

# ENGINEERING ELECTRONICS

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## PREFACE

The authors present herewith a textbook for use in a beginning course in electronics for electrical-engineering students. Most of the material used was first published in planograph form and has been used as a text at Purdue University for the past two years. It has been revised and brought up to date as use in the classroom and the advice of critics have indicated that improvements could be made.

The usual course in technical schools consists of two or three class periods and one laboratory period each week throughout the school year. Sufficient material is included for such a program. It has been the authors' experience that the average student enrolling in such a course has the following status: He is a junior and has already had courses in general physics, mathematics through calculus, and direct-current circuits. He is starting courses in alternating-current circuits, electrical measurements, and possibly differential equations, as well as electronics. The student plans to enter one of various fields—communications, electronic control, servomechanisms, power machinery, power transmission, business, graduate study. What he will actually do after graduation is often something else. In any event electronics will be useful knowledge for one engaged in nearly any branch of electrical engineering and in many allied fields. The material in this book presents the fundamental ideas of electronics in both a theoretical and a practical fashion to provide a good foundation for further study, as well as useful knowledge for a terminal course.

The first four chapters provide material for a brief study of the physics of vacuum tubes, not covered in the usual previous physics courses. They also serve to delay the study of circuits until the student has gained some knowledge of a-c circuits elsewhere. Chapter 5 presents a very elementary description of the circuits and actions of certain very common electronic devices. It also acquaints the student with some common electronic nomenclature. The authors have found it fills a very real need—to provide a background for those students who have not picked it up in their experience. Even with very rapid coverage it should be valuable.

Chapter 6 presents the usual methods employed in electronic-circuit analyses, analytic and graphical. Great stress is laid on the use of the linear-equivalent-circuit theorem. Also considerable attention is paid to graphical methods with nonlinear circuits. Only elementary aspects of

this fascinating subject are presented because of the limitations of time and space.

Although in theory a student should have well in hand all the tools he has studied, as a practical matter the authors feel that a brief restatement or treatment of certain ideas often helps enough to pay for its inclusion in a volume designed principally as a textbook. Hence the short treatments of such subjects as network theorems and Fourier analysis are included. The practical use of this material begins at once in the following chapter, although for some of it the delay is great enough, as in the case of power-series expansion of plate current, so that the student will wish to refer back to the discussion again. At any rate he knows where to find the material.

The chapters following the sixth present a selection of the various aspects of electronics which can reasonably be included in a beginning course. No claim is made that all the interesting and useful developments in the field are discussed or even mentioned.

In the numerous cases in which a mathematical development is attempted, the authors have endeavored to provide, first, a facile word explanation for the behavior. Then follows the sensing of current and voltage symbols, the writing of circuit equations, the solution of these, the simplifying assumptions and rearrangement needed to place the solution in a usable form (which often involves the drawing of a simplified equivalent circuit), and the final interpretation of the results. Numerous worked-out examples are provided to help in understanding. The authors feel that much practice is needed in these matters for students who plan to continue in fields allied to electronics.

The authors have freely consulted periodicals and engineering texts by many writers. They wish to acknowledge the valuable criticism and encouragement given by their colleagues. Especially do they appreciate the assistance of their former colleague, Dr. K. J. Hammerle. In addition, thanks are due the unknown critics engaged by the publisher. They have made many valuable suggestions.

George E. Happell  
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## CONTENTS

Preface . . . . .	v
1. ELECTRON BALLISTICS . . . . .	1
The electron. Other charged particles. Properties of charged bodies. The electric field. Potential. Potential gradient. The behavior of an electron in an electric field. Moving electrons in a magnetic field. Magnetic focusing of an electron beam. The cathode-ray tube—electrostatic focusing. The deflection of the electron beam in a cathode-ray tube.	
2. EMISSION . . . . .	30
Structure of the atom. Free electrons in a metal. Electron escape from a metal. The work function. The electron-volt. Contact difference in potential. Thermionic emission. Thermionic emission from tungsten. Thoriated-tungsten filaments. Oxide-coated emitters. Schottky effect. High-field emission. Secondary emission. Photoelectric emission.	
3. THE HIGH-VACUUM DIODE. . . . .	49
Space charge. The diode. Experimental determination of the current in a diode. Potential distribution in a diode with parallel plane electrodes. Gauss' theorem. The space-charge equation. Experimental proof of the Child-Langmuir equation. Power loss in the diode. Diode ratings. Characteristic curves for a diode.	
4. THE VACUUM TRIODE AND OTHER MULTIELEMENT TUBES . . . . .	69
De Forest's triode. Triode construction. The function of the grid. Triode characteristics. Triode coefficients. Calculation of tube coefficients. Dynamic transfer characteristics. Shortcomings of the triode. The tetrode. Tetrode characteristics. Tube coefficients for the tetrode. Shortcomings of the tetrode. The pentode. The static characteristics of a pentode. Dynamic transfer characteristics for a pentode. Tube coefficients for a pentode. Remote-cutoff tubes. Tube classification by use. Beam power tubes. Miscellaneous types of high-vacuum tubes.	
5. SOME APPLICATIONS OF VACUUM TUBES . . . . .	101
Radio communication. A-m transmitter system. An a-m receiver system. The diode rectifier. The diode detector. The triode current amplifier. The triode voltage amplifier. Two-stage voltage amplifier with resistance-capacitance coupling between stages. Two-stage a-f voltage amplifier with transformer coupling and cathode bias. The pentode voltage amplifier with resistance load. The pentode voltage amplifier with tuned load. The	

- power amplifier. Classes of vacuum-tube amplifier operation. A phase inverter. A push-pull power amplifier. An amplifier with a cathode load. A feedback oscillator. A class C amplifier.
6. CONCEPTS USEFUL IN VACUUM-TUBE-CIRCUIT ANALYSIS . . . 120
- The triode with a plate load. Quiescent operation of the triode circuit. Signal voltages. The grid-bias line and the dynamic-load line for resistive loads. The case of a reactive load. Variations of plate current and plate voltage resulting from a grid signal. The dynamic characteristic. Circuit theorems. Ohm's law. Thevenin's theorem and Norton's theorem. The equivalent-plate-circuit theorem. An example of the construction of an equivalent plate circuit. Limitations on the linear-equivalent-circuit method of analysis. Fourier analysis of a periodic function. Graphical harmonic analysis of plate current. Determination of the  $T$  point. Series expansion of plate current. Distortion in vacuum-tube circuits.
7. VOLTAGE AMPLIFIERS . . . . . 155
- Classification of voltage amplifiers. A simple single-stage amplifier with a plate load. The single-stage amplifier at higher frequencies. The output impedance of a simple amplifier. The input impedance to a simple amplifier. Amplification, decibels, gain. Methods of coupling multi-stage amplifiers. Direct-coupled amplifiers. Resistance-capacitance-coupled amplifiers. The linear equivalent for the  $R$ - $C$ -coupled amplifier. Behavior of the amplifier in the mid-frequency range. Performance of an  $R$ - $C$ -coupled amplifier in the l-f range. H-f performance. The analysis of an  $R$ - $C$ -coupled amplifier circuit. Design considerations for an  $R$ - $C$ -coupled amplifier. Video-frequency amplifiers. H-f compensation. L-f compensation. Balanced voltage amplifiers. Phase inverters. Current amplifiers. The cathode follower. Graphical treatment of cathode followers. The grounded-grid amplifier. Transformers with iron cores. The transformer with load. The transformer-coupled amplifier. Parameters in interstage-transformer design. The single-tuned-circuit r-f amplifier. The tuned-secondary type of r-f amplifier. Double-tuned transformer-coupled r-f amplifiers.
8. AUDIO-FREQUENCY POWER AMPLIFIERS . . . . . 244
- Circuit type and efficiency using class A operation. Efficiency with other classes of operation. Optimum load and bias for a class  $A_1$  amplifier. Graphical determination of the best operation for a class  $A_1$  triode amplifier. Designing a class  $A_1$  triode power amplifier using a tube manual. Class  $A_1$  amplifiers using pentode and beam power tubes. Parallel operation of tubes. Push-pull operation. Bias values and loads for push-pull operation. Class B amplifiers.
9. POWER AMPLIFIERS USING TUNED LOADS . . . . . 280
- Operation for high efficiency. The plate-load circuit. An algebraic analysis of class B amplifier operation. Graphical analysis of class B and class C amplifiers. The operation and adjustment of a tuned power amplifier.

10. FEEDBACK AMPLIFIERS. . . . .	299
Distortion and stability. Interference. How negative feedback helps. Feedback and its effect on amplification. Effect on distortion and noise. Feedback in amplifiers with low-level input. Voltage and current feedback. Multistage feedback circuits. The effect of feedback on output impedance; equivalent circuits. Some practical feedback amplifiers. Oscillation in feedback amplifiers.	
11. OSCILLATORS . . . . .	323
Types of oscillators. The parallel $L$ - $C$ circuit as a generator of oscillations. Regenerative feedback oscillators. Practical feedback oscillators. The analysis of a tuned-plate oscillator. Power oscillators and voltage oscillators. Negative-resistance oscillators. L-f oscillators. Phase-shift oscillators. Wien-bridge oscillators. The multivibrator.	
12. MODULATION AND DETECTION . . . . .	344
The meaning of modulation. Types of modulation. Amplitude modulation. Methods of amplitude modulation. Plate modulation of a class C amplifier. Grid-bias modulation of a class C amplifier. Modulation of a class A amplifier. The balanced modulated amplifier. Heterodyne frequency conversion. Square-law demodulation. Linear diode detection. Interference in radio reception. The frequency spectrum of an angle-modulated wave. Preemphasis. Frequency modulation using a reactance tube. Frequency modulation by means of phase modulation. F-m receivers. Limiters. Discriminators.	
13. CONDUCTION THROUGH GASES . . . . .	385
Types of gaseous discharges. Physical properties of the atom. The excited atom. Ionization. Collision processes in gases. Neutralization of negative space charge by positive ions. Gaseous discharges. The Townsend discharge. Breakdown. The normal glow. The abnormal glow. The arc discharge. Gaseous diodes with cold cathodes. Gas diodes with thermionic cathodes. Thermionic cathodes used in gas tubes. Gas- and vapor-filled tubes. Effects of pressure on operating characteristics. Mercury-pool rectifiers. Ignitrons. Action of the grid in a hot-cathode gas triode. Thyratrons. Shield-grid thyratrons. Ionization and deionization times.	
14. RECTIFIERS . . . . .	408
The ideal rectifier. The high-vacuum diode as a rectifier. The half-wave high-vacuum rectifier with a resistance load. Full-wave high-vacuum rectifier with a resistance load. Half-wave gas-diode rectifier with a resistance load. Half-wave rectifier with a capacitor filter. Half-wave rectifier using a series-inductor filter. Full-wave rectifier with an L-section filter. Rectifiers with a $\pi$ -section filter. Applications of diode rectifiers. Grid-controlled rectifiers. D-c control of thyratrons. On-off control. Phase-shift control. Bias phase control. The ignitron as a controlled rectifier.	

15. PHOTOELECTRIC CELLS . . . . .	448
Classification of photoelectric cells. Fundamental theory of photoemission. The vacuum photoemissive cell. The gas-filled photoemissive cell. Sensitivity of photoemissive cells. Calculation of the output of photocells. Spectral response of commercial photoemissive surfaces. Applications of phototubes. Photomultiplier tubes.	
16. SOLID-STATE ELECTRONICS AND REACTANCE AMPLIFIERS . . . . .	461
Energy states in solid matter. <i>n</i> -type and <i>p</i> -type semiconductors. Thermistors. Point-contact rectifiers. Large-area rectifiers. Varistors. Transistors. Photovoltaic cells. Magnetic amplifiers. Dielectric amplifiers.	
APPENDIX A. CHARACTERISTIC CURVES FOR SEVERAL TUBES . . . . .	487
APPENDIX B. <i>R-C</i> -COUPLED AMPLIFIER DESIGN CHARTS . . . . .	494
APPENDIX C. A TABLE OF SYMBOLS . . . . .	497
INDEX . . . . .	499



Electronic engineering (also called electronics and communications engineering) is an electrical engineering discipline which utilizes nonlinear and active electrical components (such as semiconductor devices, especially transistors, diodes and integrated circuits) to design electronic circuits, devices, VLSI devices and their systems.Â  âœ“ What is Electronic and Electrical Engineering? âœ“ Electrical vs Electronics - Difference Between Electrical and Electronics. âœ“ Electrical Vs Electronics. âœ“ Day in the Life of an EEVblog #7 - Electronics Engineering Job Interview tips galore. EEVblog. EEVblog.Â  Electronics Tutorial 2 - Voltage, Current & Resistance. 00retrobrad00. 00retrobrad00. Electrical engineering is an engineering discipline concerned with the study, design and application of equipment, devices and systems which use electricity, electronics, and electromagnetism. It emerged as an identifiable occupation in the latter half of the 19th century after commercialization of the electric telegraph, the telephone, and electrical power generation, distribution and use. Previous (Electronic commerce). Next (Electronic music). Electronic engineering is a discipline that utilizes the behavior and effects of electrons for the production of electronic devices (such as electron tubes and transistors), systems, or equipment. In many parts of the world, electronic engineering is considered at the same level as electrical engineering, so that general programs are called electrical and electronic engineering. (Many UK and Turkish universities have departments of Electronic