Preface

This book is meant to serve both as a textbook and a reference book for practicing engineers. Most undergraduates studying microwave engineering hope to shortly become practicing engineers. This book is meant to stay with the student when the student becomes a practicing engineer. During the approximately 25 years I spent at the former Collins Radio Company and Rockwell International, I had the privilege of working with some great microwave engineers, who were real practitioners. Much of what I accomplished in those years can be attributed to their patience and desire to train me in good experimental techniques in the microwave laboratory. They reinforced my conviction that good microwave design is built upon good characterization. Good characterization is proven in the laboratory. Although I have written well over 25,000 lines of Fortran code for microwave circuit analysis, I still believe in proving the circuit in the laboratory. Design cycle time and costs are very important to engineers in the microwave industry. The experimentalist knows the value of computer-aided design, but also knows when the intelligence contained in the program is not sufficient to mimic and model what occurs in the laboratory. First-time design success is the goal of many engineers and is required of many managers. One purpose of this book is to help engineers reach that goal.

Much of the material contained in Chapters 1 to 3, 5, 7 to 9, and 10 has been used in a lecture in a one-semester course at Iowa State University. The material in Chapter 6 is usually learned by those students in the concurrent laboratory assignments. At Iowa State University, the microwave student designs a 1-GHz oscillator, amplifier, and filter on a printed circuit board during the first two-thirds of the semester. During the last one-third of the semester, the boards are fabricated and the student assembles, tests, and analyzes the design and compiles a report on the performance of the small power module that was designed.

The material in Chapter 4 is meant for the engineer working in the mixed-mode analog-digital MMIC area. The mixed-mode three- and four-port scattering parameter measurement and analysis technique is covered in that chapter. The undergraduate student or practicing engineer who is interested in two-port circuits only can skip that chapter.

The material is arranged in an order that enables an engineer first to gain an appreciation of component parasitics, then to learn the scattering parameter technique and subse-