

Glaser

Microwave oven leakage: Federal regulations soon

HEW's Bureau of Radiological Health and industry officials meet to discuss reasonable safety standards.

Lyman J. Hardeman

The Bureau of Radiological Health is presently writing a safety standard that, if passed, may have an important impact on not only microwave ovens, but also the entire microwave industry.

The Radiation Control for Health and Safety Act of October 18, 1968, was passed to protect the public from exposure to possible harmful radiation emitted from electronic products. The law gives the Department of Health, Education and Welfare the responsibility and authority to regulate electronic products with potentially harmful radiation, including lasers, x-ray radiation from TV, microwave ovens, etc.

Known as Public Law 90-602 it provides for the establishment of a Technical Safety Standards Committee to include representatives from governmental agencies, industry, and the general public. This committee is to advise HEW organizations in matters concerning the standard.

Biological aspects

Non-ionizing electromagnetic radiation (microwave energy) is thought by many to produce its effects by means of two modes of microwave interaction—"thermal" and "athermal" effects. However, it is generally agreed that the effect of primary concern in the case of microwave ovens is thermal.

Temperature rises *do* take place in tissues exposed to microwave radiation, and among the human organs most sensitive to this radiation are the eyes, and the testes. The big question is, how much? What level of microwave radiation

is sufficient to cause a minimal harmful effect on humans? The real answer is—We don't know!

Dr. Milton Zaret of the Zaret Foundation, Scarsdale, N. Y., is considered by HEW officials to be one of the most knowledgeable experts on this subject. In a telephone interview with Dr. Zaret, we found that over a period of more than ten years he has assembled 42 case reports of human eye cataracts. According to Dr. Zaret, "a unique set of circumstances—including (1) the general healthiness of the eye, (2) the type of cataract, and (3) the manner in

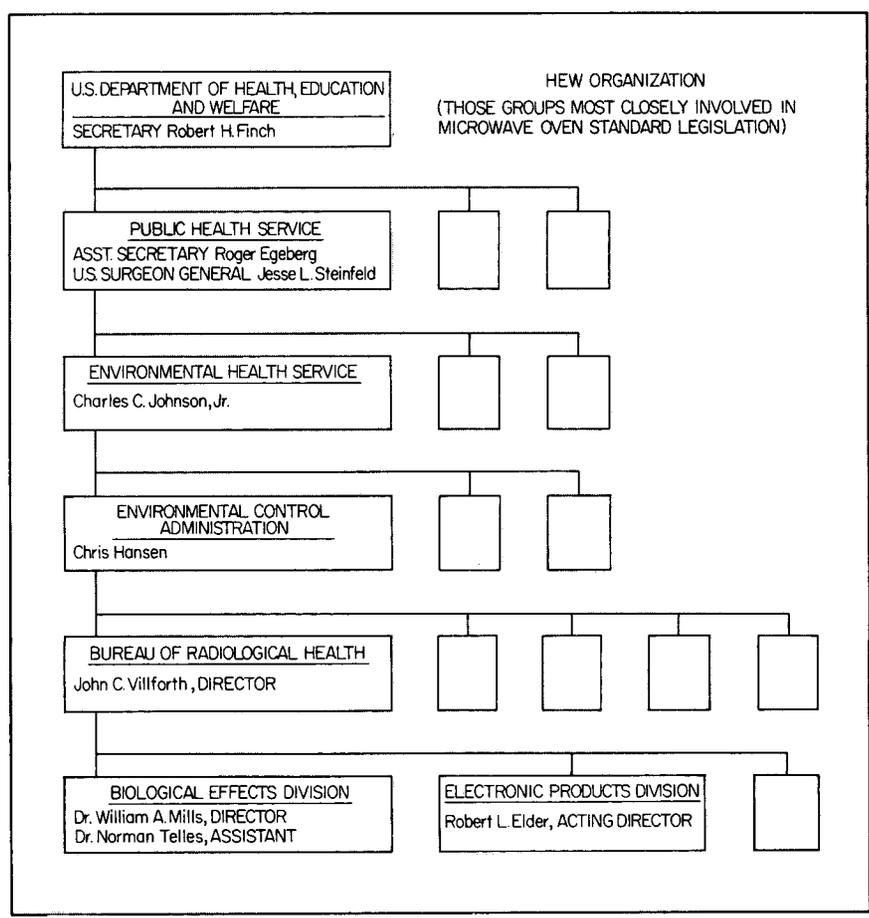
which it is formed—show that the cataract is caused by microwave radiation."

Dr. Zaret was very careful to point out, however, that these cases were found in radar trouble shooters who had been repeatedly exposed over many years to extremely high levels of radiation. Usually the cataracts were first noticed about 18 months after exposure and the lens sometimes continued to cloud for several more years.

It is important to note that with 100,000 ovens now in operation, there are no case reports of damage that is attributable to microwave ovens.

Dr. Zaret also notes that this is a relatively new industry and any potential cataract cases that are the result of possible micro-

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wave oven radiation may not have had time to develop fully.

Industry views

Members of industry most actively represented in government-industry dialogue on safe radiation (See *MicroWaves*, Jan. '70, p. 30) include Cryodry Corporation, Sage

Laboratories, Omnivend, Tappan, General Electric, Amana, Litton, and Raytheon. Also, representatives of companies in Sweden and Japan have participated. The central industry voice has been the Association of Home Appliance Manufacturers (AHAM).

Industry has in the past designed and built ovens to meet their own self imposed safety standard of 10 mW/cm². They contend that:

1. This is a well established

U. S. military standard that was originally based on sound research and has been time proven over many years.

2. Ten mW/cm² is a whole body safety standard for continuous radiation. Microwave oven leakage is localized and exposure is usually for very short duration.

HEW views

The Bureau of Radiological Health says the industry's self-imposed standard of 10 mW/cm² is too liberal. There are important areas of agreement between HEW and industry, such as monitoring and notification procedures. But HEW stands firm in their requirements of a maximum permissible oven leakage level of 1 mW/cm² at the time of manufacture and of 5 mW/cm² throughout the oven life. They, like a responsible industry, are in the uncomfortable position of having to write a meaningful safety standard at a time when there are still many unanswered questions concerning the biological consequences.

Other unresolved problems include determining methods of monitoring ovens in use to insure that they are kept safe, deciding who repairs faulty ovens after warranty, etc.

Path to regulation

When the Technical Safety Standards Committee finalizes its proposal it will be sent through the Bureau of Radiological Health and HEW Secretary Finch to be published in the Federal Register. It will remain there for a 30 day "period of comments." During this period anyone can offer suggestions and criticisms concerning the proposal.

These comments will then be reviewed and evaluated by BRH. Any areas of disagreement will be justified by BRH or the standard will be changed and resubmitted.

Under federal rule making procedures, the proposal standard becomes a regulation when it is published in the Federal Register for the second time without change. Depending on the circumstances, the law is usually effective not less than one year nor more than two

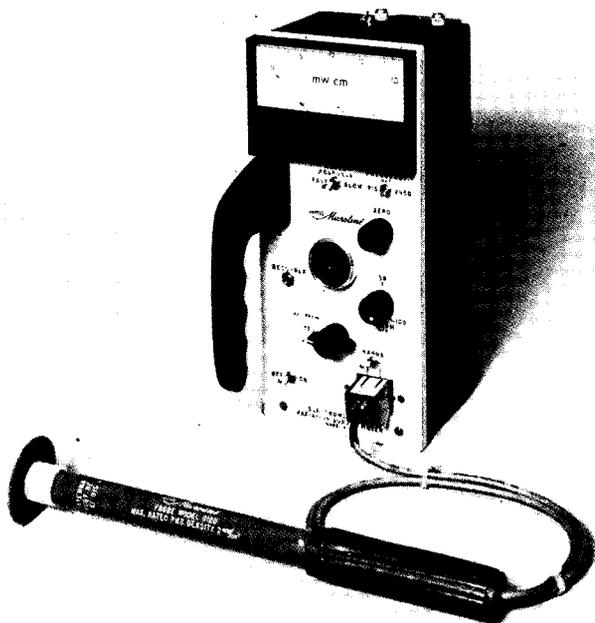
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How exposure levels are measured

According to HEW engineers, "Until recently when the Narda model 8100 Electromagnetic Radiation Survey Meter came along, there was not an instrument that was satisfactory for accurately measuring rf energy emitted from microwave ovens."

Briefly, here are characteristics of the survey meter:

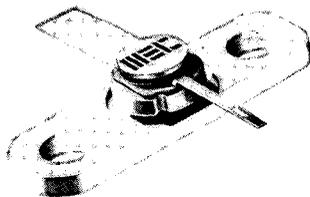
- It detects and measures radiation leakage from microwave ovens.
- Calibrations are at 915 MHz and 2450 MHz, two standard frequencies assigned by the FCC.
- Crossed dipole antenna provides polarization insensitive coupling to E-field.
- Rechargeable nickel-cadmium 15-V battery allows convenient lightweight portable unit.
- Audible alarm for preset danger level protects operator.
- Three interchangeable probes enable readings from 10 μ W/cm² to 200 mW/cm².
- Probe accuracy of ± 1 dB is obtained at the two operating frequencies.
- The 8100 integrates over two switchable time constants of 2.5 and 4 secs.
- Price is just under \$1,000 complete with carrying case.



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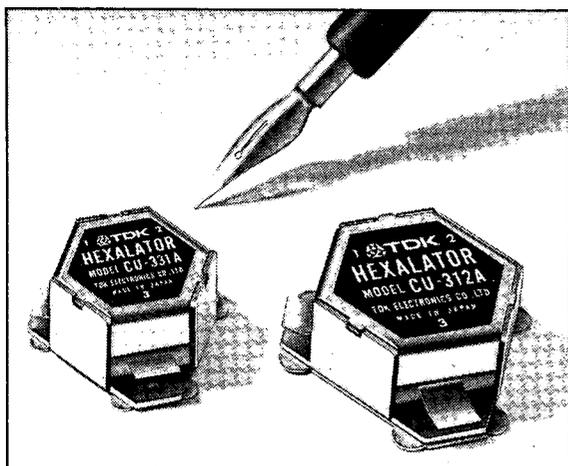
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ON READER SERVICE CARD CIRCLE 18

A good news for VHF-UHF designers!

NEW Tunable non-reciprocal circuit elements

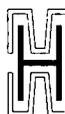


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			Insertion loss (dB)	Isolation (dB)
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	CU312A	50	< 1	> 20
200~400	CU321A	30	< 1	> 20
	CU322A	50	< 1	> 20
300~600	CU331A	30	< 1	> 20

HEXALATOR is the latest development from the joint research work of NHK Technical Research Laboratory and TDK, and based on the NHK patents (US 3335374 & Japan 498885).



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years from the date of final publication.

The microwave oven standard will probably see its first publication some time in February. Conceivably then, the standard will not become a regulation before summer.

How does this affect industry? AHAM officials say that a margin of safety is usually designed into all ovens now manufactured to make sure that no oven has more than 10 mW/cm². This means, they say, that many ovens leak less than 1 mW/cm². To design for this safety factor while using the 1 mW/cm² standard could cause oven prices to increase considerably.

Public attitude has been almost unexpressed so far, even with somewhat provocative news columns being written in syndicated newspapers. A stimulating article was recently published in several New York papers. The New York City Office of Radiation Control says that their office has had no reaction to that article.

MicroWaves Bibliography on the subject

- Apr. '68, p. 16, "Triode may cut cost of microwave cooking."
- Apr. '68, p. 10, 12, 15-17, "Industry warning to microwave power."
- Apr. '69, p. 26, "Soviet health standards on microwave exposure."
- Sept. '69, p. 13, 14, and 16, "Microwave safe exposure level scrutinized."
- Nov. '69, "Editorial—The danger of overacting."
- Jan. '70, p. 30, "Study rekindles argument on microwave oven hazards."

MCI precedent upheld

In action on January 21, 1970, the FCC denied reconsideration of the MCI Chicago-St. Louis microwave service grant, which had been made on August 14, 1969. Western Union, AT&T, Illinois Bell, and Southwestern Bell had filed petitions for reconsideration of the grant on the grounds that the point to point microwave service offered did not assure cost saving and efficient use of frequencies, no customer need for part-time sharing service was obvious, and approval would be establishing competition for its own sake.

The FCC replied that a public need does exist for part-time channel sharing, and MCI offers greater flexibility of use than existing carriers. The FCC concluded, "... any disadvantages of the MCI proposal are outweighed by the advantages which it offers to those members of the public who have unsatisfied needs for interplant and interoffice communications service."

The decision upholds an important precedent in MCI's struggle for approval to build a nation-wide microwave communications system (See MicroWaves Nov. 1969, page 11, and Jan. 1970, p. 20)

Sixteen companies are filing petitions to build regional systems which will interconnect. William McGowan, Chairman of Mi-Com, the service company which will co-ordinate the national communication effort, remarked that the FCC decision was a tribute to the Commission's realization of the nation's communication needs. AT&T is studying the decision and considering its next move, including possible court action, according to spokesman Dick Hill. JBS