

MONACO ENTERPRISES, Inc.
Ground Fault
Troubleshooting Guide
MAAP-1 and MAAP-2 Integrated Radio Transceiver Addressable Fire Alarm
Control Panel

This procedure has been prepared to help isolate the causes of Ground Fault conditions on the MAAP-1 and MAAP-2 Integrated Radio Transceiver and Fire Alarm Control Panel. This procedure is provided in three parts. Part One provides troubleshooting for the Main Panel. Part Two deals with the Backplane and Zone Expansion Cards (ZEC). Part Three deals with the Analog Addressable Controller (AAC) and Analog Driver Cards (ADC). It is important that the Troubleshooting be performed in order -- Part One first, proceeding to Part Two, and then proceeding on to Part Three.

Notes and Warnings:

1. Warning! Do not remove (or replace) the ribbon cable between the main board and the backplane with ANY power applied. Do not remove (or replace) the Analog Addressable Controller (AAC) power or RS-422 with ANY power applied.

NOTE: Removing (or replacing) either cable with power on (ac or battery) will damage the panel. This damage would be outside Monaco's warranty terms.

2. Warning! Do not remove (or replace) the main ac power fuse, F2, with AC power applied. Use the AC circuit breaker to power down the panel. Removing or replacing F2 repetitively with ac power applied could damage the fuse holder rendering the panel inoperative on ac power.
3. During this procedure, you will receive several troubles and COM fail indications. These are associated with the wiring and expansion cards that you have been required to remove. This is a normal condition due to the zone supervision circuitry.
4. Check the Analog Addressable Controller (AAC) jumper W3 (above and to the right of Port 3). There should NOT be a jumper across the pins of W3 on the AAC.

NOTE: Jumper W3 (ground fault detection enable) on the main power supply board is factory set to the B position and is located near the antenna connection on the bottom side of the power supply board.

5. Tools Required:
 - a. Digital Voltmeter (DVOM)

- b. Small Flat Blade Screw Drive
- c. Extra small Flat Blade Screw Drive

Preliminary Step: eliminate real shorts to earth ground.

1. Remove ac power (do not remove or replace F2 fuse under power), then remove battery power (F4 fuse) from the panel. (The fuse is located in the top left hand corner of the M Panel power supply board).

NOTE: Leave the field wiring conductors connected to the M Panel terminals.

2. Measure the resistance of each field wiring conductor on the panel to earth ground. There must be greater than 500K Ohms from earth ground to any conductor. If there is greater than 500K Ohms from earth ground to each of the conductors go to Part One: Troubleshooting the Main Panel.
 - a. If there is only one field wiring conductor shorted go to step **e** of this section. If there is more than one shorted field wiring conductor continue to the next step.
 - b. If there is less than 500K Ohms from earth ground to more than one conductor, remove the field wiring to those terminals on the M Panel. Measure the resistance from earth ground to the M Panel terminals associated to those conductors. If there is less than 500K Ohms on any panel terminal, without field wires, go to step **f** of this section.
 - c. Measure the resistance from earth ground to one of the conductors. If there is greater than 500K Ohms select another conductor and repeat this step **c**. When all shorts are removed go to step **h**.
 - d. Measure the resistance from earth ground to one of the conductors. If there is less than 500K Ohms go to step **g**.
 - e. If there is less than 500K Ohms from earth ground to one conductor, remove the field wiring to that terminal on the M Panel. Measure the resistance from earth ground to the M Panel terminal. If there is greater than 500K Ohms go to step **g** of this section.
 - f. If there is less than 500K Ohms from earth ground to the M Panel terminal, remove all field wiring and measure resistance again. If there is less than 500K Ohms contact Product Support at Monaco Enterprises for assistance.

g. If there is less than 500K Ohms from earth ground to the conductor, divide the circuit in half and re-measure until the resistive source is located.

NOTE: A Ground Fault condition on zone wiring can be caused by wire insulation being exposed where the conductors are making contact with the conduit. It can be also caused by faulty devices.

H. Repeat troubleshooting until all shorts are eliminated. Reconnect all field wiring and begin testing again.

Part One: Troubleshooting the Main Panel

1. Remove ac power (do not remove or replace F2 fuse under power), then remove battery power (F4 fuse) from the panel. (The fuse is located in the top left hand corner of the M Panel power supply board)
2. Ensure panel is powered down. Disconnect the ribbon cable from J6 on the main board, this is the cable that connects to the backplane(s). Do not remove or replace ribbon cable from CPU or backplane with ANY power applied.
3. Apply ac power and re-insert fuse F4. Acknowledge the troubles (COM fails) that occur because of the disconnected backplane(s).
4. Wait for five minutes to see if the ground fault condition returns. If no ground fault occurs go to Part Two: Troubleshooting the Backplane and Zone Expansion Cards (ZEC). If the ground fault recurs, remove ac power and fuse F4 and proceed to step 5.
5. Ensure panel is powered down. Remove all SLC field wiring from the AAC by unplugging from each port. Unplug the printer, the remote terminal, and Remote Display Units (RDU) from the AAC. Apply ac power and re-insert fuse F4. Acknowledge the troubles (COM fails) that occur because of the disconnected backplane(s). Wait five minutes to see if the ground fault condition returns. If no ground fault occurs go to Part Three: Troubleshooting the Analog Addressable Controller (AAC) and Analog Driver Card (ADC). If the ground fault recurs, remove ac power and fuse F4 and proceed to step 6.
6. Ensure panel is powered down. Remove and label all remaining field wiring EXCEPT: Auxiliary Power and RS-422 to the AAC. Remove individual wires from the terminal block for (Auxiliary Inputs, and Zone 1) leaving RS-422 connected to AAC. Remove Zone 2, Bell 1 & 2 by unplugging two-piece connector. Remove and

label individual wires for AUX OUT, K1 & K2 connections, and Remote Trouble, noting polarity, from the main board, (leaving Auxiliary Power connected to AAC).

7. Apply ac power and re-insert fuse F4. Acknowledge all of the troubles that are annunciated because the Backplane(s), On-Board Zones and Bell circuits have been disconnected.
8. If the ground fault occurs remove battery cable and connection to the transceiver on the CPU board, (P3). If the ground fault remains with all wiring disconnected, other than ac power, contact Monaco Enterprises for a return authorization number for the MAAP CPU and P.S.
9. If no ground fault occurs, perform the following:
 - a. Connect the field wiring to the main panel, one circuit at a time (Auxiliary Inputs, Zone 1 and 2, Bell 1 & 2, Auxiliary Out, Auxiliary Power, and K1 & K2 connections).
 - b. Wait for five minutes to see if a ground fault occurs.
 - c. If a ground fault occurs, a ground fault condition exists in the field wiring that was just connected and/or the devices connected to it. Correct the ground fault in the field wiring. Note: A Ground Fault condition on zone wiring can be caused by conditions such as 1) wire insulation being exposed where the conductors are making contact with the conduit, 2) induced ac noise where the zone wire is run next to or over ac power wiring, or 3) faulty devices.

Additional Troubleshooting: Disconnect the loop from the zone input. Measure the resistance of each leg of the loop to earth ground. If a short to ground is detected, divide the circuit in half and re-measure until the source of the short to ground is located.

If a short to ground cannot be detected check the wires for induced AC noise. Set the DVOM to measure AC. Measure each leg of the loop to earth ground. Then measure across the loop. If any of the AC measurements are 50 Millivolts, or above, the source of the induced AC noise must be located. This normally occurs when AC and DC circuits are run in the same conduit or twisted wire pair has not been used on the field wiring. To reduce the AC noise, separate the wiring or install twisted wire pair and ensure all conduit runs are bonded to earth ground.

- d. If no ground fault occurs, then re-connect the next circuit.

- e. Continue until all of the main panel circuits have been re-connected. If no ground fault occurs contact Product Support at Monaco Enterprises for assistance.

Part Two: Troubleshooting the Backplane and Zone Expansion Cards (ZEC)

1. Remove ac power, then battery power (F4 fuse) from the panel. Re-connect the ribbon cable to J6 on the main board.

Note: Do not remove any field wiring attached to the backplane at this time.

2. Apply ac power and re-insert fuse F4. If a ground fault occurs remove fuse F4 and remove ac power. Remove all of the expansion cards installed in the backplane(s).
3. Apply ac power, re-insert fuse F4, and acknowledge all Troubles.
4. If no ground fault occurs remove ac power, then battery power fuse F4 from the panel. Install one ZEC card in one slot. If a ground fault occurs proceed to step 7.
5. If no ground fault occurs remove ac power, then battery power fuse F4 from the panel. Install another ZEC card in another slot.
6. Apply ac power and re-insert fuse F4. If a ground fault occurs remove and label all field wiring from the zone inputs associated with the installed ZEC card. If no ground fault occurs, then re-connect the next circuit.
 - a. If a ground fault occurs, a ground fault condition exists in the field wiring that was just connected and/or the devices connected to it. Correct the ground fault in the field wiring. Note: A Ground Fault condition on zone wiring can be caused by conditions such as 1) wire insulation being exposed where the conductors are making contact with the conduit, 2) induced ac noise where the zone wire is run next to or over ac power wiring, or 3) faulty devices.

Part Three: Troubleshooting the Addressable (AAC)

1. Reconnect one SLC field wiring to one port. Wait five minutes, if no ground fault occurs then proceed to step 2.
 - a. If a ground fault occurs, remove SLC loop from the port. If resistance from earth ground to either side of the SLC loop is less than 500K Ohms, divide the circuit in half and re-measure until the source of the short to ground is located. If resistance is greater than 500K Ohms proceed to step c.

- c. Measure from earth ground to each side Mini Module input from conventional NAC devices. If the resistance is less than 500K Ohms remove defective device or defective Mini Module.
- d. Reconnect SLC loop to AAC port and verify no ground fault condition exists before proceeding to step 2.
- e. Swap ADC card to eliminate a possible defective card.
- f. Try another SLC loop on another AAC port, just in case the port is defective.

Note: Connecting and disconnecting SLC loops to ports may be performed with panel powered up. However the panel could reset during a reconnection if a large number of devices is present on the SLC loop.

- 2. Reconnect another SLC field wiring loop to another port. Wait five minutes, if no ground fault occurs then repeat step 2.
 - d. If a ground fault occurs, a ground fault condition exists in the field wiring that was just connected. Remove SLC loop from ADC port. Temporarily connect SLC loop across conventional loop End of Line resistor, observing polarity. Ensure no conventional field wiring is present. If no ground fault occurs temporarily connect another SCL loop across another conventional loop End of Line resistor.
 - e. If a ground fault occurs, temporarily connect only one side of the SLC loop across conventional loop End of Line resistor. Ensure no conventional field wiring is present. If no ground fault occurs remove that half of the loop and connect the other side.
 - f. If a ground fault occurs, a ground fault condition exists in the field wiring that was just connected. Temporarily connect SLC loop across conventional loop End of Line resistor, observing polarity. Ensure no conventional field wiring is present.
 - g. If a ground fault occurs, a ground fault condition exists in the field wiring that was just connected. Remove SLC loop from port. Temporarily connect SLC loop across conventional loop End of Line resistor, observing polarity. Ensure no conventional field wiring is present.
- 3. Continue until all of the SLC loop circuits have been re-connected. If no ground fault occurs contact Product Support at Monaco Enterprises for assistance.

Additional SLC LOOP Troubleshooting: Disconnect the SLC loop from the port. Measure the resistance of each leg to earth ground. There must be greater than 500K Ohms from earth ground to either loop conductor.

- a. If there is less than 500K Ohms from earth ground to one loop conductor, divide the circuit in half and re-measure until the resistive source is located.
- b. Any conventional detector must have greater than 500K Ohms between earth ground and either line of the input to the mini module.
- c. If no ground fault occurs, then re-connect the next circuit.
- d. Continue until all of the main panel circuits have been re-connected. If no ground fault occurs contact Product Support at Monaco Enterprises for assistance.