

# Honeywell Vista Panel Polling Loop Troubleshooting Guide

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## General Notes

1. Do not connect/disconnect devices when the panel is live, may cause alarms and trouble condition, use caution when doing so during troubleshooting process.
2. Mixing old dipswitch only devices and new Serial devices should be avoided, because it can cause problems, especially on the 100+ zone panels. (See Note 3 Below)
  - a. It can cause very slow zone response, and possibly slow the polling loop to where a random zone trouble occurs.
  - b. 4101sn relay response may be inconsistent.
  - c. All Serial/Dip devices must be Serial for best results in this case.
3. Twisted or Shielded Wire with one end of the shield to ground is a **must** for polling loop runs. See the Wire Limitations on [Page 7](#).
4. Serial number mode is A MUST if the panel and RPM are both able to do this mode (except 4208U and 4209U).
  - a. See direct wire numbers 134 and 135 “Mixing Serial and Dipswitch V/Plex Devices”
5. The key to any troubleshooting process is isolation. Isolate individual devices until you have a basic sub-system that works properly. Then add more of the total system piece-by piece, until everything is working.
6. A zone that has a trouble condition will display as “CHECK xx” where xx is the zone number.
  - a. After pressing “\*” to scroll through these, they may display “FAULT xx.” This can make it difficult to isolate which zones have a trouble condition versus a simple fault.
  - b. It may help to strap the zones with a resistor to eliminate a “fault” condition, or disarm to show checks, and do not press the \* after that. In addition, some panels have the option to display “TRBL” instead of “CHECK”. This is only a display difference. “TRBL” and “CHECK” mean the same thing.
7. V-plex smokes and motions can cause other devices to appear to have problems. The symptoms may not directly point to the real cause of the problems. Always look at the whole system configuration. For specific notes on V-plex smoke detectors and motion sensors, see notes under the appropriate sections.
8. To assist trouble shooting, be sure that Polling Loop Short detection (zone 97 or 997) and Earth Ground fault detection (zone 72 or 972) are enabled, Earth Ground fault detection is only a feature of a commercial fire panel. This will help find the *real* problem.
  - a. If a ground fault exists, reference the ground fault-troubleshooting document for troubleshooting steps.
9. As a last resort, bring the devices back to the control panel to see if they work alone at the panel. Other steps are:
  - a. Default the panel and start hand programming in each zone and check operation.
  - b. Replace the RPM and/or control panel
10. Abbreviations: RPM = remote point module, SIM = Serial Interface Module, V-plex/multiplex/mux/mpx = polling loop

## **Random Check on zones**

### **General Notes**

Global polling devices (such as 5192 or 998mx) **MUST** be set in serial number mode on any panel that supports serial number polling loop devices.

- a. These devices have the ability to operate in either dip-switch or serial mode, but **MUST** be set for serial mode on all panels that support serial (all current panels).
- b. Failure to do this will cause problems on these zones as well as other polling loop zones.
- c. The 998MX must have dip switches 1-7 OFF and the jumper JP1 cut all the way off at the base.

### **Smoke Maintenance Feature**

When using the 5192 Smoke Detector on a panel that does not support the Maintenance feature, it must remain disabled on the detector by leaving dip switch 8 **ON**.

- a. *Smoke detectors with the maintenance feature* enabled must be enabled as “Smart Contact” in programming.
- b. Maintenance signals may only be used on devices operating in serial mode. (All panels that support maintenance also use serial mode).
- c. Failure to follow these rules will cause problems on these zones as well as other polling loop zones.
- d. The 5193 series smoke detectors Maintenance feature is always on and cannot be disabled. This will not affect panels that do not support the feature, but if the panel does support this feature then it must be enabled per that zone.
- e. When using the Maintenance Feature 1\*77 must be on to log the first maintenance signal.
  - i. The panel must accumulate a total of 6 ‘out’ of calibration samples in order for the panel to log it.
  - ii. With 1\*77 enabled, it will bypass this logic and log it on the first signal.

### **Polling Loop and Other Voltage Thresholds**

The polling loop voltage should be fluctuating anywhere between 7-12VDC.

- a. This should be tested at the panel and at the end of the line. If it is not fluctuating, you probably do not have polling loop zones enabled, or your meter may not be sensitive enough to see it.
- b. If you have voltage below 7 volts, confirm load (current draw and wire limits) on polling loop is within specs.
- c. Remove polling loop from panel and verify the voltage returns.
- d. Add runs one at a time to find the one that is pulling down the voltage, and then break down that run to find the cause of the voltage drain.
- e. Also, confirm panel voltages as noted in above.

Basic Panel voltages: With a meter check: AC, auxiliary power, and battery (with and without AC).

### **Wiring**

Verify that all wire runs are within specifications, **twisted wire or shielded wire with one end of the shield to ground**, and not run near sources of induced noises. Realize that capacitance on the wire, not resistance, is our real enemy. Consult [Page 7](#) for limitations.

## Troubleshooting

1. If the device has the option to go serial, it must be in serial mode.
2. If using *Dip-Switch* devices, verify that you do not have any 2 zones set for the same address.

Note: if a 4208u is operating in dip-switch mode, and has only some of its zones in use, you may not use other dip-switch RPMs to overlap the unused zones. You may overlap these with wireless zones.

3. While in programming, the voltage on the polling loop should be 10.5VDC steady. When a device is tripped you will see the voltage quickly fluctuate. If voltage is fluctuating while in programming and nothing is being tripped, there is likely a device on the polling loop broadcasting constant garbage.

Isolate different branches of the polling loop to isolate the problematic device. A device that is broadcasting garbage on the loop will eliminate global polling causing slow zone response and random troubles.

4. Verify that no RPMs are connected to the polling loops, which are not programmed into the panel.

This may be difficult to verify, but if a device is talking on the polling loop and the panel is not programmed to listen to it troubles and slow response will result.

5. When using *smoke detectors with maintenance features*, the smoke detector may be sending continuous high sense/high sense restore messages to the control. This continuous broadcasting can cause problems on these zones as well as other polling loop zones. See the section on [Maintenance](#) for more information.
6. In zone programming, the “V-plex relay” option must only be enabled for 4101SN modules and not other devices.
7. In zone programming, the “Access point number” option must only be enabled for Vista-key DSM Backup zones.

## Continuous Check on zones

1. Disable tamper either by dip switch on the RPM or by setting \*24 = 1 (or both). This may be re-enabled later after the trouble has been isolated.

Note: Tamper is usually disabled by turning a switch ON, not off.

2. If using dip-switch RPMs, check *all* the dip-switches. Make sure that they are not backwards, that the correct chart was used, and that all dips are set correctly, including dip switch 1 and 2.
3. Zones set for zone type 05, 09, 16, 17, 18 may be in “Check” because of a zone fault (open). For any other zone types, proceed to the next step.
  - a. Verify the zones are correctly wired and on the correct terminals.
  - b. Check voltage on the zone terminals. This should be approximately 5-6 volts DC on any panel zone, or expansion zone (except zones that can use 2-wire smokes) when the sensor loop and end-of-line-resistor are normal.
  - c. Note: a “right loop” zone will be 0VDC when normal because it does not use an end-of-line resistor. If you do not see correct voltage on the zone terminals, the zone loop is not correct. Also, try setting as a burg zone type to isolate this.
  - d. Temporarily programming as a non-24 hour zone type will help you isolate it even further.

4. Verify polling loop voltage on the control panel and at the RPM.
  - a. This should be *fluctuating* between 7-12 VDC.
  - b. Verify that the wires are the correct polarity and on the correct terminals.
5. Verify that all devices are correctly wired.
  - a. It is often easy to misinterpret our instructions and connect devices incorrectly.
  - b. This includes panel connections, RPM connections, and field wiring.
6. Verify that the zone programming is correct:
  - a. Correct input type
  - b. Serial number and loop number if applicable.
  - c. If using serial devices, attempt to manually enroll the serial number. This verifies that the panel is able to talk to the device as well as the proper serial number.
7. \*86: On all control panels from 4140-4140XMPT2, Vista-40, and Vista-50, \*86 allows a single 4208 to operate as zones 10-17.
  - a. With this field enabled, no other polling loop devices will operate.
  - b. There is a special dip-switch configuration that allows this mode.
  - c. The Vista-50P and higher controls do not have the \*86 option. The First Alert FA1000-FA1340c have \*86. The FA1500c and FA1600c and up do not.
8. Isolate the zone by removing all other polling loop devices; connect a single module directly to the panel.
9. Set the RPM for serial mode (if it can) and try to manually enroll the device.
  - a. If using dip-switch devices, try setting the RPM for another address; or switch this address with that of a known good RPM.
10. Consult items under “*Random Checks*” on [Page 3](#).

## **Slow Zone Response**

If there is an extreme amount of activity on the polling loop (i.e. 50+ motions tripping at once, etc) the panel may start to delay the display of restore of zones. This abundance of activity, to the Global Poll logic, will cause the prioritization of the events and start processing faults/alarms before restores.

In addition to the Global poll prioritization, the panel’s processor will start to prioritize the status updates sent to the ECP (keypad) data. This will result in a delay of the restore display, all of this can add up to one or two minutes before the keypad displays the restore of a zone.

This is more noticeable when partitioning. A partition with only a few zones will notice latency in restores due to large amounts of activity on another partition. A solution would be to use SMART motions on a panel that supports the SMART motion feature on large installs like this.

This will not cause a slow display of faults/Alarms on the polling loop. Faults/Alarms should display within 5 seconds even on a fully loaded busy panel. If Faults/Alarms are slow, check the following:

1. Verify that there are no ECP devices enabled in programming, that do not exist. The easiest way to do this is by requesting an ECP LIST from the COMMANDS menu on the compass communication screen.
2. Check troubleshooting section under “*Random Checks*” and note 1 under “*General Notes*”.

## ***V-plex Smoke Detectors***

1. Check troubleshooting section under "[Random Checks](#)" regarding dip/serial modes and maintenance signals.
2. There are no base tampers on our V-plex smoke detectors.
3. When first connected, the LED may latch in the ON state. This is normal. Once the panel has polled the device it will reset. This will happen only after the zone is programmed properly and dips set correctly.
4. When a polling loop smoke detector goes into alarm on any 4140/4142 platform panel, the LED will not latch, this is normal. It is also true of the 5140XM. All other 5140 platform panels (V100/128/250/32/FA1600/1670c/1700c) will latch the LED when the smoke detector is in alarm.
5. 4192SDM, 4192SDTM, 4192CPM smoke detectors use maintenance signals. This cannot be disabled by a dip-switch like the 5192sd.
  - a. These can be used only on panels that support maintenance signals. Any 4192 model without an "M" in the part number is a dip-switch device and may be used on any panel.
  - b. 4192 switches are often set backwards because "on" looks like "off".
6. If using a 5192SD smoke detector, Switch 8 for maintenance must match the "smart contact" question (yes or no) in order for it to enroll. If this is not set correctly, it will not enroll.
7. 5193 smoke detectors have Maintenance always enabled, so Maintenance must be turned on for those zones on panels that support Maintenance for them to enroll properly.

## ***V-plex Motion Sensors***

1. Consult note 1 under "[Random Checks](#)" on [Page 3](#).
2. 998mx: on all current panels, the 998mx **must** be set for serial number mode.
  - a. To set this, set switches 1-7 OFF, and cut the white jumper off at the base completely.
  - b. Do not forget the tamper on the motion sensors that cannot be disabled by a dipswitch.

## ***Zones will not fault***

1. Disconnect polling loop module from the polling loop. The zone should go into check. If not, then the zone programming is not correct. Check the following:
  - a. Zone type
  - b. Input type
  - c. Wrong loop (**loop 1 must be used before loop 2, left loops must be used before right loops**)
  - d. Wrong partition
2. Verify the partition the zone's partition assignment, as well as the keypad you are working on.
3. Make sure tamper is enabled on the device and in \*24 (\*24=0). See if the RPM tamper causes a "check".
4. If the zones go into check in step 1, verify field wiring/connections. Then troubleshoot the RPM itself.

### Check 97/997 (polling loop short)

Indicates that there is a physical short or Low Voltage on the polling loop, or too much current being drawn.

1. The panel recognizes a short when the voltage on the polling loop drops to 4.5 Vdc or below.
2. Isolate this by checking voltage on the polling loop with wires connected and with all wires removed. Check troubleshooting section under "[Random Checks](#)".

### Limitations of V-plex Cable runs

The ADEMCO Polling Loop (V-plex) has the following limitations, which apply to panels with 128ma:

#### Procedure for Determining the Maximum Wire Length per Polling Loop

1. Use table 1A for *Unshielded* Twisted cable and table 1B for *Shielded* cable.
2. Determine the maximum device loading on the polling loop branch by adding the load currents *per device* determined from [Table 2](#).
  - a. Example: One 4190SN requires 2.0 mA. One 4208U requires 27.3 mA. The total load for *one* 4208U plus *five* 4190SNs *on the same loop* would be  $(27.3 + 10.0) = 37.3$  ma.
3. Locate the row in the table selected in step 1 corresponding to the total device load current determined in step 2. Example: A total load current of 37.3 mA, corresponds to the row of (33-40) mA.
4. The maximum cable length can now be determined from the size, or gauge, of the wire used in the cable.
5. Example: The maximum cable length of No. 20 gauge wire for a total device load of 37.3 mA is 4,680 ft if either unshielded (table 1A) cable or shielded (table 1B) cable is used. If No. 18 gauge wire were used instead, the maximum allowable cable length would be 7,410 ft for unshielded cable and 6,000 ft for shielded cable.

Total Load (ma @ 11.5) Vdc	22 ga	20 ga	18 ga	16 ga
1-16	12,000	12,000	12,000	12,000
17-24	4,850	7,810	12,000	12,000
25-32	3,640	5,850	9,260	12,000
33-40	2,910	4,680	7,410	11,760
41-48	2,420	3,900	6,170	9,800
49-56	2,080	3,350	5,290	8,400
57-64	1,820	2,930	4,630	7,350
65-72	1,620	2,600	4,110	6,540
73-80	1,450	2,340	3,700	5,880
81-88	1,320	2,130	3,370	5,350
89-96	1,210	1,950	3,090	4,900
97-104	1,120	1,800	2,850	4,520
105-112	1,040	1,670	2,650	4,200
113-120	970	1,560	2,470	3,920
121-128	910	1,460	2,310	3,680

**Table 1: Polling Loop Wiring Using *Unshielded* Twisted (or non-metal conduit)**

Total Load (ma @ 11.5) Vdc	22 ga	20 ga	18 ga	16 ga
1-16	6,000	6,000	6,000	6,000
17-24	4,850	6,000	6,000	6,000
25-32	3,640	5,850	6,000	6,000
33-40	2,910	4,680	6,000	6,000
41-48	2,420	3,900	6,000	6,000
49-56	2,080	3,350	5,290	6,000
57-64	1,820	2,930	4,630	6,000
65-72	1,620	2,600	4,110	6,000
73-80	1,450	2,340	3,700	5,880
81-88	1,320	2,130	3,370	5,350
89-96	1,210	1,950	3,090	4,900
197-104	1,120	1,800	2,850	4,520
105-112	1,040	1,670	2,650	4,200
113-120	970	1,560	2,470	3,920
121-128	910	1,460	2,310	3,680

Table 2: Polling Loop Wiring Using *Shielded* (or metal conduit) one side of the shield to ground.

### Wiring Notes and Recommendations

- Twisted, stranded, non-shielded cable is recommended. Avoid sharp bends in the wire.
- Shielded cable, running Aux power in the same jacket, and/or running wire in metallic conduit increase the capacitance of the wire run, which limits distances.
- Observe device and control requirements on serial number vs. dip-switch mode.
- Avoid running the cable near keypad wiring, intercom, or AC power lines, anything emitting RF noise.
- If the V/Plex device will go serial the device has to be programmed as serial.
- Shielded wire should have one end of the shield to good Earth Ground.

## Using the 4297 Polling Loop Extender Module (applies to panels with 128ma on polling loop)

The 4297 V-plex extender module may be used to:

1. Increase the number of V-plex polling loop loading in a given system;
2. Extend the total cable length of a specific application (See limitations of V-plex Cable Runs)
3. Provide short circuit isolation from one loop branch to another.

The maximum number of V-plex device loading that can be placed on one or more polling loops with a single supporting control panel is 128 mA.

1. If a given control panel can support a total number of devices requiring more than 128 mA, a 4297 module may be used in the manner demonstrated in Figure 1, below.
2. Each 4297 module can individually support up to 128 mA.

The maximum number of 4297 modules which can be configured as shown in Figure 1 is limited to no more than 8, and by the need for a DC power supply to furnish 50ma @ 12 Vdc plus the polling loop output current per module.

For example if each 4297 module is to supply the maximum of 128 mA, it will require a supply current of  $50+128=178$  mA. From a local power supply, even though it only requires 0.1ma from the polling loop. If the 4297 output is shorted, the power supply current increases to 350ma.

The total wire length allowed at the output of a 4297 module, as well as for the control panel's V-plex output, is limited using Tables 1 and 2 and the procedures described above. In addition, the *sum* of the wire lengths of both the *input* and *output* of a single 4297 is also limited to 12,000 ft. of unshielded wire and 6,000 ft. of shielded wire, as indicated in Figure 1

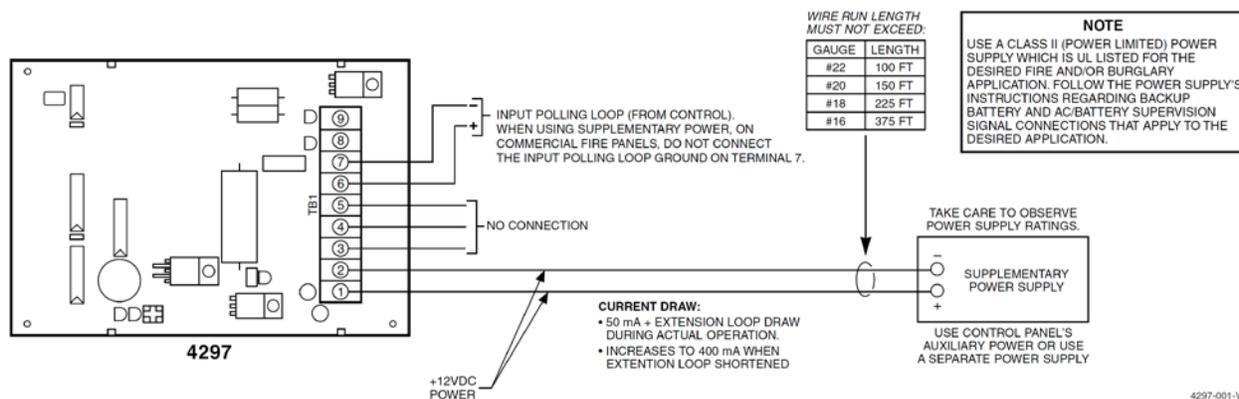


Figure 1: 4297 Supplementary Power Supply

### Using Multiple 4297 Polling Loop Extenders

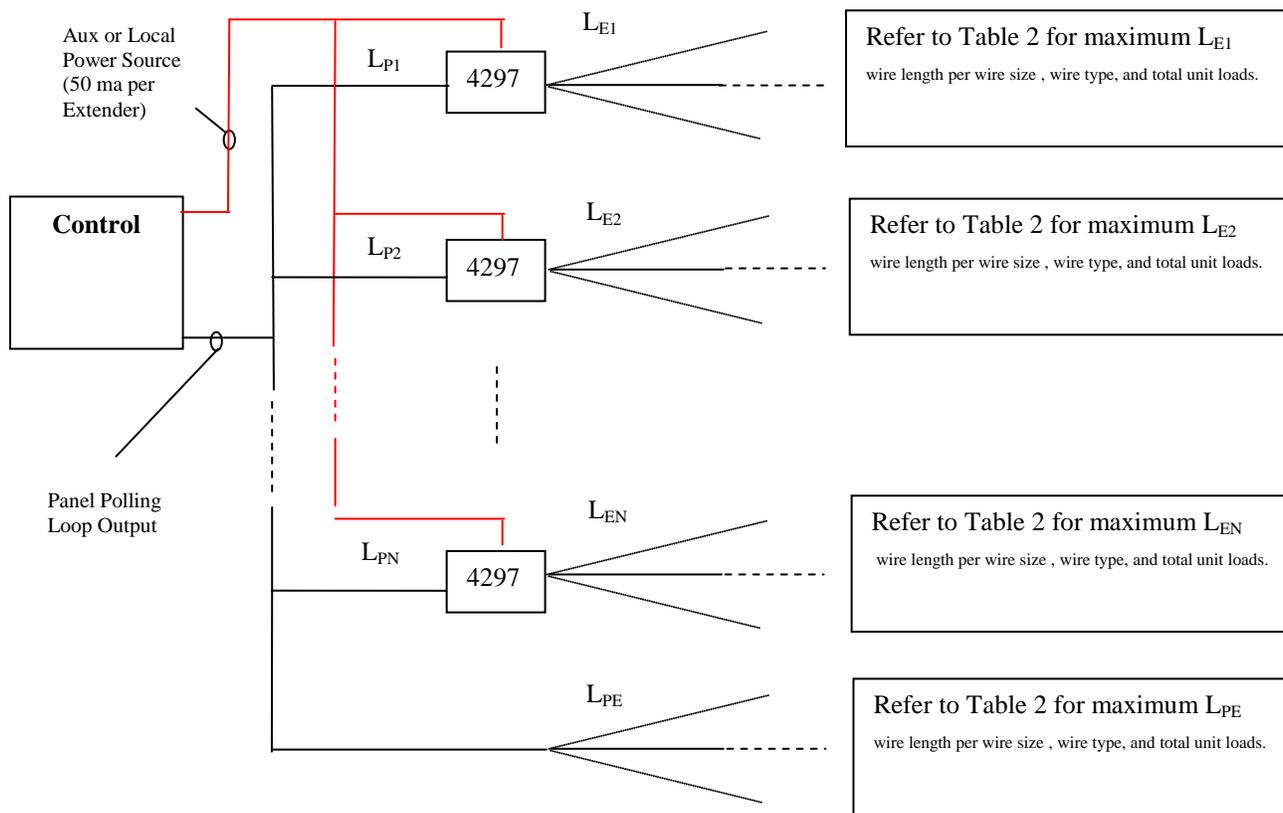


Figure 2: Using Multiple 4297's

**L<sub>E</sub>** = Total wire length on output side of each 4297.

**L<sub>P</sub>** = Total wire length on input side of each 4297.

**L<sub>E1</sub>** + (L<sub>P1</sub> + L<sub>P2</sub> + ... L<sub>PN</sub> + L<sub>PE</sub>) ≤ 12,000 ft., unshielded; ≤ 6,000 ft., shielded

**L<sub>E2</sub>** + (L<sub>P1</sub> + L<sub>P2</sub> + ... L<sub>PN</sub> + L<sub>PE</sub>) ≤ 12,000 ft., unshielded; ≤ 6,000 ft., shielded

**L<sub>En</sub>** + (L<sub>P1</sub> + L<sub>P2</sub> + ... L<sub>PN</sub> + L<sub>PE</sub>) ≤ 12,000 ft., unshielded; ≤ 6,000 ft., shielded

**Note:**

The maximum number of 4297 modules which can be connected in parallel to a single system control is limited to no more than 8, and by the maximum wire lengths specified above and the need for the Aux or Local power source to supply 50 ma per 4297. For example, if five 4297 modules are used, the Aux or Local power source must supply (5)(50) = 250 ma and the total system load current would be (5)(128)+128 = 768 ma, max. Also, from the above relations;

If (L<sub>P1</sub> + L<sub>P2</sub> + ... L<sub>PN</sub> + L<sub>PE</sub>) = 1000 ft., then L<sub>E1</sub> = L<sub>E2</sub> = ... L<sub>En</sub> ≤ 11,000 ft., unshielded  
 ≤ 5,000 ft., shielded.

## Single 4297 to Extend Polling Loop

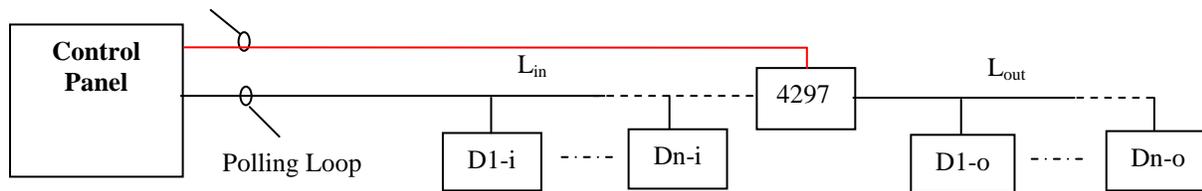


Figure 3: Single 4297 to Extend Polling Loop

$D1-i + \dots + Dn-i = 128$  max, or per Tables 1 & 2, above.

$D1-o + \dots + Dn-o = 128$  max, or per Tables 1 & 2, above.

$L_{in} + L_{out} \leq 12,000$  ft., unshielded, or per Tables 1 & 2, above, whichever is smaller.  
 $\leq 6,000$  ft., shielded, or per Tables 1 & 2, above, whichever is smaller.

## Using the VPLEX-VSI Short Isolator

The VPLEX-VSI Short Isolator provides short circuit isolation for devices on V-plex control panels. When a short occurs on a polling loop branch, it illuminates a trouble LED and isolates the defective branch from the system—reducing troubleshooting time.

1. Detects and isolates polling loop branches with complete or resistive shorts, and overload or defective polling loop devices on initial power up
2. Can be used to isolate burglary devices from fire devices,
3. LED indicator reduces troubleshooting time. Low power consumption, powered directly from the V-Plex two-wire polling loop • Can be placed on any major or minor branch in any configuration on the polling loop.

The VPLEX-VSI automatically returns to normal operation and the Trouble LED is extinguished, when the trouble condition on the output side of the VPLEX-VSI is rectified.

A control panel normally reports a short on a polling loop as a trouble on zone 97 or 997. When using the VPLEX-VSI in a properly configured polling loop, this trouble condition will not occur. Instead, the zones isolated by the VPLEX-VSI will report in trouble. A few panels do not have any delay on reporting a polling loop short as a trouble. With these panels, a 97 or 997 trouble will be reported for a polling loop short. Otherwise, operation is as described above.

## ***Ground Fault Troubleshooting (Applies to Commercial Fire Panels Only)***

### **Troubleshooting**

1. Measure Volts DC between terminals **12** (Panel Negative) and terminal **30** (Ground)

(Note: KP (-), zone (-) and polling loop (-) are all common. Any of these may be used. The exception to this is any zone that supports 2-wire smoke detectors, and the bell circuits.)

2. To determine where the ground fault is coming from, remove system wires until the voltage between terminal 12 and 30 returns to 1VDC. Note: as you remove each wire, leave it off until the problem is corrected. There may be more than one wire with a problem. Note: Leave the earth ground wire connected during this process.
3. As this progresses, you may eventually reach a point where all wires are removed except the battery and the earth ground. The next step is to remove the panel from the cabinet. Lay the PCB on a non conductive material (wood or cardboard). With the earth ground wire now disconnected the panel should give you 1VDC from terminal 12 to 30. If not, the panel is defective.

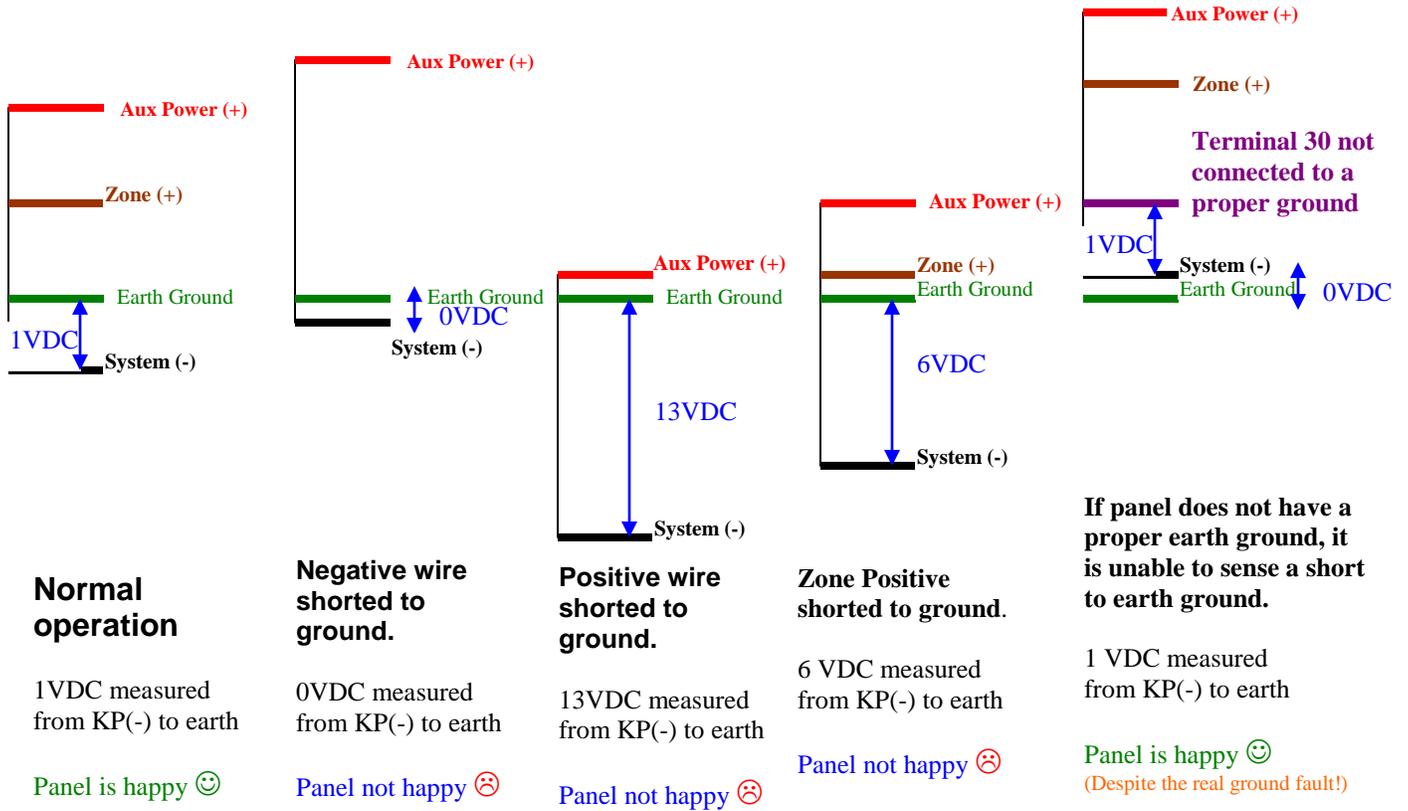
### **Notes**

Under normal conditions (no ground faults) you should read 1.0VDC (+ or - .5VDC)

A ground fault is sensed when some external input causes the voltage between terminal 12 (Panel Negative) and terminal 30 (ground) to either drop below .5 VDC or increase above 1.5 VDC

**Premise/Theory**

The control panel internally causes its power negative to float 1 volt below earth ground as shown in the first diagram below. If any wire attached to the panel shorts to earth ground or a voltage source, it will become the same reference level as earth ground, causing the panel to see a ground fault.



**Table 3: Ground Fault Voltages**

**Ground Fault FAQ's**

1. I have a Ground fault on my display. Does this mean that I have a bad earth ground?

No. This means that something in your system has a path to earth ground. In fact you must have a good earth ground to sense a system ground fault.

2. Can I assume that with the earth ground disconnected from terminal 30 that I cannot sense an earth ground?

In general, you must have a good earth ground to properly sense a ground fault. However, if you remove the earth ground wire, your panel may still have a connection to earth ground through the cabinet and conduit connected. You may notice that the mounting screws for the panel are on a trace that is connected to the earth ground terminal. This is by design and allows the cabinet to be grounded through the panel.

3. What terminals can affect a ground fault?

Any wire connected to the control can cause ground fault except the auxiliary relay terminals (these are dry contacts) Sources of problems include: keypad wires, polling loop, bell circuits, zone circuits, peripheral devices, powered devices J-connectors, phone lines, PS-24, battery connections, transformer, auxiliary power supplies, radio backup devices....

4. Can other boards or peripherals (Power supplies, LRR radios, etc) cause a ground fault?

Yes. Any device wired to the control panel can cause a ground fault.

5. Can induced voltage cause an earth ground fault?

Yes. Anything that affects the voltage potential between earth ground and the rest of the system would cause the system to report an earth ground fault, even though there is not, in fact, a real earth ground fault. In this case, the "false" earth ground message still alerts you to a system problem.

6. Can conduit (that is usually grounded) affect ground fault?

Conduit can provide another path to earth ground. As mentioned in note#2 above, the panel mounting screws provide an electrical path between the earth ground terminal (30) and the panel cabinet. This would allow an earth ground to be sensed through the conduit even with nothing connected to terminal 30. This is not a bad thing.

Some peripheral devices (7835C for example) Use a common negative to their chassis. In this case, if the cabinet is grounded or has conduit that is grounded, an earth ground fault would be sensed through the other connections to the device.

7. Does grounding the metal can affect ground fault?

As noted above, the panel mounting screws provide an electrical path between the earth ground terminal (30) and the panel cabinet. Grounding the cabinet should not cause any problems.