What Is Direct Current (DC)? What Is Alternating Current (AC)?

Electric current can be direct current (DC) or alternating current (AC). Direct current such as the power from dry cells is characterized by a uniform direction of flow and amount (voltage) of electricity. Alternating current is characterized by direction of flow and amount of electricity that changes cyclically over time.

Long ago, static electricity was the only type of electricity known, but when batteries were invented, it became possible to use DC electricity. Generators were later invented, and it became possible to use AC as well.

**DC is an abbreviation for direct current.**

Direct current such as the power from dry cells is characterized by a uniform direction of flow and amount (voltage) of electricity. The symbols used in diagrams for batteries and DC power supplies are shown above.

**AC is an abbreviation for alternating current.**

Alternating current has direction of flow and amount (voltage) of electricity that change cyclically. The symbols used in diagrams for AC power supplies are shown above.

AC Frequency

How many times the direction of AC changes each second is called the frequency. The unit of frequency is Hertz (Hz). The frequency of commercial AC is 50 Hz in eastern Japan and 60 Hz in western Japan.

**Low Frequency and High Frequency**

AC with a relatively low frequency is referred to as low frequency, and that with a high frequency is referred to as high frequency, but generally, high frequency means AC with a frequency in the kilo-Hertz, mega-Hertz, or higher range.

Why is electricity distributed as high-voltage AC?

AC has the advantage of being easy to change to a different voltage using a transformer. DC distribution is used for some portions of the distribution route.

There Is No Such Thing as Perfect DC or AC

The voltage of a battery falls steadily. The discharge curves vary depending on the type of battery.

The voltage of AC from the outlet is not constant and can vary by 10 V more or less than 100 V.

The commercial AC from outlets is not stable. Commercial AC can become unstable depending on the load (electrical devices and so on) connected to the distribution network. For example, when all the houses in a neighborhood are using the air conditioning during the afternoon in the middle of the summer, the voltage drops. There are also momentary stoppages in distribution and distortion to wave forms caused by the addition of noise.

<Cases of instability in commercial AC>

When high-frequency AC is added in the form of noise, the waveform can become jagged like this.

Load

Things that are connected to power supplies and consume energy are referred to as “loads.” Specifically, loads include resistors, circuits, connection devices, and so on.

<The flow of electricity from generation to distribution>

When electricity is distributed at high voltage, the electric power losses (thermal losses resulting from the resistance of the power lines) are lower. AC has the advantage of being easy to change to a different voltage using a transformer (DC distribution is used for some portions of the distribution route).