

In-Station Diagnostics (ISD)

Install, Setup, & Operation Manual

For Healy Assist EVR



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TLS-350R, TLS-350 PLUS, TLS-350J AND TLS-300I/C, AND TLS2 MONITORING SYSTEMS

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IN STATION DIAGNOSTICS (ISD)

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We warrant that this product shall be free from defects in material and workmanship and is compliant with all applicable performance standards and specifications for which it has been certified,, for a period of one (1) year from the date of ISD start-up when proof of the date of install is provided or twenty-four (24) months from the date of manufacture when proof of date of installation is not provided. During the warranty period, we and or our representative will repair or replace the product, if determined by us to be defective, at the location where the product is in use, at no charge to the purchaser.

For ISD components installed after the initial ISD start-up, we warrant that these products shall be free from defects in material and workmanship and is compliant with all applicable performance standards and specifications for which it has been certified, for a period of one (1) year from the date of installation when proof of the date of install is provided or fifteen (15) months from date of manufacture when proof of date of installation is not provided. We will repair or replace the product if the product is returned to us; transportation prepaid by user, within the warranty period, and is determined by us to be defective.

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Introduction

In-Station Diagnostic (ISD) equipment is designed to monitor the collection and containment of vapors by vapor recovery equipment. Using the existing Veeder-Root (V-R) TLS console platform, sensor inputs an dispenser fuel meter inputs, the ISD software continuously monitors the vapor recovery equipment, maintains test records, provides test reports, generates alarms following test/equipment failures, and finally, shuts down the site upon the occurrence of designated alarms.

This manual provides instructions to install, setup, and operate the special components of the Veeder-Root ISD system that are not covered in existing documentation shipped with other non-ISD specific V-R equipment (e.g., Mag probes, line leak detection, etc.). The ISD feature is an option for the TLS console platform, and as such, many of the installation/setup/operation instructions for non-ISD specific tasks (e.g., line leak detection) are covered in TLS-3XX supplied literature.

WARNING! Revision or reprogramming of the TLS may require notification of the local Certified Unified Program Agency (CUPA).

Site Requirements

Below are the requirements for all vapor recovery systems except where noted.

- V-R TLS-350R/EMC w/BIR, TLS-350 Plus/EMC Enhanced, TLS-350/EMC and Red Jacket ProMax consoles with ECPUII - install as per TLS-3XX Site Prep manual, setup following instructions in TLS-3XX System Setup Manual.
- A flash memory board (NVMEM2) for ISD software storage - installed on the ECPUII board in place of the console's 1/2 Meg RAM board - install as per TLS-350 Series Board and Software Replacement Manual, no setup required.
- A RS-232 module is required for RS-232 access to ISD reports - install as per instructions shipped with module, setup following instructions in this manual.
- An output relay or dispenser relay board is required (either 4-Output Relay module, I/O Combination module) to shut down each Submersible Turbine Pump (STP) or dispenser upon activation of certain ISD alarms (these alarms can also be assigned in Line Leak Disable setup to shut down the STP or dispenser if Line Leak detection feature is installed) - install as per instructions shipped with module or line leak system, setup ISD shut down alarms either using output relays or line leak system following instructions in this manual.
- Dispenser Interface module (DIM) for the type of dispensers installed - install as per installation manual shipped with device, setup following instructions in DIM manual and TLS-3XX Setup Manual. Note: the DIM supplies flow meter event inputs needed for ISD analysis.
- One V-R Mag probe in each of the gasoline tanks being monitored - install as per installation manual shipped with device, setup following instructions in TLS-3XX Setup Manual.
- Smart Sensor module is required to monitor Vapor Flow Meters and Vapor Pressure Sensor (up to 8 devices per module, or 7 if customer is using Smart Sensor module / embedded pressure). Install and connect following instructions in the Vapor Flow Meter and Vapor Pressure Sensor installation Guides.
- Vapor Flow Meters (one for each dispenser) - install as per ISD Flow Meter installation manual shipped with meter, setup following instructions in this manual.
- Vapor Pressure Sensor (one per site) - install as per ISD Pressure Sensor installation manual shipped with sensor, setup following instructions in this manual.
- To achieve CP-201 false alarm performance standards for ISD reporting, the vapor recovery system leak rate should be at or below 2.88 CFH at 2 inches water column.

Supported Vapor Recovery Systems

Table 1 lists V-R supported vapor recovery systems.

Table 1. V-R Supported Vapor Recovery Systems

Name	CARB Executive Order
Healy Assist EVR	VR-202

Contractor Certification Requirements

Veeder-Root Contractor Certification Requirements	Installer Certification ⁶	ATG Technician Certification ⁷	VR Vapor Products Certification ⁸
Install ¹ ISD	X	X	X
Install PMC	X	X	X
Install CCVP	X	X	X
Install Wireless ISD/PMC	X	X	X
Installation Checkout ²		X	X
ATG Startup ³ / Training ⁴ / Service ⁵		X	X
ISD Startup / Training / Service			X
PMC Startup / Training / Service			X
CCVP Startup / Training / Service			X
Wireless ISD/PMC Startup / Training / Service			X
Install Pressure Sensor (ATG)	X	X	X
Maintain Pressure Sensor (ATG)		X	X
Calibrate Pressure Sensor (ATG)		X	X
Clear ATG Pressure Sensor Alarm (ATG)		X	X
Clear ISD/PMC Alarms (ISD/PMC)			X
¹ Perform wiring and conduit routing; equipment mounting		⁶ UST Monitoring Systems – Installer (Level 1)	
² Inspect wiring and conduit routing; equipment mounting		⁷ Certified UST Monitoring Technician	
³ Turn power on, program and test the systems		⁸ VR Vapor Products	
⁴ Provide supervised field experience in service techniques and operations			
⁵ Troubleshoot and provide routing maintenance			

Warranty Registrations may only be submitted by selected Distributors. Certified installers are required to provide the GDF operator with the completed Equipment Warranty Notice, form 577013-868, for their records.

Related Manuals

The manuals in Table 2 below are shipped with the equipment on the V-R Tech Docs CD-ROM and will be needed to install non-ISD specific equipment.

Table 2. Related Manuals





V-R Manual	Part Number
TLS-3XX Site Prep Manual	VR202 IOM 21
ISD Flow Meter Installation Guide	VR202 IOM 22
ISD Vapor Pressure Sensor Installation Guide	577013-797
TLS-3XX Series Consoles System Setup Manual	576013-623

Table 2. Related Manuals



V-R Manual	Part Number
TLS-3XX Series Consoles Operator's Manual	576013-610
Serial Comm Modules Installation Guide	577013-528
ISD Troubleshooting Manual	577013-819
TLS-350 Series Board and Software Replacement Manual	576013-637
TLS-350R Point-of-Sale (POS) Application Guide	577013-401
Input/Output Modules Installation	576013-614
TLS RF Wireless 2 System (W2) Installation and Maintenance Guide	577013-964

Safety Precautions

The following symbols may be used throughout this manual to alert you to important safety hazards.

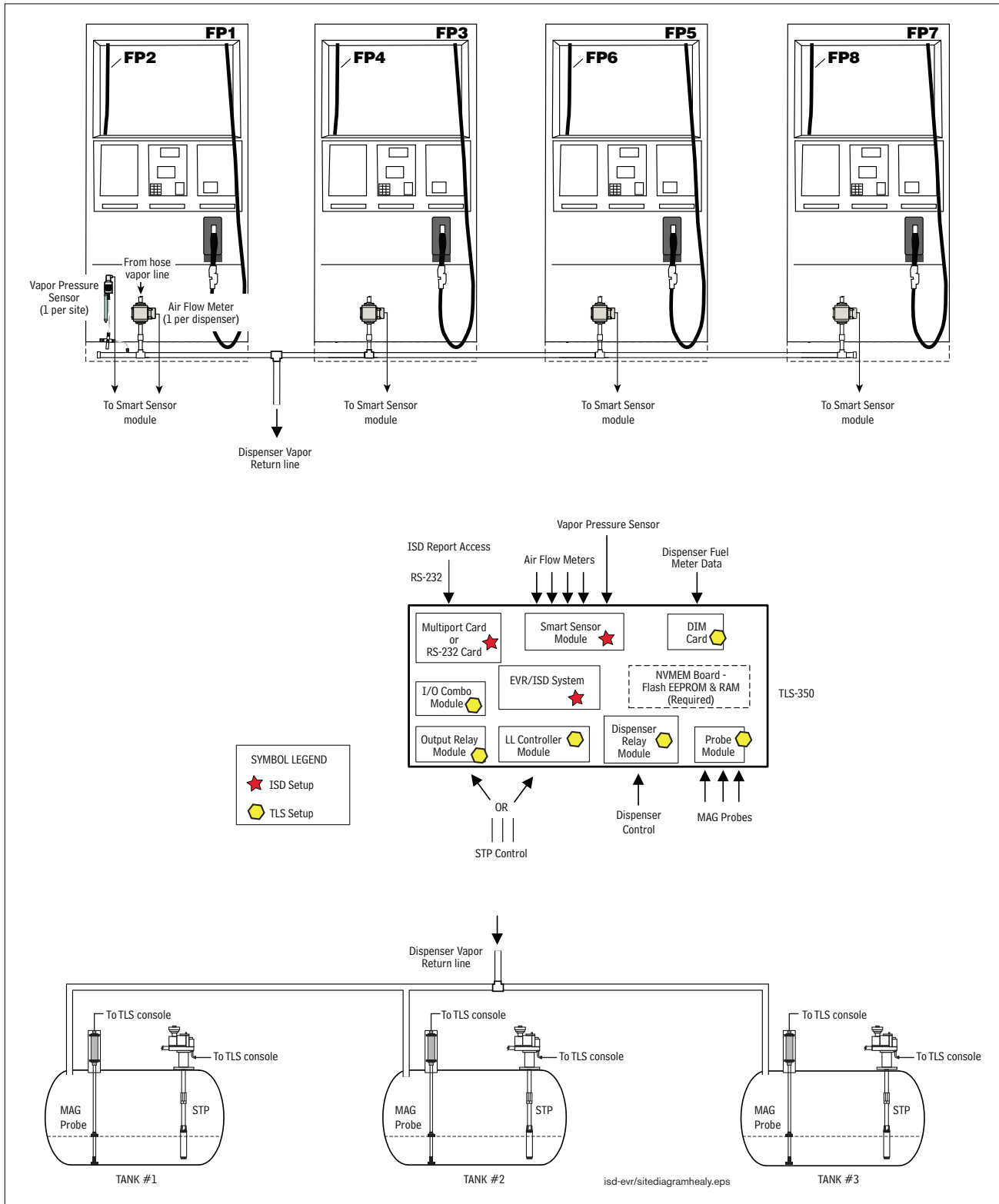
 <p>ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p>TURN POWER OFF Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>
 <p>READ ALL RELATED MANUALS Knowledge 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.</p>	 <p>WARNING Heed the adjacent instructions to avoid damage to equipment, property, environment or personal injury.</p>

⚠ WARNING

 	<p>The console contains high voltages which can be lethal. It is also connected to low power devices that must be kept intrinsically safe.</p> <p>Turn power Off at the circuit breaker. Do not connect the console AC power supply until all devices are installed.</p> <p>FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</p>
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Example Site Diagrams

Figure 1 shows an example site diagram. The diagram show setups unique to ISD which are discussed in this manual (marked with a star), and those setups performed following instructions in the appropriate sections of the TLS-3XX System Setup manual, such as In-Tank setup (marked with a hexagon).



Installation

This section discusses the installation and wiring of the hardware required to enable the TLS console to perform ISD monitoring of the site's gasoline vapor recovery equipment (non-gas tanks are not monitored):

- Vapor Flow Meter
- Vapor Pressure Sensor
- Smart Sensor Interface Module (8 input and 7 input w/embedded pressure versions)
- NVMEM board - required
- 4-Relay Output Module or Dispenser Relay Module
- Line Leak Detection
- Dispenser Interface Module
- Probe Interface Module



All field wiring, its type, its length, etc., used for TLS console sensors must conform to the requirements outlined in the Veeder-Root TLS-3XX Site Prep manual (P/N 576013-879).

Vapor Flow Meter

Install one Vapor Flow Meter in the vapor return piping of each gasoline dispenser following the instructions in the ISD Flow Meter Installation guide (P/N 577013-796). Program the meter following instructions in this manual.

Vapor Pressure Sensor

Install one Vapor Pressure Sensor in the vapor return piping of the gasoline dispenser closest to the tanks following the instructions in the ISD Pressure Sensor Installation guide (P/N 577013-797). Program the meter following instructions in this manual.

Installing TLS Console Modules - General Notes

TLS consoles have three bays in which interface modules can be installed; Comm bay (left door) and Power and Intrinsically-Safe bays (right door). Smart Sensor modules are installed in the Intrinsically-Safe (I.S.) bay only (Figure 2).

Most consoles will be shipped with modules installed as ordered. If additional features are added at a later date, modules will be field installed.

In all cases, the position of the modules, their respective connectors and the devices wired to the connectors must be recorded to prevent improper replacement during installation or service. A circuit directory for Power and I.S. bay Interface Modules is adhered to the back of the right-hand door for this purpose.

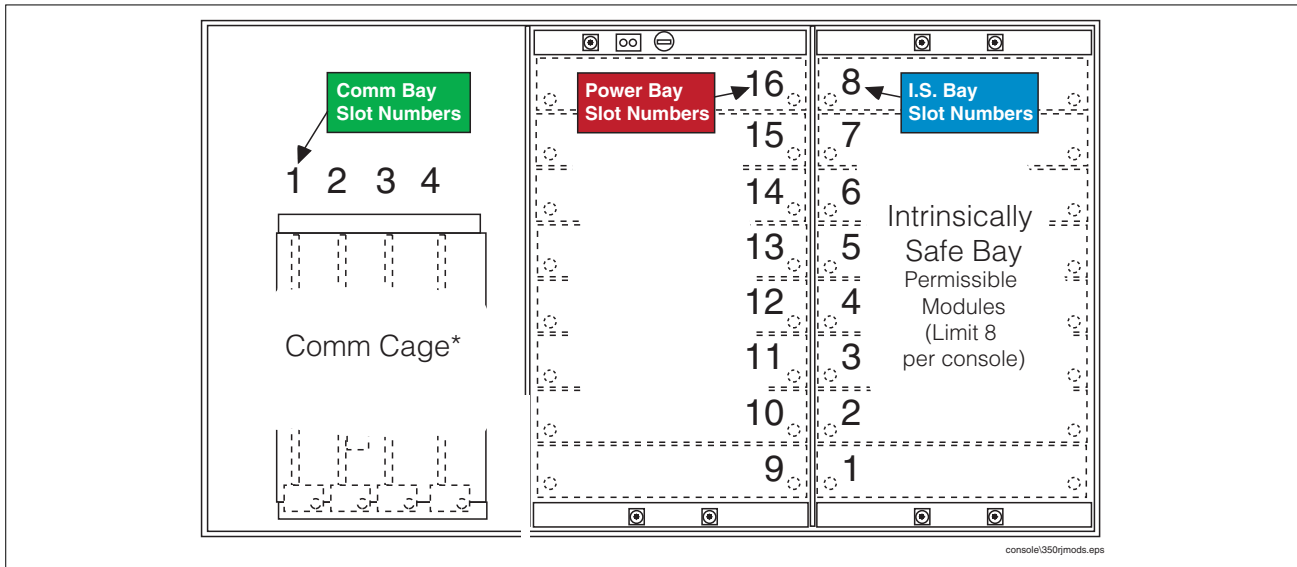


Figure 2. TLS console Interface Module Bays

CAUTION! During programming, module positions and the devices wired to each module are identified and stored in memory. If a connector is removed and reinstalled on a different module after programming, or if an entire module with its connector is removed and reinstalled in a different module slot, the system will not properly recognize the data being received.

Module Position

1. Record on the circuit directory the type of module in each slot location.
2. If a system contains multiple modules of a single type (i.e., two Smart Sensor Modules), they may be swapped between their respective slot locations, however, the connectors must remain with their original locations, not with the original modules.

Connector Position

1. Identify all connectors according to their slot location using the self-adhesive numbering labels furnished with each module. Accurately record on the circuit directory the location of each device wired to the connector as you attach wires to the module.
2. Once a device has been wired to certain terminals on a connector and the system has been programmed, the wires from that device may not be relocated to other terminals without reprogramming the system.

Grounding Probe and Sensor Shields

Connect probe and sensor cable shields to ground at the console only. Do not ground both ends of the shield.

CIRCUIT DIRECTORY

A circuit directory is adhered to the inside of the right-hand door. It should be filled out by the installer as the module's connectors are being wired.

The following information should be recorded for each slot:

- **Module Type:** record what type of module has been installed in the slot, e.g., Smart Sensor Module.
- **Position Record:** record the physical location and/or type of device wired to each terminal of the module connector in the slot, e.g., VFM1.

Smart Sensor Interface Module

The Smart Sensor Interface Module 8 input or 7 input w/embedded pressure versions monitor Vapor Flow Meter (VFM) and Vapor Pressure Sensor (VPS) inputs.



Switch off power to the TLS console while you install modules and connect sensor wiring.

Open the right door of the console and slide the necessary Smart Sensor modules into empty I.S. Bay slots. Connect the field wiring from each of the sensors following instructions in the Vapor Flow Meter and Vapor Pressure Sensor manuals. Setup the Smart Sensor module(s) following instructions in this manual.

NVMEM Board

Verify that a NVMEM board is installed in the TLS console (ref. Figure 2-14 in the V-R TLS-3XX Series Consoles Troubleshooting Manual P/N 576013-818, Rev J or later). This board contains flash EEPROM and RAM needed to run ISD software and store ISD reports. No setup is required.

Site Shut Down Requirements

Normal ISD operation requires TLS console control of the STP in each of the gasoline tanks. If the site has Wireless Pressure Line Leak Detection (WPLLD), Pressure Line Leak Detection (PLLD) or Volumetric Line Leak Detection (VLLD) for each tank, you can use the line leak disable setup to control the vapor recovery tanks (diesel tanks do not require shutdown). If the site does not have line leak detection for all vapor recovery tanks, you can use output relay setup to control each tank. In lieu of line leak detection, install the necessary modules (output relay) to control each gasoline tank. . Alternately, you can install Dispenser Relay Modules to control dispensing.

Dispenser Interface Module (DIM)

Verify that a dispenser interface module (DIM) is installed in the TLS console communication bay (ref. Figure 2) and that it is designed to communicate with the type of gasoline dispensers installed at the site. The ISD software requires dispenser fuel flow meter data inputs. Reference TLS-350R Point-of-Sale (POS) Application Guide to select correct DIM card. Refer to the manual shipped with the DIM for installation instructions, refer to the TLS-3XX System Setup manual to program the DIM.

Probe Interface Module

Verify that a Probe Interface Module(s) is installed (Intrinsically-Safe bay) and that a Mag probe is in each gasoline tank and is connected to the module(s). Program the Mag probes following instructions in the TLS-3XX System Setup manual.

Setup

Introduction

This section describes how to program the ISD system using the TLS console's front panel buttons and display. The procedures in this manual follow standard TLS console setup programming input, i.e., keypad/display interaction. If necessary, refer to Section 2 of the TLS-3XX System Setup manual (P/N 576013-623) to review entering data via the front panel keypads.

All ISD-related equipment must be installed in the site and connected to the TLS console prior to beginning the setups covered in this section. As with all TLS connections, you cannot change sensor wiring or module slots after programming or the system will not recognize the correct data. Reference the section entitled "Connecting Probe/Sensor Wiring to Consoles" in the TLS-3XX Site Prep and Installation manual (P/N 576013-879) for rewiring precautions.

SYSTEM SETUPS

- Smart Sensor Setup - All ISD sites - Figure 3
This setup mode function programs the Smart Sensor Interface module to monitor the Air Flow Meters and the Vapor Pressure Sensor.
- EVR/ISD Setup - All ISD sites - Figure 5, Figure 6, Figure 7
This setup mode function programs the TLS console for EVR/ISD vapor recovery monitoring and reporting.
- Verify Console Date/Time - Check the console front panel to confirm display of current date and time. Reset if necessary (refer to current date/current time setups in TLS-3XX System Setup manual).

ALARM SETUPS

One or more TLS setup functions must be programmed to shut down the tank or the dispenser if certain ISD alarms occur:

- XLLD Line Disable Setup - For ISD sites with line leak detection - Figure 11
This setup mode function lets you assign ISD alarms to a line leak detector that will shut down the tank's STP.
- Output Relay Setup - For ISD sites without line leak detection - Figure 13
This setup mode function lets you assign ISD alarms to a relay on the 4-Relay output module or I/O Combination module that will shut down the tank's STP.
- For ISD sites with dispenser shutdown - Dispenser Relay Setup (go to Figure 15)
This setup assigns ISD alarms to a relay that will shut down the dispenser.

Smart Sensor Setup

The Smart Sensor Interface Module is installed in the Intrinsically-Safe bay of the TLS console. This module monitors Air Flow Meters and the Vapor Pressure Sensor. Figure 3 diagrams the Smart Sensor setup procedure. Figure 4 shows a printout of the Smart Sensor setup.

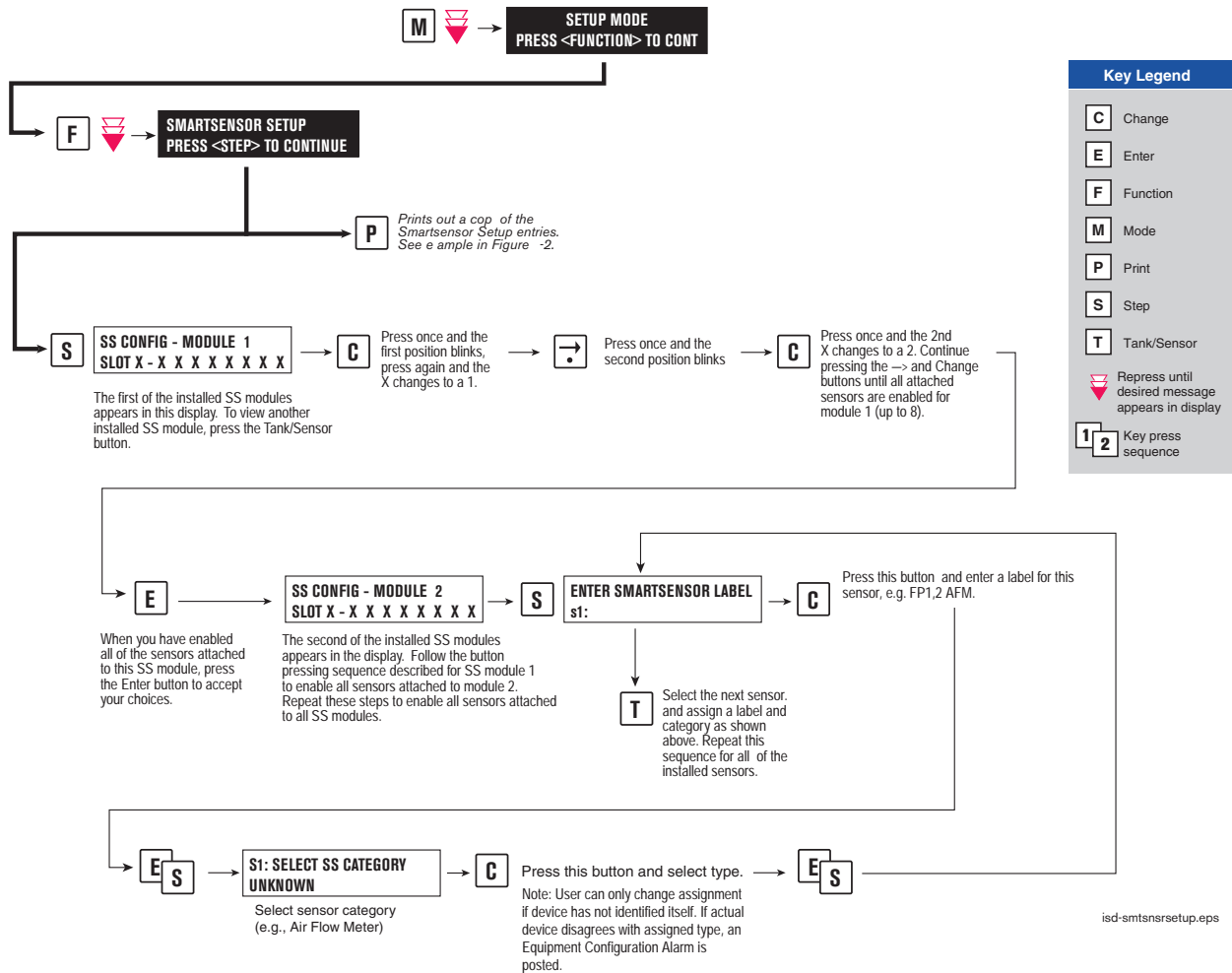
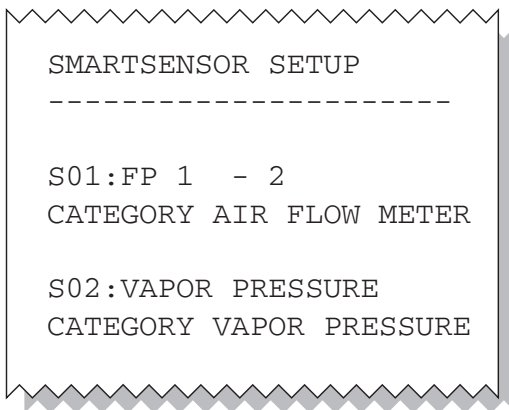


Figure 3. Smart Sensor Setup



SMARTSENSOR SETUP

S01:FP 1 - 2
CATEGORY AIR FLOW METER

S02:VAPOR PRESSURE
CATEGORY VAPOR PRESSURE

isd-evr/sssetprt.eps

Figure 4. Smart Sensor Setup Printout Example

Hose label/Fueling Point/Air Flow Meter Serial Number Chart

The next step in programming your system requires documentation of information from the ISD equipment installed at the facility. Choose the appropriate data sheet from Appendix A for the vapor recovery system installed at your facility. Record the unique information from the sensors prior to attempting the TLS EVR/ISD set up described in Figure 6. After you complete the TLS EVR/ISD you must perform the Product Meter ID set up procedure to complete the set up

EVR/ISD Setup

Figure 5, Figure 6, and Figure 7 diagram the EVR/ISD setup programming. Start with the first figure, continue to the second, and finish in the third. Figure 8 shows an example printout of the EVR/ISD setup.

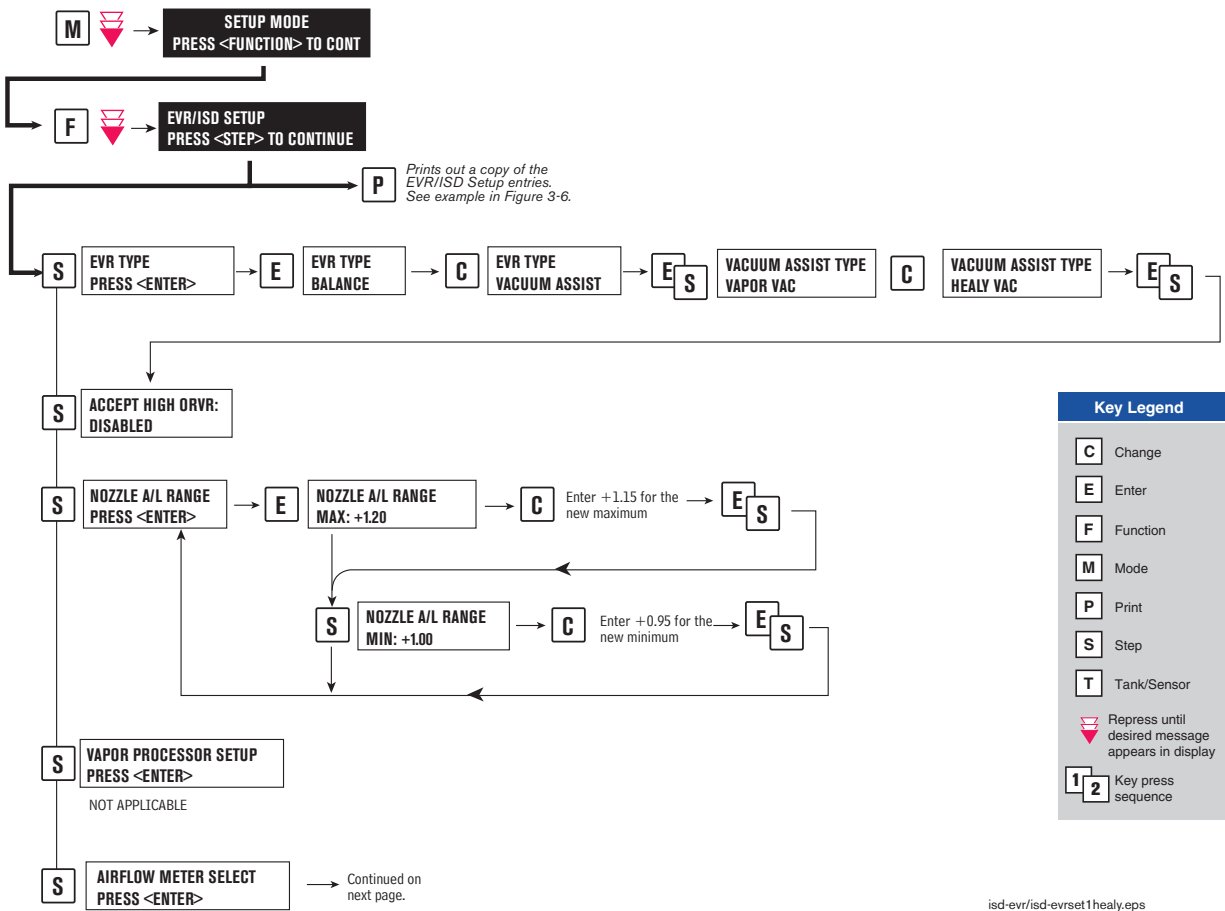
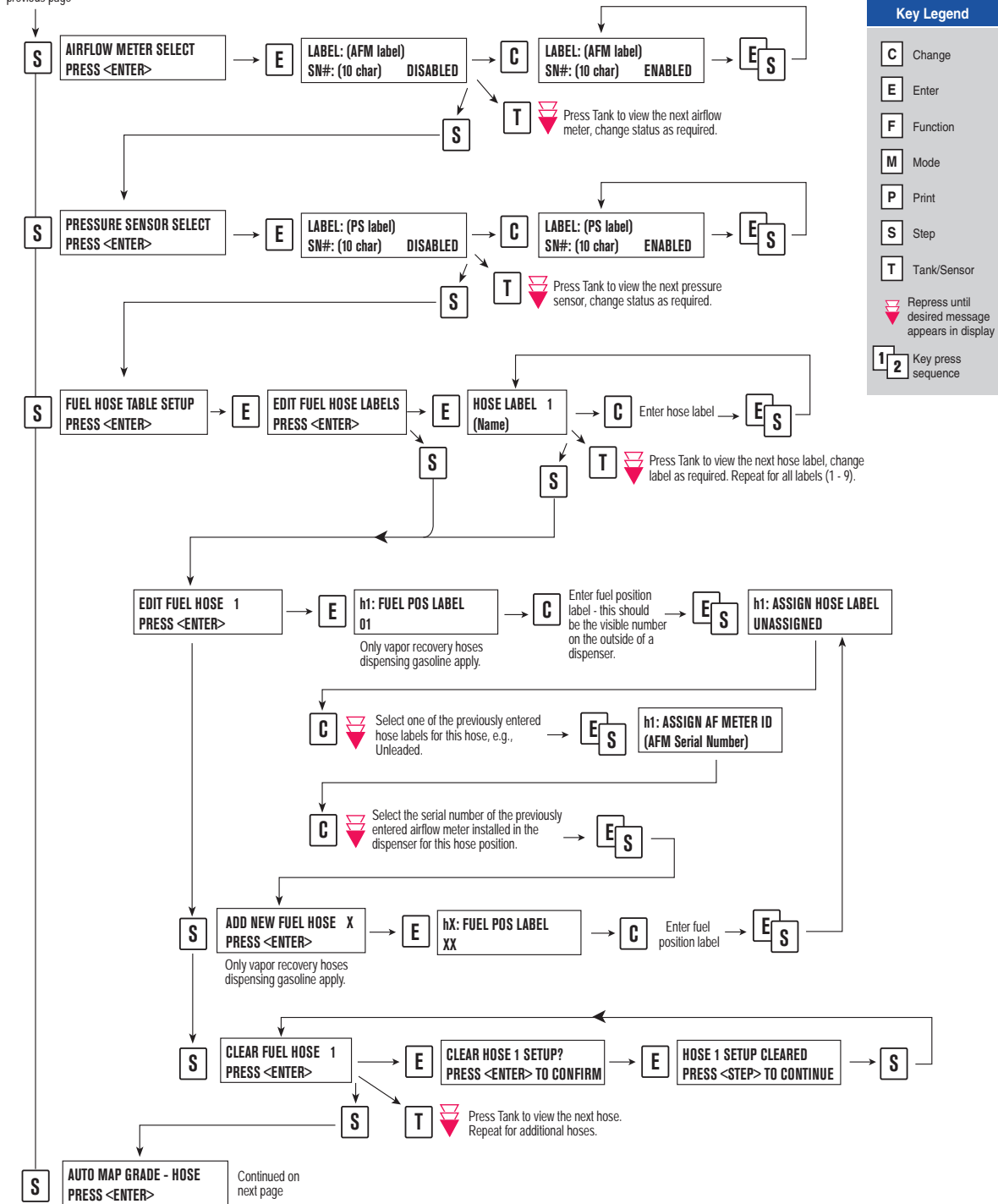


Figure 5. EVR/ISD Setup 1

Continued from previous page



Key Legend	
C	Change
E	Enter
F	Function
M	Mode
P	Print
S	Step
T	Tank/Sensor
⏮	Repress until desired message appears in display
1 2	Key press sequence

Figure 6. EVR/ISD Setup 2

isd-evr/isd-evrset1a.eps

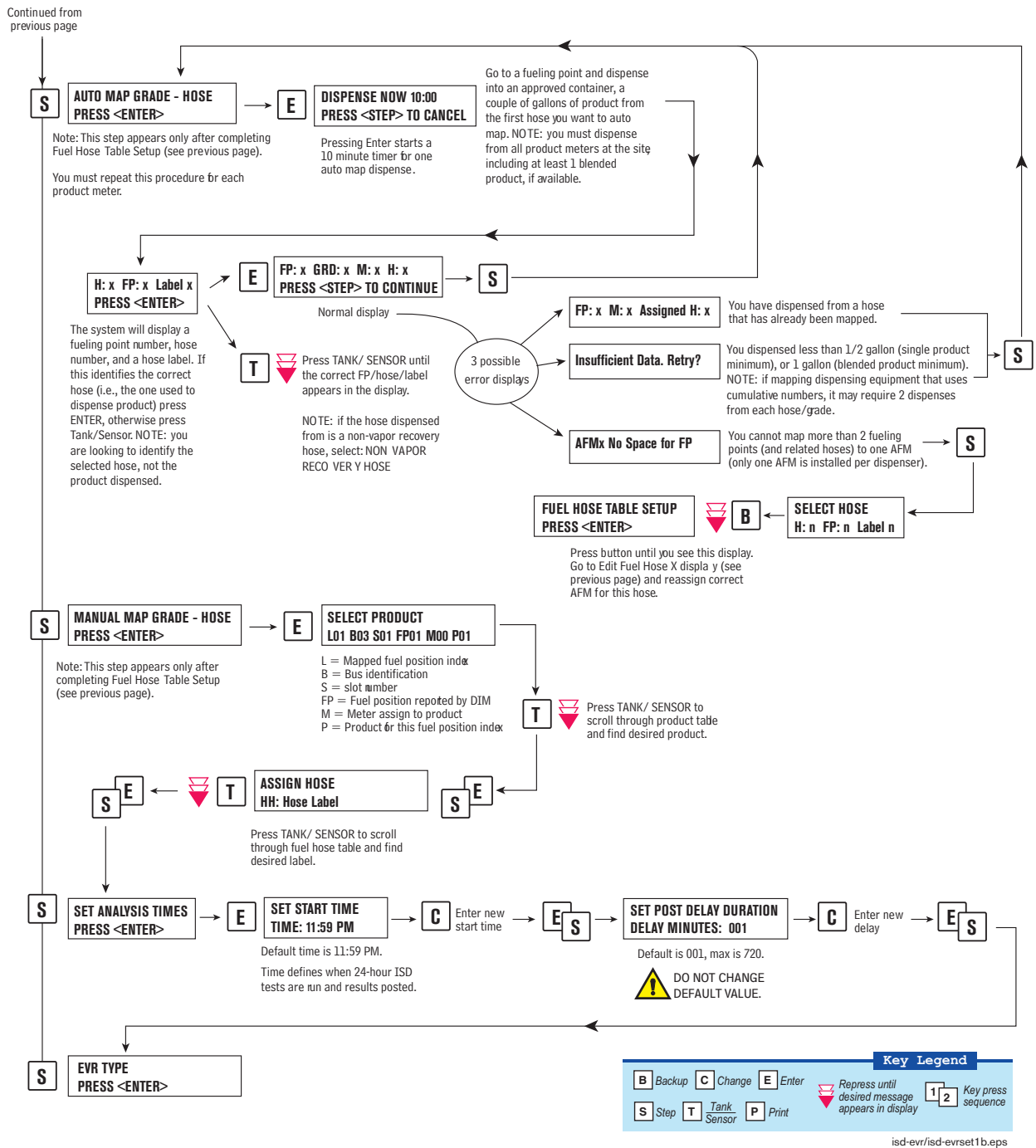


Figure 7. EVR/ISD Setup 3

```

EVR/ISD SETUP

EVR TYPE: VACUUM ASSIST
VACUUM ASSIST TYPE
HEALY VAC

NOZZLE A/L RANGE
MAX: 1.15 MIN: 0.95

VAPOR PROCESSOR TYPE
NO VAPOR PROCESSOR

ANALYSIS TIMES
TIME: 11:59 PM
DELAY MINUTES: 1

ACCEPT HIGH ORVR:
DISABLED

ISD HOSE TABLE
ID  FP  FL  HL  AA  RR
-----
01  01  01  02  01  01
02  02  02  02  01  01
03  03  03  02  02  02
04  04  04  02  02  02
05  05  05  02  03  UU
06  06  06  02  03  UU
07  07  07  02  04  UU
08  08  08  02  04  UU
09  09  09  02  05  UU
10  10  10  02  05  UU
11  11  11  02  06  UU
12  12  12  02  06  UU

ISD AIRFLOW METER MAP
ID SERIAL NUM LABEL
-----
 1 03001401  AFM1 FP1 -
 2 03001402  AFM2 FP3 -
 3 03001403  AFM3 FP5 -
 4 03001404  AFM4 FP7 -
 5 03001405  AFM5 FP9 -
 6 03001406  AFM6 FP11

ISD FUEL GRADE HOSE MAP
 1 2 3 4
FP MHH MHH MHH MHH AA
-----
01 101 301 901 U U 1
02 102 302 902 U U 1
03 103 303 903 U U 2
04 104 304 904 U U 2
05 105 305 905 U U 3
06 106 306 906 U U 3
07 107 307 907 U U 4
08 108 308 908 U U 4
09 109 309 909 U U 5
10 110 310 910 U U 5
11 111 311 911 U U 6
12 112 312 912 U U 6

LABEL TABLE
-----
 1: UNASSIGNED
 2: BLEND3
 3: REGULAR
 4: MID GRADE
 5: PREMIUM
 6: GOLD
 7: BRONZE
 8: SILVER
 9: BLEND2
10: BLEND4

```

ID = Hose ID
FP = Mapped fuel position as TLS Console recognizes it
(-1 = unassigned)
FL = Fuel position label as written on dispenser
HL = Hose label
AA = Airflow meter ID assigned
RR = Relay ID
UU = unassigned

ID = Airflow meter ID assigned
Serial Number = Airflow meter's
serial number

FP = Mapped fuel position
M/H = Meter and hose for product X
AA = Airflow meter assigned to
first (lowest X) product with
meter and hose assigned
(usually same for entire dispenser)
U = Unassigned
N = Not used by ISD

ID = Label ID
Label = User definable
00 = reserved, non-ISD

isdhealysetprtout.eps

Figure 8. Example Healy Setup Printout

Alarm Setup

INTRODUCTION

California regulations (VAPOR RECOVERY CERTIFICATION PROCEDURE, CP-201, CERTIFICATION PROCEDURE FOR VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES, Section 10.1.2) require shut down of dispensing systems that generate specific alarm conditions. To accomplish this, the TLS must be configured to control the gasoline tank's pump (diesel tanks are not monitored) or the gasoline dispensers in order to disable them when ISD shutdown alarm conditions occur. Prior to setting up ISD shut down alarms, you will need to determine how the site's tank pumps or dispensers are controlled. If the site has line leak detection, you can shut down the line (tank) by assigning the ISD alarms in Line Leak Disable setup. In the absence of line leak detection, you can assign the ISD alarms to Output Relays which in turn can be wired to shut down the tank or assign ISD alarms to Dispenser Relays which can be used to shut down the dispenser. Figure 9 illustrates two examples of tank pump control, one using a line leak/output relay combination and one using output relays.

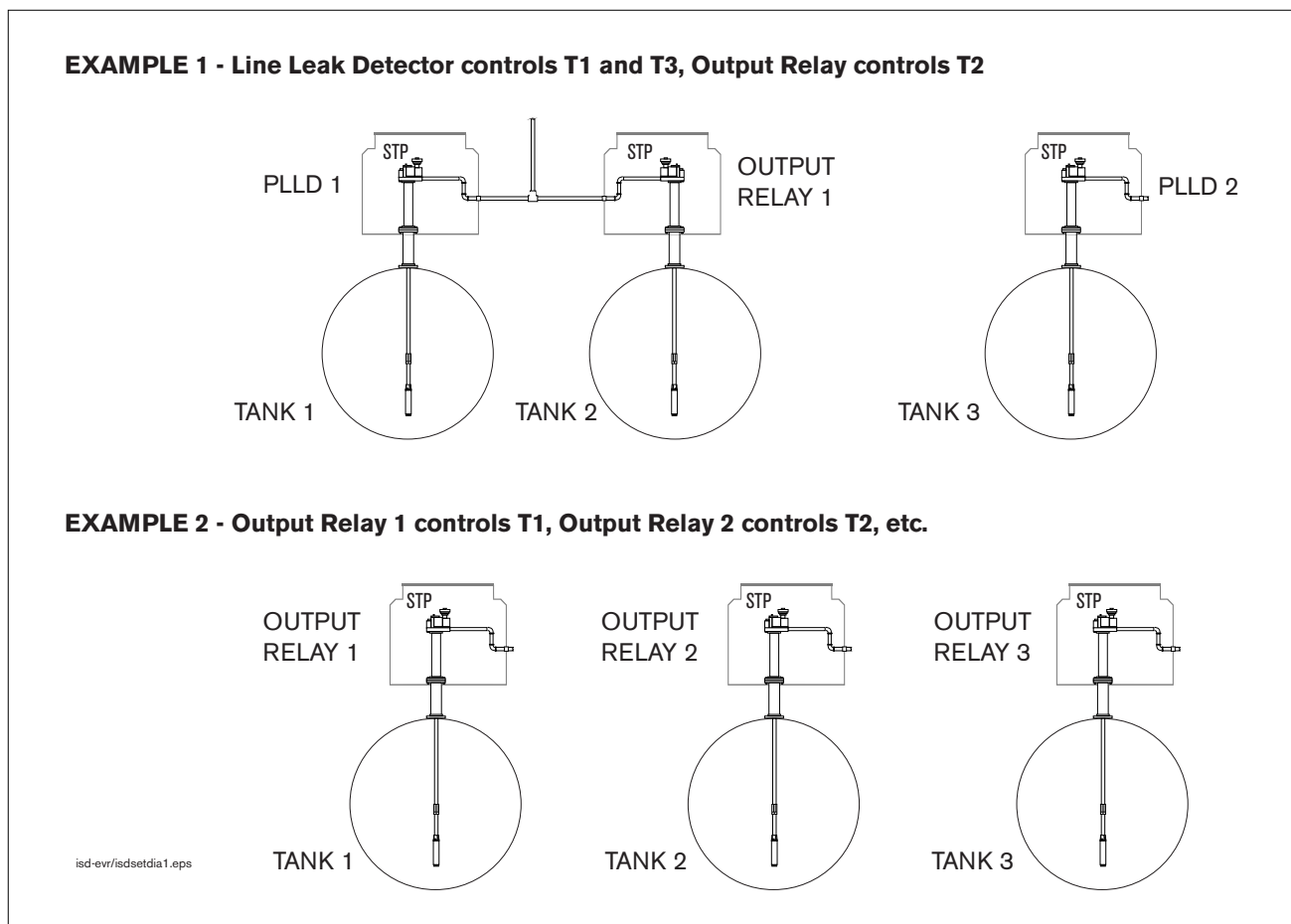


Figure 9. Site Tank Control Examples

Referencing the figure above, in example 1, you would assign the ISD shut down alarms for tank 1 to PLLD 1 in PLLD Line Leak Disable setup, for tank 2 to a relay in Output Relay Setup, and for tank 3 to PLLD 2 in PLLD Line Leak Disable setup. In example 2, you would assign the ISD shut down alarms for tank 1 to output relay 1, tank 2 to output relay 2, and tank 3 to output relay 3.

Figure 10 illustrates two examples of dispenser control using Dispenser Relay modules.

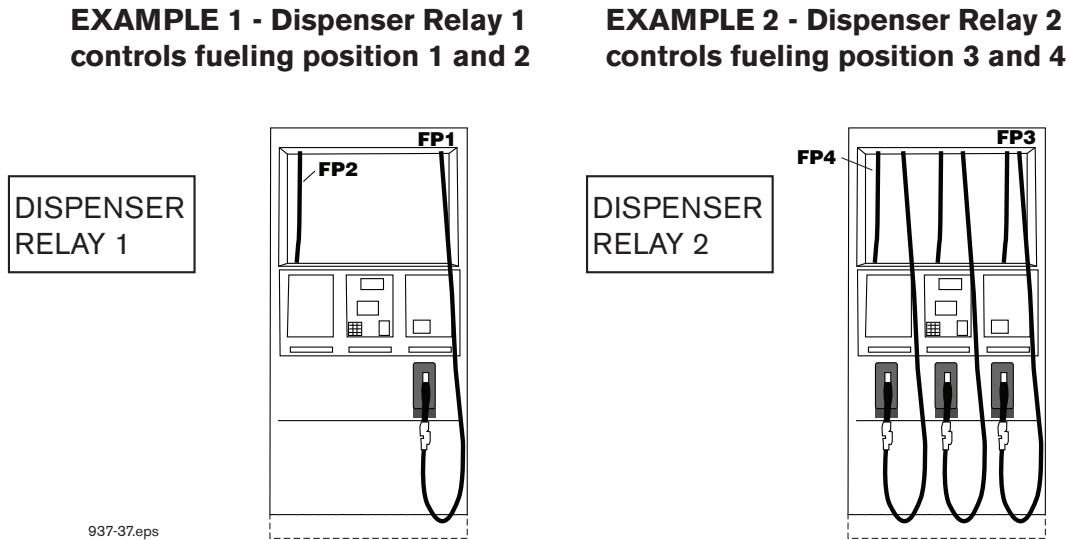


Figure 10. Dispenser Control Examples

You can assign ISD containment shut down alarms to the submersible pump output relays and assign ISD collection alarms to the dispenser relay as shown above.

PROGRAMMING ISD SHUT DOWN ALARMS

Figure 11 illustrates the setup steps required to assign ISD Shut Down Alarms to a tank having a line leak detection system installed.

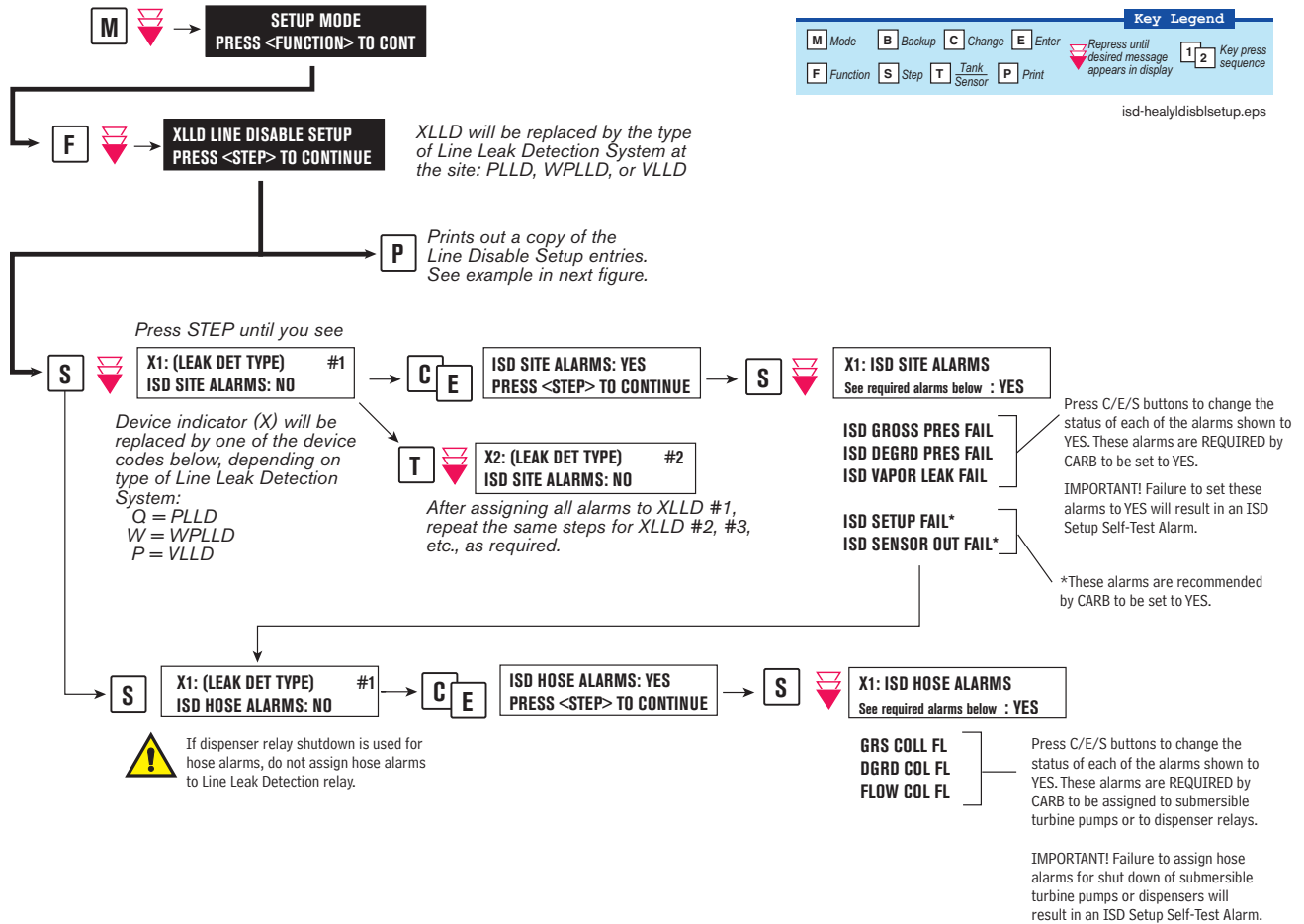


Figure 11. Assigning ISD Shut Down Alarms in Line Leak Disable Setup

Figure 12 shows a resulting printout of the Line Leak Disable setup with ISD alarms assigned when Dispenser Relay modules are not used.

```
PLLD LINE DISABLE SETUP
-----

Q 1:UNLEADED

ISD SITE ALARMS
  ISD GROSS PRESSURE FAIL
  ISD DEGRD PRESSURE FAIL
  ISD VAPOR LEAKAGE FAIL
  ISD SETUP FAIL
  ISD SENSOR OUT FAIL

ISD HOSE ALARMS
  h1: GROSS COLLECT FAIL
  h1: DEGRD COLLECT FAIL
  h1: FLOW COLLECT FAIL
```

isd-evr\healy\ldsetprt.eps

Figure 12. Example Line leak Disable Setup Printout

Figure 13 illustrates the setup steps required to assign ISD Shut Down Alarms to a tank using either a Four Relay Output Module or an I/O Combination Module.

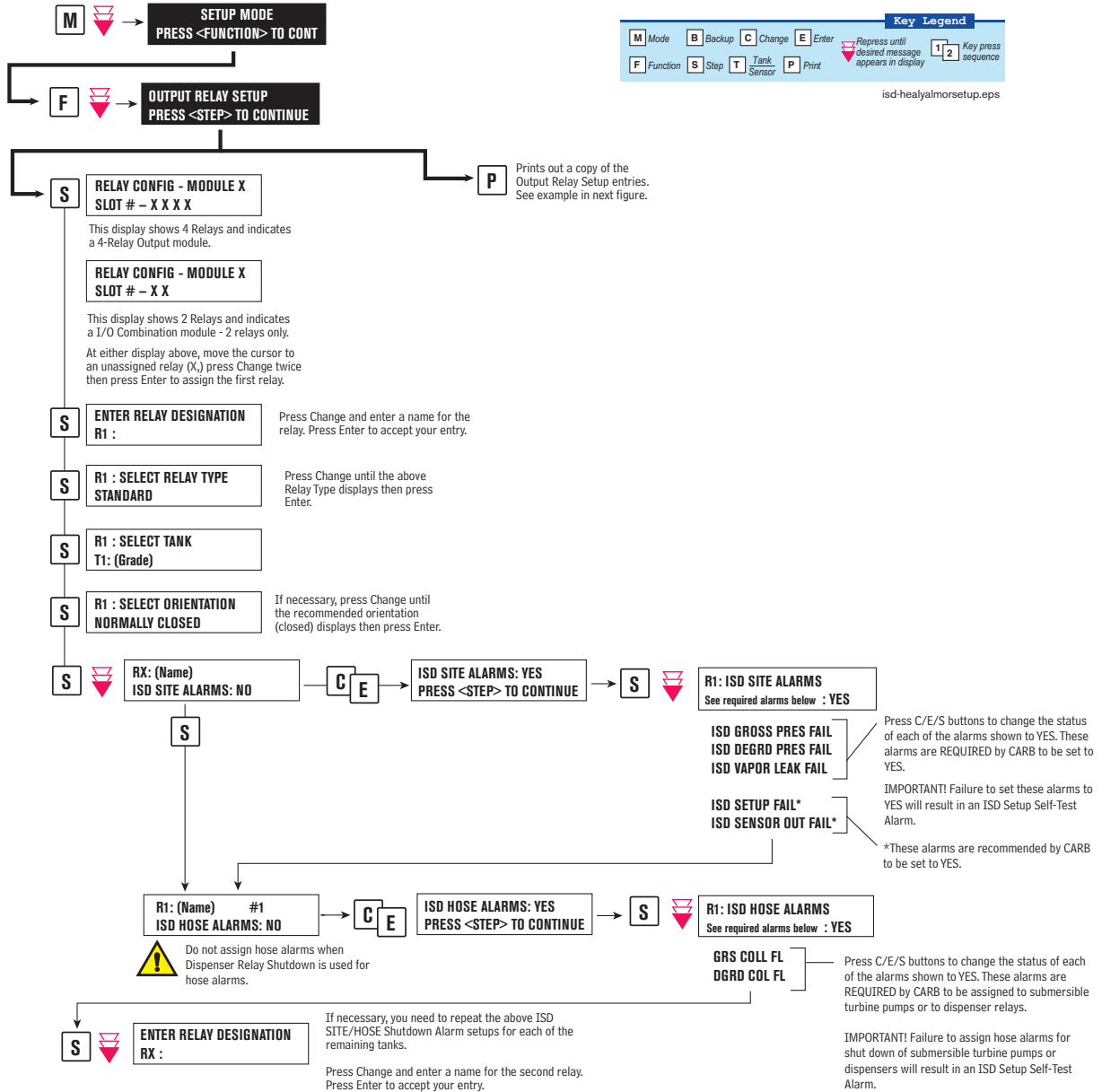


Figure 13. Assigning ISD Shut Down Alarms in Output Relay Setup

Figure 14 shows a resulting printout of the Output Relay setup with ISD alarms assigned when Dispenser Relay modules are not used.

```
OUTPUT RELAY SETUP
-----

R 1: (Input Name)
TYPE:
  STANDARD
  NORMALLY CLOSED

ISD SITE ALARMS
  ISD GROSS PRESSURE FAIL
  ISD DEGRD PRESSURE FAIL
  ISD VAPOR LEAKAGE FAIL
  ISD SETUP FAIL
  ISD SENSOR OUT FAIL

ISD HOSE ALARMS
  h1: GROSS COLLECT FAIL
  h1: DEGRD COLLECT FAIL
```

isd-evrthealysorsetprt.eps

Figure 14. Example Printout - ISD Alarms Assignments - Output Relay Setup

ALARM SETUP FOR SITES WITH DISPENSER RELAYS

Figure 15 illustrates the setup steps required to assign ISD Shut Down Alarms to a tank using Dispenser Relay Module.

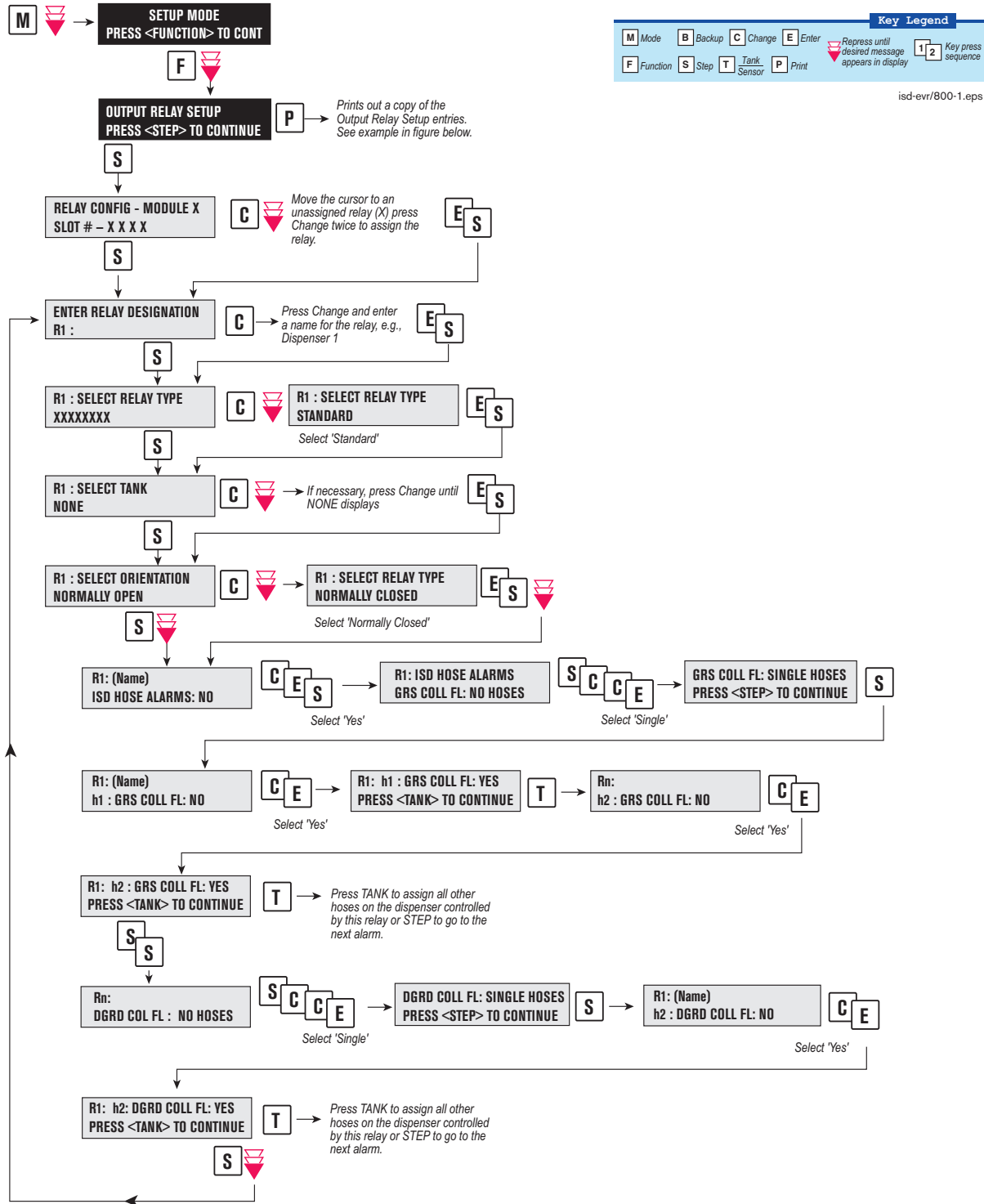


Figure 15. Assigning ISD Shut Down Alarms in Dispenser Relay Setup

Figure 16 shows a resulting printout of the Dispenser Relay setup with ISD hose alarms assigned..

```
OUTPUT RELAY SETUP
-----

R 1:DISPENSER 1
TYPE:
  STANDARD
NORMALLY CLOSED

TANK #:  NONE

ISD HOSE ALARMS
h 1:GROSS COLLECT FAIL
h 2:GROSS COLLECT FAIL
h 1:DEGRD COLLECT FAIL
h 2:DEGRD COLLECT FAIL
```

isd-evr\800-2.eps

Figure 16. Example Printout - ISD Hose Alarm Assignments - Dispenser Relay Setup

ISD Operability Test Procedure

The following procedures shall be used at field sites to determine the operability of the Veeder-Root ISD system to satisfy the requirements documented in VAPOR RECOVERY CERTIFICATION PROCEDURE, CP-201, CERTIFICATION PROCEDURE FOR VAPOR RECOVERY SYSTEMS AT GASOLINE DISPENSING FACILITIES. Testing the ISD equipment in accordance with this procedure will verify the equipment's operability for Vapor Containment Monitoring and Vapor Collection Monitoring.

Veeder-Root's TLS console ISD System Self-Test Monitoring algorithms are designed to verify proper selection, setup and operation of the TLS console modules and sensors and will not complete and report passing test results in the event of a failure of components used in the system. Completed ISD monitoring tests are evidence that:

- The system was properly powered for data collection
- All necessary ISD sensors were setup and connected
- All necessary ISD sensors were operating within specification
- All internal components including TLS console modules were properly setup and operating within specification

Veeder-Root recommends printing a copy of the ISD ALARM STATUS and ISD DAILY report (REF. Section 5, Operation of the ISD Install, Setup & Operation Manual) periodically to determine that compliance tests are being completed in accordance with local and state regulations.

A step-by-step worksheet for recording data from the following operability tests is provided in Appendix B.

Vapor Pressure Sensor Verification Test

See EO VR 202 Exhibit 9 for the Pressure Sensor Verification Test.

Vapor Flow Meter Operability Test

See EO VR 202 Exhibit 9 for the ISD Vapor Flow Meter Operability Test Procedure.

Operation

Alarms

OVERVIEW OF TLS CONSOLE INTERFACE

The TLS console is continuously monitoring the vapor recovery system and ISD sensors for alarm conditions such as excessively high or low vapor collection, containment system vapor leakage and equipment problems.

During normal operation when the TLS console and monitored EVR/ISD System is functioning properly and no alarm conditions exist, the "ALL FUNCTIONS NORMAL" message will appear in the system status (bottom) line of the console display, and the green Power light will be On (see Figure 17).

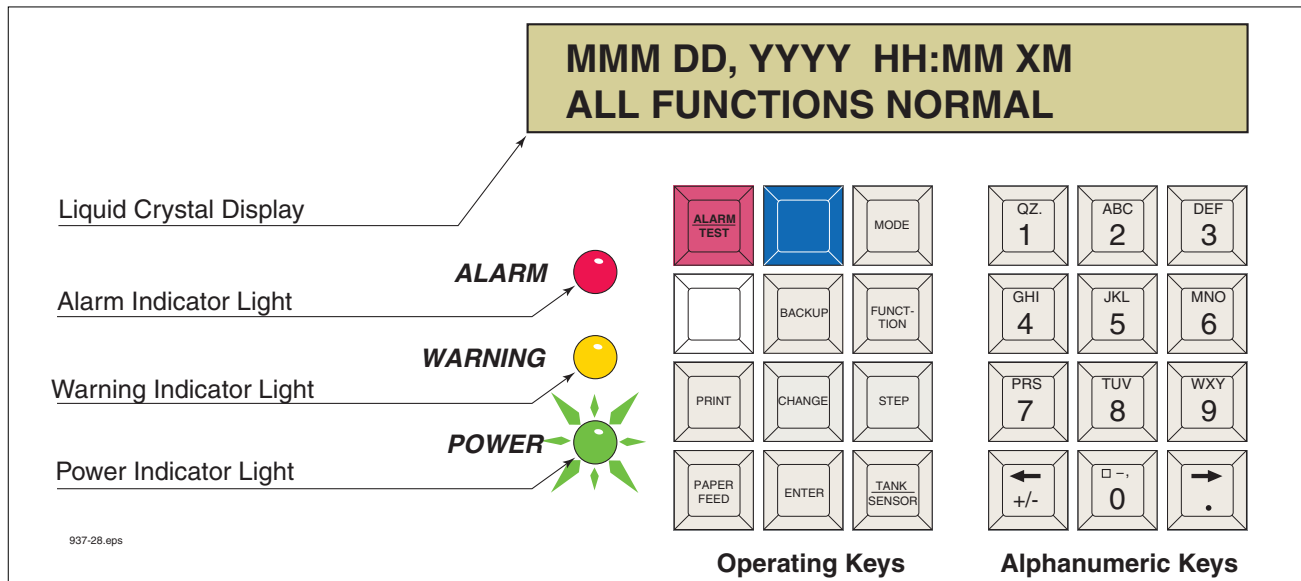


Figure 17. TLS Console Alarm Interface

If an alarm condition occurs the system displays the condition type and its location. If more than one condition exists, the display will continuously cycle through the appropriate alarm messages. The system automatically prints an alarm report showing the alarm type, its location and the date and time the alarm condition occurred.

Warning and alarm posting causes the TLS console-based system to activate warning or failure indicator lights, an audible alarm, and an automatic strip paper printout documenting the warning or alarm. Historical reports of warning and alarm events are available for up to one year.

WARNING POSTING

Displayed messages alert you to the source and type of alarm. Printed messages show the type and location of the alarm. In the Warning example in Figure 18, the display's second line and printed message indicates that the containment system's vapor leak rate has increased above the allowed standard generating a warning.

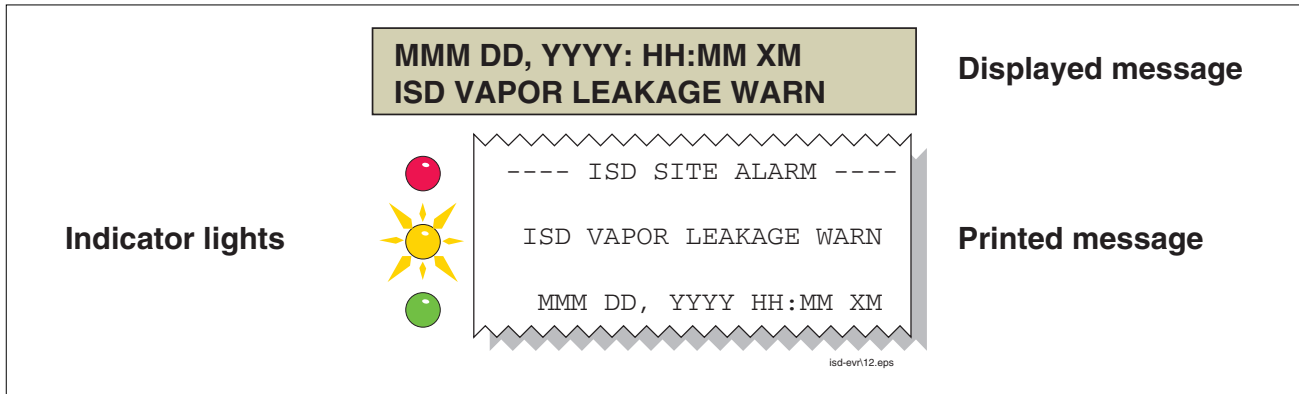


Figure 18. Example Warning Posting

The TLS console also logs an entry to the Warning Log upon posting a warning.

ALARM POSTING

Displayed messages alert you to the source/number and type of alarm. Printed messages show the type and location of the alarm. In the alarm example in Figure 19 the display's second line and printed message indicates that vapor collection on hose 1, FP1 Super has dropped below the allowed standard resulting in a failure alarm. (By default, for unihose dispensers, FP1 BLEND3 will be displayed rather than FP1SUPER as shown below.)

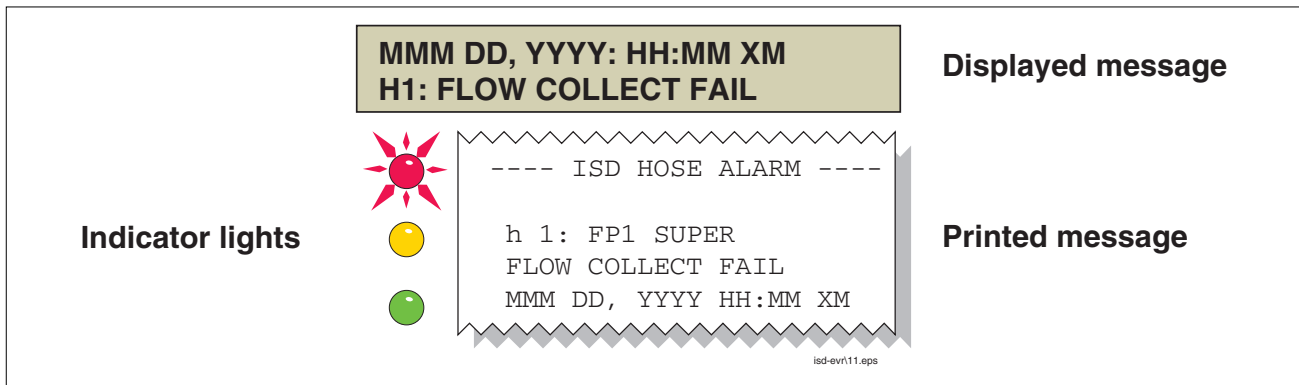


Figure 19. Example Alarm Posting

Upon posting a failure alarm, the TLS console logs an entry to the Failure Log, prohibits fuel dispensing from all ISD gasoline fueling point(s) and logs a shutdown event to the Shutdown & Misc. Event Log.

The initial release of ISD will prohibit fuel dispensing from all gasoline fueling points by shutting down the submersible pumps in all gasoline tanks. The method of overriding an ISD Alarm shutdown is discussed in the "Site Reenable" section.

SITE REENABLE

The TLS console ALARM/TEST button allows you to perform a logged shutdown override and resume dispensing. Figure 20 illustrates the ISD alarm override procedure.

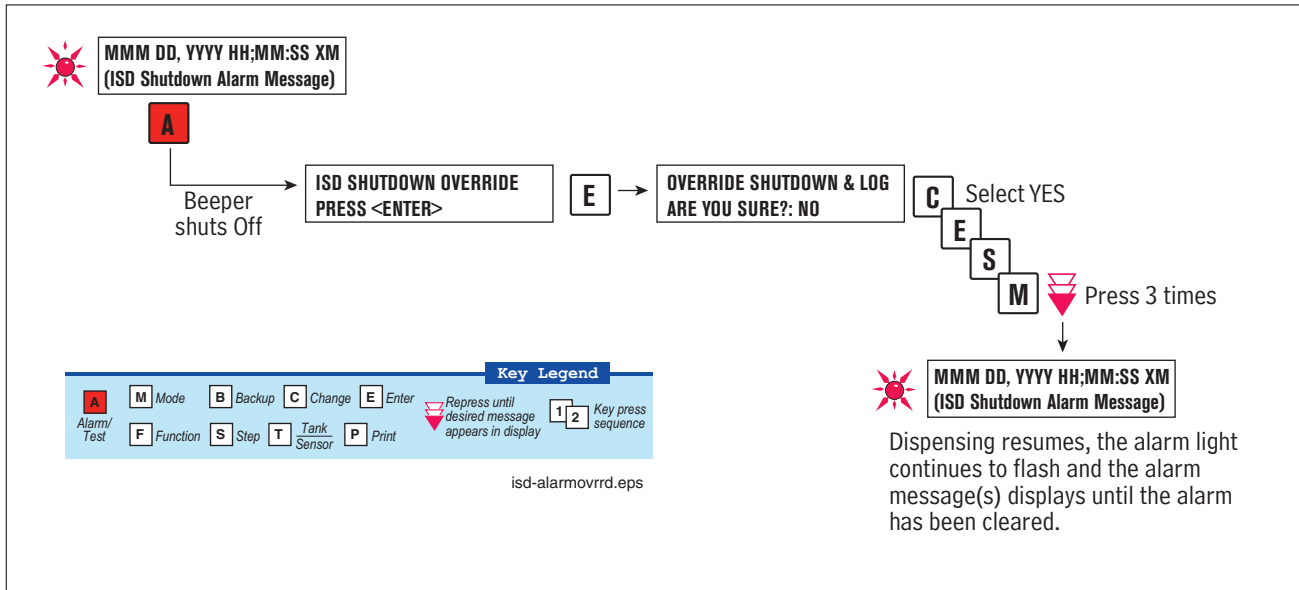


Figure 20. ISD Alarm Override Procedure

ALARM LOGS

Alarms will be recorded in the Warning Log or Failure Log of the monthly reports, which can be viewed electronically or via the integral printer (if queued in the most recent 10 events). The following example shows an excerpt from an electronically accessed monthly report.

Monthly Report Warning & Failure Log Examples:

Warning Alarms

Date	Time	Description	Reading	Value
2003/01/01	23:59	VAPOR VAPOR CONTAINMENT LEAKAGE	CFH@2"WC	14
2003/01/01	23:59	A/L RATIO DEGRADATION	FP2 MID	0.69
2002/12/31	23:59	VAPOR VAPOR CONTAINMENT LEAKAGE	CFH@2"WC	13
2002/12/31	23:59	A/L RATIO DEGRADATION	FP2 MID	0.67

Failure Alarms

Date	Time	Description	Reading	Value
2003/01/01	23:59	A/L RATIO GROSS BLOCKAGE	FP1 REG	0.06
2003/01/01	23:59	A/L RATIO DEGRADATION	FP1 REG	0.14
2003/01/01	23:59	A/L RATIO GROSS BLOCKAGE	FP1 MID	0.13
2003/01/01	23:59	A/L RATIO DEGRADATION	FP1 MID	0.15

ALARM SEQUENCE

Each ISD monitoring test operates once each day on sensor data gathered over a fixed time interval and with a minimum required number of monitored events. The interval is a fixed number of calendar days depending on the test being run. As an example, the A/L degradation Vapor Collection Monitoring test requires seven calendar days of data and at least 30 fueling events. In this example, each daily test result represents a test based on the prior

seven days' time period. When a test first fails, a warning is posted and a warning event is logged. If this condition persists for seven more consecutive days, an alarm is posted, a failure alarm event is logged and the site is shutdown. If the condition continues, additional failure events are logged and the site will continue to be shutdown each day.

ISD ALARM SUMMARY

Table 3 summarizes the ISD Alarms - Alarms with footnote 2 will result in a site shutdown.

Table 3. SD Alarm Summary

Displayed Message	ISD Monitoring Category	Light Indicator	Cause	Suggested Troubleshooting ¹
ISD VAPOR LEAKAGE WARN	Containment	Yellow	Vapor Leakage Detection test warning	<ul style="list-style-type: none"> •Exhibit 7 Nozzle Bag Test •Exhibit 9/10 Operability Test •T.P. 201.1E-PVV Test •Exhibit 4 Clean Air Separator Test •TP-201.3
ISD VAPOR LEAKAGE FAIL ²	Containment	Red	Vapor Leakage Detection test - 8th consecutive failure	
ISD GROSS PRESSURE WARN	Containment	Yellow	Gross Over Pressure test warning	<ul style="list-style-type: none"> •Are ball valves for the clean air separator in the correct position? •Is the ball valve near the pressure sensor in the correct position? •Exhibit 7 Bag Test •T.P. 201.1E-PVV Test •T.P. 201.3 •Look for problems using one or more of the following VR-202 procedures/tests: Dispenser Integrity Test B-3 (i.e. 'Pumping Tightness' test), Exhibit 4, Exhibit 5, Exhibit 9 (pressure sensor only) or Flow Rate Verification per section 1.2.3.
ISD GROSS PRESSURE FAIL ²	Containment	Red	Gross Over Pressure test - 8th consecutive failure	
ISD DEGRD PRESSURE WARN	Containment	Yellow	Degradation Over-Pressure test warning	
ISD DEGRD PRESSURE FAIL ²	Containment	Red	Degradation Over-Pressure test - 30th consecutive failure	
Hnn: GROSS COLLECT WARN	Collection	Yellow	1-Day Gross A/L Test warning	<ul style="list-style-type: none"> •Visually inspect hanging hardware at the affected fueling point •Exhibit 7 Nozzle Bag Test •VR-202 Exhibit 5
Hnn: GROSS COLLECT FAIL ²	Collection	Red	1-Day Gross A/L Test failure - 2nd consecutive failure	
Hnn: DEGRD COLLECT WARN	Collection	Yellow	7-Day Degradation A/L Test warning	
Hnn: DEGRD COLLECT FAIL ²	Collection	Red	7-Day Degradation A/L Test - consecutive failure	
ISD SENSOR OUT WARN	Self-Test	Yellow	ISD Sensor Out Self-Test warning	Confirm ISD sensor & module installation / communication per section 2.
ISD SENSOR OUT FAIL ²	Self-Test	Red	ISD Sensor Out Self-Test - 8th consecutive failure	
ISD SETUP WARN	Self-Test	Yellow	System Setup Self-Test warning	Confirm EVR / ISD programming per section 3.
ISD SETUP FAIL ²	Self-Test	Red	System Setup Self-Test failure - 8th consecutive failure	

¹ See ISD Troubleshooting Manual P/N 577013-819 for a complete list of suggestions.

² ISD Shutdown Alarms - see "Site Reenable" on page 26.

Table 4 summarizes additional alarms that may be posted by ISD related equipment. These alarms are not critical to vapor recovery functionality, but could indicate erroneous setup or equipment malfunction. NOTE: Additional TLS console alarms listed in the TLS-3XX Operator's manual may be posted and may lead to an ISD shutdown alarm if persistent (see ISD Troubleshooting Manual for details).

Table 4. Other Alarms

Displayed Message	Light Indicator	Set Condition	Clear Condition
MISSING RELAY SETUP	Red	One or more required shutdown alarms have not been assigned to a relay.	Setup required shutdown alarms.
MISSING TANK SETUP	Red	There are no vapor recovery (gasoline) tanks defined or a gasoline pump has not been assigned to a control (shut down) device in at least one tank.	Complete gasoline tank setup.
MISSING HOSE SETUP	Red	There are no product meters assigned to a hose.	Assign at least 1 product meter to a hose.
hnn: VPRFLOW MTR SETUP	Red	Incoming transaction from a hose with an unavailable Vapor Flow Meter.	Configure Vapor Flow Meter (Smart Sensor) and enable it in ISD.
MISSING VAPOR PRES SEN	Red	There is no Vapor Pressure Sensor setup or detected.	Complete Vapor Pressure Sensor setup.
MISSING VAPOR FLOW MTR	Red	There is no Vapor Flow Meter setup or detected.	Complete Vapor Flow Meter setup.
fnn: CHK VAPOR FLOW MTR	Red	Failure of volume measure test - possible problem vapor flow meter.	Volume measure test passes or vapor flow meter deconfigured, or test cleared.

Table 5. Wireless Related Sensor Alarms

Fault Message	Device	Light Indicator	Cause	Suggested Troubleshooting
BATTERY WARNING	Vapor Flow Meter, Pressure Sensor	Yellow	Device transmitter reports battery status as 'Replace' for 24 hours	Remove and replace battery.

Reports

There are two main reports (CP-201 required) that are stored by the ISD system: the Monthly Status Report, stored for 12-months, and the Daily Status Report, stored for 365 days. A third report discussed in this section is the ISD Status Report. You can print out ISD reports from the TLS console front panel as shown in Figure 21.

- The monthly report includes:
 - The Warning Log
 - The Failure Log

- The Misc. Event Log
- The daily report includes:
 - Maximum and minimum ullage pressures
 - Results of the Vapor Containment Monitoring Gross (75th percentile), Degradation (95th percentile) ullage pressure test and Vapor Leakage Detection (CVLD) tests
 - Vapor Collection Monitoring test results for each fueling position
- ISD Status Report
 - Last test report results

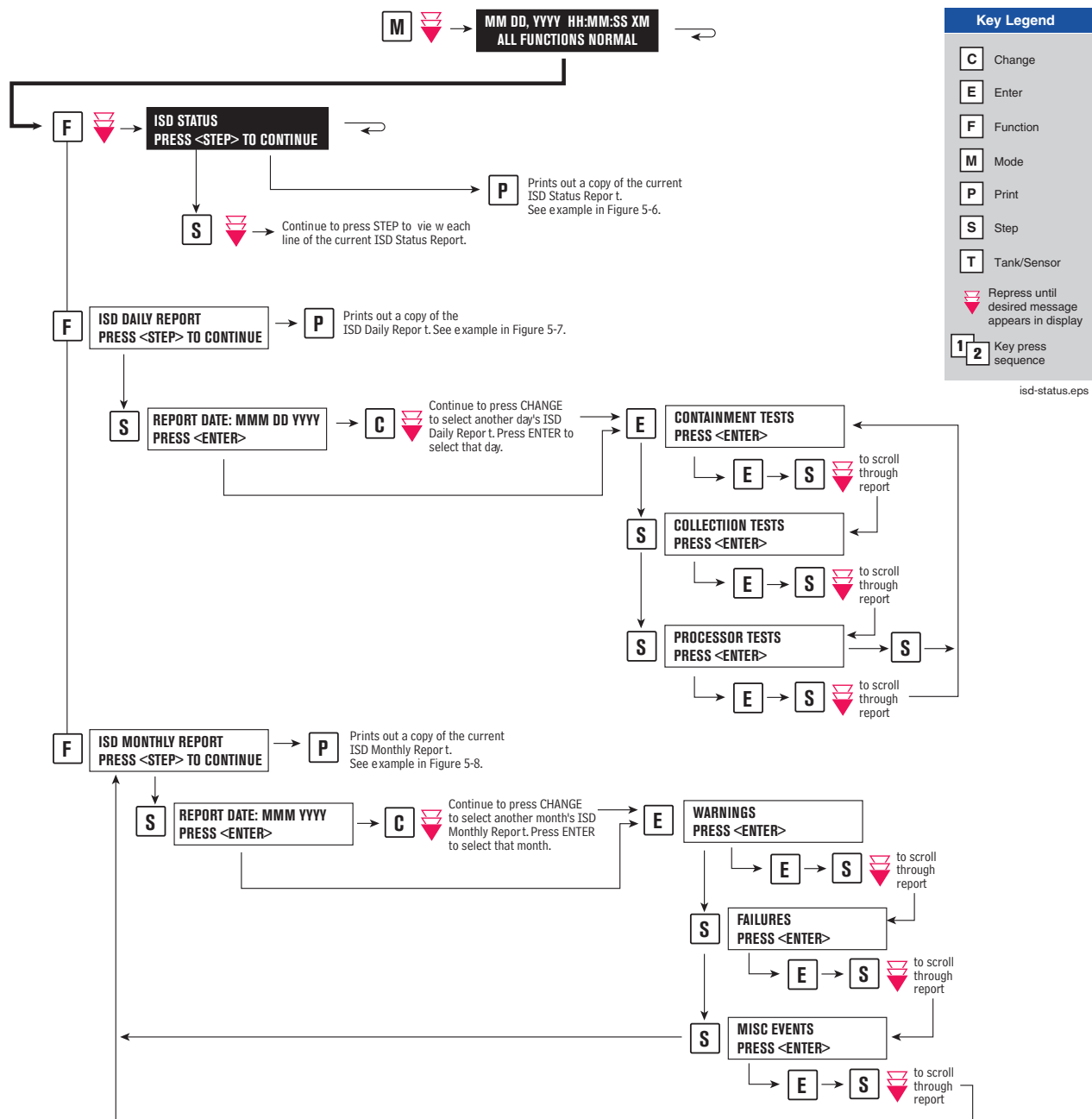


Figure 21. Printing ISD Reports on Console Printer

```
ISD STATUS

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)

(MMM DD, YYYY HH:MM XM)

EVR TYPE: VACUUM ASSIST
ISD VERSION XX.XX

REPORT DATE:SEP 22, 2004

CONTAINMENT TEST GROSS
STATUS: 0.1"WC PASS

CONTAINMENT TEST DEGRADE
STATUS: -1.1"WC PASS

CONTAINMENT TEST CVLD
STATUS: 3.26CFH PASS

COLLECTION GROSS TEST
STATUS: PASS

COLLECTION DEGRADE TEST
STATUS: PASS

ISD SENSOR SELF TEST
STATUS: PASS

ISD SETUP SELF TEST
STATUS: PASS

STAGE 1 TRANSFER TEST
STATUS: 4 of 4 PASS
```

NOTE: values are for last tests performed

isd-evr\healy5-6.eps

Figure 22. ISD Status Report Example - TLS Console Printout

```

ISD DAILY REPORT

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)
(MMM DD, YYYY HH:MM XM)

EVR TYPE: VACUUM ASSIST
ISD VERSION XX.XX

REPORT DATE: JAN 20
ISD VERSION XX.XX

OVERALL STATUS    PASS
EVR CONTAINMENT  PASS
EVR COLLECTION    PASS
STAGE1  1 of 1 PASS
SELF TEST        PASS
ISD MONITOR UP-TIME 100%

-----

CONTAINMENT TESTS
GROSS  95%  -0.0  "WC
DGRD   75%  -1.0N "WC
VAPOR LEAK    2  CFH
MAX        -0.8  "WC
MIN         -5.0  "WC

-----

COLLECTION TESTS
GROSS  DGRD
A/L(#)  A/L(#)

FP 1: BLEND
1.04( 51) 1.06(297)
FP 2: BLEND
1.12( 36) 1.10(285)
FP 3: BLEND
1.05( 28) 1.07(231)
FP 4: BLEND
1.03( 45) 1.07(211)
FP 5: BLEND
1.09( 31) 1.08(249)
FP 6: BLEND
0.99( 50) 1.01(417)
FP 7: BLEND
1.04( 52) 1.04(293)
FP 8: BLEND
1.10( 75) 1.09(457)
FP 9: BLEND
1.13( 31) 1.08(281)
FP10: BLEND
1.13( 74) 1.13(463)
FP11: BLEND
1.02( 36) 1.08(233)
FP12: BLEND
1.09( 70) 1.06(488)

-----

SELF TEST

SETUP TEST        PASS
SENSOR OUT TEST   PASS
    
```

(#) Count max number 999

isd-evr/healy/fig5-7.eps

Figure 23. ISD Daily Report Example - TLS Console Printout

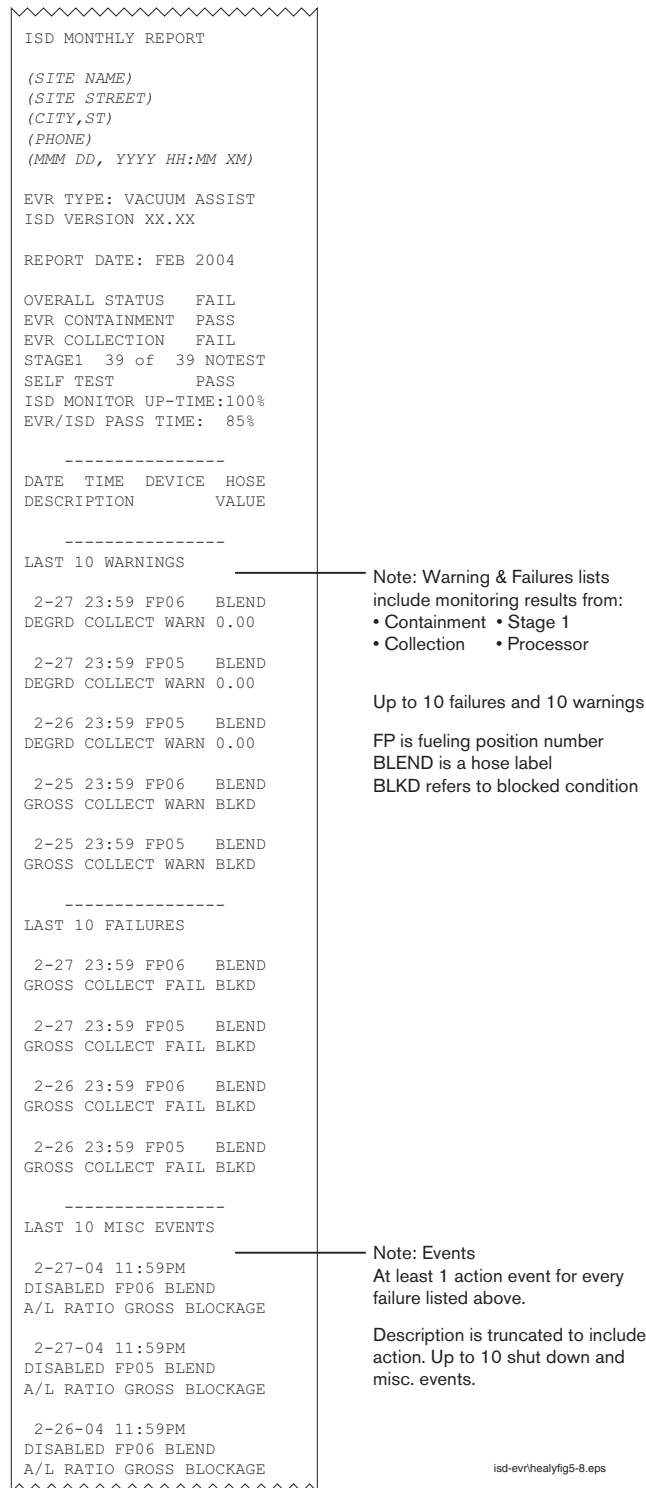


Figure 24. ISD Monthly Report Example - TLS Console Printout

Viewing ISD Reports via RS-232 Connection

CONNECTING LAPTOP TO CONSOLE

Connect your laptop to the TLS console's RS-232 or Multiport card using one of the methods shown in the examples in Figure 25 below.

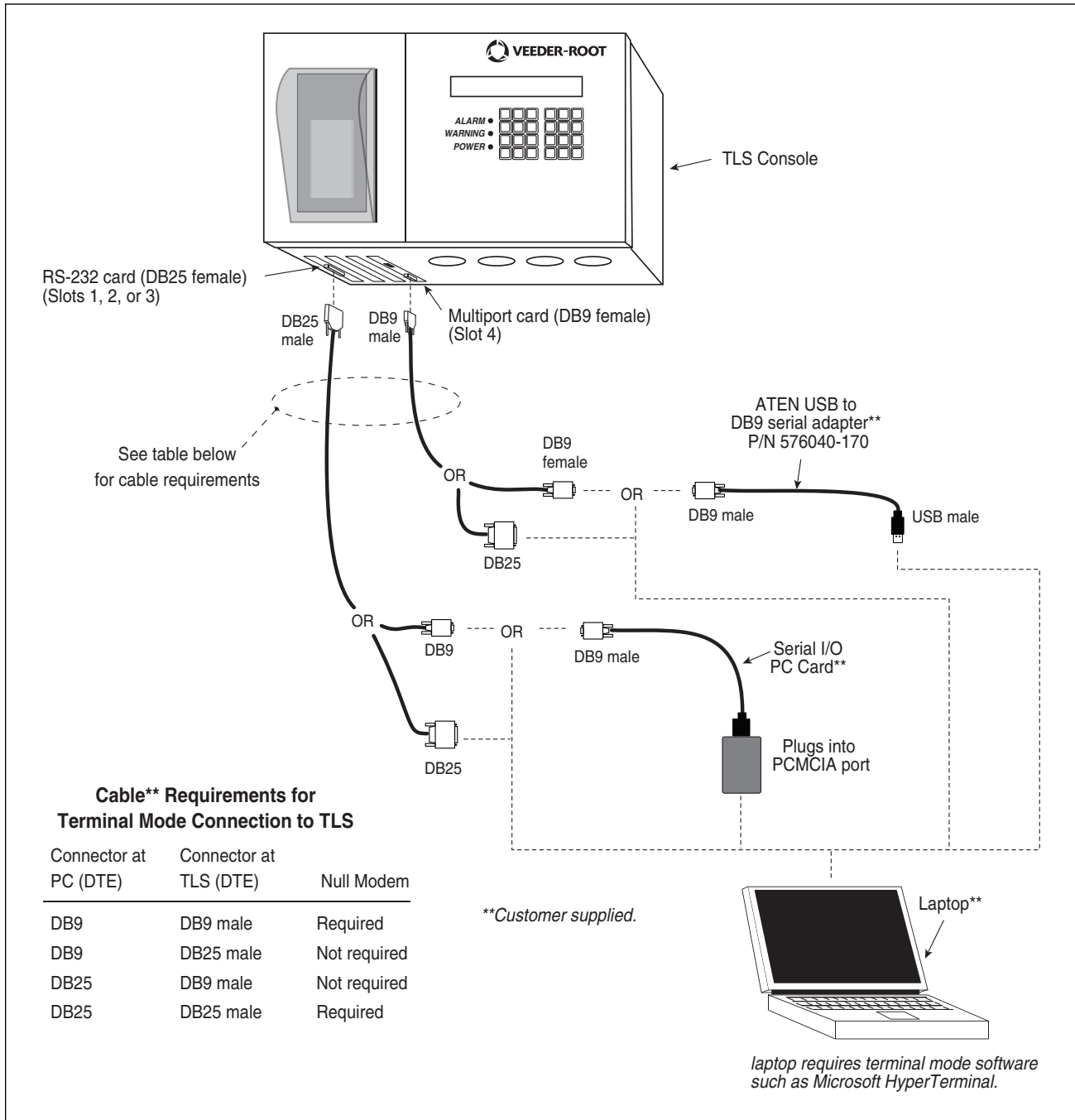


Figure 25. Connecting Laptop to TLS Console for Serial Communication

CONNECTING LAPTOP TO CONSOLE

1. Open your laptop's serial communication program, e.g., HyperTerminal. You can typically find HyperTerminal under: Start/Programs/Accessories/Communications.
2. After opening the terminal software program, ignore (cancel) any modem/dialing related request windows since you will be directly connecting to the console via serial communications. When the Connection Description window appears (Figure 26), enter a connection name, e.g., TLSDIRECT, and click the OK button.



Figure 26. Connection Description Window

3. After clicking the OK button, you may see a repeat of the modem/dialing windows, in which case ignore (cancel) them all.
4. When the Connect To window appears (Figure 27), depending on your connection method, select either COM1 (If RS-232 port on laptop), USB-Serial Controller (if using USB port on laptop), or Serial I/O PC Card (if using PCMCIA port on laptop) in the 'Connect using' drop down box, then click OK button.



Figure 27. Connect To Window



5. Next you should see the 'Port Settings' window.

IMPORTANT! The settings of the laptop's com port must match those of the console's com port to which you are connected.

a. Go to the console front panel press the MODE key until you see:

```

SETUP MODE
PRESS <FUNCTION> TO CONT
    
```

b. Press the FUNCTION key until you see the message:

```

COMMUNICATIONS SETUP
PRESS <STEP> TO CONTINUE
    
```

c. Press the STEP key until you see the message:

```

PORT SETTINGS
PRESS <ENTER>
    
```

d. Press the PRINT key to printout the port settings for all communication modules installed in the console. Figure 28 shows an example port settings printout with the RS-232 module installed. Using the console port settings in the example below, your HyperTerminal 'Port Settings' window entries would be Bits per second - 2400, Data bits - 7, Parity - Odd, Stop Bits - 1. For the 'Flow Control' entry select None. Click OK.

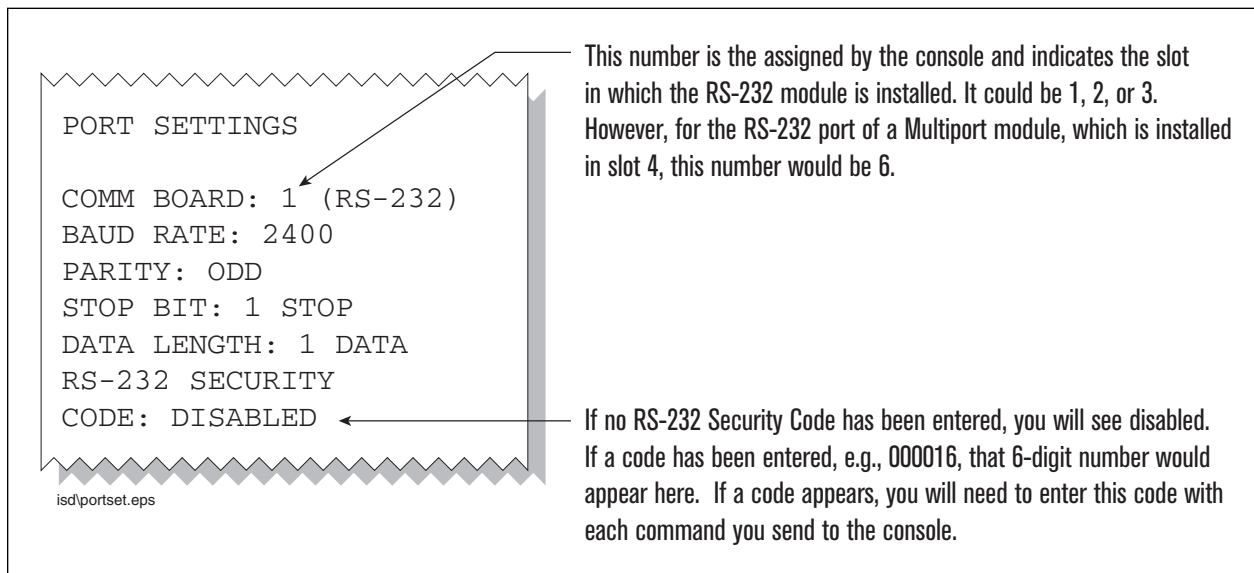


Figure 28. Console Comm Port Settings Printout Example

In the example port settings printout above, the RS-232 Security Code is disabled. If the code was enabled you would see a 6-digit number which you will need to enter to access the console (refer to the 'Sending Console Commands' paragraph below for more information).

6. After entering your port settings, the program's main window appears (Figure 29).

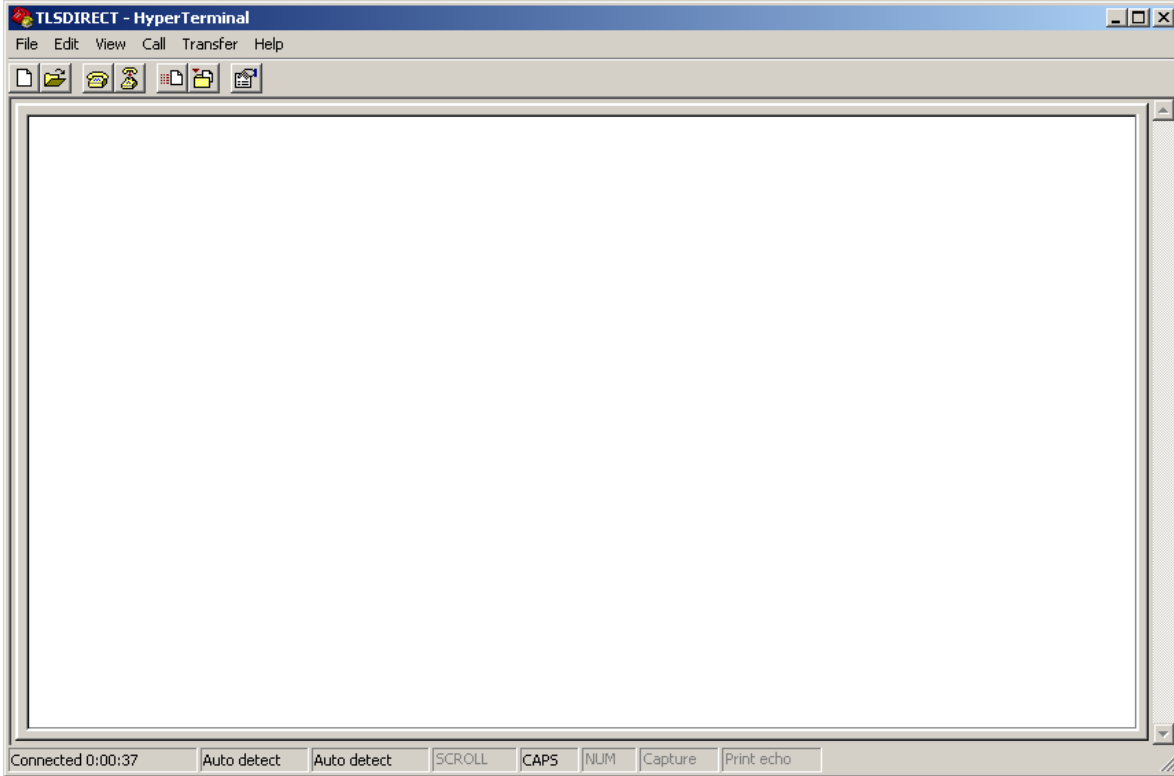


Figure 29. HyperTerminal Main Window

SENDING CONSOLE COMMANDS

Table 2-3 shows three important ISD console commands: IV0500, IV0200, and IV0100. The <SOH> shown in the table means that you must press and hold the **Ctrl** key while you press the **A** key.

For example, let's say you want to see the Daily Report Details for the last 10 days.



Note: If you want to see the characters of the command as you type them in, click on File menu, then select Properties/Settings (tab)/ASCII Setup and click the check box for 'Echo typed characters locally', then click OK to close the window(s) and return to the main screen.

If the RS-232 Security Code is disabled - press and hold the Ctrl key while you press the A key, then type in IV0500010. If the RS-232 Security Code is enabled (e.g., 000016) you must enter the security code before the command - press and hold the Ctrl key while you press the A key, then type in 000016IV0500010.

You will see the typed command on the screen: ⓈIV0500010 followed by the response (report) from the console. The Ⓢ symbol indicates Ctrl+A and the ♥ symbol indicates the end of the response.

If the console recognizes the command the response displays as soon as the command is typed in.

If the console does not recognize the command you would see something like ⓈIV0500010Ⓢ9999FF1B♥ which indicates the console did not recognize the command.

All responses (Reports) can be printed or saved to a file. See the terminal program's help file for instructions.

Table 6.- Serial Commands for ISD Alarm, Monthly, and Daily Reports

Report Type	Serial Command (PC to Console)*
Daily Report Details (See example Figure 32)	<SOH>IV0500ddd Where ddd = number of days, 001 = yesterday and today, 002 = two days ago, etc.
Monthly Status Report (See example Figure 31)	<SOH>IV0200yyyymm Where yyyy = year number, e.g. 2003, mm = month number, 01 = January, 02 = February, etc.
Alarm Status (See example Figure 30)	<SOH>IV0100

*<SOH> = Control A. For more information on TLS console serial commands, refer to the V-R Serial Interface Manual.

```

IV0500
MAR 1, 2004 12:20 AM

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)
(MMM DD, YYYY HH:MM XM)

ISD DAILY REPORT DETAILS

EVR TYPE: VACUUM ASSIST
ISD TYPE: XX.XX
VAPOR PROCESSOR TYPE: NO VAPOR PROCESSOR

OVERALL STATUS          :FAIL          EVR VAPOR COLLECTION :FAIL
EVR VAPOR CONTAINMENT  :PASS
ISD MONITOR UP-TIME    :100%          STAGE I TRANSFERS: 39 of 39 PASS
EVR/ISD PASS TIME      : 85%

Status Codes: (W)Warn (F)Fail (D)Degradation Fail (G)Gross Fail
(ISD-W)ISD Self-Test Warning (ISD-F)ISD Self-Test Fail (N)No Test

      ISD  ISD  ---CONTAINMENT TESTS---  STAGE  ---COLLECTION TESTS
      EVR  %UP  GROSS  DGRD  MAX  MIN  LEAK  I  VAPOR  FP1  FP2  FP3
DATE  STATUS  TIME  95%  75%  "WC  "WC  CFH  XFR  PRCR  BLEND BLEND BLEND
02/10  PASS  100%  -1.4N -3.1N -1.1 -5.0  0N  PASS  1.09  1.10  1.11
02/11  PASS  100%  -1.7N -3.5N  0.4 -5.0  0N  PASS  1.05  1.14  1.06
02/12  PASS  100%  -1.7N -3.4N -1.2 -5.0  0N  PASS  1.06  1.07  1.05
02/13  PASS  100%  -1.8N -3.4N -1.0 -5.0  2N  PASS  1.08  1.10  1.00
02/14  PASS  100%  -1.6N -3.3N -0.3 -5.0  2N  PASS  1.05  1.09  1.08
02/15  PASS  100%  -1.5N -3.3N  1.3 -5.0  2  PASS  1.07  1.11  1.05
02/16  PASS  100%  -1.2  -3.0N -0.3 -5.0  3  PASS  1.06  1.10  1.14
02/17  PASS  100%  -1.2  -2.9N  0.0 -5.0  3  PASS  1.06N 1.10N 1.14
02/18  PASS  100%  -1.0  -2.9N  1.0 -5.0  3  PASS  1.06N 1.10N 1.06
02/19  PASS  100%  -0.9  -2.9N  1.6 -5.0  4  PASS  1.06N 1.10N 1.09
02/20  PASS  100%  -0.6  -2.7N  2.9 -5.0  4  PASS  1.06N 1.10N 1.03
02/21  PASS  100%  -0.6  -2.7N  1.1 -5.0  1  PASS  1.06N 1.10N 1.13
02/22  PASS  100%  0.1  -2.5N  3.1 -5.0  0  PASS  1.06N 1.10N 1.03
02/23  PASS  100%  0.1  -2.6N  0.9 -5.0  0  PASS  1.06N 1.10N 1.04
02/24  PASS  100%  0.2  -2.6N  0.9 -5.0  0  PASS  1.08  1.09  1.07
02/25  W  100%  0.8  -2.3N  2.8 -5.0  0  PASS  1.10  1.11  1.08
02/26  F  100%  1.1  -2.2N  5.0 -5.0  0  PASS  1.10  1.12  1.11
02/27  F  100%  1.0  -2.4N -0.8 -5.0  0  PASS  1.11  1.13  1.11
02/28  PASS  100%  1.0  -2.4N  0.3 -5.0  0  PASS  1.09  1.16  1.08
02/29  PASS  100%  0.9  -2.3N  1.6 -5.0  0  PASS  1.01  1.14  1.08N

---COLLECTION TESTS-DAILY AVERAGE HOSE A/L RATIO-----
      FP4  FP5  FP6  FP7  FP8  FP9  FP10  FP11  FP12
DATE  BLEND BLEND BLEND BLEND BLEND BLEND BLEND BLEND BLEND
02/10  1.12  1.03  0.97  1.04  1.07  1.05  1.09  1.08  1.06
02/11  1.09  1.04  1.04  0.98  1.03  1.06  1.06  1.14  1.07
02/12  1.10  1.09  1.04  1.04  1.06  1.09  1.10  1.03  1.04
02/13  1.06  1.11  1.04  1.07  1.09  1.08  1.09  1.13  1.08
02/14  1.05  1.07  1.05  1.07  1.02  1.07  1.08  1.13  1.06
02/15  1.07  1.04  1.04  0.94  1.09  1.05  1.08  1.13  1.07
02/16  1.09  1.08  1.06  1.05  1.10  1.06  1.13  1.03  1.04
02/17  1.08  1.05  1.05  1.06  1.08  1.13  1.10  1.10  1.07
02/18  1.08  1.06  1.05  1.03  1.08  1.00  1.09  1.05  1.09
02/19  1.09  1.11  1.04  1.01  1.08  1.06  1.08  1.06  1.05
02/20  1.07  1.07  1.05  1.05  1.10  1.12  1.10  1.11  1.07
02/21  1.08  1.10  1.06  1.00  1.07  1.13  1.16  1.09  1.09
02/22  1.08  1.04  1.09  1.05  1.09  1.06  1.10  1.11  1.10
02/23  1.06  1.17  1.09  1.06  1.12  1.09  1.14  1.12  1.08
02/24  1.10  1.12  1.08  0.98  1.08  1.11  1.15  1.11  1.02
02/25  1.10  BLKDW BLKDW 1.07  1.06  1.09  1.16  1.03  1.05
02/26  1.11  BLKDF BLKDF 1.05  1.10  1.11  1.10  1.08  1.05
02/27  1.12  BLKDF BLKDF 1.08  1.08  1.06  1.15  1.13  1.09
02/28  1.08  1.11  1.08  1.07  1.07  1.10  1.18  1.05  1.08
02/29  1.09  1.14  1.08  1.03  1.10  1.06  1.19  1.09  1.09
    
```

isd-evr\healyfig5-9.eps

Figure 30. ISD Daily Report Details - Serial to PC Format

```

IV0200
MAR 1, 2004 12:20 AM

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)
(MMM DD, YYYY HH:MM XM)

ISD MONTHLY STATUS REPORT

EVR TYPE: VACUUM ASSIST
ISD TYPE: XX.XX
VAPOR PROCESSOR TYPE: NO VAPOR PROCESSOR

OVERALL STATUS           :FAIL           EVR VAPOR COLLECTION :FAIL
EVR VAPOR CONTAINMENT    :PASS
ISD MONITOR UP-TIME      :100%          STAGE I TRANSFERS: 39 of 39 PASS
EVR/ISD PASS TIME       : 85%

CARB EVR CERTIFIED OPERATING REQUIREMENTS

VAPOR COLLECTION ASSIST SYSTEM A/L RANGE      MIN      MAX
                                              0.95    1.15

ISD MONITORING TEST PASS/FAIL THRESHOLDS

PERIOD      BELOW  ABOVE
VAPOR COLLECTION ASSIST SYSTEM A/L GROSS FAIL  1DAYS    0.33  1.90
VAPOR COLLECTION ASSIST SYSTEM A/L DEGRADATION FAIL  7DAYS    0.81  1.32

VAPOR CONTAINMENT GROSS FAIL, 95th PERCENTILE      7DAYS    ----  1.30"wcg
VAPOR CONTAINMENT DEGRADATION, 75th PERCENTILE    30DAYS    ----  0.30"wcg
VAPOR CONTAINMENT LEAK DETECTION FAIL @2"WCG      7DAYS    ----  8.50cfh
STAGE I VAPOR TRANSFER FAIL, 50th PERCENTILE      20MINS    ----  2.50"wcg

WARNING ALARMS
DATE      TIME      DESCRIPTION           READING      VALUE
04-02-27 23:59:00 A/L RATIO DEGRADATION  FP 6 BLEND    0.80
04-02-27 23:59:00 A/L RATIO DEGRADATION  FP 5 BLEND    0.76
04-02-26 23:59:00 A/L RATIO DEGRADATION  FP 5 BLEND    0.79
04-02-25 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND    BLKD
04-02-25 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND    BLKD

FAILURE ALARMS
DATE      TIME      DESCRIPTION           READING      VALUE
04-02-27 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND    BLKD
04-02-27 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND    BLKD
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND    BLKD
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND    BLKD

SHUTDOWN & MISCELLANEOUS EVENTS
DATE      TIME      DESCRIPTION           ACTION/NAME
04-02-27 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 06 BLEND
04-02-27 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 05 BLEND
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 06 BLEND
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 05 BLEND
04-02-15 23:59:00 READINESS ISD:PP EVR:PP  ISD & EVR READY
04-02-14 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-13 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-12 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-11 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-10 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
    
```

isd-evr\healyfig5-10.eps

Figure 31. ISD Monthly Status Report - Serial to PC Format

```

IV0100
MAR  1, 2004 12:05 AM

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)
(MMM DD, YYYY HH:MM XM)

ISD ALARM STATUS REPORT

EVR TYPE: VACUUM ASSIST
ISD TYPE: XX.XX
VAPOR PROCESSOR TYPE: NO VAPOR PROCESSOR

OVERALL STATUS           :PASS           EVR VAPOR COLLECTION :PASS
EVR VAPOR CONTAINMENT   :PASS
ISD MONITOR UP-TIME     :100%           STAGE I TRANSFERS:  2 of  2 PASS
EVR/ISD PASS TIME      :100%

WARNING ALARMS
DATE    TIME    DESCRIPTION           READING    VALUE
04-02-27 23:59:01 A/L RATIO DEGRADATION  FP 6 BLEND  0.80
04-02-27 23:59:01 A/L RATIO DEGRADATION  FP 5 BLEND  0.76
04-02-26 23:59:00 A/L RATIO DEGRADATION  FP 5 BLEND  0.79
04-02-25 23:59:01 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND  BLKD
04-02-25 23:59:01 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND  BLKD

FAILURE ALARMS
DATE    TIME    DESCRIPTION           READING    VALUE
04-02-27 23:59:01 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND  BLKD
04-02-27 23:59:01 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND  BLKD
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 6 BLEND  BLKD
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  FP 5 BLEND  BLKD

SHUTDOWN & MISCELLANEOUS EVENTS
DATE    TIME    DESCRIPTION           ACTION/NAME
04-02-27 23:59:01 A/L RATIO GROSS BLOCKAGE  DISABLED FP 06 BLEND
04-02-27 23:59:01 A/L RATIO GROSS BLOCKAGE  DISABLED FP 05 BLEND
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 06 BLEND
04-02-26 23:59:00 A/L RATIO GROSS BLOCKAGE  DISABLED FP 05 BLEND
04-02-15 23:59:00 READINESS ISD:PP EVR:PP  ISD & EVR READY
04-02-14 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-13 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-12 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-11 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
04-02-10 23:59:00 READINESS ISD:PP EVR:PN  EVR READINESS PENDING
    
```

isd-evr\healyfig5-11.eps

Figure 32. ISD Alarm Status Report - Serial to PC Format

Maintenance

TLS Console

The TLS console, including interface modules, do not require scheduled maintenance, but the station operator is responsible to ensure printer paper is properly loaded and front panel indicator lights are operational. ISD System Self-Test Monitoring algorithms are designed to verify proper selection, setup and operation of the TLS console and sensors. Servicing should be performed in accordance with the In-Station Diagnostic System Troubleshooting Guide, Manual 577013-819 in response to warning or alarm conditions.

Vapor Flow Meter

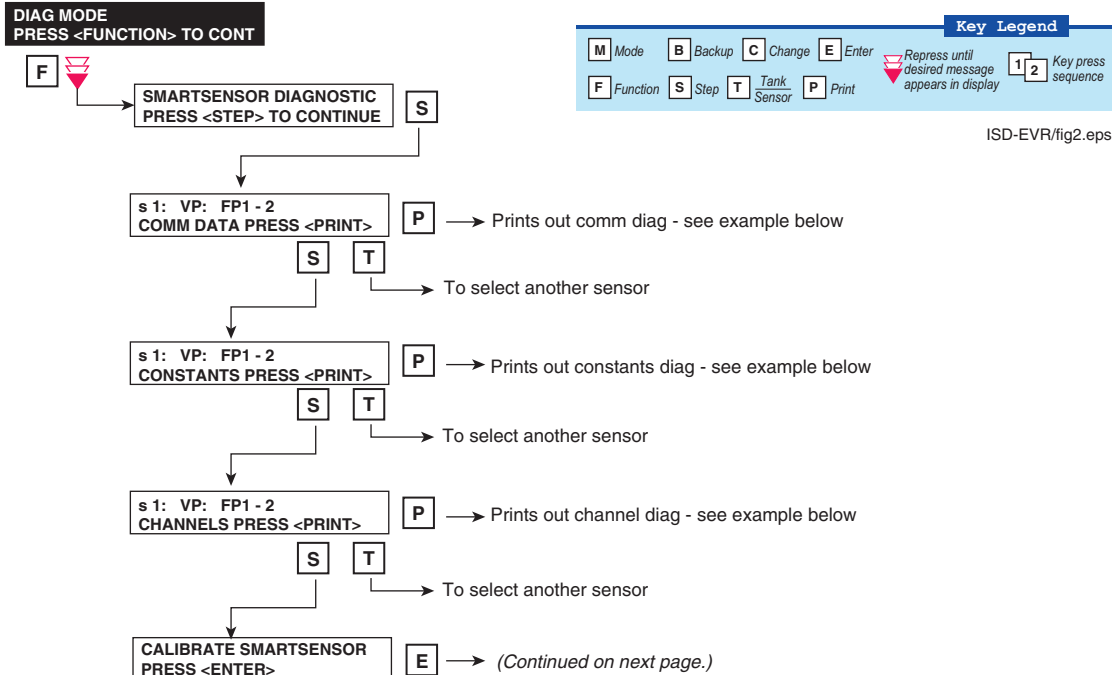
There is no recommended maintenance, inspection nor calibration for the Vapor Flow Meter. Servicing should be performed in accordance with the In-Station Diagnostic System Troubleshooting Guide, Manual 577013-819 in response to warning or alarm conditions.

Vapor Pressure Sensor

There is no recommended maintenance, inspection nor calibration for the Vapor Pressure Sensor. Servicing should be performed in accordance with the In-Station Diagnostic System Troubleshooting Guide, Manual 577013-819 in response to warning or alarm conditions.

Diagnostic Menus

The diagnostic menus below are accessed and viewed from the TLS console front panel.



This menu only appears if this SmartSensor type is a pressure sensor.

```

SS COMM DIAG
-----
s 1: AFM1  FP1-2
SAMPLES READ    58
SAMPLES USED    54
PARITY ERR      0
PARTIAL READ    0
COMM ERR        0
RESTARTS        0
    
```

```

SS CONSTANTS DIAG
-----
s 1: AFM1  FP1-2
VAPOR PRESSURE
SERIAL NUMBER    1007
PROTOCOL VERSION    0
    
```

```

SS CHANNEL DIAG
-----
s 1: AFM1  FP1-2
YY-MM-DD HH:MM:SS
C00 B50B 3D68 00E0 0000
C04 0000 03EF 0000 0004
C08 0A3C 3D68 5693 0081
C12 80C4 80A4 0104 2579
C16 0000 0000 00A3 03D6
C20 0709 0032 04C9 880F
    
```

Diagnostic Menus

CALIBRATE SMARTSENSOR
PRESS <ENTER> **E**

This menu only appears if this Smartsensor type is a pressure sensor.

S

CALIBRATE SMARTSENSOR
PRESS <STEP> TO CONTINUE **P**

→ Prints out sensor calibration history - see example at right.

S

s 1: VAPOR PRESSURE
PRESSURE: -XX.XXX **S**

This is the current uncalibrated value read by the pressure sensor.

ENTER ZERO REFERENCE
PRESSURE: +XX.XXX **S**

Enter reference pressure value from calibrated test device at pressure sensor via TLS Console front panel, e.g., ambient pressure (0.0). This is the first point of the calibration slope.

READ ZERO VALUE
PRESSURE: -XX.XXX **S**

Wait until the read zero pressure value stabilizes and no longer changes, then press STEP.

ENTER SPAN REFERENCE
PRESSURE: -XX.XXX **S**

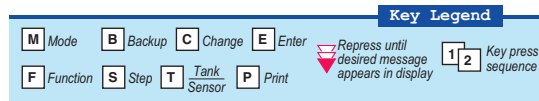
Enter span reference pressure value from calibrated test device at pressure sensor via TLS Console front panel, e.g., 2 psi. This is the second point of the calibration slope.

READ SPAN VALUE
PRESSURE: -XX.XXX **S**

Wait until the read span pressure value stabilizes and no longer changes, then press STEP.

CALB STATUS: PASS
PRESS <STEP> TO CONTINUE

This message will only appear after all 4 values have been successfully obtained and the calibrated slope and offset are within acceptable limits.



ISD-EVR/fig3.eps

VAPOR PRESSURE SENSOR
CALIBRATION HISTORY

```
s 1: VAPOR PRESSURE
DATE: MM-DD-YY HH:MM
SERIAL #: XXXXXXXX
SLOPE: XXXX.XXX
OFFSET: XXXX.XXX
CALB STATUS: PASS
```

Diagnostic Menus

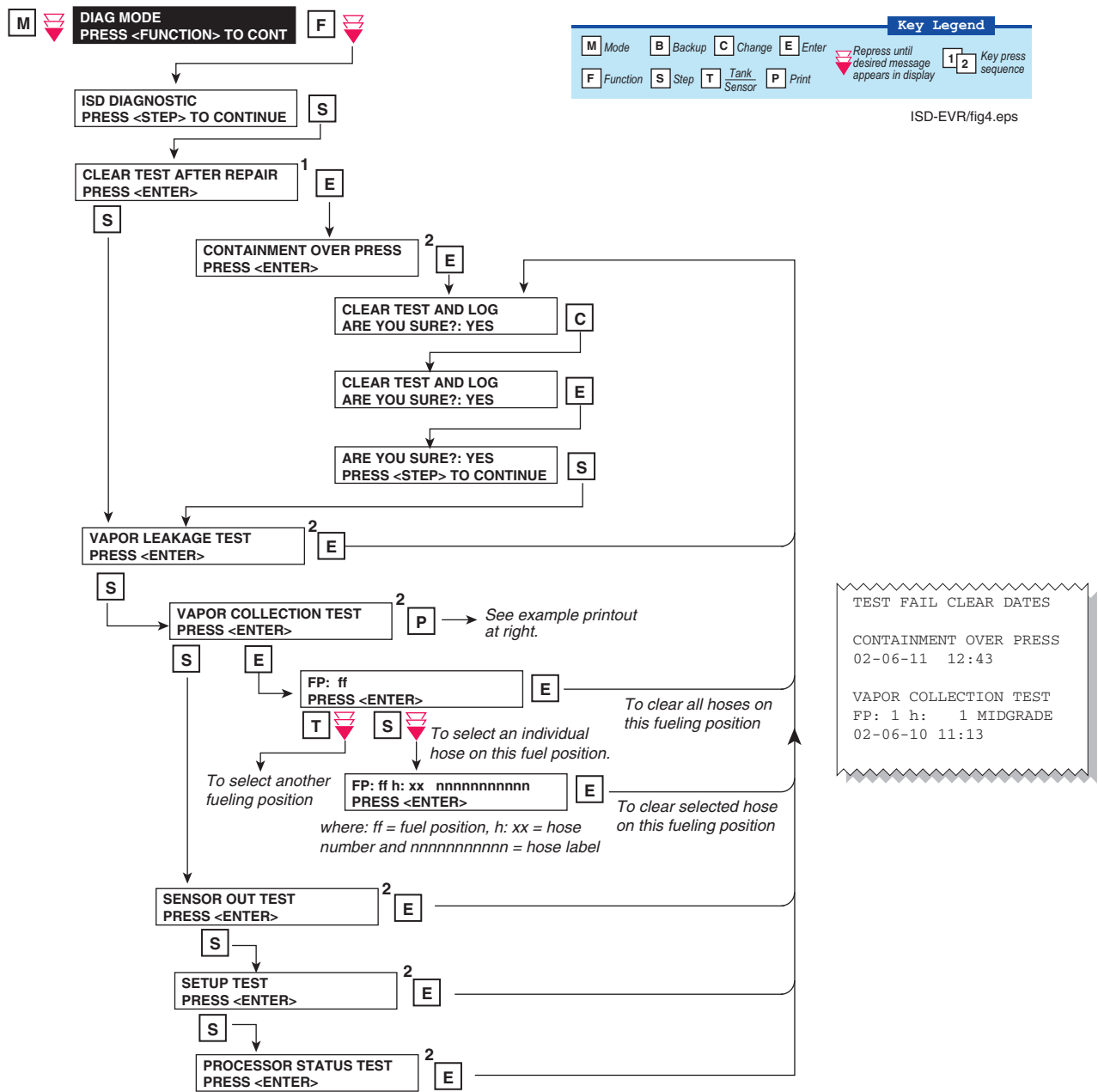


Table 7. Clear Test Repair Menu

Menu Selection	Clears Alarms	Reset Dates
Containment Over Press	ISD GROSS PRESSURE WARN ISD GROSS PRESSURE FAIL ISD DEGRD PRESSURE WARN ISD DEGRD PRESSURE FAIL	Containment Test Time
Vapor Leakage Test	ISD VAPOR LEAKAGE WARN ISD VAPOR LEAKAGE FAIL	Vapor Leak Test Time
Vapor Collection Test	GROSS COLLECT WARN GROSS COLLECT FAIL DEGRD COLLECT WARN DEGRD COLLECT FAIL AIRFLOW MTR SETUP	Hose Test Time
Sensor Out Test	ISD SENSOR OUT WARN ISD SENSOR OUT FAIL	Sensor Out Test Time
Setup Test	ISD SETUP WARN ISD SETUP FAIL	Setup Self Test Time

Appendix A: Site EVR/ISD Equipment Location Worksheet

You should create a table listing each hose, fueling point, Air Flow Meter's serial number, etc.. This information will be required when you perform the EVR/ISD Setup hose/meter dispenses. This appendix contains blank worksheets for sites with single- and multi-hose dispensers. You are advised to fill in all of the appropriate information about your installed equipment, complete the TLS console's EVR/ISD setup, then perform the Product Meter ID dispensing procedure.

Single-Hose Fueling Position Dispensers

FILL OUT - USE TO SETUP HOSE TABLE					AUTOMAP CHECK LIST			
Hose ID ^①	FP ^②	Hose Label ^③	AFM Serial Number ^④	AFM Label ^⑤	Product Dispense(s) ^⑥			
					1st	2nd	3rd	4th
1		Blend		AFM FP__&__				
2		Blend						
3		Blend		AFM FP__&__				
4		Blend						
5		Blend		AFM FP__&__				
6		Blend						
7		Blend		AFM FP__&__				
8		Blend						
9		Blend		AFM FP__&__				
10		Blend						
11		Blend		AFM FP__&__				
12		Blend						
13		Blend		AFM FP__&__				
14		Blend						
15		Blend		AFM FP__&__				
16		Blend						

^①Each hose must have a unique number (1 - 99).

^②This is the Fuel Position Label which is the visible number on the outside of the dispenser (1 -2 digits).

^③The hose label is always Blend for single-hose dispensers.

^④This is the serial number on the Air Flow Meter (1 per dispenser).

^⑤This is the AFM label entered in EVR/ISD setup (1 per dispenser and must be in the format shown, e.g., AFM FP1&2 - where 1 and 2 refer to the one [or two] numbers on the outside of the dispenser).

^⑥After you have entered the contents of columns 1 - 5 into the TLS EVR/ISD hose table setup, you now must follow automap procedure and dispense from each gas meter AND one blend grade that feeds each hose. Enter a check beneath each product following a dispense from the hose.

FILL OUT - USE TO SETUP HOSE TABLE					AUTO MAP CHECK LIST			
Hose ID	FP	Hose Label	AFM Serial Number	AFM Label	Product Dispense(s)			
					1st	2nd	3rd	4th
17		Blend		AFM FP__&__				
18		Blend						
19		Blend		AFM FP__&__				
20		Blend						
21		Blend		AFM FP__&__				
22		Blend						
23		Blend		AFM FP__&__				
24		Blend						
25		Blend		AFM FP__&__				
26		Blend						
27		Blend		AFM FP__&__				
28		Blend						
29		Blend		AFM FP__&__				
30		Blend						
31		Blend		AFM FP__&__				
32		Blend						
33		Blend		AFM FP__&__				
34		Blend						
35		Blend		AFM FP__&__				
36		Blend						

FILL OUT - USE TO SETUP HOSE TABLE					AUTO MAP CHECK LIST			
Hose ID	FP	Hose Label	AFM Serial Number	AFM Label	Product Dispense(s)			
					1st	2nd	3rd	4th
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						
		Blend		AFM FP__&__				
		Blend						

Multi-Hose Fueling Position Dispensers

FILL OUT - USE TO SETUP HOSE TABLE					AUTOMAP CHECK LIST	
Hose ID ^①	FP ^②	Hose Label ^③	AFM Serial Number ^④	AFM Label ^⑤	Product Dispense ^⑥	
				AFM FP__&__		
				AFM FP__&__		

^①Each hose must have a unique number (1 - 99).

^②This is the Fuel Position Label which is the visible number on the outside of the dispenser (1 -2 digits).

^③The hose label is the grade.

^④This is the serial number on the Air Flow Meter (1 per dispenser).

^⑤This is the AFM label entered in EVR/ISD setup (1 per dispenser and must be in the format shown, e.g., AFM FP1&2 - where 1 and 2 refer to the one [or two] numbers on the outside of the dispenser).

^⑥After you have entered the contents of columns 1 - 5 into the TLS EVR/ISD hose table setup, you now must follow automap procedure and dispense from each hose. Enter a check in this column following a dispense from the hose.

FILL OUT - USE TO SETUP HOSE TABLE					AUTOMAP CHECK LIST
Hose ID ^①	FP ^②	Hose Label ^③	AFM Serial Number ^④	AFM Label ^⑤	Product Dispense ^⑥
				AFM FP__&__	
				AFM FP__&__	
				AFM FP__&__	

FILL OUT - USE TO SETUP HOSE TABLE					AUTOMAP CHECK LIST
Hose ID ^①	FP ^②	Hose Label ^③	AFM Serial Number ^④	AFM Label ^⑤	Product Dispense ^⑥
				AFM FP__&__	
				AFM FP__&__	
				AFM FP__&__	

FILL OUT - USE TO SETUP HOSE TABLE					AUTOMAP CHECK LIST
Hose ID^①	FP^②	Hose Label^③	AFM Serial Number^④	AFM Label^⑤	Product Dispense^⑥
				AFM FP __ & __	
				AFM FP __ & __	
				AFM FP __ & __	

