

MODERN  
DICTIONARY  
of  
**ELECTRONICS**

SEVENTH EDITION  
REVISED AND UPDATED

LIBRARY  
ROPES & GRAY LLP  
1211 AVE. OF THE AMERICAS  
NEW YORK, NY 10036  
212-596-9000

**Rudolf F. Graf**




Boston Oxford Auckland Johannesburg Melbourne New Delhi

IP Bridge Exhibit 2003




Newnes is an imprint of Butterworth-Heinemann.

Copyright © 1999 by Rudolf F. Graf

 A member of the Reed Elsevier Group.

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

 Recognizing the importance of preserving what has been written, Butterworth-Heinemann prints its books on acid-free paper whenever possible.



Butterworth-Heinemann supports the efforts of American Forests and the Global ReLeaf program in its campaign for the betterment of trees, forests, and our environment.

#### Library of Congress Cataloging-in-Publication Data

Graf, Rudolf F.  
Modern dictionary of electronics / Rudolf F. Graf. — 7th ed.,  
revised and updated.  
p. cm.  
ISBN 0-7506-9866-7 (alk. paper)  
1. Electronics — Dictionaries. I. Title  
TK7804.G67 1999  
621.381'03 — dc21  
99-17889  
CIP

#### British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

The publisher offers special discounts on bulk orders of this book.

For information, please contact:

Manager of Special Sales  
Butterworth-Heinemann  
225 Wildwood Avenue  
Woburn, MA 01801-2041  
Tel: 781-904-2500  
Fax: 781-904-2620

For information on all Butterworth-Heinemann publications available, contact  
our World Wide Web home page at: <http://www.bh.com>

10 9 8 7 6 5 4 3 2 1

Typeset by Laser Words, Madras, India  
Printed in the United States of America

**filament saturation**—Also called temperature saturation. The condition whereby a further increase in filament voltage will no longer increase the plate current at a given value of plate voltage.

**filament transformer**—A transformer used exclusively to supply filament voltage and current for vacuum tubes.

**filament voltage**—The voltage value that must be applied to the filament of a vacuum tube to obtain the rated filament current.

**filament winding**—A secondary winding provided on a power transformer to furnish alternating filament voltage for one or more vacuum tubes.

**file**—1. A collection of related records. For example, in inventory control, one line of an invoice containing data on the material, the quantity, and the price forms an item; a complete invoice forms a record; and the complete set of such records forms a file. 2. To insert an item into such a set. 3. A user-defined collection of information of variable length. 4. A list. Usually, a file is a list of instructions plus data and comments. 5. A collection of information consisting of records pertaining to a single subject. A file may be recorded on all or on part of a volume or on more than one volume. 6. A logical block of computer information, designated by name, and considered as a unit by a user. A file may be physically divided into records, blocks, or other units required by the memory device. 7. A collection of related information stored on a disk.

**filed coil**—A coil of insulated wire wound around an iron core. Current flowing in the coil produces a magnetic field.

**file gap**—On a data medium, an area intended to be used to mark the end of a file and, possibly, the start of another. A file gap frequently is used for other purposes, in particular for indicating the end or beginning of some other group of data.

**file layout**—1. The organization and structure of data in a file, including the sequence and size of the components. 2. By extension, the description thereof.

**file maintenance**—The processing of a computer file in order to bring it up to date.

**file management**—An operating system facility for the manipulating of data files to and from secondary storage devices (usually disk files or magnetic tapes); it is used for building files, retrieving information from them, or modifying the information.

**file mark**—Also termed tape mark or end-of-file mark. A specially recorded block containing no data but acting as a data-block separator.

**file-protection device**—1. A device by which the existence and integrity of a file are maintained. 2. A ring that must be in place in the hub of a reel before data can be recorded on the tape contained by the reel. A reel of tape not provided with a file-protection device can be read but not written.

**file section**—That part of a file which is recorded on any one volume. The file sections may not have sections of other files interspersed.

**file set**—A collection of one or more related files, recorded consecutively on a volume set.

**file transfer**—A procedure that calls for a communication link (typically over telephone lines) to be established between two or more PCs using modems. This connection allows data files to be transferred from one computer's storage device (usually a floppy or hard-disk drive) to the other's.

**File Transfer Protocol**—Abbreviated FTP. 1. The protocol used for copying files to and from remote computer systems on a network using TCP/IP, such as the Internet. 2. A very common method of moving movie files between two Internet sites. FTP is a special way to log in

to another Internet site for the purpose of retrieving and/or sending files. There are many Internet sites that have established publicly accessible repositories of material that can be obtained using FTP, by logging in using the account name "anonymous." These sites are called anonymous FTP servers. *See also* FTP.

**fill**—1. The number of working lines in a particular cable or cable center. 2. The number of working lines as a percentage of the total pairs provided.

**filler**—1. In mechanical recording, the inert material of a recording compound (as distinguished from the binder). 2. Nonconducting component cabled with insulation conductors to impart roundness, flexibility, tensile strength, or a combination of all three, to the cable.

**film**—Single or multiple layers or coatings of thin or thick material used to form various elements (resistors, capacitors, inductors) or interconnections and cross-overs (conductors, insulators). Thin films are deposited by vacuum evaporation or sputtering and/or plating. Thick films are deposited by screen printing.

**film badge**—A type of dosimeter consisting of a small piece of film sensitive to radiation, placed in a light-tight holder and carried by a person who works with radiation. When the film is developed, the amount of darkening can be measured to determine the total dose of ionizing radiation to which the badge has been subjected.

**film capacitor**—1. A capacitor with a dielectric consisting of a plastic film. 2. A capacitor that is made by winding metal and dielectric (such as polyester, polycarbonate, polystyrene, polypropylene, or polysulfone) ribbons into a tubular shape. The metal electrodes can be separate metal foil, or can be vacuum-deposited onto the dielectric.

**film chain**—An arrangement of a film projector or projectors and a CCTV camera for transmitting moving pictures over a television system.

**film conductor**—1. A conductor formed *in situ* on a substrate by depositing a conductive material by screening, plating, or evaporation techniques. 2. Electrically conductive material formed by deposition on a substrate.

**film integrated circuit**—Also called film microcircuit. 1. A circuit made up of elements that are films all formed in place upon an insulating substrate. To further define the nature of a film integrated circuit, additional modifiers may be prefixed. Examples: thin-film integrated circuit, thick-film integrated circuit. 2. Thin- or thick-film network forming an electrical interconnection of numerous devices.

**film microcircuit**—*See* film integrated circuit.

**film pickup**—A film projector combined with a television camera for telecasting scenes from a motion-picture film.

**film reader**—A computer input device that scans opaque and transparent patterns on photographic film and relays the corresponding information to the computer.

**film recorder**—An instrument designed to place nongraphic information, usually generated by a computer, onto photographic film. The information is generally encoded as a series of opaque and translucent spots, or light and dark spots.

**film reproducer**—An instrument that reproduces a recording on film.

**film resistor**—1. A fixed resistor whose resistance element is a very thin layer of conductive material on an insulated form. Some sort of mechanical protection is placed over this layer. 2. A resistor whose characteristics depend on film rather than bulk properties. 3. A device whose resistive material is a film on an insulator substrate; final resistance value may be determined by trimming.

**film scanning**—1. The process of converting movie film into corresponding electrical signals that can be

## mark — masking

**mark**—1. In telegraphy, the closed-circuit condition, i.e., the signal that closes the circuit at the receiver to produce a click of the sounder or to print a character on a teletypewriter. 2. The presence of signal. A mark impulse is equivalent to a binary 1. 3. A term that originated with telegraphy to indicate a closed key condition. Present usage implies the presence of current or carrier on a circuit or the idle condition of a teletypewriter. It also indicates the binary digit 1 in computer language. *See* flag. 4. In RTTY applications, the mark is one of two states. The mark is the condition characterized by a closed circuit. The space, the other state, is characterized by an open-circuit condition.

**mark and space impulses**—In neutral operation of a teletypewriter system, the mark impulse is the closed-circuit signal, and the space impulse is the open-circuit signal. In other than neutral operation, the mark impulse is the circuit condition that produces the same result in the terminal equipment that a mark impulse produces in neutral operation. Similarly, the space impulse is the circuit condition that produces the same result in the terminal equipment that a space impulse produces in neutral operation.

**marker**—Also called marker beacon. A radio navigational aid consisting of a transmitter that sends a signal to designate the small area around and above it.

**marker antenna**—The transmitting antenna for a marker beacon.

**marker beacon**—*See* marker.

**marker generator**—An rf generator that injects one or more pips of specific frequency onto the response curve of a tuned circuit being displayed on the screen of a cathode-ray oscilloscope.

**marker pip**—The inverted V ( $\Delta$ ) or spot of light used as a frequency index mark in cathode-ray oscilloscopes for alignment of TV sets. It is produced by coupling a fixed-frequency oscillator to the output of a sweep-driven signal generator.

**marker thread**—A colored thread laid parallel and adjacent to the strands of an insulated conductor that identifies the wire manufacturer and often the specification under which the wire was constructed.

**marking-and-spacing intervals**—In telegraphy, the intervals corresponding to the closed and open positions, respectively, of the originating transmitting contacts.

**marking bias**—Bias that affects the results in the same direction they are affected by marking current.

**marking current**—The magnitude and polarity of line current when the receiving mechanism is in the operated condition.

**marking pulse**—The signal interval during which the selector unit of a teletypewriter is operated.

**marking wave**—Also called keying wave. In telegraphy, the emission while the active portions of the code characters are being transmitted.

**mark sense**—1. To mark a position on a punch card, using a special pencil that leaves an electrically conductive deposit for later conversion to machine punching. 2. A mechanized technique of punching data into computer cards. A graphite line positioned on the card is read electronically and converted into holes by special equipment.

**mark-sense card**—A card designed to permit data to be entered on it with an electrographic pencil.

**mark sensing**—A technique for detecting special pencil marks entered in special places on a card and automatically translating the marks into punched holes.

**mark-to-space transition**—The change from a marking impulse to a spacing impulse.

**marshalling sequence**—*See* collating sequence, 1.

456

**maser**—Acronym for microwave amplification by stimulated emission of radiation. 1. A low-noise microwave amplifier in which a signal is boosted by changing the energy level of a gas or crystal (commonly ammonia or ruby, respectively). 2. A means of focusing a stream of particles, which concentrates only on the high-energy particles. These are passed into a resonator that is resonating at the radiation frequency of the particles. The particles are raised to a strong oscillation in this state and can be used for control purposes. By reducing the flow of particles to the resonator to maintain oscillations, it can be used as an amplifier. (There are many other applications.) 3. Device for amplifying a microwave frequency signal by stimulated emission of radiation—i.e., the weak microwave signal causes electrons in an atom to change orbit in such a manner as to emit an amplified signal of the same frequency as the weak signal. 4. Amplification by a low-noise radio-frequency amplifier in which an input signal stimulates emission of energy stored in a molecular or atomic system by a microwave power supply.

**mask**—1. A frame mounted in front of a television picture tube to limit the viewing area of the screen. 2. A device (usually a thin sheet of metal that contains an open pattern) used to shield selected portions of a base during a deposition process. 3. A device used to shield selected portions of a photosensitive material during photographic processing. 4. A logical technique in which certain bits of a word are blanked out or inhibited. 5. Template used to etch circuit patterns on semiconductor wafers. Images of the circuit patterns are produced on glass or metal photographically. The mask is then used to control the diffusion process, plus metallization. 6. A transparent (glass or quartz) plate covered with an array of patterns used in making integrated circuits. Each pattern consists of opaque and transparent areas that define the size and shape of all circuit and device elements. The mask is used to expose selected areas of photoresist, which define areas to be etched. Masks may use emulsion, chrome, iron oxide, silicon, or other material to produce the opaque areas. 7. Thin metals or other materials with an open pattern designed to mask off or shield selected portions of semiconductors or other surfaces during deposition processes. There also are photomasks or optical masks for contact or projection printing of wafers; these may use an extremely flat glass substrate with iron oxide, chrome, or emulsion coating. There also are thick-film screen masks. 8. The photographic negative that serves as the master for making thick-film screens and thin-film patterns. 9. The pattern, usually "printed" on glass, used to define areas of the chip or wafer. Masks are used for the diffusion, oxidation, and metallization steps used in manufacturing of semiconductors. 10. To hide, to obscure, to make less noticeable. For example, as noise masks crosstalk. 11. A material applied to enable selective etching, etching, plating, or the application of solder to a printed board. Also, the surface on which the master artwork of the circuit pattern is projected. 12. A thin steel arrangement with fine holes (shadow mask) or stripes (slot mask) that concentrates the electron beam at points on the CRT.

**masked diffusion**—The use of a mask pattern to obtain selective impregnation of portions of a semiconductor material with impurity atoms.

**masked ROM**—A regular read-only memory (ROM) produced by the usual masking process. (Contrasted with a PROM.)

**masking**—The process by which a sound is made audible by the addition of a second sound called the masking sound. The unit of measurement is usually the decibel.