

MODERN
DICTIONARY
of
ELECTRONICS

SEVENTH EDITION

REVISED AND UPDATED

Rudolf F. Graf



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metal-thick-oxide semiconductor—Abbreviated MTOS. A device in which the oxide outside the desired active gate area is made much thicker so that problems with unwanted parasitic devices are reduced.

metal tube—A vacuum tube with a metal envelope. The electrode leads pass through glass beads fused into the metal housing.

metamers—Lights of the same color but of different spectral energy distribution.

meteorological aids service—A radio service in which emissions consist of special signals intended solely for meteorological uses.

meteorological radar station—A station, operating in the meteorological aids service, that employs radar and is not intended for operation while in motion.

meter—1. Any measuring device; specifically, any electrical or electronic measuring instrument. 2. The basic unit of linear measurement in the metric system. Originally based on the distance from the equator to the geographic north pole (10^5 meters). One meter is equal to 39.37 inches, 3.281 feet, or 1.094 yards. Letter symbol: m.

meterampere—A measure of the strength of a radio transmitter. It is equal to the antenna height in meters times the maximum antenna current in amperes.

metercandle—See lux.

meter-correction factor—The factor by which a meter reading must be multiplied to compensate for meter errors in order to obtain the true reading.

meter display—A display in which one or more pointer instruments give the indications.

meter-kilogram-second-ampere system of units—See mksa electromagnetic system of units.

meter rating—A manufacturer's designation used to indicate the operating limitations of the meter. The full-scale marking on a meter scale does not necessarily correspond to the rating of the meter.

meter resistance—The resistance of a meter as measured at the terminals at a given reference temperature. When applied to rectifier-type meters, the frequency and waveshape of the applied energy, as well as the indicated value at which the measurement is to be made, must be specified.

meter-type relay—A meter movement in which the armature function is performed by a contact-bearing pointer.

metrecon—A storage tube used in scanning converters (e.g., in radar and industrial TV).

metric—A measure for hardware or software performance, or of the extent to which a program exhibits certain characteristics.

metric system—The decimal system of weights and measures, used extensively by scientists.

metric waves—Waves with lengths between 1 and 10 meters (corresponding to frequencies between 300 and 30 MHz, respectively).

MeV—Usually pronounced M-E-V. Letter symbol for million electronvolts. 1 MeV equals 4.45×10^{-20} kilowatthours, or 1.6020×10^{-6} erg.

MEW—Abbreviation for microwave early warning.

MF—1. Abbreviation for medium frequency. 2. Abbreviation for multifrequency.

mf—Alternate abbreviation for microfarad.

mfd—Alternate abbreviation for microfarad.

mH—Letter symbol for millihenry.

MHD—Abbreviation for magnetohydrodynamics.

mho—The unit of conductance of a conductor when a potential difference of 1 volt between its ends maintains an unvarying current of 1 ampere. The mho was the unit

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of conductance in the mksa system. This term has now been replaced by siemens.

MHz—Letter symbol for megahertz.

MIC—1. Abbreviation for monolithic integrated circuit. 2. See microwave integrated circuit.

mica—1. A transparent mineral that can be split into thin sheets. Because of its excellent insulating and heat-resisting qualities, it is used to separate the plates of capacitors and to insulate electrode elements in vacuum tubes. 2. A silicate that separates into layers and has high insulation resistance, dielectric strength, and heat resistance. It is used as an insulation wrap in wires and cables to a limited degree where radiation resistance requirements are severe and for high-temperature work demanding good heat resistance.

mica capacitor—1. A fixed capacitor employing mica sheets as the dielectric material between adjacent plates. The complete units are usually encased in molded Bakelite. 2. A capacitor with a dielectric consisting of mica.

MiCamp—Abbreviation for microwave integrated circuit amplifier.

MICR—Abbreviation for magnetic-ink character recognition.

micro—1. In the metric system, a prefix meaning one millionth ($1/1,000,000$). 2. A prefix meaning something very small.

microalloy diffused transistor—Abbreviated MADT. A transistor fabricated by etching emitter and collector pits into heavily doped germanium, depositing epitaxial layers of intrinsic germanium on both sides of the wafer, and adding electrodes that are plated and electroplated in the pits.

microalloy transistor—Abbreviated MAT. A high-frequency transistor in which the emitter and collector are alloyed to a slight depth on opposite sides of the germanium base material by an electrochemical process.

microammeter—A meter having a scale that reads in microamperes, for measuring extremely small currents.

microampere—One millionth of an ampere.

microbar—A unit of pressure commonly used in acoustics. One microbar is equal to one dyne per square centimeter. (Originally the term *bar* denoted dyne per square centimeter. Therefore, to avoid confusion it is preferable to use *microbar* or *dynes per square centimeter* when speaking of sound pressures.)

micro B-display—A B-scope in which range and azimuth data are so expanded that only a small portion of the area under surveillance is presented, and, because of the degree of expansion, distortion of the presentation is negligible.

microbond—The realization of a very small fastened joint between conductors or between a conductor and a microelectronic chip device.

microcassette—A miniature cassette system originated by Olympus, allowing 30 minutes of recording per side on a capstan-driven tape, $1/8$ inch (3.63 mm) wide, running at $15/16$ ips (2.38 cm/s).

microcircuit—1. A small circuit with a high equivalent-circuit-element density, and considered as a single part, composed of interconnected elements on or within a single substrate, that performs an electronic-circuit function. (According to this definition, such structures as printed wiring boards, circuit card assemblies, and modules composed exclusively of discrete electronic parts are not considered to be microcircuits.) 2. An integrated circuit. 3. The physical realization of a (hybrid or monolithic) interconnected array of very small active and passive electronic elements. 4. A term used to describe the miniaturization of solid-state discrete components onto a continuous substrate.

microcircuit module—An assembly of microcircuits or of microcircuits and discrete parts, designed to perform an electronic-circuit function or functions and constructed in such a manner that it is considered to be a single entity for the purposes of specification, testing, commerce, and maintenance.

microcircuit wafer—A microwafer carrying one or more circuit functions such as a flip-flop or gate. Integrated-circuit chips may be bonded to deposited conductors.

microcode—1. A computer-coding system that includes suboperations, such as multiplication and division, that ordinarily are inaccessible in programming. A list of very small program steps. 2. A set of control functions performed by the instruction decoding and execution logic of a computer that defines the instruction repertoire of that computer. Microcode is not generally accessible by the programmer. 3. Sequences of low-level steps, making up machine instructions, that are built into a microprocessor that directly control the interaction of the processor's computing elements—that is, machine instructions wired into the hardware that is being controlled. 4. Permanent basic subcommands, built into a computer, that are executed directly by the computer. Generally, these commands define the instruction set of a microprogrammable computer.

microcoding—In a computer, a system of coding that uses suboperations not ordinarily accessible in programming.

microcomponents—1. Those components smaller than existing components by several orders of magnitude. 2. An assembly of very small, interconnected discrete components—active or passive—that forms an electronic circuit. Interconnection of the various leads is by soldering or welding. Microcomponents use no substrates.

microcomputer—1. A general-purpose computer composed of standard LSI components built around a central processing unit (CPU). The CPU (or microprocessor) is program-controlled, featuring arithmetic and logical instructions and a general-purpose parallel I/O bus. The CPU is generally contained on a single chip. Generally intended for dedicated applications, the microcomputer also includes any number of ROMs and RAMs (for instruction and data storage) and, in some cases, one or more I/O devices. The simplest microcomputer consists of one CPU chip and one ROM. 2. A computer whose major sections—CPU, control, timing, and memory—are each contained on a single integrated-circuit chip, or, at most, a few chips. An LSI computer. 3. A computer that has a single or multichip LSI CPU, as distinguished from a minicomputer. 4. A class of computer having all major central processor functions contained on a single printed circuit board constituting a stand-alone module. 5. A computer whose central processing unit is a microprocessor. A microcomputer includes microprocessor, memory, and input/output controllers. 6. A device consisting of a central processor (usually a microprocessor, but sometimes a custom LSI chip set or a bit-slice processor) combined with a memory and input/output.

microcomputer development system—Abbreviated MDS. Also called expandable breadboarding system. 1. A key tool used in the development phase of microprocessor-based computers. It provides an efficient means of program coding, subprogram testing, and final testing for the completed program in a simulated operating condition without the use of the hardware that is contained in the final end product. The elements of the MDS combine to make up a complete microprocessor-based computer, which is composed of the central processing unit or microprocessor unit; a mass-storage memory section; either a floppy disk or tape cassette, complete

with associated drive and control circuits; a CRT terminal (video readout), a keyboard; and, as there is in most systems, a printer. In addition, an emulator module is part of the system and is used to test the operation of the developed system under defined conditions without the use of final hardware. 2. A system designed exclusively to aid in the development of microprocessor systems. Microcomputer development systems enable a designer to develop software and hardware as if many standard operating system utilities were present in his or her final design. These utilities, however, actually reside in the development system and therefore do not require costly additions to every shipped system. 3. Microcomputer equipped with the hardware and software facilities required for efficient program development and hardware debugging.

microcontroller—A complete microprocessor system on a chip. Includes on-chip the CPU, local RAM, local ROM or EPROM, clock and control circuits, and serial and parallel I/O ports that can be programmed for various control functions. *See also* chip sets.

microcrack—A thin crack in a substrate or chip device, or in thick-film trim-kerf walls, that can only be seen under magnification and which can contribute to latent failure phenomena.

microdensitometer—An instrument used in spectroscopy to measure lines in a spectrum by light transmission measurement.

microelectrode—An extremely small electrode. Some microelectrodes are small enough to contact a single biological cell.

microelectronic circuit—Discrete electrical components assembled and connected in extremely small and compact form.

microelectronic device—An alternate term for integrated circuit.

microelectronics—Also called microsystems electronics. 1. The entire body of electronic art that is connected with or applied to the realization of electronic systems from extremely small electronic parts. 2. *See* integrated circuit. 3. All techniques for the manufacture of extremely small electronic circuits, generally including all types of silicon integrated circuits, thin-film circuits, and thick-film circuits. 4. The physical realization of electronic circuits or systems from a number of extremely small circuit elements inseparably associated on or within a continuous body. Microelectronics has developed along two basic technologies: monolithic integrated circuits and hybrid integrated circuits. 5. The field that deals with techniques for producing miniature circuits, e.g., integrated circuits, thin-film techniques, and solid-state logic modules. 6. The art of electronic equipment design and construction that uses microminiaturization schemes.

microelement—A resistor, capacitor, or transistor, diode, inductor, transformer, or other electronic element or combination of elements mounted on a small ceramic wafer 0.01 inch (or 0.25 mm) thick and about 0.3 inch (0.75 mm) square. Individual microelements are stacked, interconnected, and potted to form micromodules.

microelement wafer—A microwafer carrying one or more components or a simple network. The network can consist, for example, of several thin-film resistors deposited directly on the wafer.

microfarad—One millionth of a farad. Letter symbol: μF .

microfaradmeter—*See* capacitance meter.

microflash—An extremely short electronic flash, having a duration of about 1×10^{-6} second. Used in photographing rapidly moving subjects.

microflash lamp—A lamp that emits radiation pulses having a duration of approximately 1 microsecond.