

SPECIFICATIONS

The contractor shall provide a Portable Near Field Planar Scanner Measurement System with the following salient characteristics:

1. The total weight of the scanner assembly must be less than 500 lbs. (this includes all parts associated with the scanner to operate at the lowest frequency, 1.7 GHz, but not including the probe)
2. The maximum horizontal dimension of the scanner base platform must be less than 100 inches and the maximum depth must be less than 35 inches.
3. The contractor must provide a list of equipment that will be used to verify the performance level of their stated equipment. They also must provide what tests will be performed to verify system requirements.
4. Due to the nature of the various measurement programs that will be using this system the scanner must be able to operate within specifications at up to a 20 degree tilt angle and be able to operate up to a 45 degree tilt angle without permanent stress or damage on the scanner assembly. The offeror must provide mechanical analysis or actual measured data on an equivalent scanner which provides information of the scanner performance at the 20 degree tilt angle.
5. The contractor must provide documentation to verify that the scanner system software will be able to interface to a (GFE) FARO SI Laser tracker and utilize its position accuracy for real time position correction and mapping.
6. The contractor must provide a Probe Roll stage with 360 degree rotational movement. This stage must be able to support the lowest frequency probe (WR450) when mounted at a 20 degree tilt.
7. Basic scanner requirements
 - Scan Area: 5' x 5'
 - Planarity: < .005" RMS
 - Corrected Planarity: < .002" RMS
 - Resolution (x,y,z axis): .0025"
 - Position Repeatability: .002"
 - Scan Speed (X, Y): X- 15 inches/sec
Y- 30 inches/sec
 - Z-axis probe movement: 4 inches
8. The center of scan area must be at least 60 inches above the bottom of the attachment points.

9. The number of mounting attachment points on the bottom of the scanner must have a minimum of 6 mounting points. The six bolt-hole sizes and depths must be able to support the entire unit up to 45 degree angle.
10. The system must include 2 RF Flexible cables that are a minimum of 20' in length and contain male SMA connectors on both ends.
11. The scanner must use stepper or servo type motors. Due to the outdoor nature of this scanner usage, the use of linear type motors is prohibited. The offeror must provide a handle held controller which controls the x,y,and z position of the probe. The offeror must provide a minimum of 40' of cable with this unit.
12. Probes, associated waveguide to coax adapters and absorber are required for each the following waveguide bands.
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|-----------|-----------------|
| a. WR 430 | 1.7 - 2.6 GHz |
| b. WR 284 | 2.6 - 3.95 GHz |
| c. WR 187 | 3.95 – 5.85 GHz |
| d. WR 137 | 5.85 – 8.2 GHz |
| e. WR 90 | 8.2 – 12.4 GHz |
| f. WR 62 | 12.4 – 18 GHz |
| g. WR 42 | 18 – 26.5 GHz |
| h. WR 28 | 26.5 – 40 GHz |
| i. WR 22 | 33 – 50 GHz |
13. The contractor must provide correction software which will allow mapping of the z-plane which will be used for structure changes when system is relocated.
14. The contractor must provide a complete computer system for control and storing of the data collected with this system. This must include a 20 inch flat panel display and at least two removable 500 GB storage devices.
15. The contractor must provide detailed documentation that describes the procedure that is used for installation and breakdown of the scanner unit.
16. The contractor must supply control and power cables, which are used in the system, that are a minimum of 40' in length.
17. The contractor must supply a single channel rotary joint that operates from 1-50 GHz which will be installed on the rotary probe stage.
18. The contractor must provide a minimum of 2-days of training on usage of both the systems controlling software and the data analysis software package. Additional 2-days of training will be required on integration and usage of the Laser Scanner with the contractor's controlling software. The training shall be for at least 5 people.

19. Since this scanner will be used outside, the contractor must provide vibration analysis, measured data or best estimate (described how this is estimated) of the amount of vertical arm deflection (in the +/- z-axis direction) when at a 20 degree tilt and when subjected to wind loading due to a 15 mph wind coming from the forward direction. The contractor must show that their design minimizes vibration effects in the vertical arm.

20. The contractor must provide the on site scanner installation and alignment at the Naval Research Laboratory Compact Range Facility.

21. The system must be able to interface with and utilize the various functionalities of the microwave receivers listed below to allow the controlling software to obtain both phase and amplitude of the antenna under test as a function of probe position. The contractor must provide documentation which shows that these microwave receivers are fully supported by their software measurement package and can be demonstrated to show functionality if required.

- a. Agilent PNA series analyzers
- b. HP 8722ES

22. The contractor must provide 1-year of technical phone support and a standard commercial warranty.

23. The contractor must provide analysis software with the following capabilities:

- a. Near-field transforms:
 - Planar
 - Cylindrical
 - Spherical
- b. Coordinate systems:
 - K-space (Planar only)
 - Az-over-EI
 - EI-over-Az
 - Theta-phi and others
- c. Linear and Circular polarization displayed.
 - Ludwig-3 (E_h/E_v)
 - Ludwig-2 (E_{az}/E_{el})
 - Ludwig-2 (E_{el}/E_{az})
 - Ludwig-2 (E_q/E_f)
- d. Hologram (Back projection)
- e. MTI compensation (planar only)
- f. Gain, Directivity
- g. Analysis Beamwidth, peak, side lobes levels

- h. Probe Correction Models:
 - Open-ended waveguide
 - Cosine
 - i. Aperture truncation and tapering (Planar only.)
 - j. Probe position compensation
 - K-Correction (planar only.)
 - k. Scripting capabilities (i.e. provide phase center determination from far field data)
24. The contractor's system must be able to provide the following measurements:
- a. Planar near-field
 - b. Cylindrical near-field
 - c. Spherical near-field
 - d. Far-field
 - e. Auto scan set-up
 - f. Continuous or stop motion scans
 - g. Bidirectional Scans
 - h. Drift Check
25. The contractor must provide plotting software that has the following minimum capabilities:
- a. Antenna patterns of:
 - Amplitude, Phase,
 - Principal, Pol Cross-pol
 - b. Plot Types:
 - Linear, polar, gray-scale,
 - Contour, 3D plots, and
 - Listings
 - c. Windows 95/98/2000/NT compatibility:
 - d. Plot Customization:
 - Scales Comments
 - Multiple on-screen plots
 - Multiple plot overlays