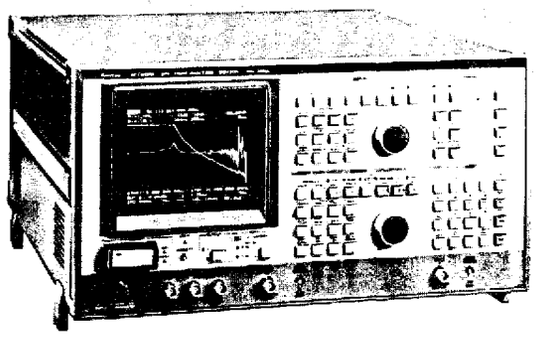
NETWORK/SPECTRUM ANALYZER

MS420B/K

10Hz to 30MHz

B: 75Ω
K: 50Ω

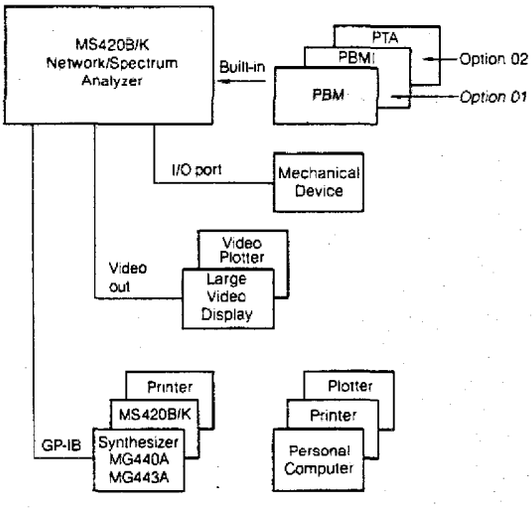


《GP-IB》

The MS420B/K Network/Spectrum Analyzer is suitable for total evaluation of electronic devices, circuits, and elements. It can analyze magnitude, phase, delay time, levels and spectrum, and frequencies of signals. The MS420B/K also has a built-in test-signal source and CRT display.
A high-performance synthesizer is employed in the test-signal source and the local signal source of the receiver, giving highly stabie measurements and high resolution.
The following options are available on the MS420B/K

PTA (Personal Test Automation)
Controller used to construct a high-speed measuring system. Its programs are written in high-level language PTL (Personal Test Language) that is similar to BASIC.

PBMI (Plug-In Bubble Memory Interface)
8k-byte PBM interface. PBM can be plugged into the MS420B/K front panel, and can memorize up to 6 functions or can file application programs written in PTL.



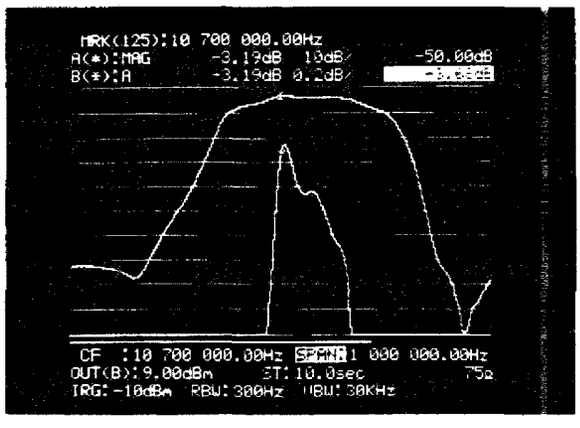
Options and peripheral equipment

Features

- Wide measurable level range of over 150dB, allowing the measured device to be checked at actual operational levels.
- *High-performance synthesizer to enable high resolution* measurements.
- High-speed measurement of 2 ms/point
  This is useful for speedier mass production of parts.
- High-precision group delay measurements
- Logarithmic frequency sweep
- Level sweep for non-linearity tests; variable input levels make the instrument suitable for characteristics tests
- Built-in GP-IB interface for remote control of front panel functions
- Video output (rear panel) allows connection of a large-scale video display or video plotter (copy speed: about 13 sec)
- Level calibration by using the output of the test-signal source
- External MG440A Synthesizer or MG443B SLG can be connected to check frequency response of conversion loss at different input/output frequencies

Applications

- **Filter adjustment**
  The MS420B/K can simultaneously display both the overall characteristics and passband ripple of a filter on the CRT. Therefore, passband ripple adjustment of a filter can be done while the overall frequency response is being observed.



Measurement of a 10.7 MHz IF filter

APPENDIX 1-(a) MS420[ ] SPECIFICATIONS

Items		Specifications	Network Analysis	Spectrum Analysis
Measuring items		Magnitude, Phase, Delay, Magnitude and Phase, Magnitude and Delay	○	
		Level (R), Level (T), Spectrum (R), Spectrum (T) R: Reference input, T: Test input Level: Measures the level at only frequency points displayed on the CRT Spectrum: Display the maximum value of the signal by making a measurement with frequency steps fine enough to acquire all frequencies in full sweep bandwidth		○
Frequency	Range	10Hz to 30 MHz, Resolution: 10 mHz	○	○
	Reference crystal Oscillator	Frequency: 10 MHz Stability: $\leqq 5 \times 10^{-8}$ after 10 minutes warm-up, based on the frequency after one hour warm-up $\pm 1 \times 10^{-7}$ (0 to 45°C)	○	○
Input	Channel	2 channels (R and T)	○	○
	Impedance	1 MΩ: 1 MΩ ±10% shunted by ≦70 pF (50 pF typical) 75Ω/50Ω: Return loss: ≧30 dB	○	○
	Range (IRG)	−40 to +20 dBm, 10 dB steps	○	○
	Connector	BNC	○	○
Dynamic range	Image rejection	≧70 dB	○	○
	IF rejection	≧70 dB	○	○
	Internal distortion	≦−60 dB at 100 Hz to 200 kHz (Resolution Bandwidth: ≦300 Hz) ≦−70 dB at 200 kHz to 15 MHz		○
	Average noise level	At level measurement when the input channel and impedance are T and 75 Ω/50 Ω.		○

Resolution bandwidth	Frequency	Values relative to input range
10 Hz	100 Hz to 30 MHz	−80 dB
10 Hz	10 kHz to 30 MHz	−90 dB
30 Hz	300 Hz to 30 MHz	−70 dB
30 Hz	10 kHz to 30 MHz	−85 dB

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<table>
<tr><th colspan="2">Item</th><th>Specifications</th><th>Network Analysis</th><th>Spectrum Analysis</th></tr>
<tr><td rowspan="2">Dynamic range</td><td rowspan="2">Average noise level</td><td>
<table>
<tr><th>Resolution bandwidth</th><th>Frequency</th><th>Values relative to input range</th></tr>
<tr><td>100 Hz</td><td>1 kHz to 30 MHz</td><td>−80 dB</td></tr>
<tr><td>300 Hz</td><td>3 kHz to 30 MHz</td><td>−80 dB</td></tr>
<tr><td>1 kHz</td><td>10 kHz to 30 MHz</td><td>−75 dB</td></tr>
<tr><td>3 kHz</td><td>30 kHz to 30 MHz</td><td>−70 dB</td></tr>
<tr><td>10 kHz</td><td>100 kHz to 30 MHz</td><td>−65 dB</td></tr>
<tr><td>30 kHz</td><td>300 kHz to 30 MHz</td><td>−60 dB</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>The best data for the network analysis is 10 dB or more improvement over above values.</td><td>○</td><td></td></tr>
<tr><td rowspan="2">Crosstalk</td><td>Between input R and T</td><td>≧100 dB</td><td>○</td><td></td></tr>
<tr><td>Between synthesizer output and input T</td><td>≧120 dB</td><td>○</td><td>○</td></tr>
<tr><td rowspan="2">Resolution bandwidth</td><td>3 dB bandwidth</td><td>3 Hz to 30 kHz in 1.3 sequence
Accuracy: ±20% at ≧30 Hz</td><td>○</td><td>○</td></tr>
<tr><td>Selectivity</td><td><20:1, shape factor 60 dB/3dB</td><td>○</td><td>○</td></tr>
<tr><td colspan="2">Video bandwidth</td><td>1 Hz to 30 kHz in 1.3 sequence</td><td>○</td><td>○</td></tr>
<tr><td rowspan="3">Magnitude measurement</td><td>Range</td><td>100 dB, Resolution: 0.01 dB</td><td rowspan="3">○</td><td rowspan="3"></td></tr>
<tr><td>Offset error</td><td>Frequency response and input range/resolution bandwidth switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).</td></tr>
<tr><td>Linearity</td><td>0 to −50 dB : ±0.15 dB
−50 to −60 dB: ±0.5 dB
−60 to −70 dB: ±1 dB
−70 to −80 dB: ±2 dB
±1 dB (0 to −10 dB) for resolution bandwidth 3 Hz</td></tr>
<tr><td rowspan="2">Level/ spectrum measurement</td><td>Range</td><td>−130 to +20 dBm. Resolution: 0.01 dB</td><td rowspan="2"></td><td rowspan="2">○</td></tr>
<tr><td>Offset error</td><td>Frequency response and input range errors can automatically be corrected by memorizing the standard data calibrated with the reference signal (synthesizer output)</td></tr>
</table>

Item		Specifications	Network Analysis	Spectrum Analysis
Level/ spectrum measure-ment	Linearity	0 to −50 dB : ±0.15 dB −50 to −60 dB: ±1 dB −60 to −70 dB: ±3 dB ±1 dB (0 to −10dB) for resolution bandwidth 3Hz		○
Phase measure-ment	Range	±180 degrees, Resolution: 0.1 deg.	○	
	Offset error	Frequency response and input range/resolution band-width switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).		
	Level charac-teristic	0 to −50dB : ±1.5 deg. −50 to −70 dB: ±3 deg. at resolution bandwidth 3 kHz.		
Delay measure-ment	Range	1 μs to 400 ms in 1,2,4 sequence	○	
	Resolution	Normal: 1/1000 of measurement range Expand: 1/10000 of measurement range		
	Offset error	Frequency response can automatically be corrected by memorizing the calibration data (usually based on the through connection).		
	Level charac-teristic	(0.5% of full scale +0.5% of reading) at 0 to −50dB and resolution bandwidth ≧10 Hz for 1 μs range (1 − 30 MHz)		
Synthesizer output	A output	−110 to +15 dBm, Resolution: 0.01 dB	○	○
	B output	−110 to +9 dBm, Resolution: 0.01 dB (power splitter output) Both output terminated		
	Level accuracy	±0.3 dB at +5 dBm		
	Impedance	75 Ω/50 Ω, Return loss: >30 dB		
	Connector	BNC		
Frequency measurement		Resolution: 1 Hz, Accuracy : Reference frequency ±1 Hz		○
Sweep mode	Frequency	LIN : START/STOP, CENTER/SPAN LOG: START/STOP	○	○
	Level	START/STOP/STEP		

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Item		Specifications	Network Analysis	Spectrum Analysis
Sweep point		251	o	o
Sweep time (ST)		500 ms* to 24 hours/SPAN *: Depends on measurement item and measurement conditions	o	o
Sweep range	AUTO	Automatic sweep over the full range	o	o
	MARKER	Measures only marker point or sweeps only the range between two markers.		
Sweep control		RESET, STOP, REPEAT START. SINGLE START	o	o
Automatic setting		SIGNAL TRACK: Ganged to maximum received signal automatically	—	o
		BW, ST: COUPLED TO FREQ Resolution bandwidth, Video bandwidth and Sweep time are automatically set to the optimum value by ganging with span width	o	o
		BW, ST: COUPLED TO SPAN Resolution bandwidth, Video bandwidth and Sweep time are automatically set to the optimum value by ganging with span width		o
Calibration	INT	Non-linearity error correction	o	o
	X→S	Offset error correction		
Calculation	X − S	Automatic correction of offset error	o	o
	A − B	Arithmetic processing between A and B memories		
	Δ	Deviation between MAIN marker and Δ marker		
	ZERO	Deviation from reference value		
Display	CRT	6.5 – inch electromagnetic deflection	o	o
	Trace	Same as the measuring items (rectangular coordinates)		
	Sub-trace	Same as the measuring items (rectangular coordinates) B, A, A − B. It is not performed for Magnitude/Phase and Magnitude/Delay		
	Marker	2 (MAIN marker and Δ marker)		
	Character	Marker point data, Trace condition, Measurement condition		

Item		Specifications	Network Analysis	Spectrum Analysis
Function memory		3 (Trace condition, Measurement condition)	○	○
Rear panel INPUT/ OUTPUT	Video output	75Ω load, Approx. 1 Vp-p (BNC)	○	○
	10 MHz reference output	TTL level (BNC)		
	10 MHZ reference input	TTL level (BNC)		
	X→S switching signal	Open collector (36 pins)		
	GP-IB	Compatible with IEEE488 (24 pins)		
Remote control		GP-IB (IEEE488, IEC 625-1; 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (without power and intensity) of front panel are remotely controllable	○	○
Power		** Vac ±10%, 50/60 Hz, <330 VA	○	○
Ambient temperature rated range of use		0°C to +45°C	○	○
Dimensions and weight		221.5H, 426W, 451D mm, ≦35 kg	○	○