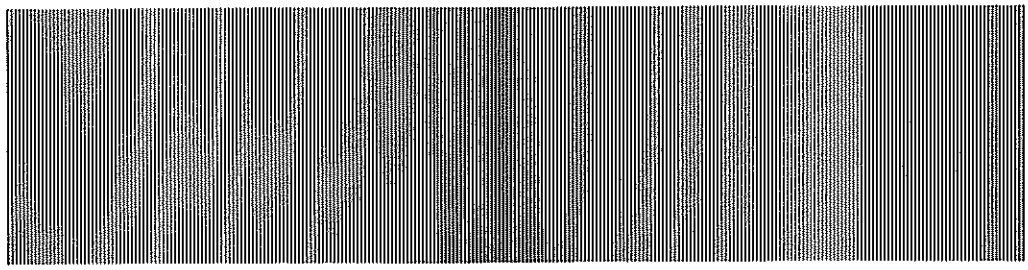


# MICRO WAVE NEWS



Vol. III No. 5

A Monthly Report on Non-Ionizing Radiation

June 1983

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### NOTICE

With our next issue, *Microwave News* will expand to 12 pages and will accept classified ads. For more information, call us at (212) 794-9633.

## Prospects Brighten for EPA's RF/MW Research Program

Two House committees are trying to rescue the Environmental Protection Agency's (EPA) radiofrequency and microwave (RF/MW) research program. Although the research group is not yet assured funding beyond the end of September, the House moves, coupled with a stronger commitment to environmental safety in Washington, increase the likelihood that the program will not be dropped from EPA's fiscal year (FY) 1984 budget (see *MWN*, January/February 1983).

On May 10, the House Committee on Science and Technology authorized a \$1 million line item in the FY84 research and development (R&D) budget for EPA's non-ionizing radiation program. (The committee also authorized the program's FY85 budget, with a further increase of \$62,000 over FY84.) Two weeks later, the House Appropriations Committee approved a similar measure specifying the \$1 million item.

Dr. Joe Elder, the head of EPA's RF/MW research group, said that he was pleased to hear the news and that it was a step in the right direction. Former EPA Administrator Anne Gorsuch Burford had sought to close down the RF/MW program, based at the Health Effects Laboratory in North Carolina, by cutting it out of the agency's FY84 budget.

### Extramural Research

The net effect of the committee actions is still uncertain. Interviews with House staffers indicate that the \$1 million appropriation is for *extramural* research on RF/MW bioeffects. Meanwhile, EPA's own in-house RF/MW team does not yet have the funds to pay its researchers after the end of the fiscal year. The House Appropriations Committee did set up a supplemental \$27.5 million fund for additional agency staff. A small part of that money is targeted for specific programs, leaving \$22.2 million and 587

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## VDT Bills Pass in Maine and Connecticut

Early this month, Maine and Connecticut became the first states to pass video display terminal (VDT) safety legislation. The measures are limited, with Maine's applying exclusively to public employees and Connecticut's authorizing only a study of VDT health issues. A broad reaching bill proposed in New York moved forward last month, but is still pending as we go to press.

Maine's governor signed Legislative Document (LD) 1675 into law on June 2, two days after it won house and senate approval. The measure directs the state's Bureau of Labor Standards to investigate ergonomic VDT health issues and promulgate rules, if necessary, to protect city, county and state workers. LD 1675 (House Paper 1265) replaced LD 831 (House Paper 657). (See *MWN*, April 1983.)

Rep. Edith Beaulieu, the bill's sponsor, told *Microwave News* that she

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## **EPA's R&D Program** (continued from p. 1)

positions to be used at the agency's discretion.

If the RF/MW program gets some of the discretionary funds, the bioeffects research effort could end up with more money in FY84 than in FY83. Many sources thought that the RF/MW group was in a good position because EPA is more likely to hold onto existing staff than to hire new people. EPA's FY83 RF/MW research budget is \$1.5 million, of which less than \$250,000 is for extramural research. If the in-house program continues to operate at this year's level, there could be a net increase in funds for grants next year. On the other hand, there is a possibility that new funds may be awarded by the agency's Washington grants staff rather than by the RF/MW group in North Carolina.

To be sure, the budget process is far from over; the Senate and the House could still revise EPA spending figures and the President must still okay them. Finally, the RF/MW program must win the approval of EPA's new administrator, William Ruckelshaus. The numbers could go up or down, though press reports indicate that the Senate favors a boost. The net result of all this could be a further increase in the overall EPA budget and more funds for R&D.

The situation at EPA is complicated by the removal of most of its senior staff. Beyond the rash of firings that followed disclosures of unethical conduct, last month Ruckelshaus asked for and received the resignation of Kathleen Bennett, the assistant administrator for air, noise and radiation. Courtney Riordan, the assistant administrator for R&D and one of the last senior officials left over from Burford's tenure, has yet to be confirmed by the Senate, and it is not yet clear whether he has Ruckelshaus's confidence. On top of all this, the whole R&D program is in the process of being reorganized. (Note that Bennett controlled the Office of Radiation Programs (ORP), while the Health Effects Lab is under Riordan's aegis. For an update on what has been called EPA's "crippled R&D program," see the story in the May 9 *Chemical & Engineering News*.)

### **Request for 60 Hz Research**

A report by the Committee on Science and Technology accompanying the R&D authorization bill directs EPA to look into "behavioral, immunological, hematologic, physiologic, reproductive, genetic and teratologic effects resulting from exposure to non-ionizing radiation." Especially noteworthy is its recommendation that the agency investigate the biological effects of exposure to high voltage power transmission lines. Tony Clark, a consultant to the subcommittee on natural resources, agriculture research and environment, explained that the committee had acted on a recommendation by former EPA staffer Bennett which cited a need to evaluate the effects of 60 Hz radiation.

Last year in a failed effort to keep the RF/MW lab in the FY84 budget, Bennett wrote a memorandum to Riordan arguing: "We also need your assistance in reaching decisions on the need for regulation at frequencies not covered by the guidance we are now developing, i.e., for frequencies above 100 GHz and below 10 kHz, especially at 60 Hz, the frequency used for high voltage power transmission. This is a critical area, since the trend is to higher transmission voltages and effects are now seen in animals at levels very near those produced by present transmission voltages.

We need an evaluation of effects, definition of uncertainties and research to resolve these uncertainties."

The recommendations of the House Science and Technology Committee appear in House Report No. 98-212 (part 1, May 16) accompanying HR 2899 and those of the House Appropriations Committee are in House Report No. 98-223 (May 24) accompanying HR 3133.

### **Lobbying Campaign**

The brighter outlook for EPA's RF/MW group is due in part to a lobbying campaign by members of the RF/MW research community. Congress received many letters stressing the need for more bioeffects data to answer public concerns over the proliferation of radiation-emitting devices.

For instance, Donald McRee, the President of the Bioelectromagnetics Society (BEMS), wrote to Representative James Scheuer asking for continued funding of RF/MW research in general and the EPA lab in particular. He noted in part: "More research is needed to determine the interaction mechanism of electromagnetic radiation with biological systems, and almost no data exists in the United States on the effects of long-term, low level exposures to this form of radiation. With the rapid increase in the use of the electromagnetic spectrum in industrial processes, communications, medical applications and consumer products, the potential for large numbers of our population to be exposed is increasing significantly. It is essential that funds be appropriated at the current level and if possible increased so that the necessary research can be performed to ensure the safety of our people." Scheuer chairs the subcommittee on natural resources at the House Committee on Science and Technology.

### **Criteria Document**

The staff at the Health Effects Lab has finished its criteria document which ORP will use as the basis for its public health standard, or guidance, for non-ionizing radiation (see *MWN*, March 1983). The document is due to go to the printer in the first week of June and should be available about a month later. ●

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## **VDT Bills Pass** (continued from p. 1)

hopes Maine's action will prompt federal agencies to develop national VDT standards. "It makes a hell of a lot more sense to have one standard rather than a collection of incompatible state rules," she explained. Beaulieu said she will now push to include private sector employees under a VDT law, noting that "it took four years to get this far; I'm willing to take another four to go further."

In Connecticut, a VDT study bill went to the governor's office after passing a senate vote on May 25 and a house vote on June 2. Senate Bill 811 authorizes representatives from the Connecticut Academy of Science and Engineering, the state's Department of Consumer Protection, Product Safety Division, and two general assembly committees to review available literature and report their findings to the legislature early next year. An amendment by Senator Michael Skelley, the bill's sponsor, eliminated a section that required employers to inform workers about potential VDT hazards (see *MWN*, April 1983). The house dropped

its own VDT measure (House Bill 5132), which called for a more limited study.

In neighboring New York State, a VDT bill which would require radiation shielding at point of manufacture and guarantee pregnant women the right to non-VDT work has cleared the Assembly Labor Committee. The measure was introduced by Assemblyman Frank Barbaro on May 6 and is now in the Ways and Means Committee. Other provisions in Assembly Bill 7158 include annual eye exams, 20-

minute alternative work breaks for every two hours at a VDT, and standards for lighting, furniture and terminal design.

An identical bill sponsored by NY Senator Joseph Pisani is now before his Labor Committee, but it will not act on Senate Bill 6528 this late in the session unless the Senate Rules Committee asks it to do so.

VDT bills are also pending in Massachusetts and Oregon. ☉

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## HIGHLIGHTS

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### Massachusetts Town Adopts 5 uW/cm<sup>2</sup> Standard; State Regs Still on Hold

The town of Wayland, MA, has passed a bylaw restricting microwave levels on private property to 5 uW/cm<sup>2</sup>. The Wayland regulation is at least 40 times stricter than a proposed state standard. At a May 3 town meeting, Wayland residents voted 158-116 to force any microwave user causing ambient radiation levels exceeding 5 uW/cm<sup>2</sup> to get permission from all affected property owners. The bylaw is primarily directed at Raytheon's Equipment Division which has its Naval Combat Weapons System Test Center in Wayland.

The state's attorney general must now approve the Wayland bylaw as being constitutional and consistent with other Massachusetts laws. A spokesman at the attorney general's office said that the bylaw was received May 16th and that a decision would be made within 90 days.

Meanwhile, the state's radiofrequency and microwave (RF/MW) safety regulations (see *MWN*, March and December 1982) have yet to be promulgated. Robert Watkins, a radiation scientist at the state's Department of Public Health, said that according to his lawyers, the enabling legislation for the state regulations specifies that state standards preempt any local rules. Massachusetts has proposed adopting a frequency dependent RF/MW safety standard, which at its most stringently regulated frequencies, would be 200 uW/cm<sup>2</sup>.

The proposed state regulations were recently revised. Watkins said that the April 15 draft incorporates comments received by his department at public hearings and by mail. The major change is that all RF/MW sources will now be considered *individually* even if they are located near other sources, as in an antenna farm. Some companies had complained that they could only be responsible for their own radiation emissions.

Watkins said that the rules are still under review by the governor's office and that he could not predict when they would be promulgated. Other sources have suggested that the rules have been delayed because of opposition from local broadcasters.

A spokesman for Raytheon said that the bylaw was really a zoning change and that a two-thirds majority is required for zoning bylaws. (The RF/MW rule passed with only a simple majority.) Asked what action the company might now take, he said that they expect the state's rules to be issued soon and will wait to see the attorney general's decision. He added, however, that "we will do what is necessary to protect our interests."

Dr. Jonathan Glass, a Wayland resident and a researcher and physician at Beth Israel Hospital in Boston, said that Raytheon had told the town that some of the radar systems

tested at the Wayland facility caused radiation levels to exceed 200 uW/cm<sup>2</sup> off of company property. He added that the bylaw might not be preempted by a state standard. ☉

### VDT Safety Campaign Launched by National Office Workers' Group

Last month 9 to 5, the National Association of Working Women, opened a telephone hotline to provide and gather information on pregnancy problems and other health complaints among video display terminal (VDT) users. In the first two weeks of operation, the line has averaged 100 calls a day from all over the country.

The hotline is part of a major campaign for more research on potential VDT health hazards and a push for interim worker safeguards. 9 to 5 leaders are particularly concerned that VDT use may be linked to eight clusters of miscarriages and birth defects reported among clerical workers. No causal factors for the clusters have been found.

Government officials in the US and Canada do not believe VDT use is hazardous and have stated that no further research is needed. But 9 to 5 Executive Director Karen Nussbaum maintains that the public must be made more aware of health problems reported by workers, particularly the clusters, and that "we simply don't know enough about low frequency radiation, or about stress and its effects."

For hotline callers, pregnancy and vision are clearly the key VDT health issues. According to 9 to 5's Diana Roose, over 50 percent of the callers are VDT users who are either asking about potential hazards or reporting health problems they think are VDT-related. To obtain more information on worker complaints; the organization has included a health questionnaire in the information packet it sends to hotline callers.

As precautionary steps, 9 to 5 wants VDT manufacturers to shield terminals to reduce radiation emissions and recommends that pregnant women receive alternative work on request. (The Canadian Center for Occupational Health and Safety recommended these measures earlier this year and shares 9 to 5's position that only more research will resolve the VDT controversy. See *MWN*, January/February 1983.)

In an eight-page *Technical Memorandum* on VDTs published last month, 9 to 5 also calls for regular terminal maintenance, periodic eye exams, hourly rest breaks, a four-hour daily limit for VDT use, minimum standards for lighting, furniture and terminal design and elimination of computer monitoring of work.

9 to 5 is a 12,000 member organization which co-founded District 925, a national union for office workers affiliated with the Service Employees International Union.

The VDT hotline numbers are 1-800-521-VDTS and 1-800-522-VDTS (in Ohio). Callers can speak to a hotline operator between 9 AM and 5 PM or request an information packet on a recorded message during off hours. Copies of the VDT *Technical Memorandum* are available for \$6.50 (\$10.00 for institutions) from 9 to 5, 1224 Huron Road, Cleveland, OH 44115. ☛

### NIOSH VDT Epidemiological Study Underway

After months of negotiations, the National Institute for Occupational Safety and Health (NIOSH) will participate in a major epidemiological study to determine if VDT use affects pregnancy. The agency has arranged to add VDTs to other risk factors under scrutiny in a study being run by one of California's private health care providers.

NIOSH decided to join the study late last year in response to mounting concerns over eight reported clusters of pregnancy problems among office workers (see *MWN*, November 1982). Though the agency maintains VDTs are safe, some US and Canadian union officials are not convinced the clusters are chance events and are worried that too little is known about the very low frequency radiation emitted by the terminals.

According to Dr. Michael Rosenberg, the chief of NIOSH's reproductive health section, the California study will provide "a conclusive indication as to whether VDT use increases the risk of spontaneous abortions." Rosenberg explained that worrying about radiation before identifying a health problem is like "putting the cart before the horse." Should the study reveal a link between terminals and the incidence of miscarriages, "then NIOSH will look at radiation as well as other factors," he said.

Pesticide exposure is a key variable in the study because of extensive spraying of malathion during California's recent medfly crisis. Rosenberg said pesticides will not confound the significance of the VDT data because the analysis will exclude women from the spraying areas if pesticides are shown to affect pregnancy.

The health care company heading the project will collect information from 5,000 to 6,000 women who became pregnant two years ago. Rosenberg requested that the company go unnamed to avoid biasing participant response. He expects final results in about one year.

In addition to the California project, NIOSH is investigating the feasibility of a prospective epidemiological study. Last month the agency's Dr. Jane Gordon began searching for a suitable population to monitor for two to four years. Gordon stressed that the agency only wants to know if the project is possible and that, as yet, no funds have been slated for its own VDT-pregnancy study. ☛

### New Evidence on ELF-Leukemia Link...

A new statistical analysis has provided more support for the hypothesis that exposure to extremely low frequency (ELF) radiation is linked to leukemia. The study of electrical workers in southeast England is the fourth to establish such an occupational link in the last year (see *MWN*, March 1983).

In a paper published in the April 30 *Lancet*, Michel Coleman and Janine Bell of the London School of Hygiene and Tropical Medicine and Richard Skeet of the South Thames Cancer Registry report that their results are "broadly consistent" with the three earlier occupational studies: a 17 percent excess of all leukemias among men working in ten electrical occupations. Of the ten groups, eight show an

excess of all leukemias, seven an excess of acute myeloid leukemia and six of chronic lymphoid leukemia.

Although not all of the associations are statistically significant due to the small number of cases, they are significant for electrical fitters and telegraph operators. The British team does note that radio and radar mechanics had a lower than expected incidence of leukemia. ☛

### ...Epidemiologist Recommends Repeating Wertheimer's Cancer Studies

A consulting epidemiologist for the New York State Power Lines Project has recommended repeating Dr. Nancy Wertheimer's studies linking cancer rates to alternating magnetic fields (AMFs) from power lines.

In an April 18 final report to the project's scientific advisory panel, Dr. Annemarie Crocetti concluded that Wertheimer's data on childhood and adult cancer rates and AMFs would require a great deal of work to reanalyze and advised funding a new study instead. Because of problems with Wertheimer's method for selecting controls and evaluating the magnetic field exposures in the adult study, Crocetti favored repeating only the childhood cancer work.

Crocetti evaluated the data for Wertheimer and Ed Leeper's two studies in Denver, CO, "Electrical Wiring Configurations and Childhood Cancer" and "Adult Cancer Related to Electrical Wires Near the Home," published in 1979 and 1982, respectively (see *MWN*, January/February and March 1983).

In addition to recommending modifications in the study populations, Crocetti advised that a new set of field measurements is needed to validate Wertheimer and Leeper's use of wiring configurations and their distance from households as a surrogate for AMF exposure. She also said that the wiring configurations for specific time periods should be verified through power company records.

In a written response to Crocetti's report, Wertheimer told the panel that she hopes new work "will correct some of the problems" she and Leeper encountered. She doubted, however, whether the overall finding of the Denver studies is an artifact created by these problems. Wertheimer said she prefers replicating the adult study over the childhood project because it would "present fewer problems in obtaining adequate subjects and in interpreting results."

Scientific advisory panel member Dr. James Stebbings has asked Dr. Richard Hamman at the University of Colorado, Denver, to submit a proposal for a new study covering the same ground as Wertheimer's. In addition, the panel will consider three proposals for a different epidemiological study. A total of \$500,000-600,000 is earmarked for the Denver project and at least one other epidemiology.

Copies of Crocetti's 26-page report and Wertheimer's 4-page response are available from the project for 25 cents per page. Contact Michael Rampolla, Power Lines Project Administrator, New York State Department of Health, Center for Laboratories and Research, Empire State Plaza, Albany, NY 12201.

In a related development, the Swedish group that independently confirmed Wertheimer and Leeper's association between power line radiation and cancer for children in Stockholm (see *MWN*, November 1982) is now continuing and expanding the study. Dr. Lennart Tomelius has notified *Microwave News* that he and his co-workers are planning to include tumor cases among children in all of Sweden, using the same general technique. ☛

## RF Sealer Survey and Epidemiology

The Food and Drug Administration's (FDA) Regional Operations Office is sponsoring a survey of radiofrequency (RF) sealers in use in the United States. In a request for proposals issued at the end of May, FDA asked for a state agency to locate RF sealers and to measure worker exposure from 50 to 100 sealers at five or more sites. Proposals are due July 28.

According to FDA's Gary Beard, the state agency may also be asked to identify a population of RF sealer workers for an epidemiological study. FDA has not yet funded this part of the contract, however.

In February 1982, the National Institute for Occupational

Health and Safety (NIOSH) awarded a \$8,700 contract to Industrial Health, Inc., of Salt Lake City, UT, to assemble a list of US work sites with more than 30 RF sealers. A final report was submitted the following July. The NIOSH project officer on the contract, John Whalen, could not be reached for comment.

NIOSH has been planning an epidemiological study of RF sealer operators since the late 1970's, but has never gotten it off the ground because of changes in staff and lack of funds. Between 1978 and 1981, NIOSH conducted more than 20 surveys of RF sealer plants and found that many workers are exposed to radiation levels far in excess of the Occupational Safety and Health Administration's 10 mW/cm<sup>2</sup> safety standard (see *MWN*, January/February 1982). ●

## RFI Complaints FY79-82

The number of radiofrequency interference (RFI) complaints reaching the Federal Communications Commission's (FCC) Field Operations Bureau has leveled off since 1979 and is expected to remain at or below last year's 75,651 mark.

Bureau RFI statistics for 1979-1982, summarized in the table below, indicate that a cooling interest in citizens band (CB) radio is responsible for this good news. Interference from CBs to television reception accounted for over 50 percent of all RFI reports last year, though these complaints dropped to 42,263 in 1982 from a peak of 51,100 in 1980.

The statistics also hold some bad news: RFI from radiofrequency (RF) devices is on the rise. Reports of inter-

ference to home entertainment equipment from these sources have doubled since 1979, reaching 5,432 last year. A bureau spokeswoman said this trend is likely to continue as many new electronic products enter the market. The bureau does not break down which RF devices, ranging from computers to cordless phones, are responsible for this surge in RFI complaints.

The complaints received by the FCC are only the tip of the RFI iceberg: based on a 1976 FCC survey, the Field Operations Branch estimates that only 12 percent of all RFI problems are reported.

Figures for the top six categories of RFI complaints, which accounted for over 85 percent of all those received in fiscal years (FY) 1979-1982, are listed in the table below. The percentage of total reports for a given year in each category appears in parentheses. ●

### *RFI Complaints Received by the FCC, FY79-82*

RFI From/To (FCC Regulatory Part Numbers)	FY79	FY80	FY81	FY82
95/69	46,452 (64.5%) <sup>1</sup>	51,100 (63.7%)	48,829 (59.5%)	42,263 (55.9%)
95/95	7,772 (10.8%)	6,471 (8.1%)	5,900 (7.2%)	4,537 (6.0%)
15/69	2,291 (3.2%)	3,567 (4.4%)	4,846 (5.9%)	5,432 (7.2%)
91/91	1,866 (2.6%)	2,094 (2.6%)	2,974 (3.6%)	2,919 (3.8%)
97/69	1,946 (2.7%)	2,618 (3.3%)	2,386 (2.9%)	2,489 (3.3%)
X/69	2,357 (3.3%)	3,783 (4.7%)	5,073 (6.2%)	6,870 (9.1%)
FY Total	72,069 <sup>2</sup>	80,244	82,084	75,651

<sup>1</sup>= Percentage of total yearly reports.

<sup>2</sup>= Total reported complaints for the year in all categories.

15= Radiofrequency devices (wide range of electronic and electrical products, from computers to cordless phones).

69= Home electronic entertainment equipment (television, radio, etc.).

91= Industrial land mobile service.

95= Personal radio service (CB radio).

97= Amateur radio service.

X= Other.

## FCC Enforces RFI Regulations: Fines Commodore

The Federal Communications Commission (FCC) has fined Commodore Business Machines \$4,000 for "willful and repeated" violations of its radiofrequency interference (RFI) regulations. The commission charged that Commodore had failed to certify that a computer and a printer complied with the commission's RF device rules.

FCC investigators discovered a new Commodore P 500 computer on display in a Texas store which had not been certified, while other FCC staffers found a Commodore 8023 P printer without a proper certification label in an Oklahoma store.

In a telephone interview, Paul Harris, a senior staff engineer with the investigations branch of the FCC's Field Operations Bureau, said that data were available to show that the printer met FCC rules but "equipment is not considered certified until it has a label on it." The commission had warned Commodore about this violation before and the computer company had agreed to correct the violation.

In both instances, the retailers told the FCC investigators that the equipment had recently been ordered directly from Commodore.

Officials from Commodore did not return calls asking for comment.

The crack down on Commodore is part of the FCC's nationwide project to enforce its RFI regulations. "It is an on-going program," Harris said, "and we will keep it at the present level for at least a year, maybe two." Each month at least four FCC regional offices work on enforcement actions, he added.

Last October, the FCC fined Coleco \$2,000 for failing to certify a computer game before marketing (see *MWN*, November 1982). ●

## US-USSR Bioeffects Workshop; News of the Identical Experiment

The fourth *US-USSR Workshop on the Biological Effects of Physical Factors in the Environment* will be held in Research Triangle Park, NC, June 21-24. The purpose of the meeting is to review the work done under the US-USSR agreement over the last two years and to develop a plan for the next two years.

One of the major agenda items is a progress report on the identical experiments by researchers in the US and the USSR (see *MWN*, July/August 1982). A group headed by Dr. Mikhael Shandala of the Institute of General and Communal Hygiene in Kiev is exposing male rats to 2450 MHz microwaves for seven hours at a power density of 10 mW/cm<sup>2</sup>. Scientists at the National Institute of Environmental Health Sciences (NIEHS) and the FDA's Office of Radiological Health (ORH) are running the experiment with the same exposure conditions, the same strain of rats and the same animal food.

NIEHS' Dr. Donald McRee, who is leading the US delegation at the workshop, told *Microwave News* that there is a good chance that the two groups will go on to run the same experiment at a power density below 10 mW/cm<sup>2</sup> for a longer exposure time, in keeping with the Russians' hypothesis that the total integrated dose is a key variable.

While power has yet to be turned on in Kiev and at NIEHS, ORH's Dr. John Monahan has some preliminary results on a small number of animals, which indicate that the 10 mW/cm<sup>2</sup> fields can induce behavioral effects. Monahan will discuss his findings at the Bioelectromagnetics Society (BEMS) meeting in Boulder, CO, on June 15.

Howard Bassen, the chief of ORH's Electromagnetics

Branch, was in the Soviet Union earlier this year to measure the fields used in Shandala's laboratory. Bassen said that he found fairly uniform fields in the Kiev exposure system, but did discover that the Soviets were using 2375 MHz radiation in contrast to the US' 2450 MHz. In addition, and perhaps more important, Bassen found that the Soviet signal has a 50 Hz amplitude modulation. He also measured the animals' absorbed dose with an electric field probe. Details will be presented at the BEMS conference.

The June workshop was scheduled to allow the Soviet scientists to attend the BEMS meeting; many of them will present papers in Boulder. Accompanying Shandala on the Soviet delegation will be: Drs. Yurii Dumanskii, Mikhael Rudnev and Vyacheslav Varetskii, from Kiev; Drs. M. Burenkov and I. Dozmorov of the Institute of Biophysics at the Ministry of Health in Moscow; Dr. Taisia Kalyada of the Leningrad Institute of Industrial Hygiene and Occupational Diseases; and Dr. Nikolai Litvinov of the A.N. Sysin Institute of General and Communal Hygiene, Academy of Medical Sciences in Moscow.

Members of the US delegation are Drs. Ezra Berman, Joe Elder, Michael Gage, Thomas Ward and John Zirix of EPA; Dr. Arthur Guy of the University of Washington; Drs. William Kaune and Richard Phillips of Battelle Northwest Labs; Drs. Donald McRee and Hugh Tilson of NIEHS; Drs. John Monahan and Mays Swicord of FDA; and Dr. Philip Sagan of the VA Hospital in Loma Linda. ●

## FDA Offers States a Calibration Service for RF Meters

The Food and Drug Administration's (FDA) National Center for Devices and Radiological Health has started a free calibration service for radiofrequency (RF) survey meters. At present, the service is limited to 27.12 MHz, but FDA will add 13.56 MHz within a year, according to Howard Bassen, the chief of the electromagnetics branch at the center.

The calibration service is designed for federal, state and local agencies, which check worker and public exposure to radiation, especially from RF sealers and medical devices. The center will calibrate the following survey meters: Narda models 8633, 8635 and 8644 and Holaday models HI-3001 and HI-3002.

The new service follows an evaluation by the center's staff of the Holaday HI-3001 and HI-3002 isotropic meters, the isotropic Narda-8635 high power magnetic field and Narda-8644 high power electric field probes, and the Raham-2 meter. The results of the study will be presented by FDA's Billy Nesmith at the July meeting of the International Microwave Power Institute in Philadelphia, PA. An FDA report will be published later.

Bassen said that the center will not calibrate the Raham meter because it is not isotropic and FDA does not recommend its use for near field measurements. At 13-27 MHz, readings are usually taken in the near field.

Last year, the center published an evaluation of Instruments for Industry's RHM-2 and EFS-1 meters, and Narda's 8633 isotropic magnetic field probe in combination with a Narda 8616 readout. A limited number of copies of the report, *Performance Evaluation of RF Electric and Magnetic Field Measuring Instruments* (No. FDA-82-8158, March 1982), are available from Billy Nesmith, HFX-240, NCDRH, 5600 Fishers Lane, Rockville, MD 20857, (301) 443-3840. Or, it may be ordered from the National Technical Information Service, Springfield, VA 22161, Order No. PB-82-195009, \$7.50 paper and \$4.00 microfiche. ●

## UPDATES

**Biological Effects...**Last month we reported on a paper by three researchers from the University of Rochester that claimed to refute Polish findings on the effects of microwaves on white blood cells. As we pointed out, there were significant differences between the two sets of experiments that make a direct comparison inappropriate —an opinion shared by Dr. Sol Michaelson, one member of the Rochester group, despite contrary claims in the published work. Now two of the same Rochester scientists take aim at another key paper on RF/MW bioeffects by Professor Charles Susskind and Susan Prausnitz of the University of California, Berkeley. In 1962 Susskind and Prausnitz found that mice chronically exposed to pulsed 9270 MHz radiation showed indications of "neoplasms of the white cells" (*IRE Transactions on Bio-Medical Electronics*, 9, 104, April 1962). The experiment has never been replicated, though it appears no one has ever tried. In a 1976 review, FDA scientists called the Susskind-Prausnitz paper "the most discomfiting finding in the available literature." The Rochester researchers believe otherwise. Writing in the April issue of *Health Physics*, Michaelson and Dr. Norbert Roberts, Jr., say that they have reanalyzed the original 1962 data and conclude that the original report "does not support" a link between exposure to microwave radiation and the development of leukemia in mice. Instead they argue that the original study "demonstrated microwave-induced beneficial, rather than detrimental, effects." In a telephone interview, Susskind said that he had not seen the Rochester analysis and had no comment. In a paper recently published in *Microwaves and Thermoregulation* (Academic Press, 1983), Susskind reviewed his old experiment, noting that some of his irradiated mice had developed malignancies that did not show up among the controls, but that the exposed animals had a greater longevity than the controls, an effect that might be a "good thing." It is this increased survival rate that Michaelson and Roberts consider beneficial....A team from the Biomedical Research Institute at the University of Wisconsin-Parkside, Kenosha, have found experimental support for the hypotheses that electromagnetic fields interact with cell membranes. The researchers exposed amoebae to 60 Hz electric (1 V/m) and magnetic (0.1 mT) fields and observed changes in partitioning behavior. Their report appears in the April issue of *Radiation Research*.

**Communications...**In preparation for the 1984 World Administrative Radio Conference (WARC), the FCC has published a report on high frequency (3-30 MHz) broadcasting bands which the US uses for Voice of America and Radio Free Europe - Radio Liberty. For information contact the commission's Neal McNaughten, (202) 653-8102....The Operational-Fixed Microwave Council and the FCC's Private Radio Bureau are sponsoring a forum on the Private Operational-Fixed Microwave Service, June 23 in Gettysburg, PA. Contact the bureau's Rick Kenney, (202) 632-6497....More radio and TV stations are on the way. The FCC has approved squeezing about 1,000 new FM radio stations between existing ones and has allocated eight channels to Multipoint Distribution Service (MDS), which uses microwave transmissions to deliver pay-TV....The FCC's final rules for low power TV appear in the May 12 *Federal Register* (48 FR 21478).

**Compatibility & Interference...**At the first meeting of the new task group on immunity standards for home electronic equipment held May 9, the American Radio Relay League (ARRL) agreed to work with ANSI C63 representatives (see *MWN*, May 1983). Hugh Turnbull will represent ARRL. A second meeting is scheduled for June 14, at which, according to FCC's Dan Yates, the group will map out how to tackle the immunity standards issue. Meanwhile, the Electronic Industries Association (EIA) has sent out a questionnaire asking its members how best to handle the immunity issue. Eb Tingley of EIA's Consumer Electronics Group said that equipment manufacturers have their own immunity guidelines, but these would now be standardized with specific immunity levels. One example of what might emerge from EIA is its 1980 guidelines to make TV tuners immune to RFI from CB radio harmonics (Con-

sumer Products Engineering Bulletin No. 8A). Tingley said that the present effort would go far beyond the 1980 guidelines. He has arranged an EIA meeting for June 22 to discuss the responses to the questionnaire....Last month we reported on a news story that appeared in the *New York Times* describing how secrets could be stolen from computers by picking up their RF emissions with sophisticated listening devices. A very similar item appeared in the May 9 *Computerworld*. Robert Courtney, Jr., of Port Ewen, NJ, wrote in charging that the National Security Agency (NSA) has a tendency to "overstate grossly" the potential for security problems. As an example, he cites NSA's "insistence that information can be extracted from the emanations of large-scale mainframes and immediately attached peripherals." He challenged NSA to demonstrate the threat. His letter appears in the May 30 *Computerworld*....Much to the pleasure of the National Association of Broadcasters, the FCC has decided to maintain the existing mileage separation between FM stations, thereby reducing the possibility of interference among them....The May 5 issue of the *New Scientist* features a story about RFI: "Radio Waves Spell Trouble for Industry." It cites an RFI incident described by John Bull of ERA Technology in Surrey, England: transmissions from a walkie-talkie confused a thermocouple into displaying a temperature that was off by 190 degrees C. The event was reminiscent of the one at the Three Mile Island nuclear plant last year (see *MWN*, March 1982)....In past months, we have mentioned the RFI problems associated with the Breathalyzer unit. Now Federal Signal Corp. of Park Forest South, IL, has a new unit, the *Intoxilyzer*, which it claims can determine a driver's sobriety without fear of RFI....The 2nd *Colloquium on Electromagnetic Compatibility* will be held in Tregastel, France, June 1-3. For more information, contact: J. Hamelin, CNET, Route de Tregastel, BP 40, 22301 Lannion Cedex, France.

**Government...**The battle over deregulating television broadcasting continues to be waged in Congress. Representative Timothy Wirth (D-CO) has abandoned his plan to charge broadcasters a spectrum fee for the right to use scarce frequency space —a proposal vigorously opposed by the National Association of Broadcasters (NAB). But the communications industry is not against all federal regulation, especially if it can counteract a growing patchwork of state and local RF/MW exposure standards. Last month, a group from NAB, Motorola and the Public Broadcasting System (PBS) met with the acting administrator of NTIA, David Markey, to see if anything could be done to resurrect ERMAC. The Electromagnetic Radiation Management Advisory Council went out of business last January when its charter as an advisory committee to NTIA and as the coordinator of federal research on non-ionizing radiation expired (see *MWN*, January/February 1983). Bernard Wunder, Jr., the then-head of NTIA eliminated ERMAC from his FY83 budget in a cost-cutting move. According to Jules Cohen, a consulting engineer who attended the meeting as an advisor to NAB, Markey was sympathetic to the group's concerns but said there was little chance that NTIA would revive ERMAC without a mandate and a budget from Congress. Markey, a former lobbyist for NAB himself, suggested that the group go to Congress for help. Cohen said that talks are now underway with committee staffers on the hill....The second phase in the reorganization of what used to be FDA's Bureau of Radiological Health (BRH) is expected to take effect shortly. In the first step announced last fall (see *MWN*, November 1982), BRH and the Bureau of Medical Devices were merged to form the National Center for Devices and Radiological Health with most of BRH becoming the Office of Radiological Health (ORH). As soon as FDA Commissioner Arthur Hayes, Jr., signs his approval, the second phase will take effect on an "interim" basis awaiting the final okay from HHS Secretary Margaret Heckler. Sources predicted that some major changes will occur but that most of the RF/MW programs will remain unchanged. They will become part of the center's new Office of Science and Technology....The FCC has named Robert Powers as its Chief Scientist. Powers has been the acting chief since Stephen Lukasik resigned last fall.

**Measurement...**The 1984 *Conference on Precision Electromagnetic Measurements* will be held at Delft University of Technology in the Netherlands, August 20-24. Those wishing to present papers should contact Professor H. Postma at the university, PO Box 5046, 2600 GA Delft, The Netherlands. All other inquiries should be sent to Mrs. I.J. Smits at the university's Department of Electrical Engineering, PO Box 5031.

**Medical Applications...**Last month, newspapers across the country ran an AP story on the Soviet "Lida" machine being tested at the VA Hospital in Loma Linda, CA. The Lida uses low frequency radiation to tranquilize experimental subjects. Dr. Ross Adey is quoted as saying, "It looks as though instead of taking Valium when you want to relax yourself, it would be possible to achieve a similar result, probably in a safer way" with radio waves....If you are thinking about investing in the companies that market electrical devices to regenerate bones, take a look at Richard Regis's "Electrifying Growth" in the May 16 *Barron's*. Regis describes the various players (Electro-Biology, Telectronics, Biomagnetics, Electromedical Products among others) competing in what has become a high stakes, competitive market, and the patent wars that are raging among them....A team from the University College London School of Medicine (UK) has used phosphorus-31 NMR spectroscopy to study the brain metabolism of newborn infants. Writing in the May 14 *Lancet*, the researchers note that they believe "the technique is completely safe" but to be conservative they decided not to study controls and to select seven infants who might profit from the NMR diagnostic data. They are most enthusiastic about the potential benefits of NMR technology....Drs. Waldo Hinshaw and Arnold Lent have published "An Introduction to NMR Imaging: From the Bloch Equation to the Imaging Equation" in the March 1983 *Proceedings of the IEEE*....Professor Richard Blakemore of the University of New Hampshire, the discoverer of magnetic bacteria in 1975, thinks there might be some gold in them too. His company, Biomagnotech Corp., has won a patent to promote applications using the magnetite bearing microbes.

**Military Systems...**The House Committee on Armed Services has issued its recommendations for the FY84 DoD budget. The committee made numerous changes to the administration's budget request (see *MWN*, April 1983). One of the largest reductions is its plan to defer procurement for the over-the-horizon backscatter radar (OTH-B), cutting \$176 million from the budget. DoD wanted to expand the system with two additional 60 degree sectors to cover the full 180 degree sector, but the committee argued: "A high degree of concurrency of development and procurement in the OTH-B program could result in the commitment of large sums for procurement prior to the completion of the development effort. In addition, other systems and methods are being rapidly developed that could perform the OTH-B early warning function." The committee approved the installation of the SPS-49 radar and the LAMPS MK III electronics on Aegis guided missile cruisers, and it endorsed a \$48.1 million request for the Aegis Combat System Center at Wallops Island, VA, calling it an "urgent requirement" in FY84. Report No. 98-107, *Department of Defense Authorization Act, 1984*, is dated May 11....The air force has decided to site its southwestern PAVE PAWS radar in Schleicher County, about 35 miles south of Goodfellow AFB, TX. Also it has determined that an environmental impact statement is not necessary. The air force has issued an environmental assessment with an accompanying finding of no significant impact. These are available from the public affairs staff at the Electronic Systems Command at Hansom AFB, MA, 01731, (617) 861-4466....The Naval Surface Weapons Center, White Oak, Silver Spring, MD, has issued a request for proposals for the development of an electromagnetic pulse (EMP) hardness assurance program for its Project ELF communication system. It notes that the system is "particularly vulnerable to EMP radiation." The contractor would have to devise ways of protecting the ELF antenna from a high-altitude EMP and run tests on the Wisconsin and Michigan facilities in 1985 and 1986. Proposals are due June 13....Meanwhile, on May 21 a group in Madison, WI, wrote to the governors of both states urging them to join together

to force the navy to close down Project ELF. On the basis of recent studies linking ELF radiation with "increased incidences of human cancers, birth defects and suicides," Stop Project ELF's Jennifer Speicher and John Stauber claim that the navy has failed to comply with the National Environmental Policy Act....One possible alternative to ELF is a blue-green laser submarine communication system. According to the May 9 *Electronic News*, the Soviets had planned to present a paper at the May Conference on Lasers and Electro-Optics, but it was pulled. In the US, a paper from Perkin-Elmer failed to get DoD clearance....Since President Reagan backed what many are calling his Star Wars plan for a directed energy ABM system, there appears to be more contract activity on high power microwave research (see *MWN*, May 1983). The army and navy's programs on high power microwave technology, including their medical and intelligence aspects, will be discussed at a June 13 meeting of the Army Science Board. The session, which will be held at the Harry Diamond Labs in Adelphi, MD, will cover classified material and will therefore be closed to the public. In the last few weeks, the following notices have appeared in the *Commerce Business Daily*: the Naval Research Lab is modifying its contract with Mission Research of Santa Barbara, CA, on an investigation of RF waves and electron beams (April 25); the Office of Naval Research (ONR) is negotiating with W.J. Schafer Associates of Wakefield, MA, for a study of the requirements of microwave technology for directed energy applications (April 28); and ONR has asked Jaycor of Alexandria, VA, to survey and evaluate the development of high power microwave sources (May 19).

**Moscow Embassy...**The *Washington Post* reported that Soviet crews building the new US embassy in Moscow walked out on May 26 to protest the use of X-ray equipment at the construction site. There was talk that the Soviet workers were worried about the health hazards associated with the X-rays, which US officials said were being used to check for structural flaws in the \$120 million buildings. The *Post* quoted sources saying that the X-ray device was also "designed to sweep the walls before they are sealed" to ensure that no listening bugs had been planted. Hidden microphones were found in the old embassy building. Some microwave experts in the US considered this latest development somewhat ironic given that the Soviets beamed microwave radiation at the embassy for many years. The Soviets' motives for irradiating Americans are still largely unknown though questions and lawsuits on possible health effects on the embassy staff are still pending.

**Occupational Health...**The National Council on Radiation Protection and Measurements (NCRP) has issued *Operational Radiation Safety - Training*, Report No. 71. It provides guidance on how to train workers who are exposed to radiation on the job. (The report is a companion volume to NCRP's *Operational Radiation Safety Program*, Report No. 59, published in 1978.) The new report is designed for workers exposed to radioactive materials as well as other types of radiation sources, including those emitting non-ionizing radiation. The report was prepared by a committee chaired by Charles Meinhold of Brookhaven National Laboratory. Copies are available for \$9 from NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, MD 20814.

**Ovens...**Jorgen Skotte, a researcher at the Danish Institute of Occupational Health, advocates the registration of all microwave ovens sold for commercial use in Denmark. In an article in the March-April issue of *Microwave World*, he reports that there are about 11,000 restaurant employees operating some 3,500 ovens. About 16 percent of the ovens are believed to leak more than 5 mW/cm<sup>2</sup> and should be overhauled - most of these are models no longer in production. Nevertheless, he finds that operator exposure during normal work is "less than (in most cases much less than) 1 mW/cm<sup>2</sup>." For more information contact Skotte at the institute at 73 Baunegaardsvej, DK-2900 Hellerup, Denmark....The market research firm of Find/SVP has published *Microwave Cooking: Ovens, Ovenwares, Food and Packaging*. The 300-page study is available for \$985 from Patricia Van Velsor at Find/SVP, 500 Fifth Avenue, New York, NY 10110, (800) 223-2054



or (212) 354-2424....Shipments of microwave ovens boomed in April. Nearly 400,000 units were shipped, almost a 40 percent increase over April 1982, setting a new all-time April record. So far this year, shipments are more than 15 percent higher than last year.

**Power Lines...**The Electric Power Research Institute (EPRI) has issued a new report, *Bipolar HVDC Transmission System Between ±600 kV and ±1200 kV: Corona Studies, Phase 2*. The study by Hydro-Quebec evaluates RFI, audible noise and corona loss performance as well as electric field and ion induction effects on people and objects. Report No. EL-2794 is available for \$20.50 from EPRI's Research Reports Center, PO Box 50490, Palo Alto, CA 94303, (415) 965-4081....And EPRI has extended a contract with Science Applications, Inc., in Schaumburg, IL, on interference effects of power lines. Marvin Frazier, the study's principal investigator, will look at the effects of induced currents from transmission line RFI on railroad signaling systems and on pipeline corrosion rates. John Dunlap is EPRI's project officer on the 22-month, \$300,000 study (No. RP1902-2). For a review of EPRI's work on the siting of transmission lines parallel to railroads and pipelines, see the short items in the May 1981 and November 1982 issues of the *EPRI Journal*.

**Satellite Communications...**The FCC has made room for 19 new satellites by reducing satellite orbital spacing to 2 degrees from 3 or 4 degrees....Newspaper mogul Rupert Murdoch plans to begin direct broadcast satellite (DBS) TV service this year with five transponders leased from Satellite Business Systems. To meet the competition, Comsat has pushed up its schedule for DBS: it now hopes to beam programs directly to home TVs in 1984....Scientific Atlanta will host its 9th annual *Satellite Communications Symposium* on November 7-9 at the Peachtree Center in Atlanta, GA. For information, contact Betsy Crawley, Symposium Coordinator, 3845 Pleasantdale Road, Atlanta, GA 30340, (404) 449-2274.

**Standards...**The new ACGIH RF/MW standard was approved unanimously by the conference's board of directors at the AIHA meeting in Philadelphia, the last week of May. According to Herbert Jones, the chairman of ACGIH's Physical Agents TLV Committee, the only changes in the standard were minor clarifications in its wording. After the board acted, the membership gave its assent in a voice vote. The revised ACGIH standard is less stringent than the new ANSI exposure limits and is somewhat controversial, having been criticized by scientists at FDA's National Center for Devices and Radiological Health (see *MWN*, April 1983, July/August 1982, September 1981)....There was some talk last year that OSHA would be issuing an advanced notice of proposed rule making for its revised RF/MW exposure standard before the end of 1982. According to the most recent OSHA regulatory agenda (published in the *Federal Register* on April 25), the agency is still reviewing its non-ionizing radiation rules. The review is expected to be completed by the end of August. For more information contact OSHA's Dr. Leonard Vance, (202) 523-7075....The first meeting of the ANSI C95 committee since the publication of the new ANSI RF/MW safety standard (C95.1-1982) will take place at the Bioelectromagnetics Society (BEMS) meeting on June 15 in Boulder, CO. According to C95 chairman Professor Saul Rosenthal, he will introduce Dr. F. Kristian Storm of UCLA medical school as the new chairman of subcommittee C95.IV (the subcommittee that drafted the C95.1 standard) and will initiate a discussion of the possibility of consolidating the two ANSI documents on RF/MW far-field and near-field measurements (C95.3-1979 and C95.5-1981). In addition, the committee will review the recommendations generated at EPA's *Radiofrequency Measurements Workshop* held in November 1980 and published last year. One of these suggested that a group like ANSI develop standardized measurement techniques based on "existing instrumentation, applicable standards and exposure situations" (see *MWN*, October 1982)....At last year's BEMS meeting, Professor Nicholas Steneck presented a paper criticizing the new ANSI safety standard as being "pro-industry" (see *MWN*, July/August 1982). Now Steneck has published an abbreviated version of the BEMS paper in the May issue of *Microwaves & RF*. The same material will

appear in different form in a book which he hopes to publish early next year. The book does not have a title yet, but his working sub-title is "Science, Technology and Policy in Conflict." Steneck describes it as a study of "how particular mentalities have overwhelmingly dominated the bioeffects research field."...The International Electrotechnical Commission (IEC) has issued the following new standards: *IEC 601-2-3-1982, Medical Electrical Equipment -Part 2: Particular Requirements for the Safety of Short-Wave Therapy Equipment*, (\$33); *IEC 555-2-1982, Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment -Part 2: Harmonics* (\$21) and *IEC 555-3-1982, Part 3: Voltage Fluctuations*, (\$38); *IEC 725-1982, Considerations on Reference Impedances for Use in Determining the Disturbance Characteristics of Household Appliances and Similar Electrical Equipment*, (\$11); and a six-month draft rule: *12F (Central Office) 76, Publication 489-3: Methods of Measurement for Radio Equipment Used in the Mobile Services; Part 3: Receivers for A3E(A3) or F3E(F3) emission; Clause 18: Radiated Spurious Components*, (\$5). These are available pre-paid for the prices noted from: International Sales Dept., American National Standards Institute, 1430 Broadway, New York, NY 10018.

**Technology...**The Federal Aviation Administration's (FAA) handling of existing air traffic control facilities and the planned new microwave landing system (MLS) is evaluated in GAO's *FAA's Plan to Improve the Air Traffic Control System: A Step in the Right Direction but Improvements and Better Coordination are Needed*, No. GAO/AFMD-83-34, February 16, 1983. It is available from the GAO Document Handling and Information Services Facility, PO Box 6015, Gaithersburg, MD 20760. For a special report on the FAA's 20-year plan for modernizing the system, see Eric Lerner's "Automating US Air Lanes: A Review" in the November *IEEE Spectrum*....A committee to develop operational characteristics and performance standards for airborne MLS equipment has been set up by the Radio Technical Commission for Aeronautics. Special Committee 151 is chaired by Robert Schwab of Boeing....Dr. Fawwaz Ulaby of the University of Kansas Center for Research in Lawrence discusses the potential that a new generation of synthetic aperture radar space sensors holds for global monitoring of renewable resources in the December *Proceedings of the IEEE*....In the February issue of the proceedings, Keigo Iizuka and Alois Freundorfer of the University of Toronto report on their use of a stepped frequency, UHF radar to detect buried, nonmetallic objects....Satellite communications beat out microwave ovens as the largest predicted growth area for microwave equipment in Europe. According to a Frost & Sullivan report, satcom technology accounted for almost one-third of the 1982 European market and will increase 92 percent, to \$638 million, by 1987. *Industrial/Commercial Microwave Equipment in Europe*, No. E604, is available for \$1,600 from F&S, 106 Fulton Street, New York, NY 10038.

**VDTs...**The Computer and Business Equipment Manufacturers Association (CBEMA) underscores its view that "there is no radiation hazard associated with VDTs" in its brochure, *The Facts About Visual Display Units*. Copies are available for 25 cents each from Charlotte LeGates, CBEMA, 311 First Street, NW, suite 500, Washington, DC 20001....Those who read French may be interested in two new publications from Quebec: *L'Ecran Cathodique et Votre Vision*, (brochure) Association des Optometristes du Quebec, 465 St. Jean Street, Suite 1003, Montreal H2Y 2R6, (514) 849-8051; and *Guide d'Amenagement de Postes de Travail a Ecran Cathodique*, (pamphlet) Commission de la Sante et de la Securite du Travail du Quebec, PO Box 3, Desjardins Station, Montreal H5B 1H1, (514) 873-3990....A VDT workshop is on the agenda for 9 to 5's *Summer School for Working Women*, July 15-17 at Bryn Mawr College near Philadelphia, PA. Registration fees range from \$75 to \$125. For information, contact 9 to 5, 37 Temple Place, Boston, MA 02111, (617) 451-9111.

**Etc...**Two British documentary film makers are developing a three-part series on non-ionizing radiation, from ELF to microwaves. The project, a joint venture of Central Independent Televi-

sion in London and WGBH, a public television station in Boston, is being produced by Richard Belfield and David Jones. No air date has yet been announced....Fred Sterzer, the director of RCA's Microwave Technology Center in Princeton, NJ, has been elected to the National Academy of Engineering....One hears a lot about radiation phobia these days, and some people contend that it is a growing phenomenon. Two current, if extreme, examples are Dorothy Burdick, the author of new book called *Such Things Are Known*, and a minor character called Marvin Zuckerman in Marshall Brickman's new film, *Lovesick*. According to a report in the June *Omni*, Burdick believes, and recounts in her book, that an air force laser telescope on Cape Cod is scanning her house and analyzing the electrical impulses in her brain with a computer. To protect herself from being "zapped," Burdick wears a coat with tin cans tied around it and a peaked hat filled with marbles. For his part, the fictional Zuckerman is obsessed by microwave radiation and is forever afraid that he is being zapped by emissions from the

World Trade Center antenna in downtown New York City. Though some may complain there are too many Burdicks and Zuckermans around, others are amazed there are so few. Writing in the March/April issue of *The Sciences* (a publication of the New York Academy of Sciences), Charles J. Lumsden and Edward O. Wilson of Harvard University offer the following analysis: "Phobias typically emerge full-blown after only a single unpleasant experience, and they are exceptionally difficult to eradicate...It is remarkable that the phobias are most easily evoked by many of the greatest dangers of humankind's ancient environment, including closed spaces, heights, thunderstorms, running water, snakes and spiders. Of equal significance, phobias are rarely evoked by the greatest dangers of modern technological society, including guns, knives, automobiles, explosives and electric sockets. Nothing could better illustrate the peculiar and occasionally obsolete rules by which the human mind is assembled, or the slowness of man to adapt to the dangers created by his own technological triumphs." ●

## SHORT COURSES

- June 27-29: *Millimeter/Infrared Wave Technology*, Cambridge, MA. Fee: \$450. Contact: Plasma Fusion Center, MIT, Cambridge, MA, 02139.
- June 27-30: *Modern Microwave Measurements: Signal and Network Analysis*, San Diego, CA. Fee: \$750. Contact: Continuing Education Institute (CEI), 10889 Wilshire Blvd., Los Angeles, CA 90024, (213) 824-9545 or (301) 596-0111. Repeated • July 11-14: Columbia, MD.
- June 28-30: *Interference Control: An Introduction to EMI/RFI/EMC*, Sunnyvale, CA. Fee: \$760. Contact: Don White Consultants Inc. (DWCI), State Route 625, PO Box D, Gainesville, VA 22065, (703) 347-0030. Repeated • August 9-11: Boston, MA.
- July 4-7: *Electromagnetic Compatibility Engineering*, Amsterdam, Netherlands. Fee: \$1160. Contact: Center for Professional Advancement, PO Box H, East Brunswick, NJ 08816, (201) 249-1400. Repeated • September 26-29: East Brunswick, NJ; • October 18-21: San Mateo, CA.
- July 10-15: *Designing Against RF Emission*, University of Sussex, UK. Fee: 212-301 pounds depending on IEE membership and housing needs. Contact: Institution of Electrical Engineers (IEE), Savoy Place, London WC2R 0BL, United Kingdom, 01-240-1871, ext. 272 or 282.
- July 11-13: *Monopulse Radar*, Washington, DC. Fee: \$685. Contact: Continuing Engineering Education Program, George Washington University (GWU), Washington, DC 20052, (800) 424-9773.
- July 11-14: *Concept and Design of Spread Spectrum Systems*, Los Angeles, CA. Fee: \$750. Contact: College of Continuing Education, CES 109, University of Southern California (USC), Los Angeles, CA 90089, (213) 743-2410.
- July 11-15: *Microwave Circuit Design*, College Park, MD. Fee: \$875. Contact: UCLA Extension, 10995 Le Conte Ave., Los Angeles, CA 90024, (213) 825-3344 or (301) 454-5237. Repeated • August 15-19: Los Angeles, CA.
- July 12-14: *EMP Design & Measurement for Control of Susceptibility*, Albuquerque, NM. Fee: \$760. Contact: DWCI, see June 28 above.
- July 12-15: *EMI Control in Electronic Data Processing Equipment*, Boston, MA. Fee: \$965. Contact: DWCI, see June 28 above.
- July 17: *Tutorial on Nuclear and Space Radiation Effects*, Gatlinburg, TN. Fee: \$100. Contact: Dept. of Conferences and Non-Credit Programs, IEEE/NSREC, University of Tennessee, Knoxville, TN 37996, (615) 974-6688.
- July 18-21: *Satellite Communications*, Los Angeles, CA. Fee: \$750. Contact: USC, see July 11 above.
- July 18-22: *Microwave Antenna Measurements*, Northridge, CA. Fee: \$795. Contact: Dr. Edmond Gillespie, School of Engineering and Computer Science, California State University, Northridge, CA 91330, (213) 885-2190.
- July 19-22: *Grounding and Shielding*, Boulder, CO. Fee: \$760. Contact: DWCI, see June 28 above. Repeated • September 20-23: San Diego, CA.
- July 24-30: *EMP Interaction and Hardening*, Socorro, NM. Fee: \$700. Contact: Dr. K.S.H. Lee, Dikewood/Kaman Sciences Corp., 2716 Ocean Park Blvd., Santa Monica, CA 90405, (213) 450-5772.
- August 1-5: *Microwave Solid-State Devices and Circuits*, College Park, MD. Fee: \$875. Contact: UCLA, see July 11 above.
- August 8-12: *Non-Ionizing Radiations: Biophysical and Biological Basis*,

*Applications and Hazards in Medicine and Industry*, Cambridge, MA. Fee: \$850. Contact: Director of Summer Sessions, Room E19-356, MIT, Cambridge, MA 02139.

• August 13-16: *EMC Design & Measurement for Control of EMI*, Philadelphia, PA. Fee: \$965. Contact: DWCI, see June 28 above.

• August 15-19: *Microwave Solid-State Devices*, Washington, DC. Fee: \$855. Contact: GWU, see July 11 above.

• August 18-24: *Computer Aided Design of Microstrip Circuits and Antennas*, Boulder, CO. Fee: \$600. Contact: Office of Conference Services, Dept. of Housing, University of Colorado, Campus Box 454, Boulder, CO 80310, (303) 492-5151.

• August 19-20: *Satellite Fundamentals*, St. Louis, MO. Fee: \$445. Contact: Walter Morgan, Communications Center of Clarksburg, 2723 Green Valley Road, Clarksburg, MD 20871, (301) 428-9000.

• August 22-24: *Electromagnetic Pulse*, Washington, DC. Fee: \$685. Contact: GWU, see July 11 above.

• August 22-26: *Microwave High-Power Tubes and Wave Propagation*, Washington, DC. Fee: \$855. Contact: GWU, see July 11 above.

• August 29-31: *Engineering Techniques for Clinical Hyperthermia*, Washington, DC. Fee: \$685. Contact: GWU, see July 11 above.

• August 30-September 1: *FCC & CISPR/VDE Compliance Design and Retrofit of Digital Devices*, Newark, NJ. Fee: \$760. Contact: DWCI, June 28 above.

• September 12-16: *Radar Systems Engineering*, Washington, DC. Fee: NA. Contact: CEI, see June 27 above.

• September 12-16: *Spread Spectrum Communications Systems*, Washington, DC. Fee: \$855. Contact: GWU, see July 11 above.

• September 18-24: *Microwave Measurements*, University of Kent, UK. Fee: 200-300 pounds, depending on IEE membership and housing needs. Contact: IEE, see July 10 above.

• 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.

• November 15-25: *Biological Effects and Dosimetry of Non-Ionizing Radiation: Static and ELF Electromagnetic Fields*, Erice, Italy. Fee: NA. Contact: Professor Martino Grandolfo, Istituto Superiore di Sanita, Viale Regina Elena 299, 00161 Rome, Italy.

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