



SECTION I GENERAL INFORMATION

1-1. DESCRIPTION.

1-2. The Model 8405A Vector Voltmeter (Figure 1-1) has a voltmeter and phasemeter for measuring the amplitude and phase relationship of the fundamental components of two RF voltages. The RF range is 1 to 1000 MHz; the phase range is 0 to 360 degrees; and the amplitude ranges are from at least 1.5 millivolts to 1 volt rms for one channel, and 10 microvolts to 1 volt rms for the other.

1-3. Phase relationship is continuously displayed. Angles from 0 to 360° can be measured and read directly from the zero-center meter with ±0.1° resolution.

1-4. Absolute voltage amplitudes read separately can be measured to within ±2% from 1 to 100 MHz, ±6% from 100 to 400 MHz and ±12% from 400 to 1000 MHz. Relative voltage measurements can be made to within ±2% (0.2 dB) of full scale on the -10 through -60 dB Amplitude Ranges.

1-5. Outputs include an intermediate frequency (IF) output for each input, a voltage proportional to amplitude meter voltage reading and a voltage proportional to phase meter reading. The IF outputs are 20 kHz replicas of the RF input waveforms with the same amplitude and phase relationship. Complete specifications of the Model 8405A are given in Table 1-1.

Table 1-1. Specifications

INPUT CHARACTERISTICS		Accessory	Impedance	Frequency	Accuracy*	
Instrument Type: Two-channel sampling RF millivoltmeter-phasemeter which measures voltage of two signals and simultaneously displays the phase angle between the two signals. Frequency Range: 1 MHz to 1 GHz in 21 overlapping octave bands (lowest band covers two octaves). Tuning: Automatic within each band. Automatic phase control (APC) circuit responds to the Channel A input signal. Search and lock time, approximately 10 millisecc.		HP 11536A 50Ω Feed-through Tee	50 Ω	1-100 MHz	±2% of full scale	
			Freq.	SWR	100-300 MHz	±6% of full scale
			1-750 MHz 1-1000 MHz	< 1.15 < 1.20	300-1000 MHz	±12% ** of full scale
Voltage Range Channel A: 1 to 10 MHz: 1.5 mV to 1 V rms. 10 to 500 MHz: 300 μV to 1 V rms. 500 to 1000 MHz: 500 μV to 1 V rms. Can be extended by a factor of 10 with 11576A 10:1 Divider. Channel B: 100 μV to 1 V rms full scale (input to Channel A required); can be extended by a factor of 10 with 11576A 10:1 Divider.		HP 11576A 10:1 Divider	1 MΩ equiv. to 2 pF $Z = \frac{80}{f(\text{MHz})} \text{ k}\Omega$ from 5-100 MHz	1-100 MHz	±6% of full scale	
Input Impedance (nominal): 0.1 megohm shunted by approximately 2.5 pF; 1 megohm shunted by approximately 2 pF when 11576A 10:1 Divider is used; 0.1 megohm shunted by approximately 5 pF when 10216A Isolator is used. AC coupled.			100 kΩ equiv. to 5 pF $Z = \frac{32}{f(\text{MHz})} \text{ k}\Omega$	1-200 MHz	±6% of full scale	
Isolation Between Channels: 1 to 300 MHz: greater than 100 dB. 300 to 1000 MHz: greater than 80 dB.		* After one-hour warmup. ** Above 300 mV and 800 MHz add +5%.				
Maximum AC Input: 2 V peak. Maximum DC Input: ±50 V.		Voltage Ratio Accuracy: 1-200 MHz. 0.2 dB for -60 to 0 dB Ranges. 0.5 dB for -70 dB and +10 dB Ranges.				
VOLTMETER CHARACTERISTICS Meter Ranges: 100 μV to 1 V rms full scale in 10-dB steps. Meter indicates amplitude of the input signal. Voltage Accuracy: When accessories are used on one or both probes.		Voltage Ratio Accuracy: 200-1000 MHz. 0.2 dB for -60 to -10 dB Ranges. 0.5 dB for -70 dB and 0 dB Ranges. 1.5 dB for +10 dB Range.				
		Residual Noise: Less than 10 μV as indicated on the meter. Bandwidth: 1 kHz.				

Table 1-1. Specifications (cont'd)

PHASEMETER CHARACTERISTICS

Phase Range: 360°, indicated on zero-center meter with end-scale ranges of ±180, ±18, and ±6°. Meter indicates phase difference between the fundamental components of the input signals.

Resolution: 0.1° at any phase angle.

Meter Offset: ±180° in 10° steps.

Phase Accuracy: At single frequency 1.5° (equal voltage at Channel A and B).

Phase Accuracy vs. Voltage: See table below.

Phase Jitter vs. Channel B Input Level:

- Greater than 700 μV: Typically less than 0.1° p-p.
- 125 to 700 μV: Typically less than 0.5° p-p.
- 20 to 125 μV: Typically less than 2° p-p.

GENERAL

20 kHz IF Output (each channel): Reconstructed signals, with 20 kHz fundamental components, having the same amplitude, waveform, and phase relationship as the input signals. Output impedance, 1000 ohms in series with 2000 pF; BNC female connectors.

Recorder Output:

Amplitude: 0 to +1 Vdc ±6% open circuit, proportional to volt meter reading in volts. Output tracks meter reading within ±0.5% of full scale. Output impedance, 1000 ohms; BNC female connector.

Phase: 0 to ±0.5 Vdc ±6%, proportional to phase-meter reading. External load greater than 10,000 ohms affects recorder output and meter reading less than 1%. Output tracks meter reading within ±1.5% end scale; BNC female connector.

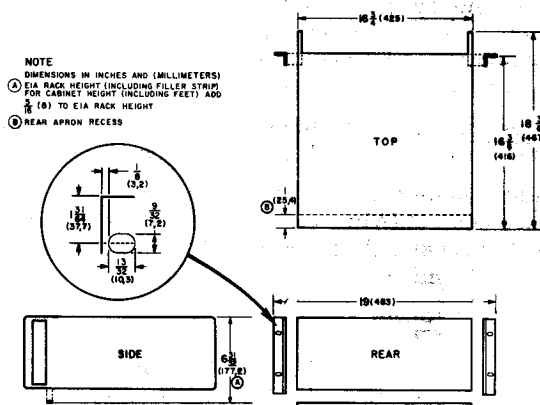
RFI: Conducted and radiated leakage limits are below those specified in MIL-I-6181D and MIL-I-16910C except for pulses emitted from probes. Spectral intensity of these pulses is approximately 60 μV/MHz; spectrum extends to approximately 2 GHz. Pulse rate varies from .98 to 2 MHz.

Option 02. Linear dB scale uppermost on voltmeter.

Power: 115 or 230 V ±10%, 50 to 400 Hz, 35 watts.

Weight: Net, 30 lbs (13,5 kg).

Dimensions:



Phase Accuracy Vs. Voltage

Accessory	Frequency (MHz)	Voltage Range Channel A	Voltage Range Channel B	Phase* Accuracy
HP 11536A	1 - 10	1.5 mV to 300 mV	100 μV to 300 mV	±3°
50-Ohm Feed-through Tee	10 - 500	300 μV to 300 mV	100 μV to 300 mV	±3°
	500 - 1000	500 μV to 100 mV	100 μV to 100 mV	±3°
HP 11576A	1 - 10	1.5 mV to 3V	1 mV to 3V	±4°
10:1 Divider	10 - 100	1 mV to 3V	1 mV to 3V	±4°
HP 10216A	1 - 10	1.5 mV to 300 mV	100 μV to 300 mV	±6°
Isolator	10 - 200	300 μV to 300 mV	100 μV to 300 mV	±6°

*To be added to single-frequency accuracy (±1.5°) when the voltages at Channel A and B are not equal.