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Phase Matrix, Inc.

Instruments You Can Count On

25B
28B

Phase Matrix, Inc. EIP 25B and 28B Frequency Counters

High Performance in a Small Package



- Count Carrier and IF Frequencies From 10Hz to 26.5 GHz
- Measure Frequency and Power Level With A Single Connection
- Analyze Individual Signals In A Multi-Channel Spectrum
- 200 Watts Peak Input Protection
- Ideal For Field Maintenance and Bench-Top Applications
- World Wide Proven Reliablity

Phase Matrix / EIP 25B and 28B. . . . High Performance in a Small Package

The Ideal Communications Counters

The 25B and 28B CW frequency counters from Phase Matrix, Inc are the ideal counters for communications applications. These portable, rugged units combine durability and small size with high performance features typically found only in larger, bench-top instruments.

The 25B measures CW, FM and AM frequencies from 10 Hz to 20 GHz, and the 28B extends that range up to 26.5 GHz. With simultaneous power measurement capability, and options for a high stability time base and a protective transit case, these high performance counters are ideally suited for applications in:

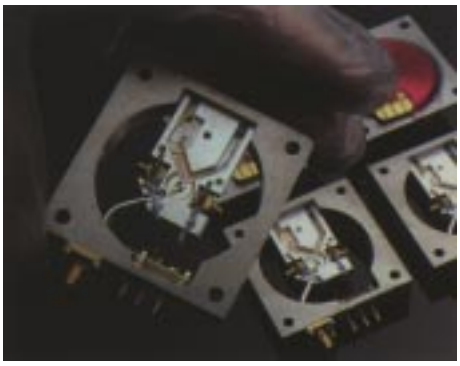
- Carrier signal measurement
- Transmitter frequency verification
- Channel specific signal measurements
- Microwave link testing
- Channel monitoring
- ATE



The 25B and 28B are ideal for frequency and power level testing of terrestrial microwave systems.

Unsurpassed Burnout Protection

Typically found in high performance spectrum analyzers; only Phase Matrix counters feature a YIG-preselected microwave input, which provides unparralled burnout protection, FM tolerance and frequency selectivity. The YIG preselector works like a tunable bandpass filter, preventing harmonics and other out-of-band spurious signals from interfering with measurement of the desired signal. It also protects the counter from accidental application of high level signals (up to 200 watts peak), reducing downtime and the associated high cost of repairing damaged microwave circuitry.



Only Phase Matrix counters offer the unique YIG-preselected heterodyne technique.

Selective Frequency and Power Measurements

With a single connection, the 25B and 28B can simultaneously measure and display the input signals frequency and power level in the microwave band, eliminating the need for a seperate microwave power meter. Within the 25MHz bandwidth of the YIG-preselector, only the selected signals frequency and power level are measured. Signals to be analyzed are selected by keystroke entry of an individual center frequency, or search a range between a low and high frquency limit. This signal selectivity, combined with 20MHz of FM tolerance at all rates up to 10MHz, allows the 25B and the 28B to make accurate frequency and power level measurements even while the input signal is carrying traffic; there is no need to take the transmitter, or adjacent channels, off the air for routine checks.



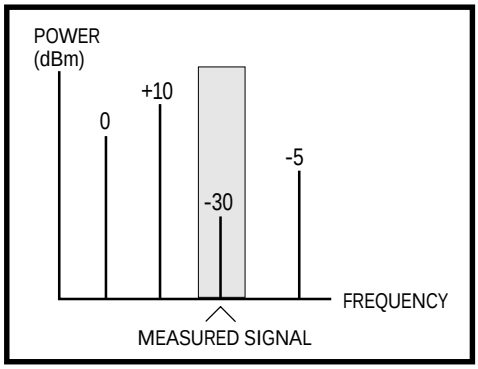
These useful counters are as capable on the bench as in the field. Their high performance matches or exceeds the best performance available in larger, bench-top instruments.

Phase Matrix / EIP 25B and 28B. . . .
Field Proven Reliability



Easy to Read and Operate

Frequency and Power measurements can be made to a resolution of 1Hz and 0.1 dB, respectively. Easy keystroke entry of frequency and power offsets allows system-under-test frequency translation devices and cable losses to be compensated for in the displayed measurement results.



The frequency selective operation of the counters allows measurement of any individual signal's frquency and power in a multi-signal environment.

Portable, Rugged Construction

The small size of the 25B and 28B, along with their convenient carrying handle and protective front cover, makes these units perfect for portable field maintence applications. Their rugged, durable construction will provide years of reliable operation under the roughest conditions. The units even feature an optional fast warm-up ovenized time base (Option 05) that delivers a reference frquency within $5x10^{-9}$ of the final value within 10 minutes of power-up. This ensures the best possible accuracy with minimum warm-up time delay.



The Phase Matrix 25B/28B feature a convenient built-in carrying handle and protective front cover.

Proven Reliability

The design of the 25B and 28B is based on the Phase Matrix / EIP 545B CW microwave frequency counter. This counter has become the standard in reliability, achieving over 26,000 hours (12.5 years) of field-proven MTBF. The high performance, economy and compact configuration of the 25B and 28B make them the ideal choice for your communications applications in the field and on the bench.

SPECIFICATIONS

MODEL 25B and 28B	BAND 1	BAND 2	BAND 3
Frequency Range	10 Hz-100 MHz	10 MHz-1 GHz	1-20 GHz (25B) 1-26.5 GHz (28B)
Sensitivity	25mV rms	-20dBm	-30 dBm 1-12.4GHz -25 dBm 12.4GHz-20GHz -20 dBm 20GHz-26.5GHz
Impedance	1MΩ/20pF	50 Ohms	50 Ohms
Connector	BNC (female)	BNC (female)	Precision Type N-female (25B) APC 3.5-female (28B)
Input Coupling	DC	AC	AC
Maximum Operating Level	120 V rms*	+10 dBm	+10 dBm
Damage Level	150 V rms*	+27 dBm	+45 dBm (30 watts) continuous +53 dBm (200 watts) peak pulsed (<1uS PW, 0.1% duty)
Acquisition Time			
Standard	N/A	<50mS	<200ms
Center Frequency Mode	N/A	N/A	<20ms
Automatic Amplitude Discrimination	N/A	N/A	10 dB
FM Tolerance	Carrier remains in band	Carrier remains in band	20 MHz P-P up to 10MHz rate
Maximum Tracking Speed	Carrier remains in band	>800MHz/sec typical	>800MHz/sec typical
VSWR	N/A	2.5:1 typical	2.5:1 typical
Center Frequency Mode	N/A	N/A	Keyboard controlled. Unit will measure signal within ±5 MHz of entered frequency. Signals of equal amplitude must be seperated by 40 MHz
Frequency Limits	N/A	N/A	Keyboard controlled. Unit will measure largest signal within set limits. Signals outside desired range must be seperated by ≥200 MHz (typical) from either limit.



*Above 1KHz, decreases @ 6dB/ octave down to 3.0 V rms

SPECIFICATIONS

Power Measurement

	Frequency Range	1-20 GHz (25B) 1-26.5 GHz (28B)
	Accuracy	±1.2 dB typical (0˚ to 50˚C, input padded by 3 dB) ±0.5 dB typical (25˚C, input padded by 3 dB)
	Resolution	Power: ±0.1 dB Frequency: 100 kHz to 1 GHz (selectable) via GPIB 1 Hz to 1 GHz (selectable) via GPIB
	Minimum Level	Equal to counter sensitivity
	Display	Simultaneous frequency and power reading
	Offset Range	-99.9 dB to +99.9 dB
	Offset Resolution	0.1 dB
	Offset Input	Keyboard or optional GPIB
	Measurement Time	1 Gate Time + 50ms + Freq Measurement Time
	Measurement Window	25 MHz nominal

Time Base: Standard TCXO

Crystal Frequency	10 MHz	
Stability	Aging Rate	$<1x10^{-7}$/month, $<1x10^{-6}$/year
	Short Term	$<1x10^{-9}$ rms for one sec. averaging time
	Temperture	$<1x10^{-6}$, 0˚ to 50˚C
	Line Variation	$<1x10^{-7}$, ±10% line voltage
Output Frequency	10 MHz square wave, 1V P-P min into 50Ω	
External Time Base	Requires 10 MHz, 1VP-P min into 300Ω	

GPIB (IEEE-488/1978) Programmabilty

GPIB	Functions, special functions and diagnostics are programmable. Address settable from the front panel. Compatible IEEE STD-488. SH1, AH1, T5, L3, SR1, RL1, DC1 and DT1 implimented.

General

Warranty	1 year Standard (Extendable to 3 years)
Frequency Resolution	Selectable 0.1 Hz to 10 MHz in band 1, 1 Hz to 1 GHz in bands 2 and 3.
Display	12-digit LED sectionalized to read GHz, MHz, kHz, Hz or GHz, MHz, kHz, dBm.
Frequency Accuracy	± 1 count ± time base error.
Test	Front panel selected service diagnostics and user information.
Sample Rate	Varies time between measurements, from 0 sec to 10 sec. HOLD freezes display indefinitely.
Reset	Resets display to zero and initiates new acquisition.
Frequency Offset	Displayed frequency is offset by the entered value to 1 Hz resolution.
Frequency Multiply	Displayed frequency is multiplied by an entered integer from 1 to 99 and displayed to 1 kHz resolution. OFFSET is added or subtracted to obtain y = mx ±b result.
Computer Interface	GPIB (IEEE 488/1978)
Certifications	CE Certified for EMI/RFI to EN50011 and EN50082-1 Certified for Safety to IEC 1010-1 (1990)
Operating Temperature	0˚ to 50˚C.
Power	100/120/140/200/220/240/VAC ±10%, 50 to 400 Hz; 60 VA typical.
Net Weight	~ 20 lbs. (9.1 kg).
Shipping Weight	~ 26 lbs. (11.8 kg).
Dimensions	3.5” H x 8.125” W x 18.75” D (89 mm H x 206 mm W x 476 mm D).
Standard Accessories	Power cord, Operating manual, Protective front cover.

SPECIFICATIONS

OPTION 05	High Stability Ovenized Timebase	
Stability	Aging Rate	$<5x10^{-10}$/day, (After 24 hour warm up).
	Short Term	$<1x10^{-10}$ rms for one sec. averaging time
	Temperture	$<3x10^{-8}$, 0˚ to 50˚C
	Line Variation	$<2x10^{-10}$, ±10% line voltage
	Retrace	$<5x10^{-9}$ of final value 10 minutes after counter is turned on at 25˚C

Time base option utilizes a proportional control oven which is energized whenever the line cord is connected to an AC source, and operates even when the unit is switched off.

ORDERING INFORMATION

MODEL 25B	10 Hz - 20 GHz Microwave Frequency Counter	
MODEL 28B	10 Hz - 26.5 GHz Microwave Frequency Counter	
Options	05	High Stability Ovenized Time Base
	14	2 Year Warranty Extension (3 years total)
	15	MIL-STD 45662 (ANSI Z540-1:94)
Accessories	011	Rack Mount Kit without Handles
	016	Chassis Slide Kit for 1 Unit
	018	Front Panel Handle Kit
	021	Suitcase Style Transit Case
	031	Extra Operating Manual (one supplied at no cost)
	032	Maintenance and Service Manual (includes operation information)
	042	Service Kit

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