

Features:

- * Antenna Training System with over 40 Antennas
- * PLL transmitter and receiver 0.005-2 GHz.
- * 50 KHz step size with measurement in 0.1 dB resolution
- * 110 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 SMA connectors, Teflon RG316 Cables
- * All antenna gain, return loss and pattern plot provided
- * 1000 location Frequency and level storage in receiver

1. PLL Synthesized Signal Source



Technical Specifications:

Frequency range :	5-2000 MHz PLL synth. in 3 ranges
Step size :	0.05, 0.1, 0.25, 0.5, 1, 10 & 100 MHz
Accuracy :	0.01%
Display :	16X2 Backlit LCD
Controls :	Menu, Enter, Escape, Up & Down
Memory :	1000 individual frequencies be stored
RF Level :	0dBm typical
Level Accuracy :	± 2dB
Attenuator :	40dB (external SMA-SMA)
Output Z :	50 ohms
Connector :	Gold plated SMA

2. PLL Synthesized Receiver



Technical Specifications:

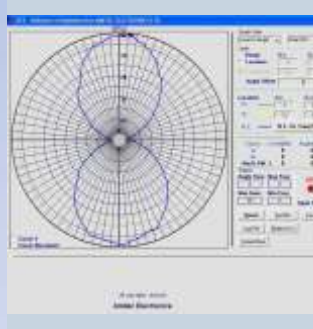
Frequency range :	5-2000 MHz PLL synth. in 3 ranges
Step size :	0.05, 0.1, 0.25, 0.5, 1, 10, 100MHz
Accuracy :	0.01%
Display :	16X2 Backlit LCD
Memory :	1000 frequencies & levels be stored
Measurements :	RF level measurement in dBuV / dBm / pW / dBr with 0.1dB resolution
Sensitivity :	-105dBm
Dynamic range :	110 dB (70dB log. + 40dB attenuator)
RS232 interface :	To PC for plotting software
Auto mode :	Interfacing with source
Input Z :	50 ohm Gold plated SMA connector

3. Stepper Motor Controller Unit



Display: 16X2 backlit LCD
 Rotation: 0-359 degrees
 Resolution: 1 degree.
 Angular steps: 1, 5, 10, 45°
 Memory: 1000 angular position store/recall
 Auto mode: Automatic rotation with receiver
 Mode: CW/CCW rotation, Fast Slow speed modes
 Power Supply: 100-240V AC, 50-60 Hz

4. Software



RS 232 interface with polar plotting with log, linear cartesian and polar plots, V_i , V_r & Return loss plots, Multiple pattern overlay, Double cursor, Zoom, Colour editing, 1000 location editor, Absolute / Relative, 3dB/10dB beam-width, Gain, Front to back, Side lobe level and position, Plot rotate, File-edit, save, get.

5. Directional Coupler



Bandwidth: 0.1 - 2 GHz
 Insertion S_{12} : 1.5 ± 0.5 dB
 Coupling S_{13} : 20 ± 2 dB
 Isolation S_{14} : 20 ± 2 dB
 Directivity S_{23} : 15 ± 3 dB
 Impedance : 50 Ohms
 Connector : SMA
 Usage: Antenna forward & reverse power & VSWR measurements.

6. Coaxial Slotted Line



S_{11} : >15 dB, S_{12} : <1.5 dB
 Resolution: 0.05 mm / 0.15 degree at 1.5GHz) using vernier
 Coupling factor: -20dB
 Connector: SMA
 Residual VSWR : <1.2
 Velocity propagation : 1.818×10^8 m/s
 Wavelength/360° phase : 121mm at 1.5GHz
 Total Length : 200mm

7, 8. Current Probe & Voltage Probe



Type: Loop, Magnetic Field
 Rejection E/H: 30dB
 Frequency: 1.5GHz upper resonant
 Sensitivity: High
 Diameter: 3cm
 Type: Directional, Electric
 Rejection H/E: 30dB
 Frequency: 3GHz upper resonant
 Sensitivity: Low
 Size: 0.6cm

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9. Microstrip Yagi



F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 4dBi
 Feed : Microstrip balun
 Impedance : 50 Ohms
 Connector : SMA

14. Microstrip Slot



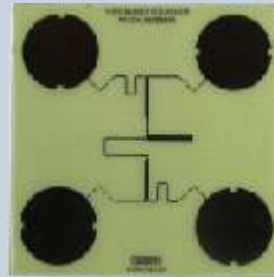
S_{11} : >10 dB
 Bandwidth: 800 ± 20 MHz
 Gain: 2dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

10. Microstrip Patch Inset Fed



F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

15. Circular Polarized Patch Array 2 X 2



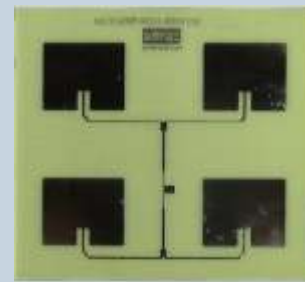
F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Circular
 Gain : 7dBi
 Impedance : 50 Ohms
 Connector : SMA

11. Log Spiral



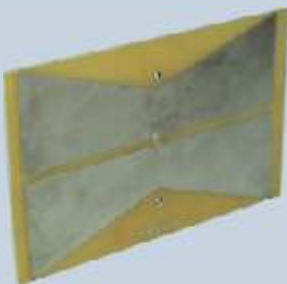
S_{11} : >10 dB
 Bandwidth: 1.5 ± 1.0 GHz
 Gain: 2dBi
 Beamwidth : E plane 80°
 Beamwidth : H Plane 120°
 Polarisation : Circular
 Front to Back Ratio: 0dB
 Connector : SMA

16. Microstrip Patch Array 2 X 2



F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 9dBi
 Impedance : 50 Ohms
 Connector : SMA

12. Batwing



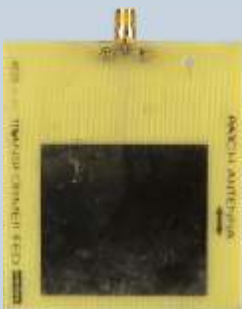
S_{11} : >10 dB
 Bandwidth: 1850 ± 50 MHz
 Gain: 6dBi
 Beamwidth : E plane 40°
 Beamwidth : H Plane 60°
 Polarisation : Linear
 Front to Back Ratio: 10dB
 Connector : SMA

17. Microstrip Annular Ring Patch



F_c : 0.8 ± 0.05 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

13. Microstrip Patch Transformer Fed



F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

18. Microstrip Circular Patch



F_c : 0.8 ± 0.05 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

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19. Microstrip Triangular Patch



F_c : 0.8 ± 0.05 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

20. Microstrip Semicircular Patch



F_c : 0.8 ± 0.05 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

21. Microstrip Rectangular Patch



F_c : 0.8 ± 0.05 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

22, 23. Microstrip Dipole



F_c : 1.5 ± 0.1 GHz
 S_{11} : 10 ± 2 dB
 Polarisation : Linear
 X Pol discrimination : 20dB
 Gain : 2dBi
 Feed: Microstrip balun
 Impedance : 50 Ohms
 Connector : SMA

24, 25. Microstrip Log Periodic Dipole Array



S_{11} : >10dB
 Bandwidth: 1500 ± 500 MHz
 Gain: 6dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: 6dB
 Connector : SMA

26. Log Periodic Dipole Array



S_{11} : >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: >6dB
 Connector : SMA

27. Discone



S_{11} : >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 0dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

28. Conical Horn



S_{11} : >10dB
 Bandwidth: 1850 ± 50 MHz
 Gain: 6dBi
 Beamwidth : E plane 40°
 Beamwidth : H Plane 60°
 Polarisation : Linear
 Front to Back Ratio: 10dB
 Connector : SMA

29. Stacked Yagi



S_{11} : >10dB
 Bandwidth: 700 ± 100 MHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: >6dB
 Connector : SMA

30, 31. Crossed Dipole



S_{11} : >10dB
 Bandwidth: 700 ± 50 MHz
 Gain: 2dBi
 Beamwidth : E plane 90°
 Beamwidth : H Plane 180°
 Polarisation : Circular LH & Circular RH
 Front to Back Ratio: 0dB
 Connector : SMA

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32. Yagi 3el



S11: >10dB
 Bandwidth: 700 ± 100 MHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: >6dB
 Connector : SMA

38. Parabolic Dish



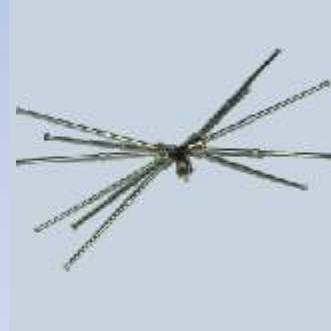
S11: >10dB
 Bandwidth: 1850 ± 50 MHz
 Gain: 6dBi
 Beamwidth : E plane 40°
 Beamwidth : H Plane 60°
 Polarisation : Linear
 Front to Back Ratio: 10dB
 Connector : SMA

33. Yagi 4el



S11: >10dB
 Bandwidth: 700 ± 50 MHz
 Gain: 5dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: >6dB
 Connector : SMA

39. Biconical



S11: >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 2dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

34. Sleeve



S11: >10dB
 Bandwidth: 750 ± 20 MHz
 Gain: 2dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

40. Folded Dipole



S11: >10dB
 Bandwidth: 600 ± 200 MHz
 Gain: 2dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

35. Monopole



S11: >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 1dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

41, 42. Endfire & Broadside phased array



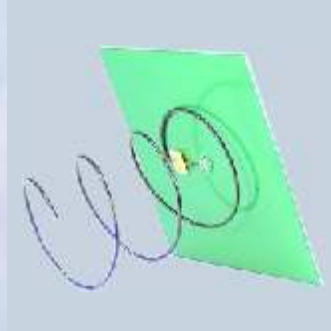
S11: >10dB
 Bandwidth: 800 ± 50 MHz
 Gain: 3dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 120°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

36,37. Dipole L/2, L/4



S11: >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 2dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

43, 44. Helix LHCP & RHCP



S11: >10dB
 Bandwidth: 750 ± 100 MHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 120°
 Polarisation : Circular RH
 Front to Back Ratio: 6dB
 Connector : SMA

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45. Square Loop



S11: >10dB
 Bandwidth: 600 ± 50 MHz
 Gain: 2dBi
 Beamwidth : E plane 80°
 Beamwidth : H Plane 120°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

46. Quad



S11: >10dB
 Bandwidth: 600 ± 50 MHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 80°
 Polarisation : Linear
 Front to Back Ratio: 6dB
 Connector : SMA

47. Whip



S11: >10dB
 Bandwidth: 600 ± 300 MHz
 Gain: 1dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 0dB
 Connector : SMA

49. Ground Plane



S11: >10dB
 Bandwidth: 600 ± 200 MHz
 Gain: 3dBi
 Beamwidth : E plane 70°
 Beamwidth : H Plane 180°
 Polarisation : Linear
 Front to Back Ratio: 4dB
 Connector : SMA

50. Terminations, Attenuators



50 Ohms Matched Termination SMA(M) - 2 No.
 Short & Open termination SMA(M)
 Teflon based SMA(M)-SMA(M) RG316 cables- 4 Nos.
 20dB attenuator- 2Nos.

51. Power Divider / Combiner



Frequency range: 3 GHz
 Connector: SMA

52. Antenna azimuth positioner



Rotation: 0-359 degree
 Azimuth
 Resolution: 1degree
 Mount: 1/2" BSW Cube
 Offset: Adjustable for phase center
 RCS: Low Non magnetic, non conductive, low dielectric
 Motor: Stepper Motor with heavy duty reduction gearbox

Accessories

- 1) Transmitter antenna mounting stand.
- 2) All necessary connectors & Teflon RF cables.
- 3) Students activity, Teachers reference & Theory Manual
- 4) Software CD
- 5) Antenna Kit
- 6) Measuring Tape
- 7) RS232 Lead
- 8) Long SMA-SMA lead- 2 Nos.

E-Manual: Installation Video for ease of Learning
Dimension : 56 X 45 x 54 cms. Weight : 18 Kg
Warranty: 3 yrs.

Areas of Experimentation and scope of study

- * Inverse square law of propagation.
- * Radiation pattern of an Omni and directional antenna.
- * Vertical, Horizontal and Circularly polarized antennas.
- * Polarization discrimination linear & circular antennas
- * Resonant and non-resonant antenna.
- * Reciprocity of antenna
- * Current distribution of an antenna
- * Comparative study of antennas
- * Significance of parasitic element dimensions
- * construct antenna using antenna kit
- * Voice communication link using antennas.
- * Antenna parameters:
- * Directive gain, beam width (Half Power/10dB), front to back ratio, plane of polarization, side lobe level & angle.
- * Antenna resonance, VSWR and bandwidth using directional coupler and adjust the antenna. Plus lot more.

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