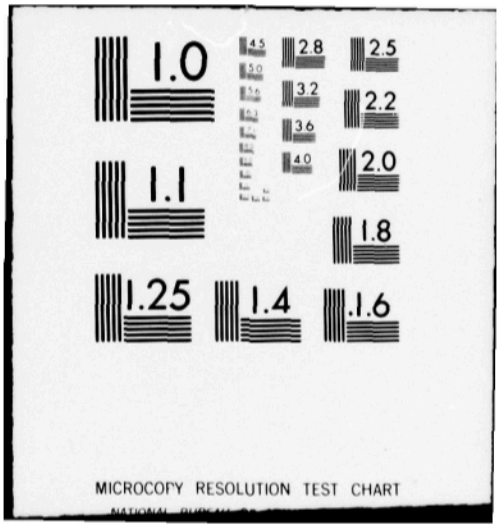
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VOLUME IV

NUMBER 2

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A Quarterly Publication Produced for
National Telecommunications and Information Administration
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OF NONIONIZING ELECTROMAGNETIC RADIATION

A Digest of Current Literature

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A Quarterly Publication Produced for
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Literature Selected and Abstracted
by
Biomedical Group, Science Information Services Organization

Bruce H. Kleinstein, Ph.D., J.D., Project Manager

Sheryl A. Dyner, Managing Editor

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BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

December, 1979 Volume IV, Number 2

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PREFACE

Biological Effects of Nonionizing Electromagnetic Radiation is a publication researched and prepared by the Franklin Research Center, Science Information Services Organization, under contract to the National Telecommunications and Information Administration (NTIA); funding provided by the U.S. Navy under interagency agreement with NTIA.

This digest serves as a vehicle through which current documentation of research highlights on the biological effects and health implications of nonionizing electromagnetic radiation (microwave and other radio frequency radiation) are compiled, condensed, and disseminated on a regular basis. *Biological Effects of Nonionizing Electromagnetic Radiation* is intended to be a highly useful current awareness tool for scientists engaged in research or related activities. The great number and diversity of relevant publications make imperative the availability of the service to persons whose work requires that they keep abreast of current developments in the field.

Biological Effects of Nonionizing Electromagnetic Radiation is published quarterly. The issues of Volume IV, and future volumes, will include materials received during the preceding three months. Each issue will include news items and announcements, a listing of meetings and conferences, abstracts of current literature, and a directory of current research. Materials for which full text is not available will be included as summary abstracts.

ABBREVIATIONS AND ACRONYMS

A, amp - ampere(s)
Å - angstrom(s)
BRH - Bureau of Radiological Health
C - centigrade
cm - centimeter(s)
cps - cycles per second
dB - decibel(s)
EPA - Environmental Protection Agency
FDA - Food and Drug Administration
g - gram(s)
G - Gauss
GHz - gigahertz
HEW - Health, Education, and Welfare
hr - hour
Hz - hertz
IEEE - Institute of Electronic and Electrical Engineers
IMPI - International Microwave Power Institute
IU - international unit(s)
J - joule(s)
k - kilo--
l - liter(s)
m - meter(s)
m - milli--
M - mega--
mho - unit of measurement of conductivity
min - minute(s)
mo - month(s)
n - nano--
NBS - National Bureau of Standard
NIH - National Institutes of Health
NSF - National Science Foundation
NIOSH - National Institute for Occupational Safety and Health
NTIA - National Telecommunications and Information Administration
NTIS - National Technical Information Service
Oe - oersted(s)
OSHA - Occupational Safety and Health Administration
OTP - Office of Telecommunications Policy
PHS - Public Health Service
rad - radiation absorbed dose
R - roentgen(s)
rpm - revolutions per minute
sec - second(s)
USAFSAM - U.S. Air Force School of Aerospace Medicine
USDA - U.S. Department of Agriculture
UV - ultraviolet
V - volt(s)
VA -Veterans Administration
W -watt(s)
Wb - Weber(s)
WHO - World Health Organization
wk - week(s)
wt - weight
yr - year(s)

μ - micro--

NEWS ITEMS

HIGH-FREQUENCY ELECTROMAGNETIC TREATMENT FOR RHEUMOCARDITIS IS PATENTED BY RUSSIANS

An electromagnetic treatment for sluggish flow rheumocarditis using a high frequency electromagnetic field applied locally to the adrenal glands and epigastric region has been designed. The electromagnetic field, range 430-460 mHz and power 40-50 W, is applied first to the adrenal glands and then to the epigastric region. Each region is exposed for 7-8 min. This treatment is expected to reduce the rehabilitation time and prevent relapse. The patent number is F2445B/24.

Sov Invent Illust B24: PQ-3; 1979.

36TH MEETING OF THE ELECTROMAGNETIC RADIATION MANAGEMENT ADVISORY COUNCIL HELD

The 36th meeting of the Electromagnetic Radiation Management Advisory Council (ERMAC) was held on August 30-31, 1978. This was the first meeting under the auspices of the NTIA; the Office of Telecommunications was the host for previous ERMAC sessions. Dr. John M. Richardson, Chairman, announced that the first session would be concerned with the up-date and review of the current environmental situations that are representative of the public concern over microwave and radio frequency (RF) potential health hazards. The environmental situations that were discussed included the Precision Acquisition of Vehicle Entry Phased-Array Warning System; radiation emission from a data communication system in Eugene, Or; the Coast Guard Vessel Traffic System; and the Solar Power Satellite. The activities of various organizations involved in the development of safety standards for RF and microwave emission were presented in the next session. The organizations included NIOSH, OSHA, EPA, BRH, American Natl. Standards Inst., Natl. Council for Radiation Protection and Measurement, Intl. Radiation Protection Assoc., and WHO. The Bioelectromagnetics Society was described. The Canadian, Russian, and New York City safety standards were also discussed. In addition, the involvement of the Federal Communications Commission in the application of microwave and RF emission safety standards was presented. The activities of the second day of the Council meeting included discussions of the study of the electromagnetic exposure environments produced by various types of emitters, the socio-economic impact of the potential standards, and the ERMAC report on program guidelines.

Minutes--36th ERMAC Meeting (available from NTIA).

ERMAC HOLDS 37TH MEETING

The 37th meeting of the Electromagnetic Radiation Management Advisory Council (ERMAC) was held on December 7, 1978. Dr. John M. Richardson served as chairman. The emphasis of the morning session was on the presentation, discussion, and review of the biologic effects of radio frequency radiation in order to develop the scope, structure, and scheduling of the 1979 ERMAC report on the recommended federal program. Ms. Janet H. Healer provided some background information on the Council's past activities and on the progress made since the Council's 1971 recommendations. A discussion of the federal program goals, guidelines, research needs, priorities, agency roles, required resources, and implementation procedures followed. In the afternoon session, several reports on the Federal Communications Commission proposed Notice of Inquiry, the Foreign Service Health Status Study, and the proposed New York City Standards were presented. In addition, Amitai Etzioni presented the paper "Some Principles Governing the Management of Risk."

Minutes--37th ERMAC Meeting (available from NTIA).

SENATE COMMITTEE REPORT ON EMBASSY EXPOSURE TO MICROWAVES IS AVAILABLE

The availability of the Senate Committee Print, *Microwave Radiation of the U.S. Embassy in Moscow*, was announced by Senator Howard W. Cannon, Chairman of the Senate Committee on Commerce, Science, and Transportation. The report reviews the history of microwave irradiation of the U.S. Embassy in Moscow from 1953-1977, including actions taken and studies conducted by the State Department to determine whether the health of U.S. personnel was jeopardized. To obtain a copy of the report send a self-addressed mailing label to the Subcommittee on Science, Technology, and Space; Committee on Commerce, Science, and Transportation; Washington, DC 20510. Questions should be directed to Ed Smick, Professional Staff Member, (202) 224-9351.

Bioelectromagnetics Society Newsletter (8): 1; July 1979.

20TH GENERAL ASSEMBLY OF THE URSI PLANNED FOR AUGUST 1981

The Twentieth General Assembly of the International Union of Radio Science (URSI) will be held August

10-19, 1981 at the Hyatt Regency Hotel in Washington, DC. The Union's nine international commissions, which will be responsible for generating the technical program, will be coordinated by William E. Gordon, Vice-President of the URSI. The U.S. National Committee (USNC) for the URSI, chaired by Dr. C. Gordon Little of Boulder, CO, will host the Assembly. For further information contact the Executive Secretary, R. Y. Dow, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, DC 20418 or at (202) 389-6478.

Bioelectromagnetics Society Newsletter (8): 1-2; July 1979.

IEEE MTT-S CALL FOR PAPERS FOR THE 1980 INTERNATIONAL MICROWAVE SYMPOSIUM

The IEEE MTT-S has announced the first call for papers for the 1980 International Microwave Symposium to be held May 28-30, 1980 in Washington, DC. The theme for next year's symposium, highlighting the expected growth of microwave use in the next decade, is "Technology Growth for the 80s." Previously unpublished papers of original work in the field of microwaves will be considered. The following areas are regarded as particularly appropriate: microwave and millimeter wave devices, circuits, and networks; low noise techniques; microwave acoustics; microwave communication systems; microwave field and network theory; microwave bioeffects; radiometry and remote sensing systems; computer aided design and measurement techniques; integrated optics, fiber optics, and optical techniques; and technology breakthroughs. Authors are requested to submit both a 35 word abstract and a 500-1,000 word summary explaining their contribution, its originality, and its relative importance to R. C. Van Wagoner, Chairman, Technical Program Committee, Code 5205, Naval Research Laboratory, Washington, DC 20375.

IEEE MTT-S Announcement.

BRH AND OSHA SPONSOR WORKSHOP ON POTENTIAL HEALTH HAZARDS OF RADIO FREQUENCY DEVICES

An open workshop dealing with the potential health hazards of personnel exposed to radio frequency (RF) energy emitted by sealers, heaters, and gluers was held on September 12 and 13, 1979. The workshop, sponsored by the BRH and OSHA, was held to bring together the users, manufacturers, and staff members of federal agencies and trade associations to ensure that the present knowledge of possible hazards is brought to the attention of the affected personnel. Because RF energy can penetrate deeply into the body without activating the skin's heat sensors, operators of RF equipment may be unaware of the RF exposure. The specific topics presented at the workshop included the measurement of stray electric and magnetic field intensities generated by RF sealers, the biologic effects of exposure to RF frequencies between 3 and 100 MHz, the near-field conditions existing during exposure, RF radiation measurement (equipment and techniques), control of stray RF emissions, and possible federal agency initiatives for the control of RF-emitting devices.

BRH Bulletin 13(16): 1-2; 1979.

SYMPOSIUM HELD ON THE PRACTICAL APPLICATIONS OF MICROWAVE ENERGY

A 1-day symposium on the practical applications of microwave energy was held on September 28, 1979 at the Kansas State University. The eleven presentations included some original research and reviews of the uses and hazards of various practical aspects of microwave use, particularly in the home and in industry. Questions concerning the symposium should be directed to Dr. D. Y. C. Fung, Chairman, or Dr. F. E. Cunningham, Co-chairman, Call Hall, Kansas State University, Manhattan, KS 66506 or telephone at (913) 532-5654.

Environ Res 19(2): 519; 1979.

A NEW MICROWAVE LEAKAGE DETECTOR WILL BE MARKETED

A new low-cost microwave leakage detection device developed by the Commonwealth Scientific and Industrial Research Organization, an agency of the Australian government, will be marketed in North America by Vexilar, Inc. The hand-held device contains a light-emitting diode that glows red on contact with microwave radiation greater than 5 mW (the FDA standard maximum level). The instrument may be used to detect leakage from microwave ovens that have been misused or damaged, during diathermy treatment, and near industrial microwave heaters that operate in the industrial, scientific, and medical band.

Am J Phys Med 58(4): 200-201; 1979.

FDA PROPOSES TO AMEND REQUIREMENTS FOR RF SEALER AND EM HEATER MANUFACTURE

The FDA is proposing that the manufacturers of radio frequency (RF) sealers and electromagnetic (EM) induction heaters be required to submit initial, annual, and model change reports and that they also maintain certain other records on these products. The agency is basing their request on available data that contends that the currently marketed RF sealers and EM induction heating equipment, which emit EM radiation in the frequency

range from 10 to 300 MHz, may present health hazards to persons exposed to the products. The industrial, scientific, and medical frequency bands centered at 13.56 MHz, 27.12 MHz, and 40.68 MHz, respectively, are of particular interest. The proposed requirements would appear as an amendment in Part 1002 (Section 1002.61, "List of Specific Product Groups") of the Radiation Control for Health and Safety Act (1968) of the Public Health Service Act. For further information contact R. S. Sternchak, BRH (HFX-460), FDA, Department of HEW, 5600 Fishers Lane, Rockville, MD 20857.

Fed Regist 41(166): 49699-49700; 1979.

EPA-SPONSORED SYMPOSIUM ON THE HEALTH ASPECTS OF NONIONIZING RADIATION TO BE HELD

A symposium will be held to present up-to-date information on the physical aspects of microwave radiation in relation to man, the biomedical aspects of microwave radiation, the public issues, and the epidemiology and clinical applications. The symposium is being supported by the EPA, Office of Health and Ecological Effects. Dr. George Simon is serving as the Project Monitor.

Smithsonian Science Information Exchange No. GMA-5860

COMMENTS ON THE ANSI PERSONNEL SAFETY LEVEL STANDARD ARE SOLICITED

The American National Standards Institute (ANSI) is currently revising the standard "Safety Level with Respect to Personnel of Radio Frequency Electromagnetic Fields (300 KHZ-300 GHz)." Subcommittee IV of the C-95 Standards Committee is responsible for this task, and is soliciting comments from committee members and research, medical, and engineering personnel. Comments may be sent to Dr. A. W. Guy, Bioelectromagnetics Research Laboratory, BB805, University Hospital RJ-30, University of Washington, Seattle, WA 98195.

Bioelectromagnetics Society Newsletter (9): 3-5; September 1979.

NOTICE OF INQUIRY IS INITIATED BY THE FCC

The Federal Communications Commission (FCC) has initiated a Notice of Inquiry to gather information in order to establish guidelines for regulating and/or promoting communications by radio. The Commission's interest stems from the growing public concern over the possible hazardous effects of exposure to nonionizing radiation. The inquiry is designed to: 1) determine whether the existing standards for nonionizing electromagnetic radiation should be revised and 2) provide documentation to allow the FCC to participate in any rule-making proceedings to insure that any proposed standard adequately takes into account the impact on licensing and equipment. To obtain a copy of the Notice of Inquiry or for further technical information, contact Will McGibbon, Office of Science and Technology, FCC, Washington, DC 20554. Comments must be received by December 15, 1979.

Bioelectromagnetics Society Newsletter (9): 6; September 1979.

1979 NONIONIZING RADIATION TRAINING RESOURCES AVAILABLE

The 1979 Radiologic Health Training Resources are now available to borrowers on a free loan basis from the Training Resources Center. This program sponsored by the Division of Training and Medical Applications of the BRH, provides training assistance to state and local radiologic health agencies, physicians, university personnel, allied health professionals, scientists, students, and consumers. Specific topics include nonionizing radiation, biologic effects of microwaves, and natural and man-made radiation sources. The resource collection consists of training publications, course listings, videocassettes, movies, and printed material. For a list of the resources and to order material, contact the Training Resources Center (HFX-70), DTMA, BRH, FDA, 5600 Fishers Lane, Rockville, MD 20857 or telephone (301) 443-2554.

HEW Publication (FDA) 79-8023, August 1979.

ITEMS FROM THE COMMERCE BUSINESS DAILY

☐ **RESEARCH CONCERNING THE EFFECTS OF MICROWAVES ON LEARNING AND ON DRUG UPTAKE.**

The Office of Naval Research, 800 N. Quincy St., Arlington, VA 22217 is negotiating with Battelle Memorial Ins., Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352 for the above study. (August 10, 1979)

☐ **MICROWAVE INTERACTION WITH NERVE CELL MEMBRANES.**

The Environmental Protection Agency, Office of Administration, Research Triangle Park, NC 27711 has contracted with the Duke University, Office of Sponsored Programs, Durham, NC 27706 for the above study. (September 11, 1979)

☐ **RESEARCH IN ANALYSIS TECHNIQUES FOR MICROWAVE DOSIMETRIC DATA.**

The U.S. Army Medical Research and Development Command, Acquisition Group, Contracting Office, Fort Detrick, MD 21701 is negotiating with Technology-U.S.A., Inc., Oxon Hill, MD for the above study. (September 17, 1979)

☐ **FURTHER RESEARCH ON MICROWAVE EFFECTS ON CELLS.**

The Office of Naval Research, 800 N. Quincy St., Arlington, VA 22217 has contracted with the Polytechnic Institute of New York, 333 Jay St., Brooklyn, NY 11201 for the above study. (September 19, 1979)

☐ **IDENTIFICATION OF SITES IN BRAIN TISSUE.**

The Environmental Protection Agency, Office of Administration, Research Triangle Park, NC 27711 has contracted with the Research Triangle Institute, P.O. Box 12194, Research Triangle Park, NC 27709 for the above study. (October 3, 1979)

INTERNATIONAL RADIATION PROTECTION ASSOCIATION FIFTH INTERNATIONAL CONGRESS

Date: March 9-14, 1980
Place: Jerusalem, Israel: Jerusalem Convention Center
Sponsor: Israel Health Physics Society, Intl. Radiation Protection Assoc. (IRPA)
Requests for Information: Israel Health Physics Society, c/o Soreq Nuclear Research Center, Yavne 70600, Israel
Content: Sessions will cover all aspects of protection against ionizing and nonionizing radiation

INTERNATIONAL MAGNETICS CONFERENCE

Date: April 21-24, 1980
Place: Boston, MA: Sheraton Boston Hotel
Sponsor: IEEE Magnetics Society
Requests for Information: D. I. Gordon, U.S. Naval Surface Weapons Center, White Oak, Silver Springs, MD 20910
Content: Topics will cover applied magnetism, including microwave devices and materials.

15th ANNUAL MICROWAVE POWER SYMPOSIUM

Date: May 6-9, 1980
Place: Ames, IA: University Iowa
Sponsor: International Microwave Power Institute (IMPI)
Requests for Information: Dr. Glen Fanslow, Dept. Electrical Engineering, Iowa State Univ., Ames, IA 50010
Content: Technical sessions and short courses will be presented. Topics will include new technical contributions in noncommunication areas of radio frequency and microwave power such as biomedical applications; biologic effects on humans, animals, and microbiologic systems; chemical and plasma process; combination thermal and microwave food cooking systems; radio frequency and microwaves in the food industry; consumer microwave oven usage patterns; and industrial radio frequency and microwave systems and applications

1980 IEEE/MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM

Date: May 28-30, 1980
Place: Washington, DC: Shoreham-Americana Hotel
Sponsor: Inst. of Electrical and Electronics Engineers (IEEE)--Microwave Theory and Techniques Society
Requests for Information: B. Shelag, Arrangements Chairman, Naval Research Lab., Code 5251, Washington, DC 20375
Content: Topics will cover the expected growth in microwave technology in the 1980s and will include microwave and millimeter wave devices, microwave acoustics, communication systems, field and network theory, and bioeffects

3rd INTERNATIONAL SYMPOSIUM ON CANCER THERAPY BY HYPERTHERMIA, DRUGS AND RADIATION

Date: June 22-26, 1980
Place: Fort Collins, CO: Colorado State Univ.
Sponsor: Natl. Cancer Inst., Colorado American Cancer Society, Journal Natl. Cancer Inst., Univ. Utah, Colorado State Univ.
Requests for Information: Office of Conferences & Inst., Rockwell Hall, Colorado State Univ., Fort Collins, CO 80523

Abstracts of papers and posters to be presented should be submitted to the Office of Conferences & Institutes by March 1, 1980.

Selected Bibliography of Papers to be Presented:

HYPERTHERMIA AND ELECTRON AFFINIC COMPOUNDS. G. E. Adams

HEAT TRANSFER MECHANISMS AND THERMAL DOSIMETRY. H. F. Bowman

APPLICATIONS OF MICROWAVE, ULTRASOUND AND RADIO-FREQUENCY HEATING IN VIVO. J. Hunt

PHYSIOLOGICAL CONSIDERATIONS. C. W. Song

CLINICAL LOCAL HEATING--RF. J. H. Kim

CLINICAL LOCAL HEATING--RF. K. Storm

CLINICAL LOCAL HEATING--MICROWAVES. R. M. Scott

CLINICAL LOCAL HEATING--RF--INTERSTITIAL. M. L. M. Boone, M. Manning

CLINICAL TECHNIQUES AND RESULTS FOR WHOLE BODY HYPERTHERMIA. T. Herman, L. Parks, W. Levin, H. Reinhold

INTERNATIONAL SYMPOSIUM ON THE BIOLOGIC EFFECTS OF ELECTROMAGNETIC WAVES

Date: June 30-July 4, 1980
Place: Near Paris, France: Centre Superieur d'Enseignement des Affaires (CESA), Near Paris, France
Sponsor: Intl. Union Radio Science (URSI), Comite National Francais de Radioelectricite Scientifique (CNFRS), Intl. Protection Agency, Bioelectromagnetics Society
Requests for Information: M. A. J. Berteaud, CNRS, 2, rue Henry Dunant, 94320 THAIS, France
Content: Topics will include the interactions of electromagnetic fields with biologic systems; the industrial and domestic uses of electromagnetic radiations; dielectric properties of living matter; dosimetry; molecular and cellular effects; physiologic, physiopathologic, and genetic effects; behavioral effects; and medical applications, such as hyperthermia and microwave thermography

FIFTH INTERNATIONAL CONFERENCE ON INFRARED AND MILLIMETER WAVES

Date: December 8-12, 1980
Place: Wurzburg, West Germany
Sponsor: Inst. of Electrical & Electronics Engineers (IEEE)--Microwave Theory & Techniques Society
Requests for Information: K. J. Button, MIT Natl. Magnet Lab., Cambridge, MA 02139
Content: Sessions will cover the biologic effects of electromagnetic radiation

TENTH L. H. GRAY CONFERENCE

Date: July 13-16, 1981
Place: Oxford, England
Sponsor: Inst. of Cancer Res.
Requests for Information: Dr. R. C. Hill, Inst. of Cancer Res., Royal Marsden Hosp., Sutton, Surrey, England
Content: The biology and biophysics of radio frequency, microwave, and ultrasonic radiation will be reviewed, particularly with respect to their potential therapeutic value

20th GENERAL ASSEMBLY OF THE URSI

Date: August 10-19, 1981
Place: Washington, DC: Hyatt Regency Hotel
Sponsor: International Union of Radio Science (URSI)
Requests for Information: Executive Secretary, R. Y. Dow, Natl. Acad. Sciences, 2101 Constitution Ave., N.W., Washington, DC 20418 or (202) 389-6478