

# EXHIBIT 23

**MODERN  
DICTIONARY  
of  
ELECTRONICS**

SEVENTH EDITION

REVISED AND UPDATED

**Rudolf F. Graf**




**Newnes**

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## frequency — frequency discrimination

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**frequency**—1. Symbolized by  $f$ . The number of recurrences of a periodic phenomenon in a unit of time. Electrical frequency is specified as so many hertz. Radio frequencies are normally expressed in kilohertz at and below 30,000 kilohertz and in megahertz above this frequency. 2. The number of complete cycles in 1 second of alternating current, voltage, or electromagnetic or sound pressure waves. 3. Number of alternations or repetitions per second in any recurring action. In the case of alternating current and other forms of wave motion, it is expressed in hertz. 4. With reference to electromagnetic radiation, the number of crests of waves that pass a fixed point in a given unit of time, in light or other wave motion.

**frequency agile**—The ability of a satellite TV receiver to select or tune all channels (transponders) from a satellite. Receivers not frequency agile are dedicated to a single channel, and are most often used in the CATV industry. Frequency agility can be via continuously variable tuning or discrete-step (channel selection) tuning.

**frequency agility**—The rapid and continual shifting of a radar frequency to avoid jamming by the enemy, reduce mutual interference with friendly sources, enhance echoes from targets, or provide necessary patterns of ECM (electronic countermeasures) or ECCM (electronic counter-countermeasures) radiation.

**frequency allocation**—1. The assignment of available frequencies in the radio spectrum to specific stations, for specific purposes. This is done to yield maximum utilization of frequencies with minimum interference between stations. Allocations in the United States are made by the Federal Communications Commission. 2. A band of radio frequencies identified by an upper and lower frequency limit ear-marked for use by one or more of the 38 terrestrial and space radiocommunication services defined by the International Telecommunication Union under specified conditions.

**frequency allotment**—The designation of portions of an allocated frequency band to individual countries or geographical areas for a particular radiocommunication service; for a satellite service, specific orbital positions may also be allotted to individual countries.

**frequency assignment**—Authorization given by a nation's government for a station or operator in that country to use a specific radio frequency channel under specified conditions.

**frequency authorization**—The document of power that legalizes the assignment of a frequency or a frequency band.

**frequency-azimuth-intensity**—Pertaining to a type of radar display in which frequency, azimuth, and strobe intensity are correlated.

**frequency band**—A continuous and specific range of frequencies. A range of frequencies between a lower and an upper limit.

**frequency band of emission**—The frequency band required for a specific type of transmission and speed of signaling.

**frequency bias**—A constant frequency purposely added to the frequency of a signal.

**frequency changer**—*See* frequency converter.

**frequency-change signaling**—A telegraph signaling method in which one or more particular frequencies correspond to each desired signaling condition of a telegraph code. The transition from one set of frequencies to the other may be either a continuous or a discontinuous change in frequency or in phase.

**frequency-changing circuit**—A circuit comprising an oscillator and a mixer and delivering an output at one or more frequencies other than the input frequency.

**frequency channel**—A continuous portion of the appropriate frequency spectrum for a specified class of emission.

**frequency compensation**—1. The technique of modifying an electronic circuit or device for the purpose of improving or broadening the linearity of its response with respect to frequency. 2. The compensation required in feedback amplifiers to ensure stability and prevent unwanted oscillations.

**frequency constant**—The number relating the natural vibration frequency of a piezoid (finished crystal blank) to its linear dimension.

**frequency conversion**—1. The process of converting a signal to some other frequency by combining it with another frequency. 2. Of a heterodyne receiving system, converting the carrier frequency of a received signal from its original value to the intermediate-frequency (IF) value in a superheterodyne receiver.

**frequency converter**—Also called frequency changer. A circuit, device, or machine that changes an alternating current from one frequency to another, with or without a change in voltage or number of phases. In a superheterodyne receiver, the oscillator and mixer first-detector stages together serve as a frequency converter.

**frequency correction**—Compensation, by means of an attenuation equalizer, for unequal transmission of various frequencies in a line.

**frequency counter**—An instrument in which frequency is measured by counting the number of cycles (pulses) occurring during a precisely established time interval.

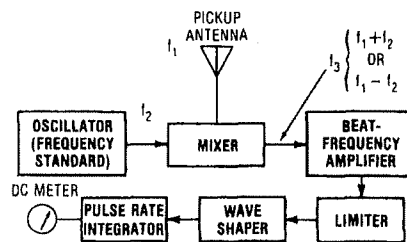
**frequency cutoff**—The frequency at which the current gain of a transistor drops 3 dB below the low-frequency gain.

**frequency demodulation**—Removal of the intelligence from a modulated carrier.

**frequency departure**—The amount a carrier or center frequency deviates from its assigned value.

**frequency deviation**—1. In frequency modulation, the peak difference between the instantaneous frequency of the modulated wave and its carrier frequency. 2. A measure of the output frequency excursion around the carrier caused by modulating the oscillator's tuning input, which produces a frequency-modulated output signal. 3. The measure of the percentage modulation of a frequency-modulated wave. It is the peak difference between the instantaneous frequency of a frequency-modulated wave and the carrier frequency.

**frequency-deviation meter**—An instrument that indicates the number of hertz a transmitter has drifted from its assigned carrier frequency.

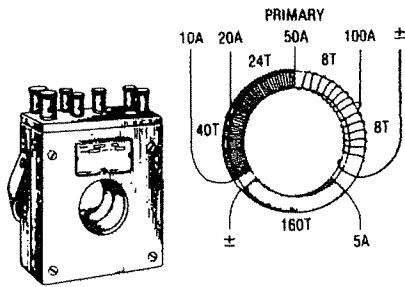


*Frequency-deviation meter.*

**frequency discrimination**—A term applied to the operation of selecting a desired frequency or frequencies from a spectrum of frequencies.

## insulated carbon resistor — insulator

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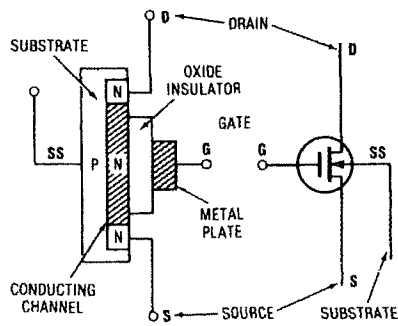
Instrument transformers.

**insulated carbon resistor**—A carbon resistor encased in fiber, plastic, or other insulation.

**insulated clip**—A clip terminating in an insulated eye through which flexible cords or wires may be run and supported.

**insulated enclosure**—A special shielded enclosure design providing insulation against weather or providing maximum temperature stability. Usually prefabricated as an exterior building panel in modular construction.

**insulated-gate field-effect transistor**—Abbreviated IGFET. In general, any field-effect transistor that has an insulated gate regardless of the fabrication process.



Insulated-gate field-effect transistor.

**insulated-substrate monolithic circuit**—An integrated circuit that may be either an all-diffused device or a compatible structure so constructed that the components within the silicon substrate are insulated from one another by a layer of silicon dioxide, instead of the reverse-biased pn junctions used for isolation in other techniques.

**insulated terminals**—Solderless terminals provided with an insulated sleeve over the barrel to prevent a short circuit.

**insulated wire**—A conductor covered with a non-conductive material.

**insulating material**—1. A material on or through which essentially no current will flow. It is used to confine the flow of current within a conductor or to eliminate the shock hazard of a bare conductor. 2. Any composition primarily adapted for preventing the transfer of electricity therethrough, the useful properties of which depend on its chemical composition or atomic arrangement.

**insulating sleeve**—Tube or tape of insulating material placed around metal-enclosed capacitors to insulate the case electrically from other components and wiring.

**insulating strength**—The measure of the ability of an insulating material to withstand electrical stress without breaking down. It is defined in terms of the voltage per unit thickness necessary to initiate a disruptive discharge and usually is measured in volts per centimeter. See also dielectric strength; electric strength.

**insulating tape**—Tape that is wrapped around joints in insulated wires or cables. It is impregnated with an insulating material and covered with adhesive on one side.

**insulating varnish**—A varnish applied to coils and windings to improve their insulation (and, at times, their mechanical rigidity).

**insulation**—1. A nonconductive material that prevents the leakage of electricity from a conductor, provides mechanical spacing or support, or protects against accidental contact. 2. The use of a material that passes negligible current to surround or separate a conductor to prevent loss of current. 3. A material that offers high electric resistance, making it suitable for covering components, terminals, and wires to prevent the possible future contact of adjacent conductors resulting in a short circuit. 4. Material used to cover electrical wires to prevent electrical leakage and short circuiting and to reduce the danger of shock.

**insulation displacement termination**—A connector that has insulated wire is forced into a channel constructed so that ridges or teeth in the channel cut through or displace the insulation and make an air-tight contact with the wire.

**insulation piercing**—A crimping method in which lances pierce wire insulation, enter into the strands, and make electrical contact without stripping the wire.

**insulation rating**—The dielectric-strength and insulation-resistance values required to ensure satisfactory performance.

**insulation resistance**—1. The resistance offered by an insulating material to the flow of current resulting from an impressed dc voltage. 2. The ratio of the voltage applied between two electrodes in contact with a specific insulator to the total current between the electrodes. 3. Industrial specifications usually call for a certain minimum value (several thousand megohms) determined with a specific voltage applied. 4. The direct current resistance between the two terminals of a capacitor, or between either or both of the terminals and the capacitor case. 5. The ratio of dc voltage impressed across a capacitor to the resultant leakage current. For a particular capacitor design, the product of insulation resistance and capacitance (megohm-microfarad) is quite constant. 6. The electrical resistance of the insulating material (determined under specified conditions) between any pair of contacts, conductors, or grounding devices in various combinations.

**insulation resistivity**—The insulation resistance per unit volume of insulation.

**insulation stress**—The molecule separation pressure caused by a potential difference across an insulator. The practical stress on insulation is expressed in volts per mil.

**insulation system**—All of the insulation materials used to insulate a particular electrical or electronic product.

**insulator**—1. A material in which the outer electrons are tightly bound to the atom and are not free to move. Thus, there is negligible current through the material when a voltage is applied. The resistivity is greater than  $10^8$  ohm-cm and generally decreases when the temperature rises. 2. A nonconducting substance such as porcelain, plastic, glass, rubber, etc. 3. A material of such low electrical conductivity that current through it can

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