

President's Message—Microwaves of the 70's

J. B. HORTON

J. B. Horton, President of G-MTT, in his keynote address at the 1973 G-MTT International Microwave Symposium, outlined three directions which G-MTT and the microwave industry should take for future growth. A summary of his talk is presented below.

THE LARGE number of technical papers and panel discussions of this meeting, the 1973 G-MTT Symposium, promises to provide us with a great deal of information about the present state of the microwave art and technology. The program this year covers a wide spectrum of microwave topics and may appear similar to past programs, but it contains some new trends that we cannot ignore. Before we launch into the first sessions, we should stop for a few moments to consider where we are and where we are headed in our field of microwave theory and techniques. This is our 19th symposium, our 21st year as an IEEE Group, and the general microwave technology is about 35 years old. There have been many significant advancements over these years, and these advancements have contributed to the creation of a unique field, a unique technology, and provided the basis for the microwave industry.

In the beginning there were guided waves, then ferrites, junction diodes such as varactors and switching diodes, balanced stripline, and sophisticated components such as parametric amplifiers and masers. Next the development of planar solid-state devices and MIC techniques brought us into an era of miniaturization and new approaches to microwave design, e.g., computer-aided design. We also began to recognize the overlap of microwave technology with allied technologies, principally solid state. Recently, new solid-state devices, for example, X -band transistors, and IMPATTs for use at millimeter-wave frequencies, have strengthened this bond of microwaves and solid state.

In the meantime, the conventional microwave technology of the 50's and 60's has matured, and we find we must now look to new applications of this technology to continue to have a strong and viable base for the industry. These areas certainly include consumer and nonmilitary applications—

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The author is with the Communications Satellite Department, Radio Frequency Laboratory, TRW Systems Group, Redondo Beach, Calif.

applications in biological research, in the development of consumer products, and in communications, to list a few.

So that now, after 20 years of almost continuing change and the evolution of a mature technology, we find that we face probably the most crucial phase in the development of our technology and our industry. What are the directions available to us? 1) We can continue with our conventional technology improving this technology and finding new applications. 2) We can merge with other technologies, principally solid state, and increase our scope in the microwave solid-state area. For example, we can look to the millimeter-wave region to develop wide-band components for high data rate communications systems. 3) We can look to even higher frequencies, new transmission media, and new technologies such as electrooptics and integrated optics.

As a keynote to this 1973 G-MTT Symposium, and as a keynote to our third decade of MTT, I propose that we choose all of these and proceed as follows.

1) Emphasize new and broader based applications of conventional microwave techniques with emphasis on social-technological applications.

2) Integrate solid-state technology with microwave techniques, with emphasis on wide-band components at millimeter-wave frequencies. During the 70's we can expect continuing advances in these solid-state components. For example, one can predict that within the next five years we will have IMPATT diodes capable of generating 100 mW at 250 GHz, varactor diodes with 2000-GHz cutoff frequencies, and field-effect transistors fully operational as low noise devices and power devices at X band.

3) I propose that we begin to seriously look at submillimeter and optical frequencies to develop components for future high data rate systems. By high data rate, I mean systems that require 40–50-GHz signal bandwidth.

The Symposium program this year shows definite trends in these directions. Millimeter-wave technology is the subject of three sessions, microwaves in biological research covers three sessions, civil microwave systems is covered in one session, one session is reserved for integrated optics, and solid-state devices appear throughout the program. The 1970's, our third decade of MTT, promises to be an exciting new period for MTT and the microwave industry. The 1973 G-MTT Symposium Program, "Microwave Applications of the 70's," serves well to launch us into this period.