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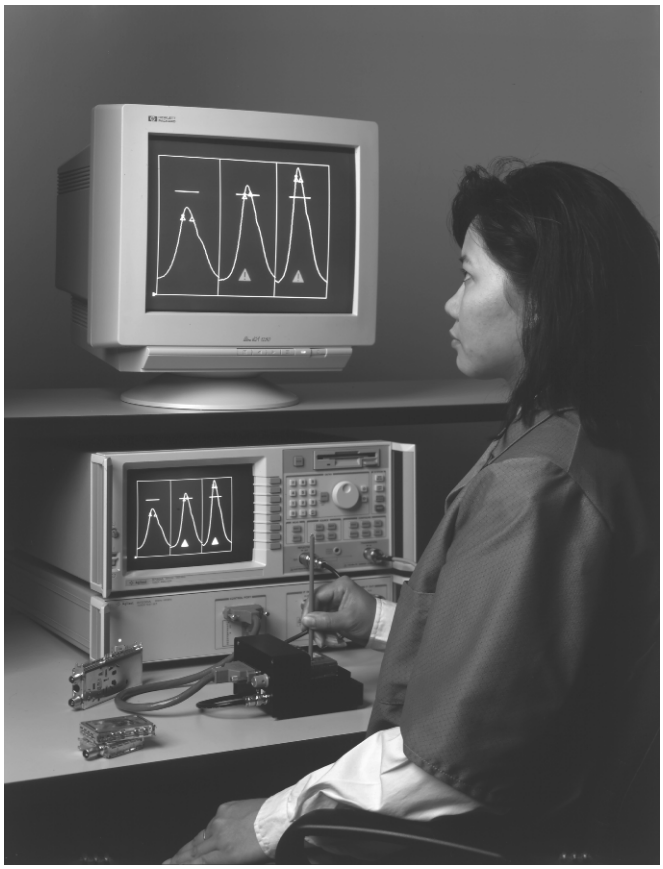
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Agilent 8730A/87030A

Tuner Test System

Product Overview



Agilent Technologies' new analyzers improve the look of your picture, and the look of your bottom line!

A sound, long-term investment

You make decisions in your business based on sound investment strategies, so why should your purchase of a new test system be any different? You can minimize your overall cost per tuner by minimizing your cost of test —and improve your bottom line. That's why you need the Agilent 8730A—the right tuner analyzer for your test needs today—with more than ample capability to keep you profitable in the future as your test needs grow.

Comprehensive tuner test

Agilent's tuner test system includes powerful measurement capability for the following tests:

- **LO**—alignment, linearity, sensitivity
- **Filter**—alignment, shape, peak-to-carrier, tilt, rejection
- **Amplifier**—gain, range, slope, compression, sensitivity
- **SWR**

Agilent Technologies

Innovating the HP Way

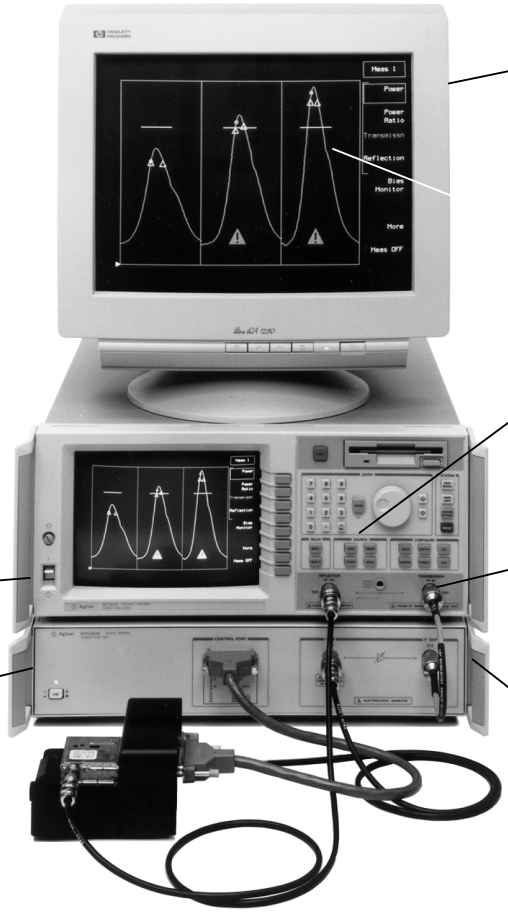
Agilent 8730A/87030A tuner test system

Easy-to-use tuner-test features
The 8730A has many features tailored to tuner measurements including:
- multi-segment sweeps
- RF and IF markers
- automatic frequency tracking
- automatic reference tracking
- gain bars

IBASIC
An optional built-in BASIC instrument controller lets you easily automate your measurements

8730A tuner analyzer

87030A tuner test set



Large VGA display
Connect a standard VGA display (not included) and see results in color on a large easy-to-read screen

Pass/fail testing
Automated pass/fail testing instantly and consistently compares measured data to your test limits

Fast 1 Hz synthesized source
Make bandwidth and channel-frequency measurements quickly and repeatably

Accurate, built-in detectors
Never worry about inaccurate, nonlinear detectors again

Complete tuner test set
The tuner test set provides all necessary bias supplies and control signals to test both analog and digitally controlled tuners

Footswitch control
An optional footswitch keeps hands free for alignment tasks while operators cycle through instrument test states

8730A tuner analyzer
(rear panel)



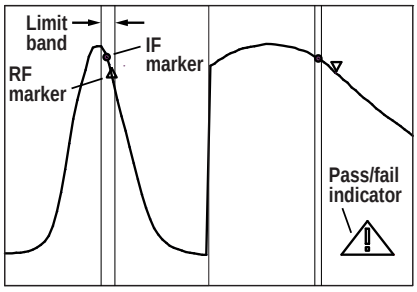
Keyboard/barcode interface
Connect a barcode reader to the DIN interface for efficient tuner inventory control

LAN
An optional LAN interface greatly simplifies automated control, program updates, and test-data management

The Agilent 8730A/87030A is a complete tuner test system with all the features and performance you need to quickly, easily, and economically test your tuners.

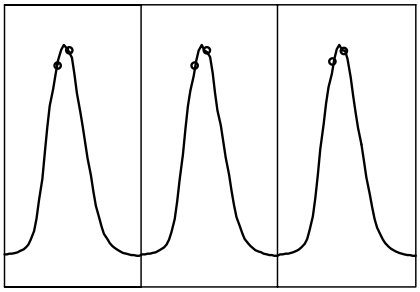
A new solution from Agilent Technologies

The 8730A is an economical tuner-test solution that brings unprecedented levels of throughput, accuracy, and reliability to your tuner manufacturing line. Now with help from Agilent Technologies—renown, for its quality and service—you can be assured of having the world's foremost test and measurement equipment.



LO alignment is as easy as placing an IF and RF marker within the limit bands. Dual-segment sweeps let you have both a coarse and fine adjustment window for faster alignment.

The 8730A tuner test system includes a fast and accurate analyzer with an integrated RF source, along with all of the necessary bias supplies and control signals for complete tuner alignment and verification. And the analyzer is capable of testing both analog and digitally controlled tuners.



The 8730A displays up to four different sweep segments simultaneously so you can easily perform multichannel alignment.

Powerful . . . yet easy to learn and use!

The 8730A is easy to learn and easy to use, which means lower operator training costs and fewer mistakes. What's more, the analyzer is tailored to fast tuner measurements, so you can maximize your manufacturing productivity.

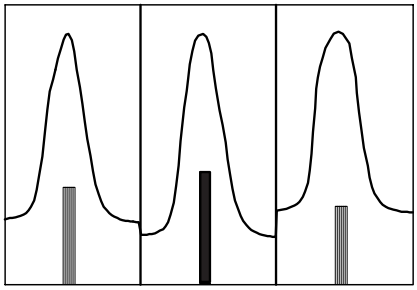
Increase your throughput

Decrease test times

The 8730A dramatically increases throughput by reducing the time it takes to align and verify your tuners. Standard tuner measurements such as LO alignment, tilt, peak-to-carrier, carrier-to-carrier, gain, and rejection have never been faster or easier. You'll get rapid measurements with the analyzer's combination of fast single and multi-segment sweeps, automatic frequency and reference tracking, and a full set of RF and IF markers.

Frequency tracking stabilizes the IF response by removing distracting frequency shifts that often occur while the LO is aligned. You can choose to automatically adjust the RF start and stop frequencies or control the LO, keeping the IF response centered on the display.

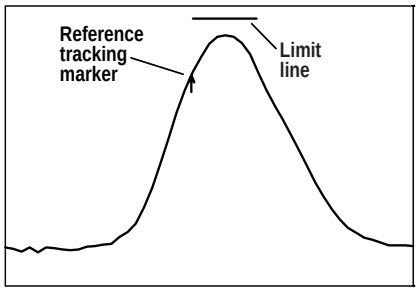
Reference tracking eliminates vertical movement of the IF response caused by gain variations. Both frequency and reference tracking let you concentrate on getting the best tuner response possible in the least amount of time.



With just a glance at the gain bars, you can tell if your tuner output power meets specification during reference track (relative) measurements.

Multi-segment sweeps let you display the passband and reject band of up to four channels simultaneously. This eliminates inefficient iteration between test setups that is required during alignment by current solutions that only display a single channel at a time. Minimizing the time spent switching between setups means less time per test—less cost per tuner—and a better looking bottom line for you.

Say goodbye to your grease pencils!
With the 8730A, you can say goodbye forever to grease-pencil marks on your screen! Automated pass/fail testing instantly and consistently compares measured data to your test limits. Pass/fail indications are also available as a TTL output on the rear panel for interfacing to automated fixtures and parts handlers.



A combination of reference tracking and limit lines let you easily make peak-to-carrier measurements such as peak-to-video, peak-to-audio, and peak-to-color.

Increase your accuracy

Increasing throughput means more than just decreasing test-cycle times. Total throughput also includes how much rework you are forced to do as a result of inaccurate and unrepeatable measurements.

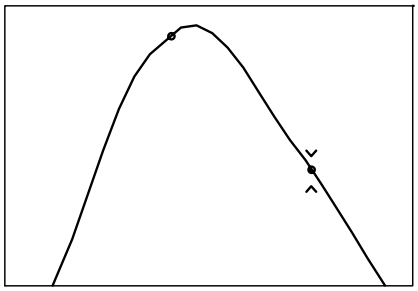
The 8730A's accuracy gives you new confidence that you are making high-quality, repeatable measurements which will improve your product yields. Its synthesized source provides precise frequencies—within 1 Hz—and its accurate absolute-power measurements mean you no longer have to rely on inaccurate, nonlinear detection.

The result? You get the same answer no matter which station is doing the test.

Automation made easy
Automation can also dramatically increase your total throughput. With the 8730A's Instrument BASIC (IBASIC) option, you get a full-featured, built-in, instrument controller for fast, flexible, complete measurement customization. You can easily automate measurements, perform complex computation, and control other test instruments, without the cost and space of an external controller. IBASIC also provides keystroke recording so you can automate manual measurements even if you don't have any programming experience.

Increase your productivity

LAN interface
Maximizing overall manufacturing productivity involves more than just achieving faster throughput. The optional LAN interface on the 8730A provides a new level of automated control and test-data management. With multiple analyzers connected to a LAN, you can readily implement test changes and improvements to all of your stations. A central computer can download new test parameters, instrument states, test limits, and IBASIC programs in seconds. Test data can easily be saved in a central database for archiving and statistical analysis.



Adjusting and measuring tilt is as simple as ensuring the delta (lower) marker is between the two point limits.

Statistical analysis of test data
Once you have easy access to your test data, statistical analysis is a powerful tool that can help analyze trends in your manufacturing processes before they become line-stoppers. For example, you can use your test data to detect changes in pass/fail percentages, performance drift, or problems with a particular test station or operator. Fixing manufacturing problems like these before you ship your products means your customers can depend on you for the best parts available. Statistical analysis can also help you modify your designs for higher yields and less rework, which further improves the look of your bottom line!

Agilent's commitment to quality

All of Agilent's instruments are built in an ISO 9002-certified facility with full NIST traceability, helping you meet the level of quality your customers demand.

Specifications

The Agilent 8730A tuner test system consists of the 8730A tuner analyzer and the 87030A tuner test set, which serves as an interface to the tuner under test.

Unless otherwise noted, these specifications describe the instrument's warranted performance over the temperature range of 25°C ± 5°C. Typical performance is nonwarranted.

RF source

Frequency

Range	300 kHz to 1.3 GHz (for frequency sweeps using narrowband detection) 10 MHz to 1.3 GHz (for tuner sweeps using broadband detection)
Resolution	1 Hz
Accuracy	±5 ppm, 0°C to 55°C (typical)

Output port

(Directivity and source match specifications apply after a one-port calibration has been performed)

Output impedance	75 ohms
Directivity	40 dB
Port match (for reflection measurements)	30 dB
Port match (for transmission measurements using enhanced-response calibration)	30 dB
Port match (for transmission measurements using response calibration)	14 dB (typical)

Output power

Resolution	0.01 dB
Level accuracy	±3.0 dB
Minimum power	–60 dBm
Maximum power	
≤1 GHz	12 dBm
>1 GHz	9 dBm

Harmonics

≤1 MHz	≤–20 dBc
>1 MHz	≤–30 dBc

Signal purity

Nonharmonic spurious	
<50 kHz from carrier	–25 dBc typical
50 kHz to 1 MHz from carrier	–20 dBc typical
>1 MHz from carrier	–30 dBc typical
Phase noise	–70 dBc/Hz typical (10 kHz offset)
Residual AM	≤–50 dBc typical (in 100 kHz bandwidth)
Residual FM	<1.5 kHz peak typical (30 Hz to 15 kHz)

RF receiver

(Assumes usage without Agilent 87030A tuner test set)

Input impedance	75 ohms
Frequency range	300 kHz to 1.3 GHz (narrowband detection) 10 MHz to 1.3 GHz (broadband detection)
Maximum input	+10 dBm (0.5 dB compression, narrow band detection) +16 dBm (0.55 dB compression, broadband detection)
Damage level	+20 dBm or ±25 VDC
Port match	20 dB (typical for frequencies >100 MHz) 30 dB (typical for frequencies between 10 MHz and 100 MHz)

IF receiver

(All frequency-related specifications apply 10 MHz to 100 MHz, unless otherwise noted)

Input port

Input impedance	75 ohms
Frequency range	10 MHz to 100 MHz
Maximum input	+16 dBm
Damage level	+20 dBm or ±25 VDC
Port match (with IF output of 87030A tuner test set connected to 8730A tuner analyzer)	21 dB (typical)

Gain

Test set gain setting	
0 dB	–2 dB (typical)
15 dB	+13 dB (typical)
35 dB	+33 dB (typical)

Power accuracy

(IF = 40 MHz, medium bandwidth)

Test set gain setting	Input power range	
0 dB	+10 dBm to –45 dBm	±1 dB (typical)
15 dB	–10 dBm to –60 dBm	±1 dB (typical)
35 dB	–30 dBm to –80 dBm	±1 dB (typical)

Frequency response

Test set gain setting	
0 dB	–0.004 dB/MHz (typical)
15 dB	+0.008 dB/MHz (typical)
35 dB	+0.010 dB/MHz (typical)

IF counter

The IF counter is used to determine IF marker values, and can also be used to monitor important frequencies at any node in the tuner.

Accuracy (gate = 1 mS)

IF frequency	
10 MHz	±17 kHz
40 MHz	±20 kHz
100 MHz	±26 kHz

Threshold	
Test set gain setting	
0 dB	–35 dBm
15 dB	–45 dBm
35 dB	–50 dBm

System dynamic range

(0 dB gain setting)

8730A bandwidth	
wide	38 dB (typical)
medium	58 dB (typical)
narrow	63 dB (typical)

System cycle time

(51 points per segment, wide bandwidth, six bias voltages on)

Number of sweep segments	RF autotracking	Typical time
one	off	30 mS
	on	42 mS
three	off	70 mS
	on	103 mS

Control port

Bias voltage outputs

Bias voltages can be used to control and/or bias portions of the tuner for proper operation. Nine different tune voltages are available. The tune-voltage settings are table driven, and are associated with a particular instrument state. Current monitoring, limiting, and alarms are also available. *(Accuracy specified for load currents less than current limit. Current limit specified at maximum absolute voltage for each range. Load capacitance is assumed to be less than 1 µF)*

Name	Voltage range	Typical resolution	Accuracy	Current limit
VB1 to VB6	0 V to 14 V	4 mV	±(0.5% + 20 mV)	>200mA
VB7	–10 V to 0 V	2.4 mV	±(0.3% + 40 mV)	>200mA
VB8	0 V to 40 V	10 mV	±(1.6% + 40 mV)	>10 mA
Vtune	0 V to 40 V	0.6 mV	±(1.6% + 40 mV)	>10 mA

Analog inputs

Analog inputs are available to monitor voltages in the tuner. Two different ranges and sensitivities are available:

Name	Voltage range	Typical resolution	Accuracy
Vaux1	–15 V to 15 V	9 mV	±(0.3% + 30 mV)
Vaux2	–40 V to 40 V	20 mV	±(0.4% + 60 mV)

Supplemental characteristics

Measurement

Number of display measurements

Two measurement displays are available. Each measurement can have independent instrument sweep and control parameters (a sweep can have up to four frequency segments). The instrument can display a single measurement, or dual measurements on a split or over-laid screen.

Formats

- Linear magnitude: V, mV, µV, W, mW, µW
- Log magnitude: dBV, dBmV, dBµV, dBW, dBm, dBµW
- SWR

Trace functions

Current data, memory data, memory with current data, division of data by memory

Gain bars

Gain bars can be displayed to monitor the gain of the tuner. Gain bars may be used in conjunction with multi-segment sweeps. This feature is especially useful during reference-track (relative) measurements, where vertical movement of the IF response is removed by normalization. Pass/fail limits for the gain bars can be set by the user.

Data markers

Both IF and RF markers are available. Up to eight IF or RF markers may be specified per tuner-sweep segment (the 8730A supports single-segment, two-segment, three-segment, and four-segment tuner sweeps). The maximum number of markers during tuner sweeps is 32: eight markers per segment for a four-segment sweep. If alternate sweep is enabled, an additional 32 markers are available on the alternate measurement. These additional markers are coupled in frequency between measurements, but have independent magnitude readouts (readouts are consistent with measurement formats). Eight markers are available for use with frequency and power sweeps. Automatic marker functions available for tuner sweeps are marker-to-maximum and marker-to-minimum.

Limits
Measurement data can be compared to any combination of line or point limits for pass/fail testing. Other measurement features that can have user-defined limits are:

- marker amplitude
- marker frequency
- gain bars
- bias supplies
- auxiliary voltage inputs

Marker limits stay fixed relative to a reference marker, regardless of where the marker is on the trace data. A limit-test TTL output is available on the rear panel for external control or indication.

Reference tracking
- Track peak: for each sweep segment and for every sweep, the peak response is maintained at the specified reference level.
- Track frequency: for each sweep segment and for every sweep, the response at the track-frequency marker is maintained at the specified reference level.

RF and LO autotrack
Autotrack stabilizes the IF response on the display of the 8730A by automatically adjusting either the RF start and stop frequencies or the LO control voltage to maintain the same IF frequency range from sweep to sweep.

Storage
Internal memory
Up to 20 instrument states can be stored in nonvolatile memory via the save/recall menu. Instrument states can include all instrument-control settings, trace data (including memory), limit lines, active calibration coefficients, display titles, and the 87030A control and bias settings.

Disk drive
Trace data, instrument states (including calibration data), and IBASIC programs can be saved on floppy disks using the built-in 3.5 inch disk drive. All files are stored in MS-DOS®-compatible format. Instrument data can be saved in binary or ASCII format, and screen graphics can be saved as PCX (bit-mapped) or GL (vector) files.

Data hardcopy
Hardcopy prints can be made using PCL (printer control language) and PCL5 printers (such as the HP DeskJet or LaserJet series of printers), or Epson-compatible printers. Single color and multicolor formats are supported. Hardcopy plots can be automatically produced with GL compatible digital plotters such as the Agilent 7475A. The analyzer provides Centronics (parallel), RS-232C, GPIB, and (optional) LAN interfaces.

Remote control and programming
Via GPIB
Interface
GPIB interface operates to IEEE 488.2 and SCPI standard-interface commands.

Control
The analyzer can either be the system controller or pass bus control to another active controller.

Data transfer formats
- ASCII
- 32- or 64-bit IEEE 754 floating-point format
- Mass-memory-transfer commands allow file transfer between external controller and the analyzer.

Via LAN
Telnet interface
The analyzer can be controlled by sending SCPI commands via telnet (TCP/IP to port 5025).

FTP interface
Instrument-state and data files can be transferred via FTP. A dynamic data-disk file structure provides direct file access.

General characteristics

8730A tuner analyzer

Front-panel connectors

Type-N female, 75 ohm

Auxiliary input

The auxiliary input measures the DC level at each sweep point. If the slew rate on this input exceeds 700 mV/msec, increased measurement errors will result.

Calibrated range	±10 V
Accuracy	±3% of reading + 20 mV
Damage level	>15 VDC

External trigger IN/OUT

Triggers on a negative TTL transition or switch-contact closure to ground. Used as an output to trigger the 87030A IF counter.

Limit test output

Provides an open-collector TTL signal. The output is pulled low when the limit test fails.

User TTL input/output

Provides a bidirectional open-collector TTL signal that can be accessed by IBASIC. Can be used to trigger a recall or show sweep out.

VGA video output

Provides a VGA-compatible video signal.

GPIB

Allows communications with compatible devices including external controllers, printers, plotters, disk drives, power meters, and other test instruments.

LAN

This RJ-45 connector allows direct connection to a 10Base-T (Ethertwist) network. TCP/IP and FTP protocols are supported.

Parallel port

This 25-pin female connector is used with parallel (or Centronics interface) peripherals such as printers and plotters. It can also be used as a general-purpose I/O port, with control provided from an IBASIC program.

RS-232C

This 9-pin male connector is used with serial peripherals such as printers and plotters.

DIN keyboard

This mini-connector is used for adding an IBM PC-AT compatible keyboard for titles, remote front-panel operation, and for IBASIC programming. It can also be used to interface to a barcode reader.

87030A tuner test set

Front-panel connectors

Type-N female, 75 ohm

Tuner LO control

LO control can be accomplished using either a bias voltage or one of several digital interfaces. Microwire™, I^2C, or TTL control may be used.

Serial communication

Type	Transfer speed
3-wire (Microwire) with two enable lines	≤ 500 kbits/sec
2-wire (I^2C)	≤ 100 kbits/sec

TTL interface

Four lines of TTL level I/O lines

Agilent 8730A / 87030A tuner test system

Line power

Frequency	47 to 60 Hz
Voltage	115 V nominal (90 V to 132 V) or 230 V nominal (198 V to 264 V)
Power consumption	
8730A	230 VA max
87030A	50 VA max

A three-wire ground is required.

Cabinet dimensions

8730A	179 mm H x 425 mm W x 514 mm D (8 in. H x 19 in. W x 23 in. D)
87030A	90 mm H x 425 mm W x 514 mm D (3.5 in. H x 19 in. W x 23 in. D)

Weight

	Net	Shipping
8730A	20.5 kg	30 kg
87030A	6 kg	10 kg

Environmental characteristics

General conditions

RFI and EMI susceptibility defined by CISPR publication 11.

ESD (electrostatic discharge) should be minimized by the use of static-safe work procedures and an antistatic bench mat (such as an Agilent 92175T).

Operating conditions

Temperature	0°C to 55°C
Humidity	5% to 95% at 40°C (noncondensing)
Altitude	0 to 4,500 meters (15,000 feet)

Storage conditions

Temperature	–40°C to +70°C
Humidity	0 to 90% at 65°C (noncondensing)
Altitude	0 to 15,240 meters (50,000 feet)

Ordering information

Agilent 8730A tuner analyzer

Standard Options:

IBASIC (Option 1C2)

Adds a resident BASIC system controller, facilitating automated measurements and control of other instruments. Using keystroke recording for the simplest applications, or an optional DIN-compatible keyboard to write complex control and computation programs, IBASIC improves productivity by allowing complete customization of your measurements.

DIN keyboard (Option 1CL)

Adds an IBM PC-AT compatible keyboard for titles, remote front-panel operation, and for IBASIC programming.

LAN interface (Option 1F7)

Adds a 10Base-T (Ethertwist) compatible LAN connector and firmware. Supports connection of the analyzer to a computer or other instruments for automated control, program updates, and data transfer. This option supports standard TCP/IP operation.

Rack-mount kit (Option 1CM)

On-site repair (Option W03)

Converts the standard one-year return-to-Agilent warranty to a 90-day on-site warranty, where available.

Special Options:

Footswitch control (Special Option 8711B - K87)

A footswitch is available as a special option to allow hands-free cycling through instrument states.

Agilent 87030A tuner test set

Includes parallel-port interface cable, 75-ohm RF cable (type N), 50-ohm trigger cable (BNC), and two 75-ohm type-N (m) to BNC (f) adapters.

Also available (order separately):

	Agilent part number
LO control-port cable (25 pin)	8120-8315
75-ohm IF cable (BNC)	8120-6743

Rack-mount kit (Option 1CM)

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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www.agilent.com/find/assist

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Agilent Technologies

Innovating the HP Way

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