Grounding Encyclopedia Article

Grounding

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Grounding is the method by which electric circuits and other equipment are electrically connected to the earth. Grounding serves two purposes: to maintain an approximately constant **voltage** reference (usually designated as zero voltage) and to provide a charge reservoir (capacitor) for diverting dangerous or unwanted current and removing undesired static electric charges. Ground (or earth) refers to any point in a circuit that is grounded.

Electric instruments and equipment are frequently housed in a grounded conducting (metal) case, both to shield circuits from external electromagnetic **interference** and to reduce the risk of causing electric shocks, fires, and other accidents. Selected points in internal circuits are then grounded by connecting them via conductors to the grounded housing.

Modern jacks in most household **power** supplies provide three connections: two terminals that supply the alternating current, and a grounding wire. An alternating voltage is supplied between the power terminals, which in most households worldwide is typically 110 or 220 volts. The ground terminal (the third pin) is grounded locally and is used to ground the metal housing of many appliances, to help to prevent electrical accidents.

Lightning rods are a dramatic example of grounding: through a conductor between a lightning rod and the ground, current from a lightning strike on the rod can be safely diverted to the earth to prevent property damage or injury.

The term "virtual ground" refers to a point in the circuit that is held to the local ground voltage by an active electronic component, such as an operational amplifier. Unlike an ordinary grounded terminal, which is usually expected to behave as a voltage source, a terminal held to virtual ground may offer very high input impedance (i.e., accept very little current).

Complicated grounding techniques can be required to avoid ground-related electrical problems such as external interference and ground loops. Interference from nearby power supplies or from other strong electromagnetic signals emitted by nearby equipment and natural electromagnetic phenomena can produce local variations in ground voltages. These ground fluctuations can cause undesirable currents between different parts of a circuit that have been grounded at different locations, and thereby interfere with the circuit's intended function. Any unintended loop of current that passes through ground wires or the earth itself is known as a ground loop.