IEEE Update
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IEEE Activity

- IEEE Std 1100™-2005
- IEEE C62.72
- IEEE Guide – Protecting Residential
- IEEE SPDC (including 10x350 Forum)
IEEE Activity - 2

- IEEE papers
- IEEE meeting minutes
- Other
Human safety first
Engineers at work

See clip

From Internet; Courtesy Dilbert, Comedy Central
Grounding and bonding

Grounded

Bonded

Grounding

Bonding
Grounding frequencies

- Power system sub-harmonics and offset (dc to 60 Hz)
- Power system harmonics (from 120 up to 3 kHz)
- Analog communication circuits (from a few up to hundreds of kHz)
  - Single point grounding for low voltage level circuits
- High-speed digital circuits (high kHz to GHz)
  - Single and multi-layer planes (common surface) on PCB
1) Safety
- Reduce fire hazard
- Prevent electric shock
- Avoid equipment damage

2) Lightning and Surge Mitigation
- Control transients
- Remove static charge
- Bond between all services
- Equalize surge reference points

3) Performance
- Control current paths
- Equalize voltage reference
- Reduce communication noise
Grounding myths

❖ Myth

1. Current takes the path of least resistance

2. Ac and dc “noise” goes into the earth ground and stays there

3. Lightning never strikes twice in the same place

❖ Fact

1. Current paths are controlled by impedance

2. Currents into the earth always return to source (lightning and static discharge are a special large-scale case)

3. Lightning strike is an independent (probability) event
Special concern - headsets

Note 1: The AC SPD (TVSS) and the Tel/Data SPD (shown as separate external units) must be placed in close proximity to accomplish the function of a Surge Reference Equalizer (SRE). Alternatively, a multi-service (multi-port) SPD unit with an external grounding terminal may be utilized.

Note 2: AC supply cords have ACEGs.
Ground loop
Ground loop - 2
Common bonding network

- ACEG conductors
- Cable racks
- Metal water pipes
- Cable racks
- AC power conduits
- Building steel
- Reinforcing rods

Other intentional grid type structures

Other unintentional connections

CBN

Grounding Electrode System (GES)

T(M)GB

LPI 2007 West Palm Beach
Conducted Z variation

Inter-cabinet signal-common impedance

Frequency MHz

Impedance OHMS

0 50 100 150 200

Ground Wire

Ground Wire and SRG

Ref. CDC
Reflection