	Inventory	- Scheduled inventory snapshots	6
dEL ivEry	Deliveries	- Delivery (Product added) transactions	4
SALES	Sales	- Bulk sales (Product removed) transactions	4
tHEFtS	Thefts	- Theft incidents	2
OrdErS	Product Order	- On-demand product reorder report	1
ALArMS	Alarms	- Probe/sensor alarms	12
EvEntS	Errors	- System errors/events	4

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 at the bottom of this page. See the following Sections for complete details for each Log submenu. A list of definitions used throughout the LOG submenus are provided below:

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].

Inventory: A scheduled Shift Inventory report as configured in the Inventory submenu of the Configuration menu.

Delivery: Addition of Product to the storage tank.

Sales: 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: 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 as defined in the Tanks submenu in the Configuration menu.

Orders: 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.

Alarms: System Alarms including High, Low and Leak conditions.

Events: System Errors and Warnings that may represent a critical problem with the TMS.

3.1.1 INVENTORY LOG

LoG

			Max
InvEntorY	**Inventory**	Scheduled inventory snaphots	6
dEL ivEry	Deliveries	Product delivered to storage tank	4
SALES	Bulk Sales	Product sold from storage tank	4
tHEFtS	Thefts	Unauthorized withdrawal from tank	2
OrdErS	Product Reordering Report	Product reordering report	1
ALArMS	Alarms	Alarms	12
EvEntS	Events	Events/Errors	4
rEturn	Return	Exits LOG menu	

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

Record Storage Capacity: 6

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)

3.1.2 DELIVERY LOG

LoG

InvEntorY	Inventory
dEL ivErY	**Deliveries**
SALES	Bulk Sales
tHEFtS	Thefts
OrdErS	Product Reordering Report
ALArMS	Alarms
EvEntS	Events
rEturn	Return

dEL ivErY 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: 4

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:

nn-dd	Date (Month-Day): Date the Delivery was recorded. Note: an empty record will show 00-00.
HH' nn	Time (Hour' Minute): 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	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:

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

Exit Delivery submenu:

rEturn	Return: Press EDIT (TEST) to exit Delivery submenu.

Note: Press STEP (MODE) to return to top of Delivery submenu showing nn-dd (Month-Day)

3.1.3 SALES LOG

LoG

InvEntorY	Inventory
dEL ivErY	Deliveries
SALES	**Bulk Sales**
tHEFtS	Thefts
OrdErS	Product Reordering Report
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: 4

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	Date (Month-Day): Date the Bulk Sale was recorded. Note: an empty record will show 00-00.
HH' nn	Time (Hour' Minute): 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	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:

bEG in Ht	Beginning Height: Total Liquid Level at the Beginning of the Bulk Sale.
End Ht	Ending Height: Total Liquid Level at the End of the Bulk Sale.
bEG tEmP	Beginning Temperature: Average Product Temperature at the Beginning of the Bulk Sale.
End tEmP	Ending Temperature: Average Product Temperature at the End of the Bulk Sale.
Gr bEG in	Gross Beginning Volume: Total Gross Volume at the Beginning of the Bulk Sale.
Gr End	Gross Ending Volume: Total Gross Volume at the End of the Bulk Sale.
Gr diFF	Gross Difference: Total Gross Volume Sold from tank. Calculated as: (Gross Beginning Volume) – (Gross Ending Volume).
nEt bEG in	Net Beginning Volume: Total Net Volume at the Beginning of the Bulk Sale.
nEt End	Net Ending Volume: Total Net Volume at the End of the Bulk Sale.
nEt diFF	Net Difference: 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)

3.1.4 THEFTS LOG

LoG

InvEntorY	Inventory
dEL ivErY	Deliveries
SALES	Bulk Sales
tHEFtS	**Thefts**
OrdErS	Product Reordering Report
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: 2

TMS Configuration Prerequisites:
Configuration menu, Tank submenu, Theft Enable: Enables Theft monitoring.
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:

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:

bEG in Ht	Beginning Height: Total Liquid Level at the Beginning of the Theft.
End Ht	Ending Height: Total Liquid Level at the End of the Theft.
bEG tEmP	Beginning Temperature: Average Product Temperature at the Beginning of the Theft.
End tEmP	Ending Temperature: Average Product Temperature at the End of the Theft.
Gr bEG in	Gross Beginning Volume: Total Gross Volume at the Beginning of the Theft.
Gr End	Gross Ending Volume: Total Gross Volume at the End of the Theft.
Gr diFF	Gross Difference: Total Gross Volume Stolen from tank. Calculated as: (Gross Beginning Volume) – (Gross Ending Volume).
nEt bEG in	Net Beginning Volume: Total Net Volume at the Beginning of the Theft.
nEt End	Net Ending Volume: Total Net Volume at the End of the Theft.
nEt diFF	Net Difference: Total Net Volume Stolen from tank. Calculated as: (Net Beginning Volume) – (Net Ending Volume).

Exit Thefts submenu:

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

3.1.5 PRODUCT ORDER LOG

LoG

InvEntorY	Inventory
dEL ivErY	Deliveries
SALES	Bulk Sales
tHEFtS	Thefts
OrdErS	**Product Reordering Report**
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:

nn-dd	Date (Month-Day): Date the Product Reordering Report was generated. Note: an empty record will show 00-00.
HH' nn	Time (Hour' Minute): 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	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:

dEL dAtE	Delivery Date: Date of Last Delivery recorded in the Delivery Log.
dEL Ant	Delivery Amount: Gross Difference (Gross Volume delivered) recorded in the Delivery Log.
Gr bEG in	Gross Beginning Volume: Gross Beginning recorded in the Delivery Log.
Gr End	Gross Ending Volume: Gross Ending recorded in the Delivery Log.
tOtAL USE	Total Usage: Gross product used since last delivery calculated as: (Gross Ending Volume) – (Current Gross Volume)
dAYS	Days: Number of Days since the last Logged Delivery.
dAiLY USE	Daily Use: Average daily usage in Gross Volume calculated as: (Total Usage) ÷ (Days)
USEAbLE	Usable: Current Usable Gross Volume calculated as: (Current Gross Volume) – (Unusable Volume)
dAYS LEFt	Days Left: Estimated number of days of Usable Gross Volume calculated as: (Usable) ÷ (Daily Use)
ULLAGE	Ullage: Gross Volume required to fill tank to defined Ullage Threshold. See Configuration menu, Header submenu, Ullage Limit.

Exit Orders submenu:

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

3.1.6 ALARMS LOG

LoG

InvEntorY	Inventory
dEL ivErY	Deliveries
SALES	Bulk Sales
tHEFtS	Thefts
OrdErS	Product Reordering Report
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: 12

TMS Configuration Prerequisites:
Configuration menu, Tank submenu: Configure Product and Temperature 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	Date (Month-Day): Date the Alarm occurred. Note: an empty record will show 00-00.
HH' nn	Time (Hour' Minute): 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	Alarm: The Name of the Alarm that occurred. i.e. Sump or High
GrouP Nun	Group Number: Group number name changes to reflect hardware in alarm.
tAnk id	Tank ID: Tank ID configured in TMS.
InPut id	Input ID: Hardware Input Number for CC or Sensor Input
ALArn id	Alarm ID: The Category of Alarm that occurred. i.e. Sensor or High
dEtA iL	Detail: Additional Details that further clarify the combined meaning of Alarm and Alarm ID. i.e. Open or Level

Exit Alarms submenu:

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

ALARM CONDITIONS INCLUDE:
Product SetPoints (High High, High, Low)
Temperature (High High, High, Low, Low Low)
CC (Non-Hazardous Contact Closure Input)
Sensor

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

3.1.7 EVENTS LOG

LoG

InvEntorY	Inventory
dEL ivErY	Deliveries
SALES	Bulk Sales
tHEFtS	Thefts
OrdErS	Product Reordering Report
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: 4

TMS Configuration Prerequisites: N/A

Group ID: Record Number.

Record Identification Data:

- nn-dd Date (Month-Day): Date the Error/Warning occurred.
  Note: an empty record will show 00-00.
- HH' nn Time (Hour' Minute): 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 Nun Error Number: A 2-digit numeric Error Number.
- WArn Nun Warning Number: A 2-digit numeric Warning Number.
- tAnk id Tank ID: As Assigned in the Configuration menu, Tank submenu.
- InPut id Input ID: As Assigned in the Configuration menu, CC Input or Sensor Input submenu
- EvEnt id Event ID: Category of the Event including Probe, Sensor, or Power.
- dEtAiL Detail: Provides additional details for the reported Error or Warning

Exit Events submenu:

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

Event log reports may contain any combination of the following data:

EVENT CONDITIONS

Errors:	**Codes:**
System	
Serial Prom (CM1)	05
Probe	
Probe Level	10
Probe Timeout	11
Probe Temperature	13
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
Front End Communication	28

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.**

3.2 CONFIGURATION

ACCESS
- LoG
- ConF iG
- C lock
- In it 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 LOG**.** Pressing the EDIT (TEST) button again would cause LOG to blink. Once LOG is blinking, press the ▲ (TEST) button to go to the CONFIG menu. Once CONFIG is blinking, pressing the ▶ (MODE) button will enter the CONFIG menu revealing the HEADER submenu.

The CONFIG menu is used to review or edit system configuration data.

Note: 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.

Entry Type: Either a numeric value or a list of choices designated by the system.

Range Limits: Selects and enters a numeric value within a fixed boundary, set by the system.

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

To select and step through other records while in the CONFIG menu, pressing the ▲ (TEST) button at the flashing term such as HEADER will increment the system to the next menu. i.e. TANK, then PROBE, etc. The ▼ (RESET) button at the flashing term such as HEADER will decrement the system to the next menu. i.e. RETURN, then DIAL OUT, etc.

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 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

3.2.1 HEADER

CONFIG

HEADER	**Header - Global System Settings**
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

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

SECURITY — 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 AL

UNIT ID — Unit ID: 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: Identifies TMS with Unit ID when Dialing Out to computer with Autopolling application
Entry Type: 3-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: This entry allows the user to select the baud rate for the 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: **9.6**

SEr iALFnt Serial Format: This entry allows the user to select the serial format for the RS-232 serial communications port in the TMS.
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
Default/Initialized value: **n-8- 1**

SP 1 LEd
SP2 LEd
SP3 LEd Product SetPoint LED assignment: 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 iH igh**: High High
SP2 LED: **H igh**: High
SP3 LED: **Lo**: Low

Note: The default LED assignments are recommended for the TMS1000D due to the matching labelling of the Product SetPoint LEDs.

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**

ULL L in it 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**

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)

3.2.2 TANK

CONFIG

HEADER	Header - Global System Settings
TANK	**Tank - Programming setup**
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

TANK — Tank: Contains Tank Channel specific settings including tank geometry, alarm setpoints, tank identification, and other tank customization options.

TANK 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

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: 01

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

CRIT HIGH / SP HIHI / SP HIGH / SP LO / LOLO / CRIT LO — 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. Setting the threshold to zero disables the SetPoint.
Entry Type: 3 digit numeric as a percent of total Tank Capacity.
Range Limits: 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 itHHorn
HiHi Horn
High Horn
Lo Horn
LoLo Horn
Cr itLHorn

Product 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. See above setting regarding mapping Product SetPoints to an SP Alarm LED. Logging is unaffected by this setting.
Entry Type: select list
Range Limits: Yes, No
Default/Initialized value:

Critical High:	no
High High:	YES
High:	YES
Low:	YES
Low Low:	no
Critical Low:	no

tEmP HiHi
tEmP High
tEmP Lo
tEmP LoLo

Temperature SetPoint Activation Thresholds: A Temperature SetPoint represents a range defined as a combination of two values: (1) the threshold is a numeric value that defines the temperature 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. Setting the threshold to zero disables the SetPoint.
Entry Type: numeric
Range Limits: -40.0 - 199.9ºF (-40.0 - 93.0ºC)
Default/Initialized value:

	ºF	ºC
High High:	90.0	32.0
High:	43.0	6.0
Low:	40.0	4.0
Low Low:	25.0	-4.0

HHtP Horn
HitP Horn
LotP Horn
LLtP Horn

Temperature SetPoint Horn: Indicates whether the integrated horn activates for the specified Temperature SetPoint. Logging is unaffected by this setting.
Entry Type: select list
Range Limits: Yes, No
Default/Initialized value:

High High:	YES
High:	no
Low:	no
Low Low:	YES

tAnk tYPE

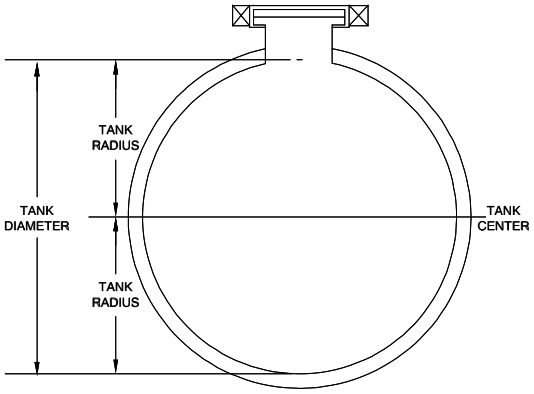
Tank Type: Select between the various Tank shapes supported by the TMS.
Entry Type: Select List
Range Limits: **Flat** (FLAt): Flat-ended horizontal cylinder, typically steel
Vertical (VErt): Tank with Vertical walls like vertical cylinders and rectangular and cubical
Custom 3 (CUSt 3): Symmetrical horizontal cylindrical tanks, typically with dished ends (fiberglass), with volume calculated using three volumes at predetermined heights provided by TMS.
Custom 8 (CUSt 8): Assymmetrical vertical tanks including trapezoid and L-shaped tanks (not common)
Cone (ConE): Vertical Cylindrical tanks with a Conical floor.
Default/Initialized value: FLAt

tAnk CAP

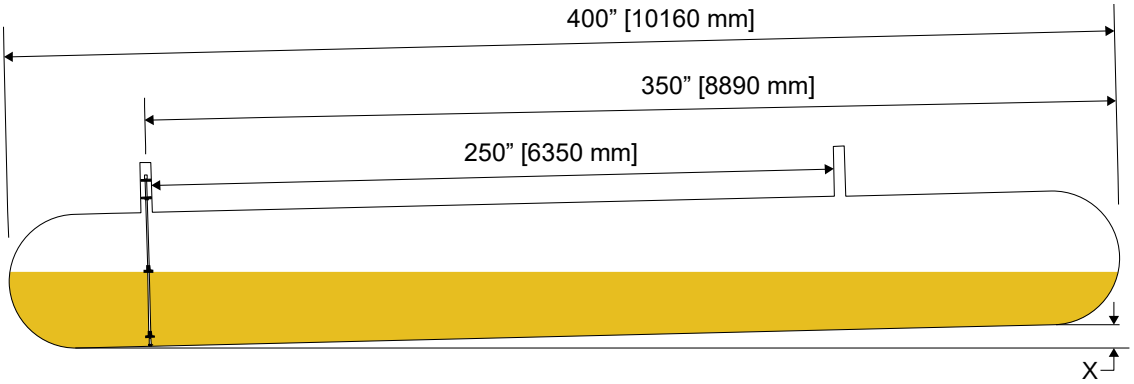
Tank Capacity: The maximum actual capacity of the tank being monitored. In general, if the capacity ends in zeroes, it is the marketing capacity. For example, a tank manufacturer may identify a tank as a 10,000-gallon tank but the manufacturer's calibration chart reveals the actual capacity is 9,841 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

MAn 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.
Entry Type: select list
Range Limits: None, 1-6
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 r iSE 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: **0.0** [**0**]



The user sticks and records fluid 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 fluid height difference is divided by the distance between the two risers.

See the above figure and following Examples:
English

User Measured values:
Fluid Level in Left Riser = 49.5" Fluid Level in Right Riser = 47"
D = Distance between the risers = 250" L = Total Tank Length = 400"

User Calculations:
S = Difference in fluid level between risers= 49.5" – 47" = 2.5"
Tank Rise (S × L ÷ D): 4" (2.5" × 400" ÷ 250")

Metric

User Measured values:
Fluid Level in Left Riser = 1250 mm Fluid Level in Right Riser = 1200 mm
D = Distance between the risers = 6350 mm L = Total Tank Length = 10160 mm

User Calculations:
S = Difference in fluid level between risers= 1250 mm – 1200 mm = 50 mm
Tank Rise (S × L ÷ D): 80 mm (50 mm × 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: **0.0** [**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: **0.0** [**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: **0.0** [**0**]

HE ,9ht 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: **0.0** [**0**]

UOLUNE 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 En Theft Enable: Enables Theft monitoring. 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**

UnUSEAbLE 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**

UnGAGEAbL Ungaugeable 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 a 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: **0.0** [**0**]

rEturn Return: Press EDIT (TEST) to exit Tank submenu.
Note: Press STEP (MODE) to return to top of Tank submenu showing **tAnk En** (Tank Enable)

3.2.3 PROBE

`ConF iG`

`HEAdEr`	Header - Global System Settings
`tAnk`	Tank - Programming setup
`ProbE`	**Probe - Programming setup**
`rELY tAnk`	Relay Tank - Programming tank related alarms to control relays
`rELY cc`	Relay Contact Closure - Programming contact closure inputs to control relays
`rELY SEnS`	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
`rELY S itE`	Relay Site - Programming site related alarms/errors to control relays
`rELY ModE`	Relay Mode - Status of relay operation
`cc inPut`	Contact Closure Input
`SEnSr inP`	Sensor Input
`InvEntorY`	Tank Inventory Log Data setup
`tHEFt`	Theft - Detection (Hours of operation)
`ModEm`	Modem Communications - Setup
`d iAL out`	Auto-Dial out - Setup for selected Alarms or Tank information
`rEturn`	Return - Exits CONFIG menu

`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.

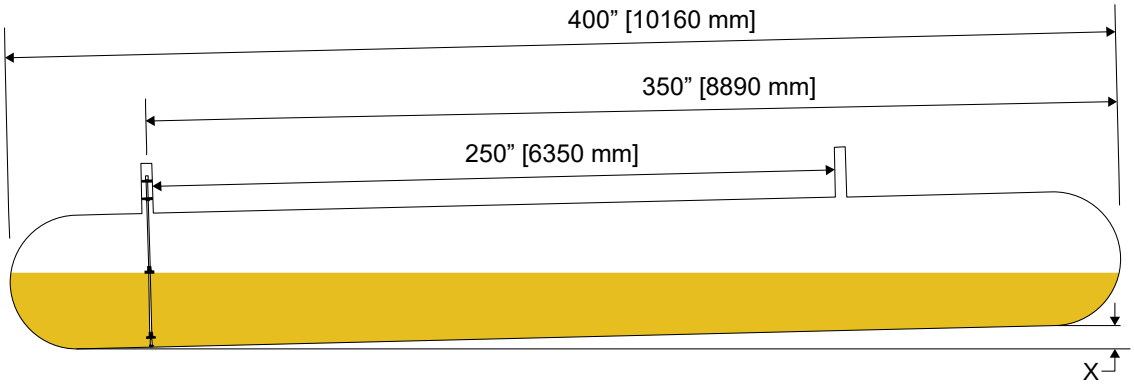
`ProbE tYP` Probe Type: The model number of the level gauging probe must be entered for accurate results. An incorrect selection may result in Probe Errors or inaccurate information. Found at the top of the probe on a label around the probe head (MP55x) or secured to the probe cable (MP56x).
Entry Type: select list
Range Limits: N/A
Default/Initialized value: `MP550`

Item List:		
`MP550` MP550	`MP---` Obsolete	`MP---` Obsolete
`MP552` MP552	`MP---` Obsolete	`MP551` MP551
`MP561` MP561	`MP562` MP562	`MP563` MP563

`ProbE LEn` Probe Length: Determines the location of the temperature sensors within the probe stem.
Entry Type: 5-digit numeric
Range Limits: Up to 1999.9 inches [Up to 49,999 millimeters]
Default/Initialized value: `0.0` [`0`]

`Prod HO` 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. 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: `0.0` [`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: **0.0** [**0**]



Mot bAnd 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: **0.20** [**5**]

Log 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**]

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)

3.2.4 RELAY TANK

`ConF ig`

`HEAdEr`	Header - Global System Settings
`tAnk`	Tank - Programming setup
`ProbE`	Probe - Programming setup
`rELY tAnk`	**Relay Tank - Programming tank related alarms to control relays**
`rELY cc`	Relay Contact Closure - Programming contact closure inputs to control relays
`rELY SEnS`	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
`rELY S itE`	Relay Site - Programming site related alarms/errors to control relays
`rELY ModE`	Relay Mode - Status of relay operation
`cc inPut`	Contact Closure Input
`SEnSr inP`	Sensor Input
`InvEntorY`	Tank Inventory Log Data setup
`tHEFt`	Theft - Detection (Hours of operation)
`ModEm`	Modem Communications - Setup
`d iAL out`	Auto-Dial out - Setup for selected Alarms or Tank information
`rEturn`	Return - Exits CONFIG menu

`rELY tAnk` <u>Relay – Tank Triggers:</u> 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 TMS1000D currently includes 4 Relay Outputs.

`CrtH tr ig` <u>Product SetPoint Triggers:</u>
`H iH i tr ig` Product SetPoints. Generally, represent High and/or Low Product.
`H igh tr ig` Entry Type: numeric list
`Lo tr ig` Range Limits: Each Relay: No (No Relay Assignment), 1-4
`LoLo tr ig` **Note:** Each assignment separated by decimal point.
`CrtL tr ig` Default/Initialized value: `no,no,no`

`HHtP tr ig` <u>Temperature SetPoint Triggers:</u>
`H itP tr ig` Temperature SetPoints. Generally, represent High and/or Low Temperature.
`LotP tr ig` Entry Type: numeric list
`LLtP tr ig` Range Limits: Each Relay: No (No Relay Assignment), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: `no,no,no`

`rEturn` <u>Return</u>: Press EDIT (TEST) to exit Relay Tank submenu.
Note: Press STEP (MODE) to return to top of Relay Tank submenu showing `CrtH tr ig` (Critical High Product SetPoint Trigger)

3.2.5 RELAY CONTACT CLOSURE

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	**Relay CC - Programming contact closure inputs to control relays**
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

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 TMS1000D includes 2 CC Inputs and 4 Relay Outputs. The Group ID shown corresponds to the Non-Hazardous Contact Closure (CC) Input Number.

CC TRIG — 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), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: NO.NO.NO

RETURN — Return: Press EDIT (TEST) to exit Relay CC submenu.
Note: Press STEP (MODE) to return to top of Relay CC submenu showing CC TRIG (CC Trigger)

3.2.6 RELAY SENSOR

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	**Relay Sensor - Using Intrinsically Safe sensor inputs to control relays**
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

RELY SENS — Relay – Sensor (ISCC) Input Triggers: Each Leak/Point Level Sensor (ISCC) Input can affect up to three relay outputs. The TMS1000D includes 2 Sensor Inputs and 4 Relay Outputs. The Group ID shown corresponds to the Leak/Point Level Sensor Input Number.

SENS TR.9 — 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), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: NO.NO.NO

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.9 (Sensor Trigger)

3.2.7 RELAY SITE

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	**Relay Site - Programming site related alarms/errors to control relays**
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

RELY SITE — 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 TMS1000D includes 4 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), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: NO.NO.NO

POWERFAIL — 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), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: NO.NO.NO

SYS ERROR — System Error Trigger: Any System Error, including Probe and Sensor 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), 1-4
Note: Each assignment separated by decimal point.
Default/Initialized value: NO.NO.NO

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)

3.2.8 RELAY MODE

`ConF iG`

`HEAdEr`	Header - Global System Settings
`tAnk`	Tank - Programming setup
`ProbE`	Probe - Programming setup
`rELY tAnk`	Relay Tank - Programming tank related alarms to control relays
`rELY cc`	Relay Contact Closure - Programming contact closure inputs to control relays
`rELY SEnS`	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
`rELY S itE`	Relay Site - Programming site related alarms/errors to control relays
`rELY ModE`	**Relay Mode - Status of relay operation**
`cc inPut`	Contact Closure Input
`SEnSr inP`	Sensor Input
`InvEntorY`	Tank Inventory Log Data setup
`tHEFt`	Theft - Detection (Hours of operation)
`ModEn`	Modem Communications - Setup
`d iAL out`	Auto-Dial out - Setup for selected Alarms or Tank information
`rEturn`	Return - Exits CONFIG menu

`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.

`NornALLY` 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 Ack` 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**

Cr itH OFF
H iH i OFF
H igh OFF
Lo OFF
LoLo OFF
Cr itL OFF

Product SetPoint Latch Off: Identifies the Product SetPoint that will 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: Specified Latch Off condition IS selected
Default/Initialized value: **tnk 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: Specified Latch Off condition IS selected as Sensor 1
Input 2: Specified Latch Off condition IS selected as Sensor 2
Default/Initialized value: **inP no**

HHtP OFF
H itP OFF
LotP OFF
LLtP OFF

Temperature SetPoint Latch Off: Identifies the Temperature SetPoint that will 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: Specified Latch Off condition IS selected
Default/Initialized value: **tnk no**

rEturn Return: Press EDIT (TEST) to exit Relay Mode submenu.
Note: Press STEP (MODE) to return to top of Relay Mode submenu showing **NornALLY** (Normally)

3.2.9 CONTACT CLOSURE INPUT

CONF.9

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	**Contact Closure Input**
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

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

OFF	Off	RELAY	Relay	GATE	Gate
ALARM	Alarm	ACK	Acknowledge	FPACK	Front Panel Ack

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	GENRTR	Generator	RES 1	Reserve 1
RES 2	Reserve 2	RES 3	Reserve 3	RES 4	Reserve 4
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

NornALLY 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**

Log ic 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**

t inEdELAY 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)

3.2.10 SENSOR INPUT

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	**Sensor Input**
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

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
LS610	LS610
RSU802	RSU802 (Future Use)

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

LS600	LS600
RSU801	RSU801 (Future Use)
ES825I	ES825-100F

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
CONTN	Containment
LEAK	Leak
GENRTR	Generator
VAULT	Vault
HIGH	High
LOLO	Low-Low

SUMP	Sump
DBWALL	Double-Wall
RESVOR	Reservoir
WATER	Water
HI RES	High Reservoir
HI HIGH	High-High
TRBINE	Turbine

PIPING	Piping
DIKE	Dike
WELL	Well
OIL	Oil
LO RES	Low Reservoir
LO	Low
DISPAN	Dispenser Pan

USEr nAnE 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**

nornALLY 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**

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)

3.2.11 INVENTORY

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	**Tank Inventory Log Data setup**
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

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. The 6-record capacity of the Inventory Log allows for two days of Snapshots.

HOUR 1
HOUR 2
HOUR 3

Snapshot Times: The TMS will record an Inventory Snaphot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. For if the example, 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

SUN ENABL
MON ENABL
TUE ENABL
WED ENABL
THU ENABL
FRI ENABL
SAT ENABL

Days of the Week: The TMS will record an Inventory Snaphot for every unique time configured in HOUR 1, HOUR 2, and HOUR 3 for the enabled Days of the Week. Enable each Day of the Week desired by choosing Yes.
Entry Type: select list
Range Limits: No, Yes
Default/Initialized value: no

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)

3.2.12 THEFT

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	**Theft - Detection (Hours of operation)**
MODEM	Modem Communications - Setup
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

THEFT — Theft – Detection (Hours of operation): Defines the Site Hours of Operation. Any loss of Product during the hours the facility is Closed is defined as a Theft. Individual Tank Channels may have Theft monitoring enabled with the Theft enable setting in the Tanks submenu within the Configuration menu.

M-F OPEN / M-F CLOSE — Weekdays (Monday – Friday) Hours of Operation: Define the hours the facility opens and closes during the week.
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

SAT OPEN / SAT CLOSE — Saturday Hours of Operation: Define the hours the facility opens and closes on Saturday.
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
Note: Set the Open and Close times to match if the facility is closed on Saturday.

SUN OPEN / SUN CLOSE — Sunday Hours of Operation: Define the hours the facility opens and closes on Sunday.
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
Note: Set the Open and Close times to match if the facility is closed on Sunday.

RETURN — Return: Press EDIT (TEST) to exit Theft submenu.
Note: Press STEP (MODE) to return to top of Theft submenu showing M-F OPEN (Monday-Friday Open)

3.2.13 MODEM

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	**Modem Communications - Setup**
DIAL OUT	Auto-Dial out - Setup for selected Alarms or Tank information
RETURN	Return - Exits CONFIG menu

MODEM — Modem: Allows the user to enable and configure the secure internal modem system within the TMS locking enclosure to assure a positive telephone link; free of tampering.

MODEM — Modem Selection: Select which type of modem is installed in the TMS.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: NONE
Item List: NONE = No modem installed; INTERNAL = Internal modem; -------- = Not available; PORT MDM = External serial port modem

BAUD RATE — Baud Rate: Defines the maximum baud rate allowed for the installed TMS modem.
Entry Type: Select list
Range Limits: 1.2K, 2.4K, 4.8K, 9.6K, 14.4K (K = 1,000. i.e 9.6K =9600)
Default/Initialized value: 2.4

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

TEL 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: DED /CRTED

RETURN — Return: Press EDIT (TEST) to exit Modem submenu.
Note: Press STEP (MODE) to return to top of Modem submenu showing MODEM (Modem)

3.2.14 DIAL-OUT

CONFIG

HEADER	Header - Global System Settings
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELY TANK	Relay Tank – Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY SENS	Relay Sensor - Using Intrinsically Safe sensor inputs to control relays
RELY SITE	Relay Site - Programming site related alarms/errors to control relays
RELY MODE	Relay Mode - Status of relay operation
CC INPUT	Contact Closure Input
SENSR INP	Sensor Input
INVENTORY	Tank Inventory Log Data setup
THEFT	Theft - Detection (Hours of operation)
MODEM	Modem Communications - Setup
DIAL OUT	**Auto-Dial out - Setup for selected Alarms or Tank information**
RETURN	Return - Exits CONFIG menu

DIAL 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 / TEL AREA / TEL AREA2 — 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.
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
---: Not Available
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:

CR HD AL	Critical High Product Alarm
HIHI AL	High High Product Alarm
HIGH AL	High Product Alarm
LO AL	Low Product Alarm
LOLO AL	Low Low Product Alarm
CR LD AL	Critical Low Product Alarm
THFT AL	Theft Alarm
CC AL	Non-Hazardous Contact Closure (CC) Input Alarm
SENS AL	Sensor (ISCC) Alarm
ERR AL	System Error

Entry Type: Select List
Range Limits: No, Yes
Default/Initialized value: no

Inv dIAL 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**

Inv 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)

3.3 CLOCK

ACCESS
- LoG
- ConF iG
- C lock
- In it dAtA
- rEturn

C lock — 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

HH'nn'SS — 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)

3.4 INIT DATA

ACCESS
LoG
ConFiG
Clock
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
dEL iVEry: Delivery Log
SALES: Bulk Sales Log
tHEFtS: Thefts Log
OrdErS: Product Reordering Report
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.
AII LoGS: All Logs
ConFiG: 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)

APPENDIX A

TMS CONSOLE ALARM & EVENT CONDITIONS TABLES

Alarm Conditions:
The following alarm conditions are recorded in the **Alarm Log**. 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 condition across the display. Theft alarms can only be acknowledged via the **Edit enable** button. The displayed message will continue until the condition is corrected.
CC and SENSOR alarms will produce an audible annunciator and appear on the TMS display showing a CC or SENSOR alarm message across the display. The audible annunciator can be acknowledged via Front panel or Edit enable buttons. The CC or SENSOR displayed message will continue until the condition is corrected.

Alarm Description			
Display			Description
LED	Message		
	Line 1	Line 2	
SP1 SP2 SP3	N/A	N/A	Product SetPoint Alarm. Factory defaults are as follows: Critical High: 98% Gr. Volume and higher High High: 95% Gr. Volume and higher High: 90% Gr. Volume and higher Low: 20% Gr. Volume and lower Low Low: 15% Gr. Volume and lower Critical Low: 12% Gr. Volume and lower
Temp	N/A	N/A	Product Temperature SetPoint Alarm: Factory defaults are as follows: High High: 90°F/32°C High: 43°F/6°C Low: 40°F/4°C Low Low: 25°F/-4°C
N/A	Theft (Tank ID)	(Tank Name)	Theft of product from the tank
N/A	CC (Input #)	(CC Input Name)	Device wired to CC Input is in alarm
N/A	Sensr (Input #)	(Sensor Input Name)	Point level (High, Low, etc.) sensor is in alarm
Leak	Sensr (Input #)	(Sensor Input Name)	Non-discriminating leak sensor is in alarm
Leak	Sensr o(Input #) Sensr w(Input #)	(Sensor Input Name)	Discriminating leak sensor (ES825-400FL) is in alarm

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

Error Conditions:
All Error conditions are recorded in the Event Log. 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. Errors conditions can only be silenced by acknowledging the Front panel buttons. The displayed error message will continue until the condition is corrected.

Event Description for Errors			
Error	**Display Message**		**Description**
	Line 1	**Line 2**	
Configuration Memory (CM1) Chip			
5	EEPROM	Err05	Checksum Error
Identification: 900699-1 Main Board: U11 socket			
Troubleshooting: Reseat CM1 Chip. Replace CM1 Chip. Repair/Replace Main Board, P/N 900699-1			
Magnetostrictive Probe			
10	Probe Err	(Tank ID) Err10	Probe Level Error: Invalid Fluid Level being received from probe
11	ProbeTime	(Tank ID) Err11	Probe Timeout Error: No signal being detected from probe
13	ProbeTemp	(Tank ID) Err13	Probe Temperature Error: Invalid Fluid Temperature being received 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.			
Leak/Point Level Sensor			
20	SensShort	(Sensor #) Err20	Sensor Fault – Short Circuit: Wiring fault with all sensors
21	Sens Open	(Sensor #) Err21	Sensor Fault – Open Circuit: Wiring fault with all sensors
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 Main Board to eliminate Main Board.			

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 (Pwr FAIL Warn21), warning conditions are not logged in the **Event Log**. 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 buttons.

Event Description for Warnings			
Warning	**Display Message**		**Description**
	Line 1	**Line 2**	
Modem			
1	Mdm Init	Warn 1	Initialization Error
2	Mdm Cmd	Warn 2	Command Error
3	Mdm Time	Warn 3	Response Timeout Error
4	Mdm DCD	Warn 4	No Carrier
5	Mdm Comm	Warn 5	Communications Error
Troubleshooting: Use alternate Modem Card to eliminate Modem.			
6	Dialtone	Warn 6	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
7	Cfg Tank	Warn 7	Tank
8	Cfg Probe	Warn 8	Probe
9	Header	Warn 9	Header
10	Rly Tank	Warn10	Relay Tank
11	Rly CC	Warn11	Relay CC
12	Rly Sensr	Warn12	Relay Sensor
13	Rly Site	Warn13	Relay Site
14	Rly Mode	Warn14	Relay Mode
15	CC Inp	Warn15	CC Input
16	Sensr Inp	Warn16	Sensor Input
17	Inventory	Warn17	Inventory
18	Cfg Theft	Warn18	Theft
19	Cfg Modem	Warn19	Modem
20	Dialout	Warn20	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 Main Board, P/N 900699-1.			
Miscellaneous			
21	Pwr Fail	Warn21	Power Fail Detected
Note: Reported after a 1-2 minute loss of power when the power has been restored.			
28	FrE Comm	Warn28	Front End Communication
Corrective Action: Indicates a communications failure on the Main Board. Power off the TMS1000D, wait at least two seconds, and power on the TMS1000D. If the Warning persists, the Main Board, P/N 900699-1, will need to be repaired or replaced.			

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 buttons. They do not generate audible/visual alarms, and are not captured in any of the system logs.

Event Description for Information Messages			
Info #	**Display Message**		**Description**
	Line 1	**Line 2**	
2	Low Prod	(Tank ID) Info02	Ungaugeable Level

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.**

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 TMS1000D 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
TMS	1. Press the TEST button to verify all integrated lights and horn are functioning 2. Take a stick reading of the tank 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.
Rigid Probes (MP55xS)	Remove the probe to verify there is no damage to the floats and no residue buildup on the floats or probe shaft. Clean as necessary.
ES825-300FL (non-discriminating)	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.
Float switch sensors: Includes: LS600, LS600LD, LS610, RSU800	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.
Remote Alarms: Includes all RA and select LC1000 systems	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.

APPENDIX C

TMS Main Board Dip Switch Settings

The TMS1000D is equipped with a Main System Board that is supplied with DIP switches that have been factory set. Switches are housed in a small rectangular Red enclosure and are numbered 1-4.

Note: As always, any mechanical or electrical modifications to TMS system (including switch settings), probe, sensor, or other accessories requires the console to be powered-down.

DIP Switch Function/Condition:

SW1: Edit Enable – With the rocker arm in the OPEN position, this switch activates the **Edit Enable** feature. This allows the user to make any necessary programming changes via the front panel buttons.

SW2: Unused – Factory set at Closed.

SW3: Motion Band Symbol – 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 ID #. 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 PROBE menu. 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.

SW4: Communications Security – 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.

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)*
- Returned parts are found to be 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.

Distributed by:

PNEUMERCATOR
Liquid Level Control Systems
1785 Expressway Drive North, Hauppauge, NY 11788
(631) 293-8450 Fax (631) 293-8533