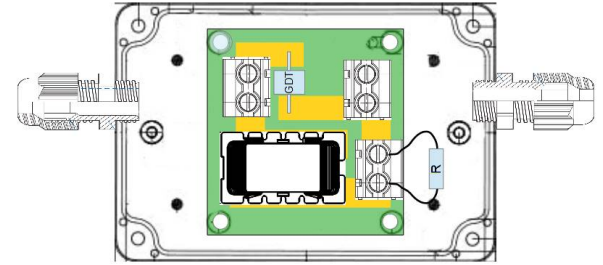


McAfee NCB Protocol

Video: Installing the Nuisance Current Blocker



Zipse's Law: "In order to have and maintain a safe electrical installation: All continuous flowing current shall be contained within an insulated conductor or if a bare conductor, the conductor shall be installed on insulators, insulated from earth, except at one place within the system and only one place can the neutral be connected to earth.¹

How Does Current Get onto our Grounding System?

- 1) The equipment grounding conductor used as a neutral on the load side of the main disconnect which violates at least NEC 250.24 and 250.142.
- 2) Ground loops: A grounding conductor, water/gas bond, a coolant line that connects the service and a sub-panel or connects two service panels together will allow neutral current or grid current to flow.
- 4) Primary return current (PRC), local AM radio stations, neighborhood secondary side open neutral current, uncleared faults, will use the water pipe, cable Internet, phone bond, and any conductive path connected to your grounding system and travel through the earth/soil, back to its source, through two earth reference points.
- 5) From a motor or appliance leaking current to its equipment grounding conductor, especially Variable Speed Drives or Variable Frequency Drives (VSD, VFD).

Always amp clamp (<1mA) the branch circuit hot and neutral together to check for an imbalance (like a GFCI) to see if the leakage/nuisance ground current is from that circuit (a local source) or is coming from another circuit, ground loop, or a foreign source, (water pipe, cable internet or grid, etc).

¹ Zipse, D.W.. (2003). The Hazardous Multigrounded Neutral Distribution System and Dangerous Stray Currents. 23 - 45. 10.1109/PCICON.2003.1242596.

First, Find Current Sources and Fix the Wiring Problems (allow 3+ days with electrician)

1. NFA 1000 9 Point Bed Map (a “before we start” snapshot of the conditions)
2. Amp clamp the GEC, main EGC feed and Service Neutral (power on) and record levels. Same with power off. Confirm the neutral at service is working properly (low impedance). See [The Water Pipe Solution](#) for hot pot or hair dryer test.
3. Add meter/disconnect combo if needed. See [Meter/Disconnect Installation Notes](#).
4. Separate N/G (neutrals from the equipment grounding conductors) after meter/disconnect. See [Addendum IEEE 1695](#)
5. Complete panel diagnostics and correct all N/N and N/G wiring errors in sub-panels. See [EMF Tracing 102](#).
6. Cut water pipe and plumbing drain if metal, insert PVC or PEX to stop all foreign current. See [Water Pipe Solution](#).
7. Bring all earth/ground bonds and references to one point, the GEC Intersystem Bonding Termination (cable internet, Lightning, Dish or other antenna, phone bond, solar panels, metal roof, etc. These foreign sources will not trip a breaker. They may require a lightning arrestor, ground loop isolator or NCB.
8. Once all foreign current has been removed, clean the contacts on the grounding electrode conductor or replace existing ground rods with two new ones, 16 feet apart. Then, see if 1/0 copper stranded GEC is an improvement. **Use NFA 1000 to confirm reduction in magnetic fields, or not.**
9. Reroute Romex wires, Metal Clad (MC) cable, anything with grounding conductors, away from pipes, motors, appliances, doorbell transformers, electric panels, anything that creates an electromagnetic field.

Standards for EMI E176-1017²

- 13.6.9 Identify conductors (VFD) with the highest levels of emission and physically separate them from other wires.
- 13.6.10 Route power line and ground wires at least 30 cm (~1 ft.) away from other wires.

10. Metal framed or aluminum sided homes (tiny houses, house trailers, steel barns, etc.) are especially problematic. The Service panel and mast head must not be bolted to the metal siding or metal frame. The appliances must not be bolted to the metal siding or grounded frame or we will certainly need the NCB on their equipment grounding conductor.

2 <https://store-us.semi.org/products/e17600-semi-e176-guide-to-assess-and-minimize-electromagnetic-interference-emi-in-a-semiconductor-manufacturing-environment>

Install the McAfee Nuisance Current Blocker (NCB)

As per allowed by **NEC 250.6(B)** and **(E)** and **SEMI E176**: Also see Addendum IEEE 1695.

Standards for EMI E176-1017

13.6 *Mitigation of Conducted Emission Recommendations*

13.6.5 Install ground filters in line with internal grounding of the equipment.

At all times, the goal is safety and good health. Wear gloves and safety glasses. Licensed electricians need to do the electrical work.

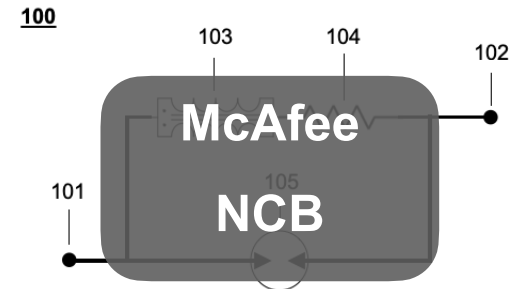


FIG. 1

- 1) **NFA 1000 9-Point Bed Map**: Update the records to track the changes made immediately before and after installing the NCB.
- 2) **Indoors**: Fig. 2. NCB plug version at outlet. Plug in grounded object (grounded bed sheets, grounding mats, RF shielding paint, static discharge mats, etc.) into the EGC outlet of the NCB. Test the room electric field with an NFA 1000 and contact current levels with a Fluke 287/289 before and after installation. Body voltage testing with a multimeter is not an accurate means of measurement.
- 3) Turn power off to rooms using RF shielding paint. Removing electric fields with grounding cords is best only for appliances (laptops, frames, etc.), not humans! Do not touch any wire associated with your electrical system.
- 4) **Outdoors**: Fig. 3. On any equipment grounding conductor that has circuit breaker protection, add the NCB in line/series. Install in either sub-panels or appliance cabinets that still have current after all the repair work is done.
 - a) Well pump (321), Sump pump, flood drain grinder pump or sewage pumps
 - d) Heat/AC air handler with grounded 24V transformers, or from inductive current on pipes, etc.
 - e) Any phone bonds/grounding conductors still carrying current (or from shielding paint, auxiliary grounding, etc.)
 - f) VSD, VFD appliance equipment grounding conductors
 - g) Pool grid bonds or in pool pump motor sub-panel. Remove all lighting and electrical sources from pools.

Be sure to tape up or insulate the bare copper wires that were carrying current to make sure they don't touch the cabinet! You can take a Romex sheath sleeve and pull it over the bare wire so it won't touch other wires.

5. **Isolate Home from Service Neutral/Grid Noise**: Get power company to install a neutral isolator on transformer (See Dairyland Neutral Isolator), or you install an isolation transformer, like Controlled Power Company's ULTRA-K Series 600K-he High Efficiency, K-Rated, Power Conditioning Transformers.

Indoor Applications

Wired Version Consideration

(It really doesn't matter which way it is used. It will be effective either way)

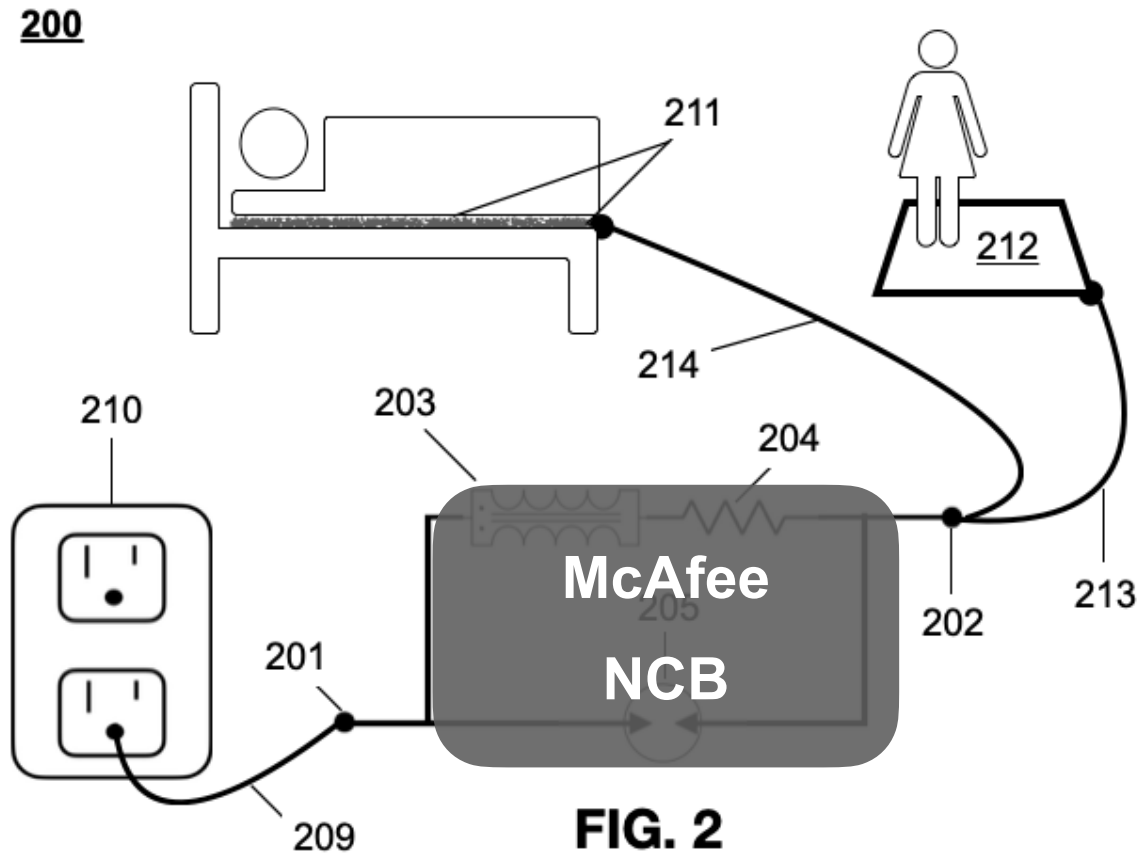
201 is consider the "IN" direction

202 is considered the "OUT" direction

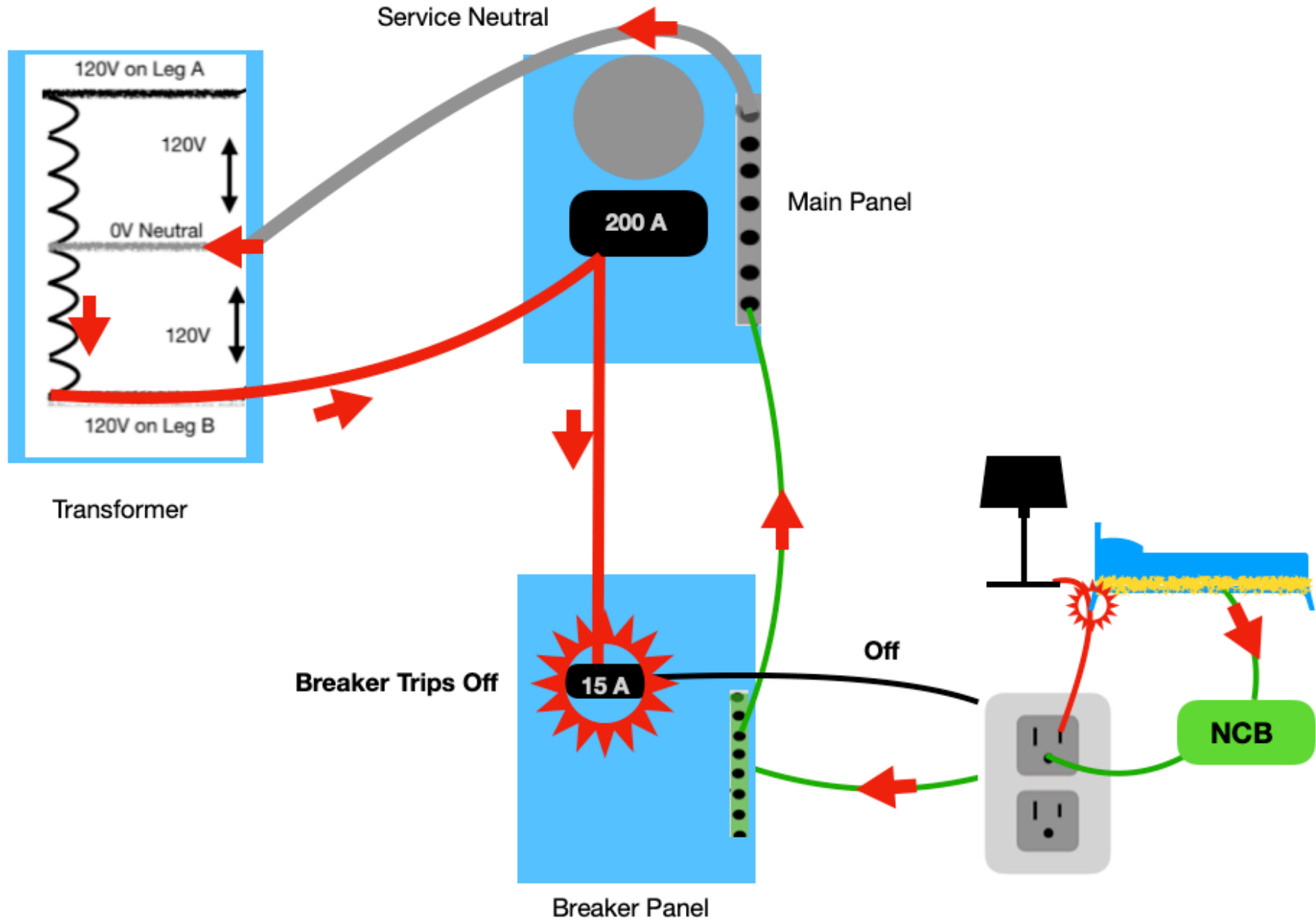
201 is dirty and the noisy end.

202 is the protected and clean side.

201 line of the NCB has a colored piece of tape on it to help you optimize the installation. The taped wire goes toward the outlet 210.



The NCB provides an Effective Ground-Fault Current Path to quickly trip a breaker in case of a fault condition.



Outdoor Applications (or Inside Cabinets and Subpanels)

301 is consider the “IN” direction

302 is considered the “OUT”
direction

301 is dirty and the noisy end
towards the appliance.

302 is the protected and clean side
towards the panel and the rest of
the circuits you want to protect.

301 line of the NCB has a colored
piece of tape on it to help you
optimize the installation. The
taped wire goes toward the well
pump 321.

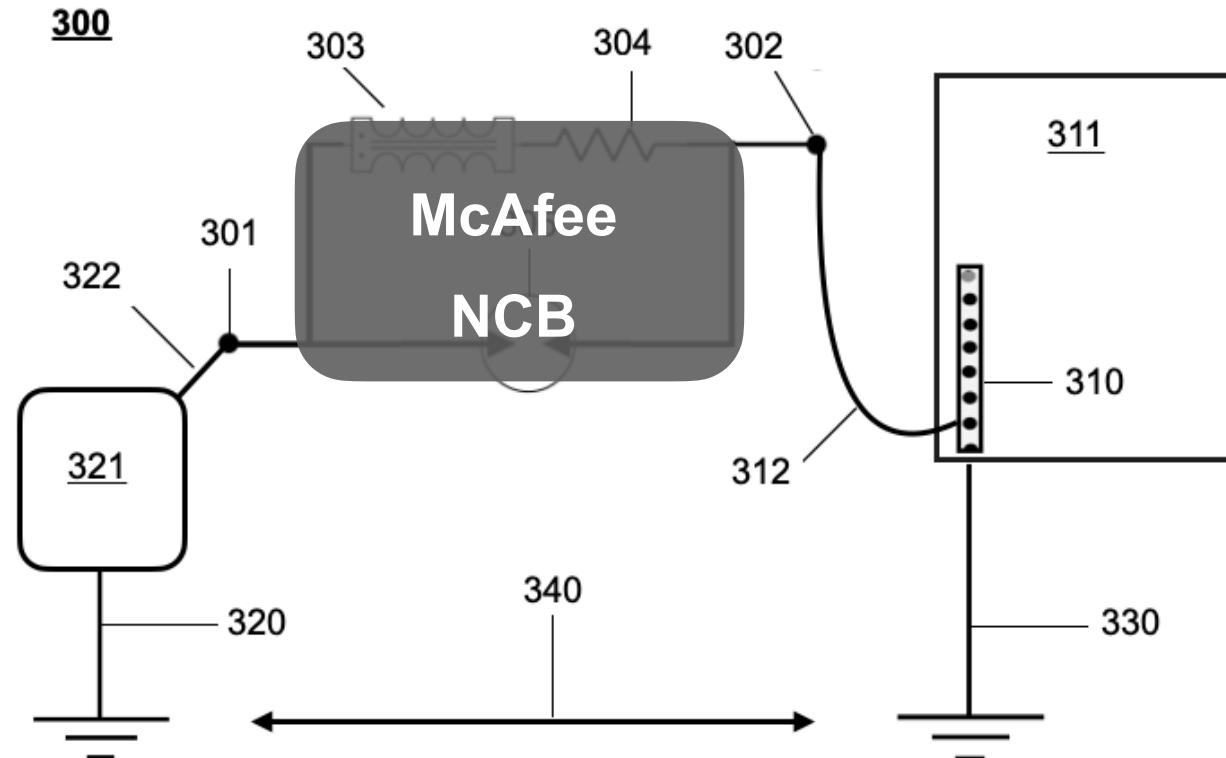
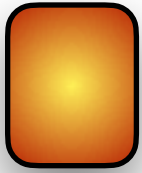


FIG. 3

Remove Current Loops



Loops on any system, especially the grounding system, will allow current to flow as a loop is a circuit. See [Addendum IEEE 1695](#). Some appliances leak current to the EGC when running, but this won't show up in a N/G continuity test with the power off.

The water bond and gas bond may be retired as we will replace that code requisite with another section of the code which allows the equipment grounding conductor, from the appliance served, to be the qualifying bond.

Cutting the water pipe eliminates it as a qualifying "electrode" so is no longer required to be bonded within five feet of entering the basement wall. Ensure the water pipe is connected to an appliance with an EGC sized adequately to remove fault current. See [Water Pipe Solution](#) for supporting code and numerous details. Always confirm the Neutral is good.

Gas pipe will need to have a dielectric union installed to insure no current either AC/DC will enter the wiring premises. And, add as many dielectric unions at the junctions to ensure that there are no loops, only home runs on each section of the pipe back to an appliance EGC to clear any potential faults, or provide adequate bonding for lightning or grid surges to go to earth (GEC) at the intersystem bonding termination only, not back into the home wiring.

Solar panels may have their own earth references if installed on pole mounts. Same principle. No loops. No current.

Propane tanks with buried lines, secondary sheds, remote garages or workshops with ground rods, buried bunkers, safe rooms, or anything that connects to the earth other than the one GEC at the service, will bring in PRC, increasing magnetic fields and adding to ground current loops. You want one earth reference point (2 ground rods acting as one).

Dirty Electricity / Transients / Harmonics

RESULTS

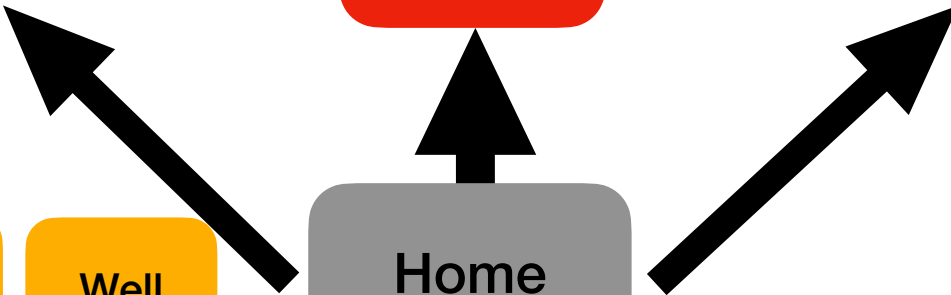
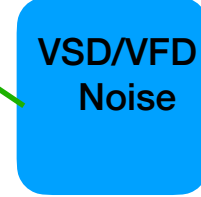
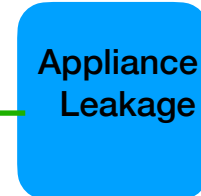
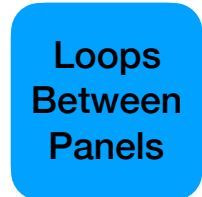
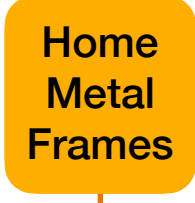
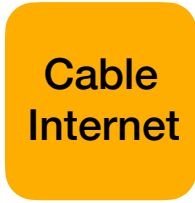
Magnetic Fields

>1 uA Contact Current

Electric Fields

“Foreign” Uncontrolled Sources

Local and Controllable



Less Dirty Electricity / Transients / Harmonics

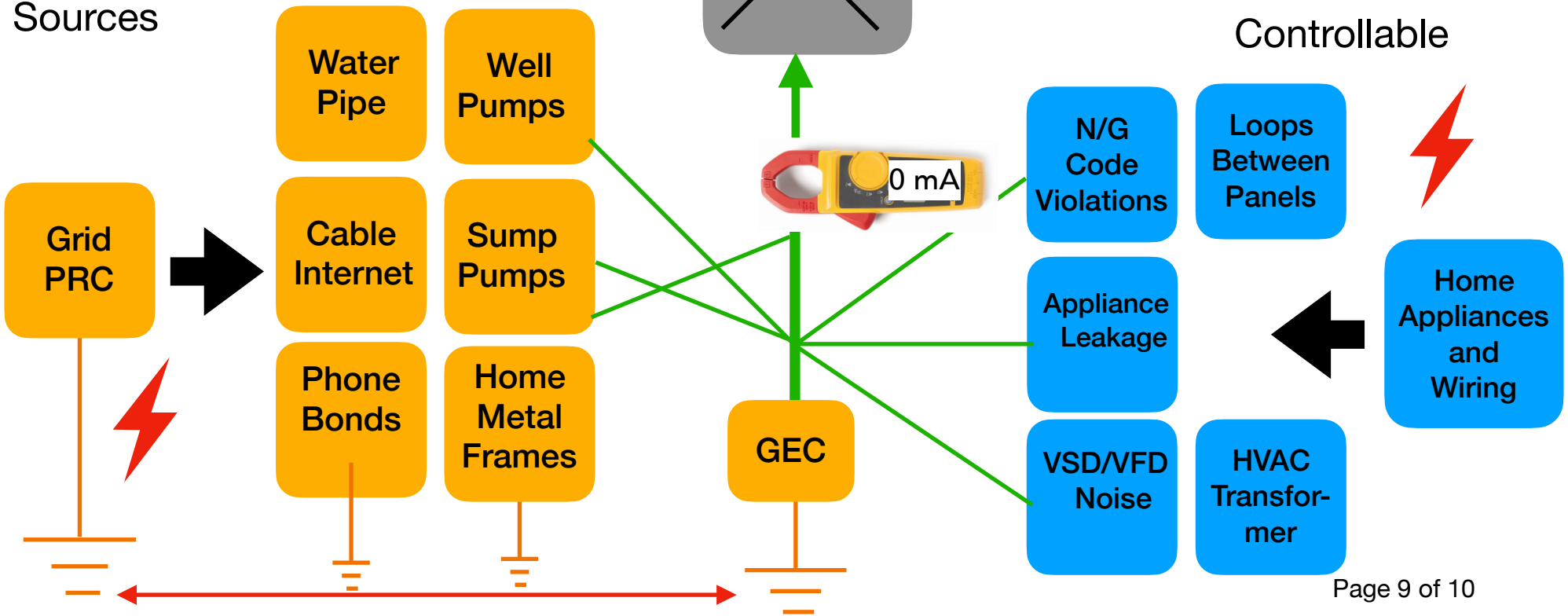
RESULTS

Reduced Electric Fields

~~Home Current~~

“Foreign” Uncontrolled Sources

Local and Controllable



In the end, always check the resulting electric and magnetic fields with the NFA 1000. That is the bottom line to accomplish, a reduction. Because this is such a game of whack-a-mole, diverting the current to a different location or path around the sleeping area, may be the best we can accomplish.

As long as the target area (bedroom, home, etc.) has achieved its goal, we are going in the right direction. The NFA 1000 and using its bed-map program and the Fluke 287/289 for contact current are the best tools that I know of to confirm, not multi-meter voltage tests (AKA body voltage meters).

Ensure there are effective ground-fault paths to trip breakers, as fast as possible. Safety, our health is the highest priority, above all. If you are unsure of the results or the process or don't have the equipment to confirm results, do not install the NCB. Set up a consult call to get training as needed.

Attend the available training programs and NCB zoom calls before installing. This is cutting edge and controversial work and specifically created and designed to help the electrically sensitive achieve a healthier environment than what can exist only through the NEC, even under its most ideal conditions.

Be wise about who you share this information with. Many will reject it and attack us as they don't understand the information, or the reasons, or its importance. The "just add a ground rod" mentality is the world we live in. Mike Holt is working tirelessly to change that towards the better. See this video and read/watch all the prep materials.

The NCB is a last ditch effort to save lives because the "code" has failed to effectively protect us. Exhaust all other options first and learn about the options provided in 250.6(B) and (E), SEMI and IEEE 1695.

Thank you for walking this path with me. Little by little, we can help those that have no other options. - Andrew M. McAfee

