

Foreword

THIS special Bicentennial Issue of the IEEE TRANSACTIONS ON ELECTRON DEVICES: "Historical Notes on Important Tubes and Semiconductor Devices" is appearing in July 1976 to commemorate the two hundredth anniversary of the founding of the United States of America. The content of this issue is somewhat different from usual in that all of the articles highlight the history of the most important inventions in the field of tubes and semiconductors. Rather than asking historians to describe the evolution and growth of these inventions, we have asked one of the original inventors to describe the story as he saw it. We were aware that this approach might lead to a subjective view, but we believed that a high degree of professional fairness and the perspective of elapsed time would avoid any major controversies. Careful reading of the 20 articles in this issue shows that this confidence was generally well founded. Nevertheless, we emphasize that these articles are not to be considered the ultimate words on this subject.

The first editorial task in assembling this issue was to choose the most important electron devices which had been conceived and developed during the past number of years (40 years seemed to be reasonable), select the key person involved in the work, and finally convince that person that he should write such a historical article under a strict time schedule.

The selection of topics and authors was a group effort. Those involved were Guest Editor, Gerald L. Pearson, Editor, Roland H. Haitz, and the Publications Committee of the IEEE Electron Devices Society, headed by Eugene I. Gordon. The selection process was difficult because there were many more worthy topics than could be accommodated in this single Bicentennial issue of the Transactions.

In selecting topics, we limited ourselves to devices which proved to have significant economic impact. We further

limited the topics to those covered by the IEEE TRANSACTIONS ON ELECTRON DEVICES. However, we have included articles on germanium, silicon, and III-V materials since progress in devices based on these materials was so fundamentally interwoven with the state of the art in materials technology.

Most major inventions were the result of team work which complicated the choice of an author. Because of a tight time schedule, we chose single authors except in two cases where the original inventors are still publishing joint papers today. In several cases the development of a new device concept was the result of simultaneous work in several laboratories. In these instances we asked one of the participants to write not only about his own contribution but also to report on work in the other laboratories.

Undoubtedly a different committee would have come up with some alternate choices, but we believe that those finally selected are representative of the "cream of the crop." It turned out that the final task of obtaining commitments from the authors was relatively simple. Twenty-one topics were chosen and 20 of the key authors readily agreed to write historical articles.

Readers and editors alike owe a special debt of gratitude to the authors. Not only were they key figures in the invention and development of the outstanding electron devices of the last 40 years, but they also researched their memories and records to share early frustrations and successes with us.

GERALD L. PEARSON
Guest Editor
ROLAND H. HAITZ
Editor



Gerald L. Pearson (SM'63-F'64) was born in Salem, OR, on March 31, 1905. He received the A.B. degree from Willamette University, Salem, in 1926 and the M.A. degree from Stanford University, Stanford, CA, in 1929. He was awarded an honorary Sc.D. degree from Willamette University in 1956.

He joined Bell Laboratories, Murray Hill, NJ, in 1929, as a Research Physicist, and specialized in the physics of semiconducting materials and devices. He was awarded 32 US patents on semiconducting devices such as thermistors, silicon power rectifiers, solar cells, and transistors. From 1957 to 1960, he was Head of a department specializing in applied physics of solids. After 31 years of service at Bell Laboratories, he retired August 1, 1960, to become Professor of Electrical Engineering at Stanford University. He is director of the Solid-State Electronics Laboratory at Stanford University and directs graduate students in investigations on the electrical, metallurgical, and optical properties of ternary III-V compound semiconductor materials and devices. Although he became Emeritus Professor in 1970, he continues full-time teaching and research.

Dr. Pearson is a Fellow of the American Physical Society, as well as a member of the National Academy of Sciences, the National Academy of Engineering, and Sigma Xi. He is a recipient of the John Scott Award from the City of Philadelphia, the John Price Wetherill Medal from the Franklin Institute, the Gold Plate Award from the American Academy of Achievement, and the Marian Smoluchowski Medal from the Polish Physical Society.



Roland H. Haitz was born in Durmersheim, Germany, on October 6, 1935. He received the B.S. degree in physics from the Technical University Karlsruhe, Germany, in 1958, and the M.S. and Ph.D. degrees in physics from the Technical University Munich, Germany, in 1961 and 1963, respectively.

From 1961 to 1964, he was associated with the Shockley Research Laboratory, Clevite Semiconductor Division, Palo Alto, CA, where he completed his doctoral dissertation on microplasma phenomena under the direction of Dr. W. Shockley. His research at Clevite included secondary breakdown in power transistors, avalanche breakdown, radiation damage, and noise generation. From 1964 to 1969 he was a member of the Physics Research Laboratory of Texas Instruments, Dallas, TX, where he investigated a variety of problems related to device physics. His investigations included avalanche breakdown, noise, transit time oscillators, particle detectors, heat removal, thermal transients, current instabilities, and silicon diode arrays for imaging tubes. In 1969 Dr. Haitz joined the Components Division of Hewlett-Packard where he conducted research and development on a variety of microwave and optoelectronic devices. He is presently R&D Manager of the Optoelectronics Division of Hewlett-Packard.