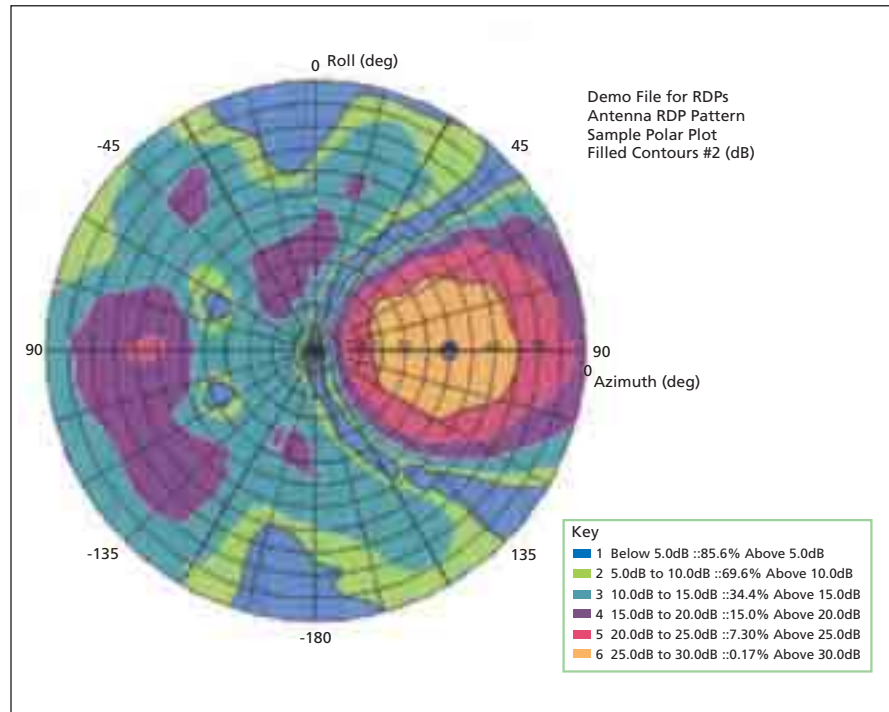# Displaying and Analyzing Antenna Radiation Patterns

*Lyndon B. Johnson Space Center, Houston, Texas*

Radiant Energy Display and Analysis Software Package (REDAP) is a computer program for processing antenna-radiation-pattern data that have been pre-processed by a data-collection program and stored in a spherical-coordinate format. REDAP is designed specifically for application to data generated in testing of antennas in an anechoic chamber at Johnson Space Center; parts of REDAP may be reusable for processing antenna-test data collected elsewhere. REDAP provides a graphical user interface (GUI) and executes mathematical and plotting routines on a personal computer. The routines include statistical calculations (e.g., maximum, minimum, 3-dB-falloff points, and percent coverage); addition and subtraction of offsets; multiplication and division by scaling factors; and computation of circular-polarization characteristics from linear-polarization measurement data.

REDAP can display radiation-pattern data in a variety of formats that include, for example, lines plotted on rectangular coordinates, images of radiation patterns in three-dimensional space, and contour plots on polar coordinates (see figure). All characteristics of a display, including contents of plots, coordinate axes, marks, colors, and the destination



Demo File for RDPs
Antenna RDP Pattern
Sample Polar Plot
Filled Contours #2 (dB)

Key
1 Below 5.0dB ::85.6% Above 5.0dB
2 5.0dB to 10.0dB ::69.6% Above 10.0dB
3 10.0dB to 15.0dB ::34.4% Above 15.0dB
4 15.0dB to 20.0dB ::15.0% Above 20.0dB
5 20.0dB to 25.0dB ::7.30% Above 25.0dB
6 25.0dB to 30.0dB ::0.17% Above 30.0dB

A **Sample Polar Plot** illustrates one of the formats that can be generated from REDAP.

(e.g., printer or file) to which the display data are to be sent are controlled through a series of GUI dialog boxes.

*This work was done by Jim Siekierski of Johnson Space Center and Ash Henson of Lockheed Martin Corp. Further information is contained in a TSP (see page 1). MSC-23210-1*

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# Payload Operations Support Team Tools

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Payload Operations Support Team Tools is a software system that assists in (1) development and testing of software for payloads to be flown aboard the space shuttles and (2) training of payload customers, flight controllers, and flight crews in payload operations. POST Tools includes the following subsystems:

• The Orbiter-in-a-Box Tool is an embedded real-time operating-system model of the space-shuttle orbiter avionics. In conjunction with the Command and Data Tool described below, the Orbiter-in-a-Box Tool (see figure) enables testing of the application software of the Cargo PC, which is a computer through which a space-shuttle crew can monitor and control payloads.

• The Shuttle Mission Simulator (SMS) Model Tool is a suite of software tools that payload customers can use to cre-
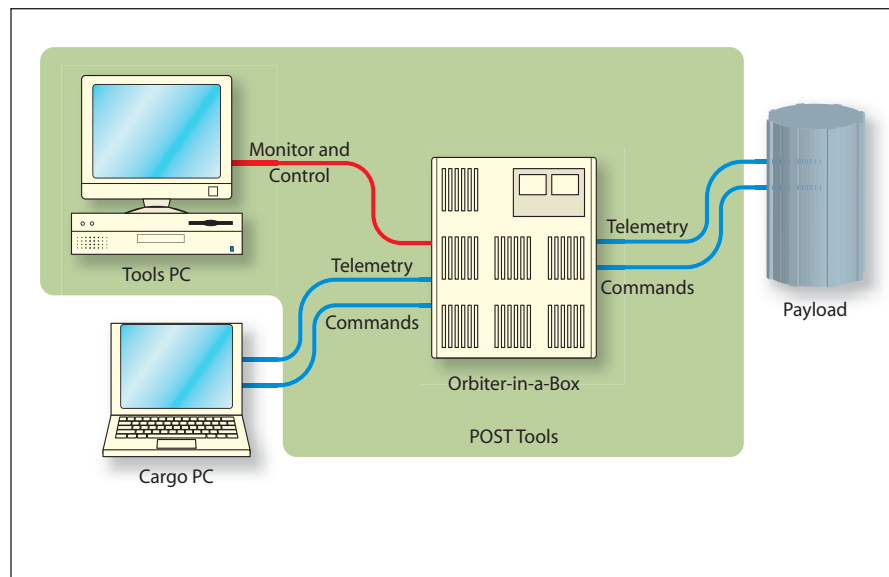


An **Orbiter-in-a-Box** can be used to test the orbiter interface between the cargo PC and the payload.