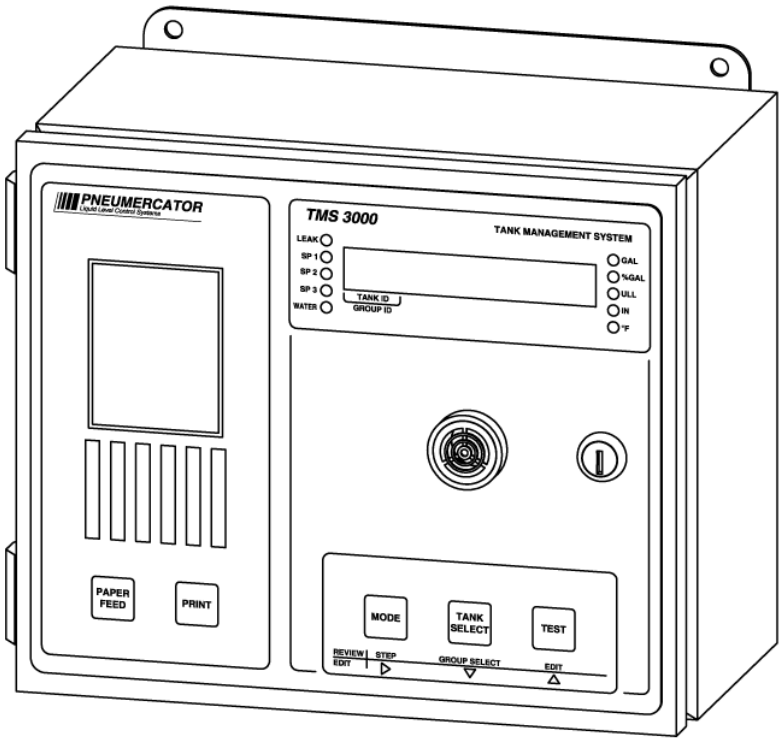
PNEUMERCATOR
Liquid Level Control Systems

MULTI TANK MONITORING SYSTEM

OPERATION MANUAL



DRAWING NO. 20001 REV. A

MODEL TMS 2000 and TMS 3000

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System Overview:

1.0 Front Panel Description:

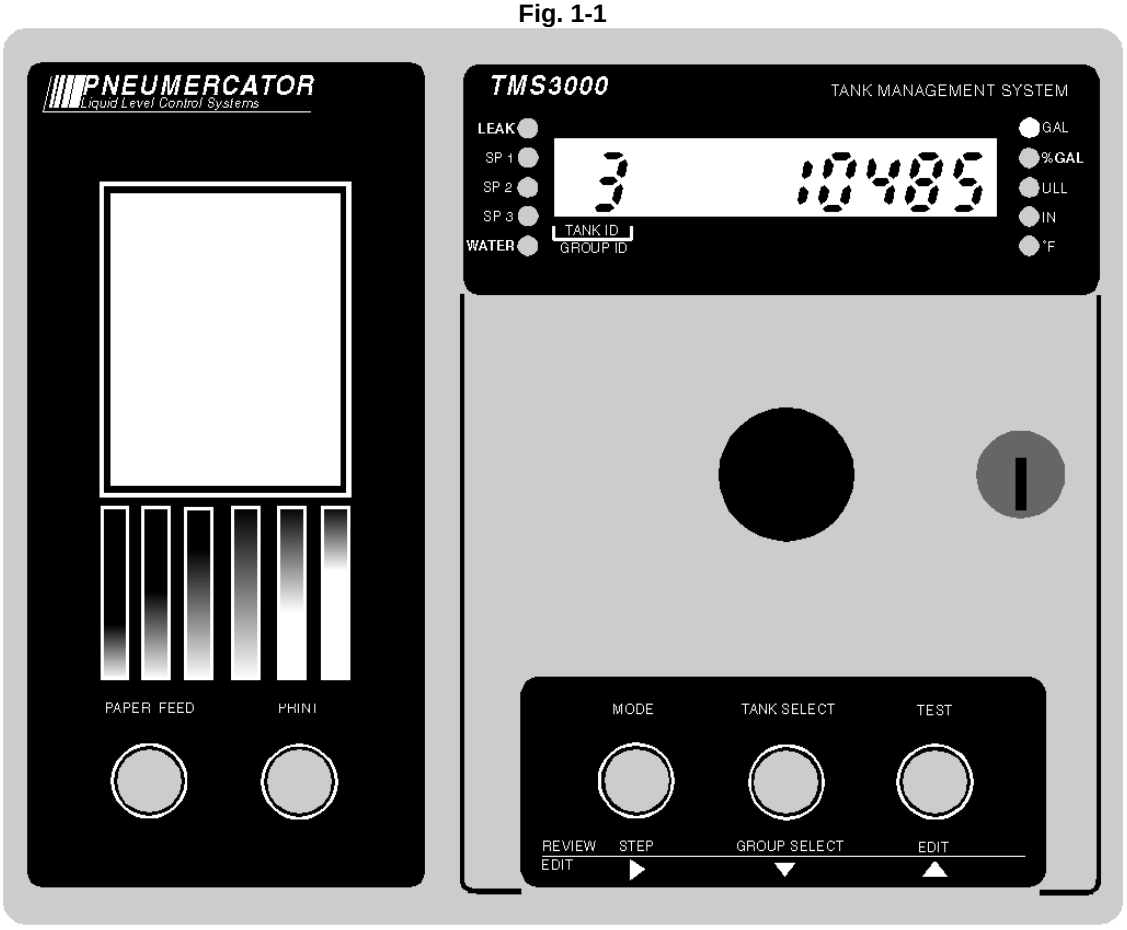
The front panel of the TMS is available in four different configurations as listed below:

-1... Console without display, without internal printer
-2... Console with display, no printer
-3... Console with display and internal printer
-4... Console with display and internal printer w/autowinder

This manual describes operational procedures pertaining to -2, -3, and -4 consoles.

As illustrated in Figure 1-1 below, the TMS front panel consists of an LED data display with visual alarm and mode annunciators, audible alarm annunciator, user -friendly pushbutton controls, security lock, and optional printer with or without autowinder.

Fig. 1-1



1.1 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.

1.2

1.2 Audible Annunciator:

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 " rEAding**/**Config (Reading /Configuration).

3. System initialization, including pre-start-up calculations.
   Display shows " systEn/init" (System/Initialization).

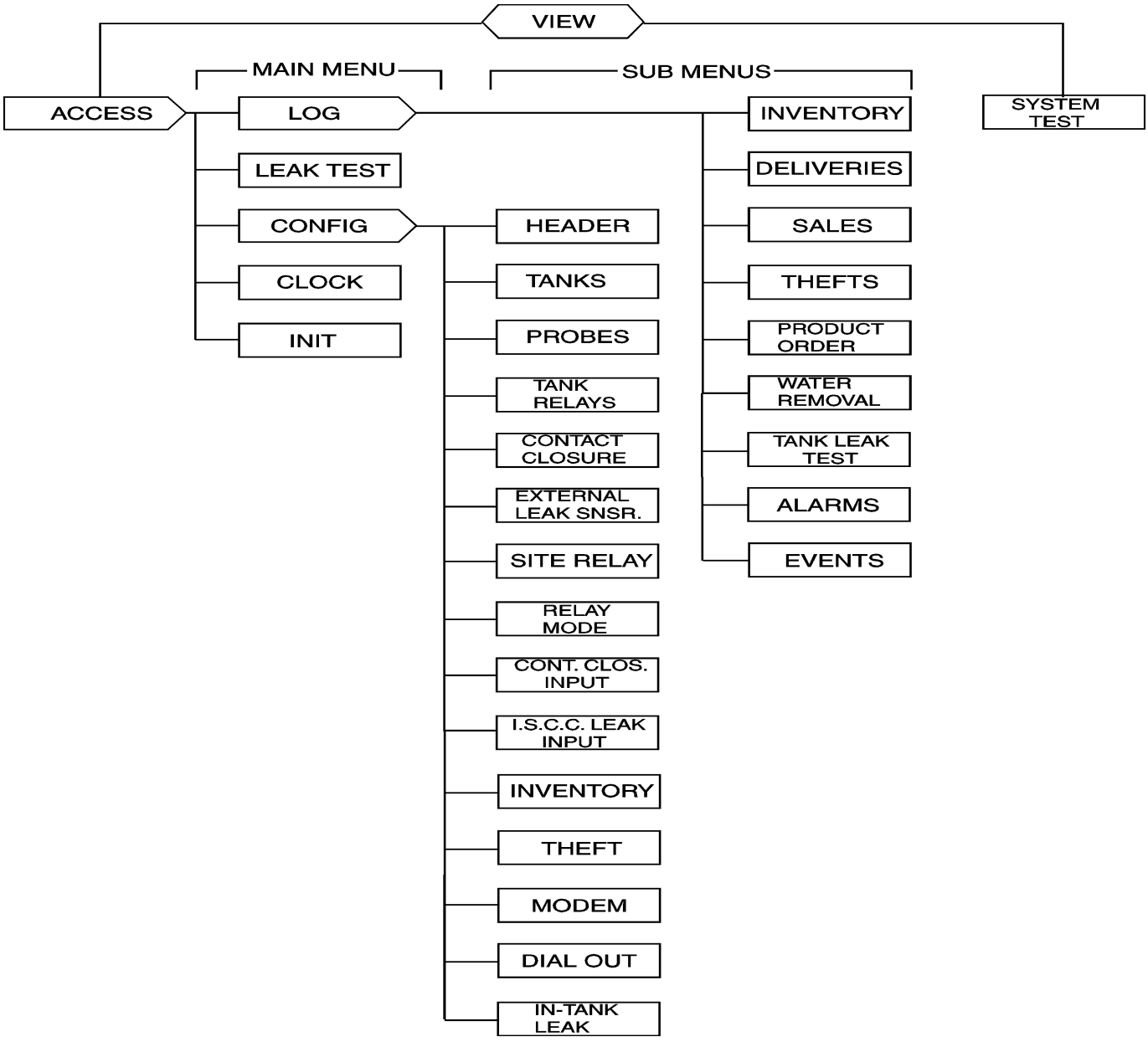
4. Visual display and audible alarm check.
   Display shows "**88888888**" (88888888) with all LEDs on, audible alarm beeps **twice**.

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

Note: In cases where the TMS power has been turned off for more than one to two minutes, a power-up sequence will generate the following warning message on the display and a similar message on the optional front panel printer, "Uarn21 – Pur FAiL" 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 any front panel pushbutton, this message will disappear from the display.

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 1-3, System Function Tree below.

1.3
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. If the system includes the optional printer, on demand printed inventory reports can be generated.

Access - The access mode provides access to all of the menus and submenus shown in Figure 1-3. In this mode the user can review and print report logs; review, edit and print system configuration data; enable or schedule in-tank leak tests; perform initialization functions; read or set the system clock.

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

VIEW Mode Description

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

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

Pushbutton Operation:
MODE/PRODUCT NAME RECALL - 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;

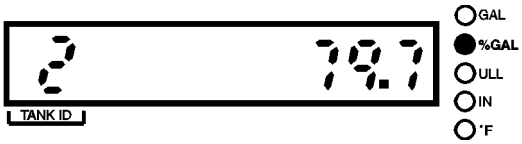
Display Item	Units	Display Resolution
Gross Volume (uncompensated)	Gallons	x1
Net Volume (Temperature compensated)	Gallons	x1
Percent Volume	%Gallons	x0.1
90% Ullage	Gallons	x1
Product Level	Inches	x0.1
Water Level	Inches	x0.1
Product Temperature	deg F	x+/-0.1

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

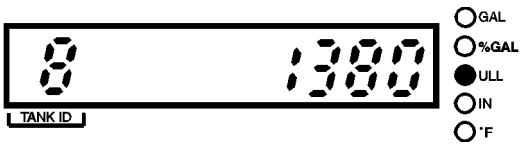
See below: Actual TMS Visual representation of Front Panel displayed items, in order of appearance:

Gross Volume = 10679 Gallons, Tank 2

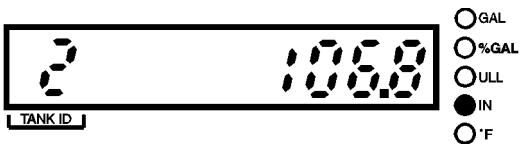
Net Volume = 10596 Gallons, Tank 2



Percent Volume = 79.7% of Capacity, Tank 2

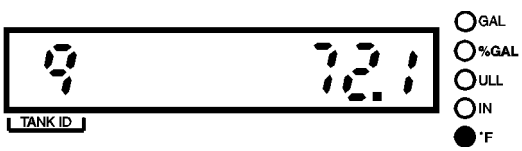


90% Ullage = 1380 Gallons, Tank 8

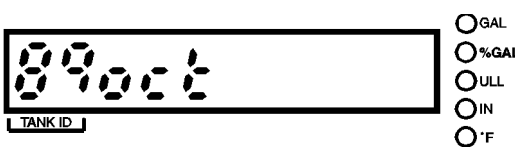


Product Level = 106.8 Inches, Tank 2

Water Level = 2.4 Inches, Tank 12



Product Temperature = 72.1°F, Tank 9



Product Type = 89 Octane

Pressing the MODE button until the BEEP, will select each item

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

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

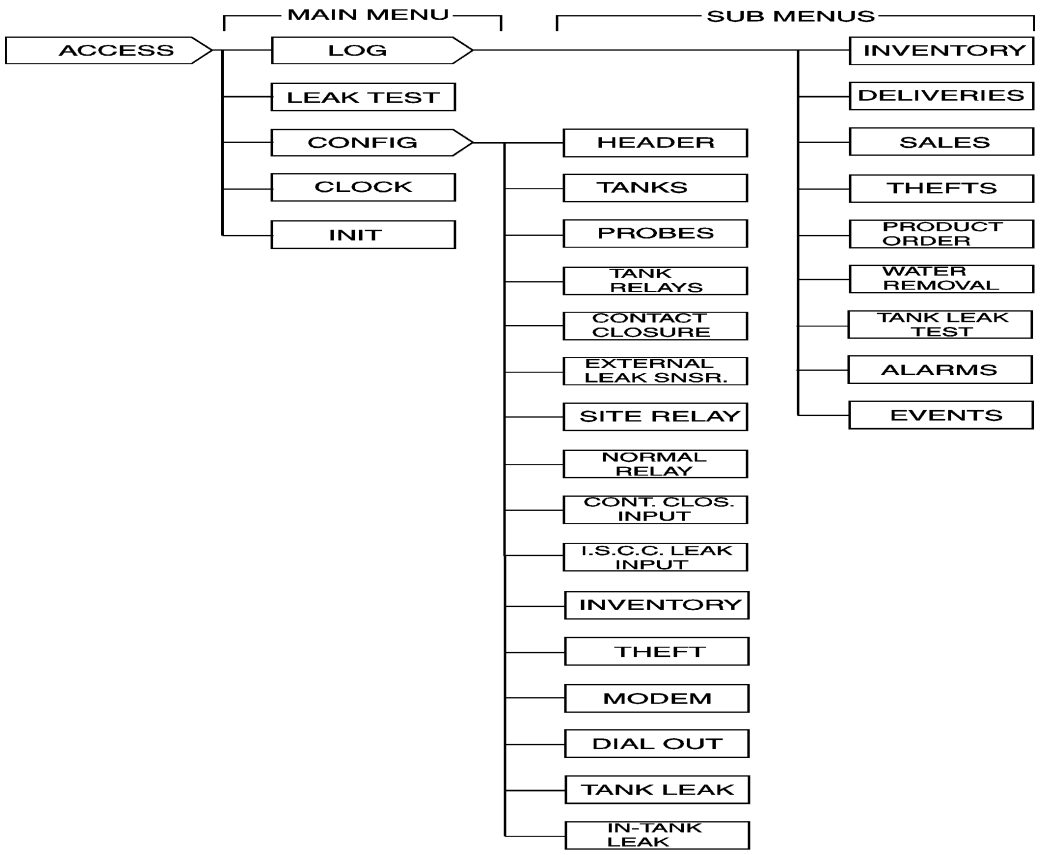
PRINT - Depressing the PRINT pushbutton while in the VIEW mode generates an on-demand inventory report for all enabled tanks. See the Printer section of this manual for detailed information on report format.

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

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.

2.3

ACCESS Mode Description



Within the **ACCESS** mode there are several levels of menus and sub-menus, as illustrated in Figure 1-3 above. The main menus include **LOG** reports, **LEAK** test, **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 and print any of the various log reports generated by the TMS. The system does not allow the user to edit any of these reports.

LEAK - The LEAK Test menu is used to select, schedule, and enable in-tank leak tests.

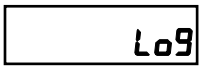
ConFiG - The CONFIGuration menu is used to review, edit, or print system configuration data.

Clock - The CLOCK menu is used to edit or print clock date, time, and day.

Init 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:



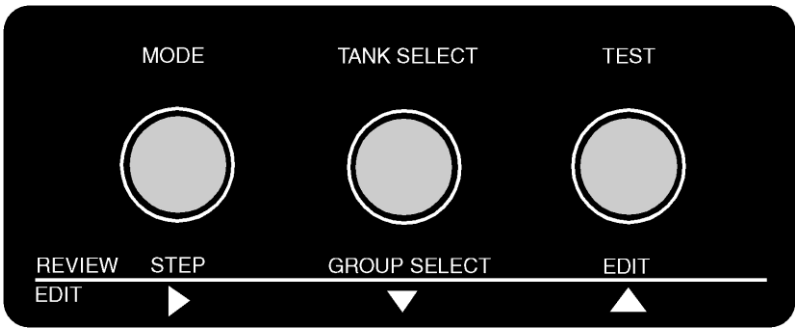
where LOG is the first main menu

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

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

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

Pushbutton Operation:



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

GROUP SELECT- The GROUP SELECT pushbutton functions in the same manner as manual tank selecting in the VIEW mode, except that "GROUP" is more generic, and refers to the fact that, depending upon which menu the user has entered, GROUP SELECT will select the next Tank, probe, relay, leak sensor, log record, etc.
EXAMPLE: If the user enters a relay setup menu, GROUP SELECT will select the next relay, and the GROUP ID display field will indicate the relay number rather than a tank ID. If the user enters the INVENTORY LOG menu, which stores up to 36 records, depressing GROUP SELECT will step to the next inventory record and the GROUP ID display field will represent the inventory record number 1 through 36.

EDIT - The EDIT pushbutton is used to edit or change the value of the currently displayed data item. If the displayed item is a menu or sub-menu name, EDIT allows the user to change the menu. If the displayed item is system data, for example, configuration or clock data, the EDIT function is inhibited unless enabled by the **EDIT ENABLE** pushbutton located on the inside of the front panel. See Figure 2.4 for button location. To enable editing, an authorized user would first unlock and open the front panel, press **EDIT ENABLE**, and then re-lock the enclosure. This prevents unauthorized persons from modifying stored data since the front panel would normally be locked. An audible beep informs the user when editing in inhibited. Once **EDIT ENABLE** has been pressed, editing is enabled for as long as the user remains in the ACCESS mode. For additional security, if the **TMS** is in the ACCESS mode for more than two minutes and detects no user activity on the front panel pushbuttons, the system will time out and revert back to VIEW mode. Entry back into the ACCESS mode will again require pressing **EDIT ENABLE** to re-enable editing.

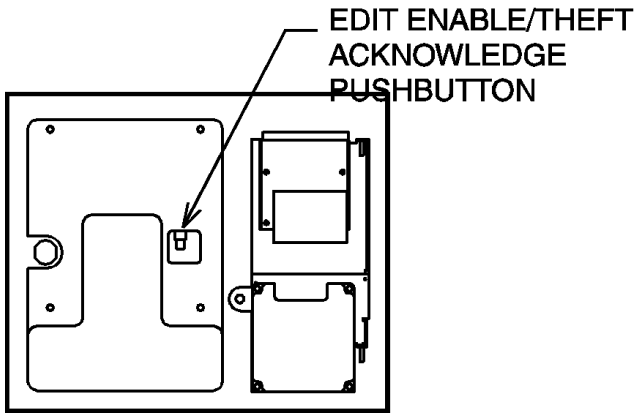


Figure 2-4

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 2-3.

▶ - 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.

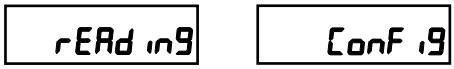
TEST - The TEST mode is initiated by depressing the TEST pushbutton. This action activates all of the front panel display LED segments and LED annunciators for visual verification, and will produce a "beep-beep" from the audible annunciator for audible verification. If TEST is depressed for more than ten seconds, a self-test will also be performed.

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

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:

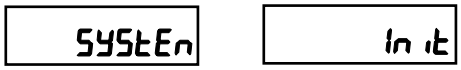
1) A self-test to verify integrity of both system program and data memories, system I/O, and data acquisition interface electronics. Display is blank during this process.
2) Retrieval and verification of configuration and set-up data.

Display shows



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

Display shows



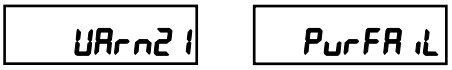
4) Visual display and audible alarm check.

Display shows

with all LEDs on, audible alarm beeps twice.

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

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



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 any front panel pushbutton, this message will disappear from the display within 10 seconds.

ACCESS

LoG	- System reports
LEAK tESt	- Leak test setup
ConFig	- System configuration
C lock	- Set system clock
In it dAtA	- Resets data to initialized values
rEturn	- Exits access menu

The **LOG** menus listed below are a grouping of historical recorded events that have been captured and stored in the TMS memory.

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 **Test** button again will increment to the Leak menu. Once in "LoG" pressing the **MODE** button will open the InvEntorY submenu. **The LOG menu is used to review and print various reports generated by the TMS.**

While in the **Log** mode, the system does **not** allow the user to **edit** any of these reports.

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 Log menus.
This information below will be explained again in the LEAk and CONFIG sections of the manual.

The **Entry Type:** User programs either a numeric value or chooses from a list of selected terms designated by the system.

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

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

The user may increments through the following submenus in LOG to edit data in the following categories.

To select and step through other records while in the LOG menu, Pressing of the Test/Edit button at the flashing term such as InvEntorY will increment the system to the dEL ivEry, next to the SALES etc.
To select and step through other records while in the LOG menu, Pressing the Group/Select button at the flashing term such**,** InvEntorY will decrement the system to the**,** EvEntS, next to the ALArMS etc.

LoG

			Max
InvEntorY	**Inventory**	- Captured inventory records	36
dEL ivEry	Deliveries	- Captured delivery records	12
SALES	Sales	- Captured bulk sales records	24
tHEFtS	Thefts	- Captured theft reports	6
OrdErS	Product Order	- Tank management reports	12
WAtEr	Water Removal	- Captured water removal reports	12
tAnK LEAK	Tank Leak Test	- Captured leak test reports	12
ALArMS	Alarms	- Captured alarm reports	24
EvEntS	Errors	- Captured event reports (list on page 28)	8
rEturn	Return	- Exits **LOG** menu	

InuEntorY Inventory This menu displays a snapshot of the stored **inventory** data for each tank, which the user programs, at up to three scheduled capture times a day and selectable for each day of the week. An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the **TMSCOMM** communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 36 inventory records. Inventory log reports will contain the following data: Site ID, Unit ID, Date, Time, Product Type, Product Name, Tank ID, Gross Volume, Net Volume, 90% Ullage, Product Height, Product Temperature.

nn-dd	Month - Day	Month and Day of this inventory record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the Inventory record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00'00 = Midnight
tAnk nAnE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
Prod Ht	Product Height	Product level at the time of Inventory capture.
Gr UoL	Gross Volume	Gross Volume in gallons (Gr Vol), at the time of Inventory capture.
nEt UoL	Net Volume	Net Volume or Temperature compensated gallons (N Vol), at the time of Inventory capture.
P UoL	Percent Volume	Percentage of Total Volume (P Vol), at the time of Inventory capture.
ULLAGE	Ullage	The complement difference between the actual fuel volume and volume in which the tank can be filled to 90% capacity in Gross Volume gallons (Gr Vol) at the time of Inventory capture. Example: A 10,000/g tank is 8000/g full - System will store a 90% Ullage record of 1000/g.
h2o Ht	Water Height	Water Gauging height, recorded from tank bottom in Level units, at the time of Inventory capture. An empty record or a logged record with (no water present) will have a uu 0.0.
tEnP	Temperature	Product Temperature in degrees in Fahrenheit (ºF), at the time of Inventory capture.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the Log cycle again. InuEntorY *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the InuEnt TMS main menu nn-dd

LoG

InuEntorY	Inventory
dEL ıuErY	**Deliveries**
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
UAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EuEntS	Errors
rEturn	Return

dEL ıuErY Delivery This menu displays a snapshot of the stored **delivery** data for each tank, which the system will automatically log and record as a inventory increase when a delivery to a tank has occurred. An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 12 delivery records. Delivery log reports will contain the following data: Site ID, Unit ID, Date, Time, Tank Name, Product type, Tank ID, Start Product Height, End Product Height, Start Temperature, End Temperature, End Gross Volume, Start Gross Volume, Gross Volume Increase, End Net Volume, Start Net Volume, Net Volume Increase.

nn-dd	Month - Day	Month and Day of this delivery record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the delivery record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00'00 = Midnight
tAnk nAnE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
bEG in Ht	Begin Height	Pre-delivery Product level at the time of delivery capture.
End Ht	End Height	Post-delivery Product level at the time of delivery capture.
bEG tEnP	Beginning Temperature	Pre-delivery Product Temperature in degrees in Fahrenheit (ºF), at the time of delivery capture.
End tEnP	End Temperature	Post-delivery Product Temperature in degrees in Fahrenheit (ºF), at the time of delivery capture.
Gr End	Gross End Volume	Post-delivery Gross Volume in gallons (Gr Vol), at the time of delivery capture.
Gr bEG in	Gross Begin Volume	Pre-delivery Gross Volume in gallons (Gr Vol), at the time of delivery capture.
Gr d iFF	Gross Difference	Gross difference between the beginning and ending post-delivery product volumes in gross gallons (Gr Vol), at the time of delivery capture.
NEt End	Net End Volume	Post-delivery Net Volume or Temperature compensated gallons (N Vol), at the time of delivery capture.

nEt bEg in	Net Begin Volume	Pre-delivery Net Volume or Temperature compensated gallons (N Vol), at the time of delivery capture.
nEt diFF	Net Difference	Net difference between the beginning and ending post-delivery product volumes in net gallons (N Vol), at the time of delivery capture.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the **dEL inErY** cycle again. dEL inErY *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the **dEL inErY** TMS main menu nn-dd

LoG

InvEntory	Inventory
dEL IvEry	Deliveries
SALES	**Sales**
tHEFtS	Thefts
OrdErS	Product Order
WAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EvEntS	Errors
rEturn	Return

SALES Sales This menu displays a snapshot of the stored **bulk sales** data for each tank, which the system will automatically log and record as a inventory decrease when a withdrawal from a tank has occurred. An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 24 sales records. Sales log records will contain the following data: Site ID, Unit ID, Date, Time, Tank Name, Product Type, Tank ID, Start Product Height, End Product Height, Start Temperature, End Temperature, Start Gross Volume, End Gross Volume, Gross Volume decrease, Start Net Volume, End Net Volume, Net Volume decrease.

mm-dd	Month - Day	Month and Day of this sales record. An empty record will have a 00-00.
HH'mm	Hour-Minute	Hour and Minute of the sales record. (time stored in 24 hr. sequence) Example 12 PM = 12'00; 23'59 = 11:59 PM; 00'00 = Midnight
tAnk nAmE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
bEG in Ht	Begin Height	Pre-sales Product level at the time of sales capture.
End Ht	End Height	Post-sales Product level at the time of sales capture.
bEG tEmP	Beginning Temperature	Pre-sales Product Temperature in degrees in Fahrenheit (ºF), at the time of sales capture.
End tEmP	End Temperature	Post-sales Product Temperature in degrees in Fahrenheit (ºF), at the time of sales capture.
Gr bEG in	Gross Begin Volume	Pre-sales Gross Volume in gallons (Gr Vol), at the time of sales capture.
Gr End	Gross End Volume	Post-sales Gross Volume in gallons (Gr Vol), at the time of sales capture.
Gr diFF	Gross Difference	Gross difference between the beginning and ending post-sales product volumes in gross gallons (Gr Vol), at the time of sales capture.
NEt bEG in	Net Begin Volume	Pre-sales Net Volume or Temperature compensated gallons (N Vol), at the time of sales capture.

nEt End	Net End Volume	Post-sales Net Volume or Temperature compensated gallons (N Vol), at the time of sales capture.
nEt diFF	Net Difference	Net difference between the beginning and ending post-sales product volumes in net gallons (N Vol), at the time of sales capture.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the **SALES** cycle again. SALES *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the **SALES** TMS main menu mm-dd

LoG

InuEntorY	Inventory
dEL iuErY	Deliveries
SALES	Sales
tHEFtS	**Thefts**
OrdErS	Product Order
UAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EuEntS	Errors
rEturn	Return

tHEFtS Thefts This menu displays a snapshot of the stored **theft** data for each tank. Logged capture times, which the user programs are based on the facility scheduled closed hours, selectable on a daily basis. The system will automatically log and record an inventory decrease as a fuel theft while the station is closed and no leak test is active. An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 6 theft records. Theft log reports will contain the following data: Site ID, Unit ID, Date, Time, Tank Name, Product Type, Tank ID, Start Product Height, End Product Height, Start Temperature, End Temperature, Start Gross Volume, End Gross Volume, Gross Volume decrease, Start Net Volume, End Net Volume, Net Volume decrease.

nn-dd	Month - Day	Month and Day of this theft record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the theft record. (time stored in 24 hr. sequence) Example 12 PM = 12'00; 23'59 = 11:59 PM; 00'00 = Midnight
tAnk nAmE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
bEG in Ht	Begin Height	Pre-theft Product level at the time of theft capture.
End Ht	End Height	Post-theft Product level at the time of theft capture.
bEG tEnP	Beginning Temperature	Pre-theft Product Temperature in degrees in Fahrenheit (ºF), at the time of theft capture.
End tEnP	End Temperature	Post-theft Product Temperature in degrees in Fahrenheit (ºF), at the time of theft capture.
Gr bEG in	Gross Begin Volume	Pre-theft Gross Volume in gallons (Gr Vol), at the time of theft capture.
Gr End	Gross End Volume	Post-theft Gross Volume in gallons (Gr Vol), at the time of theft capture.
Gr diFF	Gross Difference	Gross difference between the beginning and ending post-theft product volumes in gross gallons (Gr Vol), at the time of theft capture.

nEt bEg in	Net Begin Volume	Pre-theft Net Volume or Temperature compensated gallons (N Vol), at the time of theft capture.
nEt End	Net End Volume	Post-theft Net Volume or Temperature compensated gallons (N Vol), at the time of theft capture.
nEt diFF	Net Difference	Net difference between the beginning and ending post-theft product volumes in net gallons (N Vol), at the time of theft capture.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the **tHEFtS** cycle again. **tHEFtS** *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the **tHEFtS** TMS main menu **nn-dd**

LoG

InuEntorY	Inventory
dEL ruErY	Deliveries
SALES	Sales
tHEFtS	Thefts
OrdErS	**Product Order**
UAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EuEntS	Errors
rEturn	Return

OrdErS Product Order The Product Order menu displays a manually generated report for each tank. The user will utilize this information to determine average daily fuel usage for determining date and the amount of fuel to order for the next delivery. In addition to the system capturing this data, an automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 12 Product Order records. Product Order log reports will contain the following data: Date, Time, Tank Name, Product Type, Tank ID, Delivery Date, Delivery Amount, Start Gross Volume, End Gross Volume, Gross Volume Usage, Days of Usable Fuel, Average Daily Usage, Usable Fuel remaining, Elapsed days since the last delivery, 90% Ullage or (Order amount).

nn-dd	Month - Day	Month and Day of this product order record. An empty record will have a 00-00.
HH'nn	Hour-Minute	Hour and Minute of the product order record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00"00 = Midnight
tAnk nAmE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
dEL dAtE	Delivery Date	Date of Last Delivery for the indicated tank captured by the TMS.
dEL Ant	Delivery Amount	Amount of fuel delivered for the indicated tank captured by the TMS.
Gr bEGin	Gross Begin Volume	Pre-delivery Gross Volume in gallons (Gr Vol) for the indicated tank, at the time of product order capture.
Gr End	Gross End Volume	Post-delivery Gross Volume in gallons (Gr Vol) for the indicated tank, at the time of product order capture.
tOtAL USE	Gross Difference	Gross amount of fuel used since last delivery in gross gallons (Gr Vol) for the indicated tank, at the time of product order capture.
dAYS	Days	Elapsed days since the last delivery for the indicated tank, at the time of product order capture.

dAiLY USE	Daily Use	Average daily usage in Gross gallons (Gr Vol), based on the number of days since last delivery for the indicated tank, at the time of product order capture. Example; 6000 gal = 200 avg. daily use 30 days
USEAbLE	Usable	The current usable volume (Gr Vol) at 90% of total tank capacity for the indicated tank, at the time of product order capture.
dAYS LEFt	Days Left	This is how many days of fuel supply are remaining for the indicated tank, based on the average daily usage and current usable volume, at the time of product order capture.
ULLAgE	Ullage	Maximum product order amount for the indicated tank in Gross gallons (Gr Vol) calculated at 90% of tank capacity, at the time of product order capture.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the **OrdErS** cycle again. **OrdErS** *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the **OrdErS** TMS main menu **nn-dd**

LoG

InuEntorY	Inventory
dEL iuErY	Deliveries
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
UAtEr	**Water Removal**
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EuEntS	Errors
rEturn	Return

UAtEr Water Removal The Water Removal menu displays an automatically generated report for each tank after the removal of water has taken place. In addition to the system capturing this data, an automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 12 Water Removal records. Water Removal log reports will contain the following data: Date, Time, Tank Name, Product Type, Tank ID, Pre-report Product Volume, Pre-report H2o Volume, Pre-report Total (Product and H2o) Volume, Post-report Product Volume, Post-report H2o Volume, Post-report Total (Product and H2o) Volume, Post-report (Product and H2o) Percent Volume, Post-report Percent Volume, Post-report 90% Ullage or the (Order amount).

nn-dd	Month - Day	Month and Day of this product order record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the product order record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00'00 = Midnight
tAnk nAnE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
Prod bEG i	Product Begin Volume	Initial Product volume for the indicated tank in Gross gallons (Gr Vol) excluding Water, before the water removal process starts.
h2o bEG in	Water Begin Volume	Initial Water volume for the indicated tank in Gross gallons (Gr Vol) excluding Product, before the water removal process starts.
bEG totAL	Gross Begin Volume	Initial Product and Water volume for the indicated tank in Gross gallons (Gr Vol), before the water removal process starts.
Prod End	Product End Volume	End Product volume for the indicated tank in Gross gallons (Gr Vol) excluding Water, after the water removal process has been completed.
h2o End	Water End Volume	End Water volume for the indicated tank in Gross gallons (Gr Vol) excluding Product, after the water removal process has been completed.
End totAL	Gross End Volume	End Product and Water volume for the indicated tank in Gross gallons (Gr Vol), after the water removal process has been completed.

P VoL	Percent End Volume	Total Product and Water Volume for the indicated tank in Percent, after the water removal process has been completed.
VLLA9E	Ullage	Maximum product order amount for the indicated tank in Gross gallons (Gr Vol) calculated at 90% of tank capacity, after the water removal process has been completed.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the WAtEr cycle again. WAtEr *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the WAtEr TMS main menu. nn-dd

LoG

InuEntorY	Inventory
dEL iuEry	Deliveries
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
UAtEr	Water Removal
tAnk LEAk	**Tank Leak Test**
ALArMS	Alarms
EuEntS	Errors
rEturn	Return

tAnk LEAk Tank Leak Test menu displays an automatically generated report for each tank after the leak test has taken place. In addition to the system capturing this data, an automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 12 Tank Leak test records. Tank Leak Test log reports will contain the following data: Date, Time, Site ID, Unit ID, Date of Test, Start time, End Time, Tank Name, Product Type, Net Beginning Volume, Net Ending Volume, Beginning Temperature, Ending Temperature, Leak Threshold Limit in (gph), Rate (gph), Test Result, Rate Hr. 1, Rate Hr. 2, Rate Hr. 3, Rate Hr. 4, Rate Hr. 5, Rate Hr. 6, Rate Hr. 7, Rate Hr. 8.

nn-dd	Month - Day	Month and Day of this product order record. An empty record will have a 00-00.
StArtt inE	Start Time	Hour and Minute of the product order record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23"59 = 11:59 PM; 00"00 = Midnight
End t inE	End Time	Hour and Minute of the product order record. (time stored in 24 hr. sequence)
tAnk NAnE	Tank Name	Tank Name assigned by user.
Prod tYPE	Product Type	Tank Product Name assigned by user.
tAnk id	Tank Ident	2-digit numeric value assigned by user.
NEt bEG in	Product Begin Volume	Initial Product volume for the indicated tank in temperature compensated gallons (N Vol).
NEt End	Product End Volume	End Product volume for the indicated tank in temperature compensated gallons (N Vol).
bEG tEnP	Beginning Temperature	Product Temperature in degrees in Fahrenheit (ºF), at the time of pre-test capture.
End tEnP	End Temperature	Product Temperature in degrees in Fahrenheit (ºF), at the time of post test capture.
LEAkL in it	Leak Limit	Leak Threshold Rate displayed for the indicated tank in Gallon/Hour (gph), from 0.1 to 0.9 gph inclusive.

rAtE 9Ph	Leak Rate	Calculated loss or addition of product in gallons/hr. for the indicated tank. The result derived from the previously user programmed Leak Threshold Rate.
rESULt	Test Result	PASS or FAiL In-Tank Leak Test for the indicated tank.
rAtE hr 1	Leak Rate Hour-1	Calculated loss or addition of product in gallons/hr. for the indicated tank during the first test hour.
rAtE hr2-8	Leak Rate Hour-2-8	System will log same report as above for each hour 1-8 inclusive.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the tAnk LEAk cycle again. tAnk LEAk *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the tAnk LEAk TMS main menu mm-dd

LoG

InuEntorY	Inventory
dEL iuEr4	Deliveries
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
UAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	**Alarms**
EuEntS	Errors
rEturn	Return

ALArMS Alarms This menu displays a snapshot of the stored **alarm** data for each tank, which the system will automatically log and record as a system, tank specific, or external leak alarm(s). An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 24 alarm records. Alarm log reports will contain the following data: Site ID, Unit ID, Date, Time, Alarm, Group Number, Alarm ID, and Detail. The TMS will report In-Tank Leak, Line Leak, 3 Product set points per tank in level, volume, or % Capacity units, 1 - water setpoint per tank in level units, Non-IS Contact Closure Input, Theft, System Error, and Power Recovery.

nn-dd	Month - Day	Month and Day of this alarm record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the alarm record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00"00 = Midnight
ALArn	Alarm	Specific alarm condition assigned by TMS. An empty record will display the term LEVEL.
GrouP Nun	Group Number	A numeric alarm Identification code. An empty record will have a 0.
ALArn id	Alarm Ident	Designates specific alarm as system, tank, or external devices. An empty record will display the term LEAk.
dEtAiL	Detail	Designates the condition as an Alarm, Warning, Information condition, or Error. An empty record will display the term ALArn.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat the ALArMS cycle again. ALArMS *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the ALArMS TMS main menu nn-dd

For description of Alarms, Warnings, or Errors. (See: Alarm Code Table following the Event menu).

LoG

InuEntorY	Inventory
dEL ıuErY	Deliveries
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
UAtEr	Water Removal
tAnk LEAk	Tank Leak Test
ALArMS	Alarms
EuEntS	**Errors**
rEturn	Return

EuEntS Events This menu displays a snapshot of the stored **event** data for each tank, which the system will automatically log and record as a system Error, Warning, or TMS Information Condition. An automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing the TMSCOMM communicator software package. The user may also step through and view the record manually, utilizing the TMS front panel pushbuttons. The system has the capacity to store, beginning with the most recent, up to 8 event records. Event log reports may contain any combination of the following data: Site ID, Unit ID, Date, Time, Error Number, Event ID, and Detail.

nn-dd	Month - Day	Month and Day of this alarm record. An empty record will have a 00-00.
HH' nn	Hour-Minute	Hour and Minute of the alarm record. (time stored in 24 hr. sequence) Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00'00 = Midnight
Error Nun	Error Number	A numeric 2-digit error Identification code. An empty record will have a 0.
EuEnt id	Event Ident	Designates specific condition of event. An empty record will display the term iLLEG.
dEtA iL	Detail	Designates specific event as a Error, Warning, or TMS Information Condition. An empty record will display the term Error.
rEturn	Return	*Pressing the Test/Edit button at Return decrements the TMS back to the top of that submenu to repeat EuEntS cycle again. EuEntS *Pressing the Mode/Step button at the Return decrements the TMS back out to the top of the EuEntS TMS main menu. nn-dd

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

Alarm Conditions:
Leak
SP1, SP2, SP3
Water Sp
Theft
cc, and iScc.

Warning Conditions:	**Codes:**
Modem Initialization Warning	01
Modem Command Warning	02
Modem Timeout Warning	03
Modem Carrier Warning	04
Modem Communication Warning	05
Modem No dial tone Warning	06
Tank Configuration Warning	07
Probe Configuration Warning	08
Header Configuration Warning	09
Relay Tank Configuration Warning	10
Relay cc Configuration Warning	11
Relay iScc Configuration Warning	12
Relay Status Configuration Warning	14
cc Configuration Warning	15
iScc Configuration Warning	16
Inventory Configuration Warning	17
Theft Configuration Warning	18
Modem Configuration Warning	19
Dial out Configuration Warning	20
Power Failure Warning	21
Information Conditions:	**Codes:**
Change of SP Units	01
Error Conditions:	**Codes:**
System	
Illegal error	00 TMS Default Value
Boot Prom Checksum error	01 FATAL Error
Flash Prom Checksum error	02
Flash Prom Write error	03
Flash Prom Frame error	04
Serial Prom Error	05
Probe	
Probe Synch error	10
Probe Timeout error	11
Fault detecting sensors	
iScc Short Circuit error	20
iScc Open Circuit error	21

***For detailed definitions of TMS Alarm, Events, and Warnings Codes; See Appendix - "A".**

ACCESS LoG

LEAK tESt

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 **Test** button again will increment to the LEAk menu. Once in "**LEAK**" **pressing** the **MODE** button will open the **In-tank leak** submenu. **The Leak menu is used to select, schedule and enable In-Tank leak tests.**

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 LEAk menus.
This information below will be explained again in the CONFIG section of the manual.

The **Entry Type:** User programs either a numeric value or chooses from a list of selected terms designated by the system.

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

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

The user may increments through the following submenus in **LEAK** to edit data in the following categories.

LEAK tEST This menu allows the user enable and schedule times for conducting in-tank leak tests. Menus include the following: Test duration, Start time, Schedule type, Schedule rate, Schedule day and Control.

tEST LEn In-Tank Test Length This entry allows the user to select either a 4 or 8 hour in-tank leak test time.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **8 hr**.

StArtt inE Start Time This entry allows the user to select an appropriate starting time to begin the in-tank leak test. (user programs time in 24 hr. sequence)
Entry Type: 4 digit numeric hours, minutes
Range Limits: 1-23, 1-59.
Default/Initialized value: **00'00**
Example 12'00 = 12 Noon; 23'59 = 11:59 PM; 00'00 = Midnight

Schd tYPE Schedule Type This entry allows the user to select the schedule type to begin the in-tank leak test.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **th iS**
Example: **th iS** = test will be activated **once only** as per designated user programming by user.
If selected (thiS) and (Sunday), The TMS would perform the test on (Sunday-once only).
Examples: **EUEry** = test will be activated per user selected day(s) of the month.
If selected (**SundAY**) and (**EUEry**), The TMS would perform the test on (every Sunday).
If selected (**dAY**) and (**EUEry**), The TMS would perform the test on (every Day at programmed specific time).
If selected (**Month**) and (**EUEry**), the TMS would perform the test on
(every Month at programmed specific time).

Schd rAtE Schedule Rate This entry allows the user to select the schedule day, days, or month to begin the in-tank leak test.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **Sun**
Example: **Sun** = test will be activated on Sunday when user selects this item.
Example: **dAY** = test will be activated on the day relative to TMS internal clock setting.
Example: **MONTH** = test will be activated on this day every month relative to TMS internal clock setting.

Schd dd Schedule Day This entry allows the user to select the numerical day number from 00 to 29 days to begin the in-tank leak test.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **dAY 00**
Example: 00 = Default/Initialized value; test will be not be activated if user selects this item.
Example: 01 = test will be activated on the first (1st) day of the month.
Example: 29 = test will be activated on the twenty-ninth (29th) day every month.

Example: If customer would like to conduct a test on the first of every month, programming selections would be as follows: User selects a **rate of 4 or 8 hours**, a time of **00' 00** =**Midnight, type** = **EVEry**, with the **rate** = **Month,** and the **dd** = **0 1.**

When facility opens that morning the first of every month the leak test will be completed.

Control Control This entry allows the user to select the in-tank leak test control functions Stop, Start.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **StoP**
Example: Start = test will be vitalized for programmed operation after user selects this item.
Example: Stop = test operation will be terminated immediately when user selects this item.

The following terms **PAuSE** and **run** are indicated only after a test has been programmed in the Control menu. These terms will only be displayed when the user reviews Leak Test information in the Recall MODE.

Example: **PAuSE** = test will be deactivated and or timed-out if tank is not stable due to liquid level movement or product temperature instability.
Example: **run =** current test is activated and in process as user programmed from above menus.

rEturn Return

*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the Leak Test menu.
LEAK tESt

*Pressing the Mode/Step button at the Return increments the TMS back out to the top of the TEST Length repeating this TMS menu cycle again.
tESt LEn

ACCESS

LoG

LEAK tESt

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 **Test** button again will increment to the **LEAK** menu and then to the **ConF iG** menu. Once in **ConF iG pressing** the **MODE** button will open the **HEAdEr** submenu.

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

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.

The **Entry Type:** User programs either a numeric value or chooses from a list of selected terms designated by the system.

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

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

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

ConF iG

HEAdEr	**Header - System default mode setup**
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 iScc	Relay IS Contact Closure - 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
iScc inP	Intrinsically Safe Contact Closure Leak 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
tAnK LEAK	In-Tank Leak - Setup

HEAdEr Header This menu in CONFIG; **Header**, lets the user program and select the following TMS setup and operating modes. It is essential that these parameters are qualified prior to further tank and probe related programming. Note: Displayed below, is the TMS nomenclature for this menu.

Acc CodE = Access Code
OP dEFLt = Operation Default
SP Un itS = Set Point Units
Un it id = Unit ID
bAud rAtE = Baud Rate
SALE En = Sale Enable
AutoPr int = Auto Print Enable
S itE id = Site ID
tAnK 9tY = Number of Tanks
HornDELAY = Horn Delay

Acc CodE Access Code When set to a non-zero value, prevents unauthorized access to TMS via modem.
Entry Type: 6-digit numeric
Range Limits: 0-9/digit
Default/Initialized value **000000**

Unit id Unit ID Useful as a means for differentiating between multiple TMS systems at the same site. Unit ID appears on all hardcopy reports, and is transmitted over any of the communications ports. User may assign up to 100 unique numbers per site.
Entry Type: 2-digit numeric
Range Limits: 0-99
Default/Initialized value: **00**

Site id Site ID Useful as a means for identifying more than one site. Site ID appears on all hardcopy reports, and is transmitted over any of the communications ports. User can assign up to 1000 unique site ID numbers.
Entry Type: 3-digit numeric
Range Limits: 0-999
Default/Initialized value: **000**

OP dEFLt View Default This entry selects the mode in which the TMS will report and display data while in the normal viewing mode. Selecting a default type allows user to set the display and report level gauging in one of the following parameters.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **9r UoL**

Note: Displayed below, is the TMS nomenclature for this menu.

9r UoL = Gross Volume **LEVEL** = Units of measure **PctUoL** = Percent Gross Volume
nEtUoL = Net Volume

Example: If the default mode is set to (**9r UoL**) gross volume and user would like to momentarily view volume data in (**LEVEL**) level by pressing the Mode panel pushbutton, the TMS will automatically revert back to the default mode (**9r UoL**) gross volume display after a two minute time out is recognized for non-utilization of the front panel pushbuttons.

bAud rAtE Baud Rate This entry allows the user to select the baud rate for the TMS RS-232 serial communications port. (Port #1).
Entry Type: select list
Range Limits: 1200-9600
Default/Initialized value: **1200**

Note: Displayed below, is the TMS nomenclature for this menu.

1200 Baud Rate **2400** Baud Rate **4800** Baud Rate
9600 Baud Rate

tAnk 9tY Tank Qty This entry allows the user to select and identifying how many tanks will be associated with the console at the site. Tank quantity appears on all hardcopy reports, and is transmitted over any of the communications ports. User can assign up to 12 unique tank numbers.
Entry Type: 2-digit numeric
Range Limits: 1-12
Default/Initialized value: **1**

SP Units — Set Point Units This entry, will globally selects and allows all setpoints units to be programmed for all tanks. This entry affects all tanks that will be enabled. Percent Volume **(PVol)** is the preferred method of in programming set point, as it will display a uniform setting across all tanks regardless of size and geometry.
Note: Water Set Points are always displayed in LEVEL units of measure.
Note: Any Set Point that is NOT going to be utilized should be set to (0000.0) ZERO.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: PuoI

Note: Displayed below, is the TMS nomenclature for this menu.
PUoL = Percent Gross Volume GrUoL = Gross Volume LEUEL = Units of measure

SALE En — Sale Enable When enabled, Allows system to detect and log bulk sales when the following conditions are valid:
1. Station is open for business, according to hours of operation programmed in THEFT DETECT submenu.
2. Withdrawal exceeds MINIMUM LOG VOLUME programmed in TANK submenu for that tank.
3. Tank is not in LEAK DETECT mode.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

HorndELAY — Horn Delay This entry allows the user automatically **to program and disable** the TMS horn at selected times from 1-9 minutes. Although the horn is silenced, the LED for that condition will continue to be visually illuminated until alarm condition is corrected.
Entry Type: select list
Range Limits: (None, 1-9)
Default/Initialized value: nonE

AutoPr int — Auto Print Enable This entry selects the mode in which the optional TMS printer can be configured. The system allows the user to select automatic or manual print reporting capabilities. When enabled the TMS will print any Log, Alarm or Event in the automatic mode. If disabled the user will depress the PRINT pushbutton while in VIEW mode generating on-demand reports for all enabled tanks.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

rEturn — Return

*Pressing the Test/Edit button at Return decrements the TMS back to the top of the submenu to repeat the cycle again.
HEAdEr

*Pressing the Mode/Step button at Return decrements the TMS back out to the top of the HEAdEr main menu.
ACC CodE

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

TANK

The **tank** menu in CONFIG lets the user configure each tank with the following programmable features: Tank enable, Tank Name, Tank id, Product Type, Product Alarm Setpoints 1, 2, and 3, Product Name, Water Enable, Water Alarm Setpoint, Temperature Enable, Tank Type, Tank Capacity, Manifold Capacity, Tank Radius, Tank Length, Tank Rise, Motion Band, Minimum Logged Volume, and Theft Enable.

TANK EN

Tank Enable This entry identifies which tank or tanks are active and that have a probe in service. Enables tanks 1-12.
Note: User will see the active tank displayed on the TMS panel left hand side above the label (Tank ID & Group ID) verbiage.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: NO

TANK NAME

Tank Name This entry allows the user to select a generic name for fuel contents.
User selects the Tank Name for each enabled tank. See table below.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: PROD

PROD = Product	GAS = Gas	DIESEL=Diesel	FUEL = Fuel
2 OIL = #2 Fuel Oil	3 OIL = #3 Fuel Oil	4 OIL = #4 Fuel Oil	
5 OIL = #5 Fuel Oil	6 OIL = #6 Fuel Oil	OIL = Oil	WASTE = Waste Oil
KERO = Kerosene	AV GAS = Aviation Gas	AV 100 = Aviation 100	100 LL = 100 Low Lead
JET = Jet Fuel	JET A = Jet Fuel	JP4 JP5 JP8	

TANK ID

Tank Identification This entry selects a unique identification for each tank which corresponds to the TMS hardware channels (1-12). If desired the user may re-assign these tank ID numbers to any 2-digit numerical value up to (100) for each specific tank assignment.
Entry Type: 2-digit numeric
Range Limits: 0-99
Default/Initialized value: 00

UOL ModE — Volume Mode This entry allows the user to select one of two menus which is dependent on tank capacity. The by 1 mode is selected for 6 digit Tank capacities 0-999,999/gal as viewed on the TMS display. The by 10 mode is selected for 7 digit Tank capacities 0-9,999,999/gal as viewed on the TMS display. The printed and displayed capacity in the TMS View mode will represented to the actual 7-digits.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: by 1
Example: A 2,000,000/g capacity would be entered as 200,000 in the CONFIG Tank Capacity menu.

Prod tYPE — Product Type This entry allows the user to select tank contents.
User selects the Product Type for each enabled tank. See table below.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: 87 OctAnE
Note: For products not listed - Consult Factory

d iESEL = Diesel	KEro = Kerosene	No 2 = #2 Fuel Oil
No 4 = #4 Fuel Oil	No 6 = #6 Fuel Oil	UAStE = Waste Oil
Au GAS = Aviation Gas	Au 100 = Aviation 100	100 LL = 100 Low Lead
JEt = Jet Fuel	JEt A = Jet A Fuel	JP4 JP5 JP8
87 oct = 87 Octane	89 oct = 89 Octane	91 oct = 91 Octane
92 oct = 92 Octane	93 oct = 93 Octane	94 oct = 94 Octane
95 oct = 95 Octane		

SP1 P UoL
SP1 6 UoL
SP1 LEUEL — Set Point This is one of the three programmable alarms for detecting and annunciating product Overage(n) and Underage(u). Set Points are user programmed in one of the three values as specified in the Set Point Units options previously described in the Header Menu (Pg. 34).
Note: SP1 set point is most commonly utilized for a High-high condition.

Entry Type: 6 digit numeric, gals; 5 digit numeric, ins; 3 digit numeric, %
Range Limits: 0-999,999/g; 0-9999.9/in; 0-99.9%
Default/Initialized value: 000000/g 0000.0/in. 00.0/%

Example A: n90.0 = This represents a 90% set point value. If this product value is (>) greater than 90% the system will annunciate the alarm.
Example B: u00 12.5 = This represents a 12.5" LEVEL set point value. If this product value is (<)less than 12.5 the system will annunciate the alarm.

SP2 P UoL
SP2 6 UoL
SP2 LEUEL — Set Point This is one of the three programmable alarms for detecting and annunciating product Overage(n) and Underage(u). Set Points are user programmed in one of the three values as specified in the Set Point Units options previously described in the Header Menu (Pg. 34).
Note: SP2 set point is most commonly utilized for a High condition.

Entry Type: 6 digit numeric, gals; 5 digit numeric, ins; 3 digit numeric, %
Range Limits: 0-999,999/g; 0-9999.9/in; 0-99.9%
Default/Initialized value: 000000/g 0000.0/in. 00.0/%

SP3 P UoL
SP3 G UoL
SP3 LEVEL

Set Point This is one of the three programmable alarms for detecting and annunciating product Overage (⁻) and Underage (ᵤ). Set Points are user programmed in one of the three values as specified in the Set Point Units options previously described in the Header Menu (Pg. 34).
Note: SP3 set point is most commonly utilized for a Low condition.

Entry Type: 6 digit numeric, gals; 5 digit numeric, ins; 3 digit numeric, %
Range Limits: 0-999,999/g; 0-9999.9/in; 0-99.9%
Default/Initialized value: 000000/g 0000.0/in. 00.0/%

SP1 NAnE

Set Point Name This is a user selectable name assignable to product Set Point #1 for the selected tank. User selects the (Name) for # 1 set point from Table below.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: LEVEL

LEVEL = Level	HIGH = High	HIHIGH = High-high
OVERFL = Overfill	Lo = Low	LoLo = Low-Low
CrItHi = Critical High	CrItLo = Critical Low	

SP2 NAnE

Set Point Name This is a user selectable name assignable to product Set Point #2 for the selected tank. User selects the (Name) for # 2 set point from Table above.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: LEVEL

SP3 NAnE

Set Point Name This is a user selectable name assignable to product Set Point #3 for the selected tank. User selects the (Name) for # 3 set point from Table above.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: LEVEL

SP1 Horn

Set Point Horn This entry informs the console to enable or disable the audible annunciator for product Set Point # 1. This is useful when setpoints are associated with gate or latching pump or motor controls.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

SP2 Horn

Set Point Horn This entry informs the console to enable or disable the audible annunciator for product Set Point # 2. This is useful when setpoints are associated with gate or latching pump or motor controls.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

SP3 Horn

Set Point Horn This entry informs the console to enable or disable the audible annunciator for product Set Point # 3. This is useful when setpoints are associated with gate or latching pump or motor controls.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

h2o EnAbL

H2O Enable This entry informs the console that water gauging is activated for the selected tank. Note: Most commonly the in-tank probe includes water interface float.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

SP h2o — Water Setpoint This entry allows the user to select Water gauging value for the selected tank. Typically, water level set points are programmed in units of LEVEL (inches) ONLY. They are programmed for detecting and annunciating water level Overage (⁻) and Underage (ᵤ). The Water Set Point is not affected by the mode previously selected in the Set Point Units options menu described in the Header Menu (Pg. 34).
Entry Type: 5-digit numeric
Range Limits: 0 - 1999.9
Default/Initialized value: 0
Note: To disable water gauging set the value to (0) ZERO.
Example: A typical field setting range for an 8-10,000 gal. UST would be from (2-6") Overage (⁻).
Example: A typical field setting range for OIL/WATER tanks would be from (90") Underage (ᵤ).

tAnk tYPE — Tank Type The Tank menu is broken down in (3) Categories as shown below. This entry allows the user to selects the specific tank geometry that include Flat, Vertical, Vert 5 and Other
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: FLAt

FLAt — **Flat** Type is chosen for flat ended, Horizontal Cylinders typically, (Steel Tanks).

UErt — **Vertical** Type is chosen for any tank in which the Gallons/Inches remain constant with the respective height of the container.
Examples include: Horizontal cubic (AST) Above Ground tanks (Lube Cube, ConVault), Flat ended Vertical Cylinders, and (Domed Roof Bulk Storage Tanks).

OthEr — **Other** or Custom is most typically chosen for tanks having **dished ends** and are symmetrical about the tanks' horizontal middle plane axis or a mirror image.
Examples include: Fiberglass Tanks (FCI, XERXES) as well as, Dished end Steel Tanks, Spherical, Semi-Hemispherical, and Hemispherical.

*** Note:** If **Other** is selected the TMS menu will ask the user to input a (Tank Chart Volume) at (3) TMS selected Tank Heights.
E.G.: (HeiGht 1 - 9.0) (VOLUME 1 - 000000) User enters volume at 9.0 inches. User finishes by inputting the Volume data for (HeiGhts #2 and 3 respectively).

UErt 5 — This tank type is selected for custom tank geometries that do not create a mirror image about the horizontal middle plane axis of the tank.

*** Note:** If UErt 5 is selected the TMS menu will ask the user to input both a product level and its corresponding volume (Tank Chart Volume) at (5) user selected Tank Heights.
E.G.: (HE iGht 1 - 0.0) (VOLUME 1 - 000000) User enters data for five level and volume points. User finishes by inputting the Height and Volume data for (HE iGht 2, 3, 4, and 5 respectively).

tAnk CAP — Tank Capacity This entry requires the user to enter **Actual** tank capacity in gallons for the selected tank.
Entry Type: 6-digit numeric
Range Limits: 0 - 999,999
Default/Initialized value: 0

MAn iFoLd — Manifold Factor This entry is selected when multiple tanks of the same geometry are manifolded together and monitored with one probe located in the primary tank.
Options include choices of none, 1, 2, 3, 4, 5, or 6 for the tank manifold factor entry.
Entry Type: select list
Range Limits: None, 1-6
Default/Initialized value: nonE

Note: The manifold factor reflects the # of tanks connected to the primary tank.

Note: If no tanks are manifolded together the system should be set to (**nonE**).

Tank 1 Tank 2 Tank 3

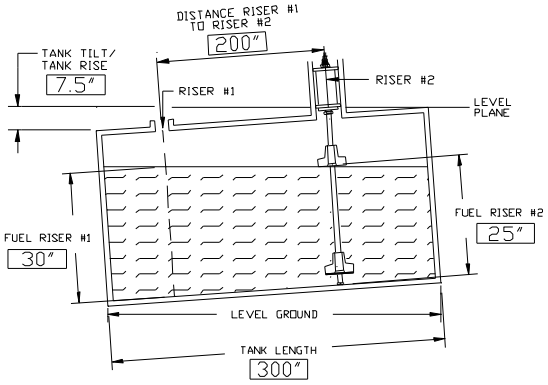
Example: Total of (3) tanks and (1) common probe are joined together. This is treated as a single tank system; the manifold factor would = 2. (Primary tank + 2 Other tanks)

tAnk rAd Tank Radius This entry requires the user to enter the **tank radius** and **not** tank diameter for the selected tank.
Entry Type: 4 digit numeric
Range Limits: 0- 999.9
Default/Initialized value: **0**

Reminder: Tank radius (R) is 1/2 tank diameter (1/2D).

tAnk LEn Tank Length This entry requires the user to enter **(ID**) **inside tank length** dimension for the selected tank.
Entry Type: 5-digit numeric
Range Limits: 0 - 1999.9
Default/Initialized value: **0**

tAnk r iSE Tank Rise This menu determines Tank Tilt. This entry requires the user to **manually Dip and record a field measured fuel height** for each selected tank.
Note: Tank tilt is calculated over the entire tank length.



A. The user sticks and records fuel level in the probe riser opening and also in another tank riser, (E.G. "Fill") and preferable at the opposite end of the tank. The fuel height difference is divided by the distance between the two risers.
See the following figure and Example:
User Measured values:
Fuel Level in Riser #1 =30
Fuel Level in Riser #2 =25
Distance between the (2) risers = 200"
Total Tank Length = 300"

User Calculations:
Difference in fuel level between (2) risers= 30-25 =5"
Calculated ratio between the Total Tank Length over the distance between the (2) risers= 1.5
Total Tank Length = 300 = 1.5 Ratio
Distance between the (2) risers 200

The above value 1.5 is then multiplied by the difference in fuel level calculated between the (2) risers. 1.5 x 5 = **7.5 Tank tilt** over the entire tank length and entered into tAnk riSE TMS menu.
Entry Type: 2-digit numeric
Range Limits: 0-9.9
Default/Initialized value: **0**

thEFt En Theft Enable This entry requires the user to enable the TMS **for detecting and logging a inventory decrease as a theft** for the selected tank when the following conditions are valid:

1. Station is closed for business, according to hours of operation programmed in THEFT DETECT submenu.
2. Withdrawal exceeds MINIMUM LOG VOLUME programmed in TANK submenu for that tank.
3. Tank is not in LEAK DETECT mode.
Entry Type: select list
Range Limits: None
Default/Initialized value: no

An automatic hardcopy report can also be generated if optional printer is installed. The system will have the capacity to store up to the (6) most recent theft records. Theft log records will contain the following data: Site ID, Unit ID, Date, Time, Product Type, Product Name, Tank ID, Start Gross Volume, Start Net Volume, Start Product Height, Start Temperature, End Gross Volume, End Net Volume, End Product Height, End Temperature, Gross Volume Decrease, Net Volume Decrease.

UnuSAbLE — Unusable Fuel This entry requires the user to enter the amount of product volume in gross gallons (gVol) that is typically non-usable.
Entry Type: 6-digit numeric
Range Limits: 0 – 999999
Default/Initialized value: 0
Example: the product level below a submersible or suction pump and can not be utilized.

GAGEAbLE — Gaugeable Fuel This entry applies to probes which are mounted in a fixed position to a flange and or suspended from the top of a tank. Once the probe is calibrated, it will report a minimum gaugeable level (never zero).
Example: The MP460, 461 FLEX probes and MP451 are designed with a **collar stop** preventing the floats traveling into the probes "Deadband Zone", at a specified distance above the actual tank bottom. At this level, the TMS will report and display a message showing a product level equal to the float resting on the collar stop. The actual product level in the tank may be below the reported TMS value or empty. This message will alternate on the front panel with a minimum gauging limit displayed as (Lou Prod), "Low Product" for that tank.
Entry Type: 5-digit numeric
Range Limits: 0 - 9999.9
Default/Initialized value: 0

rEturn — Return *Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the tAnk menu.
tAnk

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the tank menu repeating the cycle again.
tAnk En

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

PROBE Probe This menu in CONFIG lets the user configure the Inventory PROBE for each selected tank. Each probe employs digital transmission for high signal to noise ratio immunity and fault detection. Probes are capable of performing a 0.1 or better in-tank leak test as well as, continuously measuring water level from tank bottom.

PROBE CF Probe Calibration Factor This entry is requires the user to enter a **calibration factor** for each selected in-tank probe. This calibration factor **(CF) is stamped on top of each probe housing and designated as a wire speed value**. This factor critical and must be entered in order to conduct **In-Tank leak** testing.
Entry Type: 4-digit numeric
Range Limits: 8.999 - 9.099
Default/Initialized value: **8.000**
Example: Look for this type of data on top of probe housing - (W.S. 9.086).

PROBE TYP Probe Type This entry requires the user to enter the specific **type** of each selected magnetostrictive in-tank probe. Probe **Type information # is stamped on top of each probe housing**. This information is critical and must be entered in order to conduct **In-Tank leak** testing.
Entry Type: select list
Range Limits: none
Default/Initialized value: **MP450**
Options include, See table below.

MP440 MP440	**MP450** MP 450	**MP451** MP451
MP452 MP452	**MP460** MP 460	**MP461** MP461

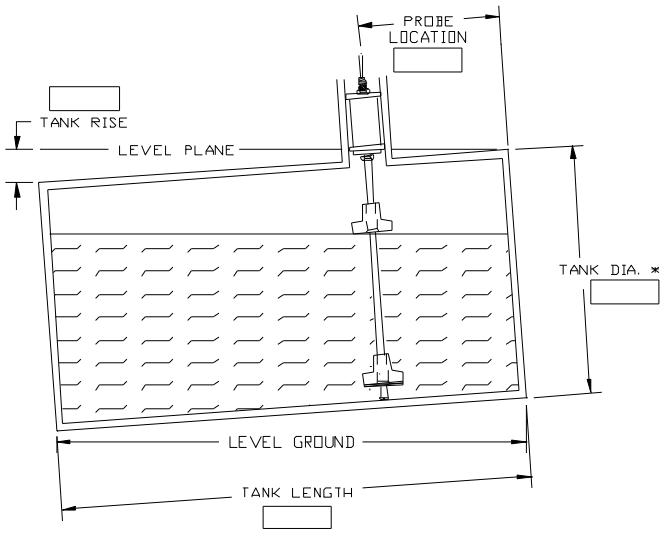
PROBE LEN Probe Length This entry requires the user to enter the specific **Length** of each selected magnetostrictive in-tank probe. **This value in inches is stamped on top of each probe housing**. This information is critical and must be entered in order to conduct **In-Tank leak** testing.
Entry Type: 5-digit numeric
Range Limits: 012.0 - 1999.9
Default/Initialized value: **0** 1st# 2nd#
Example: Look for the second number on top of probe housing - (7100 **0100**) = 100" Length

Prod HO Product Height Offset This entry requires the user to measure and verify the actual fuel height value in inches before placing the magnetostrictive in-tank probe in its mounting location. A offset value in inches and (typically a negative number) will be user entered to calibrate each in-tank probe product float to match the dip stick reading. Note: It has also been found, that the probe mounting location may have a striker plate on the inside bottom of the tank which introduces another variable (decrease in the tank diameter) resulting in and additional **height offset**. This information is critical and must be entered in order to conduct **In-Tank leak** testing.
Entry Type: 4-digit numeric
Range Limits: +/- 0.0 - 299.9
Default/Initialized value: 000.0

h2o HO Water Height Offset This entry requires the user to measure and verify that no water is present in the tank before placing the magnetostrictive in-tank probe in its mounting location. A offset value in inches and (typically a negative number) will be user entered to calibrate each in-tank probe water float to a **baseline water reporting level of zero inches.** This information is critical and must be entered in order to conduct **In-Tank leak** testing.
Entry Type: 4-digit numeric
Range Limits: +/- 0.0 - 299.9
Default/Initialized value: 000.0
A Common user **field setting is approx. (-1.4 to -1.7")**.

ProbE Loc Probe Location Offset This entry requires the user to measure the distance from the highest end of the tank to probe mounting location. This value is especially critical to the [tank tilt (tAnk riSE calculation)] and must be entered in order for the TMS to complete this equation for each tank.
Entry Type: 4-digit numeric
Range Limits: 0.0 - 599.9
Default/Initialized value: 000.0

See Drawing below:



ProbE rEP Probe Rep Rate This entry is only required when the user is calibrating the model **MP440** magnetostrictive in-tank probe. The rep rate for the MP 440 inventory probe and is stamped on top of each MP 440 probe housing. This factor is critical **for net volume gauging accuracy** and must be entered in order for enhanced probe performance.
Entry Type: 4-digit numeric
Range Limits: 18 - 29.99
Default/Initialized value: **00.00**

tEmP En Temperature This entry informs the console that temperature measurement is activated for the selected tank. Temperature must be enabled for Net Volume and for Temperature display data. TMS will report a resolution up to 3 digits.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **no**

Mot bAnd Motion band This entry requires the user to enter minimum fuel trip value for probe float travel. This entry will negate the possibility of wave action in the tank, which can trigger false deliveries, sales, thefts, water removal and product reorder reports. Typically, this small change in level is treated as an inventory increase value due to a fuel delivery.
Entry Type: 2-digit numeric
Range Limits: 0 - .95"
Default/Initialized value: **0**

Note: A commonly used motion band **field setting range is 0.1"**.

Example: If the product in the tank is stable and not in motion, and the M Band is set to (.1) the TMS will continually monitor the probe and look for any level movements either (>) greater than or (<) less than this offset value over a three (3) minute window. When the Trip value is exceeded the TMS will treat the condition as a delivery, sale, theft, water removal or product reorder event and log and report it accordingly.

Log Min Minimum Logged Volume This entry requires the user **to enter a minimum trip threshold value in gallons** for each selected tank that the TMS will recognize and treat as a inventory increase or decrease due to a delivery, sale, theft, water removal or product reorder event and log it accordingly. This value which user programs into the TMS system will negate the possibility of wave action in the tank triggering false deliveries and also interfering with In-Tank Leak test information.
Entry Type: 3-digit numeric
Range Limits: 0 - 999/g
Default/Initialized value: **0**

Note: A commonly used **field setting range is 50/gallons.**

rEturn Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the ProbE menu.
ProbE
*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the Probe menu repeating the cycle again.
ProbE CF

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

RELY TANK Relay Tank This entry allows the user configure the optional relay plug-in card containing four (4) uncommitted Form C relay contacts. Relays are UL/CSA listed devices having contact rating minimum of 7 amps with a maximum of 10 amps @ 110 VAC; or minimum 5 amps with a maximum of 8 amps @ 220 VAC Console will accept up to Two (2) cards for a total of eight (8) relay contacts. Relays are programmable to trigger on any combination of events, including leak, setpoint, water, theft, or contact closure input.

LEAK TR IG Leak Trigger User enters choice from list of relays from 1-8. The selection entered will trigger up to THREE separate relays on a per tank basis (up to 12) via the Group Select button, when the active **Level Probe** changes from its normal status to indicate an **In-Tank Leak.**
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Leak Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0
Example: 1 1-0-0 Leak switch #1 will trigger Relay #1

SP 1 TR IG Set Point #1 Trigger User enters choice from list of relays from 0-8. The selection entered will trigger up to THREE separate relays on a per tank basis (up to 12), via the Group Select button, when the tank product level **Set point #1** is activated.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Set Point #1 Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

SP2 TR IG Set Point #2 Trigger User enters choice from list of relays from 0-8. The selection entered will trigger up to THREE separate relays on a per tank basis (up to 12), via the Group Select button, when the tank product level **Set point #2** is activated.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Set Point #2 Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

SP3 tr.9 — Set Point #3 Trigger User enters choice from list of relays from 0-8. The selection entered will trigger up to THREE separate relays on a per tank basis (up to 12), via the Group Select button, when the tank product level **Set point #3** is activated.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Set Point #3 Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0 0-0

h2o tr.9 — Water Trigger User enters choice from list of relays from 0-8. The selection entered will trigger up to THREE separate relays on a per tank basis (up to 12), via the Group Select button, when the tank **Water level Set point** is activated.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Water Set Point Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0 0-0

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the rELY tAnk menu.
rELY tAnk

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the rELY tAnk menu repeating the cycle again.
LEAk tr.9

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

RELY CC — Relay Board Contact Closure This entry allows the user configure the optional plug-in card containing four (4) uncommitted optically isolated dry contacts closure inputs. Console will accept up to Two (2) cards for a total of (8) non-hazardous contacts closure inputs.

CC TRIG — Contact Closure Trigger User enters choice of dry contact 01-8. The contact closure (CC) selection entered will trigger up to THREE separate relays per (CC) contact closure (up to 8), via the Group Select button, when the active **input** changes from its normal status.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Contact closure Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

RETURN — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the RELY CC menu.
RELY CC

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the RELY TANK menu repeating the cycle again.
CC TRIG

ConF iG

HEAdEr	Header - System default mode setup
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 iScc	**Relay IS Contact Closure-Using Intrinsically Safe sensor input to control relays**
rELY SitE	Relay Site - Programming site related alarms/errors to control relays
rELY ModE	Relay Mode - Status of relay operation
cc inP	Contact Closure Input
iScc inP	Intrinsically Safe Contact Closure Leak 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
tAnk LEAk	In-Tank Leak - Setup

rELY iScc — Intrinsically Safe Leak Sensor Inputs This entry allows the user configure from 1-40 external **leak sensors** to interface optional plug-in Form C relay contacts or the probe/sensor cards. Console will accept up to Two (2) cards for a total of (8) relay contacts closure outputs as well as accepting up to Three (8) probe/sensor cards.

iScc tr iG — Contact Closure Trigger User enters choice of relay contact 0-8. The selection entered will trigger relay selected. Each (Leak ISCC sensor) can trigger up to THREE separate relays per ISCC sensor (up to 40), via the Group Select button, when the active **sensor** changes from its normal status.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the IS Leak Sensor Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the rELY iScc menu.
rELY iScc

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the iScc tr iG menu repeating the cycle again.
iScc tr iG

CONFIG

HEADER	Header - System default mode setup
TANK	Tank - Programming setup
PROBE	Probe - Programming setup
RELAY TANK	Relay Tank - Programming tank related alarms to control relays
RELY CC	Relay Contact Closure - Programming contact closure inputs to control relays
RELY ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

RELY SITE Site Specific relay interface This entry allows the user configure and activate the optional plug-in Form C relay contacts for Theft, Power Failure and System Error. Console will accept up to Two (2) cards for a total of 8 relay contacts closure outputs.

THEFT Theft Trigger User enters choice of relay contact 1-8. If programmed so, the system will detect inventory decrease while station is closed. The selection entered will trigger up to THREE separate relays.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Theft Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

POWERFAIL Power Fail Trigger User enters choice of relay contact 0-8. If programmed so, the system will detect and trigger a relay on a Power Fail Recovery. The selection entered will trigger up to THREE separate relays.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the Power Fail Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

SYS Error System Error Trigger User enters choice of relay contact 0-8. If programmed so, the system will detect and trigger a relay on System Error. This selection entered will trigger up to THREE separate relays.
Programmable format includes n #1 (Relay choices 1- 8), n #2 (Relay choices 1 - 8) and n #3 (Relay choices 1 - 8); where n=relay selection. **0= no relay selection for that position**.
System will accept up to 1 digit (1-8) for either n #1, n #2 or n #3 for the System Error Trigger entry.
Entry Type: numeric list
Range Limits: [Relay n #1 (1-8)]-[Relay n #2 (1-8)]-[Relay n #3 (1-8)]
Default/Initialized value: 0-0-0

RETURN Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the RELY SITE menu.
RELY SITE

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the THEFT menu repeating the cycle again.
THEFT

`ConF ıG`

`HEAdEr`	Header - System default mode setup
`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 ıScc`	Relay IS Contact Closure - Using Intrinsically Safe sensor inputs to control relays
`rELY SıtE`	Relay Site - Programming site related alarms/errors to control relays
`rELY ModE`	**Relay Mode - Status of relay operation**
`cc inP`	Contact Closure Input
`ıScc inP`	Intrinsically Safe Contact Closure Leak Input
`InvEntorY`	Tank Inventory Log Data setup
`tHEFt`	Theft - Detection (Hours of operation)
`ModEn`	Modem Communications - Setup
`d ıAL out`	Auto-Dial out - Setup for selected Alarms or Tank information
`tAnk LEAk`	In-Tank Leak - Setup

`rELY ModE` Operation Relay Status This entry allows the user configure the relay status of the optional plug-in Form C relay contacts for either normally OFF de-energized or ON energized. User may program up to a total of 8 relay contacts closure outputs, when modular relay cards are supplied. Programmable ranges are selectable OFF or ON per relay basis (up to 8), via the Group Select button.

Note: TMS Fail-Safe Positive Shutdown operation requires **Relays Energized (ON)** and the Comm. **(C)** and **N/O** output contacts utilized on the Relay card. Either condition, a **Power loss** to the TMS or an enabled leak **Sensor "in leak status**", will trigger the programmed **Relay(s)** to **OPEN** and shut down the turbine.

`NornALLY` This entry allows the user select and enable from one (1) to eight (8) plug-in relay contacts.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: `OFF`

`FP Act` Fr Panel Acknowledgment This entry allows the user to select and disable the optional plug-in Form C relay contacts via front panel pushbutton acknowledgment.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: `no`

`dELAY` Delay This entry allows lets the user configure the optional plug-in Form C relay contacts to delay immediate relay engaging automatically from 1 -9 minutes. Up to a total of 8 relay contacts closure outputs are programmable.
Entry Type: select list in minutes
Range Limits: (None, - 1-9)
Default/Initialized value: `nonE`

`LAtch En` Latch Enable This entry allows lets the user configure the optional plug-in Form C relay contacts to latch automatically and de-energize the relay condition for the following tank or sensor events. The latching feature is most useful for controlling pumps and motors. Up to a total of 8 relay contacts closure outputs are programmable.
Entry Type: select list
Range Limits: (N/A)
Default/Initialized value: `no`

Example: (1 - tnk 3) = Relay #1 is assigned to Tank #3; A user may wish to program a low level setpoint (SP #3) to energize relay #1 and start a pump to fill the #3 tank. Next, the LAtch Enable menu would be programmed at the high level setpoint (SP 1 OFF), which will automatically disable that relay condition shutting off the pump when the product level reaches Setpoint #1.

SP 1 OFF — Set Point Latch This entry, will select from the group the relays (1-8) assignable from 1-12 tanks (01 tnk 1-12) and allows the setpoint #1 unit to be programmed to latch and hold the relay condition until the tank product level reaches the user specified# 1 setpoint in each enabled tank.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: 1 (tnk no) - Relay # - Tank Number

SP2 OFF — Set Point Latch This entry, will select from the group the relays (1-8) assignable from 1-12 tanks (01 tnk 1-12) and allows the setpoint #2 unit to be programmed to latch and hold the relay condition until the tank product level reaches the user specified # 2 setpoint in each enabled tank.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: (tnk no) - Relay # - Tank Number

SP3 OFF — Set Point Latch This entry, will select from the group the relays (1-8) assignable from 1-12 tanks (01 tnk 1-12) and allows the setpoint #3 unit to be programmed to latch and hold the relay condition until the tank product level reaches the user specified # 3 setpoint in each enabled tank.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: (tnk no) - Relay # - Tank Number

iScc OFF — Intrinsically Safe Input Latch This entry, will select from the group the relays (1-8) assignable to Leak sensors inputs from 1-40 (01 InP 1-40), and allows the user selected iScc Sensor input to be programmed to latch and hold the relay condition until the sensor/switch input is activated.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: (InP no) - Relay # - Sensor Input Number

rEturn — Return *Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the rELY ModE menu.
rELY ModE

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the rELY ModE menu repeating the cycle again.
OFF

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	**Contact Closure Input**
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

CC INP — Contact Closure Input This entry allows the user configure and enable each external contact closure input for On/Off, Relay, Gate function control, Alarm and Acknowledgment. Console will accept up to Two (2) cards for a total of eight non-hazardous (8) contacts closure inputs.

Example: Any contact closure input can be programmed as a **Gate** function to add an extra condition to any relay output, such as disabling a pump override control application. Similarly, the user may select to **Acknowledge** any contact closure input, such as a remote mounted Horn or Beacon, disabling the optional relay contact(s) that have been programmed to trigger the remotely located annunciating alarm device.

CC ENABLE — Contact Closure Enable User enters choice of dry contact closure input. Options include Off, Relay, Gate Control function, Alarm or Acknowledge. The contact closure selection entered will enable and operate in one of the above modes. User will select from menu for specific contact closure operational modes.
Entry Type: Select list
Range Limits: N/A
Default/Initialized value: OFF

OFF Off	RELAY Relay	GATE Gate
ALARM Alarm	ACK Acknowledge	

INP NAME — Input Name User selects input name options. The default displayed entry is Input. Options include Input or Generator.
Entry Type: select list
Range Limits: None
Default/Initialized value: INPUT
GENRTR Generator

NORMALLY — Normally User individually selects input for normally open/closed operation. Options include CLOSE or OPEN. The default displayed entry is Close.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: OPEN

RETURN — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the CC INP menu.
CC INP

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the CC EN menu repeating the cycle again.
CC ENABLE

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	**Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

ISCC INP — Contact Closure Leak Input This menu allows the user to configure and enable each external Intrinsically Safe contact closure Leak sensor inputs for either OFF or ON. All enabled leak sensor inputs shall activate a leak alarm, and shall be selectable for normally open/closed operation. Each input shall have a user-selectable-name. Console will accept up to Two (2) cards for a total of eight Intrinsically Safe contacts closure inputs.

ISCC EN — Contact Closure Enable User enters the condition that the dry contact sensor leak input will activate. Options include OFF, Alarm or Relay. The selection entered will either enable or disable the external sensor leak inputs to actuate alarms and or relays. In the non-supervised mode the leak sensor data will be detected and reported as either "normal" or "alarm" state.
Entry Type: Select list
Range Limits: N/A
Default/Initialized value: OFF

TYPE — Sensor type User selects sensor options. Options include ES 825, HS 100, LS 600, LS 610, RSU 800, RSU 801, RSU 802, or other.
Entry Type: select list
Range Limits: None
Default/Initialized value: ES 825

MODE — Input mode type User selects input options. The default displayed entry is LEAK. Options include Leak or Other. The **Leak** menu selection is chosen when interfacing any **external leak sensors**. **Other** is chosen when interfacing contact closure inputs besides external leak sensors, such as status of a stand alone single or multi-point high or low switch or other device. If **Other** is chosen it will NOT be visually annunciated by any front panel LED indicator.
Entry Type: select list
Range Limits: None
Default/Initialized value: LEAK

INP NAME — Input Name User selects input name options. The default displayed entry is Input.
Entry Type: select list
Range Limits: None
Default/Initialized value: INPUT

Options include:

INPUT Input	SUMP Sump	PIPING Piping	CONTN Containment
DBLWALL Dbl-Walled	DIKE Dike	LEAK Leak	RESVOR Reservoir
WELL Well	GENRTR Generator	WATER Water well	OIL Oil
VAULT Vaulted Annular space	HI RES High Reservoir	LO RES Low Reservoir	HIGH High
HI HIGH High-High	LOW Low	LO LO Low-Low	TRBINE Turbine
DSPAN Dispenser Pan			

FAuLt En — Fault Enable In supervised mode the system will detect and report short-circuited and open-circuited sensor field wiring when used in conjunction with fault reporting sensors. Fault-reporting leak sensors will require the Pneumercator type "F" series or compatible. User selects either NO or YES to enable the fault detection. Supervised mode the leak sensor data will be detected and reported as either "normal" or report short-circuited and open-circuited sensor field wiring.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: no

nornALLY — Normally User individually selects input for normally open/closed operation. Options include CLOSE or OPEN. The default displayed entry is Close.
Entry Type: select list
Range Limits: None
Default/Initialized value: CLOSE

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the ıScc inP menu.
ıScc inP

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the ıScc En menu repeating the cycle again.
ıScc En

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

INVENTORY — Inventory Log Setup This menu allows the user to enable and program the **inventory** data reporting times for each tank, at up to three user-programmable times per day, selectable for each day of the week. An automatic hardcopy report can also be generated if optional printer is installed. The system will have the capacity to store up to the 36 most recent inventory records. Inventory log reports will contain the following data: Site ID, Unit ID, Date, Time, Product Type, Product Name, Tank ID, Gross Volume, Net Volume, 90% Ullage, Product Height, Product Temperature, Last In-Tank Test Results.

HOUR 1 — Hour 1 User enters which hour of the day in (24 hour scale) for the TMS to report inventory data per enabled tank.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

HOUR 1 PRT — Hour 1 Print User may enable the TMS to print inventory data per enabled tank at the specified time designated in the previous menu.
Entry Type: Select
Range Limits: none
Default/Initialized value: no

HOUR 2 — Hour 2 User enters which hour of the day in (24 hour scale) for the TMS to report inventory data per enabled tank.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

HOUR2 PRT — Hour 2 Print User may enable the TMS to print inventory data per enabled tank at the specified time designated in the previous menu.
Entry Type: Select
Range Limits: none
Default/Initialized value: no

HOUR 3 — Hour 3 User enters which hour of the day in (24 hour scale) for the TMS to report inventory data per enabled tank.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

Hour3 Prt — Hour 3 Print User may enable the TMS to print inventory data per enabled tank at the specified time designated in the previous menu.
Entry Type: Select
Range Limits: none
Default/Initialized value: no

Sun EnAbL — Sunday User can select and enable the day of (Sunday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

Mon EnAbL — Monday User can select and enable the day of (Monday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

tuE EnAbL — Tuesday User can select and enable the day of (Tuesday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

WEd EnAbL — Wednesday User can select and enable the day of (Wednesday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

thu EnAbL — Thursday User can select and enable the day of (Thursday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

Fri EnAbL — Friday User can select and enable the day of (Friday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

SAt EnAbL — Saturday User can select and enable the day of (Saturday) for the TMS to report inventory data per enabled tank.
Entry Type: select list
Range Limits: none
Default/Initialized value: no

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the InvEntory menu.
InvEntory

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the Hour 1 menu repeating the cycle again.
Hour 1

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

THEFT — Theft Enable This menu allows the user to enable the system to detect and log and inventory decrease as a theft when the following conditions are valid:

1. Station is closed for business, according to hours of operation programmed in THEFT DETECT submenu.
2. Withdrawal exceeds MINIMUM LOG VOLUME programmed in TANK submenu for that tank.
3. Tank is not in LEAK DETECT mode.

An automatic hardcopy report can also be generated if optional printer is installed. The system will have the capacity to store up to the (6) most recent theft records. Theft log records will contain the following data: Site ID, Unit ID, Date, Time, Product Type, Product Name, Tank ID, Start Gross Volume, Start Net Volume, Start Product Height, Start Temperature, End Gross Volume, End Net Volume, End Product Height, End Temperature, Gross Volume Decrease, Net Volume Decrease.

Entry Type: select list
Range Limits: None
Default/Initialized value: NO

M-F OPEN — Monday-Friday Open User enters which hours of the day in 24-hour scale for Monday- Friday that the facility is **OPEN** for business and the tanks are in use.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

M-F CLOSE — Monday-Friday Closed User enters which hours of the day in 24-hour scale for Monday-Friday that the facility is **CLOSED** for business and the tanks are not in use.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

SAT OPEN — Saturday Open User enters which hours of the day in 24-hour scale for Saturday that the facility is **OPEN** for business and the tanks are in use.
Entry Type: 4 digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

SAT CLOSE — Saturday Closed User enters which hours of the day in 24-hour scale for Saturday that the facility is **CLOSED** for business and the tanks are not in use.
Entry Type: 4-digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

Sun OPEN — Sunday Open User enters which hours of the day in 24-hour scale for Sunday that the facility is **OPEN** for business and the tanks are in use.
Entry Type: 4 digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

Sun CLOSE — Sunday Closed User enters which hours of the day in 24-hour scale for Sunday that the facility is **CLOSED** for business and the tanks are not in use.
Entry Type: 4 digit numeric hours, minutes
Range Limits: 01-23 and 01-59
Default/Initialized value: 00-00

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the tHEFt menu.
tHEFt

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the n-F OPEn menu repeating the cycle again.
n-F OPEn

CONF IG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	In-Tank Leak - Setup

MODEM Modem Enable This menu allows the user to enable and provide a secure internal modem system within the controller's locking enclosure to assure a positive telephone link; free of tampering. The device is a Hayes-compatible, auto-answer, originate type, and will provide remote located communications access to and from the TMS unit at a baud rate of 1200-2400 bps to a Type 2 FAX or at 2400 bps for other data communications. Options user may select and enable are Fax ID number, Line Type, Baud Rate, Dial type, and Pause.

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

INTERNAL Modem Selection User may select and enable either (INTERNAL) Internal modem, (FCS MDM) Fax modem, (PORT MDM) External port modem or (NONE) None for communication type.

Note: System will **auto-detect** and select proper modem type connection or will **default to IntErnal** when modem is installed.

Entry Type: select list
Range Limits: N/A
Default/Initialized value: INTERNAL

FCS AREA Sender ID Code # User can select any ID code # or use the facility phone # and enable the (Area code).
Entry Type: up to 7-digits
Range Limits: 0-7
Default/Initialized value: 0000000

FCS LOCAL Sender ID Code # User can select any ID code # or use the facility phone # and enable the (7) local digits of the phone number.
Entry Type: 7-digit numeric
Range Limits: 0-7
Default/Initialized value: 0000000

BAUD RATE Baud Rate User selects and enables the baud rate of either 1200 or 2400 bps.
Entry Type: Select list
Range Limits: None
Default/Initialized value: 1200

d iAL TYPE — Dial Type User selects and enables telephone signal of Pulse or Tone.
Entry Type: Select list
Range Limits: None
Default/Initialized value: tonE

PAUSE — Pause User selects and enables system to initiate a pause from 1-9 seconds.
Entry Type: 1-digit numeric, seconds
Range Limits: 1-9
Default/Initialized value: 1 SEc

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the ModEn menu.
ModEn

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the IntErnAL menu repeating the cycle again.
IntErnAL

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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**
TANK LEAK	In-Tank Leak - Setup

DIAL OUT Enable This menu allows the user enable and provide TMS Alarms and or Tank information to be dialed out to a remotely located data, fax line, or PC computer access from the TMS unit at a baud rate of 2400 bps. Options user may select and enable are, In-Tank Leak, Line Leak, Discriminating/Non-Discriminating Leak sensors, Product Setpoints 1, 2, 3 (in level, volume, or % Capacity units), Water Setpoint (in level units), Theft, Non-hazardous CC, Power Recovery, and System Error.

TEL AREA Telephone # User can select and enable outboard dialing of up to 5 different outboard (Country and Area Codes) Phone numbers that the TMS will transmit data to. If needed the system may require that you obtain an outside line before dialing (usually the # 9).
The letter **(P)** = pause or space
Entry Type: up to 7 Alphanumeric
Range Limits: 0-9 & P for Pause character
Default/Initialized value: 0 1 0000000

TEL LOCAL Telephone # User can select and enable local outboard dialing of up to 5 different Phone numbers that the TMS will transmit data to. If needed, the system may require that you obtain an outside line before dialing (usually the # 9).
The letter **(P)** = pause or space
Entry Type: up to 7 Alphanumeric
Range Limits: 0-9 & P for Pause character
Default/Initialized value: 0 1 0000000

LINE TYPE Telephone User can select and enable either Data or Fax phone line type.
Entry Type: Select list
Range Limits: N/A
Default/Initialized value: DATA

LEAK DIAL Leak Dial User selects and enables system to initiate an Outbound dialing if the In-Tank Probe Leak Test has been activated or aborted during testing.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

SP 1 DIAL Setpoint Dial User selects and enables system to initiate an Outbound dialing if System Setpoint #1 is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

SP2 dIAL — Setpoint Dial User selects and enables system to initiate an Outbound dialing if System In-Tank Setpoint #2 is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

SP3 dIAL — Setpoint Dial User selects and enables system to initiate an Outbound dialing if System In-Tank Setpoint #3 is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

h2o dIAL — H2O Setpoint Dial User selects and enables system to initiate an Outbound dialing if System In-Tank Water Setpoint is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

thFt dIAL — Theft Dial User selects and enables system to initiate an Outbound dialing if is an unauthorized inventory decrease when facility is closed and System was programmed to activate alarm as per conditions in the prior CONFIG Theft menu.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

cc dIAL — Contact Closure Dial User selects and enables system to initiate an Outbound dialing if the Systems Non-Hazardous Contact Closure is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

iScc dIAL — Intrinsically Safe Contact Closure Dial User selects and enables system to initiate an Outbound dialing if the Systems Intrinsically Safe Leak sensor Contact Closure is activated.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

Err dIAL — System Error Dial User selects and enables system to initiate an Outbound dialing when there is a System Error detected. TMS Flashing codes are displayed for these captured logged events for each tank and will report system Errors, Warnings and TMS Information conditions. An automatic hardcopy report can also be generated if optional printer is installed. The system will have the capacity to store the most recent event records up to the eight events per enabled tank.
Entry Type: Select List above
Range Limits: N/A
Default/Initialized value: nonE

Inv dIAL — Inventory Dial User selects and enables system to initiate Outbound dialing for the TMS inventory log reports. Earlier in the Inventory menu, the user has pre-selected an enabled these specified reporting times and days.
Entry Type: Select List
Range Limits: N/A
Default/Initialized value: no

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the dIAL out menu.
dIAL out

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the tEL ArEA menu repeating the cycle again.
tEL LOCAL

CONFIG

HEADER	Header - System default mode setup
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 ISCC	Relay IS Contact Closure - 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 INP	Contact Closure Input
ISCC INP	Intrinsically Safe Contact Closure Leak 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
TANK LEAK	**In-Tank Leak - Setup**

TANK LEAK This menu allows the user configure each tank for conducting in-tank leak testing. Choices include manual, timed or automatic testing and user programmable Gallon/Hour (gph) thresholds.

TEST EN Test Enable This entry identifies which tank or tanks the user is configuring for in-tank leak testing. Enables tanks 1-12.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **no**

After enabling a test the following front panel displayed characteristics will illustrated.

A. While in normal View Mode, if the user depresses the Mode (review) button, it will display and recall the (Product in that Tank). Also if a leak test is **scheduled**, the letter (L) will appear in the far left hand digit position directly above Tank ID number.
B. While in normal View Mode, the TMS will illustrate the (Tank #) on the display and if either a leak test is **scheduled** or **paused**; the **BLINKING** letter (L) will appear to the left of the Tank ID number.
C. While in normal View Mode, the TMS will illustrate the (Tank #) on the display and if a leak test is **running**, a **SOLID** letter (L) will appear to the left of the Tank ID number.

TEST MODE Test Mode This menu allows the user to select the tank or tanks along with the test modes when configuring an in-tank leak test.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **MANUAL**

The following Modes available are as follows:
A. Manual type (programmed for immediate on-demand sampling analysis).
B. Timed type (programmed for multiple monthly, or daily sampling analysis).
C. Automatic type (programmed for continuous sampling analysis during tank quiescence).

Note: Displayed below, is the TMS nomenclature for this menu.

MANUAL Manual Test **t inEd** Timed Test **AUto** Automatic or Continuous Test

LEAK Limit

Leak Limit This menu allows the user to select the **threshold leak limit rate** per tank in (gph) Gallon/hour increments when configuring an in-tank leak test.
Entry Type: 1 digit numeric
Range Limits: 0.1 - 0.9 gph
Default/Initialized value: 0.1

Note: Displayed below, is the TMS nomenclature for this menu.

1 GPH 0.1 Tank 1, 0.1 gph = tank 1 is set to test for a leak rate of 0.1 gallons/hr.

rEturn

Return
*Pressing the Test/Edit button at Return decrements the TMS back to the Config menu at the tAnK LEAK menu.
tAnK LEAK

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the tESt En menu repeating the cycle again.
tESt En

CLOCK

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:

ACCESS LoG

LEAK tESt

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 **Test** button again will increment to the LEAK menu and then to the ConF iG and then C lock menu. Once in C lock pressing the MODE button will open the **DATE** submenu.

The **CLOCK** menu is used to **edit** or **print clock date, time,** and **day**.

The user may increments through the following submenus in CLOCK to edit data in the following categories.

C lock

nn-dd-YY	Date
HH' nn' SS	Time
dAY	Day

C lock — Set Clock The CLOCK menu allows the user program the TMS current date, time, and day of the week. This information must be programmed in the console initially before configuring and programming the other TMS menus. Options user may select and enable are, Date, Time (24 Hr. schedule) and Day of the week.

nn-dd-YY — Date User enters current date into TMS memory.
Entry Type: 6 digit numeric, months, days, years
Range Limits: 12, 31, 99
Default/Initialized value: 00-00-00

HH'nn'SS — Time User enters current time of the day in Hours, Minutes, and Seconds of the day into the TMS in 24-hour scale.
Entry Type: 6 digit numeric hours, minutes, seconds
Range Limits: 1-23, 1-59, 1-59.
Default/Initialized value: 00-00-00

dAY — Day User enters current day of the week.
TMS listed options include:
Entry Type: select list
Range Limits: N/A
Default/Initialized value: Mon

TMS listed options include:

Mon Monday tuE Tuesday WEd Wednesday thu Thursday Fr i Friday SAt Saturday Sun Sunday

rEturn — Return
*Pressing the Test/Edit button at Return decrements the TMS back to the C lock menu.
C lock

*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the nn-dd-YY menu repeating the cycle again.
nn-dd-YY

Init dAtA

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:

ACCESS
- LoG
- LEAK tESt
- ConFIG
- 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 **Test** button again will increment to the **LEAK** menu and then to the **ConFIG**, **C lock** and then the **In it dAtA** menu. Once in INIT data menu, pressing the MODE button will open the **nonE** submenu.

The **init dAtA** menu is used to **initialize** all or selected log report groups, or configuration memory after the edit enable button (inside of console) has been activated.

The user may increments through the following submenus in INIT to edit data in the following categories.

In it dAtA

nonE	None
InvEntory	Inventory
dEL IvEry	Delivery
SALES	Sales
tHEFtS	Thefts
OrdErS	Product Order
WAtEr rEn	Water Removal
tAnK LEAK	In-Tank Leak Test
ALArmS	Alarms
EvEntS	Errors
A l l LoGS	All Logs
ConFIG	Configuration
ALL	All
rEturn	Return

In it dAtA The INIT menu allows the user to select and initialize the TMS existing logged records as well as user programmed system configuration data. It is designed to delete records either individually, if the ALL menu is chosen, will delete the TMS data in all the following menus. Selected options include, the **default value** "None" (no changes), Inventory, Delivery, Sales, Thefts, Product Order, Water Removal, Tank Leak Test, Alarms, Events, Logs, System Configuration, or (ALL which deletes all TMS programmed and logged information). To initialize any of the above menus the user must activate the (**EDIT Enable)** button located on the backside of the console door.

nonE None User selects the entry None, the TMS default value, if no changes are to be made in the TMS Log, Config, Alarm, or Event menus.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: **nonE**

InuEntorY — Inventory User selects this entry to delete the current TMS logged Inventory data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

dEL iuEry — Delivery User selects this entry to delete the current TMS logged Delivery data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

SALES — Sales User selects this entry to delete the current TMS logged Sales data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

tHEFtS — Thefts User selects this entry to delete the current TMS logged Theft data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

OrdErS — Product Order User selects this entry to delete the current TMS logged Product Order data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

UAtEr rEn — Water Removal User selects this entry to delete the current TMS logged Water Removal data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

tAnk LEAk — In-Tank Leak Test User selects this entry to delete the current TMS logged In-Tank leak test data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

ALArnS — Alarms User selects this entry to delete the current TMS logged Alarm data menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

EuEntS — Events User selects this entry to delete the current TMS logged Errors, and Warning data menus.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

A ll Lo9S — All Logs User selects this entry to delete ALL current TMS LOG menus simultaneously.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

ConF ig — Configuration User selects this entry to delete the current TMS configuration set-up menu data.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

ALL — <u>All</u> This entry to delete ALL the current TMS LOG, LEak, and CONFIG data menus. This entry will **not** alter the CLOCK menu.
Entry Type: select list
Range Limits: N/A
Default/Initialized value: In it

rEturn — <u>Return</u>
*Pressing the Test/Edit button at Return decrements the TMS back to then nonE menu.
nonE

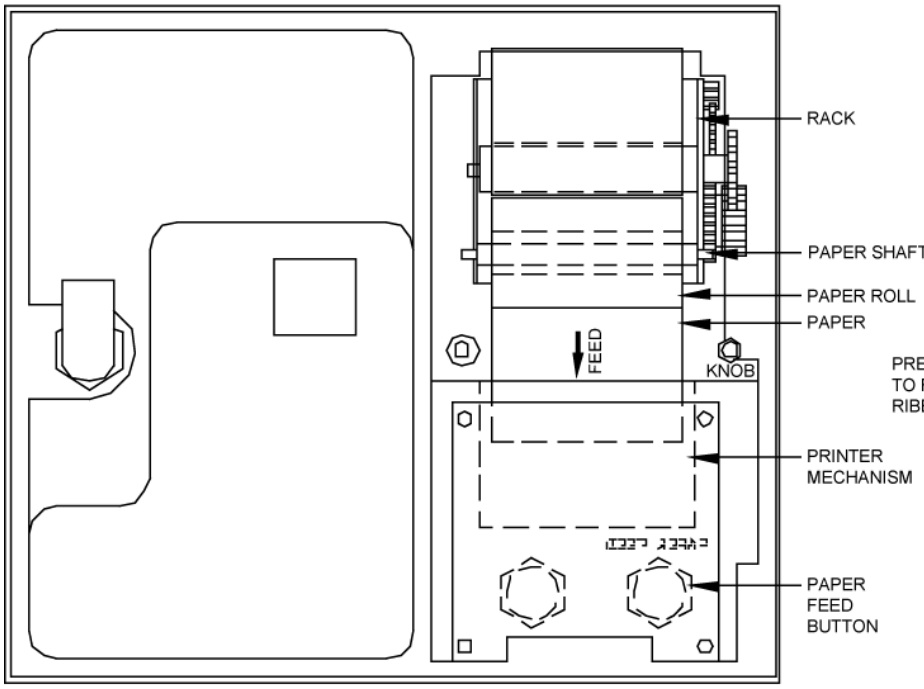
*Pressing the Mode/Step button at the Return increment the TMS back out to the top of the In it dAtA menu repeating the cycle again.
In it dAtA

Note: A separate Installation Manual is available, but not required for TMS operation

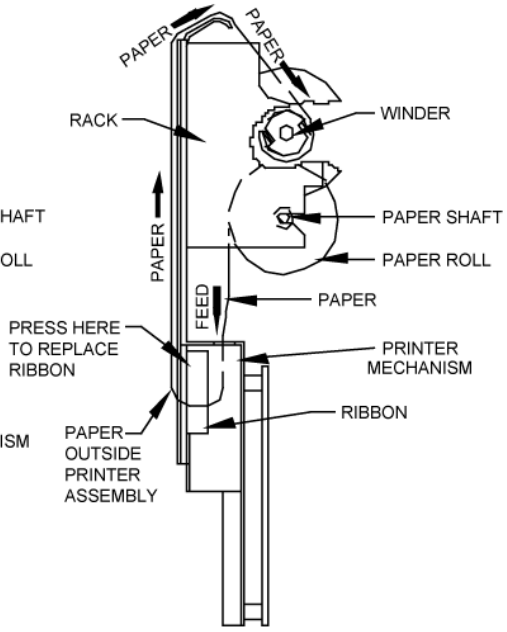
PRINTER PAPER REPLACEMENT (WITH WINDER)

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

REPLACEMENT PAPER ROLL P/N 183601-1



VIEW INSIDE COVER

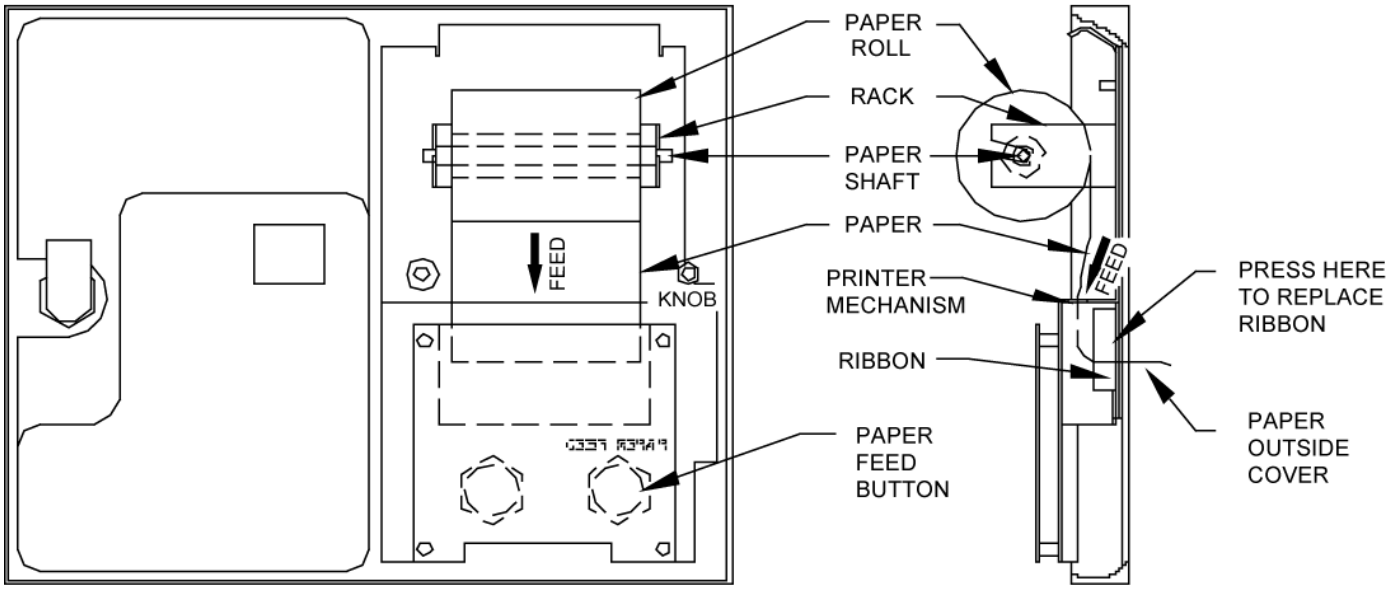


PRINTER ASSY.
SIDE VIEW
STANDING
ON HINGE

PRINTER PAPER REPLACEMENT (NO WINDER)

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

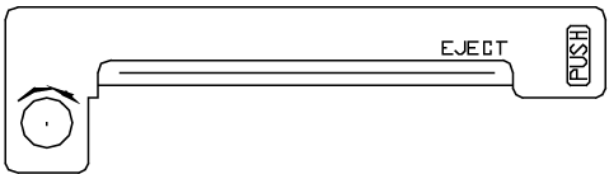
REPLACEMENT PAPER ROLL P/N 183601-1



PRINTER RIBBON REPLACEMENT

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

REPLACEMENT RIBBON P/N 183501-1



RIBBON

APPENDIX A

TMS CONSOLE ALARM & EVENT CONDITIONS TABLES

Alarm Conditions:

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

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

Theft alarms will produce an audible annunciator and appear on the TMS display showing a theft message 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 ISCC alarms will produce an audible annunciator and appear on the TMS display showing a CC or ISCC alarm message across the display. The audible annunciator can be acknowledged via Front panel or Edit enable buttons. The CC or ISCC displayed message will continue until the condition is corrected.

Alarm Description					
Display and Printout Only		Display, Printout, and Computer Format			
Status	**Detail**	**Description**	**Item ID**	**Name**	**Notes**
Leak	n/a	IN-TANK LEAK ALARM	tank #	n/a	Failure of an In-Tank Leak Test
SP1	n/a	PRODUCT SETPOINT #1 ALARM	tank #	SP1 Name	Meets or exceeds the programmed product SetPoint. Factory default value is for a HIGH HIGH alarm at or above 95% of Gross Volume.
SP2	n/a	PRODUCT SETPOINT #2 ALARM	tank #	SP2 Name	Meets or exceeds the programmed product SetPoint. Factory default value is for a HIGH alarm at or above 90% of Gross Volume.
SP3	n/a	PRODUCT SETPOINT #3 ALARM	tank #	SP3 Name	Meets or exceeds the programmed product SetPoint. Factory default value is for a LOW alarm at or below 20% of Gross Volume.
Water	n/a	WATER SETPOINT ALARM	tank #	n/a	Meets or exceeds the programmed water SetPoint. Factory default value is 2 inches or higher of water in tank.
Theft	n/a	THEFT ALARM	tank #	n/a	Theft of product from the tank
CC	Open	CONTACT CLOSURE ALARM - OPEN	cc #	Contact Closure Name	Device wired to CC Input is in alarm
CC	Closed	CONTACT CLOSURE ALARM - CLOSED	cc #	Contact Closure Name	
Sensor	Open	POINT SENSOR ALARM - OPEN	sensor #	Sensor Name	Point level (High, Low, etc.) sensor is in alarm
Sensor	Closed	POINT SENSOR ALARM - CLOSED	sensor #	Sensor Name	
Sensor	Open	LEAK SENSOR ALARM - OPEN	sensor #	Sensor Name	Non-discriminating leak sensor is in alarm
Sensor	Closed	LEAK SENSOR ALARM - CLOSED	sensor #	Sensor Name	
Sensor	Product	LEAK SENSOR ALARM - PRODUCT	sensor #	Sensor Name	Discriminating leak sensor is in alarm
Sensor	Water	LEAK SENSOR ALARM - WATER	sensor #	Sensor Name	

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

Event Description for Errors				
Error #	**Description**	**Item ID**	**Name**	**Notes**
1	BOOT PROM CHECKSUM ERROR	n/a	n/a	Trouble with boot prom firmware chip in U4 socket
2	FLASH PROM CHECKSUM ERROR	n/a	n/a	Trouble with flash prom firmware chip in U5 socket
3	FLASH PROM WRITE ERROR	n/a	n/a	
4	FLASH PROM ERASE ERROR	n/a	n/a	
5	EEPROM CHECKSUM ERROR	n/a	n/a	Trouble with CM1 chip in U2 (TMS3000) or U14 (TMS2000) socket
10	PROBE SYNC ERROR	probe #	n/a	Unintelligible signal being received from probe
11	PROBE TIMEOUT ERROR	probe #	n/a	No signal being detected from probe
20	SENSOR FAULT - SHORT CIRCUIT	sensor #	sensor name	Wiring fault with all sensors except ES825-200F
21	SENSOR FAULT - OPEN CIRCUIT	sensor #	sensor name	
22	SENSOR FAULT	sensor #	sensor name	Wiring fault with ES825-200F

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 (Pur FAiL UArn21), warning conditions are not logged in the **Event Log**. All warning conditions are printed automatically if printer is supplied. Warnings will produce an audible alarm and appear on the TMS display showing the specific warning condition and code number. Warning conditions may be user acknowledged via Front panel or Edit enable buttons.

Event Description for Warnings				
Warning #	**Description**	**Item ID**	**Name**	**Notes**
1	MODEM - INITIALIZATION ERROR	n/a	n/a	Check the phone line and then the modem for trouble
2	MODEM - COMMAND ERROR	n/a	n/a	
3	MODEM - RESPONSE TIMEOUT ERROR	n/a	n/a	
4	MODEM - NO CARRIER	n/a	n/a	
5	MODEM - COMMUNICATIONS ERROR	n/a	n/a	
6	MODEM - NO DIALTONE	n/a	n/a	
7	CONFIGURATION WARNING - TANK	tank #	n/a	Checksum error in the referenced section of memory. Review the
8	CONFIGURATION WARNING - PROBE	probe #	n/a	configuration and resave the configuration to the TMS. If the warning
9	CONFIGURATION WARNING - HEADER	n/a	n/a	persists there may be a memory failure in the TMS
10	CONFIGURATION WARNING - RELAY/TANK	tank #	n/a	
11	CONFIGURATION WARNING - RELAY/CC	cc #	n/a	
12	CONFIGURATION WARNING - RELAY/SENSOR	sensor #	n/a	
13	CONFIGURATION WARNING - RELAY/SITE	n/a	n/a	
14	CONFIGURATION WARNING - RELAY/MODE	relay #	n/a	
15	CONFIGURATION WARNING - CC	cc #	n/a	
16	CONFIGURATION WARNING - SENSOR	sensor #	n/a	
17	CONFIGURATION WARNING - INVENTORY	n/a	n/a	
18	CONFIGURATION WARNING - THEFT	n/a	n/a	
19	CONFIGURATION WARNING - MODEM	n/a	n/a	
20	CONFIGURATION WARNING - DIALOUT	dialout ch. #	n/a	
21	POWER FAIL DETECTED	n/a	n/a	Reported after a 1-2 minute loss of power when the power has been restored.
22	DUPLICATE TANK ID	tank #	n/a	2 tank channels have been assigned the same tank ID number
23	SINGLE DIGIT TANK ID ONLY	tank #	n/a	A single digit tank ID has been assigned to a tank channel. The TMS requires all ID's be 2 digits so a tank ID of 1 should be represented as 01.
24	LEAK TEST ABORT/DELIVERY	tank #	n/a	Aborted in-tank leak test due to a delivery to the tank during the test.
25	NO MONTHLY TEST	tank #	n/a	A warning associated with Auto Leak test mode alerting the owner that no monthly test has been completed.

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

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

Event Description for Information Messages				
Info #	**Description**	**Item ID**	**Name**	**Notes**
1	SETPOINT UNITS - MODE CHANGE ADVISORY	n/a	n/a	TMS informs user in the TMS VIEW menu that the globally programmed Setpoints units for all enabled tanks have been changed in the **Config Header menu.**
2	UNGAUGEABLE LEVEL	tank #	n/a	TMS informs user that the product float for the indicated tank has reached a float collar stop or its minimum gaugeable level. Because the stop is some distance above the actual tank bottom, an alternating minimum gaugeable level and the message "Low Product" will be displayed. This condition is usually associated with probes requiring "Special Tank TOP mounting". These minimum gauging points are programmed for all enabled tanks in the changed in the **Config Tank Menu.**

APPENDIX B

TMS Processor Board Dip Switch Settings

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

Note: Switch positions should **not** be field modified. If required and before attempting any changes, consult the factory for specific details. As always, any mechanical or electrical modifications to TMS system, probe, sensor, or other accessories requires the console to be powered-down.

Dip Switch Function/Condition:

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

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

Switch # 2 With the rocker arm in the OPEN position, this switch activates the System **Motion Band Symbol**, producing a lower case horizontal line to the right of the Tank I D #. This visual display represents movement of product in the tank for either Deliveries, Sales, or Thefts. Any of these conditions will be logged as a function of the motion band (Not 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.

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

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

TMS CONFIGURATION - DATA ENTRY WORKSHEET

CUSTOMER:
SITE:

DATE:

LEAK TEST	tAnk	1	2	3	4	5	6	7	8	9	10	11	12
TEST LENGTH	tESt LEn												
START TIME	StArtt inE												
SCHEDULE TYPE	Schd tYPE												
SCHEDULE RATE	Schd rAtE												
SCHEDULE DAY	Schd dd												
CONTROL	control												

CONFIGURE ConF iG

HEADER HEAdEr

ACCESS CODE	Acc CodE	
UNIT ID	Unit id	
SITE ID	SitE id	
OPERATIONAL DEFAULT MODE	OP dEFLt	
BAUD RATE	bAud rAtE	
TANK QUANTITY	tAnk QtY	
SET POINT UNITS	SP UnitS	
SALE DETECT ENABLE	SALE En	
HORN DELAY	HorndELAY	
AUTO PRINT ENABLE	AutoPr int	

TANK	tAnk	1	2	3	4	5	6	7	8	9	10	11	12
TANK ENABLE	tAnk En												
TANK NAME	tAnk nAnE												
TANK ID	tAnk id												
VOLUME MODE	UOL nodE												
PRODUCT TYPE	Prod tYPE												
SET POINT 1 (%VOL, GAL, INCHES)	SP1 Prod												
SET POINT 2 (%VOL, GAL, INCHES)	SP2 Prod												
SET POINT 3 (%VOL, GAL, INCHES)	SP3 Prod												
SET POINT 1 NAME	SP1 nAnE												
SET POINT 2 NAME	SP2 nAnE												
SET POINT 3 NAME	SP3 nAnE												
SET POINT 1 HORN	SP1 Horn												
SET POINT 2 HORN	SP2 Horn												

SET POINT 3 HORN	SP3 Horn											
WATER FLOAT ENABLE	h2o EnAbL											
WATER SET POINT	SP h2o											
TANK TYPE	tAnk tYPE											
TANK CAPACITY	tAnk CAP											
MANIFOLD QUANTITY	nAn iFoLd											
TANK RADIUS	tAnk rAd											
TANK LENGTH	tAnk LEn											
TANK RISE	tAnk r iSE											
IF TANK TYPE IS OTHER:												
HEIGHT 1 (CALC. BY TMS)	HE iGht 1											
VOLUME 1 (USER ENTRY)	UOLUnE 1											
HEIGHT 2 (CALC. BY TMS)	HE iGht 2											
VOLUME 2 (USER ENTRY)	UOLUnE 2											

HEIGHT 3 (CALC. BY TMS)	HE ,9ht	
VOLUME 3 (USER ENTRY)	UOLUnE 3	
THEFT ENABLE	thEFt En	
UNUSABLE	UnUSERbLE	
UNGAUGEABLE	Un9A9ERbL	

PROBE	ProbE	1	2	3	4	5	6	7	8	9	10	11	12
PROBE CAL FACTOR	ProbE CF												
PROBE TYPE	ProbE tYP												
PROBE LENGTH	Prod LEn												
PRODUCT HEIGHT OFFSET	Prod HO												
WATER HEIGHT OFFSET	h2o HO												
PROBE LOCATION OFFSET	ProbE Loc												
PROBE REP RATE (MP440 ONLY)	ProbE rEP												
TEMPERATURE ENABLE	tEnP En												
PRODUCT MOTION BAND	Mot bAnd												
MINIMUM LOG TRIP VOLUME	Log Min												

RELAY TANK	rELY tAnk	1	2	3	4	5	6	7	8	9	10	11	12
LEAK TRIGGER	LEAk tr ,9												
SET POINT #1 TRIGGER	SP 1 tr ,9												
SET POINT #2 TRIGGER	SP2 tr ,9												
SET POINT #3 TRIGGER	SP3 tr ,9												
WATER TRIGGER	h2o tr ,9												

RELAY CONTACT CLOSURE	rELY cc	1	2	3	4	5	6	7	8	9	10	11	12
CONTACT CLOSURE TRIGGER	cc tr ,9												

RELAY IS CONT. CLOSURE	rELY ,Scc	1	2	3	4	5	6	7	8	9	10	11	12
CONTACT CLOSURE TRIGGER	,Scc tr ,9												
	rELY ,Scc	13	14	15	16	17	18	19	20	21	22	23	24
CONTACT CLOSURE TRIGGER	,Scc tr ,9												

RELAY SITE	rELY SitE	1
THEFTTRIGGER	tHEFt	
POWER FAIL TRIGGER	PouErFAiL	
SYSTEM ERROR TRIGGER	SYS Error	

RELAY MODE	rELY ModE	1	2	3	4	5	6	7	8
FRONT PANEL ACKNOWLEDGEMENT	FP Act								
DELAY ACKNOWLEDGEMENT	dELAY								
LATCH ENABLE	LAtch En								

CONT. CLOSURE INPUT	cc inPut	1	2	3	4	5	6	7	8
CONATCT CLOSURE ENABLE	cc EnAbLE								
INPUT NAME	inP NAnE								
NORMALLY	NornALLY								

I.S. CONTACT CLOSURE NUMBER

I.S. CONTACT CLOSURE	SEnSr inP	1	2	3	4	5	6	7	8	9	10	11	12
CONTACT CLOSURE ENABLE	SEnSor En												
TYPE	tYPE												
MODE	ModE												
INPUT NAME	inP nAmE												
FAULT DETECT ENABLE	FAuLt En												
NORMALLY OPEN/CLOSE	norMALLY												
I.S. CONTACT CLOSURE	SEnSr inP	13	14	15	16	17	18	19	20	21	22	23	24
CONTACT CLOSURE ENABLE	SEnSor En												
TYPE	tYPE												
MODE	ModE												
INPUT NAME	inP nAmE												
FAULT DETECT ENABLE	FAuLt En												
NORMALLY OPEN/CLOSE	norMALLY												

TANK INVENTORY LOG DATA SETUP

	InvEntorY	1
HOUR 1	Hour 1	
PRINT HOUR 1	Hour 1 Prt	
HOUR 2	Hour 2	
PRINT HOUR 2	Hour2 Prt	
HOUR 3	Hour 3	
PRINT HOUR 3	Hour3 Prt	
SUNDAY	Sun EnAbL	
MONDAY	Mon EnAbL	
TUESDAY	tuE EnAbL	
WEDNESDAY	UEd EnAbL	
THURSDAY	thu EnAbL	
FRIDAY	Fr i EnAbL	
SATURDAY	SAt EnAbL	

THEFT DETECTION	tHEFt	1
MONDAY-FRIDAY OPEN	n-F OPEn	
MONDAY-FRIDAY CLOSED	n-F CLOSE	
SATURDAY OPEN	SAt OPEn	
SATURDAY CLOSED	SAt CLOSE	
SUNDAY OPEN	Sun OPEn	
SUNDAY CLOSED	Sun CLOSE	
MODEM COMMUNICATION	nodEn	1
INTERNAL MODEM	nodEn	
TELEPHONE #	FCS LOCAL	
TELEPHONE #	FCS ArEA	
BAUD RATE	bAud rAtE	
DIAL TYPE	d iAL tYPE	
PAUSE	PAUSE	

AUTO DIALOUT	d iAL out	1	2	3	4	5
TELEPHONE #	tEL LOCAL					
TELEPHONE #	tEL ArEA					
LINE TYPE	L inE tYPE					
LEAK DIAL	LEAt d iAL					
SET POINT 1 DIAL	SP 1 d iAL					
SET POINT 2 DIAL	SP2 d iAL					
SETPOINT 3 DIAL	SP d iAL					
H2O SET OPINT DIAL	h2o d iAL					
THEFT DIAL	thFt d iAL					
CONTACT CLOSURE DIAL	cc d iAL					
IS CONTACT CLOSURE DIAL	iScc d iAL					
SYSTEM ERROR DIAL	Err d iAL					
INVENTORY DIAL	inu d iAL					

TANK LEAK	tAnk LEAk	1	2	3	4	5	6	7	8	9	10	11	12
TEST ENABLE	tESt En												
TEST MODE	tESt ModE												
LEAK LIMIT	LEAkL in it												

TMS CONFIGURATION - DATA ENTRY WORKSHEET

CLOCK	C lock	
DATE	nn-dd-YY	
TIME	HH' nn' SS	
DAY OF WEEK	dAY	

TMS CONFIGURATION - DATA ENTRY WORKSHEET

INITIALIZE LOG & CONFIGURATION DATA

INIT DATA 

PNEUMERCATOR TMS SERIES

LIMITED WARRANTY

TMS Series

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

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

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

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

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

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

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

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

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

PNEUMERCATOR
Liquid Level Control Systems

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