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Time Windows in Bioeffects Research

Time is emerging as a key variable in the study of the biological effects of non-ionizing radiation. A number of important studies reported at conferences in June indicate that the duration of exposure and the time at which a response is measured can be crucial in detecting a biological effect. Researchers are beginning to talk of "time windows" to complement the already well documented frequency and power windows.

In the course of radiating a biological system, "there is a complex sequence of events at work, and if you don't time it right you might fail to observe an effect," Glen Rein explained during a break at the Bioelectromagnetics Society (BEMS) annual meeting in Boulder, CO, June 12-17. Rein, a researcher at St. Bartholomews Hospital in London, England, said that "the postulated time windows offer a good explanation for the inconsistency and absence of bioeffects in the literature."

Dr. Ross Adey of the VA Medical Center in Loma Linda, CA, spoke of "windows in time" at the *International Conference on Nonlinear Electrodynamics in Biological Systems* which he hosted the week before the BEMS meeting. "We are gradually learning about how membranes can achieve induced and persistent molecular states," he told *Microwave News*. The lifetime of such states could determine how a radiation-induced effect may be observed. Indeed, the effect may only show up at some later time or even in a later generation of cells, Adey said.

Dr. Przemyslaw Czerski of the Food and Drug Administration's National Center for Devices and Radiological Health commented that the importance of the time variable in studying living systems is not news for biologists. This trend, he said in an interview after the BEMS conference, represents "a move toward a biological rather than an engineering approach" within the electromagnetic research community.

Microwaves and the Cornea

Studies on the eye being carried out at Johns Hopkins University's Applied Physics Lab demonstrate the importance of time windows. A team led by Henry Kues has found that pulsed 2.45 GHz microwaves can affect the endothelial layer of the cornea in primates at average power levels of 10 mW/cm^2. But cellular abnormalities only occurred 24-72 hours *after* a four-hour exposure. Kues discovered that he would not see an effect until the latency period had elapsed.

Although there has been some discussion about this microwave effect on the eye during the last 18 months (see *MWN*, January/February and May 1982), Kues's paper at the BEMS meeting and a similar presentation at the Loma Linda conference by Dr. Sam Koslov, also of the Johns Hopkins Lab, mark the beginning of what promises to be a long public debate. The effect is occurring at a relatively low power level and there is already speculation that it will force a reassessment of health standards. For example, the new American Conference of Governmental Industrial

(continued on p. 2)

Time Windows *(continued from p.1)*

Hygienists standard, adopted in May, is 10 mW/cm² at 2450 MHz.

In the meantime, Kues and his colleagues will be busy explaining and extending their results. They plan to run experiments at lower power levels, down to 5 mW/cm², and at higher frequencies, probably at 9 GHz, in search of a threshold for the effect. They will also look into two notable observations. First, pulsed radiation is about four times more effective in damaging the cornea than continuous wave (CW) radiation. According to Kues, to achieve the same effect as that found for pulsed signals at 10 mW/cm² requires 40 mW/cm² of CW microwaves. Second, they are detecting a new, unexpected, regeneration phenomenon in the cornea.

PEMFs and Time

At the non-linear meeting, papers by Rein and by Dr. Richard Luben of the University of California, Riverside, also indicated the presence of time windows. Rein's experiments on the action of a 500 Hz pulsed magnetic field on the release of noradrenaline from cultured PC12 cells (see *MWN*, May 1982), and Luben's experiments with various pulsed electromagnetic fields (PEMFs) on the adenyl cyclase system show effects that are strongly dependent on when the field is turned on and when the response is measured.

Similarly, Dr. Jose Delgado, who has demonstrated that extremely weak PEMFs can have a pronounced effect on the development of chicken embryos (see *MWN*, March 1983), has added a new twist to his findings. In an interview at the BEMS meeting, he said that unpublished data from his lab in Madrid, Spain, indicated that all embryos at a particular stage of development will be affected by PEMFs. But, he added, if you expose the eggs in the same way, and then allow them to develop for four to five more days, half of the embryos return to normal.

Dr. Betty Sisken of the University of Kentucky in Lexington reported that chick embryos with amputated limbs developed abnormally if PEMFs were administered immediately after amputation. If exposure to the signal was delayed for 24 hours after amputation, however, the embryos were immune to the PEMFs.

In and Out of the Field

The course of electromagnetic interactions over time may be significantly different from the typical dose-response relationship for chemical and physical agents. Adey and Dr. Craig Byus of the University of California, Riverside, have found a decrease in protein kinase activity in human lymphocytes after 15 to 30 minutes of exposure to a 450 MHz, amplitude modulated field. (This system exhibits the well known 16 Hz frequency window.) But they found no difference between the exposed cultures and controls after a 60-minute exposure.

The cultures adapt to the field in an hour, but not during shorter periods —indicating the presence of a narrow time window for stimulating a response. Biological systems are quite adaptable, but only if there is enough time for homeostasis. Adey draws the inference that going in and out of a weak field may be more detrimental than staying in it and adjusting to it. One facet still to be explored is whether the effect returns with prolonged exposures.

Prospects for Funding

There was a strong consensus at both the BEMS and Loma Linda meetings that the level of science within the bioelectromagnetic research community is more rigorous than ever before. Many are excited by the papers and by the prospect of finally understanding the mechanisms of interaction. The question on everyone's mind is whether there will be enough funds to pursue the new avenues of investigation.

At the final session of the Loma Linda meeting, Adey said that he had watched the slow growth of "credible scientific results" on the biological effects of electromagnetic fields, and it is now time to turn the research effort from the sphere of hazard analysis to the pursuit of a whole new set of scientifically acceptable tools and techniques. Only in this way, he said, can the research community be assured stable funding.

The prognosis for more research moneys remains bleak, however. As Koslov put it: "The role of the federal government to date in this critical field can be most kindly described as ranging from pathetic to abysmal." One indication of the poor prospects is that the National Science Foundation failed to send an observer to the Loma Linda meeting. Some of the organizers of that meeting are considering setting up an ad hoc committee to make the case for more research funds in Washington.

Plenum Press will be publishing the proceedings of the Loma Linda conference. A major effort is being made to expedite the process: all manuscripts were due on July 31 with a commitment from Plenum to have the book ready within 100 days. The model for such speed was set by Springer-Verlag, which issued the proceedings of an international symposium held in West Germany in record time; the meeting was held November 29-December 1, 1982 and the printed volume was already making the rounds at Loma Linda in the first week of June. (*Coherent Excitations in Biological Systems*, edited by H. Frohlich and F. Kremer, New York: Springer-Verlag, 1983, $25.50)

There were many other interesting papers presented at the BEMS meeting. Next month, we will feature an overview of new research on extremely low frequency (ELF), radiofrequency, microwave and millimeter radiation reported in Boulder.

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HIGHLIGHTS

EPA Releases RF/MW Bioeffects Review

The Environmental Protection Agency (EPA) has released its draft review of the biological effects of radiofrequency and microwave (RF/MW) radiation in the 500 kHz-100 GHz frequency range. The document will serve as the basis for limits on population exposures to RF/MW radiation, which EPA is scheduled to propose later this year.

The three-volume, 500-page review draft does not indicate what the future standard might be. The closest EPA comes to a recommendation is the following summary sentence: "Despite the recognizably incomplete state of knowledge in this area, the currently available information suggests that the biologically effective SAR [specific absorption rate] for mammalian systems lies in the range 0.4 to 6.0 W/Kg."

EPA does not specify how these SAR values would translate into power density limits. For comparison, the new American National Standards Institute (ANSI) RF/MW safety level is 1 mW/cm^2 between 30 and 300 MHz, based on the consensus that whole-body SARs below 4 W/Kg are not "associated with effects that demonstrably constitute a hazard."

Although the literature review was written by the staff at EPA's Office of Research and Development, the RF/MW standard will be set by the agency's Office of Radiation Programs (ORP). In a telephone interview, ORP's Dave Janes said that the standard is "still a moving target." One of the key variables still to be decided is how the agency will handle frequency dependence. A flat, ramp and well approach are all still in the running, Janes said.

Although EPA officials would not disclose what levels are now under consideration, the speculation within the RF/MW community is that the standard will be in the 100-200 uW/cm^2 range. The EPA limits, once promulgated, will only apply to federal agencies, and are known as a "guidance."

The first public discussion of EPA's draft document will come at a meeting of a special panel of the Scientific Advisory Board (SAB), chaired by Professor Charles Susskind of the University of California, Berkeley (see *MWN*, March 1983). The SAB panel is tentatively scheduled to meet in Washington, DC, on September 22-23. Public comments on the draft are due by September 16.

A copy of the EPA report, *Biological Effects of Radiofrequency Radiation,* (No. EPA-600/8-83-026A, June 1983, External Review Draft) is available from: ORD Publications — CERI-FR, US EPA, Cincinnati, OH 45268, (513) 684-7562. (Be sure to include the document number with your request.)

Wisconsin Sues Over Project ELF

The state of Wisconsin has filed suit to block the navy's Project ELF communication system until a new environmental impact statement (EIS) is prepared. On July 20, Wisconsin Attorney General Bronson La Follette charged in federal court that the navy had failed to revise its 1977 EIS to take into account changes in the proposed submarine communications antenna and new studies on environmental and health effects of extremely low frequency radiation (ELF).

La Follette and Assistant Attorney General Shari Eggleson cited a number of changes in the navy's ELF proposal including a small, suspended antenna instead of the originally planned larger buried antenna. The mode of transmission has also gone from a unified to a joint, synchronized system. In addition, the attorneys cited the publication of "numerous" new studies on the bioeffects of ELF radiation that "raise serious concerns."

A spokesman for the navy would not comment on the suit except to say that the navy will contest it.

The navy's Wisonsin facility at Clam Lake was deactivated by President Carter in 1979; in 1981 President Reagan decided to reopen, upgrade and expand it —adding two antennas in Michigan operated by a control center at K.I. Sawyer air force base (see *MWN*, May 1981 and March 1982). According to current plans, the navy intends to have the ELF system in operation by 1986.

The Secretary of Defense, Caspar Weinberger, and the Secretary of the Navy, John Lehman, Jr., the defendants in the suit, have 60 days from July 20 to respond to the complaint (No. 83C672C) filed in US District Court for the Western District of Wisconsin.

Meanwhile, on July 15 in neighboring Michigan, the Natural Resources Commission voted 5-0 in favor of granting the navy an easement to build the ELF antenna. Michigan Governor James Blanchard opposes the navy project as a "terrible waste of taxpayers' money," and asked the commission to turn down the navy request. Wisconsin's Eggleson told *Microwave News* that Michigan has been invited to join the Wisconsin suit but has not yet responded.

Stop Project ELF, a citizen's group based in both states, is considering court action to reverse the Michigan decision. The group's John Stauber said that the commission does not have the authority to give the navy permission to build the antenna. "Only the state legislature has that power," Stauber claimed.

Power Line Action in Montana and Florida

Montana has set a standard to limit public exposure to power line radiation, and similar regluations are planned in Florida.

Montana's Board of Natural Resources and Conservation recently established a 1 kV/m limit for electric fields at the edge of the right-of-way (ROW) in residential and subdivided areas along a planned 500 kV power line. To comply with the rule, the Bonneville Power Administration (BPA) will have to widen the ROW along certain sections of its Garrison, ND-Spokane, WA, line from 125 feet to 160 feet. Property owners may waive the requirement.

The board based its decision on recommendations from Dr. Asher Sheppard, its consultant on the biological effects

of power line radiation. Sheppard, a research physicist at the VA Hospital in Loma Linda, CA, concluded that the electric fields produced by a 500 kV transmission line "are sufficiently intense that regulations intended to limit chronic exposure are a prudent requirement." BPA maintained that there is no evidence that higher field strengths are hazardous. Along with the 1 kV rule, the board imposed a 50 dBA transmission line noise limit in populated areas. This will require a 205 foot ROW.

Copies of Sheppard's report, *Biological Effects of High Voltage AC Transmission Lines*, February 1983, and the final report of the Department of Natural Resources and Conservation, Energy Division, *Preferred and Alternate Routes for the Bonneville Power Administration's 500 kV Transmission Line From Garrison West*, April 1983, are available from K. Heart, DNRC, 32 South Ewing, Helena, MT 59620, (406) 449-4600.

Florida will tackle radiation hazards under revisions in its Transmission Line Siting Act, which passed the state legislature in late May. Statutes 403.52 - 403.536 of the measure authorize the Department of Environmental Regulation to establish public safety requirements for siting applicants. Since no funds accompanied the order, the department must make a 1984 budget request before beginning its work. The regulations will not apply to lines built under the state's Power Plant Siting Act. These lines link new generating facilities to the state power grid.

The state action grew out of a local battle to block construction of a Florida Power and Light substation in Tamarac. After successfully leading community opposition to the project, town resident Herman Bender petitioned the governor and the legislature for state-wide regulations for power line radiation.

NAS Panel Finds VDTs Safe

The National Academy of Sciences (NAS) panel studying effects of video display terminals (VDTs) on workers' vision has concluded that VDTs are safe. The panel strongly discounted the possibility that radiation emissions from terminals could cause eye damage, including cataracts.

The Panel on the Impact of Video Viewing on Vision of Workers did not address radiation risks for fetuses in its report, *Video Displays, Work, and Vision*. Neither did the panel consider very low frequency (VLF) radiation emitted by flyback transformers which some researchers believe may be dangerous.

The panel concluded that radiation emissions from VDTs "are highly unlikely to be hazardous" to health. On the basis of its review of seven studies completed between 1977 and 1981, the panel found that "emissions of all types of electromagnetic radiation —X-rays, ultraviolet (UV), visible (light), infrared (IR), and radiofrequency (RF) radiation, including microwaves— are well below accepted occupational and environmental health and safety standard limits." The report states that the panel did not try to assess the adequacy of these standards.

The panel challenged the 10 cases of VDT-related cataracts reported by Dr. Milton Zaret, a Scarsdale, NY, ophthalmologist. Only four of those cases involved "significant lenticular opacities," according to the report, "and each of them had known preexisting disease or exposure to cataractogenic agents." The six other cases involved "inconsequential opacities that did not appreciably reduce visual acuity," the report says.

In a telephone interview with *Microwave News*, Zaret said that the panel never contacted him and that he had not seen its final report. But he contested the panel's conclusions on the basis of media coverage. He said he sees "more and more people who are being injured by radiation" from VDTs. "Not a week goes by that I don't see that the problem is worse than I originally thought," he said.

The panel found that visual problems commonly experienced by VDT workers varied with the quality of equipment, workstation design, and the nature of the task. The most common difficulties reported by the panel were blurred vision, tired eyes, muscular aches and stress. The report recommends that employers pay closer attention to designing jobs and workstation environments that improve worker comfort and reduce job-related stress.

A spokeswoman for 9 to 5, the National Association of Working Women, told *Microwave News* that a VDT telephone hotline run by that group is producing evidence in "complete contrast to the conclusions of the report." Janice Blood said that early results from the hotline indicate a need for further research.

She also said that the report's conclusions probably will delay additional research which she maintains is already overdue. Of the 3,012 calls received in the hotline's first month, 17 percent were related to eye and visual problems, 10 percent to pregnancy concerns, 8 percent to headaches, and 5 percent to muscle strain.

Spokesmen for The Newspaper Guild and the Communications Workers of America also were critical of the report.

The Panel on the Impact of Video Viewing on Vision of Workers was formed by NAS in the spring of 1981 in response to a request from the National Institute for Occupational Health and Safety (NIOSH) to evaluate available research on visual health problems associated with VDTs. The panel, chaired by Professor Edward J. Rinalducci, a psychologist at the Georgia Institute of Technology, held a public symposium in Washington, DC, in August 1981 as part of the study (see *MWN*, September 1981). A summary of those proceedings is published in *Behavior and Information Technology*, Vol.1, No.2, 1982.

VDTs Dropped from California Epidemiological Study

Contrary to statements made in June by the National Institute for Occupational Safety and Health (NIOSH), an epidemiological study of pregnancy outcomes among video display terminal (VDT) users is *not* underway. The agency's plan to collect information through a project headed by Kaiser-Permanente, one of California's major health care companies (see *MWN*, June 1983), fell through in July.

NIOSH staffers now say the agency is likely to launch its own study.

Dr. David Brown, assistant chief of NIOSH's Industry Wide Studies Branch, told *Microwave News* that "the California study is a moot point now, but the VDT-pregnancy issue is important enough for us to go ahead and do our own study." NIOSH hopes to identify a suitable study population by this fall. Both Brown and Dr. Jane Gordon, the VDT project supervisor, are optimistic that NIOSH will fund a full-scale investigation in fiscal year 1984, which begins in October.

Although NIOSH's Dr. Michael Rosenberg said he had reached an agreement with Kaiser early this summer, the company decided against adding the agency's proposed question on VDTs to its questionnaire. Rosenberg recently left NIOSH to work for Family Health International in Research Triangle Park, NC.

Kaiser is collecting data for California's Department of Health Services on the reproductive effects of malathion, the pesticide sprayed to combat medflies. According to the project's principal investigator, Dr. Diane Pititti, the study will also investigate a limited number of other topics, but not VDTs.

Standards and Litigation at IMPI

Professor Herman Schwan sought to clarify the history of the early development of radiofrequency and microwave (RF/MW) safety standards in his keynote address at the 18th Annual *Microwave Power Symposium*, in Philadelphia, July 19-21.

Looking back to the late 1950's and early 1960's, Schwan said that he wanted to deflate four myths: First, that there was no interest in non-thermal effects during the Tri-Service research period. Second, that there was no research on non-thermal effects at that time. Third, that there was no interest in Soviet research. And fourth, that there was a conspiracy to ignore RF/MW bioeffects.

"Some have accused us of neglecting non-thermal effects," Schwan said, "but nothing could be further from the truth." Schwan, who chaired the subcommittee that recommended the first American National Standards Institute (ANSI) safety limit (the 10 mW/cm^2 standard adopted in 1966), recalled that there was no pressure from industrial and military groups —only scientific considerations went into formulating the standard, he said. He went on to note that the new ANSI standard "is a logical extension of the early standard." Schwan recently became a professor emeritus at the University of Pennsylvania in Philadelphia, but he will continue to teach and do research there.

Professor Nicholas Steneck a historian at the University of Michigan in Ann Arbor, took a different position. "RF bioeffects research has over the years been adversely affected by its dependence on the development community, namely industry and the military," he told the same crowd that had just heard Schwan. Judging bioeffects research to be "biased in very pronounced ways," Steneck urged that "politics and social maneuvering" be avoided so that the field be allowed to develop on its own, free of the constraints that have proven to be so controversial.

Steneck was particularly critical of the RF/MW research community for not using accident reports to assess human health impacts. As an example he cited the lack of follow-up on the death of a Hughes Aircraft employee who died in 1953 most probably from exposure to microwaves. "The contention that no one is dying or even being injured is not a statement that has the weight of science behind it. It is a statement that reflects, basically, the faith of the RF/MW bioeffects research community," he said. Steneck is completing a book on the development of RF/MW standards.

Marc Moller, an attorney with Kreindler and Kreindler in New York City, told the conferees that with the proliferation of microwave technology in industry, medicine and the home, "an increase in personal injury claims and litigation is a virtual certainty." Moller was the lead attorney on behalf of Robert Engell, a TACAN repair mechanic who developed pancreatic cancer. The suit was settled last December but details on the settlement were not divulged (see *MWN*, January/February 1983).

While noting that the question of causation —relating injury to microwaves— varies from case to case, Moller said "some plaintiffs, in my judgment, will inevitably be able to meet the 'reasonable preponderance of the evidence test' required to obtain favorable litigation results."

ANSI C95 Goes Back to Work

At the first meeting of the American National Standards Institute (ANSI) C95 Committee on Radiofrequency Radiation Hazards since the approval of the new safety standard (C95.1-1982) last year, Dr. F. Kristian Storm presented an ambitious plan for revising the standard. According to ANSI rules, all of the institute's standards must be updated every five years, and as Storm noted "the clock is running."

Under Storm's plan, the C95.IV subcommittee would set up five new task groups: to scan the world literature for new reports, to evaluate their engineering, biological and statistical validity and to assess their implications for exposure risks. The data will flow through these groups to Storm and the members of his C95.IV subcommittee. The review process is already under way.

Among the other C95 subcommittees, there were the following developments:

- NBS' Dr. Ray Baird reported that his subcommittee (C95.I) on instrumentation had decided to combine two existing ANSI standards on far-field (C95.3-1979) and near-field (C95.5-1981) measurements into one document. A new task group, under the direction of FDA's Howard Bassen will decide the best way to consolidate and update them. One suggestion for the revision is to place a greater emphasis on the measurement of magnetic fields.
- Baird's subcommitee will study the possibility of addressing dosimetric techniques.
- Dr. John Osepchuk, the chairman of subcommittee II/III on terminology and units, reported that no one, including

the navy, had yet printed the new non-ionizing radiation warning signal (C95.2-1981, see *MWN*, October 1981). Although this subcommittee has no detailed plans for the immediate future, Osepchuk did suggest that C95 should revise its vocabulary to make it consistent with that of the ANSI C63 committee on electromagnetic compatibility.

• In the next few months a new standard covering electroexplosive devices, prepared by subcommittee V under the chairmanship of Ramie Thompson, will be ready for circulation to the full C95 committee.

• Dr. Paul Tyler's medical surveillance subcommittee (C95.VII) called for volunteers to assist him in determining the medical tests that should be administered to RF/MW workers, and to help him decide how to address the problem of defining who are RF/MW workers.

At the meeting, Storm presented a tentative roster of experts who will serve on the new C95.IV committees and task groups: *Committee for Literature Surveillance,* Chair: Louis Heynick. *Committee for Engineering Principles Validation,* Chair: Bill Guy; Working Groups: 3 kHz-3 MHz: C.K. Chou, 3 MHz-300 MHz: O.P. Gandhi, 300 MHz-100 GHz: R.A. Tell. *Committee for Biologic Principles Validation,* Chair: Don Justesen; Working Groups: Behavior: J. D'Andrea, Biorhythm: R. Smith, Cardiovascular: J. Lords, Nervous System: R. Lebovitz, Development & Teratology: M. O'Connor, Endocrine: S. Lu, Visual: R. Carpenter, Genetics: C. Blackman, Acoustic: K. Foster, Hematology & Immunology: R. Smialowicz, Metabolic & Thermoregulation: E. Adair, Physiology: R. Phillips, Oncology: J. Dickson, Compound Interactions: P. Czerski. *Committee for Statistical Validation,* Chair: Carol Newton. *Committee for Evaluation of Exposure Risk,* Chair: Dave Janes.

Storm, an associate professor of surgery in the Division of Oncology at the UCLA Medical Center, took over as chairman of the C95.IV subcommittee after Dr. A.W. Guy resigned when the new health standard was approved. Raytheon's Osepchuk will serve as the secretary of the subcommittee. Professor Saul Rosenthal of the Polytechnic Institute of New York continues to serve as the chairman of the parent C95 committee.

NBS Calibration Program

The National Bureau of Standards (NBS) has announced the formation of an accreditation program for laboratories that measure microwave power, attenuation and reflection coefficients. NBS expects to certify the first labs under the National Voluntary Laboratory Accreditation Program (NVLAP) by the spring of 1985.

Labs that are found to have the necessary expertise and competence will join the NVLAP for electromagnetic calibration services. In order to win accreditation in the LAP, labs must participate in at least one of three Measurement Assurance Programs (MAPs): power, attenuation and reflection coefficient, all in the frequency range 0.1-18 GHz.

The decision to formally set up the new LAP stems from a 1977 request by Bruno Weinschel of Weinschel Engineering in Gaithersburg, MD. In early 1982, NBS announced its decision that labs providing electromagnetic calibration services should be accredited. In July 1982, some 46 representatives from government agencies and the private sector attended an NBS workshop in Boulder, CO, to help develop the LAP.

For more information, contact Douglas Thomas, project leader for the EM NVLAP or John Locke, manager of laboratory accreditation, NBS, TECH B141, Washington, DC 20234, (301) 921-3431. NBS' announcement for the new EM LAP appears in the June 30 *Federal Register,* (48 *FR* 30174).

CLASSIFIEDS

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Rates start at only $50 for 1/32 of a page. (For a sample 1/32 page listing see the ad below for *VDTs: Health and Safety.)* From there:

1/16 of a page costs $ 95	1/4 of a page costs $325
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UPDATES

BIOLOGICAL EFFECTS

Literature Surveys... The *Biological Effects of Non-Ionizing Electromagnetic Radiation: A Digest of Current Literature* is back in print. Volume VII, Number 1, covering the period from January to June 1982, was published in June and the next issue is due out soon. The quarterly BENER digests had stopped appearing after NTIA and ERMAC ran out of funds. The Office of Naval Research (ONR) came to the rescue with a three-year contract to allow Bruce Kleinstein's Information Ventures, Inc., based in Philadelphia, PA, to continue the service. A limited number of copies are available from Dr. Michael Marron, ONR, Code 441CB, 800 North Quincy St., Arlington, VA 22217. Please include a mailing label....Louis Heynick and Dr. Peter Polson of SRI International in Menlo Park, CA, have prepared *Bioeffects of Radiofrequency Radiation: A Review Pertinent to Air Force Operations,* Report No. USAFSAM-TR-83-1. The 181-page analysis of the current bioeffects literature, commissioned by the air force (AF), is designed as a background document for environmental impact statements and assessments for installations that involve emissions of RF/MW radiation —for example the AF's west coast over-the-horizon radar and southeast PAVE PAWS radar system. Those seeking a copy should contact James Merritt, USAF School of Aerospace Medicine, Brooks AFB, TX 78235. According to Polson, the report will be updated from time to time as a function of AF needs and available funding.

COMMUNICATIONS

FCC RF/MW Rules... At a meeting in mid-September, the FCC will decide how to proceed with its proposed rules (issued January 1982) on the evaluation of radiation hazards in its licensing procedures for RF/MW sources. The commission has completed its review of the 18 sets of comments from the broadcasting and communications industries and is now considering various policy options (see *MWN,* March and September 1982)....Meanwhile, the FCC's Office of Science and Technology has published a revised edition of its report, *Questions and Answers About Biological Effects and Potential Hazards of Radiofrequency Radiation,* OST Bulletin No. 56, second edition, June 1983. A copy is available from the commission's Consumer Assistance Office, Washington, DC 20554, (202) 632-7000.

COMPATIBILITY & INTERFERENCE

Immunity Task Group... The task group studying ways of enhancing the immunity of home electronic equipment met in Washington on July 26. Hector Davis of the FCC Labs has joined the group, which is chaired by Don Heirman of American Bell. Davis is preparing an internal FCC report on the immunity of TV sets. The Electronic Industries Association's (EIA) Consumer Electronics Group is going forward with immunity measurements of 18 TV sets and two VCRs from ten manufacturers. And the American Radio Relay League (ARRL) is completing a questionnaire that should pinpoint the most common RFI problems. At a meeting on June 23, the IEEE Standards Board welcomed the progress being made by the task group toward voluntary standards, avoiding the need for mandatory rules. The board set the following priority list: TV receivers, VCRs and related equipment, hi-fis, telephones, home computers, home security devices (detectors and alarms), home appliances and other electronic devices with microprocessors. The group's next meeting will be the week of the EMC annual symposium in late August. Heirman intends to continue the current schedule of meeting every four to six weeks.

EMC '83... Everything is set for the *1983 International Symposium on Electromagnetic Compatibility.* While the conference runs from August 23 to 25, workshops on EMP and shielding are scheduled for Monday the 22nd and a number of IEEE, ANSI, EIA and SAE meetings will also be held on Monday and on Friday the 26th. It will be a busy week, with six workshops and 23 paper and poster sessions. Attendance should be good: by the end of July, the Hyatt-Regency Crystal City Hotel was fully booked, forcing EMCers to neighboring hotels.

Reports, Products and Contracts... The FCC's Office of Science and Technology has issued two Technical Memorandums, "Teletext Related Interference Observed on WETA-TV, Washington, DC" (No. FCC/OST TM 83-2) and "Diurnal Variation in MF Skywave Propagation" (No. FCC/OST TM 83-4). The first describes the potential problems facing broadcasters when transmitting teletext information. The second details the ways in which daytime stations can expand their time on the air without causing interference to stations already authorized to broadcast during the sunset-sunrise hours. Both reports are available from the Downtown Copy Center, 1413 K St., NW, Washington, DC 20037, (202) 289-4140....A group from EPA, Southwest Research Institute and Electro-Metrics describes a new under-the-hood antenna system for measuring electric and magnetic fields from an automobile ignition system in the May *IEEE Transactions on Electromagnetic Compatibility.*...Dow Jones, the publisher of the *Wall Street Journal* has shielded its 11-meter satellite communications antenna in Highland, IL, from RFI with precast concrete panels made by the Fanwall Corp. of Arlington, VA. The 35-foot high, 72-foot long shield reduced the strength of an interfering terrestrial signal by 14 dB. The shielding wall can withstand winds of up to 100 mph....Keene Corp.'s Ray Proof Division in Norwalk, CT, has introduced a special shielding system to protect NMR imagers from RFI. The Series 84 enclosures can provide isolation from RF noise, reducing it 100 dB between 1 and 100 MHz....Comsearch Applied Technology has opened a field office in Annapolis, MD, to support EMC projects for the navy....The navy has awarded a one year, $893,044 contract to Bendix Field Engineering of Columbia, MD, for electromagnetic environmental effects and RF systems performance analysis. And Rome Air

Development Center at Griffiss AFB, NY, is negotiating with the Draper Lab in Cambridge, MA, for an analysis of the UHF and L-band interference threat for the late 1980's and 1990's.

GOVERNMENT

EPA's R&D Budget... In mid-July, the President signed HR 3133, which contains EPA's FY84 appropriations. The bill had emerged from a House-Senate conference committee with the House's $1 million line item for non-ionizing radiation health effects research deleted. Instead, the conferees agreed to add $4 million to the administration's original budget request —the one that planned to close EPA's RF/MW research program— for health effects research on air, drinking water, toxics and non-ionizing radiation (House Report No. 98-264, June 23, 1983). How the new money will be divided among these programs has been left up to EPA, though one House staffer was optimistic that agency officials would follow the recommendations of the House committees which called for more non-ionizing radiation research, especially at power line frequencies. It is not yet clear whether these funds are for extra-mural research or can be used to preserve the RF/MW group at EPA's Health Effects Research Lab in Research Triangle Park, NC. If the $4 million must be spent outside the agency, EPA could still save the lab by using some of the more than $24 million and 607 positions that Congress added to the EPA budget to be allocated at the agency's discretion. EPA Administrator William Ruckelshaus is scheduled to complete his EPA FY84 and FY85 budgets by mid-August. The fate of the RF/MW lab should be known then. Also, as we go to press, the *Washington Post* reports that Ruckelshaus has offered Professor Bernard Goldstein of Rutgers University the job of EPA Assistant Administrator for R&D. If Goldstein accepts he will replace Courtney Riordan who has been filling in on an acting basis.

FDA's Radiation Program Reorganized... The reorganization of FDA's National Center for Devices and Radiological Health is nearly complete: the plan has won the approval of FDA Commissioner Arthur Hayes, Jr., (who resigned on July 28) and the Assistant HHS Secretary for Health Edward Brandt. The center, with John Villforth as Director and James Benson as Deputy Director, is now operating under the new structure on an interim basis, with new appointees working in an "acting" capacity until HHS Secretary Margaret Heckler gives the final okay. As such, the Offices of Radiological Health and Medical Devices have been replaced by eight new offices. Four major ones: Compliance, Device Evaluation, Science & Technology and Training & Assistance; and four smaller ones: Health Affairs, Health Physics, Management & Systems and Standards & Regulations. The Office of Science & Technology, directed by Roger Schneider with Dr. Moris Shore as deputy director, has three new components: the Division of Physical Sciences (the same as BRH's old Division of Electronic Products) directed by William Herman; the Division of Life Sciences (the same as the old Division of Risk Assessment) directed by Dr. William Leach; and the Division of Biomedical Engineering (no director has yet been named). Howard Bassen will continue as chief of the electromagnetics branch in the new Division of Physical Sciences and Dr. Mays Swicord will serve as chief of the non-ionizing radiation branch in the Division of Life Sciences. Walter Gundaker is in charge of the new Office of Compliance, Robert Britain of the Office of Device Evaluation and Philip White of the Office of Standards & Regulations. When the plan is approved, a notice will appear in the *Federal Register.*

MEASUREMENT

New Narda Probe... Narda Microwave of Hauppauge, NY, has introduced a new electric field probe to simplify the measurement of radiation fields relative to the new ANSI RF/MW safety standard. The Model 8682 probe, when used in conjunction with the standard Narda 8611 or 8616 meter, will indicate exposure levels as a percentage of the ANSI guidelines —from 0.2 to 200 percent— by taking into account the frequency dependence in the ANSI limits. The probe costs $1250.

Dosimeter Expands... Dr. Wordie Parr, who resigned as chief of NIOSH's Physical Agents Effects Branch in Cincinnati, OH, at the end of last year has joined the Dosimeter Corp., also in Cincinnati, as products manager and consultant. While Dosimeter has been primarily involved with ionizing radiation, Parr plans to lead the company into the RF/MW instrumentation field.

MEDICAL APPLICATIONS

FDA Panel Smiles on BSD and NMR... Meeting in Rockville, MD, on July 6-7, the FDA's Radiologic Devices Panel recommended three NMR imagers and BSD Corp.'s hyperthermia unit be approved for marketing. The FDA must still accept the recommendation and give the final okay; the companies and the agency must agree on labelling language, which determines how the units may be used. The action on the BSD-1000 cancer treatment unit had been expected (see *MWN,* May 1983). NMR imagers made by Diasonics, Picker and Technicare are the first to receive clearance from the panel. The official FDA decision is not expected for about another three months, although action on the BSD unit could be a little quicker since the company has been negotiating with the agency for some time. The panel's action has put on hold a proposal by the National Electrical Manufacturers Association (NEMA) to reclassify NMR imagers from Class III to Class I or II (which do not require premarket approval)....NCI has awarded the Allegheny-Singer Research Corp. of Pittsburgh, PA, $1,654,712 for its hyperthermia quality assurance program, and the institute has issued a request for proposals (RFP 223-83-6032) for the development of educational guidelines and recommendations for hyperthermia operators.

Electric Fields Kill Pain and Affect RNA... Low frequency electrical fields are being used as anesthetics. Dr. William Bauer of the VA Medical Center in Cleveland, OH, has applied transcutaneous electrical nerve stimulation to treat severe head and neck pain among cancer patients. Writing in the June 1983 issue of *Archives of Otolaryngology,* Bauer reports that he achieved "extremely positive" results; the best frequency was between 0.5 and 8 Hz. Bauer used the Alpha-Stim 2000, developed by Dr. Daniel Kirsch and marketed by Electromedical Products Inc. of Hawthorne, CA. The unit costs $5,850; a smaller consumer (by prescription) model, the Alpha-Stim 350, is available for $995. (There are many other similar products on the market.) In a telephone interview, Bauer said that the use of electric fields is "opening up a whole new discipline in medicine." Bauer will soon be moving to Emory University in Atlanta, GA, where he will continue his work on pain as well as do research on the effects of electric fields on immunological and neurological diseases.... A team from Columbia University's medical school has found that two different pulsed electromagnetic fields (PEMFs) have different effects on RNA transcription. In a paper in the June 17 *Science,* Drs. Reba Goodman, Andrew Bassett and Ann Henderson describe their experiments with *Sciara Coprophila,* a fungus gnat, using single (72 Hz) and repetitive (15 Hz) pulses. While the single pulses increased the activity of messenger RNA after 15 and 45 minutes, the repetitive train of pulses increased activity only after 45 minutes. The authors conclude that their study "supports the hypothesis that PEMFs induce specific modifications in normal cell function."

OVENS

FTC-Amana Suit... The FTC has settled its 1982 suit charging Amana Refrigeration Inc. with falsely advertising its Radarange microwave oven (see *MWN,* November 1982). The commission maintained that company ads claimed an Amana oven was the only brand to pass an independent laboratory test, when in fact a Panasonic also passed. It also charged Amana with claiming a consumer survey rated its oven "best quality," even though many oven owners preferred other brands. Under a consent agreement, appearing in the July 18 *Federal Register,* (48 *FR* 32596), Amana, a Raytheon subsidiary, and its ad agency, Foote Cone & Belding, promise not to make these claims and to avoid misrepresenting any other surveys or tests. Amana officials say they entered the agreement, which carries no admission of guilt, to avoid lengthy and expensive legal action. Copies of the agreement and the original complaints are available from the FTC's Public Reference Branch, Room 130, 6th St. and Pennsylvania Ave., NW, Washington, DC 20580, (202) 523-3598. Comments on the agreement are due by Septmeber 16, after which the commission will decide whether to make the agreement final.

POWER LINES

Generally... Recent studies that link leukemia to low levels of ELF radiation from power lines (see *MWN,* March 1983) have caught the attention of Congress. According to Christopher Dodge of the Congressional Research Service (CRS) at the Library of Congress, CRS has received some two dozen inquiries about these studies from both Senate and House members. Dodge said he would not be surprised if hearings were held....DOE has released its *Draft Environmental Impact Statement, DOE/DEIS-0103, for the New England/Hydro-Quebec ±450 kV DC Electric Transmission Line.* Copies are available from Garet Bornstein, Office of Fuels Programs, Economic Regulatory Administration, Room GA-017, 1000 Independence Avenue, SW, Washington, DC 20585, (202) 252-5935....The Electric Power Research Institute (EPRI) has published *Measurement and Characterization of Substation Electromagnetic Transients,* final report (No. RP1359-2), March 1983, from the Texas A&M University. It is available from EPRI's Research Reports Center, PO Box 50490, Palo Alto, CA 94303, (415) 965-4081....CORRECTION: The title of another EPRI report, *Bipolar HVDC Transmission System Study Between ±600 kV and ±1200 kV: Corona Studies, Phase 2,* (No. RP430-2) was misreported in our June issue....A history of the ±400 kV DC transmission line cutting across Minnesota from North Dakota, a bitter siting controversy lasting nearly ten years, is featured in the July *IEEE Spectrum.* In his special report, Sheldon Mains of the Minnesota Environmental Quality Board maintains that the story holds important lessons for technical planners.

STANDARDS

RF Heaters in Canada... The Canadian government has proposed rules governing the design, construction and functioning of industrial RF heaters in order to limit radiation exposures to operators. The new amendment to the *Radiation Emitting Devices Regulations* specifies that stray fields measured 15 cm or more from the external surface of the heater shall not exceed: (i) a maximum electric field of 300 V/m; (ii) an effective electric field of 60 V/m; (iii) a maximum magnetic field of 0.8 A/m; and (iv) an effective magnetic field of 0.16 A/m. The rules also set limits for X-ray exposure. The regulations were proposed on March 30 and appear in the April 16 issue of the *Canada Gazette Part I.*

...Copies of the proposed new standard *Recommended Practice on Procedures for Control of System Electromagnetic Compatibility* No. BSR C63.12, are available for $6.00 from: Margaret Lynch, IEEE, 345 East 47th Street, New York, NY 10017....ANSI has approved a new set of definitions of radar terminology. Standard ANSI/IEEE 686-1982, *Radar Terms,* is available from ANSI, 1430 Broadway, New York, NY 10018. The price has not yet been set.

VDTs

Legislation and Regulation... Following legislative successes in Maine and Connecticut for supporters of VDT health and safety measures (see *MWN*, June 1983), state representatives in Oregon and New York plan to continue their efforts to enact VDT safety rules. Oregon State Senator Margie Hendriksen, whose VDT bill was not acted upon before the senate adjourned, told *Microwave News* that the Senate Labor Committee she chairs has recommended that a task force be established to study VDT health and safety issues. In a letter to the president of the Oregon Senate, the committee suggested the task force be directed to report to the senate when it reconvenes in 1985. New York State Assemblyman Frank Barbaro also announced his intention to reintroduce VDT safety legislation in the next assembly session. His legislation would require radiation shielding at the point of manufacture and guarantee pregnant women the right to non-VDT work. Barbaro appeared on the *Donahue* television show recently to discuss VDT health and safety concerns and state legislation. Also appearing were Karen Nussbaum of 9 to 5, Vico Henriques of CBEMA, Key Dismukes of the NAS Committee on Vision and Sue Waltz, a VDT worker. For a transcript of the show, send a check for $2.50 to Donahue Transcript, PO Box 2111, Cincinnati, OH 45201....Citing recent research findings of very low frequency radiation (VLF) health hazards from VDT flyback transformers (see *MWN*, November 1982, January/February and April 1983), the Newspaper Guild has called on the federal government to study possible VLF shielding. In its Officers' Report to the 1983 Newspaper Guild convention the guild urges "the appropriate government agencies" to develop specifications and cost estimates immediately for such shielding.

Studies in Progress... Researchers at the University of Texas, Austin, are at work on a study to establish an objective measure for visual fatigue among VDT workers. The project is scheduled to take four years to complete and is being led by Dr. A.J. Welch of the University's Departments of Electrical Engineering and Biomedical Engineering. Funding for the work comes from the IBM Corp., which has committed $382,000 to the study....The results of an epidemiological study of approximately 2,000 Newspaper Guild members (see *MWN*, March 1981) are expected soon. The study, coordinated by Dr. Arthur Frank at the Mount Sinai Medical Center in New York City, included eye examinations and a survey questionnaire involving seven locals of the guild. Frank recently left Mount Sinai to become Chairman of the Department of Preventive Medicine and Environmental Health at the University of Kentucky's College of Medicine in Lexington....Two University of Wisconsin, Madison, researchers are continuing their work on office automation problems. Dr. Robert Arndt is preparing a policy paper on office technology hazards due soon from the congressional Office of Technology Assessment (OTA). Arndt's presentation of differing views on potential health problems and available documentation will be released by OTA this fall and subsequently will be included in OTA's *Health and Safety Control Technologies in the Workplace*, a compilation of studies. Professor Steven Sauter, a colleague of Arndt's in the University's Department of Preventive Medicine, is studying the effect of automation on the nature of work in a project under contract to NIOSH. No date for the final report has been set....A new study looking at the impact of VDTs in the office will consider both ergonomic and radiation concerns. The *Project On the Workplace Impact of Video Terminals in the Office* began in April 1982 and is expected to cost between $250,000 and $300,000, according to its director, Professor Alan Westin of Columbia University. The research is being supported in part by IBM and Hewlett-Packard. The remainder of the funding comes from Westin's Educational Fund for Individual Rights....The Canadian Standards Association has set up a Technical Committee on Ergonomics to produce guidelines for workers and employers on office environment, workstation, equipment and furniture. Representatives from the Canadian Business Equipment Manufacturers Association and the Canadian Center for Occupational Health and Safety (CCOHS) will participate. Draft guidelines are scheduled for public review in early September and a final *Guidance on Ergonomics of the Office Environment* is due in December.

Resources...CCOHS has released a follow-up report to its recommendation early this year that radiation standards be extended to include the very low frequency radiation (VLF) emitted by some VDTs (see *MWN*, January/February 1983). *The Case for Concern About Very Low Frequency Fields from Visual Display Terminals: The Need for Further Research and Shielding of VDTs* is a 24-page document that argues the need for caution about VLF radiation at least until more is known. Also a pivotal Czechoslovakian study cited by CCOHS in making its recommendation has been translated into English and is available from the Center. Both the follow-up report and Czech researcher Dr. Hana Pafkova's finding of "an unfavorable effect" on embryonic development of pregnant mice exposed to a pulsed 300 Hz field with a peak value of 28,500 V/m and a pulse width of 10 microseconds can be obtained from CCOHS, 250 Main Street East, Hamilton, Ontario, L8N 1H6....The Canadian Department of National Health and Welfare recently released *Investigation of Radiation Emissions from Video Display Terminals* (see *MWN*, December 1982). The report concludes that, "There is no reason for any person, male or female, young or old, pregnant or not, to be concerned about radiation health effects from VDTs." Copies of the report, No.83-EHD-91, are available from: Public Affairs Directorate, Department of National Health and Welfare, 5th Floor, Brooke Claxton Building, Ottawa K1A 0K9....The highlights of the International Conference on Office Work and New Technology held in October 1982 (*MWN*, November 1982) are excerpted in *Office Automation: Jekyll or Hyde?* Copies cost $12.95 and can be ordered from Working Women Education Fund, 1224 Huron Road, Cleveland, Ohio 44115....The Canadian Advisory Council on the Status of Women has published, *Reproductive*

Hazards at Work: Men, Women and the Fertility Gamble, by Nancy Miller Chenier. In an early chapter this book-length study outlines reproductive hazards associated with VDTs. Other potential dangers discussed include chemicals, ionizing radiation, and psychosocial hazards. It is available free of charge from the Canadian Advisory Council on the Status of Women, Box 1541, Station B, Ottawa, Ontario, K1P 5R5.

ETC.

People...A number of changes are taking place among the leadership of the Bioelectromagnetics Society (BEMS). Dr. Bill Guy of the University of Washington, Seattle, took over as president of the society in June. The BEMS membership has elected Dr. Don Justesen vice-president, and he will take over as president when Guy steps down next year. Dr. Elliot Postow of the National Naval Medical Center in Bethesda, MD, will retire as editor of *Bioelectromagnetics* after completing the journal's fifth volume. Dr. R.D. Phillips of Battelle Pacific Northwest Labs in Richland, WA, will be the next editor of the BEMS journal; all manuscripts submitted for publication after January 1 should be sent to Phillips. And Dr. Michael Marron, who is replacing Dr. Tom Rozzell at the Office of Naval Research (ONR), will also assume editorship of the BEMS newsletter. Rozzell is off to ONR's office in London....At EPA's Health Research Lab in North Carolina, Dr. Claude Weil, who works on computer models of electromagnetic fields, is leaving the agency for Boeing in Seattle, WA....Dr. Eleanor Adair of the John Pierce Foundation at Yale University has been elected a fellow of the AAAS....And the Canadian Center for Occupational Health and Safety in Hamilton, Ontario, has formed a new section devoted to physical hazards. Dr. Karel Marha will serve as manager and Dr. Shelly Beauchamp as project scientist for the section, which will begin by focussing on the effects of non-ionizing radiation in general and low frequency magnetic fields in particular.

CONFERENCES

August 16-19: *2nd Annual Meeting of the Society of Magnetic Resonance in Medicine,* Fairmont Hotel, San Francisco, CA. Contact: SMRM, Radiology Postgraduate Education, Room C324, University of California, San Francisco, CA 94143.

August 23-25: *IEEE International Symposium on Electromagnetic Compatibility,* Hyatt Regency Crystal City, Arlington, VA. Contact: Aaron Sullivan, Jr., 7121 Wolf Tree Lane, Rockville, MD 20852.

August 23-26: *URSI International Symposium in Electromagnetic Theory,* Santiago de Compostela, Spain. Contact: Dr. J.L. Sebastian, Dept. de Electricidad y Electronica, Facultad de Ciencias Fisicas, Ciudad Universitaria, Madrid (3), Spain.

September 4-6: *URSI Symposium on Techniques in Studies of Biological Effects of Low-Level Millimeter Waves,* Herrsching, West Germany (near Munich). Contact: Professor Saul Rosenthal, Polytechnic Institute of New York, Route 110, Farmingdale, NY 11735.

September 5-8: *13th European Microwave Conference,* Messezentrum, Nurnberg, West Germany. Contact: Microwave Conference, Convex House, 43 Dudley Road, Tunbridge Wells, Kent, TN1 1LE, England.

September 6-8: *2nd International Conference on Radio Spectrum Conservation Techniques,* University of Birmingham, England. Contact: Conference Services, IEE, Savoy Place, London WC2R 0BL, England.

September 12-14: *36th Annual Conference on Engineering in Medicine and Biology,* Hyatt Regency Hotel, Columbus, OH. Contact: Alliance for Engineering in Medicine and Biology, 4405 East-West Highway, Suite 210, Bethesda, MD 20814.

September 19-21: *16th Annual Electronics and Aerospace Conference and Exposition,* Shoreham Dunfey Hotel, Washington, DC. Contact: Susan Vekich, Honeywell Inc., Aerospace and Defense, Honeywell Plaza, Minneapolis, MN 55408.

October 2-5: *3rd International Meeting of the Bioelectrical Repair and Growth Society,* Holiday Inn Golden Gate, San Francisco, CA. Contact: Executive Secretary, BRAGS, 425 Medical Education Building, 36th and Hamilton Walk, Philadelphia, PA 19104.

October 4-6: *7th International Colloquium on Prevention of Occupational Risks due to Electricity: The Prevention of Electrical Accidents by Influencing Human Behavior,* Cologne, West Germany. Contact: Secretariat of ISSA-Section and Colloquium, Berufsgenossenshaft der Feinmechanik und Elektrotechnik, Gustav-Heinemann-Ufer 130, D-5000 Koln 51, West Germany.

October 16-20: *Conference on Electrical Insulation and Dielectric Phenomena,* Buck Hill Inn, Buck Hill Falls, PA. Contact: Dr. J.K. Nelson, Center for Electric Power Engineering, Rensselaer Polytechnic Institute, Troy, NY 12181.

October 27-28: *Studying Problems Associated with Video Display Systems,* Skyline Ottawa Hotel, Ottawa, Canada. Contact: Planetary Association for Clean Energy, 77 Metcalfe St., Suite 607A, Ottawa, Ontario, K1P 5L6, Canada.

November 7-9: *1983 Satellite Communications Symposium,* Hyatt Regency Hotel, Atlanta, GA. Contact: Betsy Crawley, Symposium Coordinator, 3845 Pleasantdale Rd., Atlanta, GA 30340.

November 14-17: *1983 Radio Technical Commission for Aeronautics Annual Assembly and Technical Symposium,* Marriott Crystal Gateway Hotel, Arlington, VA. Contact: RTCA Secretariat, One McPherson Square, 1425 K Street, NW, Suite 500, Washington, DC 20005.

November 16-17: *JINA 83,* (2emes Journees Internationale de Nice sur les Antennes), Nice, France. Contact: J.L. Guiraud, Centre National d'Etudes des Telecommunications, Centre de La Turbie, 06320 Cap D'Ail, France.

December 12-17: *8th Annual IEEE International Conference on Infrared and Millimeter Waves,* Carillon Hotel, Miami Beach, FL. Contact: Dr. K.J. Button, National Magnet Laboratory, Building NW-14, MIT, Cambridge, MA 02139.

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January 16-20: *Microwave Signatures in Remote Sensing,* URSI Commission F Specialist Meeting, Toulouse, France. Contact: Dr. Richard Moore, Remote Sensing Laboratory, University of Kansas Center for Research, 2291 Irving Hill Drive, Lawrence, KS 66045.

January 17-19: *Instrumentation & Measurement Society Technology Conference (IMTC) '84,* Aboard the Queen Mary, Long Beach, CA. Contact: Robert Myers, 1700 Westwood Blvd., Suite 101, Los Angeles, CA 90024.

February 20-22: *Office Automation & You,* Los Angeles Convention Center, CA. Contact: American Federation of Information Processing Societies,Inc., 1815 N. Lynn St., Arlington, VA 22209.

April 2-5: *3rd Annual Test & Measurement World Expo,* Brooks Hall, San Francisco, CA. Contact: Meg Bowen, 215 Brighton Avenue, Boston, MA 02134.

FROM THE FIELD

With this issue Microwave News *is introducing "From the Field," a monthly column featuring contributions of fact and opinion from our readers. We welcome short items of interest to the electromagnetic bioeffects and compatibility communities.*

"From the Field" offers you a quick way to communicate with your colleagues. There is no charge for this service, and we hope you will take advantage of it.

Of course, we continue to encourage our readers to submit letters to the editor on any relevant subject.

The opinions expressed in "From the Field" are those of the author(s) and do not necessarily represent the views of the editors of Microwave News.

Corrections From Battelle Pacific NW Labs

At last fall's Department of Energy contractors' review, Battelle's Dr. R.D. Phillips explained that a high-voltage transformer failed and was not correctly repaired: "The two high-voltage outputs, which are connected to adjacent electrodes in the mouse exposure system, were in phase rather than 180 degrees out of phase as specified." This resulted in lower field strengths than previously stated. The following two letters will be published in a forthcoming issue of Bioelectromagnetics. *We reproduce them here, at Battelle's request, to expedite the corrections in the papers cited.*

An erratum needs to be published in *Bioelectromagnetics* for the paper entitled, "Effects of 60 Hz Electric Fields on Specific Humoral and Cellular Components of the Immune System" 1982, *Bioelectromagnetics, 3,* 341-347 by J.E. Morris and R.D. Phillips.

A malfunction of the transformer used in this study was discovered after publication of this paper. The electric field strength in the mouse cages was 0.15-0.25 kV/m rather than 100 kV/m as reported in the publication. Experiments are planned to repeat this study at 100 kV/m.

James E. Morris, Ph.D.

An erratum needs to be published in *Bioelectromagnetics* for the paper by B.W. Wilson, et al. entitled "Chronic Exposure to 60 Hz Electric Fields: Effects in Pineal Function in the Rat" *Bioelectromagnetics, 2,* 371-380.

A malfunction of the transformers used for this study was detected subsequent to publication of this paper. The unperturbed field strength was 1.7-1.9 kV/m rather than 65 kV/m stated in the paper. A subsequent study at 60 kV/m produced essentially the same results as those observed at 1.7-1.9 kV/m.

Larry E. Anderson, Ph.D.

Biology and Chemistry Department, Battelle Pacific Northwest Laboratories, PO Box 999, Richland, WA 99352.

SHORT COURSES

August 26: ***The Understanding and Application of MIL-STD-461B,*** Arlington, VA. Fee: $295. Contact: R&B Enterprises, 20 Clipper Road, W. Conshohocken, PA 19428, (215) 825-1960.

August 29-30: ***Doppler Radar Meteorology,*** San Francisco, CA. Fee: $585. Contact: Technology Service Corp., 8555 16th St., Suite 300, Silver Spring, MD 20910, (301) 565-2970.

August 29-31: ***Engineering Techniques for Clinical Hyperthermia,*** Washington, DC. Fee: $685. Contact: Continuing Engineering Education, George Washington University (GWU), Washington, DC 20052, (800) 424-9773.

August 30-September 1: ***FCC & CISPR/VDE Compliance Design and Retrofit of Digital Devices,*** Newark, NJ. Fee: $760. Contact: Don White Consultants, Inc. (DWCI), State Route 625, PO Box D, Gainesville, VA 22065, (703) 347-0030.

September 12-16: ***Radar Systems Engineering,*** Washington, DC. Fee: NA. Contact: Continuing Education Institute (CEI) 10889 Wilshire Blvd., Los Angeles, CA 90024, (213) 824-9545 or (301) 596-0111. Repeated • September 19-23: Columbia, MD.

September 12-16: ***Spread Spectrum Communications Systems,*** Washington, DC. Fee: $855. Contact: GWU, see August 29 above.

September 13-15: ***EDP Equipment Design Seminar on Coping with the FCC/VDE Regulations on RFI,*** San Diego, CA. Fee: $695. Contact: EMXX Corp., 6706 Deland Drive, Springfield, VA 22152, (703) 451-4619. Repeated • October 11-13: Boston, MA; • November 8-10: San Francisco, CA.

September 18-24: ***Microwave Measurements,*** University of Kent, UK. Fee: 200-300 pounds, depending on IEE membership and housing needs. Contact: Institute of Electrical Engineering (IEE), Savoy Place, London WC2R 0BL, England, 01-240-1871, ext. 272 or 282.

September 19-21: ***Imaging Equipment Update,*** Chicago, IL. Fee: $150/$250/$300 for 1/2/3 days. (NMR and Nuclear Medicine on the 21st). Contact: Ms. Judy Gallegos, Dept. of Radiology, University of Utah School of Medicine, Salt Lake City, UT 84132.

September 20-23: ***Grounding and Shielding,*** San Diego, CA. Fee: $760. Contact: DWCI, see August 30 above.

September 26-29: ***Electromagnetic Compatibility Engineering,*** East Brunswick, NJ. Fee: $1160. Contact: Center for Professional Advancement, PO Box H, East Brunswick, NJ 08816, (201) 249-1400. Repeated • October 18-21: San Mateo, CA.

September 26-30: ***Electromagnetic Interference and Control,*** Ottawa, Canada. Fee: $855. Contact: GWU, see August 29 above. Repeated • December 12-16: Washington, DC.

September 27-29: ***Grounding, Bonding and Shielding,*** Nashua, NH. Fee: $695. Contact: R&B, see August 26 above. Repeated • October 3-5: Philadelphia, PA; • November 7-9: Atlanta, GA.

October 6-7: ***EMI and ESD Control in Electronic Systems,*** Philadelphia, PA. Fee: $495. Contact: R&B, see August 26 above. Repeated • October 24-25: Boston, MA; • November 10-11: Atlanta, GA.

October 10-11: ***International Requirements for EMI and Product Safety,*** Philadelphia, PA. Fee: $495. Contact: R&B, see August 26 above. Repeated • October 31-November 1: Boston, MA.

October 10-15: ***Advanced Microwave Circuit Design,*** Los Angeles, CA. Fee: $975. Contact: Short Course Program Office, UCLA Extension, PO Box 24901, Los Angeles, CA 90024, (213) 825-1295.

October 11-13: ***Current Issues and Trends in Controlling Occupational Exposures to RF/Microwave Radiation,*** Salt Lake City, UT. Fee: NA. Contact: K. Blosch, Rocky Mountain Center for Occupational and Environmental Health, University of Utah, Salt Lake City, UT 84112 (801) 581-5710.

October 17-18: ***EMI Workshop,*** Philadelphia, PA. Fee: $575. Contact: R&B, see August 26 above. Repeated • December 5-6.

October 17-21: ***Communications Satellite Engineering,*** Washington, DC. Fee: $855. Contact: GWU, see August 29 above.