HP 89400 Series
Vector Signal Analyzers

Configuration Guide

Digital Video Modulation Analysis

Single Button Radio Test Personalities

The Hewlett-Packard 89400 series vector signal analyzers perform critical measurements of signal quality quickly and easily. Powerful yet flexible digital signal processing furnishes insights into signal characteristics that, in the past, often required special purpose or customized test systems.

Three analyzers comprise the product family. Two RF versions include the HP 89441A, which operates from dc to 2.65 GHz with enhanced sensitivity and dynamic range, and the standard performance HP 89440A, with coverage to 1.8 GHz. One RF input channel is standard on both models, with options for an RF source and a second baseband-only input.

For those concerned only with signals below 10 MHz, the HP 89410A provides the same signal processing and analysis as the models above, less the RF front-end section. A built-in signal source is standard, and a second input channel is optional.

The HP 89411A 21.4 MHz downconverter adapts the HP 89410A for use with user-furnished front ends. In conjunction with an HP 8590- or HP 70000-series spectrum analyzer (or external receiver with a 21.4 MHz IF output), frequency coverage into the microwave region can be readily obtained.

A wide selection of options allows HP 89400 series vector signal analyzers to be configured for specific applications. Measurement personalities bring one-button simplicity to common measurement tasks. The following pages of this guide show recommended configurations for several key application areas.

For complete descriptions and technical specifications for these analyzers and their options, please consult the HP 89400 series technical data sheets and product brochure. An up-to-date index of all HP 89400 literature is available electronically by sending an e-mail message containing the single word "HP89400" to *lit_index@lsid.hp.com.*
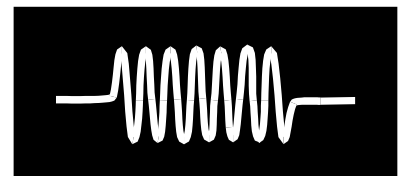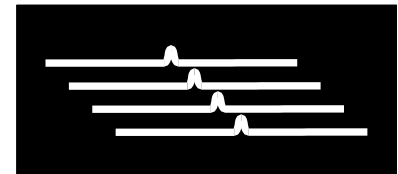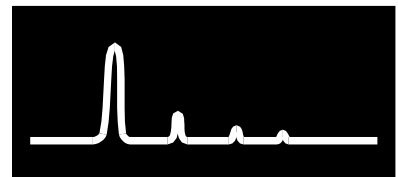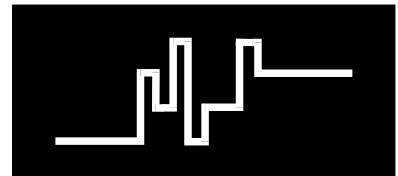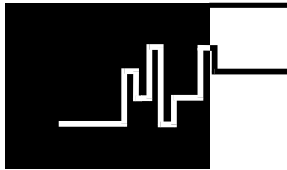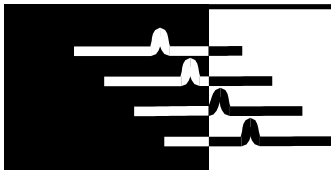
Digital Communications

For designers of current and next-generation mobile or cellular radios, personal communication systems or other systems that transmit or receive voice, video or data signals.
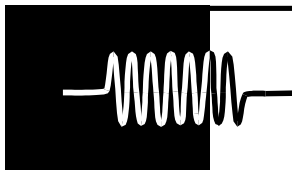
Recommended models

HP 89441A	PCS, DECT, PHP, wireless LAN and other systems to 2.65 GHz	
HP 89440A	NADC, GSM, PDC digital video and other systems to 1.8 GHz	
HP 89410A	Baseband (I + Q) signals from dc to 10 MHz	

Recommended options

Option AYA	Vector Modulation Analysis	Specialized analysis tools and displays for complex modulation formats
Option AY7	Second 10 MHz Input Channel	To view RF and baseband signals simultaneously, or for complex (I + Q) signal inputs
Option AY8	Internal RF Source	Generate custom signals or replay captured waveforms for test stimulus
Option UFG	Extended RAM, Additional I/O	Recommended for faster, more flexible operation in vector demodulation mode

Other options which may be useful

Option 1C2	HP Instrument BASIC
Option AY9	Extend Time Capture Memory to 1 Msample
Option AYH	Digital Video Modulation Analysis

Signal Monitoring

For government, regulatory and other surveillance functions that monitor spectrum occupancy, identify unknown signals and measure or verify communications signals off-air.
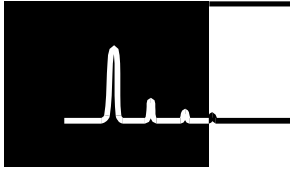
Recommended models

HP 89441A	Spectrum monitoring to 2.65 GHz with increased sensitivity and dynamic range	
HP 89440A	Spectrum monitoring to 1.8 GHz	
HP 89410A	High-speed analysis of recorded or externally downconverted signals at baseband frequencies up to 10 MHz	

Recommended options

Option AYB	Waterfall and Spectrogram Displays	Specialized display formats to portray the time history of spectrum events
Option UFG	4 MB Extended RAM	Deeper display memory enhances operation of waterfall and spectrograms
Option UG7	Advanced LAN Support	Allows front panel control and display viewing from remote locations via LAN

Other options which may be useful

Option AYA	Vector Modulation Analysis
Option AY7	Second 10 MHz Input Channel
Option AY9	Extend Time Capture Memory to 1 Msample
Option 1C2	HP Instrument BASIC

Burst, Transient and Pulsed Signal Analysis

For measurements involving sonar, radar, medical imaging, data storage and other signals that vary with time, or whose transient behavior must be precisely characterized.

Recommended models

HP 89441A	Signals from dc-2.65 GHz with pulse bandwidths to 7 MHz	
HP 89440A	Signals from dc-1.8 GHz with pulse bandwidths to 7 MHz	
HP 89410A	Acoustic, data and baseband signals entirely below 10 MHz	

Recommended options

Option AY7	Second 10 MHz Input Channel	View and compare two baseband signals for phase and ratio measurements
Option AYB	Waterfall and Spectrogram Displays	Special display modes that can portray the entire time history of an event
Option AY9	Extend Time Capture Memory to 1 Msample	Capture longer transient signals for post-analysis
Option UFG	Extended RAM, Additional I/O	Recommended with Option AYB, for deeper display memory and enhanced data storage
Option AY8	Internal RF Source	Replay captured events, or create custom stimulus waveforms

Other options which may be useful

Option AYA	Vector Modulation Analysis
Option 1C2	HP Instrument BASIC

General Spectrum Analysis

For traditional spectrum analyzer applications including harmonic and spurious analysis, phase noise measurements, modulation analysis and component measurements.

Recommended models

HP 89441A	Signals from dc-2.65 GHz, or for measurements requiring the highest possible sensitivity and dynamic range
HP 89440A	Signals from dc-1.8 GHz
HP 89410A	Baseband and IF signals below 10 MHz

Recommended options

Option AY7	Second 10 MHz Input Channel	Allows ratio measurements of amplitude and phase, or comparisons of multiple test devices
Option AY8	Internal RF Source	High performance tracking source with arbitrary waveform capability

Other options which may be useful

Option AYA	Vector Modulation Analysis
Option AYB	Waterfall and Spectrogram Displays
Option AY9	Extend Time Capture Memory to 1 Msample
Option UFG	Extended RAM, Additional I/O
Option 1C2	HP Instrument BASIC

Measurement Personalities

Automate common radio measurements such as adjacent channel power, occupied bandwidth and modulation accuracy.

HP 89450A	DMCA Radio Test Personality	One-button measurements for RCR-32 Digital Multi-Channel Access (DMCA) radio systems. (Requires option AYA)
HP 89451A	Radio Test Personality	One-button measurements for NADC, PHS, PDC and user-configurable system formats. (Requires option AYA)

Accessories

The following products are compatible with the HP 89400 series analyzers and can help complete your measurement solution.

Probes

HP 41800A	Active probe	5 Hz - 500 MHz, 100 kΩ / 3 pF input impedance
HP 1141A	Active differential probe	dc - 200 MHz, 1 MΩ / 7 pF input impedance
HP 10020A	Resistive divider probe	1:1, 10:1 or 100:1, for 50Ω systems

Programmable switches

HP 3488A	Switch control unit
HP 3235A	Switch control unit

Preamplifiers

HP 8447D	Preamplifier	25 dB gain, 100 kHz - 1.3 GHz, NF <8.5 dB
HP 8449D	Preamplifier	25 dB gain, 100 kHz - 1.8 GHz, NF <8.5 dB

Minimum loss pad

HP 11852B Opt. CO4	50W - 75Ω minimum loss pad	Matches 50Ω analyzer input to 75Ω environment

User Training

Gain the skills to become efficient in configuring and operating your HP 89400 vector signal analyzer with three days of comprehensive, hands-on training.

HP 89400+24C	Scheduled course	Open enrollment; presented at HP location
HP 89400+24Y	Dedicated course	Closed enrollment; presented at your site

HP 89400 Series Vector Signal Analyzers
Ordering Information

HP 89441A Vector Signal Analyzer, DC-2.65 GHz
HP 89440A Vector Signal Analyzer, DC-1.8 GHz
HP 89410A Vector Signal Analyzer, DC-10 MHz
HP 89411A 21.4 MHz Downconverter

HP 89450A DMCA Radio Test Personality
HP 89451A Radio Test Personality

Options available:

		HP 89441A HP 89441U	HP 89440A HP 89440U	HP 89410A HP 89410U	HP 89431A HP 89430A	HP 89411A	
AYA	Vector Modulation Analysis	•	•	•			Option UFG recommended
AYB	Waterfall and Spectrogram	•	•	•			Option UFG recommended
AYC	Freq. Reference Retrofit (reverses Opt. AY4)	•	•				Retrofit at service center only
AYH	Digital Video Modulation Analysis	•	•	•			Options AYA, UFG required
AY4	Delete Precision Frequency Reference	•	•		•		Retrofit unavailable
AY5	Precision Frequency Reference				•		Retrofit at service center only
AY7	Second 10 MHz Input Channel	•	•	•			
AY8	Internal RF Source	•	•		•		Retrofit at factory (HP 89440/430A) Retrofit at service center (HP89441/431A)
AY9	Extend Time Capture to 1 Msample	•	•	•			
UE2	Firmware Upgrade	•	•	•			HP 894XXU only
UFG	4 MB Extended RAM, Additional I/O	•	•	•			
UG7	Advanced LAN Support	•	•	•			Option UFG required
UK6	Commercial Calibration Certificate	•	•	•			Retrofit unavailable
1C2	HP Instrument BASIC	•	•	•			
1D7	50-75 Ohm Minimum Loss Pad	•	•				
1F0	PC-style Keyboard - U.S. version	•	•	•			Other keyboards available; consult sales office
AX3	Front Handle Kit	•	•	•	•	•	
AX4	Rack Flange Kit	•	•	•	•	•	
AX5	Flange and Handle Kit	•	•	•	•	•	
0B1	Extra Manual Set	•	•	•	•		
0BU	Extra Instrument BASIC Manuals	•	•	•			
0B3	Service Manual	•	•	•	•		
AVK	Printed Version of Online Help	•	•	•			
1BH	General Export License version	•	•	•			Retrofit unavailable
1BP	MIL STD 45662A Calibration with Test Data	•	•	•			Retrofit unavailable

Option upgrades

To retrofit any of the above options, specify upgrade model number **HP 89441U**, **89440U** or **89410U** and the codes for the options to be added. Unless otherwise noted, all options are customer installable.

Mainframe upgrades

To convert an existing HP 89410A to an HP 89441A or HP 89440A, order the appropriate model number below.
HP 89430A: Converts an HP 89410A to an HP 89440A.
HP 89431A: Converts an HP 89410A to an HP 89441A.

Additional options may be ordered at the same time using model number **HP 89410U** as described under "option upgrades".

Note: Older HP 89400 analyzers may require hardware upgrades at a Hewlett-Packard service center prior to conversion or option retrofits.