VEEDER-ROOT
SERIAL INTERFACE
MANUAL

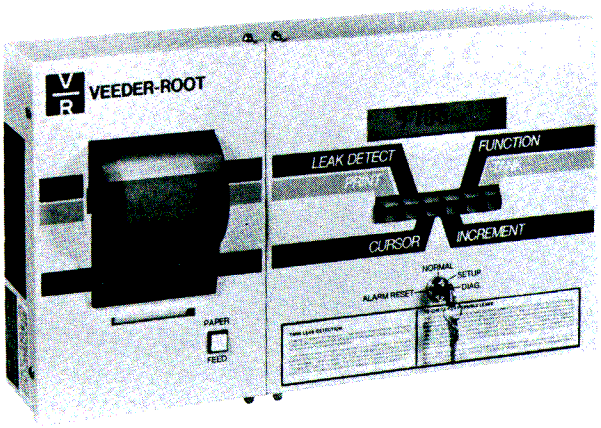
Technical Manual
14-206
Issued: 2/90
Supersedes: 8/89

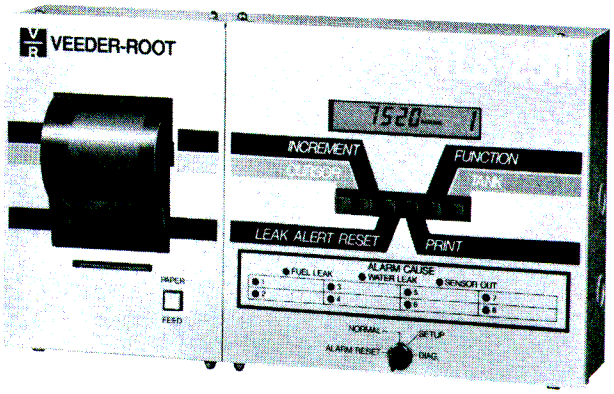
TLS-250 & TLS-250i TANK LEVEL SENSING SYSTEMS

RS-232 Interface for General Purpose Use

(including emergency backup generator applications)

Manual No. 576013-693





The information contained in this manual describes the Serial Interface Protocol for the following TLS-250 and TLS-250i products:

TLS-250 Standard Systems:	**P/N 784190-102 (without printer)** **P/N 784190-122 (with printer)**
TLS-250 Emergency Generator Systems:	**P/N 784190-302 (without printer)** **P/N 784190-322 (with printer)**
TLS-250i Four-Tank Systems:	**P/N 794191-102 (without printer)** **P/N 794191-122 (with printer)**
TLS-250i Eight-Tank Systems:	**P/N 794190-102 (without printer)** **P/N 794190-122 (with printer)**
TLS-250i Eight-Tank Emergency Generator Systems:	**P/N 794190-302 (without printer)** **P/N 794190-322 (with printer)**

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576013-693 11626 Replaces 11202

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PLEASE NOTE: It is understood that Veeder-Root assumes no responsibility for the use of the information contained in this manual or for the results obtained therefrom. Despite our efforts to avoid them, this manual may contain technical inaccuracies or typographical errors.

Information contained in this manual is subject to change from time to time. Any such change will be reported in subsequent revisions. Requests for copies of Veeder-Root publications should be made to Veeder-Root Company, 125 Powder Forest Drive, P.O. Box 2003, Simsbury, CT 06070-2003.

Any person working with Veeder-Root equipment is expected to take every safety precaution possible and observe the following safety practices when servicing Veeder-Root equipment:

- To prevent electrical shock and the possibility of serious injury, disconnect all power prior to accessing the interior of the enclosure.
- Refer to the appropriate Veeder-Root "Site Preparation and Installation Instructions:" TLS-250 (including Emergency Generator Version), Manual No. 576013-553; TLS-250i Four-Tank System, Manual No. 576013-579; or TLS-250i Eight-Tank System (including Emergency Generator Version), Manual No. 576013-577.
- Refer to the appropriate Veeder-Root "System Start-Up and Operating Instructions:" TLS-250 (including Emergency Generator Version), Manual No. 576013-692; TLS-250i Four-Tank System, Manual No. 576013-578; TLS-250i Eight-Tank System (including Emergency Generator Version), Manual No. 576013-583.

1.0 INTRODUCTION

The TLS RS-232 interface is used to connect the TLS to a controlling computer, a display terminal (CRT) or a printing terminal. A modem can be connected directly to the TLS to provide telephone line access.

A vertical bar ▌ adjacent to text indicates information added or changed during the issue date on the front cover.

2.0 HARDWARE CONNECTIONS

The interface is wired to terminals on the TLS main board I/O 12-position barrier strip located on the upper left-hand side of the circuit board mounted in the back of the wall-mounted box. The terminals are labeled showing the RS-232 connection.

The RS-232 interface is also wired from the 12-position barrier strip to a pair of 25-pin D-connectors located on the bottom of the box. The forward mounted connector is the RS-232 interface. The rear mounted connector is an auxiliary input intended to be connected to another TLS RS-232 interface for ganged, multisystem operation.

2.1 RS-232

The RS-232 D-connector is a panel mount, 25-pin female type, wired in a Data Terminal Equipment (DTE) configuration. A modem (DCE) may be connected directly to the interface using a straight-through cable. A CRT or printing terminal (DTE) may be connected to the interface by using a full null cable which reverses the sense of both the transmit/receive signals and the handshake signals. The TLS does not require any handshake signals; however, two outputs are wired in the enabled state (+12 volts). They are Request To Send (pin 4) and Data Terminal Ready (pin 20).

RS-232 signals are wired to the female D-connector as follows:

Pin	
2	Transmitted Data
3	Received Data
4	Request To Send (always enabled)
7	Signal Ground (common return) and Chassis
20	Data Terminal Ready (always enabled)

2.2 EIA RS-232 INTERFACE

The EIA RS-232 interface is designed to connect to modems for transmission of data over telephone lines. It can be used for direct local attachment of terminals if the cable run is **no more than 50 feet**. In practice, cable runs longer than 50 feet have performed satisfactorily, however, since the RS-232 specification is designed for operation up to 50 feet, direct connect cable runs greater than 50 feet are not warranted for proper operation.

WARNING: RS-232 cable runs longer than 50 feet could result in data errors or component damage or both.

3.0 CHARACTER FORMAT

The TLS receives and sends characters in an ASCII format with the following bit configuration: 1 start bit, 7 data bits, 1 parity bit (selectable odd or even) and 1 stop bit. Communication rate is selectable: 110, 150, 300, 600, 1200, 2400, 4800 or 9600 baud. The TLS operates in a half duplex mode. Characters are not echoed when received, and transmitted characters must not be echoed back to the TLS. Transmit and receive can occur simultaneously, and commands can be stacked in the TLS buffer (up to 60 characters).

4.0 SWITCH SETTINGS

4.1 BAUD RATE

The baud rate is set on the rotary switch located on the component side of the option board, which is mounted behind the hinged right-hand side cover of the TLS console. The switch is visible on the right-hand edge of the circuit board. Baud rate settings are numbered on the switch as follows:

Position	Baud Rate
1	9600
2	4800
3	2400
4	1200
5	600
6	300
7	150
8	110

4.2 DIP SWITCH

A five-position DIP switch is located on the main board, which is mounted in the back of the TLS console. The switch is on the upper left-hand side of the circuit board. This switch controls the interboard communication rate (must not be changed from factory setting) and the parity and enables the security code. The switches are assigned as follows:

Switch		
1, 2, 3	Interboard Communication Rate:	all closed
4	Parity:	open-even, closed-odd
5	Security Code:	open-disabled, closed-enabled

5.0 COMMAND MESSAGE FORMAT

All command and response messages are configured in a format which includes a surrounding envelope of control characters and a function code and data field message. The control characters are described in this section while the function codes and data field messages are described in subsequent sections.

The TLS responds to a command message that has the following configuration:

SOH	Security Code	Function Code	Data Field

SOH is a control-A character (ASCII 01).

The security code is an optional six-digit code used to limit access to the TLS for security purposes. It can be set to any unique set of characters using either the front panel switches or the external communication interface setup commands. The TLS will not respond to a command without the proper security code. It can be disabled with a DIP switch on the main board (see previous section). If it is disabled, omit the six-digit code.

The function code is a three character command code which the TLS interprets to determine the type of action to take and response to return. TLS function codes and response messages are defined in subsequent sections.

The data field is optional and contains information necessary to perform the selected function (such as setup information).

There is one command which does not follow the above format. The escape command is performed by sending an ESC (escape character, ASCII 27), to the TLS. It is a means to halt a response message at any time before its completion.

6.0 RESPONSE MESSAGE FORMAT

There are two types of response message formats: computer (or packed data format) and display format. Each format uses a different surrounding envelope of control characters.

6.1 COMPUTER FORMAT

The computer format is a stream of numbers without any formatting characters; i.e., carriage return, line feed, spaces, labels, etc. The message format is as follows:

SOH	Function Code	Data Field	9	Checksum	ETX*

The function code is identical to the received command message function code.

The data field contains the response message which is described in subsequent sections.

The "9" is a fixed tag character which corresponds to the tank numbers (1 through 8) in the data field response message. It indicates that the checksum follows instead of tank information.

Checksum is four ASCII hexadecimal characters which provide a check on the integrity of all the characters preceding it, including the control characters. The four characters represent a 16-bit binary count which is the 2's complemented sum of the 7-bit binary representation of the message characters. Overflows are ignored. The data integrity check can be done by converting the four checksum characters to the 16-bit binary number and adding the 7-bit binary representation of the message characters to it. The binary result should be zero.

ETX is the control-C character (ASCII 03).

6.2 DISPLAY FORMAT

The display format is intended for display on a CRT or printer. It includes all the necessary formatting characters such as carriage returns, line feeds, nulls, spaces, labels, etc. The message format is as follows:

SOH	Function Code	Data Field	ETX*

See subsequent sections for a description of the data field response messages.

**See Function Codes 005 and 006 for additional end of message information.*

7.0 FUNCTION CODES AND RESPONSE MESSAGES

All response messages are sent in a format described in previous sections. The function codes and data fields of these message formats are described in this section. The data field response messages are divided into the following major groupings:

Function Code Range	Response Types
001 to 006	Control Functions (Computer Format)
10T to 1GS	Operational Reports (Computer Format)
20T to 2GS	Operational Reports (Display Format)
500 to 6GS	Setup Functions (Computer Format)
700 to 8GS	Setup Functions (Display Format)
900 to 9D0	Diagnostic Reports (Display Format)
A00 to ADS	Diagnostic Reports (Computer Format)

Most response messages can be requested for either a single tank or all tanks. A "T" in the function code signifies single tank number 1 through 8. When "T" is 0, it signifies all tanks.

Typically, response messages include information on the active probes only. That is, those probes that are connected and working. However, the TLS can be forced to send data on any combination of tanks by setting up the "channel configuration" status (using the setup commands). In this case, if no valid data is available on a tank, the message is filled out with question marks (?) in place of numbers.

Computer format response messages do not include any formatting characters such as carriage returns, line feeds, spaces, nulls, labels, etc. Only those characters shown are actually included in the response message. For convenience, the messages are shown in segments and do not actually include any line feeds, carriage returns, etc. Also, the notes to the right and between the message lines are not included in the messages. All number values contained in the response messages retain leading zeroes.

Display format response messages include the formatting characters shown. All message lines end with a carriage return, line feed and six nulls. All response messages start and end with at least one blank line.

The TLS function codes and response messages are described in detail in the following sections under the major headings given above. A summary list of all function codes is given at the end of this document.

7.1 CONTROL FUNCTIONS (COMPUTER FORMAT)

Function Code: **001** (All Systems)

Function: Cold Start (Reset)

Command Format: <SOH>001

Typical Response Message: <SOH>0019FF35<ETX>

NOTE: The TLS-250 or TLS-250i executes a cold start (power-up reset) sequence after receiving this command. The power reset status flag is then set. Power reset status is a character included in the inventory report (function code 10T). The self-diagnostic test is performed after the cold start sequence. Results can be obtained using function A70 or 970.

Function Code: **002** (All Systems)

Function: Clear Power Reset Status

Command Format: <SOH>002

Typical Response Message: <SOH>0029FF34<ETX>

NOTE: Power reset status is a character included in the inventory report (function code 10T). It is set whenever a cold start or power-up reset occurs. This command clears the status.

Function Code: **003** (All Systems)

Function: Remote Alarm Reset

Command Format: <SOH>003

Typical Response Message: <SOH>0039FF33<ETX>

NOTE: This command clears all presently active alarm status flags in the TLS-250 or TLS-250i. This is the same result that is achieved by turning the key switch to the "Alarm Reset" position on the front panel. Either action also clears any presently active auto-transmit flags.

Function Code: **004** (TLS-250 Standard System)
Function: Auto-Transmit Flag Reset
Command Format: <SOH>004TM
Typical Response Message: <SOH>004TM9FED2<ETX>

NOTES:

1. Whenever the TLS-250 sends an auto-transmit message resulting from an enabled alarm, it sets an internal flag indicating that the message has been sent. If the repeat mode has been enabled, it uses these flags to trigger the repetition. These flags remain set even if the triggering alarm condition ceases to exist. Therefore, these flags can be examined (using code 1B0 or 2B0) to see if a message was ever sent.
2. These flags can be cleared in one of three ways:
   a. Function code 004 may be used to clear these flags individually or in groups.
   b. Function code 003 clears all existing alarm conditions and all of the flags.
   c. The front panel "Alarm Reset" key switch clears all existing alarm conditions and all of the flags.
3. "T" is the tank number of the flag to be cleared. If T = 9, the external input flag is cleared. If T = 0, the indicated flag is cleared on all tanks (but not the external input).
4. "M" indicates the specific flag to be cleared as follows:

If T = 0 to 8 (T = tank number, 0 = all tanks)

M = 0	All flags for given tank (but not external input)
M = 1	Leak Alarm Flag
M = 2	High Water Alarm Flag
M = 3	Overfill Alarm Flag
M = 4	Low Limit Alarm Flag
M = 5	Theft Alarm Flag
M = 6	Delivery Start Flag
M = 7	Delivery End Flag

If T = 9 (external input)

M = 0	Both External Input Flags
M = 1	External Input Closed (on) Flag
M = 2	External Input Open (off) Flag

Function Code: **004** (TLS-250 Emergency Generator System)
Function: Auto-Transmit Flag Reset
Command Format: <SOH>004TM
Typical Response Message: <SOH>004TM9FED2<ETX>

NOTES:

1. Whenever the TLS-250 sends an auto-transmit message resulting from an enabled alarm, it sets an internal flag indicating that the message has been sent. If the repeat mode has been enabled, it uses these flags to trigger the repetition. These flags remain set even if the triggering alarm condition ceases to exist. Therefore, these flags can be examined (using code 1B0 or 2B0) to see if a message was ever sent.
2. These flags can be cleared in one of three ways:
   a. Function code 004 may be used to clear these flags individually or in groups.
   b. Function code 003 clears all existing alarm conditions and all of the flags.
   c. The front panel "Alarm Reset" key switch clears all existing alarm conditions and all of the flags.
3. "T" is the tank number of the flag to be cleared. If T = 9, the generator input flag is cleared. If T = 0, the indicated flag is cleared on all tanks (but not the generator flags).
4. "M" indicates the specific flag to be cleared as follows:

If T = 0 - 8 (T = tank number, 0 = all tanks):

M = 0	All flags for given tank (but not generator flags)
M = 1	Leak Alarm Flag
M = 2	High Water Alarm Flag
M = 3	Overfill Alarm Flag
M = 4	Low Limit Alarm Flag
M = 5	Theft Alarm Flag
M = 6	Delivery Start Flag
M = 7	Delivery End Flag

If T = 9 (generator input):

M = 0	Both Generator Input Flags
M = 1	Generator Input Start Flag
M = 2	Generator Input Stop Flag

Function Code: **004** (TLS-250i Four-Tank System)

Function: Auto-Transmit Flag Reset

Command Format: <SOH>004TM

Typical Response Message: <SOH>004TM9cccc<ETX>

NOTES:

1. Whenever the TLS-250i sends an auto-transmit message resulting from an enabled alarm, it sets an internal flag indicating that the message has been sent. If the repeat mode has been enabled, it uses these flags to trigger the repetition. These flags remain set even if the triggering alarm condition ceases to exist. Therefore, these flags can be examined (using code 1B0 or 2B0) to see if a message was ever sent.
2. These flags can be cleared in one of three ways:
   a. Function code 004 may be used to clear these flags individually or in groups.
   b. Function code 003 clears all existing alarm conditions and all of the flags.
   c. The front panel "Alarm Reset" key switch clears all existing alarm conditions and all of the flags.
3. "T" = The tank number or sensor number of the flag to be cleared. If T = 9 the external input flag is cleared. If T = 0 all tank and sensor flags are cleared (but not external input).
4. "M" indicates the specific flag to be cleared as follows:

If T = 0 to 4 (T = tank number, 0 = all tanks)

M = 0	All flags for a given tank (except external input)		
M = 1	RESERVED	M = C	Sensor Fuel Flag
M = 2	High Water Alarm Flag	M = D	Sensor Water Flag
M = 3	Overfill Alarm Flag	M = E	Sensor Out Flag
M = 4	Low Limit Flag	M = F	RESERVED
M = 5	Theft Alarm Flag	M = G	RESERVED
M = 6	Delivery Start Flag	M = H	RESERVED
M = 7	Delivery End Flag		

If T = 9 (external input)

M = 0	Both External Input Flags
M = 1	External Input Closed (on) Flag
M = 2	External Input Open (off) Flag

Function Code: **004** (TLS-250i Eight-Tank System)

Function: Auto-Transmit Flag Reset

Command Format: <SOH>004TM

Typical Response Message: <SOH>004TM9cccc<ETX>

NOTES:

1. Whenever the TLS-250i sends an auto-transmit message resulting from an enabled alarm, it sets an internal flag indicating that the message has been sent. If the repeat mode has been enabled, it uses these flags to trigger the repetition. These flags remain set even if the triggering alarm condition ceases to exist. Therefore, these flags can be examined (using code 1B0 or 2B0) to see if a message was ever sent.
2. These flags can be cleared in one of three ways:
   a. Function code 004 may be used to clear these flags individually or in groups.
   b. Function code 003 clears all existing alarm conditions and all of the flags.
   c. The front panel "Alarm Reset" key switch clears all existing alarm conditions and all of the flags.
3. "T" = The tank number or sensor number of the flag to be cleared. If T = 9 the external input flag is cleared. If T = 0 all tank and sensor flags are cleared (but not external input).
4. "M" indicates the specific flag to be cleared as follows:

If T = 0 to 8 (T = tank number, 0 = all tanks)

M = 0	All flags for a given tank (except external input)		
M = 1	Leak Alarm Flag	M = C	Sensor Fuel Flag
M = 2	High Water Alarm Flag	M = D	Sensor Water Flag
M = 3	Overfill Alarm Flag	M = E	Sensor Out Flag
M = 4	Low Limit Flag	M = F	RESERVED
M = 5	Theft Alarm Flag	M = G	RESERVED
M = 6	Delivery Start Flag	M = H	RESERVED
M = 7	Delivery End Flag		

If T = 9 (external input)

M = 0	Both External Input Flags
M = 1	External Input Closed (on) Flag
M = 2	External Input Open (off) Flag

Function Code: **004** (TLS-250i Eight-Tank Emergency Generator System)

Function: Auto-Transmit Flag Reset

Command Format: <SOH>004TM

Typical Response Message: <SOH>004TM9FED2<ETX>

NOTES:

1. Whenever the TLS-250i sends an auto-transmit message resulting from an enabled alarm, it sets an internal flag indicating that the message has been sent. If the repeat mode has been enabled, it uses these flags to trigger the repetition. These flags remain set even if the triggering alarm condition ceases to exist. Therefore, these flags can be examined (using code 1B0 or 2B0) to see if a message was ever sent.
2. These flags can be cleared in one of three ways:
   a. Function code 004 may be used to clear these flags individually or in groups.
   b. Function code 003 clears all existing alarm conditions and all of the flags.
   c. The front panel "Alarm Reset" key switch clears all existing alarm conditions and all of the flags.
3. "T" = The tank number or sensor number of the flag to be cleared. If T = 9 the external input flag is cleared. If T = 0 all tank and sensor flags are cleared (but not external input).
4. "M" indicates the specific flag to be cleared as follows:

If T = 0 to 8 (T = tank number, 0 = all tanks)

M = 0	All flags for a given tank (but not generator flags)		
M = 1	Leak Alarm Flag	M = C	Sensor Fuel Flag
M = 2	High Water Alarm Flag	M = D	Sensor Water Flag
M = 3	Overfill Alarm Flag	M = E	Sensor Out Flag
M = 4	Low Limit Flag	M = F	RESERVED
M = 5	Theft Alarm Flag	M = G	RESERVED
M = 6	Delivery Start Flag	M = H	RESERVED
M = 7	Delivery End Flag		

If T = 9 (generator input)

M = 0	Both Generator Input Flags
M = 1	Generator Input Start Flag
M = 2	Generator Input Stop Flag

Function Code: **005** (All Systems) [Not available in systems with option board software Rev. 20 or higher]

Function: Set Computer Format End of Message Character(s)

Command Format: <SOH>005AB

Typical Response Message: <SOH>005AB9FED2AB<ETX>

NOTES:

1. The default end of message character transmitted by the TLS-250 or TLS-250i is an <ETX> (ASCII 03 Hex). If desired, the TLS-250 or TLS-250i can be programmed to transmit up to two other characters at the end of each computer format response message.
2. The TLS-250 or TLS-250i accepts any ASCII character (00 Hex through 7F Hex) in either of the two positions. However, if the first "A" character is a <NUL> (ASCII 00 Hex), the TLS-250 or TLS-250i reverts to its default condition. If the first "A" character is not a <NUL>, but the second character "B" is, only the first character is transmitted as the response message. If neither character is a <NUL>, both characters are transmitted, in sequence, at the end of each computer format response message.

Function Code: **006** (All Systems) [Not available in systems with option board software Rev. 20 or higher]

Function: Set Display Format End of Message Character(s)

Command Format: <SOH>006AB

Typical Response Message: <SOH>006AB9FED2<ETX>

NOTES:

1. The default end of message character transmitted by the TLS-250 or TLS-250i is an <ETX> (ASCII 03 Hex). If desired, the TLS-250 or TLS-250i can be programmed to transmit up to two other characters at the end of each display format response message.
2. The TLS-250 or TLS-250i accepts any ASCII character (00 Hex through 7F Hex) in either of the two positions. However, if the first "A" character is a <NUL> (ASCII 00 Hex), the TLS-250 or TLS-250i reverts to its default condition. If the first "A" character is not a <NUL>, but the second "B" character is, only the first character is transmitted as the response message. If neither character is a <NUL>, both characters are transmitted, in sequence, at the end of each display format response message.

7.2 OPERATIONAL REPORTS (COMPUTER FORMAT)

Function Code: **10T** (TLS-250 Standard; TLS-250i Eight-Tank Systems)

Function: Inventory Report

Command Format: <SOH>10T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank: <SOH>100MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt (1st tank)
TPssssIIIhhGGGGGGSFFFtGGGGGGWWt (2nd tank)

.
etc.
.
up to 8 tanks
.

TPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX> (last tank)

Single tank: <SOH>102MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX>

NOTES:

1. "MMDDHHmm" is present time in month, day, hours, minutes.
2. "sss" is three system status characters, each can be 0 (off) or 1 (on):
   a. The first "s" is present leak test OFF/ON status.
   b. The second "s" is present power reset OFF/ON status.
   c. The third "s" is present external input OPEN (0)/CLOSED (1) status.
3. "T" is tank number 1 through 8. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "ssss" is four tank status characters:
   a. The first "s" is "1" if the tank is "active."
   b. The second "s" is "1" if the tank is "configured" (see function 670 or 870).
   c. The third "s" is unused (always 0).
   d. The fourth "s" is "1" if there is a delivery-in-progress. It is set when a rising product level is detected. Whenever the increase is not sufficient to meet the full "delivery" criteria, it is cleared. However, if the criteria continue to be met, this flag is not cleared until the delivery report is stored, printed and a "delivery end" message has been sent (if enabled).
6. "IIIhh" is the fuel level in inches and hundredths.
7. "GGGGGG" is fuel volume in gallons.
8. "SFFFt" is fuel temperature in degrees Fahrenheit and tenths with a preceding sign character (0 or -).
9. "GGGGGG" is tank ullage (unused capacity) in gallons.
10. "WWt" is water level in inches and tenths.

Function Code: **10T** (TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Inventory Report

Command Format: <SOH>10T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank: <SOH>100MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt (1st tank)
TPssssIIIhhGGGGGGSFFFtGGGGGGWWt (2nd tank)

.
etc.
.
up to 8 tanks
.
TPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX> (last tank)

Single tank: <SOH>102MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX>

NOTES:

1. "MMDDHHmm" is present time in month, day, hours, minutes.
2. "sss" is three system status characters, each can be 0 (off) or 1 (on):
   a. The first "s" is present leak test OFF/ON status.
   b. The second "s" is present power reset OFF/ON status.
   c. The third "s" is present generator input OFF/ON status.
3. "T" is tank number 1 through 8. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "ssss" is four tank status characters:
   a. The first "s" is "1" if the tank is "active."
   b. The second "s" is "1" if the tank is "configured" (see function 670 or 870).
   c. The third "s" is unused (always 0).
   d. The fourth "s" is "1" if there is a delivery-in-progress. It is set when a rising product level is detected. Whenever the increase is not sufficient to meet the full "delivery" criteria, it is cleared. However, if the criteria continue to be met, this flag is not cleared until the delivery report is stored, printed and a "delivery end" message has been sent (if enabled).
6. "IIIhh" is the fuel level in inches and hundredths.
7. "GGGGGG" is fuel volume in gallons.
8. "SFFFt" is fuel temperature in degrees Fahrenheit and tenths with a preceding sign character (0 or -).
9. "GGGGGG" is tank ullage (unused capacity) in gallons.
10. "WWt" is water level in inches and tenths.

Function Code: **10T** (TLS-250i Four-Tank System)

Function: Inventory Report

Command Format: <SOH>10T (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank: <SOH>100MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt (1st tank)

TPssssIIIhhGGGGGGSFFFtGGGGGGWWt (2nd tank)

.

etc.

.

up to 4 tanks

.

TPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX> (last tank)

Single tank: <SOH>102MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX>

NOTES:

1. "MMDDHHmm" is present time in month, day, hours, minutes.
2. "sss" is three system status characters, each can be 0 (off) or 1 (on):
   a. The first "s" is present shutdown mode OFF/ON status.
   b. The second "s" is present power reset OFF/ON status.
   c. The third "s" is present external input OPEN (0)/CLOSED (1) status.
3. "T" is tank number 1 through 4. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "ssss" is four tank status characters:
   a. The first "s" is "1" if the tank is "active."
   b. The second "s" is "1" if the tank is "configured" (see function 670 or 870).
   c. The third "s" is unused (always 0).
   d. The fourth "s" is "1" if there is a delivery-in-progress. It is set when a rising product level is detected. Whenever the increase is not sufficient to meet the full "delivery" criteria, it is cleared. However, if the criteria continue to be met, this flag is not cleared until the delivery report is stored, printed and a "delivery end" message has been sent (if enabled).
6. "IIIhh" is the fuel level in inches and hundredths.
7. "GGGGGG" is fuel volume in gallons.
8. "SFFFt" is fuel temperature in degrees Fahrenheit and tenths with a preceding sign character (0 or -).
9. "GGGGGG" is tank ullage (unused capacity) in gallons.
10. "WWt" is water level in inches and tenths.

Function Code: 11T (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Leak Report

Command Format: <SOH>11T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>110MMDDHHmmhhsTPSFFFtGGGGGGSGGtSGGtSGGtSGGt (1st tank)
TPSFFFtGGGGGGSGGtSGGtSGGtSGGt (2nd tank)

.
etc.
.
up to 8 tanks
.

<SOH>110MMDDHHmmhhsTPSFFFtGGGGGGSGGtSGGtSGGtSGGt9F6E9<ETX> (last tank)

Single tank:

<SOH>112MMDDHHmmhhsTPSFFFtGGGGGGSGGtSGGtSGGtSGGt9F6E9<ETX>

NOTES:

1. "MMDDHHmm" is leak test starting time in month, day, hours, minutes.
2. "hh" is the number of hours of leak data to follow for each tank. This number indicates the data field length for each tank.
3. "s" is a character indicating present leak test off/on status.
4. "T" is tank number 1 through 8. Tanks appear in sequential order.
5. "P" is product code character (set by function 55T or 75T).
6. "SFFFt" is leak test temperature change. This is the temperature change which occurred between the first reference hour and the last completed hour of the leak test. The temperature change is in degrees Fahrenheit and tenths with a preceding sign character (0 or -).
7. "GGGGGG" is leak test starting fuel volume in gallons. It is the "temperature-compensated" fuel volume averaged over the first reference hour of the test.
8. "SGGt" is the cumulative "temperature-compensated" volume change for each hour of the leak test with respect to the first reference hour of the test. An "all-tank" leak test report may contain up to 23 of these values if the system has four or less tanks, or up to 12 values if there are more than four tanks. A "single tank" test may contain up to 96 of these values. The actual number of values is given by the "hh" sequence at the beginning of the report. The volume change is in gallons and tenths with a preceding sign character (0 or -). The value is limited to + or -99.9 gallons.
9. "If no leak test data is available, only system data is included in the report. A "?" appears in all start time and date positions and "hh" is "00".

Function Code: **12T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Turn ON Leak Test

Command Format: <SOH>12T (T = tank number 1 to 8, 0 = all active tanks)

Typical Response Message:

Multiple tank: <SOH>120ks9F6EA<ETX>

Single tank: <SOH>121ks9F6E9<ETX>

NOTES:

1. Turns on a leak test for tank number "T" (T = 0 for all active tanks). If a leak test was already on, it leaves it running.
2. "k" is the number of the tank being tested **after** executing this command. If it is an all-tank test, k is 0.
3. "s" is the leak test ON/OFF status **after** executing this command. It indicates an OFF condition if the command attempted to test an inactive tank.

Function Code: **12T** (TLS-250i Four-Tank System)

Function: Turn ON Shutdown Mode

Command Format: <SOH>12T (T = tank number 1 to 4, 0 = all active tanks)

Typical Response Message:

Multiple tank: <SOH>120ks9F7EA<ETX>

Single tank: <SOH>121ks9F7E8<ETX>

NOTES:

1. Turns on shutdown mode for tank number "T" (T = 0 for all active tanks). If shutdown mode was already on, it leaves it running.
2. "k" is the number of the tank in the shutdown mode state. If it is an all-tank condition, k is zero.
3. "s" is the shutdown mode ON/OFF status **after** the execution of this command. It indicates an OFF condition if the command attempted to shutdown an inactive tank. 0 = OFF 1 = ON

Function Code: **130** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Turn OFF Leak Test

Command Format: <SOH>130

Typical Response Message: <SOH>130ks9F6E9<ETX>

NOTES:

1. Turns off a leak test only if it was turned on by the external communications interface (not by the front panel button or the auto-timer). If it was already off, leaves it off.
2. "k" is the number of the tank being tested **before** executing this command. If it was an all-tank test, k is 0.
3. "s" is the leak test ON/OFF status **after** executing this command.

Function Code: **130** (TLS-250i Four-Tank System)

Function: Turn OFF Shutdown Mode

Command Format: <SOH>130

Typical Response Message: <SHO>130ks9F6E9<ETX>

NOTES:

1. Turns off shutdown mode only if it was turned on by the external communication interface (not by the front panel button or the auto-timer). If it was already off, it remains off.
2. "k" is the number of the tank in shutdown **before** the execution of the command. If it was an all-tank condition, k is 0.
3. "s" is the leak ON/OFF status **after** executing the command. 0 = OFF 1 = ON

Function Code: **14T** (TLS-250 Standard; TLS-250i Eight-Tank Systems)

Function: Probe Alarm History Report

Command Format: <SOH>14T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:	<SOH>140nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input Off
(1st tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft
(2nd tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft
	etc.	
	up to 8 tanks	
(last tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft
Single tank:	<SOH>141nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input Off
	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft

NOTES:

1. "T" is tank number 1 through 8. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "n" indicates the number of alarm occurrences for each alarm category included in the response message (n = 0 through 3). This number describes the length of the string to follow.
4. "YYMMDDHHmm" is the year, month, day, hour and minute at which an alarm condition occurred.
5. The latest three alarm occurrences are included for each alarm type. If information is requested for a non-active tank, the n's are set to 0 and no alarm occurrence data is included.

Function Code: **14T** (TLS-250 Emergency Generator; TLS-250i Emergency Generator Systems)
Function: Probe Alarm History Report
Command Format: <SOH>14T (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

Multiple tank:	<SOH>140nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Generator Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Generator Input Off
(1st tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft
(2nd tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft
	etc.	
	up to 8 tanks	
(last tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft
Single tank:	<SOH>141nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Generator Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Generator Input Off
	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Leak
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft

NOTES:

1. "T" is tank number 1 through 8. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "n" indicates the number of alarm occurrences for each alarm category included in the response message (n 0 through 3). This number describes the length of the string to follow.
4. "YYMMDDHHmm" is the year, month, day, hour and minute at which an alarm condition occurred.
5. The latest three alarm occurrences are included for each alarm type. If information is requested for a non-active tank, the n's are set to 0 and no alarm occurrence data is included.

Function Code: **14T** (TLS-250i Four-Tank System)

Function: Probe Alarm History Report

Command Format: <SOH>14T (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:	<SOH>140nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input Off
(1st tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Reserved
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft
(2nd tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Reserved
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Theft

etc.

up to 4 tanks

(last tank)	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Reserved
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft
Single tank:	<SOH>141nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input On
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	External Input Off
	TPnYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Reserved
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	High Water
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Overfill
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm	Low Limit
	nYYMMDDHHmmYYMMDDHHmmYYMMDDHHmm9FD3C<ETX>	Theft

NOTES:

1. "T" is tank number 1 through 4. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "n" indicates the number of alarm occurrences for each alarm category included in the response message (n = 0 through 3). This number describes the length of the string to follow.
4. "YYMMDDHHmm" is the year, month, day, hour and minute at which an alarm condition occurred.
5. The latest three alarm occurrences are included for each alarm type. If information is requested for a non-active tank, the n's are set to 0 and no alarm occurrence data is included.

Function Code: **15T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Emergency Generator Systems)

Function: Delivery Report

Command Format: <SOH>15T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank: <SOH>150TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (1st tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt
TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (2nd tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 8 tanks

TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (last tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt9E3B2<ETX>

Single tank: <SOH>150TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt9E3B2<ETX>

NOTES:

1. "T" is tank number 1 through 8. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "rr" is the number of delivery reports to follow for the tank. This number can range from 00 to 10 and describes the length of the string to follow. If it is 00, no reports are included in the response for this tank.
4. Each report consists of two "MMDDHHmmGGGGGGSFFFt" groupings. The first is data for the beginning of delivery, and the second is data for the end of delivery.
5. "MMDDHHmm" is time in month, day, hours, minutes.
6. "GGGGGG" is fuel volume in gallons.
7. "SFFFt" is fuel temperature in degrees Fahrenheit and tenths with a preceding sign character (0 or -).

Function Code: **15T** (TLS-250i Four-Tank System)

Function: Delivery Report

Command Format: <SOH>15T (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank: <SOH>150TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (1st tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt
TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (2nd tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 4 tanks

TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt (last tank)
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt9E3B2<ETX>

Single tank: <SOH>150TPrrMMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt
MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt

etc.

up to 10 reports

MMDDHHmmGGGGGGSFFFtMMDDHHmmGGGGGGSFFFt9E3B2<ETX>

NOTES:

1. "T" is tank number 1 through 4. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "rr" is the number of delivery reports to follow for the tank. This number can range from 00 to 10 and describes the length of the string to follow. If it is 00, no reports are included in the response for this tank.
4. Each report consists of two "MMDDHHmmGGGGGGSFFFt" groupings. The first is data for the beginning of delivery, and the second is data for the end of delivery.
5. "MMDDHHmm" is time in month, day, hours, minutes.
6. "GGGGGG" is fuel volume in gallons.
7. "SFFFt" is fuel temperature in degrees Fahrenheit and tenths with a preceding sign character (0 or -).

Function Code: **160** (All Systems)
Function: Clear Stored Delivery Reports
Command Format: <SOH>160
Typical Response Message: <SOH>1609FF2F<ETX>

NOTE: Stored delivery reports numbered 2 through 10 are cleared on all tanks. The latest report for each tank is retained.

Function Code: **17T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Stored Inventory Report 1
Command Format: <SOH>17T (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

Multiple tank: <SOH>170MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt (1st tank)
TPssssIIIhhGGGGGGSFFFtGGGGGGWWt (2nd tank)

etc.

up to 8 tanks

TPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX> (last tank)

Single tank: <SOH>172MMDDHHmmsssTPssssIIIDDGGGGGGSFFFtGGGGGGWWD9F6E9<ETX>

NOTE: These response message formats are identical to function 10T except the data is historical information stored at Auto Print Times 1, 2 and 3, respectively.

Function Code: **17T** (TLS-250i Four-Tank System)
Function: Stored Inventory Report 1
Command Format: <SOH>17T (T = tank number 1 to 4, 0 = all active or configured tanks)
Typical Response Message:

Multiple tank: <SOH>170MMDDHHmmsssTPssssIIIhhGGGGGGSFFFtGGGGGGWWt (1st tank)
TPssssIIIhhGGGGGGSFFFtGGGGGGWWt (2nd tank)

etc.

up to 4 tanks

TPssssIIIhhGGGGGGSFFFtGGGGGGWWt9F6E9<ETX> (last tank)

Single tank: <SOH>172MMDDHHmmsssTPssssIIIDDGGGGGGSFFFtGGGGGGWWD9F6E9<ETX>

NOTE: These response message formats are identical to function 10T except the data is historical information stored at Auto Print Times 1, 2 and 3, respectively.

Function Code: **18T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Stored Inventory Report 2
Command Format: <SOH>18T (T = tank number 1 to 8, 0 = all active or configured tanks)

Function Code: **18T** (TLS-250i Four-Tank Systems)
Function: Stored Inventory Report 2
Command Format: <SOH>18T (T = tank number 1 to 4, 0 = all active or configured tanks)

Function Code: **19T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Stored Inventory Report 3

Command Format: <SOH>19T (T = tank number 1 to 8, 0 = all active or configured tanks)

Function Code: **19T** (TLS-250i Four-Tank System)

Function: Stored Inventory Report 3

Command Format: <SOH>19T (T = tank number 1 to 4, 0 = all active or configured tanks)

Function Code: **1AT** (TLS-250 Standard; TLS-250i Eight-Tank Systems)

Function: Probe Alarm Status Report

Command Format: <SOH>1AT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1A0aTPsssss (1st tank)
TPsssss (2nd tank)
etc.
up to 8 tanks
TPsssss9F6E9<ETX> (last tank)

Single tank:

<SOH>1A2aTPsssss9F6E9<ETX>

NOTES:

1. "a" is external input status, 0 = open (off), 1 = closed (on).
2. "T" is tank number 1 through 8. Tanks appear in sequential order.
3. "P" is product code character (set by function 55T or 75T).
4. "sssss" indicates five characters which describe the present status (0 off, 1 on) for the alarm conditions in the following sequence:

1st	Leak Alarm	3rd	Overfill Alarm	5th	Theft Alarm
2nd	High Water Alarm	4th	Low Limit Alarm		

Function Code: **1AT** (TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Probe Alarm Status Report

Command Format: <SOH>1AT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1A0aTPsssss (1st tank)
TPsssss (2nd tank)
etc.
up to 8 tanks
TPsssss9F6E9<ETX> (last tank)

Single tank:

<SOH>1A2aTPsssss9F6E9<ETX>

NOTES:

1. "a" is generator input status, 0 = off, 1 = on.
2. "T" is tank number 1 through 8. Tanks appear in sequential order.
3. "P" is product code character (set by function 55T or 75T).
4. "sssss" indicates five characters which describe the present status (0 off, 1 on) for the alarm conditions in the following sequence:

1st	Leak Alarm	3rd	Overfill Alarm	5th	Theft Alarm
2nd	High Water Alarm	4th	Low Limit Alarm		

Function Code: **1AT** (TLS-250i Four-Tank System)

Function: Probe Alarm Status Report

Command Format: <SOH>1AT (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1A0aTPsssss (1st tank)
TPsssss (2nd tank)
.
etc.
.
up to 4 tanks
.
TPsssss9F6E9<ETX> (last tank)

Single tank: <SOH>1A2aTPsssss9F6E9<ETX>

NOTES:

1. "a" is external input status, 0 = open (off), 1 = closed (on).
2. "T" is tank number 1 through 4. Tanks appear in sequential order.
3. "P" is product code character (set by function 55T or 75T).
4. "sssss" indicates five characters which describe the present status (0 off, 1 on) for the alarm conditions in the following sequence:

1st	Reserved	3rd	Overfill Alarm	5th	Theft Alarm
2nd	High Water Alarm	4th	Low Limit Alarm		

Function Code: **1BT** (TLS-250 Standard; TLS-250i Eight-Tank Systems)

Function: Auto-Transmit Flag Status Report

Command Format: <SOH>1BT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1B0abTPsssssss (1st tank)
TPsssssss (2nd tank)
.
etc.
.
up to 8 tanks
.
TPsssssss9F6E9<ETX> (last tank)

Single tank: <SOH>1B2abTPsssssss9F6E9<ETX>

NOTES:

1. "a" is external input closed (on) flag, 0 = off, 1 = on.
2. "b" is external input open (off) flag, 0 = off, 1 = on.
3. "T" is tank number 1 through 8. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "sssssss" indicates seven characters which describe the present status (0 off, 1 on) for the auto-transmit flags in the following sequence:

1st	Leak Alarm Flag	5th	Theft Alarm Flag
2nd	High Water Alarm Flag	6th	Delivery Start Flag
3rd	Overfill Alarm Flag	7th	Delivery End Flag
4th	Low Limit Alarm Flag		

Function Code: **1BT** (TLS-250 Emergency Generator; TLS-250i Emergency Generator Systems)

Function: Auto-Transmit Flag Status Report

Command Format: <SOH>1BT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1B0abTPsssssss (1st tank)
TPsssssss (2nd tank)
etc.
up to 8 tanks
TPsssssss9F6E9<ETX> (last tank)

Single tank: <SOH>1B2abTPsssssss9F6E9<ETX>

NOTES:

1. "a" is generator start flag, 0 = off, 1 = on.
2. "b" is generator stop flag, 0 = off, 1 = on.
3. "T" is tank number 1 through 8. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "sssssss" indicates seven characters which describe the present status (0 off, 1 on) for the auto-transmit flags in the following sequence:

1st	Leak Alarm Flag	5th	Theft Alarm Flag
2nd	High Water Alarm Flag	6th	Delivery Start Flag
3rd	Overfill Alarm Flag	7th	Delivery End Flag
4th	Low Limit Alarm Flag		

Function Code: **1BT** (TLS-250i Four-Tank System)

Function: Auto-Transmit Flag Status Report

Command Format: <SOH>1BT (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1B0abTPsssssss (1st tank)
TPsssssss (2nd tank)
etc.
up to 4 tanks
TPsssssss9F6E9<ETX> (last tank)

Single tank: <SOH>1B2abTPsssssss9F6E9<ETX>

NOTES:

1. "a" is external input closed (on) flag, 0 = off, 1 = on.
2. "b" is external input open (off) flag, 0 = off, 1 = on.
3. "T" is tank number 1 through 4. Tanks appear in sequential order.
4. "P" is product code character (set by function 55T or 75T).
5. "sssssss" indicates seven characters which describe the present status (0 off, 1 on) for the auto-transmit flags in the following sequence:

1st	Reserved	5th	Theft Alarm Flag
2nd	High Water Alarm Flag	6th	Delivery Start Flag
3rd	Overfill Alarm Flag	7th	Delivery End Flag
4th	Low Limit Alarm Flag		

Function Code: **1CT** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Stored In-Tank Leak Test Analysis Report

Command Format: <SOH>1CT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1C0TPabddggff (1st tank)
TPabddggff (2nd tank)
.
etc.
.
up to 8 tanks
.
TPabddggff9F955<ETX> (last tank)

Single tank:

<SOH>1C2TPabddggff9F6E9<ETX>

NOTES:

1. "T" is tank number 1 through 8. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "a" is a three bit binary number added to ASCII "0" (30 Hex). The three bits indicate the following status:
   Most significant (third) bit set for tank level low.
   Middle (second) bit set for recent delivery.
   Least significant (first) bit set for temperature out of range.
4. "b" is a three bit binary number added to ASCII "0" (30 Hex). The three bits indicate the following status:
   Most significant (third) bit set for first hour error.
   Middle (second) bit set for last hour error.
   Least significant (first) bit set for temperature change error.
5. "dd," gg" and "ff" each indicate two three-bit binary numbers added to ASCII "0" (30 Hex). The six bits together represent the status of probe segments 6 through 1 (from most through least significant bit):

dd	Delivery Mix Error
gg	Gross Capacitance Error
ff	Test Mix Error

Function Code: **1DT** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Present In-Tank Leak Test Analysis Report

Command Format: <SOH>1DT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>1D0TPabddggff (1st tank)
TPabddggff (2nd tank)
.
etc.
.
up to 8 tanks
.
TPabddggff9F955<ETX> (last tank)

Single tank:

<SOH>1D2TPabddggff9F6E9<ETX>

NOTES:

1. "T" is tank number 1 through 8. Tanks appear in sequential order.
2. "P" is product code character (set by function 55T or 75T).
3. "a" is a three bit binary number added to ASCII "0" (30 Hex). The three bits indicate the following status:
   Most significant (third) bit set for tank level low.
   Middle (second) bit set for recent delivery.
   Least significant (first) bit set for temperature out of range.

4. "b" is a three bit binary number added to ASCII "0" (30 Hex). The three bits indicate the following status:

   Most significant (third) bit set for first hour error.
   Middle (second) bit set for last hour error.
   Least significant (first) bit set for temperature change error.

5. "dd," gg" and "ff" each indicate two three-bit binary numbers added to ASCII "0" (30 Hex). The six bits together represent the status of probe segments 6 through 1 (from most through least significant bit):

dd	Delivery Mix Error
gg	Gross Capacitance Error
ff	Test Mix Error

Function Code: 1ES (TLS-250i Four-Tank System)
Function: Sensor Alarm Status
Command Format: <SOH>1ES (S = sensor number 1 to 8, 0 = all)
Typical Response Message:

Multiple tank: <SOH>1ESxsabcdef (1st sensor)
sabcdef (2nd sensor)
.
etc.
.
up to 8 sensors
.
sabcdef9E7A4<ETX> (last sensor)

Single tank: <SOH>1E33 abcdef9E727<ETX>

NOTES:

1. "x" is the external input status (0 = OFF, 1 = ON).
2. "s" is the sensor number for data field that follows.
3. "ace" indicates six characters which describe the present status (0 = OFF, 1 = ON) of the sensor alarm.

   "a" is Fuel Alarm Sensor "A". "b" is Reserved.
   "c" is Water Alarm Sensor "A". "d" is Reserved.
   "e" is Sensor Out Alarm Sensor "A". "f" is Reserved.

Function Code: 1ES (TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Sensor Alarm Status
Command Format: <SOH>1ES (S = sensor number 1 to 8, 0 = all)
Typical Response Message:

Multiple tank: <SOH>1ESxsabcdef (1st sensor)
sabcdef (2nd sensor)
.
etc.
.
up to 8 sensors
.
sabcdef9E7A4<ETX> (last sensor)

Single tank: <SOH>1E33 abcdef9E727<ETX>

NOTES:

1. "x" is the external input status (0 = OFF, 1 = ON).
2. "s" is the sensor number for data field that follows.
3. "abcdef" indicates six characters which describe the present status (0 = OFF, 1 = ON) of the sensor alarm.

   "a" is Fuel Alarm Sensor "A".
   "b" is Fuel Alarm Sensor "B".
   "c" is Water Alarm Sensor "A".
   "d" is Water Alarm Sensor "B".
   "e" is Sensor Out Alarm Sensor "A".
   "f" is Sensor Out Alarm Sensor "B".

Function Code: **1FS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Auto-Transmit Flag Status

Command Format: <SOH>1FS (S = sensor number 1 to 8, 0 = all)

Typical Response Message:

Multiple tank: <SOH>1FSsabcrrr (1st sensor)
sabcrrr (2nd sensor)
.
etc.
.
up to 8 sensors
.
sabcrrr9E7A4<ETX> (last sensor)

Single tank: <SOH>1F33abcrrr9E727<ETX>

NOTES:

1. "s" is the sensor number for data field that follows.
2. "abcrrr" indicates six characters which describe the present status (0 = OFF, 1 = ON) of the sensor auto-transmit flags.
   "a" is Fuel Alarm Flag.
   "b" is Water Alarm Flag.
   "c" is Sensor Out Alarm Flag.
   "r" is Reserved.
   "r" is Reserved.
   "r" is Reserved.

Function Code: **1GS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Alarm History Report

Command Format: <SOH>1GS (S = sensor number 1 to 8, 0 = all)

Typical Response Message:

Multiple tank: <SOH>1GSsNTFYYMMDDHHmm (1st sensor)
TFYYMMDDHHmm (2nd sensor)
.
etc.
.
up to 8 sensors
.
sNTFYYMMDDHHmm (last sensor)
TFYYMMDDHHmm9E454<ETX>

Single tank: <SOH>1F33NTFYYMMDDHHmm9EAB7<ETX>

NOTES:

1. "s" is the sensor number for data field that follows.
2. "N" is the number of Alarm occurrences, 0 to 3.
3. "T" is the Alarm Type.
   "1" = Fuel alarm.
   "2" = Water alarm.
   "3" = RESERVED.
   "4" = Sensor Out.
   "5" = Sensor Return to Normal after Water.
   "6" = ESA adapter out.
4. "F" = Sensor "A", "B", or " " if adapter out.
5. "YYMMDDHHmm" = Year, Month, Day, Hour, Minute.

7.3 OPERATIONAL REPORTS (DISPLAY FORMAT)

All display format responses begin with the following string (2**XX** indicates the original command sent):

<SOH>2**XX**<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL>

All display format responses end with the following string:

<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

Function Code: **20T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Inventory Report

Command Format: <SOH>20T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

200
VEEDER-ROOT
TLS-250
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - - -

NOV 12, 1986
4:09 PM

TANK	PRODUCT	GALLONS	INCHES	WATER	DEG F	ULLAGE
1	UNLEADED REGULAR	7930	64.52	0.0	76.9	2450
2	DIESEL FUEL	7775	63.36	0.0	78.0	2605

.
etc.
.
up to 8 tanks

Function Code: **20T** (TLS-250i Four-Tank System)

Function: Inventory Report

Command Format: <SOH>20T (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

200
VEEDER-ROOT
TLS-250
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - - -

NOV 12, 1986
4:09 PM

TANK	PRODUCT	GALLONS	INCHES	WATER	DEG F	ULLAGE
1	UNLEADED REGULAR	7930	64.52	0.0	76.9	2450
2	DIESEL FUEL	7775	63.36	0.0	78.0	2605

.
etc.
.
up to 4 tanks

Function Code: **21T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: In-Tank Leak Report

Command Format: <SOH>21T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

```
210
LEAK MONITOR REPORT

TEST START:      3:31 PM      NOV 11, 1986
TEST STATUS:  OFF

TANK 1        UNLEADED REGULAR              0.2 GALLON/HOUR TEST FAILED
  START TEMP:  79.6 DEG F          START VOLUME:  6787 GALLONS
 ENDING TEMP:  79.6 DEG F              LEAK RATE:  6.39 GALLONS/HOUR
CUMULATIVE HOURLY VOLUME CHANGE (GALLONS):
    0.0    0.0    8.7    8.7    8.7   16.2   16.2   16.2   40.2   40.2   47.3   47.3
   55.7   62.7   70.4   70.4   78.6   78.6   85.3   85.3   85.3   92.0   99.9

TANK 2        DIESEL FUEL                   0.2 GALLON/HOUR TEST PASSED
  START TEMP:  80.6 DEG F          START VOLUME:  8464 GALLONS
 ENDING TEMP:  80.5 DEG F              LEAK RATE:  0.12 GALLONS/HOUR
CUMULATIVE HOURLY VOLUME CHANGE (GALLONS):
    0.0    0.0    0.2    0.2    0.2    0.6    0.6    0.6    1.1    1.1    1.1    1.1
    1.3    1.3    1.6    1.6    1.6    1.6    1.8    1.8    1.8    1.8    2.8
                                   .
                                 etc.
                                   .
                              up to 8 tanks
```

NOTE: If any tanks are manifolded, the 0.2 gallon/hour test passed or failed status will be replaced with the combined manifolded leak rate.

EXAMPLE:

```
TANK 1        UNLEADED REGULAR              MNFD (1, 2) RATE: 6.51
  START TEMP:  79.6 DEG F          START VOLUME:  6787 GALLONS
 ENDING TEMP:  79.6 DEG F              LEAK RATE:  6.39 GALLONS/HOUR
CUMULATIVE HOURLY VOLUME CHANGE (GALLONS):
    0.0    0.0    8.7    8.7    8.7   16.2   16.2   16.2   40.2   40.2   47.3   47.3
   55.7   62.7   70.4   70.4   78.6   78.6   85.3   85.3   85.3   92.0   99.9

TANK 2        DIESEL FUEL                   MNFD (1, 2) RATE: 6.51
  START TEMP:  80.6 DEG F          START VOLUME:  8464 GALLONS
 ENDING TEMP:  80.5 DEG F              LEAK RATE:  0.12 GALLONS/HOUR
CUMULATIVE HOURLY VOLUME CHANGE (GALLONS):
    0.0    0.0    0.2    0.2    0.2    0.6    0.6    0.6    1.1    1.1    1.1    1.1
    1.3    1.3    1.6    1.6    1.6    1.6    1.8    1.8    1.8    1.8    2.8
```

Function Code: **22T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Turn ON In-Tank Leak Test

Command Format: <SOH>22T (T = tank number 1 to 8, 0 all active tanks)

Typical Response Message:

Multiple tank:
220
LEAK TEST START: 4:09 PM NOV 12, 1986

Single tank:
222
TANK 2 DIESEL FUEL
LEAK TEST START: 4:10 PM NOV 12, 1986

NOTE: Turns on a leak test for tank number "T" (T = 0 for all active tanks). If a leak test was already on, it leaves it running and responds with:

LEAK TEST IN PROGRESS

Function Code: **22T** (TLS-250i Four-Tank System)

Function: Turn ON Shutdown Mode

Command Format: <SOH>22T (T = tank number 1 to 4, 0 all active tanks)

Typical Response Message:

Multiple tank:
220
SHUTDOWN MODE START: 4:09 PM NOV 12, 1986

Single tank:
222
TANK 2 DIESEL FUEL
SHUTDOWN MODE START: 4:10 PM NOV 12, 1986

NOTE: Turns on the shutdown mode for tank number "T" (T = 0 for all active tanks). If this shutdown mode is approved of, the response is:

SHUTDOWN MODE IN PROGRESS

Function Code: **230** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Turn OFF In-Tank Leak Test

Command Format: <SOH>230

Typical Response Message: 230
LEAK TEST STOP: 4:09 PM NOV 12, 1986

NOTES:

1. Turns off a leak test only if it had been turned on by the external communications interface (not the front panel button or auto-timer). If it was already off, leaves it off and responds with:

   LEAK TEST WAS NOT IN PROGRESS

2. If a leak test was in progress that had been turned on by the auto-timer or front panel button, this command does not turn it off and responds with:

   LEAK TEST IN PROGRESS

Function Code: **230** (TLS-250i Four-Tank System)

Function: Turn OFF Shutdown Mode

Command Format: <SOH>230

Typical Response Message: 230
SHUTDOWN MODE STOP: 4:09 PM NOV 12, 1986

NOTES:

1. Turns off a shutdown mode only if it had been turned on by the external communications interface (not the front panel button or auto-timer). If it was already off, leaves it off and responds with:

   SHUTDOWN MODE WAS NOT IN PROGRESS

2. If a shutdown mode was in progress that had been turned on by the auto-timer or front panel button, this command does not turn it off and responds with:

   SHUTDOWN MODE IN PROGRESS

Function Code: **24T** (TLS-250 Standard; TLS-250i Eight-Tank Systems)
Function: Probe Alarm History Report
Command Format: <SOH>24T (T = tank number 1 to 8, 0 all active tanks)
Typical Response Message:

```
240
ALARM HISTORY REPORT
EXTERNAL INPUT ON:      NOV 12, 1986    2:43 PM
                        NOV 12, 1986    2:35 PM
                        NOV 12, 1986    1:22 PM
EXTERNAL INPUT OFF:     NOV 12, 1986    2:37 PM
                        NOV 12, 1986    1:24 PM
TANK 1 UNLEADED REGULAR
    LEAK ALARM:         NOV 12, 1986    2:53 PM
    HIGH WATER:         NOV 12, 1986    3:48 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:53 PM
    THEFT ALARM:        NOV 12, 1986    2:53 PM
TANK 2 DIESEL FUEL
    HIGH WATER:         NOV 12, 1986    3:48 PM
                        NOV 12, 1986    3:46 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:54 PM
                            .
                          etc.
                            .
                      up to 8 tanks
```

Function Code: **24T** (TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Probe Alarm History Report
Command Format: <SOH>24T (T = tank number 1 to 8, 0 all active tanks)
Typical Response Message:

```
240
ALARM HISTORY REPORT
GENERATOR START:        NOV 12, 1986    2:43 PM
                        NOV 12, 1986    2:35 PM
                        NOV 12, 1986    1:22 PM
GENERATOR STOP:         NOV 12, 1986    2:37 PM
                        NOV 12, 1986    1:24 PM
TANK 1 UNLEADED REGULAR
    LEAK ALARM:         NOV 12, 1986    2:53 PM
    HIGH WATER:         NOV 12, 1986    3:48 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:53 PM
    THEFT ALARM:        NOV 12, 1986    2:53 PM
TANK 2 DIESEL FUEL
    HIGH WATER:         NOV 12, 1986    3:48 PM
                        NOV 12, 1986    3:46 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:54 PM
                            .
                          etc.
                            .
                      up to 8 tanks
```

Function Code: **24T** (TLS-250i Four-Tank System)

Function: Probe Alarm History Report

Command Format: <SOH>24T (T = tank number 1 to 4, 0 all active tanks)

Typical Response Message:

```
240
ALARM HISTORY REPORT
EXTERNAL INPUT ON:      NOV 12, 1986    2:43 PM
                        NOV 12, 1986    2:35 PM
                        NOV 12, 1986    1:22 PM
EXTERNAL INPUT OFF:     NOV 12, 1986    2:37 PM
                        NOV 12, 1986    1:24 PM
TANK 1 UNLEADED REGULAR
    RESERVED:           NOV 12, 1986    2:53 PM
    HIGH WATER:         NOV 12, 1986    3:48 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:53 PM
    THEFT ALARM:        NOV 12, 1986    2:53 PM
TANK 2 DIESEL FUEL
    HIGH WATER:         NOV 12, 1986    3:48 PM
                        NOV 12, 1986    3:46 PM
    OVERFILL:           NOV 12, 1986    3:51 PM
    LOW LIMIT:          NOV 12, 1986    3:54 PM
                          .
                        etc.
                          .
                      up to 4 tanks
```

Function Code: **25T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Emergency Generator Systems)

Function: Delivery Report

Command Format: <SOH>25T (T = tank number 1 to 8, 0 = all active or contigured tanks)

Typical Response Message:

250
DELIVERY REPORT

TANK 1 UNLEADED REGULAR

START TIME/DATE	GALLONS	DEG F	STOP TIME/DATE	GALLONS	DEG F	INCREASE
3:51 PM NOV 12	7999	78.4	3:53 PM NOV 12	8714	78.2	715
3:35 PM NOV 12	6306	79.5	3:36 PM NOV 12	8401	79.4	2095

TANK 2 DIESEL FUEL

START TIME/DATE	GALLONS	DEG F	STOP TIME/DATE	GALLONS	DEG F	INCREASE
3:51 PM NOV 12	8110	79.4	3:53 PM NOV 12	8821	79.2	711
3:24 PM NOV 12	6635	80.9	3:27 PM NOV 12	8572	80.8	1937
3:15 PM NOV 12	3693	81.1	3:17 PM NOV 12	6635	81.0	2942

.
etc.
.
up to 8 tanks

Function Code: **25T** (TLS-250i Four-Tank System)

Function: Delivery Report

Command Format: <SOH>25T (T = tank number 1 to 4, 0 = all active or configured tanks)

Typical Response Message:

250
DELIVERY REPORT

TANK 1 UNLEADED REGULAR

START TIME/DATE		GALLONS	DEG F	STOP TIME/DATE		GALLONS	DEG F	INCREASE
3:51 PM	NOV 12	7999	78.4	3:53 PM	NOV 12	8714	78.2	715
3:35 PM	NOV 12	6306	79.5	3:36 PM	NOV 12	8401	79.4	2095

TANK 2 DIESEL FUEL

START TIME/DATE		GALLONS	DEG F	STOP TIME/DATE		GALLONS	DEG F	INCREASE
3:51 PM	NOV 12	8110	79.4	3:53 PM	NOV 12	8821	79.2	711
3:24 PM	NOV 12	6635	80.9	3:27 PM	NOV 12	8572	80.8	1937
3:15 PM	NOV 12	3693	81.1	3:17 PM	NOV 12	6635	81.0	2942

.
etc.
.
up to 4 tanks

Function Code: **260** (All Systems)

Function: Clear Stored Delivery Reports

Command Format: <SOH>260

Typical Response Message: 260
DELIVERY REPORT ERASED

NOTE: Stored delivery reports number 2 through 10 are cleared on all tanks. The latest report for each tank is retained.

Function Code: **27T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Stored Inventory Report 1

Command Format: <SOH>27T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

270
VEEDER-ROOT
TLS-250
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - -

NOV 12, 1986
4:09 PM

TANK	PRODUCT	GALLONS	INCHES	WATER	DEG F	ULLAGE
1	UNLEADED REGULAR	7930	64.52	0.0	76.9	2450
2	DIESEL FUEL	7775	63.36	0.0	78.0	2605

.
etc.
.
up to 8 tanks

NOTE: These response message formats are identical to function 20T except the data is historical information stored at Auto Print Times 1, 2 and 3, respectively.

Function Code: **27T** (TLS-250i Four-Tank System)
Function: Stored Inventory Report 1
Command Format: <SOH>27T (T = tank number 1 to 4, 0 = all active or configured tanks)
Typical Response Message:

270
VEEDER-ROOT
TLS-250
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - - -

NOV 12, 1986
4:09 PM

TANK	PRODUCT	GALLONS	INCHES	WATER	DEG F	ULLAGE
1	UNLEADED REGULAR	7930	64.52	0.0	76.9	2450
2	DIESEL FUEL	7775	63.36	0.0	78.0	2605

.
etc.
.
up to 4 tanks

NOTE: These response message formats are identical to function 20T except the data is historical information stored at Auto Print Times 1, 2 and 3, respectively.

Function Code: **28T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Stored Inventory Report 2
Command Format: <SOH>28T (T = tank number 1 to 8, 0 = all active or configured tanks)

Function Code: **28T** (TLS-250i Four-Tank System)
Function: Stored Inventory Report 2
Command Format: <SOH>28T (T = tank number 1 to 4, 0 = all active or configured tanks)

Function Code: **29T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Stored Inventory Report 3
Command Format: <SOH>29T (T = tank number 1 to 8, 0 = all active or configured tanks)

Function Code: **29T** (TLS-250i Four-Tank System)
Function: Stored Inventory Report 3
Command Format: <SOH>29T (T = tank number 1 to 4, 0 = all active or configured tanks)

Function Code: **2AT** (TLS-250 Standard; TLS-250i Eight-Tank Systems)
Function: Probe Alarm Status Report
Command Format: <SOH>2AT (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

2A0
ALARM STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	LEAK	HIGH WATER	OVER FILL	LOW LIMIT	THEFT
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF

.
etc.
.
up to 8 tanks

EXTERNAL INPUT STATUS: OPEN

Function Code: **2AT** (TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Probe Alarm Status Report
Command Format: <SOH>2AT (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

2A0
ALARM STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	LEAK	HIGH WATER	OVER FILL	LOW LIMIT	THEFT
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF

.
etc.
.
up to 8 tanks

GENERATOR STATUS: ON

Function Code: **2AT** (TLS-250i Four-Tank System)
Function: Probe Alarm Status Report
Command Format: <SOH>2AT (T = tank number 1 to 4, 0 = all active or configured tanks)
Typical Response Message:

2A0
ALARM STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	RESERVED	HIGH WATER	OVER FILL	LOW LIMIT	THEFT
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF

.
etc.
.
up to 4 tanks

EXTERNAL INPUT STATUS: OPEN

Function Code: **2BT** (TLS-250 Standard; TLS-250i Eight-Tank Systems)
Function: Probe Auto-Transmit Flag Status Report
Command Format: <SOH>2BT (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

2B0
AUTO-TRANSMIT FLAG STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	LEAK	HIGH WATER	OVER FILL	LOW LIMIT	THEFT	DLVY START	DLVY STOP
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF	ON	ON
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF	ON	ON

.
etc.
.
up to 8 tanks

	CLOSED	OPEN
EXTERNAL INPUT FLAG:	OFF	OFF

Function Code: **2BT** (TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)
Function: Probe Auto-Transmit Flag Status Report
Command Format: <SOH>2BT (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

2B0
AUTO-TRANSMIT FLAG STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	LEAK	HIGH WATER	OVER FILL	LOW LIMIT	THEFT	DLVY START	DLVY STOP
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF	ON	ON
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF	ON	ON

etc.

up to 8 tanks

	CLOSED	OPEN
GENERATOR STATUS FLAG:	OFF	OFF

Function Code: **2BT** (TLS-250i Four-Tank System)
Function: Probe Auto-Transmit Flag Status Report
Command Format: <SOH>2BT (T = tank number 1 to 4, 0 = all active or configured tanks)
Typical Response Message:

2B0
AUTO-TRANSMIT FLAG STATUS

NOV 12, 1986
4:11 PM

TANK	PRODUCT	RESERVED	HIGH WATER	OVER FILL	LOW LIMIT	THEFT	DLVY START	DLVY STOP
1	UNLEADED REGULAR	OFF	OFF	OFF	OFF	OFF	ON	ON
2	DIESEL FUEL	OFF	OFF	OFF	OFF	OFF	ON	ON

etc.

up to 4 tanks

	CLOSED	OPEN
EXTERNAL INPUT FLAG:	OFF	OFF

Function Code: **2CT** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator TLS-250i Eight-Tank Emergency Generator Systems)

Function: Stored In-Tank Leak Test Analysis Report

Command Format: <SOH>2CT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

2C0
STORED LEAK TEST ANALYSIS REPORT

TANK 1 REGULAR
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
TEMP CHANGE ERROR

TANK 2 REGULAR UNLEADED
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
SEG 4 TEST MIX ERROR
TANK LEVEL LOW
TEMP CHANGE ERROR

TANK 3 SUPER UNLEADED
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
TANK LEVEL LOW
TEMP CHANGE ERROR

Function Code: **2DT** (TLS-250 Standard; TLS-250 Emergency Generator; TLS-250i Eight Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Present In-Tank Leak Test Analysis Report

Command Format: <SOH>2DT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

2D0
PRESENT LEAK TEST ANALYSIS REPORT

TANK 1 REGULAR
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
TEMP CHANGE ERROR

TANK 2 REGULAR UNLEADED
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
SEG 4 TEST MIX ERROR
TANK LEVEL LOW
TEMP CHANGE ERROR

TANK 3 SUPER UNLEADED
SEG 1 TEST MIX ERROR
SEG 2 TEST MIX ERROR
SEG 3 TEST MIX ERROR
TANK LEVEL LOW
TEMP CHANGE ERROR

Function Code: **2ES** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Alarm Status

Command Format: <SOH>2E0

Typical Response Message:

2E0
SENSOR ALARM STATUS

JAN. 4, 1988
8:01AM

SENSOR	FUEL A	FUEL B	WATER A	WATER B	OUT A	OUT B
4	OFF	OFF	OFF	OFF	ON	OFF
8	OFF	OFF	OFF	OFF	OFF	OFF

Function Code: **2FS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Auto-Transmit Flag Status

Command Format: <SOH>2F0

Typical Response Message:

2F0
SENSOR AUTO-TRANSMIT STATUS

JAN. 4, 1988
8:01AM

SENSOR	FUEL	WATER	OUT	RSVD	RSVD	RSVD
4	OFF	OFF	OFF	OFF	OFF	OFF
8	OFF	OFF	OFF	OFF	OFF	OFF

Function Code: **2GS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Alarm History Report

Command Format: <SOH>2G0

Typical Response Message:

2G0
SENSOR ALARM HISTORY REPORT

SENSOR 4A	OPEN SENSOR	JAN 4, 1988	7:23AM
SENSOR 4A	FUEL DETECT	JAN 1, 1988	8:01AM
SENSOR 8B	WATER DETECT	JAN 1, 1988	8:33AM

7.4 SETUP FUNCTIONS (COMPUTER FORMAT AND DISPLAY FORMAT)

A valid setup command causes the TLS-250 to perform the setup function and send back the whole data field as received. The data fields for the 5XX (computer format) and 7XX (display format) commands are identical. The only difference is in the TLS-250 response message.

Example: (set time/date to 1:25 PM, 18 NOV 1986)

Computer Command Format: <SOH>5008611181325
Response Message: <SOH>50086111813259FD2D<ETX>
Display Command Format: <SOH>7008611181325
Response Message: <SOH>7008611181325<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

If a setup command is found to be invalid (unacceptable characters or out-of-range), the TLS-250 responds with a string of "?" characters equal in length to the data field of the specified command and makes no change to the previously stored data.

Example: (set time/date to 1:75 PM, 18 NOV 1986)

Computer Command Format: <SOH>5008611181375
Response Message: <SOH>500??????????9FCBB<ETX>
Display Command Format: <SOH>7008611181375
Response Message: <SOH>700??????????<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

Function Code: **500 or 700** (All Systems)

Function: Set Calendar Clock

Command Format: <SOH>500YYMMDDHHmm

Typical Response Message: <SOH>500YYMMDDHHmm

NOTE: "YYMMDDHHmm" is year, month, day, hour and minute (24-hour time format).

Function Code: **51T or 71T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Set Tank T Leak Test Start Time

Command Format: <SOH>51THHmm

Typical Response Message: <SOH>51THHmm

NOTES:

1. "T" indicates desired tank number. If "T" = 0, data are set on all tanks.
2. "HHmm" is hour and minute (24-hour time format).

Function Code: **51T or 71T** (TLS-250i Four-Tank System)

Function: Set Tank T Shutdown Mode Start Time

Command Format: <SOH>51THHmm

Typical Response Message: <SOH>51THHmm

NOTES:

1. "T" indicates desired tank number. If "T" = 0, data are set on all tanks.
2. "HHmm" is hour and minute (24-hour time format).

Function Code: **519 or 719** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Set Leak Test Stop Time

Command Format: <SOH>519HHmm

Typical Response Message: <SOH>519HHmm

NOTE: "HHmm" is hour and minute (24-hour time format).

Function Code: **519 or 719** (TLS-250i Four-Tank System)

Function: Set Shutdown Mode Stop Time

Command Format: <SOH>519HHmm

Typical Response Message: <SOH>519HHmm

NOTE: "HHmm" is hour and minute (24-hour time format).

Function Code: **521 or 721** (All Systems)

Function: Set Auto-Print Time 1

Command Format: <SOH>521HHmm

Typical Response Message: <SOH>521HHmm

NOTE: "HHmm" is hour and minute (24-hour time format).

Function Code: **522 or 722** (All Systems)

Function: Set Auto-Print Time 2

Command Format: <SOH>522HHmm

Typical Response Message: <SOH>522HHmm

NOTE: "HHmm" is hour and minute (24-hour time format).

Function Code: **523 or 723** (All Systems)

Function: Set Auto-Print Time 3

Command Format: <SOH>523HHmm

Typical Response Message: <SOH>523HHmm

NOTE: "HHmm" is hour and minute (24-hour time format).

Function Code: **531 or 731** (All Systems)

Function: Set Print Header Line 1

Command Format: <SOH>531aaaaaaaaaaaaaaaaaaa

Typical Response Message: <SOH>531aaaaaaaaaaaaaaaaaaa

NOTE: "a" indicates any printable ASCII character (20 Hex - 7E Hex).

Function Code: **532 or 732** (All Systems)

Function: Set Print Header Line 2

Command Format: <SOH>532aaaaaaaaaaaaaaaaaaa

Typical Response Message: <SOH>532aaaaaaaaaaaaaaaaaaa

NOTE: "a" indicates any printable ASCII character (20 Hex - 7E Hex).

Function Code: **533 or 733** (All Systems)

Function: Set Print Header Line 3

Command Format: <SOH>533aaaaaaaaaaaaaaaaaa

Typical Response Message: <SOH>533aaaaaaaaaaaaaaaaaa

NOTE: "a" indicates any printable ASCII character (20 Hex - 7E Hex).

Function Code: **534 or 734** (All Systems)

Function: Set Print Header Line 4

Command Format: <SOH>534aaaaaaaaaaaaaaaaaa

Typical Response Message: <SOH>534aaaaaaaaaaaaaaaaaa

NOTE: "a" indicates any printable ASCII character (20 Hex - 7E Hex).

Function Code: **54T or 74T** (All Systems)

Function: Set Tank T Product Label

Command Format: <SOH>54Taaaaaaaaaaaaaaaaaa

Typical Response Message: <SOH>54Taaaaaaaaaaaaaaaaaa

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "a" indicates any printable ACCII character (20 Hex - 7E Hex).

Function Code: **55T or 75T** (All Systems)

Function: Set Tank T Product Code

Command Format: <SOH>55Ta

Typical Response Message: <SOH>55Ta

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "a" indicates any printable ACCII character (20 Hex - 7E Hex).

Function Code: **56T or 76T** (All Systems)

Function: Set Tank T High Water Alarm Limit

Command Format: <SOH>56TId

Typical Response Message: <SOH>56TId

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "Id" indicates inches and tenths (maximum 5.0 inches).

Function Code: **57T or 77T** (All Systems)

Function: Set Tank T Overfill Alarm Limit

Command Format: <SOH>57TGGGGGG

Typical Response Message: <SOH>57TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons.

Function Code: **58T or 78T** (All Systems)

Function: Set Tank T Low Level Alarm Limit

Command Format: <SOH>58TGGGGGG

Typical Response Message: <SOH>58TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons.

Function Code: **59T or 79T** (All Systems)

Function: Set Tank T Theft Alarm Limit

Command Format: <SOH>59TGGGGGG

Typical Response Message: <SOH>59TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons.

Function Code: **5AT or 7AT** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Set Tank T Leak Alarm Limit

Command Format: <SOH>5ATGG

Typical Response Message: <SOH>5ATGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GG" indicates leak limit gallons. Accepts only 01 through 99 and internally assumes it is a negative value.

Function Code: **5BT or 7BT** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Set Tank T Temperature Coefficient

Command Format: <SOH>5BTCCCC

Typical Response Message: <SOH>5BTCCCC

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "CCCC" indicates the thermal coefficient of expansion of the fuel in the tank. The value entered may range from -999 through 9999. The nmber entered is multiplied by 0.0001 and is expressed in Gal/Gal/Deg F. A typical value for gasoline is -0.00065 Gal/Gal/Deg F which would be set by sending -065. If a value of 0000 (which is the default value) is sent, the product label is used to determine the correct coefficient.

Function Code: **5CT or 7CT** (All Systems)

Function: Set Tank T Delivery Report Delay

Command Format: <SOH>5CTdd

Typical Response Message: <SOH>5CTdd

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "dd" indicates the length of time in minutes (1 - 99) that the system delays a delivery report printout after a rising fuel level has been detected. If at the end of this delay period the increase has been less than 15 gallons, there is no delivery report.

Function Code: **5DM or 7DM** (TLS-250 Standard System)

Function: Set Auto-Transmit Message

Command Format: <SOH>5DMaaaaaaaa

Typical Response Message: <SOH>5DMaaaaaaaa

NOTES:

1. "a" indicates any printable ASCII character (20 Hex - 7E Hex).
2. "M" indicates the auto-transmit message number to be set. Each message may consist of any eight printable ASCII characters. The default messages set by the TLS-250 are as follows.

M = 1	$LEAK##$	Leak Alarm Message
M = 2	$WATR##$	High Water Alarm Message
M = 3	$OVFL##$	Overfill Alarm Message
M = 4	$LOLV##$	Low Limit Alarm Message
M = 5	$THFT##$	Theft Alarm Message
M = 6	$DLST##$	Delivery Start Message
M = 7	$DLND##$	Delivery End Message
M = 8	$EXTNON$	External Input On Message
M = 9	$EXTOFF$	External Input Off Message

If the sixth character in the message is "#", it is replaced by the tank number, and the seventh character is replaced by the product code when the message is sent.

If the sixth character is not "#" but the seventh character is, the seventh character is replaced by the tank number when the message is transmitted and the product code is not sent.

If neither the sixth or seventh character is "#", the message is sent intact without either tank or product code information.

Function Code: **5DM or 7DM** (TLS-250 Emergency Generator System)

Function: Set Auto-Transmit Message

Command Format: <SOH>5DMaaaaaaaa

Typical Response Message: <SOH>5DMaaaaaaaa

NOTES:

1. "a" indicates any printable ASCII character (20 Hex - 7E Hex).
2. "M" indicates the auto-transmit message number to be set. Each message may consist of any eight printable ASCII characters. The default messages set by the TLS-250 are as follows.

M = 1	$LEAK##$	Leak Alarm Message
M = 2	$WATR##$	High Water Alarm Message
M = 3	$OVFL##$	Overfill Alarm Message
M = 4	$LOLV##$	Low Limit Alarm Message
M = 5	$THFT##$	Theft Alarm Message
M = 6	$DLST##$	Delivery Start Message
M = 7	$DLND##$	Delivery End Message
M = 8	$GNSTRT$	Generator Start Message
M = 9	$GNSTOP$	Generator Stop Message

If the sixth character in the message is "#", it is replaced by the tank number, and the seventh character is replaced by the product code when the message is sent.

If the sixth character is not "#" but the seventh character is, the seventh character is replaced by the tank number when the message is transmitted and the product code is not sent.

If neither the sixth or seventh character is "#", the message is sent intact without either tank or product code information.

Function Code: **5DM or 7DM** (TLS-250i Four-Tank System)
Function: Set Auto-Transmit Message
Command Format: <SOH>5DMaaaaaaaa
Typical Response Message: <SOH>5DMaaaaaaaa9cccc<ETX>

NOTES:

"M" indicates the auto-transmit message number to be set. Each message may consist of any eight printable ASCII characters. The default messages set by the TLS-250i are as follows.

M = 1	$RESV##$	RESERVED
M = 2	$WATR##$	High Water Alarm Message
M = 3	$OVFL##$	Overfill Alarm Message
M = 4	$LOLV##$	Low Limit Alarm Message
M = 5	$THFT##$	Theft Alarm Message
M = 6	$DLST##$	Delivery Start Message
M = 7	$DLND##$	Delivery End Message
M = 8	$EXTNON$	External Input On Message
M = 9	$EXTOFF$	External Input Off Message
M = C	$FUEL##$	Sensor Fuel Message
M = D	$H2O##$	Sensor Water Message
M = E	$OUT##$	Sensor Out Message
M = F	$RESV##$	RESERVED
M = G	$RESV##$	RESERVED
M = H	$RESV##$	RESERVED

If the sixth character in messages 1 - 8 is "#", it is replaced by the tank number. If the sixth character in messages "C" - "H" is "#", it is replaced by the sensor number. The seventh character is replaced by the product code when the message is sent.

If the sixth character is not "#" but the seventh character is, the seventh character is replaced by the tank or sensor number when the message is transmitted and the product code is not sent.

If neither the sixth or seventh character is "#", the message is sent intact without either tank, sensor, or product code information.

Function Code: **5DM or 7DM** (TLS-250i Eight-Tank System)
Function: Set Auto-Transmit Message
Command Format: <SOH>5DMaaaaaaaa
Typical Response Message: <SOH>5DMaaaaaaaa9cccc<ETX>

NOTES:

"M" indicates the auto-transmit message number to be set. Each message may consist of any eight printable ASCII characters. The default messages set by the TLS-250i are as follows.

M = 1	$LEAK##$	Leak Alarm Message
M = 2	$WATR##$	High Water Alarm Message
M = 3	$OVFL##$	Overfill Alarm Message
M = 4	$LOLV##$	Low Limit Alarm Message
M = 5	$THFT##$	Theft Alarm Message
M = 6	$DLST##$	Delivery Start Message
M = 7	$DLND##$	Delivery End Message
M = 8	$EXTNON$	External Input On Message
M = 9	$EXTOFF$	External Input Off Message
M = C	$FUEL##$	Sensor Fuel Message
M = D	$H2O##$	Sensor Water Message
M = E	$OUT##$	Sensor Out Message
M = F	$RESV##$	RESERVED
M = G	$RESV##$	RESERVED
M = H	$RESV##$	RESERVED

If the sixth character in messages 1 - 8 is "#", it is replaced by the tank number. If the sixth character in messages "C" - "H" is "#", it is replaced by the sensor number. The seventh character is replaced by the product code when the message is sent.

If the sixth character is not "#" but the seventh character is, the seventh character is replaced by the tank or sensor number when the message is transmitted and the product code is not sent.

If neither the sixth or seventh character is "#", the message is sent intact without either tank, sensor, or product code information.

Function Code: **5DM or 7DM** (TLS-250i Eight-Tank Emergency Generator System)

Function: Set Auto-Transmit Message

Command Format: <SOH>5DMaaaaaaaa

Typical Response Message: <SOH>5DMaaaaaaaa9cccc<ETX>

NOTES:

"M" indicates the auto-transmit message number to be set. Each message may consist of any eight printable ASCII characters. The default messages set by the TLS-250i are as follows.

M = 1	$LEAK##$	Leak Alarm Message
M = 2	$WATR##$	High Water Alarm Message
M = 3	$OVFL##$	Overfill Alarm Message
M = 4	$LOLV##$	Low Limit Alarm Message
M = 5	$THFT##$	Theft Alarm Message
M = 6	$DLST##$	Delivery Start Message
M = 7	$DLND##$	Delivery End Message
M = 8	$GNSTRT$	Generator Start Message
M = 9	$GNSTOP$	Generator Stop Message
M = C	$FUEL##$	Sensor Fuel Message
M = D	$H2O##$	Sensor Water Message
M = E	$OUT##$	Sensor Out Message
M = F	$RESV##$	RESERVED
M = G	$RESV##$	RESERVED
M = H	$RESV##$	RESERVED

If the sixth character in messages 1 - 8 is "#", it is replaced by the tank number. If the sixth character in messages "C" - "H" is "#", it is replaced by the sensor number. The seventh character is replaced by the product code when the message is sent.

If the sixth character is not "#" but the seventh character is, the seventh character is replaced by the tank or sensor number when the message is transmitted and the product code is not sent.

If neither the sixth or seventh character is "#", the message is sent intact without either tank, sensor, or product code information.

Function Code: **5E0 - 7E0** (TLS-250i Four-Tank; TLS-250i Eight-Tank Systems)

Function: External Input Alarm Enable

Command Format: <SOH>5E0x

Typical Response Message: <SOH>5E0x93F83<ETX>

NOTE:

1. "x" is a flag to 0, disable and 1, enable the assignment of the external alarm to the front panel LED 8.

Function Code: **5E0 - 7E0** (TLS-250i Eight-Tank Emergency Generator System)

Function: Generator ON Alarm Enable

Command Format: <SOH>5E0x

Typical Response Message: <SOH>5E0x93F83<ETX>

NOTE:

1. "x" is a flag to 0, disable and 1, enable the assignment of the generator on alarm to the front panel LED 8.

A valid setup command causes the TLS-250 to perform the setup function and send back the whole data field as received. The data fields for the 6XX (computer format) and 8XX (display format) commands are identical. The only difference is in the TLS-250 response message.

Example: (Set Tank 3 Full Height Volume to 9,728 Gallons)

Computer Command Format: <SOH>603009728
Response Message: <SOH>6030097289FDF3<ETX>

Display Command Format: <SOH>803009728
Response Message: <SOH>803009728<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

If a setup command is found to be invalid (unacceptable characters or out of range), the TLS-250 responds with a string of "?" characters equal in length to the data field of the specified command and makes no change to the previously stored data.

Example: (Set Tank 3 Full Height Volume to 9,**X**28 Gallons)

Computer Command Format: <SOH>603009**X**28
Response Message: <SOH>603??????9FDB3<ETX>

Display Command Format: <SOH>803009**X**28
Response Message: <SOH>803??????<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

Function Code: **60T or 80T** (All Systems)

Function: Set Tank T Full Height Volume (Clear 0.80 - 0.95 Volume)

Command Format: <SOH>60TGGGGGG

Typical Response Message: <SOH>60TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons data for tank volume parameters. If these functions are used to set the volumes, the other intermediate 20 point volumes are set to zero as shown. To set 20 point volume data, use functions 69T-6CT or 89T-8CT.

Function Code: **61T or 81T** (All Systems)

Function: Set Tank T 1/4 Height Volume (Clear 0.05 - 0.20 Volume)

Command Format: <SOH>61TGGGGGG

Typical Response Message: <SOH>61TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons data for tank volume parameters. If these functions are used to set the volumes, the other intermediate 20 point volumes are set to zero as shown. To set 20 point volume data, use functions 69T-6CT or 89T-8CT.

Function Code: **62T or 82T** (All Systems)

Function: Set Tank T 1/2 Height Volume (Clear 0.30 - 0.45 Volume)

Command Format: <SOH>62TGGGGGG

Typical Response Message: <SOH>62TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons data for tank volume parameters. If these functions are used to set the volumes, the other intermediate 20 point volumes are set to zero as shown. To set 20 point volume data, use functions 69T-6CT or 89T-8CT.

Function Code: **63T or 83T** (All Systems)

Function: Set Tank T 3/4 Height Volume (Clear 0.55 - 0.70 Volume)

Command Format: <SOH>63TGGGGGG

Typical Response Message: <SOH>63TGGGGGG

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "GGGGGG" indicates gallons data for tank volume parameters. If these functions are used to set the volumes, the other intermediate 20 point volumes are set to zero as shown. To set 20 point volume data, use functions 69T-6CT or 89T-8CT.

Function Code: **64T or 84T** (All Systems)
Function: Set Tank Diameter
Command Format: <SOH>64TIIIhh
Typical Response Message: <SOH>64TIIIhh

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "IIIhh" indicates inches and hundredths.

Function Code: **65T or 85T** (All Systems)
Function: Set Tank T Tilt
Command Format: <SOH>65TIIIhh
Typical Response Message: <SOH>65TIIIhh

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "IIIhh" indicates inches and hundredths. The tilt function accepts a negative sign (—) in the first character.

Function Code: **66T or 86T** (All Systems)
Function: Set Tank T Manifolded Partners
Command Format: <SOH>66Tpppppp
Typical Response Message: <SOH>66Tpppppp

NOTES:

1. "T" indicates desired tank number. If T = 0, data are set on all tanks.
2. "pppppp" indicates up to six other tank numbers which are manifolded to Tank T. Each "p" character can be a number from 1 to 8, or 0 if no other tanks are required.

Function Code: **670 or 870** (All Systems)
Function: Set Channel Configuration
Command Format: <SOH>670cccccccc
Typical Response Message: <SOH>670cccccccc

NOTE: "cccccccc" is used to set the channel configuration. Each character must be 0 (not configured) or 1 (configured) and indicates whether each tank (in sequence from 1 to 8) is to be configured or not. If no tanks are "configured," any "all-tank" requests include data from all active tanks. However, if any tanks are "configured," only data from those tanks are included.

Function Code: **680 or 880** (All Systems)
Function: Set Security Code
Command Format: <SOH>680aaaaaa
Typical Response Message: <SOH>680aaaaaa

NOTE: "aaaaaa" indicates any six printable ASCII characters for the security code. Only numeric data can be set or viewed from the front panel. Any non-numeric data are displayed as a dash (-) on the display.

Function Code: **69T or 89T** (All Systems)
Function: Set Tank T 1.00 - 0.80 Height Volume
Command Format: <SOH>69TGGGGGGgggggGGGGGGgggggGGGGGG
Typical Response Message: <SOH>69TGGGGGGgggggGGGGGGgggggGGGGGG

NOTE: "GGGGGGgggggGGGGGGgggggGGGGGG" indicates series of five six-digit gallon values used to set the 20 point volume parameters. The volumes are transmitted in sequence from highest to lowest for each quarter of the tank.

Function Code: **6AT or 8AT** (All Systems)

Function: Set Tank T 0.75 - 0.55 Height Volume

Command Format: <SOH>6ATGGGGGGgggggGGGGGGgggggGGGGGG

Typical Response Message: <SOH>6ATGGGGGGgggggGGGGGGgggggGGGGGG

NOTE: "GGGGGGgggggGGGGGGgggggGGGGGG" indicates series of five six-digit gallon values used to set the 20 point volume parameters. The volumes are transmitted in sequence from highest to lowest for each quarter of the tank.

Function Code: **6BT or 8BT** (All Systems)

Function: Set Tank T 0.50 - 0.30 Height Volume

Command Format: <SOH>6BTGGGGGGgggggGGGGGGgggggGGGGGG

Typical Response Message: <SOH>6BTGGGGGGgggggGGGGGGgggggGGGGGG

NOTE: "GGGGGGgggggGGGGGGgggggGGGGGG" indicates series of five six-digit gallon values used to set the 20 point volume parameters. The volumes are transmitted in sequence from highest to lowest for each quarter of the tank.

Function Code: **6CT or 8CT** (All Systems)

Function: Set Tank T 0.25 - 0.05 Height Volume

Command Format: <SOH>6CTGGGGGGgggggGGGGGGgggggGGGGGG

Typical Response Message: <SOH>6CTGGGGGGgggggGGGGGGgggggGGGGGG

NOTE: "GGGGGGgggggGGGGGGgggggGGGGGG" indicates series of five six-digit gallon values used to set the 20 point volume parameters. The volumes are transmitted in sequence from highest to lowest for each quarter of the tank.

Function Code: **6DR or 8DR** (TLS-250 Standard System)

Function: Set Relay R Configuration

Command Format: <SOH>6DRrrrrrr

Typical Response Message: <SOH>6DRrrrrrr

NOTE: "R" indicates the relay number (1 or 2) to be programmed. "rrrrrr" indicates a sequence of six characters (0 = No, 1 = Yes) which indicate whether a given alarm condition will activate Relay R or not. Any combination of alarm conditions can be programmed to activate either relay. The characters are sent in the following sequence:

1st	External Input	4th	Overfill Alarm
2nd	Theft Alarm	5th	High Water Alarm
3rd	Low Limit Alarm	6th	Leak Alarm

Function Code: **6DR or 8DR** (TLS-250 Emergency Generator System)

Function: Set Relay R Configuration

Command Format: <SOH>6DRrrrrrr

Typical Response Message: <SOH>6DRrrrrrr

NOTE: "R" indicates the relay number (1 or 2) to be programmed. "rrrrrr" indicates a sequence of six characters (0 = No, 1 = Yes) which indicate whether a given alarm condition will activate Relay R or not. Any combination of alarm conditions can be programmed to activate either relay. The characters are sent in the following sequence:

1st	External Input	4th	Overfill Alarm
2nd	Theft Alarm	5th	High Water Alarm
3rd	Low Limit Alarm	6th	Leak Alarm

Function Code: **6DR or 8DR** (TLS-250i Four-Tank System)

Function: Set Relay R Configuration

Command Format: <SOH>6DRrrrrrr

Typical Response Message: <SOH>6DRrrrrrr

NOTE: "R" indicates the relay number (1 or 2) to be programmed. "rrrrrr" indicates a sequence of six characters (0 = No, 1 = Yes) which indicate whether a given alarm condition will activate Relay R or not. Any combination of alarm conditions can be programmed to activate either relay. The characters are sent in the following sequence:

R = 1 or 2, for Relay 1 or 2.

"a" - External Input	"d" - Overfill Alarm
"b" - Theft Alarm	"e" - High Water Alarm
"c" - Low Limit Alarm	"f" - RESERVED

R = 3 or 4, for Relay 1 or 2, respectively.

"a" - RESERVED	"d" - Sensor Out Alarm
"b" - RESERVED	"e" - Sensor Water Alarm
"c" - RESERVED	"f" - Sensor Fuel Alarm

Function Code: **6DR or 8DR** (TLS-250i Eight-Tank System)

Function: Set Relay R Configuration

Command Format: <SOH>6DRrrrrrr

Typical Response Message: <SOH>6DRrrrrrr

NOTE: "R" indicates the relay number (1 or 2) to be programmed. "rrrrrr" indicates a sequence of six characters (0 = No, 1 = Yes) which indicate whether a given alarm condition will activate Relay R or not. Any combination of alarm conditions can be programmed to activate either relay. The characters are sent in the following sequence:

R = 1 or 2, for Relay 1 or 2.

"a" - External Input	"d" - Overfill Alarm
"b" - Theft Alarm	"e" - High Water Alarm
"c" - Low Limit Alarm	"f" - Leak Alarm

R = 3 or 4, for Relay 1 or 2, respectively.

"a" - RESERVED	"d" - Sensor Out Alarm
"b" - RESERVED	"e" - Sensor Water Alarm
"c" - RESERVED	"f" - Sensor Fuel Alarm

Function Code: **6DR or 8DR** (TLS-250i Eight-Tank Emergency Generator System)

Function: Set Relay R Condition

Command Format: <SOH>6DRrrrrrr

Typical Response Message: <SOH>6DRrrrrrr

NOTE: "R" indicates the relay number (1 or 2) to be programmed. "rrrrrr" indicates a sequence of six characters (0 = No, 1 = Yes) which indicate whether a given alarm condition will activate Relay R or not. Any combination of alarm conditions can be programmed to activate either relay. The characters are sent in the following sequence:

R = 1 or 2, for Relay 1 or 2.

"a" - Generator Start	"d" - Overfill Alarm
"b" - Theft Alarm	"e" - High Water Alarm
"c" - Low Limit Alarm	"f" - Leak Alarm

R = 3 or 4, for Relay 1 or 2, respectively.

"a" - RESERVED	"d" - Sensor Out Alarm
"b" - RESERVED	"e" - Sensor Water Alarm
"c" - RESERVED	"f" - Sensor Fuel Alarm

Function Code: **6EM or 8EM** (TLS-250 Standard System)

Function: Set Message M Auto-Transmit Mode

Command Format: <SOH>6EMm

Typical Response Message: <SOH>6EMm

NOTES:

"M" indicates the auto-transmit message number (0 through 9) to be set as follows:

M = 0	All Messages including External Input	M = 5	Theft Alarm Message
M = 1	Leak Alarm Message	M = 6	Delivery Start Message
M = 2	High Water Alarm Message	M = 7	Delivery End Message
M = 3	Overfill Alarm Message	M = 8	External Input On Message
M = 4	Low Limit Alarm Message	M = 9	External Input Off Message

"m" indicates the auto-transmit message mode (0 through 2) to be set as follows:

If m = 0	both transmit and repeat are disabled for message M.
If m = 1	transmit is enabled but repeat is disabled.
If m = 2	both transmit and repeat are enabled.

Function Code: **6EM or 8EM** (TLS-250 Emergency Generator System)

Function: Set Message M Auto-Transmit Mode

Command Format: <SOH>6EMm

Typical Response Message: <SOH>6EMm

NOTES:

"M" indicates the auto-transmit message number (0 through 9) to be set as follows:

M = 0	All Messages including Generator Input	M = 5	Theft Alarm Message
M = 1	Leak Alarm Message	M = 6	Delivery Start Message
M = 2	High Water Alarm Message	M = 7	Delivery End Message
M = 3	Overfill Alarm Message	M = 8	Generator Input On Message
M = 4	Low Limit Alarm Message	M = 9	Generator Input Off Message

"m" indicates the auto-transmit message mode (0 through 2) to be set as follows:

If m = 0	both transmit and repeat are disabled for message M.
If m = 1	transmit is enabled but repeat is disabled.
If m = 2	both transmit and repeat are enabled.

Function Code: **6EM or 8EM** (TLS-250i Four-Tank System)

Function: Set Message M Auto-Transmit Mode

Command Format: <SOH>6EMm

Typical Response Message: <SOH>6EMm9cccc<ETX>

NOTES:

1. "M" indicates the auto-transmit message character (0 through H) to be set as follows:

M = 0	All Messages including External Input	M = 9	External Input Off Message
M = 1	RESERVED	M = C	Sensor Fuel Alarm Message
M = 2	High Water Alarm Message	M = D	Sensor Water Alarm Message
M = 3	Overfill Alarm Message	M = E	Sensor Out Alarm Message
M = 4	Low Limit Alarm Message	M = F	RESERVED
M = 5	Theft Alarm Message	M = G	RESERVED
M = 6	Delivery Start Message	M = H	RESERVED
M = 7	Delivery End Message		
M = 8	External Input On Message		

"m" indicates the auto-transmit message mode (0 through 2) to be set as follows:

If m = 0	both transmit and repeat are disabled for message M.
If m = 1	transmit is enabled but repeat is disabled.
If m = 2	both transmit and repeat are enabled.

Function Code: **6EM or 8EM** (TLS-250i Eight-Tank System)

Function: Set Message M Auto-Transmit Mode

Command Format: <SOH>6EMm

Typical Response Message: <SOH>6EMm9cccc<ETX>

NOTES:

1. "M" indicates the auto-transmit message character (0 through H) to be set as follows:

M = 0	All Messages including External Input	M = 9	External Input Off Message
M = 1	Leak Alarm Message	M = C	Sensor Fuel Alarm Message
M = 2	High Water Alarm Message	M = D	Sensor Water Alarm Message
M = 3	Overfill Alarm Message	M = E	Sensor Out Alarm Message
M = 4	Low Limit Alarm Message	M = F	RESERVED
M = 5	Theft Alarm Message	M = G	RESERVED
M = 6	Delivery Start Message	M = H	RESERVED
M = 7	Delivery End Message		
M = 8	External Input On Message		

"m" indicates the auto-transmit message mode (0 through 2) to be set as follows:

If m = 0	both transmit and repeat are disabled for message M.
If m = 1	transmit is enabled but repeat is disabled.
If m = 2	both transmit and repeat are enabled.

Function Code: **6EM or 8EM** (TLS-250i Eight-Tank Emergency Generator System)

Function: Set Message M Auto-Transmit Mode

Command Format: <SOH>6EMm

Typical Response Message: <SOH>6EMm

NOTES:

1. "M" indicates the auto-transmit message character (0 through H) to be set as follows:

M = 0	All Messages including External Input	M = 9	Generator Stop Message
M = 1	Leak Alarm Message	M = C	Sensor Fuel Alarm Message
M = 2	High Water Alarm Message	M = D	Sensor Water Alarm Message
M = 3	Overfill Alarm Message	M = E	Sensor Out Alarm Message
M = 4	Low Limit Alarm Message	M = F	RESERVED
M = 5	Theft Alarm Message	M = G	RESERVED
M = 6	Delivery Start Message	M = H	RESERVED
M = 7	Delivery End Message		
M = 8	Generator Start Message		

"m" indicates the auto-transmit message mode (0 through 2) to be set as follows:

If m = 0	both transmit and repeat are disabled for message M.
If m = 1	transmit is enabled but repeat is disabled.
If m = 2	both transmit and repeat are enabled.

Function Code: **6EN or 8EN** (All Systems)

Function: Set Auto-Transmit Timer N

Command Format: <SOH>6ENttt

Typical Response Message: <SOH>6ENttt

NOTE: "N" indicates the auto-transmit timer (A or B) to be set.

If "N" = A, "ttt" indicates the length of time in minutes (1 through 240) the TLS-250 waits before it repeats the auto-transmit message (if the repeat mode is enabled and if the flag has not been turned off (see Function 004).

If "N" = B, "ttt" indicates the length of time in seconds (1 through 240) the TLS-250 waits after any other external communication before it sends any auto-transmit message.

Function Code: **6F0 or 8F0** (TLS-250 Emergency Generator; TLS-250i Emergency Generator Systems)

Function: Set Generator Off Mode & Leak Report Enable

Command Format: <SOH>6F0G

Typical Response Message: <SOH>6F0G

NOTE: "G" indicates the desired generator off mode, where:

0 = Normally Open Leak Report Disabled
1 = Normally Closed Leak Report Disabled
2 = Normally Open Leak Report Enabled
3 = Normally Closed Leak Report Enabled

Function Code: **6GS or 8GS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Set Sensor Type and Water Alarm Delay Time

Command Format: <SOH>6GSatttbttt (S = sensor number 1 to 8, 0 = all)

Typical Response Message: <SOH>6GSatttbttt949<ETX>

NOTES:

1. "a" is the "A" channel sensor type. If "A" is:

   0 = Standard Sensor Water Audible Disabled
   1 = Standard Sensor Water Audible Enabled
   2 = Normally Open Switch Sensor
   3 = Normally Closed Switch Sensor

2. "ttt" is the water delay time in xx.x hrs.†
3. "b" is the "B" channel sensor type. If "B" is:

   0 = Standard Sensor Water Audible Disabled
   1 = Standard Sensor Water Audible Enabled
   2 = Normally Open Switch Sensor
   3 = Normally Closed Switch Sensor

4. "ttt" is the water delay time in xx.x hrs.†

†Sensor Type 0 or 1 Only

7.5 DIAGNOSTIC REPORTS (DISPLAY FORMAT)

All display format responses begin with the following string (where 9**XX** indicates the original command sent):

<SOH>9**XX**<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL>

All display format responses end with the following string:

<CR><LF><NUL><NUL><NUL><NUL><NUL><NUL><ETX>

Function Code: **90T** (All Systems)

Function: Tank Chart Volume, Single Point

Command Format: <SOH>90TIIIhh (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

901

TANK	PRODUCT	CHART HEIGHT	CHART VOLUME
1	UNLEADED REGULAR	56.38	6800

NOTES:

1. "T" is tank number 1 through 8.
2. "IIIhh" is tank chart height in inches and hundredths to be converted into volume. This function is provided as a means to check the TLS-250 height to volume conversion. A response is always sent even if the desired tank is not active or "configured."

Function Code: **91T** (All Systems)

Function: Full Tank Chart

Command Format: <SOH>91T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message: See "Tank Calibration Chart"

NOTES:

1. A full formal tank chart for tank T is printed.
2. If the tank is larger than 103.5 inches in diameter, the chart requires more than one page to print out.

VEEDER-ROOT
TLS-250
TANK LEVEL SENSOR

VEEDER-ROOT
TLS-250
TANK CALIBRATION CHART

TANK 2
DIESEL FUEL
10380 GALLONS
91.00 INCHES

DEPTH INCHES	CAPACITY GALLONS	DEPTH INCHES	CAPACITY GALLONS	DEPTH INCHES	CAPACITY GALLONS	DEPTH INCHES	CAPACITY GALLONS
0.0	0	26.0	2384	52.0	6161	78.0	9524
0.5	6	26.5	2451	52.5	6234	78.5	9573
1.0	18	27.0	2517	53.0	6307	79.0	9620
1.5	33	27.5	2584	53.5	6380	79.5	9667
2.0	51	28.0	2651	54.0	6453	80.0	9714
2.5	71	28.5	2718	54.5	6525	80.5	9759
3.0	94	29.0	2786	55.0	6598	81.0	9803
3.5	118	29.5	2854	55.5	6672	81.5	9847
4.0	144	30.0	2922	56.0	6745	82.0	9889
4.5	172	30.5	2990	56.5	6818	82.5	9929
5.0	202	31.0	3059	57.0	6890	83.0	9968
5.5	233	31.5	3128	57.5	6963	83.5	10006
6.0	267	32.0	3198	58.0	7035	84.0	10042
6.5	301	32.5	3270	58.5	7107	84.5	10078
7.0	337	33.0	3342	59.0	7179	85.0	10112
7.5	373	33.5	3414	59.5	7249	85.5	10146
8.0	411	34.0	3486	60.0	7318	86.0	10177
8.5	450	34.5	3559	60.5	7387	86.5	10207
9.0	490	35.0	3632	61.0	7456	87.0	10235
9.5	532	35.5	3705	61.5	7524	87.5	10261
10.0	576	36.0	3778	62.0	7592	88.0	10285
10.5	620	36.5	3851	62.5	7659	88.5	10308
11.0	665	37.0	3923	63.0	7727	89.0	10328
11.5	712	37.5	3996	63.5	7794	89.5	10346
12.0	759	38.0	4069	64.0	7861	90.0	10361
12.5	806	38.5	4142	64.5	7928	90.5	10373
13.0	855	39.0	4215	65.0	7994	91.0	10380
13.5	905	39.5	4288	65.5	8060		
14.0	955	40.0	4361	66.0	8126		
			. . etc. . .				
18.5	1447	44.5	5038	70.5	8694		
19.0	1506	45.0	5114	71.0	8754		
19.5	1565	45.5	5190	71.5	8814		
20.0	1625	46.0	5265	72.0	8873		
20.5	1685	46.5	5341	72.5	8932		
21.0	1746	47.0	5416	73.0	8989		
21.5	1807	47.5	5491	73.5	9046		
22.0	1869	48.0	5567	74.0	9102		
22.5	1931	48.5	5642	74.5	9157		
23.0	1994	49.0	5718	75.0	9212		
23.5	2058	49.5	5793	75.5	9266		
24.0	2123	50.0	5868	76.0	9319		
24.5	2187	50.5	5942	76.5	9372		
25.0	2253	51.0	6015	77.0	9424		
25.5	2318	51.5	6088	77.5	9474		

Function Code: **920** (All Systems)
Function: Send Message to Printer
Command Format: <SOH>920aaaaaaaaaaaaaaaaaaa
Typical Response Message: 920aaaaaaaaaaaaaaaaaaa

NOTES:

1. "aaaaaaaaaaaaaaaaaaa" indicates any 20 printable ASCII characters (20 Hex - 7E Hex).
2. The 20-character message is printed on the TLS-250 system 20-column printer. The printer automatically line feeds after each 20-character message. If an extra line feed is desired, send 20 spaces (ASCII 20 Hex).

Function Code: **930** (TLS-250 Standard System)
Function: System Setup Parameters
Command Format: <SOH>930
Typical Response Message:

```
930
SYSTEM SETUP CONDITIONS:
        VEEDER-ROOT
          TLS-250
     TANK LEVEL SENSOR
    -----------------

CALENDAR CLOCK:          4:13 PM     NOV 12, 1986
LEAK DETECT START:      10:00 PM   TANK 1  PREMIUM UNLEADED
LEAK DETECT STOP:        6:00 AM
AUTO PRINT 1:            6:05 AM
AUTO PRINT 2:            9:55 PM
AUTO PRINT 3:            8:00 AM
TANK CONFIGURATION:      1, 2, 3, 4
SECURITY CODE:           C12543
RELAY CONFIGURATION:    RELAY 1   RELAY 2
  LEAK ALARM              NO        NO
  HIGH WATER ALARM        NO        NO
  OVERFILL ALARM          NO       YES
  LOW LIMIT ALARM         NO        NO
  THEFT ALARM            YES        NO
  EXTERNAL INPUT ON       NO        NO
```

NOTE: For TLS-250i Set-Up Parameters, see Function Code 9CO.

Function Code: **930** (TLS-250 Emergency Generator System)

Function: System Setup Parameters

Command Format: <SOH>930

Typical Response Message:

```
930
SYSTEM SETUP CONDITIONS:
        VEEDER-ROOT
          TLS-250
     TANK LEVEL SENSOR
     -----------------

CALENDAR CLOCK:            4:13 PM     NOV 12, 1986
LEAK DETECT START:        10:00 PM   TANK 1  PREMIUM UNLEADED
LEAK DETECT STOP:          6:00 AM
AUTO PRINT 1:              6:05 AM
AUTO PRINT 2:              9:55 PM
AUTO PRINT 3:              8:00 AM
TANK CONFIGURATION:        1, 2, 3, 4
SECURITY CODE:             C12543
GENERATOR OFF MODE:        NORMALLY OPEN
LEAK REPORT PRINTOUT:      DISABLED
RELAY CONFIGURATION:     RELAY 1    RELAY 2
  LEAK ALARM               YES        NO
  HIGH WATER ALARM         NO         NO
  OVERFILL ALARM           NO         YES
  LOW LIMIT ALARM          NO         NO
  THEFT ALARM              NO         NO
  GENERATOR START          NO         NO
```

NOTE: For TLS-250i Set-Up Parameters, see Function Code 9CO.

Function Code: **93T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Tank Setup Parameters

Command Format: <SOH>93T (T = tank number 1 to 8; cannot be 0)

Typical Response Message:

```
931
TANK 1 SETUP CONDITIONS
PRODUCT:                 UNLEADED REGULAR
PRODUCT CODE:                   1
HIGH WATER LIMIT:             3.0
OVERFILL LIMIT:              9380
LOW LIMIT:                   1000
THEFT LIMIT:                  100
LEAK LIMIT:                   -10
THERMAL COEFF:            -0.00065
DELIVERY DELAY:                 5
TANK FULL CAPACITY:         10380     10205     9881     9460     8967
3/4 HEIGHT CAPACITY:         8417      7821     7201     6540     5876
1/2 HEIGHT CAPACITY:         5190      4501     3837     3177     2558
1/4 HEIGHT CAPACITY:         1963      1413      920      499      175
TANK DIAMETER:              91.00
TANK TILT ADDER:             0.00
MANIFOLDED TANKS:            NONE
TANK CONFIGURED:               NO
```

Function Code: **93T** (TLS-250i Four-Tank System)
Function: Tank Setup Parameters
Command Format: <SOH>93T (T = tank number 1 to 4; cannot be 0)
Typical Response Message:

931
TANK 1 SETUP CONDITIONS

PRODUCT:	UNLEADED REGULAR				
PRODUCT CODE:	1				
HIGH WATER LIMIT:	3.0				
OVERFILL LIMIT:	9380				
LOW LIMIT:	1000				
THEFT LIMIT:	100				
DELIVERY DELAY:	5				
TANK FULL CAPACITY:	10380	10205	9881	9460	8967
3/4 HEIGHT CAPACITY:	8417	7821	7201	6540	5876
1/2 HEIGHT CAPACITY:	5190	4501	3837	3177	2558
1/4 HEIGHT CAPACITY:	1963	1413	920	499	175
TANK DIAMETER:	91.00				
TANK TILT ADDER:	0.00				
MANIFOLDED TANKS:	NONE				
TANK CONFIGURED:	NO				

Function Code: **94T** (All Systems)
Function: Standard Capacitance Data
Command Format: <SOH>94T (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

940
TANK 1 UNLEADED REGULAR NUMBER OF SAMPLES = 49
1355.32 1285.54 2471.52 2452.58 2480.21 2547.75 1513.78 1521.89 298.19 1435.62

TANK 2 DIESEL FUEL NUMBER OF SAMPLES = 46
1346.95 1298.23 2469.52 2463.19 2439.56 2351.75 1481.60 1518.56 286.30 1411.12

.
etc.
.
up to 8 tanks

Function Code: **95T** (All Systems)
Function: Calibration Values
Command Format: <SOH>95T (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

950
TANK 1 UNLEADED REGULAR
573 506 1203 1212 1219 1402 1223 1230 1054 987 2186 2166 2194 2889 2169 2213
506 1203 1212 1219 1402 1213 1222 987 2173

TANK 2 DIESEL FUEL
584 512 1210 1223 1191 1260 1212 1259 1065 1020 2213 2209 2184 2956 2201 2242
512 1210 1223 1191 1232 1194 1230 1011 2183

.
etc.
.
up to 8 tanks

Function Code: **96T** (All Systems)

Function: Probe Serial Numbers

Command Format: <SOH>96T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

960

		CKT CODE	PROBE LENGTH	SERIAL NO.
TANK 1	UNLEADED REGULAR	000	96.00	004096
TANK 2	DIESEL FUEL	000	96.00	000050

.
etc.
.
up to 8 tanks

Function Code: **970** (All Systems)

Function: Self-Diagnostic Results

Command Format: <SOH>970

Typical Response Message:

970

	I/O	RAM	PROM
MAIN BOARD	PASS	PASS	PASS
OPTION BOARD	PASS	PASS	PASS

NOTE: This function does not actually run the test. Results from the last test are returned. To run the test, use 001 function.

Function Code: **980** (All Systems)

Function: ID, Revision Level Request

Command Format: <SOH>980

Typical Response Message: 980
TLS-250-VV-YY REVISION LEVEL MM-OO

NOTES:

1. "VV" is the TLS-250 version number.
2. "YY" is the main board type, where:
   00 = eight-probe non-ESA main board.
   01 = eight-probe ESA-compatible main board.
   02 = four-probe direct-connect main board.
3. "MM" is the main board software revision level.
4. "OO" is the option board software revision level.

Function Code: **990** (TLS-250 Standard System)

Function: Auto-Transmit Parameters

Command Format: <SOH>990

Typical Response Message:

990
AUTO-TRANSMIT PARAMETERS
NOV 12, 1986
4:11PM

ACTUATING EVENT	AUTO TRANSMIT	AUTO REPEAT	MESSAGE
LEAK ALARM	DISABLED	DISABLED	$LEAK##$
HIGH WATER ALARM	DISABLED	DISABLED	$WATR##$
OVERFILL ALARM	DISABLED	DISABLED	$OVFL##$
LOW LIMIT ALARM	DISABLED	DISABLED	$LOLV##$
THEFT ALARM	DISABLED	DISABLED	$THFT##$
DELIVERY START	ENABLED	DISABLED	$DLST##$
DELIVERY STOP	ENABLED	DISABLED	$DLND##$
EXTERNAL INPUT ON	DISABLED	DISABLED	$EXTNON$
EXTERNAL INPUT OFF	DISABLED	DISABLED	$EXTOFF$

AUTO-REPEAT TIME = 60 MINUTES

TRANSMIT DELAY TIME = 5 SECONDS

Function Code: **990** (TLS-250 Emergency Generator System)

Function: Auto-Transmit Parameters

Command Format: <SOH>990

Typical Response Message:

990
AUTO-TRANSMIT PARAMETERS
NOV 12, 1987
1:20PM

ACTUATING EVENT	AUTO TRANSMIT	AUTO REPEAT	MESSAGE
LEAK ALARM	DISABLED	DISABLED	$LEAK##$
HIGH WATER ALARM	DISABLED	DISABLED	$WATR##$
OVERFILL ALARM	DISABLED	DISABLED	$OVFL##$
LOW LIMIT ALARM	DISABLED	DISABLED	$LOLV##$
THEFT ALARM	DISABLED	DISABLED	$THFT##$
DELIVERY START	DISABLED	DISABLED	$DLST##$
DELIVERY STOP	DISABLED	DISABLED	$DLND##$
GENERATOR START	DISABLED	DISABLED	$GNSTRT$
GENERATOR STOP	DISABLED	DISABLED	$GNSTOP$

AUTO-REPEAT TIME = 60 MINUTES

TRANSMIT DELAY TIME = 5 SECONDS

Function Code: **990** (TLS-250i Four-Tank System)

Function: Auto-Transmit Parameters

Command Format: <SOH>990

Typical Response Message:

990
AUTO-TRANSMIT PARAMETERS
JAN 4, 1988
8:00AM

ACTUATING EVENT	AUTO TRANSMIT	AUTO REPEAT	MESSAGE
RESERVED	DISABLED	DISABLED	$RESEVD$
HIGH WATER ALARM	DISABLED	DISABLED	$WATR##$
OVERFILL ALARM	DISABLED	DISABLED	$OVFL##$
LOW LIMIT ALARM	DISABLED	DISABLED	$LOLV##$
THEFT ALARM	DISABLED	DISABLED	$THFT##$
DELIVERY START	DISABLED	DISABLED	$DLST##$
DELIVERY STOP	DISABLED	DISABLED	$DLND##$
EXTERNAL INPUT ON	DISABLED	DISABLED	$EXTNON$
EXTERNAL INPUT OFF	DISABLED	DISABLED	$EXTOFF$
SENSOR FUEL ALARM	DISABLED	DISABLED	$FUEL##$
SENSOR WATER ALARM	DISABLED	DISABLED	$H2O ##$
SENSOR OUT ALARM	DISABLED	DISABLED	$OUT ##$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$

AUTO-REPEAT TIME = 60 MINUTES
TRANSMIT DELAY TIME = 5 SECONDS

Function Code: **990** (TLS-250i Eight-Tank System)

Function: Auto-Transmit Parameters

Command Format: <SOH>990

Typical Response Message:

990
AUTO-TRANSMIT PARAMETERS
JAN 4, 1988
8:00AM

ACTUATING EVENT	AUTO TRANSMIT	AUTO REPEAT	MESSAGE
LEAK ALARM	DISABLED	DISABLED	$LEAK##$
HIGH WATER ALARM	DISABLED	DISABLED	$WATR##$
OVERFILL ALARM	DISABLED	DISABLED	$OVFL##$
LOW LIMIT ALARM	DISABLED	DISABLED	$LOLV##$
THEFT ALARM	DISABLED	DISABLED	$THFT##$
DELIVERY START	DISABLED	DISABLED	$DLST##$
DELIVERY STOP	DISABLED	DISABLED	$DLND##$
EXTERNAL INPUT ON	DISABLED	DISABLED	$EXTNON$
EXTERNAL INPUT OFF	DISABLED	DISABLED	$EXTOFF$
SENSOR FUEL ALARM	DISABLED	DISABLED	$FUEL##$
SENSOR WATER ALARM	DISABLED	DISABLED	$H2O ##$
SENSOR OUT ALARM	DISABLED	DISABLED	$OUT ##$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$

AUTO-REPEAT TIME = 60 MINUTES
TRANSMIT DELAY TIME = 5 SECONDS

Function Code: **990** (TLS-250i Eight-Tank Emergency Generator System)

Function: Auto-Transmit Parameters

Command Format: <SOH>990

Typical Response Message:

990
AUTO-TRANSMIT PARAMETERS
JAN 4, 1988
8:00AM

ACTUATING EVENT	AUTO TRANSMIT	AUTO REPEAT	MESSAGE
LEAK ALARM	DISABLED	DISABLED	$LEAK##$
HIGH WATER ALARM	DISABLED	DISABLED	$WATR##$
OVERFILL ALARM	DISABLED	DISABLED	$OVFL##$
LOW LIMIT ALARM	DISABLED	DISABLED	$LOLV##$
THEFT ALARM	DISABLED	DISABLED	$THFT##$
DELIVERY START	DISABLED	DISABLED	$DLST##$
DELIVERY STOP	DISABLED	DISABLED	$DLND##$
GENERATOR START	DISABLED	DISABLED	$GNSTRT$
GENERATOR STOP	DISABLED	DISABLED	$GNSTOP$
SENSOR FUEL ALARM	DISABLED	DISABLED	$FUEL##$
SENSOR WATER ALARM	DISABLED	DISABLED	$H2O ##$
SENSOR OUT ALARM	DISABLED	DISABLED	$OUT ##$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$
RESERVED	DISABLED	DISABLED	$RESEVD$

AUTO-REPEAT TIME = 60 MINUTES
TRANSMIT DELAY TIME = 5 SECONDS

Function Code: **9AT** (All Systems)

Function: Long Term Capacitance Data

Command Format: <SOH>9AT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

9A0
TANK 1 UNLEADED REGULAR NUMBER OF SAMPLES = 2149
1355.32 1285.54 2471.52 2452.58 2480.21 2547.75 1513.78 1521.89 298.19 1435.62

TANK 2 DIESEL FUEL NUMBER OF SAMPLES = 3246
1346.95 1298.23 2469.52 2463.19 2439.56 2351.75 1481.60 1518.56 286.30 1411.12

etc.

Function Code: **9B0** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250 Emergency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Auto-Transmit Flag Status

Command Format: <SOH>9B0

Typical Response Message:

9B0
SENSOR AUTO-TRANSMIT STATUS

SENSOR	CHANNEL 1 I.D.	CHANNEL 1 COUNT	CHANNEL 1 DATA	CHANNEL 2 I.D.	CHANNEL 2 COUNT	CHANNEL 2 DATA
1	0	0	00	0	0	00
2	0	0	00	0	0	00
3	0	0	00	0	0	00
4	E	F	50	0	0	00
5	0	0	00	0	0	00
6	0	0	00	0	0	00
7	0	0	00	0	0	00
8	E	F	55	0	0	00

Reserved

Function Code: **9C0** (TLS-250i Four-Tank System)

Function: System Setup Parameters

Command Format: <SOH>9C0

Typical Response Message:

9C0
SYSTEM SETUP CONDITIONS:

VEEDER-ROOT
TLS-250i
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - - -

CALENDAR CLOCK:	8:03 AM	JAN 4, 1988
SHUTDOWN MODE START:	DISABLED	
SHUTDOWN MODE STOP:	DISABLED	
AUTO PRINT 1:	DISABLED	
AUTO PRINT 2:	DISABLED	
AUTO PRINT 3:	DISABLED	
TANK CONFIGURATION:	NONE	
SECURITY CODE:	000000	
EXTERNAL INPUT ALARM:	DISABLED	

RELAY CONFIGURATION:	RELAY 1	RELAY 2
RESERVED	NO	NO
HIGH WATER ALARM	NO	NO
OVERFILL ALARM	NO	YES
LOW LIMIT ALARM	NO	NO
THEFT ALARM	YES	NO
EXTERNAL INPUT ON	NO	NO
SENSOR FUEL ALARM	NO	NO
SENSOR WATER ALARM	NO	NO
SENSOR OUT ALARM	NO	NO

Function Code: **9C0** (TLS-250i Eight-Tank System)

Function: System Setup Parameters

Command Format: <SOH>9C0

Typical Response Message:

```
9C0
SYSTEM SETUP CONDITIONS:
        VEEDER-ROOT
          TLS-250i
     TANK LEVEL SENSOR
     -----------------

CALENDAR CLOCK:          8:03 AM      JAN 4, 1988
LEAK DETECT START:       DISABLED
LEAK DETECT STOP:        DISABLED
AUTO PRINT 1:            DISABLED
AUTO PRINT 2:            DISABLED
AUTO PRINT 3:            DISABLED
TANK CONFIGURATION:        NONE
SECURITY CODE:           000000
EXTERNAL INPUT ALARM:    DISABLED
RELAY CONFIGURATION:     RELAY 1   RELAY 2
  LEAK ALARM               NO        NO
  HIGH WATER ALARM         NO        NO
  OVERFILL ALARM           NO       YES
  LOW LIMIT ALARM          NO        NO
  THEFT ALARM             YES        NO
  EXTERNAL INPUT ON        NO        NO
  SENSOR FUEL ALARM        NO        NO
  SENSOR WATER ALARM       NO        NO
  SENSOR OUT ALARM         NO        NO
```

Function Code: **9C0** (TLS-250i Eight-Tank Emergency Generator System)

Function: System Setup Parameters

Command Format: <SOH>9C0

Typical Response Message:

9C0
SYSTEM SETUP CONDITIONS:

VEEDER-ROOT
TLS-250i
TANK LEVEL SENSOR
- - - - - - - - - - - - - - - - -

CALENDAR CLOCK:	8:03 AM	JAN 4, 1988
LEAK DETECT START:	DISABLED	
LEAK DETECT STOP:	DISABLED	
AUTO PRINT 1:	DISABLED	
AUTO PRINT 2:	DISABLED	
AUTO PRINT 3:	DISABLED	
TANK CONFIGURATION:	NONE	
SECURITY CODE:	000000	
GENERATOR OFF MODE:	NORMALLY OPEN	
LEAK REPORT PRINTOUT:	DISABLED	
GENERATOR ALERT:	ENABLED	
EXTERNAL INPUT ALARM:	DISABLED	

RELAY CONFIGURATION:	RELAY 1	RELAY 2
LEAK ALARM	NO	NO
HIGH WATER ALARM	NO	NO
OVERFILL ALARM	NO	YES
LOW LIMIT ALARM	NO	NO
THEFT ALARM	YES	NO
GENERATOR START	NO	NO
SENSOR FUEL ALARM	NO	NO
SENSOR WATER ALARM	NO	NO
SENSOR OUT ALARM	NO	NO

Function Code: **9D0** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Setup Report

Command Format: <SOH>9D0

Typical Response Message:

9D0
SENSOR SETUP REPORT

SENSOR	WATER AUDIBLE ALARM*	WATER ALARM DELAY TIME*
4A	ENABLED	0.5 HRS.
4B	DISABLED	0.5 HRS.
8A	SW OPEN	0.5 HRS.
8B	SW CLOSED	0.5 HRS.

*SW Open and SW Closed Sensor do not provide Water Alarm Indications or display Time Options.

7.6 DIAGNOSTIC REPORTS (COMPUTER FORMAT)

Function Code: **A0T** (All Systems)
Function: Tank Chart Volume, Single Point
Command Format: <SOH>A0TIIIhh (T = tank number 1 to 8, cannot be 0)
Typical Response Message: <SOH>A0TIIIhhGGGGGG9FCF1<ETX>

NOTES:

1. "T" is tank number 1 through 8.
2. "IIIhh" is tank chart height in inches and hundredths to be converted into volume. This function is provided as a means to check the TLS-250 height to volume conversion. A response is always sent even if the desired tank is not active or "configured."
3. "GGGGGG" is the volume in gallons calculated by the TLS-250.

Function Code: **A20** (All Systems)
Function: Send Message to Printer
Command Format: <SOH>A20aaaaaaaaaaaaaaaaaaaa
Typical Response Message: <SOH>920aaaaaaaaaaaaaaaaaaaa9FCAB<ETX>

NOTES:

1. "aaaaaaaaaaaaaaaaaaaa" indicates any 20 printable ASCII character (20 Hex - 7E Hex).
2. The 20-character message is printed on the TLS-250 system 20-column printer. The printer automatically line feeds after each 20-character message. If an extra line feed is desired, send 20 spaces (ASCII 20 Hex).

Function Code: **A30** (TLS-250 Standard System)
Function: System Setup Parameters
Command Format: <SOH>A30
Typical Response Message:

<SOH>A30YYMMDDHHmmTHHmmHHmmHHmmHHmmHHmmcccccccccssssssRRRRRRrrrrrr
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh9E40A<ETX>

NOTES:

1. "YYMMDDHHmm" indicates present year, month, day, hour, and minute.
2. "THHmmHHmm" indicates tank number "T" (0 for all-tank) and automatic leak detect start and stop times.
3. The next three "HHmm" sequences indicate the automatic inventory report print times 1, 2 and 3.
4. "cccccccc" indicates tank 1 through 8 configuration status (0 = not configured, 1 = configured).
5. "ssssss" is the system security code.
6. "RRRRRR" and "rrrrrr" indicate relay 1 and relay 2 configuration. Each character is 0 (No) or 1 (Yes) to indicate whether the relay will be activated by alarm conditions in the following sequence:

1st	Leak Alarm
2nd	High Water Alarm
3rd	Overfill Alarm
4th	Low Limit Alarm
5th	Theft Alarm
6th	External Input

7. The last 80 "H" or "h" characters indicate the four 20-character print header lines 1, 2, 3 and 4.
8. For TLS-250i Setup Parameters, see Function Code AC0.

Function Code: **A30** (TLS-250 Emergency Generator System)

Function: System Setup Parameters

Command Format: <SOH>A30

Typical Response Message:

<SOH>A30YYMMDDHHmmTHHmmHHmmHHmmHHmmHHmmcccccccccssssssRRRRRRrrrrrrG
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh9E40A<ETX>

NOTES:

1. "YYMMDDHHmm" indicates present year, month, day, hour, and minute.
2. "THHmmHHmm" indicates tank number "T" (0 for all-tank) and automatic leak detect start and stop times.
3. The next three "HHmm" sequences indicate the automatic inventory report print times 1, 2 and 3.
4. "cccccccc" indicates tank 1 through 8 configuration status (0 - not configured, 1 = configured).
5. "ssssss" is the system security code.
6. "RRRRRR" and "rrrrrr" indicate relay 1 and relay 2 configuration. Each character is 0 (No) or 1 (Yes) to indicate whether the relay will be activated by alarm conditions in the following sequence:

1st	Leak Alarm	4th	Low Limit Alarm
2nd	High Water Alarm	5th	Theft Alarm
3rd	Overfill Alarm	6th	Generator Start

7. "G" indicates the present generator off mode where:

   0 = Normally Open Leak Report Disabled
   1 = Normally Closed Leak Report Disabled
   2 = Normally Open Leak Report Enabled
   3 = Normally Closed Leak Report Enabled

8. The last 80 "H" or "h" characters indicate the four 20-character print header lines 1, 2, 3 and 4.
9. For TLS-250i Setup Parameters, see Function Code AC0.

Function Code: **A3T** (TLS-250 Standard; TLS-250i Eight-Tank; TLS-250 Emerency Generator; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Tank Setup Parameters

Command Format: <SOH>A3T (T = tank number 1 to 8; cannot be 0)

Typical Response Message: <SOH>A3Taaaaaaaaaaaaaaaaaaa WtOOOOOOLLLLLLTTTTTT-LLCCCCdd
GGGGGGGggggggGGGGGGGggggggGGGGGG
GGGGGGGggggggGGGGGGGggggggGGGGGG
GGGGGGGggggggGGGGGGGggggggGGGGGG
GGGGGGGggggggGGGGGGGggggggGGGGGG
DDDhhTTThhMMMMMMCP9E3B7ETX

NOTES:

1. "T" is tank number 1 through 8; it cannot be 0.
2. "aaaaaaaaaaaaaaaaaaaa" is the 20-character product label.
3. "Wt" is the high water limit in inches and tenths.
4. "OOOOOO" is the overfill limit in gallons.
5. "LLLLLL" is the low limit in gallons.
6. "TTTTTT" is the theft limit in gallons.
7. "-LL" is the leak limit in gallons (always negative).
8. "CCCC" is the thermal coefficient of expansion of the fuel in the tank in Gal/Gal/Deg F. The first character may be a negative sign. This value is multiplied by 0.0001 internally.

9. "dd" indicates the length of time in minutes (1 - 99) that the system delays a delivery report printout after a rising fuel level has been detected. If at the end of this delay period the increase is less than 25 gallons, there is no delivery report.
10. "GGGGGG" and "gggggg" represent 20 six-digit gallon values in sequence from full height capacity to 0.05 height capacity.
11. "DDDhh" is tank diameter in inches and hundredths.
12. "TTThh" is tank tilt in inches and hundredths (first character may be a negative sign).
13. "MMMMMM" indicates up to six other tanks which are manifolded to this one. Each character is a number from 1 through 8, or 0 if no other tanks are indicated.
14. "C" is channel configuration (0 = not configured, 1 = configured).
15. "P" is product code character (set by function 55T or 75T).

Function Code: **A3T** (TLS-250i Four-Tank System)

Function: Tank Setup Parameters

Command Format: <SOH>A3T (T = tank number 1 to 4; cannot be 0)

Typical Response Message: <SOH>A3TaaaaaaaaaaaaaaaaaaaWtOOOOOOLLLLLLTTTTTT-LLCCCCdd
GGGGGGgggggGGGGGGgggggGGGGGG
GGGGGGgggggGGGGGGgggggGGGGGG
GGGGGGgggggGGGGGGgggggGGGGGG
GGGGGGgggggGGGGGGgggggGGGGGG
DDDhhTTThhMMMMMMCP9E3B7ETX

NOTES:

1. "T" is tank number 1 through 4; it cannot be 0.
2. "aaaaaaaaaaaaaaaaaaaa" is the 20-character product label.
3. "Wt" is the high water limit in inches and tenths.
4. "OOOOOO" is the overfill limit in gallons.
5. "LLLLLL" is the low limit in gallons.
6. "TTTTTT" is the theft limit in gallons.
7. "-LL" is RESERVED.
8. "CCCC" is RESERVED.
9. "dd" indicates the length of time in minutes (1 - 99) that the system delays a delivery report printout after a rising fuel level has been detected. If at the end of this delay period the increase is less than 25 gallons, there is no delivery report.
10. "GGGGGG" and "gggggg" represent 20 six-digit gallon values in sequence from full height capacity to 0.05 height capacity.
11. "DDDhh" is tank diameter in inches and hundredths.
12. "TTThh" is tank tilt in inches and hundredths (first character may be a negative sign).
13. "MMMMMM" indicates up to six other tanks which are manifolded to this one. Each character is a number from 1 through 4, or 0 if no other tanks are indicated.
14. "C" is channel configuration (0 = not configured, 1 = configured).
15. "P" is product code character (set by function 55T or 75T).

Function Code: **A4T** (All Systems)

Function: Standard Capacitance Data

Command Format: <SOH>A4T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

```
<SOH>A40TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
                    FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh        (1st tank)
          TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
                    FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh        (2nd tank)
                          etc.
                       up to 8 tanks
          TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
                    FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh9E653<ETX>  (last tank)
```

Single Tank:

```
<SOH>A41TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
                    FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh9E653<ETX>
```

NOTES:

1. "T" is tank number 1 through 8.
2. "NNNNN" is the number of capacitance samples contained in the report.
3. "AAAAhh", "BBBBhh, etc., are probe capacitance in hundredths starting with C0 (water segment) and ending with C9 (temperature segment).

Function Code: **A5T** (All Systems)

Function: Calibration Values

Command Format: <SOH>A5T (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple Tank:

```
<SOH>A50Taaaabbbbccccddddeeeeffffgggghhhhiiiijjjjkkkkllllmmmmnnnn
      ooooppppqqqqrrrrsssstttuuuuvvvvwwwwxxxxyyyy        (1st tank)
     Taaaabbbbccccddddeeeeffffgggghhhhiiiijjjjkkkkllllmmmmnnnn
      ooooppppqqqqrrrrsssstttuuuuvvvvwwwwxxxxyyyy        (2nd tank)
                          etc.
                       up to 8 tanks
     Taaaabbbbccccddddeeeeffffgggghhhhiiiijjjjkkkkllllmmmmnnnn
      ooooppppqqqqrrrrsssstttuuuuvvvvwwwwxxxxyyyy9E653<ETX>  (last tank)
```

Single Tank:

```
<SOH>A52Taaaabbbbccccddddeeeeffffgggghhhhiiiijjjjkkkkllllmmmmnnnn
      ooooppppqqqqrrrrsssstttuuuuvvvvwwwwxxxxyyyy9E653<ETX>
```

NOTES:

1. "T" is tank number 1 through 8.
2. "aaaa", "bbbb, etc., are probe calibration values in the following order: D0 through D7, W0 through W7, DX1 through DX7, WX1, WX2.

Function Code: **A6T** (All Systems)
Function: Probe Serial Numbers
Command Format: <SOH>A6T (T = tank number 1 to 8, 0 = all active or configured tanks)
Typical Response Message:

Multiple Tank:

<SOH>A60TCCCLLLhhSSSSSS (1st tank)
TCCCLLLhhSSSSSS (2nd tank)

etc.

up to 8 tanks

TCCCLLLhhSSSSSS9F946<ETX> (last tank)

Single Tank:

<SOH>A63TCCCLLLhhSSSSSS9F946<ETX>

NOTES:

1. "T" is tank number 1 through 8.
2. "CCC" is probe circuit board code.
3. "LLLhh" is probe length in inches and hundredths.
4. "SSSSSS" is probe serial number.

Function Code: **A70** (All Systems)
Function: Self-Diagnostic Results
Command Format: <SOH>A70
Typical Response Message: <SOH>A70IRPIRP9FDFEETX

NOTES:

1. The first "IRP" sequence is the main board test results:
   I/O, RAM, and PROM (0 = passed, 1 = failed).
2. The second "IRP" sequence is the option board test results:
   I/O, RAM, and PROM (0 = passed, 1 = failed).
3. This function does not actually run the test. Results from the last test are returned. To run the test, use 001 function.

Function Code: **A80** (All Systems) Old
Function: ID Revision Level Request
Command Format: <SOH>A80
Typical Response Message: <SOH>A80TLS250vvmmoo9FC3E<ETX>

NOTES:

1. "vv" is the TLS-250 version number.
2. "mm" is the main board software revision level.
3. "oo" is the option board software revision level.

Function Code: **A81** (All Systems) New

Function: ID Revision Level Request

Command Format: <SOH>A81

Typical Response Message: <SOH>A81TLS250vvmmooyy9FC3E<ETX>

NOTES:

1. "vv" is the option board type.
2. "mm" is the main board software revision level.
3. "oo" is the option board software revision level.
4. "yy" is the main board type, where:
   00 = eight-probe non-ESA main board,
   01 = eight-probe ESA-compatible main board,
   02 = four-probe direct-connect main board.

Function Code: **A90** (TLS-250 Standard System)

Function: Auto-Transmit Parameters

Command Format: <SOH>A90

Typical Response Message: <SOH>A90RRRDDDab$LEAK##$ab$WATR##$ab$OVFL##$ab$LOLV##$ab$THFT##$ab$DLST##$ab$DLND##$ab$EXTNON$ab$EXTOFF$9EA1F<ETX>

NOTES:

1. "RRR" is the message repeat time from 1 through 240 minutes. Use command 6EA or 8EA to set this time.
2. "DDD" is the message delay time from 1 through 240 seconds. Use command 6EB or 8EB to set this time.
3. "a" is the transmit enable status for the subsequent message (0 = disabled, 1 = enabled)
4. "b" is the repeat enable status for the subsequent message (0 = disabled, 1 = enabled)
5. $LEAK##$ is the leak alarm message.
6. $WATR##$ is the high water alarm message.
7. $OVFL##$ is the overfill alarm message.
8. $LOLV##$ is the low limit alarm message.
9. $THFT##$ is the theft alarm message.
10. $DLST##$ is the delivery start message.
11. $DLND##$ is the delivery end message.
12. When any of the above messages are transmitted, the first "#" character is replaced by the tank number, and the second "#" character is replaced by the product code. Use command 5DM or 7DM to modify these messages.
13. $EXTNON$ is the external input closed (On) message.
14. $EXTOFF$ is the external input open (Off) message.

Function Code: **A90** (TLS-250 Emergency Generator System)

Function: Auto-Transmit Parameters

Command Format: <SOH>A90

Typical Response Message: <SOH>A90RRRDDDab$LEAK##$ab$WATR##$ab$OVFL##$ab$LOLV##$ab$THFT##$ab$DLST##$ab$DLND##$ab$EXTNON$ab$EXTOFF$9EA1F<ETX>

NOTES:

1. "RRR" is the message repeat time from 1 through 240 minutes. Use command 6EA or 8EA to set this time.
2. "DDD" is the message delay time from 1 through 240 seconds. Use command 6EB or 8EB to set this time.
3. "a" is the transmit enable status for the subsequent message (0 = disabled, 1 = enabled)
4. "b" is the repeat enable status for the subsequent message (0 = disabled, 1 = enabled)
5. $LEAK##$ is the leak alarm message.
6. $WATR##$ is the high water alarm message.
7. $OVFL##$ is the overfill alarm message.
8. $LOLV##$ is the low limit alarm message.
9. $THFT##$ is the theft alarm message.
10. $DLST##$ is the delivery start message.
11. $DLND##$ is the delivery end message.
12. When any of the above messages are transmitted, the first "#" character is replaced by the tank number, and the second "#" character is replaced by the product code. Use command 5DM or 7DM to modify these messages.
13. $GNSTRT$ is the external input closed (On) message.
14. $GNSTOP$ is the external input open (Off) message.

Function Code: **A91** (TLS-250i Four-Tank System)

Function: Auto-Transmit Parameters

Command Format: <SOH>A91

Typical Response Message:

A91A91RRRDDDab$RESEVD$ab$WATR##$ab$OVFL##$ab$OVFL##$ab$LOLV##$ab$THFT##$ab$DLST##$ab$DLND##$ab$EXTNON$ab$EXTOFF$ab$FUEL##$ab$H20 ##$ab$OUT ##$ab$RESEVD$ab$RESEVD$ab$RESEVD$9DC68

NOTES:

1. "RRR" is the message repeat time from 1 through 240 minutes. Use command 6EA or 8EA to set this time.
2. "DDD" is the message delay time from 1 through 240 seconds. Use command 6EB or 8EB to set this time.
3. "a" is the transmit enable status for the subsequent message (0 = disabled, 1 = enabled).
4. "b" is the repeat enable status for the subsequent message (0 = disabled, 1 = enabled).
5. $RESEVD$ is reserved for future use.
6. $WATR##$ is the high water alarm message.
7. $OVFL##$ is the overfill alarm message.
8. $LOLV##$ is the low limit alarm message.
9. $THFT##$ is the theft alarm message.
10. $DLST##$ is the delivery start message.
11. $DLND##$ is the delivery end message.

12. When any of the above messages are transmitted, the first "#" character is replaced by the tank number, and the second "#" character is replaced by the product code. Use command 5DM or 7DM to modify these messages.
13. $EXTNON$ is the external input closed (On) message.
14. $EXTOFF$ is the external input open (Off) message.
15. $FUEL##$ is the sensor fuel leak message.
16. $H2O ##$ is the sensor water leak message.
17. $OUT ##$ is the sensor out message.
18. When sensor messages are transmitted, the first "#" is the sensor number, and the second "#" is the product code.
19. $RESEVD$ is the last three messages and is reserved for future use.

Function Code: **A91** (TLS-250i Eight-Tank System)

Function: Auto-Transmit Parameters

Command Format: <SOH>A91

Typical Response Message:

A91A91RRRDDDab$LEAK##$ab$WATR##$ab$OVFL##$ab$OVFL##$ab$LOLV##$ab$THFT##$
ab$DLST##$ab$DLND##$ab$EXTNON$ab$EXTOFF$ab$FUEL##$
ab$H2O ##$ab$OUT ##$ab$RESEVD$ab$RESEVD$ab$RESEVD$9DC68

NOTES:

1. "RRR" is the message repeat time from 1 through 240 minutes. Use command 6EA or 8EA to set this time.
2. "DDD" is the message delay time from 1 through 240 seconds. Use command 6EB or 8EB to set this time.
3. "a" is the transmit enable status for the subsequent message (0 = disabled, 1 = enabled).
4. "b" is the repeat enable status for the subsequent message (0 = disabled, 1 = enabled).
5. $LEAK##$ is the leak alarm message.
6. $WATR##$ is the high water alarm message.
7. $OVFL##$ is the overfill alarm message.
8. $LOLV##$ is the low limit alarm message.
9. $THFT##$ is the theft alarm message.
10. $DLST##$ is the delivery start message.
11. $DLND##$ is the delivery end message.
12. When any of the above messages are transmitted, the first "#" character is replaced by the tank number, and the second "#" character is replaced by the product code. Use command 5DM or 7DM to modify these messages.
13. $EXTNON$ is the external input closed (On) message.
14. $EXTOFF$ is the external input open (Off) message.
15. $FUEL##$ is the sensor fuel leak message.
16. $H2O ##$ is the sensor water leak message.
17. $OUT ##$ is the sensor out message.
18. When sensor messages are transmitted, the first "#" is the sensor number, and the second "#" is the product code.
19. $RESEVD$ is the last three messages and is reserved for future use.

Function Code: **A91** (TLS-250i Eight-Tank Emergency Generator System)

Function: Auto-Transmit Parameters

Command Format: <SOH>A91

Typical Response Message:

A91A91RRRDDDab$LEAK##$ab$WATR##$ab$OVFL##$ab$OVFL##$ab$LOLV##$ab$THFT##$
ab$DLST##$ab$DLND##$ab$GNSTRT$ab$GNSTOP$ab$FUEL##$
ab$H20 ##$ab$OUT ##$ab$RESEVD$ab$RESEVD$ab$RESEVD$9DC68

NOTES:

1. "RRR" is the message repeat time from 1 through 240 minutes. Use command 6EA or 8EA to set this time.
2. "DDD" is the message delay time from 1 through 240 seconds. Use command 6EB or 8EB to set this time.
3. "a" is the transmit enable status for the subsequent message (0 = disabled, 1 = enabled).
4. "b" is the repeat enable status for the subsequent message (0 = disabled, 1 = enabled).
5. $LEAK##$ is the leak alarm message.
6. $WATR##$ is the high water alarm message.
7. $OVFL##$ is the overfill alarm message.
8. $LOLV##$ is the low limit alarm message.
9. $THFT##$ is the theft alarm message.
10. $DLST##$ is the delivery start message.
11. $DLND##$ is the delivery end message.
12. When any of the above messages are transmitted, the first "#" character is replaced by the tank number, and the second "#" character is replaced by the product code. Use command 5DM or 7DM to modify these messages.
13. $GNSTRT$ is the generator input on message.
14. $GNSTOP$ is the generator input off message.
15. $FUEL##$ is the sensor fuel leak message.
16. $H2O ##$ is the sensor water leak message.
17. $OUT ##$ is the sensor out message.
18. When sensor messages are transmitted, the first "#" is the sensor number, and the second "#" is the product code.
19. $RESEVD$ is the last three messages and is reserved for future use.

Function Code: **AAT** (All Systems)

Function: Long Term Capacitance Data

Command Format: <SOH>AAT (T = tank number 1 to 8, 0 = all active or configured tanks)

Typical Response Message:

Multiple tank:

<SOH>AA0TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh (1st tank)

TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh (2nd tank)

.
etc.
.
up to 8 tanks
.

TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh9E653<ETX> (last tank)

Single Tank:

<SOH>AA1TNNNNNAAAAhhBBBBhhCCCChhDDDDhhEEEEhh
FFFFhhGGGGhhHHHHhhIIIIhhJJJJhh9E653<ETX>

NOTES:

1. "T" is tank number 1 through 8.
2. "NNNNN" is the number of capacitance samples contained in the report.
3. "AAAAhh", "BBBBhh", etc., are probe capacitance in hundredths starting with C0 (water segment) and ending with C9 (temperature segment).

Function Code: **ABS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Data

Command Format: <SOH>ABS (S = sensor number 1 to 8, 0 = all)

Typical Response Message:

Multiple tank:

<SOH>ABSsICDDICDD (1st sensor)
sICDDICDD (2nd sensor)

.
etc.
.
up to 8 sensors
.

sICDDICDD9E454<ETX> (last sensor)

Single tank:

<SOH>ABSsICDDICDD9EAB7<ETX>

NOTES:

1. "s" is the sensor number for data field that follows.
2. "I" is the ESA ID code.
   "F"= single sensor ESA or direct connection.
   "E"= double sensor ESA.
3. "C" is the consecutive data counter.
4. "DD" is sensor 2 data, sensor 1 data respectively.

Function Code: **ACO** (TLS-250i Four-Tank System)

Function: System Setup

Command Format: <SOH>ACO

Typical Response Message: <SOH>ACOYYMMDDHHMMTHHMMHHMMHHMMHHMMHHMM
cccccccccssssssERRRRRRRRRRRRrrrrrrrrrrrr
9cccc<ETX>

NOTES:

1. "YYMMDDHHmm" indicates present year, month, day, hour and minute.
2. "THHmmHHmm" indicates tank number "T" (0 for all-tank) and automatic shutdown mode start and stop times.
3. The next three "HHmm" sequences indicate the automatic inventory report print times 1, 2 and 3.
4. "cccccccc" indicates tank 1 through 4 configuration status (0 = not configured, 1 = configured).
5. "ssssss" is the system security code.
6. "E" is the external input alarm enable/disable.
7. "RRRRRRRRRRRR" is relay 1 configuration.
   "rrrrrrrrrrrr" is relay 2 configuration.

   Relay flags as follows:

1 - Shutdown Mode	4 - Low Limit	7 - Sensor Fuel	10 - RESERVED
2 - High Water Alarm	5 - Theft	8 - Sensor Water	11 - RESERVED
3 - Overfill Alarm	6 - External Input	9 - Sensor Out	12 - RESERVED

Function Code: **ACO** (TLS-250i Eight-Tank System)

Function: System Setup

Command Format: <SOH>ACO

Typical Response Message: <SOH>ACOYYMMDDHHMMTHHMMHHMMHHMMHHMMHHMM
cccccccccssssssERRRRRRRRRRRRrrrrrrrrrrrr
9cccc<ETX>

NOTES:

1. "YYMMDDHHmm" indicates present year, month, day, hour and minute.
2. "THHmmHHmm" indicates tank number "T" (0 for all-tank) and automatic leak detect start and stop times.
3. The next three "HHmm" sequences indicate the automatic inventory report print times 1, 2 and 3.
4. "cccccccc" indicates tank 1 through 8 configuration status (0 = not configured, 1 = configured).
5. "ssssss" is the system security code.
6. "E" is the external input alarm enable/disable.
7. "RRRRRRRRRRRR" is relay 1 configuration.
   "rrrrrrrrrrrr" is relay 2 configuration.

   Relay flags as follows:

1 - Leak Alarm	4 - Low Limit	7 - Sensor Fuel	10 - RESERVED
2 - High Water Alarm	5 - Theft	8 - Sensor Water	11 - RESERVED
3 - Overfill Alarm	6 - External Input	9 - Sensor Out	12 - RESERVED

Function Code: **ACO** (TLS-250i Eight-Tank Emergency Generator System)

Function: System Setup

Command Format: <SOH>ACO

Typical Response Message: <SOH>ACOYYMMDDHHMMTHHMMHHMMHHMMHHMMHHMM
ccccccccssssssERRRRRRRRRRRRrrrrrrrrrrrrG
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh
HHHHHHHHHHHHHHHHHHHHhhhhhhhhhhhhhhhhhhhh9cccc<ETX>

NOTES:

1. "YYMMDDHHmm" indicates present year, month, day, hour and minute.
2. "THHmmHHmm" indicates tank number "T" (0 for all-tank) and automatic leak detect start and stop times.
3. The next three "HHmm" sequences indicate the automatic inventory report print times 1, 2 and 3.
4. "cccccccc" indicates tank 1 through 8 configuration status (0 = not configured, 1 = configured).
5. "ssssss" is the system security code.
6. "E" is the external input alarm enable/disable.
7. "RRRRRRRRRRRR" is relay 1 configuration.
   "rrrrrrrrrrrr" is relay 2 configuration.
   Relay flags as follows:

1 - Leak Alarm	4 - Low Limit	7 - Sensor Fuel	10 - RESERVED
2 - High Water Alarm	5 - Theft	8 - Sensor Water	11 - RESERVED
3 - Overfill Alarm	6 - Generator Start	9 - Sensor Out	12 - RESERVED

8. "G" indicates the present generator off mode where:

0 = Normally Open Leak Report Disabled	2 = Normally Open Leak Report Enabled
1 = Normally Closed Leak Report Disabled	3 = Normally Closed Leak Report Enabled

9. The last 80 "H" or "h" characters indicate the four 20-character print header lines 1, 2, 3 and 4.

Function Code: **ADS** (TLS-250i Four-Tank; TLS-250i Eight-Tank; TLS-250i Eight-Tank Emergency Generator Systems)

Function: Sensor Setup

Command Format: <SOH>ADS (S = sensor number 1 to 8, 0 = all)

Typical Response Message:

Multiple tank: <SOH>ADSsAftttBfttt (1st sensor)
sAftttBfttt (2nd sensor)
.
etc.
.
up to 8 sensors
.
sAftttBfttt9E454<ETX> (last sensor)

Single tank: <SOH>ADSsAftttBfttt9EAB7<ETX>

NOTES:

1. "s" is the sensor number for data field that follows.
2. "A" A sensor setup data to follow.
3. "f" is the sensor type. If "f" is:

0 = Standard Sensor Water Audible Disabled	2 = Normally Open Switch Sensor
1 = Standard Sensor Water Audible Enabled	3 = Normally Closed Switch Sensor

4. "ttt" is the water alarm delay time in xx.x hours.†
5. "B" B sensor setup data to follow.
6. "f" is the sensor type. If "f" is:

0 = Standard Sensor Water Audible Disabled	2 = Normally Open Switch Sensor
1 = Standard Sensor Water Audible Enabled	3 = Normally Closed Switch Sensor

7. "ttt" is the water alarm delay time in xx.x hours.†

†Sensor Type 0 or 1 Only

8.0 FUNCTION CODE SUMMARY

CODE	CONTROL FUNCTIONS (Computer Format)
001	Cold Start (Reset)
002	Clear Power Reset Status
003	Remote Alarm Reset
004	Auto-Transmit Flag Reset
005	Computer Format End of Message
006	Display Format End of Message
	OPERATIONAL REPORTS (Computer Format)
10T	Inventory Report
11T	Leak Report
12T	Turn ON Leak Test (Shutdown Mode*)
130	Turn OFF Leak Test (Shutdown Mode*)
14T	Alarm History Report
15T	Delivery Report
160	Clear Stored Delivery Reports
17T	Stored Inventory Report 1
18T	Stored Inventory Report 2
19T	Stored Inventory Report 3
1AT	Alarm Status Report
1BT	Auto-Transmit Flag Status Report
1CT	Stored Leak Test Analysis Report
1DT	Present Leak Test Analysis Report
1ES	Sensor Alarm Status
1FS	Sensor Auto-Transmit Flag Status
1GS	Sensor Alarm History Report
	OPERATIONAL REPORTS (Display Format)
20T	Inventory Report
21T	Leak Report
22T	Turn ON Leak Test (Shutdown Mode*)
230	Turn OFF Leak Test (Shutdown Mode*)
24T	Alarm History Report
25T	Delivery Report
260	Clear Stored Delivery Reports
27T	Stored Inventory Report 1
28T	Stored Inventory Report 2
29T	Stored Inventory Report 3
2AT	Alarm Status Report
2BT	Auto-Transmit Flag Status Report
2CT	Stored Leak Test Analysis Report
2DT	Present Leak Test Analysis Report
2ES	Sensor Alarm Status
2FS	Sensor Auto-Transmit Flag Status
2GS	Sensor Alarm History Report

CODE	SETUP FUNCTIONS (Computer Format)
500	Set Calendar Clock
51T	Set Tank T Leak Test Start Time
519	Set Leak Test Stop Time
521	Set Auto-Print Time 1
522	Set Auto-Print Time 2
523	Set Auto-Print Time 3
531	Set Print Header Line 1
532	Set Print Header Line 2
533	Set Print Header Line 3
534	Set Print Header Line 4
54T	Set Tank T Product Label
55T	Set Tank T Product Code
56T	Set Tank T High Water Alarm Limit
57T	Set Tank T Overfill Alarm Limit
58T	Set Tank T Low Limit Alarm Limit
59T	Set Tank T Theft Alarm Limit
5AT	Set Tank T Leak Alarm Limit
5BT	Set Tank T Temperature Coefficient
5CT	Set Tank T Delivery Report Delay
5DM	Set Auto-Transmit Message
5EO	Set External Input Alarm Enable
60T	Set Tank T Full Height Volume (Clear 0.80 - 0.95 Volume)
61T	Set Tank T 1/4 Height Volume (Clear 0.05 - 0.20 Volume)
62T	Set Tank T 1/2 Height Volume (Clear 0.30 - 0.45 Volume)
63T	Set Tank T 3/4 Height Volume (Clear 0.55 - 0.70 Volume)
64T	Set Tank T Diameter
65T	Set Tank T Tilt
66T	Set Tank T Manifolded Partners
670	Set Channel Configuration
680	Set Security Code
69T	Set Tank T 1.00 - 0.80 Height Volume
6AT	Set Tank T 0.75 - 0.55 Height Volume
6BT	Set Tank T 0.50 - 0.30 Height Volume
6CT	Set Tank T 0.25 - 0.05 Height Volume
6DR	Set Relay R Configuration
6EM	Set Message M Auto-Transmit Mode
6EN	Set Auto-Transmit Timer N
6FO	Set Generator Off Mode
6GS	Set Audible Water Alarm Disable and Water Alarm Delay Time

**Shutdown Mode for TLS-250i Four-Tank System Only.*

CODE	SETUP FUNCTIONS (Display Format)
700	Set Calendar Clock
71T	Set Tank T Leak Test Start Time
719	Set Leak Test Stop Time
721	Set Auto-Print Time 1
722	Set Auto-Print Time 2
723	Set Auto-Print Time 3
731	Set Print Header Line 1
732	Set Print Header Line 2
733	Set Print Header Line 3
734	Set Print Header Line 4
74T	Set Tank T Product Label
75T	Set Tank T Product Code
76T	Set Tank T High Water Alarm Limit
77T	Set Tank T Overfill Alarm Limit
78T	Set Tank T Low Limit Alarm Limit
79T	Set Tank T Theft Alarm Limit
7AT	Set Tank T Leak Alarm Limit
7BT	Set Tank T Temp. Coefficient
7CT	Set Tank T Delivery Report Delay
7DM	Set Auto-Transmit Message
7EO	Set External Input Alarm Enable
80T	Set Tank T Full Height Volume (Clear 0.80 - 0.95 Volume)
81T	Set Tank T ¼ Height Volume (Clear 0.05 - 0.20 Volume)
82T	Set Tank T ½ Height Volume (Clear 0.30 - 0.45 Volume)
83T	Set Tank T ¾ Height Volume (Clear 0.55 - 0.70 Volume)
84T	Set Tank T Diameter
85T	Set Tank T Tilt
86T	Set Tank T Manifolded Partners
870	Set Channel Configuration
880	Set Security Code
89T	Set Tank T 1.00 - 0.80 Height Volume
8AT	Set Tank T 0.75 - 0.55 Height Volume
8BT	Set Tank T 0.50 - 0.30 Height Volume
8CT	Set Tank T 0.25 - 0.05 Height Volume
8DR	Set Relay R Configuration
8EM	Set Message M Auto-Transmit Mode
8EN	Set Auto-Transmit Timer N
8FO	Set Generator Off Mode
8GS	Set Audible Water Alarm Disable and Water Alarm Delay Time

CODE	DIAGNOSTIC REPORTS (Display Format)
90T	Tank Chart Volume, Single Point
91T	Full Tank Chart
920	Send Message to Printer
930	System Setup Parameters
93T	Tank Setup Parameters
94T	Standard Capacitance Data
95T	Calibration Values
96T	Probe Serial Numbers
970	Self-Diagnostic Results
980	ID Revision Level Request
990	Auto-Transmit Parameters
9AT	Long Term Capacitance Data
9BS	Sensor Data Report
9CO	System Setup Parameters
9DS	Sensor Setup Report

CODE	DIAGNOSTIC REPORTS (Computer Format)
A0T	Tank Chart Volume, Single Point
A20	Send Message to Printer
A30	System Setup Parameters
A3T	Tank Setup Parameters
A4T	Standard Capacitance Data
A5T	Calibration Values
A6T	Probe Serial Numbers
A70	Self-Diagnostic Results
A80	ID Revision Level Request - Old
A81	ID Revision Level Request - New
A90	Auto-Transmit Parameters
A91	Auto-Transmit Parameters
AAT	Long Term Capacitance Data
ABS	Sensor Data Report
ACO	System Setup Parameters
ADS	Sensor Setup Report

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Environmental Products

125 Powder Forest Drive, Post Office Box 2003, Simsbury, CT 06070-2003 TEL: (203) 651-2700, FAX: (203) 651-2719

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