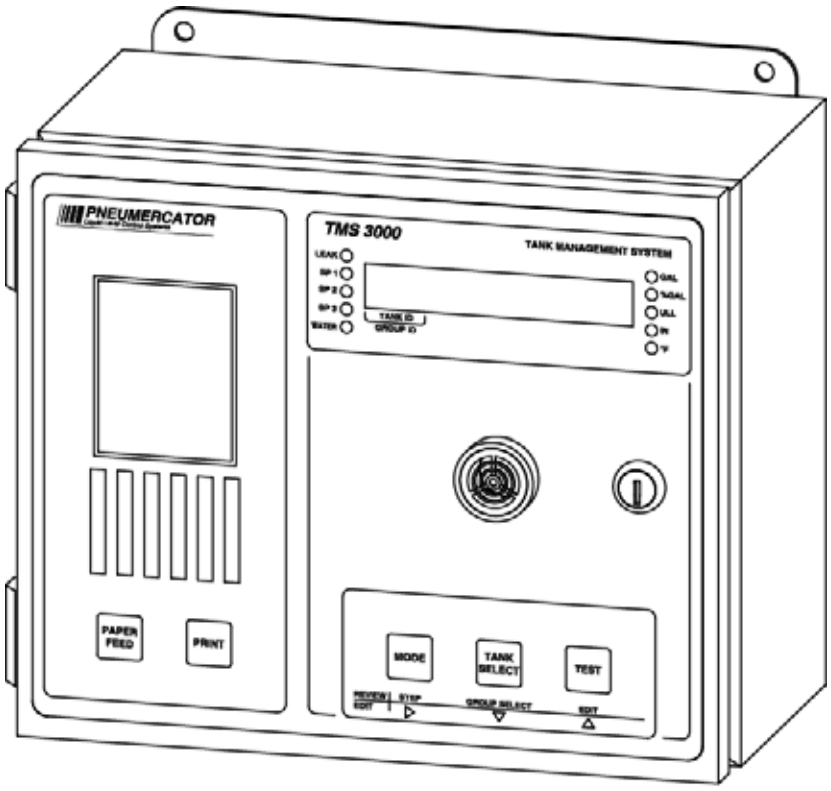
PNEUMERCATOR
Liquid Level Control Systems

MULTI TANK
MONITORING
SYSTEM

OPERATION MANUAL (VERSION 2.0A)



DRAWING NO. 20001 REV. A

MODEL TMS2000 and TMS3000

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TABLE OF CONTENTS

Getting Started

This manual was designed to assist in the operation & programming of the TMS series Tank Management Systems.

Please review the next few pages to familiarize yourself on how this manual is designed and how you can access certain functions & programming in the TMS system.

The main thing is to decide what you need to accomplish and then consult that section of the manual. We have a "Quick Start-up guide" to assist you in start up, if the TMS system has been factory pre- programmed. THIS IS A SEPARATE MANUAL. Please contact Pneumercator for a printed copy, or download from the Pneumercator Web Site at the following link: http://www.pneumercator.com/pages/service.htm.

SECTION 1 – PRODUCT DESCRIPTIONS

1.1 TMS System Overview

The front panel of the TMS2000 /3000 is available in four different configurations as listed below:

TMS2/3000-1... Console without display, printer
TMS2/3000-2... Console with display, no printer
TMS2/3000-3... Console with display, printer
TMS2/3000-4... Console with display, printer w/auto-winder

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 auto-winder.

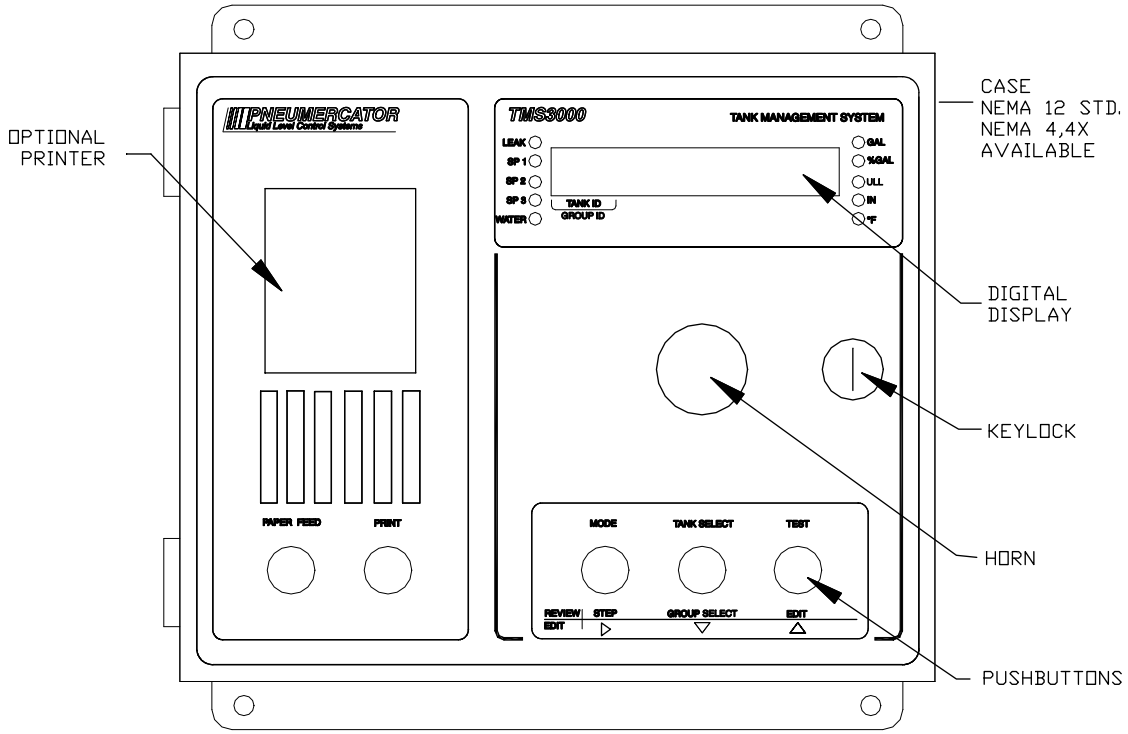


Figure 1-1 – Front Panel Features

1.2 Display Description

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 LED's annunciate alarm conditions visible up to 75 feet away from console. Five additional LED indicators provide indication of units of measure of the currently selected display data. See Figure 1-2 below.

Figure 1-2 – Display Features

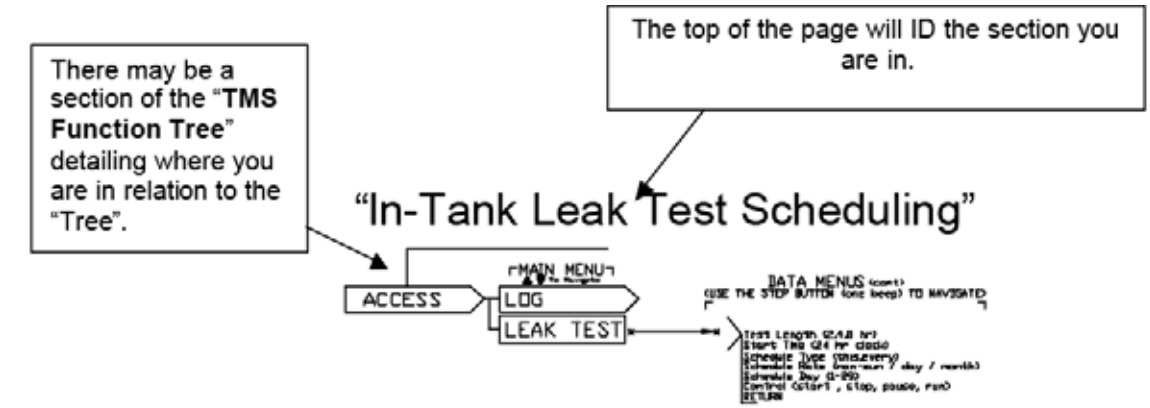
1.3 Power-up Sequence

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

1. A self-test to verify integrity of both, system program and data memories, system I/O, and data acquisition interface electronics. Display is blank during this process.
2. Retrieval and verification of configuration and set-up data.
Display shows "rEAd ing ConF ig (Reading/Config).
3. System initialization, including pre-start-up calculations.
Display shows "SYStEn in it" (System/Init).
4. Visual display and audible alarm check.
Display shows "88888888" (88888888) with all LED's 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,
"WArn21- PwrFA iL" Warning 21, Power Failure. This message is normal, and is just informing the user that the TMS has detected a power failure. Once acknowledged by the user, by pressing any front panel pushbutton, this message will disappear from the display.

1.4 Understanding This Manual



"In-Tank Leak Test Scheduling" works in conjunction with the Tank Leak Setup and allows various "Scheduling" options for running Precision leak tests on underground tanks. Tank Leak test must be enabled under {configuration > tanks > leak test} in the programming section.
This Scheduling is **PER TANK**.
{Leak Test} [LEAK TEST]

Function Tree

The Text Box will include information on the item it is pointing to and will also show you the wording used for that item in the {Function Tree} and what the display would show on the TMS for that item in seven segment font. [LEAK TEST]

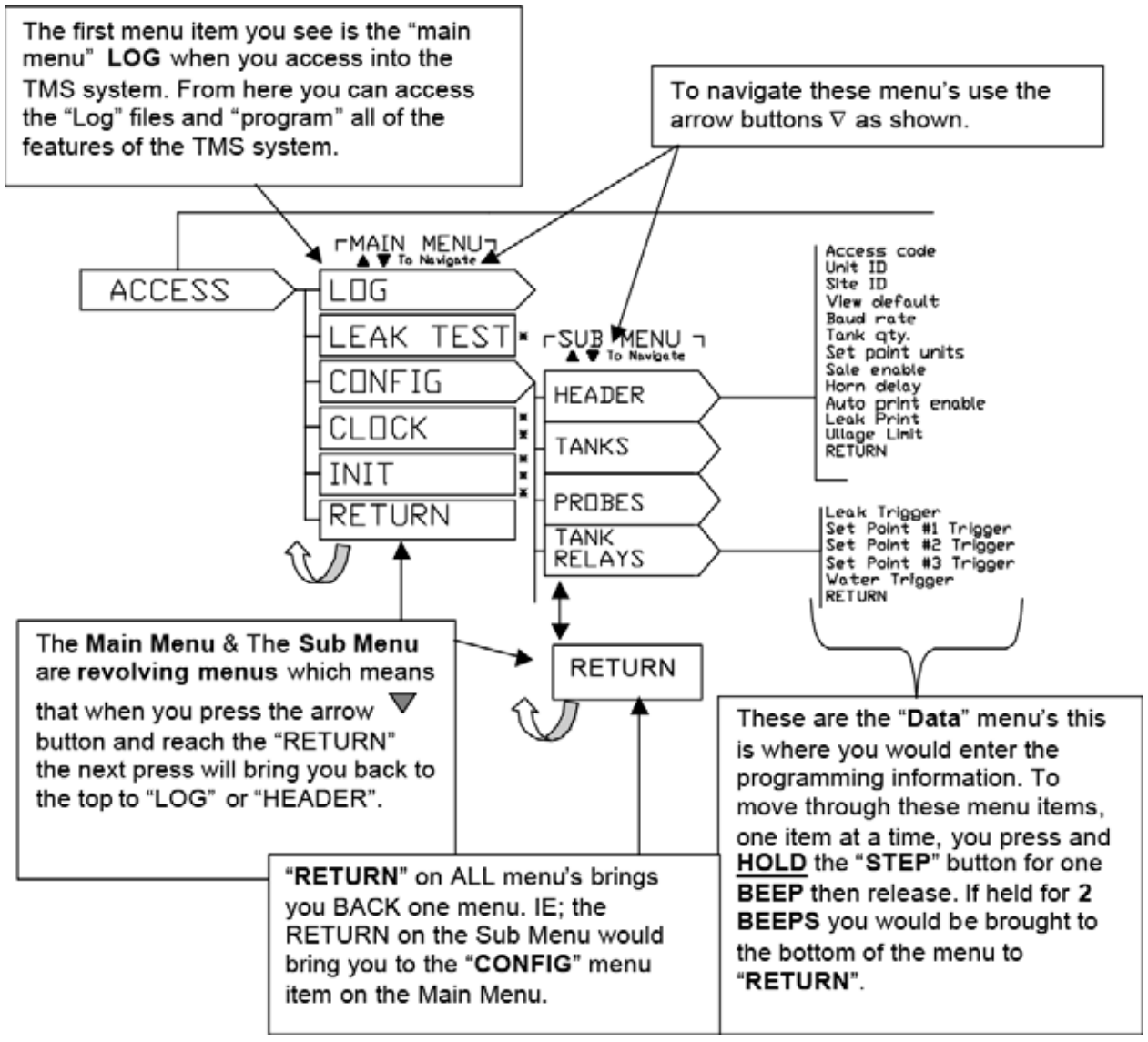
TMS Display Font (7 Segment)

Used by TMS COMM Only

When you see this it means that the item is only used by **TMS COMM** and **not** by the **TMS** console, so you will not find any reference to that item on the "Function Tree".

1.5 Access Function Tree Description

The "**Access Function Tree**" lays out the TMS programming and access features.



1.6 Front Panel Programming Basics

Programming systems via the front panel can be a simple process if the basics are understood. All of the programming is done using the three buttons as shown below, the graphics that are printed above and below show you the different uses of the buttons depending on where you are in the programming. The graphics above the button shows that when looking at the system in the "Normal View" (default) mode the buttons allow you to "TEST" (right button), the display LED's to ensure that the display is working correct and the "TANK SELECT" (middle button) allows you to switch between tanks. The "MODE" (left button) lets you switch display modes (ie; gallons, inches, %gallons, temp. etc,) as shown on the graphic next to the right side of the display.

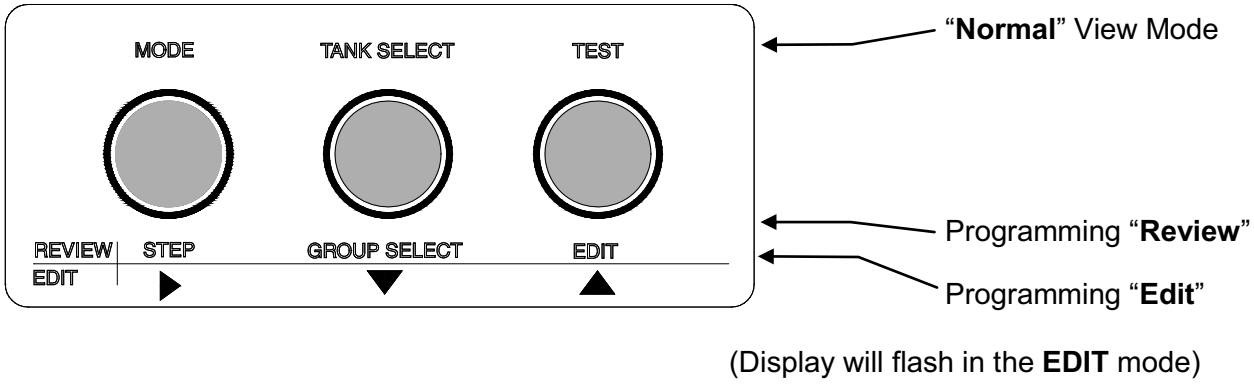


Figure 1-2 – Display Features

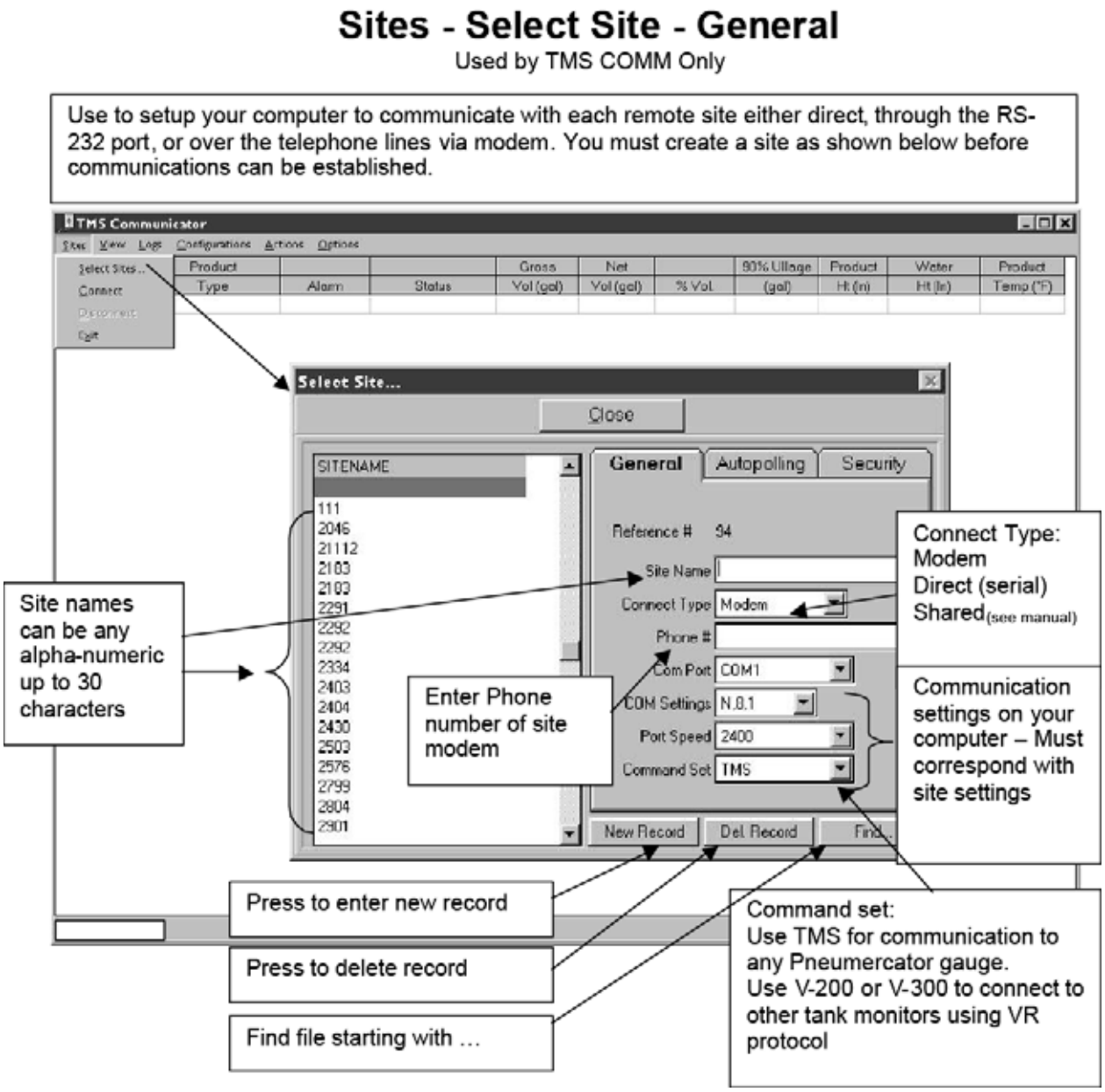
The "**Review**" mode is when you are into programming and have not begun to edit any programming. These will allow you to "Step" from one menu item to another, select a different "Group" (ie; tank, probe, relay etc) and to "Edit" the item that is shown on the display.

The "**Edit**" mode is when you are in programming and are editing the programming. The display will "**FLASH**" indicating that you are in the "Edit" mode. The arrows allow you to increment ▲ a number or selection or decrement ▼ a number or selection. The Right ► arrow will allow you to move the "cursor"(flashing digit) to the right and also to "lock" the selection. You need to press the "**EDIT ENABLE**" button on the inside of the front door to enable editing of the programming.

One key to remember what button to press is that when you want to make a selection or edit what you are looking at you need to press the opposite button than you last pressed. ie; the increment ▲ and decrement ▼ buttons work together and that if pressing one of these and you want to select an item, you would press the Right ► arrow button to select. If the last button pressed was the right arrow ► you would press the ▲ increment button to select that item.

SECTION 2 – PRODUCT DESCRIPTIONS

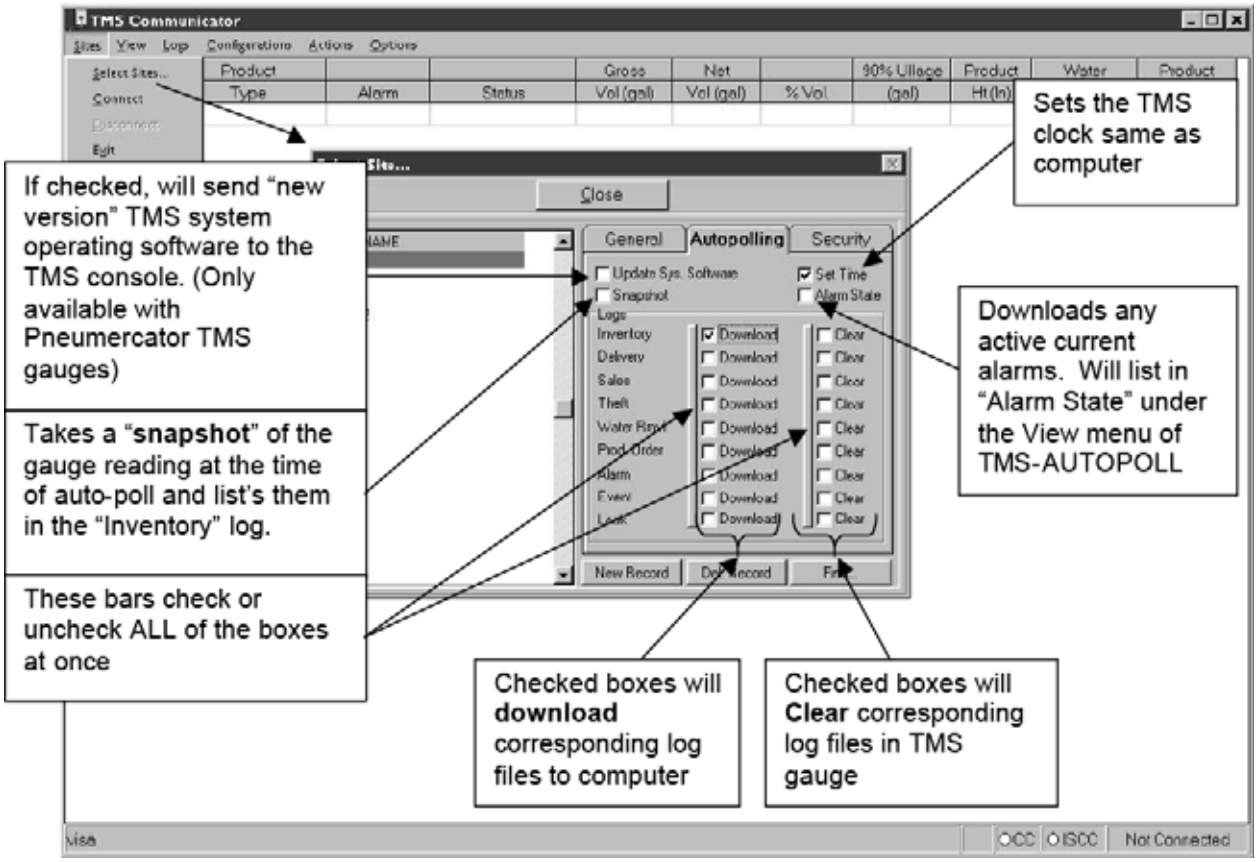
2.1 Sites Menu



Sites - Select Site - Auto-polling

Used by TMS COMM Only

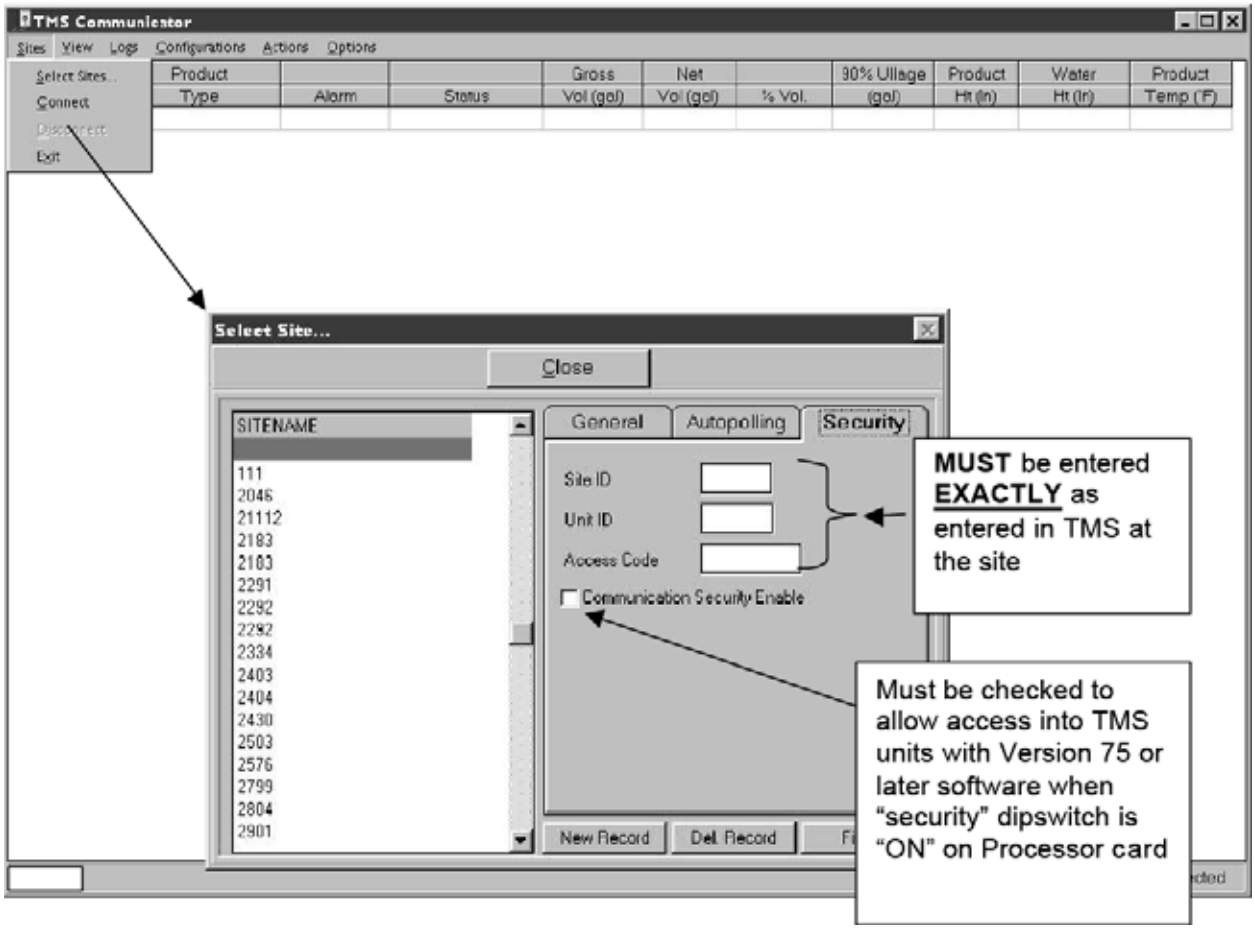
Use to setup what information should be collected for each site when TMS-COMM is in the "Auto-Poll" Mode.



Sites - Select Sites - Security

Used by TMS COMM Only

Allows you to set up individual site security features

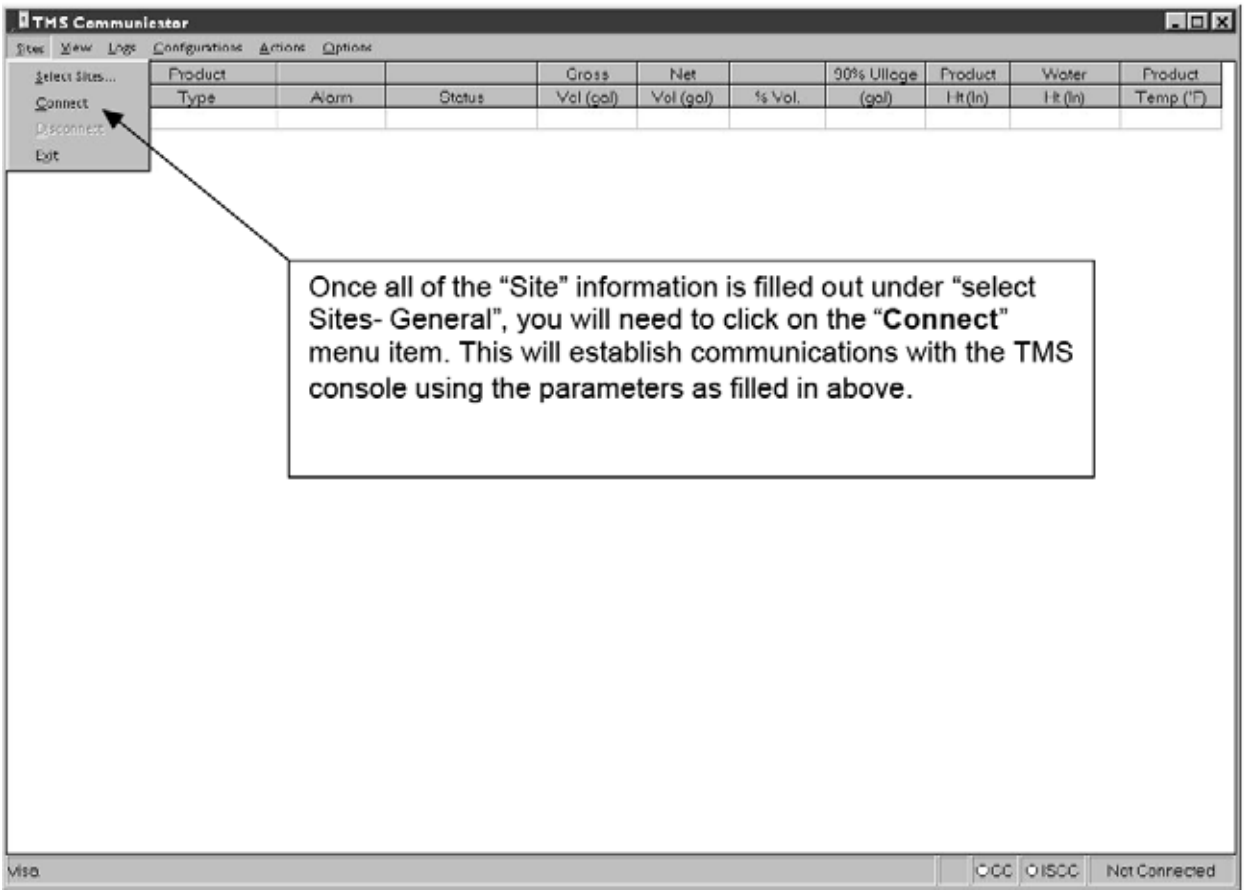


Sites - Connect

You will need a physical connection between the TMS and your computer before you can communicate. There are two ways to connect:

1. Direct connection between the Serial Comm Port in your computer (9 pin or 25 pin) connected to the UPPER RJ13 port on the main board in the TMS 2000 or 3000. With cable # 600038-15 (9 pin) available from Pneumercator Co.

2. Connection through a modem (Part # 900433-1) in the TMS and a standard phone cable connected into a phone line with your computer & modem connected to another.



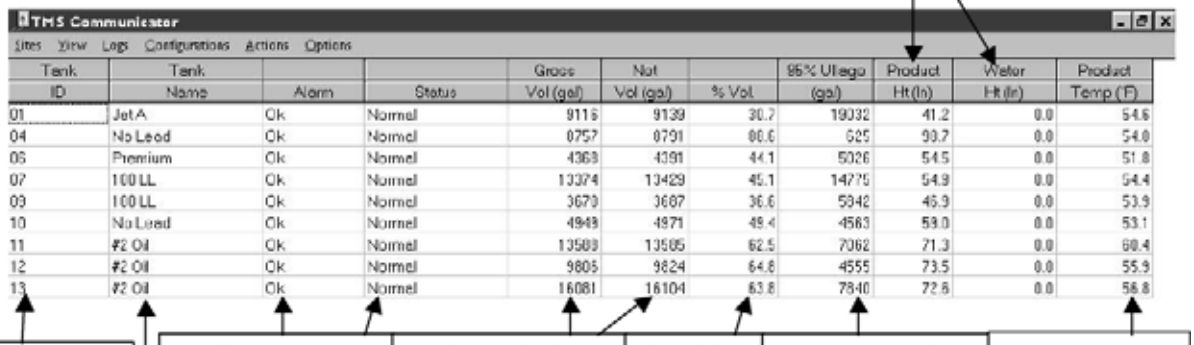
2.2 Main User Screen

Main User Screen

Used by TMS COMM Only

This is the first screen that is shown when you connect to a tank gauge system.

Product & water heights – Equivalent to stick readings



Tank ID	Tank Name	Alarm	Status	Gross Vol (gal)	Net Vol (gal)	% Vol	95% Ullage (gal)	Product Ht (in)	Water Ht (in)	Product Temp (F)
01	Jet A	Ok	Normal	9116	9139	30.7	19032	41.2	0.0	54.6
04	No Lead	Ok	Normal	8757	8791	80.6	625	90.7	0.0	54.0
05	Premium	Ok	Normal	4368	4391	44.1	5026	54.5	0.0	51.8
07	100 LL	Ok	Normal	13374	13429	45.1	14775	54.9	0.0	54.4
09	100 LL	Ok	Normal	3670	3687	36.6	5342	46.9	0.0	53.9
10	No Lead	Ok	Normal	4948	4971	49.4	4563	59.0	0.0	53.1
11	#2 Oil	Ok	Normal	13569	13585	62.5	7062	71.3	0.0	60.4
12	#2 Oil	Ok	Normal	9805	9824	64.8	4555	73.5	0.0	55.9
13	#2 Oil	Ok	Normal	16081	16104	63.8	7840	72.6	0.0	56.8

Tank Identification

Product Name

Shows tank "**Alarm**" ie; high, low etc. and "**Status**" ie; in-use, delivery in progress etc.

Gross & Net (compensated to 60°F) volume readings per tank.

% of the tank that has product

Amount of product that can be "delivered" to the tank to reach the set "Ullage" % (high level point)

Average temperature of sensors that are "IN-PRODUCT", up to 5 per probe

Summary indicator for NON-HAZARDOUS **C**ONTACT **C**LOSURES inputs on the relay boards. **Green** will indicate "ALL CONTACTS NORMAL" and **Red** will indicate a "CLOSED / OPEN" indication with one or more Contacts. Double "Click" will bring up full "Contact Closure" screen

Summary Indicator for LEAK SENSORS. **Green** will indicate "ALL SENSORS NORMAL" and **Red** will indicate a problem / leak indication with one or more leak sensors. Double "Click" will bring up full "sensor" (**ISCC**) screen.

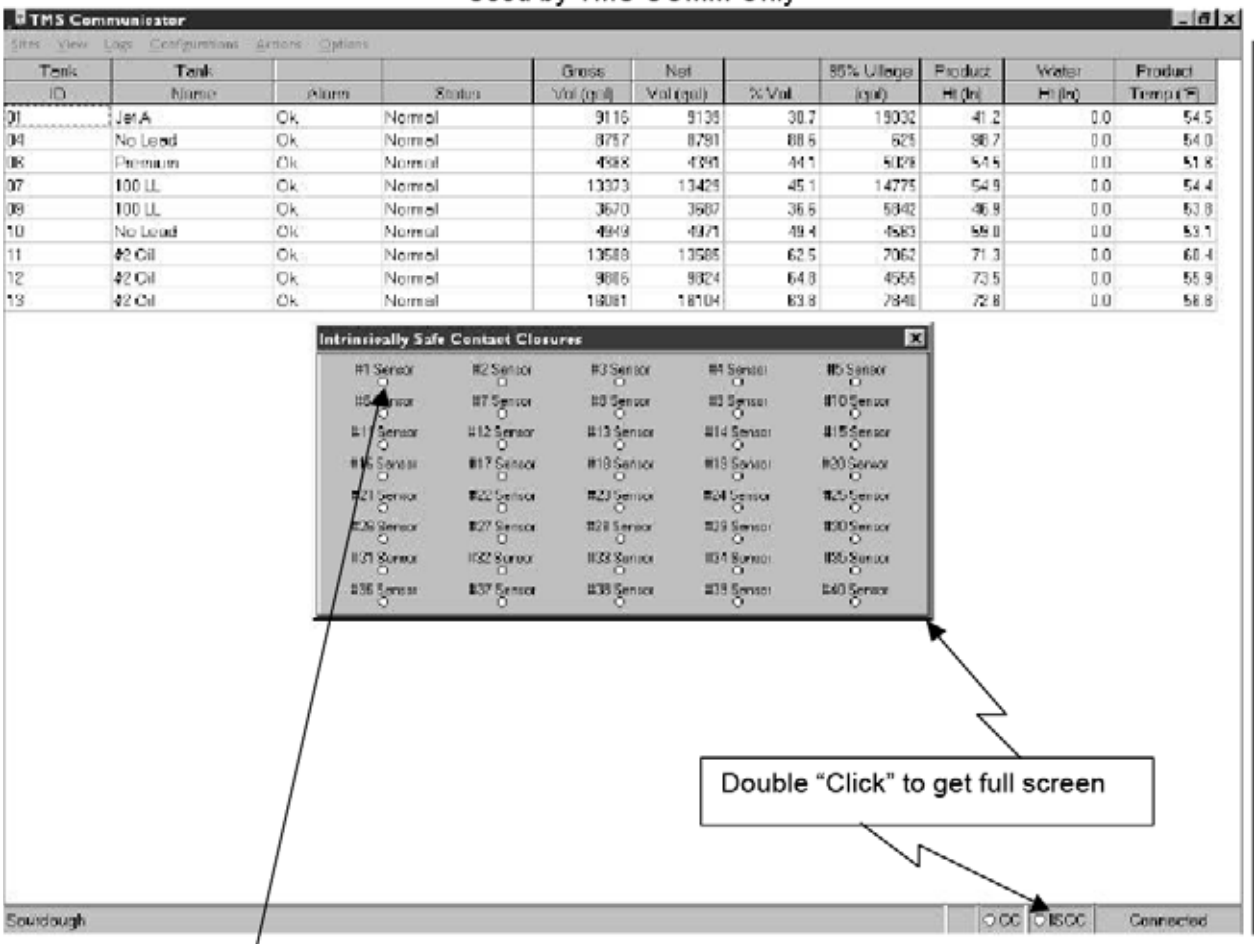
Identifies which site you are connected to.

A "BELL" shown here will indicate there is an "ALARM" condition. Double "Click" will bring up the alarm screen. When screen is closed, the bell will disappear.

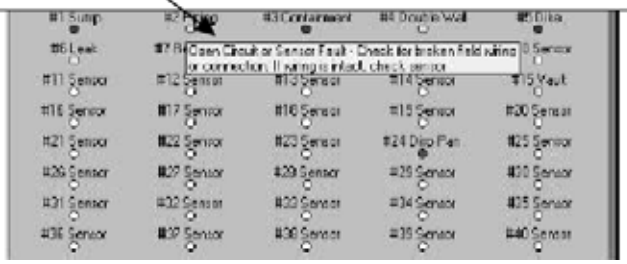
Indicates that you are "**Connected**" or shows "**Polling**" every 10 seconds while connected to a site

User leak Sensor

Used by TMS COMM Only

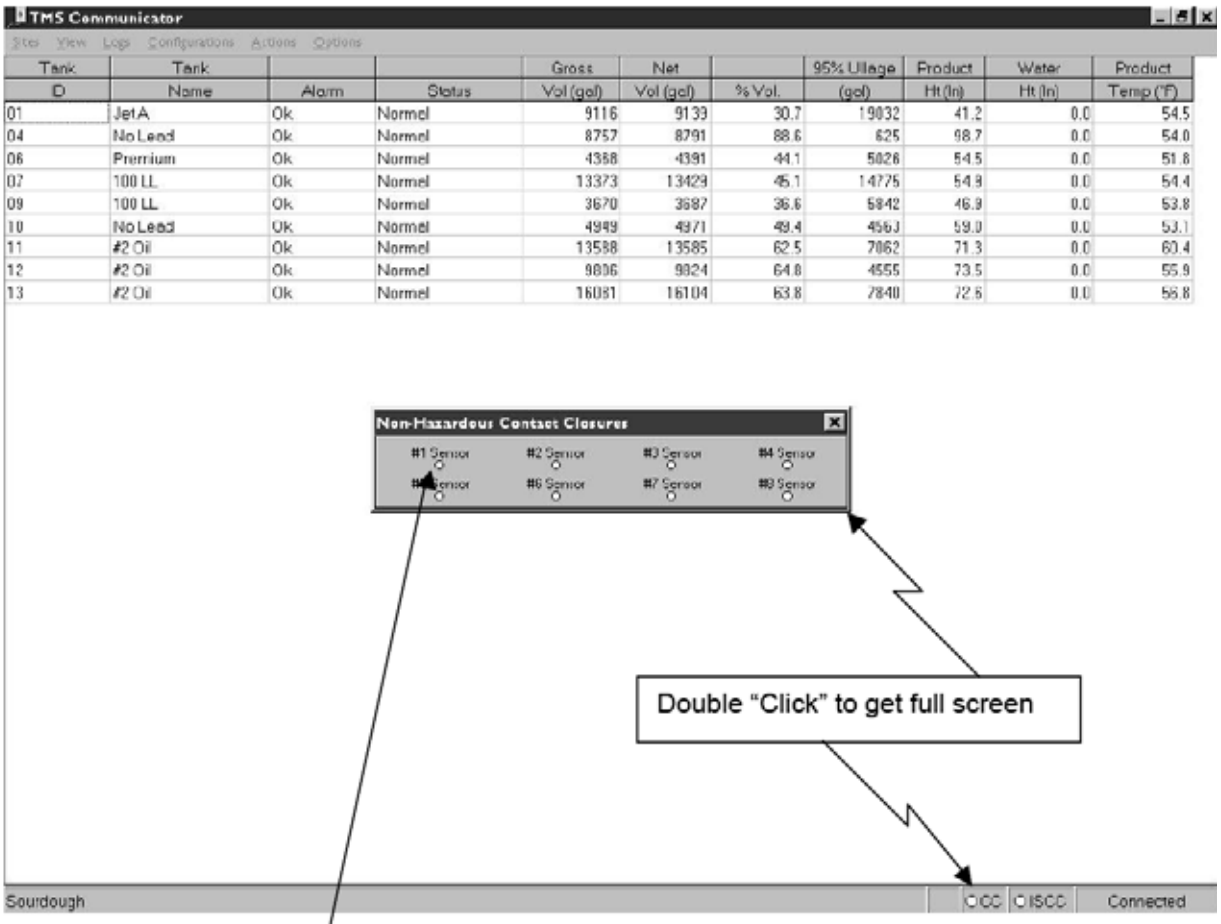


This is the Leak Sensor screen that shows the status of all sensors connected to the Intrinsically safe inputs of the TMS system.
GREEN- Indicates the sensor is programmed and working correctly.
RED- Indicates the sensor is in an "ALARM" or "ACTIVE" condition.
YELLOW- Indicates a "FAULT" condition from a Pneumercator "fault detection" sensor. Will indicate "Open" (sensor has an open connection in the wiring), "Short" (sensor has a crossed or shorted connection in the wiring) or "Sensor Fault" (sensor has failed).
Dragging the mouse cursor over the sensor will display the status for that sensor in addition to a color change. See below.



User Contact Closure

Used by TMS COMM Only



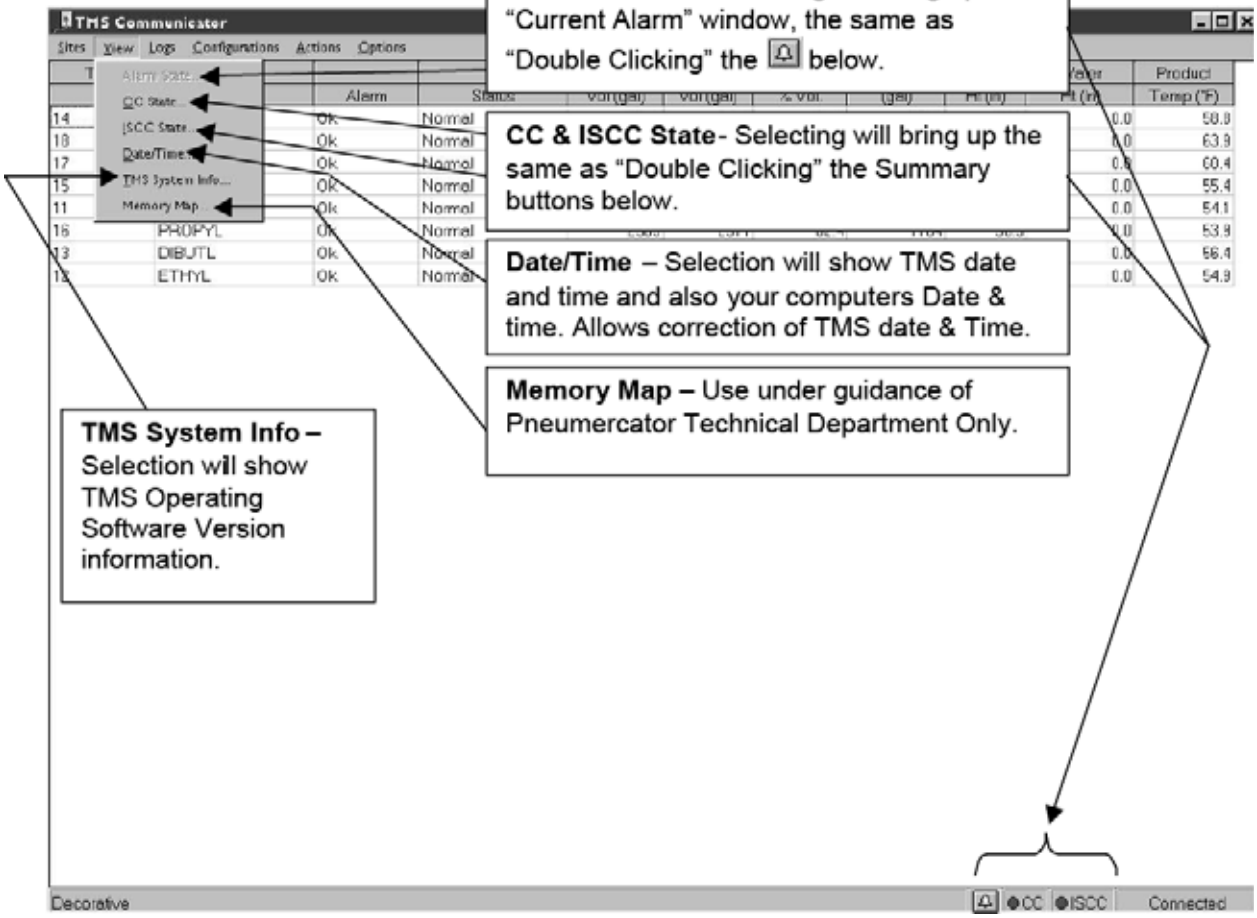
This is the "dry contact closure" input screen that shows the status of the "**NON-HAZARDOUS** " Contact Inputs that are on the Relay Board. Green indicates the contact is in it's "NORMAL" state. A Red would indicate the dry contact is "ACTIVE".

2.3 View Menu

View Menu

Used by TMS COMM Only

The "VIEW" menu item allows you to view different items within the TMS system



ALARM STATE- Selecting will bring up the "Current Alarm" window, the same as "Double Clicking" the 🔔 below.

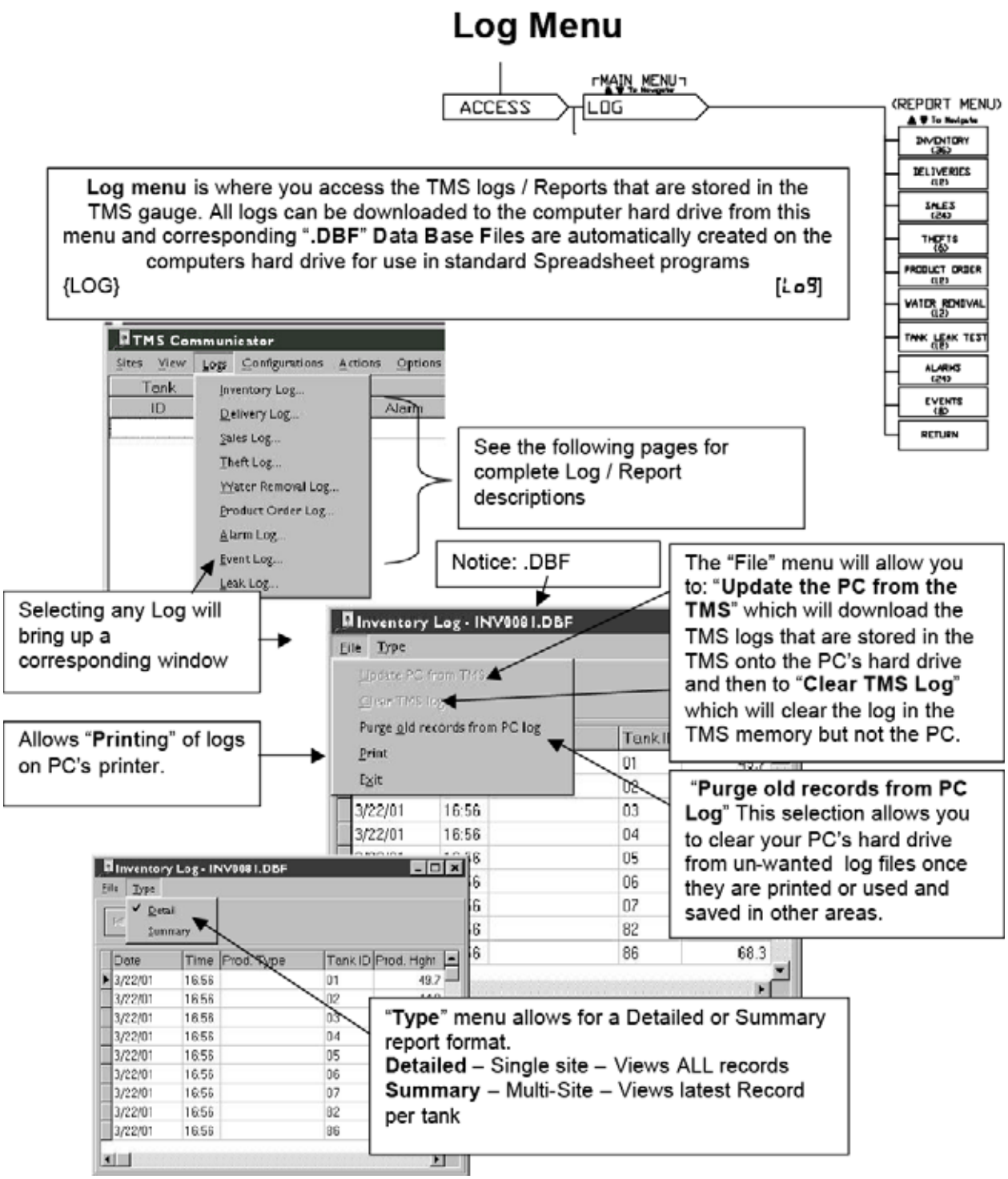
CC & ISCC State- Selecting will bring up the same as "Double Clicking" the Summary buttons below.

Date/Time – Selection will show TMS date and time and also your computers Date & time. Allows correction of TMS date & Time.

Memory Map – Use under guidance of Pneumercator Technical Department Only.

TMS System Info – Selection will show TMS Operating Software Version information.

2.4 Log (Reports) Menu



Log / Report Descriptions

Inventory: [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.

Delivery: [dEL ıuErY] 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.

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 an 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.

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 communications 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.

Water Removal: [WAtEr rEn] This 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 H20 Volume, Pre-report Total (Product and H20) Volume, Post-report Product Volume, Post-report H20 Volume, Post-report Total (Product and H20) Volume, Post-report (Product and H20) Percent Volume, Post-report Percent Volume, Post-report 90% Ullage or the (Order amount).

Product Order: [OrdErS] This 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, Ullage or (Order amount).

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 set-point per tank in level units, Non-IS Contact Closure Input, Theft, System Error, and Power Recovery.

Events: [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.

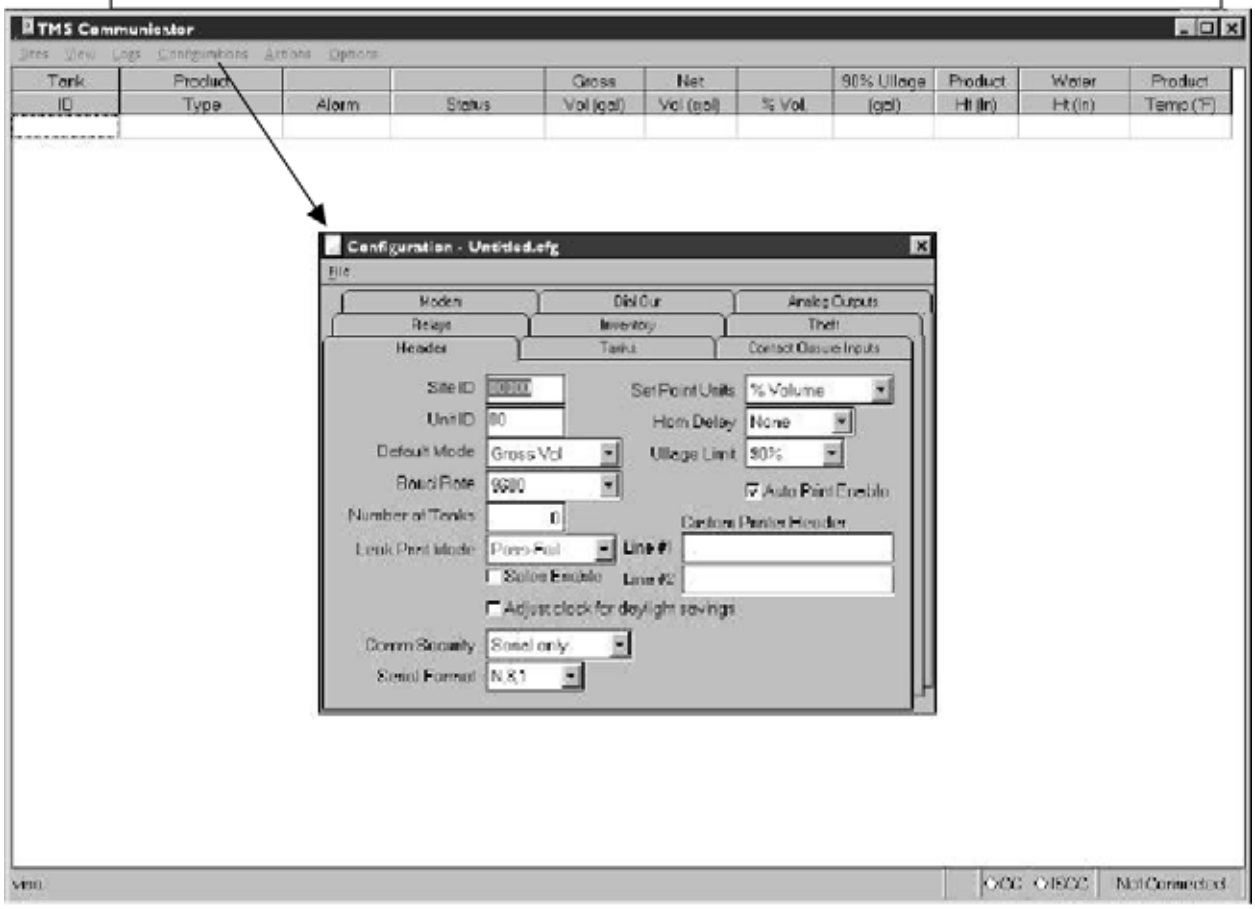
Tank Leak Test: [tAnK LEAK] Menu displays an automatically generated report for each tank after the teak test has taken place. In addition to the system capturing this data, an automatic hardcopy report can be generated if either, optional printer is installed, or if the TMS is linked to a PC utilizing 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 Results, Rate Hr. 1, Rate Hr. 2, Rate Hr. 3, Rate Hr. 4, Rate Hr. 5, Rate Hr. 6, Rate Hr. 7, Rate Hr. 8.

2.5 Configuration Menu

Configuration Menu

The "**Configuration**" Menu allows you to configure the TMS "SET-UP" programming. This programming usually consists of site specific programming ie; tank sizes, how many leak sensors, Etc. This information is for the most part only entered once on initial site set-up but could also include features that may be required to be adjusted after initial start-up. These items could include In-tank leak scheduling, Dial out programming, Etc.
{CONFIG} [ConF ,9]



For detailed information, Please refer to section 3 entitled Programming Reference.

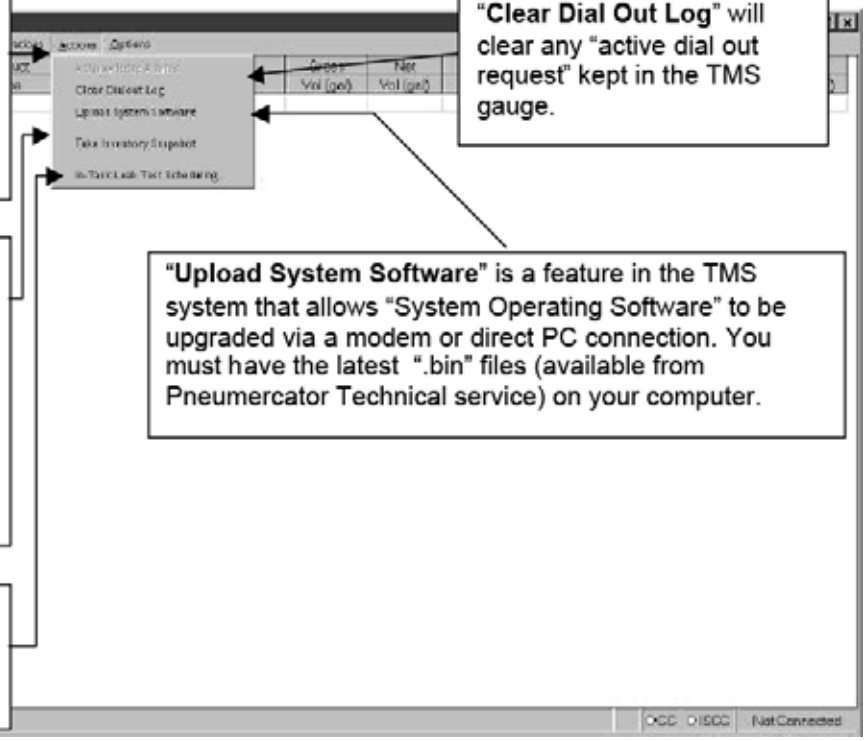
2.6 Actions Menu

Actions Menu

Used by TMS COMM Only

The **"Actions"** menu are management functions that can be performed when connected to a TMS gauge.

The "**Acknowledge Alarms**" menu item is to reset or acknowledge any current "alarms" that are on the TMS. This function will silence alarms but not eliminate or completely shut them off.



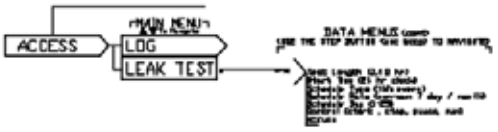
"**Clear Dial Out Log**" will clear any "active dial out request" kept in the TMS gauge.

"**Take Inventory Snapshot**" Will record a complete record of all active tank inventory, levels, etc. (all information that is shown on the "Main User Screen" and add that record to the "Inventory Log" report on your computer's hard drive

"**Upload System Software**" is a feature in the TMS system that allows "System Operating Software" to be upgraded via a modem or direct PC connection. You must have the latest ".bin" files (available from Pneumercator Technical service) on your computer.

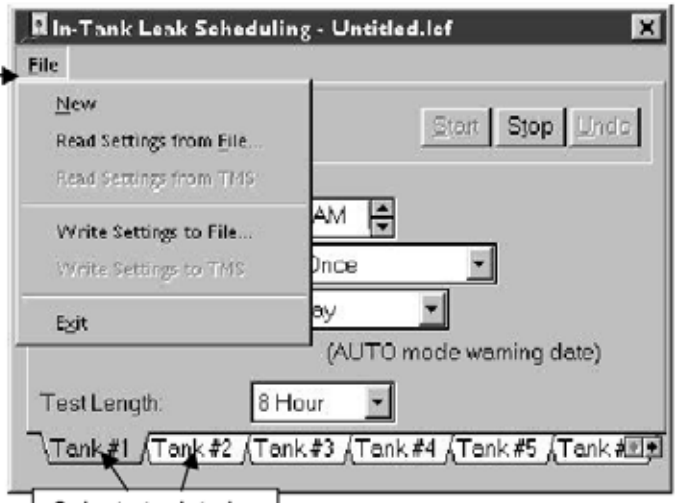
"**In-Tank Leak Test Scheduling**"
PLEASE SEE NEXT PAGE FOR DETAILS

In-Tank Leak Test Scheduling



"In-Tank Leak Test Scheduling" works in conjunction with the Tank Leak Setup and allows various "Scheduling" options for running Precision leak tests on underground tanks. Tank Leak test must be enabled under {configuration > tanks > leak test} in the programming section.
This Scheduling is **PER TANK**.
{Leak Test} [LEAK TEST]

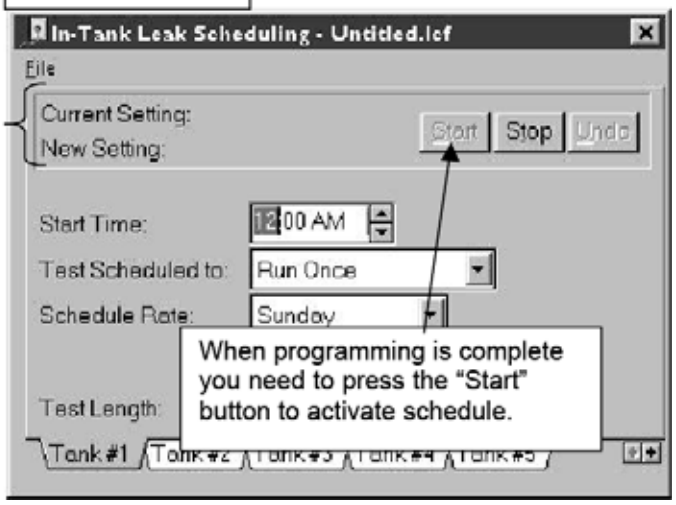
"**File**" menu allows you to "Read & Write" settings from a saved file on your computer or read current setting from the TMS system. Once settings are changed, they must be "Written" to the TMS to activate new settings. A copy of the settings can also be "Saved" to a file in the computers hard drive.



Selects tank to be programmed

Shows you what the TMS "**Settings**" are:
"**Start**" – Indicates the TMS leak scheduling has been started and will perform a leak test when indicated by start time.
"**Stop**"- test operation will be terminated immediately when user selects this item.
"**Run**" – Indicates the TMS current test is activated and in progress as user programmed.
"**Pause**"- test will be deactivated and or timed-out if tank is not stable due to liquid level movement or product temperature instability.

{Control} [Control]

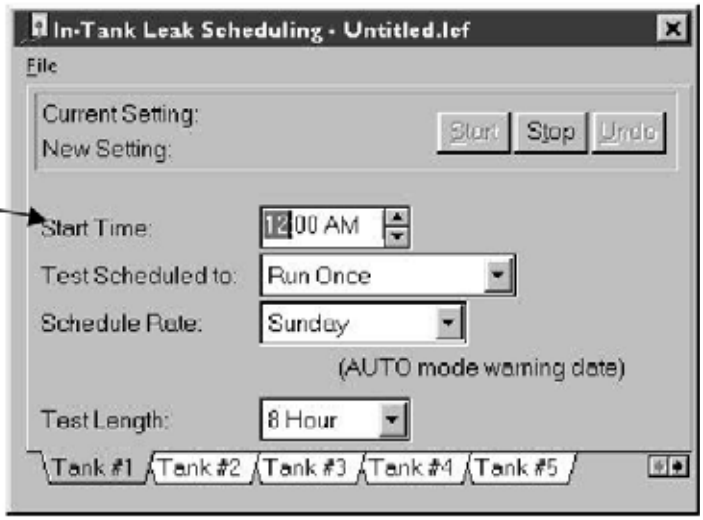


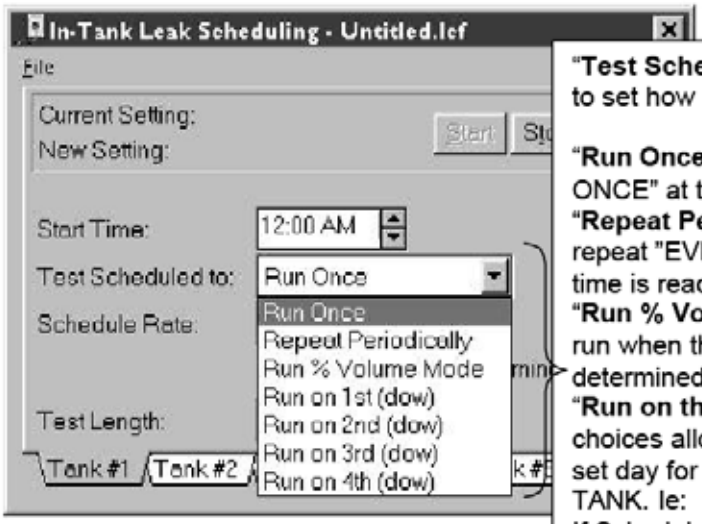
When programming is complete you need to press the "Start" button to activate schedule.

In-Tank Leak Test Scheduling

Continued

"**Start Time**" – Sets the time that the leak test will start.
24 Hour Military Time
{Start Time} [StArtt inE]



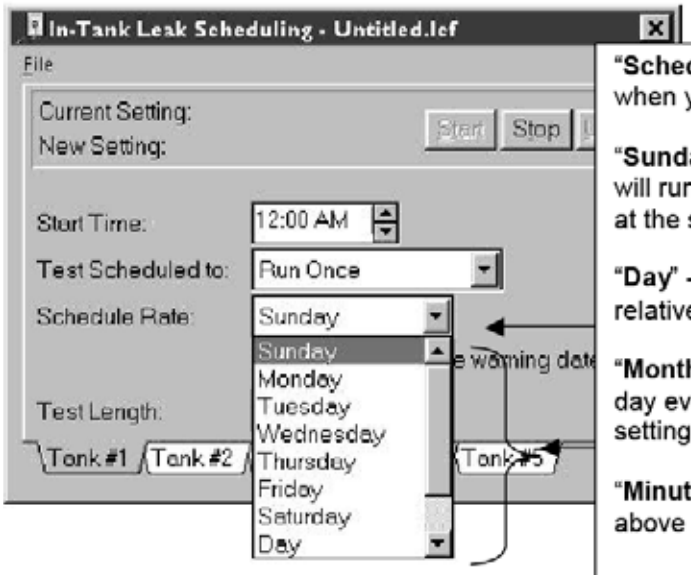


"**Test Scheduled To**" [Schd tYPE] Allows you to set how often you want the leak test to run.

"**Run Once**" –[th ,5] The test will run "ONLY ONCE" at the programmed day & time.
"**Repeat Periodically**" –[EUErY] The test will repeat "EVERY TIME" the programmed day & time is reached.
"**Run % Volume Mode**"- [PctUoL]The test will run when the % of volume reaches a pre-determined set-point.
"**Run on the #xx (dow)**"-[on 15t] The 4 choices allow you to set each tank to run on a set day for each week of the Month, PER TANK. Ie:
If Scheduled Rate is a "Tuesday", selecting "Run on 1st(dow) will only run the test on the 1st. Tuesday of the month, Every Month. Selecting "Run on 2nd.(dow), will only run the test on the 2nd. Tuesday of the month, Every Month.

In-Tank Leak Test Scheduling

Continued



"Schedule Rate" [SchdrAtE] Allows you to set when you want the test to run. Ie:

"Sunday – Saturday" –[Sun SAt] Any selection will run the test on the day of the week specified at the start time shown above.

"Day" – [dAY] Test will be activated on the day relative to TMS internal clock setting.

"Month" – [month] Test will be activated on this day every month relative to TMS internal clock setting.

"Minute"- [minutE] Test will run EVERY time the above time is reached.

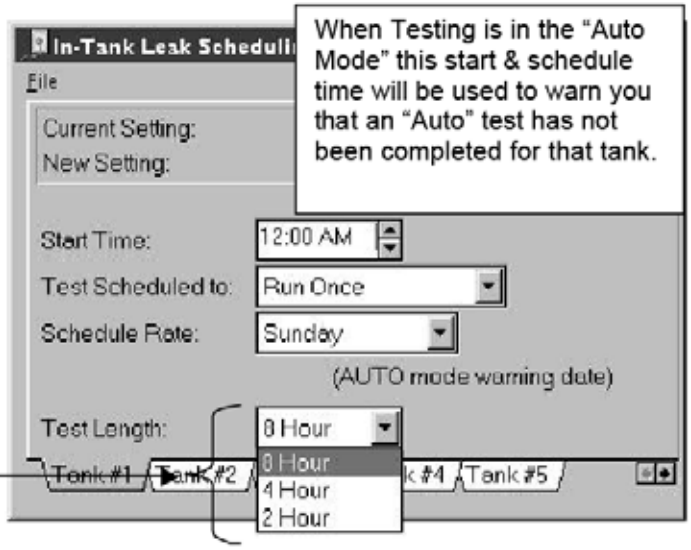
"Test Length" [tESt LEn] Sets the length of the leak test.

Reference:

"2 Hour" – Would be used for a .2 GPH "quick test", EPA requires once per Month.

"4 Hour" – Would be used for a .2 GPH on a large tank, or a .1GPH Precision test on tanks under 3000 gallons.

"8 Hour" – Would be used for .1 GPH on any tank up to EPA approved 20,000 gallons or for a .2 GPH on any tank up to EPA approved 75,000 Gallons.



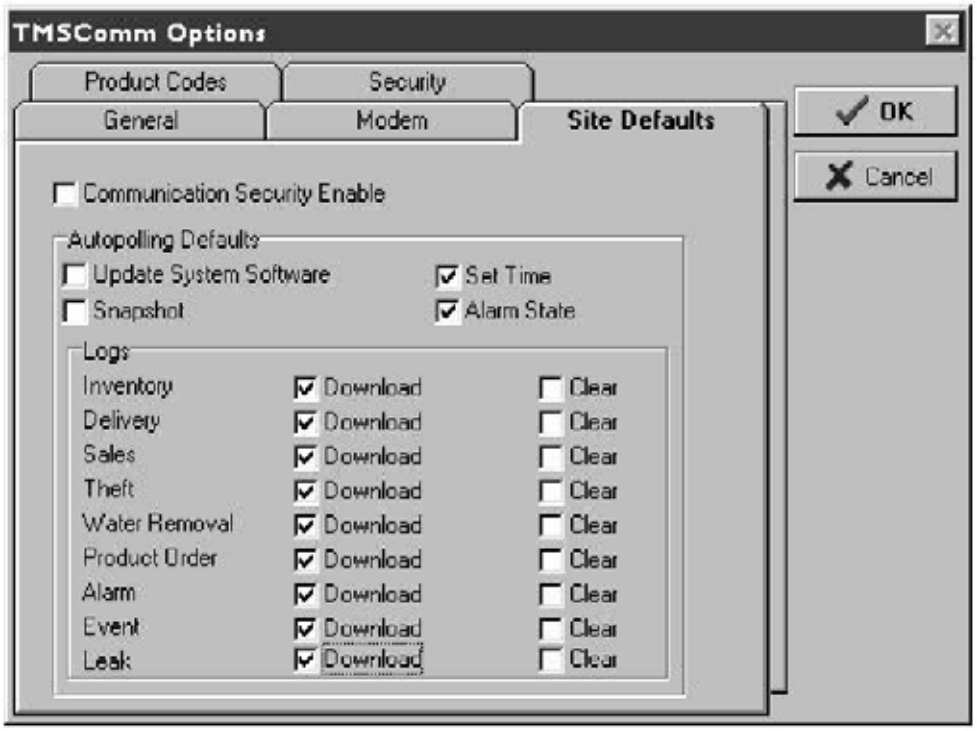
When Testing is in the "Auto Mode" this start & schedule time will be used to warn you that an "Auto" test has not been completed for that tank.

2.7 Options Menu

Options Menu – Site Defaults

Used by TMS COMM Only

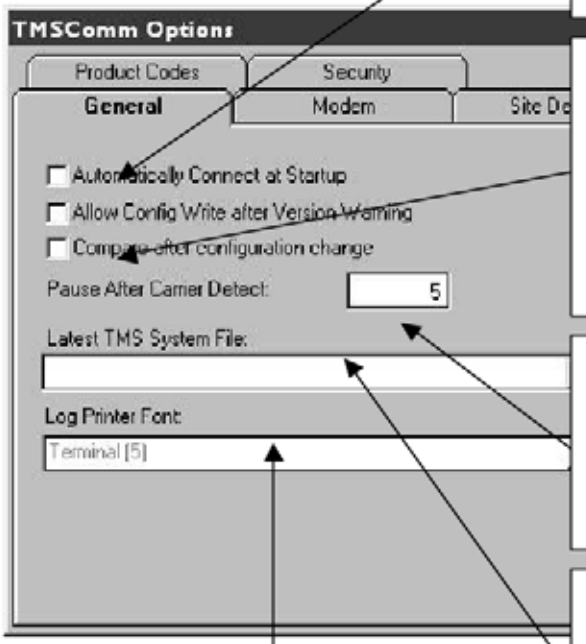
The Options Menu allows you to set various user items relating to the computer you are using and how it interacts with the TMS and includes special programming items.



The first window that comes up is the "**Site Defaults**" menu item. This allows you to set your computer to use "Default" options that would normally have to be set when setting up a new "Site". Once set up here, you would not have to enter the same information when setting up each site. **SEE " SITES MENU"** for more details on options.

Options Menu – General

Used by TMS COMM Only



"**Automatically Connect at Startup**" – If checked TMS-COMM will detect the last site that it was connected to and re-establish communications. This item is useful when you have the TMS connected to a Windows® based POS (point of sale) computer and are running TMS-COMM from that computer and need constant communications. If the computer is reset, TMS-COMM (if in the computers "start-up" file) would automatically start and establish communication with the TMS gauge.

"**Compare After Configuration Change**" Reads back and compares the configuration that was sent to the TMS with the original after writing the configuration to the TMS. This is to assure that what you sent to the TMS is what the TMS actually received.

"**Pause After Carrier Detect**" Used by TMS-COMM "Dial Out" Feature, leave at default setting (5 sec) unless you are having problems establishing communications in "Dial Out". Contact Pneumercator Technical Service for assistance.

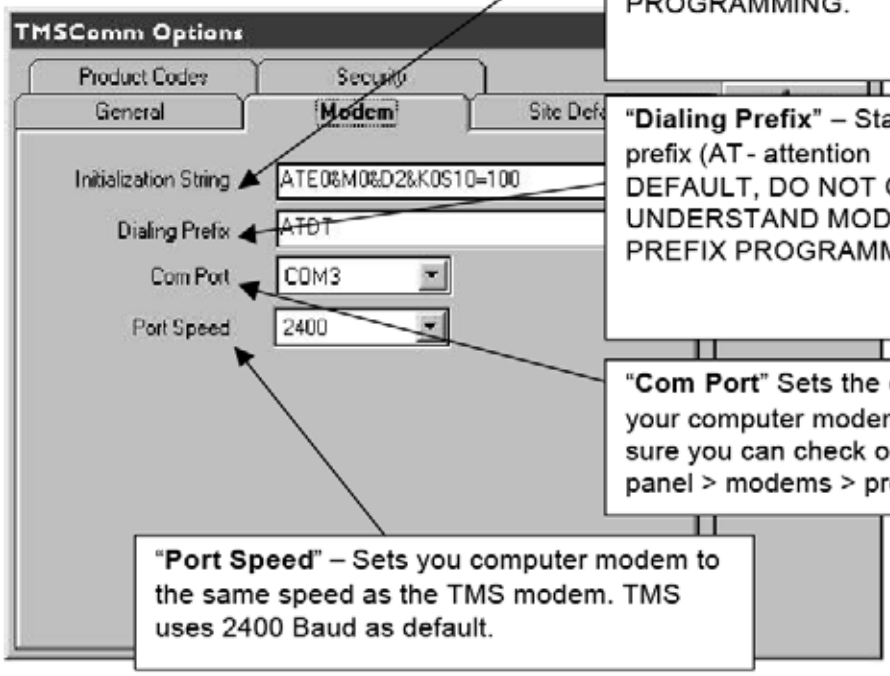
"**Latest TMS System File**" – Allows you to reference the latest TMS operating software version when "**Upload system Software**" feature is used in the "TMS-AUTOPOLL" software.

"**Log Printer Font**" Allows you to change the printer Font when printing TMS logs / reports from the "**Log Menu**" on your system printer.

Options Menu – Modem

Used by TMS COMM Only

Sets Modem Options when using TMS-AUTOPOLL.



"**Initialization String**" – Standard Modem String used to establish communications with other modems. FACTORY DEFAULT, DO NOT CHANGE UNLESS YOU UNDERSTAND MODEM COMMUNICATION STRING PROGRAMMING.

"**Dialing Prefix**" – Standard telephone modem prefix (AT - attention DT- Dial tone) FACTORY DEFAULT, DO NOT CHANGE UNLESS YOU UNDERSTAND MODEM COMMUNICATION PREFIX PROGRAMMING.

"**Com Port**" Sets the communications port that your computer modem is using. If you are not sure you can check on [My Computer > control panel > modems > properties].

"**Port Speed**" – Sets you computer modem to the same speed as the TMS modem. TMS uses 2400 Baud as default.

NOTE: NORMALLY THE ONLY ITEM THAT WOULD NEED TO BE CH ANGED IS THE "COM PORT" BEING USED BY YOUR COMPUTER.

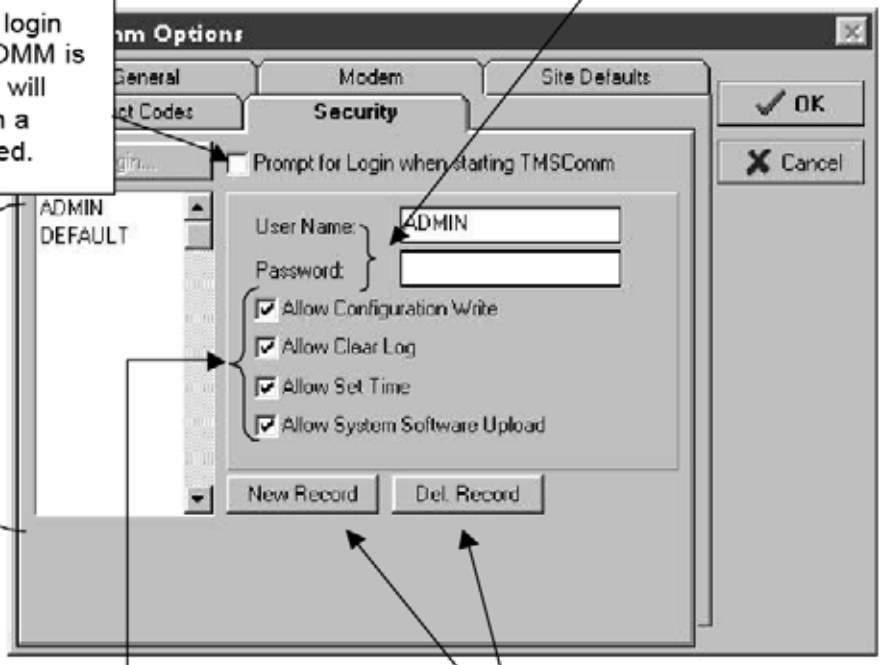
Options Menu – Security

Used by TMS COMM Only

"**Security**" – Allows you to set security passwords for the TMS-COMM software program. THIS ONLY AFFECTS THE COMPUTER SOFTWARE, HAS NO EFFECT ON THE ACCESS TO THE TMS GAUGE.

"**User Name**" & "**Password**" can be set for up to 12 alpha-numeric characters, no limit on the number of users.

If checked, will prompt for login information when TMS-COMM is started up. If not checked, will only prompt for login when a security feature is accessed.



Keeps a list of user log in information

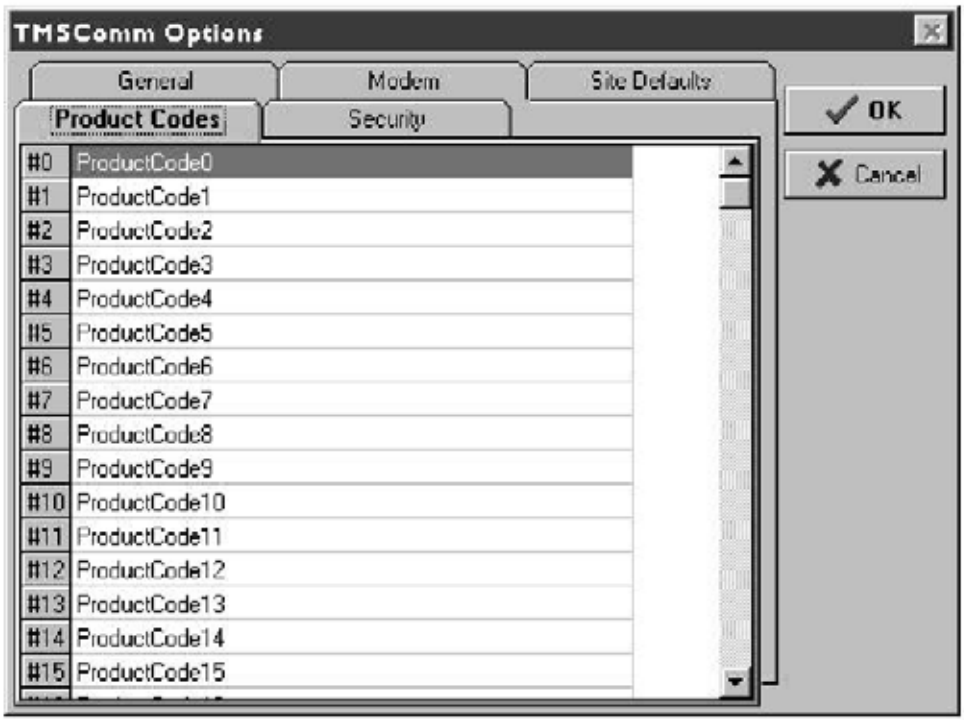
"**Security Features**" – Different users can have access to different features. When checked, will allow user to change corresponding information when connected to a TMS Gauge.

Used to add or delete records (Users)

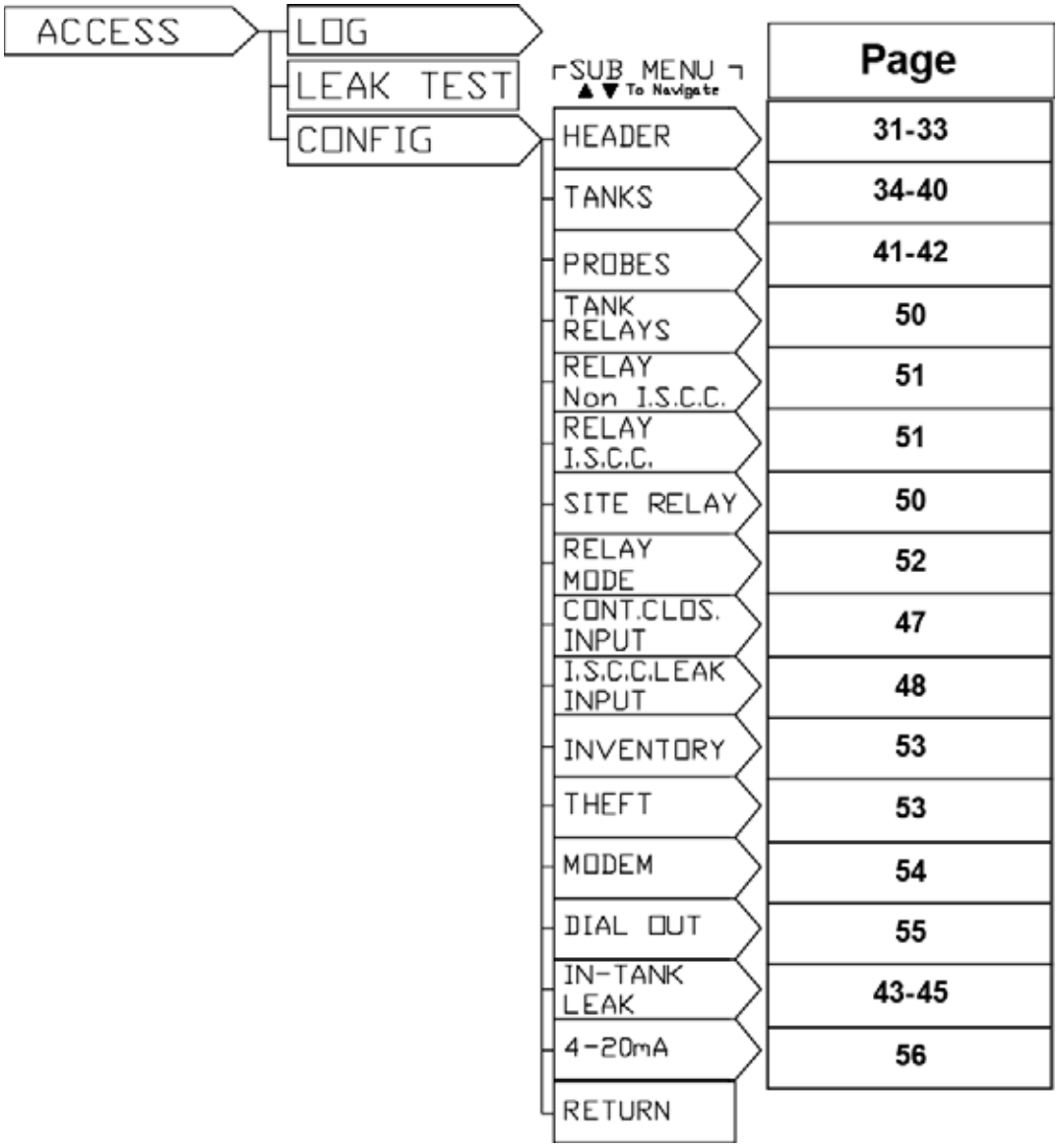
Options Menu – Product Codes

Used by TMS COMM Only

"**Product Codes**" Are used to identify a tank with a custom "product code". This option is only used for third party equipment connected to the TMS gauge (fuel Card / key systems)

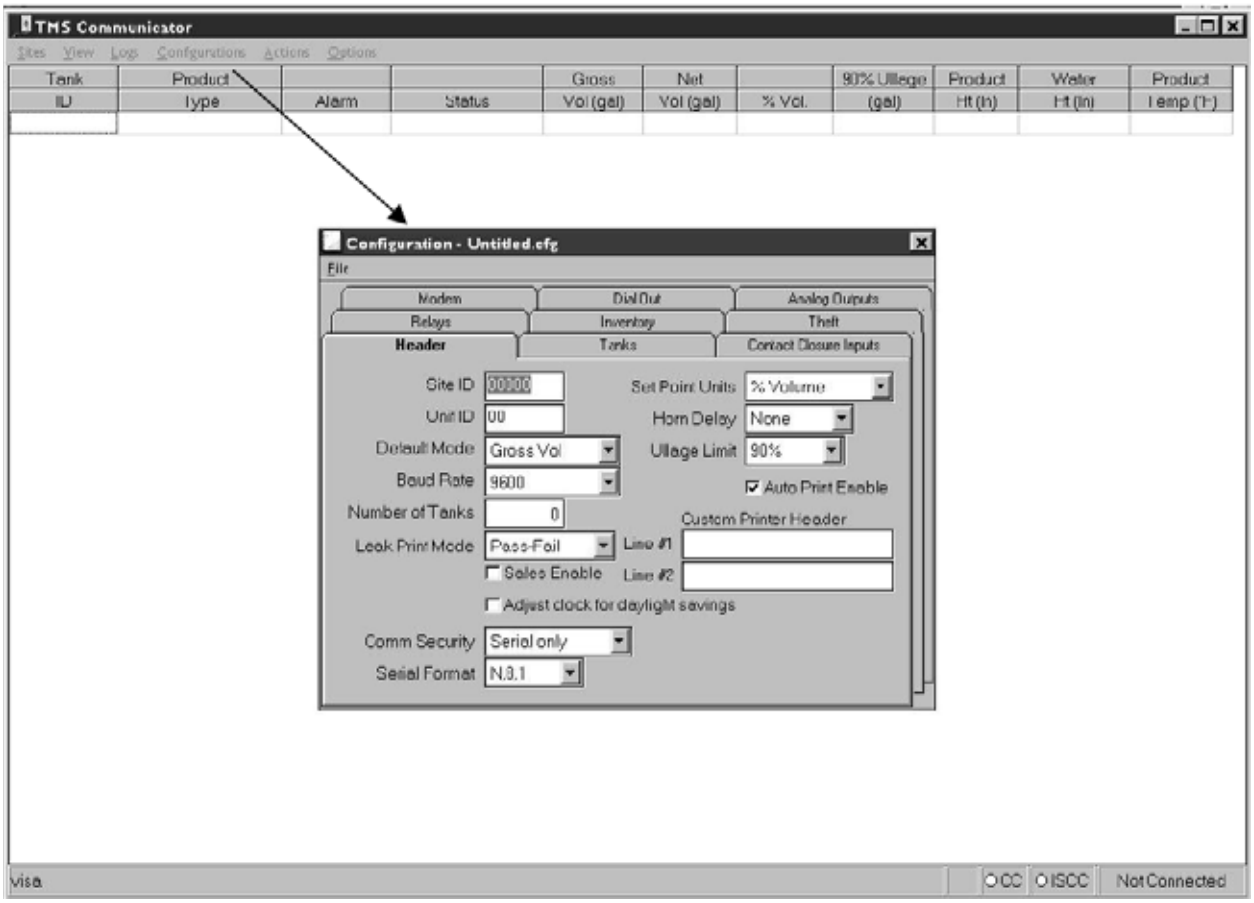


SECTION 3 – PROGRAMMING REFERENCE

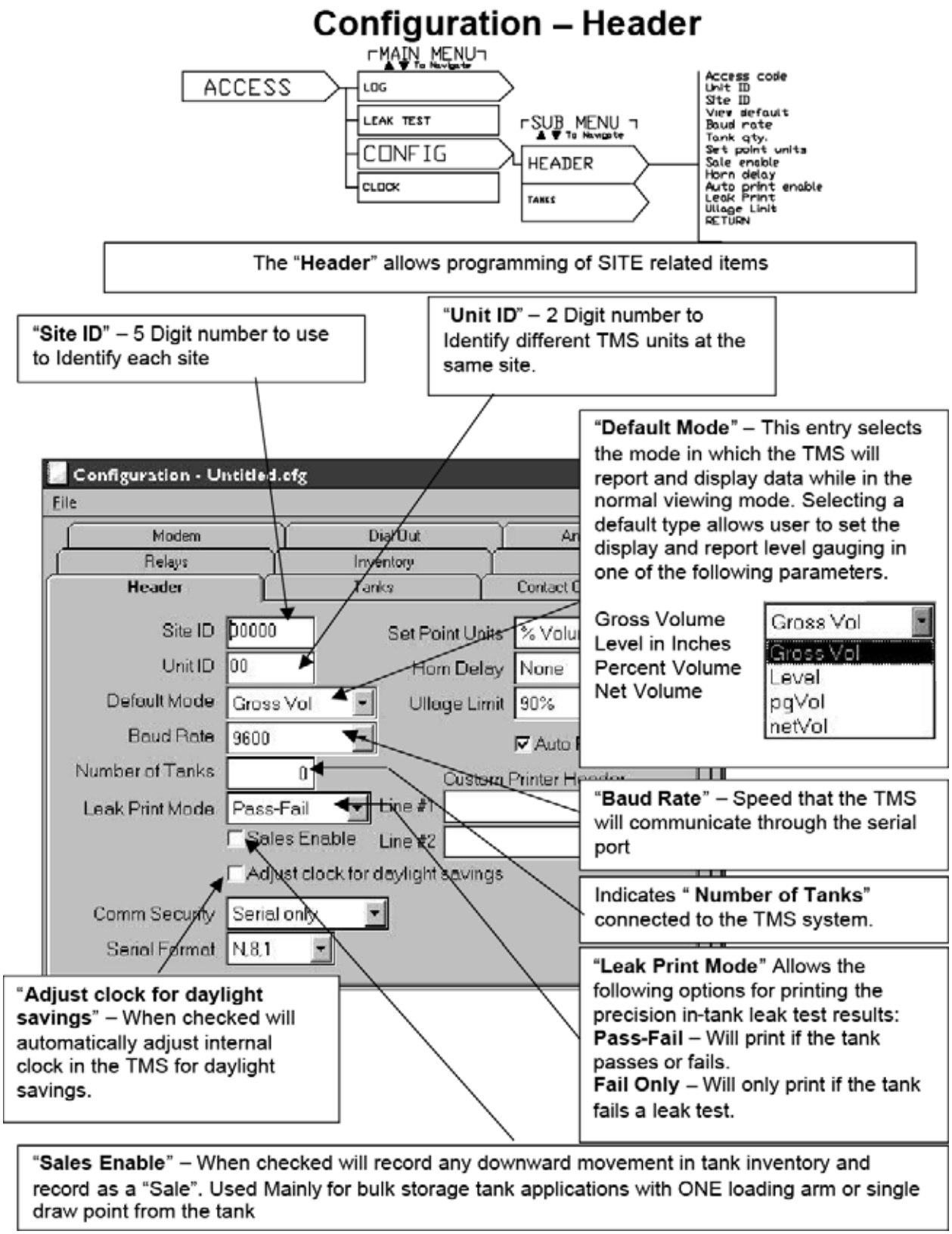


Configuration Menu

The "**Configuration**" Menu allows you to configure the TMS "SET-UP" programming. This programming usually consists of site specific programming ie; tank sizes, how many leak sensors, Etc. This information is for the most part only entered once on initial site set-up but could also include features that may be required to be adjusted after initial start-up. These items could include In-tank leak scheduling, Dial out programming, Etc.



3.1 Header Tab

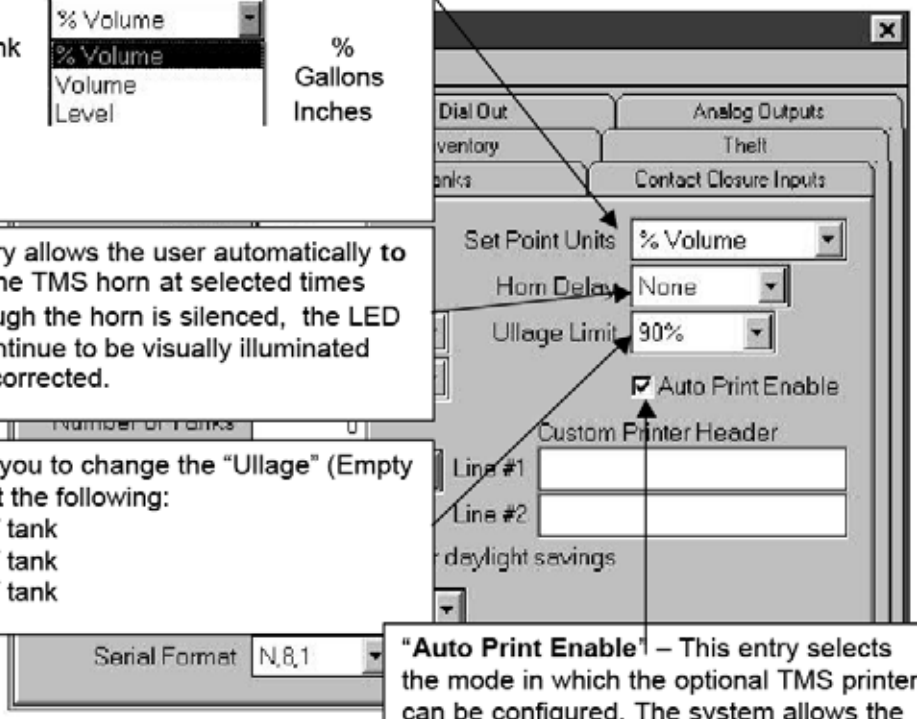


Configuration – Header

Continued

"Set Point Units" - This entry, will globally select and allow all set-points units to be programmed for all tanks. This entry affects all tanks that will be enabled. Percent Volume (% Volume) is the preferred method of in programming set point, as it will display a uniform setting across all tanks regardless of size and geometry. Choices are as follows:

	Display	
% Volume of prod in tank	% Volume	%
Volume of prod in tank	Volume	Gallons
Level of prod in tank	Level	Inches



"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.

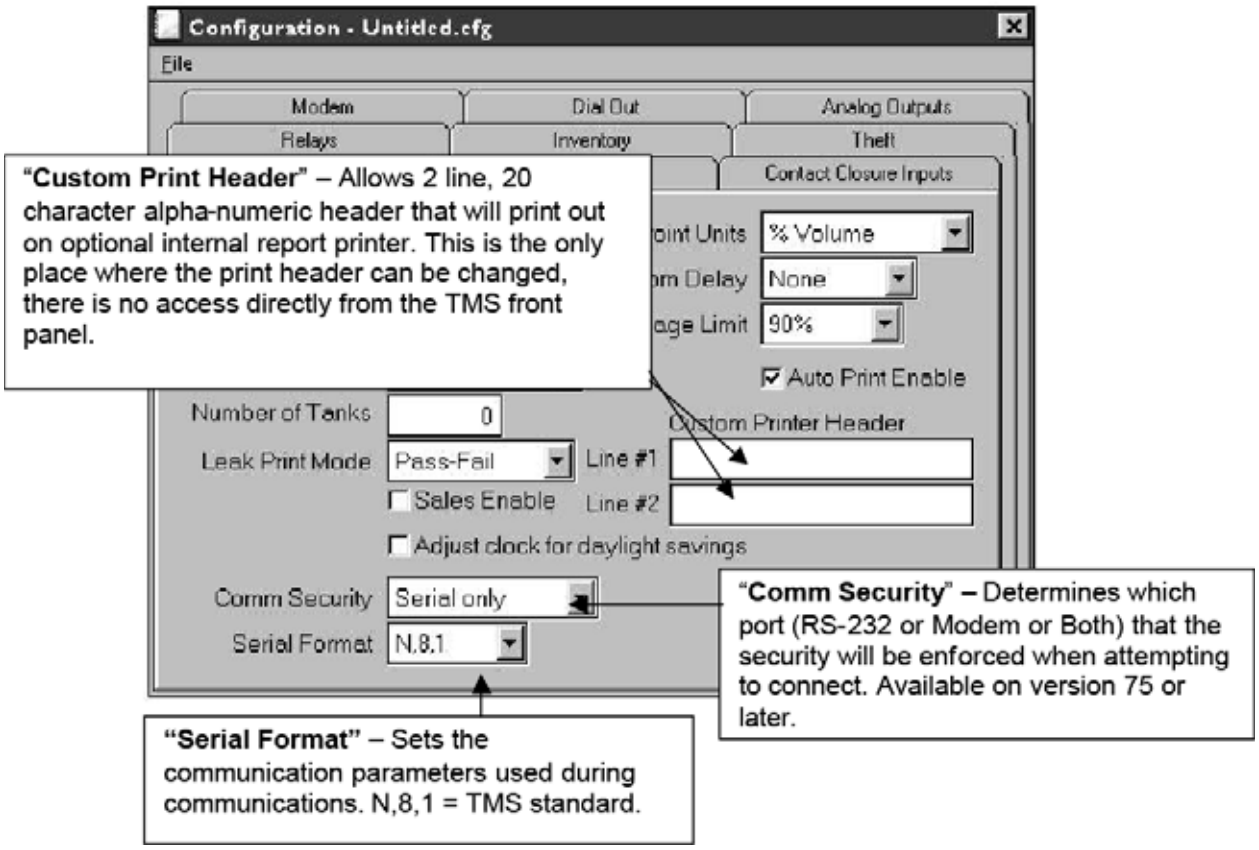
"Ullage Limit" – Allows you to change the "Ullage" (Empty Space in tank) to reflect the following:

90% Total Capacity of tank
95% Total Capacity of tank
100% Total Capacity of tank

"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 the VIEW mode generating on-demand reports for all enabled tanks.

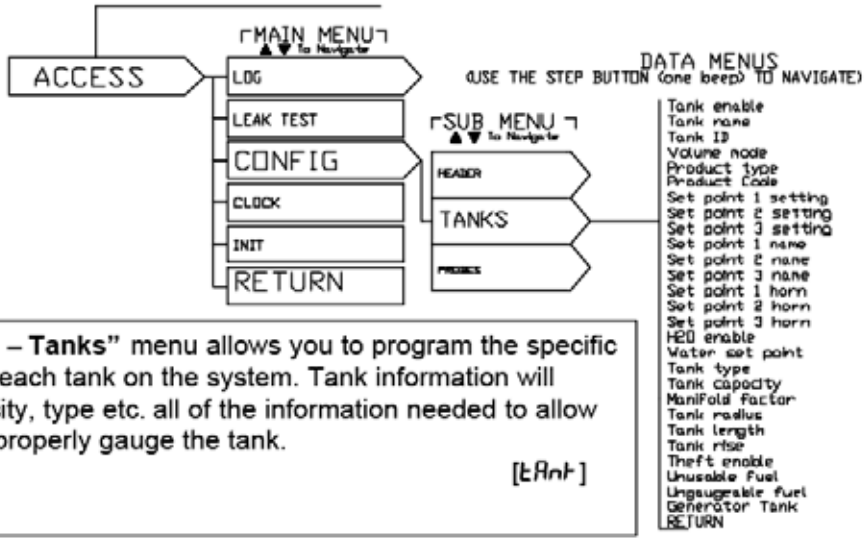
Configuration – Header

Continued



3.2 Tanks Tab

Configuration – Tanks

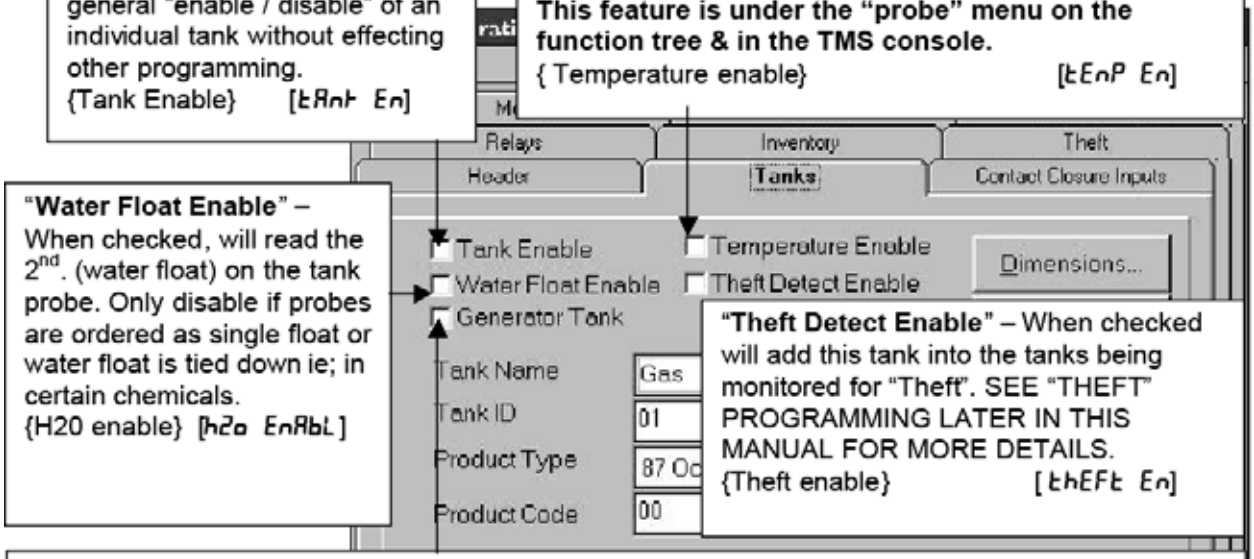


The "**Configuration – Tanks"** menu allows you to program the specific tank information for each tank on the system. Tank information will include; Size, capacity, type etc. all of the information needed to allow the TMS system to properly gauge the tank.
{Tanks} [tAnk]

"**Tank Enable**" – Allows a general "enable / disable" of an individual tank without effecting other programming.
{Tank Enable} [tAnk En]

"**Temperature Enable**" – When checked will read the temperature sensor ('s), (1 or 5 depending how probe was ordered) and will display the average of the sensors that are "in Product".
This feature is under the "probe" menu on the function tree & in the TMS console.
{ Temperature enable} [tEnP En]

"**Water Float Enable**" – When checked, will read the 2nd. (water float) on the tank probe. Only disable if probes are ordered as single float or water float is tied down ie; in certain chemicals.
{H20 enable} [h2o EnAbL]



"**Theft Detect Enable**" – When checked will add this tank into the tanks being monitored for "Theft". SEE "THEFT" PROGRAMMING LATER IN THIS MANUAL FOR MORE DETAILS.
{Theft enable} [tHEFt En]

"**Generator Tank**" – When checked, puts the tank into "Generator Mode" which allows a leak test to be performed on a constant basis (once one test finishes, another starts) Test will automatically stop when "generator run" is sensed on CC input, then will restart automatically.
Leak Test "Enable", "Limit", "Length", & "CC-input" all need to be programmed for **Generator Tank** to work properly.
{Generator Tank} [gEn tAnk]

Configuration – Tanks

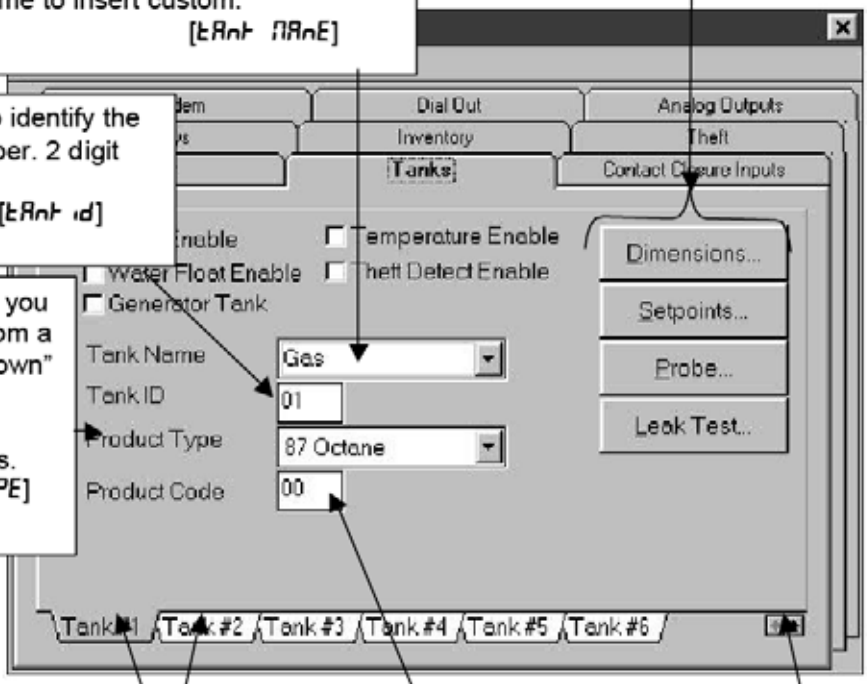
Continued

"**Tank Name**" Allows a user to select a generic name or type a custom name (6 Alpha Numeric characters in TMS COMM only). Press the "Down" arrow to select generic names or double click name to insert custom.
{Tank name} [tAnk nAmE]

These "Sub Menus" are described later in this manual.

"**Tank ID**" – Allows you to identify the tank with a different number. 2 digit only.
{Tank ID} [tAnk id]

"**Product Type**" – Allows you to select tank contents from a generic list, Press the "Down" arrow to select from list. Needed for accurate calculation of NET gallons.
{Product type} [Prod tYPE]



Allows selection of tank you want to program.

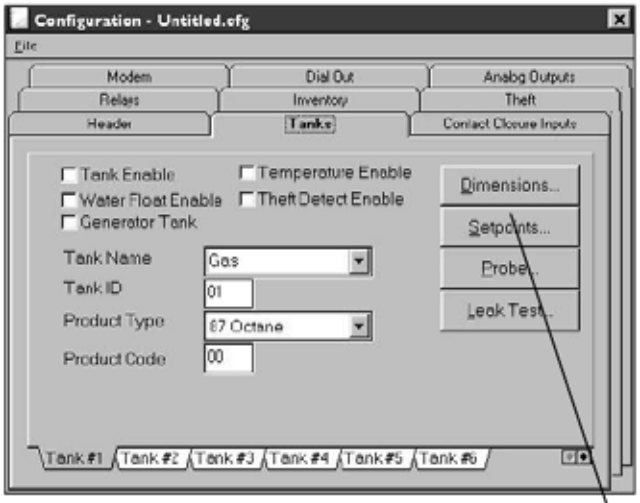
Advances to higher tanks

"**Product Code**" Allows entry of 2 digit code to identify a custom "product code" as programmed in the "Options Menu – Product Code"
{Product code} [Prod CodE]

3.2.1 Dimensions Button

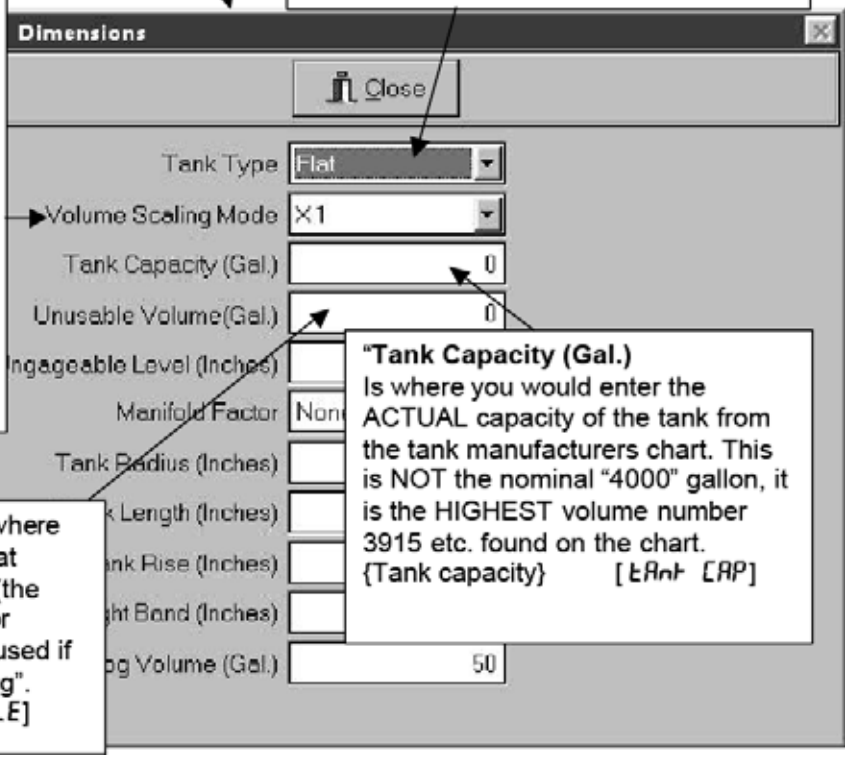
Configuration - Tank – Dimension

"Configuration Tank Dimension" – Allows you to input the tank information, usually from the tank manufacturers supplied "tank chart".



"Tank Type" This is where you tell the system what kind of tank it is ie: Vertical, Horizontal, round, square etc.
Press "Down" arrow for type selections
SEE NEXT PAGE FOR DETAILS ON "TANK TYPE" PROGRAMMING.
{Tank type} [tAnk tYPE]

"Volume Scaling 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.
{Volume Mode} [UOL ModE]



"Tank Capacity (Gal.)
Is where you would enter the ACTUAL capacity of the tank from the tank manufacturers chart. This is NOT the nominal "4000" gallon, it is the HIGHEST volume number 3915 etc. found on the chart.
{Tank capacity} [tAnk CAP]

"Unuseable Volume (Gal.)" Is where you enter the volume amount that cannot be accessed in the tank (the amount below the suction stub or submersible pump), this is only used if you are using "Product Order Log".
{Unuseable Fuel} [UnUSEAbLE]

Configuration - Tank – Dimension

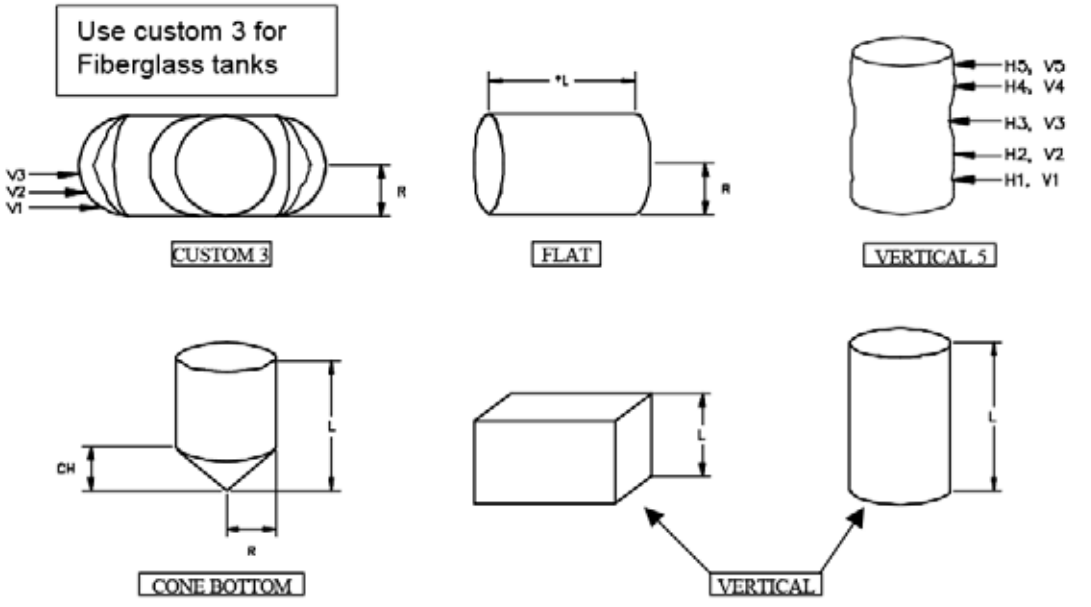
TANK TYPE DETAILS

"Y" indicates information needed to be entered for each tank type

TANK TYPE:	FLAT	VERTICAL	CUSTOM 3	VERTICAL 5	CONICAL
Capacity	Y	Y	Y	Y	Y
Radius	Y		Y		Y
Length / Height[4]	Y_1	Y	Y_1		Y
Volume Data Point #1			Y_2	Y	
Volume Data Point #2			Y_2	Y	
Volume Data Point #3			Y_2	Y	
Volume Data Point #4				Y	
Volume Data Point #5				Y	
Height Point Data #1				Y	
Height Point Data #2				Y	
Height Point Data #3				Y	
Height Point Data #4				Y	
Height Point Data #5				Y	
Cone Height					Y
Tank Rise(Tilt)	Y_3		Y_3		
Probe Location Offset	Y_3		Y_3		

Notes:

1) Entry required only if Tank Rise is entered or TMS firmware version is x0.99.65 or earlier.
2) Volume entry must be taken from tank chart.
3) Required only if tank is tilted and probe is not located near center of tank along its length.
4) Horizontal dimension for FLAT and CUST 3, vertical dimension for others.

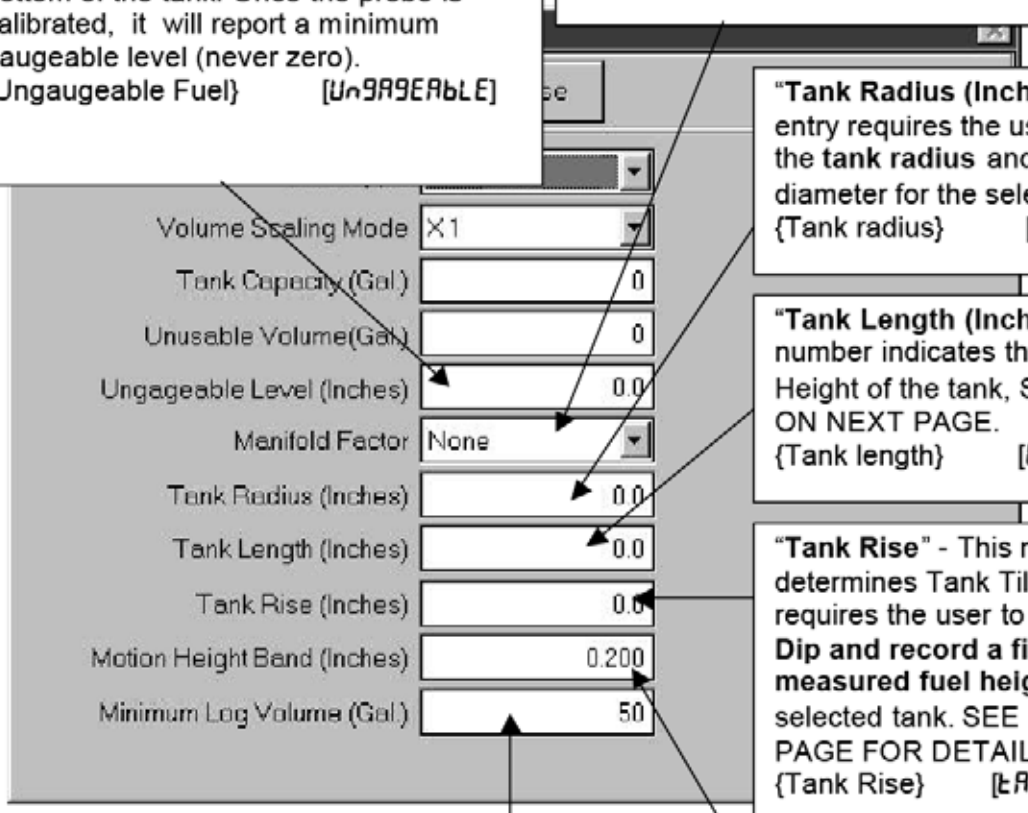


Configuration - Tank – Dimension

Continued

"**Ungageable Level (Inches) -** This entry applies to probes which are mounted in a fixed position to a flange and or suspended from the top of a tank and has a space between the probe and the bottom of the tank. Once the probe is calibrated, it will report a minimum gaugeable level (never zero).
{Ungaugeable Fuel} [UnGAGEAbLE]

"**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.
{Manifold Factor} [MAn FoLd]



"**Tank Radius (Inches)**" - This entry requires the user to enter the **tank radius** and **not** tank diameter for the selected tank.
{Tank radius} [tAnk rAd]

"**Tank Length (Inches)" –** This number indicates the length **OR** Height of the tank, SEE CHART ON NEXT PAGE.
{Tank length} [tAnk LEn]

"**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. SEE NEXT PAGE FOR DETAILS.
{Tank Rise} [tAnk r iSE]

"**Minimum Log Volume (Gal.)**" - 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 triggering false deliveries and thefts due to expansion & contraction and also interfering with In-Tank Leak test information. **This feature is under the "probe" menu on the function tree & in the TMS console.**

{Min Logged Volume} [LoG MIn]

"**Motion Height Band (Inches)**" – 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 triggering 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.
This feature is under the "probe" menu on the function tree & in the TMS console.
{Motion band} [Mot bAnd]

Configuration - Tank – Dimension

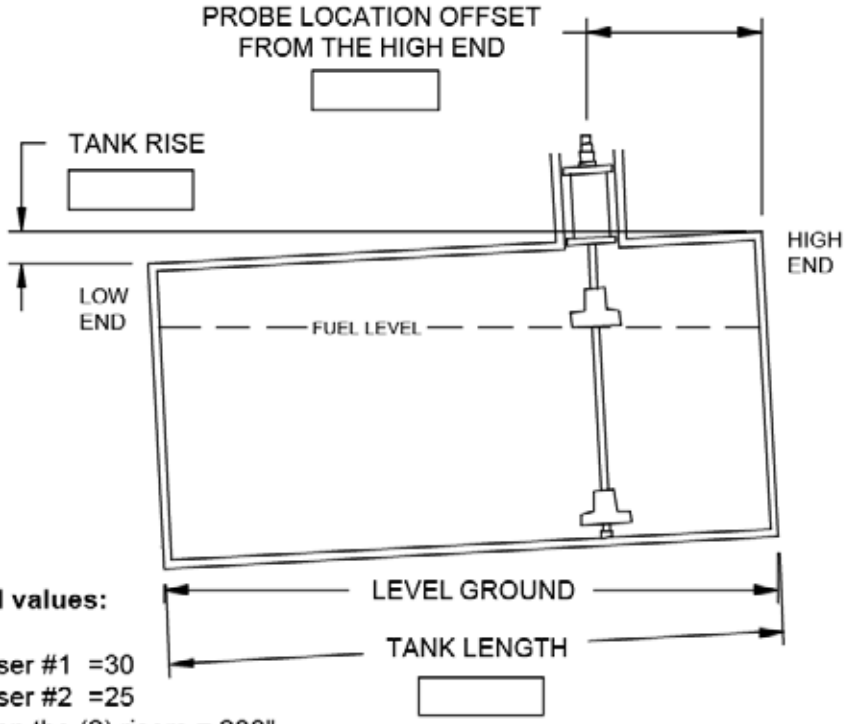
Detail – TANK RISE

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, EG: "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"

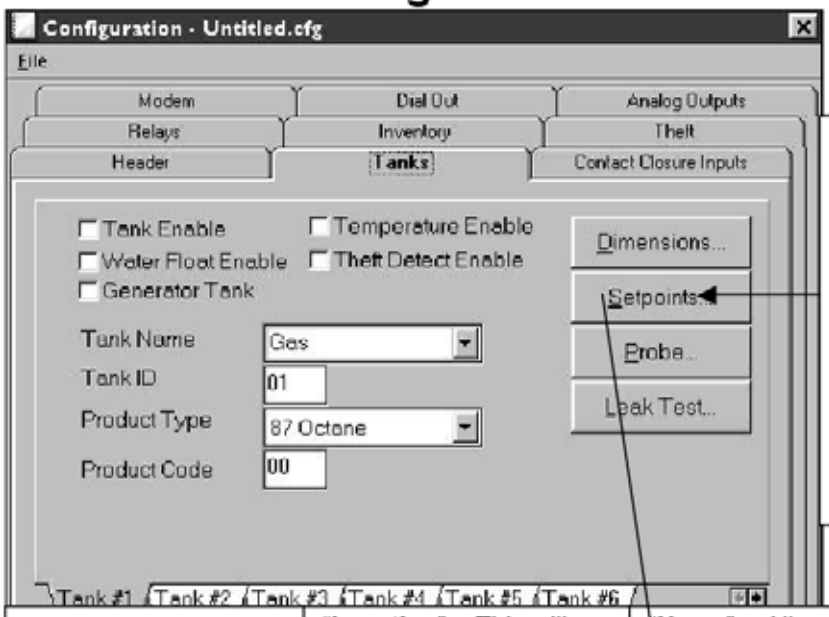
Calculated ratio between the Total Tank Length over the distance between the (2) risers= 1.5

$$\frac{\text{Total Tank Length}}{\text{Distance between the (2) risers}} = \frac{300}{200} = 1.5 \text{ Ratio}$$

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 .

3.2.2 SetPoints Button

Configuration – Tank – Set-points



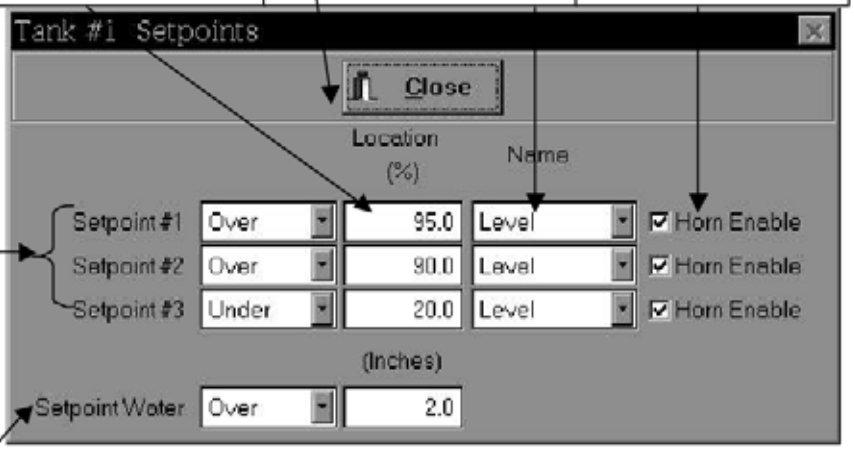
"**Configuration – Tank – Set-points**" – Is where you set the alarm points on the "In-Tank" probe. Ie; high level, low level, etc. These set-points will be set in the "Units" selected on the HEADER screen. If % Volume is selected, this entry will be in % Volume.

Each tank probe has 3 "**Setpoint's**" available. They can be set for "**Over**" (it will trigger if the level gets **over** the set-point). Or it can be set for "**Under**" (it will trigger if the level gets **under** the set-point).
The indication on the TMS front panel for **Over** would be > and **under** would be < followed by the set-point number.
{Set point **X** setting}
[SP X 9 UoL]

"**Location**" – This will change depending what is set in the "**Configuration – Header – Set-point Units**" menu.

"**Name**" – Allows selection of generic name to identify set-point.
{Set-point **X** name}
[SP X nAnE]

"**Horn Enable**" – When checked, will sound horn on the front of the TMS console.
{Set-point **X** horn}
[SP X Horn]

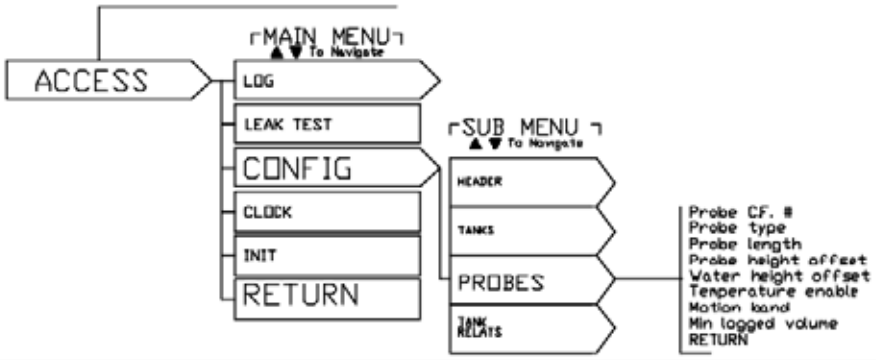


"**Set-point Water**" Allows you to set the trigger point for water detection inside the tank. Only available on probes ordered with 2 floats (standard).
{Water Set Point} [SP h2o]

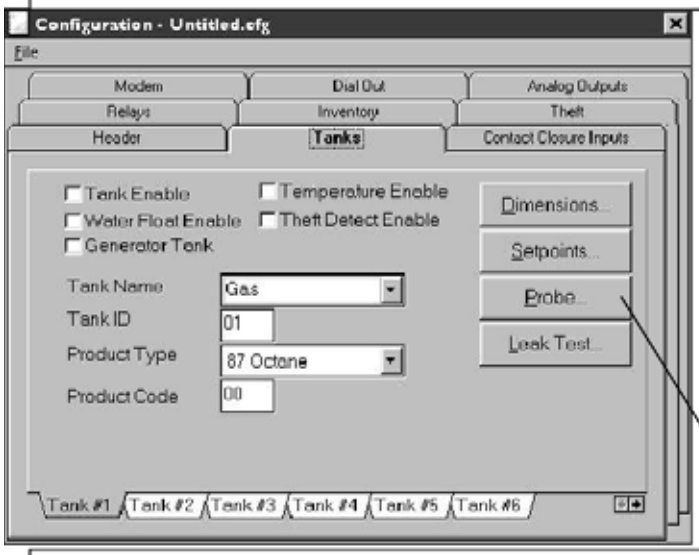
X = 1,2,3 (set-point #)

3.2.3 Probe Button

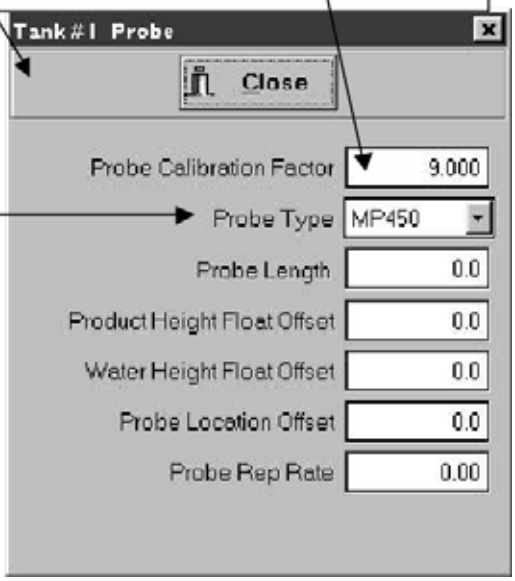
Configuration – Tank – Probe



"**Configuration Tank Probe**" – Is where you program the type of probe, length of probe and any items related to the individual tank probe.
{Probes} [ProbE]



"**Probe Calibration Factor**" – This is a number determined at the factory used to calibrate EACH probe's wire speed. This number may be the same for different probes. This number is stamped and printed on the probe label, see next page for details.
[Probe C.F. #] [ProbE CF]



"**Probe Type**" – Is the Pneumercator base probe model number. It can be found on the probe label. Or determined as follows:
MP-450 Probes rigid shaft up to 18'
MP-451 Probes rigid shaft 19' – 25'
MP-452 Probes used for oil/water separators
MP-461C Probes Flex shaft up to 12'
(MP461C not on menu, USE MP461)
MP-461 Probes Flex shaft 12' – 20'
MP-462 Probes Flex shaft 20' – 26'
MP-463 Probes Flex shaft 26' – 60'
{Probe Type} [ProbE tYP]

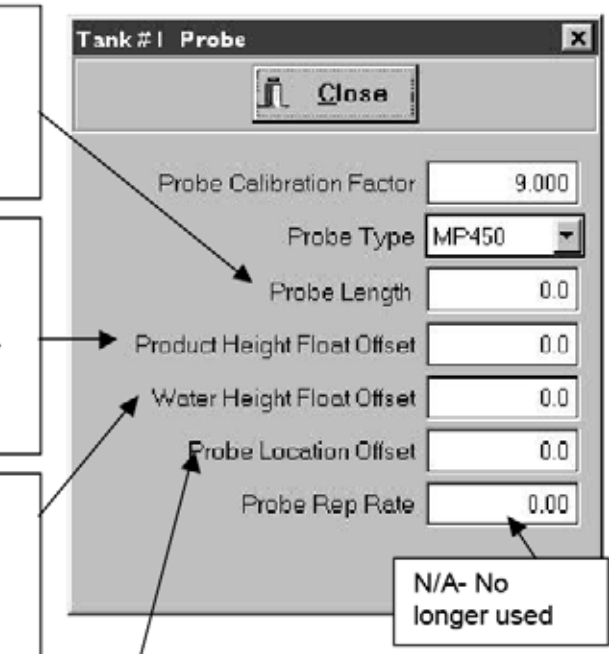
Configuration – Tank – Probe

Continued

"**Probe Length**" – Is the actual length of the SHAFT of the probe, not including the head. This number is also stamped on the Plate & label. See below .
{Probe Length} [ProbE LEn]

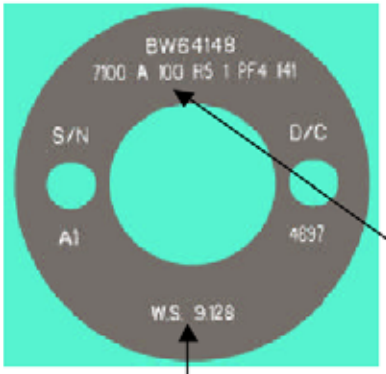
"**Product Height Float Offset**" – This allows you to enter any difference between the manual stick reading taken at the probe with actual probe readings. This should always be a negative number.
{Probe height offset} [Prod HO]

"**Water Height Float Offset**" – This allows you to "zero" adjust the water reading at the bottom of the tank. This number should be between –1.4 & -1.7 inches, if more or less contact Technical services.
{Water Height Offset} [h2o HO]



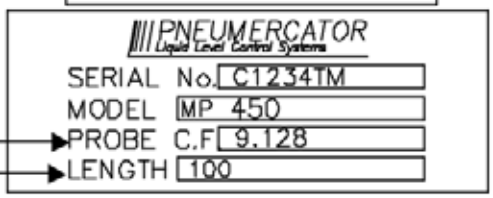
"**Probe Location Offset**" – Used in the formula for tank tilt to determine where the probe is in relation to the high end of the tank.
{Probe Loc Off} [ProbE Loc]

TMS Probe ID Plate



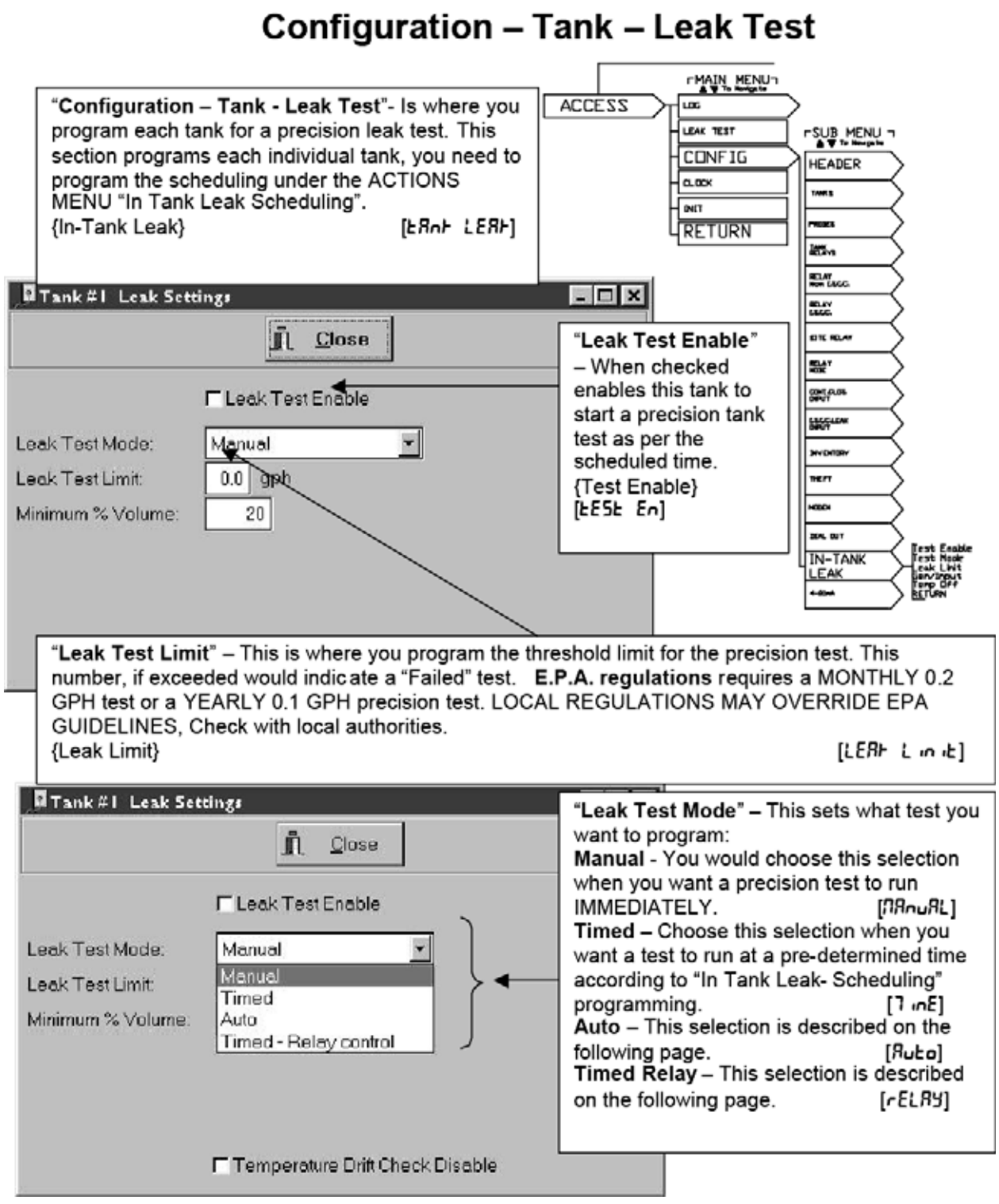
Probe Length

TMS Probe ID Label



Probe Calibration Factor (Wire Speed)

3.2.4 Leak Test Button



Configuration – Tank – Leak Test

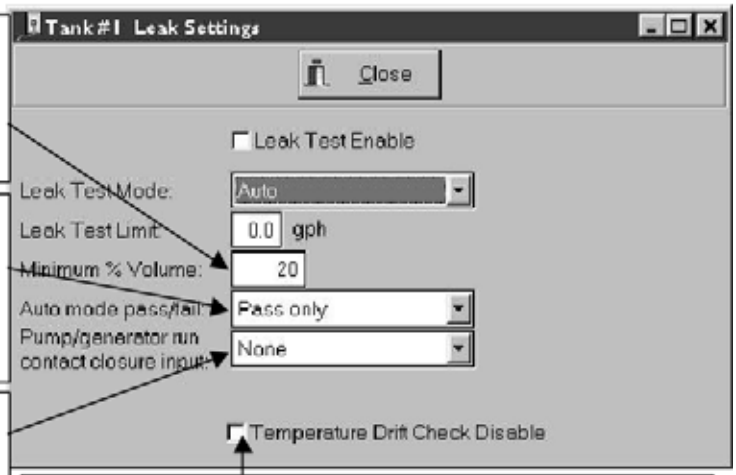
Continued

An **AUTO** leak test mode is a test that provides monthly in-tank leak testing for stations that operate on a 24-hour basis. In this mode, a test is automatically initiated when the submersible pump becomes idle. The test continues until complete (minimum 2 hours) or until interrupted by submersible pump activity. If interrupted, the test aborts and a new test is started after the submersible returns to the idle mode. Once a test is completed for the month, no more testing is performed until the next month. The user can specify PASS-FAIL or PASS ONLY in defining a "completed" test. Additionally, a "no monthly test" day of the month can be programmed to alert the user that an in-tank leak test has not yet been completed for the month, giving the user the option of running an off-line test.

"**Minimum % Volume**" – When set, will not perform a precision test below this amount.
{Not Listed} [thrEShoLd]

"**Auto Mode pass/fail**" - As stated above user can specify PASS-FAIL or PASS ONLY in defining a "completed" test.
{Not Listed} [Auto nodE]

"**Pump/Generator run**" – Enter the corresponding Non-Hazardous contact closure that the submersible pump current switch is connected to for this tank.
{Gen/Input} [PunP-GEn]



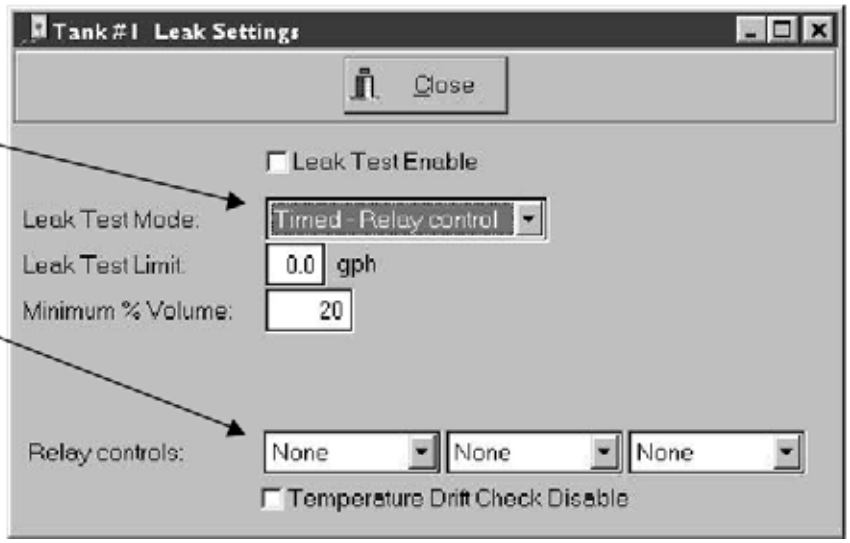
"**Temperature Drift Check Disable**" –No Longer Used, check or uncheck, does not matter.

Configuration – Tank – Leak Test

Continued

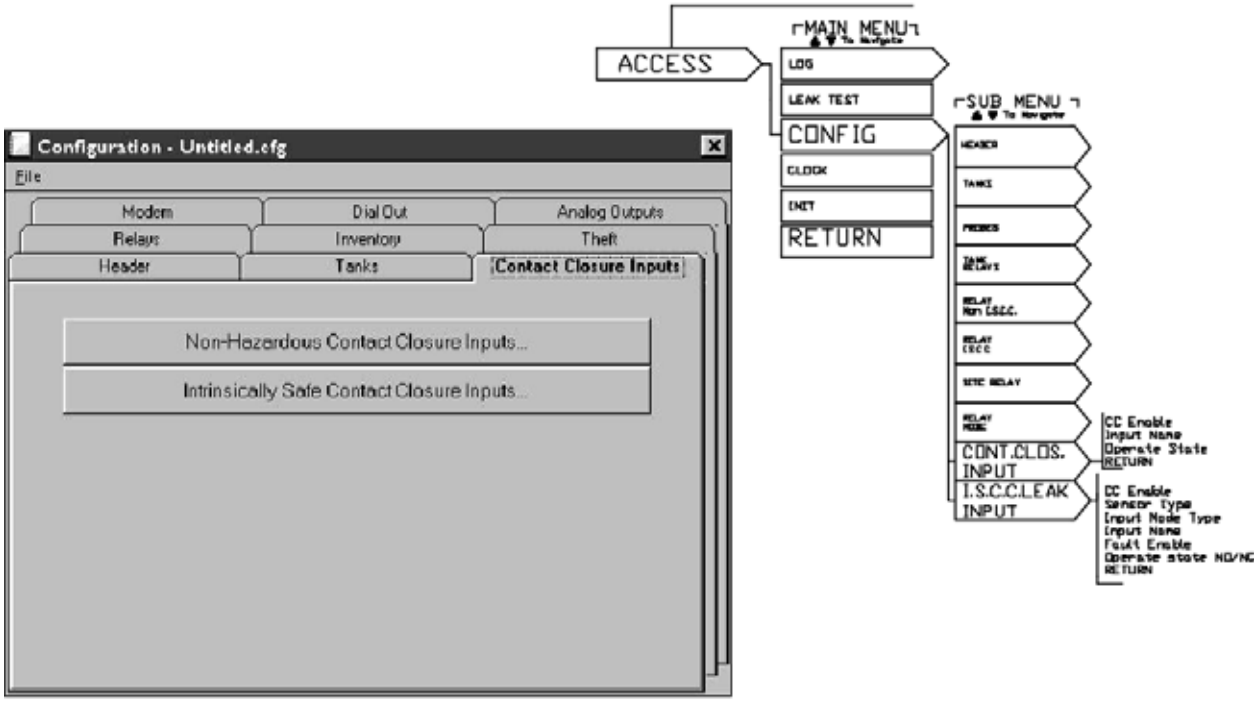
A **TIMED-RELAY** in-tank leak test mode addresses manifolded tank and pump shutdown applications. This mode is identical to the TIMED mode, with the additional feature of allowing the user to program up to three relays to activate at the scheduled leak test time, followed 15 minutes later by the start of the scheduled leak test. At the completion of the test all programmed relays are de-activated. These relays can be used to control manifold suction release valves or to lock out submersible pumps.

A selection of "**Timed – Relay Control**" – Will bring up the window asking "Which Relays should be activated when leak test is started" There is a choice of ALL of the relays available in the system, and up to 3 of them can be activated at once.
{Not Listed} [rLY CNtrL]



3.3 Contact Closure Inputs Tab

Configuration – Contact Closures



Contact Closures – Comprise of two separate types of inputs. These inputs are used for any signal needed to be brought into the TMS console other than Level Probes.

Non-Hazardous – Is used for all other types of dry-contact inputs. These can be from Generator Run sensors, Gate opener sensors, Acknowledge switches Etc. These contacts are located along with the Relays either on the Main Board (TMS-2000) or on a separate relay board available for the 2000 & 3000 systems. These are 2 wire NO or NC contacts.

{Cont. Clos. INPUT} [CC InP]

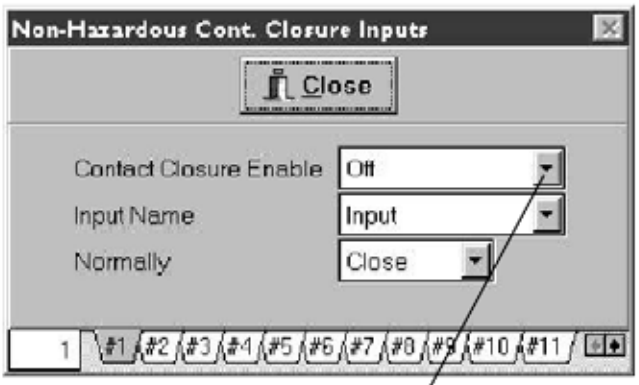
Intrinsically Safe – These contacts are located in the "Low Voltage – Intrinsically Safe" side of the TMS consoles on the Probe / Sensor interface boards. "Intrinsically safe" Indicates that the signals used to communicate with the sensor is protected against creating a spark in a hazardous area if the sensor is shorted or grounded out. **Only Pneumercator Approved Sensors are allowed to be connected to the Intrically Safe Inputs**.

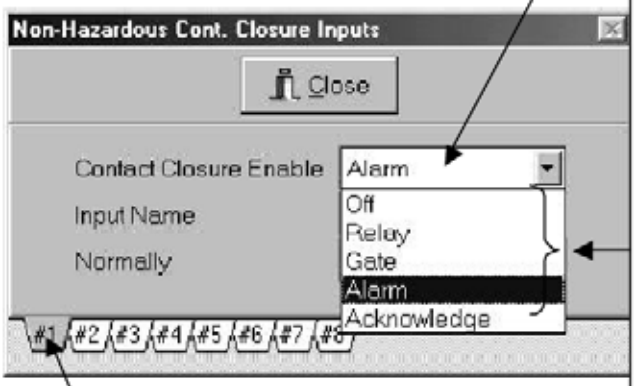
{I.S.C.C. LEAK INPUT} [SEnSor]

3.3.1 Non-Hazardous Contact Closure Inputs Button

Configuration – Contact Closure – Non – Hazardous

(Non Intrinsically Safe)





"**Contact Closure Enable**" – Allows for the programming of the following:

Off – Shuts contact off completely.

Relay – Tells the system that the contact is controlling one of the relays in the system.

Gate – Tells the system that the contact is from a gate open signal.

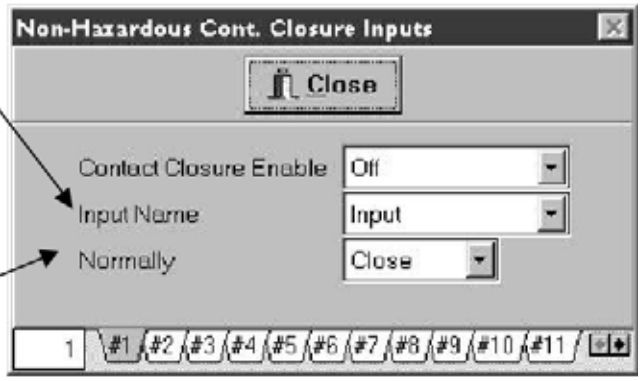
Alarm – Tells the system that the sensor connected to this contact should sound the "Alarm" when activated.

Acknowledge – Used when there is an acknowledge button connected, allows for relay reset.

Selects which input is being programmed. Relays are numbered from top down starting with the top board (1-4) on the TMS 3000. The TMS-2000 relays that are on the main board are 1 & 2 as marked. The optional board is inputs # 3-6 from the top.

"**Input Name**" – Allows selection of preset names to identify the input on printouts & display.

"**Normally**" – Allows you to change the "normal" input state from "Normally Open" to "Normally Closed".



3.3.2 Intrinsically Safe Contact Closure Inputs Button

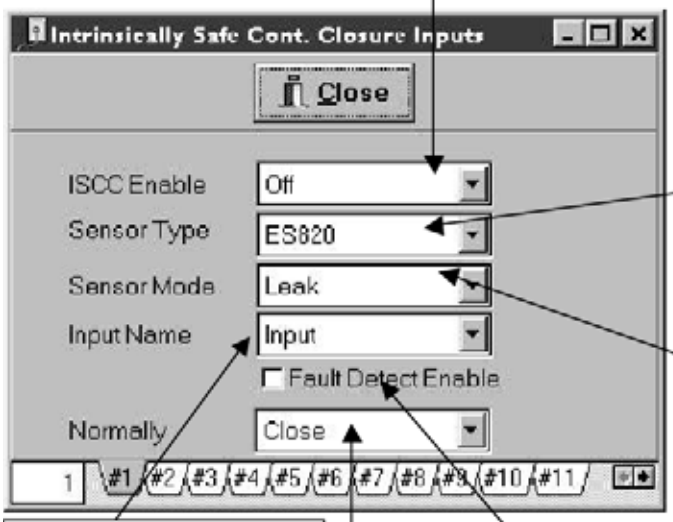
Configuration – Contact Closures – I.S.

(Intrinsically Safe)

"ISCC Enable" – Enables the sensor input for one of two choices:

Alarm – Will indicate an alarm state when the sensor is activated. Use this setting for leak sensor programming.

Relay – Will NOT trigger any alarms, only allow relay control when activated. Used for In-tank sensor pump control etc. where a sensor in a hazardous area will activate a relay but is not considered to be a Leak or Alarm.



"Sensor Type" – You need to program the type of sensor connected to the input so the TMS can determine what signals are normal and what is not. These are Pneumercator sensor numbers, if you are trying to connect something different, please consult Pneumercator Technical Services.

"Sensor Mode" – There are two choices:
Leak – When set to leak, any activation of the sensor will turn on the "LEAK" LED on the front panel and also record in the "Leak" log file.
Other – This choice is for inputs other than leak sensors. This choice will NOT turn on the "LEAK" LED or record in the log.

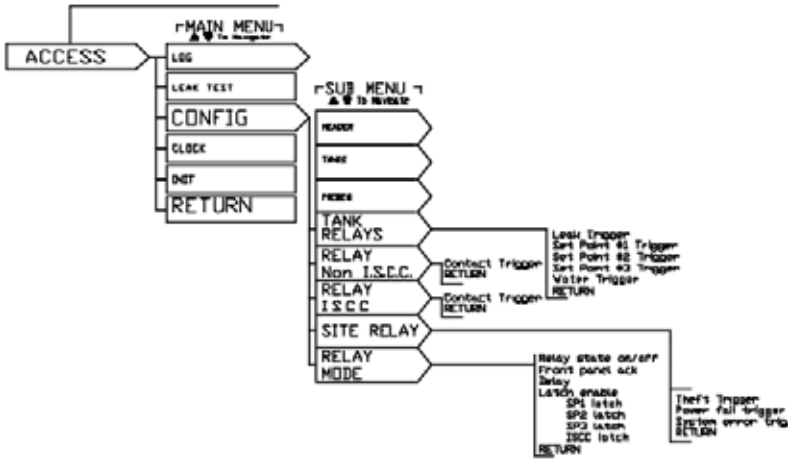
"Input Name" – Select from pre-set names to identify sensor.

"Normally" – Allows you to set the "normal" state of the input. "Normally Open" or "Normally Closed".

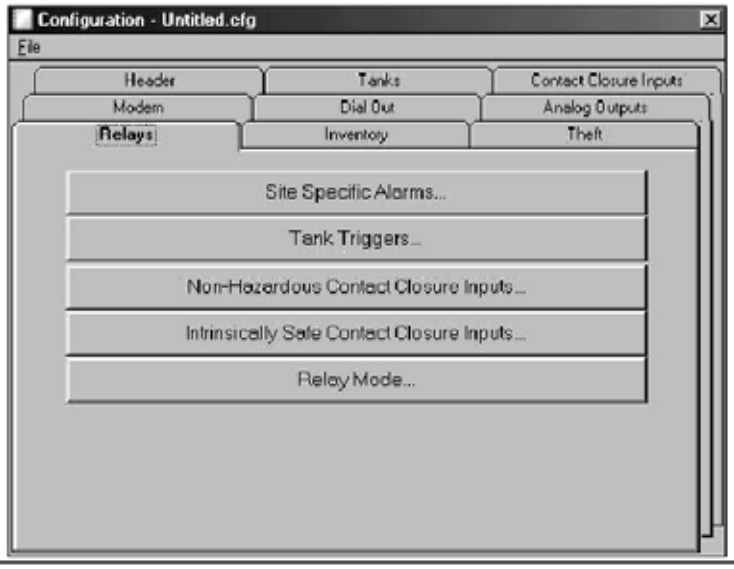
"Fault Detect Enable" – When checked for each sensor, will monitor Pneumercator's feature of **fault detection**, where the TMS system constantly monitors the sensor & the wiring going to it to determine that the wiring is not "shorted out" or "open" (disconnected). This feature is standard on the ES-825 sensors and is available on almost all of the other sensors that Pneumercator makes. Indication of –F following the part number will indicate that the sensor has "**fault detection**".

3.4 Relays Tab

Configuration – Relays



"**Relays**" – There are 5 menu items associated with relay programming. This gives you the ability to turn relays on / off for almost any system event or alarm. For most events / alarms you can turn on multiple relays for the same event. There is also a menu that allows you to control how the relay reacts when activated.



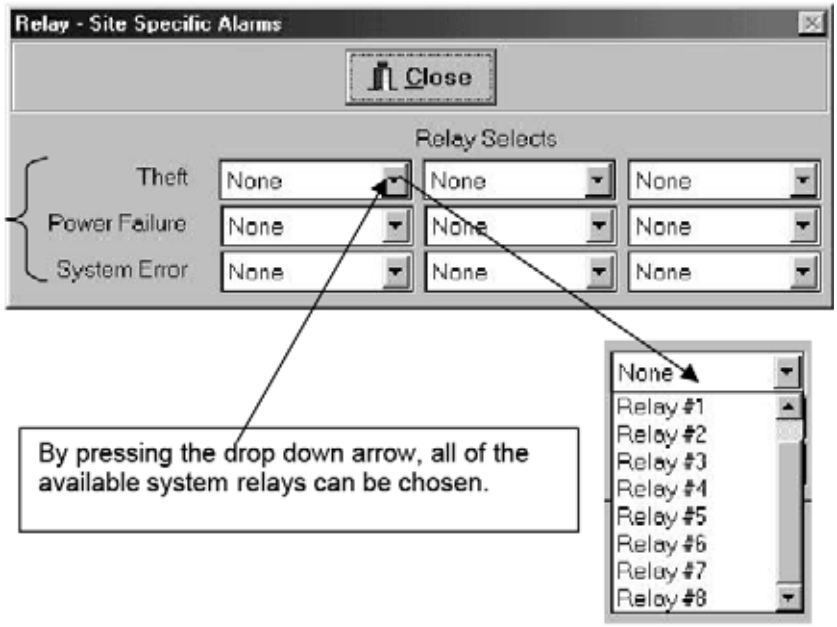
The first 4 menu items all work the same, when selected they will show you the event / alarm and you have the choice of selecting up to 3 of the relays that are in the system. You **CAN** select the same relay for multiple events / alarms. IE; you could set relay #1 as a "general system" alarm and then program all of the events / alarms to trigger that relay. This is handy when using building management systems and they want one alarm to come into their system for any problem / alarm with the tank gauge system.

3.4.1 Site Specific Alarms Button

Configuration – Relays
Sites

"**Relay Site**" – This is the events / alarms that are associated with the complete site. The choices are;
"**Theft**" – This would trigger selected relays when the system senses a "theft" alarm as programmed under the Tank Menu.
"**Power Failure**"- This would trigger selected relays when the system detects an "error 21 – power fail" alarm.
"**System Error**" – This would trigger selected relays when the system detects any "System Errors".

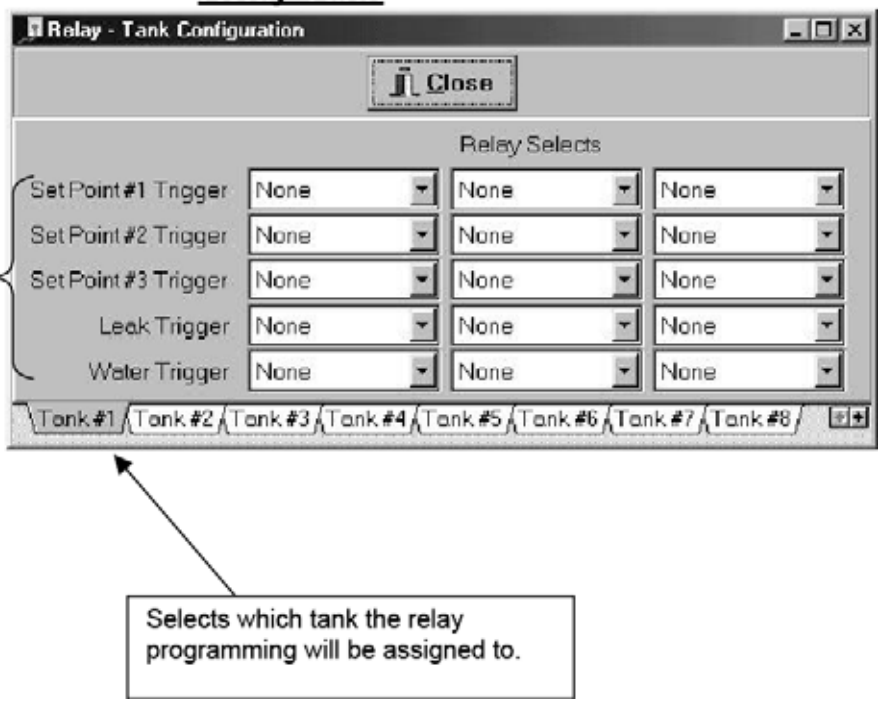
{Site Relay} [rLY S tE]



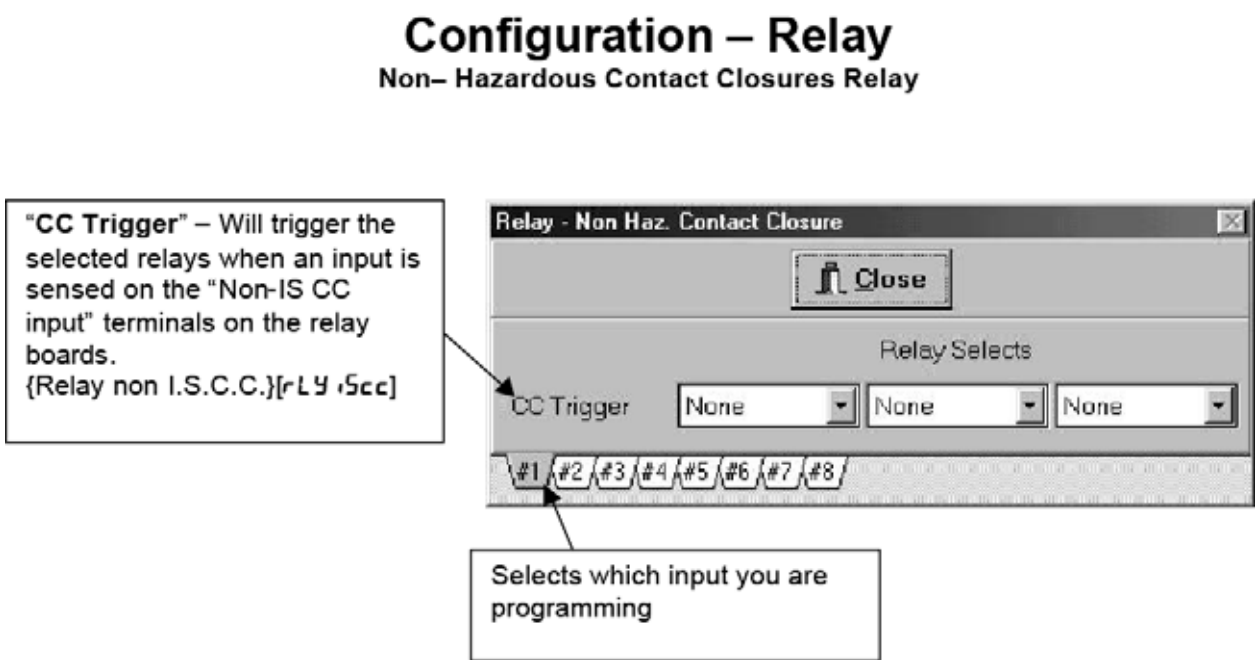
3.4.2 Tank Triggers Button

Relay Tank

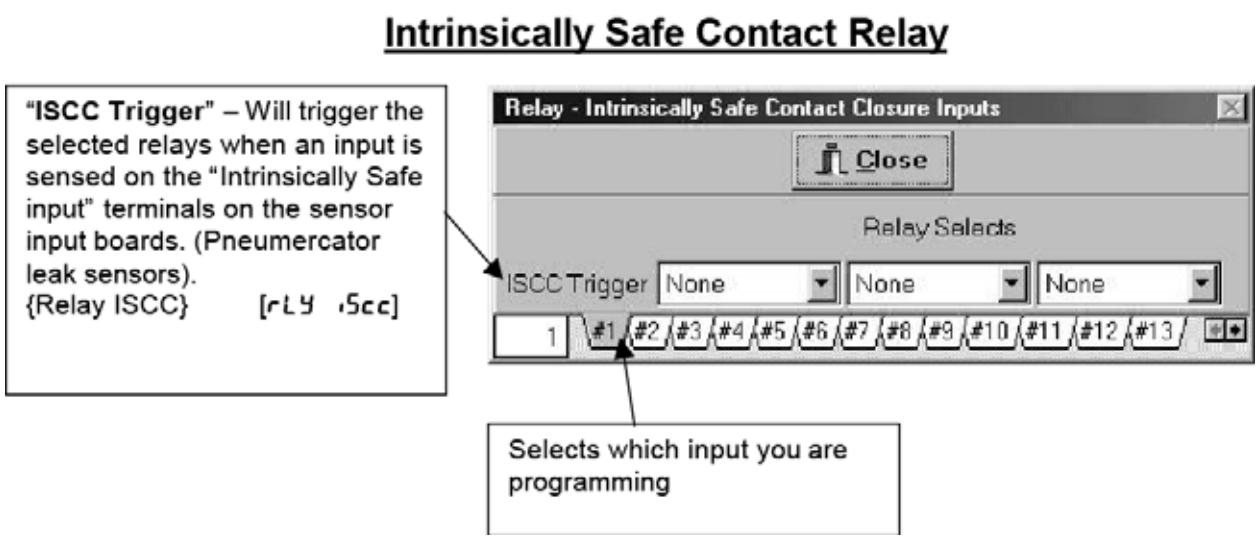
These are the "In-Tank" "**setpoints**" from the Mag probes. When each point is hit on the mag probe it will trigger the selected relay(s).
"**Leak Trigger**" Will trigger the selected relays when any sensor that is programmed to "leak" on the input mode under the "ISCC Leak" menu.
"**Water Trigger**" Will trigger the selected relays when any Mag probe senses "water" on the bottom float.
{Tank Relays} [rLY tAnK]



3.4.3 Non-Hazardous Contact Closure Inputs Button



3.4.4 Intrinsically Safe Contact Closure Inputs Button



3.4.5 Relay Mode Button

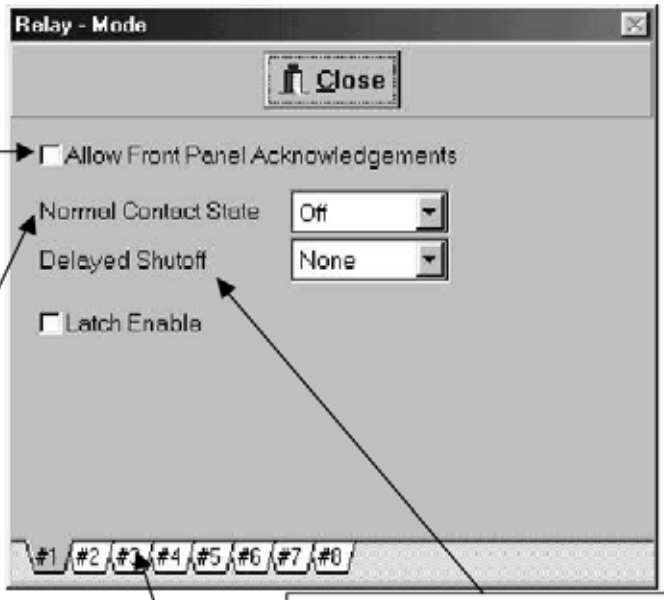
Configuration – Relay

Relay Mode

"**Relay Mode**" – Allows you to program **HOW** the relay will react when triggered and what state (open / closed) the relay will be in prior to being triggered.
{Relay Mode} [rLY ModE]

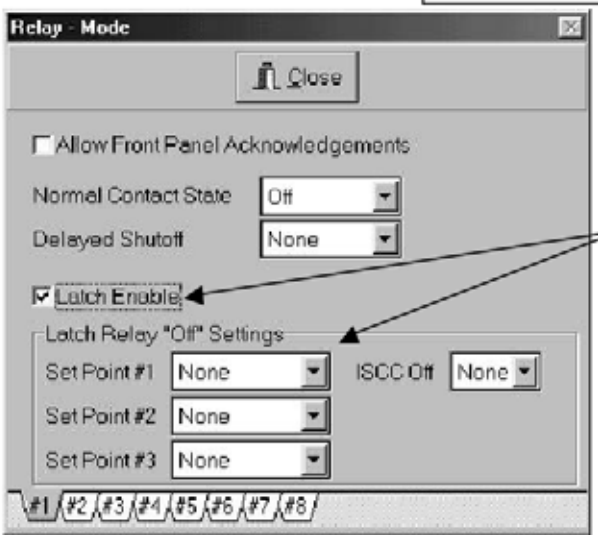
When checked will allow the operator to reverse the state (turn off) the relay by pressing any of the front buttons on the TMS console. This is used for acknowledging overfill alarms and any other time you need a relay to shut off manually.

"**Normal Contact State**" – Allows you to set the relay to be on / off (open / closed) when there are NO TRIGGERS telling the relay to turn on. This is helpful for a "fail safe" system, you can set the relay to be normally closed when power is on to the system and if power is lost the relay will open.



Selects which relay you are programming

"**Delayed Shutoff**" – Basically is a timer that you can set for 0– 9 minutes to shut the relay off after it was triggered.

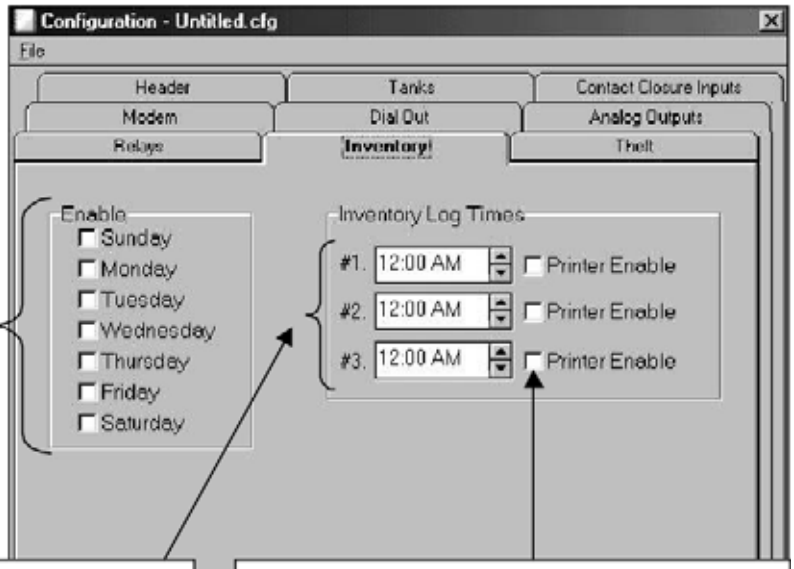


"**Latch Enable**" – When checked, will keep the relay "triggered" until one of the Latch "OFF" triggers are reached. This is useful when using the TMS for pump control, you would set the relay to turn on at a tank set-point (low level) and the relay (even though it comes out of low level) will stay closed until it reaches the "off" point (high level). There is also an "off" point associated with the ISCC inputs. IE: using a Pneumercator LS600 multipoint switch for high & low level and not using a Mag probe at all.

3.5 Inventory Tab

Configuration – Inventory

"**Inventory**" – Allows you to collect a "snapshot" of what is in the tanks at pre-determined times.
{Inventory} [inuEntorY]



"**Enable**" – When checked, will collect inventory data for that day at pre-determined times.

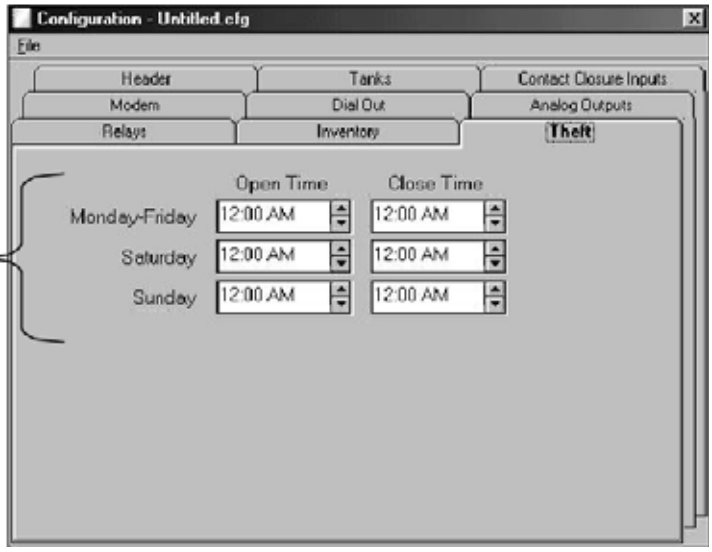
"**Inventory Log Times**" – Gives you up to 3 "shift" times for you to collect data. Set for 12:00 AM shuts inventory OFF.

"**Printer Enable**" – When checked, will print out an inventory report at pre determined times.

3.6 Theft Tab

Theft

"**Theft**" – Allows for you to set your open & closed times and have the TMS system watch your tanks for any downward movement of product in excess of normal contraction. You need to enable each tank under the "tanks" menu. You can trigger a relay or dial out for any alarms.
{Theft} [tHEFt]



3.7 Modem Tab

Configuration – Modem

"**Modem**" – This is where you would program any modems that are installed on the TMS console.
{Modem} [ПodEn]

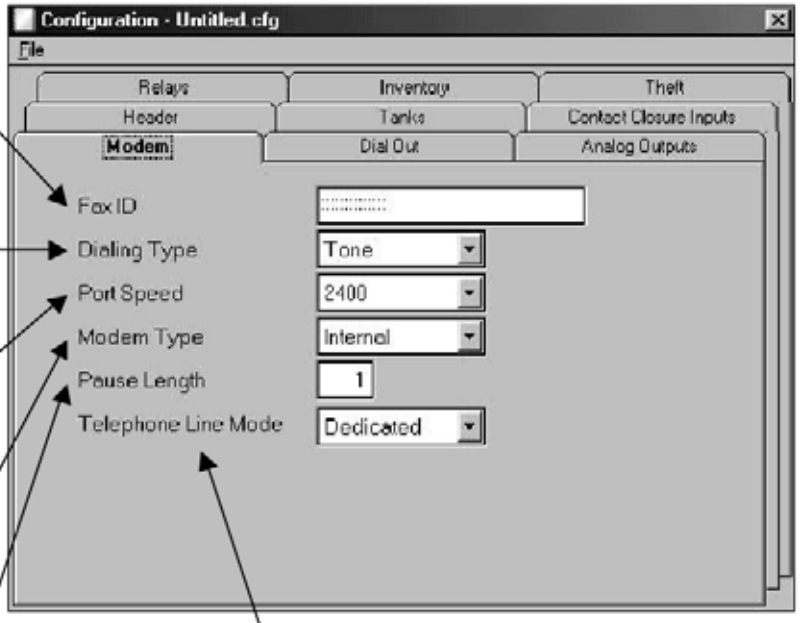
"**Fax ID**" – For future use with Fax Modems. Identifies individual fax modem address.

"**Dialing Type**" – Specify Tone or Pulse phone. Most phone systems are Tone.

"**Port Speed**" – Specify modem communication speed, 1200 or 2400

"**Modem Type**" – Specify standard internal, future Fax, or a modem connected to the RS-232 port.

"**Pause Length**" – This allows you to set the time that a comma represents when setting dial out numbers. You can make a comma represent a pause of 1-9 seconds.

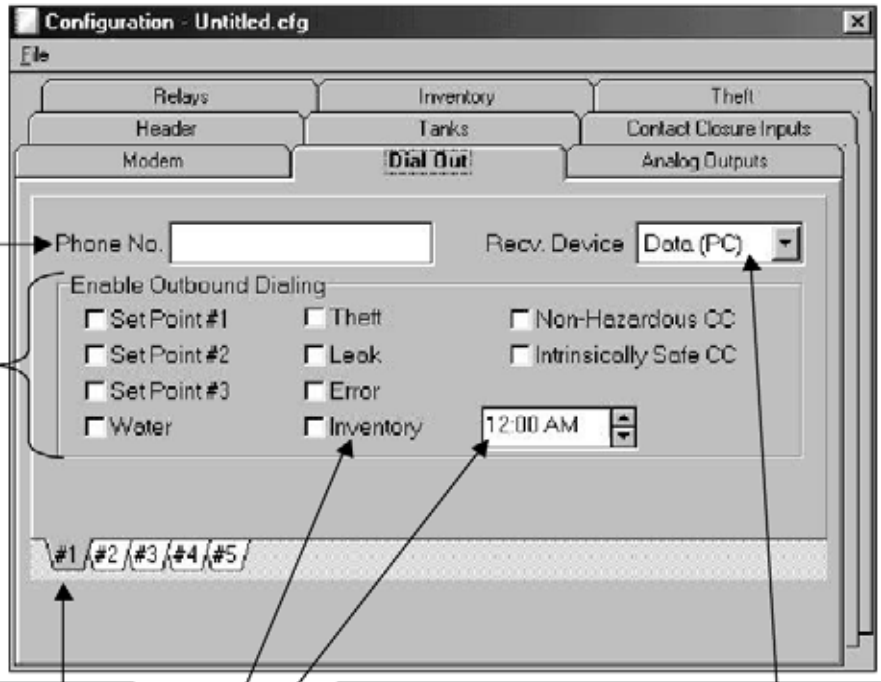


"**Telephone Line Modem**" – Specify if modem is connected to a dedicated telephone line or a shared phone line.

3.8 Dial Out Tab

Configuration – Dial Out

"**Dial Out**"- Allows you to configure up to 5 outbound numbers to dial out to and send alarm data, event data or inventory data automatically.
{Dial Out} [d iAL out]



Outbound Dialing Phone Number

Checks will enable dialing to occur when that event / alarm is triggered.

Selects 1 of 5 dial out numbers to be configured.

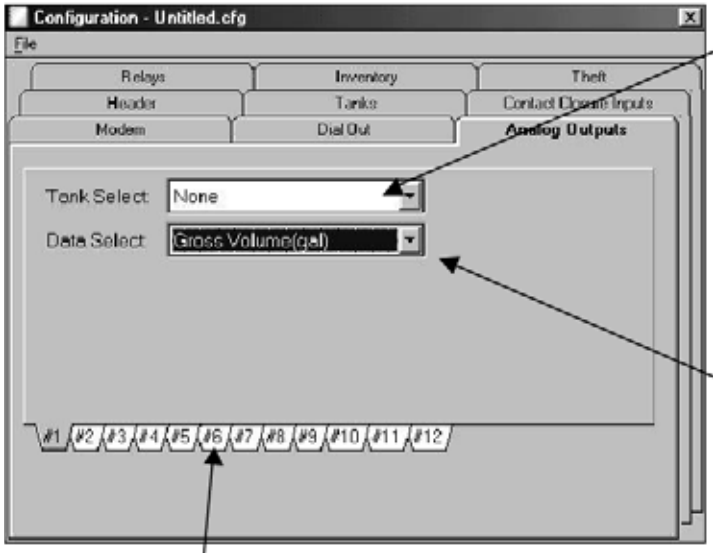
When checked, will send an inventory report at pre set time.

Allows you to send information to different types of devices.
Data PC – Sends to a standard PC with Pneumercator software.
Fax – Will send information to a standard fax machine. (Available near future)
TTY – Will send data to a standard TTY device (Screen / printer etc.)
Numeric Pager – Will send a message to any standard numeric pager.

3.9 Analog Outputs Tab

Configuration – Analog Outputs

"**Analog Outputs**" – Allows you to program optional Analog output channels to send data to Programmable logic controllers, building management systems, and similar analog input monitoring devices. There are up to 12 channels available and you can set the output ranges in either non-isolated current loop or voltage output. Consult Bulletin # 139 for more information on analog board configuration. This section allows you to set the tank and data information you need, to the channel you are using.
{4-20 mA} [4 to 20mA]



"**Tank Select**" – Selects which tank you want to get the information from, to send out on the analog output.

"**Data Select**" – You can select which data from the tank you want to send out, choices are:
Gross Volume(gal) – This is the most common data selection, this is the actual gallons in the tank.
Net Volume (gal) – This is the temperature compensated gallons of product in the tank.
Product Level(in) – This is the actual inches of product in the tank measured in inches.
Water Level(in) – This is the actual inches of water as measured on the bottom of the tank by the Mag probe.
Product Temperature(F) – Average temperature of the product in the tank.

These select which output channel you are programming. TMS systems can have either 6 or 12 channels.

APPENDIX A – TMS CONSOLE ALARM CONDITIONS & CODE TABLE

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 2 inches or higher of water in tank.
Water	n/a	WATER SETPOINT ALARM	tank #	n/a	Meets or exceeds the programmed water SetPoint. Factory default value is for a LOW alarm at or below 20% of Gross Volume.
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 (*Pwr FAIL WArn2 1*), 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/MAIN BOARD DIP SWITCH SETTINGS

The TMS is equipped with a Processor Card or Main Board located in the (left side) electrical non-intrinsically safe compartment of the console where power and control devices are handed. They are equipped with DIP switches that have been factory set. Switches are centrally located near bottom of the processor card housed in a small rectangular Red enclosure (marked S1). The switches are numbered 1-4. With switches in the OPEN position, the rocker arm will be oriented toward the word OPEN stamped on the switch block. The CLOSED switch position will orient the rocker arm toward the switch number stamped on the switch block.

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 **security** feature. For all TMS systems with version 75 operating software or later.

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.

TMS2000/3000

WARRANTY POLICY

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 15 months from date of invoice, whichever comes first. During the warranty period on the **TMS Series**, PCO, or factory trained 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.

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.

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

PROCEDURES

If the trouble call is made to a service company:
Before dispatching to the trouble site, the Service Company **must** place a call to Pneumercator Customer Service at (800) 209 7858. The location of the equipment, telephone number of the customer, type of equipment, serial number, and installation date (if known) must be furnished.

PCO Customer Service will contact the customer and verify the reported problem. PCO will troubleshoot the equipment with the customer and attempt to rectify any problems. If PCO Customer Service is unable to repair the equipment and determines the equipment is covered by warranty, PCO will contact a Service Company and issue a *Warranty Repair Number*. All information obtained by PCO will be relayed to the service company. No work is to be started until a *Warranty Repair Number* is issued

If the trouble call is made to PCO:
Pneumercator will determine if the equipment is covered by warranty. Customer Service will try to rectify the problem by dialing into the unit or troubleshooting the unit over the telephone with the customer. If the problem cannot be corrected, Pneumercator will determine the Service Company to be dispatched to the site for warranty repair. The Service Company will be issued a Warranty Repair Number from PCO before work is started.

If after PCO determines that the installed unit is not covered by warranty, the customer will be supplied a listing of service companies and instructed to contact one of them for repair. The selected Service Company has the responsibility to obtain a purchase order number from the customer for payment. The Service Company must obtain a return authorization number before equipment is returned for repair. Pneumercator will not be liable for any expenses incurred for travel or repair costs on non-warranty repairs.

SOME OF THE CRITERIA USED IN SELECTING A SERVICE COMPANY:

- Does the Service Company maintain spare parts?
- A radius of 60 miles (One Way) or 2 hours (Round Trip) from the service company to the customer

Is there a factory-trained technician to be dispatched by the Service Company (TMS Series)?

Unless authorized, Pneumercator will only pay for one warranty service trip.
If a return trip is necessary because of missing parts etc., time travel, mileage, or trouble-shooting time will not be covered.

NOTE

IT IS RECOMMENDED THAT ALL SERVICE COMPANIES MAINTAIN SPARE COMPONENTS FOR TROUBLESHOOTING.

A Field Service Report and Invoice must be written and submitted to Pneumercator with the *Warranty Repair Number* stated. The returned defective unit must have the *Warranty Repair Number* attached. Upon verification or duplication of the reported problem on the defective part (by testing), Pneumercator will replace/repair the unit and return it to the Service Company for its spare inventory. If a problem cannot be verified or is not written on the return tag, the unit will be returned and the service company will be charged a bench repair time.

If problems are encountered during a new installation it is responsibility of the technician to trouble-shoot, diagnose and repair as part of the installation process. No additional charges will be allowed if it is determined that the equipment is defective from the factory. The technician must call for a *warranty repair number* before returning the component.

Spare Parts Kits are recommended and available for qualified Service Companies.

New Spare Parts are warranted for 90 Days from date of installation or for the balance of original equipment Warranty period. Service companies must notify PCO of the serial number of the spare part installed as warranty repair. The defective unit must be returned for repair with the WRGA attached. Upon repair the unit will be returned to the Service Company to be used as a "new" spare. The repaired unit is warranted for 90 days after installation into a new location.

Distributed by:

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