(in **letters** to the Editor section)

Facial burns from a microwave oven?

To The Editor:

I read with interest your news article, "Microwave Oven Controversy Sizzles," MicroWaves, May, 1973 pg. 9, and I would like to take issue with your statement implying that there have been no injuries due to microwave oven use.

My wife and I received an MCA oven as a wedding gift, and she suffered corneal and facial burns from looking through the window too often. She was unable to see for several days.

I checked the oven for leakage using a microwave field intensity meter, and I also had the FDA run a check on the oven. In both cases, the leakage was below the permissible level. This would seem to substantiate CU's concern over the BRH permissible level standards.

Donald C. Burrows
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Arlington, VA 22201

Editor's note: Due to the rather unusual circumstances described, a copy of Mr. Burrow's letter was sent to Dr. James Van Allen of the Department of Physics at the University of Iowa. His reply is as follows:

To The Editor:

Mr. Burrows' allegation is totally contrary to the comprehensive study that I have made of the safety of household microwave ovens that are currently on the market.

I consider it exceedingly unlikely that the allegation is true. Nonetheless, it is of sufficiently serious nature that it deserves investigation.

I am referring your letter and that of Mr. Burrows to Mr. Richard Foerstner of the Amana Refrigeration Company. Mr. Foerstner has extensive contacts within the home appliance industry and the Bureau of Radiological Health and may well wish to initiate an appropriate investigation through either or both of these channels.

J. A. Van Allen
Department of Physics and Astronomy
The University of Iowa
Iowa City, IA 52242

CAD programs available

To The Editor:

In your article on CAD programs, August, 1973, MicroWaves, pg. 9, you failed to mention the program, "Magic" or University Computing Company, the company that markets it.

Magic is available in all major United States cities and is capable of optimizing up to 50 circuit elements. The other programs you mentioned: COMPAC and OPTINET do a maximum of 15, SPEEDY does 8, and BAMP will not optimize any. In-house versions of Magic can be leased.

Magic has a total capability for both microwave and conventional circuits. It will optimize any measurable circuit responses, do constrained optimization (with an upper and lower bound on any or all element sizes) and display any or all circuit responses either in tabular or graphical form. In addition, Magic does circuit stability analysis, sensitivity analysis, statistical (Monte Carlo) analysis and worst case analysis. Magic has an extensive capability for direct input of measured data and requires no active device modeling.

John D. Trudel
President
Scientific System Technology, Inc.
603 Business Parkway
Richardson, TX 75080.

To The Editor:

Optinet, a trademark and program of Dean Hall Associates, was mentioned without discussion in your August issue as microwave CAD programs.

Optinet provides analysis, sensivity, optimization and worst case analysis for amplifiers, switches, parametric amplifiers, mixers, filters and a wide range of other microwave networks. It handles active, passive, distributed and lumped constant circuits in any combination.

Data on HP transistors is prestored in the program and available to users and commercial data storage is available to other manufacturers. User's problems can be stored at intermediate points for later resumption. The program will also estimate the computing costs before the problem is run, thus providing cost control as well as cost reporting.

Optinet is typically used by engineers dealing with modeling, manufacturing and design problems having significant performance or cost impact on overall system effectiveness. The program is supported also by RRC International, Inc., (Dr. A. Armstrong) 1124 Peoples Avenue, Troy, NY, (518) 274-8100. Complete technical consultation and support services are available.

Robert D. Hall
President
Dean Hall Associates, Inc.
200 Third Street
Los Altos, CA 94022.

Boost switch isolation by 6 dB

To The Editor:

I would like to point out some errors in the article "Simplify Switch Design" by Charles Bosomworth, August, 1973 pp 56-59. The use of multiple shunt PIN diodes spaced a quarterwave apart provides more isolation than is indicated, i.e. multiplying the dB isolation of a single diode by the number of diodes. There is an additional isolation of approximately 6 dB per diode.

The equation relating power dissipated to power input (Eq. 14) should read

$$\frac{P_{in}}{P_{DISS}} = \frac{Z_o}{4R_F}\left(\frac{2R_F}{Z_o} + 1\right)^2$$

The following equations, (15) and (16), are correct because the term in error is small and was neglected.

Although not mentioned, it is interesting to note that series PIN diode switches can handle four times as much power as shunt switches. It is well known that double throw shunt diode switches can also handle four times as much power as single throw shunt diode switches. These relationships will be explored in an HP application note to be published.

Jack H. Lepoff
Applications Engineer
Hewlett-Packard
640 Page Mill Road
Palo Alto, CA 94304.

Author's reply:

Mr. Lepoff's observation that an additional 6 dB of isolation is available with an additional diode is correct, and I was remiss in not clearly stating it.

Equation (14) was simply a rewrite of the incident power vs. transmitted power equation. As such it is correct as printed. I have made the tacit assumption that all power incident is dissipated in the diode. Perhaps Mr. Lepoff has made different assumptions in obtaining his equation. In either case, the "working equations" (15) and (16) are a satisfactory simplification. I also noticed a minor error on the graph (p. 57). The 0.01 on the Forward Resistance Axis should read 0.1; likewise the 0.001 should read 0.01.

Charles Bosomworth
Bosomworth Associates
55 Newbury Neck Road
Newbury, MA 01950.

12(10): 86 only

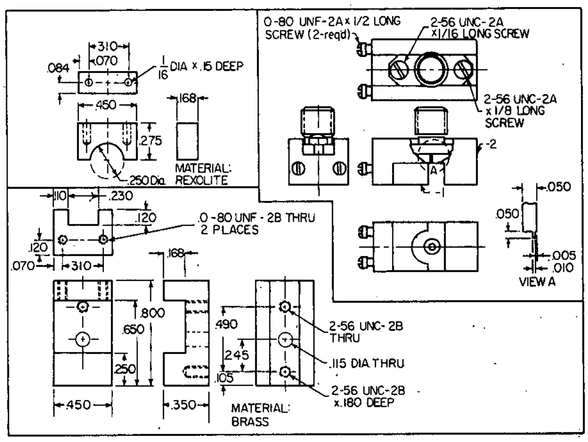
microwave notebook

If you find any of these brief design techniques clever or useful in your own work, indicate your preference by checking the reader service card at the appropriate number. Both these authors will receive a check for $25 for having their entries published. On the basis of the votes each will also be eligible at the end of the year to receive a microwave oven or an 18 inch color portable TV. Send your entries to MicroWaves, 50 Essex St., Rochelle Park, N.J. 07662.

Coax-microstrip transition fits any size circuit

Most test fixtures for microstrip circuits have fixed locations for their input and output connectors. Here is a simple coax to microstrip transition which allows one to test any microstrip circuit without resorting to custom made fixtures. With a sufficient supply of these transitions and appropriate ground planes, one can readily test circuits of any complexity with various dielectric thicknesses.

The measured VSWR of two transitions with SMA connectors between a 50 ohm microstrip line (0.025 inch thick) is less than 1.10 up to 4 GHz, less than 1.2 to 8 GHz and less than 1.3 to 12.4 GHz. This transition may be used for microstrips of any substrate material with thickness up to about .070" by simply varying the thickness of the ground plane support. This transition offers comparable performance to most coax-microstrip transition in use today, however, adaptability to circuits of any size and shape is unique. For example, most of coax-microstrip transitions are part of a fixture housing a particular circuit and cannot be used for circuits with inputs at different locations. This transition can be used on circuits with inputs and outputs at any place. **Chuck Y. Pon, Dalmo Victor Co., A Textron Division, Belmont, Ca. 94002.**



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Measure FM with high modulation index three ways

The modulation index of a high index FM signal can be accurately measured by using a spectrum analyzer. For high modulation indices the spectrum displayed has two peaks as shown. The frequency difference between these peaks ΔF_p, is related to the modulation index β by $\beta = \Delta F_p/2 + 0.9316 [\Delta F_p/2]^{0.3045}$

If a spectrum analyzer isn't available, the frequency difference between peaks can be approximated by using a transmission type cavity wavemeter. The wavemeter is simply turned until the output suddenly starts to drop. By rocking the wavemeter tuning back and forth, the peak can be located.

Alternately, the FM spectrum can be displayed on an analyzer and by using the variable frequency marker available with some spectrum analyzers the frequency difference between the peaks determined. For more accuracy, a frequency comb can be coupled into the analyzer input. It is preferable to drive the comb generator with a variable frequency. Then one comb line can be accurately positioned at the spectrum peak by noting when it just coincides with the spectrum line at the peak. This will cause that spectrum line to suddenly jump. The variable comb can be generated with a unit such as the Hewlett-Packard model 8406A or with an FM'd klystron as shown. **Emanuel Kramer, ESL Inc., Arlington, VA. 22209.**

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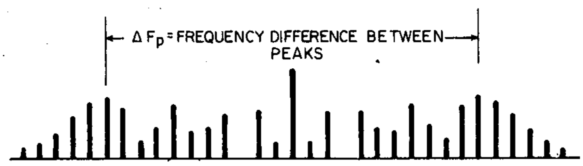
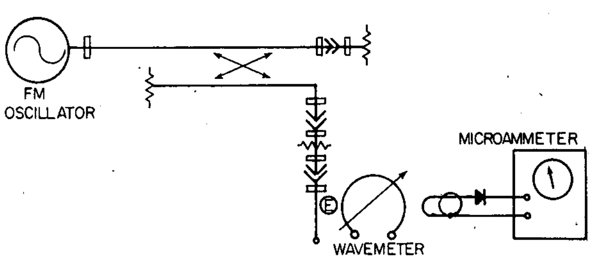
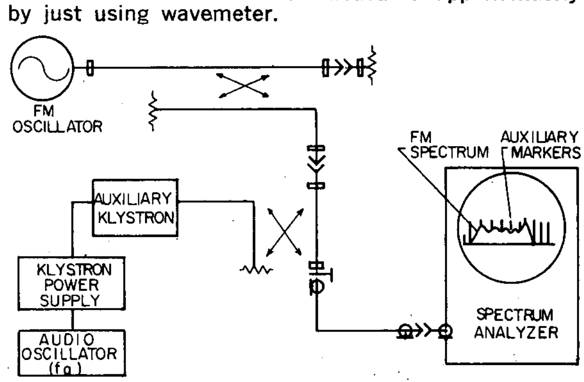


1. **FM spectrum for high mod index** can be obtained by measuring the frequency difference between peaks.



2. **Modulation index** can be measured approximately by just using wavemeter.



3. **Using a spectrum analyzer and marker comb** gives the most accurate measurement.