HEWLETT PACKARD

OPERATING NOTE

HP 70600A PRESELECTOR

1212 VALLEY HOUSE DRIVE, ROHNERT PARK, CALIFORNIA 94928 U.S.A.

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CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of the other International Standards Organization members.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

CONTENTS

SAFETY SYMBOLS

The following safety symbols are used throughout this manual and in the instrument. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Instruction manual symbol. The instrument will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the instrument against damage. Location of pertinent information within the manual is indicated by use of this symbol in the table of contents.

Indicates dangerous voltages are present. Be extremely careful.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

GENERAL SAFETY CONSIDERATIONS

WARNING

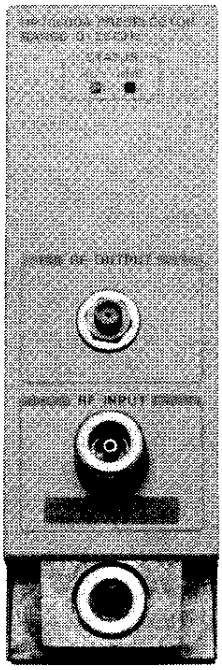
BEFORE THIS INSTRUMENT IS SWITCHED ON, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact. Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.

WARNING

There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.

CAUTION

BEFORE THIS INSTRUMENT IS SWITCHED ON, make sure its primary power circuitry has been adapted to the voltage of the ac power source. Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

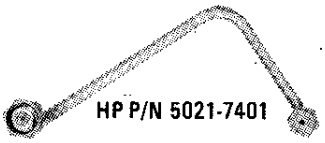


HP 70600A

HP 70905B
TO
HP 70600A*

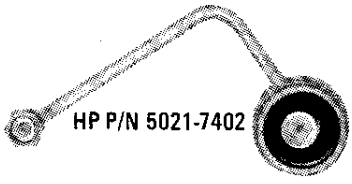
HP P/N 5021-7403

HP 70906A
TO
HP 70600A*

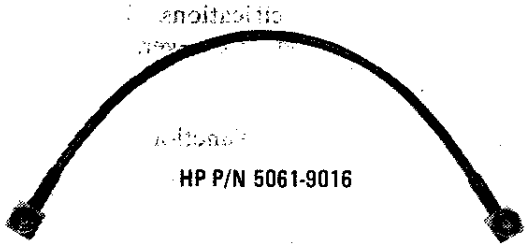


HP P/N 5021-7401

HP 70905A
TO
HP 70600A*



HP P/N 5021-7402



HP P/N 5061-9016

*NOTE: NOT ALL SEMI-REGID CABLES ARE SHIPPED WITH EACH HP 70600A PRESELECTOR ORDER. REFER TO ACCESSORIES TO VERIFY WHICH CABLE ASSEMBLY BELONGS WITH YOUR SYSTEM.

Figure 1. HP 70600A Preselector with Supplied Accessories

INTRODUCTION

SAFETY

Before operating this module, read the safety markings on the module and the safety instructions in the manuals. This module is manufactured and tested to international safety standards. However, to prevent instrument damage and ensure your personal safety, all cautions and warnings must be heeded. Refer to the summary of safety information at the beginning of this document.

DOCUMENTATION DESCRIPTION

This document is intended to provide you with installation and operating information necessary to incorporate this module into an existing HP 70000 system. Other information, such as Specifications and Compatibility History, is included to ensure that the necessary information is complete when this module is received.

For additional information, refer to the manuals described in the Compatibility History section.

ELEMENT DESCRIPTION

The HP 70600A Preselector is a 1/8-width plug-in module for the HP 70001A Mainframe. It is one of the components of the HP 71201A Preselected Microwave Spectrum Analyzer. It functions as a tunable bandpass filter for input frequencies from 2.7 to 22 GHz. For input frequencies between 0 and 2.9 GHz, the HP 70600A switches to the low-pass filter path. Either of these filter paths may be bypassed for improved displayed average noise specifications. The HP 70600A Preselector is primarily designed to operate with the HP 70905B RF Section. However, it may be used with either the HP 70905A or HP 70906A RF Sections.

The HP 70600A Preselector functions to reduce unwanted mixing products and multiple and image frequencies.

SYSTEM DESCRIPTION

The HP 71201A Modular Spectrum Analyzer is an automatic preselected microwave spectrum analyzer that covers the frequency range from 50 kHz to 22 GHz. It is made up of the following modules in an HP 70001A Mainframe:

Model Number	Description
HP 70600A	Preselector (0 to 22 GHz)
HP 70905B	RF Section (50 kHz to 22 GHz)
HP 70902A	IF Section (10 Hz to 300 kHz)
HP 70900A	Local Oscillator
HP 70205A	Graphics Display
HP 70001A	Mainframe

The standard HP 71201A Microwave Spectrum Analyzer is essentially an HP 71200A Microwave Spectrum Analyzer with the addition of an HP 70600A Preselector. The preselector provides preselection from 2.7 to 22 GHz and low-pass filtering from 0 to 2.9 GHz. Along with the HP 70600A Preselector, the HP 70905B RF Section is being introduced as a part of the standard HP 71201A Microwave Spectrum Analyzer. The HP 70905B RF Section is designed without the input step attenuator that is in the HP 70905A. The Type N RF INPUT connector has been replaced with an SMA connector.

Refer to the HP 71000 Modular Spectrum Analyzer Ordering Guide (HP Part Number 5954-2700, specify the third update) for information on ordering options to the HP 71201A System.

ACCESSORIES

HP Part Number 5061-9016 (1 per) Cable — Flex Coax, 3/8 MODULE, SMB (m) Connector (HP 70600A Preselector TUNE-SPAN INPUT to HP 70900A Local Oscillator TUNE-SPAN)

HP Part Number 5021-7403 (1 per) Cable — Semi-Rigid, SMA (m) to SMA (m) (HP 70600A Preselector RF OUTPUT to HP 70905B RF Section RF INPUT)

HP Part Number 5021-7402 (1 per) Cable — Semi-Rigid, SMA (m) to TYPE N (m) CABLE ASSEMBLY (HP 70600A Preselector RF OUTPUT to HP 70905A RF Section RF INPUT)

HP Part Number 5021-7401 (1 per) Cable — Semi-Rigid, SMA (m) to APC 3.5 (m) (HP 70600A Preselector RF OUTPUT to HP 70906A RF Section RF INPUT)

For the HP 70600A Preselector ordered alone, the cables supplied are as follows:

HP Part Number 5061-9016
HP Part Number 5061-7402
HP Part Number 5061-7401

Cable assembly, HP Part Number 5021-7403, is shipped as a part of the HP 70905B RF Section order.

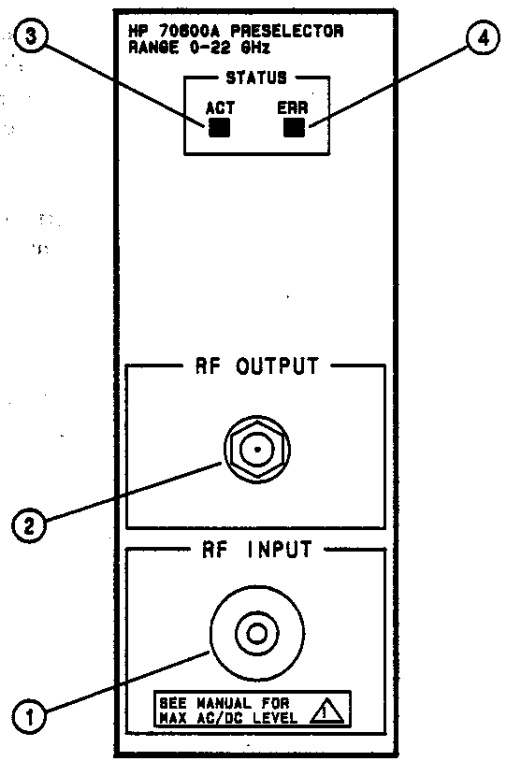


Figure 2. Front-Panel Features

FRONT-PANEL FEATURES

Inputs and Outputs

(1) RF INPUT – (Type N female connector) This is the RF input for the modular spectrum analyzer. The frequency range is 0 to 22 GHz.

(2) RF OUTPUT – (SMA female connector) This is normally connected to the RF INPUT of the HP 70905B, HP 70905A, or HP 70906A RF Sections.

Indicator LEDs

(3) STATUS ACT indicates that the HP 70600A Preselector is active.

(4) STATUS ERR indicates that there is an error in the HP 70600A Preselector.

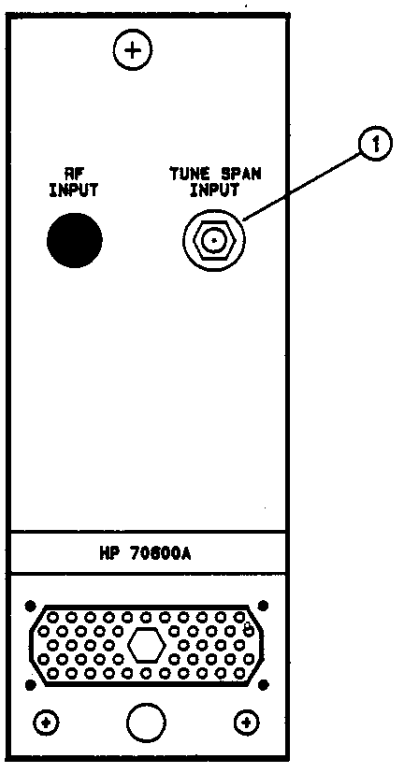


Figure 3. Rear-Panel Feature

REAR-PANEL FEATURE

Input

(1) TUNE SPAN INPUT (SMB male connector) This is normally connected to the TUNE SPAN output on the HP 70900A Local Oscillator.

COMPATIBILITY HISTORY

Firmware

The HP 70600A Preselector is compatible with HP 70900A Local Oscillator ROM versions 861015 or later. Systems with earlier versions must be updated with the HP 70900A Mem-Plus Controller Board Upgrade Kit, HP Part Number 70900-60096, which includes a new controller board assembly and firmware for the HP 70900A Local Oscillator. This upgrade kit may be purchased as an option (Option 098) to the HP 70600A Preselector, or purchased as a kit through an HP sales office.

System Verification

System Verification Version A.02.00 (HP Part Number 5010-1536 for 3-1/2 inch disc or 5010-1537 for 5-1/4 inch disc) may be used to test a modular spectrum analyzer that contains an HP 70600A Preselector. Contact the nearest HP sales or service office regarding availability.

System Diagnostics

The HP 70600A Preselector may be tested by System Diagnostics Version 861015, HP Part Number 5010-1534 (3-1/2 inch disc) or HP Part Number 5010-1535 (5-1/4 inch disc). System Diagnostics is included in the HP 70900A Mem-Plus Controller Board Upgrade Kit, HP Part Number 70900-90096.

Documentation

The following documents include information on the HP 70600A Preselector Section:

- System Support Manual, October 1986, HP Part Number 5958-6459.
- Operating Manual, January 1986, HP Part Number 5958-4233
- Module Support Manual (when available)
- Technical Reference (when available)
- Operating Note, November 1986, HP Part Number 70600-90005
- HP 71000 Modular Spectrum Analyzer Ordering Guide, HP Part Number 5954-2700

INSTALLATION

UNPACKING

Inspect the shipping container for damage. If the container or cushioning material is damaged, check the contents of the shipment both mechanically and electrically. If the contents are damaged or defective, contact the nearest Hewlett-Packard sales or service office. A list of these offices is included at the end of this document. Hewlett-Packard will arrange for repair or replacement of the damaged or defective equipment without waiting for a claim settlement. Keep the shipping materials for the carrier's inspection.

It is also recommended that the packaging materials be kept for future shipment or storage of the module. For a description of packaging materials, refer to the Preparation for Use (Module Exchange) section of the System Support Manual.

OPERATING REQUIREMENTS

Temperature, humidity, and power requirements are listed in the Specifications section of the System Support Manual.

POSITION OF MODULE IN A SYSTEM

NOTE

It is important that the HP 70600A Preselector always be placed to the right-hand side of the RF section, as viewed from the front panels.

The HP 70600A Preselector must be placed immediately to the right-hand side of the RF module used in the system. ONLY the correct semi-rigid cable may be used to connect the RF OUTPUT of the HP 70600A Preselector to the RF INPUT of the RF module. Cable part numbers are listed in the Accessories section of this operating note, along with the modules that each cable interconnects. Failure to use the correct semi-rigid cable will degrade system-level performance, since frequency-response calibration factors that are stored in the HP 70600A are based on the use of the correct cable.

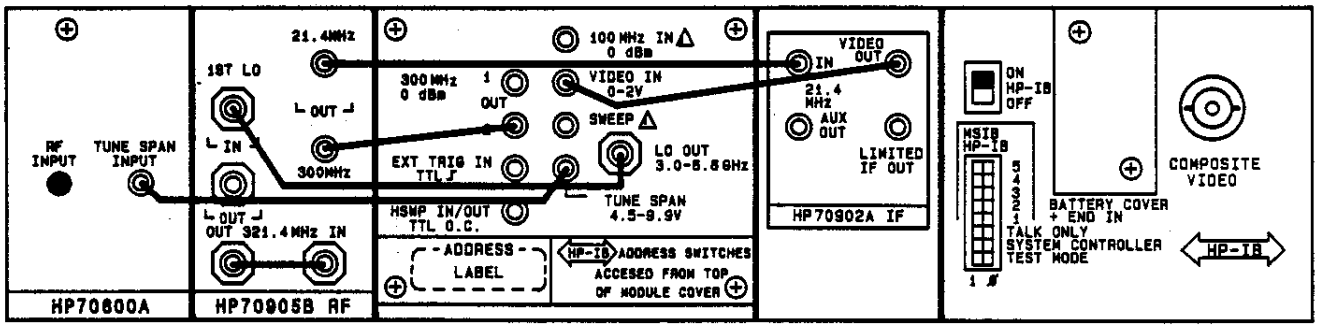
CABLING

Place the module into the mainframe before connecting any cables. First, connect the RF OUTPUT from the front panel of the preselector to the RF INPUT of the HP 70905B, HP 70905A, or HP 70906A. Connect the semi-rigid cable designed for the RF module used. Refer to the Accessories section of this operating note for cable identification.

The rear-panel cabling for the HP 71201A Preselected Microwave Spectrum Analyzer is shown in Figure 4. The rear-panel cabling for this system is essentially the same as that for the HP 71200A Microwave Spectrum Analyzer. The difference is that there is an additional connection from the HP 70900A Local Oscillator TUNE-SPAN to the HP 70600A Preselector TUNE-SPAN INPUT. Refer to the HP 71000

Modular Spectrum Analyzer System Support Manual for information on the HP 71200A Microwave Spectrum Analyzer cable connections.

REAR PANEL CABLE CONNECTIONS



SYSTEM COMPONENTS:

HP 70001A MAINFRAME
HP 70205A GRAPHICS DISPLAY
HP 70900A LOCAL OSCILLATOR
HP 70902A IF SECTION
HP 70905B RF SECTION
HP 70600A PRESELECTOR

THE HP 70001A MAINFRAME DOES NOT HAVE AN HP-MSIB ADDRESS. THE USUAL ADDRESS FOR THE HP 70600A PRESELECTOR IS ROW 5, COLUMN 18.

NOTE

TO RUN THE SYSTEM DIAGNOSTICS PROGRAM ON THIS SPECTRUM ANALYZER, THE HP-MSIB ADDRESSES MUST BE IN A SPECIFIC ORDER. SEE SYSTEM DIAGNOSTICS UNDER THE SYSTEM TROUBLESHOOTING TAB.

ADDRESSING EXAMPLE

ROW	17	18	19	20
7				
6				
5		70600A PRESEL		
4		70905B RF SECT		
3				
2				
1		70902A IF SECT		
0		70900A LO/CTLR HP-IB18		

COLUMN

Figure 4. Module Placement with Rear-Panel Cable Connections

ADDRESSING

The HP-MSIB address of the HP 70600A Preselector must be one higher than that of the RF section in the system. The address of this element was preset at the factory to row 5, column 18. If the other elements of the system have not had their preset addresses changed, no further addressing steps are required. If a custom addressing configuration is being used, refer to Preparation for Use (HP-MSIB/HP-IB Address Selection) in the HP 71000 Modular Spectrum Analyzer System Support Manual for instructions.

INSTALLATION VERIFICATION

POWER-ON SELF-TEST

At power-on, an internal self-test is initiated and performed on the HP 70600A Preselector. During this test, a ROM check is made and the module attempts to change the state of its RF switches and input attenuator settings. If no change in the state of either is sensed, an error message is generated and reported to the display CRT. These error messages are described in the Error Messages section of this document.

Verify that the HP 70600A is functioning properly by running the System Diagnostics program. Be sure to use System Diagnostics Version 861015, or later, to test the preselector. This version of System Diagnostics is included with systems shipped November 1, 1986 or later, or with the HP 70900A Mem-Plus Controller Board Upgrade Kit (HP Part Number 70900-60096).

HP 71201A PRESELECTED MICROWAVE SPECTRUM ANALYZER SPECIFICATIONS

The following specifications apply to the HP 71201A Preselected Microwave Spectrum Analyzer.

Specifications describe the warranted performance over the temperature range 0° to 55°C (except where noted) after one hour of continuous operation.

Characteristics provide useful information by giving functional, but non-warranted, performance parameters.

FREQUENCY

Frequency Range

50 kHz to 22 GHz, tunable in <1 Hz increments

Band*	Frequency
1H—	50 kHz to 2.90 GHz
1L—	2.7 GHz to 6.20 GHz
2L—	6.0 GHz to 12.7 GHz
3L+	12.5 GHz to 19.9 GHz
4L+	19.7 GHz to 22.0 GHz

*H = 3.6214 GHz IF
L = 321.4 MHz IF

Preselector Modes

Bypass Path . . . . . 0 to 22 GHz
Low-Pass Filter Path . . . . . 0 to 2.9 GHz
YIG-Tuned Filter Path . . . . . 2.7 to 22 GHz (in four bands)

Frequency Readout Accuracy

Span $\leq$ 10 MHz x N . . . . . ±((Frequency Readout x Frequency Reference Accuracy) + 1% of Span + 10 Hz)

Span >10 MHz x N . . . . . ±((Frequency Readout x Frequency Reference Accuracy) + 2% of Span + 10 Hz)

Frequency Reference Accuracy

Aging . . . . . <3 x 10^{-6}/year

Temperature Drift . . . . . <1 x 10^{-5} over 0 to 55°C

Frequency Span Range

Range . . . . . 0 to 22 GHz, in 0.5% increments

Accuracy

Span ≤10 MHz x N . . . . . ±(1% of Span + (Span x Frequency Reference Accuracy)

Span >10 MHz x N . . . . . ±(2% Span)

Frequency Drift

For spans >10 MHz × N, frequency drift during one sweep is ±1 kHz/second and ±150 kHz/°C. Errors due to drift are not cumulative from sweep to sweep.

Resolution Bandwidths (-3 dB)

Range (Adjustable in 1, 3, 10 sequence and 10% increments (except from 3 kHz to 10 kHz):
10 Hz to 300 kHz
10 Hz to 3 MHz (Opt. 004)
100 Hz to 3 MHz (Opt. 005)

Accuracy . . . . . ±20%

Selectivity (-60 dB/-3 dB)

10 Hz to 3 kHz Bandwidths <12:1
10 kHz to 3 MHz Bandwidths <16:1

Shape . . . . . Synchronously Tuned:

5 poles (10 Hz to 3 kHz)
4 poles (10 kHz to 10 kHz)
(Approximately Gaussian Shape)

Video Bandwidth

Range:
3 Hz to 300 kHz in 1, 3, 10 increments
3 Hz to 3 MHz (Opt. 004)
300 Hz to 3 MHz (Opt. 005)

When set to 300 kHz (Standard) or 3 MHz (Opt. 004), the filter is off and has an effective value of >300 kHz (Standard) or >3 MHz (Opt. 004)

Accuracy (characteristic only) . . . . . ±20%

Residual FM

Span >10 MHz x N . . . . . <25 kHz x N p-p in .1 second (measurement BW=100 kHz)
Span ≤ 10 MHz x N . . . . . In synthesized spans, residual FM is determined by noise sidebands. See Noise Sidebands specifications for values.

Spectral Purity

Noise Sidebands (dBc/Hz)

Offset	Band				
	50 kHz– 2.9 GHz (dBc)	**2.7– 6.2 GHz (dBc)**	**6.0– 12.7 GHz (dBc)**	**12.5– 19.9 GHz (dBc)**	**19.7– 22.0 GHz (dBc)**
>100 Hz	-69	-70	-64	-60	-58
>1 kHz	-85	-85	-79	-75	-73
>10 kHz	-90	-90	-84	-80	-78
>30 kHz	-97	-97	-91	-87	-85
>100 kHz	-108	-110	-104	-100	-98
>300 kHz	-117	-119	-111	-107	-103
>1.0 MHz	-125	-127	-119	-113	-108

Line and System Related Sidebands (dBc)

Offset Frequency	Band				
	50 kHz– 2.9 GHz (dBc)	**2.7– 6.2 GHz (dBc)**	**6.0– 12.7 GHz (dBc)**	**12.5– 19.9 GHz (dBc)**	**19.7– 22.0 GHz (dBc)**
N×50, 60, 400 Hz	-65	-66	-62	-59	-57
40 kHz	-67	-68	-63	-59	-58
80 kHz	-65	-65	-59	-55	-57
24 kHz	-65	-65	-59	-55	-53

AMPLITUDE

Maximum Amplitude Range . . . . . -130 to +30 dBm

Band	Range
10 MHz – 2.9 GHz	-127 to +30 dBm
2.7 GHz – 6.2 GHz	-130 to +30 dBm
6.0 GHz – 12.7 GHz	-121 to +30 dBm
12.5 GHz – 19.9 GHz	-115 to +30 dBm
19.7 GHz – 22.0 GHz	-111 to +30 dBm

Maximum Safe Input Power

AC Average Continuous Power . . . . . +15 dBm (0 dB input attenuation)

Bypass Mode . . . . . +15 dBm (0 dB input attenuation)
Low-Pass Filter Mode . . . . . +30 dBm (>10 dB input attenuation)
Preselected Mode . . . . . +25 dBm (10 dB input attenuation)
Any Mode . . . . . +30 dBm (with >10 dB input attenuation)

Pulse Power . . . . . 100W, 10 μs Pulse (≥ 40 dB input attenuation)

DC . . . . . 0 V

Gain Compression

Bypass Mode . . . . . <-0.5 dB for signal levels ≤-10 dBm
Low-Pass Filter Mode . . . . . ≤-5 dBm
Preselected Mode . . . . . ≤0 dBm

Displayed Average Noise Level

10 Hz Res BW, 0 dB Attenuation, HP 70902A IF Section:

Band	Bypass Mode (dBm)	Preselected Mode (dBm)
50 kHz – 100 kHz	<-88	<-82
100 kHz – 300 kHz	<-97	<-91
300 kHz – 1 MHz	<-107	<-101
1 MHz – 3 MHz	<-117	<-111
3 MHz – 10 MHz	<-120	<-114
10 MHz – 2.9 GHz	<-127	<-119
2.7 GHz – 6.2 GHz	<-130	<-118
6.0 GHz – 12.7 GHz	<-121	<-109
12.5 GHz – 19.9 GHz	<-115	<-101
19.7 GHz – 22.0 GHz	<-111	<-96

100 kHz Res BW, 0 dB Attenuation, using the HP 70903A IF Section:

[a] for frequencies >1 MHz, displayed average noise level is 40 dB higher than the above values.

For the HP 70200A Microwave Spectrum Analyzer with an HP 70600A Preselector:

for frequencies from 50 kHz–12.7 GHz, displayed average noise level is 1 dB higher than the above values.

for frequencies from 12.5 GHz–22 GHz, displayed average noise level is 2 dB higher than the above values.

Display Range

Scale . . . . . 10 Division CRT

Calibration:

Log . . . . . .01–20 dB/div. in increments of 0.5%

Linear . . . . . 10% of Reference Level/division

Reference Level Range:

Log . . . . . +30 dBm to -140 dBm

Linear (50Ω System) . . . . . 7.07V to 22 nV

Spurious Responses

For mixer levels ≤-30 dBm, all spurious responses, except as listed below, are less than these values (10 dB attenuation).

Input	Spurious
50 kHz to 10 MHz	<-60 dBc
10 MHz to 22 GHz	<-70 dBc

Second Harmonic Distortion for input at mixer <±30 dBm in bypass and low-pass bands, and ≤0 dBm in preselected bands (10 dB attenuation).

Band	Second Harmonic (bypass/filtered)
100 kHz to 20 MHz	<-60/-66
20 MHz to 2.9 GHz	<-70/-76
2.7 GHz to 6.2 GHz	<-70/-100
6.0 GHz to 12.7 GHz	<-60/-100
12.5 GHz to 19.9 GHz	<-55/-90
19.7 GHz to 22.0 GHz	<-50/-85

Third-Order Intermodulation Distortion w/HP 70902A IF Section for two signals at the RF INPUT, each ≤-20 dBm in bypass mode and ≤-10 dBm in preselected (filtered) mode (both 10 dB attenuation)

Center Frequency	Intermodulation Products (bypass/filtered)	Equivalent TOI (dBm) (bypass/filtered)
50 kHz to 10 MHz	<-66/-58	+3/+9
10 MHz to 2.9 GHz	<-74/-66	+7/+13
2.7 GHz to 6.2 GHz	<-74/-74	+7/+17
6.0 GHz to 22 GHz	<-76/-76	+8/+18

Third-Order Intermodulation Distortion with an HP 70903A IF Section for two signals at the RF INPUT, each ≤-10 dBm in bypass mode and ≤0 dBm for preselected (filtered) mode.

Center Frequency	Intermodulation Products (bypass/filtered)	Equivalent TOI (dBm) (bypass/filtered)
50 kHz to 10 MHz	<-46/-38	+3/+9
10 MHz to 2.9 GHz	<-54/-46	+7/+13
2.7 GHz to 6.2 GHz	<-54/-54	+7/+17
6.0 GHz to 22 GHz	<-56/-56	+8/+18

Image response for RF INPUT level input level ≤ 0 dBm (≤10 dB attenuation) in filtered mode

Center Frequency	Image Response (dBc) -6 MHz	-42.8 MHz	-642.8 MHz
0 to 2.9 GHz	<-85	<-85	<-100
2.7 to 12.7 GHz	<-85	<-85	<-70
12.5 to 22.0 GHz	<-85	<-85	<-60

Multiple and Out-of-Band Responses for RF INPUT level ≤0 dBm (≥10 dB attenuation) . . . . . -60 dBc

Residual Responses

(0 dB input attenuation with input terminated)

Band	Response (dB) (bypass/filtered)
10 MHz to 2.9 GHz	<-99/-91
2.7 GHz to 6.2 GHz	<-99/-86
6.0 GHz to 12.7 GHz	<-90/-76
12.5 GHz to 19.9 GHz	<-85/-63

Frequency Response

(10 dB input attenuation)

Band	Response (dB) (bypass/filtered)
400 kHz to 2.9 GHz	±1.2/1.5
50 kHz to 2.9 GHz	±2.6/2.8
2.7 GHz to 6.2 GHz	±1.2/1.5
6.0 GHz to 12.7 GHz	±1.8/2.2
12.5 GHz to 19.9 GHz	±2.4/3.0
19.7 GHz to 22 GHz	±3.0/3.0

Frequency Response

Referenced to 300 MHz, -10 dBm Calibrator (10 dB input attenuation)

Band	Response (dB) (bypass/filtered)
400 kHz to 2.9 GHz	±1.5/1.8
50 kHz to 2.9 GHz	±2.9/3.1
400 kHz to 6.2 GHz	±2.5/2.8
400 kHz to 12.7 GHz	±3.1/3.5
400 kHz to 19.9 GHz	±3.7/4.3
400 kHz to 22 GHz	±4.3/4.8

Calibrator Uncertainty

±0.3 dB (-10 dBm, 300 MHz)

Amplitude Temperature Drift (characteristic only)

For -10 dBm reference level with 10 dB input attenuation, in 100 Hz Res BW (HP 70902A IF Section) or 300 kHz Res BW (HP 70903A IF Section), drift is ±.05 dB/°C (accumulated error eliminated by recalibration)

Resolution Bandwidth Switching Uncertainty

(Reference Bandwidth = 100 Hz in HP 70902A, 300 kHz in HP 70903A IF Sections)

Corrected . . . . . ±0.2 dB
Uncorrected . . . . . ±0.3 dB

Log Scale Switching Uncertainty . . . . . ±0.03 dB

IF Gain Uncertainty

Gain	20 to 30 °C	0 to 55 °C
10 dB	±0.1 dB	±0.1 dB
20 dB	±0.1 dB	±0.2 dB
30 dB	±0.1 dB	±0.3 dB
40 dB	±0.2 dB	±0.5 dB
50 dB	±0.2 dB	±0.6 dB

Input Attenuator Switching Uncertainty . . . . . ±0.2 dB
(Variation for any setting referenced to 10 dB attenuation)

Scale Fidelity

Bandwidth	Display Range (dB)	Fidelity (dB)
LOG:		
≥30 Hz, ≤100 kHz	0 to 90 dB	+0.5
<30 Hz	0 to 90 dB	+0.5
<100 kHz	0 to 90 dB	+0.7
≤1 MHz	0 to 80 dB	+0.5
>1.0 MHz	0 to 80 dB	+0.7

Incremental fidelity 0.1 dB/dB

All Bandwidths (uncorrected) ±3 dB over 0 to 90 dB or 80 dB*

Linear . . . . . ±7.5% of Reference Level

*Applies to HP 70903A IF Section

SWEEP

Sweep Time

Range . . . . . 50 ms to 1000s adjustable to four digits of precision

Accuracy . . . . . ±2%

Trigger

Free Run
Line
Video
External

HP 71201A PRESELECTED MICROWAVE SPECTRUM ANALYZER INPUTS AND OUTPUTS

HP 70600A Preselector

Front-Panel Input

RF Input (50 kHz to 22 GHz)

Connector . . . . . Type N (f)
Impedance (characteristic) 50Ω

LO Emission
<-10 dBm Bypass Mode (0 to 22 GHz)
<-50 dBm Low Band (0 to 2.9 GHz)
<-80 dBm High Band (2.7 to 22 GHz)

VSWR (≥10 dB Attenuation):

Frequency (GHz)	VSWR (characteristic only)
0 to 12.7	1.9:1
12.5 to 19.9	2.0:1
19.7 to 22.0	2.5:1

HP 70905B RF Section

Rear-Panel Output

First LO Auxiliary Output

Connector . . . . . SMA (f)
Impedance (characteristic) 50Ω
Frequency Range . . . . . 3.0 to 6.6 GHz
Power Range . . . . . +1.5 dBm to 12 dBm

HP 70902A IF Section

Rear-Panel Output

Auxiliary Video Output

Connector	BNC (f)
Impedance (characteristic)	1 kΩ
Output Voltage (characteristic)	0 to 1V

3 MHz IF Output (linear)

Connector	BNC (f)
Impedance	50Ω
VSWR (characteristic)	1.5:1
Output Power	-15 dBm nominal with -10 dBm RF input, 0 dB attenuation and -10 dBm reference level

HP 70903A IF Section (Option 004)

Auxiliary Video Output

Connector	BNC (f)
Impedance (characteristic)	100Ω
Output Voltage (characteristic)	0 to 1V

21.4 MHz IF Output (linear)

Output Power	-15 dBm nominal with -10 dBm RF input, 0 dB attenuation and -10 dBm reference level

HP 70900A LO Section

Front Panel

300 MHz Calibrator Output

Connector	BNC (f)
Impedance (characteristic)	50Ω
VSWR (characteristic)	<1.2:1
Output Power	-10 dBm ±0.3 dB
Frequency Accuracy	300 MHz x Frequency Reference Accuracy

Rear Panel

External Frequency Reference (100 MHz)

Connector . . . . . SMB (m)
Impedance (characteristic) 50Ω
Power Required . . . . . 0 dBm ±3 dB

Maximum Phase Noise:

Offset	Phase Noise
10 Hz	-75 dBc/Hz
100 Hz	-105 dBc/Hz
1.0 Hz	-135 dBc/Hz
≥10 kHz	-145 dBc/Hz

Maximum Spurious . . . . . Less than phase noise or -115 dBc, whichever is greater

Sweep Output/Input

Connector . . . . . SMB (m)
Output Voltage . . . . . 0 to 10V
Accuracy 2%

Tune + Span Output

Connector . . . . . SMB (m)
Output Voltage . . . . . 4.5 to 9.9V (1.5V/GHz)

HSWP Output/Input

Connector . . . . . SMB (m)
Logic . . . . . TTL open collector

Sweep Condition

Low . . . . . not ready to sweep
Maximum Delay . . . . . 200 µs from HSWP high to sweep
Maximum Current Draw . . . . . 16 mA

HP 70205A and HP 70206A Displays

Composite Video Output

Connector	BNC
Impedance (characteristic)	75Ω
Output Voltage	1 Vp-p ±10%
Horizontal Sweep	24 kHz ±1%
Refresh Rate	60 Hz ±1%
Bandwidth	25 MHz

GENERAL

Environmental

Temperature

Operation	0°C to +55°C
Storage	-40°C to +75°C

Humidity

Operation	0 to 95% relative humidity at +45°C

EMI

Radiated interference is within the requirements of MIL-STD 461B, Class Alc, REO2

Power Requirements

Power and cooling requirements are provided by the HP 70001A Mainframe.

Warm-up Time

One hour from cold start	0°C to 55°C

Weight

System

HP 71201A Preselected Microwave Spectrum Analyzer	30.6 kg (67.5 lb)

Module

HP 70600A Preselector	2.7 kg (6.0 lb)

For any other module characteristics or weights, refer to the HP 71000 Modular Spectrum Analyzer System Support Manual, Preparation for Use section.

ERROR MESSAGES

HP 70600A PRESELECTOR (ONLY)

User Error

2001 Illegal cmd Illegal command, user-generated error

2002 Illegal parameter User-generated error

2006 Parm out of range Parameter out of range, user-generated error

2009 Protocol error User-generated error

HARDWARE ERROR

6000 EAROM unprotected The write/protect switch is not in the protect position.

HARDWARE BROKEN ERROR

7000 ROM check error The HP 70600A Preselector failed one of the following: EAROM checksum, the internal CPU/ROM checksum, or the RAM read/write check test. ROM check is only activated during power-up or during module self-test.

7077 YTF drive error The module did not sense activity in either the RF switch driver or the input attenuator drive circuitry. This check is made only at power-up or during module self-test when the module tries to force a change in the RF switch and input attenuator settings.

7078 Tune + Span error The voltage at the TUNE SPAN input is below 4V. This voltage is continually monitored.

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