

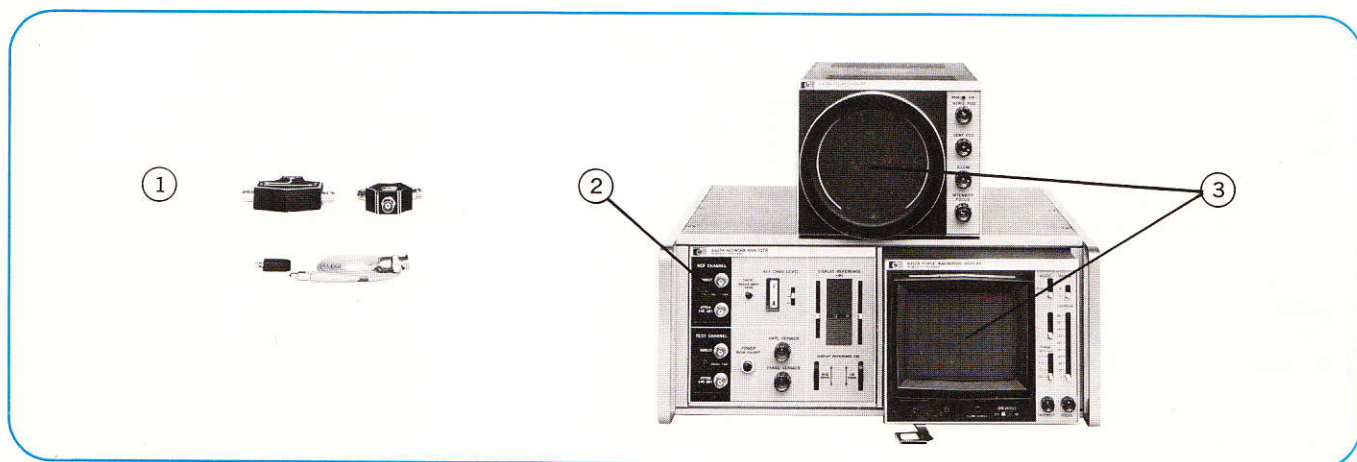
NETWORK ANALYZERS



NETWORK ANALYZER

Accurate measurement of amplitude & phase

Models 8407A, 8412A, 8414A, 11651A, 11652A, 11654A



8407A Network Analyzer System

The 8407A system accurately measures amplitude ratio and phase difference between two signals on a swept basis from 100 kHz to 110 MHz. A wide variety of transducers and displays offers the ideal solution to practically any application in this frequency range. The system, shown above, consists of:

Transducers—process your device's response for accurate measurement.

The 11651A Transmission kit allows accurate transmission measurements. A power splitter splits the source's output to provide both TEST and REFERENCE signals. The kit includes three matched low-leakage cables for wide dynamic range measurements.

The 11652A Reflection-Transmission Kit allows you to measure return loss, VSWR, complex impedance and reflection coefficient, as well as transmission. Included are a directional bridge, precision terminations, and cable.

If you prefer to probe circuits directly, the 11654A Passive Probe Kit allows minimum disturbance voltage and current measurements.

8407A Mainframe—the heart of the system. The 8407A accepts signals from the transducers and processes them for convenient display.

Since the 8407A is a ratiometer, it requires both a TEST and REFERENCE channel. The reference signal is held constant within the instrument and the test signal compared to it. These signals then go to the display where both amplitude and phase are measured.

The DIRECT input operates at levels of -10 to -90 dBm. For high gain measurements, the ATTENUATED input accepts signals ranging from $+20$ to -50 dBm. By using the two in combination, ratios to $+90$ and -100 dB can be measured with no additional accessories (up to 80 dB range is possible on each input separately).

The 8407A tracks two Hewlett-Packard sources: the 8601A, 0.1 to 110 MHz Generator/Sweeper, and the 8690B/8698B, 0.4 to 110 MHz Sweeper. Their 0.5% linearity and accurate sweep widths en-

hance 8407A capability. Tracking eliminates unwanted responses from source harmonics and spurious signals and allows extremely sensitive, low noise detection.

A warning light on the front panel tells you if an improper TEST/REF ratio is applied. This prevents erroneous measurements.

Another convenience is the DISPLAY REFERENCE. It allows you to read directly off the front panel the number of dB measured without having to mentally add or subtract values.

The 8407A has 50-ohm BNC inputs. Thus, you use only BNC cable or detachable probes simply by connecting them to the inputs. Probe power is also supplied at the front panel.

Displays—to see best what your device is doing.

The 8412A Phase-Magnitude Display is an accurate oscilloscope readout. It displays amplitude and phase vs. frequency. It has 80 dB $\pm 180^\circ$ display range with selectable resolutions up to 0.25 dB and 1° per division, allowing resolution of 0.05 dB and 0.2° .

The 8412A is ideal for making transmission measurements of gain or attenuation and phase shift or for measuring return loss (VSWR).

Amplitude and phase may be displayed either separately or simultaneously.

The 8414A is a polar display having 30 dB and 360° range. If you want Smith Chart displays of complex impedance or reflection coefficient, the 8414A is a natural. The 8414A includes Smith Chart overlays with full scale values of 0.2, 1.0, and 3.16.

Transmission Measurements

The 11651A Transmission Kit provides you with all the equipment necessary to make accurate transmission measurements from 0.1 to 110 MHz. A power splitter and matched, low-leakage cables assure you of phase matching (so you don't need a line stretcher) and negligible crosstalk.

Some common applications are shown on the next page. Others include measuring cable loss, attenuator accuracy, feedback amplifiers, coupler flatness and directivity. The ability to measure phase greatly enhances the power of your measurement—now you can design and test your devices for linear phase shift (constant group delay) to reduce signal distortion through the device.