B: 75Ω
K: 50Ω

《GP-IB》
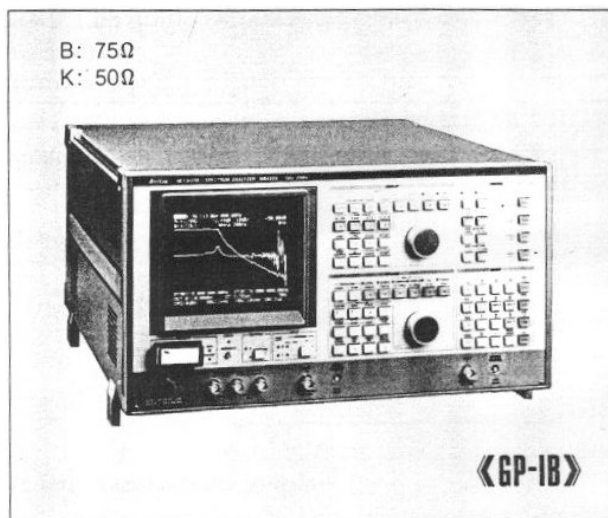
The MS420B/K Network/Spectrum Analyzer is suitable for total evaluation of electronic devices, circuits, and elements. It can analyze magnitude, phase, delay time, levels and spectrum, and frequencies of signals. The MS420B/K also has a built-in test-signal source and CRT display.

A high-performance synthesizer is employed in the test-signal source and the local signal source of the receiver, giving highly stable 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.
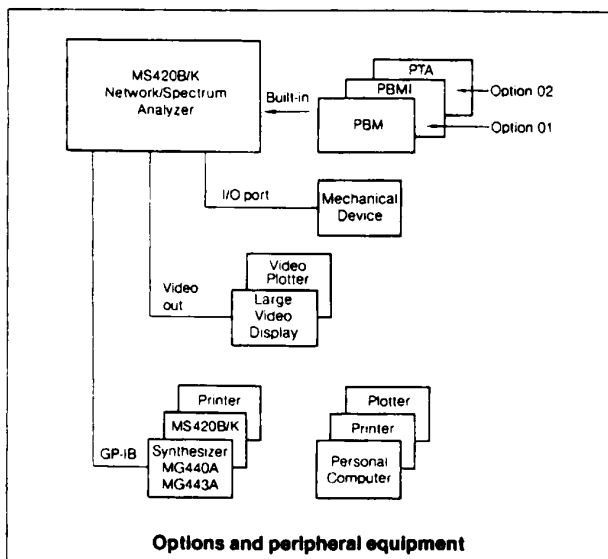
Features

● 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 2ms/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.
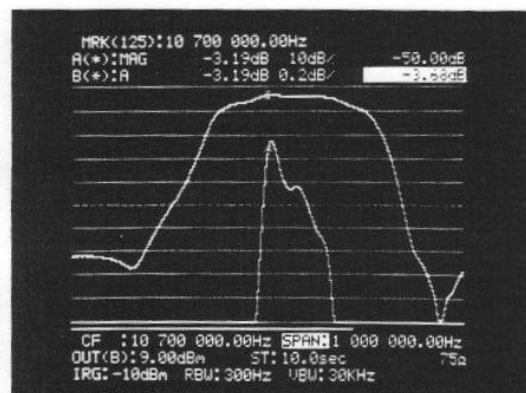

Measurement of a 10.7 MHz IF filter

Options and peripheral equipment

/Inritsu

● **High precision delay time measurement**

Delay time and frequency response of VTR 1H delay lines must be measured precisely. The delay time expansion function of the MS420B/K can test samples that have very feeble frequency response in comparison with the absolute delay time. At 400kHz aperture, samples of 1 μs delay time can be tested easily at a resolution of 1 ns. For VTR 1H delay lines, 63-μs delay time can be tested at 10-ns resolution.
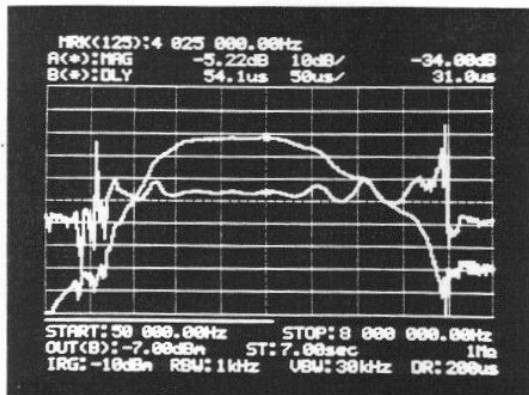
Measurement of a delay line
Upper trace: Amplitude
Lower trace: Group delay

● **High-resolution spectrum analysis**

A high-performance synthesizer is built in, so that stable analysis can be performed at a resolution bandwidth of 3 Hz. This permits accurate analysis of even a spurious signal from a power line.
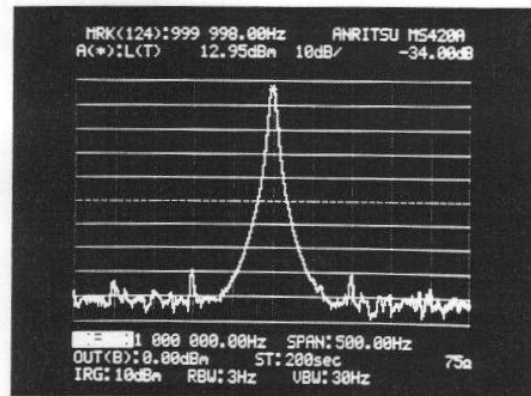

Analysis of spurious related to hum

● **Connection to personal computer**

Through the built-in GP-IB interface, the MS420B/K can be connected to a data processor, such as personal computer, so that all the functions except the POWER switch and the INTENSITY control can be controlled externally. The interface is especially useful when mass of data is to be processed, and when the MS420B/K is to be combined with other measuring instruments. External memory, an XY plotter, and a serial printer can also be connected for recording and listing of data.
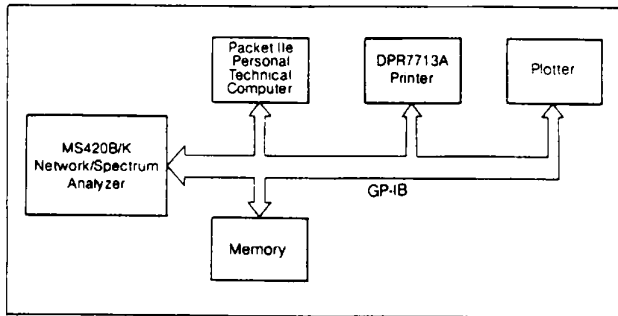
● **Frequency shift measurement by MAX HOLD**

The MAX HOLD function can measure frequency shift of F signals and the degree of such shifts. For a spectrum havir a large level change, the maximum value can be held easily
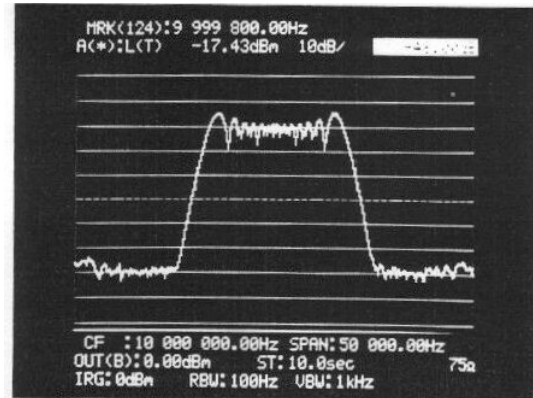
Frequency deviation measurement
of FM signal

MS420☐ specifications

Functions		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 only at frequency points displayed on the CRT, Spectrum: Displays 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 30MHz. Resolution: 0.01Hz	●	●
	Reference crystal oscillator	Frequency: 10MHz Stability: $\leq 5 \times 10^{-8}$ 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	1MΩ: 1MΩ ±10% shunted by $\leq$ 70pF (50pF typical) 75Ω: (MS420B); 50Ω: (MS420K); Return loss: $\geq$30dB	●	●
	Range (IRG)	−40 to +20dBm, 10dB steps	●	●
	Connector	BNC	●	●
Dynamic range	Image rejection	$\geq$ 70dB	●	●
	IF rejection	$\geq$ 70dB	●	●
	Internal distortion	$\leq$ −60dB at 100Hz to 200kHz (Resolution bandwidth: $\leq$ 300Hz) $\leq$ −70dB at 200kHz to 15MHz	●	●
	Average noise level	At level measurement when the input channel and impedance are T and 75Ω/50Ω. | Resolution bandwidth	Frequency	Values relative to input range | |---|---|---| | 10 Hz | 100 Hz to 30MHz | −60dB | | 10 Hz | 10kHz to 30MHz | −90dB | | 30 Hz | 300 Hz to 30MHz | −70dB | | 30 Hz | 10kHz to 30MHz | −85dB | | 100 Hz | 1kHz to 30MHz | −80dB | | 300 Hz | 3kHz to 30MHz | −80dB | | 1kHz | 10kHz to 30MHz | −75dB | | 3kHz | 30kHz to 30MHz | −70dB | | 10kHz | 100kHz to 30MHz | −65dB | | 30kHz | 300kHz to 30MHz | −60dB |		●
		The best data for the network analysis is 10dB or more improvement over above values.	●	
Crosstalk	Between input R and T	$\geq$ 100dB	●	
	Between synthesizer output and input T	$\geq$ 120dB	●	●
Resolution bandwidth	3dB bandwidth	3Hz to 30kHz in 1,3 sequence. Accuracy: ±20% at $\geq$30Hz	●	●
	Selectivity	< 20:1, shape factor 60dB/3dB	●	●
Video bandwidth		3Hz to 30kHz in 1,3 sequence	●	●
Magnitude measurement	Range	100dB. Resolution: 0.01dB		
	Offset error	Frequency response and input range/resolution bandwidth switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).	●	
	Linearity	0 to −50dB : ±0.15dB −50 to −60dB: ±0.5dB −60 to −70dB: ±1dB −70 to −80dB: ±2dB ±1dB (0 to −10dB) for resolution bandwidth 3Hz		
Level/ spectrum measurement	Range	−130 to +20dBm. Resolution: 0.01dB		
	Offset error	Frequency response and input range errors can automatically be corrected by memorizing the standard data calibrated with the reference signal (synthesizer output)		●
	Linearity	0 to −50dB : ±0.15dB −50 to −60dB: ±1dB −60 to −70dB: ±3dB ±1dB (0 to −10dB) for resolution bandwidth 3Hz		●
Phase measurement	Range	±180 degrees. Resolution: 0.1 deg.		
	Offset error	Frequency response and input range/ resolution bandwidth switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).	●	
	Level characteristic	0 to −50dB: ±1.5 deg. −50 to −70dB: ±3 deg. at resolution bandwidth 3kHz.		
Delay measurement	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 characteristic	(0.5% of full scale +0.5% of reading) at 0 to −50dB and resolution bandwidth $\geq$ 10Hz for 1 μs range (1 to 30MHz)		

Synthesizer output	A output	−110 to +15dBm, Resolution: 0.01dB	•	•
	B output	−110 to +9dBm, Resolution: 0.01dB (power splitter output). Both outputs terminated		
	Level accuracy	±0.3dB at +5dBm		
	Impedance	75Ω, Return loss: >30dB (MS420B), 50Ω, Return loss: >30dB (MS420K)		
	Connector	BNC		
Frequency measurement		Resolution: 1Hz, Accuracy: Reference frequency ±1Hz		•
Sweep mode	Frequency	LIN: START/STOP, CENTER/SPAN LOG: START/STOP	•	•
	Level	START/STOP/STEP		
Sweep points		251	•	•
Sweep time (ST)		500ms* to 24 hours/ SPAN * Depends on measurement item and measurement conditions	•	•
Sweep range	AUTO	Automatic sweep over the full range	•	•
	MARKER	Measures only marker point or sweeps only the range between two markers		
Sweep control		RESET, STOP, REPEAT START, SINGLE START	•	•
Automatic setting		SIGNAL TRACK: Automatically ganged to maximum received signal		•
		BW, ST: COUPLED TO FREQ Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with span width	•	•
		BW, ST: COUPLED TO SPAN Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum value by ganging with frequency		•
Calibration	INT	Non-linearity error correction	•	•
	X → S	Offset error correction		
Calculation	X − S	Automatic correction of offset error	•	•
	A − B	Arithmetic processing between A and B memories		
	△	Deviation between MAIN marker and △ marker		
	ZERO	Deviation from reference value		
Display	CRT	6.5 inch electromagnetic deflection	•	•
	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		
	Markers	2 (MAIN marker and △ marker)		
	Character	Marker point data, trace condition, measurement condition		
	Function memory	3 (Trace condition, measurement condition)	•	•
Rear panel INPUT/ OUTPUT	Video output	75Ω load, approx. 1 Vp-p (BNC)	•	•
	10MHz reference output	TTL level (BNC)		
	10MHz reference input	TTL level (BNC)		
	X → S switching signal	Open collector (36 pins)		
	GP-IB	Compatible with IEEE-488 (24 pins)		
Remote control		GP-IB (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllable	•	•
Power		AC100V ± 10%, 50/60Hz, <330VA	•	•
Ambient temperature, rated range of use		0°C to +45°C	•	•
Dimensions and weight		221.5H, 426W, 451D mm, ≤ 35 kg	•	•