

Contents

Acknowledgment	vii
Preface	ix
Chapter 1: Cardiac Electrophysiology (Cardiac Anatomy, Conduction System, Activation of the Ventricles)	1
<i>Reprint 1</i> Total Excitation of the Isolated Human Heart, <i>D. Durrer, R. Th. Van Dam, G. E. Freud, M. J. Janse, F. L. Meijler, and R. C. Arzbaeher (Circulation, June 1970)</i>	5
Chapter 2: The Single Cardiac Cell (Membrane Properties of Excitable Tissue, Elementary Physical Sources, Field of Active Cell)	19
<i>Reprint 2</i> The Formulation of Bioelectric Source-field Relationships in Terms of Surface Discontinuities, <i>R. Plonsey (Journal of the Franklin Institute, May 1974)</i>	24
Chapter 3: Macroscopic Cardiac Sources (Uniform Fiber, Plane Activation Wave in A Syncytium, Cardiac Muscle Histology, Bi-Domain Model)	33
<i>Reprint 3</i> Electrical Properties of Anisotropic Nerve-Muscle Syncytia II. Spread of Flat Front of Excitation, <i>A. L. Muler and V. S. Markin (Biophysics, 1978)</i>	40
<i>Reprint 4</i> Extracellular Potentials Related to Intracellular Action Potentials during Impulse Conduction in Anisotropic Canine Cardiac Muscle, <i>M. S. Spach, W. T. Miller, III, E. Miller-Jones, R. B. Warren, and R. C. Barr (Circulation Research, August 1979)</i>	46
Chapter 4: The Volume Conductor (Fundamental Theory, Equivalent Sources, Inhomogenieties—Secondary Sources)	63
Chapter 5: Electrocardiographic Leads (Lead Vector, Reciprocity Applied to Electrocardiography, Lead Vector Field, Limited Leads)	69
<i>Reprint 5</i> Selection of the Number and Positions of Measuring Locations for Electrocardiography, <i>R. C. Barr, M. S. Spach, and G. S. Herman-Giddens (IEEE Transactions on Bio-Medical Engineering, March 1971)</i>	74
Chapter 6: The Electrocardiogram (Limb Leads, Precordial Leads, Vectorcardiography)	89
Chapter 7: Heart Source Models (Single Dipole, Single Moving Dipole, Multiple Dipoles and Dipole Layers, Multipoles, Effects of Capping, Accuracy of Minimum Residual Estimators, Epicardial Potentials) ..	93
<i>Reprint 6</i> Representation of Cardiac Electrical Activity by a Moving Dipole for Normal and Ectopic Beats in the Intact Dog, <i>P. Savard, F. A. Roberge, J-B Perry, and R. A. Nadeau (Circulation Research, March 1980)</i>	100
<i>Reprint 7</i> Simulation Studies of the Electrocardiogram I. The Normal Heart, <i>W. T. Miller, III and D. B. Geselowitz (Circulation Research, August 1978)</i>	111
<i>Reprint 8</i> Determination of Multipole Components, <i>D. B. Geselowitz (The Theoretical Basis of Electrocardiography, 1976)</i>	126
<i>Reprint 9</i> Inverse Solutions Directly in Terms of Potentials, <i>R. C. Barr and M. S. Spach (The Theoretical Basis of Electrocardiography, 1976)</i>	130
Chapter 8: Forward Problems (Exact Solutions to Forward Problems, Numerical Techniques for Forward Problems, Error Analysis of the Computation of Torso Potentials from Epicardial Potentials)	133
<i>Reprint 10</i> A Comparison of Volume Conductor and Source Geometry Effects on Body Surface and Epicardial Potentials, <i>Y. Rudy and R. Plonsey (Circulation Research, February 1980)</i>	137
<i>Reprint 11</i> A Mathematical-Physical Model of the Genesis of the Electrocardiogram, <i>H. L. Gelernter and J. C. Swihart (Biophysical Journal, 1964)</i>	146
<i>Reprint 12</i> Determining Surface Potentials from Current Dipoles, with Application to Electrocardiography, <i>R. C. Barr, T. C. Pilkington, J. P. Boineau, and M. S. Spach (IEEE Transactions on Bio-Medical Engineering, April 1966)</i>	151
<i>Reprint 13</i> Relating Epicardial to Body Surface Potential Distributions by Means of Transfer Coefficients Based on Geometry Measurements, <i>R. C. Barr, M. Ramsey, III, and M. S. Spach (IEEE Transactions on Bio-Medical Engineering, January 1977)</i>	156
<i>Reprint 14</i> Quantitative Comparison of Pre-Mortem ECG's with Those Reconstructed From Activation Data of a Revived Heart, <i>S. Rush, R. Lux, A. Baldwin, and E. Lepeschkin (Journal of Electrocardiology, 1980)</i>	167
<i>Reprint 15</i> Comparison of Measured Torso Potentials with Those Simulated from Epicardial Potentials for Ventricular Depolarization and Repolarization in the Intact Dog, <i>M. Ramsey, III, R. C. Barr, and M. S. Spach (Circulation Research, November 1977)</i>	175

Chapter 9: Inverse Problems (Constrained Multiple Dipole Estimates, Critical Analyses of Inverse Estimates), . . .	189
<i>Reprint 16</i> A Proposed Method for the Inverse Problem in Electrocardiology, <i>M. S. Lynn, A. C. L. Barnard, J. H. Holt, and L. T. Sheffield (Biophysical Journal, 1967)</i>	194
<i>Reprint 17</i> Test of the Multiple Dipole Array as an Inverse Generator, Based on Data from Isolated Rabbit Hearts, <i>R. E. Ideker, F. W. Keller, J. W. Cox, Jr., H. A. Phillips, and D. A. Brody (Advances in Cardiology, 1974)</i>	200
<i>Reprint 18</i> An Inverse Electrocardiographic Solution with an ON-OFF Model, <i>R. C. Barr, T. C. Pilkington, J. P. Boineau, and C. L. Rogers (IEEE Transactions on Bio-Medical Engineering, January 1970)</i>	202
<i>Reprint 19</i> The Use of Time Dependent Models in Inverse Electrocardiography, <i>C. M. Baker and T. C. Pilkington (IEEE Transactions on Bio-Medical Engineering, November 1974)</i>	210
<i>Reprint 20</i> An Equivalent Cardiac Generator which Preserves Topography, <i>L. Zablow (Biophysical Journal, 1966)</i>	219
<i>Reprint 21</i> An Approach to Inverse Calculation of Epicardial Potentials from Body Surface Maps, <i>P. Colli Franzone, B. Taccardi, and C. Viganotti (Advances in Cardiology, 1976)</i>	220
<i>Reprint 22</i> Statistically Constrained Inverse Electrocardiography, <i>R. O. Martin, T. C. Pilkington, and M. N. Morrow (IEEE Transactions on Bio-Medical Engineering, November 1975)</i>	222
<i>Reprint 23</i> Inverse Calculation of QRS-T Epicardial Potentials from Body Surface Potential Distributions for Normal and Ectopic Beats in the Intact Dog, <i>R. C. Barr and M. S. Spach (Circulation Research, May 1978)</i>	228
Author Index	243
Subject Index	245
Editors' Biographies	248