

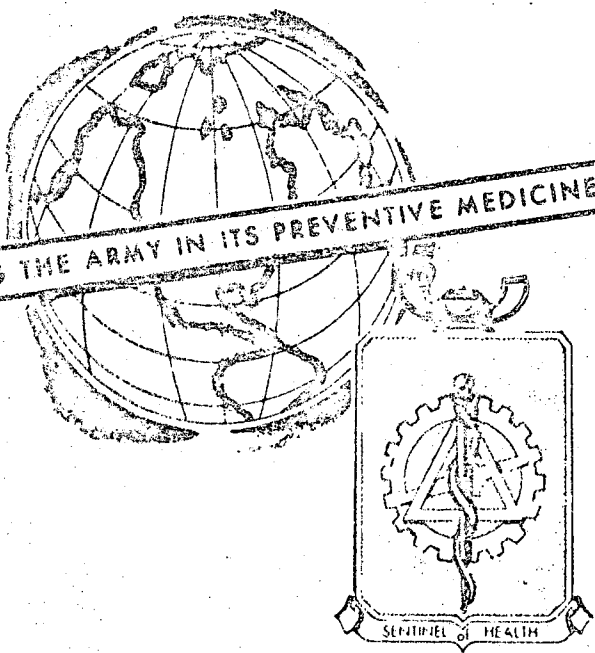
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J.R.
by Taylor

HAZARDS FROM
MICROWAVE OVENS
and
INSPECTION GUIDELINES

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SERVING THE ARMY IN ITS PREVENTIVE MEDICINE PROGRAM



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13. ABSTRACT The technical guide discusses the microwave cooking oven, the areas where leakage could exist from such devices and certain precautions to take for safe operation. Also outlined in the guide is a visual inspection check list to detect those faults that do occur which could make the oven potentially hazardous to the health of personnel and a suggested inventory list.			

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USAEHA-RL Technical Guide

August 1970

HAZARDS FROM
MICROWAVE OVENS
and
INSPECTION GUIDELINES

1. HAZARDS.

a. The cooking process in ovens of this type is accomplished with microwave energy generated by a magnetron tube. This energy is the same type as that emitted by radar units. The hazards involved are due to the leakage of microwave energy and are usually confined to the area surrounding the oven door.

b. Leakage from microwave ovens is usually caused by a worn door seal, faulty door safety interlocks, and on ovens with a viewing area by the seal around the faceplate or screen. Failure of door interlocks to shut off the oven when the door is opened could expose personnel in the vicinity of the oven to microwave radiation levels a hundred-fold above safe levels.

c. The use of metal cooking containers or aluminum-foil wrapped food in these ovens also increases leakage levels. If for any reason the oven must be operated without food, to check its operation, a small container of water should be placed in the oven as a load. This load would simulate the operating condition the oven would normally be subjected to. It is possible to operate the oven in a no-load condition, but this is inadvisable since damage to the microwave generating source could occur if operated empty over an extended period of time. When operated under such no-load conditions, the leakage would be of a higher level since none of the energy is absorbed.

d. Although ovens in good operating condition with relatively low leakage levels do not present a direct hazard to personnel, an indirect hazard could exist to individuals wearing cardiac pacemakers. At least one incident has occurred where radiation from a microwave oven has disrupted the normal rhythm of a pacemaker nearly causing death to the individual involved. Tests have shown that cardiac pacemakers may be affected by microwave levels on the order of one-one hundredth (1/100) of the normal maximum permissible exposure of 10 milliwatts per square centimeter (mW/cm^2). Individuals utilizing pacemakers should be cautioned not to enter areas where microwave ovens are in use. Hospital

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personnel utilizing microwave ovens on mobile food carts should recognize the danger involved in using these ovens in the vicinity of patients with pacemakers.

2. VISUAL INSPECTION.

a. Although it is impossible to determine the exact amount a microwave cooking oven is leaking, without suitable instrumentation, there are certain visual checks which can be made.

b. As almost all instances of leakage are around the door area, the following visual checks should be made:

- (1) Check for loose or bent door hinges, screws missing from hinges.
- (2) Sprung, warped, or misaligned doors.
- (3) Faulty interlocks; for example, oven should not be operable with door open or slightly ajar.
- (4) Worn, missing, or damaged seals around the door or viewing area.
- (5) Check for pitting and burnt spots around the periphery of the door closure area. This is usually caused by arcing as a result of grease buildup around the door. Ovens should be checked at frequent intervals to eliminate this arcing which causes an increase in leakage levels.
- (6) Check to see if personnel are using metal or aluminum foil cooking vessels, as reflections from metal objects can also increase leakage.
- (7) Check to see that ovens are not being operated empty. If for any reason the oven must be operated without food, to check its operation, such as interlocks, a small bowl or beaker of water should be used to simulate a normal load.

c. Appropriate signs indicating the potential hazard to personnel should be posted.

3. INVENTORY. A suggested oven survey sheet, which can be used for maintaining an inventory of ovens at an installation, should include the following information:

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- a. Installation
- b. Oven location, building number, and using activity.
- c. Presently in use or under procurement - if under procurement, give estimated date of installation.
- d. Oven manufacturer.
- e. Model number.
- f. Serial number, if available.
- g. Operating frequency of magnetron - this should be either 915 MHz (megahertz) or 2450 MHz (report other frequencies, if found).
- h. Number of magnetron tubes.
- i. Name of individual responsible for oven.
- j. Activity providing maintenance for oven.
- k. Name of individual completing this form.