

CONTENTS

PREFACE	vii
-------------------	-----

PART I. GENERAL THEORY

INTRODUCTION	1
1. FUNDAMENTAL COLLISION PROCESSES	3
<i>Collision Cross-sections — Elastic Collisions — Electron-Atom Elastic Collisions — Positive Ion-Atom Elastic Collisions — Inelastic Collisions between Electrons and Gas Atoms</i>	
2. MOTION OF SLOW ELECTRONS IN GASES	10
<i>Calculation of Electron Energy Distribution Function — Diffusion of Electrons in Electric Fields — Data Obtained from Observations on Diffusing Electron Swarms — Microwave Studies of Slow Electrons</i>	
3. MOBILITY AND DIFFUSION OF POSITIVE IONS IN GASES	38
<i>Mobility of Ions in Gases of Higher Ionization Potential — Diffusion of Positive Ions in Gases — Measurement of Ionic Mobility — Mobilities of Ions Moving in Their Own Gas — Mobilities of Ions in Gaseous Mixtures</i>	
4. ELECTRON-ION RECOMBINATION AND AFTERGLOW STUDIES	64
<i>Definition of Recombination Coefficient — Possible Recombination Processes — Experimental Investigation of Electron-Ion Recombination</i>	
5. IONIZATION BY ELECTRON COLLISION IN A GAS	78
<i>Electron Multiplication in Uniform Fields — Back Diffusion of Liberated Electrons — Calculation and Measurement of the Electron Ionization Coefficient η_1 — η_1 in Gas Mixtures — Importance of Gas Purity in Measurement of η_1</i>	
6. NEGATIVE ION FORMATION	93
<i>Attachment Mechanisms — Attachment Probability and Attachment Cross-section — Simultaneous Measurement of Ionization and Attachment Coefficients</i>	
7. SECONDARY IONIZATION PROCESSES	100
<i>Steady Field Measurements — Analysis of Cathode Dependent Secondary Mechanisms by Time Lag Studies</i>	
8. SPARK BREAKDOWN	122
<i>Breakdown Potential in Uniform Fields — Time Lags in the Development of Spark Breakdown — Breakdown in Non-uniform Fields</i>	
9. LOW CURRENT SELF-MAINTAINED DISCHARGES	152
<i>Large Plane Parallel Electrode Systems — Coaxial Cylinder Systems</i>	

COLD CATHODE DISCHARGE TUBES

10. GLOW DISCHARGES	164
<i>General Discussion of Glow Discharges — Cathode Region of the Glow Discharge — Positive Column and Anode Region of the Glow Discharge — Investigation of the Plasma Regions of the Glow Discharge by Means of Probe Studies</i>	
PART II. PRACTICE AND DESIGN	
11. THE AIMS AND LAYOUT OF PART II	197
<i>The Aims — Scope and Limitations — Arrangement of Part II — Origins and Acknowledgement — Units</i>	
12. GLOW DISCHARGE	200
<i>Collisions Between Electrons and Gas Molecules — The Maintenance Condition — Striking — The Onset of Space Charge — Current Density in the Glow Discharge — The V vs i Characteristic of the Glow Discharge — Metastable Atoms and the η Coefficients — The Glow Discharge in Pure Inert Gases — The Interaction Principle — Some Examples of the Interaction Principle — Penning Mixtures — Quenched Inert Gas Mixtures — Hydrogen as a Trace Gas</i>	
13. NUMERICAL DATA	228
<i>The Initial Energy Correction — The Computation of η_m and η_g for the Pure Gases — Computation of $\gamma - \eta_m$ and η_g for Gas Mixtures — Collected Tables of η_m, η_g, V_i, V_*, V_g, and γ — Values of J, Z_g, and Z_m — The Variation of V_s with px_a — Engineering Formulae</i>	
14. GLOW DISCHARGE STABILIZERS	242
<i>The Static Characteristic — Parallel Voltage Stabilization — Primed Stabilizers — Reference Tubes — Comparison of Stabilizing Systems — Miscellaneous Remarks</i>	
15. STABILIZER DESIGN	254
<i>Relative Striking Voltage — Regulation — The Maximum Current — The a.c. Impedance — Noise — Running Voltage: The Choice of Gas and Cathode Surface — Cathode Surfaces — Examples of Actual Designs</i>	
16. TRIGGER TUBES	274
<i>Definitions — The Basic Circuit — Input Circuits and Takeover Current — Input Circuits and Time Lags — Extinction of the Discharge — Circuit Analysis by Phase Trajectories — The Self-quenching Circuit — Classification of Trigger Tubes</i>	
17. TRIGGER TUBE DESIGN	294
<i>Striking Voltage — Running Voltage and Current Ratings — Ionization in the Presence of 'Slight' Space Charge — Takeover — Formative Lag — Statistical Lag and Ambient Light — Deionization — Practical Examples of Trigger Tubes</i>	
18. DEKATRONS	309
<i>The Double Pulse Dekatron — Static Characteristics — Back Transfer Failures — Discrimination Failures — The Sufficiency Rules — Imperfections — Dekatron Circuits — Dekatron Design — Single Pulse Dekatrons — Other Types of Dekatron</i>	
19. PARTICLE COUNTERS	335
<i>Pre-Townsend and Townsend Discharges — Basic Processes in Geiger Counters — Geiger Counters</i>	
INDEX	347

