

SEVENTH EDITION

MODERN

DICTIONARY

of

ELECTRONICS

RUDOLF F. GRAF



MODERN
DICTIONARY
of
ELECTRONICS

SEVENTH EDITION
REVISED AND UPDATED


Rudolf F. Graf



Boston Oxford Auckland Johannesburg Melbourne New Delhi


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

age occurring in the human (abbreviated EKG or ECG).
-Recording and interpretation of the heart. The voltage is set up by surface electrodes attached, and applied to a strip-

aph—An instrument that

-An electrochemical system with a cathode in metallic contact with an electrolyte. The anode and cathode are on dissimilar areas on the same

arioration—A process in which chemical reactions produce an end in turn ultimate thermal

ce—A device that operates on electrical principles, e.g., a lead-

ffused-collector trans-

valent—The weight of an atom or ion involved in a specified reaction during passage of a specified amount of electric charge is a coulomb.

tion transistor—A junction device for detecting an n-type germanium diode or jets of a salt solution such

ntial—Also called electrochemical potential. The total electrochemical potential derivative of the total electrochemical system with respect to the constituent except that it includes chemical contributions to the

ording—A recording made of current through a sensitized electrode acts to the current and thereby

ision—See electrochemical

ducer—A device that uses an external input parameter, and the electrical signal proportional

e—Electric valve consisting of a solution or compound, across which current flows more readily in one direction and in which the valve undergoes chemical changes.

-That branch of science concerned with transformations of chemical and electrical energy includes electrolysis, electroplating, and charge of batteries, etc. 2. The conversion of chemical energy into electrical energy by electroplating is an electrochemical

play—A passive solid-state device in which a material whose light absorption is changed by an externally applied electric field. Electrochromic materials do not absorb in the visible range of the spectrum, so they appear colorless. When a moderate electric field is applied, an absorption band develops, and the material changes in color to a color that remains even after the field is removed and lasts from minutes to hours. The color can be reversed and the device returned to its original state when the polarity of the field is reversed.

electrocoagulation—The process of solidifying tissue by means of a high-frequency electrical current.

electrocution—Killing by means of an electric current.

electrode—1. In an electronic tube, the conducting element that does one or more of the following: emits or collects electrons or ions, or controls their movement by means of an electric field on it. 2. In semiconductors, the element that does one or more of the following: emits or collects electrons or holes, or controls their movements by means of an electric field on it. 3. In electroplating, the metal being plated. 4. A conductor by means of which a current passes into or out of a fluid or an organic material, such as human skin; often one terminal of a lead. 5. A metallic conductor such as in an electrolytic cell, in which conduction by electrons is changed to conduction by ions or other charged particles. 6. A conductor, not necessarily metal, through which a current enters or leaves an electrolytic cell, arc, furnace, vacuum tube, gaseous discharge tube, or any conductor of the nonmetallic class. 7. That part of a semiconductor device providing the electrical contact between the specified region of the device and the lead to its terminal. 8. In a spark plug, the center rod passing through the insulator forms one electrode. The rod welded to the shell forms another. They are referred to as the center and side electrodes. 9. A conducting element at whose surface electricity passes into another conducting medium.

electrode admittance—The alternating component of the electrode current divided by that of the electrode voltage (all other electrode voltages maintained constant).

electrode capacitance—The capacitance between one electrode and all the other electrodes connected together.

electrode characteristic—The relationship, usually shown by a graph, between the electrode voltage and current, all other electrode voltages being maintained constant.

electrode conductance—The quotient of the in-phase component of the electrode alternating current divided by the electrode alternating voltage, all other electrode voltages being maintained constant. This is a variational and not a total conductance.

electrode current—Current passing into or out of an electrode.

electrode dark current—Also called dark current. 1. In phototubes, the component of electrode current that flows in the absence of ionizing radiation and optical photons. 2. The current that flows in a photodetector when there is no incident radiation on the detector.

electrode dissipation—The power that an electrode dissipates as heat when bombarded by electrons and/or ions and radiation from nearby electrodes.

electrode drop—The voltage drop produced in an electrode by its resistance.

electrode impedance—The reciprocal of electrode admittance.

electrode inverse current—Current through a tube electrode in the direction opposite to that for which the tube was designed.

electrodeless discharge—A luminous discharge produced by means of a high-frequency electric field in a gas-filled glass tube that has no internal electrodes.

electrodeless discharge tube—Abbreviated EDT. A device consisting of an airtight quartz tube that holds the material to be analyzed. When a high-frequency electrostatic field, generated by microwaves, is applied to the tube, it emits energy of a wavelength identical with that of the contained material.

electrodeposition—Also called electrolytic deposition. See also electroplating.

electrocoagulation — electroencephalograph

electrode potential—1. The instantaneous voltage on an electrode. Its value is usually given with respect to the cathode of a vacuum tube. 2. The difference in potential between an electrode and the immediately adjacent electrolyte referred to some standard electrode potential as zero. 3. The potential in volts that an electrode has when immersed in an electrolyte, compared to the zero potential of a hydrogen electrode. The potential depends on the material of which the electrode is made.

electrode reactance—The imaginary component of electrode impedance.

electrode resistance—The reciprocal of electrode conductance. It is the effective parallel resistance, not the real component of electrode impedance.

electrodermography—The recording of the electrical resistance of the skin, which is a sensitive indicator of the activity of the autonomic nervous system.

electrode voltage—The voltage between an electrode and the cathode or a specified point of a filamentary cathode. The terms *grid voltage*, *anode voltage*, *plate voltage*, etc., designate the voltage between these electrodes and the cathode. Unless otherwise stated, electrode voltages are measured at the available terminals.

electrodialytic process—A process for producing fresh water by using a combination of electric current and two types of chemically treated membranes.

electrodynamics—Pertaining to electric current, electricity in motion, and the actions and effects of magnetism and induction.

electrodynamics braking—A method of stopping a tape-deck motor gently by the application of a predetermined voltage to the motors.

electrodynamics instrument—An instrument that depends for its operation on the reaction between the current in one or more moving coils and the current in one or more fixed coils.

electrodynamics machine—Electric generator or motor in which the output load current is produced by magnetomotive currents generated in a rotating armature.

electrodynamics—1. The science dealing with the various phenomena of electricity in motion, including interactions of currents with each other, with their associated magnetic fields, and with other magnetic fields. 2. The study of the generation of electromagnetic power by radiation from high-energy beams.

electrodynamics speaker—A speaker consisting of an electromagnet called the field coil, through which a direct current flows.

electrodynamometer—1. An instrument for detecting or measuring an electric current by determining the mechanical reactions between two parts of the same circuit. 2. A meter movement consisting of a rotatable (moving) wire coil suspended between two fixed (field) wire coils. The three coils can be connected in various configurations, so that rotation of the moving coil is proportional to applied ac or dc voltage or current, to power, power factor, etc.

electroencephalogram—1. A waveform obtained by plotting brain voltages (available between two points on the scalp) against time. An electroencephalogram is not necessarily a periodic function, although it can be particularly if the patient is unconscious. These voltages are of extremely low level and require recording apparatus that displays excellent noise rejection. 2. The tracing of brain waves made by an electroencephalograph.

electroencephalograph—Abbreviated EEG. An instrument for measuring and recording the rhythmically varying potentials produced by the brain by the use of electrodes applied to the scalp.

mesh current—The current assumed to exist over all cross sections of a closed path in a network. It may be the total current in a branch included in the path, or a partial current that, when combined with the others, forms the total current.

message—1. An ordered selection of an agreed set of symbols for the purpose of communicating information. 2. The original modulating wave in a communication system. 3. An arbitrary amount of information whose beginning and end are defined or implied. 4. One or more blocks of data that contain the total information to be transmitted. 5. A group of characters that have a meaning when taken together and that always are handled as a group.

message center—Communication agency charged with the responsibility for acceptance, preparation for transmission, receipt, and delivery of messages.

message circuit—A long-distance telephone circuit used in providing regular long-distance or toll service to the general public, as opposed to a circuit used for private-line service.

message exchange—A service used between a communications line and a computer to perform certain communications functions and free the computer for other tasks.

message interpolation—Insertion of data between syllables or during speech pauses on a busy voice channel without noticeably affecting the voice transmission.

message precedence—Designations employed to indicate the relative order in which a message of one precedence designation is handled with respect to all other precedence designations.

message switching—1. The technique of data transmission in which data may be received, stored until the proper line is available, then retransmitted. No direct connection is set up between the originator of the data and its destination. 2. Routing messages between three or more locations by store-and-forward techniques in a computer.

message unit—1. A unit of measurement used in charging for local telephone messages, based on time and distance between the parties. 2. Call measurement for a call within a local service area for which charges are accrued.

message-waiting lamp—A small lamp on a telephone set that can be lighted (or flashed) from the switchboard (or call waiting panel) to notify a hotel or motel guest that a message is being held for him or her.

metadyne—British term for amplidyne. A direct-current machine used for voltage regulation or transformation. It has more than two brushes for each pair of holes.

metal—A material that has high electrical and thermal conductivity at normal temperatures.

metal-base transistor—A transistor with a base of a thin metal film sandwiched between two n-type semiconductors, with the emitter doped more heavily than the base to give it a high electron-current-to-hole-current ratio.

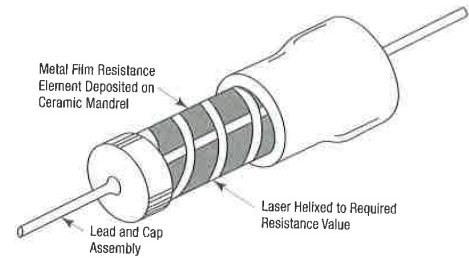
metal detector—Also called metal locator. An electronic device for detecting concealed metal objects.

metal-etched mask—A mask formed by chemically etching openings in a metal film or plate where it is not protected by photoresist or other chemically resistant material.

metal film resistor—An electronic component in which the resistive element is an extremely thin layer of metal alloy vacuum-deposited on a substrate.

metal foil capacitor—A capacitor in which the electrodes consist of metal foils separated by a dielectric consisting of plastic film or paper.

mesh current — metallizing



Metal film resistor.

metal gate—Refers to the use of aluminum as the gate conductor instead of silicon or refractory metals.

metal halide lamp—A discharge lamp in which the light is produced by the radiation from a mixture of metallic vapor (for example, mercury) and the products of the disassociation of halides (for example, halides of thallium, indium, or sodium).

metal-insulator silicon—See MIS.

metallic circuit—A circuit in which the earth itself is not used as ground.

metallic insulator—A shorted quarter-wave section of transmission line, which acts as an electrical insulator at the transmitted frequency.

metallic noise—Weighted noise current in a metallic circuit at a given point when the circuit is terminated at that point in the nominal characteristic impedance of the circuit.

metallic rectifier—A rectifier in which the asymmetrical junction between dissimilar solid conductors presents a high resistance to current flow in one direction and a low resistance in the opposite direction.

metallic rectifier cell—An elementary rectifying device having only one positive electrode, negative electrode, and rectifying junction.

metallic-rectifier stack—A single structure made up of one or more metallic rectifier cells.

metallization—1. The deposition of a thin-film pattern of conductive material onto a substrate to provide interconnection of electronic components or to provide conductive contacts (pads) for interconnections. 2. A film pattern (single or multilayer) of conductive material deposited on a substrate to interconnect electronic components, or the metal film on the bonding area of a substrate that becomes a part of the bond and performs both electrical and mechanical functions. 3. The selective deposition of metal film on a substrate to form conductive interconnection between IC elements and points for connections with the outside world.

metallized capacitor—A capacitor that is made with dielectric film that has had metal vacuum-deposited on it. This thin metallization restricts the maximum current capacity, but at the same time provides a very high volumetric efficiency and a unique self-healing property. Any internal arcover (which could be triggered by a transient voltage spike) will usually clear itself by vaporizing the deposited metal film in the immediate area, thus extending the arc path beyond the sustaining gap length limit. Foil capacitors cannot clear in this manner and may therefore sustain the arcovers and short out.

metallized resistor—A fixed resistor in which the resistance element is a thin film of metal deposited on the surface of a glass or ceramic substrate.

metallizing—Applying a thin coating of metal to a nonmetallic surface. This may be done by chemical