

Troubleshooting Guide

ECS Membrane *Processor* PMC and ISD

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1 Introduction

- The purpose of this Troubleshooting Guide is to explain what actions to take when the TLS-350 posts a VST EVR-system equipment-alarm.
- This Guide will cover in detail:
 1. What each alarm means
 2. What the threshold settings are
 3. What troubleshooting steps to take
 4. What troubleshooting procedures to follow
- With the VST EVR system, there are two Executive Orders:
 - ▶ **VR-203 (PMC)**
 - ▶ **VR-204 (ISD)**
- Sites will either be using PMC software or ISD software.

1.1 VR-203 (PMC Software)

VST Equipment	Veeder-Root Equipment
EVR Hanging Hardware	Pressure Transducer
Vapor Processor	PMC (Pressure Management Control) Software
	PMC Multiport Card (Controller)

1.2 VR-204 (ISD Software)

VST Equipment	Veeder-Root Equipment
EVR Hanging Hardware	Pressure Transducer
Vapor Processor	Vapor Flow Meters
	ISD (In-Station Diagnostic) Software
	PMC Multiport Card (Controller)

1.3 Alarm Overview

- The front panel of the TLS-350 has three lights:
 1. Red = Failure Alarm
 2. Yellow = Warning Alarm
 3. Green = Power
- The TLS console is continuously monitoring the vapor-recovery system for alarm conditions. During normal operation when the EVR system is functioning properly and no alarm conditions exist, the “**ALL FUNCTIONS NORMAL**” message will appear in the system status line of the console display, and the green power light will be the only light ON.
- 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 a warning or a failure indicator light, an audible alarm, and an automatic strip-paper printout that documents the warning or alarm. Historical reports of warning and alarm events are available for up to one year with ISD only.
- Alarm posting causes the TLS console-based system to activate a warning or a failure indicator light, an audible alarm, and an automatic strip-paper printout that documents the alarm. Historical reports of warning and failure events are available for up to one year with ISD only.

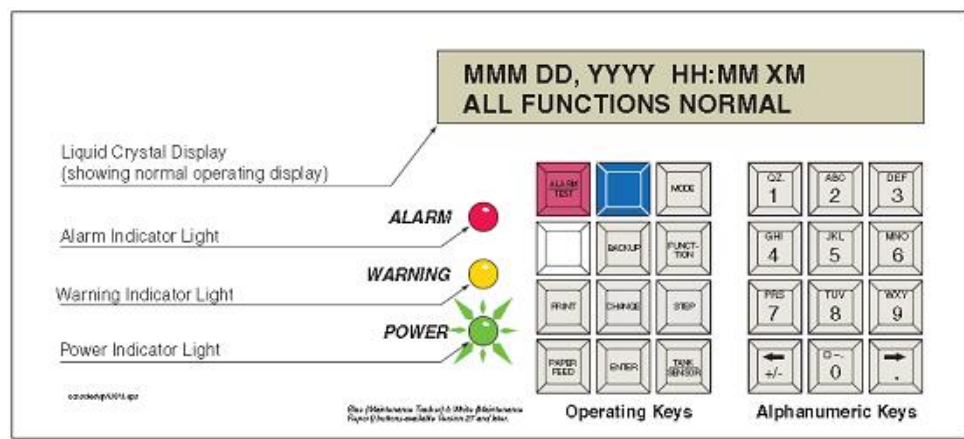


Figure 1: TLS-350 Console

2 Alarm Thresholds

Alarm	Thresholds
VP Pressure Alarm	A VP pressure failure occurs when the 90 th percentile of 1-days' ullage pressure data is equal to or exceeds 1" WC.
VP Emissions Alarm	> 0.64 LB/1KG
VP Duty Cycle	>75.00% of 24 hours
ISD VP Status	Summary of the VP Emissions Test and VP Duty-Cycle Test. The summary is the worst-case result of these two tests.
ISD Flow Collection	The vapor collection flow performance is less than 0.6.
ISD Gross Pressure	A gross over-pressure failure occurs when the 95 th percentile of 7-days' ullage pressure data exceeds the gross over-pressure requirement. That means the pressure is greater than 1.3" WC for more than 1.2 hours a day on average or more than 8.4 hours for 7 days.
ISD Pressure Degradation	A gross over-pressure failure occurs when the 75 th percentile of 30-days' ullage pressure data exceeds the degradation over-pressure requirement. That means the pressure is greater than 0.3" WC for more than 6 hours a day on average or more than 7.5 days for 30 days.
ISD Vapor Leakage	2 times the allowable CARB standard defined in CP.201, Section 9.2.4(d)

3 PMC Only Alarms

CAUTION:

PMC alarms will not shut down a GDF; however, it is the GDF owner's responsibility to correct the alarm to avoid a NOV as defined in CP-201.

3.1 Alarm Intervals

3.1.1 1-Day Test

- 1 warning before the system goes into failure alarm.
- Failure alarm occurs on the 2nd consecutive test failure.
- Alarms that are PMC 1-Day Tests:
 - ▶ VP Emissions
 - ▶ VP Pressure
 - ▶ VP Duty Cycle

3.2 PMC Only Alarms Overview

PMC Alarm Troubleshooting Summary				
Message	PMC Category	Light	Cause	Suggested Troubleshooting
VP EMISSION WARN	Processor	Yellow	Mass emission exceeded the certified threshold.	<ul style="list-style-type: none"> • Troubleshooting Guide found out www.vsthose.com. • Exhibit 8 • Exhibit 9 • VST ASC Level C
VP EMISSION FAIL	Processor	Red	2 nd Consecutive Mass emission test failure.	
ISD VP PRESSURE WARN	Processor	Yellow	90th percentile of 1 day ullage pressure exceeds 1 IWC.	<ul style="list-style-type: none"> • Troubleshooting Guide www.vsthose.com. • Exhibit 10 • Exhibit 9 • VST ASC Level C
ISD VP PRESSURE FAIL2	Processor	Red	2 nd Consecutive Failure of Vapor Processor Overpressure Test	
VP DUTY CYCLE WARN	Processor	Yellow	Duty cycle exceeds 18 hours per day Or 75% of 24 hours.	<ul style="list-style-type: none"> • Troubleshooting Guide www.vsthose.com. • TLS 350 PMC Setup Procedure • Exhibit 10 • Exhibit 9 • Exhibit 4 • VST ASC Level C
VP DUTY CYCLE FAIL	Processor	Red	2 nd Consecutive Duty Cycle Test Failure.	

3.3 VP Emissions Alarm (PMC only)

Threshold:	> 0.64 LB/1KG
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-203 (PMC):	The red alarm light will persist until the problem is fixed and the alarm is manually cleared, using CLEAR TEST AFTER REPAIR or a Pass assessment is posted.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

3.3.1 VP Emissions Alarm Troubleshooting Procedures (PMC only)

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC/ISD Variable Set-Up Confirmation procedure	TSP-001	VST ASC Level C
2	HC Sentry Module Check	TSP-002	VST ASC Level C
3	HC Sensor Signal Verification Check	TSP-003	VST ASC Level C
4	HC Sensor Verification Test	Exhibit 8 TSP-009	VST ASC Level C
5	VST Processor Activation Pressure Test (EVR System Operability Test)	Exhibit 9 TSP-004	VST ASC Level C
6	UST Overfill Check	TSP-007	Owner/Operator
7	UST Overfill Maintenance Procedure (after a positive confirmation that there had been an overfill)	TSP-008	VST ASC Level C

3.3.2 VP Emissions Alarm Troubleshooting Checklist (PMC only)

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	HC Sentry Module Check				Explain:
	Check Power LED is ON	<input type="checkbox"/>		<input type="checkbox"/>	
	RX and TX is flashing	<input type="checkbox"/>		<input type="checkbox"/>	
	4-20 mA signal is present	<input type="checkbox"/>		<input type="checkbox"/>	
3.	HC Sensor Signal Verification Check				Explain:
	The mA signal > 4.0 mA	<input type="checkbox"/>		<input type="checkbox"/>	
	The mA signal < 4.0 mA	<input type="checkbox"/>		<input type="checkbox"/>	
4.	HC Sensor Verification Test – Exhibit #8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:
5.	VST Processor Activation Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	TLS-350	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	PMC Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	P/V Valve	<input type="checkbox"/>		<input type="checkbox"/>	
6.	UST Overfill Check	<input type="checkbox"/>			Explain:
7.	UST Overfill Maintenance Procedure (after positive confirmation)	<input type="checkbox"/>	<input type="checkbox"/>		Explain:

3.4 VP Pressure Alarm (PMC only)

Threshold:	A VP pressure failure occurs when the 90 th percentile of 1-days' ullage pressure data is equal to or exceeds 1" WC.
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-203 (PMC):	The red alarm light will persist until the problem is fixed and the alarm is manually cleared, using CLEAR TEST AFTER REPAIR or a Pass assessment is posted.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a "PASS" assessment or if "CLEAR TEST AFTER REPAIR" is used.</p>	

3.4.1 VP Pressure Alarm Troubleshooting Procedures (PMC only)

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	EVR PMC Set-up Confirmation Procedure	TSP-001	VST ASC Level C
2	Vapor Pressure Sensor Verification test procedure	Exhibit 8 TSP-005	VST ASC Level C
3	VST Processor Activation Pressure Test (EVR System Operability Test)	Exhibit 9 TSP-004	VST ASC Level C

3.4.2 VP Pressure Alarm Troubleshooting Checklist (PMC only)

Step	Item Checked	Checked out OK?	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	Vapor Pressure Sensor Verification Test Procedure: Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
3.	VST Processor Activation Pressure Test: Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	V/P Valve	<input type="checkbox"/>		<input type="checkbox"/>	
	TLS-350 with PMC Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

3.5 VP Duty Cycle Alarm (PMC only)

Threshold:	>75.00% of 24 hours (which is 18 hours)
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-203 (PMC):	The red alarm light will persist until the problem is fixed and the alarm is manually cleared, using CLEAR TEST AFTER REPAIR or a Pass assessment is posted.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

3.5.1 VP Duty-Cycle Troubleshooting Procedures (PMC only)

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC Variable Set-Up Confirmation procedure Verify AUTOMATIC not MANUAL mode PMC diagnostic menu	TSP-001	VST ASC Level C
2	Vapor Pressure Sensor Verification Test procedure	Exhibit 8 TSP-005	VST ASC Level C
3	VST Processor Activation Pressure Test	Exhibit 9 TSP-004	VST ASC Level C
4	Pressure Decay Test Check for open containment	Exhibit 4 TSP-006	VST ASC Level C

3.5.2 VP Duty-Cycle Alarm Troubleshooting Checklist (PMC only)

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	Vapor Pressure Sensor Verification Test Procedure– Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
3.	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	V/P Valve	<input type="checkbox"/>		<input type="checkbox"/>	
	TLS-350 with PMC Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Pressure Decay Test: Exhibit 4	<input type="checkbox"/>	<input type="checkbox"/>		Explain:

4 ISD Alarms

CAUTION:

The ISD alarms that are notated with a superscript 2 (²) as outlined in the ISD Alarm Troubleshooting Summary (Section 4.2 of this document), will shut down the GDF if the cause of those alarms are not corrected as defined in this manual.

It is **VERY IMPORTANT** to correct the alarm before the alarm goes into **FAILURE** to avoid a possible **NOV (Notice of Violation)**.

4.1 Alarm Intervals

4.1.1 1-Day Test

- 1 warning before the system goes into failure alarm.
- Failure alarm occurs on the 2nd consecutive test failure.
- Alarms that are ISD 1-Day Tests:
 - ▶ **VP Status**
 - VP Emissions
 - VP Duty Cycle
 - ▶ **VP Pressure**
 - ▶ **ISD Flow Collection**

4.1.2 7-Day Test

- 7 consecutive warnings before the system goes into failure alarm.
- Failure alarm occurs on the 8th consecutive test failure.
- Alarms that are ISD 7-Day Tests:
 - ▶ **ISD Gross Pressure**
 - ▶ **ISD Vapor Leakage Detection**

4.1.3 30-Day Test

- 30 consecutive warnings before the system goes into failure alarm.
- Alarms that are ISD 30-Day Tests:
 - ▶ **ISD Degradation**

4.2 TLS-350 (ISD): Alarm Troubleshooting Summary

ISD Alarm Troubleshooting Summary				
Message	ISD Category	Light	Cause	Suggested Troubleshooting ¹
ISD VAPOR LEAKAGE WARN	Containment	Yellow	Containment system leaks at 2 times the TP-201.3 standard.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com • Exhibit 4 • VST ASC Level C
ISD VAPOR LEAKAGE FAIL ²	Containment	Red	8 th Consecutive Failure of Pressure Integrity (Vapor Leak) Test	
ISD GROSS PRESSURE WARN	Containment	Yellow	95 th percentile of 7-days' ullage pressure exceeds 1.3"WC.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com • Exhibit 10 • Exhibit 9 • VST ASC Level C
ISD GROSS PRESSURE FAIL ²	Containment	Red	8 th Consecutive Failure of Gross Containment Pressure Test	
ISD DEGRD PRESSURE WARN	Containment	Yellow	75 th percentile of 30-days' ullage pressure exceeds 0.3"WC.	
ISD DEGRD PRESSURE FAIL ²	Containment	Red	31 st Consecutive Failure of Degradation Pressure Test	
hnn ³ : FLOW COLLECT WARN	Collection	Yellow	Vapor collection flow performance is less than 50%.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com. • Exhibit 17 • VST ASC Level C
hnn ³ : FLOW COLLECT FAIL ²	Collection	Red	2 nd Consecutive Failure of Vapor Collection Flow Performance Monitoring Test	
ISD VP* STATUS WARN	Processor	Yellow	Failure of Vapor Processor Effluent Emissions or Duty Cycle test.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com. • VP Emission Test • VP Duty Cycle Test • VST ASC Level C
ISD VP STATUS FAIL ²	Processor	Red	2 nd Consecutive Failure of Vapor Processor Status test.	
ISD VP PRESSURE WARN	Processor	Yellow	90 th percentile of 1 day ullage pressure exceeds 1"WC.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com. • Exhibit 10 • Exhibit 9 • VST ASC Level C
ISD VP PRESSURE FAIL ²	Processor	Red	2 nd Consecutive Failure of Vapor Processor Overpressure Test	

ISD Alarm Troubleshooting Summary				
Message	ISD Category	Light	Cause	Suggested Troubleshooting ¹
VP EMISSION WARN	Processor	Yellow	Mass emission exceeded the certified threshold.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com. • Exhibit 8 • Exhibit 9 • VST ASC Level C
VP EMISSION FAIL	Processor	Red	2 nd Consecutive Mass emission test failure.	
VP DUTY CYCLE WARN	Processor	Yellow	Duty cycle exceeds 18 hours per day Or 75% of 24 hours.	<ul style="list-style-type: none"> • Troubleshooting Guide found at www.vsthose.com. • PMC Setup Procedure • Exhibit 10 • Exhibit 9 • Exhibit 4 • VST ASC Level C
VP DUTY CYCLE FAIL	Processor	Red	2 nd Consecutive Duty Cycle Test Failure.	
ISD SENSOR OUT WARN	Self-Test	Yellow	Failure of Sensor Self-Test	<ul style="list-style-type: none"> • Confirm ISD sensor & module installation / communication per VR 204 Section 16, Chapter 2 • VST ASC Level C
ISD SENSOR OUT FAIL	Self-Test	Red	8 th Consecutive Failure of Sensor Self-Test	
ISD SETUP WARN	Self-Test	Yellow	Failure of Setup Test	<ul style="list-style-type: none"> • Confirm EVR/ISD programming per VR 204 Section 12 • VST ASC Level C
ISD SETUP FAIL ²	Self-Test	Red	8 th Consecutive Failure of Setup Test	
² ISD Site shut down alarms *VP=Vapor Processor				

4.3 ISD VP Pressure Alarm

Threshold:	A VP pressure failure occurs when the 90 th percentile of 1-days' ullage pressure data is equal to or exceeds 1" WC.
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a "PASS" assessment or if "CLEAR TEST AFTER REPAIR" is used.</p>	

4.3.1 ISD VP Pressure Alarm Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC Set-up Confirmation Procedure	TSP-001	VST ASC Level C
2	Vapor Pressure Sensor Verification test procedure	Exhibit 10 TSP-005	VST ASC Level C
3	VST Processor Activation Pressure Test (EVR System Operability Test)	Exhibit 9 TSP-004	VST ASC Level C

4.3.2 ISD VP Pressure Alarm Troubleshooting Checklist

Step	Item Checked	Checked out OK?	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	Vapor Pressure Sensor Verification Test Procedure– Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
3.	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	V/P Valve	<input type="checkbox"/>		<input type="checkbox"/>	
	TLS-350 with ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

4.4 ISD VP Emissions Alarm

Threshold:	> 0.64 LB/1KG
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

4.4.1 ISD VP Emissions Alarm Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC Variable Set-Up Confirmation procedure	TSP-001	VST ASC Level C
2	HC Sentry Module Check	TSP-002	VST ASC Level C
3	HC Sensor Signal Verification Check	TSP-003	VST ASC Level C
4	HC Sensor Verification Test	Exhibit 8 TSP-009	VST ASC Level C
5	VST Processor Activation Pressure Test (EVR System Operability Test)	Exhibit 9 TSP-004	VST ASC Level C
6	UST Overfill Check	TSP-007	Owner/Operator
7	UST Overfill Maintenance Procedure (after a positive confirmation that there had been an overfill)	TSP-008	VST ASC Level C

4.4.2 ISD VP Emissions Alarm Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	HC Sentry Module Check				Explain:
	Check Power LED is ON	<input type="checkbox"/>		<input type="checkbox"/>	
	RX and TX is flashing	<input type="checkbox"/>		<input type="checkbox"/>	
	4-20 mA signal is present	<input type="checkbox"/>		<input type="checkbox"/>	
3.	HC Sensor Signal Verification Check				Explain:
	The mA signal > 4.0 mA	<input type="checkbox"/>		<input type="checkbox"/>	
	The mA signal < 4.0 mA	<input type="checkbox"/>		<input type="checkbox"/>	
4.	HC Sensor Verification Test – Exhibit #8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:
5.	VST Processor Activation Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	TLS-350	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	P/V Valve	<input type="checkbox"/>		<input type="checkbox"/>	
6.	UST overfill Check	<input type="checkbox"/>			Explain:
7.	UST Overfill Maintenance Procedure (after positive confirmation)	<input type="checkbox"/>	<input type="checkbox"/>		Explain:

4.5 ISD VP Duty Cycle Alarm

Threshold:	>75.00% of 24 hours (which is 18 hours)
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

4.5.1 ISD VP Duty-Cycle Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC Variable Set-Up Confirmation procedure Verify AUTOMATIC not MANUAL mode PMC diagnostic menu	TSP-001	VST ASC Level C
2	Vapor Pressure Sensor Verification Test procedure	Exhibit 10 TSP-005	VST ASC Level C
3	VST Processor Activation Pressure Test	Exhibit 9 TSP-004	VST ASC Level C
4	Pressure Decay Test Check for open containment	Exhibit 4 TSP-006	VST ASC Level C

4.5.2 ISD VP Duty-Cycle Alarm Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	Vapor Pressure Sensor Verification Test Procedure– Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
3.	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	V/P Valve	<input type="checkbox"/>		<input type="checkbox"/>	
	TLS-350 with ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Pressure Decay Test: Exhibit #4	<input type="checkbox"/>	<input type="checkbox"/>		Explain:

4.6 ISD VP Status Alarm

Threshold:	The ISD VP Status Alarm is result of a failure of VP Emissions or Duty Cycle.
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

4.6.1 ISD VP Status Alarm Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1.	Take the appropriate action for each of these alarms. Go to the appropriate sections within this manual. <ul style="list-style-type: none"> ▶ VP Emissions Alarm ▶ Duty Cycle Alarm 		

4.7 ISD VP Pressure Alarm

Threshold:	A VP pressure failure occurs when the 90 th percentile of 1-days' ullage pressure data equal to or exceeds 1"WC.
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at any time during the assessment period the system posts a "PASS" assessment or if "CLEAR TEST AFTER REPAIR" is used.</p>	

4.7.1 ISD VP Pressure Alarm Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	PMC Variable Set-up Confirmation Procedure	TSP-001	VST ASC Level C
2	Vapor Pressure Sensor Verification test procedure	Exhibit 10 TSP-005	VST ASC Level C
3	VST Processor Activation Pressure Test (EVR System Operability Test)	Exhibit 9 TSP-004	VST ASC Level C

4.7.2 ISD VP Pressure Alarm Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	PMC Variable Set-up Confirmation Procedure	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
2.	Vapor Pressure Sensor Verification Test Procedure– Exhibit #8	<input type="checkbox"/>	<input type="checkbox"/>		Explain:
3.	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	V/P Valve	<input type="checkbox"/>		<input type="checkbox"/>	
	TLS-350 with ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

4.8 ISD Flow Collection Alarm

Threshold:	The vapor collection flow performance is less than 0.6.
Interval:	1-day
Yellow Warning Light:	1 warning before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 2nd consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at time during the assessment period the system should post a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

4.8.1 ISD Flow Collection Alarm Troubleshooting Procedures

Steps	Procedure Name	Procedure #	Who can perform the inspections or tests
1	Removal of Liquid from Blocked Hose	TSP-011	Owner/Operator VST ASC Level C
2	ISD Vapor Flow Meter Operability Test Procedure	Exhibit 17 TSP-012	VST ASC Level C
3	Run a Pressure-Decay Test	Exhibit 4	Authorized Service Technician

4.8.2 ISD Flow Collection Alarm Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1	Did you find the hose that triggered the alarm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:
2	ISD Vapor Flow Meter Operability Test Procedure: Exhibit #17	<input type="checkbox"/>		<input type="checkbox"/>	Explain:
3	Pressure Decay Test: Exhibit #4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:

4.9 ISD Gross Pressure Alarm

Threshold:	A gross over-pressure failure occurs when the 95 th percentile of 7-days' ullage pressure data exceeds the gross over-pressure requirement. That means the pressure is greater than 1.3" WC for more than 1.2 hours a day on average or more than 8.4 hours for 7 days.
Interval:	7-Day Test
Yellow Warning Light:	7 consecutive warnings before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 8th consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
NOTE: A failure will not occur if at time during the assessment period the system should post a "PASS" assessment or if "CLEAR TEST AFTER REPAIR" is used.	

4.9.1 ISD Gross Pressure Troubleshooting Procedures

Step	Procedure Name	Procedure #	Who can perform the inspections or tests
1	Vapor Pressure Sensor Verification Test	Exhibit 10 TSP-006	VST ASC Level C
2	Vapor Processor Activation Test	Exhibit 9 TSP 004	VST ASC Level C

4.9.2 ISD Gross Pressure Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1	Vapor Pressure Sensor Verification Test – Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:
2	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	TLS-350	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	P/V Valve	<input type="checkbox"/>		<input type="checkbox"/>	

4.10 ISD Degradation (DEGRD) Alarm

Threshold:	A degradation over-pressure failure occurs when the 75 th percentile of 30-days' ullage pressure data exceeds the degradation over-pressure requirement. That means the pressure is greater than 0.3" WC for more than 6 hours a day on average or more than 7.5 days for 30 days.
Interval:	30-day
Yellow Warning Light:	30 consecutive warnings before the system goes into failure alarm.
Red Failure Light:	Failure alarm occurs on the 31st consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
NOTE: A failure will not occur if at time during the assessment period the system should post a "PASS" assessment or if "CLEAR TEST AFTER REPAIR" is used.	

4.10.1 ISD Degrd Troubleshooting Procedures

Step	Procedure Name	Procedure #	Who can perform the inspections or tests
1	Vapor Pressure Sensor Verification Test	Exhibit 10 TSP-005	VST ASC Level C
2	Vapor Processor Activation Test	Exhibit 9 TSP 004	VST ASC Level C

4.10.2 ISD Degrd Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1	Vapor Pressure Sensor Verification Test: Exhibit #10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:
2	VST Processor Activation Pressure Test– Exhibit #9	<input type="checkbox"/>			Explain:
	Blower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Vacuum Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Pressure Sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	TLS-350	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	ISD Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	P/V Valve	<input type="checkbox"/>		<input type="checkbox"/>	

4.11 ISD Vapor Leakage Detection Alarm

Executive Order:	VR-204
Threshold:	2 times the allowable CARB standard defined in CP.201, Section 9.2.4(d)
Interval:	7-Day Test
Yellow Warning Light:	7 consecutive warnings before the system goes into failure alarm.
Red Failure Light:	The failure alarm occurs on the 8th consecutive test failure.
Red Failure Light: If the GDF is equipped with VR-204 (ISD):	A red light failure will result in a GDF shutdown.
<p>NOTE: A failure will not occur if at time during the assessment period the system should post a “PASS” assessment or if “CLEAR TEST AFTER REPAIR” is used.</p>	

4.11.1 ISD Vapor Leakage Troubleshooting Procedures

Step	Procedure Name	Procedure #	Who can perform the inspections or tests
1	Run a Pressure-Decay Test	Exhibit 4 TSP-006	Authorized Service Technician

4.11.2 ISD Vapor Leakage Troubleshooting Checklist

Step	Item Checked	OK	Repaired	Replaced	Repaired or Replaced
1.	Pressure Decay Test Exhibit #4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Explain:

Troubleshooting Procedures

- The following Troubleshooting Procedures are used for both PMC and ISD alarms.

Troubleshooting Procedure	Description
TSP-001	EVR PMC/ISD Variable Set-Up Confirmation Procedure
TSP-002	HC Sentry Module Check Procedure
TSP-003	HC Sensor Signal Verification
TSP-004	VST Processor Activation Test
TSP-005	Vapor Pressure Sensor Verification Test: Exhibit 10
TSP-006	Pressure Decay Test: Exhibit 4
TSP-007	UST Overfill Check
TSP-008	UST Overfill Maintenance Procedure
TSP-009	HC Sensor Verification Test: Exhibit 8
TSP-0010	Removal of Liquid from Blocked Hose: Exhibit 5
TSP-0011	ISD Vapor Flow Meter Operability Test Procedure: Exhibit 17

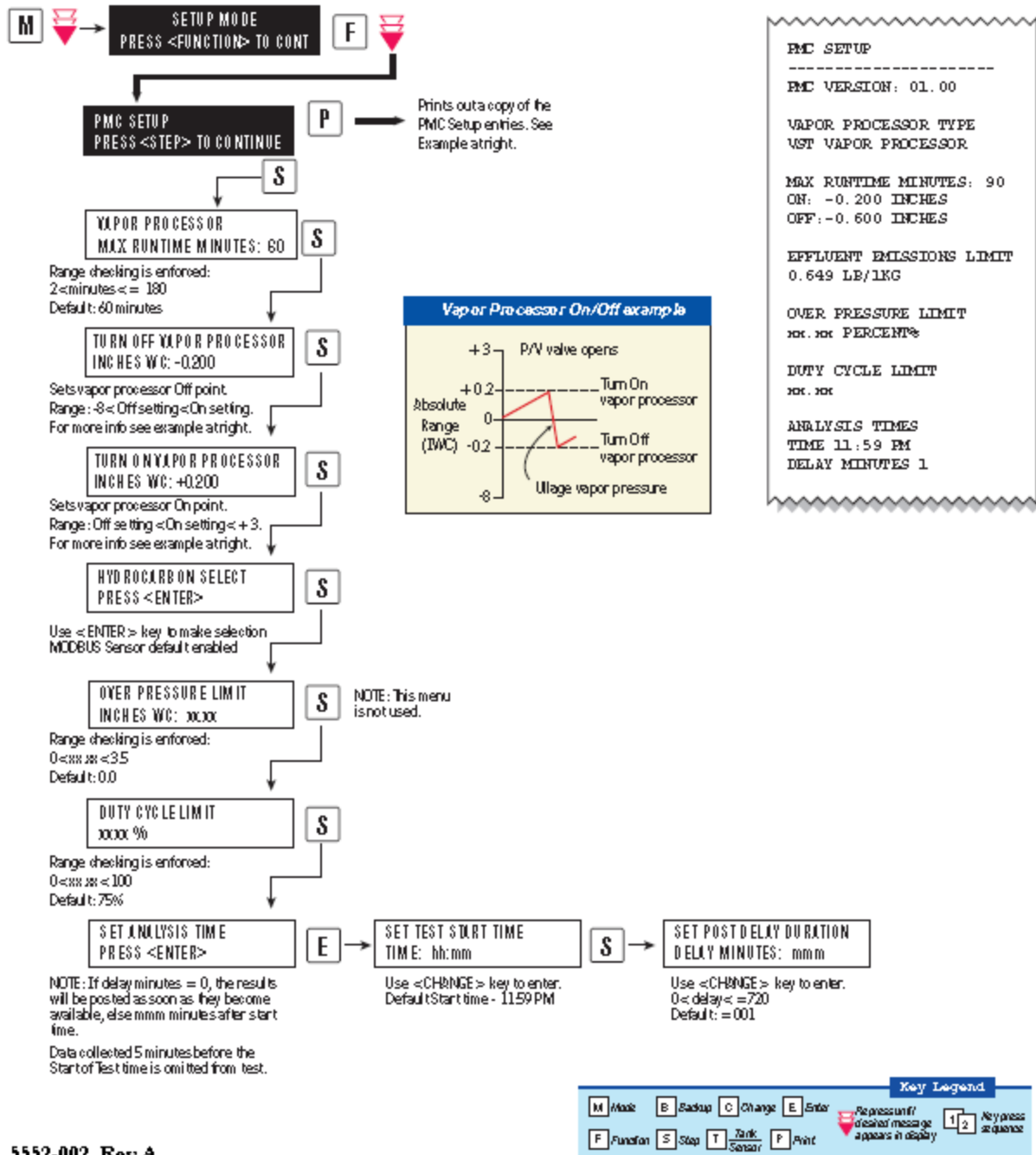
5 TSP-001: EVR PMC/ISD Variable Set-Up Confirmation Procedure

TSP-001: EVR PMC/ISD Variable Set-Up Confirmation Procedure	
Purpose:	To make sure the following <i>Processor</i> parameters are set to their proper values:
MAX RUNTIME MINUTES:	=30 minutes
TURN OFF VAPOR PROCESSOR:	- 0.2 Inches WC
TURN ON VAPOR PROCESSOR:	+ 0.2 Inches WC
HYDROCARBON SENSOR:	Set To A ModBus Sensor
OVER PRESSURE LIMIT:	\leq 1.0 Inches WC
DUTY CYCLE LIMIT:	75%

5.1 EVR PMC/ISD Variable Set-Up Confirmation Diagram Using the Set-Up Menus

- Use the diagrams on the next two pages for running a PMC Variable Set-Up Confirmation Procedure.

5.1.1 PMC Setup Menu Inside of PMC



5552-002, Rev A

Figure 2: PMC Set-Up Menu Inside of PMC

5.1.2 PMC Setup for ISD

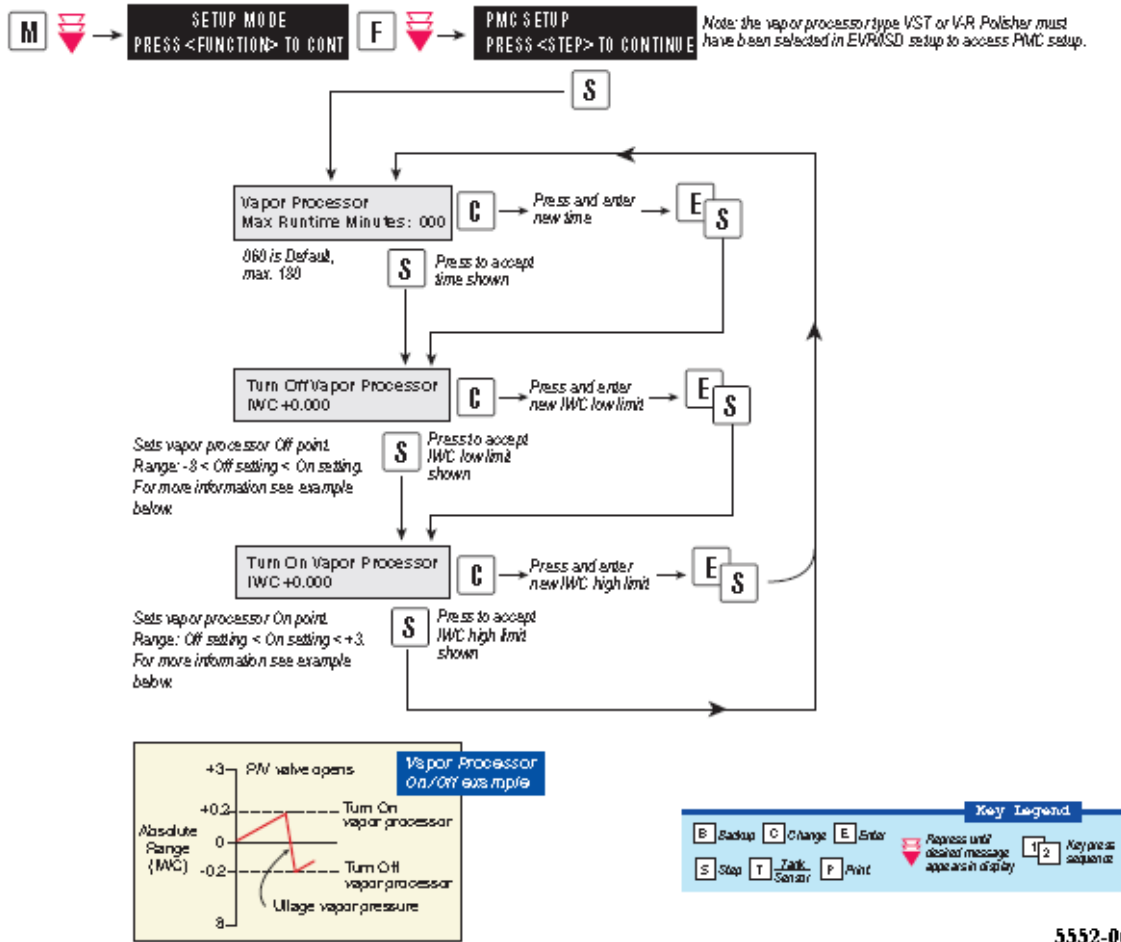


Figure 3: PMC Set-Up Menu for ISD

6 TSP-002: HC Sentry Module Check Procedure

TSP-002: HC Sentry Module Check Procedure	
Purpose:	To test the HC Sentry Module for proper operation.
Note:	The HC Sentry acts as an interface between the TLS-350 and the field HC Sensor, which is part of the <i>Processor</i> .
1.	Begin the procedure by running a PMC/ISD Diagnostic Menu HC Sensor Self Test (See the section below.)
2.	Do an HC Sentry Module Check Procedure. (See section 7.3)

6.1 PMC Diagnostic Menu for VR-203 (PMC)

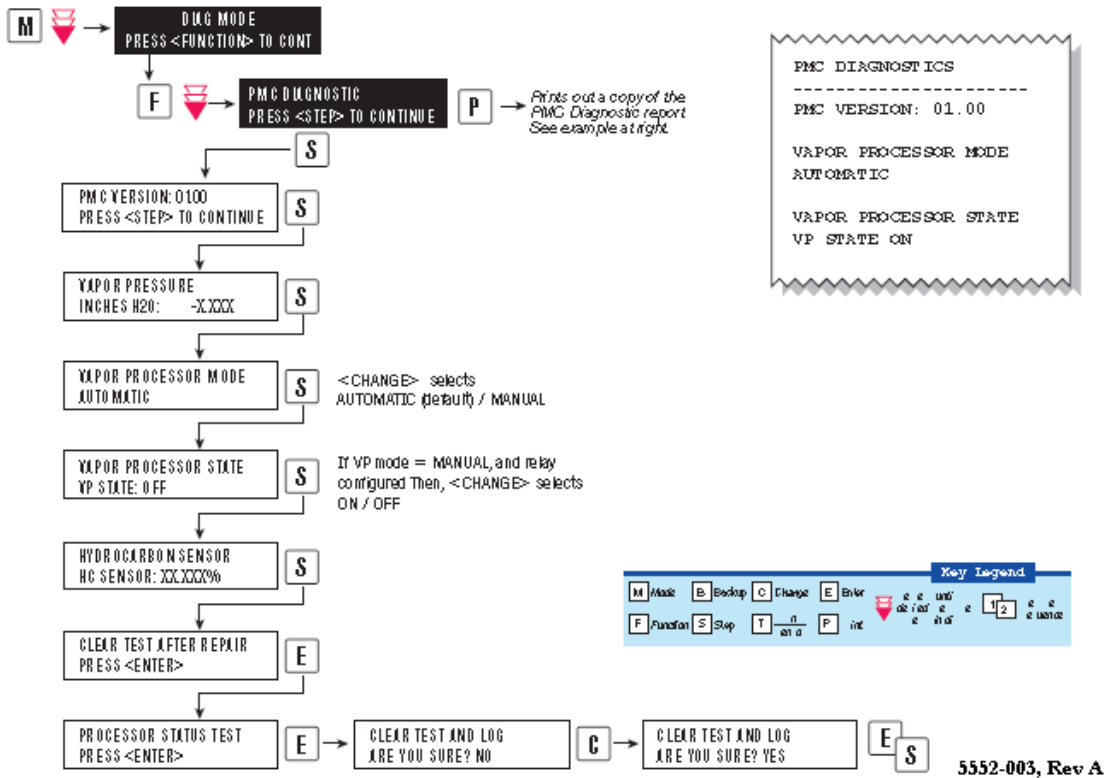


Figure 4: PMC Diagnostic Menu for PMC

6.2 PMC Diagnostic Menu for VR-204 (ISD)

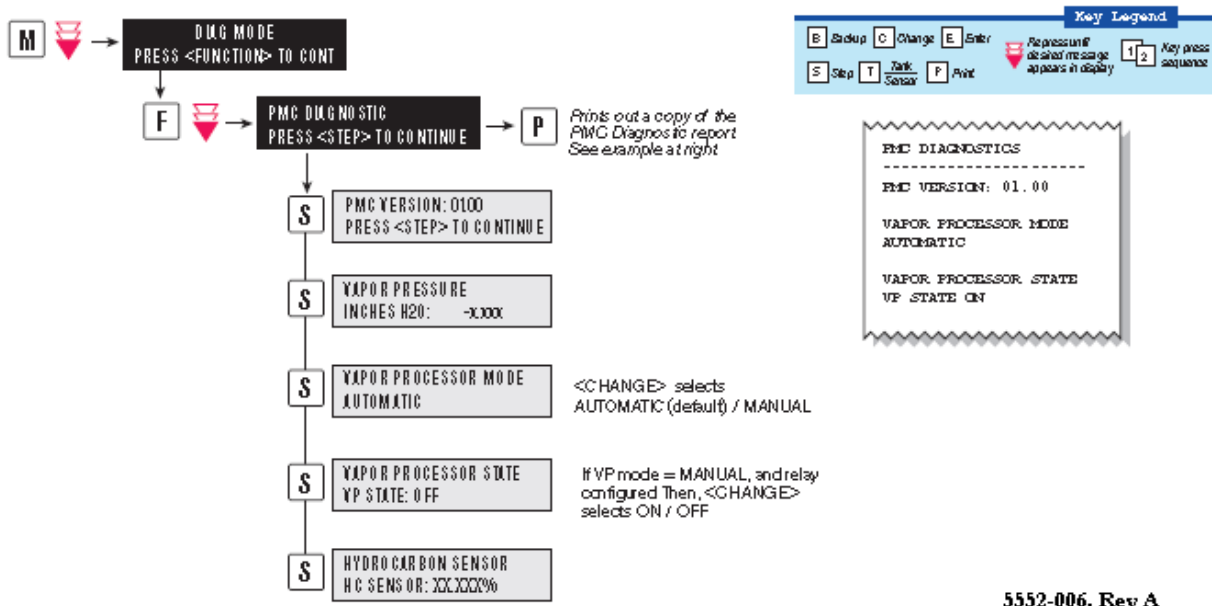


Figure 5: PMC Diagnostic Menu for ISD

6.3 HC Sensor Module Check

1.	<p>With 24V power supply connected to the HC Sentry Module, check that the power light is ON.</p> <p>If not, verify the power supply and 115v outlet its plugged into are functional.</p>
2.	<p>RX and TX flashes to indicate data transfer to and from the TLS-350. If not verify the cable connections at the sentry and TLS are as prescribed.</p>
3.	<p>Loop LED is ON, indicating that the loop current is not broken. Verify the wiring at the H/C sensor and sentry are as prescribed.</p>
4.	<p>Replace the HC Sentry Module if all item in 1, 2, and 3 above fails.</p>



Figure 6: Front of the HC Sentry

6.4 Explanation of the HC Sentry's Markings

ICD/ICSP:	NOT TO BE USED IN THE FIELD: This connection provides a means for performing in-circuit-debug and circuit-serial-programming.
RX:	This LED flashes to indicate received data via the RS485 link.
TX:	This LED flashes to indicate transmitted data via the RS485 link.
RS-485:	This two pin connector provides the two wire connection to the TLS-350 RS-485 network.
Power:	This LED indicates that the HC Sentry device is powered up (24V).

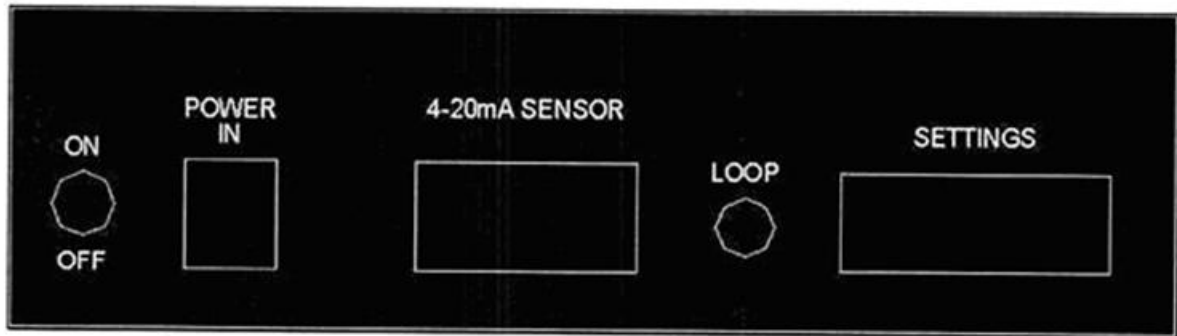


Figure 7: Back of the HC Sentry

ON / OFF:	Switch for turning the device ON and OFF.
Power In:	Power supply converts 115VAC to 24VDC power input.
4-20mA Sensor:	Connection for wiring up the 4-20 mA HC Sensor. The HC Sentry supplies 24VDC power to the HC Sensor and receives the 4-20 mA signal from the HC Sensor.
Loop:	This LED provides a simple visual indication of loop current on the 4-20 mA loop circuit, and it can be used as a means of field debugging a broken loop etc.
Settings:	This bank of dip switches (10) are set up to communicate with the TLS-350 and should not be changed in the field.

Switch #	1	2	3	4	5	6	7	8	9	10
	Address7	Address6	Address5	Address4	Address3	Address2	Address1	Address0	Baud Rate	Term.
Default	Off	Off	Off	Off	Off	Off	Off	On	Off	On

Figure 8: DIP Switch Settings on the HC Sentry Module

7 TSP-003: HC Sensor Signal Verification

TSP-003: HC Sensor Signal Verification	
Purpose:	To test the HC Sensor for proper operation.
Note:	The HC Sentry acts as an interface between the TLS-350 and the field HC Sensor, which is part of the <i>Processor</i> .
1.	<p>Using a multimeter, check that the mA signal to the HC Sentry Module is between 4-20 mA.</p> <ul style="list-style-type: none"> ▶ If there is not a signal, check all the wiring connections inside the HC Sensor J-Box. ▶ If the wiring connections are tight and there is no signal, replace the HC Sensor. To replace the HC Sensor, see the procedure in IOM-15.



Figure 9: TSP-004 HC Sensor Electrical Junction Box

8 TSP-004: VST Processor Activation Test: Exhibit 9

TSP-004 VST Processor Activation Procedure	
Purpose:	<p>The purpose of this test procedure is to determine compliance with the VST processor activation (e.g. turns on) pressure requirement of Exhibit 9.</p> <p>This procedure is applicable for compliance testing.</p>
Note:	<p>This test will also confirm proper operation of the following components:</p> <ul style="list-style-type: none"> ▶ Blower ▶ Vacuum pump ▶ Pressure sensor ▶ TLS-350 ▶ P/V valve
Test Procedure:	<p>The steps to this test procedure are listed in Exhibit #9.</p>
If the test fails:	<p>If this test fails, check each of the components listed above. See the next page for more details on how to check the components.</p>

- During the VST Processor Activation Test, all the components listed on the following page must be working properly for the test to pass. If the test does not pass, the equipment below must be checked (each component one-by-one) to determine which component is causing the test to fail.
- Note that the VST Processor Activation Test does not test the operation of the Hydrocarbon Sensor.

8.1 Blower Check

- Check the Output Relay configuration in the TLS-350 in the In-Station Diagnostics (ISD) Manual for starting/stopping the motor. The Output Relay must be configured for operating the VST Vapor Processor.
- The blower must be rotating in the correct direction as indicated by the arrow on the blower. Provided the blower is operating and rotating correctly, no action is required.
- If the blower is not operating correctly, **see Section 17** of this manual for troubleshooting procedures.

8.2 Vacuum Pump Check

- Check the Output Relay configuration in the TLS-350 in the In-Station Diagnostics (ISD) Manual for starting/stopping the motor. The Output Relay must be configured for operating the VST Vapor Processor.
- The vacuum pump must be rotating in the correct direction as indicated by the arrow on the vacuum pump. Provided the vacuum pump is operating and rotating correctly, no action is required.
- If the vacuum pump is not operating correctly, **see Section 18** of this manual for troubleshooting procedures.

8.3 Pressure Sensor

- The pressure sensor must be operational, connected to the TLS-350, and set-up to operate with the TLS-350 PMC or ISD software.
- Confirm that the Smart Sensor Setup as outlined in the Veeder-Root Pressure Management Control Installation, Setup, & Operation Manual has been completed and configured properly.
- Exhibit 8 is a Vapor Pressure Sensor Verification Test that tests the operability of the pressure sensor.
- If the Vapor Pressure Sensor Verification Test fails, refer to the Veeder-Root Pressure Sensor Installation Guide found in the VST IOM Section 17.

8.4 P/V Valve Check

- During the VST Processor Activation Test, the P/V valves must operate within the parameters set by CARB, with the valve opening above + 3.5" WC and below -8.0" WC.
- If the valve is stuck in the open position, the Processor would not be able to pull the UST vapor pressure below the lower threshold pressure of -0.2" WC.
- If the Processor cannot pull the UST vapor pressure below 0.2" WC, the Processor would cycle, and continue to cycle, until the P/V valve is replaced. The VST Processor Activation Test would fail if the P/V valve was stuck open.
- Replace the P/V valve with a CARB EVR approved P/V valve.

8.5 TLS-350 Check

- The TLS-350 must be configured with the VST Vapor Processor as outlined in the Veeder-Root Pressure Management Control (PMC) Installation, Setup, & Operation Manual or in the In-Station Diagnostics (ISD) Manual.
- If the VST Processor Activation Test does not pass, check the System Setup in the PMC or ISD Manual.

9 TSP-005: Vapor Pressure Sensor Verification Test: Exhibit 10

TSP-005: Vapor Pressure Sensor Verification Test	
Purpose:	The purpose of this test is to determine if the PMC/ISD Vapor Pressure Sensor (Model #331946-001) is reading properly, according to VST specifications.
Note:	This test will also confirm proper operation of the Pressure Sensor.
Test Procedure:	See Exhibit #10 for the steps to running this test.
Action:	If the Vapor Pressure Sensor fails, refer to the Pressure Sensor Check section of this document.

10 TSP-006: Pressure Decay Test – Exhibit 4

TSP-006: Pressure Decay Test	
Purpose:	The purpose of this test is to quantify the vapor tightness of vapor-recovery systems installed at GDF's that are equipped with P/V valves.
Test Procedure:	See TP-201.3 and Exhibit 4.

11 TSP-007: UST Overfill Check

TSP-007: UST Overfill Check	
Purpose:	The purpose of this test to determine if an overfill has occurred.
Test Procedure:	<p>Check the TLS-350 for an overfill alarm. If an alarm occurred, check the fuel delivery for the day the VP Emissions Alarm was activated:</p> <ul style="list-style-type: none"> ▶ If an overfill did not occur, an overfill did not cause this alarm. ▶ If an overfill did occur, see TSP-009.

12 TSP-008: UST Overfill Maintenance Procedure

TSP-008: UST Overfill Maintenance Procedure	
Purpose:	The purpose of this procedure is to show the action steps to take when an overfill occurs.

12.1 Overfill

- An underground storage tank overfill is a serious situation that will destroy the membrane and could damage other internal components that reside inside the *Processor*.
- An overfill might happen if the delivery person fails to stop fueling, ignoring both the overfill limit and the high-product limit.
- VST has determined that overfill protection is needed to reduce the chance of gasoline entering the *Processor*.
- Below are the precautionary measures taken to protect the *Processor* against an overfill situation:
 - ▶ The TLS-350 will disable the *Processor* when the UST level reaches the **HIGH PRODUCT** Alarm setting (**HIGH PRODUCT: 95%**).
 - ▶ Eventually, as fuel is dispensed, the product would drop below the **HIGH PRODUCT** Alarm threshold thereby resetting the relay and re-enabling the *Processor*.
 - ▶ Using an alarm limit, there is no way to know if the *Processor* was immersed in fuel; therefore, you'll need to go through the "Overfill Maintenance Checklist."
 - ▶ See document: **Veeder-Root In-Station Diagnostic System Troubleshooting Guide** for the description of the alarms and how the alarms are reset.
 - ▶ The TLS-350 **MAX VOLUME ALARM** will not guarantee that the *Processor* is protected from gasoline entering into it.

CAUTION

The *Processor* should be turned off manually until the required maintenance is performed.

CAUTION

Should gasoline get into the membrane, the membrane **MUST be replaced.**

Gasoline in the membrane voids the membrane warranty.

- The table below lists the VST recommended alarm settings for the tank level.

Position of Tank Alarm Limits	VST Recommended Alarm Settings
Max Volume	98%
High Product	95%
Overfill Limit	90%

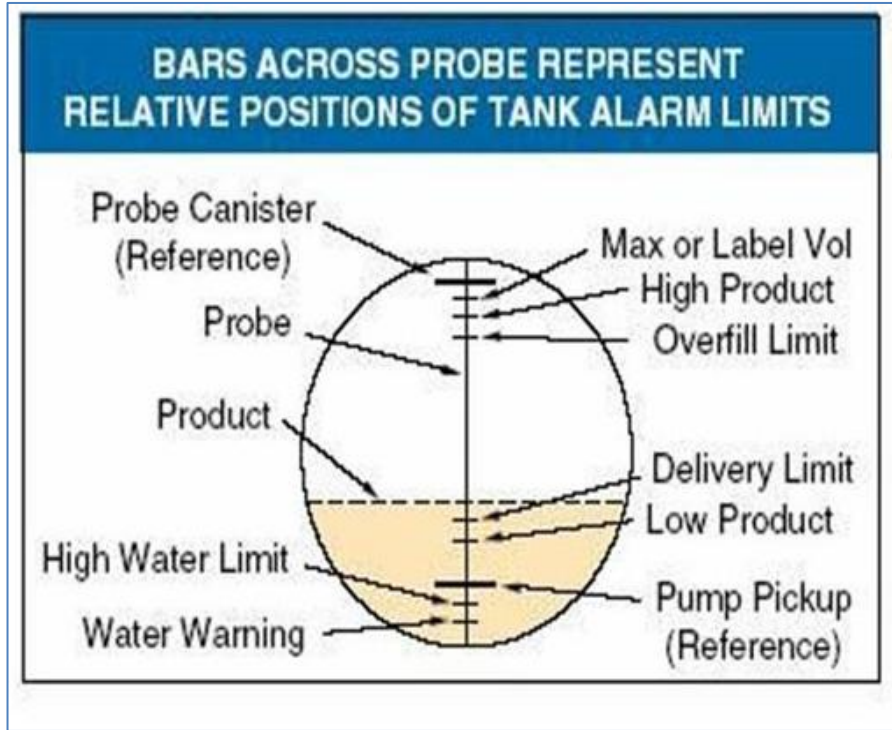


Figure 10: UST Maximum Volume

12.2 Over-Fill Maintenance Report

Over Fill Report		
ASC #:		Date:
ASC Name:		
ASC Company:		
GDF Name:		
Address:		
City:	State:	ZIP Code:
GDF Contact Person Name:		
GDF Contact Person Title:		
GDF Contact Person Phone:		
GDF Contact Person E-mail:		
Over Fill Details		
Date of Overfill:		
Octane of the fuel being dispersed:		
Serial Number of the <i>Processor</i> :		
Complete the Over Fill Maintenance Checklist on the following page. →		

12.3 Over-Fill Maintenance Checklist

Steps	Action	Completed
1.	Set the TLS-350 controls to operate the <i>Processor</i> in the MANUAL OFF mode.	
2.	Turn off the power to the <i>Processor</i> and lockout the power supply.	
3.	Turn off the 120v power to the heat-trace cable and lockout the power supply.	
4.	Unplug the HC sentry module's power supply, which removes power from the HC sensor in the <i>Processor</i> .	
5.	Close the vapor inlet, vapor return, and air outlet valves at the ECS unit (ECS valves).	
6.	Carefully remove plugs from the tees that exist in vapor inlet, vapor return, and air-outlet lines.	
6.1	CAUTION: THE VAPOR LINES MAY BE UNDER POSITIVE OR NEGATIVE PRESSURE.	X
7.	Disconnect and remove the 1/2" tubing from the membrane top plate. Remove the membrane housing top plate.	
7.1	CAUTION: THE MEMBRANE HOUSING TEMPERATURE MAY BE AS HIGH AS 150° F.	X
8.	Carefully remove the membrane and store in a plastic bag.	
9.	Inspect the inside of the membrane housing for gasoline.	
9.1	If gasoline is present inside the membrane housing, GO TO step 10.	
9.2	If gasoline is present inside the membrane housing, the membrane will have to be replaced.	X
9.3	If gasoline is not present GO TO step 16.	
10.	Replace the membrane housing top plate and 1/2" tubing. See OM&S for complete instructions.	
11.	Remove the <i>Processor</i> power lockout and turn ON power to the <i>Processor</i> .	
11.1	CAUTION: LEAVE POWER TO THE HEAT TRACE AND HC SENSOR OFF.	X
12.	Run the <i>Processor</i> for 2-hours (30 minutes ON, 15 minutes OFF, for 2-hours) to dry out the <i>Processor</i> components.	
13.	Turn OFF the power to the <i>Processor</i> and lockout the supply power.	
14.	Disconnect and remove the 1/2" tubing from the membrane top plate. Remove the membrane housing top plate.	
15.	Inspect the membrane housing for the presence of gasoline.	
15.1	If gasoline is still present in the membrane housing, repeat steps 10 through 15.	X
15.2	If gasoline is not present in the membrane housing, go to step 16.	X
16.	Replace all membrane housing and membrane o-rings ***Critical***	
17.	Install either the new membrane or the existing membrane to the instructions in 9.2 (of this table).	
18.	Install the top plate and 1/2" tubing on top of the membrane housing.	
19.	Replace the plugs for the tees in the vapor inlet, the vapor return, and the air outlet lines.	
20.	Open the valves in the vapor inlet, the vapor return, and the air outlet lines.	
21.	Remove the heat-trace cable power lockout and turn ON the power to the heat-trace cable.	
22.	Plug in the HC Sentry Module's power supply, which supplies power to the HC sensor.	
23.	Remove the <i>Processor</i> power lockout and turn ON power to the <i>Processor</i> .	
24.	Reset the TLS-350 controls to operate the <i>Processor</i> in the AUTOMATIC mode.	

13 TSP-009: HC Sensor Verification Test – Exhibit 8

TSP-009: HC Sensor Verification Test – Exhibit #8	
Purpose:	To determine if the HC sensor is functioning properly.
Test Procedure:	See Exhibit #8
If it fails:	Replace the HC Sensor. See OM&S manual.

14 TSP-010: Removal of Liquid from Blocked Hose: Exhibit 5

TSP-010: Removal of Liquid from Blocked Hose	
Purpose:	To clear a hose of all liquid
Test Procedure:	Print an ISD Daily Report #IV0500 Check to see which fueling position is blocked Conduct a liquid-removal test: Exhibit 5
If it fails:	Replace the hose

15 TSP-011: ISD Vapor Flow Meter Operability Test Procedure – Exhibit 17

TSP-011: ISD Operability Test Procedure: Exhibit 17	
Purpose:	To verify the setup and operation of the vapor flow meter.
Test Procedure:	See Exhibit #17
If it fails:	Replace the vapor flow meter. See In-Station Diagnostics Install, Setup, & Operation Manual #577013-916 Rev. B

Troubleshooting Tests

16 Troubleshooting: Motor Rotation Test

- The purpose of this test is to insure that the motors are rotating in the correct direction.
- Turn the power **OFF** at the disconnect switch located near the Processor.
- Put the *Processor* in the manual **ON** Mode at the TLS as shown in the diagnostic menu in **Figures 4 or 5**.
- Remove the cover from the *Processor*.
- Bump the power (briefly energize) at the disconnect switch.
 - ▶ **Visually check the motor rotation for the vacuum pump and blower motor to be sure they are rotating according to the arrows that are shown on the equipment.**
 - ▶ **The rotation of the motors can be visually checked by looking at the rotation of the fan located on the end of each motor.**

CAUTION: DO NOT RUN THE PUMP(S) FOR ANY EXTENDED PERIOD OF TIME UNTIL THE PROPER ROTATION IS VERIFIED OR YOU COULD CAUSE SERIOUS DAMAGE.

17 Troubleshooting: Heat Trace Continuity Test

The purpose of the Heat Trace Continuity test is to insure there is not a short or damage to the Heat Trace cable. The self-regulating heating cable provides safe and reliable heat tracing for process temperature maintenance.

In electronics, a continuity test is the checking of an electric circuit to see if current flows (that it is in fact a complete circuit). A continuity test is performed by placing a small voltage (wired in series with an LED) across the chosen path. If the electron flow is inhibited by broken conductors, damaged components, or excessive resistance, the circuit is "open." Devices that can be used to perform continuity tests include multimeters or specialized continuity testers.

17.1.1 Preparing the heat trace electrical junction box for the test:

- **CAUTION: Be sure to use Lockout/Tag-Out procedures when performing work on the Processor or while working on electrical components.**

1. Put the *Processor* in the manual OFF mode at the TLS-350.
2. Trip the heat trace cable 115v circuit breaker in the electrical panel to remove the power from the heat trace cable.
3. Remove the cover to the *Processor*.
4. Remove the heat trace electrical junction box cover by removing the 4 hold-down screws and lifting the molded plastic cover off the base.

17.1.2 Testing the heat trace circuit

5. Using a multimeter or continuity tester, check the continuity (current flow) across the heat trace circuit as shown in **Figure 11**.
6. Verify the circuit is complete between the positive terminal the neutral at the three-position terminal block.
7. If the red light does not come on, the heat trace circuit is open. (If electron flow is inhibited by broken conductors, damaged components, or excessive resistance, the circuit is "open.):
 Check that all wiring connections are correct.
 Repair/replace the heat trace cable as required to correct the problem.
8. Replace the cover on the heat trace electrical junction box using the 4-hold down screws.
9. Replace the cover on the Processor.
10. The Processor can now be put back in the Automatic Mode at the TLS-350 provided all work is completed.



Figure 11: Heat Trace Circuit Test