# Foreword

## SPECIAL ISSUE ON SOLID-STATE MICROWAVE/MILLIMETER-WAVE POWER GENERATION, AMPLIFICATION, AND CONTROL

SOLID-STATE devices have been key to the development of today's microwave systems. Radars, communications systems, and EW systems currently in use offer advantages in performance, size, reliability, and cost that would certainly not be possible without these devices. Equally certain is the fact that the future course of microwave and millimeter-wave systems will be determined by solid-state devices currently under development.

During the past several years, significant progress has been achieved in many areas of solid-state microwave device performance and application. These have included improvements in bandwidth, gain, power output, and noise, as well as increased availability, uniformity, reliability, and reduced cost. The realization of all of these devices has been due to a more thorough understanding of basic physical mechanisms, improved characterization techniques, and new device/circuit design techniques employing the computer. In addition, frequency coverage of solid-state devices is being continuously expanded into the millimeter-wave and even into the submillimeter-wave regions.

This special issue focuses on current developments in solid-state microwave device technology and its applications. We intend, in this issue, to present an overview of the current status of solid-state microwave power generation, amplification, and modulation with detailed descriptions of design, development, and application of specific devices. With this in mind, papers have been included to provide reviews of fast-moving new areas and to bench mark the state of the art. Solid-state microwave technology, of course, covers a wide frequency range and broad areas of application. Specifically included here are microwave and millimeter-wave generation utilizing field-effect and bipolar transistors, IMPATT and other junction devices, and Gunn effect devices. Control devices utilizing p-i-n/varactor/Schottky-barrier devices and novel optoelectronic techniques are also covered.

You may note that papers on FET, IMPATT, and millimeter-wave devices dominate the issue, reflecting the current balance in solid-state microwave development activities. There is no doubt that these three areas will play key roles in microwave systems technology during the next decade and beyond. However, other devices are just as important for systems development. For example, radar systems require not only power sources but also receivers, frequency converters, power and phase control devices, and modulators. Overall system performance is determined not by a single component but by a combination of many. Therefore, it is essential that all areas be explored.

We hope this special issue will serve in a small way to stimulate development of microwave technology in the 1980's. Judging from the large response we received to the "Call for Papers," we can conclude that significant effort is being devoted to the field of solid-state power generation and control. Many papers could not be included in this issue due to page budget limitations. However, we wish to thank all contributing authors for submitting their manuscripts. Special thanks go to Diana Manley, Linda Jones, and Ginger Hirose for their devoted assistance. It made an editor's task manageable.

The help of the reviewers, listed below, was vital to this issue, not only in selecting the best papers, but in improving the quality of papers. Our thanks to them.

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BERT BERSON
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*Guest Editors*

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**Bert Berson** (S'59–M'64) was born in Brooklyn, NY, on January 20, 1938. He received the B.E.E. degree from the City College of the City University of New York, New York, NY, in 1960, and the Master's degree in engineering physics from the University of Rochester, Rochester, NY, in 1963.

From 1962 to 1966 he was a Senior Physicist with the Pomona Division of the General Dynamics Corporation. From 1966 to 1973 he was employed at the RCA David Sarnoff Research Center, Princeton, NJ, in a series of technical positions culminating in his serving as Head of Microwave Materials and Device Technology in the Microwave Technology Center. He joined the Hewlett–Packard Company, Santa Fe, CA, in 1973, where he is currently Manager of Research and Development for the Microwave Semiconductor Division. In this position he is responsible for the development of silicon and gallian arsenide discrete devices, integrated circuits, and hybrid components, at frequencies from 60 Hz up into the millimeter-wave range.

Mr. Berson is a member of the American Physical Society.

**H. J. Kuno** (S'61–M'63–SM'75–F'77) received the B.S., M.S., and Ph.D. degrees in engineering from the University of California, Los Angeles, in 1961, 1963, and 1966, respectively.

From 1961 to 1966 he was with the Electronics Division of the NCR, Hawthorne, CA. His work concerned various projects, including the development of solid-state digital and analog circuits, and the development of high-speed thin magnetic film memories. From 1965 to 1966 he was a Post Graduate Research Engineer, under a NASA Research Grant, at the University of California, investigating microwave and millimeter-wave propagation in solid-state plasmas. From 1966 to 1969 he was with the RCA David Sarnoff Research Center, Princeton, NJ, as a Member of the Technical Staff where he worked on solid-state microwave devices and high-power semiconductor devices. In 1969 he joined the Hughes Aircraft Company, Torrance, CA, where he has been involved in the development of various solid-state millimeter-wave devices and circuits. He is currently Manager of the Solid-State Subsystems Department in charge of research, engineering, and manufacturing of solid-state millimeter-wave and microwave devices, circuits, components, and subsystems.

Dr. Kuno is a member of Tau Beta Pi, Sigma Xi, and the American Physical Society.