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## AC-DC AND DC-AC TRANSFORMATION

Not every electric appliance uses alternating current to operate. Most of the home appliances are powered up from AC network, but some of them have built-in rectifiers.

The diode bridge or bridge rectifier is the most simple device for transformation of alternating current to the direct pulse current. The essential feature of a diode bridge is that the polarity of the output is the same regardless of the polarity at the input. The diode bridge circuit was invented by Polish electrotechnician Karol Pollak and patented in December 1895 in Great Britain and in January 1896 in Germany. In 1897, the German physicist Leo Graetz independently invented and published a similar circuit. Today the circuit is still often referred to as a Graetz circuit or Graetz bridge.

Since about 1950, a single four-terminal component containing the four diodes connected in a bridge configuration became a standard commercial component and is now available with various voltage and current ratings.

Sometimes it is necessary to convert direct current into alternating one. This kind of transformation is not as widespread as first, but it is used in such conditions when it is not possible to reach the power network because of its remote location and when the usage of mobile fuel generators is not relevant or in some apparatuses.

The early DC-AC transforming devices were vibro transformers. They were represented as electromechanical devices. Their action was based on quick tripping of contacts and change of polarity with each their connection. It resulted in appearing of alternating current on external terminals. These apparatuses allowed converting low direct voltage from accumulators into low alternating voltage that could be transformed into high voltage with the help of high voltage transformer. These devices are completely replaced by semiconductor devices nowadays.

The structure of semiconductor DC-AC transformer is based on multivibrator circuit. It can generate rectangular pulses with a frequency set by its components. Connecting it to the transformer, a modified sine-wave voltage with variable frequency can be achieved. A simple modification, such as putting the bridge rectifier on the external terminals will turn the DC-AC device into a DC-DC transformer.

There may be two types of DC-DC, DC-AC and AC-DC transformation devices: step-up type, which transforms low rate internal voltage into high rate external voltage and step-down type, whose action is the opposite to the first type. Step-down transformers are most commonly used for powering up low voltage devices. They also incorporate voltage stabilizers and fuses, which prevent devices from overvoltage. Step-up transformers help to achieve higher voltage than voltage supplied where it is needed.