2008 NEC Study Guide For
"Grounding Separately Derived Systems"

(This Study Guide was prepared by Gaylord Poe)

What is a "Separately Derived System"?

NEC Art. 100 defines a Separately Derived System as "A premises wiring system whose power is derived from a source of electric energy or equipment other than a service. Such systems have no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system."

Are all Generator & Transformer Installations Separately Derived Systems?

- For **generator** installations, the connections in the transfer switch determine if a generator is a separately derived system. (*If the neutrals from the "normal" and the "emergency" and the "load" all tie together in the transfer switch the generator <u>is not</u> a separately derived system.*)

- For **transformer** installations, most premises wiring transformers that you encounter will be separately derived systems. (*The exception being a "Y-Y" transformer where the primary and secondary neutral conductors are tied together.*)

Determining whether or not an installation is a "separately derived system" is extremely important so that proper and safe system grounding can be achieved. For example, if a system is not separately derived, a downstream connection of a circuit conductor to a grounding electrode system will have disastrous results. Separately derived systems require a separate grounding electrode conductor and non-separately derived systems (generators and transformers with a direct neutral-to-neutral connection with the service) do not require a separate grounding electrode conductor because the neutrals **<u>are already connected to a grounding electrode system</u>** through the common neutral connection.

Grounding Separately Derived Systems –

The rules for establishing the grounding electrode system for a separately derived system are very similar to the rules for the grounding of services. Some of the applicable code sections are listed at the end of this section.

<u>*Some of the similarities are:*</u> If there is a neutral* (a *grounded* system) it must be bonded and grounded. It must be connected to a grounding electrode system via a grounding electrode conductor. This connection can be upstream but not downstream of the system overcurrent device. A system having no neutral (an *ungrounded* system), must also be connected to a grounding electrode system in like manner. The grounding electrode

conductor for either system must be sized in accordance with the size of the secondary conductors using the same table that is used for sizing grounding electrode conductors for service installations. (*Note: Be sure and read 250.20(B)...you may have to "ground" a system even if you don't want to!)

Some issues unique to separately derived systems are: Using layman's terms, unlike grounding electrode systems for services, there is a "pecking order" of preferred electrodes. You must use ***the nearest*** one of the following – a metal water pipe or building steel (*Building steel must qualify as a grounding electrode.*). It's important to note that the only portion of a metal water pipe that qualifies for use (in most cases) is the first 5 ft. after it enters the building. What if there is no "building steel" and the metal water pipe enters the opposite end of the building? Can you just drive a ground rod? **No.** A ground rod can only be used when "building steel" and a metal water pipe are not available on the premises. Additionally, **you must install bonding conductors to the metal water piping and other exposed structural metal in the area served by the separately derived system.**

250.20(B), 250.30(A), 250.30(A)(7), 250.30(B), 250.104(C) & (D).