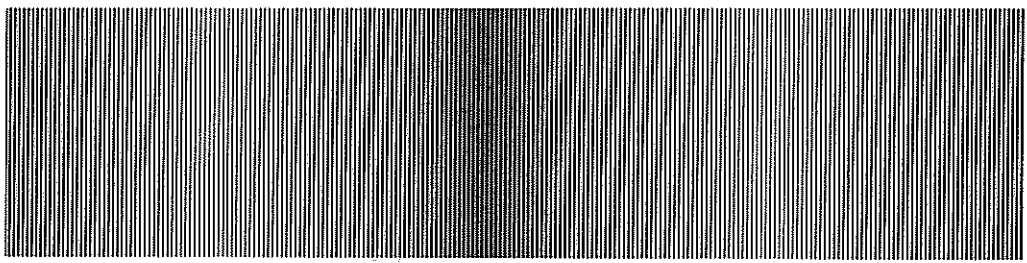


MICRO WAVE NEWS



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A Monthly Report on Non-Ionizing Radiation

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Microwave News invites contributions to *From the Field*, our occasional column featuring news and opinions from the non-ionizing radiation community. Letters from readers are also welcome.

VDT-Pregnancy Clusters Prompt NIOSH Research

Investigators from the National Institute for Occupational Safety and Health (NIOSH) have agreed to inspect an Alma, MI, telephone company office where 17 of 32 pregnancies among operators ended abnormally during a 16-month period. The cluster of suspected video display terminal (VDT) related pregnancy problems in Alma is the third to be made public this year (see *MWN*, March and April 1984) and the eleventh since 1980.

Researchers at NIOSH and the federal Centers for Disease Control (CDC) have long discounted a possible VDT-problem pregnancy link. But now NIOSH officials say that an epidemiological study focussing on VDT work has become a "very high priority." Dr. J. Donald Millar, director of NIOSH, is expected to outline the planned study when he testifies before a congressional subcommittee evaluating VDT health and safety on May 15.

Recent news reports in *The Wall Street Journal* (April 6), *Business Week* (April 23) and *Computerworld* (April 30) have quoted NIOSH officials as saying that the study will begin soon, but interviews with these officials revealed that major issues remain unresolved. A study population has not yet been identified, the study questionnaire lacks final approval and the lead researcher on the project, Dr. Jane Gordon, will be leaving the agency in June, before the study is underway.

Michigan Cluster

Long distance operators in the Alma office of General Telephone of Michigan, a subsidiary of GTE, first reported their cluster in the spring of 1983, according to H. Max Preston, the company's state vice president and general manager. Through their union, the International Brotherhood of Electrical Workers (IBEW), the workers informed the company of the unusually high number of miscarriages, birth defects and other problem pregnancies that had occurred between December 1981 and March 1983.

The state's Radiological Health Services Division (RHSD) tested 51 terminals at the site for ionizing radiation emissions, at the request of IBEW. In a letter to the union, Robert Skowronek of RHSD reported that "no ionizing radiation was detected" and that, "in our opinion, the use of these video display terminals does not pose a radiation exposure hazard for employees."

Recent publicity about the cluster led the company to ask NIOSH to visit the site. Dr. Peter Lichty, a medical officer in NIOSH's Hazard Evaluations and Technical Assistance Branch (HETAB) who is investigating the cluster, told *Microwave News* that a team of researchers would make an initial site inspection on May 8 and follow up with a second visit later.

General Telephone's Preston said in a telephone interview that the company is concerned that all the publicity has "heightened concerns among workers that had been allayed by the state's tests."

(continued on p. 12)

CISPR: Information and ISM Equipment EMC

Progress towards two new electromagnetic compatibility (EMC) standards—for information technology equipment (ITE) and for industrial, scientific and medical (ISM) equipment—was made at the meetings of the International Special Committee on Radio Interference (CISPR) and its six subcommittees held in Paris, France, March 5-17.

Information Technology Equipment

CISPR's Subcommittee B on "Interference from ISM Radiofrequency Apparatus" released a document on ITE standards, which will be issued as an International Electrotechnical Commission (IEC) "six months' draft rule" (CISPR is a special committee of the IEC). The document, which specifies emission limits and measurement techniques, will now go to each member country for approval.

Art Wall of the Federal Communications Commission (FCC) reports that there are several minor differences between the FCC's Part 15 rules for computers and other digital equipment and the CISPR proposal, but that they are "basically the same." He predicts that the CISPR standards will be accepted by the member nations.

If so, the FCC will have to go through formal rule making proceedings before they can be adopted in the US. Speaking at the 1984 IEEE National Symposium on Electromagnetic Compatibility, in San Antonio, TX, on April 24, Wall said that he "would not be surprised if industry petitioned the FCC to adopt the CISPR rules." Wall, who is the chief of the RF Devices Branch in the FCC's Office of Science and Technology, added that the commission "might act alone, but given our work load, it will be quicker if industry petitions."

The Computer and Business Equipment Manufacturers Association (CBEMA) has been anxious to have an international standard and may well petition. In 1977, in response to FCC's original proposals for limiting computer radiofrequency interference, CBEMA wrote: "Worldwide compatibility is desirable, not only from a technical viewpoint but also for reasons of international comity. There are, in addition, economic considerations inasmuch as it is costly to comply with different, inconsistent standards using different measurement techniques and different kinds of measurement equipment."

In a telephone interview, CBEMA's William Hanrahan said that the group still favored international standards and that there was a "good possibility" that CBEMA would petition the FCC if the CISPR limits are reasonable. Hanrahan had not yet seen the numbers that emerged from the Paris meetings: "We will be discussing this question in the coming weeks," he said.

At a CISPR plenary meeting, the Canadian delegation proposed that a new subcommittee be established to deal with ITE. There has been some dispute over whether Committee B or F has jurisdiction over ITE (see *MWN*, May 1983). A report outlining the merits of a new subcommittee is being prepared for consideration at next year's CISPR meeting.

One change in definition was made in Paris: according to EMACO's Herb Mertel, the term "data processing equipment" was changed to "information technology equipment" to include devices connected to telephone lines.

ISM Equipment

Subcommittee B delegates failed to reach a general agreement on emissions from ISM equipment at the CISPR meetings. Some progress was made as a 90 dB ceiling gained preliminary acceptance for frequencies below 1.6 MHz. (The CISPR measure is relative to 1 uV/m at 30 meters; 90 dB is equivalent to 31.6 mV/m.) There was no consensus for limits at higher frequencies, however.

ISM equipment is a broad category which includes microwave ovens, induction and dielectric heaters, RF welders and diathermy units.

Setting emission limits for ISM equipment is complicated and controversial, and the stakes riding on the outcome are high. The Interim Working Party 1/4 of the International Radio Consultative Committee (CCIR) is writing new standards and CISPR is participating in that effort (see *MWN*, September 1983). Unlike CISPR standards, which are essentially voluntary, CCIR limits would have the status of an international treaty and would be mandatory.

The US out-of-band limits for ISM equipment, set by the FCC in Part 18 of its regulations, are generally considered to be lenient: 10 uV/m at one mile from the source in industrial areas. In 1978, the commission proposed tightening these limits to 900 uV/m or less at 30 meters for frequencies below 1 GHz (43FR46326). These proposals, which were similar to the then current CISPR limits, were opposed by US manufacturers and they are still on hold at the FCC pending the outcome of international deliberations.

Given that the CISPR and the FCC specify limits measured at different distances from the source, an attenuation model is needed if the two are to be compared. What the appropriate model should be is also the subject of some controversy.

Indeed, in its proposed 1978 ISM rules, the FCC advised that it had not attempted to convert various field strength limits to a standard distance because "there is some disagreement about how the value should be extrapolated. We do not want to get into this argument."

For example, if you assume that the signal decreases with the square of the distance, 10 uV/m at one mile is equivalent to 89 dB at 30 meters. According to this model, the new CISPR limit of 90 dB is essentially the same as the present FCC limits. But if you assume that the signal decays with the cube of the distance, the FCC's 10 uV/m standard translates to 125 dB at 30 meters. Under this latter model, CISPR's proposed 90 dB limit is significantly stricter than the current FCC standard.

Although a consensus is developing on standards for emissions at low frequencies, US delegates believe that the CISPR proposals above 1.6 MHz are too harsh. Unless a compromise is reached within CISPR, some participants

fear that CCIR will adopt mandatory limits that are too stringent.

For emissions above 1.6 MHz, which is at the top of the AM radio band, European representatives favor limits in the 60 dB range. Lamont Wilson, a consultant to US companies who attended the CISPR meetings, opposes this move. In a telephone interview, he said that as far as he is concerned the limits for the higher frequencies "are up in the air."

In a series of telephone interviews, US delegates to the CISPR meetings suggested that the disagreement is based on the different enforcement rules in Europe compared to those in the US. For instance, they maintained that in a number of European countries, the government must pay for repairs if a source of radiofrequency interference is discovered which complies with the national limits.

The ISM document, which is a briefing rather than a voting document, will now be reviewed by the US's Subcommittee B technical advisory committee, chaired by the FCC's Herman Garlan. Garlan is about to retire after 44 years with the commission.

Immunity Measurements

In the third major development at the Paris meetings, a working group of Subcommittee E on "Interference Characteristics of Radio Receivers" proposed using the open strip line or parallel plate as the preferred method of measuring the susceptibility of electronic equipment.

According to Gilbert Hermeling, a former RCA staffer and now a consultant to the Electronic Industries Association, who attended the Paris meetings, the TEM cell would be allowed as an alternative method under the CISPR rules.

This action reverses the position taken by the Subcommittee E working group at last year's meeting in Kristiansand, Norway. At that time, the closed TEM cell was the preferred technique and the strip line was the alternative method.

The US delegates favor the TEM cell as the standard technique because it is more accurate and is already in common use. On the other hand, many European countries still use the strip line and do not want to incur the expense of switching over to the TEM cell.

The matter is by no means settled. The working group will issue a new draft document and it will be discussed again at the 1985 meeting.

Other Actions

Subcommittee A on "Radio Interference Measurements and Statistical Methods" has issued two draft six months' rules: CISPR/A(Central Office)28, *Amendment of CISPR Publication 16 to Provide for the Measurement of Screening Effectiveness*, applicable to measuring instrumentation for 10 kHz to 1 GHz; and CISPR/A(Central Office)30, *Amendment of CISPR Publication 16 to Provide For Measurement of Total Radiated Power from Apparatus Operating in the Microwave Range*, (reverberating chamber method). Copies of all the six-months' rules should be available this month.

CISPR has also recently released a new amendment to

CISPR 13-1975: Amendment No.1-1983, *Limits and Methods of Measurement of Radio Interference Characteristics of Sound and Television Receivers*. It is available for \$13.00 (prepaid) from the International Sales Dept., American National Standards Institute, 1430 Broadway, New York, NY 10018.

Future Meetings

The next CISPR meeting will probably be held in Sydney, Australia, either in May or September 1985. The 1986 meeting may be in San Diego, CA.

This year's meeting included a celebration of the committee's 50th anniversary. CISPR was founded in Paris in 1934 under the sponsorship of the IEC.

Microwaves Affect DNA

Researchers at the Food and Drug Administration's (FDA) Center for Devices and Radiological Health and the University of Maryland have shown that microwaves can affect DNA, the basic genetic material of all living systems.

In an invited paper presented at the annual meeting of the American Physical Society on March 28, FDA's Dr. Mays Swicord reported the "first observation of microwave energy absorption by DNA in the 8-12 GHz frequency range."

A number of researchers have already reported experimental data indicating that non-ionizing radiation can alter genetic systems. But many observers are dubious about these effects because the energy of microwave photons is too low to cause biological interactions through currently accepted mechanisms.

Now, Swicord and Dr. Christopher Davis and Glen Edwards of the University of Maryland in College Park have found that "direct excitation of the DNA molecule by electromagnetic radiation in the radiofrequency range is not only possible, but indeed does occur." Their experiments "further suggest that from physical considerations, low-level athermal microwave genetic effects are conceptually possible."

Using a technique called dielectrometry, the researchers measured the absorption coefficients of DNA in a saline solution. They discovered not only that the DNA was an efficient absorber of microwave energy, but also that the degree of absorption was dependent on the length of the DNA chain.

In a telephone interview, Swicord said that they had observed chain length resonance modes. "For a *specific* number of base pairs of DNA, you have a *specific frequency* that will resonate with the molecule," he explained. For example, if a given DNA chain resonates at a particular frequency, a chain with twice as many base pairs will resonate at half the original frequency.

Swicord's data conform to a theory developed by Dr. Earl Prohofsky of Purdue University in Lafayette, IN. Prohofsky calculated that nucleosomes, which have only a few hundred base pairs, would resonate at 40 GHz.

Swicord cautioned that "any jump from these physical measurements to observed biological effects is still highly speculative." But he added that "it is possible that some of

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the genetic effects that have been observed could be explained by these new results."

Dr. Friedrich Kremer of the Max Plank Institute for Solid State Physics in Stuttgart, West Germany, has shown that millimeter waves (64-69 GHz) can cause an impairment of the puffing pattern of the giant chromosome of a midge (see *MWN*, October 1983). At somewhat lower frequencies, approximately 41 GHz, Dr. Fritz Keilman, also of the Max Planck Institute, and co-workers found that non-thermal levels of radiation can affect the growth rate of yeast (see *MWN*, December 1982).

At microwave frequencies, a team led by FDA's Dr. Przemyslaw Czerski has demonstrated that 0.915, 2.45 and 9.45 GHz radiation changes the chromosomes of male mice during spermatogenesis (see *MWN*, October 1983).

Dr. Abe Liboff of Oakland University in Rochester, MI, has reported that extremely low frequency (ELF) radiation (10 Hz-4 kHz) can enhance DNA synthesis (see *Biological Effects Update* on p.7). Swicord said that he suspects the mechanism of interaction for ELF radiation is different from that at higher frequencies.

Swicord's group has already published a paper on the enhanced DNA absorption in *Biopolymers*, 22, 2513, 1983. Glen Edwards will present new data on the base pair/frequency relationship at this summer's Bioelectromagnetics Society annual meeting.

PEMF Treatment for Shoulder Pain

Rotator cuff tendinitis, a common cause of shoulder pain, has been treated effectively with pulsed electromagnetic fields (PEMFs). In a paper published in the March 31 *Lancet*, a team from Addenbrooke's Hospital and Strangeways Research Labs in Cambridge, England, reports that PEMF therapy is beneficial for patients who do not respond to conventional therapy.

The new study marks two important milestones in the development of PEMF therapy. While PEMFs have been used to accelerate bone repair, to regenerate nerves and to heal skin ulcers, this is their first application to rotator cuff tendinitis. Second, the Cambridge paper is the first published report of a double-blind controlled study for any type of PEMF treatment.

Drs. Allan Binder, Graham Parr and Brian Hazleman of Addenbrooke and Dr. Sylvia Fitton-Jackson of Strangeways used Electro-Biology's (EBI) coil to administer single pulses of 73 ± 2 Hz to the shoulders of patients whose injuries had persisted for more than three months.

The 29 patients who participated in the study were divided into two groups: 15 were treated with PEMFs for eight weeks while the 14 patients in the control group were fitted with dummy coils. Neither patients nor researchers knew who had the active coils. After four weeks, the coils of the control group were activated for four weeks of treatment—without breaking the double-blind code. The therapy sessions varied from three to ten hours a day.

At the end of the first phase of the experiment (after four weeks), there was a statistically significant improvement in

all the measures used to assess treatment success. A similar improvement was found among the control group after their four weeks of PEMF therapy.

All the patients were monitored for eight weeks after the coils were removed. Of the 29 patients, 19 were symptomless at the end of 16 weeks. Among the remaining ten, two became symptomless, three had "only minor residual disability," and five still experienced either pain and tenderness or felt no improvement. The research team concluded that "more than 70 percent of patients improved on PEMF therapy."

No side effects were reported in the course of the study, though many patients found the coils to be "cumbersome and uncomfortable." In a pilot study, which has not been published, one patient suffered neck pain and "neurological deficit" in the arms—a condition which was connected to a prior ailment. This patient's shoulder improved with PEMF therapy. The pilot study had an overall 67 percent success rate.

PEMF therapy for certain types of persistent and severe shoulder pain could become quite popular. According to the researchers, rotator cuff tendinitis is "extremely common" and, while most cases respond to local corticosteroid injections, 23 percent of those referred to the shoulder clinic at Addenbrooke did not respond or derived only temporary benefit from conventional therapy. The Cambridge group suggests that PEMFs could also be useful in the treatment of other chronic tendon lesions.

ARRL Seeks FCC Decision On RF/MW Safety

The American Radio Relay League (ARRL) has asked the Federal Communications Commission (FCC) to complete its rule making on radiofrequency and microwave (RF/MW) radiation safety. The commission issued a notice of proposed rule making in January 1982 on procedures for ensuring that its licensees do not create RF/MW radiation hazards (see *MWN*, March 1982). No final action has followed.

According to the ARRL's counsel, Christopher Imlay, the league filed its request "more out of frustration than out of hope." The March 20 petition echoes broadcast industry comments filed in 1982, which urged the commission to adopt an interim exposure standard while the Environmental Protection Agency (EPA) develops its RF/MW guidelines.

The league argues that "the absence of any clear guidelines from the commission" will make it impossible to answer mounting public concern over potential RF/MW health hazards and that the situation will foster more siting disputes and state and local rule making.

Although the commission has yet to set a date for the release of a final action, officials maintain the commission has not backed away from setting an RF/MW safety policy. Peggy Reed, the commission's deputy chief scientist for policy, told *Microwave News* that "this area is getting a lot of attention here" and explained that the delay is in part a result of "the increasing complexity of this issue." Reed noted that when the notice was released, the commission

thought the Occupational Safety and Health Administration's 10 mW/cm² exposure guideline could be used, but that this is no longer considered an available option (see *MWN*, March 1984).

Contrary to Reed's assurance that work is continuing, the league maintains in its petition that it has been informed that the commission is "deferring action" until EPA adopts its general population exposure guidance. Though EPA plans to publish proposed exposure limits this June, the league warns that "a substantial amount of time—possibly another two years—is likely to pass before [EPA] releases a final recommendation."

FCC staff would not confirm that the commission has decided to wait for EPA, but the schedule for RF/MW safety rules does not appear in the FCC's current semi-annual "unified agenda of federal regulations." (The agenda appeared in the April 19 *Federal Register*, 49FR16598.) The word from the deputy scientist's office is that the omission was an administrative oversight.

The league, while pushing for an interim standard, opposes using guidelines which are more restrictive than the American National Standards Institute (ANSI) 1982 standard. ARRL would therefore most likely oppose EPA's proposed guidance because it is rumored to be ten times lower than ANSI's. EPA is expected to propose a 100 uW/cm² limit for resonant frequencies.

FCC officials said they do not know how long it will take to respond to ARRL's petition.

BEMS Workshops and ANS C95 Meeting

If you are planning to attend the 6th Annual Meeting of the Bioelectromagnetics Society (BEMS) in mid-July, be prepared for a hectic week. In addition to the 180 papers accepted for presentation at the daily technical sessions, a symposium and two workshops are being organized for the evening hours. Before the BEMS meeting gets underway, there will be a meeting of the American National Standards (ANS) Committee C95.

On Sunday, July 15, the eve of the formal opening of the conference, Dr. Don Justesen will host a symposium on the biological effects of low frequency pulsed magnetic fields. The starting point for the evening's discussion will be Dr. Jose Delgado's studies with chicken embryos (see *MWN*, March and November 1983), though the Spanish researcher will be unable to attend the BEMS meeting, according to Justesen.

For the following evening, Dr. Eleanor Adair is organizing a workshop on the "Pound Proposal." Four years ago, Harvard University Professor Robert V. Pound argued that much of the energy used to heat buildings could be saved if people were warmed up instead of the space that surrounds them. In a paper published in the May 2, 1980, *Science*, he outlined how this could be accomplished with microwaves of centimeter wavelengths because in the 40-90 GHz fre-

(continued on p.6)

CLASSIFIEDS

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HIGHLIGHTS

quency range, 95 percent of the incident radiation is absorbed by the skin. With such shallow penetration, Pound believes that non-thermal effects would be unlikely. Adair plans a discussion of the economic and technical feasibility of the idea, its medical implications and the ethical and legal questions associated with pilot studies using human subjects. Pound is planning to attend.

On Tuesday night, a panel will discuss the range of issues, from political to scientific to legal, raised by the use and regulation of radiofrequency and microwave radiation. Richard Tell of the Environmental Protection Agency and Robert Cleveland of the Federal Communications Commission are assembling representatives from federal agencies, industry and the general public to field questions from the audience. They want to focus on "real life situations," that is, "Where are people being exposed and how much of a problem is there with regard to both potential hazards and economic impact of corrective actions?" A lively inter-

change is expected.

The American National Standards Committee on Radiofrequency Radiation Hazards, C95, has scheduled a meeting for Sunday, July 15 at 2 pm at the Omni International Hotel.

Among the agenda items are reports on the status of the revisions of the American National Standards Institute (ANSI) exposure limits (C95.1-1982) and of the measurement guidelines (C95.3-1979 and C95.5-1981). A new draft standard covering hazards to electric blasting caps will also be presented.

The BEMS meeting will be held at the Omni International Hotel in Atlanta, GA, July 15-19. Rooms should be reserved directly with the hotel at 1 Omni International, Atlanta, GA 30335, (800) 241-5500, or (404) 659-0000 in Georgia. For more information about the meeting, contact Marsha Ryan at BEMS, 1 Bank St., Suite 307, Gaithersburg, MD 20878, (301) 948-5530.

SHORT COURSES

June 11-15: Computer Aided Design of Microstrip Circuits and Antennas, Boulder, CO. Fee: \$650. Contact: Prof. S.W. Maley, EE Dept., University of Colorado, Campus Box 425, Boulder, CO 80309, (303) 492-7004.

June 11-15: The Modern Geometrical Theory of Diffraction, Columbus, OH. Fee: \$750. Contact: Richard Frasher, Ohio State University, Engineering Short Courses, 2070 Neil Ave., Columbus, OH 43210, (614) 422-2651.

June 13-15: Biological Effects of Transmission Lines and Substations, Chicago, IL. Fee: \$685. Contact: Ms. Hargett, Professional Development Services (PDS), 4 Professional Dr., Suite 148, Gaithersburg, MD 20879, (301) 926-2797.

June 18-19: Electrical Accidents Involving Power Lines, Washington, DC. Fee: \$475. Contact: PDS, see June 13 above. Repeated **June 21-22: Denver, CO.**

June 18-22: Antennas and Arrays, Washington, DC. Fee: \$875. Contact: Contact: George Harrison, Continuing Engineering Education, George Washington University (GWU), Washington, DC 20052, (800) 424-9773, or (202) 676-6106 in DC. Repeated **August 13-17: Ottawa, Canada.**

June 19-21: Seminar on Mutual Design of Overhead Transmission Lines and Railroad Communications and Signal Systems, Washington, DC. Fee: \$100 (approx.). Contact: John Dunlap, Electric Power Research Institute (EPRI), PO Box 10412, Palo Alto, CA 94303, (415) 855-2305. Repeated **September 11-13: Atlanta, GA.**

June 19-22: Grounding & Shielding, Chicago, IL. Fee: \$815. Optional fourth day for \$235. Contact: Don White Consultants Inc. (DWCI), Star Route 625, PO Box D, Gainesville, VA 22065, (703) 347-0030. Repeated **July 17-20: Boulder, CO; August 14-17: Ottawa, Canada; September 18-21: San Diego, CA; October 23-26: Atlanta, GA.**

June 19-22: Communication Satellite Antenna Technology, Burlington, MA. Fee: \$850. Contact: Ann Beekman, Southeastern Center for Electrical Engineering Education (SCEEE), Central Florida Facility, 11th & Massachusetts Ave., St. Cloud, FL 32769, (305) 892-6146.

June 20-22: Mobile Cellular Telecommunication Systems, Washington, DC. Fee: \$695. Contact: GWU, see June 18 above.

June 25-27: Design Methods for Emission and Susceptibility Control, Sunnyvale, CA. Fee: \$695. Contact: Jim Hill, EMXX Corp., 6706 Deland Dr., Springfield, VA 22152, (703) 451-4619.

June 28-29: EMC Laboratory Experience Workshop, Mariposa, CA. Fee: \$695. Contact: EMXX, see June 25 above.

July 10-13: Advanced EMC Workshop, Philadelphia, PA. Fee: \$995. Contact: DWCI, see June 19 above.

July 11-13: Communication Satellite Systems - The Earth Station, Washington, DC. Fee: \$695. Contact: GWU, see June 18 above.

July 16-20: Microwave Antenna Measurements, Atlanta, GA. Fee: \$800. Contact: Dept. of Continuing Education, Georgia Institute of Technology, Atlanta, GA 30332, (404) 894-2400.

July 17-18: Radar Principles for the Non-Specialist, Washington, DC. Fee: \$625. Contact: GWU, see June 18 above.

July 31-August 3: Antenna Theory and Design, Myrtle Beach, SC. Fee: \$645. Contact: SCEEE, see June 19 above.

August 6-10: Non-Ionizing Radiations: Biophysical and Biological Basis, Applications and Hazards in Medicine and Industry, Cambridge, MA. Fee: \$950. Contact: Office of Summer Session, Room E19-356, MIT, Cambridge, MA 02139.

August 7-9: Grounding & Interference Control in Buildings and Electrical/Electronic Facilities, Philadelphia, PA. Fee: \$785. Contact: DWCI, see June 19 above.

August 14-15: EMI Diagnostics & Fixes, Virginia Beach, VA. Fee: \$635. Contact: DWCI, see June 19 above.

August 27-29: Electromagnetic Pulse and Its Effects on Systems, San Diego, CA. Fee: \$695. Contact: GWU, see June 18 above.

September 10-11: EMI Testing Workshop: Commercial, Philadelphia, PA. Fee: \$595. Contact: Michele Elkes, R&B Enterprises, 20 Clipper Rd., West Conshohocken, PA 19428, (215) 825-1965. Repeated **October 29-30.**

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BIOLOGICAL EFFECTS

Electric Blankets and Fetal Loss...Dr. Nancy Wertheimer has found a significant increase in fetal loss among users of electric blankets — a less than significant increase was also observed among users of water beds — as compared to controls who did not heat their beds. Wertheimer, who is with the Department of Preventive Medicine and Biometrics at the University of Colorado Medical School in Denver, reports that the incidence of fetal loss “showed a significant seasonal skewing, most concentrated in the months when cold nights are increasing (September through January).” In addition, live births among those using electrically heated beds had longer gestation times but not higher birth weights. She concludes that “this tendency and the excess fetal loss both seemed to be associated with high electric blanket settings used by the mother rather than those used by the father.” Wertheimer will be presenting these results in a talk at the New York Academy of Sciences in New York City on May 16 and in a poster paper at the annual meeting of the AAAS, which will be held in New York City during the last week of May. Dr. Sol Michaelson of the University of Rochester School of Medicine and Dentistry is also on the academy's May 16 program. He will talk on the “Influence of Power Frequency Electric and Magnetic Fields on Human Health.” According to Michaelson, a careful review of the information available on the possible risks associated with EM fields from overhead power lines indicates that “if a hazard is determined, it is not from the electric or magnetic field per se, but other factors.” He emphasizes that, “it is imperative that we recognize the fact that practical decisions must be made on the basis of *what is known* rather than what is postulated or assumed without any rational basis.”

Resources...NIEHS' Drs. Don McRee and H.G. Davis have been studying “Whole-Body and Local Dosimetry in Rats Exposed to 2.45 GHz Microwave Radiation” and have found that local SARs in the brain can be two to three times higher than the whole-body SARs. With respect to studies on fetal development, they recommend measuring the SAR in the uterine area because “it would probably be different from the average whole-body SAR of the adult pregnant rat.” Their results are described in the February 1984 *Health Physics*....Dr. Abe Liboff's paper on the effects of time-varying magnetic fields on DNA synthesis (see *MWN*, October 1983) appears in the February 24, 1984 *Science*....A new chapter in the ongoing debate on an organism's thermoregulatory response to microwave radiation has been written by EPA's Dr. Christopher Gordon. His response to a critique by a group from the John Pierce Foundation led by Dr. Eleanor Adair appears in the recently released December 1983 issue of *The Journal of Microwave Power*. Adair et al.'s comments were in the journal's June 1983 issue and Gordon's original paper appeared in the June 1982 issue....A report from a symposium on “Human Cataract Formation,” held in London, England, in October 1983, was published in the December 15, 1983 *Nature*....A research group from England has measured the relative

permittivity and conductivity of the cerebellum, cerebrum and brain stem of mice in the 72 MHz-5 GHz frequency range. The details are in the August 1983 issue of *Physics in Medicine and Biology*.

COMPATIBILITY & INTERFERENCE

ARRL on Cable TV...The American Radio Relay League (ARRL) has issued a collection of materials on cable TV RFI, including instructions on how to deal with local cable operators whose systems leak interfering signals. The ARRL and the National Cable Television Association (NCTA) have formed a special committee to review reported cases of cable TV RFI in an effort to stem what had become a source of mutual antagonism (see *MWN*, March 1984). To get a copy of the ARRL booklet, *Cable Television Interference: Working Materials for the Radio Amateur*, send \$6.00 and a 9x12 inch self-addressed envelope with \$1.20 in postage affixed to CATVI Desk, ARRL, 225 Main St., Newington, CT 06111.

WVEU-TV Saga Continues...The FCC is still waiting for WVEU-TV and 23 land mobile radio services operating from the roof of Atlanta's Peachtree Plaza Hotel to resolve a three-year-old RFI dispute. Last year the commission ordered the TV station to pay for relocating the frequencies used by the mobile services (see *MWN*, October 1983). This March, the commission warned that it will not reconsider its initial ruling, despite WVEU-TV's latecomer status, and said the matter must be resolved within 90 days. Everyone with an antenna on the roof has submitted comments on the order, and these are now being reviewed by the commission.

GOVERNMENT

NTIA & EPA's Guidance...The impact on government agencies of EPA's soon to be proposed RF/MW radiation exposure guidance is being evaluated by NTIA's Ad Hoc Committee 189. The interagency group, which was set up under the Interdepartment Radio Advisory Committee (IRAC) last summer and is comprised of representatives from 14 federal agencies, has met six times to date. Its principal tasks are to develop analytical models to predict radiation levels produced by different types of transmitters — paralleling work nearly completed by EPA — and to review each agency's internal assessment of the guidance. According to NTIA's Paul Russo, the committee chairman, no models will be ready before June, when EPA is scheduled to publish the proposed guidance. He does hope to give EPA a synthesis of agency comments before the proposal is released, however. NTIA, which provides all frequency assignments for federal agencies, has yet to define its role in aiding guidance implementation. Several staffers suggested that the engineering models could be used to screen for potential problems during the analyses NTIA performs for all proposed federal broadcast facilities. In general, however, NTIA believes each agency will have to tackle compliance independently, though Russo notes, “we would like to be the focal point for these efforts.” The agency receives

UPDATES

6,000 to 7,000 requests each month related to the frequency assignment process.

State RF/MW Rules...Connecticut's Assembly Bill 5675, which would establish ANSI's 1982 RF/MW exposure guidelines as a state standard, is about to reach the full Assembly for a vote as we go to press (see *MWN*, April 1984)...Oregon has taken an unusual position. Instead of trying to stem the proliferation of local exposure standards, Oregon legislators have opted to leave standards setting to local authorities. After considering broader action, in July the legislature passed Senate Bill 623, which requires only that the state investigate non-ionizing radiation health effects. The brief measure was incorporated into Chapter 755 of the state statutes. A year earlier, Oregon's Multnomah County became the first US locality to adopt public exposure rules (see *MWN*, July/August 1982). Though hotly debated before approval, no compliance problems have arisen from that standard, which at its strictest level sets a 200 $\mu\text{W}/\text{cm}^2$ limit for exposures in the 30-300 MHz band.

New Name at FDA...Most people still call it BRH (for the Bureau of Radiological Health) but eighteen months ago, FDA was reorganized and the unit was consolidated with another bureau at the agency to become the National Center for Devices and Radiological Health (see *MWN*, November 1982). Now the "National" has been dropped and it will be called simply the "Center for Devices and Radiological Health." According to an FDA spokesman, the change, which took effect on March 16 and appeared in the March 19 *Federal Register* (49 FR 10166), was made because the word "national" had created "misperceptions about the range of the center's activities and authorities."

LITIGATION

Radar Disability Award...Former radar technician Frederick Becker has been awarded work-related disability benefits by the Veterans Administration Board of Appeals in Washington, DC, and is about to file a product liability suit against the manufacturers of the equipment he worked on while in the Navy. In a decision reached last fall (Docket No. 83-22 605, October 3, 1983), the VA board found "a reasonable probability that the veteran developed posterior subcapsular cataracts as the result of his rather extensive exposure to microwave radiation in connection with his training and duties with electronic and radar equipment." Becker, now 45 years old, discovered he had cataracts in 1978, 12 years after leaving active service as a technician for airborne early warning radar systems on an EC-121K aircraft. Becker estimated that during a two-year period he received 4,800 to 5,000 hours of radiation exposure. In addition to approximately \$5,000 in retroactive benefits, Becker will receive monthly, cost-of-living adjusted disability payments, now set at \$250. An original disability claim was rejected by the Colorado VA Board of Appeals in April 1983. Robert Pafundi, Becker's attorney, told *Microwave News* that he is about to file a product liability suit on his client's behalf in Federal District Court in Denver, CO. The personal injury claim will name a number of

equipment manufacturers as defendants. Pafundi's law firm — Sweeney, Pafundi and Scanlon of Westlake Village, CA — is also handling the VA disability claim of Joseph Coatney (see *MWN*, December 1982).

MEASUREMENTS

NBS Reports...Last fall we announced the publication of a NBS technical note, *A Method to Quantify the Radiation Characteristics of an Unknown Interference Source* (see *MWN*, November 1983). Now NBS researchers Mark Ma and Galen Koepke have prepared a companion report that details the uncertainties in interference testing caused by such factors as background noise, equipment limitations and measurement inaccuracies. *Uncertainties in Extracting Radiation Parameters for an Unknown Interference Source Based on Power and Phase Measurements*, (Technical Note 1064) is available for \$3.75 (prepaid) from the Government Printing Office (GPO), Washington, DC 20402. Order No. 003-003-02497-0...NBS has also released two other technical notes: *Reference Flat Pulse Generator* (TN 1067) by J.R. Andrews, B.A. Bell and E.E. Baldwin. It describes a step-like waveform generator for characterizing the response of oscilloscopes, transient recorders and automatic test equipment. Available from GPO for \$4.50 (prepaid); Order No. 003-003-02527-5. *Design and Error Analysis for the WR10 Thermal Noise Standard* (TN 1071) by William Daywitt, who details the construction of the waveguide horn antenna and isothermal cavity for the first national reference standard in the frequency range 75-110 GHz. Available from GPO for \$3.75 (prepaid); Order No. 003-003-02538-1.

MEDICAL APPLICATIONS

NMR Approvals...On March 30, the FDA approved the first two NMR imagers for marketing as being "safe and effective." Technicare Corp. of Cleveland, OH, and Diasonics of Milpitas, CA, won the right to sell their units nine months after the FDA's Radiologic Devices Panel recommended agency approval (see *MWN*, July/August 1983). The panel had also recommended that Picker International's NMR imager be approved, but FDA has yet to act on its application. Picker is based in Highland Heights, OH. FDA's Dr. Robert Phillips would only say that the agency was working on Picker's request. Meanwhile, the Radiologic Devices Panel has scheduled a meeting for May 17 in Rockville, MD, to consider an unspecified number of other NMR premarket approval applications.

Hyperthermia Notes...FDA's Medical Radiation Advisory Committee met on April 30-May 1 and was briefed on hyperthermia. Among those invited to participate were Dr. J. Robert Stewart of the University of Utah Medical Center in Salt Lake City; Tom Drennan of the University of Washington Hospital in Seattle, WA; Dr. Gerald Hanks of the Radiation Oncology Center in Sacramento, CA; Louis Stripling of BSD Corp. in Salt Lake City, UT; and Dr. Bhudatt Paliwal, the chairman of the American Association of Physicists in Medicine's Hyperthermia Committee. For more information, contact Robert Morton at (301) 443-

4600....The Independent Broadcasting Authority in the UK is giving its old 405-line transmitters to British hospitals to be used in hyperthermia treatment. The March 29 *New Scientist* reports that the transmitters, which will be phased out by the end of the year, operate at frequencies up to 200 MHz....Also in the UK, the Institution of Electrical Engineers and the Hospital Physicists' Association sponsored a meeting on *Electromagnetic Techniques for the Detection and Treatment of Malignant Disease* on April 2. Nine papers were presented, including one by Professor J.C. Bolomey of Ecole Supérieure d'Electricité in France on "Microwave Tomography and Its Potential Applications to the Control of Hyperthermia Treatment." Contact: IEE, Savoy Place, London WC2R 0BL....RF heat treatment has been found to be highly effective against ringworm, a fungal disease of the skin which affects dogs, cats, horses and humans. A report in the April issue of *Companion Animal News*, a publication of the Morris Animal Foundation in Englewood, CO, notes that the heat treatment "takes 30 seconds per application, requires one treatment and in tests has been 100 percent effective."

MEETINGS

Neurobehavioral Workshop...Drs. Richard Lovely and Mary Ellen O'Connor are organizing *Electromagnetic Waves and Neurobehavioral Function: A Workshop*, to be held August 19-23 in Corsendonk, Belgium, which is an hour from Brussels. Lovely describes the goal of the meeting as bringing together researchers from diverse fields who normally do not interact with each other. Topics to be covered include physiological, anatomical, behavioral and toxicological responses to EM fields, as well as circadian rhythms and homing and navigation in animals. One day of the meeting will be devoted to occupational medicine and human clinical studies. Attendance, which is strictly limited to 32 participants due to space limitations, is by invitation only. For more information, contact Lovely at Battelle Pacific NW Labs, PO Box 999, Richland, WA 99352, (509) 375-2269....Another conference of related interest is being planned by EPA and Johns Hopkins University. *Cross Species Extrapolation in Neurotoxicology* will be held in Raleigh, NC, June 7-8. The meeting is directed to those studying toxic chemical risks. Contact: Dr. Zoltan Annau, Neurobehavioral Toxicology Program, Dept. of Environmental Health Sciences, Johns Hopkins University, 615 N. Wolfe St., Baltimore, MD 21205.

Wroclaw Symposium...The program for the *7th International Wroclaw Symposium on Electromagnetic Compatibility*, which will be held in Poland, June 18-20, has been released. Among the papers scheduled to be presented are: "Natural Electromagnetic Earth Field at ELF" by a group from the Siberian Department of the Academy of Sciences, USSR in Ulan-Ude; "Shielding Efficiency of Reinforced Concrete Against EM Radiation [including EMP]" by J. Bruchin of the Swiss Federal Office of Energy; "Measurement of the 50 Hz Noise Level in Urban and Rural Environments" by a team at Mickiewicz University in Poznan, Poland; "Differences of Biological Effects of Simple and

Combined Electromagnetic Fields" by H. Mikolajczyk of the Institute of Occupational Medicine in Lodz, Poland; and "Membrane Effects of Low Intensity Millimeter Range Irradiation" by a group at the Institute of Radioengineering and Electronics of the Academy of Sciences of the USSR, Moscow. A copy of the symposium record is available for \$40.00 (US), prepaid, from: EMC Organizing Committee, Box 2141, 51-645 Wroclaw 12, Poland. Checks should be made payable to "Wroclaw Technical University."

NAB Sessions...There was a session on non-ionizing radiation chaired by Jules Cohen on April 30 at the *62nd Annual Convention of the National Association of Broadcasters*. Raytheon's John Osepchuk discussed the "Electromagnetic Energy Policy Alliance—A Source of Facts;" Verle Blaha of Holiday Industries on "Measuring Broadcast Signals;" AT&T Bell Labs' R.C. Peterson on "Public Exposure to RF Radiation—Perceived or Real Risk? A Case in Point;" Robert Hargrove of Nixon, Hargrove, Derans & Doyle served as a legal advisor. At a May 1 session on "Broadcast Interference," Jules Cohen proposed solutions to the channel 6/educational broadcast interference problem; NAB's Edmund Williams described TV antenna preamps, a local FM broadcaster concern; William King of Jules Cohen and Associates discussed land mobile interference to TV channels 14 and 69; Robert Culver of Lohnes & Culver addressed RF lighting and its potential impact on AM broadcasters; and NAB's Ralph Justus reviewed broadcast RFI to aeronautical navigation and communications. Lisa Stevenson of Koteen & Naftalin was the legal advisor for this latter session.

Call for Papers...The *1985 Instrumentation/Measurement Technology Conference* will be held at the Hyatt Regency in Tampa, FL, March 21-22. The theme for the meeting is "Understanding Measurement Methods." Contact: Dr. Norris Nahman, Electromagnetic Fields Division, NBS, Mail Code 723.03, Boulder, CO 80303....*1985 International Symposium on Electromagnetic Compatibility*, to be held at the Hilton in Wakefield, MA, August 20-22. The theme here is "EMC, A Universal Goal." Contact: Dr. Donald Weiner or Dr. Gerald Capraro, Dept. of Electrical and Computer Engineering, 111 Link Hall, Syracuse, NY 13210.

MILITARY SYSTEMS

Project ELF...The Navy has suffered two setbacks in its efforts to resume work on Project ELF, its submarine communication system, while it prepares an environmental impact statement (EIS) (see *MWN*, March 1984). After agreeing to the Navy's request for a reconsideration of her January 30 verdict, US District Court Judge Barbara Crabb reaffirmed her decision on April 5. At the same time, she ruled that the Navy could continue to operate its Clam Lake facility. The Navy then took its case to the US Court of Appeals for the Seventh Circuit in Chicago, IL. On April 24, a three-judge panel refused to lift Judge Crabb's injunction pending the completion of the Navy's formal appeal. Oral arguments by attorneys for the Navy and the State of Wis-

consin before the Court of Appeals are scheduled for the week of May 28....A Navy contract for evaluating the data on health and biological effects of ELF collected by IIT Research Institute (IITRI) (see *MWN*, March 1984), is about to be signed, although the Navy has not yet picked a contractor to write the actual impact statement. Rumors about the Navy setting up a "blue ribbon" panel to review the new EIS were neither confirmed nor denied by a Navy spokesman. The official announcement that the Navy is preparing a supplement to its 1977 EIS appeared in the March 26 *Federal Register* (49 FR 11233)....The Naval Electronic Systems Command in Washington, DC, has released a new report, prepared by IITRI, detailing EM exposure levels from both power lines (60 Hz) and the ELF antenna (76 Hz) near the ELF facilities in Clam Lake, Wisconsin, and near the Navy's planned facility in Republic, Michigan. A previous study investigated only the field intensities near Clam Lake (see *MWN*, May 1983). The IITRI study found that the fields generated by the ELF transmitter near Clam Lake are "very low." The report includes a tabulation of 33 cases of judicial and state regulatory agency decisions related to ELF fields and their effects on health and the environment. One noteworthy finding of the surveys in both states was that, "There is no consistency in the relationship between indoor and outdoor [magnetic flux densities] measurements. In some locations the magnetic field was higher indoors, while in others the opposite was found. A copy of the Navy report, *Representative Electromagnetic Field Intensities Near the Clam Lake (WI) and Republic (MI) ELF Facilities*, January 1984, is available for \$5.25 (prepaid) from the National Technical Information Service, Springfield, VA 22161....Much has been written about the need for the ELF system to signal orders for a nuclear attack to submerged submarines. In the March *Bulletin of the Atomic Scientists*, William Arkin of the Institute for Policy Studies observes, "One of the least known purposes of the ELF system is communication with submarines on covert missions in the Arctic and under the ice cap."

OCCUPATIONAL HEALTH

NIOSH Draft Standard...NIOSH staffers in Cincinnati, OH, have completed a draft of the agency's recommended occupational standard for RF/MW radiation (see *MWN*, March 1983). At the end of March, NIOSH assembled five experts to review the draft, which is said to be 40 pages long with approximately 100 pages of appended tables listing bioeffects data. There is no official date for the release of an external review draft, but a NIOSH spokesman said that the agency hopes to have it ready by this summer.

POWER LINES

CRS Report...A recently published report by Christopher Dodge of the Congressional Research Service provides an overview of bioeffects research on power line radiation, especially of the recent reports linking it to leukemia and genetic effects; it also outlines federal activity in this field. On balance, the report indicates that a better managed and better funded federal research program is needed. In review-

ing what is known about ELF fields, Dodge states that while available information does not explicitly link electromagnetic field exposures to health problems, a growing body of evidence suggests "subtle interactions between very weak electromagnetic fields and biological systems at the level of the cell." The author goes on to point out that there is "no single federal agency responsible for assuring public safety and comfort in the proximity of overhead transmission lines, and no federal standards exist setting quantitative limits for [high voltage transmission line] field exposures." The 34-page report includes a summary of literature reviews for electromagnetic field bioeffects. Copies of *High Power Voltage Lines and Extremely Low Frequency Communications Systems: Health and Safety Concerns*, No. 84-579 SPR, are available from your congressman's Washington or local office.

Resources...A detailed description of the experimental setup used in Dr. Wendell Winter's study on the effects of low level 60 Hz fields on human tumor cells (see *MWN*, April 1984), which found that certain exposures significantly increased cell growth rates, has been prepared by Jeffrey Lucas and Melvin Johnson of the Southwest Research Institute. Copies of the paper, which was presented on April 25 at the 1984 *IEEE National Symposium on Electromagnetic Compatibility* in San Antonio, TX, are available from the authors at SwRI, Post Office Drawer 28510, 6220 Culebra Road, San Antonio, TX 78284....Results from the first phase of Dr. Charles Graham's study of the "Influence of 60 Hz Fields on Human Behavior, Physiology and Biochemistry" are outlined in the minutes of the March 26 meeting of the New York State Power Lines Project. Graham found that 90 percent of his subjects could not detect fields below 9 kV/m and that 70 percent could not detect fields of less than 12 kV/m. For copies of the minutes and a status report on all 16 project-funded studies, contact Project Administrator Michael Rampolla at the Center for Laboratories and Research, New York State Department of Health, Albany, NY 12201, (518) 474-7888.

VDTs

Maine Rejects Rules...Maine officials rejected proposed VDT work rules April 25 by a 4-3 vote. The rules would have required periodic rest breaks, adjustable equipment and furniture, glare control, regular eye exams for operators and other measures. Only public employees would have been covered. Last June, state legislators passed the first VDT law in the US, which directed labor department officials to study health and safety issues and to propose rules, if necessary. The Occupational Safety and Health Board in Augusta, which made the decision against mandatory standards, will consider voluntary guidelines at a meeting later this year.

Legislation...Connecticut, the other state that passed a VDT law in 1983, is considering another bill that would establish a task force "to develop a code of conduct" for the use of VDTs. Substitute House Bill 5763 was approved by the Committee on Labor and Public Employees on April 11

and currently is awaiting action by the full House of Representatives....The California Assembly's Labor and Employment Committee approved recently-introduced legislation, Assembly Bill 3175, which is now being considered by the Ways and Means Committee. The proposal would require radiation shielding of terminals, non-VDT work during pregnancy, employer-provided eye exams and regular rest breaks. State officials are preparing a fiscal impact statement, and Ways and Means has scheduled a public hearing on the measure for May 23. An aide at the committee reports that interest in the bill is growing....A special committee of the Oregon Senate is in the midst of six meetings on VDT health and safety. At the three meetings held to date — on February 22, April 2 and May 7 — committee members decided to focus on ergonomics and vision, and eliminated radiation-exposure risks from their deliberations....The Wisconsin Assembly completed its recent legislative session without considering the first VDT bill to be introduced in the state, Assembly Bill 1076. Nevertheless, three state agencies completed fiscal impact reports on the proposal, which would have required radiation testing, adjustable furniture and equipment, periodic eye exams and other measures.

Resources...The Canadian Center for Occupational Health and Safety (CCOHS) has published an annotated VDT bib-

liography covering scientific literature, public policy reports and newspaper and trade journal stories. The 48-page booklet is divided into six primary areas, including electromagnetic emissions and adverse effects on reproduction, and is printed in both English and French. *Visual Display Terminals: An Occupational Health and Safety Bibliography with Selected Annotations*, is available at no cost from Paul Gallina, CCOHS, 250 Main Street East, Hamilton, Ontario L8N 1H6, Canada.

ETC...

Special Issues...A number of IEEE publications have featured special issues in recent months. Here is a list of the most notable. The March 1984 *Transactions on Magnetics* contains the papers presented at the 2nd Annual Symposium on Electromagnetic Launch Technology held in Boston, MA, in October 1983. The January 1984 issue of the *IEEE Transactions on Biomedical Engineering* is devoted to hyperthermia and cancer therapy. The proceedings of the *Conference on the Computation of Electromagnetic Fields* held in Genoa, Italy, May 30-June 2, 1983, appear in the November 1983 *IEEE Transactions on Magnetics*. The October 1983 issue of the *Proceedings of the IEEE* is on global navigation systems, including papers on Loran-C, Navstar and Omega. And the second part of the September 1983

CONFERENCES

June 3-8: 29th Annual Meeting of the Health Physics Society, Hyatt Regency, New Orleans, LA. Contact: Richard Burk, Jr., HPS, 4720 Montgomery Lane, Suite 506, Bethesda, MD 20814, (301) 654-3080.

June 4-8: International Conference on DC Power Transmission, Hyatt Regency Hotel, Montreal, Canada. Contact: Eileen Dornier, IREQ, 1800 Montee Ste-Julie, Varennes, Quebec, Canada J0L 2P0, (514) 652-8512.

June 5-7: International Conference on Lightning and Power Systems, London, UK. Contact: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, UK, (01) 240-1871, ext. 222.

June 18-21: 1984 Power Electronics Specialists Conference, Gaithersburg, MD. Contact: Frank Oettinger, NBS, Room B344, Technology Bldg., Washington, DC 20234, (301) 921-3541.

June 25-28: 1984 International IEEE/AP-S Symposium and National Radio Science Meeting, Westin Hotel, Boston, MA. Contact: Professor Harold Raemer, Dept. of Electrical Engineering, Northeastern University, Huntington Ave., Boston, MA 02115.

June 26-28: 7th International Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland. Contact: W. Moron, EMC Symposium, Box 2141, 51-645 Wroclaw 12, Poland.

June 26-28: 1984 International Conference on Lightning and Static Electricity, Hyatt Orlando Hotel, Orlando, FL. Contact: J.J. Fisher, US Naval Air Systems Command, PO Box 15036, Arlington, VA 22215, (202) 692-7788.

July 2-6: 1984 Nuclear EMP Meeting, Baltimore Hilton Hotel, Baltimore, MD. Contact: Dr. Arthur Sindoris, Harry Diamond Labs, 2800 Powder Mill Rd., Adelphi, MD 20783.

July 2-6: 4th International Symposium on Hyperthermic Oncology, Aarhus, Denmark. Contact: Dr. Jens Overgaard, Institute of Cancer Research, Radiumstationen, DK-8000 Aarhus C, Denmark.

July 9-12: 9th Annual Conference of the Australian Radiation Protection Society, Darwin, Australia. Contact: Ian Prince, C/GPO Box 1701, Darwin, NT 5794, Australia.

July 15-19: 6th Annual Bioelectromagnetics Society Meeting, Omni International Hotel, Atlanta, GA. Contact: BEMS, 1 Bank St., Gaithersburg, MD 20878, (301) 948-5530.

July 15-20: IEEE Power Engineering Society: 1984 Summer Meeting, Washington Plaza, Seattle, WA. Contact: Jack Richardson, Puget Sound Power & Light Co., 10608 NE Fourth St., Bellevue, WA. 98008, (206) 453-6800.

July 22-25: 21st Annual Conference on Nuclear and Space Radiation Effects, Broadmoor Hotel, Colorado Springs, CO; followed by **July 26-27: 1984 Hardened Electronics and Radiation Technology (HEART) Conference**, Fort Carson Army Base, Colorado Springs, CO. Contact for both meetings: B.D. Shafer, Division 2114, Sandia National Labs, Albuquerque, NM 87185, (505) 846-0629.

July 29-August 4: 8th International Biophysics Congress, Bristol, England. Contact: Meon Conferences Services, Petersfield, Hampshire GU32 3JN, England, (0730) 66561.

July 30-August 3: Gordon Conference on Bioelectrochemistry, Tilton School, Tilton, NH. Contact: Dr. Alexander Cruickshank, Gordon Research Center, University of Rhode Island, Kingston, RI 02881, (401) 783-4011.

August 13-14: Industrial Applications of Computed Tomography and NMR Imaging, Hecla Island, Manitoba, Canada. Contact: Optical Society of America, 1816 Jefferson Place, NW, Washington, DC 20036, (202) 223-8130.

August 18-23: Electromagnetic Waves and Neurobehavioral Function: A Workshop, Corsendonk, Belgium. Contact: Dr. Richard Lovely, Battelle Pacific NW Labs, PO Box 999, Richland, WA 99352, (509) 375-2269.

UPDATES

IEEE Transactions on Microwave Theory and Techniques is a cumulative index of MTT symposia held between 1952-1983.

On the Eighth Day...The April 19 *Wall Street Journal* recounts how James Jaeger, the president of Cincinnati Microwave Inc., which markets the Escort radar detector, speeded up the company's annual meeting. He offered the following history of the firm: "The earth cooled. The

dinosaurs ruled the earth, died and became oil. The US created the 55-mile-an-hour speed limit, and the Escort came into being. Are there any questions?"

CORRECTION

Oven Sales...Microwave oven shipments in 1983 ran 50.2 percent over 1982 levels. A story in our April issue misreported the increase, although the chart accompanying the story provided the correct number.

NIOSH VDT Research

(continued from p.1)

NIOSH Study

Several factors led NIOSH to move forward with its plans for an epidemiological study, which has been under consideration since late 1982 (see *MWN*, November 1982). Anxiety over VDT health hazards has spread as reports of new clusters have surfaced and media coverage has increased. In addition to the eight clusters reported from 1980 through 1983, 9 to 5, The National Association of Working Women, said in February that its 1983 survey of more than 800 VDT users nationwide turned up 15 clusters, including the three reported this year (see *MWN*, March 1984).

Dr. Philip J. Landrigan, director of NIOSH's Division of Surveillance, Hazard Evaluation and Field Studies, said that the agency is still looking for a study population, although negotiations are underway with several federal agencies and private companies where VDTs are used in large numbers. The negotiations will take "at least several months" and could take much longer, he said.

Gordon, who has led the study through its planning stages, said in a telephone interview that negotiations were "moving slower than expected." Gordon also explained that the study questionnaire has not yet been approved by the Office of Management and Budget (OMB), although OMB has okayed a similar questionnaire. She cautioned that it could take several additional months to get final approval if OMB requires changes in the form.

Landrigan does not believe that Gordon's departure will cause delays. Another epidemiologist from her branch will take over the study, he said. Funding for the study, which he estimated at \$100,000 over three years, will be allocated from within the division's budget and will not require specific congressional approval.

The planned study will involve at least 3,000 and perhaps as many as 5,000 VDT operators, according to Landrigan. Researchers will collect and compile the data; the analysis will then take six to eight months.

NIOSH's first attempt at an epidemiological study fell through last summer. For several months in late 1982 and early 1983, Dr. Michael Rosenberg, then head of the reproductive health section at the agency, maintained that VDT-related questions from NIOSH would be added to a study on pesticides and pregnancy being done by a private group in California. Later it was revealed that no commitment had been made by the group to include VDTs, and Rosenberg was forced to retract his statements (see *MWN*,

June and July/August 1983). After this setback, NIOSH officials started planning an in-house study.

Other Investigations Continue

NIOSH is making progress on its ongoing investigations of two clusters. A final report is expected soon on the cluster at Southern Bell in Atlanta that NIOSH learned about last year (see *MWN*, April 1984). In a preliminary report on his findings, NIOSH medical officer John Morawetz wrote to the company last November 7: "At this point, there appears to be a statistically significant cluster of miscarriages among women working on the 5th floor (six miscarriages out of 15 pregnancies, as compared to 19 out of 135 pregnancies...before working at [the Southern Bell office])....Preliminary analysis of the data seems to indicate that this cluster, although statistically significant, was most likely a random occurrence."

Dr. Lichty, who is looking into the cluster at the United Airlines Reservations Center in San Francisco as well as the one in Alma, sent a letter to United on April 5, 1984 recapping his site inspection of March 19. "We have no recommendations for you based on our first visit," he wrote.

Dr. Jim Melius, director of HETAB, told *Microwave News* that NIOSH has not learned of clusters other than those currently under investigation. Three other clusters have been reported in the US; another five occurred in Canada, where concern about VDT-related pregnancy risks first surfaced.

Plans for an epidemiological study in Canada have progressed slowly. In a recent report on its VDT research, Ontario Hydro recommended a four-year, \$500,000 epidemiological study but said that it could not pay more than 20 percent of that cost (see *MWN*, January/February 1984). Bob Facey, a spokesman for the electric utility, said negotiations have generated little outside interest in the study to date.

A spokesman for the American College of Obstetricians and Gynecologists plans to tell the House Committee on Education and Labor's subcommittee on health and safety that radiation emissions from VDTs could not have caused the eleven reported clusters. In testimony to be delivered on May 8, he will not dismiss the possibility that other aspects of VDT work, including stress and equipment design, might have caused the problem pregnancies.

The subcommittee has held a series of hearings on VDT health and safety and will continue the process into the summer. NIOSH Director Millar is one of several witnesses scheduled to testify in May and June. ●