

DOCUMENTATION SUR L'OSCILLOSCOPE HEWLETT-PACKARD HP 8414A

FICHE N° 3914

PRÉSERVER
SAUVEGARDER
VALORISER

Période de fabrication : 1950-1974
Fabricant : Hewlett-Packard Company
Domaines : Physique
Sous-domaines : Electronique
Organisme : Université de Rennes
Ville : Rennes
Modèle : HP 8414A
Matériaux : Papier

Description

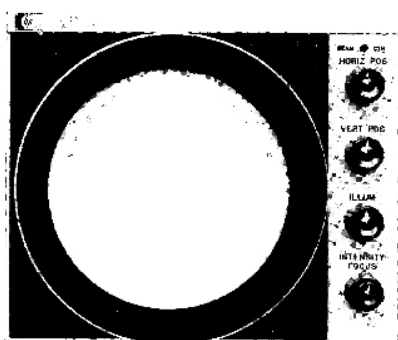
Un manuel d'utilisation de l'oscilloscope HP 8414A (Phase-Magnitude Display) a été édité par Hewlett-Packard en 1973. Ce manuel de 115 pages décrit dans le détail le fonctionnement de l'appareil, ses propriétés, les circuits électroniques et les tests de mesures possibles. Cet appareil est aussi présenté dans le catalogue général Hewlett-Packard de 1969 (page 470) mais aussi de 1982 (page 498). Il est souvent associé à l'analyseur de réseau 8410A. Une présentation sommaire figure aussi dans le journal de HP de février 1967.

Utilisation

Cet oscilloscope était très utilisé en travaux pratiques d'électronique à la Faculté des Sciences de Rennes dans les années 1970-1980. On pouvait tracer des diagrammes de phases (degrés) et d'amplitudes (dB) de circuits électriques et électroniques et observer leur évolution en fonction de la nature des composants et de la fréquence. Les échelles sont de 30 dB pour le gain et de 360 ° pour l'angle de phase. On peut aussi traiter des questions comme l'impédance complexe ou les coefficients de réflexion et tracer des abaques de Smith. L'abaque de Smith est un nomogramme reliant le rapport des ondes guidées incidentes et réfléchies le long d'un guide de propagation, à la variation d'impédance caractéristique le long de ce guide.

POLAR DISPLAY

8414A



HEWLETT
PACKARD

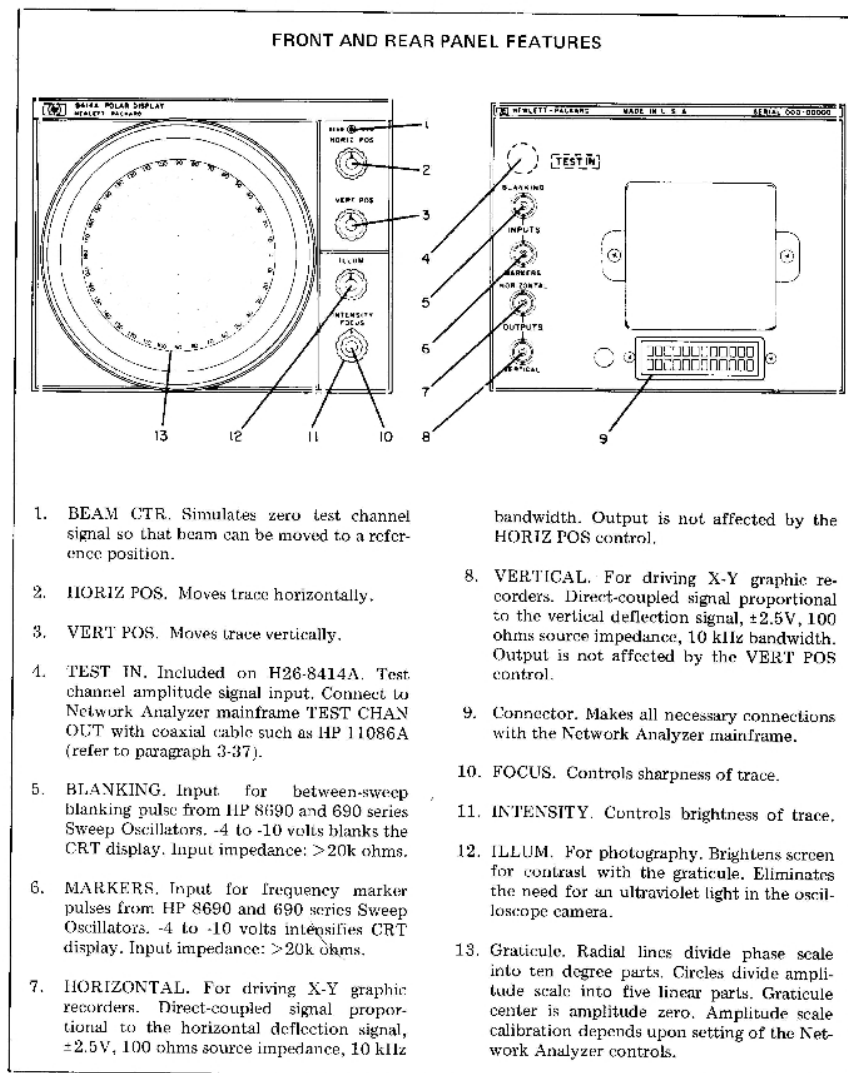


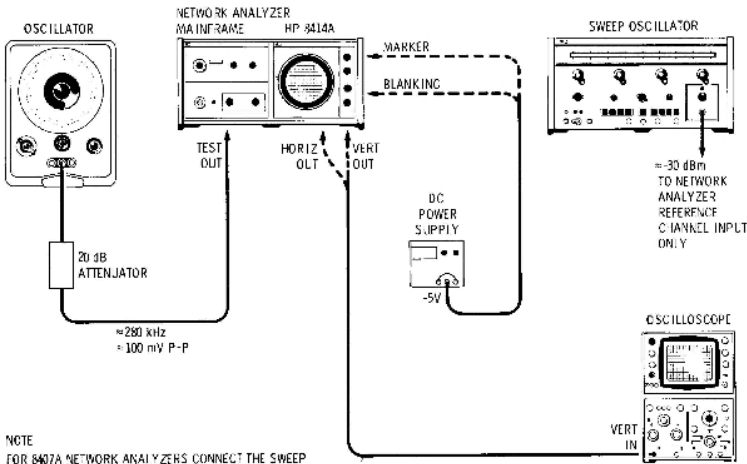
Figure 3-1. Model 8414A Front and Rear Panel Features

PERFORMANCE TEST

OPERATING PRECAUTIONS

MECHANICAL SHOCK. Do not bump or jar the Polar Display as misalignment of the CRT gun may result.

MAGNETIC FIELDS. Do not place the Polar Display near a sweep generator containing a BWO which has an unshielded magnet or the CRT will be permanently magnetized, causing poor focus. Separate the 8414A from any magnetic source by at least two feet.



EQUIPMENT

20 dB ATTENUATOR	HP 8491A
OSCILLATOR	HP 3165C
NETWORK ANALYZER	HP 8410A/8411A OR HP 8407A
SWEEP OSCILLATOR	HP 8690-SERIES WITH RF UNIT AS REQUIRED
OSCILLOSCOPE	HP 180A/1801A/1821A
DC POWER SUPPLY	HP 721A

Figure 4-1. Performance Test Equipment Setup

CHOOSE YOUR SYSTEM BY APPLICATION



NETWORK ANALYZERS

APPLICATION	TRANSDUCER UNIT	8413A PHASE—GAIN INDICATOR	8414A POLAR DISPLAY UNIT
TRANSMISSION TESTS ONLY Wide Dynamic Range Filters, attenuators, paramps, IC amplifiers, modulators, mixers Insertion Loss and Phase (Residual Conditions) Unloaded PIN modulator, coaxial pads, switches, cables, variable attenuators, pass band of filters Component Matching Pads, cables, antennas, amplifiers, phase shifters Group Delay Filters, cables, system components 11-12.4 GHz	Accessories including adapters, pads, air lines are recommended (11587A). 8740A Transmission Test Unit 60 dB dynamic range for viewing amplitude excursion of attenuation or gain. Correct power and relations between reference and test channels must be used according to type of response to be viewed. Power levels will not be the same for attenuators as for gain. Comparison against amplitude and phase offsets. Coaxial pads in reference and test channels reduce mismatch ambiguity in measurement of low amplitude values. Standard device in reference channel, unknown in test channel. Actual evaluation of test device from standard may be plotted directly. Physical length is compensated in reference channel. Corrections must be made with line stretcher to offset compensation.	8413A recommended for all transmission measurements. Accurate meter readout for CW measurements. If offset attenuator allows greater resolution about any amplitude. Phase offset in 10° steps allows greater resolution about any phase shift. Swept frequency readout is provided. Five analog outputs at 50 mV/100 and 10 mV/deg. Readout to within 1 dB and 6° provided with amplitude and phase offsets. Resolution from meter is then to 0.5 dB and 1°. Generally used where low insertion. CW tests can be made accurately with meter. Residual tracking between channels as a function of frequency can be eliminated by X-Y recording the system response at the desired offset. Linearity of display on scope given quick indicators of overall group delay. By measuring phase for a given frequency change the group delay can be computed.	See 8413A for X-Y readout of transmission characteristics. Direct magnitude and phase readout of transmission coefficient of test device. Either CW or swept frequency display in polar coordinates. Markers allow frequency readout. The polar plot provides easy direct readout of both magnitude and phase for transmission coefficient. An X-Y recording allows resolution to within 1% of full scale. CW tests of amplitude and phase variation shown as a function of frequency. CW or swept frequency display on CRT does not eliminate tracking error. X-Y recording allows greater resolution but tracking must be subtracted. With X-Y sweep and phase read directly from polar display, group delay may be computed quickly. Linearity of phase with frequency is not readily available.
REFLECTION TESTS ONLY Reflection Coefficient 0.5-10.0 (VSWR 1.0-∞) Impedance Antennas, loads, system components, impedance matching, cavities, filters, circuit design and test dynamic tuning on swept frequency basis.	Accessories including adapters, air lines, pads, shorts, are recommended (11587A). 8741A Reflection Test Unit 1-2 GHz. 8742A Reflection Test Unit 1-12.4 GHz. Pads in reference and test channels reduce mismatch ambiguity and allow greater measurement range. High directivity reflectometer systems allow accurate measurement of reflection coefficient. Standard reflectometer systems allow broadband coverage.	CW and swept measurement; or return loss magnitude and phase referred to a short circuit. Residual tracking may be eliminated using X-Y recorder. CW and swept return loss. Converting to return Smith Chart with return loss and phase angle is time consuming. Use 8414A for direct Smith Chart plots.	8414A recommended for all reflection measurements. Readout of reflection coefficient directly in both magnitude and phase. CW or swept frequency measurements appear as a dot per frequency on scope face. If attenuator allows excursion and compression of scope scale to provide direct readout. CW and swept frequency display with transparent Smith Chart overlay for direct normalized impedance readout. Overlays are available for compressed, normal and expanded Smith Charts.
TRANSMISSION AND REFLECTION TESTS Full Two-Port Characterization 1-2.0 GHz. Component Tests Amplifiers, unilateral and bilateral devices, filters, attenuators, phase shifters.	Accessories including adapters, pads, shorts are recommended (11587A). 8745A 9-Parameter Test Set Push button selection of S11, S21, S12, S22. Use 8745A with 11604A Universal Extension calculator of plane of connection to allow correct interpretation of measurements. Use 11500A transfer fixture and 11601A Calibration Kit for TO-5 and TO-18 type transistors, 11602A fixture fixture and 11603A Calibration Kit for TO-18 and TO-77 type transistors.	Scope X-Y recorder, or meter readout of selected parameters. CW with meter readout or swept with scope readout to show full response of device particularly for transmission characteristics S21 and S12. The input and output reflection parameters S11, S22 can be displayed as return losses. Read amplitude and phase response of transistors in dB and degrees directly from meter for CW or from oscilloscope for swept frequency. Allows rapid characterization under a variety of bias conditions.	Polar readout of parameters of each port of a device. CW and swept Smith Chart readout of all 9-Parameters. Direct impedance readout of S11 and S22 with Smith Chart overlays. Transmission coefficients S21 and S12 may be read directly from linear scale at phase shift indicated. Read amplitude and phase response of transistors directly from polar plot for either CW or swept measurements. Test channel gain control allows gain and isolation as well as input and output impedance to be displayed.
Single Port Characterization 2.0-12.4 GHz. Component Testing Amplifiers, pads, attenuators, phase shifters, cables, joints. Waveguide —X-Rect, P-Rect, or others of 1000 psi. Reflection or transmission depending on point of connection in system.	8743A Transmitter/Reflection Test Unit Push button Selection of S11, S21 or S12, S22, depending on device under test and connection. The 11605A Probe arm consists of coaxial seal joints and right air line allows rigid connection to any geometrical configuration. 8747A Waveguide Transmission/Reflection Test System Symmetrical bridge system using HP 752 directional couplers and a special power splitter. See Application Note 92.	CW with meter readout or swept with scope readout to show full response of device particularly for transmission characteristics S21 and S12. The input and output reflection parameters S11, S22 can be displayed as return losses. Read amplitude and phase response of transistors in dB and degrees directly from meter for CW or from oscilloscope for swept frequency. Allows rapid characterization under a variety of bias conditions.	Polar readout of parameters of each port of a device. CW and swept Smith Chart readout of all 9-Parameters. Direct impedance readout of S11 and S22 with Smith Chart overlays. Transmission coefficients S21 and S12 may be read directly from linear scale at phase shift indicated. Read amplitude and phase response of transistors directly from polar plot for either CW or swept measurements. Test channel gain control allows gain and isolation as well as input and output impedance to be displayed.

NETWORK ANALYZERS



NETWORK ANALYZER

Broadband measurement systems
to suit your application

8410A Network Analyzer System

8410A Mainframe for readout modules includes tuning circuits, IF amplifiers, and precision IF attenuator.

8411A Harmonic Converter Converts 2 RF input signals (110 MHz-12.4 GHz) into 20 MHz IF signals.

11567A Accessory Kit

Couplers

Accessories normally used for transmission and reflection tests contained in sturdy carrying case.

Transmission Only
0.10 - 12.4 GHz

Reflection Only
0.10 - 2.0 GHz

Reflection Only
2.0 - 12.4 GHz

Phase/Gain

Polar Display



8740A Transmission Test Unit

Transmission measurements only. RF input signal is split into reference and test channels. Calibrated line stretcher in test channel varies the linear phase shift between channels.



8741A Reflection Test Unit

Reflection measurements only. Wide band reflectometer. Calibrated line stretcher in reference channel varies the linear phase shift between channels.



8413A Phase-Gain Indicator
Meter readout module for 8410A Mainframe. Provides CW display of relative amplitude and phase between input signals. Auxiliary outputs provide swept frequency displays on a scope or X-Y recorder.



8414A Polar Display
CRT polar display module for 8410A Mainframe. Provides swept frequency display of relative amplitude and phase between input signals. Smith Chart overlays give direct impedance readout. Auxiliary X-Y outputs allow high resolution polar and Smith Chart plots.



8742A Reflection Test Unit

Reflection measurements only. Ultra-wide band reflectometer. Calibrated line stretcher in reference channel varies the linear phase shift between channels.

Transmission/Reflection
(Waveguide)
X-Band (8 - 12.4 GHz)
P-Band (12.4 - 18 GHz)

Transmission/Reflection
(Transistors)
0.10 - 2.0 GHz
two-port

Transmission/Reflection
2.0 - 12.4 GHz



X8747A/P-8747A Waveguide Reflection/Transmission Test Unit
For reflection and transmission measurements of waveguide components. Has calibrated sliding short for varying phase shift between channels. Two models, for X-band and for P-band.



8746A S Parameter Test Set
Four pushbuttons (S_{11} , S_{22} , S_{21} , S_{12}) switch between reflection and transmission response of two-ports. Calibrated line stretcher in reference channel varies linear phase shift between channels.



8743A Reflection/Transmission Test Unit
Two pushbuttons switch between reflection and transmission measurements. Calibrated line stretcher in reference channel varies linear phase shift between channels.

HEWLETT-PACKARD JOURNAL

Cover: A NEW MICROWAVE INSTRUMENT SWEEP-
MEASURES GAIN, PHASE, IMPEDANCE
WITH SCOPE OR METER READOUT; page 2

See Also: THE MICROWAVE ANALYZER IN THE
FUTURE; page 11
S-PARAMETERS THEORY AND
APPLICATIONS; page 13



FEBRUARY 1967

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Pour nous citer :

Base de la Mission nationale de sauvegarde et de valorisation du patrimoine scientifique et technique contemporain, PATSTEC, Documentation sur l'oscilloscope Hewlett-Packard HP 8414A (Hewlett-Packard Company),
<https://www.patstec.fr/ressources/objets/detail?id=15932>, consulté le 2026-07-28