Procedure to trace earth faults using a Voltmeter

1. With the Earth fault present on the control panel measure the voltage between the mains supply earth terminal and the black lead connecting one of the batteries to the panel PCB. The black lead of the voltmeter should connect to the black lead of the battery when you make your measurement. Record it here: → **READING A** - Earth to 0V with fault present: V
2. Remove outgoing circuits connected to the control panel one at a time until the fault clears. Note that you will need to remove both sides of the circuit, positive and negative. Note also that some panels such as the Gent 3260 (SMS FP580/590) treat earth fault as a low priority fault and it is only possible to determine whether one is present or not if the panel is otherwise 100% fault-free. If you are unsure whether you have cleared the fault or not then simply remove all outgoing circuits.
3. Now repeat the voltage reading described at 1). Record the result here: → **READING B** - Earth to 0V with no fault present: V
   If you have carried out this procedure successfully you should expect to see a notable difference between voltage Reading A and Reading B.
4. Having established fault and no-fault voltages, leave the voltage meter connected to the points from which measurements were previously taken and commence reinstating the circuits you previously removed. Check the voltage after each circuit is reconnected, one at a time and you should be able to quickly identify which circuit causes the reading to change and is therefore causing the problem. Bear in mind that earth faults can occur on either negative or positive wires in any circuit so you should always disconnect or reconnect them fully.
5. Having identified the circuit concerned, connect it into the panel so that the fault is present and then connect the voltmeter between circuit earth (black lead) and circuit negative (red lead). Record the result here: → **READING C** - Earth to negative on faulty circuit with fault present: V
6. Disconnect the faulty circuit fully then connect the voltmeter between circuit earth (black lead) and the screw terminal in the panel to which the circuit negative was previously connected (red lead). Record the result here: → **READING C** - Earth to negative on faulty circuit with no fault present: V
7. Reconnect the faulty circuit in the control panel.
8. Now move out into the site and find the approximate centre of the faulty circuit. At this point, separate the incoming and outgoing positive and negative wires (you do not need to know which is which) and then measure between earth (black lead) and each negative wire in turn (red lead). Only one of the two wires should give you a sensible reading and this is the feed which returns to the control panel. If the voltage that you read matches reading 'C' then the fault lies in the section of cable beyond this device – if it matches 'D' then the fault lies between the control panel and this device.
9. Repeat as necessary until the fault is identified.

Note: Loop circuits should be treated as radials for the purpose of finding earth faults. Just disconnect one of the pairs which returns to the control panel and put it in connector blocks temporarily so that it does not accidentally short to something and give you misleading readings.