BANTAM INSTRUMENTS

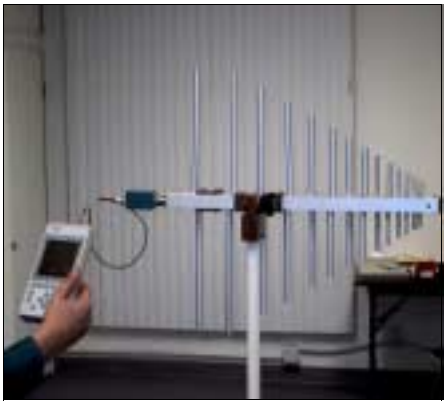
PERSONAL SPECTRUM ANALYZER

MODEL 401B 1 MHz to 1024 MHz

THE WORLD'S MOST VERSATILE RF SPECTRUM ANALYZER

Calibrated E-Field Probe makes
EMC Pre-Compliance easy

Broadband Active Antenna makes
Field Strength Measurements a snap



Self Powered Preamplifier Module
Boosts Sensitivity by 26 dB

Fully Programmable Serial Interface
for Remote Monitoring Applications

Calibrated H-Field Probe solves
Magnetic Leakage problems

Affordable 1 GHz Spectrum Analyzer that fits in Your Toolbox

VERSATILITY AND EASE OF USE

The Model 401B Personal Spectrum Analyzer brings affordable, palm-size, battery operated measurement capability to the user, whether at the bench or in the field. Now you can quickly and easily make spectrum analysis measurements without wrestling with bulky, difficult to use, bench top products. The Model 401B weighs only 1.2 pounds (0.55 kg).

Operation is menu driven, with six soft keys to guide you through the measurement process. Functionality and ease of use have been designed in, making operation straightforward and intuitive.

The display is large and easy to read with an optional back light for low light level operation. Context-sensitive help menus are available at the push of a front panel button.

A HOST OF APPLICATIONS

The 401B Personal Spectrum Analyzer is ideal for signal characterization, identification of unknown signals, harmonic and spurious measurements, signal monitoring, field strength measurements, and EMC pre-compliance. Data can be displayed either in dBm or dBµV.

In the field, the 401B can be used to measure the radiation level of an antenna site, align antennas, locate and identify interfering signals, and remote monitoring. Installation of wireless LANs and modems, and indoor paging and music systems represent but a few of the many additional applications.

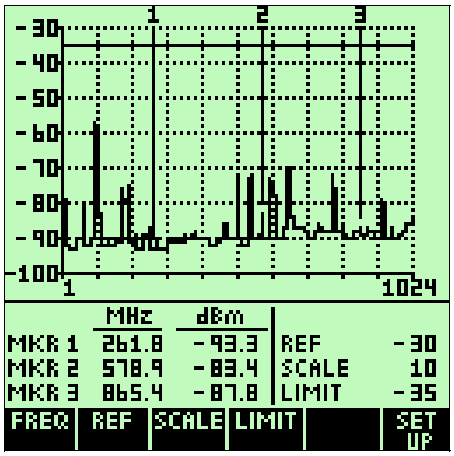
BATTERY OPERATED

Low power circuitry and state-of-the-art Nickel Metal Hydride (NiMH) rechargeable batteries are used to provide hours of measurement between charges. When not being actively used, the instrument reverts to a "sleep mode" which greatly reduces power consumption. It is awakened at the touch of a front panel button, and resumes the measurement where it left off. This sleep mode typically allows all-day operation without recharging. An on-screen battery icon indicates the battery life remaining.

A line powered battery charger is included, and when connected to the instrument during operation, allows continuous non-stop measurements. An accessory 12 VDC cigarette lighter adapter is also available.

SET UP MEASUREMENTS EASILY

The measurement frequency span can be set up in two modes: Start/Stop or Center/Span and the two modes can be easily interchanged. When in the Start/Stop mode, simple front panel button pushes zoom out to the full measurement range of the instrument to search for out of band signals. The measurement range can then be quickly returned to the previous area of interest. Measurement



Display with Markers and Limit Line

Serial Port for Transferring Data to your PC and 401B Remote Programming

The 401B Spectrum Analyzer has an RS-232 serial interface which can be used for transferring measurement data to a PC or to control the 401B via a PC. This capability can be used for automated test or to monitor the RF environment at a remote location. All 401B measurement functions are available remotely through the serial interface, including frequency measurement range, markers, and limit lines. All control commands use ASCII characters and simple three-letter mnemonics, making programming straightforward.

The 401B includes PC Enhancement software which is compatible with any PC using a WINDOWS 95[1] or later operating system. The PC Enhancement Software makes data transfer to the PC simple and straightforward. Measurement data can be transferred to the PC and stored on the hard drive either as a bitmap graphic or EXCEL[1] Spreadsheet compatible data. This allows virtually unlimited storage capacity for measurement data to be archived for later use.

Measurement data can be printed using the printer connected to the PC. A unique mode allows data to be printed using a front panel command from the spectrum analyzer without touching the PC keyboard. A serial cable for connecting between the 401B and the PC is included.

PC Interface for downloading data and 401B control

[1]WINDOWS and EXCEL are Registered Trademarks of Microsoft Corporation

width can be zero span (single frequency) up to the full measurement range of the instrument .

Using the front panel soft keys, the scale (dB/div), Reference (dB value at the top of the screen), a horizontal Limit Line, and dB Offset can easily be set. The instrument can be set to beep if a signal exceeds the limit line value. If desired, the instrument can easily be returned to factory preset values.

FREQUENCY MARKERS

Three Frequency Markers are available to indicate frequency ranges or identify frequencies of interest. Marker functions include SEEK where the marker automatically moves either right or left to the highest signal. The MARKER TO CENTER function automatically changes the measurement range so that the frequency of the selected marker is at the center of the screen. It is then straightforward to zoom in on the signal of interest.

SAVE / RECALL OF SETUPS AND TRACES

At the press of a front panel button, measurement setups can be stored or recalled from 20 memory locations. For each entry the frequency range, reference level, and dB/div scale of the setup are displayed, making them easy to identify in the future.

A similar trace memory has 20 locations to store measurement data. These memory locations are numbered 1 through 20 and the memory list includes the date and time that the measurement was stored, as the spectrum analyzer contains an internal battery operated clock similar to a Personal Computer. If additional trace memory is required, measurement data can be downloaded to a PC for virtually unlimited storage capacity.

BROADBAND ACTIVE ANTENNA AND HIGH GAIN PREAMPLIFIER ARE POWERFUL ACCESSORIES

The ANT01A Active Antenna has a built-in preamplifier and is very broadband, 30 MHz to 1024 MHz. It is calibrated in dBµV/m as the Model 401B automatically compensates for the ANT01A amplifier gain and antenna factor. The result is accurate, broadband signal strength measurements., and a noise floor of 57 dBµV/m.

The ANT01A and Model 401B can be used for measuring signals from intermittent radiators such as radio transceivers and key fobs. The 401B can be placed in the Peak Hold mode and then the key fob or transceiver can be keyed. With the rapid (typically 300 ms) update rate of the 401B, the signal will be reliably captured.

Another accessory, the PA01A Preamplifier has a gain of 26 dB and is designed for use with EMC measuring antennas and other applications where additional sensitivity is required. The type N male input connector interfaces directly with most measuring antennas. An SMA male to SMA male cable can be used to connect between the 401B and the preamplifier. Both the ANT01A and the PA01A receive DC power from the 401B.

MEASUREMENT ENHANCEMENTS

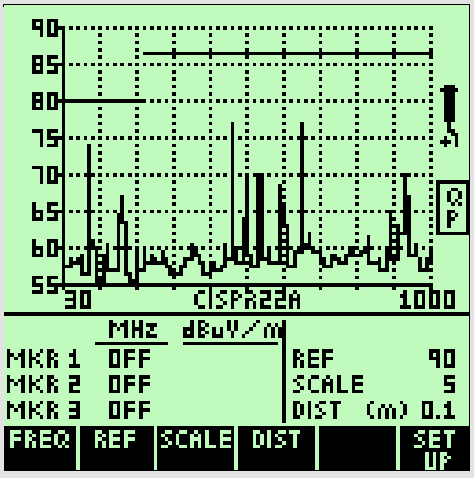
Resolution Bandwidths of 1 MHz and 120 kHz are available, along with Video Bandwidths of 300 kHz and 30 kHz. In the AUTO mode, the instrument selects the optimum bandwidth for the measurement range. Trace Averaging can be used to reduce the effective noise floor, bringing signals into view which had been hidden in the noise. Peak Hold can be used to capture the maximum value signals varying in amplitude.

Active E-Field and H-Field Probes for Troubleshooting and EMC Measurements

The Model P101A Active E-Field Probe is included with the Model 401B Personal Spectrum Analyzer. The Probe contains an internal high gain transimpedance amplifier which is powered through the input connector of the spectrum analyzer. The probe is calibrated in dBµV/m from 30 MHz to 1024 MHz and functions as a miniature antenna so circuits can be non-invasively measured.

The 401B Spectrum Analyzer combined with the P101A Active E-Field Probe can be used for Electro-Magnetic Compatibility (EMC) pre-compliance testing. Stored within the memory of the 401A spectrum analyzer are limit lines corresponding to FCC Part 15 A/B, CISPR 11 A/B and CISPR 22 A/B. One of these EMC standards can be selected and the distance between the probe and the test device is entered through the spectrum analyzer front panel. The specification limits are then displayed, making EMC pre-compliance measurements simple and straight-forward.

If magnetic interference is the problem, then the optional P201A Active H-Field Probe, which is calibrated in dBµV/m can be used. Interference due to switching power supplies, transformers, or high currents can be easily investigated.



EMC Pre-Compliance Measurements are straightforward. CISPR 22A is shown.

MODEL 401B PERFORMANCE SPECIFICATIONS

FREQUENCY

Frequency Range:	1 MHz to 1024 MHz
Span:	0 to 1023 MHz
Span Accuracy:	±50 ppm
Frequency Markers:	3
Marker Resolution (Frequency):	1% of span or 100 kHz
Marker Resolution (Amplitude):	0.1 dB
Marker Readout Accuracy:	1% of span ±50 ppm
Resolution Bandwidth, 3dB:	120 kHz, 1 MHz
Video Bandwidth:	30 kHz, 300 kHz
Sweep Time:	300 ms, typical

GENERAL

Display:	Monochrome LCD
Display Backlight (Optional):	Electro-luminescent
Operating Temperature Range:	0°C to 40°C
Storage Temperature:	-10°C to 50°C
Line Power:	6VA
Power (12-14 VDC):	0.4A max.
Dimensions, mm:	193H x 102W x 33D
Dimensions, inches:	7.6H x 4.0W x 1.3D
Weight:	1.2 lbs (0.55 kg)
Safety and Electromagnetic Compatibility:	CE Mark Compliance

AMPLITUDE

Measurement Range:	-25 dBm to –95 dBm
Displayed Average Noise Level at 100 kHz Resolution B/W, typical:	-95 dBm, span<10MHz -90 dBm, span>10MHz
Reference Level Accuracy, -30 dBm	±1 dB
Maximum Safe Input Level:	+23 dBm, 50 VDC
Scale:	1, 2, 5, 10, 20 dB/div
Measurement Units:	dBm, dBµV
Intermods (3rds, -35dBm signals):	-75 dBc, typical
Harmonic Distortion (-35 dBm):	-75 dBc, typical
Amplitude Accuracy:	±2.5 dB, -25 to –70 dBm
Detection Modes:	Normal, Quasi-Peak, and Peak Hold
Input Connector:	SMA (Female)

OTHER FEATURES

Save/Recall, Setups:	20
Save/Recall, Traces:	20
RS-232 Interface Speed:	9600, 57600 Baud
RS-232 Interface Connector:	DB-9 (Female)
Stored EMC Specifications:	FCC Part 15 A/B, CISPR 11 A/B, 22 A/B
Data Download Modes:	Screen display as bitmap or Excel compatible data

ORDERING INFORMATION

Model 401B Personal Spectrum Analyzer
Includes: Model P101A Active E-Field Probe
Line Powered Battery Charger
Serial Interface Cable
PC Enhancement Software
Soft Carrying Case
Operating Manual
One Year Warranty
Option 001, Warranty Extension to 3 years
Option 002, Backlight, for use in low illumination
Option 003, Substitute ANT01A Active Antenna for P101A Active E-Field Probe

OPTIONAL ACCESSORIES

P201A, Active H-Field Probe
ANT01A, Active Antenna
PA01A, Preamplifier
9010-0002, Cigarette Lighter 12 VDC adapter
9010-0003, SMA Male to BNC Female Adapter
9010-0004, Type N Female to SMA Female Adapter
9011-0001, 10 dB SMA Attenuator
9011-0002, 20 dB SMA Attenuator
9011-0003, 30 dB SMA Attenuator
9011-0004, 40 dB SMA Attenuator
9014-0001, 1/4 Wavelength Antenna, 433 MHz
9014-0002, 1/4 Wavelength Antenna, 868 MHz
9020-0001, SMA Male Cable, RG174A/U, 6ft (1.8m)
9020-0002, SMA Male Cable, RG174A/U,12 ft, (3.6m)
9050-0001, Transit Case for Model 401B

EXTERNAL ACTIVE DEVICES

P101A ACTIVE E-FIELD PROBE

Frequency Range:	30 MHz to 1024 MHz
Sensitivity at 30 MHz:	57 dBµV/m, typical

P201A ACTIVE H-FIELD PROBE

Frequency Range:	30 MHz to 1024 MHz
Sensitivity at 30 MHz:	57 dBµV/m, typical

ANT01A ACTIVE ANTENNA

Frequency Range:	30 MHz to 1024 MHz
Sensitivity at 30 MHz:	57 dBµV/m, typical

PA01A PREAMPLIFIER

Frequency Range:	1 MHz to 1024 MHz
Gain, typical:	26 dB
Input Connector:	Type N Male
Output Connector:	SMA Female

NOTE: DC Power for above devices is supplied by the 401B. The active device must be connected directly to the 401B input connector. Active devices cannot be cascaded.

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