HEWLETT PACKARD

HP 35670A Dynamic Signal Analyzer

Product Overview

Versatile two- or four-channel high-performance FFT-based spectrum/ network analyzer

122 µHz to 102.4 kHz 16-bit ADC

The HP 35670A shown with Four Channels (option AY6)

Frequency Range	102.4 kHz 1 channel 51.2 kHz 2 channel 25.6 kHz 4 channel
Dynamic Range	90 dB typical
Accuracy	±0.15 dB
Channel Match	±0.04 dB and ±0.5 degrees
Real-time Bandwidth	25.6 kHz/1 channel
Resolution	100, 200, 400 & 800 lines
Time Capture	0.8 to 5 Msamples (option UFC)
Source Types	Random, Burst random, Periodic chirp, Burst chirp, Pink noise, Sine, Swept-Sine (option1D2), Arbitrary (option 1D4)

The HP 35670A is a portable two- or four-channel dynamic signal analyzer with the versatility to be several instruments at once. Rugged and portable, it's ideal for field work. Yet it has the performance and functionality required for demanding R&D applications. Optional features optimize the instrument for trouble-shooting mechanical vibration and noise problems, characterizing control systems, or general spectrum and network analysis.

Take the HP 35670A where it's needed!

Whether you're moving an instrument around the world or around the lab, portability is a real benefit. Small enough to fit under an airplane seat, the HP 35670A goes where it's needed. But there's more to portability than size. Like a nominal 12- to 28-volt dc power input and self-contained features that do not require external hardware, such as built-in piezoelectric integrated circuit power supply, analog trigger and tachometer inputs, and optional computed order tracking.

Versatile enough to be your only instrument for low frequency analysis

With the HP 35670A, you carry several instruments into the field in one package. Frequency, time, and amplitude domain analysis are all available in the standard instrument. Build on that capability with options that either add new measurement capability or enhance all measurement modes.

AY6	Add Two Channels (Four Total)
1D0	Computed Order Tracking
1D1	Real-Time Octave Measurements
UK4	Microphone Adapter and Power Supply
1D2	Swept-Sine Measurements
1D3	Curve Fit and Synthesis
1D4	Arbitrary Waveform Source
1C2	HP Instrument BASIC
UFF	Add 1-Mbyte NVRAM
AN2	Add 4-Mbyte RAM (8 Mbytes Total)
UFC	Add 8-Mbyte RAM (12 Mbytes Total)
100	1D0 - 1D4/UFC bundle

Laboratory-quality measurements in the field

Obtain all of the performance of your bench-top analyzer in a portable instrument.

Ease-of-use

Portability, versatility, and performance are valued attributes, but to be really valuable an instrument must also be easy to use. The HP 35670A has a friendly front panel, plus online help that's always available to answer your questions. An interactive measurement state lets you configure the instrument setup from a single display.

HP 35670A Dynamic Signal Analyzer

HP Instrument BASIC (Option 1C2)
Develop a custom user-interface, integrate several instruments and peripherals into a system using the HP 35670A as the system controller, or simply automate measurements.

Versatile Measurement Modes
Standard and optional measurement modes include:
- FFT Analysis
- Real-Time Octave Analysis (option 1D1)
- Order Analysis (option 1D0)
- Swept-Sine (option 1D2)
- Correlation Analysis
- Histogram Analysis
- Time Capture

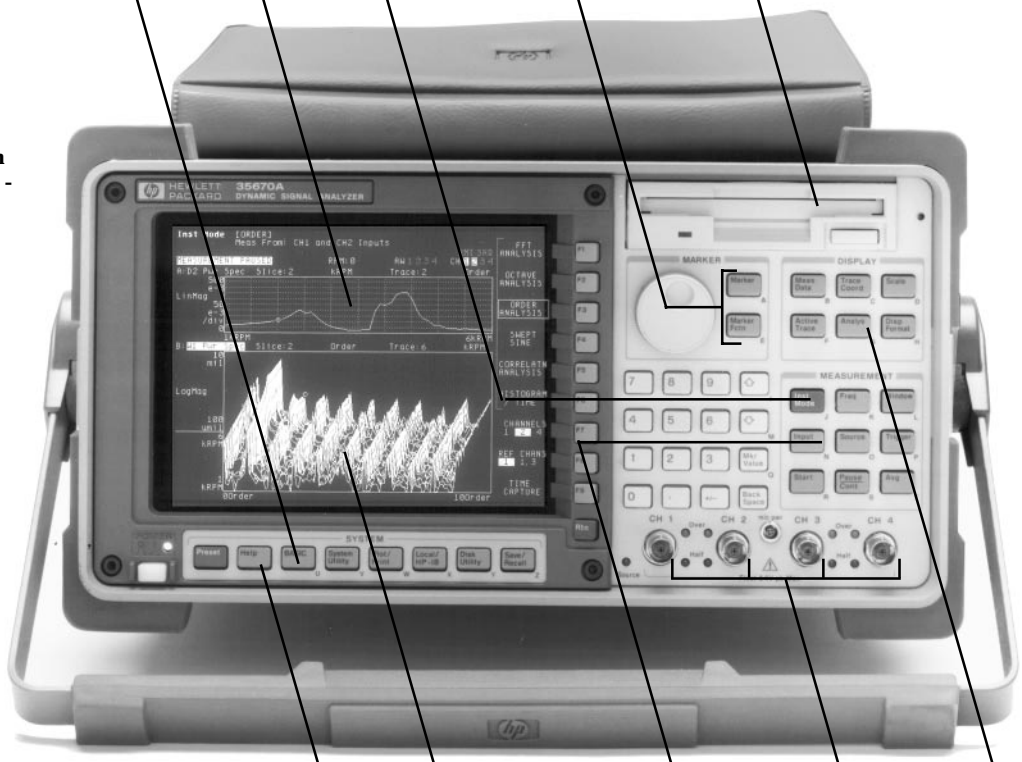
All measurement options may be retrofitted.

RPM Display
Read RPM in any measurement mode

Powerful Markers
Extract information from measurement data with trace and special markers:
- Individual Trace
- Coupled Trace
- Absolute or Relative
- Peak Search
- Harmonic
- Band
- Sideband Power
- Waterfall
- Time Parameter
- Frequency and Damping

Built-In 3.5 inch Flexible Disk Drive
Store instrument states, programs, time captured data, waterfall data, trace data, limits, math functions, data tables, and curve fit/synthesis tables.
Supported disk formats are HP-LIF and MS-DOS. Internal RAM may also be formatted as storage disk.

Shown with option AY6 - Add Two Channels



Online Help
Applications oriented help is just a few keystrokes away.

Large 6.9 inch (17.5 cm) display
Display area is not compromised by portability

Input Channels
- Analog A-weighted filters (switchable)
- Transducer sensitivity input
- Engineering units: g, m/s^2, m/s, m, in/s^2, in/s, in, mil, kg, dyn, lb, N, and pascals
- Built-in 4 mA constant current power supply

Precision Measurements
- 16-bit ADC
- ±0.15 dB spectrum amplitude accuracy
- ±0.04 dB, ±0.5 degrees channel match (full scale)
- 90 dB dynamic range (typical)
- 130 dB dynamic range with swept-sine (option 1D2)
- Up/Down autorange
- Up only autorange

Math Functions
Powerful math and data editing functions to quickly modify measurement results. (Curve fit and frequency response synthesis available with option 1D3.)

Source Types

- Random Noise
- Burst Random Noise
- Periodic Chirp
- Burst Chirp
- Pink Noise
- Fixed Sine
- Arbitrary Waveform Source (Option 1D4)
- Swept-Sine Source (Option 1D2)

Note: The source is located on the front panel of a standard two-channel HP 35670A.

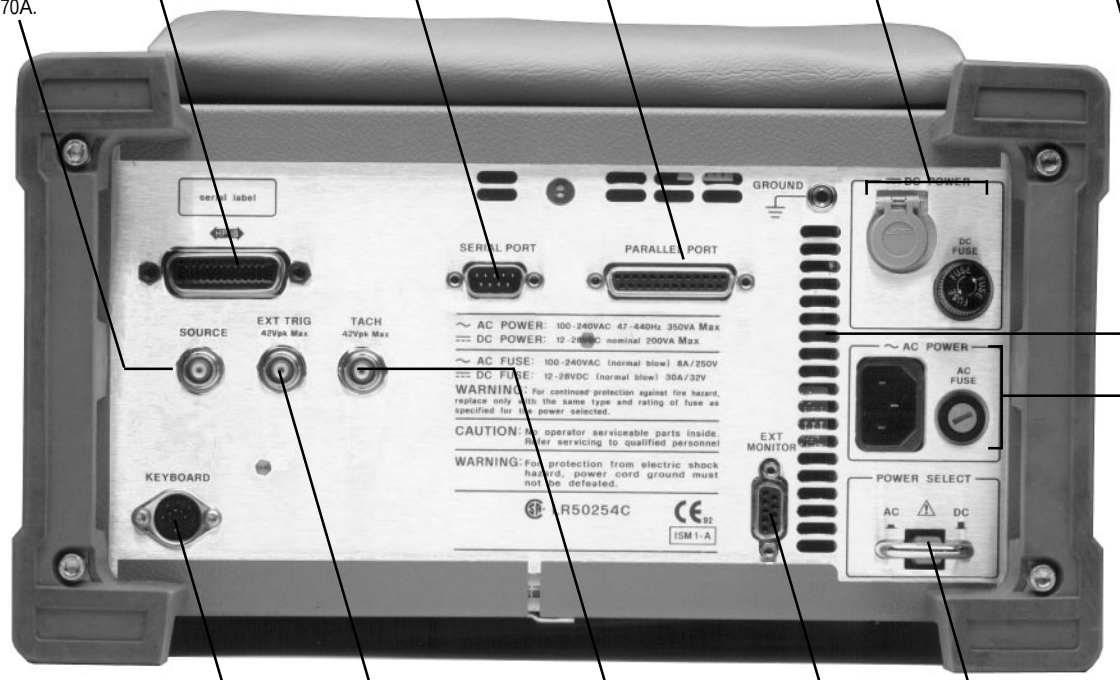
HP-IB Connector
Integrate the HP 35670A with other instruments and peripherals for system operation or printing/plotting. System controller for HP-IB (IEEE-488.1 and 488.2) compatible instrumentation via HP Instrument BASIC (option 1C2). Provides direct control of HP-IB printers, plotters, and HP SS80 disk drives.

Serial Port
Plot to HP-GL plotters or print to HP-GL and raster printers.

Parallel Port
Plot to HP-GL plotters or print to HP-GL and raster printers.

DC Power
Accepts 12 to 28 volts dc (nominal). Use the HP 35250A power cable for DC power source connection, or the HP 35251A power cable with cigarette-lighter adapter.

Low Noise Fan
Fan may be turned off for acoustic applications. Running speed depends on ambient temperature.



AC Power
Universal power supply will operate with any combination of voltage between 100 and 240 VAC and line frequency between 47 and 440 Hz. The maximum power requirement is 350 VA.

Power Select
Switch between ac and dc power sources without interrupting instrument operation.

External Monitor
Drive a multisync monitor for remote viewing by large groups.

Tachometer
(42 Volt Peak Max)
No external signal conditioning hardware required. Reads frequency (RPM) on selected levels between ±20 volts.

External Trigger
(42 Volt Peak Max)
No external signal conditioning hardware required. Triggers on selected level between ±10 volts.

Keyboard
Use a standard PC keyboard to title data, edit HP Instrument BASIC programs, or to operate the instrument.

Spectrum Analysis

FFT-based spectrum analyzers, such as the HP 35670A, are ideal for measuring the spectra of low-frequency signals like speech or mechanical vibration. Transient components, usually missed with swept-frequency analyzers, are easily measured and displayed at speeds fast enough to follow trends. The HP 35670A has both the performance and features required to take full advantage of this technology.

16-Bits for High Performance

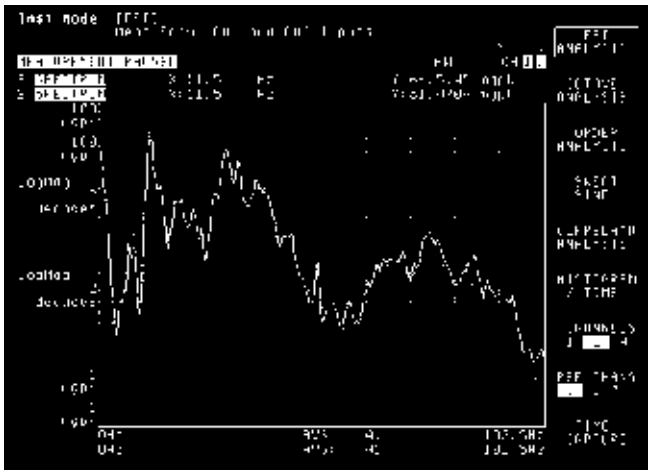
With a 16-bit ADC (90 dB typical dynamic range) and a real-time bandwidth of 25.6 kHz, you can be sure nothing will be missed. Resolve signals using 100 to 1600 lines resolution, or for really close-in analysis, use frequency zoom to resolve signals with up to 61 µHz resolution. Use time or RPM arming to develop waterfalls of sequential vibration spectra for trend analysis or for an overview of device vibration.

Power and Linear Spectrums

Match your spectrum measurement mode to the signal being tested. Use linear spectrum analysis to measure both the amplitude and phase of periodic signals such as the spectra of rotating machinery. Power spectrum analysis is provided for averaging nonrepetitive signals.

Averaging

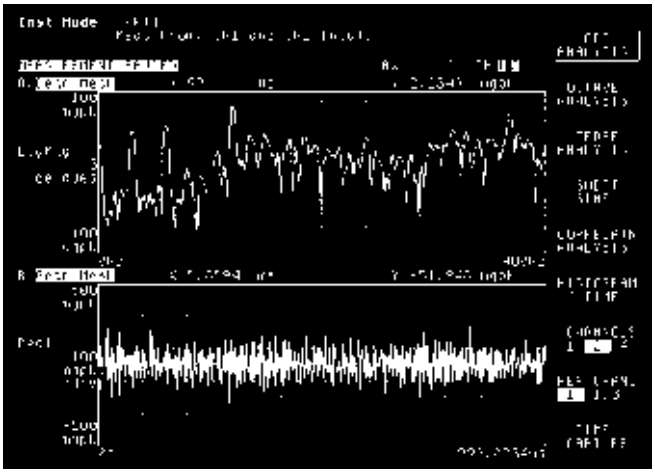
Various averaging modes let you further refine spectrum analysis measurements. Time averaging extracts repetitive signals out of the noise while rms averaging reduces the noise to its mean value. Exponential averaging, available for both time and rms averaging, is useful for reducing the noise while following changing signals—tracking the resonance shifts in a fatiguing structure for example.



Two spectrums of road induced vibration measured at different speeds are compared using the front/back mode of the HP 35670A.

Time Domain

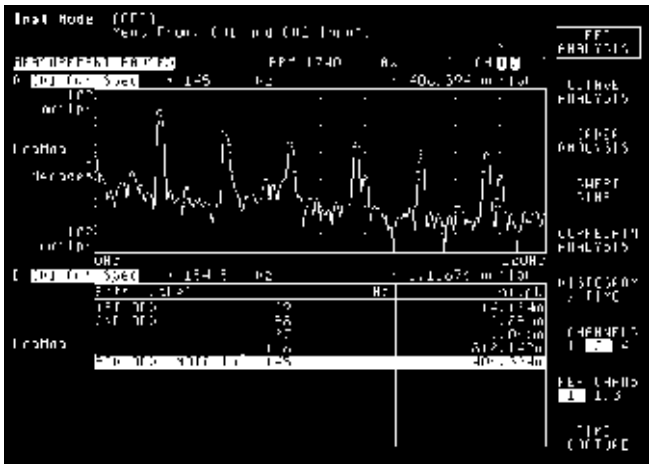
Use your spectrum analyzer as a low-frequency oscilloscope or view signals in the time and frequency domains simultaneously. (Note: anti-alias filters can be switched off.) Special markers for time-domain data facilitate extraction of key control system performance parameters: overshoot, rise time, setting time, and delay time.



Simultaneous display of frequency and time domain data facilitates analysis of gear mesh vibration.

Data Table

Use a tabular format to keep track of key frequencies in the spectra of rotating machinery. The amplitude and frequency of the signal and a 16-character entry label field are listed for each selected point.



Measurement results at key frequencies can be labeled and listed using data table.

Markers

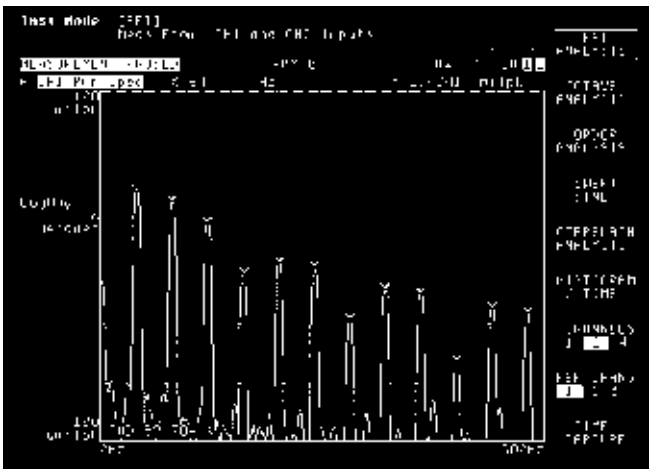
Markers streamline analysis by helping you select and display specific data. Marker functions include marker to peak, next right peak, and coupled markers for selecting points in multiple data displays. Markers readouts are absolute or relative to your selected reference.

Special Markers

Three special marker functions facilitate analysis of your spectral data. Sideband markers aid analysis of modulation signals. Use this function to quickly locate sidebands in the complicated spectra of rotating machines. A band-power marker reads the total power in a selected band of frequencies and a total harmonic distortion marker lets you calculate total harmonic distortion without including the effects of noise.

Automatic Units Conversion

Display vibration data in the units of your choice. Select *g, m/sec*^{2}*, in/sec*^{2}*, m/s, in/s, m, mil, inch, Kg, lb, N, dyn,* or *pascals* as appropriate for your application. The instrument automatically converts frequency-domain data from specified input transducer units to the units you select for display. For example, accelerometer data is automatically converted and displayed as mils when mils are selected. Of course, *dB, dBV, dBm* and *volts* are available for electrical applications.



Harmonic markers are used to calculate the THD of a signal without including the effects of noise.

Frequency Response Measurements

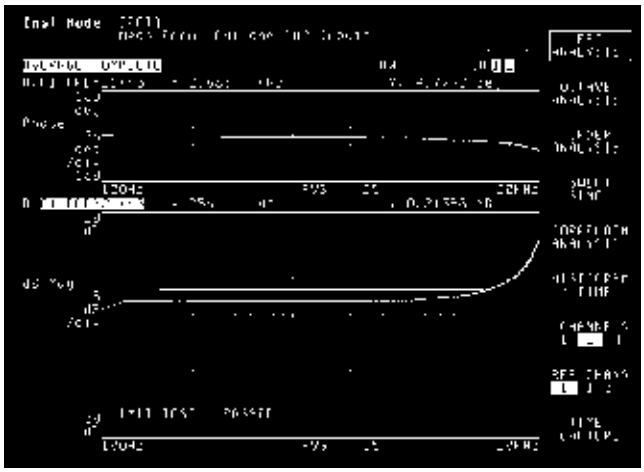
The HP 35670A has the flexibility to make measurements of both electrical networks and mechanical devices. FFT-based network analysis is fast enough to allow real-time adjustments of circuit parameters while the swept-sine option provides exacting measurements over more than six frequency decades, and a 130 dB dynamic range.

Source

Select the optimum stimulus for each application—random noise, periodic chirp, pink noise, fixed sine, burst random, and burst chirp. For zoomed network analysis measurements, the source is band-translated to match the zoom span at frequencies up to 51.2 kHz. An optional arbitrary source lets you test your product using real-world signals. A ±10 volt dc source offset facilitates tests of control systems.

Impact Testing

Force and exponential windows allow impact testing for modal and structural analysis. Quality measurements are ensured using preview and accept/reject during averaging. A 4 mA constant current transducer power supply is built-in for true portability.



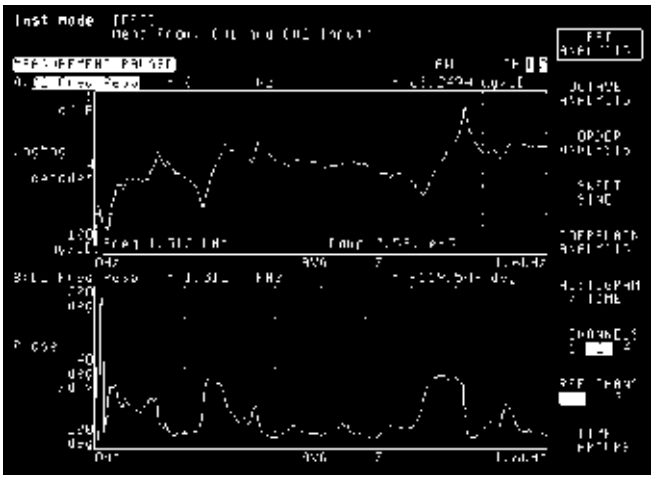
Limits are used for go/no go testing in production. The response of an accelerometer is being checked in this example.

Limits

Test network measurements against preset limits. Up to 800 separate line segments are available for setting upper and lower limits. Limits are also used for testing spectrum measurements.

Four Channels (option AY6)

Test up to three devices simultaneously with a four-channel HP 35670A. Channel one is the common reference channel and two, three, and four are the response channels. Alternatively, select channels one and three as reference channels for two totally independent network measurements. See option AY6 description for more information.



Characteristics of a selected resonance are automatically calculated from an impact measurement using the frequency and damping marker.

Time Capture

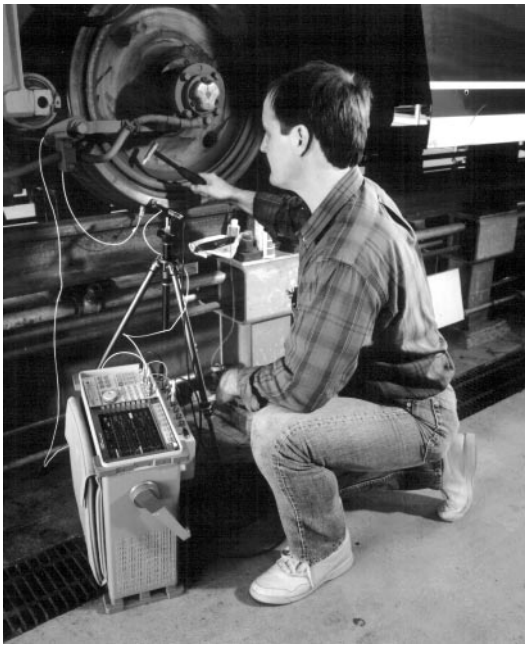
Markers

A frequency and damping marker provides the resonant frequency and the damping ratio of single-degree-of-freedom frequency response measurements.

Gain and phase margin markers extract key frequency-domain stability data from frequency-response measurements of control systems.

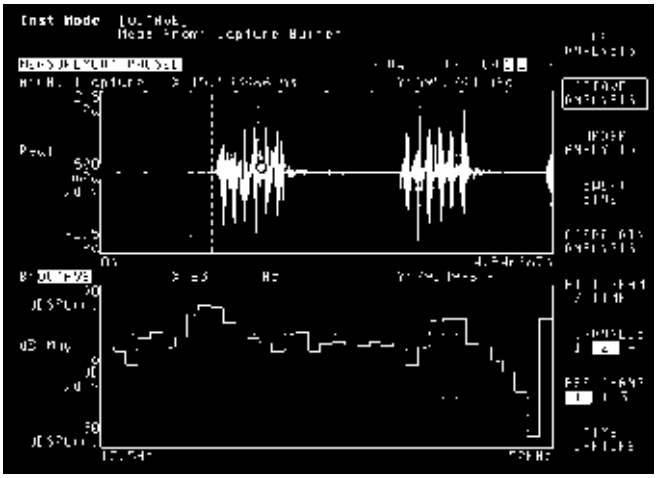
Signal Injection for Control Loops

Use one of three HP signal injection devices for testing control loops. The HP 35280A summing junction provides convenient dc to 1 MHz signal injection for most control loops. Use the HP 35281A clip-on transformer when it is not possible to temporarily open the loop, or use the HP 35282A signal injection transformer when secondary voltages are up to 600 Vpk.



Capture transient events or time histories for complete analysis in any measurement mode (except swept-sine). Use either the entire time-capture record or a selected region of interest for repetitive analysis in the FFT, octave, order track, correlation or histogram instrument modes.

Add an additional 4 Mbytes (option AN2) or 8 Mbytes (option UFC) of memory for really deep time-capture capability.



An interval of time-capture data has been selected for analysis in the octave mode.

STARModal and STARAcoustics are products of Structural Measurement Systems.

CADA-PC is a product of LMS International.

Microsoft® is a U.S. registered trademark of Microsoft Corp.

AMI PRO is a product of Lotus Development Corp.

Using Measurement Results

Taking the measurement is only half the job. Raw measurement data must be stored, recalled, printed, plotted, integrated with other data for analysis, and reported. The HP 35670A has a variety of tools to help you finish the job.

Enhanced Data Transfer Utilities for PCs

Standard Data Format (SDF) Utilities, provided with the HP 35670A, allow you to easily move data from the instrument to wherever it's needed:

- For general digital signal processing and filtering , translate data files to formats compatible with MATLAB and MATRIX$_x$, Data Set 58, or ASCII for use in popular spreadsheets.
- For specific applications, use application software that reads SDF files directly, such as STARModal and STARAcoustics from SMS and CADA-PC from LMS.
- Transfer data to and from the HP 35665A, 3566A, 3567A, 3562A, 3563A.
- Use the viewdata feature to display data on your PC or to convert to the HP-GL format for transfer to Microsoft's Word for Windows or Lotus' AMI PRO word processing software.
- Convert between HP-LIF and MS-DOS formats.
- Read data files into a program.

Documented Results

The HP 35670A supports a variety of HP-IB, serial and parallel printers and plotters for direct hardcopy output. The internal 3.5 inch flexible disk drive stores data, instrument states, HP-GL plots and HP Instrument BASIC programs in HP-LIF or MS-DOS formats for future recall or use on HP workstations or a personal computer.

Entire display screens can be imported directly into your word processing program by plotting HP-GL files to your named DOS file. HP-GL files are interpreted and displayed directly by Microsoft's Word for Windows and AMI PRO from Lotus Development Corp.

Computed Order Tracking

(Option 1D0)

Self-contained—no ratio synthesizer or tracking filter required

Order Maps

Order Tracking

RPM or Time Trigger

Display RPM Profile

Track Up to Five Orders/Channel

Up to 200 Orders

Composite Power

RPM Measurements

Order tracking facilitates evaluation of spectra from rotating machines by displaying vibration data as a function of orders (or harmonics) rather than frequency. All measurement spectra is normalized to the shaft RPM.

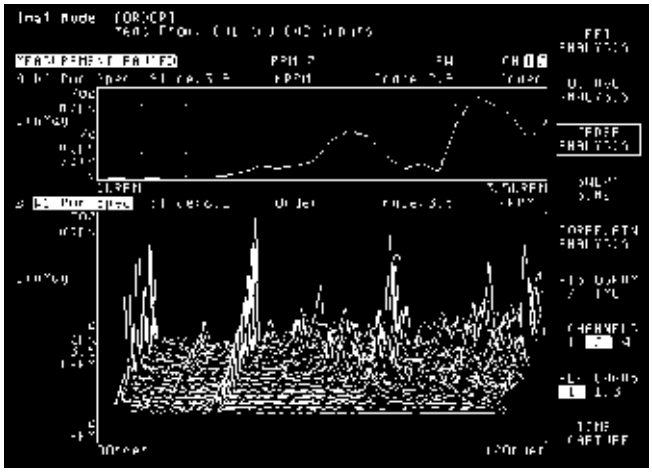
Now you can have order tracking without compromising portability. Traditional analog order tracking techniques require external tracking filters and ratio synthesizers. With HP's computed order tracking algorithm, external hardware is gone.

Because order tracking is implemented in the software, data is more precise and your job is easier. Compared to traditional analog order tracking techniques, computed order tracking offers:

- Improved dynamic range at high orders
- More accurate tracking of rapidly changing shaft speeds
- Accurate RPM labeled spectra with exact RPM trigger arm
- Wide 64:1 ratio of start to stop RPMs

Order Map

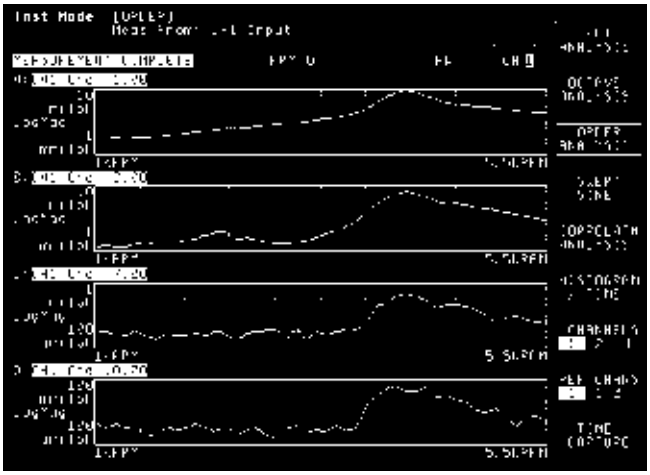
Use order maps for an overview of vibration data versus RPM or time. Display the amplitude profile of individual orders and suborders using the slice marker function. Alternatively, use trace markers to select individual traces for display.



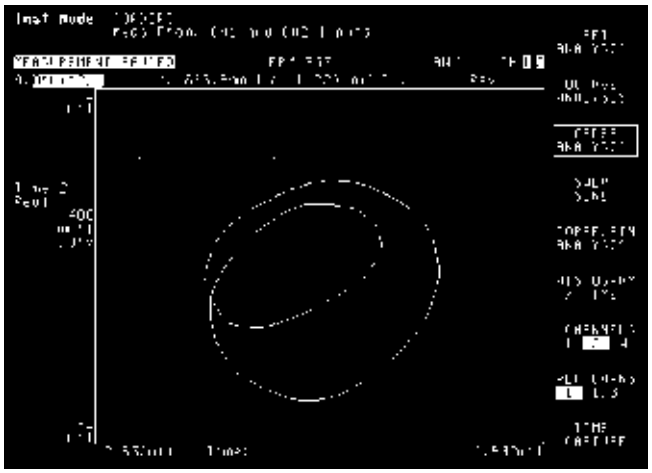
The slice marker feature is used to select and display an order or suborder from an order map.

Order Tracking

Measure only the data you need. Order tracking lets you measure the amplitude profile of up to five orders plus composite power simultaneously on each channel. Up to four orders or three orders and composite power can be displayed simultaneously.



Order tracking is used to simultaneously display up to four orders or a combination of orders, composite power and RPM profile.



Oscilloscope-quality orbit diagrams mean you carry only one instrument onto the shop floor.

Orbits

Obtain oscilloscope-quality orbit measurements with your HP 35670A. Unlike traditional FFT analyzers, the HP 35670A equipped with computed order tracking displays a selected number of loops (usually one) as the shaft RPM is varied.

RPM Profile

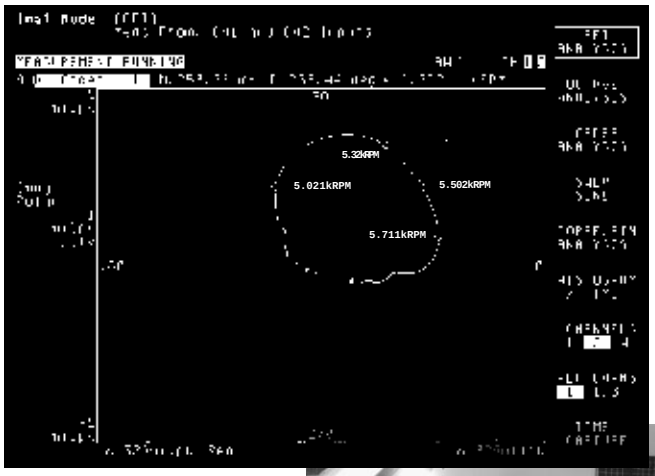
Use RPM profile to monitor the variation of RPM with time during order tracking measurements.

Composite Power

Composite power provides the total signal power in a selected channel as a function of RPM.

Run-Up and Run-Down Measurements

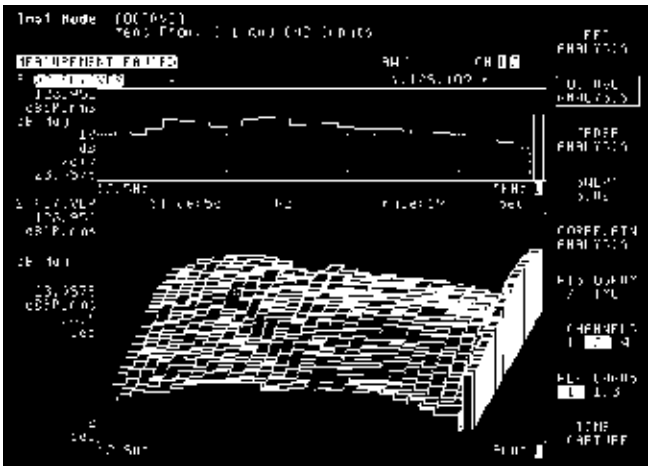
Run-up and run-down measurements of any order are made using external trigger as the phase reference. Display the results as bode or polar plots; both are available. Markers allow convenient notation of important shaft speeds.



Markers are used to annotate shaft speeds at selected points in a run-up measurement.

Real-Time Octave Measurements
(Option 1D1)
Microphone Adapter and Power Supply
(Option UK4)

Real-Time Third Octave to 40 kHz
ANSI S1.11-1986 Filter Shapes
Microphone Inputs and Power
A-Weighted Overall SPL
RPM or Time-Triggered Waterfalls



This waterfall display of a flyover test can be analyzed trace-by-trace or by selecting time slices along the z-axis.

Eliminate the expense and inconvenience of multiple instruments in the field. With optional real-time octave analysis, and the optional microphone adapter and power supply, you have a complete real-time octave analyzer added to your HP35670A at a fraction of the cost of a second instrument. Now you can carry both your FFT and real-time octave analyzers to the job site in the same hand.

Real-Time 1/3-Octave to 40 kHz on One Channel

With two input channels of 1/3-octave real-time measurements at frequencies up to 20 kHz, you get all of the information you'll ever need to understand the noise performance of your product. No misinterpreted measurements because transient components were missed. When the frequency range requirement is 10 kHz or less, use four channels to characterize spatial variations. For those exceptional circumstances, use 1/3-octave resolution at frequencies up to 40 kHz on a single channel. Resolutions of 1/1- and 1/12-octave are also available.

Overall sound pressure level and A-weighted sound pressure level can be displayed with the octave bands individually, together, or not at all.

A fan-off mode lets you use the instrument in the sound field being measured.

ANSI S1.11-1986

All octave filters comply with filter shape standards ANSI S1.11-1986 (Order 3, type 1-D), DIN 45651, and IEC 225-1966. An 80-dB dynamic range for the audio spectrum provides the performance required by acousticians. Switchable analog A-weighting filters in the input channels comply fully with both ANSI S1.4-1983 and IEC 651-1979 Type 0.

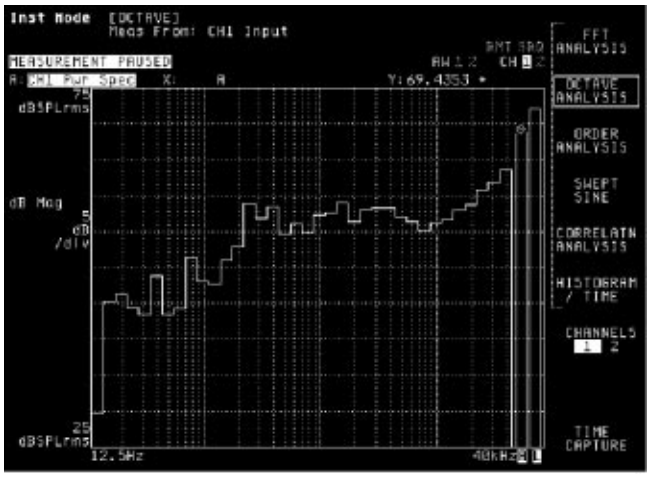
Advanced Analysis

Use waterfall displays of octave data for an overview of device noise versus time or RPM. Display individual frequency bands as a function of RPM or time using the slice marker function. Alternatively, use trace markers to select individual traces for display.

A pink noise source is available for testing electro-acoustic devices.

Sound Level Meter Measurements

Peak hold, impulse, fast, slow, and L_{eq} are all provided with optional Real-time Octave Measurements. All measurements conform to IEC 651-1979 Type 0 - Impulse.



Real-time 1/3-octave measurements at frequencies up to 40 kHz.

HP 35670A with option UK4 microphone adapter and power supply.

Swept-Sine Measurements
(Option 1D2)

130-dB Dynamic Range

Logarithmic or Linear Sweeps

“Auto” Frequency Resolution

While FFT-based network analysis is fast and accurate, swept-sine measurements are a better choice when the device under test has a wide dynamic range or covers several decades of frequency range. Use swept-sine measurements to extend the network measurement capabilities of the HP 35670A.

Network Analysis Over a 130-dB Range

With traditional swept-sine, the HP 35670A is optimally configured to measure each individual point in the frequency response. The result is a 130 dB dynamic range. With FFT-based network analysis, all frequency points are stimulated simultaneously and the instrument configures itself to measure the highest amplitude response—thereby limiting the dynamic range.

Characterize Nonlinear Networks

Use the auto-level feature to hold the input or output amplitude constant during a sweep. This provides the device response for a specific signal amplitude. With FFT-based network analysis using random noise, the random amplitudes of the stimulus tend to “average out” the nonlinearities and therefore does not capture the dependency of the response on the stimulus amplitude.

Logarithmic Sweep

Test devices over more than six decades of frequency range using logarithmic sweep. In this mode, the frequency is automatically adjusted to provide the same resolution over each decade of frequency range. With FFT-network analysis, resolution is constant—not a problem when measuring over narrow frequency ranges.

Flexible

Make the measurement your way. Independently select logarithmic or linear sweep, sweep up or down, automatic or manual sweep, and autoresolution.

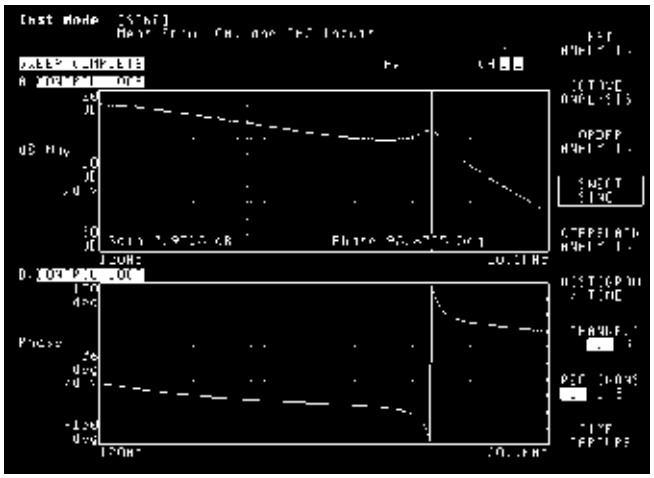
Automatic Frequency Resolution

Use autoresolution to obtain the fastest sweep possible without sacrificing accuracy. With autoresolution, the HP 35670A automatically adjusts the frequency step according to the device response. High rates of amplitude and phase change are matched with small frequency steps. Low rate-of-change regions are quickly measured with larger frequency steps.

Test Multiple Devices Simultaneously

Increase throughput in production. Swept-sine measurements up to 25.6 kHz can be made on three devices simultaneously using swept-sine on a four-channel HP 35670A. Channel one is the common reference channel for these measurements.

Alternatively, channels one and three can be designated as independent reference channels for two totally independent swept-sine measurements.



The stability of a control loop is quickly characterized using the gain and phase margin marker function.

HP Instrument BASIC
(Option 1C2)

Realize the advantages of using your instrument with a computer without sacrificing portability. HP Instrument BASIC provides the power of a computer inside your HP 35670A.

- Create custom interfaces for simplified operation.
- Use the HP 35670A as a system controller to integrate it with other instruments and peripherals.
- Enhance functionality by creating custom measurements.
- Increase productivity with automated operation.

HP Instrument BASIC is a compatible subset of the HP BASIC used in HP 9000 series 200, 300, 400 and 700 computers.

Easy Programming

The HP Instrument BASIC program editor supports:

- Line-by-line syntax checking
- Pre-run program verification
- Single step and debug
- Automatic line numbering

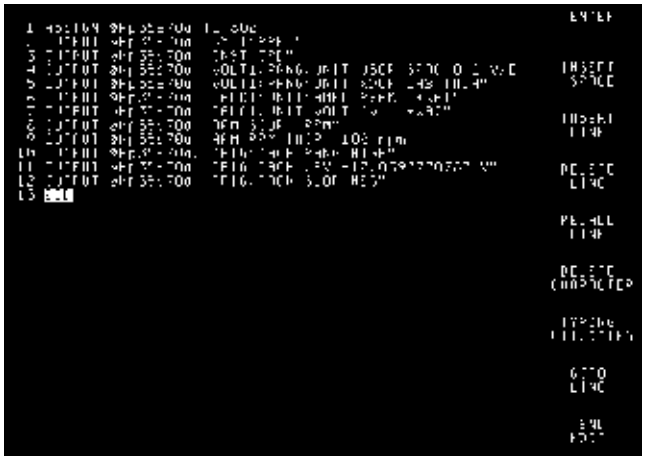
An optional PC-style 101-key keyboard facilitates program development and editing. Simple programs can be entered or edited using the front-panel keys. Large programs can be developed or edited in HP 9000 Series 200, 300, and 400 computers, or on a HP Vectra with Instrument BASIC for Windows, HP E2200A, and then transfered to the HP 35670A.

Over 200 HP Instrument BASIC Commands

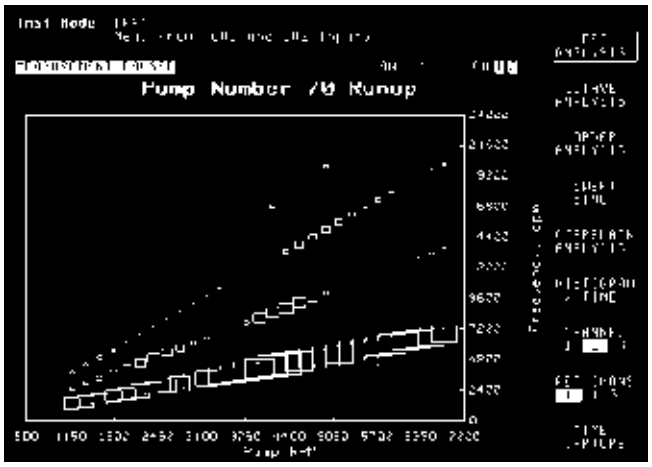
Program entry and editing	**Binary functions**
Program debugging	**Trigonometric operations**
Memory allocation	**String operations**
Relation operators	**Logical operators**
General math	**HP-IB control**
Graphics control	**Mass storage**
Graphics plotting	**Event initiated branching**
Graphics axes and labeling	**Clock and calendar**
Program control	**General device I/O**
	Array operations

Keystroke Recording

Most program development begins with keystroke recording. Each keystroke is automatically saved as a program instruction as you set up your measurement using the front panel. The recorded sequence can be used as the core of a sophisticated program or run as an automatic sequence.



Keystroke recording quickly creates the core of your HP Instrument BASIC program.



HP Instrument BASIC can be used to display measurement results in a new format or to create a new operator interface.

Add Two Channels
(Option AY6)

51.2-kHz Frequency Range On One and Two Channels

25.6-kHz Frequency Range On Four Channels

One or Two Reference Channels

Enhance your productivity by adding two additional input channels to your portable analyzer. Having four channels often means the difference between solving a problem in the field and having to schedule time in a test bay.

Monitor four signals simultaneously or use channel one as the reference channel for up to three simultaneous cross-channel measurements. Two totally independent cross-channel measurements are made by selecting channels one and three as independent reference channels. All channels are sampled simultaneously.

Use triaxial measurements to simultaneously characterize the motion of mechanical devices in three axes.

For control systems, simultaneously measure several points in a single loop.

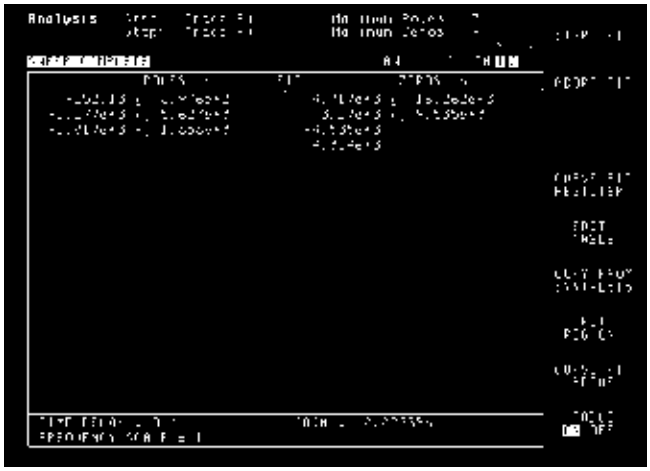
Curve Fit and Synthesis
(Option 1D3)

20 Poles/20 Zeros Curve Fitter

Frequency Response Synthesis

Pole/Zero, Pole/Residue and Polynomial Format

Use curve fit and synthesis in the HP 35670A to take the guesswork out of your design process. The 20-pole and 20-zero multiple-degree-of-freedom curve fitter calculates a mathematical model of your system or circuit from measured frequency response data. The model can be expressed in pole/zero, pole/residue, or polynomial format.



Curve fit provides an exact mathematical model of your circuit or device.

Transfer the circuit model to the synthesis function to experiment with design modifications. Add and delete poles and zeros, change gain factors, time delays, or frequency scaling, then synthesize the frequency response from the modified model. Design modifications are tested without ever touching a soldering iron.

Arbitrary Waveform Source
(Option 1D4)

Frequency or Time Domain Entry

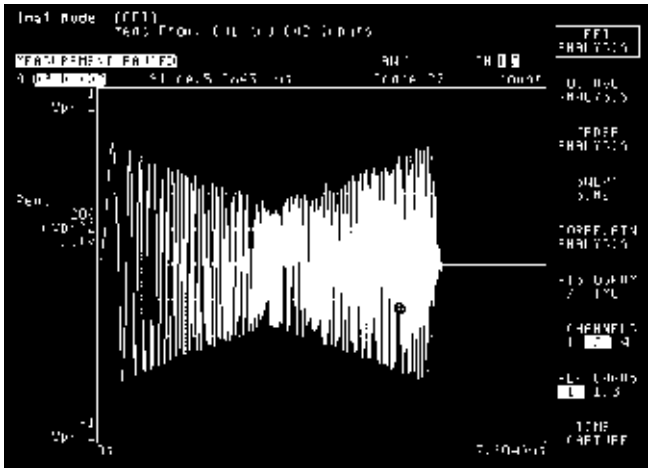
Data Edit

Store Up to Eight Arbitrary Waveforms

Test your products using real-world signals. Measure a signal in either the time or frequency domain, then output it via the arbitrary waveform source. Use math functions and data edit to obtain precisely the output waveform you need. An arbitrary waveform may be output once or repeatedly.

Standard source types can be optimized for specific applications. For example, random noise can be shaped to improve the effective dynamic range of your measurement. Alternatively, you can use data edit and math functions to create an arbitrary waveform.

Use time capture as a digital tape recorder, then playback captured signals through the arbitrary waveform source.



Math functions are used to optimize a burst chirp signal for a frequency response measurement.

Add 8-Mbytes RAM
(Option UFC)
Add 4-Mbytes RAM
(Option AN2)

Expand the data storage and time-capture capacity of your HP 35670A.

Number of Spectra Stored Per Channel

	Standard	Add 4 Mbyte	Add 8 Mbyte
FFT - 1 Channel [1]	130	600	1000
FFT- 2 Channels [2]	50	250	400
FFT - 4 Channels [3]	20	100	200
1/3-Octave Spectra [4]	4000	18800	32000
Time Capture [1]	550 KSamples	2.6 MSamples	4.7 MSamples

[1] Conditions: Preset with instrument mode switched to 1 channel.
[2] Conditions: Preset
[3] Conditions: Preset with instrument mode switched to 4 channels.
[4] Conditions: Preset with instrument mode switched to octave.

Add 1-Mbyte Nonvolatile RAM
(Option UFF)

Use the 1-Mbyte nonvolatile RAM in environments too harsh for the 3.5 inch flexible disk drive. The memory functions as a high-speed disk for storage of the following information.

- Instrument Setup States
- Trace Data
- User Math Definitions
- Limit Data
- Time Capture Buffers
- HP Instrument BASIC Programs
- Waterfall Display Data
- Curve Fit/Synthesis Tables
- Data Tables

Information stored in nonvolatile RAM is retained when the power is off.

HP 35670A Ordering Information

HP 35670A
Dynamic Signal Analyzer
Standard Configuration:

- 1.4 Mbyte, 3.5-in. flexible disk drive
- 1.5 Mbytes user RAM
- Impact Cover
- Standard Data Format Utilities
- AC Power Cord
- Operating manual set including:

  Operator's Guide
  Quick Start Guide
  Installation and Verification Guide
  HP-IB Programming with the HP35670A
  HP-IB Commands:Quick Reference
  HP-IB Programmer's Guide
- Standard one-year warranty

Options for the HP 35670A

Opt.	Description
AY6	Add Two Channels (four total)
1D0	Computed Order Tracking
1D1	Real-Time Octave Measurements
UK4	Microphone Adapter and Power Supply
1D2	Swept-Sine Measurements
1D3	Curve Fit and Synthesis
1D4	Arbitrary Waveform Source
1C2	HP Instrument BASIC
AN2	Add 4-Mbytes Memory
UFC	Add 8-Mbytes Memory Note: Only one of option AN2 or UFC may be installed
UFF	Add 1-Mbyte Nonvolatile RAM
1F0	PC-style Keyboard
1F1	German Keyboard
1F2	Spanish Keyboard
1F3	French Keyboard
1F4	UK Keyboards
1F5	Italian Keyboard
1F6	Swedish Keyboard
AX4	Rack Mount Without Handles
100	Software Bundle 1D0-1D4, UFC
UK5	Carrying Case (for shipping)
0B1	Additional Manual Set
0BU	Additional HP Instrument BASIC Manual Set
0B3	Add Service Manual
1BP	Military Calibration (meets MIL 45662A)
W30	Two Year Extended Service Contract

To Upgrade Your HP 35670A

To add an option to your HP 35670A, order HP 35670U followed by the option number. Options AY6, AN2, UFC and UFF must be installed by Hewlett Packard. Option UE2 is available to upgrade instrument firmware to latest version, as appropriate.

Accessories

DC Power Cables

The HP 35250A is a three meter cable terminated with lugs for connecting to most dc power sources. The HP 35251A is a three meter cable terminated with an adaptor that plugs into a cigarette lighter.

For Testing Control Systems

The HP 35280A summing junction provides convenient dc to 1 MHz signal injection for most control loops. Use the HP 35281A clip-on transformer when it is not possible to temporarily open the loop, or use the HP 35282A signal injection transformer when secondary voltages are up to 600 Vpk.

Physical Sensors

For a complete list of accessories for this and other HP Dynamic Signal Analyzers, please refer to the HP DSA Accessory Catalog (publication number 5091-9708E).

HEWLETT PACKARD

Summary of Features on Standard Instrument

The following features are standard with the HP 35670A:

Instrument Modes
FFT Analysis
Correlation Analysis
Histogram/Time
Time Capture

Measurement
Frequency Domain
Frequency Response
Linear Spectrum
Cross Spectrum
Power Spectrum
Coherence
Power Spectral Density

Time Domain (oscilloscope mode)
Time Waveform
Cross-Correlation
Autocorrelation
Orbit Diagram

Amplitude Domain
Histogram, PDF, CDF

Trace Coordinates
Linear Magnitude
Log Magnitude
dB Magnitude
Group Delay
Phase
Unwrapped Phase
Real Part
Imaginary Part
Nyquist Diagram
Polar

Trace Units
Y-axis Amplitude: combinations of units, unit value, calculated value, and unit format describe y-axis amplitude

Units: volts, g, meters/sec^2, inches/sec^2, meters/sec, inches/sec, meters, mils, inches, pascals, Kg, N, dyn, lb, user-defined EUs

Unit Value: rms, peak, peak-to-peak

C*alculated Value:* V, V^2, V^2/Hz, V/$\sqrt{\text{Hz}}$, V^{2}s/Hz (ESD)

Unit Format: linear, dB's with user selectable dB reference, dBm with user selectable impedance.

Y-Axis Phase: degrees, radians

X-Axis: hz, cpm, order, seconds, user-defined

Display Formats
Single
Quad
Dual Upper/Lower Traces
Small Upper and Large Lower
Front/Back Overlay Traces
Measurement State
Bode Diagram
Waterfall Display with Skew, -45 to 45 Degrees
Trace Grids On/Off
Display Blanking
Screen Saver

Display Scaling
Autoscale
Manual Scale
Input Range Tracking
Selectable Reference
Linear or Log X-Axis
Y-Axis Log
X & Y Scale Markers with Expand and Scroll

Marker Functions
Individual Trace Markers
Coupled Multi-Trace Markers
Absolute or Relative Marker
Peak Search
Harmonic Markers
Band Marker
Sideband Power Markers
Waterfall Markers
Time Parameter Markers
Frequency Response Markers

Signal Averaging (FFT Mode)
Average Types (1 to 9,999,999 avgerages)
RMS
RMS Exponential
Time
Time Exponential
Peak Hold

Averaging Controls
Overload Reject
Fast Averaging On/Off
Update Rate Select
Select Overlap Process Percentage
Preview Time Record

Measurement Control
Start Measurement
Pause/Continue Measurement

Triggering
Continuous (Freerun)
External (Analog or TTL Level)
Internal Trigger from any Channel
Source Synchronized Trigger
HP-IB Trigger
Armed Triggers
Automatic/Manual
RPM Step
Time Step
Pre- and Post-Trigger Measurement Delay

Tachometer Input:
±4 V or ±20 V range
40 mv or 200 mV resolution
Up to 2048 pulses/rev
Tach hold-off control

Source Outputs
Random
Periodic Chirp
Pink Noise
Burst Random
Burst Chirp
Fixed Sine
Note: Some source types are not available for use in optional modes. See option description for details.

Input Channels
Manual Range
Up-Only Auto Range
Up/Down Auto Range
Floating or Grounded
Anti-alias Filters On/Off
AC or DC Coupling
LED Half Range and Overload Indicators
A-Weight Filters On/Off
Transducer Power Supplies (4 ma constant current)

Frequency
20 Spans from 195 mHz to 102.4 kHz (1 channel mode)
20 Spans from 98 mHz to 51.2 kHz (2 channel mode)
Digital zoom with 244 μHz resolution throughout the 102.4 kHz frequency bands.

Resolution
100, 200, 400, 800 and 1600 lines

Windows
Hann
Flat Top
Uniform
Force/Exponential

Math
+,-,*, /
Magnitude
Square Root
LN
*jω or /jω
Differentiation
Integration
Conjugate
Real and Imaginary
FFT, FFT^{-1}
EXP
PSD
A, B, and C weighting
Constants K1thru K5
Functions F1 thru F5

Analysis
Limit Test with Pass/Fail
Data Table with Tabular Readout
Data Editing

Time Capture Functions
Capture transient events for repeated analysis in FFT, octave, order, histogram, or correlation modes (except swept-sine). Time-captured data may be saved to internal or external disk, or transferred over HP-IB. Zoom on captured data for detailed narrowband analysis. Up to 750K samples of data can be saved in the standard unit.

Data Storage Functions
Built-in 3.5 in., 1.44-Mbyte flexible disk also supports 720-KByte disks, and 128-Kbyte NVRAM disk. Both MS-DOS® and HP-LIF formats are available. Data can be formatted as either ASCII or Binary (SDF). The HP 35670A provides storage and recall from the internal disk, internal RAM disk, internal NVRAM disk, or external HP-IB disk for any of the following information:

Instrument Setup States
User-Math
Time Capture Buffers
Waterfall Display Data
Data Tables
Trace Data
Limit Data
HP Instrument BASIC Programs
Curve Fit/Synthesis Tables

Interfaces
HP-IB (IEEE-488.1 and 488.2)
Parallel
RS-232C Serial

Hard-Copy Output
To Serial or Parallel HP-GL Plotters
To Raster Printers
To Serial or Parallel HP-GL Printers
To Disk File (Supports Raster Printer, HP-GL Plotter, and HP-GL Printer)
Time Stamp

HP-IB Capabilities
Listener/Talker (Direct control of plotters, printers, disk drives)
Conforms to IEEE 488.1/488.2
Conforms to SCPI 1992
Controller with HP Instrument Basic option

Standard Data Format (SDF) Utilities
Exchange data between virtually all HP Dynamic Signal Analyzers
Easy data transfer to spreadsheets
Data transfer to MATRIX$_x$ and Matlab

SDF utilities run in an external PC

Calibration & Memory
Single or Automatic Calibration
Built-In Diagnostics & Service Tests
Nonvolatile Clock with Time/Date
Time/Date Stamp on Plots and Saved Data Files

Online Help
Access to Topics via Keyboard or Index

Fan
On/Off

MS-DOS® is a U.S. registered trademark of Microsoft Corporation.
MATRIX$_x$ is a product of Integrated Systems Inc.
Matlab is a product of The Math Works.

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