

CONTENTS

	<u>Page</u>
PREFACE	V
CHAPTER 1	
Resistivity and Conductivity.	1
1.0 Introduction	1
1.1 Two-probe resistivity measurements	2
1.2 Collinear four-probe resistivity measurements.	6
1.3 Square four-probe resistivity measurements	11
1.4 Probes and instruments	16
1.5 Resistivity of lamellae of arbitrary shape	21
1.6 Error introduced by contact size, position and geometry	26
1.7 Electrodeless measurement of resistivity	32
References	37
CHAPTER 2	
The Hall Effect	39
2.0 Introduction	39
2.1 Measurement procedures	44
2.2 Systematic errors.	50
2.3 Hall effect of arbitrary contour specimens	53
2.4 Apparatus and techniques	59
2.5 Microwave Hall effect.	65
2.6 Helicon waves.	68
References	70
CHAPTER 3	
Magnetoresistance	72
3.0 Introduction	72
3.1 Geometrical magnetoresistance.	74
3.2 Perturbations and inhomogeneities.	78
3.3 Physical magnetoresistance	83
3.4 Microwave magnetoresistance.	86
References	93
CHAPTER 4	
Charge Carrier Transport Parameters	95
4.0 Introduction	95
4.1 Intrinsic and near-intrinsic conduction.	97
4.2 Extrinsic and compensated materials.	103
4.3 Degeneracy	107
4.4 Interconduction and intervalence band transfer of charge carriers.	108
4.5 Mobility of charge carriers.	113
References	119

	<u>Page</u>
CHAPTER 5	
Inhomogeneous and Anisotropic Materials	121
5.0 Introduction	121
5.1 Diffusion and ion implantation	122
5.2 Ordered inclusions and conductivity striations	130
5.3 Polycrystalline and polyphase materials.	136
5.4 Anisotropic materials.	139
References	142
CHAPTER 6	
Surface Space Charge-Controlled Measurements.	144
6.0 Introduction	144
6.1 Equilibrium and quasi-static properties.	149
6.2 High frequency and non-equilibrium C-V measurements.	155
6.3 Complex admittance measurements.	157
6.4 Free carrier concentration profiles.	162
6.5 Gate-controlled conductivity and Hall measurements	166
References	174
CHAPTER 7	
Spatial Distribution of Electrical Properties	176
7.0 Introduction	176
7.1 Optical and photovoltaic scanning methods.	176
7.2 Electron beam mapping of conductivity gradients.	186
7.3 Probe mapping and isoresistivity maps.	192
7.4 Conformal representation and method of finite differences. . .	197
7.5 Spreading resistance techniques.	203
References	205
CHAPTER 8	
Electrical Measurements on High Resistivity Materials	207
8.0 Introduction	207
8.1 DC methods of measurement.	207
8.2 AC measurement techniques.	216
8.3 Electrical measurements on insulators.	220
References	227
CHAPTER 9	
Thermoelectric and Thermomagnetic Measurements.	229
9.0 Introduction	229
9.1 Seebeck measurements	233
9.2 Thermomagnetic measurements.	242
9.3 Heat transport parameters.	245
9.4 Thermogalvanomagnetic properties of inhomogeneous materials. .	248
References	250

	<u>Page</u>
CHAPTER 10	
Automatic and Computer-Aided Measurements	252
10.0 Introduction.	252
10.1 Automatic resistivity and Hall measurements	257
10.2 Time-sharing computer-controlled measurements	266
10.3 Ovens, cryostats and temperature controllers.	272
10.4 Digitally-programmable components	274
References.	276