



Chapter 11: GM Operator Training Guide

11 About VST



Vapor Systems Technologies, Inc. began in 1990 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 the world's air quality.

VST's product offering includes curb pump and vapor recovery hoses, safety breakaways, nozzles, and emission-control system - GREEN MACHINE. 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.

11.1 GREEN MACHINE Theory of Operations

- The VST GREEN MACHINE operates based on monitoring the Underground Storage Tank (UST) system pressure.
- The GREEN MACHINE controller provides UST pressure data via a Pressure Sensor, located in the GREEN MACHINE, and manages the GREEN MACHINE operation.
- The pressure data is provided to the VST Control Panel for system monitoring functions.
- The closed loop vapor piping solution continuously operates the system to control UST pressure below 0.2 IWC.
- **See Figure 11-1** for an overview layout of where a GREEN MACHINE is located and operates in a gasoline station.

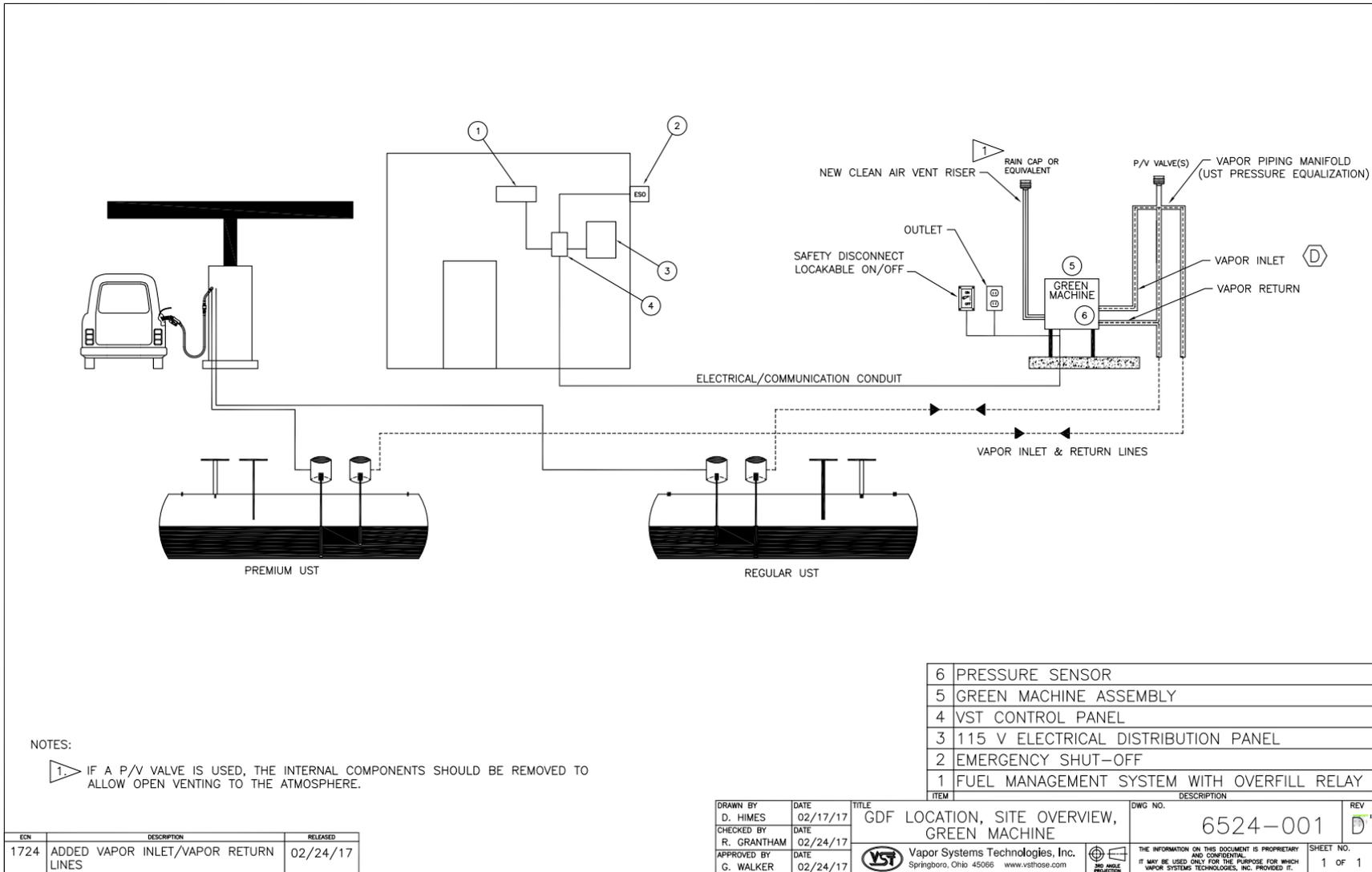


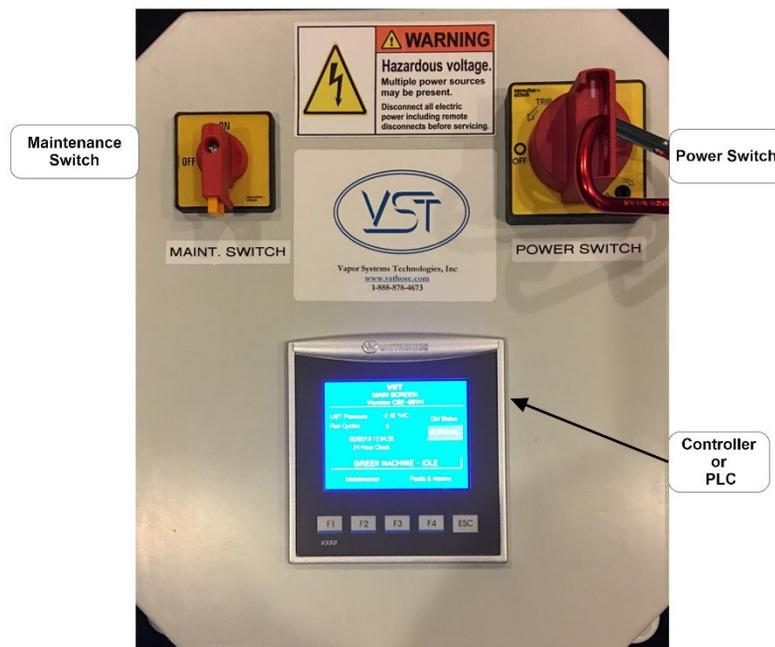
Figure 11-1: GREEN MACHINE Gasoline Station Overview



11.2 VST Control Panel

11.2.1 VST Control Panel Overview

- The VST Control Panel is designed to manage the operations of the GREEN MACHINE based on UST vapor pressure. **Figure 11-2** shows the front of the Control Panel with the following items:
 - GREEN MACHINE Controller.
 - Controls the GREEN MACHINE based on UST vapor pressure.
- Power Switch:
 - Provides a means to disconnect ALL power from the Control Panel and ALL power to the GREEN MACHINE.
 - Can be locked in the OPEN or CLOSED position. (Use lockout/tagout procedures.)
- Maintenance Switch:
 - Turning OFF the Maintenance Switch will remove ALL power from the GREEN MACHINE.
 - Turning OFF the Maintenance Switch will keep power ON to the GREEN MACHINE Controller for Testing and/or Maintenance.



NA GM CS2 Control Panel, 04-24-2018

Figure 11-2: VST Control Panel



11.2.2 Main Screen

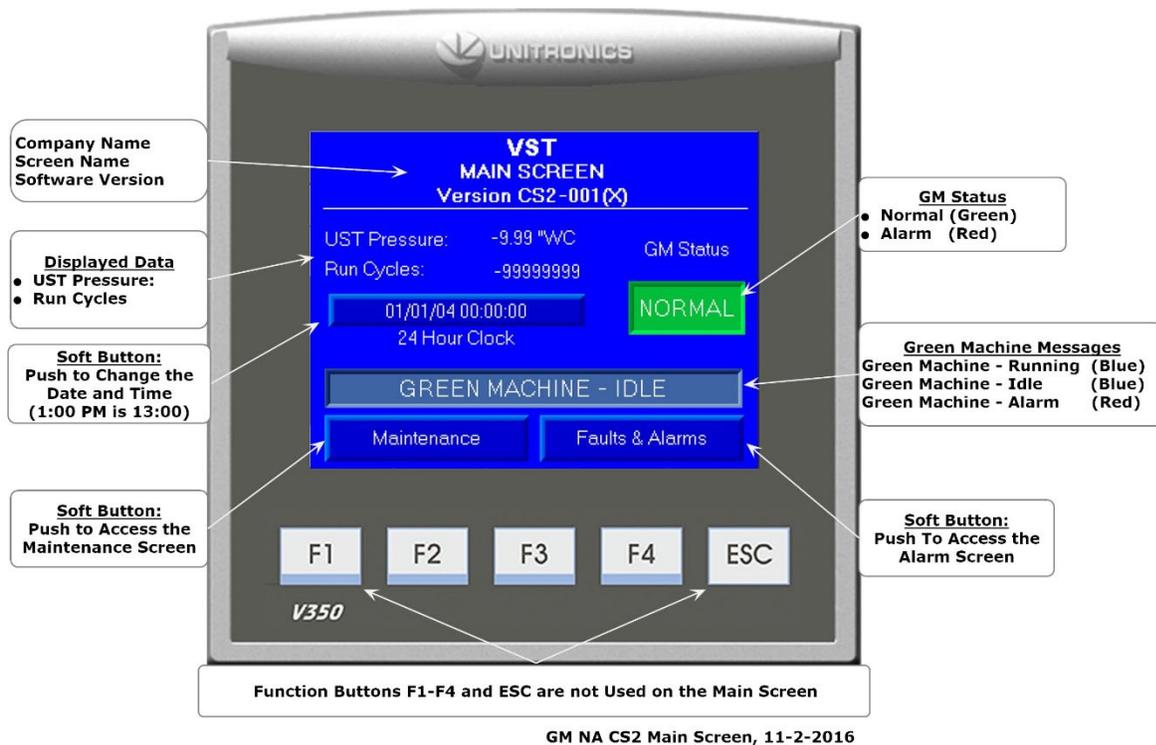


Figure 11-3: Main Screen

- The Control Panel PLC will always power up in the Main Screen. **See Figure 11-3.**
- The GREEN MACHINE will always be in the Normal Operating mode when the Main Screen is showing on the PLC, unless there is an Alarm Condition.
- **GM Status:**
 - Normal (Green Box) indicates the GREEN MACHINE is operating normally (no active Alarms).
 - Alarm (Red Box) indicates an Alarm is active.
 - When an Alarm is active, see the Operator Instruction Sheet for directions.
- **Date and Time:**
 - Push the Date and Time soft button to change the Date and Time.
- **Maintenance Screen and an Alarm Screen:**
 - Push the Maintenance Screen soft button to access the Maintenance Screen.
 - A password 878 is required to access the Maintenance.
 - Push the Alarm Screen soft button to access the Alarm Screen.



GREEN MACHINE Messages, continued...

- **GREEN MACHINE Messages:**
 - GREEN MACHINE – Running
Due to the UST pressure being greater than 0.2 IWC
(Blue Text Box)
 - GREEN MACHINE – Idle
Due to the UST pressure being less than 0.2 IWC
(Green Text Box)
 - GREEN MACHINE – Alarm
Go to the Alarm Screen to identify the Alarm: An Alarm has activated.
(Red Text Box)
See the Operator Instruction Sheet for directions.
- **Displayed Data:**
 - UST Pressure (IWC):
Displays the UST pressure in real-time.
 - Run Cycles:
Displays the number of GREEN MACHINE completed cycles.
 - Date and Time Date (MM/DD/YY) and 24-Hour Clock (HH:MM:SS)

11.2.3 Maintenance Screen

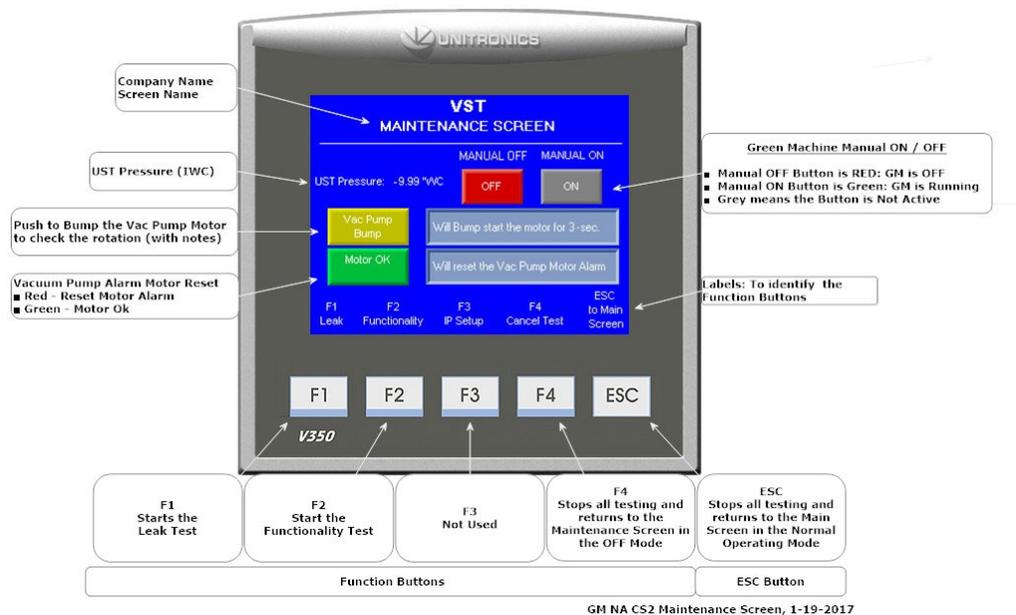


Figure 11-4: Maintenance Screen



Maintenance Screen, continued...

- When the Maintenance Screen is shown, the GREEN MACHINE will always be in the OFF mode (unless the Manual ON button is pushed). **See Figure 11-4.**
- The UST Pressure is displayed as Inches of Water (IWC).
- The GREEN MACHINE can be placed in the Manual ON or Manual OFF mode only in the Maintenance Screen.
 - This feature is used when conducting maintenance on the GREEN MACHINE.
- Vac Pump Bump is used to check the Vacuum Pump motor rotation during start-up or after performing maintenance on the Vacuum Pump motor.
- The Reset Motor Alarm is used when the Vacuum Pump is in Alarm.
- Function Button labels are shown at the bottom of the screen.
- The F1, F2, F3, F4 Function buttons and the ESC button are accessible.
 - F1 Start a Leak Test
 - F2 Start a Functionality Test
 - F3 Not Used
 - F4 Stops all testing and returns to the Maintenance Screen in the OFF Mode.
- Pushing the ESC button stops all testing and returns to the Main Screen to the Normal Operating Mode.



11.2.4 Alarm Screen

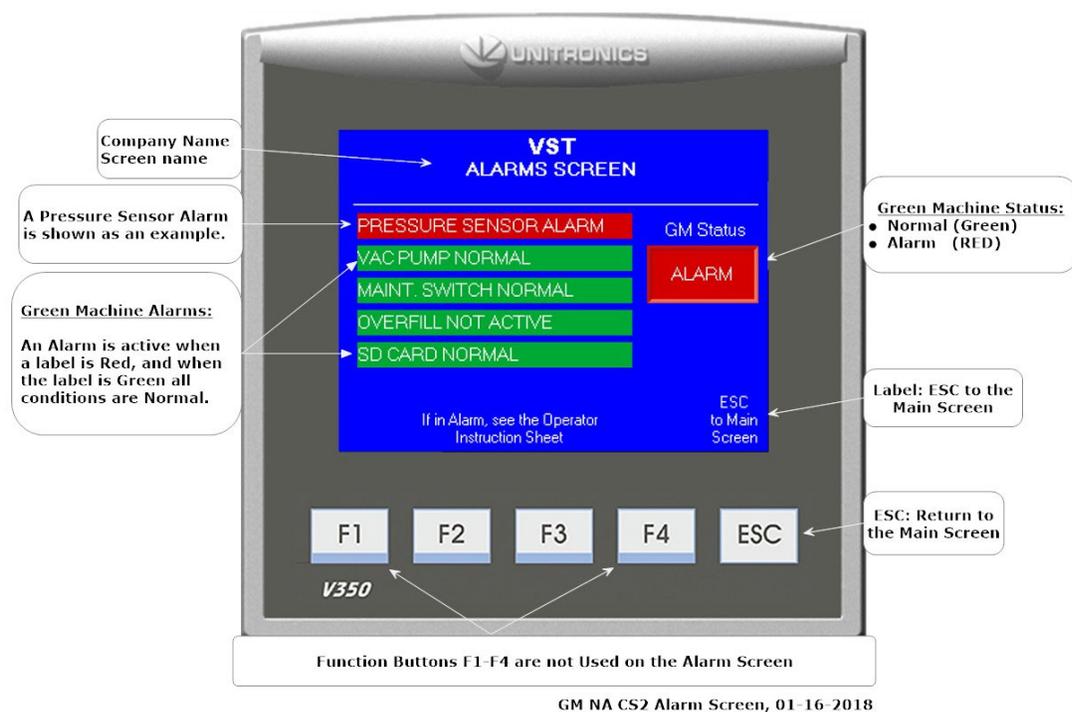


Figure 11-5: Pressure Sensor Alarm shown on the Faults & Alarms Screen

11.3 Alarms Overview

- The Alarms Screen shows the following alarms: **See Figure 11-5.**

11.3.1 GM Status

- Normal (Green Box) indicates the GREEN MACHINE is operating normally (no active Alarms)
- Alarm (Red Box) indicates an Alarm is active. When an Alarm is active, See the Operator Instruction Sheet for directions.

11.3.2 Pressure Sensor Alarm

- The fault will occur if the Pressure Sensor is not connected to the VST Control Panel or is wired incorrectly at the VST Control Panel or the Pressure Sensor fails.
- The GREEN MACHINE will not to operate during this alarm.



11.3.3 Vacuum Pump Alarm

- The VST controller will indicate an alarm for the following items:
 - The Vacuum Pump breaker has tripped
 - Main voltage is too low
 - Output short circuit
 - Motor overload
 - Motor temperature is too high
 - The Vacuum Pump is not working properly
 - The GREEN MACHINE will not to operate during this alarm

11.3.4 Maintenance Switch Alarm

- When the Maintenance Switch is engaged the GREEN MACHINE will not operate and a Maintenance Switch Alarm will show as active.
- To remove the Maintenance Switch Alarm, turn the Maintenance Switch ON to disengage the Maintenance Switch.
- The GREEN MACHINE will not to operate during this alarm.

11.3.5 Overfill Alarm

- An overfill condition exists when, during a fuel drop, the gasoline level in the UST exceeds the Overfill Alarm setting, which is 90% capacity of the UST.
 - The VST Control Panel is connected to the Tank Overfill Alarm output relay.
 - When an overfill occurs, the output (N.O.) relay closes and GREEN MACHINE will turn OFF.
 - The Overfill Alarm box will display RED indicating an Overfill Alarm is active.
 - When the gasoline level drops below the Overfill Alarm level, the output relay opens and the alarm clears, the GREEN MACHINE will remain OFF for 2 additional hours.
 - After the 2-hours elapse:
 - The Overfill Alarm box will clear.
 - The GREEN MACHINE will turn ON if the UST pressure is above 0.2 IWC.
 - The GREEN MACHINE will remain OFF if the UST pressure is below 0.2 IWC.

Overfill Alarm, continued...



- 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 GREEN MACHINE.
- Below are the precautionary measures taken to protect the GREEN MACHINE against an overfill situation:
 - The VST Control Panel will disable the GREEN MACHINE when the UST level reaches the OVERFILL Alarm setting (OVERFILL LIMIT: 90%) when the relay contacts close at the Fuel Management System.
 - Eventually, as fuel is dispensed, the product would drop below the OVERFILL Alarm threshold thereby resetting the relay and re-enabling the GREEN MACHINE.
 - The Fuel Management System OVERFILL Alarm will not guarantee that the GREEN MACHINE is protected from gasoline entering into it.
 - The GREEN MACHINE will not operate during this alarm.

11.3.6 SD Card Alarm

- The GREEN MACHINE will operate when there is a SD Card Alarm.
- The SD Card Alarm will activate when the following items occur:
 - An SD Card is not installed in the PLC.
 - The SD Card write protection is ON.
 - When the SD Card is not inserted in to the slot properly.
 - The card cannot record the data while there is an SD Card Alarm.
- After the Card is installed, the fault will clear and Alarm will show Green.
- The GREEN MACHINE will operate during this alarm.



Scan for Video

11.3.6.1 How to Insert and Remove the SD Card into Unitronics PLC Slot

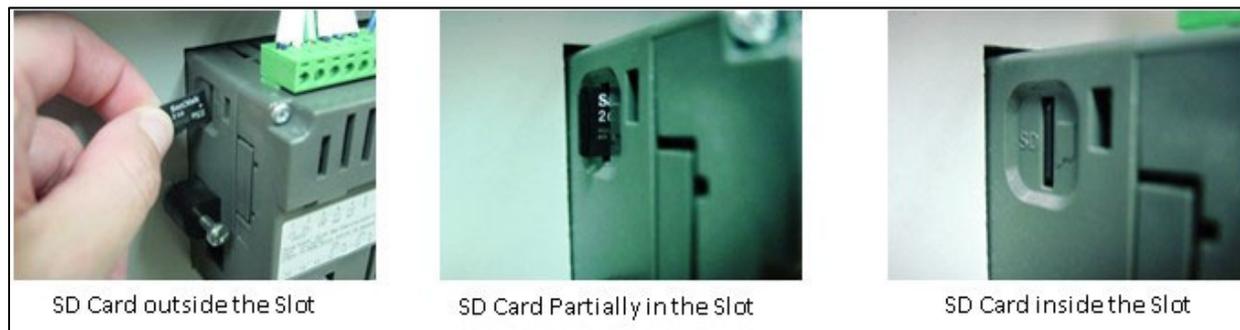


Figure 11-6: Inserting and Removing the SD Card from the PLC

- **See Figure 11-6** shows how the SD Card is inserted into the PLC. Please note the orientation of the SD Card.
- To install, place the SD Card into the PLC slot, note the orientation of the SD Card.
 - **CAUTION:** Once the SD Card is partially inserted in the PLC slot, use your finger nail, not a hard tool, to fully insert the SD Card into PLC slot.
- To remove the SD Card from the PLC slot:
 - The SD Card can be removed from the PLC by using your finger nail and pressing the SD Card in, releasing it and then pulling the SD Card out of the slot in the PLC.



11.4 Station UST Environmental Compliance Testing and Services

- When a UST Environmental Compliance Testing and Service company conducts their testing, it is usually for compliance or company regulations. The testing usually has to do with underground storage tanks, piping, dispensers, or a combination of the three. There are several test that may be conducted (if applicable).
- Any time a test is being conducted, the GREEN MACHINE MUST BE TURNED OFF to ensure the GREEN MACHINE does not operate.
- Before Testing Begins:
 1. At the front of the VST Control Panel, remove the carabiner clip and turn OFF the Power Switch. Reinstall the carabiner clip after power is turned OFF by pushing in the “handle slide” then installing the clip. This will turn OFF all power to the VST Control Panel and to the GREEN MACHINE. The PLC will not show any screens and will be blank
 2. There is no need to close the isolation valves at the GREEN MACHINE since powering off the VST Control Panel will close the control valves inside the GREEN MACHINE. This will isolate the GREEN MACHINE from the UST, the vent risers, and all external vapor piping.
- After Testing is Complete:
 1. Remove the carabiner clip and turn the Power Switch to ON. Next install the carabiner clip by pushing the “handle slide” in, then installing the clip.
 2. The PLC will boot up in the Main Screen and will be in a Normal Operating Mode.

11.5 Locks and Keys

- VST has provided keys with the GREEN MACHINE, specifically for the following:
 - 3-Locks - Locking Ball Valves on the Vapor Inlet, Vapor Return and on the Air Outlet
 - 2-Locks – For the Cover
 - 1-Lock – For the Power Switch at the GREEN MACHINE.
- All the locks are keyed the same.
 1. When the GREEN MACHINE is operational, the ball valves must remain locked in the open position to prevent damaging the GREEN MACHINE.