

Contents

	<u>PAGE</u>
1. Introduction	
1.1 Introduction and Aims of the Research	1.1
1.2 Previous Work	1.2
1.3 Reason for conducting the research	1.2
1.4 General Hypotheses	1.3
1.5 Context of the Research	1.3
1.6 The need for an objective measurement system in clinical electrotherapy research	1.6
1.7 Rationale for using skin potentials as the objective indicator	1.7
1.8 Organisation of the thesis	1.8
2. Literature Review	
2.1 Skin Potentials	2.3
2.2 Injury Potentials	2.28
2.3 Implications for the Current Study	2.38
3. Rationale for Differential Skin Potential Measurements	
3.1 Criticisms of the Transcutaneous Skin Potential for the Current Project	3.1
3.2 Theory of the Differential Skin Surface Potential (DSSP)	3.2
3.3 Relationship between the Skin Potential Level and the DSSP	3.4
3.4 Extension of the basic SPL Models to Injured Tissues	3.5
3.5 Injury Model using the Differential Technique	3.7
3.6 Factors Affecting the Skin Potential Level	3.8
4. Development of Instrumentation and Software	
4.1 Introduction to System Development	4.1
4.2 Hardware Development	4.3
4.3 Software Development	4.8
4.4 Summary	4.25
5. Subject Interface and System Evaluation	
5.1 Electrodes	5.1
5.2 Electrolyte	5.6
5.3 Electrode Tests	5.9
5.4 Leads and Connections	5.16
6. Non Injured and Injured Subject Pilot Studies	
6.1 Non Injured Subject Pilot Studies	6.1
6.2 Injured Subject Pilot Studies	6.22
7. Environmental, Physiological and Psychological Variables	
7.1 Factors to Consider in Relation to the Measurement of Skin Potential	7.2
7.2 Environmental	7.2
7.3 Physiological	7.4

	<u>PAGE</u>
7.4 Psychological	7.7
7.5 Experimental Philosophy for the Proposed Work	7.7
7.6 Environmental Test Chamber	7.8
7.7 System Tests	7.11
7.8 Electrode Tests	7.19
7.9 Comparative Tests Outside the Test Chamber	7.22
7.10 Additional Environmental Tests	7.26
7.11 Conclusions	7.27
7.12 Subject Test Protocol	7.28
8. Non Injured Subject Tests - The A Series	
8.1 Introduction	8.1
8.2 Subject Trials at the University - the A Series	8.1
8.3 Analysis of A Series Results	8.10
8.4 Overall Distribution of the Mean Potentials	8.11
8.5 Normal Pattern of Mean Potentials in Non Injured Subjects	8.16
8.6 Goodness of Fit for Normal Distribution	8.17
8.7 Variability of the Potentials in a Single Session	8.21
8.8 Correlation Analysis	8.22
8.9 Discussion	
8.10 A Series Retests	8.42
8.11 Results	8.42
8.12 Psychological Stress Tests	8.49
8.13 A Series Conclusions	8.54
9. B Series Tests	
9.1 Introduction and Test Series Overview	9.1
9.2 Subject Profiles and Summary Information	9.2
9.3 Test Procedure	9.4
9.4 Results	9.4
9.5 Non Injured Subjects	9.5
9.6 Normal Pattern for Non Injured Subjects	9.11
9.7 Injured Subject Results	9.14
9.8 Comparison of Injured and Non Injured Potentials	9.19
9.9 Summary	9.27
9.10 B Series Stress Tests	9.28
9.11 B Series Biogram Tests	9.28
9.12 B Series Stress Tests	9.36
9.13 Conclusion	9.39

	<u>PAGE</u>
10. C Series Clinical Trial	
10.1 Aims of the Trial	10.1
10.2 Trial Protocol	10.1
10.3 Subject Profiles	10.2
10.4 Results	10.3
10.5 Conclusions	10.17
11. Discussion and Conclusions	
12. References and Bibliography	

Appendices

- A. Glossary**
- B. Outline Chronology of Development and Experimental Work**
- C. Software Flowcharts and Programme Listings**
- D. Grass Experiments**
- E. Injured Subject Pilot Study - Test Results**
- F. Environmental Electromagnetic Radiation**
- G. A, B and C Series Documents**
- H. Comparison of the Cardionics and Tunturi Heart Rate Monitors**
- I. A Series Results**
- J. Non Injured Subject Stress Tests**
- K. B Series Results**
- L. B Series Biogram Test Results**
- M. C Series Test Results**