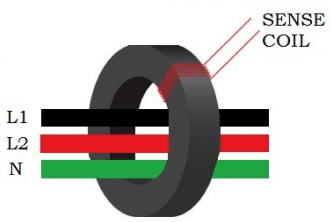
AN ISSUE WITH GFCI

Many portable generators are equipped with so-called Ground Fault Circuit Interrupt (GFCI), a.k.a Ground Fault Interrupter (GFI) to meet OSHA requirements for construction sites. When you are trying to connect such a generator to a transfer switch, GFCI will trip and no outlet will function. Below I'll explain you the issue and will describe the solutions.

WHAT DOES GFCI DO?

GFCI is intended to protect people from electric shocks. When it detects a hazardous current to earth ground that can flow through a human body, it opens the circuit. Some GFCI can also detect ground to neutral faults. There are various designs of these devices, but they all have one thing in common: a current sense transformer wound on a high permeability core. Its primary is made by passing all line and neutral wires through the center of this core. The secondary coil is used as a sense coil.



Under normal conditions the sum of currents leaving the outlet equals to the sum of return currents, and the net current through the core is zero. If a person gets into a contact with an electric wire (L1 or L2), a portion of current will flow to ground through the body. This will cause current imbalance in the GFCI transformer, which in turn will create current in the sense coil. The control circuit will detect this condition and trip the main circuit breaker (typically within 25 milliseconds). The GFCI trip threshold usually is set as low as ± 5mA, so it is supposed to de-energize the outlets before serious shock occurs.

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WHY IS GFCI TRIPPING WITH TRANSFER SWITCH?

In generators equipped with GFCI, the frame is bonded to neutral (otherwise, GFCI would not function). In the transfer switch the neutral is also bonded to ground. As the result, a portion of neutral current flows through the ground lead of the generator cable, which causes an imbalance of GFCI transformer, which treats it as a fault. To fix this problem you need to remove second ground connection of generator's neutral, i.e. to make neutral grounded only in one place. This can be accomplished in a number of ways.

SOLUTIONS TO GFCI PROBLEM:

Option 1. Open generator cover and remove neutral bond jumper wire. This disables GFCI. Attach a label stating "Neutral Unbonded". If later on you will need to use this generator elsewhere without a transfer switch, you should re-install the neutral bond before use, since it is not safe to operate it without GFCI.

Option 2. Inside your transfer switch lift the ground wire coming from generator inlet (isolate the loose end). Your genset will still be grounded via its neutral wire in generator cord. Attach a label stating "Ground Disconnected". If you later will need to connect a different generator without bonded neutral, you will need to re-connect the ground wire in transfer switch before use.

Option 3. Install Switched Neutral Kit (such as Generac model 6297 that sells for about $100), which can upgrade most manual transfer switches from continuous neutral to switched neutral. When the transfer switch is in GEN mode, the kit disconnects generator's neutral from utility.

Option 4. Install a 3-pole (neutral switching) transfer switch, such as Eaton CH10GEN503 that sells for about $500.

For the above Options 3 and 4 the installation just like any wiring should be done by a licensed professional.

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