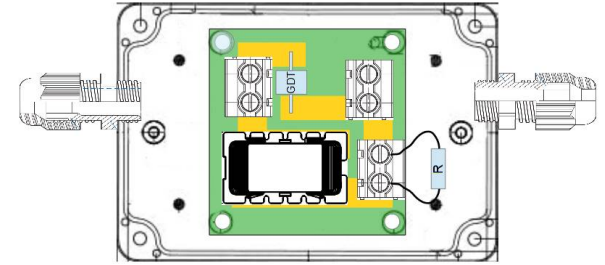


# McAfee NCB Protocol

## 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.<sup>1</sup>

## How Does Current Get onto our Grounding System?

The 4 Most Common Ways:

- 1) A neutral to equipment grounding conductor connection on the load side of the main disconnect which violates at least NEC 250.24 and 250.142.
- 2) A grounding conductor or water/gas bond connecting two service panels together.
- 3) Any grounding conductor making a loop with a pipe, a coolant line or appliance between the service and a sub-panel.
- 4) Foreign current sources like from primary side transformer return current, or Primary Return Current (PRC), local AM radio stations, secondary side open neutral current, will use the water pipe, cable Internet, phone bond, and any conductive path connected to the grounding system and travel through the earth/soil, back to its source.
- 5) A motor or appliance leaking current to its equipment grounding conductor, especially Variable Speed Drives or Variable Frequency Drives (VSD, VFD)

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

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# 1st, 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) Power company/electrician confirms neutral is working properly.
- 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) Panel diagnostics and correct all N/N and N/G wiring errors in sub-panels.
- 6) Cut water pipe and plumbing drain if metal, insert PVC or PEX to stop all current from outside home. See [Water Pipe Solution](#).
- 7) Upgrade Grounding Electrode Conductor (GEC) with 1/0 copper stranded insulated conductor. Confirm two electrodes (ground rods). Add Intersystem Bonding Termination (IBT) if needed and connect all cable and phone bonds.
- 8) Bring all earth/ground bonds and references for lightning strikes to the GEC IBT including, Cable Internet, Lightning array, Dish or other antenna, Phone bond, Auxiliary grounding systems for solar panels, metal roof, etc. These will not trip a breaker. If they are carrying current, they will require a ground loop isolator or NCB.
- 9) Reroute Romex wires, Metal Clad (MC) cable, anything with grounding conductors, away from pipes, motors, appliances, doorbell transformers, electric breaker panels, anything that creates an electromagnetic field.

## **Standards for EMI E176-1017<sup>2</sup>**

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 must not be bolted to the metal siding or frame. The appliances must not be bolted to the frame or we will certainly need the NCB on their equipment grounding conductor.

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<sup>2</sup> <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)

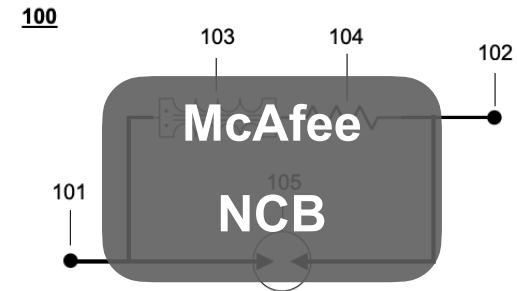
As per allowed by **NEC 250.6(B)** and **(E)** and **SEMI E176**: Also see Addendum IEEE 1695.

## 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.

- 1) **NFA 1000 9-Point Bed Map:** Update the records to track the changes made with 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. #1 rule: 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.
  - 3) **Outdoors:** Fig. 3. On any equipment grounding conductor that has circuit breaker protection, add the NCB in line/series. Can be install in either sub-panels or appliance cabinets that still have current after all the repair work is done.
    - a) Well pump (321)
    - b) Sump pump
    - c) 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.
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- FIG. 1**



**FIG. 1**

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

4. **Isolate Service Neutral Noise:** If power company will not install a neutral isolator, or cannot use an isolation transformer, certain clients may qualify for a specially made NCB model installed on main EGC feed, after the neutral bond at the service, to block PRC neutral/grid frequencies from entering the equipment grounding conductor system.

## Indoor Applications

201 is consider the “IN” direction

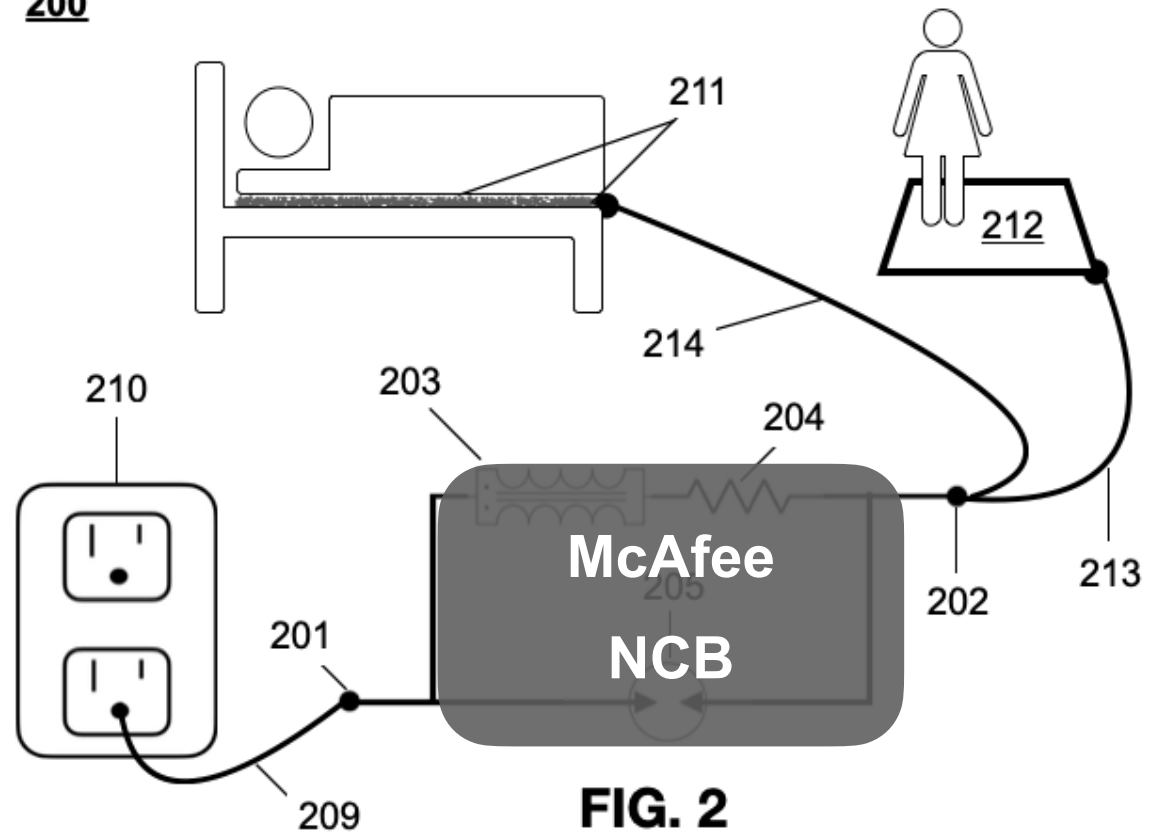
202 is considered the “OUT” direction

201 is dirty and the noisy end.

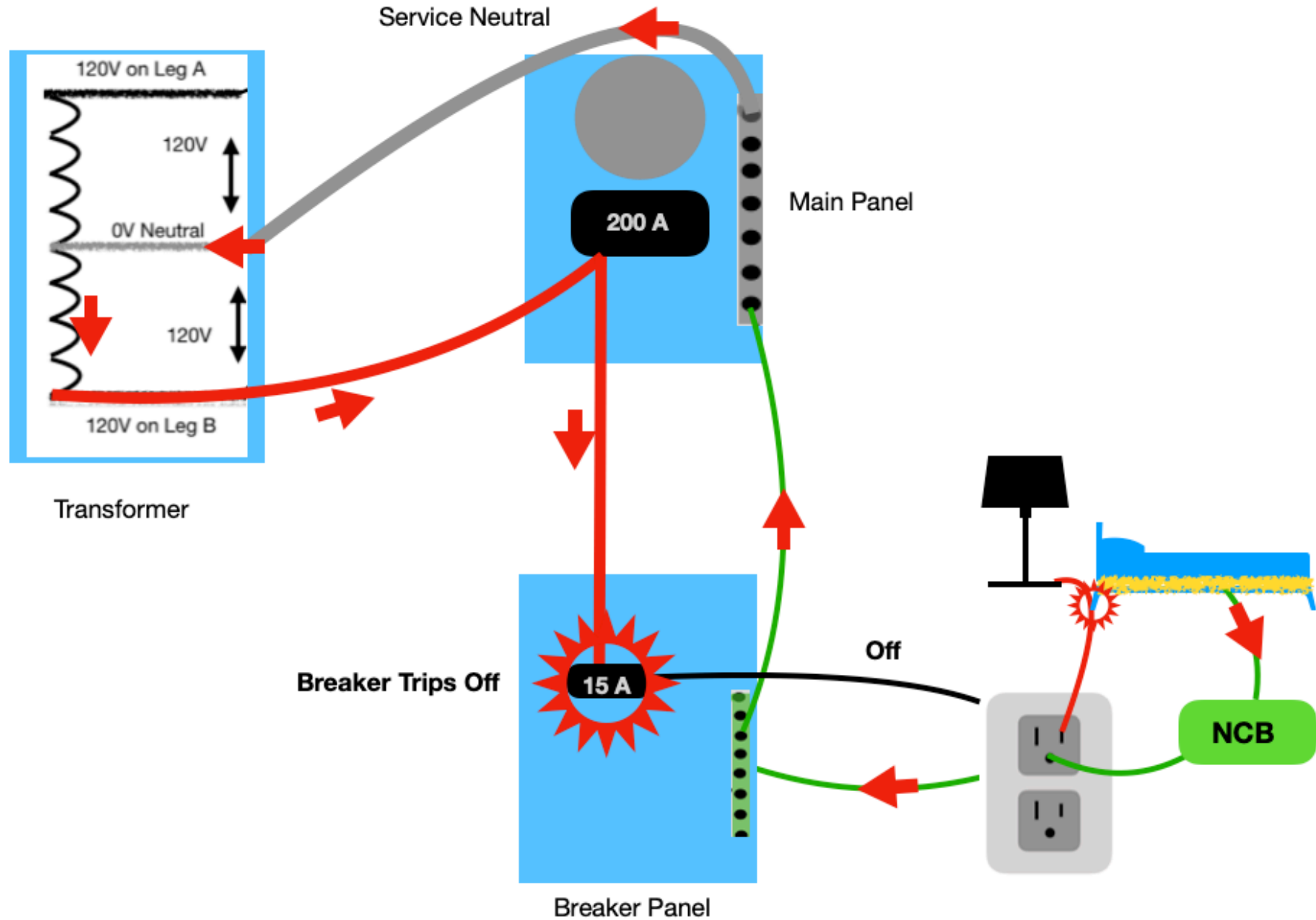
202 is the protected and clean side.

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.

**200**



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)

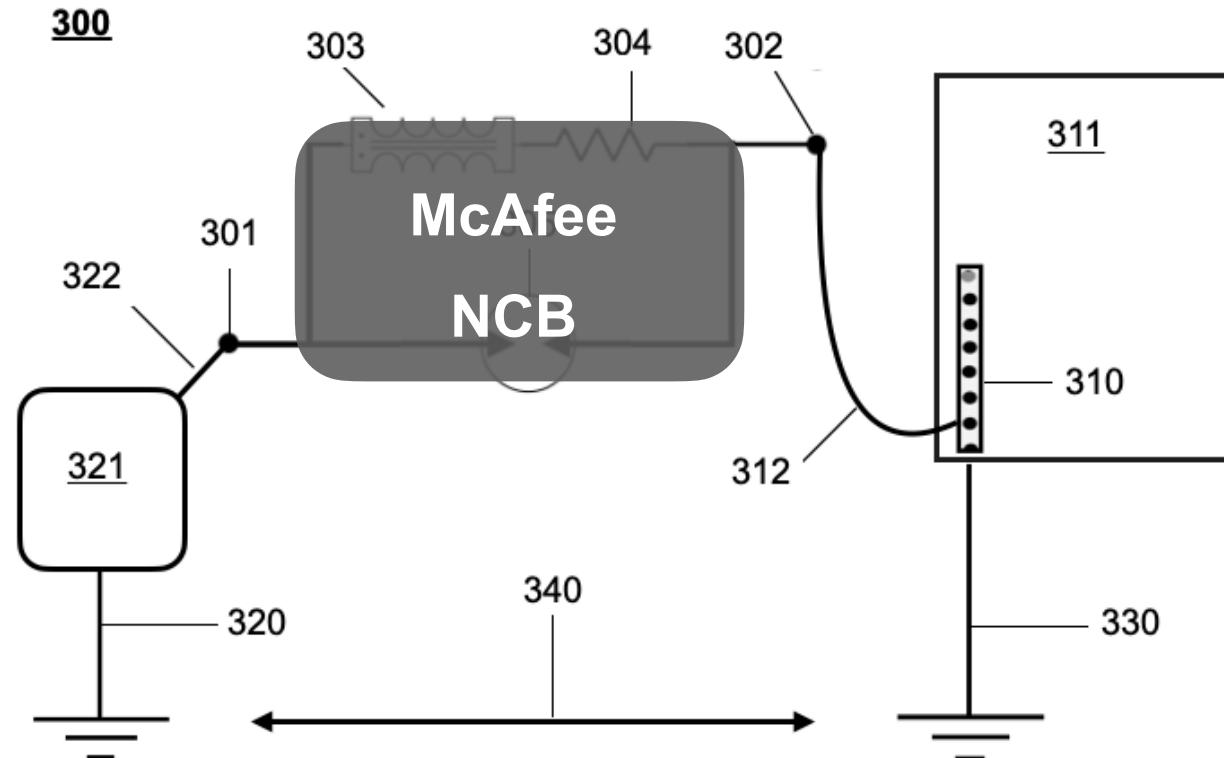
301 is consider the “IN” direction

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.

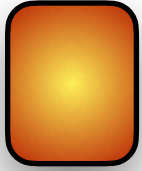
301 line of the NCB has a colored  
piece of tape on it to help you  
optimize the installation. The  
taped wire goes toward the well  
pump 321.



**FIG. 3**

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## 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 allow 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 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 directly to earth (GEC) at the intersystem bonding termination only, never back into the home wiring.

Pool bonds, pool lighting equipment, and pool pumps EGC are all bonded together by code. They will bring NEV and PRC into the home. Pool lights will have a path back to the sub-panel with PRC. Cut pool lighting circuits and replace with floating battery operated night lights as needed. No electricity in or around the pool.

The pool pump motor probably needs an OnFilter VFD motor filter installed to reduce the harmonics and dirty electricity. Even if there is no NEV/PRC or code violations putting current onto the grounding system, a VSD or VFD motor will leak dirty electricity noise and current onto the grounding system and end up in the pool water, saturating people with dirty electricity.

After that, the NCB should be installed where the PRC is best removed, either on the pool pump EGC or at the sub-panel. The pool equipotential grid and the pool motor are still solidly bonded. Stop that PRC from circulating into the home.

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 GEC at the service will bring in PNC, will increase magnetic fields and add to ground current loops. You want one earth reference point (2 ground rods acting as one).

# Dirty Electricity / Transients / Harmonics

RESULTS

Magnetic Fields

>1  $\mu$ A  
Contact Current

Electric Fields

Home Current

Local and Controllable

“Foreign”  
Uncontrolled Sources

Grid  
PRC

Water  
Pipe

Well  
Pumps

Cable  
Internet

Sump  
Pumps

Phone  
Bonds

Home  
Metal  
Frames

GEC

N/G  
Code  
Violations

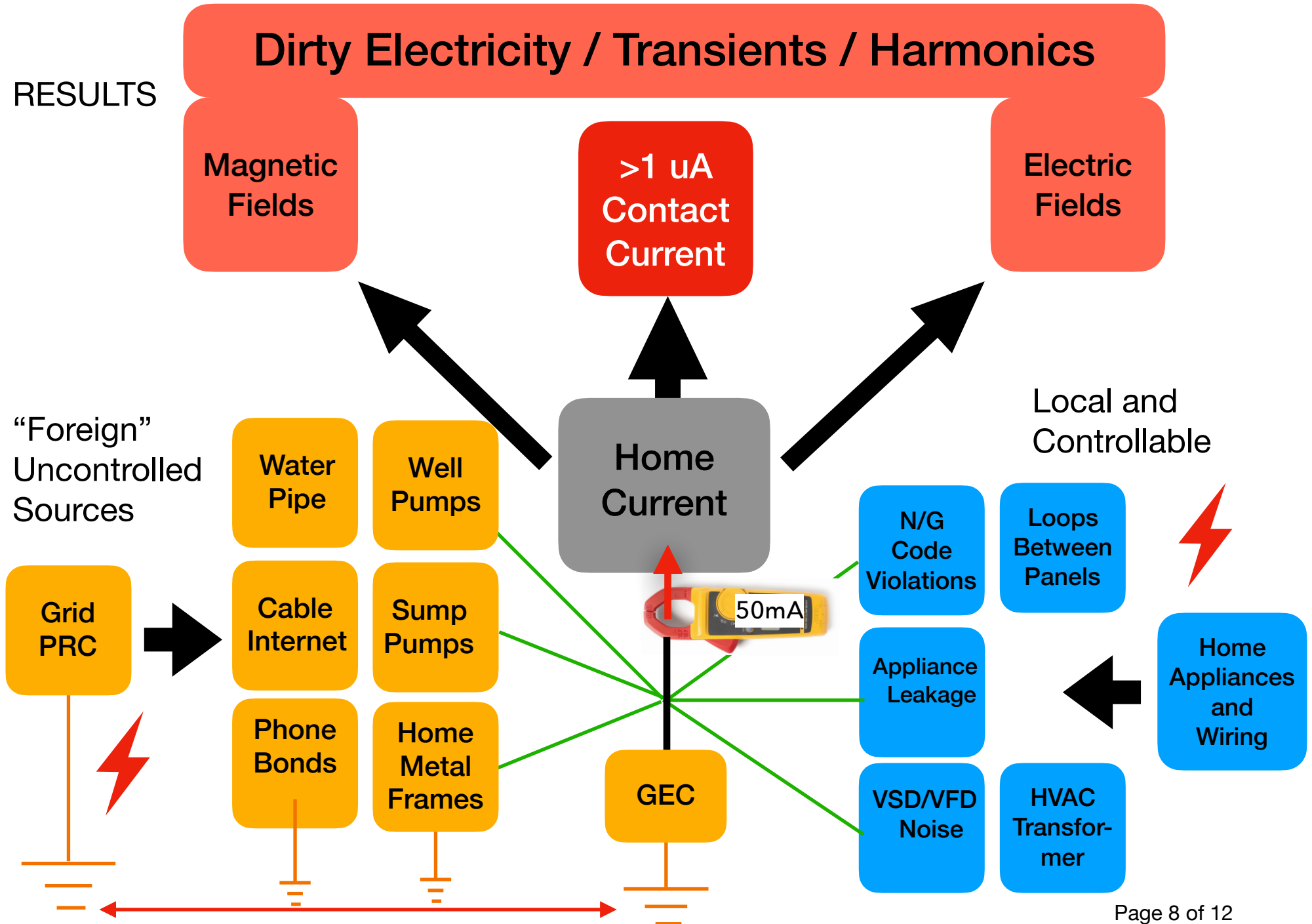
Loops  
Between  
Panels

Appliance  
Leakage

VSD/VFD  
Noise

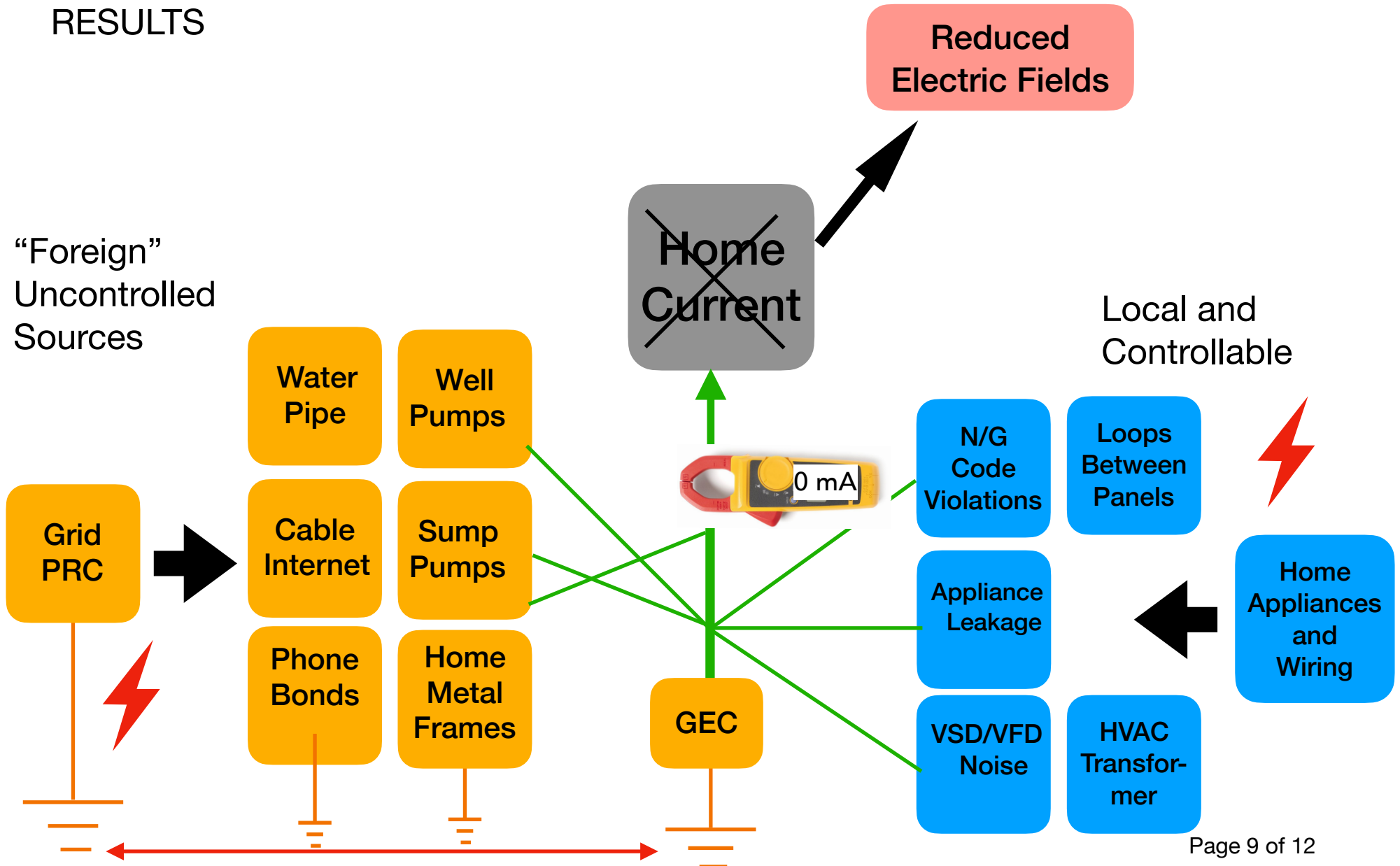
HVAC  
Transfor-  
mer

Home  
Appliances  
and  
Wiring



## Less Dirty Electricity / Transients / Harmonics

### RESULTS



In the end, always check the resulting electric and magnetic fields. That is the bottom line to accomplish. Because this is such a game of whack-a-mole, diverting the current to a different location 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 is the best tool that I know of to confirm the results.

Ensure 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, do not install the NCB. Set up a consult call to confirm as needed.

Attend training programs and zoom calls. This is cutting edge work and specifically created and designed to help the electrically sensitive achieve a healthier environment.

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 for its existence. The "just add a ground rod" mentality is everywhere. It is the world we live in.

The NCB is a last ditch effort to save lives because the "code" has failed to effectively protect us. Those that live by the "code" will need to 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.





