

Contents

Preface	vii
1 Introduction	1
1.1. Ancestor's Light: The Seven Lamps	1
1.2. Definitions: Are They Really Necessary?	1
1.3. Quantification Process	3
1.4. Witchery, Charlatanism, Frankenstein, Science Fiction	5
1.5. Koestler's Creative Collisions	7
1.6. Guiding Philosophy of this Book: The Recording Channel	8
1.7. Objectives	10
2 Source: Physiological Systems and Levels	13
2.1. Organism in a Block Diagram	13
2.2. Cardiovascular System	16
2.3. Respiratory System	98
2.4. Renal System	121
2.5. Gastrointestinal System	142
2.6. Endocrine System	158
2.7. Nervous System	191
2.8. Muscular System	203
2.9. The Cell	212
3 Signals: What They Are	217
3.1. Introduction	217
3.2. Bioelectric Events and their Signals	218
3.3. Signals Produced by Biomechanical Systems	253
3.4. Signals Produced by Biomaterials	259
3.5. Cellular Signals	262
3.6. Image as a Signal	263
3.7. Concluding Remarks of Chapter 3	268
4 Signal Pick Up	271
4.1. Introduction	271

4.2. Electrodes: The Electric-Electric Transducer	272
4.3. Sensors/Transducers	288
4.4. Biosensors	292
4.5. Comments and Conclusions	296
5 Biological Amplifier	299
5.1. Introduction	299
5.2. Basic Requirements	300
5.3. Instrumentation Amplifiers (IA)	301
5.4. Instrumentation Amplifier Specifications	312
5.5. Noise and Interference	318
5.6. Conclusions	335
6 The Interpreter: Reading the Signals	337
6.1. Introduction	337
6.2. Pattern Reading	338
6.3. Discretization of a Signal	340
6.4. What Do We Do With the Signals?	344
6.5. Final Remarks and Conclusions	346
7 Feedback: The Need of Mathematical Models	349
7.1. Introduction	349
7.2. Linear versus Non-Linear Models	351
7.3. Characteristics of a System Model	355
7.4. Partial Final Remarks	357
8 Rounding Up and Looking Ahead	359
References	365
Index	383
List of Figures	393