Hargrave's Communications Dictionary

Frank Hargrave

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power detection That form of detection in which the power output of the detecting device is used to supply a substantial amount of power to the subsequent devices.

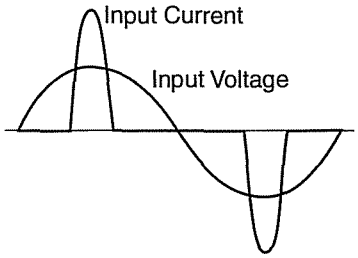
power density In optics, a deprecated synonym for *irradiance.*

power dissipation The amount of energy converted to heat in a device. Mathematically, it is the square of the current through the device times its resistance ($P = I^2 R$).

power disturbance Any of several forms of mains waveform distortions and deviations from the nominal value—e.g., blackout, brownout, spike, surge, frequency stability, waveform purity, and noise. See also *mains.*

power factor **(1)** The ratio of active power (watts) to apparent power (voltamps).

In ac power transmission and distribution, the cosine of the phase angle between the voltage and current. When the load is inductive (e.g., an induction motor), the current lags the applied voltage, and the power factor is said to be a lagging power factor. When the load is capacitive (e.g., a synchronous motor or a capacitive network), the current leads the applied voltage, and the power factor is said to be a leading power factor. *Power factors* other than unity have deleterious effects on power transmission systems—i.e., excessive transmission losses and reduced system capacity. See also *power* (*P*). **(2)** In switchmode power supplies, the existence of significant distortion in the current waveform due to both the high-input capacitance of the converter and the effect of charging the capacitor only at the peak input voltage. This leads to a current waveform such as is shown in the drawing along with high associated harmonic content. By regulation,



these harmonics must be reduced to levels below those illustrated in the table.

MAXIMUM PERMISSIBLE HARMONIC CURRENT

	EN60555	IEC 1000-3-2	
Harmonic Order (n)	Maximum Harmonic Current (A)	Maximum Harmonic Current (mA/W)	Maximum Harmonic Current (A)
2	1.08		
3	2.30	3.4	2.30
4	0.43		
5	1.14	1.9	1.14
6	0.30		
7	0.77	1.0	0.77
9	0.40	0.5	0.40
11	0.33	0.35	0.33
13	0.21	0.30	0.21
$8 \le n_{EVEN} \le 40$	1.84 / n		
$15 \le n_{ODD} \le 39$	2.25 / n	3.85 / n	2.25 / n

power failure transfer **(1)** In power, the switching of a load from a primary source to a secondary (backup) source when a measured parameter of the primary source is outside specified limits. Examples include:

- *Power distribution.* The switching of primary utility mains to a secondary (backup) whenever the primary source operates outside specified parameters.
- *Telephony.* The switching from commercial power sources at the central office (CO) to locally generated (backup) power in the event commercial power falls outside desired limits.

(2) In telephony, the transfer of certain analog telephone instruments from private automatic branch exchange (PABX) station lines to predesigned central office analog trunks in the event of commercial power failure and a low PABX battery condition. *Power failure transfer* is an emergency mode of operation in which only one instrument at the subscriber location may be powered from each central office trunk. Also called *power fail bypass.*

power gain **(1)** In general, the ratio of the power a device delivers to its load to the power the device receives at its input. Power gain is usually expressed in decibels (dB). **(2)** With an antenna, the ratio of the power flux (at a point in the far field) per unit area of the antenna to an isotropic radiator.

The Friis transmission formula is usually used to define far-field distance (r), that is,

$$r \ge 2 \cdot D^2 \cdot \lambda$$

where D is the maximum aperture dimension of the antenna and λ is the wavelength of the radiation. The isotropic radiator must be contained in the smallest sphere containing the antenna; common points are the antenna terminals and points of symmetry.

power law index profile In optical fibers, a class of *graded index profiles* characterized by:

$$n(r) = \begin{cases} n_1 \sqrt{1 - 2\Delta\left(\frac{r}{r_c}\right)^g}, & r \le r_c \\ n_1 \sqrt{1 - 2\Delta}, & r \ge r_c \end{cases}$$

where $\Delta = \frac{n_1^2 - n_2^2}{2n_1^2}$ and

- r is the distance from the fiber axis,
- $n(r)$ is the nominal refractive index as a function of distance from the fiber axis,
- n_1 is the nominal refractive index on axis,
- n_2 is the refractive index of the homogeneous cladding ($n(r) = n_2$ for $r \ge a$),
- r_c is the core radius, and
- g is the profile parameter, i.e., defines the shape of the index profile. (α is often used in place of g. Hence, this is sometimes called an *alpha profile.*)

Multimode distortion is minimum when g takes a particular value depending on the material used. For most materials, this optimum value is approximately 2. When g increases without limit, the profile tends to a *step index profile.*

power level The magnitude of power averaged over a specified time interval. Expressed either in watts (W) or as a ratio to a reference power in dBm or dBW.

power line carrier A communications method employing a low-frequency RF carrier (usually less than 600 kHz) to transmit infor-

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