

Contents

LIST OF CONTRIBUTORS	ix
PREFACE	xi
Chapter 1 A Short History of Gaseous Electronics	1
<i>Sanborn C. Brown</i>	
References	18
Chapter 2 Glow Discharges at DC and Low Frequencies	
Part 2.1 Anatomy of the Discharge	
<i>John H. Ingold</i>	
I. General Remarks	19
II. Cathode Region	24
III. Positive Column	40
IV. Anode Region	59
References	63
Part 2.2 Ionization Waves in Glow Discharges	
<i>Alan Garscadden</i>	
I. Introduction	65
II. Ranges of Occurrence	68
III. Methods of Observation and Measurements	75
IV. Analyses	84
V. Summary and Conclusions	104
References	105
Part 2.3 Nonuniformities in Glow Discharges: Electrophoresis	
<i>L. M. Chanin</i>	
I. Terminology	109
II. Theory	111

III. Recent Results	115
IV. Electrophoretic Effects	125
References	131

Part 2.4 Nonuniformities in Glow Discharges: Cataphoresis

L. M. Chanin

I. Introduction	133
II. Theory	134
III. Experimental Techniques	141
IV. Recent Results	145
V. Retrograde Cataphoresis	160
VI. Applications	163
References	170

Chapter 3 High Frequency and Microwave Discharges

A. D. MacDonald and S. J. Tetenbaum

I. Introduction	173
II. Breakdown	176
III. Maintaining and Steady State Discharges	201
IV. Microwave Gas-Discharge Applications	203
References	215

Chapter 4 Corona Discharges

M. Goldman and A. Goldman

I. Introduction	219
II. Onset of the Corona Discharge	221
III. Continuous Glow Discharge	229
IV. Transient Corona	236
V. Alternating Voltage Corona Discharge	275
VI. Corona Discharges in Long Air Gaps	276
References	285

Chapter 5 Electric Arcs and Arc Gas Heaters

E. Pfender

I. Introduction	291
II. Physics of Electric Arcs	293
III. Arc Gas Heaters and Plasma Torches	364
References	390

Chapter 6 Relativistic Electron Beam Produced Plasmas*Gerold Yonas and Alan J. Toepfer*

I. Introduction	399
II. Pulsed Power Technology as Applied to REB Accelerators	401
III. Diode Phenomenology	408
IV. Intense Beam Injection into Neutral Gases	414
V. Beam Interaction with Plasma	424
VI. Beam Interaction with Solid Targets	432
VII. Other Applications of Intense Pulsed REBs	437
VIII. Conclusion	447
References	448

Chapter 7 Shock Induced Plasmas*P. Bogen and E. Hintz*

I. Introduction	453
II. Some Characteristic Properties of Shock Waves	455
III. Experimental Methods	462
IV. Plasma Heating and Plasma Behavior in Theta Pinches	470
V. Plasma Behavior in the Front of Shock Waves	481
VI. Miscellaneous Topics	494
References	498