ANTENNA RF / MICROWAVE TESTING

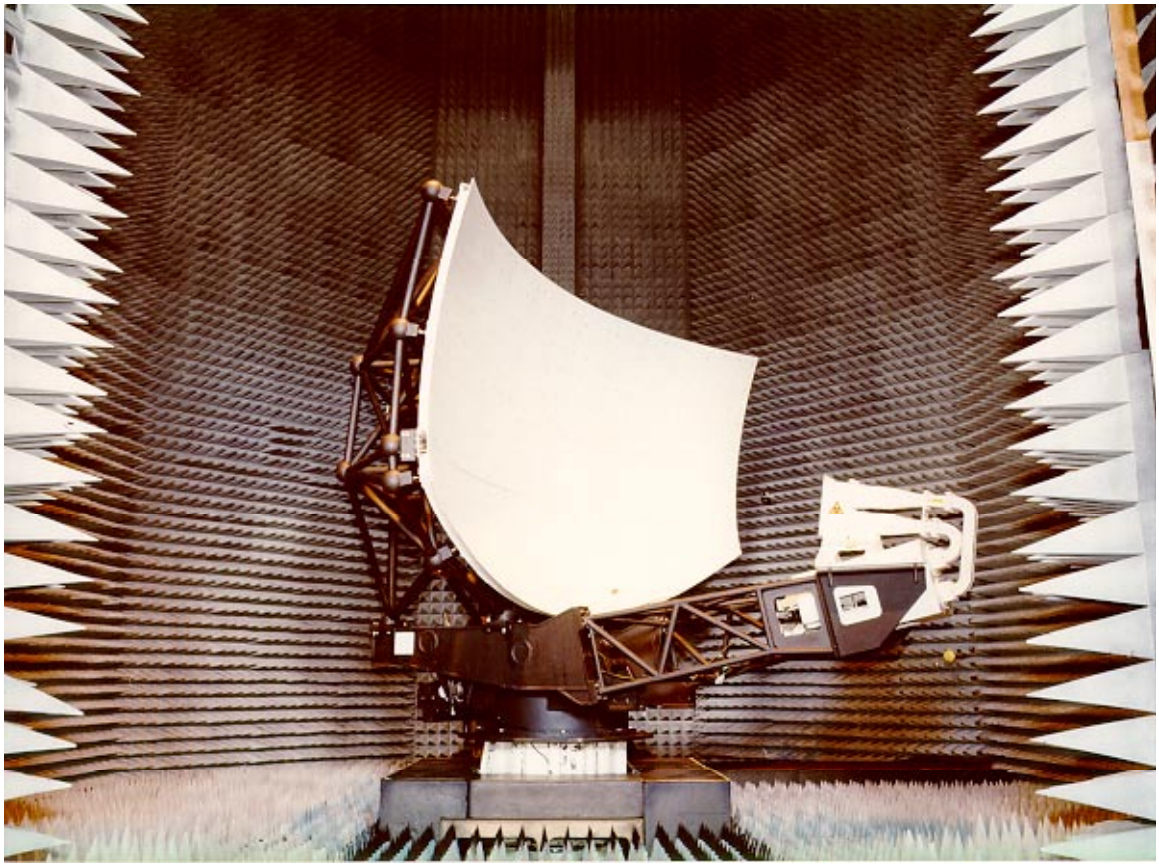
Stoke-on-Trent, December 2003.

ANTENNA RF / MICROWAVE TESTING

Every antenna manufactured by Easat is subjected to RF testing in an independent ISO 9001 accredited microwave antenna test facility.

The main features of the measurement system are:

- Near-field sampling;
- Controlled environment;
- Diagnostic capability using inverse Fourier transform;
- Higher accuracy of measurements than outdoor far-field ranges, especially for surface surveillance radar applications;
- Fully calibrated and certified.



Measurement data

Each measurement set fully characterises the radiation patter at any one frequency. This includes full characterisation of the polarisation (co and cross polar, linear and circular components). The radiation pattern data may be presented as conventional rectangular radiation pattern plots, or as contour plots of surface plots in two dimensions. Polarisation data such as axial ratio may also be plotted in contour format. Measured data can also be supplied in digital form for further processing.

Gain measurements

Gain measurements are made with reference to a pyramidal horn. A complete range of standard gain horns is available to cover the microwave bands.

Positioner and probe systems

The azimuth positioner includes a multi-channel slip-ring system to connect equipment for control of the antenna under test, such as power supplies, signals for phased-array beam control and mechanical sensors, and to connect extra instrumentation if required. A high accuracy angle encoder and an RF rotating joint form part of the measurement system. The azimuth positioner axis of rotation remains vertical to within extremely tight tolerances with the antenna mounted.

A laser-based system ensures that the probe antenna moves on a truly vertical reference line and that its height can be accurately recorded. Horizontal and vertical polarisations are measured simultaneously, together with their relative phases. The data collection is completely computer controlled; near to far-field processing and all subsequent processing is done off line.

Measurement uncertainty

- Uncertainty of peak gain measurement: ± 0.3 dB;
- Chamber reflectivity better than -50dB.

Diagnostics

A proprietary suite of diagnostic software can produce near-field holographic images of the antenna under test and identify particular radiating features. Reflector profiles can be directly determined instead of taking indirect and time consuming mechanical profile measurements. The effect of repositioning a feed in a reflector antenna can be determined without the need to take additional measurements. Individual array elements can be imaged for phased-array alignment and detection of defective elements.

Quality control

Procedures to ensure the measurement facility is performing to specification are carried out at six monthly intervals as a part of ISO9001 approval. Certificates of conformance can be issued as a proof that the work is performed in accordance with a written test schedule.

References

A good selection of technical papers on near-field antenna testing can be found on www.nearfield.com/amta.

ACKNOWLEDGEMENT

This application note is based on materials provided to Easat by Mr Andrew Tyler from BAE Systems Electronics Limited, and from various contributors to near field measurement development at University of Sheffield, Queen Mary College, London and AMTA.

Disclaimer

This is a general document giving an overview of antenna microwave testing capabilities. For details of the antenna testing program for a particular application, please, contact **Easat.**