


Features:

- * Inside outside precious metal plated with diamond polish.
- * Tested on HP network analyser
- * PC and audio communications
- * Microwave Trainer with Antennas like Parabolic dish, Patch arrays, Horn etc.
- * In built Microwave power meter receiver with 0.1dB resolution
- * 70 dB dynamic range.
- * Directional Coupler for VSWR/ Return Loss.
- * Stepper motor antenna rotator.
- * 1 degree resolution stepper motor
- * RS232 interface with polar/cartesian plotting software
- * Microstrip antennas
- * All antenna gain, return loss and pattern plot provided
- * 1000 location Frequency and level storage in receiver
- * Ability to transfer Digital signal over microwave.

Technical Specifications

1. X Band Network Analyser

S parameters :	Waveguide & Coaxial Microwave components	
Frequency :	10.5 GHz	
Accuracy :	0.1%	
Dynamic range:	70 dB	
Level :	0 dBm Typical	
Sensitivity :	-80 dBm	
Measurement:	dBm and dBuV	
Resolution :	0.1dB	
Impedance :	50 ohms with SMA connector	
PC interface :	RS 232 connectivity to PC for antenna Plotting using supplied software	
Display :	16x2 backlit LCD for Power level & Position	
Rotation :	0-359 degrees	
Control :	Menu, Enter, Escape, Up & Down	
Angle :	User selectable steps of 1, 5, 10, 45 degree	
Memory :	1000 memories for storing positions and Power levels for quick recall	
Auto Mode :	Automatic rotation in user steps with Datalogging facility.	
Modulation :	ASK(DC-15 KHz) Ext	
Demod :	Digital out	
Spectrum Out:	For spectrum Analyser SAX01	
Power Supply :	100-240V AC, 50-60 Hz	

2. Precision Micrometer tunable Gunn Oscillator



Frequency: X band (8.2-12.4 GHz)
 Power output: 10 mW typical
 S11: >10dB
 Calibration chart: steps of 100 MHz
 Body: Solid wirecut Aluminum for thermal stability and long life
 Tuning: Precision Micrometer driven solid short

3 PIN Diode Modulator



S11: >15dB
 S12 off: 10dB
 S12 on: <2dB
 Bandwidth: 8.2GHz-12.4 GHz
 Diode: Microwave SMD package

4 Ferrite Isolator



S11: >20dB
 S12: >20dB
 S21: <1.5dB
 Bandwidth: 8.2 GHz-12.4 GHz

5 Calibrated Frequency Meter



S11: >20dB
 S12: >3dB at resonance
 Q factor: 1000
 Accuracy: 1%
 Calibration Chart: Frequency v/s micrometer in steps of 100 MHz

6 Broadband Waveguide Detector



S11: 20dB
 Sensitivity: 0.5mV/uW
 Bandwidth: 9.3-11.3 GHz

6 Slide Screw Tuner with Precision Micrometer



Resolution X Y: 0.05 mm
 Drive: Vernier on teflon bearing

7 Fixed Short



S11: >60dB
 Flange: UG39/U

8 Calibrated Precision Variable Attenuator



S11: >20dB
 S12: 1 to 25dB variable
 Resolution: 1dB
 Accuracy: ±1.5dB
 Calibration Chart: Attenuation v/s micrometer in steps of 1 dB

9 Broadband Matched Termination - 2 Nos.



S11: >25dB
 Bandwidth: 8.2 GHz-12.4 GHz

10 Precision Slotted Line with Matched Detector Probe



S11: >20dB
 S12: <1dB
 Resolution: 0.05mm using vernier
 Sensitivity: 0.1mV/uW

11 Broadband Multihole Waveguide Directional Coupler



Coupling: 10dB
 Directivity: 30dB
 Insertion Loss: <1.5dB
 Bandwidth: 8.2-12.4 GHz

12 Hybrid / Magic Tee



S11: >10dB
 Isolation: 20dB H & E arms
 Bandwidth: 9.8-10.8GHz

13 Series E plane Tee



S11, S22, S33: >20dB
 S12, S13: 3.5dB
 Phase: 180 degree
 Bandwidth: 8.2-12.4 GHz

14 Shunt H Plane Tee



S11, S22, S33: >20dB
 S12, S13: 3.5dB
 Phase: 0 degree
 Bandwidth: 8.2-12.4 GHz

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16. Solid Dielectric cell

Bakelite
Teflon
Acrylic
Nylon
Polystyrene

17. Liquid Dielectric cell

18. Rectangular waveguide

S11: >20dB
S12: <1dB
Bandwidth: 8.2 GHz-12.4 GHz

19. Phase Shifter

S11: >15dB
S12: >15dB
Bandwidth: 9.3 GHz-11.3 GHz
Calibration Chart: Phase Vs.
Micrometer reading

20. Circulator

S11: >20dB
S12: >20dB
S21: <1.5dB
Bandwidth: 8.2 GHz-12.4 GHz

21. Broadband Pyramidal Horn Antenna



Gain: 16dB
S11: 20dB
Beamwidth : 30 degree E & H

22. Conical Horn



Beamwidth: <40 degree E & H
Gain: 12 dB
S11: 10dB

23. Monopole



Frequency: 10.5GHz
Gain: 1dBi
Feed: Microstrip
Connector: SMA
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution,

24. Dipole



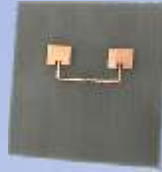
Frequency
Gain: 2dBi
Feed: Microstrip balun
Connector: SMA
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution

25. Patch Microstrip



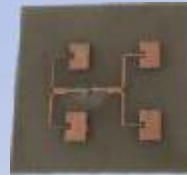
Frequency: 10.5 GHz
Gain: 4dBi
S11: >10dB
Feed: Microstrip Inset feed
Connector: SMA
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution

26. Patch Microstrip Array x2



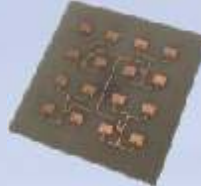
Frequency: 10.5GHz
Gain: 5dB
S11: >6dB
Feed: Microstrip Inset corporate
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution

27. Patch Microstrip Array x4



Frequency: 10.5GHz
Gain: 7dB
S11: >6dB
Feed: Microstrip Inset corporate
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution

28. Patch Microstrip Array x16



Frequency: 10.5GHz
Gain: 10dB
S11: >6dB
Feed: Microstrip Inset corporate
Result: EM Simulation of S parameters, 3D radiation pattern, 3D current distribution

29. Parabolic Dish



Frequency: 10.5GHz
Gain: 12dB
S11: >6dB



30. Waveguide Stands - 7 Nos

Mount: E & H plane WR90

31. Stepper motor controlled Antenna Rotator

Resolution: 1 degree
Mount: E & H plane
Phase centering: 15 cms. For centering antennas
Mount: Waveguide E&H Wr90

32. Reflector Panel

RCS: 0dBsm



33. Microwave Absorber panel

Reflection: <20dB
Absorption: >20 dB13.

34. Digital Gunn Power Supply



Voltage: 2-10 V
Current: upto 500 mA
PIN Mod. Frequency: 800-1200Hz
PIN Modulator Voltage: 0-10 V
Offset Voltage: 0-10 V DC
Display: LCD for voltage / current
RS 232 port: PC interface for serial data communication
MIC input: Audio communication

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35. SWR Meter square Law



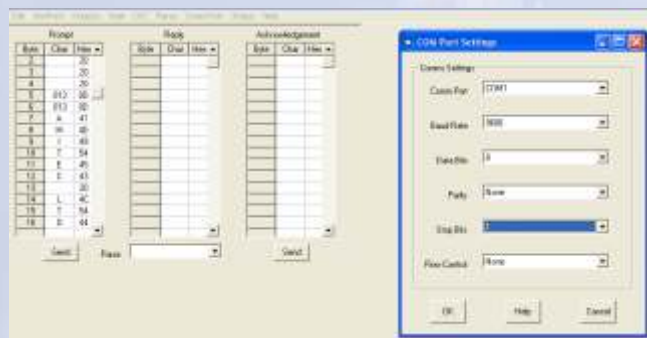
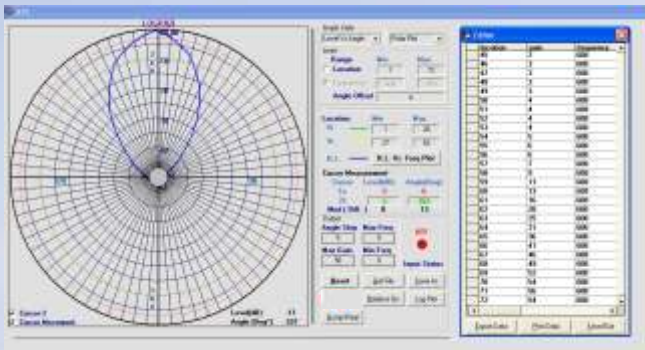
Frequency: 1 KHz center
 Bandwidth: 100 Hz
 Sensitivity: 1 uV
 Display: Analog meter
 Attenuator: 70 dB in 5 dB steps
 Scale: Normal/Expand
 RS232 port: PC interface for data serial communication
 Demod. Out: For audio link
 Speaker: Inbuilt for audio link

Windows Software:

RS232 interface with polar plotting software with log, linear cartesian and polar plots, Multiple pattern overlay, Double cursor measurement, Zoom, Colour editing, 1000 location editor, Absolute/Relative, 3dB/10dB beam-width measurement

Data Communication Software:

RS232 with selection of comports, Baud rates (1200 to 38,400), parity, Dat bits, stop bits.



List of Experiments:

1. Gunn oscillator
 - i) Measurement of current vs. voltage characteristic
 - ii) Measurement of Gunn oscillator power and voltage.
 - iii) Measurement of Gunn frequency and voltage.
2. Modulator and crystal detector
 - i) Operation of PIN diode modulator & crystal detector.
 - ii) Measurement of square law behavior of detector.
3. Propagation modes, wavelength and phase velocity
 - i) Measurement of frequency of source.
 - ii) Measurement of free space & guide wavelength
4. Q and bandwidth of resonance cavity.
5. VSWR and Reflection Coefficient by Standing wave and Double Minimum Method
 - i) Measurement of low, medium, high SWR
6. Impedance Measurement
 - i) Measurement of unknown Impedance of load
 - ii) To match an unknown impedance.
7. Waveguide Hybrid(Magic) Tee
 - i) Measurement of Power division or Decoupling between H-arm and E- arm of a Magic Tee.
 - ii) Measurement of Insertion loss of a Magic Tee.
 - iii) Measurement of Return Loss of H arm of a Magic Tee
 - vi) Measurement of VSWR of ports of Hybrid (Magic) Tee
8. Properties of Directional Coupler
 - i) Measurement of coupling factor, directivity, return loss of a load, Main line insertion loss, VSWR of ports.
9. Fixed and Variable Attenuator
 - i) Measurement of attenuation using the Power Ratio and substitution method
 - ii) Measurement of low values of attenuation.
 - iii) Measurement of VSWR and Insertion Loss.
12. To study a cavity resonator type frequency counter.
13. To establish a Microwave audio & PC-PC link.
14. To measure the VSWR of the antenna
15. To plot the radiation pattern (E & H Plane Polar & Cartesian Plots on Log/Linear scale of an antenna on PC.
16. To measure the ANTENNA PARAMETERS (directivity, gain, beam width (Half Power/10dB), front to back ratio, plane of polarization, cross polarization discrimination, side lobe level and its angular position from polar plot, VSWR/return loss) of Dipole antenna.
17. To measure antenna parameters of Horn & open waveguide antenna.
18. To measure antenna parameters of conical Horn antenna
19. To measure antenna parameters of monopole antenna
20. To measure antenna parameters of Parabolic dish antenna
21. To measure antenna parameters of Patch array antenna

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