

Contents

	Page
Foreword	III
Preface	IV
Editor's note	V

1. Power

Papers

1.1. Radio frequency power measurements. A. Y. Rumfelt and L. B. Elwell	1
1.2. A bolometer mount efficiency measurement technique. G. F. Engen	16
1.3. A DC-RF substitution error in dual-element bolometer mounts. Glenn F. Engen	28
1.4. Coaxial power meter calibration using a waveguide standard. Glenn F. Engen	35
1.5. A dual load low calorimeter for RF power measurement to 4 GHz. M. L. Crawford and P. A. Hudson	47

Abstracts

1.a. Mismatch errors in microwave power measurements. R. W. Beatty and A. C. MacPherson	54
1.b. An improved method of measuring efficiencies of ultra-high- frequency and microwave bolometer mounts. R. W. Beatty and Frank Reggia	54
1.c. A transfer instrument for the intercomparison of microwave power meters. G. F. Engen	54
1.d. A survey of microwave power-measurement techniques em- ployed at the National Bureau of Standards. Glenn F. Engen	54
1.e. A variable impedance power meter, and adjustable reflection coefficient standard. Glen F. Engen	54
1.f. A precision RF power transfer standard. P. A. Hudson	54
1.g. A microwave microcalorimeter. A. C. MacPherson and D. M. Kerns	54
1.h. Microwave power measurements employing electron beam techniques. Harold A. Thomas	54
See also 7.e.	

2. Sinusoidal Voltage and Current

Papers

	Page
2.1. Voltage measurement at high and microwave frequencies in coaxial systems. M. C. Selby	57
2.2. The measurement of current at radio frequencies. W. W. Scott, Jr. and N. V. Frederick	63
2.3. A precision current comparator. C. McKay Allred and Robert A. Lawton	69

Abstract

2.a. Pulsed and CW sinusoidal voltage and current measurements. M. C. Selby	72
---	----

3. Electromagnetic Fields and Antennas

Papers

3.1. Field strength above 1 GHz; measurement procedures for standard antennas. Ronald R. Bowman	75
3.2. NBS field-strength standards and measurements (30 Hz to 1000 MHz). Frank M. Greene	85
3.3. Field strength calibration techniques at the National Bureau of Standards. Harold E. Taggart	97
3.4. A new near-zone electric-field-strength meter. Frank M. Greene	104

Abstracts

3.a. Discussion of errors in gain measurements of standard electromagnetic horns. R. W. Beatty	111
3.b. Theory of diffraction in microwave interferometry. D. M. Kerns and E. S. Dayhoff	111
3.c. Calibration of loop antennas at VLF. A. G. Jean, H. E. Taggart, and J. R. Wait	111
See also 7.e.	

4. Radar and Baseband Pulses

Papers

4.1. The measurement of baseband pulse rise times of less than 10^{-9} second. N. S. Nahman	115
4.2. Peak pulse voltage measurement (baseband pulse). A. R. Ondrejka	125
4.3. Measurement of RF peak pulse power. Paul A. Hudson	129
4.4. Analysis and performance of superconductive coaxial transmission lines. R. J. Allen and N. S. Nahman	134
4.5. Nanosecond response and attenuation characteristics of a superconductive coaxial line. N. S. Nahman and G. M. Gooch	142
4.6. Measurement standards for low and medium peak pulse voltages. A. R. Ondrejka and P. A. Hudson	147

4. Radar and Baseband Pulses—Continued

Abstracts

	<i>Page</i>
4.a. Random sampling oscillography. G. J. Frye and N. S. Nahman	153
4.b. On the applicability of the comparison method for picosecond pulse instrumentation. G. H. Honnold and N. S. Nahman	153
4.c. Measurement of RF peak-pulse power by a sampling-comparison method. P. A. Hudson, W. L. Ecklund, and A. R. Ondrejka	153
4.d. A discussion on the transient analysis of coaxial cables considering highfrequency losses. N. S. Nahman	153
4.e. Transient analysis of coaxial cables considering skin effect. R. L. Wigington and N. S. Nahman	153

5. Noise

Papers

5.1. Noise standards, measurements, and receiver definitions. C. K. S. Miller, W. C. Daywitt, and M. G. Arthur	157
5.2. A precision noise spectral density comparator. C. M. Allred ..	170
5.3. A precision noise-power comparator. M. G. Arthur, C. M. Allred, and M. K. Cannon	178
5.4. Measurement of effective temperatures of microwave noise sources. J. S. Wells, W. C. Daywitt, and C. K. S. Miller.....	183

Abstracts

6.a. Absolute measurement of temperatures of microwave noise sources. A. J. Estin, C. L. Trembath, J. S. Wells, and W. C. Daywitt	195
5.b. Sensitivity of a correlation radiometer. John J. Faris	195
5.c. A waveguide noise-tube mount for use as an interlaboratory noise standard. C. K. S. Miller, W. C. Daywitt, and E. Campbell	195
5.d. The sensitivity of the Dicke radiometer. David F. Wait	195
See also 7.5.	

6. Attenuation and Phase

Papers

6.1. Insertion loss concepts. Robert W. Beatty	199
6.2. RF attenuation. D. Russell and W. Larson	208
6.3. UHF and microwave phase-shift measurements. Doyle A. Ellerbruch	226
6.4. Effects of connectors and adapters on accurate attenuation measurements at microwave frequencies. Robert W. Beatty	236
6.5. Mismatch errors in microwave phase shift measurements. G. E. Schafer	249
6.6. A modulated sub-carrier technique of measuring microwave attenuation. G. E. Schafer and R. R. Bowman	255

6. Attenuation and Phase—Continued

	Page
6.7. A 2:1 ratio inductive voltage divider with less than 0.1 PPM error to 1 MHz. Cletus A. Hoer and Walter L. Smith.....	259
6.8. A precision RF attenuation calibration system. C. M. Allred and C. C. Cook	268

Abstracts

6.a. Some basic microwave phase shift equations. Robert W. Beatty	275
6.b. Microwave attenuation measurements and standards. Robert W. Beatty	275
6.c. Analysis of a differential phase shifter. Doyle A. Ellerbruch	275
6.d. Evaluation of a microwave phase measuring system. Doyle A. Ellerbruch	275
6.e. Further analysis of the modulated subcarrier technique of attenuation measurement. William E. Little	275
6.f. A method for the self-calibration of attenuation-measuring systems. Robert L. Peck	276
6.g. A modulated subcarrier technique of measuring microwave phase shifts. G. E. Schafer	276
6.h. Error analysis of a standard microwave phase shifter. G. E. Schafer and R. W. Beatty	276

7. Impedance

Papers

7.1. Definitions of v , i , Z , Y , a , b , β , and S. D. M. Kerns	279
7.2. Impedance measurements and standards for uniconductor waveguide. Robert W. Beatty	288
7.3. Impedance measurements in coaxial waveguide systems. R. L. Jesch and R. M. Jickling	297
7.4. Lumped parameter impedance measurements. L. E. Huntley and R. N. Jones	309
7.5. A guide to the use of the modified reflectometer technique of VSWR measurement. Wilbur J. Anson	321
7.6. Precise reflection coefficient measurements with an untuned reflectometer. W. E. Little, and D. A. Ellerbruch	328
7.7. Measurement of reflections and losses of waveguide joints and connectors using microwave reflectometer techniques. R. W. Beatty, G. F. Engen, and W. J. Anson	332
7.8. Measuring impedance through an adapter without introducing additional error. R. W. Beatty	340
7.9. An automatic method for obtaining data in the Weissflock-Feenburg node-shift technique. R. W. Beatty	341

7. Impedance—Continued

Page

Abstracts

7.a.	The measurement of arbitrary linear microwave two-ports. H. M. Altschuler	342
7.b.	Application of reflectometer techniques to accurate reflection measurements in coaxial systems. R. W. Beatty and W. J. Anson	342
7.c.	Measuring the directivity of a directional coupler using a sliding short-circuit and an adjustable sliding termination.* R. W. Beatty	342
7.d.	Microwave impedance measurements and standards. R. W. Beatty	342
7.e.	Microwave standards and measurements in the U.S.A., 1963-1966. Robert W. Beatty	342
7.f.	Second-harmonic effects in tuned reflectometers.* M. Michael Brady	342
7.g.	Inductance and characteristic impedance of a strip-transmission line. R. L. Brooke, C. A. Hoer, and C. H. Love	342
7.h.	Current distribution and impedance of lossless conductor systems.* R. L. Brooke and J. E. Cruz	342
7.i.	A variable characteristic impedance coaxial line.* J. E. Cruz and R. L. Brooke	342
7.j.	Exact inductance equations for rectangular conductors with applications to more complicated geometrics. Cletus Hoer and Carl Love	343
7.k.	A self-calibrating instrument for measuring conductance at radio frequencies. Leslie E. Huntley	343
7.l.	Standards for the calibration of Q-meters 50 kHz to 45 MHz. R. N. Jones	343
7.m.	Precision coaxial connectors in lumped parameter immittance measurement. R. N. Jones and L. E. Huntley	343
7.n.	Perturbation theorems for waveguide junctions, with applications. D. M. Kerns and W. T. Grandy, Jr.	343
7.o.	A coaxial adjustable sliding termination.* W. E. Little and J. P. Wakefield	343

• Private communication.

8. Radio Frequency Materials

Papers

8.1.	Measurement of RF properties of materials: a survey. H. E. Bussey	347
8.2.	Equations for the radiofrequency magnetic permeameter. Cletus A. Hoer, and Alvin L. Rasmussen	355
8.3.	Parallel reversible permeability measurement techniques from 50 kc/s to 3 Gc/s. Cletus A. Hoer and R. D. Harrington	363

8. Radio Frequency Materials—Continued

	Page
8.4. Measurement and standardization of dielectric samples. H. E. Bussey and J. E. Gray	370
8.5. Absolute determination of refractive indices of gases at 47.7 GHz. A. C. Newell and R. C. Baird	374
8.6. A radio-frequency permittimeter. R. C. Powell and A. L. Rasmussen	383

Abstracts

8.a. International comparison of dielectric measurements. H. E. Bussey, J. E. Gray, E. C. Bamberger, E. Rushton, G. Russell, B. W. Petley, and D. Morris	389
8.b. Ferrimagnetic resonance measurements using IF substitution techniques. W. E. Case, R. D. Harrington, and L. B. Schmidt	389
8.c. Calibration of vibrating-sample magnetometers. W. E. Case and R. D. Harrington	389
8.d. Ferromagnetic resonance relaxation, wide spin-wave covered by ellipsoids. Allan S. Risley and Howard E. Bussey	389
8.e. Polycrystalline spin wave theory of ferromagnetic resonance compared with the tilting experiment. A. S. Risley, E. G. Johnson, Jr., and H. E. Bussey	389
8.f. Interpretation of ferromagnetic resonance measurement made in a nonresonant system. A. S. Risley and H. E. Bussey	389
8.g. Tensor permeability measurements at L-band frequencies using a degenerate mode cavity. L. B. Schmidt, R. D. Harrington, and W. E. Case	390

9. Quasi-Optics and Millimeter Waves

Papers

9.1. Measurement of laser energy and power. G. Birnbaum and M. Birnbaum	393
9.2. Calorimetric measurement of pulsed laser output energy. D. A. Jennings	399
9.3. Millimeter wavelength resonant structures. R. W. Zimmerer, M. V. Anderson, G. L. Strine, and Y. Beers	403
9.4. Spherical mirror Fabry-Perot resonators. Robert W. Zimmerer	411
9.5. New wavemeter for millimeter wavelengths. Robert W. Zimmerer	420

9. Quasi-Optics and Millimeter Waves—Continued

Abstracts

	Page
9.a. Reflectors for a microwave Fabry-Perot interferometer. W. Culshaw	422
9.b. High resolution millimeter wave Fabry-Perot interferometer. William Culshaw	422
9.c. Resonators for millimeter and submillimeter wavelengths. William Culshaw	422
9.d. Experimental investigation of Fabry-Perot interferometers.* R. W. Zimmerer	422

• Correspondence

10. Components and Subsystems

Papers

10.1. Precision detector for complex insertion ratio measuring systems. C. M. Allred and R. A. Lawton	425
---	-----

Abstracts

10.a. A low input VSWR coaxial diode switch for the UHF band.* W. L. Ecklund	431
10.b. A method of improving isolation in multi-channel waveguide systems.* G. F. Engen	431
10.c. Errors in dielectric measurements due to a sample insertion hole in a cavity. A. J. Estin and H. E. Bussey	431
10.d. A versatile ratio instrument for the high ratio comparison of voltage or resistance. Alfred E. Hess	431
10.e. A high directivity, broadband coaxial coupler.* P. A. Hudson	431
10.f. Low-level low-frequency detection system. Neil T. Larsen See also 8.e., and 8.g.	431

• Private communication.

Author index	438
Subject index	435
SI physical units (inside back cover)	