

## **Electronic Fundamentals Part I**

**Each individual ham has had a variety of electronic training. This series of tech talks is not meant to give everyone an in depth knowledge of electronics. It is intended as a refresher and to give an overview of electronics to those that may not have a significant knowledge of electronics. It is recognized that it will be difficult to give you in depth training in electronics in the time available during the PPRAA simplex net. This overview will cover some basic math involved in concepts like ohms law and power calculations. However, it is not the authors intent to burden you with extensive mathematics.**

**Electronics is based on the concepts of electricity and magnetism. If you learn the relation between the two you will have made a major start in understanding electronics as is used in the world of amateur radio.**

**Electricity is a form of energy. It powers lights, makes our toast, does a variety of work for us and powers our radios to include transmitting and receiving.**

**Everything around us is comprised of microscopic parts called atoms. These atoms are in turn comprised of several types of parts. We are interested in the part called an electron. Some materials such as copper, silver, gold, aluminum and iron are metals. Their electrons can easily move from one atom to another. These materials are known as conductors. Other materials such as glass, plastics and rubber have properties that prevent electrons from easily moving from one atom to another. These items are known as insulators. Other materials such as silicon and germanium have properties that under certain circumstances allow electrons to move about freely and under other circumstances prevents their free movement. These materials are know as semiconductors.**

**A basic principle of electronics is that like charges repel and unlike charges attract. Electrons are considered to have a negative charge. Thus electrons repel each other. With proper controls such as batteries, magnetic fields, and electrical wiring this property can be made to produce useful work and in turn make our lives easier.**

**This movement of electrons is not always the same. It can be made more or less. This movement of electrons is called current flow. This current flow is measured in amperes and is frequently referred to as simply amps. Two amps are twice the current flow of one amp and ten amps is ten times the current flow of one amp.**

**A milliamp is one thousandth of an amp and one microamp is one millionth of an amp. Also, one microamp is one thousandth of a milliamp.**

**As mentioned earlier we can change the amount of current flowing. It is changed by varying the force that pushes the electrons. This force pushing electrons is called voltage. It is measured in volts. The same mathematics relation applies to millivolts and microvolts as we discussed for milliamps and microamps.**

**One other factor controls current flow in a circuit. That factor is resistance. All conductors do not allow the same number of amps to flow with the same voltage applied to them. Some allow more and some less. In fact all conductors have some opposition to the flow of current.**

**This opposition is called resistance. The resistance of a conductor is determined by how readily current moves through it. This resistance to current flow is measure in ohms. Resistance is typically measure in kiloohms. One kiloohm is one thousand ohms and one megaohm is one million ohms and is one thousand times one kiloohm.**

**Next time we will talk more about the relationship of amps, volts and ohms. You will be introduced to ohms law. It is a simple math principle that shows their relations in numbers.**