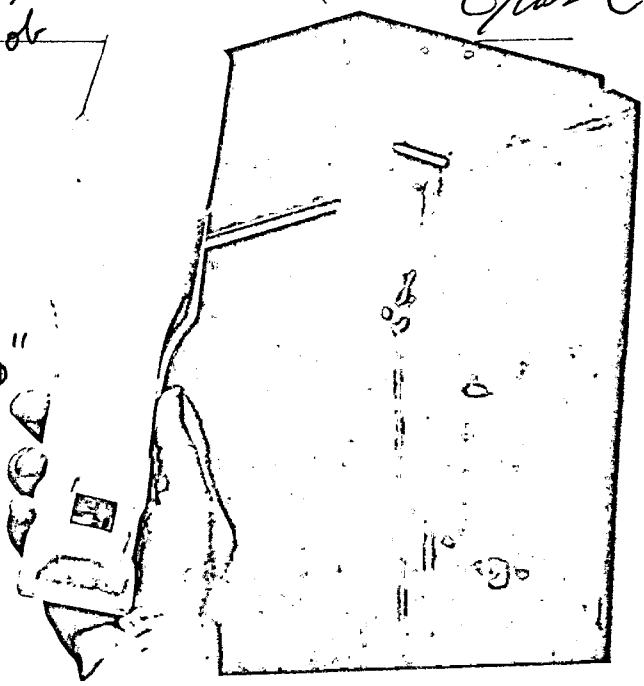
Oven tests: Ineffective instruments or a potential consumer-sales gold mine?



1. The Guard-Rod ($19.95) was one of the units tested by the BRH. Investigators found that it would fail to warn of emissions "ten times greater than allowable limits."

A recent government study uncovered some disturbing inaccuracies in "inexpensive microwave survey instruments." The results of the study focus attention on the technical feasibility of the devices, and their potential in the consumer market.

The instruments, all introduced within the last year, are intended for use by consumers "as an initial check for potentially dangerous leakage from microwave ovens," according to one manufacturer. Some of the detectors have battery-operated circuitry, but most feed the output of a detecting diode or diodes to a meter or LED indicator. The devices are being marketed for under $50, with the majority in the $15 to $25 range.

Serious questions raised

According to a report issued by the Bureau of Radiological Health (BRH), "there are serious questions about the ability of these devices to distinguish oven leakage levels which exceed [government standards] from lower levels which do not."

The BRH, a section of the Food and Drug Administration, sets and enforces levels for microwave oven emissions. These standards allow 1 mW/cm² leakage at the time of manufacture and 5 mW/cm² after use. The measurements are made with 5 cm between the point of leakage and the detector.

BRH investigators used a slot radiator under controlled laboratory conditions to check instrument calibration and the effects of signal polarization, modulation, and level on the devices. Four units received BRH scrutiny: the Micromate (Princeton Microwave & Testing, Inc., Princeton, NJ), the Guard-Rod (Tanray Associates, Inc., Elberon, NJ), the Interceptor (Electrobits Pty., Ltd., Australia) and the Microscan (Birene Medical Supplies Pty., Ltd., Australia).

The BRH reports that the Micromate yielded warnings at levels as low as 0.6 mW/cm². Other units, such as the Microscan, did not indicate excessive levels until emissions reached 7 to 9 mW/cm². This unit also failed to give any warning between 28 and 52 mW/cm². (See "The Sorry Facts" for a partial summary of the test results.)

(continued on next page)

The Sorry Facts: BRH faults existing units

The BRH report, "Inexpensive Microwave Survey Instruments: An Evaluation," was authored by William A. Herman and Donald M. Witters, Jr., of the Bureau's Division of Electronic Products. The Herman and Witters study was conducted because of the interest by repairpersons and consumers in the low-cost detectors.

The four sample devices were tested in front of a slot radiator by comparison to calibrated reference survey meters. Data was collected over several test parameters including:

Calibration—the ability of the instrument to give a warning indication above 5 mW/cm² and a safe indication below this level. (Measured using CW radiation.)

Polarization ellipticity—the effect of device orientation on its sensitivity and its likely performance in areas of cross-polarization, such as near the corner of an oven door.

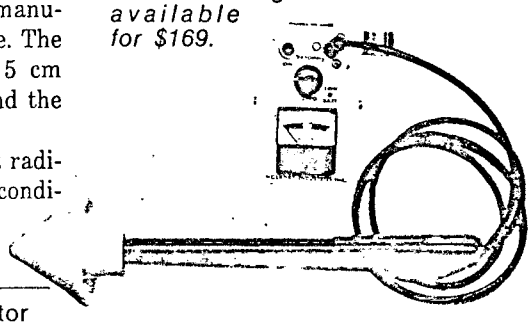
AM response—the effect of amplitude modulation (5:1 peak-to-average) on calibration. (Ovens can emit considerable AM radiation.)

Test results: Effects on instrument sensitivity

Instrument	CW calibration level	AM sensitivity	Polarization ellipticity
Micromate	1.9 mW/cm²	+3.4 dB	+5 dB
Guard-Rod			
end surface	5 mW/cm²	−4.5 dB	+3 dB
back surface	37 mW/cm²	−1 dB	+9 dB
Interceptor	3.6 mW/cm²	+7 dB*	− ∞ **
Microscan	4.4 mW/cm²	+7 dB*	− ∞ **

*peak detectors **linearly polarized

2. Holaday's HI-1800 is intended for use in servicing microwave ovens. It's available for $169.



Walter J. Bojsza, Associate Editor

Oven testers (continued from p. 15)

According to Samuel Sperling, information chief at the BRH, the agency would question the need for the low-cost devices, even if the tests had shown 100-percent accuracy. In Sperling's view, the BRH has carefully set the existing standards and enforces them adequately with periodic inspections of manufacturing facilities. Since the inspections are often random and unannounced, he told *MicroWaves:* "We are confident that the standards are being met and that microwave ovens pose no danger to the consumer."

This confidence contrasts with the language used to promote the low-cost detectors. According to a publicity release for the *Guard-Rod* (Fig. 1), one of the units tested by the BRH, "severe doubts exist concerning the stringency of the Bureau of Radiological Health regulations."

"We are confident that the standards are being met and that microwave ovens pose no danger to the consumer."

This statement is attributed to Kirk Ray, general manager, Tanray Associates, Inc., Elberon, NJ, who is further quoted as saying: "Experts have held that there is ample evidence to show that microwaves are responsible for cataracts, infertility, birth defects, and psychological problems."

Sperling, at BRH, counters these "severe doubts" by saying, "We have no record of any health damage caused by microwave ovens other than simple heat burns from hot platters."

(Although questioning existing standards seems to be one of the principal marketing tactics for the low-cost detectors, all are said to warn of leakage levels of 5 mW/cm² or more, the precise level set by the BRH.)

Established firms comment

The detectors studied by the BRH are manufactured and marketed by firms which have little previous exposure in microwave instrumentation. Established firms in this field have contrasting opinions of the quality and marketability of these devices.

Burton Gran, vice president of Holaday Industries, Edina, MN, a firm that makes instruments for oven manufacturers and repairpersons, says that consumers should not be concerned with microwave leakage. Gran contends that, since manufacturers must include the "worst-case" inaccuracies of their measurement equipment in any reading, an oven's certification of safety will always be accurate.

Gran echoed a statement by the BRH's Sperling that any microwave oven with excessive leakage would show obvious mechanical damage, making consumer leakage measurement unnecessary.

Gran's major conern is that the inexpensive devices might be used by repairpersons to diagnose and fix microwave ovens. (Interest in the instruments by "repair shops" is also mentioned in the introduction to the BRH report). Gran stated that Holaday's HI-1800 (Fig. 2), at $169, represents the lowest-priced survey instrument that can be manufactured within the required degree of accuracy. The firm has no plans for a low-cost detector.

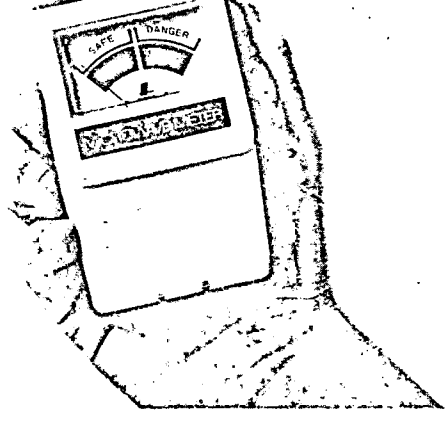
How safe is safe?

Holaday's rejection of the usefulness and marketability of inexpensive microwave detectors is not shared by at least one major microwave manufacturer. Jerry Hausner, chief engineer for the Narda Microwave Corporation, Plainview, NY, expressed a contrasting view.

Although Hausner agrees with the BRH that the existing designs are not effective, he does not concede that consumers need not measure microwave oven leakage. "I think everyone in the industry agrees that microwave ovens will have no adverse effect on health in the long or short term," he says, "but the consumer is staking his life on the probability."

In Hausner's opinion, it causes no harm to be conservative on the safety issue, especially since the effects of radiation appear after a long time. When asked if a microwave oven leaking excessively would show obvious physical damage, Hausner pointed out the subjective nature and inherent unreliability of this kind of observation. In other words, the only true way to determine leakage is to measure it.

3. Metrifast is making a special pitch for its detector to the restaurant trade. Model 749 sells for about $25.



Narda's least-expensive microwave survey instrument is the Model 8201, at about $395. Although Narda has no plans for the near-term release of a consumer-oriented detector, Hausner said he has a "hunch" that the market for these devices might be a good one. He also feels that an accurate, low-cost detector could be made.

The low-cost detector market

The market for these devices is illustrated by the experience of Metrifast, a New Hyde Park, NY, firm that sells the *Metrifast Microwave Radiaton Leak Detector* (Fig. 3). Two models of the detector, which was not included in the BRH study, are available at prices between $15 and $25.

"Many employees have read about the possible safety hazards and are concerned."

According to Herbert Arum, marketing manager, Metrifast does not manufacture the detector, but obtains it from Micro Safe Pty., Ltd., an Australian firm. (Coincidentally, two of the devices tested by the BRH, although not of the same design, were also made in Australia.) Arum said that Metrifast tested samples of the devices before marketing them.

Arum's firm has sold about 1,000 of the detectors and lists the device in several safety equipment catalogs. In addition to a direct consumer appeal, Metrifast also markets the device through wholesalers in the restaurant trade. "Many employees have read of the possible safety hazards and are concerned." Arum said. "We're telling restaurant owners that it's good management to demonstrate the safety of their ovens by using the detector."

Although *MicroWaves* attempted to reach other manufacturers and distributors of low-cost detectors, either telephone listings for these firms could not be found or spokespersons were not available for comment.••