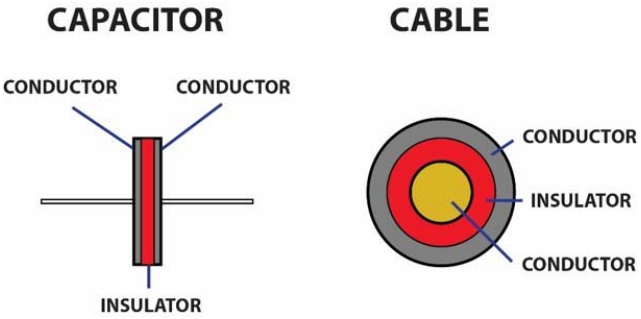
Ground fault tracing: stray capacitance

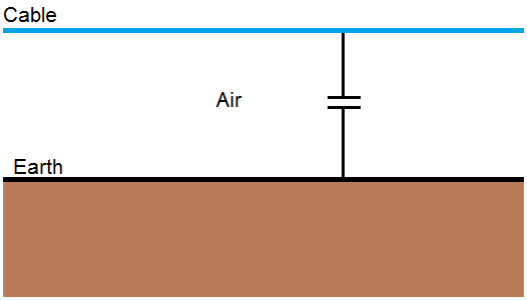
Tracing a ground fault on an isolated DC system can be simple or quite difficult depending on the nature of the fault and the characteristics of the DC system. This application note explores why a DC system's characteristics may impede efforts to locate a ground fault and offers a simple solution.

The biggest problem that is encountered when tracing ground faults is tracing false paths due to high levels of capacitance on the system. There will always be some amount of capacitance on a DC system. Shielded cables have a capacitive property. They consist of 2 conductors separated by an insulator. This is, in essence, a capacitor.



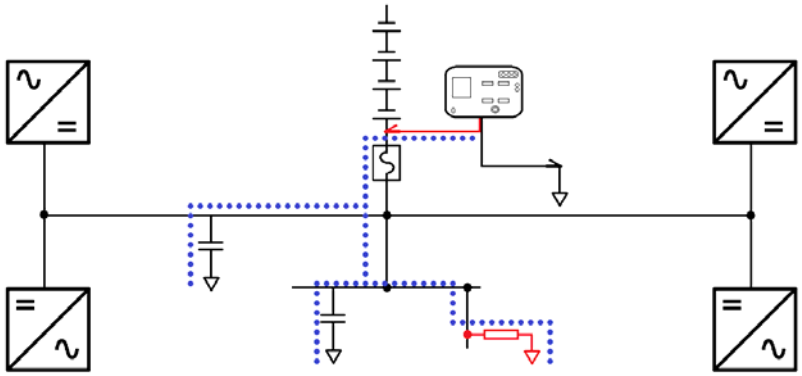
The longer a cable is, the greater the surface area of its conductors and the higher its capacitance will be.

Even unshielded cables form a capacitor from the cable to earth. The cable is a conductor, the earth is a conductor and the air between is an insulator.



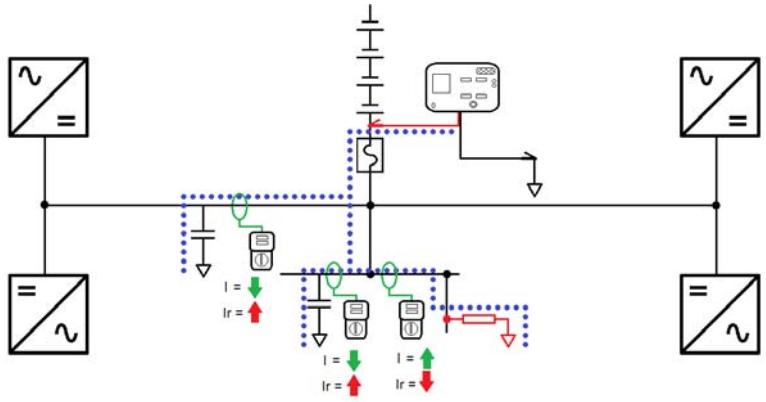
In addition, capacitance is already on the system due to equipment on the system. It is clear, therefore, that the capacitance on these systems can exist at substantial levels.

This capacitance will have little impact on the DC system itself, since a capacitor does not pass DC current. However, when tracing a fault, AC current is used. This means that in addition to the faulted circuit, other circuits with high capacitance will also draw the current used for tracing.



Therefore, if you do not know which circuit has the real fault and which circuits are only drawing current due to capacitance, then you can be tracing the wrong path all day and never find a fault.

A capacitive pickup allows you to directly measure both the fault current and the reactive current caused by the capacitance.



This allows one to see which circuit(s) is drawing current due to a fault(s) and which is drawing current due to high levels of capacitance.

Simply place the CT and the capacitive pick up in the same circuit. The receiver will display the magnitude of real (fault) current (I_R) and the reactive current (I_C) due to capacitance.

If the reactive current is higher than the fault current, then this circuit is only drawing current due to capacitance and the fault is on another circuit.

Using this technique, you will never trace the wrong path again!