

TABLE OF CONTENTS

Volume II

	Page No.
CHAPTER VIII: MEASUREMENT OF Q	417
8.01 Definition and Basic Relations	417
8.02 Microwave Resonant Circuits and Their Uses	427
8.03 Matching Considerations and Frequency Pulling	429
8.04 Basic Measurement Techniques - General Description	430
8.05 Precautions	431
Measurement Methods	
8.06 Slotted Line Measurement of Q	431
8.07 Reflectometer Method - Measurement of Q by Reflected Power	445
8.08 Q from Transmitted Power Measurements	455
8.09 Bandwidth Measurements	467
8.10 Decrement Method of Measuring Q	478
Appendix A: Relationship Between Input and Output Coupling Coefficients of a Transmission Cavity and the Insertion Loss and Standing Wave Ratio at Resonance	481
Appendix B: Relationship between Reflection Coefficient Magnitude and Q of a Single Ended Resonator	483
Appendix C: Phase Shift of Modulation Envelope of a Sinusoidally Modulated Signal Transmitted Through a Resonator	485
Appendix D: Error in Loaded Q Caused by Error in Measuring VSWR	486
Appendix E: Error in Loaded Q Caused by Error in Measuring Reflection Coefficient Magnitude	487
Appendix F: Error Analysis of Nodal Shift Method of Measuring Q	488
Appendix G: The Wayne Kerr Laboratories Ltd. S-Band Q Meter	489
Appendix H: Table for Solution of $ \rho ^2 = (1 + \rho_0 ^2)/2$ in db Values	491
CHAPTER IX: DIELECTRIC CONSTANT	495
9.01 Definitions and Discussion of Dielectric Constant and Magnetic Permeability	496
9.02 Some Quantities Related to Dielectric Constant	498
9.03 The Sample	499
9.04 Dielectric Samples in Waveguide Viewed as Two-Ports	501
9.05 Two Point Method of Measuring Dielectric Constant Involving the Solution of a Transcendental Equation	503
9.06 Measurement of Dielectric Constant Involving Two Reactive Terminations	508
9.07 Measurement of Dielectric Constant of a High Loss Material ("Infinite" Sample)	511
9.08 Measurement of the Dielectric Constant Independent of the Length or Location of the Sample	513
9.09 Cavity Methods (Q, Conductivity)	518
9.10 Cavity Perturbation Methods	530
9.11 Measurement of the Dielectric Constant and the Permeability of (Dissipative) Ferromagnetic Materials	536

Chapter IX, continued

9.12	Correction for Clearance between Dielectric Sample and Waveguide.	539
9.13	Correction of Measured Data for Dissipation in the Measuring Equipment . .	539
9.14	Averaging Techniques	545
9.15	Summary of Measurements	546
CHAPTER X: POWER CAPACITY AND BREAKDOWN VOLTAGE		549
10.01	Breakdown Voltage and Power Capacity	549
10.02	Factors Influencing Breakdown	550
10.03	Experimental Factors and Techniques	552
10.04	Experimental Arrangements and Procedures	559
10.05	Summary and Conclusions	566
CHAPTER XI: RADIO FREQUENCY LEAKAGE		569
11.01	Measurement of the Shielding Efficiency of Screen Rooms	569
11.02	Measurement of Cable Leakage Parameters	572
11.03	Microwave Field Intensity Meters for Interference Measurement	583
CHAPTER XII: DIRECTIONAL COUPLERS		591
Part A: Fundamentals of Directional Coupler Junctions: Theory, Representation and Evaluation		
12.01	Introduction	591
12.02	The Directional Coupler: Definitions	592
12.03	Experimental Determination and Evaluation of Coupler Junctions	600
12.04	Directional Coupler Networks	611
Tables of Symmetry and Asymmetry Parameters for Directional Coupler Junctions		620
Table of Equivalent Circuits and Scattering Matrices of Typical Structures		638
Part B: Measurement Outlines of the Characteristics of Directional Coupler Components		
12.05	Coupler Components	640
12.06	Measurement Outlines for Directional Coupler Components	640
12.07	Hybrid and Special Devices	670
12.08	Measurement Outlines for Hybrids and Special Devices	672
12.09	Measurement Applications of Directional Coupler Coefficients	678
CHAPTER XIII: OPEN NONCONVENTIONAL WAVEGUIDES		687
13.01	Characteristics	688
	I. Open TEM (Strip) Waveguides	688
	II. Surface Wave Transmission Lines	698
13.02	Application of Standard Measurement Techniques to Nonconventional Waveguides	730

CHAPTER XIV: NONRECIPROCAL STRUCTURES: THE MEASUREMENT OF THEIR EQUIVALENT CIRCUIT PARAMETERS	737
14.01 Matrix Descriptions of Nonreciprocal Structures	738
14.02 Reduction of a Multi-Port Measurement to Successive Two-Port Measurements	739
14.03 Impedance Measurement Techniques Applied to Nonreciprocal Two-Ports .	741
14.04 Difference Measurement	750
14.05 The Measurement of Absolute Phase Shift and Attenuation	755
14.06 Calibration of Phase Shifters	756
14.07 A Standing Wave Measurement of Nonreciprocal Two-Port Scattering Matrix Parameters	763
14.08 Some Alternative Representations of Nonreciprocal Microwave Two-Ports.	767
14.09 Summary of Measurements	772
 CHAPTER XV: INTRINSIC PROPERTIES OF FERRITES	 777
15.01 Introduction	777
15.02 Measurement Techniques	779
I. Survey of General Methods	779
II. Details of Resonant Cavity Techniques	783
15.03 Measurement Procedure	790
I. Transmission Method	791
II. Reflection Cavity Method	800
III. Some General Precautions	800
15.04 Appendices	801