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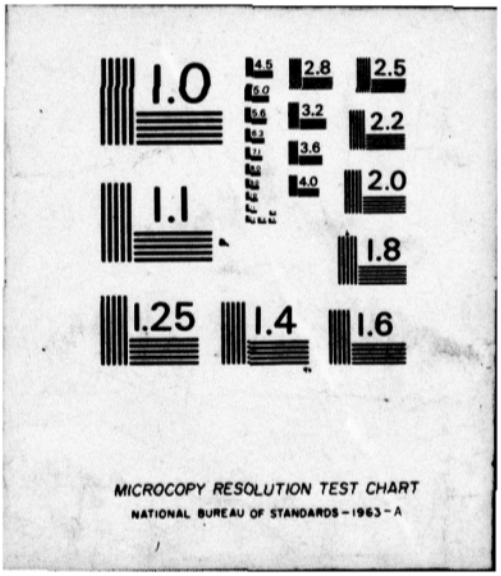
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Biological Effects of Nonionizing Electromagnetic Radiation

VOLUME I
NUMBER 1
OCTOBER, 1976

A DIGEST OF CURRENT LITERATURE

A Quarterly Publication
Produced for
Office of Telecommunications Policy
and
United States Navy

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Biological Effects of Nonionizing Electromagnetic Radiation is a publication researched and prepared by the Franklin Institute Research Laboratories, under a contract with the U.S. Navy and administered by the Office of Telecommunications Policy.

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 radiofrequency radiation) are compiled, condensed, and disseminated on a regular basis. It 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 publication make imperative the availability of this 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 1, 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.

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by
Biomedical Group, Science Information Services Department

Bruce H. Kleinstein, Ph.D., J.D., Project Manager
Elena P. Saboe, Production Manager, Editor

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BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

October, 1976 Volume 1, Number 1

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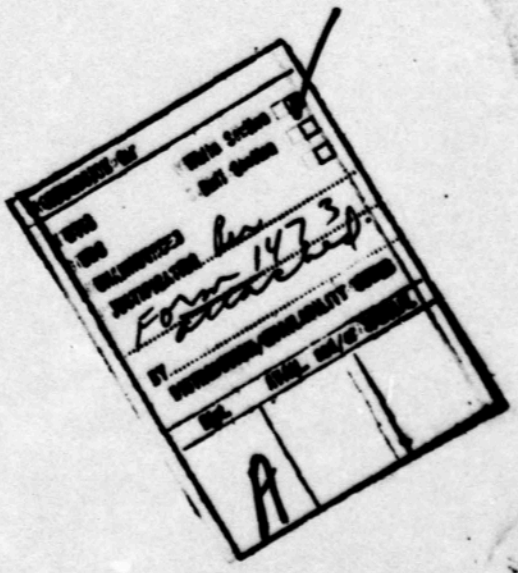
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PREFACE

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ABBREVIATIONS AND ACRONYMS

A, amp - ampere
BRH - Bureau of Radiological Health
C - centigrade
cm - centimeter
cps - cycles per second
dB - decibel
EPA - Environmental Protection Agency
ERDA - Energy, Research and Development Agency
FDA - Food and Drug Administration
g - gram
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 units
J - joule
k - kilo--
l - liter
m - meter
m - milli--
M - mega--
mho - unit of measurement of conductivity
min - minute
mo - month
NBS - National Bureau of Standards
NIH - National Institutes of Health
nm - nanometer
NSF - National Science Foundation
NIOSH - National Institute for Occupational Safety and Health
NTIS - National Technical Information Service
Oe - oersted
OSHA - Occupational Safety and Health Administration
OTP - Office of Telecommunications Policy
PHS - Public Health Service
rad - radiation absorbed dose
R - Roentgen
rpm - revolutions per minute
sec - second
UHF - ultra high frequency
USAFSAM - U.S. Air Force School of Aerospace Medicine
USDA - U.S. Department of Agriculture
UV - ultraviolet
VA - Veterans Administration
W - watt
WHO - World Health Organization
wt - weight
yr - year

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NEWS ITEMS

WHAT LEADS A TERMITE THROUGH A MAGNETIC FIELD?

Dr. Gunther Becker, one of the world's leading experts on termites claims that termites possess a natural ability to detect weak electric and magnetic fields. This ability would account, in part, for termites' remarkable social organization. A reaction to the earth's magnetic field has been suspected for some time, since it has been observed that certain termite mounds are flattened vertically along an E/W direction. To demonstrate the influence of alternating magnetic fields on termites, Becker placed a small plastic container of termites more than 3 m away from a room heater generating a 50 Hz field. Although the field was of such low intensity that it could only be measured up to 10 cm from the source, the termites built vertical galleries at the edges farthest away from the source. The termites must therefore have been able to perceive the minute differences in the strength of the alternating magnetic field within the confines of their container. Another experiment showed that termites can influence each other by their own "biofields". Becker demonstrated that termites were able to communicate through 5 mm of plastic foam but could not communicate when shielded by 5 mm of aluminum. Becker believes biofields are probably alternating electric fields enabling termites to construct galleries at the borders of nesting areas where the insects need to forage. Such biofields would enable termites to avoid serious competition for food. Becker's research poses the question as to whether one could put a magnetic field around a house to protect it from termite damage.

New Scientist 71(1014): 391; 1976

MICROWAVE EXPOSURE LEVELS FROM MARINE RADAR EVALUATED

The Division of Electronic Products of the Bureau of Radiological Health has conducted a study of the range and magnitude of microwave radiation exposure resulting from marine radar units used on small pleasure boats. Investigators surveyed 33 marine radar units in actual use and compiled information concerning 43 different models. Laboratory measurements were performed in the Division's anechoic chamber, and calculated emission levels were compared with experimentally measured values. According to a recently published report on the study, personnel exposure to microwave emissions from the radar units probably will not exceed 1 mW/cm^2 average power density under normal operating conditions. However, significantly increased emission levels might be encountered if a unit is operated with the antenna rotation stopped. The report recommends that exposure under such conditions be avoided. Another finding was that instantaneous peak microwave emissions in the region surrounding the antenna might be quite high. Although any possible biological hazards associated with these emission levels are uncertain at present, the possibility of interference phenomena in critical devices, such as cardiac pacemakers, seems to warrant caution. Therefore, the report suggests that care be exercised to limit the unnecessary use of marine radar in areas of high population density--for example, when docked in harbor. The U.S. Coast Guard has reviewed the report and has agreed to a program of cooperation with the Bureau on the safety aspects of marine radar. The report is available from the National Technical Information Service, as indicated under "New Bureau Publications."

BRH Bulletin 10(1): 3-4; 1976

VISITING SCIENTIST JOINS BUREAU STAFF

Dr. Przemyslaw Cerski has accepted an appointment with the Bureau of Radiological Health to work with the Division of Biological Effects on a program to determine the effects of microwaves on the blood-forming system. He comes to the Bureau from Poland's National Research Institute of Mother and Child where he is a Professor of Genetics and Head of the Department of Human Genetics. This department has been designated a World Health Organization Collaborating Center for Bioeffects of Nonionizing Radiation, and Dr. Czerski serves as the Center's Head. He also has served as adviser on nonionizing radiation protection to the Polish Ministry of Health and Social Welfare.

BRH Bulletin 10(1): 2; 1976

MICROWAVE SAFETY LEVEL STILL TOO HIGH?

In experiments performed for the Environmental Protection Agency, Dr. Andrew Huang of Duke University Medical Center has detected changes in the white blood cells of hamsters exposed to microwave doses as low as 5 mW/cm^2--half the maximum dose set by Food and Drug Administration regulations for microwave ovens. Huang exposed hamsters to 15 minutes of microwave radiation (at 2.45 and 9.00 GHz) per day for seven days. The ability of the animal's lymphocytes to transform into antibody forming cells, when stimulated in the test tube, was impaired by the microwave radiation. This preliminary experiment raises the possibility that the immune response of hamsters to infection is likely to be decreased as a result of microwave radiation exposure. Huang has become seriously concerned about the safety of the rapidly growing number of microwave ovens now being sold in the U.S. He believes that if what he finds true in hamsters is true in humans, existing ovens could pose a potential threat in the home. Ironically, the radiation levels in a typical kitchen equipped with a microwave oven far exceed those recently beamed into the U.S. Embassy in Moscow, which, it was feared, endangered the health of Embassy employees.

New Scientist 69(987): 323; 1976