

# Multimeter Notes:

## I. DC current

DC stands for “direct current”. DC is most commonly created chemically as in a battery. You will find it in automobile electrical systems, portable applications like cordless drills and phones, and in your emergency generator starting and control systems.

You are unlikely to encounter DC power above 24 volts. Most generators use 12-volt systems but some use 24-volt systems. To work with DC current set your multimeter to the DCV-20 or DCV-200 scale. You should not use the 200m or 2000m scales. You will not need the DCV-1000 scale. If you think you do, get a second opinion. DC above 30 volts can be real nasty.

## II. AC current

AC stands for alternating current. This is most commonly found in household or commercial power applications. It is created mechanically.

AC current alternates typically from 120 volts positive from neutral to 120 volts negative from neutral. This same voltage can be measured as 240 volts line to line. AC is used to drive most of our power applications because it is easily generated, can travel long distances at high voltage with little loss, and can be readily transformed from very high transmission voltages to usable standard voltages.

This is the power your generator is designed to make. Unlike DC it is only available from your generator when the engine is running. Some AC may be present at the generator when the engine is not running because the

battery and coolant heater must be supplied with AC power from the normal utility service.

Standard AC systems are 120/240 single phase (as in house wiring), 120/240 three phase, 120/208 three phase, and 277/480 three phase.

**120/240 single-phase** current uses two “hot” conductors and one neutral. The voltage is measured 120 volts from either “hot” conductor to neutral and 240 volts from one “hot” conductor to the other “hot” conductor.

**120/240 three-phase** current uses three “hot” conductors and one neutral. The voltage is measured 120 volts from A or C phase (hot conductor) to neutral, around 200 volts from B phase to neutral, and 240 volts from A to B, B to C, and C to A. This type system uses a “Delta” configuration for the generator windings.

**120/208 three-phase** current uses three “hot” conductors and one neutral. The voltage is measured 120 volts from A, B, or C phase to neutral, and 208 volts from A to B, B to C, and C to A. This type system uses a “Low Wye” configuration for the generator windings.

**277/480 three-phase** current uses three “hot” conductors but seldom uses a neutral. When a neutral is used the voltage is measured 277 volts from A, B, or C phase to neutral, and 480 volts from A to B, B to C, and C to A. This type system uses a “High Wye” configuration for the generator windings. It is most commonly used for large motors and heavy industrial lighting.

To measure AC voltages with your multimeter, set the dial to either the 750 or 200 ACV setting.

### III. Ohms

This scale is symbolized by an omicron ( $\Omega$ ) the Greek letter for “O”. It measures resistance to the flow of electrons in a conductor; the lower the number the less the resistance.

If you had, for example, a wire that was 100 feet long and had a resistance value of one ohm per foot it would measure 100 ohms resistance. If that wire was wound around in a coil and the insulation rubbed off so that the coils touched, that coil would be “shorted”. Or a “short circuit” would exist. The electrons through the wire would no longer have travel the full length of 100 feet. If a 25-foot long loop was “shorted” out, the resistance reading would only be 75 ohms.

If you have the known value of a coil of wire (You can get this value from the manufacturer) like that in an electric motor, a generator, or a relay you can measure the resistance and determine if the circuit needs to be repaired.

Most generally, however, the ohms scale on a multimeter is used to determine continuity. **Continuity** is simply a test to see if a circuit is open (broken) or intact. You can use this function to test fuses; light bulbs, relay contacts, switches, wires, and a whole lot more.

To check continuity set your meter to 200 ohms. To check resistance you may want to use the other scales.

### IV. Current

Don't use this unless you'd like to find out how much smoke your multimeter can make.

### V. Diode Test

You can test to see if a diode is open or shorted. You can use the ohms scale for this just as well.

## VI. Transistor Test

I wouldn't bet on this being worth your time.