

# **ELECTRONIC DESIGNERS' HANDBOOK**

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# Preface

This is a handbook for students and practicing engineers in the electronic field and is intended to provide adequate technical discussions, design data, and basic design procedures for the solution of many design problems. It has been the authors' opinion that handbooks often have limited value since the presentation is frequently so concise that the material presented has little value unless the reader has had previous experience with the subject. Consequently, an attempt has been made to overcome this limitation by making the text as lucid as possible and by including design examples which illustrate the application of the material to specific design problems.

The "Electronic Designers' Handbook" contains over 1,100 figures, 1,400 equations, and 140 examples. In many cases it is believed that significant contributions have been made in the form of new design data and/or design techniques. Also, the degree to which frequently used circuits and practices have been integrated into the material should contribute appreciably to the value of the handbook. Specific examples of material which are of special interest include fundamentals of statistical and probability theory (Sec. 23), graphical methods as an aid in the determination of inverse Laplace transforms (Sec. 23), a comparatively complete treatment of the design of low-power iron-core transformers and chokes (Sec. 14), design data for the optimum number of  $RC$  and  $LC$  ladder types of filter sections (Sec. 15), graphical presentation of the amplitude and phase characteristics of  $RC$  parallel-T and  $RC$  bridged-T circuits (Sec. 16), graphical performance data for constant- $k$  and  $m$ -derived filter sections having dissipation (Sec. 16), extensive coverage and analysis of both voltage and power amplifier fundamentals (Secs. 3 and 4), a detailed discussion of receivers and associated subjects such as noise figure and characteristics of different mixer types (Sec. 7), an extensive presentation of feedback fundamentals and the principal methods of stability analysis (Secs. 18 and 19), the analysis of complex waveforms (Sec. 22), etc.

As is the case with all handbooks of this type, it has been necessary to omit a large amount of valuable design material. The electronic field

has become so vast and is growing at such a rate that the authors of such publications can only include the material which they believe has the broadest application and then, with the publisher, attempt to attain a publication date before the material becomes either obsolescent or seriously limited in scope. For example, in the case of the "Electronic Designers' Handbook," we regret that we did not have sufficient time to include certain digital computer techniques, magnetic memory circuits, and a much broader treatment of transistor applications.

It is believed that the "Electronic Designers' Handbook" should find extensive use as a text even though the equation derivations are not always given. Before publication, this material was used as a text for undergraduate students, graduate students, and practicing engineers with very gratifying results. With reference to these classes, the assignments which included the derivation of equations often proved to be especially educational. In general, the material is intended to be self-explanatory and, considering the practical design examples, should be of value in teaching the student to take a practical approach to design problems.

To those who have contributed in the preparation of this handbook we are especially grateful. Specifically, we wish to single out the names of Messrs. Nathan Patrusky, Ray W. Sanders, Robert T. Johnson, Robert E. Hull, and Warren E. Wilke who enthusiastically participated in all aspects of this effort and who generously donated much of their time and made many significant contributions, suggestions, and constructive criticisms. We are equally appreciative of the many valuable suggestions and criticisms made by D. C. Arnold, S. Benson, Miss G. R. Brown, P. M. Brown, C. W. Chandler, D. J. Green, M. L. Ingalsbe, T. J. Johnson, E. S. Klotz, J. J. Nesler, G. M. Salamonovich, and A. G. Woolfries.

We also wish to express thanks to Mrs. Lois Van Allen, Miss Liana Pucelli, and Miss Barbara McArdell for their aid in typing and preparing many of the original figures. In addition, we shall be forever grateful for the indirect but real contribution made by our families and friends who patiently awaited the completion of this handbook.

It is our sincere hope that we have successfully prepared a combination handbook and text which will be of value to our fellow engineers.

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