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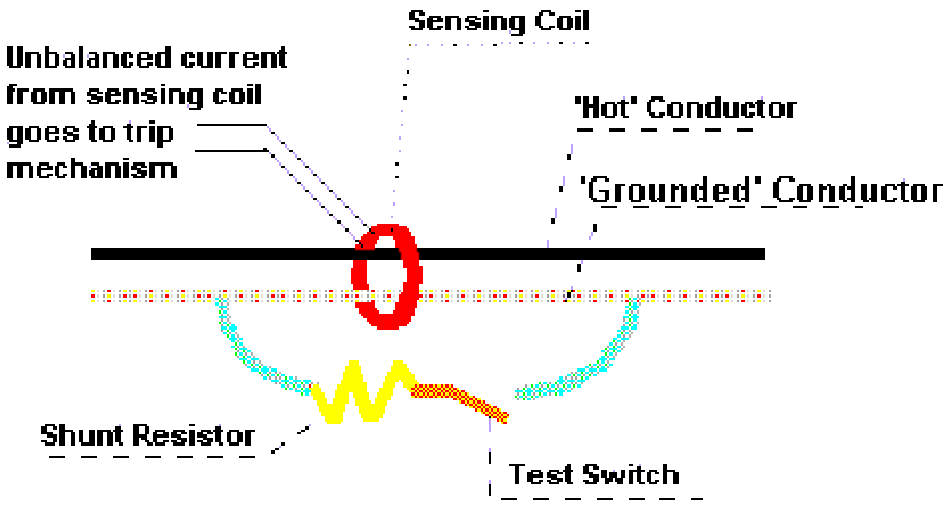
GROUND FAULT CIRCUIT INTERRUPTERS



(GFCI's)

Basic operation of a GFCI is as follows:

In the normal circuit with no fault to ground; all the current passing through the "hot" conductor will return through the "neutral" conductor. The sensing coil senses the difference in the current flowing through the two conductors inside the coil. When current flows through a conductor, a magnetic field is generated (when the current is equal in each conductor of the same circuit, the magnetic fields cancel each other out). The magnetic field in turn generates a current in the sensing coil which flows through a coil on the trip mechanism.

When the current flows through the coil at the trip mechanism by a preset amount, the mechanism trips off.

As shown in the above simplified drawing, when the test button is pushed, it causes a predetermined amount of current (5 ma +/- 1 ma) to be redirected through the "neutral" conductor shunt resistor outside of the sensing coil.

Now, even though the "neutral" current still equals the current in the "hot" conductor, the current flow through the "neutral" conductor in the sensing coil does not equal the current flow through the "hot" conductor in the sensing coil (some of the neutral current is bypassing the sensing coil by going around the coil through the shunt circuit resistor).

When this happens, the current flow through the sensing coil creates a current flow in the trip coil at the trip mechanism. This causes the trip mechanism to trip off.

If you have followed the above description, you will notice that pushing the test button on the GFCI unit will test the GFCI operation without requiring a ground to fault to. Thus a GFCI device can be used on ungrounded two wire circuits.

Testing GFCI's with a GFCI tester is similar, but different.

The GFCI tester actually creates a specific fault current to ground. This causes an imbalance between the current flowing in the "hot" conductor and the current flowing in the "neutral" conductor. This unequal current causes the trip mechanism to trip just as it does in the internal test button mode.

If no ground is available at the GFCI, a GFCI tester will not trip the GFCI.

If the GFCI trips when the internal test button is pushed, the GFCI IS WORKING!

You may now go to all the other outlets you suspect are protected by the GFCI and use you GFCI tester, or an non-GFCI tester to check for power, if there is still power, the GFCI is not WIRED correctly, is not installed on this circuit, or another GFCI may be protecting this circuit. If the outlet is "dead", go reset the GFCI and power should come back on at the remote outlet you have your tester plugged into, if the outlet is still "dead", then it is not protected by this GFCI, is not working, or is protected by another GFCI.

As you can see, the GFCI tester is used as a mere convenience to testing the GFCI device as you can test the circuit from a remote outlet, but is not required for the GFCI testing.

Another check to make is to push the GFCI device's test button and check for power in the GFCI itself after the trip mechanism trips off. If the GFCI outlet itself is still "hot", the GFCI was wired incorrectly.

MOST GFCI PROBLEMS ARE NOT WITH THE GFCI ITSELF, BUT ARE WIRING PROBLEMS FROM INCORRECT INSTALLATION.

If you lose your GFCI tester, leave it behind at your last inspection, or don't have one, DON'T PANIC, you don't need it. After all, the GFCI tester is only a CONVENIENCE tool, and the GFCI may be properly tested without the use of a GFCI tester.

NEVER, I repeat, NEVER use a wire to short between any one prong and another prong or a ground screw, strap or metal box or conduit. First, THERE IS NO NEED TO do this. Second, what if the outlet is reverse polarity! Or the hot and ground are reversed! Yikes is right!!!

If you are not sure if the GFCI is working, PUSH THE TEST BUTTON! Then plug in any outlet tester, use a voltage detector, or a test light. Any of these pieces of equipment will let you find out if the outlet still has power, and you will live to put it in your report.

REMEMBER, THE GFCI PROTECTION IS WORKING IF THE INTERNAL TEST BUTTON CAUSES THE GFCI TO TRIP OFF, however there may be a wiring problem that needs further investigation as described above.

I used the term "mere convenience" when describing the use for the GFCI tester. "Mere convenience" is an understatement. If you are checking exterior outlets, check each outlet as you find it for power and polarity as you make your first swing around the exterior, when you make your second swing around the exterior (as I do) start testing for GFCI protection by pushing the GFCI testers test button, every outlet that was "on" will "shut off" if GFCI protected.

How do you test a GFCI installed on older ungrounded 2-wire systems? Use the internal test button and follow up by remote testing suspected GFCI protected outlets with a plug-in tester, voltage detector, or test light just like you would otherwise test them for power. Are they on when the GFCI is on, and off when the GFCI is off?