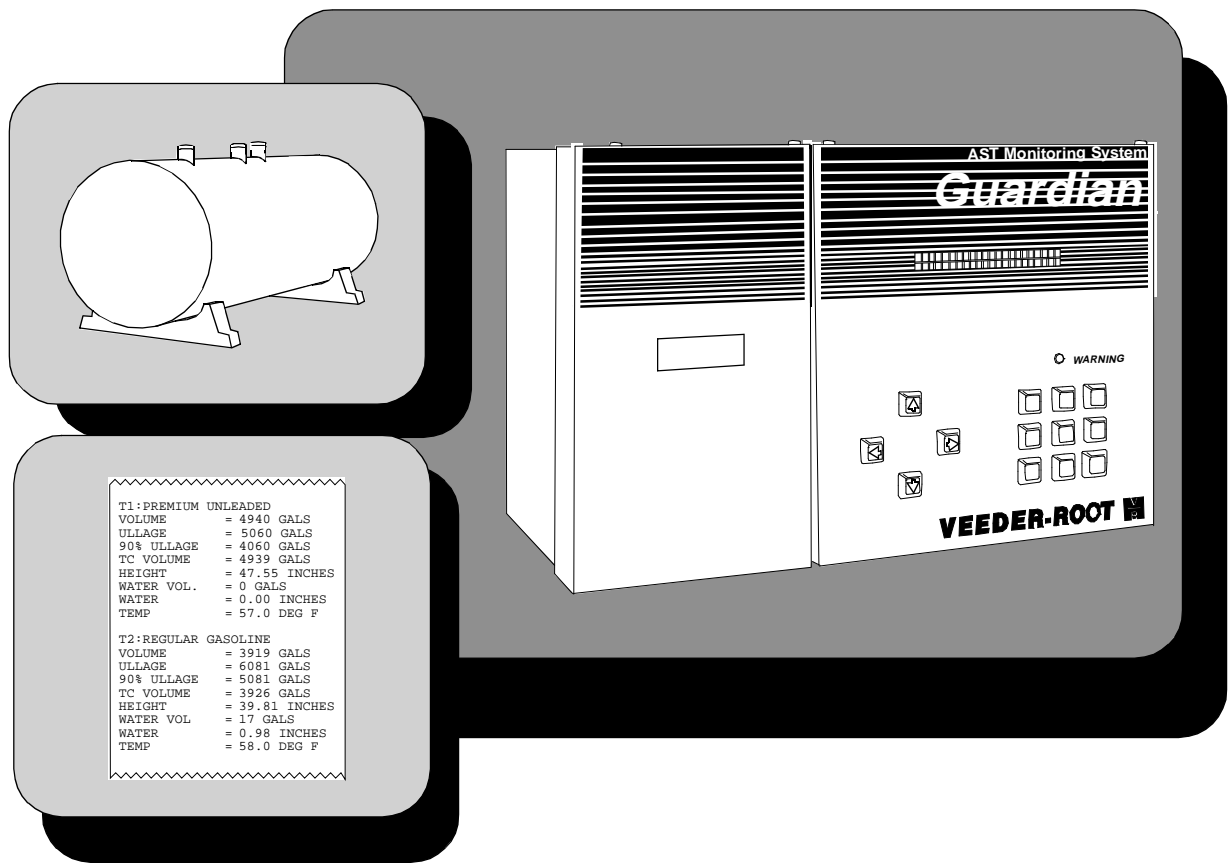


Setup and Operating Manual

Guardian

AST Monitoring System

Manual Number 576013-978, Revision C



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Introduction

General

This manual describes the setup and operating procedures for the Guardian AST.

Safety Symbols

The following safety symbols are used throughout this manual to alert you to important safety hazards and precautions.



Explosive

Fuels and their vapors are extremely explosive if ignited.



Flammable

Fuels and their vapors are extremely flammable.



Electricity


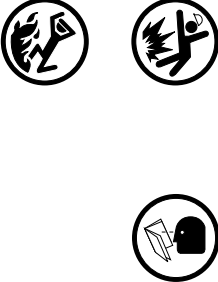
High voltage exists in, and is supplied to, the device. A potential shock hazard exists.



Read All Related Manuals

Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does.

Safety Warnings

 WARNING	
	<p>This system operates near highly combustible fuel storage tanks.</p> <p>Fire or explosion resulting in serious injury or death could result if the equipment is improperly installed or modified or is used in any way other than its intended use. Serious contamination of the environment may also occur.</p> <p>To ensure proper installation, operation, and continued safe use of this product:</p> <ol style="list-style-type: none">1. Read and follow all instructions in this manual, including all safety warnings.2. Have equipment installed by a contractor trained in its proper installation and in compliance with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.3. Do not modify or use service parts other than those provided by Veeder-Root.

Description

The AST console is designed for compliance and inventory control in above ground storage tanks where in-tank leak detection is not required. The system is capable of monitoring one or two tanks as well as up to six sensors. Three output relays as well as an RS-232 port are supplied.

Console Features

The AST console [Figure 1] has these features:

- A two-line, 24-character-per-line display.
- A cursor keypad and a keypad for stepping through menu-driven programming and operation functions.
- A red warning indicator on the front panel to alert you of leaks and other warning and alarm conditions.
- An internal audible warning and alarm indicator to alert you of leaks and other warning and alarm conditions.
- An **optional** printer for inventory, sensor status, shift, setup, delivery, and alarm reports.

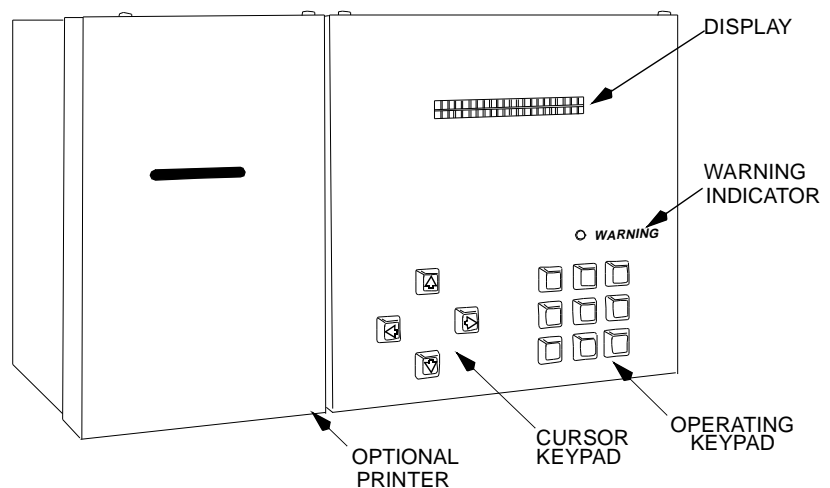


Figure 1. AST Console

Probes and Sensors

The following [Table 1] probes and sensors are compatible with the AST console.

Table 1. Probes and Sensors Compatible with AST Console

Part No.	Description
847390-3XX	Magnetostrictive Probe for Inventory Measurement
794390-YXX	High/Low Level Sensors
794390-40X	Interstitial Sensor for Fiberglass Tanks
794390-420	Interstitial Sensor for Steel Tanks
794390-205	Piping Sump Sensor
794380-301	Single-Float Hydrostatic Sensor
794380-302	Dual-Float Hydrostatic Sensor

Inventory-only measurement probes are available in lengths up to six feet. For longer lengths, standard mag probes can be used; however, the console will not perform tank leak tests.

Magnetostrictive Probes

Magnetostrictive probes allow inventory management, and in-tank warnings and alarms for the following conditions:

- High Product
- Maximum Product
- Low Product
- High Water

High/Low Level Sensors

High/Low Level Sensors indicate either a delivery is required or an overfill condition is present. (The indication depends on the sensing type selected.)




Interstitial and Piping Sump Sensors

Interstitial and Piping Sump Sensors indicate the presence of liquid in an interstitial area of a tank or in a piping sump.

Hydrostatic Sensors

Hydrostatic Sensors monitor liquid-filled double walled tanks, such as brine-filled tanks.

Run/Program Mode

 WARNING	
	<p>This equipment utilizes lethal voltages.</p> <p>Serious injury or death may occur if you contact high voltage wiring or components while accessing any internal programming switches.</p>
	<ol style="list-style-type: none">1. Do not access the inside of the console unless you have been trained in this equipment's service and are familiar with safety precautions necessary with handling live electronic components.2. Do not touch or disturb any electronic board, electrical components, or wires when accessing the switch. Do not wear conductive jewelry or watches.

The RUN/PROGRAM switch is on the back of the console door [Figure 2 on page 8]. The switch must be in the PROGRAM mode to setup the system. When setup is complete, return the switch to the RUN mode.

Relay Outputs

Three built-in output relays [Figure 2 on page 8] are provided for alarms and cutoffs. Relays can shut down the submersible pump if power to the console is lost or the system detects a leak.

Monitoring Functions

Monitoring functions, such as inventory control and leak sensing, are provided by probes and sensors connected to the circuitry in the intrinsically safe area of the console [Figure 2 on page 8].

Probe Interface

The interface accepts inputs from up to two in-tank Magnetostrictive Probes for Inventory Measurement.

Sensor Interface

The interface accepts inputs from up to six interstitial, piping sump, high/low and hydrostatic liquid sensors.

Reset Switch

The Reset switch is used as a service tool for authorized service personnel only. Do Not Press This Switch! It may erase all programmed setup data.

Communications Interface

An external communications interface is provided through a 25-pin, D connector, RS-232 Interface [Figure 3 on page 8]. Data can be accessed directly via a null modem cable or through an external modem and telephone line to a computer. The console communicates at 1200 baud, odd parity, seven data bits, and one stop bit.

The Communications Interface supports the following TLS-250 display format commands:

Table 2. TLS-250 Display Format Commands

Commands
200 Inventory
250 Delivery

The Communications Interface supports the following TLS-350 display format commands:

Table 3. TLS-350 Display Format Commands

Commands
S00100 Reset
S00200 Clear Reset Flag
S00300 Remote Alarm Reset
I10100 System Status Report
I20100 Inventory
I20200 Delivery
I20400 Shift Inventory
I20500 Tank Status
I20600 Tank Alarm History
I30100 Sensor Status
I30200 Sensor Alarm History
I40600 Relay Status
S50100 Set Time of Day
IA0100 Tank Diagnostics
IB0100 Sensor Diagnostics

Important  *The Communications Interface does not support computer format protocol.*

Printer Interface

The printer interface is a parallel printer port.

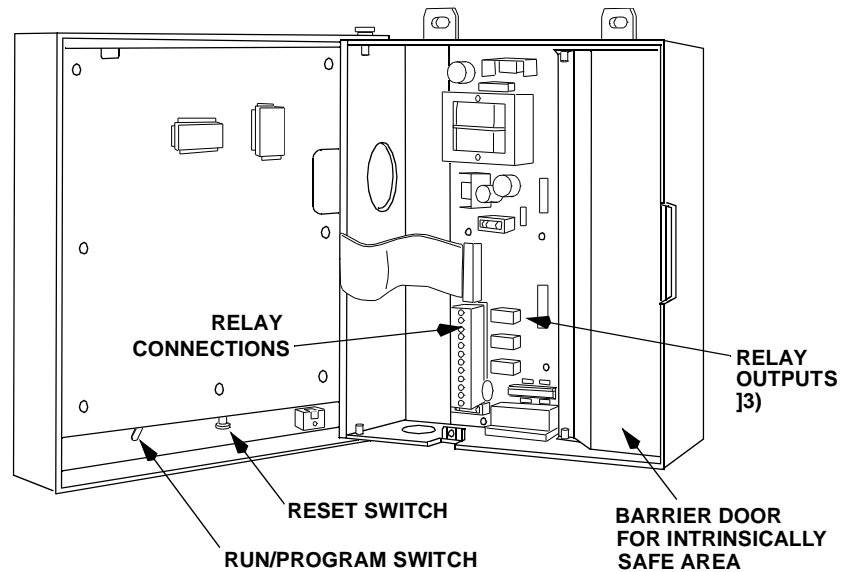


Figure 2. AST Console, Inside View

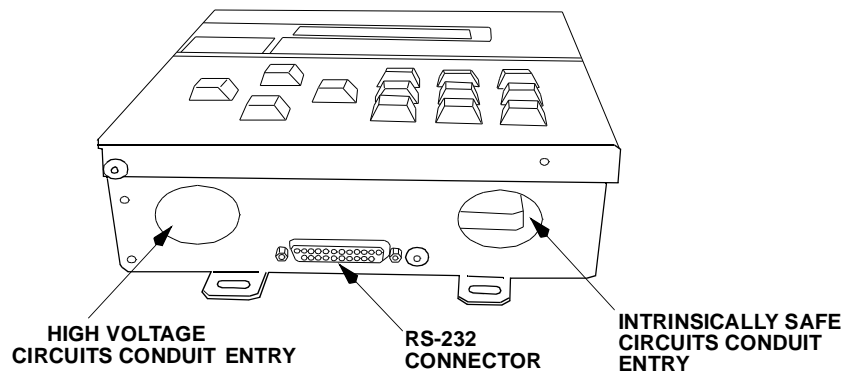


Figure 3. Conduit Entries and RS-232 Connector

Keypad

The keypad [Figure 4 on page 9] is arranged in two groups: cursor keys and operating keys. The cursor and operating keys make programming and operating simple.

Operating Keys

The operating keys on the right of the front panel [Figure 4 on page 9]. They let you access and print data, program the system, test system operation and review diagnostic

information. In the PROGRAM Mode, all Operating Keys are functional. In the RUN Mode, only the Change key is disabled.

Cursor Keys

The cursor movement keys are the blue arrow keys on the left of the front panel [Figure 4]. They allow you to advance through the menu by moving up and down and to move left and right on the display during data entry.

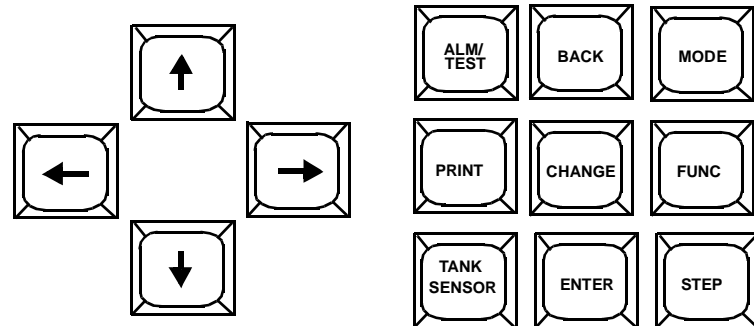


Figure 4. Cursor and Operating Keys

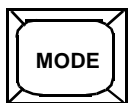
Operating Key Functions



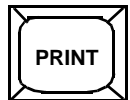
ALARM/TEST silences the alarm. It does not clear the alarm message from the display or disable the alarm.



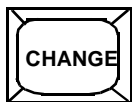
BACKUP lets you move backward through Steps, Functions and Modes to access data or entries you have already passed.



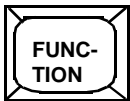
MODE selects a mode: Operating, Setup, or Diagnostic. If you press MODE while in a Function or Step, the system advances to the next mode.



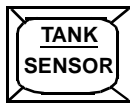
PRINT If you have an optional printer, pressing PRINT will print inventory, delivery, sensor status, setup and alarm history reports, depending on the function you have selected.



CHANGE is used in Setup Mode to enter and revise a previous setup parameter or change an entry. The Run/Program switch must be in PROGRAM for this key to work.



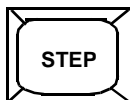
FUNCTION accesses functions within a mode. If you press FUNCTION while in a Step, the system advances to the next function.



TANK/SENSOR advances by tank, sensor, or relay through setup procedures or diagnostic data.



ENTER completes a selection or enters data into a function.



STEP advances to the next step in an operation.

Setup Procedures

You can enter system information and choose operating parameters that tailor the AST console to your particular site and monitoring requirements. You use the front-panel keypad to choose setup options and enter setup data.

Setup Overview

The AST console takes you through setup in the logical paths as shown in the Setup Mode Programming Charts on the following pages. When appropriate, refer to the notes included with each programming chart for specific information on the selections available for certain setup steps. These charts also let you know the types of information you will need to obtain before you start programming the AST console.

Setup Mode

In order to enter setup information, you must be in the Setup Mode. To access Setup Mode, press MODE until you see the SETUP MODE message [Figure 6 on page 12].

Functions and Steps

Once you are in the Setup Mode, you press the FUNCTION key to access the desired setup function. Functions are general categories of procedures for the AST console. Within the Setup Mode there are four basic setup functions:

- System Setup
- Tank Setup
- Sensor Setup
- Relay Setup

Within each Function are Steps where enter setup data or make setup choices.

Chart Symbols

The following [Figure 5] symbols are used in the charts:

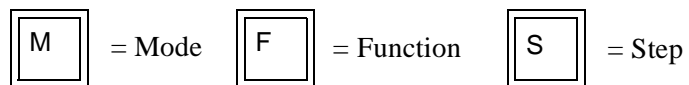


Figure 5. Symbols Used for Setup

System Setup

To enter System Setup information, choose the System Setup function within the Setup Mode. Then step through the various System Setup parameters [Figure 6].

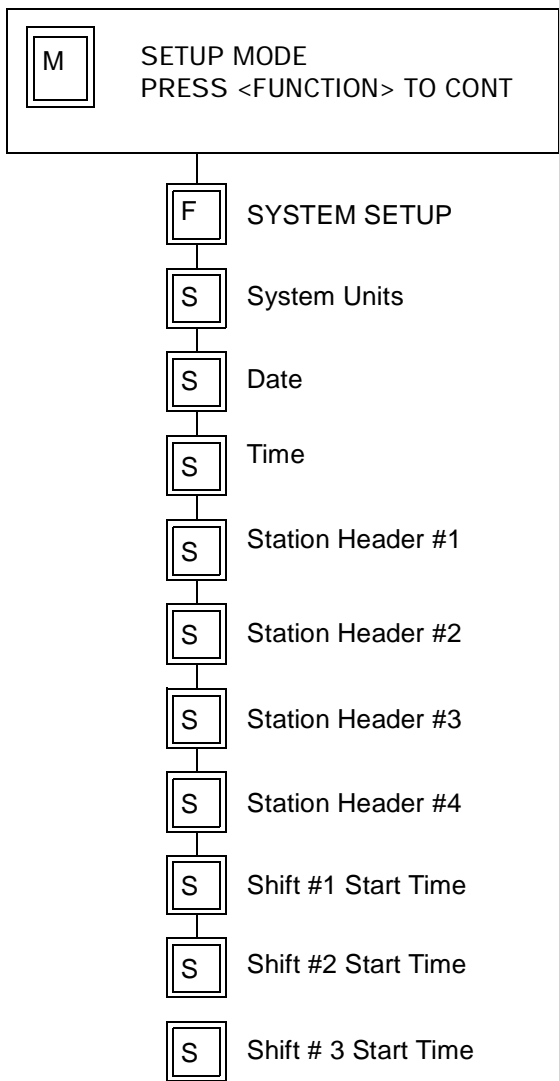


Figure 6. Setup Mode Chart

Once you have entered data, you must press the ENTER key to store the information. Failure to press ENTER will restore the original data when you press STEP, FUNCTION, or MODE. Pressing TANK/SENSOR during programming will index the tank or sensor to the next one to be programmed. When in SETUP, if no keying activity occurs for 15 minutes, a time-out will return the screen to operating mode and any data not confirmed with the ENTER key will be lost.

Tank Setup

To enter Tank Setup information, choose the Tank Setup function within the Setup Mode. Then step through the various Tank Setup parameters [Figure 7].

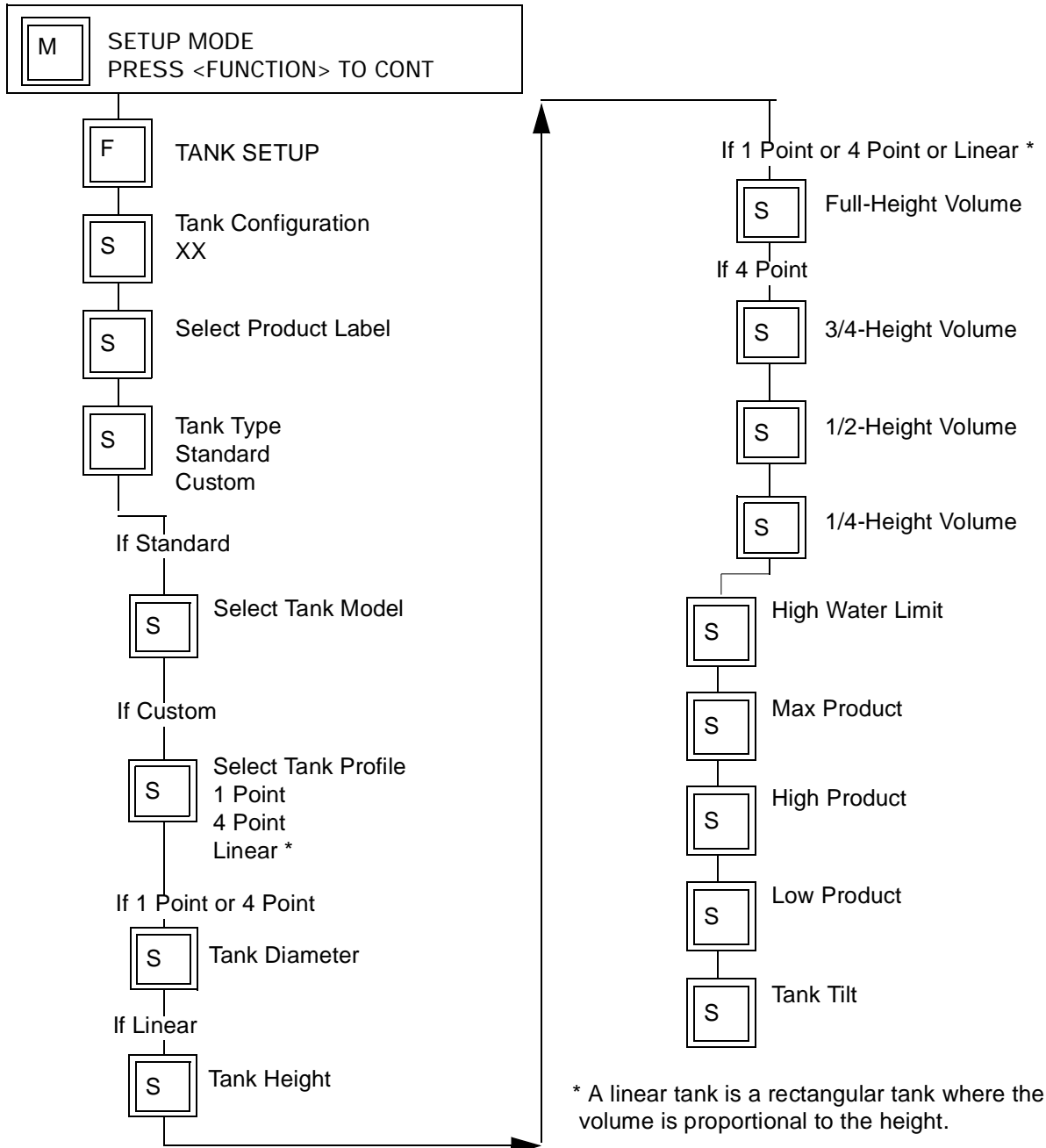


Figure 7. Tank Setup Chart

Select Product Labels

To change the default value for product labels:

1. Press the CHANGE function key.
2. Use the down cursor arrow to select one of the following Product Labels:
 - UNLEADED
 - DIESEL
 - KEROSENE
 - JET FUEL
 - UNLEADED PREMIUM
 - TOLUENE
 - AV GAS
 - #2 HEATING OIL
 - WASTE OIL
 - WATER
 - PRODUCT
 - GASOLINE
3. Press ENTER to complete your selection.

Select Tank Type

To change the default value for tank type:

1. Press the CHANGE function key.
2. Use the down cursor arrow key to select one of the following tank types:

OC-DWG6	10000/9728G	8'
OC-DWG6	12000/11627G	8'
OC-DW	2500/2649G	6'
OC-DWD5	1000/971G	4'
OC-DWD5	550/548G	4'
OC-DWG6	6000/5929G	8'
OC-DWG6	8000/7829G	8'
OC-DWD6	4000/3918G	8'
OC-DWD6	20000/19947G	10'
OC-DWD5	600/610G	4'
OC-DWD6	15000/15104G	10'
OC-DWD6	6000/5997G	6'
OC-D6	2000/2086G	6'
OC-G6	4000/4030G	8'
OC-D6	15000/15104G	10'
CD-D6	25000/24677G	12'

OC-D6	30000/29695G	12'
OC-D6	40000/39276G	12'
OC-D6	48000/47821G	12'
OC-D3	25000/24474G	12'
OC-D3	30000/31205G	12'
OC-D3	40000/39185G	12'
OC-D3	48000/47655G	12'
OC-DWTII	30000/29982G	10'
OC-DWTII	25000/24989G	10'
OC-DWTII	6000/6136G	6'
HM-2	250	3' 3"
HM-5	500	3' 4"
HM-10	1000	4' 8"
HM-20	2000	5' 1"
HM-40	4000	6' 4"
HM-50	5000	6' 4"
HM-60	6000	7' 4"
HM-80	8000	7' 10"
HM-100	10000	7' 10"
HM-120	12000	7' 10"
CV-2	250	23"
CV-5	500	24"
CV-10	1000	36"
CV-20	2000	46.81"
CV-40	4000	58"
CV-50	5200	65"
CV-60	6000	86"
CV-80	8000	86"
CV-100	10000	86"
CV-120	12000	86"

Tank Alarm Types

High Water Limit - High water level alarm warns when the level of water at the bottom of the tank reaches the programmed limit. This limit should be set at a level lower than the pickup for the submersible pump or suction line. Enter the high water limit in gallons.

Max Product - Product level alarm warns of a potential overflow during a bulk delivery. The level should be set no higher than 90% to permit a tank truck operator to react to an alarm before an overflow or spill occurs. Enter amount in gallons.

High Product - High product level alarm warns when the level of fluid in the tank reaches the programmed limit. The High Level alarm will occur whenever its limit is exceeded whether or not a delivery is in progress. This is especially useful in applications such as used oil holding tanks, where the rate of fill can be too gradual for the system to recognize the increase as a delivery. Enter amount in gallons.

Low Product - Low product level alarm warns when inventory in a tank drops to the programmed limit. Enter amount in gallons.

Tank Tilt

If the tank is tilted, you will need to make adjustments using Tank Tilt. Tank tilt lets you adjust for a difference between fuel height at the probe location and fuel height at the center of the tank. Use Table 1 to record measurements and perform tank tilt calculations for up to two tanks:

1. Stick the tank at the fill riser at least three times. Record the average in column (a).
2. Stick the tank at the probe riser opening at least three times. Record the average reading in inches in column (b).
3. Subtract the fuel height at the probe riser (b) from the height at the fill riser (a). Record the results in column (c).
4. Measure the distance **in inches** between the probe and fill risers and record the measurement in column (d). Record positive or negative number as calculated.
5. Divide the value in column (c) by column (d) to determine the pitch. Record the results in column (e). Be sure to record the plus or minus sign.
6. Measure the distance in inches or millimeters from the probe riser to the center of the tank. Record the distance in column (f). Be sure to record the plus or minus sign.
7. Multiply column (e) by column (f) to determine tank tilt value. Be sure to record the plus or minus sign.

Table 4. Tank Tilt Chart

Tank #	Product Height Fill Riser (a)	Product Height Probe Riser (b)	(a-b) (c)	Distance, Fill to Probe Risers (d)	Pitch (c ÷ d) (e)	Distance, Probe Riser to Tank Center (f)	Tank Tilt Factor (e X f) (g)
1							
2							

To enter the Tank tilt factor for the selected tank, press CHANGE. Enter the value as calculated according to the above procedures (inches or millimeters depending on the units specified in System Setup). If the value is negative, press the +/- key so a minus (-) sign appears on the display. (If the probe is at the deep end of the tank, tilt will be a negative number.) Press ENTER. The system confirms your entry and displays:

TANK TILT ±XXX.XX
PRESS <STEP> TO CONTINUE

Sensor Setup

To enter Sensor Setup information, choose the Sensor Setup function within the Setup Mode. Then step through the various Sensor Setup parameters [Figure 8].

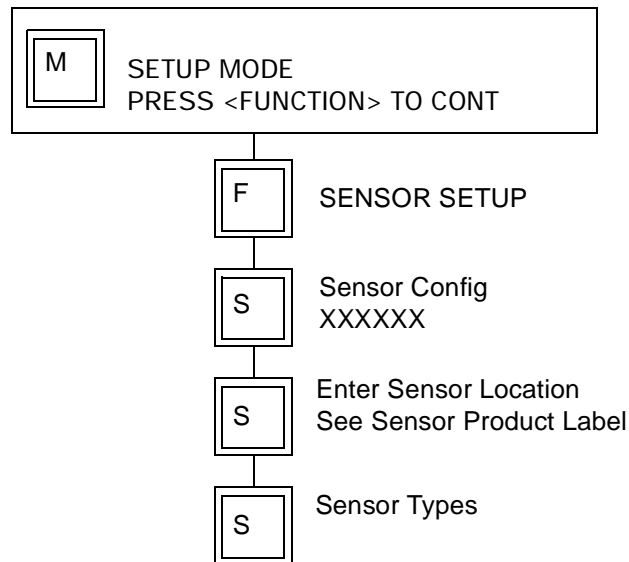


Figure 8. Sensor Setup Chart

Sensor Product Labels

1. Press the CHANGE function key.
2. Use the down cursor arrow key to select one of the following Product Labels:
 - UNLEADED
 - DIESEL
 - KEROSENE
 - JET FUEL
 - UNLEADED PREMIUM
 - TOLUENE
 - AV GAS
 - #2 HEATING OIL
 - USED OIL
 - WATER
 - PRODUCT
 - GASOLINE

Sensor Type

1. To change the type, press the CHANGE function key.
2. Use down cursor arrow key to select one of the following types.
 - INTERSTITIAL
 - SUMP
 - HIGH LEVEL
 - LOW LEVEL
 - HYDROSTATIC

Relay Setup

To enter Relay Setup information, choose the Relay Setup function within the Setup Mode. Then step through the various Relay Setup parameters [Figure 9 on page 19].

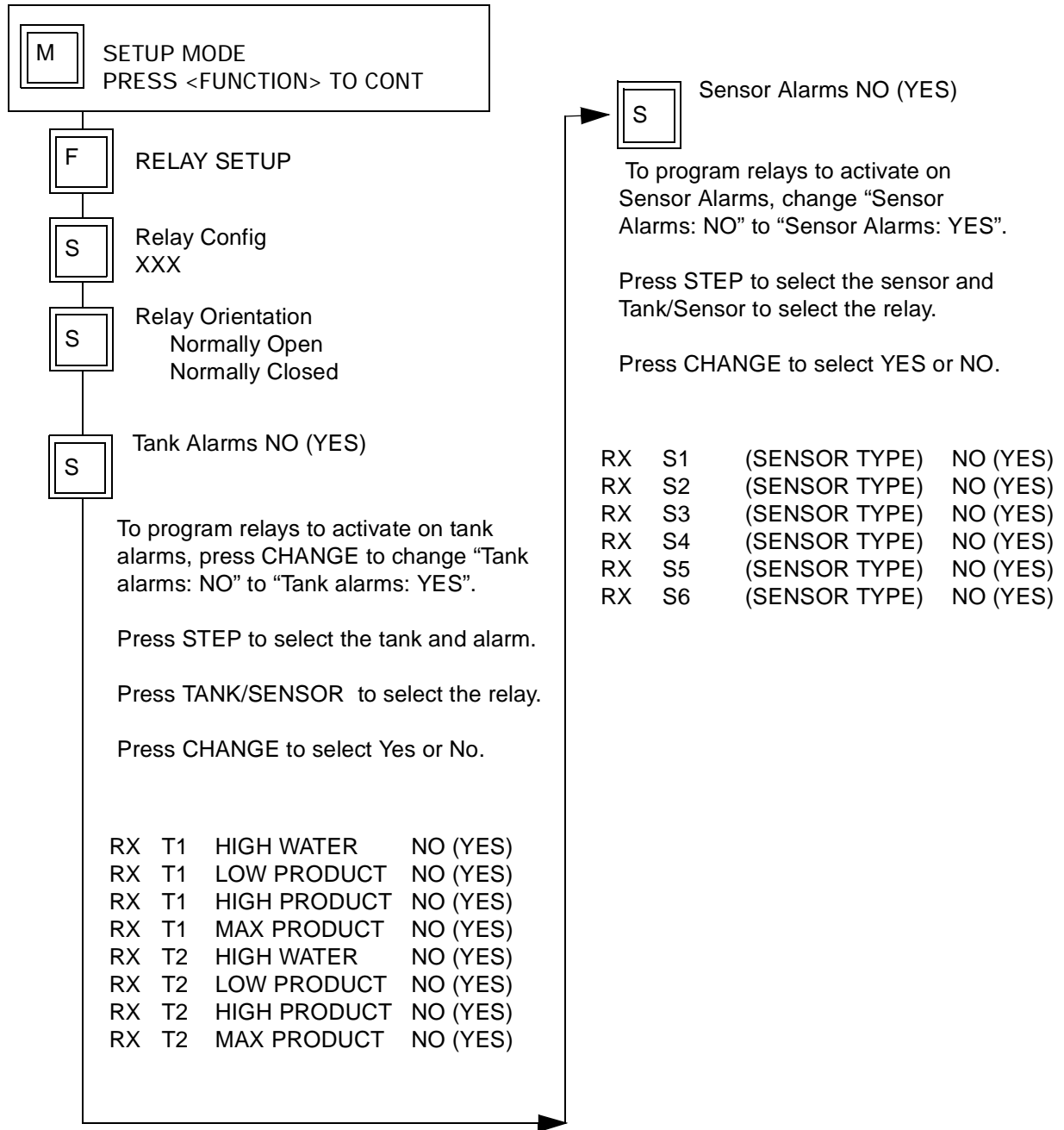





Figure 9. Relay Setup Chart

Setup Example

The following example takes you step-by-step through a procedure System Setup procedure for entering station data.

 WARNING	
 	<p>This equipment utilizes lethal voltages.</p> <p>Serious injury or death may occur if you contact high voltage wiring or components while accessing any internal programming switches.</p> <ol style="list-style-type: none">1. Do not access the inside of the console unless you have been trained in this equipment's service and are familiar with safety precautions necessary with handling live electronic components.2. Do not touch or disturb any electronic board, electrical components, or wires when accessing the switch. Do not wear conductive jewelry or watches.

Before You Begin

Make sure you have read and are familiar with the Setup Mode before programming the AST console.

Make sure you are in the PROGRAM mode. The RUN/PROGRAM switch should be set to Program.

Entering Station Data

To enter station data, choose Setup Mode, then choose System Setup. Then step through the various System Setup parameters and enter information or choose settings, as illustrated in the following example [Figure 10 on page 21].

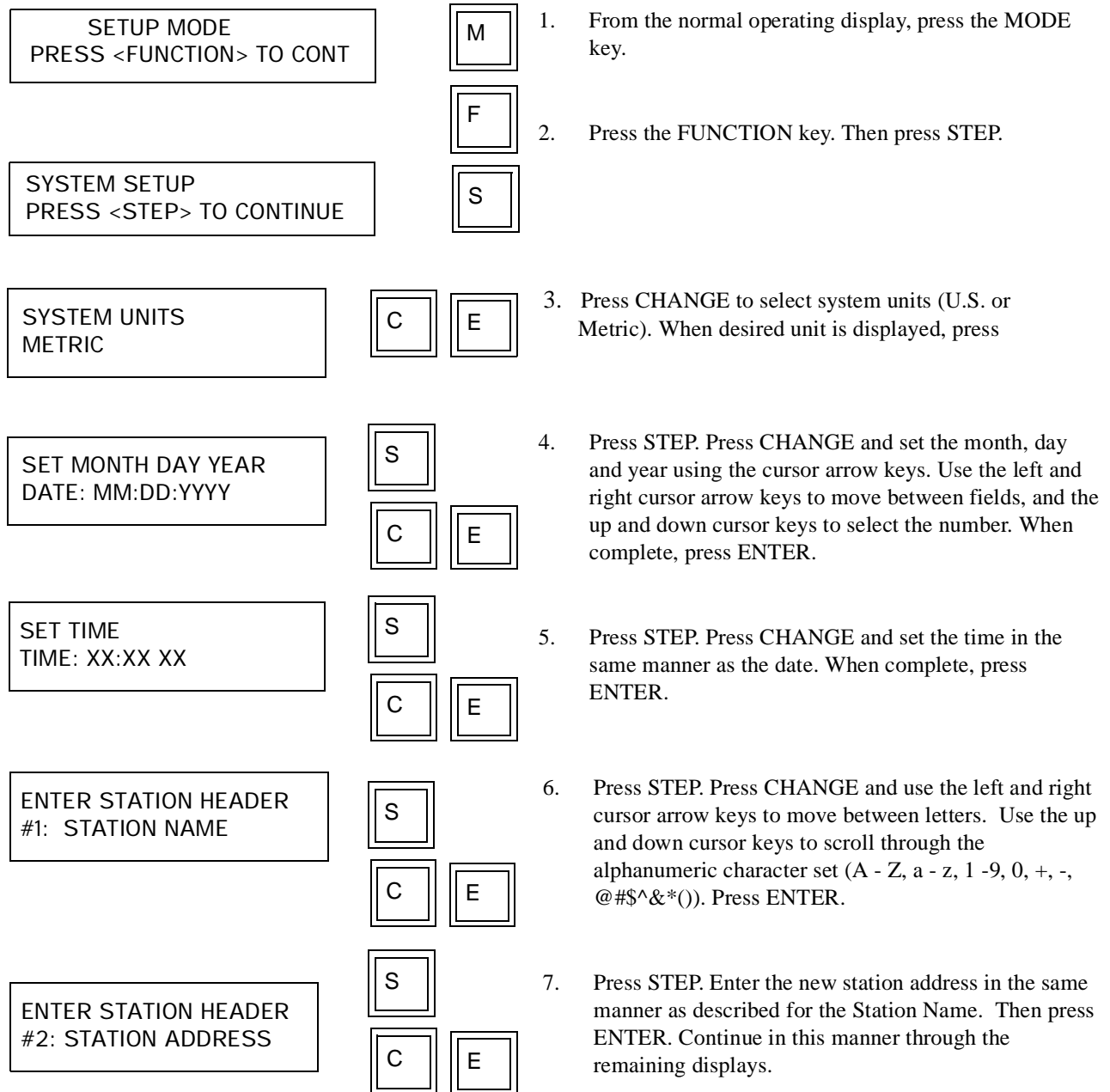


Figure 10. Programming Example: Entering Station Data

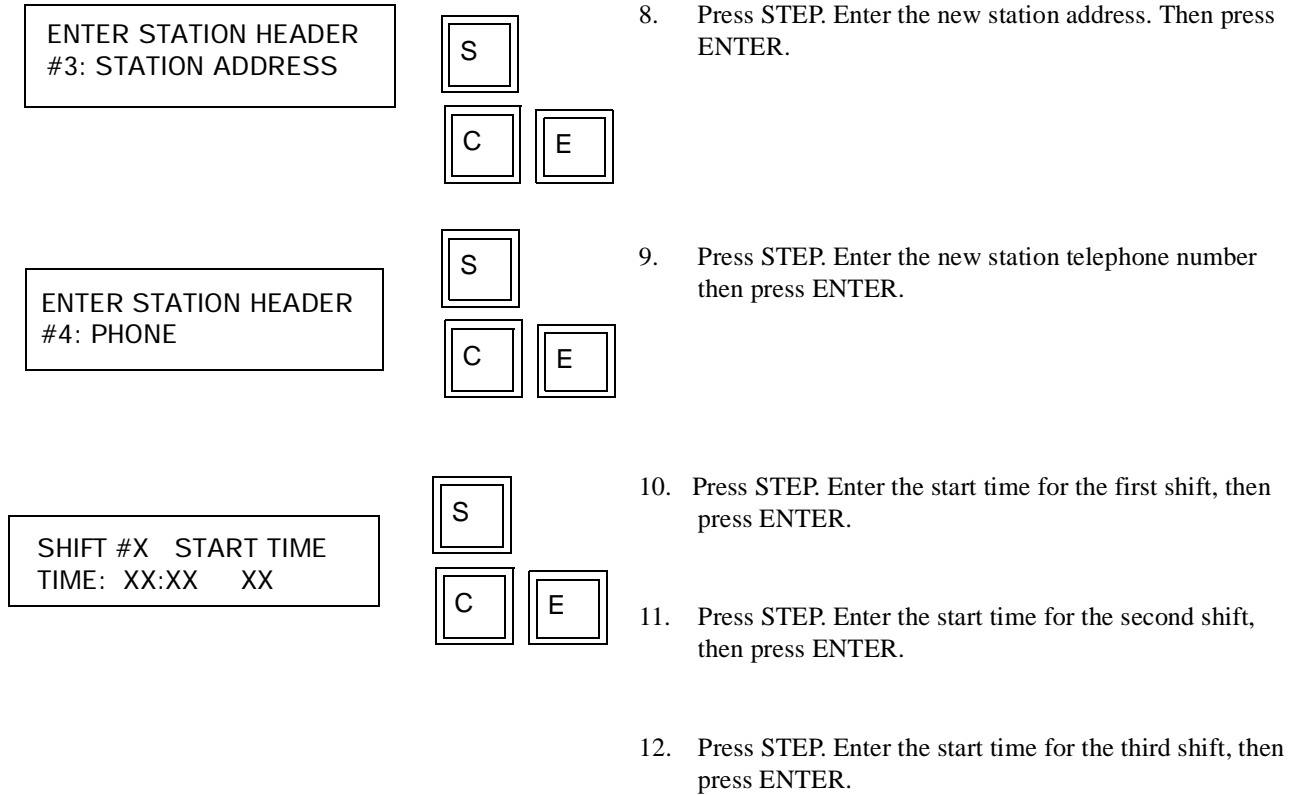


Figure 10. Programming Example: Entering Station Data (Continued)

Operating Procedures

Information regarding tank inventories, shift inventories, and sensor status as well as means to test relays are provided in the operating mode. Access to information and testing can be done by pressing keys in the order as shown in the chart [Figure 11].

F

Press the FUNCTION key to select from among the following: In-Tank Inventory, Last Shift Inventory, Sensor Status, Test Output Relays.

S

From In-Tank Inventory, press STEP to select one of the following: Fuel Volume, Fuel Height, Water Volume, Water Height, Water Volume, Water Height, Fuel Temperature, Ullage, Delivery Increase Amount.

S

From Last Shift Inventory, press STEP to select one of the following: Beginning Inventory, Ending Inventory, Delivery Offset, Gross Change.

S

From Sensor Status, press STEP to select the following: Sensor Location (Normal or Alarm).

S

From Test Output Relays, press STEP to select on of the following: Activate Relay Output, Deactivate Relay Output.

Figure 11. Operating Mode Functions

In-Tank Inventory

In-Tank Inventory lets you view and print information about how much product you have in your tanks. From the ALL FUNCTIONS NORMAL message, press FUNCTION until you see the message:

```
TANK INVENTORY
PRESS <STEP> TO CONTINUE
```

Press STEP to view the tank inventory for your first tank:

```
T 1: (PRODUCT NAME)
VOLUME = XXXXX (UNITS)
```

The system displays the fuel volume (how much of the product is in the tank) in gallons or liters. For example, if you had unleaded gasoline in Tank 1 containing 10,000 gallons of fuel, the system would display the message:

```
T 1: UNLEADED  
VOLUME = 10,000 GAL
```

To view how much inventory is in the next tank, press TANK/SENSOR. The system will display the data for Tank 2. To print an Inventory Report for all tanks in a system, press PRINT. An example inventory report is shown [Figure 12].

```
SEP 22, 1994 1:39 PM  
INVENTORY REPORT  
T 1:UNLEADED GASOLINE  
VOLUME      = 8518 GALS  
ULLAGE      = 1482 GALS  
90% ULLAGE=  482 GALS  
HEIGHT      =76.26 INCHES  
WATER VOL   =    0 GALS  
WATER       = 0.00 INCHES  
TEMP        = 64.6 DEG F  
  
T 2: SUPER UNLEADED  
VOLUME      = 7545 GALS  
ULLAGE      = 2455 GALS  
90% ULLAGE= 1455 GALS  
HEIGHT      =67.76 INCHES  
WATER VOL   =    0 GALS  
WATER       = 0.00 INCHES  
TEMP        = 64.6 DEG F
```

Figure 12. Sample Inventory Report

Fuel Height

Fuel height is the depth of all liquid in the tank in inches or millimeters. To view the liquid height in the tank, press STEP until this message appears:

```
T1: (PRODUCT NAME)  
HEIGHT = XX.XX (UNITS)
```

For example, if you had 80 inches of liquid in Tank 1, the system would display the message:

```
T1: UNLEADED  
HEIGHT = 80.00 INCHES
```

Press TANK again to view the liquid height for the next tank. You can view information for up to two tanks.

Water Volume

Water volume is the amount of water in the tank in gallons or liters. To view the Water Volume in a tank, press STEP until you see the message:

```
T 1: (PRODUCT NAME)
WATER VOL = XXXXX (UNITS)
```

For example, if Tank 1 containing regular gasoline had a water volume of 1 gallon, the system would display the message:

```
T 1: REGULAR
WATER VOL = 1 GALS
```

Press Tank/Sensor to view the Water Volume in the other tank.

Water Height

Water Height is the depth of the water in the tank. To view the Water Height, press STEP until you see the message:

```
T 1: (PRODUCT NAME)
WATER = X.XX (UNITS)
```

For example, if Tank 1 containing regular gasoline had a water height of 2 inches, the system would display the message:

```
T 1: REGULAR
WATER = 2.00 INCHES
```

Press Tank/Sensor to view the water height in the other tank.

Fuel Temperature

The system displays the fuel temperature in the tank in Fahrenheit (F) or Centigrade (C) temperature, depending on how your system was set up. To find out what the fuel temperature in Tank 1 is, press STEP until you display the message:

```
T1: (PRODUCT NAME)
TEMP = XX.X DEG (F or C)
```

For example, if the fuel in Tank 1 is Premium Unleaded and the temperature is 65 degrees Fahrenheit, the system would display the message:

```
T1: PREMIUM UNLEADED
TEMP = 65.0 DEG F
```

To view the temperature for the second tank, press TANK. To print an inventory report for all tanks, press PRINT.

90% Ullage

90% Ullage is the amount of product required to fill a tank to 90% of capacity.

Ullage

Ullage is the amount of room left in the tank. Normally, a tank is not totally full to leave room for the product to expand. To determine tank ullage, press STEP until you see the message:

```
T1: (PRODUCT NAME)
ULLAGE = XXXXX (UNITS)
```

For example, the system displays the message:

```
T1: REGULAR UNLEADED
ULLAGE = 5792 GALS
```

You would have to add 5,792 gallons of product to fill the tank to capacity. Press TANK/SENSOR to view ullage for the next tank. To print an inventory report for both tanks, press PRINT.

Delivery

To view the inventory increase for a tank (the last delivery amount), press STEP until you see the message:

```
T 1: (PRODUCT NAME)
DELIVERY = XXXXX (UNITS)
```

To view the last delivery amount for the other tank, press TANK/SENSOR. To print an inventory report for the selected tank, press PRINT.

Last-Shift Inventory

Last-Shift Inventory displays what the inventory was in each tank for up to three shifts when the shift was closed. To select Last-Shift Inventory, press FUNCTION until you display the message:

```
LAST-SHIFT INVENTORY  
PRESS <STEP> TO CONTINUE
```

Press PRINT to print a Shift Inventory Report. The system will print a report for all shifts for up to two tanks [Figure 13].

```
SHIFT STARTING INV #1  
-----  
JAN 17, 1995 4:00 AM  
T 1:GASOLINE  
VOLUME      = 439 GALS  
ULLAGE       = 9561 GALS  
90% ULLAGE= 8561 GALS  
HEIGHT       = 8.02 INCHES  
WATER VOL    = 0 GALS  
WATER        = 0.00 INCHES  
TEMP         = 64.6 DEG F  
  
SHIFT ENDING INV #1  
-----  
JAN 17, 1995 4:00 PM  
T 1:GASOLINE  
VOLUME      = 399 GALS  
ULLAGE       = 9601 GALS  
90% ULLAGE= 8601 GALS  
HEIGHT       = 8.02 INCHES  
WATER VOL    = 0 GALS  
WATER        = 0.00 INCHES  
TEMP         = 65.3 DEG F  
  
BEGIN INVENTORY : 439  
END INVENTORY   : 399  
DELIVERY OFFSET : 0  
GROSS CHANGE    : 40
```

Figure 13. Shift Inventory Report

Beginning Inventory

The beginning inventory is the amount of product in a tank at the beginning of a shift. To view the beginning inventory for the last shift, press STEP until you display the message:

```
T #: PRODUCT NAME  
BEGIN INVENTORY: XXXXXX
```

To view the beginning inventory for the other tanks in the system, press TANK. To generate a report, press PRINT.

End Inventory

The ending inventory is the amount of product in a tank at the end of a shift. To view the ending inventory for the shift, press STEP until you see the message:

```
T #: PRODUCT NAME  
END INVENTORY: XXXXXX
```

To view the ending inventory for other tanks in the system, press TANK. To generate an Ending Inventory Report, press PRINT.

Delivery Offset

Delivery Offset is the sum of all the deliveries during a shift period. To view the delivery offset for the shift, press STEP until you see the message:

```
T #:  
DELIVERY OFFSET:  XXXX
```

Gross Change

Gross Change is the difference between the beginning inventory and the ending inventory. To view the Gross Change, press STEP until you see the message:

```
T #:  
GROSS CHANGE:  XXXX
```

Sensor Status

Sensor Status reports the status of the sensors and if liquid or an alarm condition exists. To select Sensor Status, press FUNCTION until you display the message:

```
SENSOR STATUS
PRESS <STEP> TO CONTINUE
```

To print a complete Sensor Status Report for all sensors in the system, press PRINT. A sample report is shown [Figure 14].

```
~~~~~
SENSOR STATUS
-----
SEP 28, 1994   2:53 PM

S 1 : UNLEADED ANNULAR
SENSOR NORMAL

S 2 : SUPER ANNULAR
SENSOR NORMAL
```

Figure 14. Sensor Status Report

To view the Sensor Status for a particular sensor, press STEP to display the message:

```
S#: (Product Name)
(Status Indicator)
```

If the sensor is functioning properly and no alarm conditions exist, the system displays the message SENSOR NORMAL. If the sensor is not functioning normally or an alarm condition exists, the system displays a message about the status of the sensor.

To view the Sensor Status for other sensors in the system, press TANK/SENSOR. To generate a Sensor Status Report for the selected sensor, press PRINT.

Test Output Relays

This function activates relay and input/output devices, energizing the selected relays. You can use this function to control external devices such as external alarms or pump contactors.

To select this function, press FUNCTION until you display the message:

TEST OUTPUT RELAYS
R1: TEST RELAY: NO

Press Tank/Sensor to enter the number of the relay you want to test. Press CHANGE twice to display:

TEST OUTPUT RELAYS
R1: TEST RELAYS: YES

Press ENTER to test the relay. Press STEP to continue. The system displays the message:

TEST OUTPUT RELAYS
R1: TEST RELAY: NO

Repeat this procedure for any additional relays, or press FUNCTION to exit.

Printer Option: Replacing the Paper Roll

Use approved paper only. Use of other papers may create excessive debris and damage or foul the printer.

1. Open the printer door by removing the upper and lower torx™ screws or the thumbscrews on the right side of the printer door.
2. Remove shaft from printer. Remove old paper roll core, if any. Install the paper roll on the shaft. Insert the shaft and paper roll into the printer with paper as shown [Figure 15].

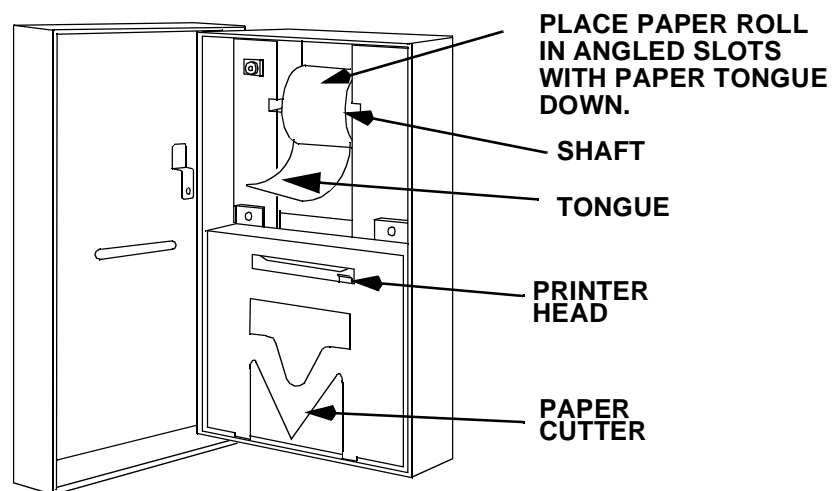


Figure 15. Paper Roll in Printer

3. Cut the paper tongue using the cutting mechanism as shown [Figure 16].
4. Thread the paper through the print head slot [Figure 17]. Be sure the print head is off to one side to avoid damage.

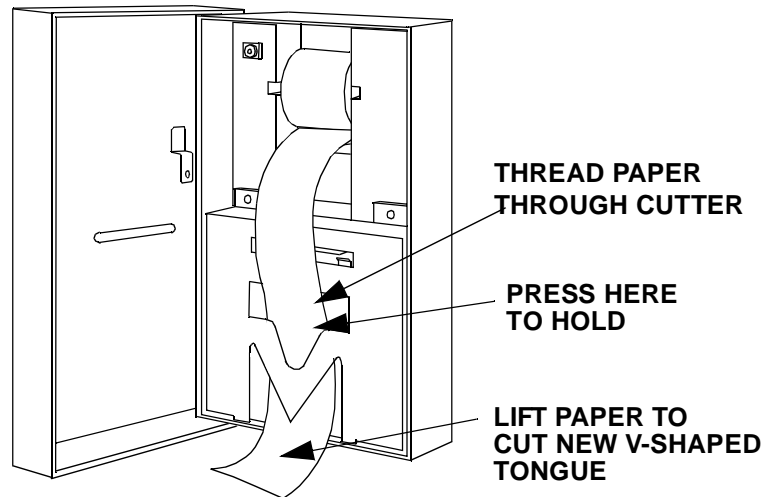


Figure 16. Paper Threaded Through Cutter

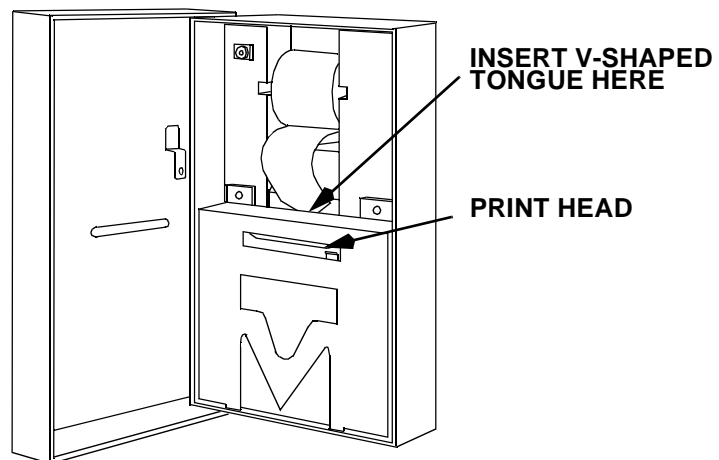


Figure 17. Paper Threaded Through Print Head Slot

5. Press the PRINT button to advance the paper. The paper tongue will become visible and longer [Figure 18].
6. Feed the paper through the slot in the door Figure 19).

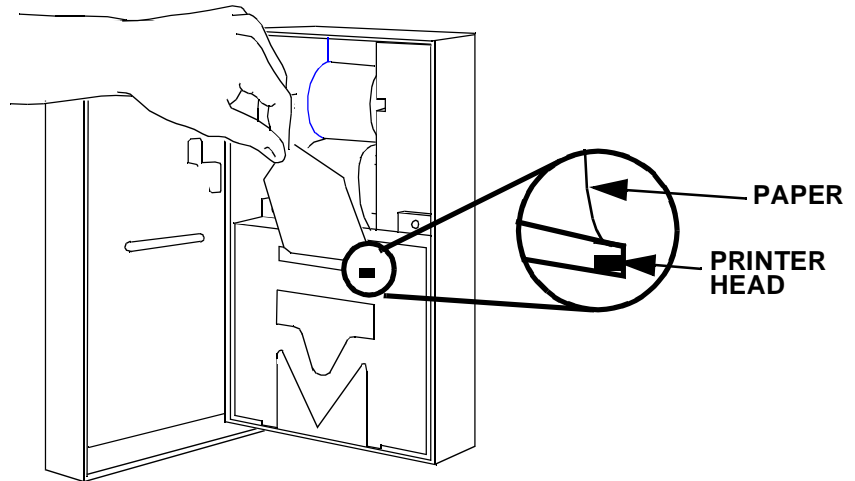


Figure 18. Paper Over Printer Head

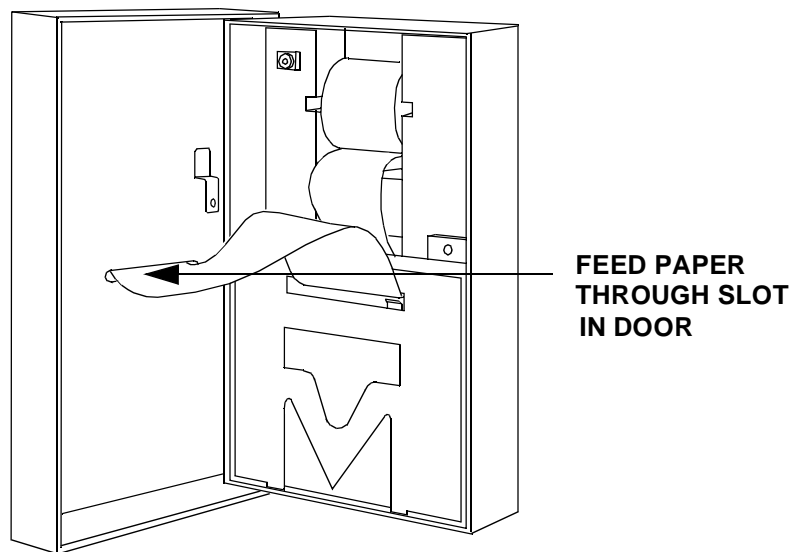


Figure 19. Printer Door Slot

7. Close the printer door.

8. Pull the paper down and across to tear off the extended portion [Figure 20].

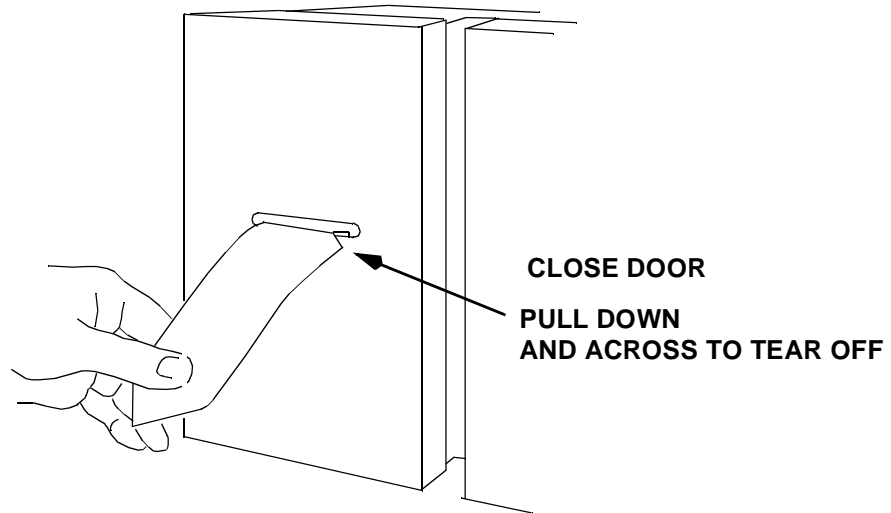


Figure 20. Printer with Door Closed

9. Secure the printer door with the torx™ screws or thumbscrews. Failure to secure the door properly may cause the printer paper to jam.

Warranty Conditions and Limitations of Liability

Limitations Of Liability

We warrant that this product will be free from defects in materials and workmanship for a period of 1 year from the date of installation or 15 months from the date of invoice, whichever occurs first. We will repair or replace the product if it is returned to us, transportation prepaid, within the warranty period and is determined by us to be defective.

We shall not be responsible for any expenses incurred by the user.

This warranty applies only when the product is installed in accordance with [Veeder-Root's](#) specifications. This warranty will not apply to any product which has been subjected to misuse, negligence or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

Inspection

You shall inspect the product promptly after receipt and shall notify [us at our Simsbury office](#) in writing of any claims, including claims of breach of warranty, within 30 days after you discover or should have discovered the facts upon which the claim is based. Your failure to give written notice of a claim within the time period shall be deemed to be a waiver of such claim.

Limitation of Remedy and Warranty

The provisions of "Limitations Of Liability" on page 35 are our sole obligation and exclude all other remedies or warranties, express or implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, whether or not purposes or specifications are described herein. We further disclaim any responsibility whatsoever to you or to any other person for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

Limitation of Damages

Under no circumstances shall [we](#) be liable for any incidental, consequential or specific damages, losses or expenses arising from this contract or its performance or in connection with the use of, or inability to use, our product for any purpose whatsoever.

Limitation of Actions

No action regardless of form arising out of this contract may be commenced more than 1 year after the cause of action has accrued, except an action for nonpayment.

Collateral Promises

There are no representations, warranties, or conditions, express or implied, statutory or otherwise except those herein contained, and no agreement or waivers collateral hereto shall be binding on either party unless in writing and signed by you and accepted by [us at our Simsbury office](#).

Interpretation

Rights and liabilities arising out of any contract with [us](#) shall be determined under the Uniform Commercial Code as enacted in [Connecticut](#).

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