Specifications for an Antenna Measurement System

Description

The Radar Division at the Naval Research Laboratory is upgrading an existing Indoor Anechoic Chamber facility. This upgrade is to provide automated antenna-testing capabilities utilizing an existing N5245A PNA-X Agilent Network Analyzer and will provide antenna alignment utilizing an Azimuth/Elevation/Mast/Offset/Azimuth/Slide antenna positioning system and provide antenna analysis and measurement software. The following is a list of salient features required for this upgrade.

Antenna Measurement System – CLIN 0001

1. Antenna Positing Equipment:

1. Azimuth/Elevation Positioner
    a. Total Vertical load: min. 95 lbs
    b. Bending Moment: min 110 ft-lbs
    c. Delivered Torque (min.):
        i. Azimuth: 90 ft-lbs
        ii. Elevation: 90 ft-lbs
    d. Speed (max.)
        i. Azimuth: 2.0 rpm
        ii. Elevation: 600 deg/min (elevation)
    e. Accuracy:
        i. Azimuth: +/- 0.05
        ii. Elevation: +/- 0.05
    f. Max. Backlash: 0.08 (Azimuth and Elevation)
    g. Max Weight: 115 lbs
    h. Turntable Diameter: min 10”
    i. Max Height (0deg elevation): 14”

2. Linear Positioner
    a. Travel: 18 ft (complete unit not to exceed 20 ft max)
    b. Vertical load (min.): 1450 lbs
    c. Fore-Aft Bending Moment (min.): 3000 ft-lbs
    d. Side Bending Moment (min.): 3000 ft-lbs
    e. Width (max.): 28 inches
    f. Height (max.): 10 inches

3. Model Tower Base
    a. Travel (min.): 24 inches (front face of Az/EL positioner to center of rotation)
    b. Positioning: Manual Hand wheel travel on linear bearings

4. Azimuth Positioner
    a. Vertical load (min.): 8500 lbs
    b. Bending Moment (min.): 10,000 ft-lbs
    c. Delivered Torque: 400 ft-lbs
    d. Speed (min.): 1.5 rpm
    e. Accuracy: +/- 0.03 degrees
    f. Backlash (max.): 0.05
    g. Weight (max.): 200 lbs
    h. Turntable Diameter (min.): 20”
    i. Azimuth Slip Rings (min.): 30 contacts
    j. Azimuth Rotary Joint: DC-40 GHz, single channel, Type K
    k. Height (max): 13 inches

5. Mast Section
    a. 3-stage steel mast
    b. Stage 1: 10 deg wedge (Mates to Azimuth / Elevation pos.)
    c. Stage 2: Provides center of Azimuth / Elevation 86” off floor
    d. Stage 3: Provides center of Azimuth/ Elevation 64” off floor

6. Positioner Controller
    a. 6 axis (sequential) capability
    b. 2 Axis Display
    c. Course / Fine Speed control
    d. Emergency Stop button
    e. Remote control capability
    f. Velocity Display
    g. Position Offset Entry
    h. Axis Select
    i. BCD / Binary output
    j. TTL increment output
    k. Software selectable output
    l. Supported Sensors
        i. Dual Speed Synchro (1:1 & 36:1)
        ii. Single speed Synchro (1:1)
        iii. Incremental Encoder

7. Remote Control Unit
    a. Provides Axis Select
    b. Coarse / Fine Speed control
    c. Speed / Direction Control
    d. Limit Indicators

8. Cabling for Positioners

a. Cabling between control room and positioners (min): 40 feet
b. Cable for RCU (min): 40 feet

2. Antenna Measurement Software:

The measurement software integrated with the above hardware and GFE Network Analyzer shall provide the following capabilities:

1. Sequence Scripting
2. Variable Aspect Velocity Sampling
3. Online Documentation
4. Optimum Speed Determination
5. Plot capture Formats to .jpg, .bmp, .dib
6. One button testing
7. Real Time Plotting
8. Long File Name Support
9. File Concatenation
10. CSV import capability
11. File Export to ASCII, Matlab or Mathematica formats
12. Analysis
    a. Polarization Axial Ratio
    b. Tilt Angle
    c. Sense Analysis
    d. Directivity
13. CP Analysis
    a. CP Beam Peak
    b. CP Beamwidth
    c. CP Sidelobe
    d. CP Axial Ratio
    e. CP Gain

3. PNA Software Driver:

1. Provide software support for a N5245A PNA-X
2. Provide multi-frequency and multiple (non-switched) ratioed, unratioed, reverse frequency sweeps, and S-parameter measurements.

4. Software Maintenance and Support:

1. Provide 1 year software maintenance and support
    a. This includes all updates, enhancements, new features and bug fixes for all purchased software and provides priority status technical consultation via
        i. Telephone
        ii. Email

iii. Fax

5. System Controller:

1. Intel Quad Class computer: 2.6GHz or Higher
2. Minimum of 4 GB of RAM
3. I GB Video Card
4. Two removable 500 GB HDD
5. DVD +/- RW
6. 24 inch (minimum) Digital Flat Color Monitor
7. USB Key Board
8. USB Optical Mouse
9. Microsoft Windows 7 (latest service pack)
10. Microsoft Office 2007 Basic
11. Adobe Acrobat Reader

6. Color Laser Printer:

1. HP LaserJet CP4525n (or equivalent)
2. 512 MB RAM
3. 42 ppm Black
4. 42 ppm Color
5. 1200 x 1200 dpi
6. PCL6/5c/Postscript Level 3
7. High Speed USB

7. Control Room Rack:

1. EIA Control Rack
2. AC Power Distribution
3. 200 CFM Fan (CFM levels required to maintain safe operation)
4. Rail Kit
5. 5.25" Drawer
6. PNA Keyboard Shelf
7. Mounting Hardware

<u>Documentation – CLIN 0002</u>

1. Provide System Design and Engineering documentation 30 days before delivery.

<u>System Delivery/Installation – CLIN 0003</u>

1. The contractor must deliver CLIN 0001 within 180 days of award.

2. The contractor shall install the system within 30 days of delivery of CLIN 0001 at NRL, Washington, DC. Installation of the system must include all hardware and software components necessary to operate the equipment to meet the specifications.

3. The price of the system must include shipping cost to NRL, Washington, DC.

Testing – CLIN 0004

1. Site Functional Test within 30 days of delivery.

Warranty – CLIN 0005

1. The system must include a 1-year factory warranty that covers all parts and labor. The 1-year warranty will become effective after commissioning by a certified technician.

NRL will provide the following:

1. N5245A (2 channel) PNA-X network analyzer
2. RF cabling between analyzer and DUT
3. RF cabling between analyzer and receive antenna
4. Clean work area (area will be cleared out for ease of access)
5. Support for loading / unloading hardware to chamber area. This includes assistance from NRL riggers for heavy objects.
6. AC power