

COMPULSATOR

A compulsator is the short name for a compensated pulsed alternator, a form of power supply.

What it does

As the name suggests, it is an alternator that is "compensated" (more on that below) to make it better at delivering pulses of electrical energy than a normal alternator.

Principle

The principle is very similar to an alternator, except that the rotor is usually kept spinning by its inertia (having been "spun up" by an external motor, or the compulsator itself having been used in reverse as an AC motor) and the small matter of the "compensation".

How used

The compulsator is used like a capacitor, to gather energy from a low-power source and store it, then generate a high-power output for a short period.

Winding design

The windings of a compulsator are different from those of a normal alternator in that they are designed for minimal inductance. This allows the current in the windings to change very rapidly, which is why this "compensation" makes it better at delivering pulses.

Explanation

The kinetic energy of a rotating object depends on the mass of the object, the shape of the object, and the square of the speed of rotation. Therefore, compulsators tend to have very light rotors that spin very fast in order to store the most energy in the available mass, and because too much mass in the rotor causes problems with the magnitude of centripetal force required to prevent the rotor from flying apart.

Uses

Compulsators are popular choices for high-end railgun power supplies. One possibility being considered is to build an electric tank that uses a conventional diesel engine for propulsion and to charge a compulsator. The compulsator would be used to power a railgun, and potentially other pulsed energy weapons (particularly electronic warfare systems); also, the compulsator could be used in non-pulsed mode to drive the tank with electric motors for limited periods as a kind of "quiet mode", which could be useful in urban combat.