Waveshape changes or distortions

Waveshape changes are caused by disruptions, which results in a deviation from an ideal sine wave at power frequency. The change in the waveshape can be due to notching, harmonics, dc offset etc.

1.6.1 Distortion (harmonics)

Distortion occurs when harmonic frequencies are added to the 60 Hertz (60Hz) voltage or current waveform, making the usually smooth wave appear jagged or distorted. Distortion can be caused by solid state devices such as rectifiers, adjustable speed controls, fluorescent lights, and even computers themselves.

At high levels, distortion can cause computers to malfunctions and cause motors, transformers, and wires to heat up excessively. Distortion is probably the most complicated and least understood of all power disturbances.

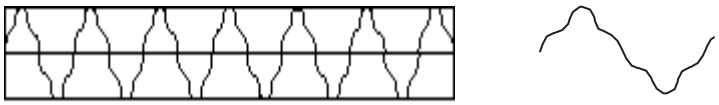

Figure 1.5 Harmonics Waveform

Major causes

Power electronic equipment, arcing, transformer saturation

Major Consequences

Equipment overheating, high voltage/current, protective device operations

1.6.2 Interharmonics

Interharmonics are defined as frequency components of voltages or currents that are *not an integer multiple* of the normal system frequency (e.g., 60 or 50 Hz).

The main sources of interharmonics are static frequency converters, cycloconverters, induction motors, and arcing devices. Power line carrier signals can be considered as interharmonics. The effects of interharmonics are not well known but have been shown to affect power line carrier signaling and induce visual flicker in display devices such as cathode ray tubes (CRTs).

1.6.3 Noise

Noise, or more specifically electrical noise, is a rapid succession of transients tracking up and down along the voltage waveform. The magnitude of these rapid transients is usually much less than that of an isolated transient.

Noise often originates in electrical motors and motor control devices, electric arc furnaces, electric welders, relays, and remote atmospheric discharges such as lightning.

Although less destructive than a large rapid transient, electrical noise can cause computers to malfunction and can interfere with the operation of communications equipment or other sensitive electronic equipment.

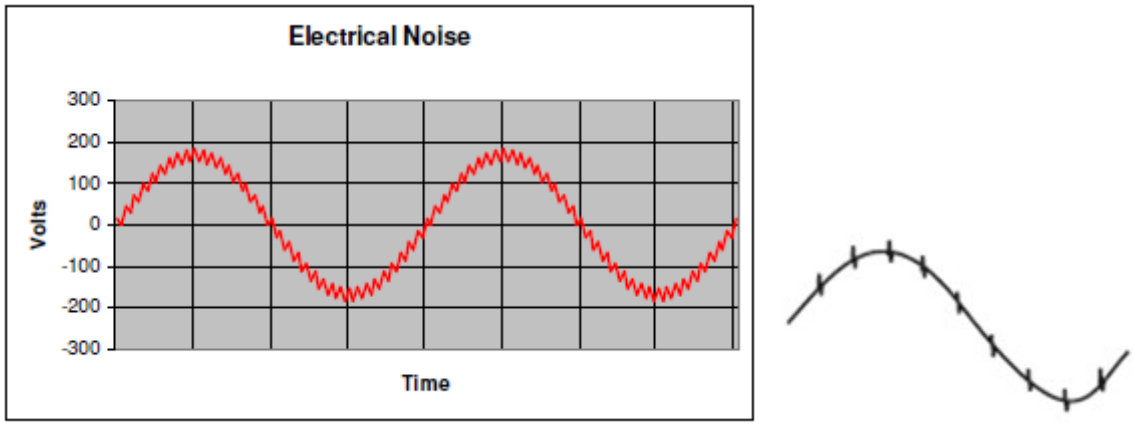

Figure 1.6 Noise Waveform

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