

California Environmental Protection Agency



ARB Approved

Installation, Operation and Maintenance Manual

for

Executive Order

VR-205-B

VST Phase II EVR System

with Hirt Thermal Oxidizer

Not Including In-Station Diagnostics (ISD)

NOTICE:

The **ARB Approved Installation, Operation and Maintenance Manual (IOM) for VR-205** describes the tools, methods, and skill levels required to install the **VST Phase II EVR System**.

Unless specified in this IOM, only skilled technicians that are trained, certified, and licensed by VST, Inc. (i.e. VST Authorized Service Contractors) are able to perform installation, maintenance, or repairs of components manufactured by VST Inc. or the warranty will be void. Unless specified otherwise, only skilled technicians that are trained, certified, and licensed by Hirt Combustion Engineers, Inc. (HCE or Hirt) are able to perform installation, maintenance, or repairs of components manufactured by HCE or the warranty will be void.

It is the responsibility of each VST Authorized Service Contractor (ASC) and Hirt technician to be familiar with the current requirements of state, federal, and local codes for installation and repair of gasoline dispensing equipment.

It is also the responsibility of the VST ASC and Hirt technician to be aware of all the manuals, necessary safety precautions, and site safety requirements to assure a safe and trouble-free installation.

To participate in a VST training class, a candidate will need to complete an enrollment form, which can be downloaded from the VST website at www.vsthose.com or requested by phone at 937-704-9333. Once the enrollment form is approved by VST, the candidate can enroll in a VST training class. A schedule of classes is also available on the above VST website.

To confirm a VST Authorized Service Contractor status, a regulator can go to the VST website at www.vsthose.com. This list is updated periodically.

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Hirt maintains an active list of certified installers and companies. To confirm Hirt training, a regulator should contact Hirt below with the name (and company) of the technician.

Contact Information:

Customer Service Department
Hirt Combustion Engineers, Inc.
Phone: (562) 692-6970
email: HirtVCS@aol.com

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About VST



Vapor Systems Technologies, Inc. began in 1989 with the vision of **One Company – One Integrated Solution.**

Today, that philosophy is still in place and getting stronger. Recognizing that a healthier environment is a need and not an option, VST has dedicated its undivided attention to the ever-changing, stringent regulations that govern fugitive vapors at gasoline dispensing facilities (GDF).

To this challenge, VST is committed to a continual R&D campaign of developing the most current, technologically advanced solutions to service not only the United States, but also the world.

VST specializes in the development, engineering, and manufacturing of products that are sold into the GDF segment of the petroleum industry. The VST focus provides our customers and users with exceptional products, services, and innovative solutions for improving the fueling-station experience as well as for the world's air quality.

VST's product offering includes curb pump and vapor recovery hoses, safety breakaways, nozzles, and emission-control system *Processors*. The ENVIRO-LOC™ vapor-recovery product offering represents the most innovative concept in the industry for trapping fugitive vapors from the front end (vehicle refueling) to the back end (vent risers) of the GDF site.

Notice

Vapor Systems Technologies, Inc. shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this publication.

No part of this publication may be translated into another language without the prior written consent of Vapor Systems Technologies, Inc

Table of Terms and Abbreviations

ASC:	Authorized Service Contractor
AQMD:	Air Quality Management Districts
CARB:	California Air Resources Board
CDFA:	California Department of Food & Agriculture
EO:	Executive Order
EVR:	Enhanced Vapor Recovery
GDF:	Gasoline Dispensing Facility
HC:	Hydrocarbon
NEC:	National Electric Code
NFPA:	National Fire Protection Association
ORVR:	On-Board Refueling Vapor Recovery
OSHA:	Occupational Safety Health Administration
Retentate:	Vapor return to UST
RVP:	Reid Vapor Pressure
TS:	Troubleshooting
Ullage:	Vapor space above liquid in a UST
UST:	Underground Storage Tank
VCK:	Vapor Collection Kit
VOC:	Volatile Organic Compounds
VST:	Vapor Systems Technologies, Inc. - manufacturer of the ECS Membrane <i>Processor</i>
WC:	Water Column

VST Contractor Requirements

Due to the highly volatile nature of gasoline and its handling and storage, VST requires the following certifications for its ASC's:

Level	Component	Authorized Tasks	Training Pre-Requisites
A Must be re-certified every two years	Hanging Hardware	Functional Testing Installation Maintenance Repair	No pre-requisite

NOTE:

Depending on local codes, in addition to the VST training, contractors may be required to take air-district training or ICC certification as an approved vapor-recovery installer.

- ASC's must be able to show proof of certification if asked. Carry the wallet card or have a copy of your certification on file with the GDF.
- The ASC must record his or her certification number on the applicable paperwork for all warranties to be deemed valid.
- Contractors should **ALWAYS** verify the training and certification requirements with the air-district staff **BEFORE** beginning installation of EVR systems.

Hirt Contractor Requirements

Technician Certification	Contractors holding valid Installer Certification are approved to perform VCS 100 processor and indicator panel installation; wiring and conduit routing; start-up; maintenance; troubleshooting; and parts replacement.
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NOTE:

Depending on local codes, in addition to the Hirt training, contractors may be required to take air-district training or ICC certification as an approved vapor-recovery installer.

Executive Order VR-205-B
VST Phase II EVR System with Hirt Thermal Oxidizer

Exhibit 1
Equipment List

Component	Manufacturer / Model
Nozzle	VST Model VST-EVR-NB, VST-EVR-NB-R (Rebuilt) (VR-205, Exhibit 1, Figure 1A-1)
Coaxial Curb Hose	VST Model VDV-EVR Series (VR-205, Exhibit 1, Figure 1A-2)
Coaxial Whip Hose	VST Model VSTA-EVR Series (VR-205, Exhibit 1, Figure 1A-2)
Breakaway Coupling	VST Model VSTA-EVR-SBK (VR-205, Exhibit 1, Figure 1A-2)
Hanging Hardware with Liquid Removal Device	(VR-205, Exhibit 1, Figure 1A-3)
Hirt Thermal Oxidizer With Indicator Panel	Hirt Model VCS 100 (VR-205, Exhibit 1, Figure 1A-4) Leg Attachments: 5" – M39 48" - M40
Hirt 1/4" Check Valve¹	Hirt P65

¹ Optional component used with Hirt Thermal Oxidizer System.

Overview: EVR Balance Total System

The Hirt VCS 100 Processor does not interact directly with the other balance system hardware. It is in place to monitor and control the pressure in the UST to within limits specified by CARB.

Under conditions where the GDF is operational and the balance system hardware is functioning normally, the inherent ORVR compatibility of the balance system (when using VST's ENVIRO-LOC nozzle) will produce a predominately negative gauge pressure in the ullage space of the UST. Under these conditions, the Hirt VCS 100 Processor will typically not need to operate.

During periods of less activity, the GDF being shut down overnight, winter fuels being present, or other conditions that promote the pressurization of the ullage space, the Hirt VCS 100 Processor will operate as needed to control the pressure in the ullage space to an accepted level. The processor continuously measures the pressure of the vapor in the storage tanks with the use of a vacuum sensor switch located in the processor. When that pressure is negative, the processor remains de-energized and completely inactive. At any time when the vapor pressure in the storage tank approaches positive pressure, the processor energizes its turbine, which extracts vapor from the storage tanks and sends that vapor into its thermal oxidizer where that vapor is destroyed. The processor continues to extract vapor until the pressure of the vapor is returned to negative, whereupon the processor turns itself off. It remains off unless or until the vapor pressure again approaches a positive condition.

Daily Inspections

HANGING HARDWARE SYSTEM					
Component	Procedure	Fail Criteria	Corrective Action	Reference Manuals	Authorized Personnel
Nozzle Hose Breakaway	Inspect each hose, breakaway, and nozzle for loose connections or leaks	Presence of a leak	Tighten connections or replace with new VST product	IOM-10	Nozzle, hose, or breakaway replacement: GDF owner-operator or VST ASC Levels A, B, or C Component repair: VST ASC Levels A, B, or C
		Presence of residue from a leak	Tighten connections or replace with new VST product	IOM-12	
		Visible o-ring between any component connection	Tighten connections or replace with new VST product	IOM-13	
CO-AXIAL HOSES					
Component	Procedure	Fail Criteria	Corrective Action	Reference Manuals	Authorized Personnel
Coaxial Hose	Inspect hoses for wear, severe kinks, cracks, splitting, and functional swivels	Kinks, cracks, splitting, non-functional swivels, or any visible openings	Replace with new VST hose	IOM-12	Hose replacement: GDF owner-operator or VST ASC Levels A, B, or C
BREAKAWAY					
Component	Procedure	Fail Criteria	Corrective Action	Reference Manuals	Authorized Personnel
Breakaway	Inspect breakaway for leaks around the scuff	Presence of a leak around the scuff	Replace with new breakaway	IOM-13	Replace breakaway: Owner/Operator or VST ASC Levels A, B, or C

NOZZLE						
Nozzle Component	Procedure	Fail Criteria	Corrective Action	Reference Manuals	Authorized Personnel	
Nozzle lever, lever guard, lever lock	Inspect for defects, cuts, or damage to the: Nozzle Lever Lever Guard Lever Lock Spout Spout Vent Hole Face Seal Interlock Rod Vapor Collection Sleeve.	Damaged or missing	Replace with new VST nozzle	IOM-10	GDF Owner/Operator or VST ASC Levels A, B, or C	
Nozzle Spout		Sheared or bent	Replace nozzle spout assembly with new VST spout or replace with new VST nozzle	IOM-10 IOM-11	VST ASC Levels A, B, or C	
Nozzle Vent Hole		Vent hole blocked	Clear blockage	IOM-10	GDF Owner/Operator or VST ASC Levels A, B, or C	
Nozzle Collection Sleeve		If greater than 18 inches total length of cuts (if greater than .375 sq. inches of material missing)	Replace vapor collection kit	IOM-11 Exhibit 2	VST ASC Levels A, B, or C	
			Replace nozzle with new VST nozzle	IOM-10 Exhibit 2	GDF Owner/Operator or VST ASC Levels A, B, or C	
Nozzle Face Seal		Greater than 30% of the material is missing (if greater than 2.5 inches of the accumulated faceplate circumference is missing)	Replace vapor collection kit	IOM-11	VST ASC Levels A, B, or C	
			Replace nozzle with new VST nozzle	IOM-10	GDF Owner/Operator or VST ASC Levels A, B, or C	
Nozzle Front-End Kit (Collection sleeve and face seal)		Alignment lines are misaligned and/or the assembly is cockeyed	Replace vapor collection kit	IOM-11	VST ASC Levels A, B, or C	
			Replace nozzle with new VST nozzle	IOM-10	GDF Owner/Operator or VST ASC Levels A, B, or C	
Nozzle Interlock Rod		IOM-10 IOM-11	Interlock rod sticks during engagement or disengagement	Replace vapor collection kit	IOM-11	VST ASC Levels A, B, or C
				Replace nozzle with new VST nozzle	IOM-10	GDF Owner/Operator or VST ASC Levels A, B, or C

Daily Inspection and Testing Checklist

Checklist results may be used to assist with filling out GDF maintenance log.			Date:	Page: _____ of _____
Dispenser Number	Unihose or Fuel Grade (circle one)	Nozzle Inspection (circle one)	Hose Inspection (circle one)	Breakaway (circle one)
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail
	Unihose 87 89 91 other _____	Pass Fail	Pass Fail	Pass Fail

Hirt VCS 100 Processor Annual Inspection Checklist

DATE OF TEST:

SERVICE COMPANY NAME	SERVICE COMPANY'S TELEPHONE
SERVICE TECHNICIAN	HIRT TECHNICIAN CERTIFICATION # (as applicable) ICC or DISTRICT TRAINING CERTIFICATION (as applicable)
STATION NAME	DISTRICT PERMIT #
STATION ADDRESS	CITY STATE ZIP
Instructions: Perform each step and check each box after step is completed. File completed checklist with station's Maintenance Records.	
1.	Turn OFF electrical power to processor. CAUTION: The processor can be hot from operation. Use caution when removing Weather Cover, Shell, and raising Inner Stack; they are HOT! <input type="checkbox"/>
2.	Remove Weather Cover. Look inside stack and burner chamber to check for debris. Remove any debris. <input type="checkbox"/>
3.	Remove padlocks, if any, and remove Shell from processor. <input type="checkbox"/>
4.	Loosen stack bolt and raise Inner Stack. The pilot and igniter/sensor are now exposed. The internals should be checked for foreign material. Remove any foreign material. <input type="checkbox"/>
5.	Check igniter/sensor for carbon buildup. Replace Pilot Tip assembly if Excessive buildup. See instructions that come with replacement Pilot Tip for Installation details. <input type="checkbox"/>
6.	Visually check all processor piping and tubing for leaks (this is checked when conducting TP-201.3 and Exhibit 4 of Executive Order VR-205). Check metal tubing and piping for kinks, worn areas, and cracks, or deterioration. Check piping and metal tubing fittings to insure that they are strong and tight sealing. Replace any questionable components. <input type="checkbox"/>

7.	Conduct Exhibit 8 of Executive Order VR-205 "Hirt VCS 100 Processor With Indicator Panel Operability Test Procedure"	<input type="checkbox"/>
8.	Check setting of Pilot Needle Valve adjustmet (section 8.8 of Hirt VCS 100 IOM).	<input type="checkbox"/>
9.	Lower Inner Stack and Tighten bolt. Replace Shell, Weather Cover, and padlocks removed for visual inspection.	<input type="checkbox"/>
10.	Verify handle on 3-way valve is in down position – Processor to UST Ullage.	<input type="checkbox"/>
11.	Turn ON electrical power to processor.	<input type="checkbox"/>

Alarm Troubleshooting Summary For Hirt VCS 100 Processor

Hirt VCS 100 Troubleshooting Summary				
VCS 100 Indicator Panel	Category	Light	Cause	Recommended Troubleshooting
OVERPRESSURE LIGHT	VCS 100 Processor or System	Red	UST ullage pressure is positive for at least 1 continuous hour.	<p>GDF Owner/Operator Responsibilities:</p> <ul style="list-style-type: none"> • “Daily Inspections” of Hanging Hardware as specified in section 6 of Installation, Operation, and Maintenance Manual. • “Drive-Offs and Other Customer Abuse” as specified in section 9 of Installation, Operation, and Maintenance Manual. • Exhibit 7 of Executive Order VR-205 • Record findings in GDF Owner/Operator Maintenance Log. <p>Certified Contractor Responsibilities:</p> <ul style="list-style-type: none"> • Follow VCS 100 Troubleshooting Guide (Contact Hirt by either Phone: (562) 692-6970 or by email: HirtVCS@aol.com to get Guide) • TP-201.3 and Exhibit 4 of Executive Order VR-205 • Exhibit 7 of Executive Order VR-205 • Exhibit 8 of Executive Order VR-205 • Record findings in GDF Owner/Operator Maintenance Log.

Drive-Offs and Other Customer Abuse

If the hanging hardware components are involved in a drive-off or if they incur some customer abuse, and they are not replaced as new, each individual component of the hanging hardware **must be visually inspected and functionally tested** before the components can return to dispensing fuel.

- ▶ A visual assessment and functional tests are outlined in the following pages.

ANY COMPONENT THAT DOES NOT PASS A VISUAL INSPECTION OR FUNCTIONAL TEST MUST BE REPLACED.

IF THE BREAKAWAY IS INVOLVED IN A DRIVEOFF, IT MUST BE REPLACED.

THE BREAKAWAY IS NON-RECONNECTABLE.



Before beginning work, barricade the work area to block customer use.

1 Drive Offs & Other Customer Abuse: Perform a Visual Assessment

Visually inspect the hanging hardware system as follows to determine the extent of the damage:

Action	Test Procedure	Corrective Action	Reference Material	Authorized Personnel
Perform a thorough visual examination of the exterior of the whip hose and the curb hose for any obvious imperfections.	Obvious imperfections include, but are not limited to: Damage to the swivels Damage to the couplings Kinks / flat spots Tears to the outer hose	Replace with new VST hose(s).	IOM-12	Hose replacement: GDF Owner/Operator or VST ASC Levels A, B, or C
	If there are no imperfections to the whip and curb hose, those hoses may be reused.	After reassembly, conduct required functional tests.	IOM-12	VST ASC Levels A, B, or C
		If the functional tests fail, replace the hose(s).	IOM-12	GDF Owner/Operator or VST ASC Levels A, B, or C
Perform a thorough visual inspection of the nozzle for any obvious imperfections.	Obvious imperfections include, but are not limited to: Damaged spout (broken, bent) Damage to the face-seal collection sleeve / interlock rod assembly Broken face seal Torn collection sleeve Bent interlock rod Nozzle alignment marks Damage to the lever and lever guard	Replace damaged components where applicable.	IOM-11	Nozzle repair: VST ASC Levels A, B, or C
		Replace with new VST nozzle.	IOM-10	Nozzle replacement: GDF Owner/Operator or VST ASC Levels A, B, or C
If no imperfection or damage is visibly evident, proceed to functional testing.				

Function Testing Description

Perform the following functional tests prior to re-using a hose or a nozzle following a drive-off:

Test	Test Procedure	Corrective Action	Authorized Personnel
Leak Check	<p>Verify that there are no liquid leaks in all components.</p> <p>Dispense fuel and check each connection between the components.</p> <p>A visual inspection of the nozzle can determine any obvious liquid leaks.</p>	<p>Any component that does not pass the functional test must be replaced.</p> <p>Go to IOM 10, 12, and 13</p>	GDF Owner/Operator or VST ASC Levels A, B, or C
Meter Creep	<p>Checking for meter creep will verify the integrity of the connections.</p> <p>Dispense 1/10 to 2/10 of a gallon of fuel into an approved container then release lever and move components around and/or gently shake the hose and verify if the displace amount on the dispenser changes.</p>	<p>Any component that does not pass the functional test must be replaced.</p> <p>Go to IOMs 10, 12, and 13</p>	GDF Owner/Operator or VST ASC Levels A, B, or C
Automatic Shut-Off and Insertion Interlock	<p>Section 10</p> <p>The insertion interlock mechanism shall not allow dispensing when the bellows is uncompressed as determined by direct observation or GDF-09 (See Vapor Recovery Defects list).</p>	<p>Repair or replace the nozzle</p> <p>Go to IOM-11</p>	<p>Nozzle replacement</p> <p>GDF Owner/Operator or VST ASC Levels A, B, or C</p>
			<p>Nozzle repair</p> <p>VST ASC Levels A, B, or C</p>
Resistance	<p>Section 10</p>	<p>Any component that does not pass the functional test must be replaced.</p> <p>Go to IOM 10, 12, and 13</p>	GDF Owner/Operator or VST ASC Levels A, B, or C

VST Installation Procedure for Phase II Coaxial EVR Balance Dripless Nozzles

Part Number Series: VST-EVR-NBcc, VST-EVR-NBccR
cc = Scuff Guard Color Code and R = rebuilt



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GENERAL INFORMATION

If hanging hardware components are involved in a drive-off or incur other customer abuse, each individual component must be functionally tested prior to customer dispensing activities.

INSTALLATION PREPARATION

This procedure must be followed to insure leak-proof installation and operation of these nozzles.

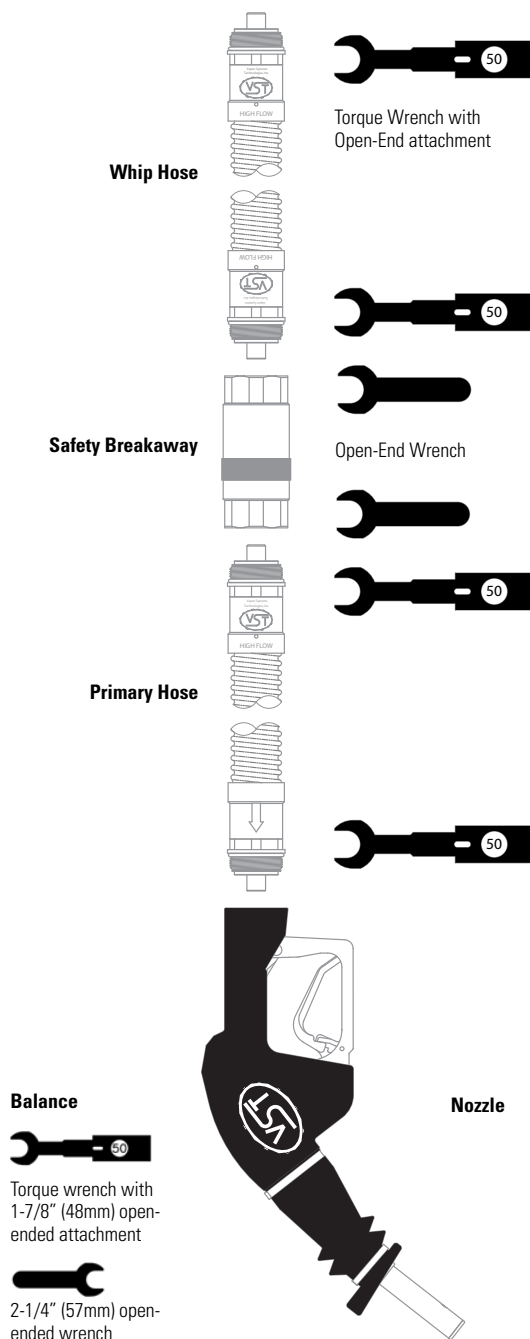
1. Turn off and tag the power to the dispenser. Dispenser must be de-energized prior to service to avoid personal injury.
2. Barricade work area to block vehicle access to the dispenser.
3. Close the dispenser shear valve prior to removing hanging hardware (hoses, safety breakaways, and nozzles).
4. Drain liquid product from the hanging hardware set into an approved container prior to replacing any hanging hardware components.
5. Remove hanging hardware from the dispenser prior to making replacement component assembly connections. VST recommends connecting the whip hose to the dispenser as the last connection during the hanging hardware assembly.

INSTALLATION AND FUNCTION TESTS

1. **STOP!** If this is a new facility installation, the fueling point must be flushed into an approved container before installing the nozzle. Using this nozzle to flush the system could result in foreign material becoming lodged in the nozzle's valve and cause it not to shut off.
2. Initial inspection and function tests:
 - a. Carefully unpack nozzle from shipping carton.
 - b. Inspect nozzle exterior for any damage.
 - c. Inspect threads, lever, lever lock, spout, collection sleeve, band clamps, and face seal to determine that they are present and undamaged.
 - d. Verify interlock rod alignment. Check interlock for engagement and release. Proper function of interlock rod requires the nozzle collection sleeve to be compressed $\frac{1}{4}$ " to $\frac{1}{2}$ " and the lever to be engaged into the dispensing position. Nozzle will not function without interlock rod properly engaged.
 - e. Inspect spout vent hole. It should be clear of debris.

Figure 1.

EVR Hanging Hardware Assembly



VST Installation Procedure for Phase II Coaxial EVR Balance Dripless Nozzles

Part Number Series: VST-EVR-NBcc, VST-EVR-NBccR

cc = Scuff Guard Color Code and R = rebuilt

3. Lightly lubricate ALL O-Rings on mating connections with petroleum jelly or other suitable lubricant. DO NOT USE pipe dope or thread sealant.
4. Attach nozzle onto mating hose connection and tighten by hand.
5. Tighten the nozzle connection to 50 ft-lbs of torque. DO NOT OVER TIGHTEN. Use a torque wrench with an open-end attachment to fit the hose couplings and an open-end wrench to properly tighten coupling connections. DO NOT USE channel-locks or pliers to tighten hose joints. Proper ft./lb. torque may not be achieved with these tools.
6. Purge air from the system by pumping one-tenth (1/10) to two-tenths (2/10) of a gallon of fuel into an approved container. Inspect the nozzle connection for liquid leaks and make proper adjustments at hose connection if necessary.
7. Check the nozzle shut-off action by dispensing fuel into an approved container at least three times to assure the proper automatic operation of the interlock rod. According to U/L requirement 842, the fuel flow-rate must be greater than 3 gpm for the automatic shut-off mechanism to operate.

To test, operate the nozzle and submerge the spout tip in fuel until the fuel level covers the vent hole. The main valve of the nozzle automatically shuts off when the liquid covers the vent hole at the end of the spout. The nozzle is not designed to operate on gravity flow. The hold-open latch will disengage automatically when liquid covers the vent hole in the spout. Verify that the fuel flow stops when the nozzle collection sleeve is decompressed (e.g. interlock rod is disengaged). To test that the fuel flow stops, dispense some fuel into an approved container. Slowly remove the nozzle from the container while dispensing fuel. Fuel flow should stop when the nozzle collection sleeve is fully decompressed.

8. Measure the resistance between the dispenser outlet casting and the tip of the nozzle spout. Use an electronic multimeter set on the high range of the ohmmeter function. Resistance should not indicate more than 70,000 ohms per foot of hose. Example: The measured resistance for a 12-foot hose must not exceed 840,000 ohms (840 kilohms).

MAINTENANCE

Inspect nozzles daily for damaged component parts: vapor collection sleeve, face seal, interlock rod, spout, lever, lever lock, etc.

Damaged components must be replaced. Vent hole at the end of the spout should be clear of debris. The nozzle will not operate properly if vent hole becomes clogged. The nozzle will not function properly without the interlock rod properly engaged. Keep the hose connections tight.

Should there be a drive-off or incidence of customer abuse, follow the initial inspection instructions found in the INSTALLATION section. The nozzle should be replaced when damaged. The nozzle is designed and constructed to give lasting service if properly handled and maintained. If for any reason it should need attention, contact your VST distributor for proper disposition.

NOTE

Due to abuse, misuse, changing gasoline formulas, variation in maintenance practices, environmental conditions, and/or conditions beyond the manufacturer's control, dispensing equipment may need replacement before five (5) years. Inspections and proper maintenance procedures should be followed by the station manager to determine if replacement is required before five (5) years.

WARNING

Unauthorized rebuilding or modifying of nozzles voids ALL approvals and warranties.

VST products must be used in compliance with applicable federal, state, and local laws and regulations.

If local regulatory codes prohibit use of the nozzle's hold-open clip, it must be removed prior to nozzle installation. Remove the nozzle to a safe work area.

Place the nozzle on a flat surface.

Locate the alloy rivet securing the hold-open clip and spring in the nozzle's handle. Use a drill with a 3/16" (5mm) drill bit, drill out the rivet securing the hold-open clip, and discard the clip, spring, and all other rivet debris.



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VST Installation Procedure for Phase II Coaxial EVR Balance Nozzle Repair Kits



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Part Number Series: VST-FEK-100 (Front End Kit includes VCK & NSA)
VST-VCK-100 (Vapor Collection Kit: Boot Assembly Only)
VST-NSA-100 (Nozzle Spout Assembly: Spout Assembly Only)

TOOLS

Adjustable Wrench	Nozzle Band Clamp Pincers
Approved Fuel Container	Torque Wrench
Wide Mouth Funnel	Vaseline (or suitable lubricant)

GENERAL INFORMATION

If hanging hardware components are involved in a drive-off or incur other customer abuse, each individual component must be functionally tested prior to customer dispensing activities.

INSTALLATION PREPARATION

This procedure must be followed to insure leak-proof installation and operation of these nozzles.

1. Turn off and tag the power to the dispenser. Dispenser must be de-energized prior to service to avoid personal injury.
2. Barricade work area to block vehicle access to the dispenser.
3. Close the dispenser shear valve prior to removing hanging hardware (hoses, safety breakaways, and nozzles).
4. Visually inspect and assess the extent of the damage to all hanging hardware components. If there are no imperfections/damages, proceed to FUNCTIONAL TEST.
5. Drain liquid product from the hanging hardware set into an approved container prior to replacing any hanging hardware components.
6. Remove hanging hardware from the dispenser prior to making replacement component assembly connections. VST recommends connecting the whip hose to the dispenser as the last connection during the hanging hardware assembly.
7. To drain nozzle, engage nozzle interlock:
 - a. Push in face seal on nozzle boot assembly
 - b. Hold the backend of the nozzle over an approved container
 - c. Pull nozzle lever to fully drain the nozzle

VAPOR COLLECTION KIT (VST-VCK-100) REMOVAL

(See Figure 1)

1. Remove large band clamp from the Vapor Collection assembly with nozzle band clamp pincers. (VST-BPT-100)
2. Pull the Vapor Collection assembly (boot) off of the clamping groove of nozzle body.
3. Pull Vapor Collection assembly off of the spout by slightly twisting to go over the spout latch ring.
4. Properly discard the removed components.

VAPOR COLLECTION KIT (VCK) REPLACEMENT

1. Place the large band clamp on the collection sleeve. (See Figure 1)
2. Check proper orientation of the interlock rod. (See Figure 2)
3. Slide VCK over the spout.
4. Align and insert the interlock rod into the interlock port. (See Figure 2)
5. Align and center all alignment marks on top of the vapor collection kit and nozzle scuff. (See Figure 1)

6. Engage interlock a few times to check for correct alignment and functionality. (See Function Test 3)
7. Tighten collection band clamp until collection sleeve will not rotate. (See Figure 1)

NOZZLE SPOUT ASSEMBLY (VST-NSA-100) REMOVAL

1. Remove Vapor Collection Assembly.
2. Loosen spout nut with smooth-jaw wrench. (See Figure 3)
NOTE Do not use pipe wrench or locking-type pliers.
3. Once threads are completely disengaged, pull the spout straight out.

NOZZLE SPOUT ASSEMBLY (NSA) REPLACEMENT (See Figure 3)

1. Fuel chamber should remain in the nozzle casting with the vacuum sensing tube hole oriented at the top.
2. If the fuel chamber is pulled out of the nozzle casting:
 - a. Check O-ring for damage.
 - b. Replace O-ring if damaged (check for cuts, nicks, etc.).
 - c. Lubricate O-ring prior to re-assembly.
3. Insert fuel chamber into nozzle casting:
 - a. Poppet stem with spring goes through poppet hole in the fuel chamber (center hole).
 - b. Push fuel chamber until it is flush with casting.
 - c. Vacuum sensing tube in the fuel chamber should be oriented at the top.

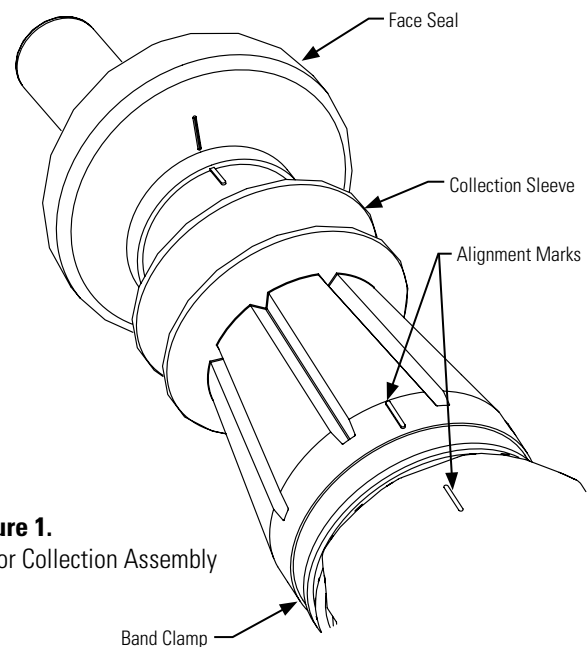


Figure 1.
Vapor Collection Assembly

VST Installation Procedure for Phase II Coaxial EVR Balance Nozzle Repair Kits

Part Number Series: VST-FEK-100 (Front End Kit includes VCK & NSA)
 VST-VCK-100 (Vapor Collection Kit: Boot Assembly Only)
 VST-NSA-100 (Nozzle Spout Assembly: Spout Assembly Only)

- Lightly lubricate **ALL** O-rings on the spout assembly.
NOTE Do not block vacuum sensing-tube hole with lubricant.
- Align vacuum sensing tube with mating hole in the fuel chamber.
- Align the anti-rotation bump on the spout with the casting notch. Be careful not to damage the spout O-rings.
- Firmly insert spout assembly into the nozzle casting.
- Apply a dab of Loctite® 565 (or equivalent thread sealant) to the male thread of the nozzle casting. Be careful not to apply the Loctite® so that it would enter into the casting notch. (See Figure 3)
- Thread spout nut onto the nozzle casting and tighten firmly. Torque to 30 foot-pounds. Spout should be tight and not able to rotate. Do not over-tighten the spout nut.
- After tightening the spout nut, place the Vapor Collection Kit onto the spout. Examine the location of the interlock rod to make sure it does not interfere or ride against the spout nut. If there is interference, tighten the spout nut a few degrees to allow the interlock rod to move freely.
- Re-install the Vapor Collection Kit assembly per the Vapor Collection Kit Replacement instructions.

FUNCTION TESTS

- Follow the VST Installation Procedure for each hanging hardware component. (Procedures: Section 10, 12, and 13)
- Purge air from the system by pumping one-tenth (1/10) to two-tenths (2/10) of a gallon of fuel into an approved container. Inspect the nozzle connection for liquid leaks and make proper adjustments at the hose connection if necessary.
- Check the nozzle shut-off action by dispensing fuel into an approved container at least three times to assure the proper automatic operation of the interlock rod. According to U/L requirement 842, the fuel flow-rate must be greater than 3 gpm for the automatic shut-off mechanism to operate.

To test, operate the nozzle and submerge the spout tip in fuel until the fuel level covers the vent hole. The main valve of the nozzle automatically shuts off when the liquid covers the vent hole at the end of the spout. The nozzle is not designed to operate on gravity flow. The hold-open latch will disengage automatically when liquid covers the vent hole in the spout. Verify that the fuel flow stops when the nozzle collection sleeve is decompressed. To test that the fuel flow stops, dispense some fuel into an approved container. Slowly remove the nozzle from the container while dispensing fuel. Fuel flow should stop when the nozzle collection sleeve is fully decompressed.

- Measure the resistance between the dispenser outlet casting and the tip of the nozzle spout. Use an electronic multimeter set on the high range of the ohmmeter function. Resistance should not indicate more than 70,000 ohms per foot of the hose. Example: The measured resistance of a 12-foot hose must not exceed 840,000 ohms (840 kilohms).

MAINTENANCE Inspect nozzles daily for damaged components parts: vapor collection sleeve, face seal, interlock rod, spout, lever, lever lock, etc. Damaged components must be replaced. Vent hole at the end of the spout should be clear of debris. The nozzle will not operate properly if vent hole

becomes clogged. The nozzle will not function properly without the interlock rod properly engaged. Keep the hose connections tight.

Should there be a drive-off or incidence of customer abuse, follow the initial inspection instructions found in the VST Installation Procedure Section 10. The nozzle should be replaced when damaged. The nozzle is designed and constructed to give lasting service if properly handled and maintained. If for any reason it should need attention, contact your VST distributor for proper disposition.

NOTE Due to abuse, misuse, changing gasoline formulas, variation in maintenance practices, environmental conditions, and/or conditions beyond the manufacturer's control, dispensing equipment may need replacement before five (5) years. Inspections and proper maintenance procedures should be followed by the station manager to determine if replacement is required before five (5) years.

WARNING Unauthorized rebuilding or modifying of nozzles voids ALL approvals and warranties. VST products must be used in compliance with applicable federal, state, and local laws and regulations. If local regulatory codes prohibit use of the nozzle's hold-open clip, it must be removed prior to nozzle installation. Remove the nozzle to a safe work area. Place the nozzle on a flat surface. Locate the alloy rivet securing the hold-open clip and spring in the nozzle's handle. Use a drill with a 3/16" (5mm) drill bit, drill out the rivet securing the hold-open clip, and discard the clip, spring, and all other rivet debris.

Figure 2.
Interlock Assembly

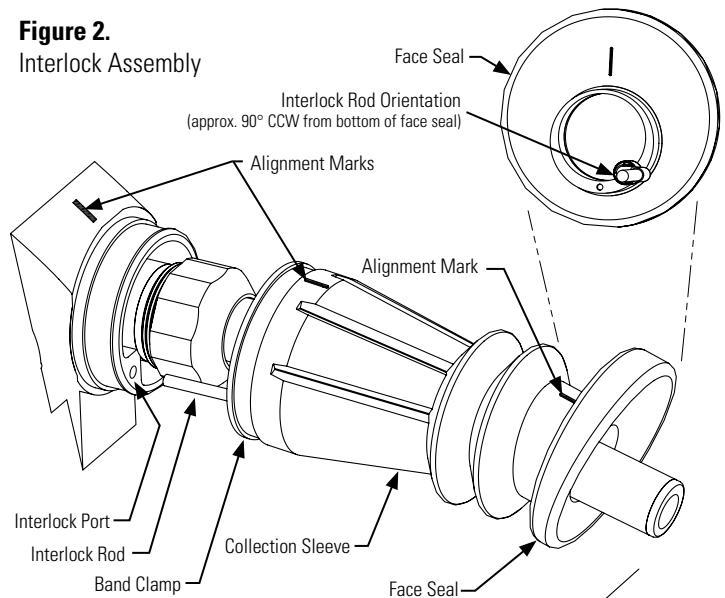
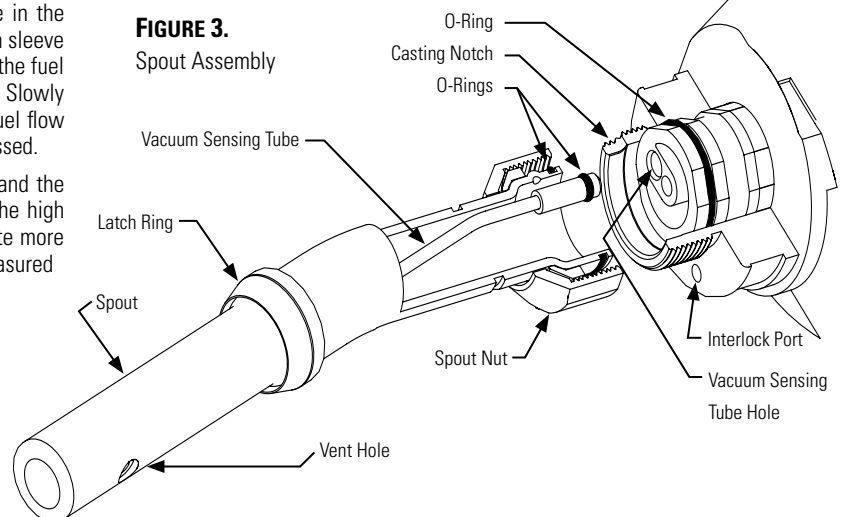


FIGURE 3.
Spout Assembly



VST Installation Procedure for Phase II Coaxial EVR Balance Fuel Hoses

Part Number Series: VSTA-EVR and VDV-EVR



Vapor Systems Technologies, Inc.

650 Pleasant Valley Drive
Springboro, Ohio 45066 (USA)

Toll Free: 1-888-878-4673

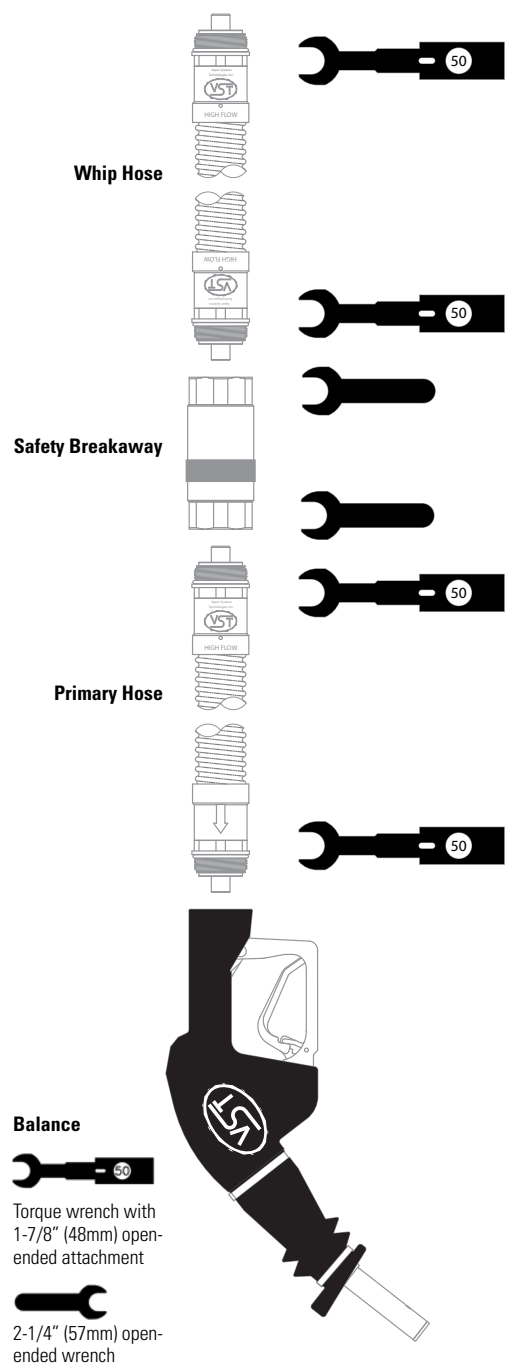
Phone: 937-704-9333

Fax: 937-704-9443

www.vsthose.com

Figure 1.

EVR Balance Hanging Hardware Assembly



GENERAL INFORMATION

If hanging hardware components are involved in a drive-off or incur other customer abuse, each individual component must be functionally tested prior to customer dispensing activities.

INSTALLATION PREPARATION

This procedure must be followed to insure leak-proof installation and operation of these hose products.

1. Turn off and tag the power to the dispenser. Dispenser must be de-energized prior to service to avoid personal injury.
2. Barricade work area to block vehicle access to the dispenser.
3. Close the dispenser shear valve prior to removing hanging hardware (hoses, safety breakaways, and nozzles).
4. Drain liquid product from the hanging hardware set into an approved container prior to replacing any hanging hardware components.
5. Remove hanging hardware from the dispenser prior to making replacement component assembly connections. VST recommends connecting the whip hose to the dispenser as the last connection during the hanging hardware assembly.

INSTALLATION AND FUNCTION TESTS

1. Initial inspection:
 - a. Carefully unpack hose from shipping carton.
 - b. Inspect ALL O-Rings on each end of the hose to determine that they are present and undamaged.
 - c. Inspect hose exterior for any damage.
 - d. Inspect coupling threads for any damage.
2. Lightly lubricate ALL O-Rings on mating connections with petroleum jelly or other suitable lubricant. DO NOT USE pipe dope or thread sealant.
3. Insert the hose coupling into the mating connection and hand-tighten.

NOTE Flow direction arrows on whip and primary hoses, where applicable, are indicated on hose coupling cuffs.
4. Tighten all the hose-joint connections to 50 foot-pounds of torque. DO NOT OVER TIGHTEN. Use a torque wrench with an open-end attachment to fit the hose couplings and an open-end wrench to properly tighten coupling connections. DO NOT USE channel-locks or pliers to tighten hose joints. Proper ft./lb. torque may not be achieved with these tools.
5. Purge air from the system by pumping one-tenth (1/10) to two-tenths (2/10) of a gallon of fuel into an approved container. Inspect each hose-joint connection for liquid leaks and make proper adjustments if necessary.

6. Check the nozzle shut-off action by dispensing fuel into an approved container at least three times to assure the proper automatic operation of the interlock rod. According to U/L requirement 842, the fuel flow-rate must be greater than 3 gpm for the automatic shut-off mechanism to operate.

To test, operate the nozzle and submerge the spout tip in fuel until the fuel level covers the vent hole. The main valve of the nozzle automatically shuts off when the liquid covers the vent hole at the end of the spout. The nozzle is not designed to operate on gravity flow. The hold-open latch will disengage automatically when liquid covers the vent hole in the spout. Verify that the fuel flow stops when the nozzle collection sleeve is decompressed (e.g. interlock rod is disengaged). To test that the fuel flow stops, dispense some fuel into an approved container. Slowly remove the nozzle from the container while dispensing fuel. Fuel flow should stop when the nozzle collection sleeve is fully decompressed.

7. Measure the resistance between the dispenser outlet casting and the tip of the nozzle spout. Use an electronic multimeter set on the high range of the ohmmeter function. Resistance should not indicate more than 70,000 ohms per foot of hose. Example: The measured resistance for a 12-foot hose must not exceed 840,000 ohms (840 kilohms).

PROCEDURE FOR POSITIONING THE LIQUID REMOVAL DEVICE

This procedure must be followed to insure proper positioning for the liquid removal device in Part Number Series: VDV-EVR (See Figure 2).

1. After installing the VST hanging hardware, hold the nozzle straight out from the dispenser so that the compressed bellows is 48 inches away from the front face of the dispenser and the spout tip of the nozzle is 30 inches above the pavement. The nozzle spout is to be at a 30-degree angle above the horizontal plane. (Simulate when the bellows is compressed in the filler neck of a vehicle.)
2. When the hose and nozzle are held in position as shown in Figure 2, the factory installed liquid removal device indicator mark on the vapor hose must be at the bottom of the loop. If the indicator mark is not at the bottom of the primary hose loop, the installer may choose one of the following options:
 - Adjust the hose retractor (if installed)
 - Use a different length whip hose
 - Use a different length primary hose

IMPORTANT

It is the installing technician's responsibility to insure that the properly sized and marked hanging hardware is installed at the dispenser. Failure to properly install and locate the liquid removal device may reduce the effectiveness of the product in application resulting in outer hose liquid blockage and failure of the liquid removal test procedure.

MAINTENANCE

Inspect hoses daily for damage, loose connection, or leaks. Replace as necessary. Subject to customer abuse, hose should be replaced when damaged.

The hose is designed and constructed to give lasting service if properly handled and maintained. If for any reason it should need attention, contact your VST distributor for proper disposition.

NOTE Due to abuse, misuse, changing gasoline formulas, variation in maintenance practices, environmental conditions, and/or conditions beyond the manufacturer's control, dispensing equipment may need replacement before five (5) years. Inspections and proper maintenance procedures should be followed by the station manager to determine if replacement is required before five (5) years.

WARNING Unauthorized rebuilding or modifying of hoses voids **ALL** approvals and warranties. VST products must be used in compliance with applicable federal, state and local laws and regulations.

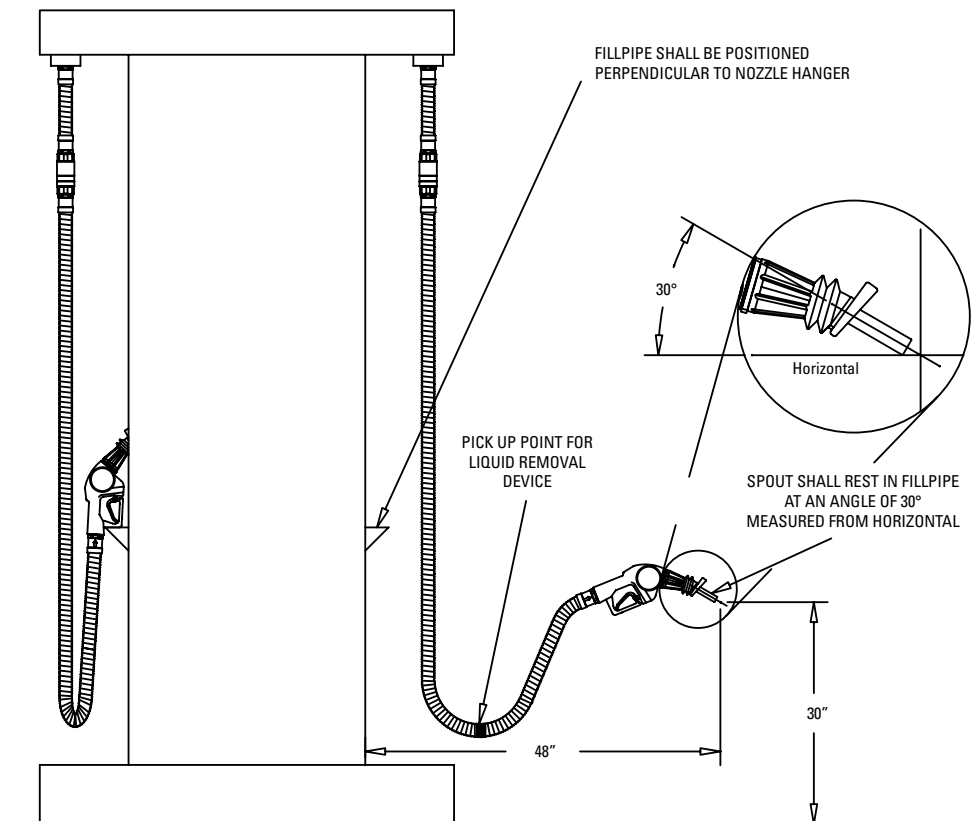


Figure 2. Procedure For Positioning the Liquid Removal Device

VST Installation Procedure for Phase II Coaxial EVR Balance Safety Breakaway Devices

NON-Reattachable Breakaway Part Number Series: VSTA-EVR



Vapor Systems Technologies, Inc.

650 Pleasant Valley Drive
Springboro, Ohio 45066 (USA)

Toll Free: 1-888-878-4673

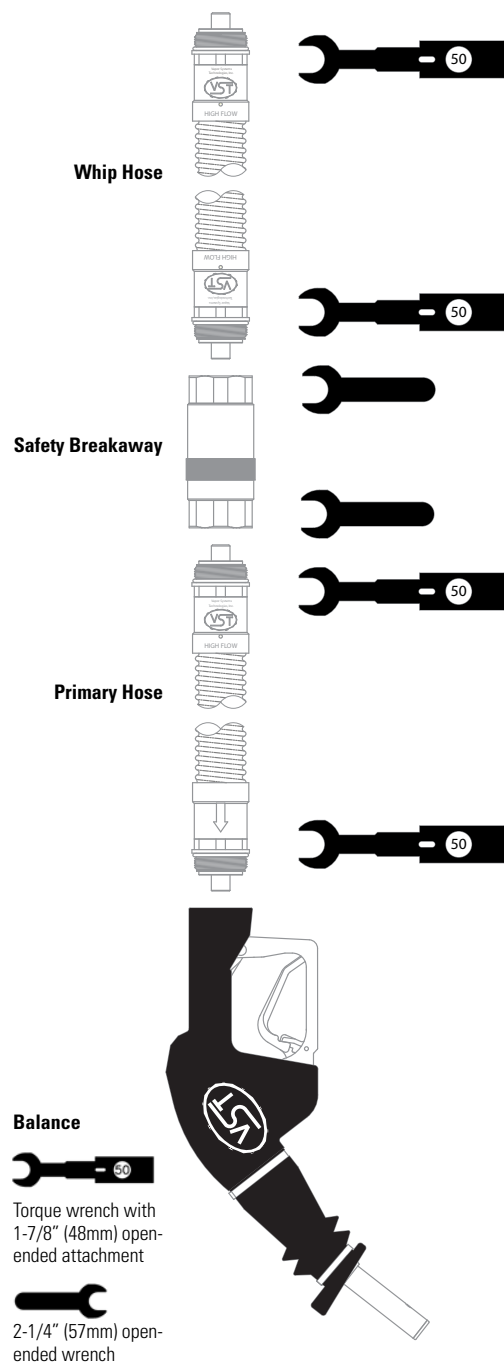
Phone: 937-704-9333

Fax: 937-704-9443

www.vsthose.com

Figure 1.

EVR Balance Hanging Hardware Assembly



APPLICATION

These VST Safety Breakaway devices are intended to prevent damage to the dispenser and hose in the event of a vehicle drive off. These devices separate at pull forces up to 350 lbs. Prior to installation (see Installation Preparation), you will need to determine that 350 lbs. of pull force will not damage the dispenser. After verifying that the dispenser is securely bolted to the island, it can be tested by using a spring scale and a length of rope. The rope must be connected at the dispenser outlet casting, which may require a threaded bushing with a hole for attaching the rope. Attach the scale to the rope and pull to 350 lbs. in several directions. Be sure to avoid damaging the dispenser.

NOTE

- The whip hose ALWAYS attaches to the dispenser. If a retractor is being used, the retractor clamp MUST be between the breakaway and the dispenser.
- VST hoses are made to withstand 350 pounds tensile pull without damage. If another brand of hose is present at the dispenser, VST recommends that you contact the hose manufacturer regarding the compatibility with this breakaway device.

GENERAL INFORMATION

If hanging hardware components are involved in a drive-off or incur other customer abuse, each individual component must be functionally tested prior to customer dispensing activities.

INSTALLATION PREPARATION

This procedure must be followed to insure leak-proof installation and operation of these safety breakaway products.

- Turn off and tag the power to the dispenser. Dispenser must be de-energized prior to service to avoid personal injury.
- Barricade work area to block vehicle access to the dispenser.
- Close the dispenser shear valve prior to removing hanging hardware (hoses, safety breakaways, and nozzles).
- Drain liquid product from the hanging hardware set into an approved container prior to replacing any hanging hardware components.
- Remove hanging hardware from the dispenser prior to making replacement component assembly connections. VST recommends connecting the whip hose to the dispenser as the last connection during the hanging hardware assembly

VST Installation Procedure for Phase II Coaxial EVR Balance Safety Breakaway Devices

NON-Reattachable Breakaway Part Number Series: VSTA-EVR



Vapor Systems Technologies, Inc.

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Springboro, Ohio 45066 (USA)

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Phone: 937-704-9333

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www.vsthose.com

INSTALLATION AND FUNCTION TESTS

1. Initial inspection:
 - a. Carefully unpack safety breakaway from shipping carton.
 - b. Inspect safety breakaway for any damage to threads, O-Rings, exterior, etc.
2. Lightly lubricate ALL O-Rings on mating connections with petroleum jelly or other suitable lubricant. DO NOT USE pipe dope or thread sealant.
3. Attach breakaway on mating connection and tighten by hand. NOTE THE FLOW DIRECTION ARROW (where applicable). Use the hex on the breakaway body to tighten. DO NOT USE the breakaway body to tighten the unit.
4. Tighten breakaway connection to 50 foot-pounds torque. DO NOT OVER TIGHTEN. Use the hex on the breakaway body to tighten. Use a torque wrench with an open-end attachment to fit the hose couplings and an open-end wrench to properly tighten breakaway connections. DO NOT USE channel-locks or pliers to tighten connections. Proper ft./lb. torque may not be achieved with these tools.
5. Purge air from the system by pumping one-tenth (1/10) to two-tenths (2/10) of a gallon of fuel into an approved container. Inspect each hose joint connection for liquid leaks and make proper adjustments if necessary.
6. Check the nozzle shut-off action by dispensing fuel into an approved container at least three times to assure the proper automatic operation of the interlock rod. According to U/L requirement 842, the fuel flow-rate must be greater than 3 gpm for the automatic shut-off mechanism to operate.

To test, operate the nozzle and submerge the spout tip in fuel until the fuel level covers the vent hole. The main valve of the nozzle automatically shuts off when liquid covers the vent hole at the end of the spout. The nozzle is not designed to operate on gravity flow. The hold-open latch will disengage automatically when liquid covers the vent hole in the spout. Verify that the fuel flow stops when the nozzle collection sleeve is decompressed (e.g. interlock rod is disengaged). To test that the fuel flow stops, dispense some fuel into an approved container. Slowly remove the nozzle from the container while dispensing fuel. Fuel flow should stop when the nozzle collection sleeve is fully decompressed.

7. Measure the resistance between the dispenser outlet casting and the tip of the nozzle spout. Use an electronic multimeter set on the high range of the ohmmeter function. Resistance should not indicate more than 70,000 ohms per foot of hose. Example: The measured resistance for a 12-foot hose must not exceed 840,000 ohms (840 kilohms).

MAINTENANCE

Inspect safety breakaways daily for damage, loose connections or leaks. Replace as necessary. Subject to customer abuse, safety breakaway should be replaced when damaged.

The safety breakaway is designed and constructed to give lasting service if properly handled and maintained. If for any reason it should need attention, contact your VST distributor for proper disposition.

NOTE

Due to abuse, misuse, changing gasoline formulas, variation in maintenance practices, environmental conditions and/or conditions beyond the manufacturer's control, dispensing equipment may need replacement before five (5) years. Inspections and proper maintenance procedures should be followed by the station manager to determine if replacement is required before five (5) years.

WARNING

Unauthorized rebuilding or modifying of safety breakaways voids **ALL** approvals and warranties.

VST products must be used in compliance with applicable federal, state, and local laws and regulations.

INSTALLATION MANUAL

HIRT VCS 100
VAPOR PROCESSOR AND INDICATOR PANEL

FOR EXECUTIVE ORDER VR-205

HIRT COMBUSTION ENGINEERS, INC.

3659 San Gabriel River Parkway · Pico Rivera, Ca 90660

P.O. Box 6816 · Pico Rivera, CA 90661

Tel: (562)692-1490 · Fax: (562)692-7413 · E-mail: HirtVCS@AOL.com

REV. 6: 07/2009

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1. INTRODUCTION

This Manual contains the operation, installation, interconnection, start-up, and maintenance instructions for the VCS 100 processor and Indicator Panel. Note, these instructions are written to give the best installation in a sequence easiest for the installer. If there are any instructions in this manual which seem impossible, impractical, or questionable for your installation, call the Hirt Customer Service Department at (562) 692-6970 and ask for information regarding your local Hirt representative. Note, this manual should be retained for future reference.

2. SAFETY/WARNINGS

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury, or death. Read instructions thoroughly before installing or servicing this equipment.

WARNING: When gasoline vapor abatement system (i.e. processor) is in operation, temperature inside can exceed 2,000°F. To prevent burn hazard, do not contact any part of the gasoline vapor abatement system except controls. Do not remove protective covers while gasoline vapor abatement system is in operation.

3. CONTRACTOR REQUIREMENTS

To prevent from voiding the product warranty, all contractors who install, startup, and/or repair the VCS 100 system must be a Hirt VCS 100 certified technician. To attend a VCS 100 training session, call Hirt Customer Service at (562) 692-6970 or send an email request to HirtVCS@aol.com. Once Hirt training is successfully completed, the technician will receive a wallet size proof of certification card. Technicians should carry the card while on the jobsite. Hirt maintains a list of active certified installers and companies. Technician certification can be verified by calling or emailing Hirt Combustion Engineers, Inc.

Note to Contractors/Technicians: Contractors should always verify the training and certification requirements with the local Air Quality Management District (District) before beginning installation of CARB EVR systems. The District inspector may request to see your certification card(s) on-site for confirmation.

4. HIRT VCS 100 PROCESSOR OVERVIEW

4.1 THEORY OF OPERATION

The processor continuously measures the pressure of the vapor in the storage tanks. When that pressure is negative, the processor remains de-energized and completely inactive. At any time when the pressure in the storage tank vapor becomes positive, the processor energizes its turbine, which extracts vapor from the storage tanks and sends that vapor into its thermal oxidizer where that vapor is destroyed. The processor continues to extract vapor until the pressure of the vapor is returned to negative, whereupon the processor turns itself off. It remains off unless or until the pressure again becomes positive.

4.2 PROCESSOR MECHANIZATION

The processor is connected to the storage tanks via the tank vapor vents, or another vapor pipe. The processor contains a vacuum sensor/switch, turbine, spark igniter, pilot, flame safeguard, vapor valve, and a thermal oxidizer.

When the vacuum sensor/switch measures that the pressure in the storage tank is negative, it remains open, thus not energizing the processor. In this condition the processor is inert and has zero effect on the remainder of the dispensing facility or its Stage I/II vapor recovery systems.

When the vacuum sensor/switch measures that the pressure of the vapor in the storage tanks is positive, the switch closes thereby energizing the turbine and activating the flame safeguard. The flame safeguard generates a spark at the pilot tip (i.e. spark igniter). The vapor is forced by the turbine from the storage tanks into the pilot and hence into the spark igniter. Only ignition of the pilot can cause the flame safeguard's relay to close*. Only when pilot ignition is present and the flame safeguard relay is closed does the vapor valve open admitting vapor to the thermal oxidizer. Note that if the pilot does not ignite, the main vapor valve does not open, thus unprocessed vapor from the thermal oxidizer cannot be vented to the atmosphere. In the thermal oxidizer, the vapor is converted into CO₂ and H₂O and then vented to the atmosphere.

*This electrical interlock, built into the flame safeguard, is required by the California State Fire Marshal, ETL, American Gas Association specification 1-97, and ANSI Z21.20

4.3 INDICATOR PANEL FUNCTION

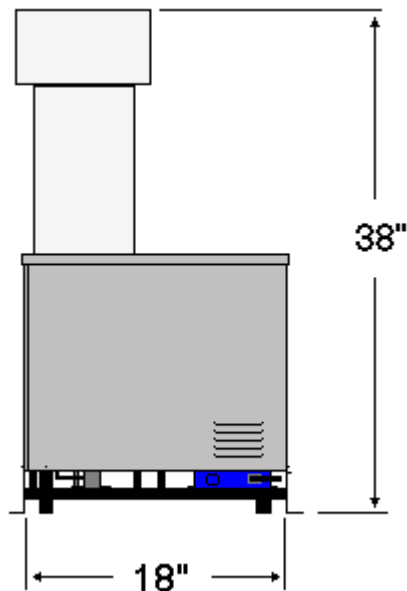
The processors' electrical power source comes thru an Indicator Panel. The panel allows the station operator to determine the current state of the

processor and whether or not the processor is operating properly. The panel includes a POWER switch with an integral POWER (green) lamp, a PROCESSING (green) lamp, and an OVERPRESSURE (red) lamp.

During normal operation, the POWER switch is on, the POWER lamp is on, the PROCESSING lamp is lit intermittently, and the OVERPRESSURE lamp is extinguished. The PROCESSING lamp is wired so it will light when the main valve is open and thermal oxidation is occurring.

The OVERPRESSURE lamp is wired to the vacuum sensor/switch and a timing module. If the UST pressure is positive for at least 1 hour, then the vacuum sensor/switch will be closed and the timing module will light the OVERPRESSURE lamp. The OVERPRESSURE lamp indicates a leak in the vapor recovery system or possibly a malfunction of the Hirt VCS 100 processor. The OVERPRESSURE lamp will extinguish after the leaks or processor malfunction is corrected and the processor has restored the UST ullage to a nominal -0.40 " w.c.

4.4 Processor Dimensions, Weight, and Specifications



MODEL: VCS 100

SERVICE: Outdoor, non hazardous area

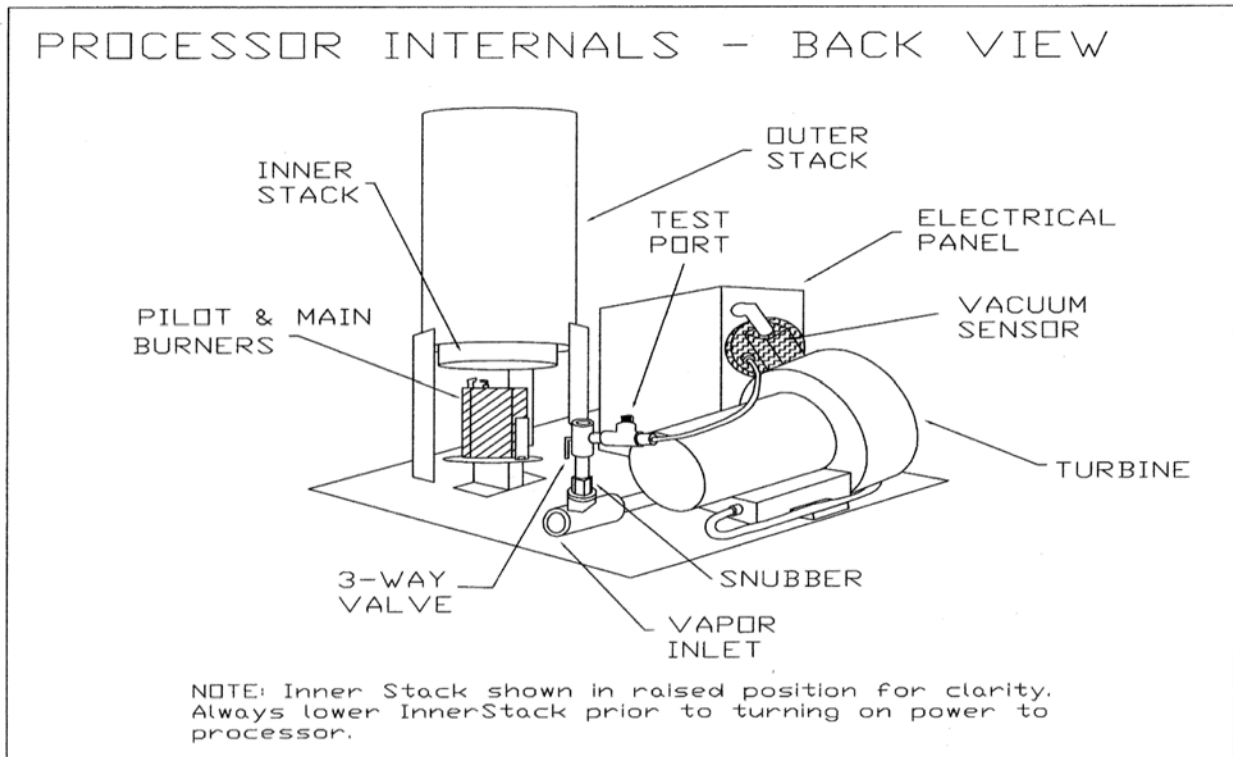
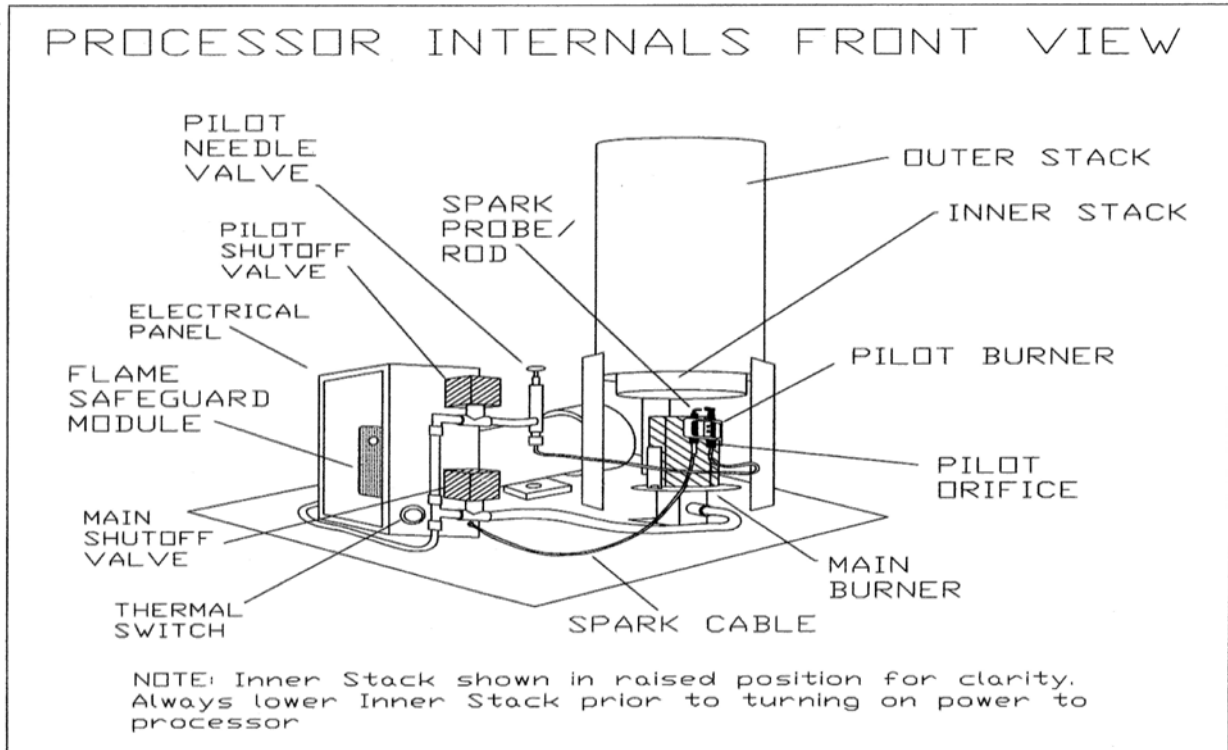
ELECTRICAL: 120 VAC, 3 Ampere, intermittent

VAPOR PIPE CONNECTION: 3/4@ NPT

WEIGHT: 80 lbs.

OVERALL DIMENSIONS: 18" wide X 18" deep x 38" high (without legs)

4.5. Processor Internal Components



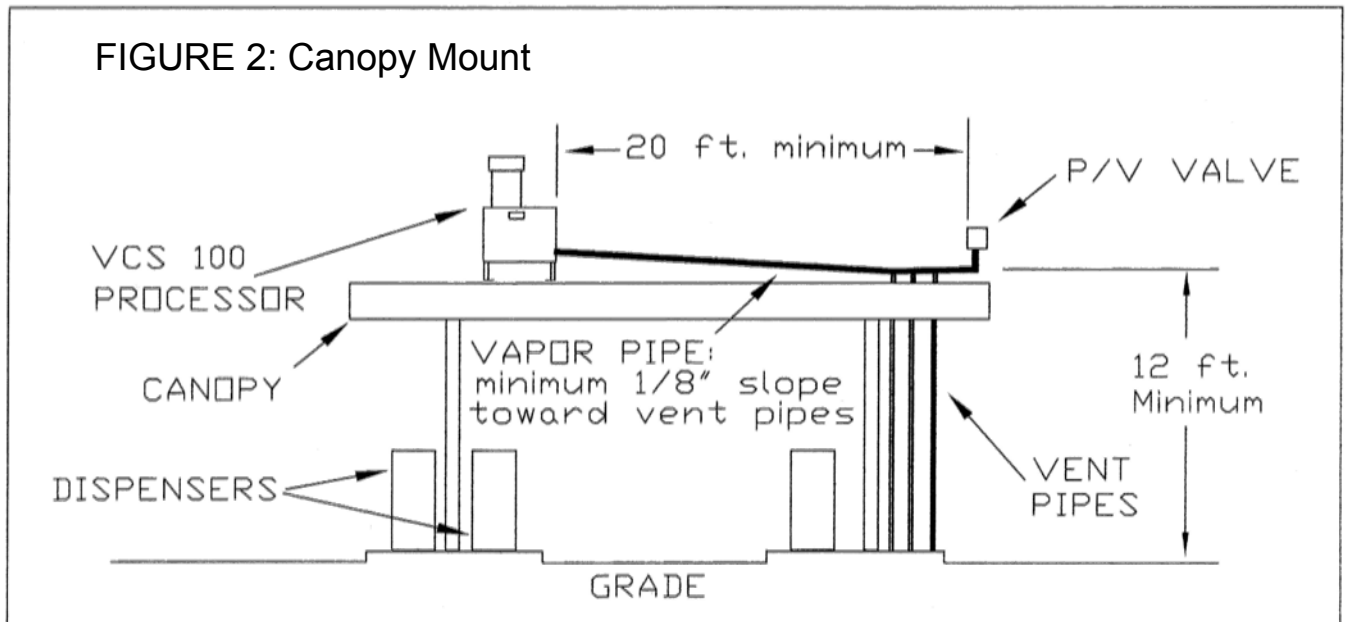
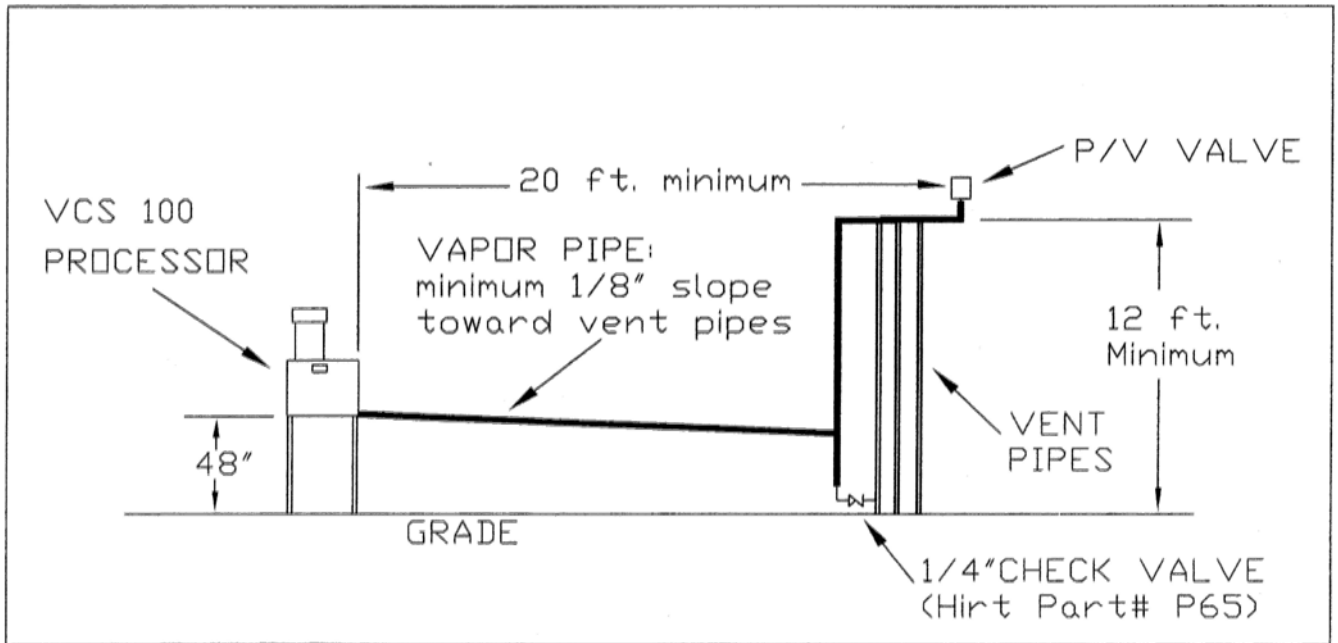
5. INSTALLATION OF PROCESSOR

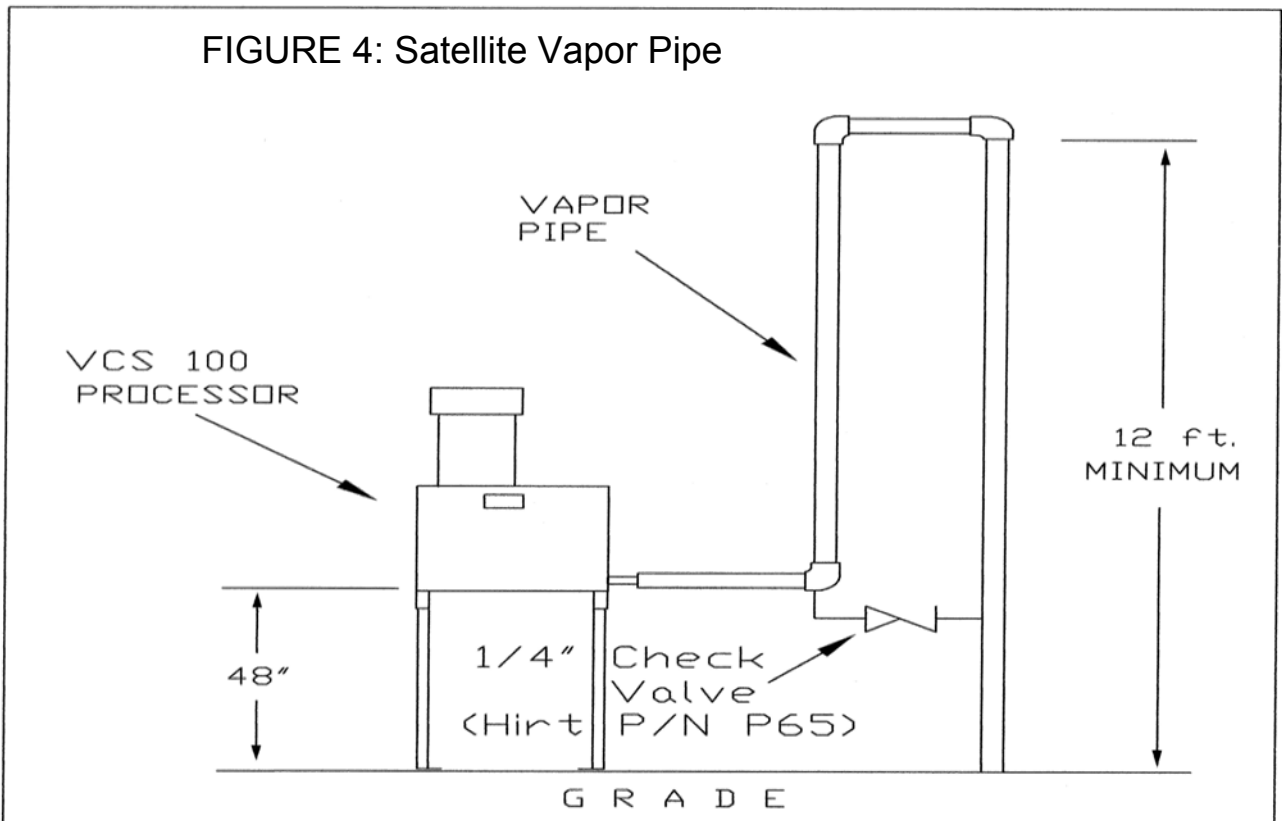
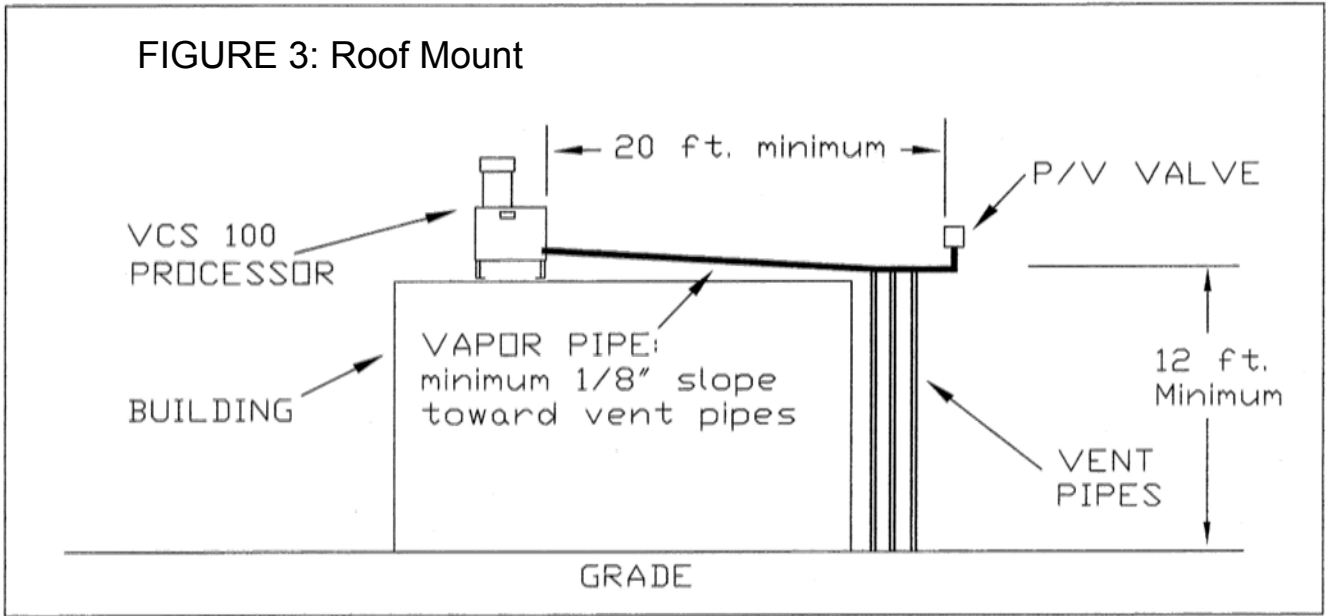
5.1 PRE-INSTALLATION SITE REQUIREMENTS

Selection of processor location should be based on the following requirements and considerations:

- 5.1.1 Non-Hazardous area.
- 5.1.2 A minimum horizontal distance of 20 ft. from any fuel transfer point (i.e. nozzles or storage tank drop tubes).
- 5.1.3 A minimum horizontal distance of 20 ft. from pressure/vacuum valve.
- 5.1.4 Processor must be located so there is a 2 ft. clearance on all sides for maintenance.
- 5.1.5 Remote from wheel traffic, foot traffic, and valuable ground level space.
- 5.1.6 Ease of pipe run to processor from underground storage tanks(s). Typically the processor connects to the storage tank vent pipes. However, the processor can be connected to any tank fitting except for the dispenser's vapor return pipe. Note, the vapor piping must slope 1/8" per foot to prevent condensate from blocking vapor path. A slope of 1/4" per foot is recommended. (See section 7.2.2 and FIGURE 8)
- 5.1.7 Ease of conduit run to Indicator Panel.
- 5.1.8 Do not locate processor on property easement. Consult local authority, such as City Hall, to determine width of set back from property line.

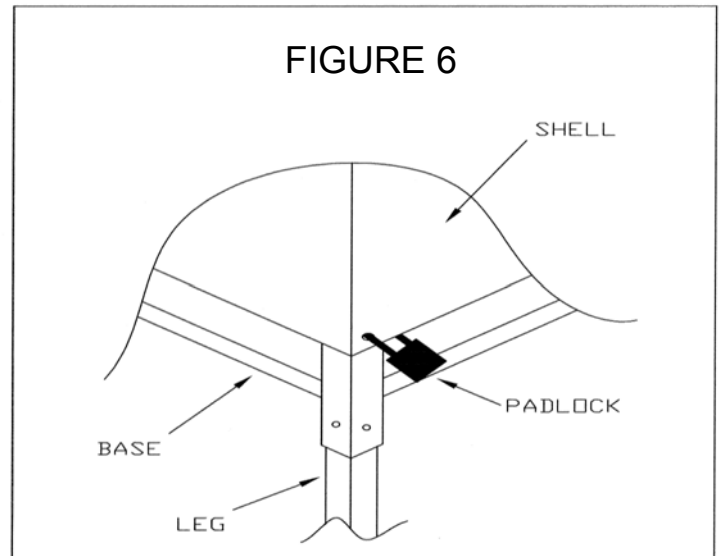
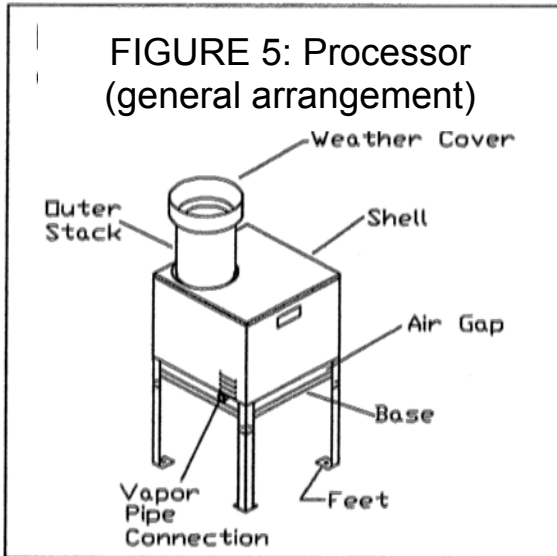
The preferred location for the processor is on the roof of the building to which the vent pipes attach. Many other locations are also practical such as ground mount, canopy mount, roof mount on a remote building, and satellite mount as noted in Figures 1 through 4.





5.2 ASSEMBLY OF LEGS TO PROCESSOR

Please refer to FIGURE 5, the processor general arrangement drawing, for the following instructions.

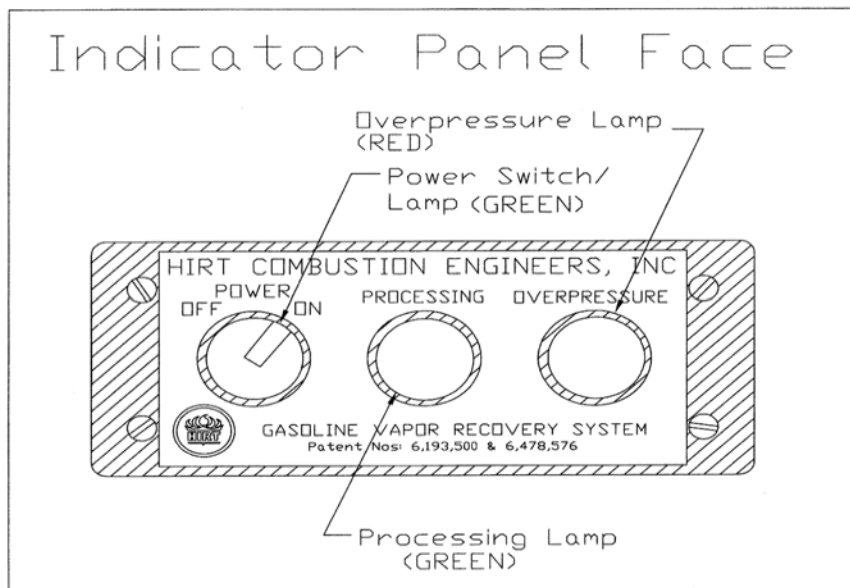


Ground level mount requires the use of the 48" Legs, and canopy or roof mount will require the 5" or longer Legs. If Legs not already purchased, see your local Hirt distributor.

- 5.2.1 Bolt appropriate Legs to Base of processor. Be sure to use the bolts, lock washers, and nuts provided with the Legs. Note that Legs attach behind corner angle brackets of Base, See FIGURE 6 for details.
- 5.2.2 Bolt feet to concrete, deck plate, and/or solid non-flammable structure. Note, concrete mount will require the use of (4) 1/4" DIA. X 3" RED HEAD wedge anchors (i.e. 2.5" embedment).

WARNING: Do not block 1.5" air gap between processor Shell and Base. This gap allows combustion air to reach thermal oxidizer. Also, keep the processor area free and clear from combustibles, keep a minimum clearance of 2 ft. all the way around processor.

6. INSTALLATION OF INDICATOR PANEL



Install the Indicator Panel at a location chosen for the following considerations:

- 6.1 Indoors
- 6.2 Access by attendant.
- 6.3 In view of attendant.
- 6.4 Ease of conduit run to station's main electrical panel.
- 6.5 Ease of conduit run to processor location.

7. CONNECTION OF ELECTRICAL AND VAPOR PIPE

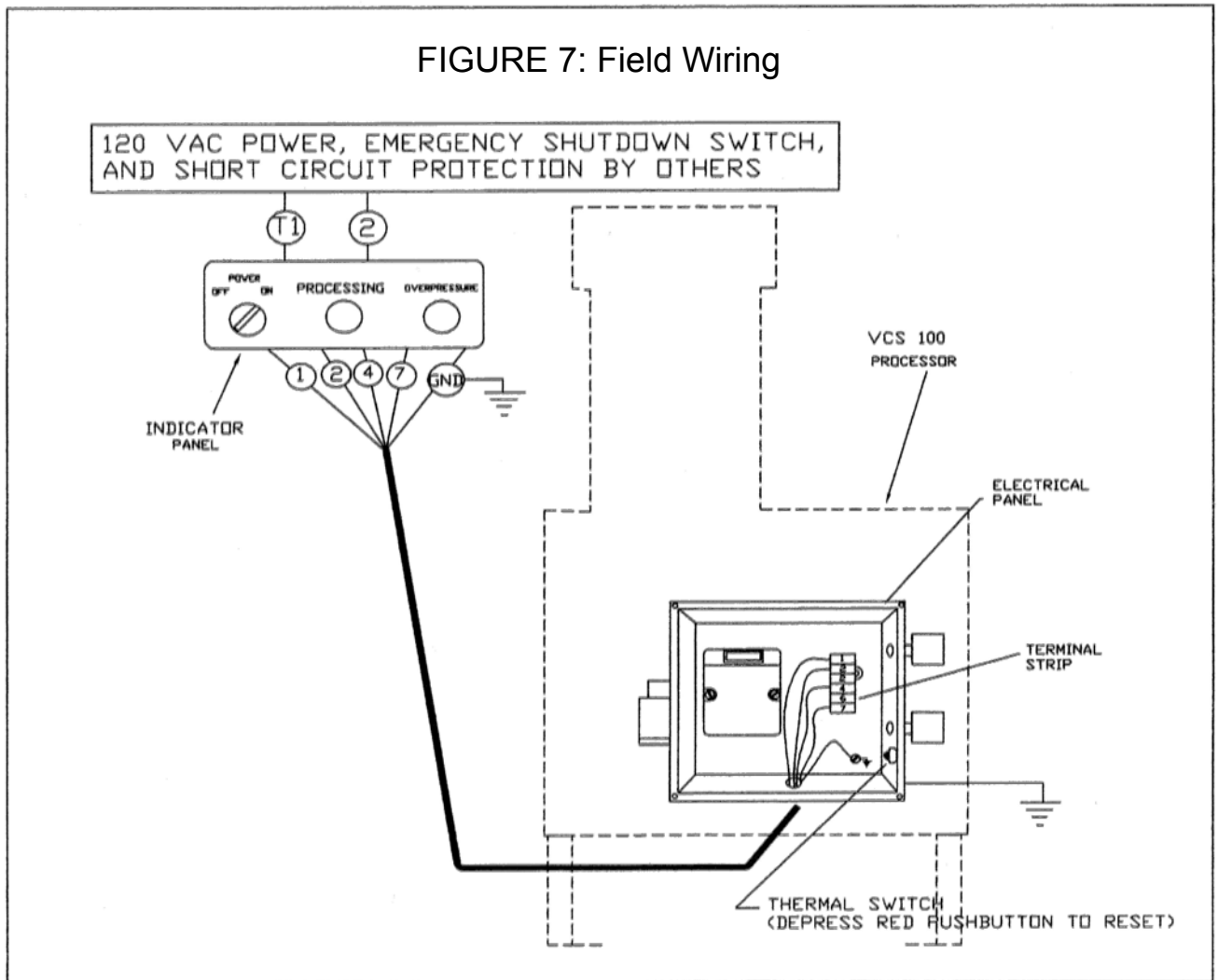
Remove Processor's Weather Cover, Shell, and electrical panel lid prior to performing the following steps.

7.1 ELECTRICAL POWER SUPPLY

- 7.1.1 Note that the power to the Indicator Panel and processor comes through the station master switch and the emergency pump shutdown switch. See FIGURE 7.
- 7.1.2 Wire size should be per local electrical code for an eight (8) ampere, 120 VAC load. Be sure to include circuit protection per local code. Also, system must be electrically grounded in accordance with local

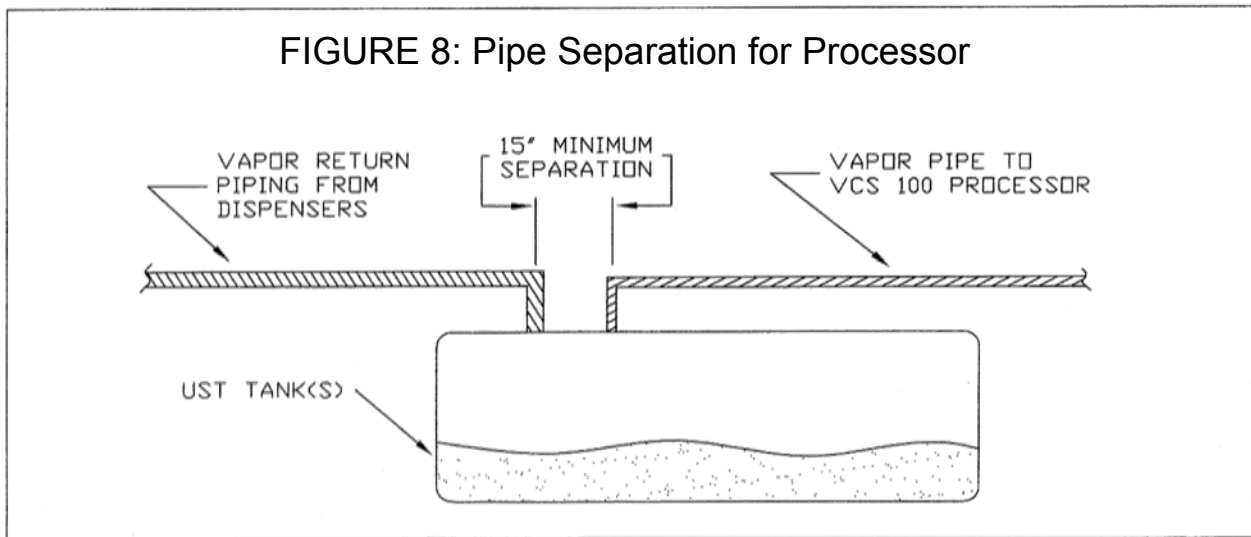
codes, or in the absence of local codes, with the current edition of the National Electrical Code, ANSI/NFPA70.

- 7.1.3 Conduit access to the processor is through the bottom of the processor's electrical panel. Be sure to use a sealed cable fitting approved for use in Class I, Groups C and D, Division 2 areas where the conduit enters the panel.



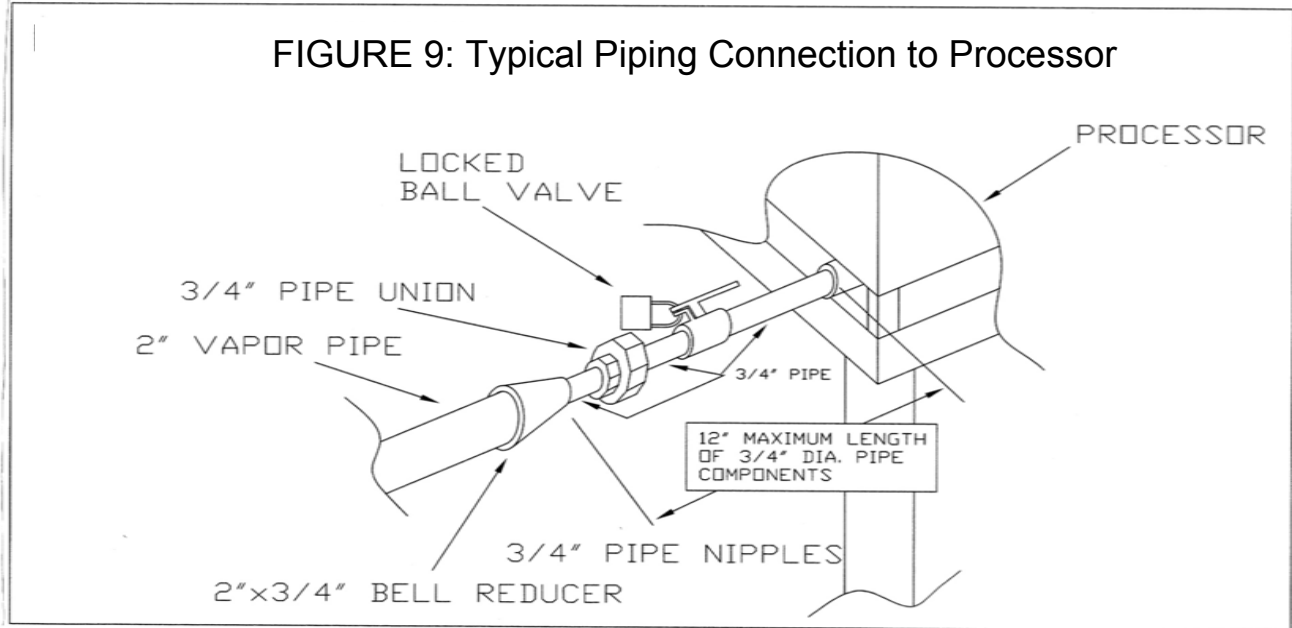
7.2 GASOLINE VAPOR SUPPLY

- 7.2.1 A vapor pipe is needed to connect the processor to the ullage of all the gasoline storage tanks. Use 2" NPT galvanized pipe for runs up to 300 ft. Usually the vapor pipe connects to the vent pipes, however, any connection to the ullage of the storage tanks, other than direct connection to the dispenser's vapor return pipe, is acceptable. See FIGURE 8.



- 7.2.2 Vapor pipe must rise continuously from storage tank ullage connection to processor connection, and it needs to be supported to prevent trapping liquid in droops or sags in the pipe. Pipe slope must be at least 1/8" per foot, but a slope of 1/4" per foot is recommended. Also be sure to put a pipe support close to the processor to prevent placing undue stress on the Turbine.
- 7.2.3 Vapor pipe configuration must prevent liquid gasoline from reaching processor. Acceptable solutions include locating the processor 12 ft. above grade, connecting the vapor pipe to the top of the vent pipes, and installing a 12 ft. high loop. See FIGURES 1, 2, 3, and 4.
- 7.2.4 Vapor pipe connection at the processor is with (3) 3/4" NPT nipples, (1) 3/4" NPT lockable ball valve, (1) 3/4" NPT union, and (1) 3/4" NPT to 2" NPT bell reducer. Note: The ball valve is installed in the vapor pipe at the processor for maintenance and repair. The ball valve is to be left in the locked open position (Opened to UST Ullage) during normal operation. Failure to leave valve in an open position may result in a processor malfunction. Note, use no more than a 12" length of 3/4" piping components. See FIGURE 9 for details.

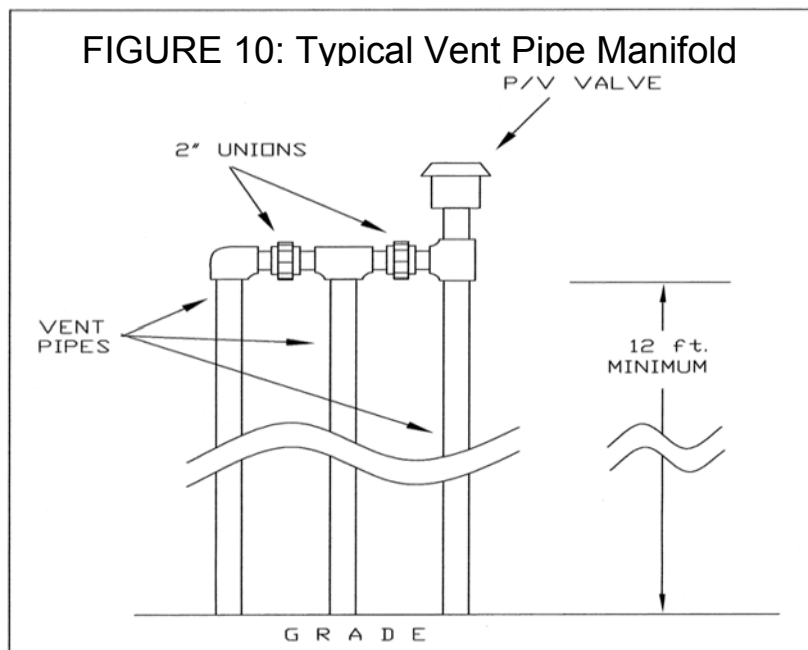
FIGURE 9: Typical Piping Connection to Processor



CAUTION: Hold processor internal pipe train with backing wrench to prevent twisting pipe train while connecting vapor piping.

7.2.5 If the ullage of the tanks is not already interconnected underground, then manifold the vent pipes together with 2" galvanized pipe at a minimum of 12 ft. above grade. See FIGURE 10 below. Note that at least (1) P/V Valve must remain connected to the manifold.

FIGURE 10: Typical Vent Pipe Manifold



8. START-UP

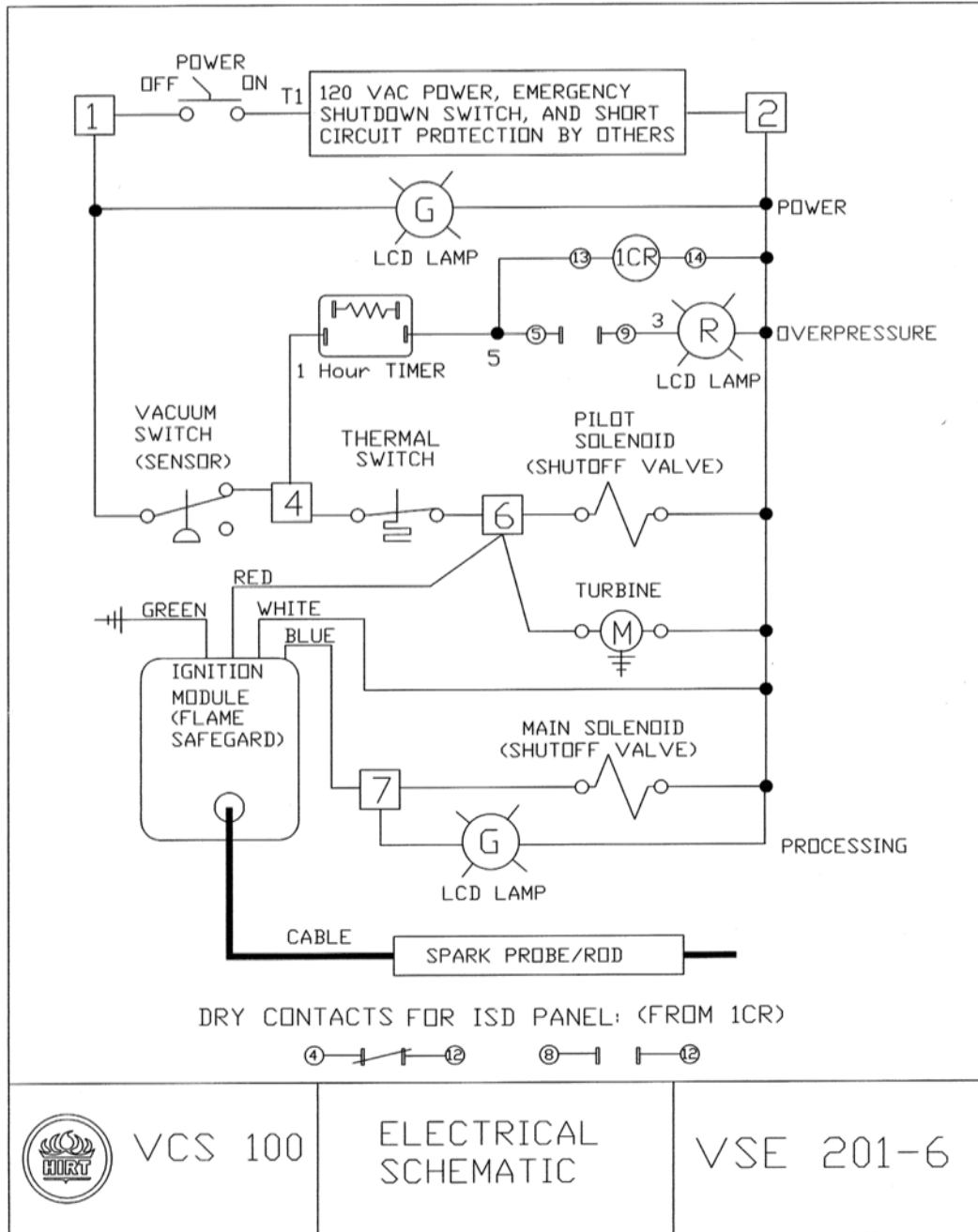
If all instructions thus far have been followed, the system should start itself and run automatically. Proceed with the following steps:

- 8.1 Check to see that nozzles are on their hangers and vapor hoses are connected. Check also to see that gasoline storage tank fittings (fill caps, dry breaks, drop tubes, drain valves, etc.) are seated and sealing.
- 8.2 At the Indicator Panel, turn the POWER switch ON. The green lamp on the switch should light, and the processor should have electrical power now. The green PROCESSING lamp will be lit intermittently (only when the processor is energized), and the red OVERPRESSURE lamp should remain extinguished.

WARNING: The processor (pilot and main burner) is automatic. It will cycle its thermal oxidizer ON if vacuum diminishes in the vapor spaces and OFF if there is sufficient vacuum. Therefore use caution when working close to the thermal oxidizer. It may come ON without notice. A mirror is recommended for looking down the stack.

- 8.3 Check the pressure in storage tanks.
 - 8.3.1 If UST ullage pressure is negative (vacuum), then proceed with step 8.6.
 - 8.3.2 If the storage tank pressure is positive, check to see that turbine is running and either there is a flame at pilot burner tip or a spark. If not, reset thermal switch inside processor's electrical panel, by depressing (red) pushbutton, see FIGURE 7, Field Wiring Drawing. Turbine and spark should come on. If so, proceed with step 8.4. If turbine is not running or sparking is not present, refer to Hirt VCS 100 Troubleshooting Manual.
- 8.4 Within 1 hour, the processor pilot and main burner stages should ignite. Once a vacuum of approximately -0.40" w.c. is generated, the processor should shutoff. This indicates that the processor is completely functional and controlling itself automatically. If so, go to step 8.8. If the stages don't ignite within 1 hour or if your work schedule is such that waiting 1 hour is inconvenient then continue with the following step 8.5.

8.5 The turbine in the processor should be running and the igniter/sensor probe sparking but the pilot will not be ignited. Failure of the pilot to ignite is probably because the station's vapor piping is full of air. To purge this air and replace it with vapor, use 2 short pieces of wire and jump the circuit from terminal [1] to [6] and [6] to [7] at the terminal strip inside the electrical panel inside the processor.



Note on the ELECTRICAL SCHEMATIC that a [1] to [6] jumper energizes the turbine, ignition module, and pilot solenoid. A [6] to [7] jumper energizes the main solenoid.

As soon as the air is purged from the vapor piping, approximately 15 minutes, the pilot and main stages will both ignite. As soon as pilot and main ignite, the 2 jumpers must be removed. If so, go to step 8.8.

If the stages do not ignite after 15 minutes, go to step 8.7.

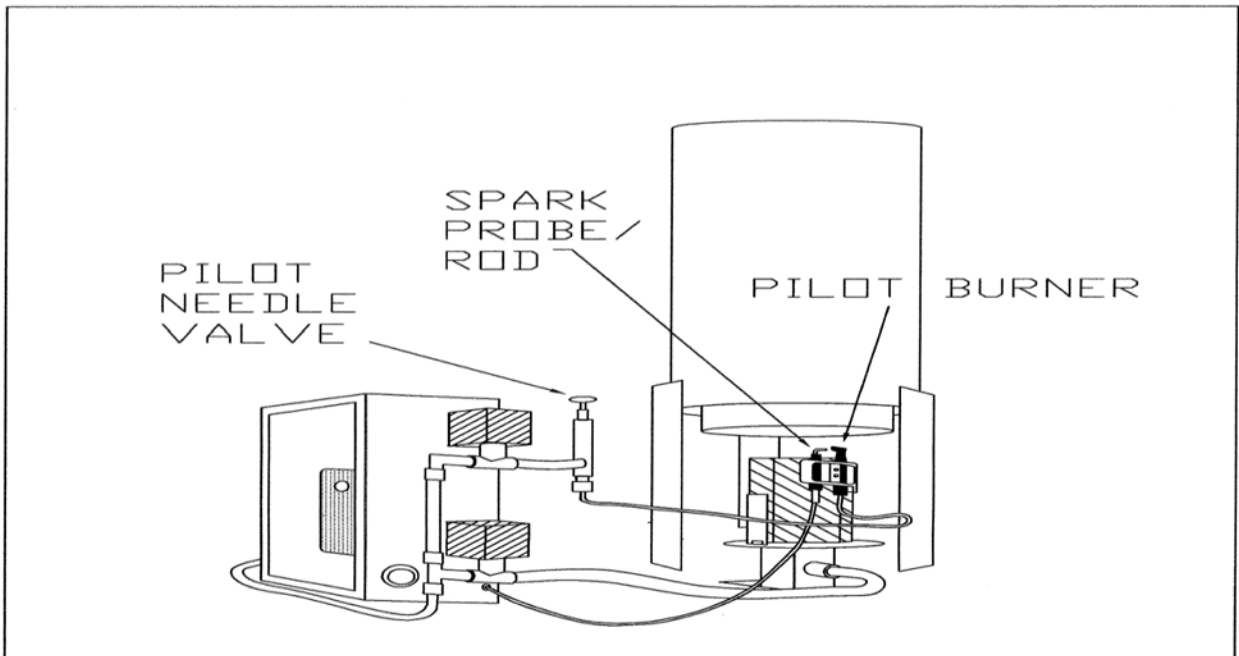
8.6 The processor will not turn on if the vacuum sensor/switch is satisfied. Therefore, any air in the vapor piping will need to be purged so the processor stages can ignite when storage tank vacuum decays. To purge this air and replace it with vapor, use 2 short pieces of wire and jump the circuit from Terminal [1] to [6] and [6] to [7] at the terminal strip inside the electrical panel inside the processor. Note on the ELECTRICAL SCHEMATIC that a [1] to [6] jumper energizes the turbine, igniter, and pilot solenoid. A [6] to [7] jumper energizes the main solenoid. As soon as the air is purged from the vapor piping, approximately 15 minutes, the pilot and main stages will both ignite. As soon as pilot and main ignite, the 2 jumpers must be removed. If so, go to step 8.8. If the stages do not ignite after 15 minutes, go to step 8.7.

8.7 If the pilot and main do not ignite after the jumpers have been connected for 15 minutes, it is probably because there is an air leak in the vapor piping and air is entering as fast as it is being purged.

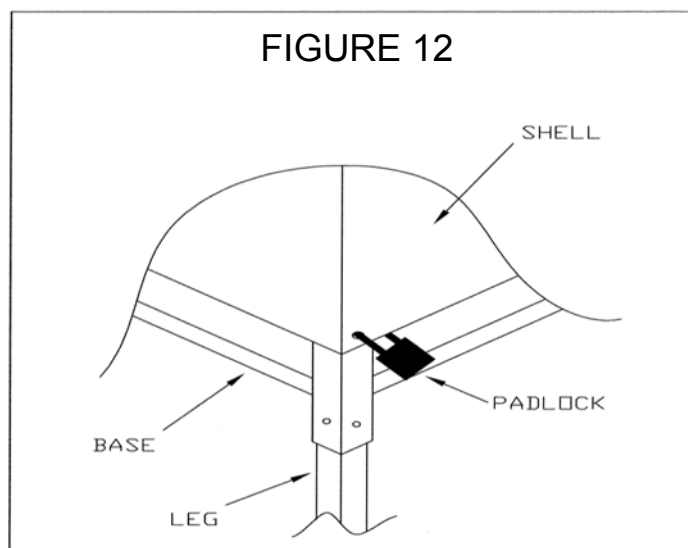
First remove the jumper wires. To find leak(s), conduct ARB test procedure TP-201.3 and Exhibit 4 (Items to consider when conducting TP-201.3). Check the pipe fittings, vent riser manifold, PV valve, storage tank fill tube caps, dry break gaskets and cover cap gaskets, hoses, nozzles, and vapor valves – any place where air could be entering the UST ullage space. Correct leaks and then go back to step 8.3.

8.8 Check setting of Pilot Needle Valve adjustment. The valve is used to adjust the length of the (2) tongues of flame at the pilot burner. The ideal pilot flames are approximately 1” long, blue in color, with yellow tips. One flame tongue licks the Spark Probe/Rod. The factory setting for the Pilot Needle Valve is 2 1/4 turns open. A small adjustment may be necessary to achieve the ideal flame length. If required, adjust the black knob on the Needle

Valve more open or closed until ideal flame setting is achieved. See FIGURE 11.



- 8.9 Installation and start-up are now complete. Turn off power to processor. Replace lid on electrical panel, Shell, and Weather Cover. If desired, the station owner can add padlocks to prevent tampering, see FIGURE 12 below. Ensure the 3/4" ball valve at the processor inlet is in the locked open position (Opened to UST Ullage). Turn on power to processor. The processor is now in normal, automatic mode.



9. MAINTENANCE INSTRUCTIONS

The Hirt VCS 100 vapor processor must be inspected and tested annually. The technician must complete the Hirt VCS 100 Annual Inspection Checklist (reference section 7 of VR-205 IOM) and leave with the site's maintenance records.

10. REPAIR AND REPLACEMENT OF COMPONENTS

Any Hirt VCS 100 system components which have failed cannot be repaired. Failed components must be replaced. In order to maintain the product warranty, use only genuine Hirt replacement parts. Each component comes with its own written instructions covering replacement and testing to insure proper installation and operation.

11. PRODUCT WARRANTY

- HCE warrants the workmanship and materials to be free from defects and will comply with the performance standards of California ARB CP-201 for a period of one (1) year from the date of installation or from date of shipment from HCE, if registration card is not returned.
- Liability under any implied or expressed warranty is limited to replacement of the product.
- HCE is not responsible for improperly installed or misuse of the product.
- HCE cannot be held responsible for damage to the product or its equipment due to acts of nature, vandalism, or neglect.
- HCE products are warranted to be free of defects in material and workmanship.
- In the event of a warranty claim, the purchaser must obtain a Return Authorization Number prior to returning product. All shipping costs are the responsibility of the customer.
- HCE shall repair or replace, at its option, any HCE component which proves to be defective.
- The cost of labor for any field repair, removal, replacement, or diagnosis is not covered by this warranty.
- The liability of HCE is limited solely and specifically to this warranty.

- HCE shall not be liable for any special, collateral, or consequential damages arising from this warranty, the use of this equipment or from any order accepted pursuant thereto.
- The use of parts not authorized by HCE voids the warranty.
- Installation, start-up, service, or repairs of this product by personnel not certified by HCE voids the above described warranty.