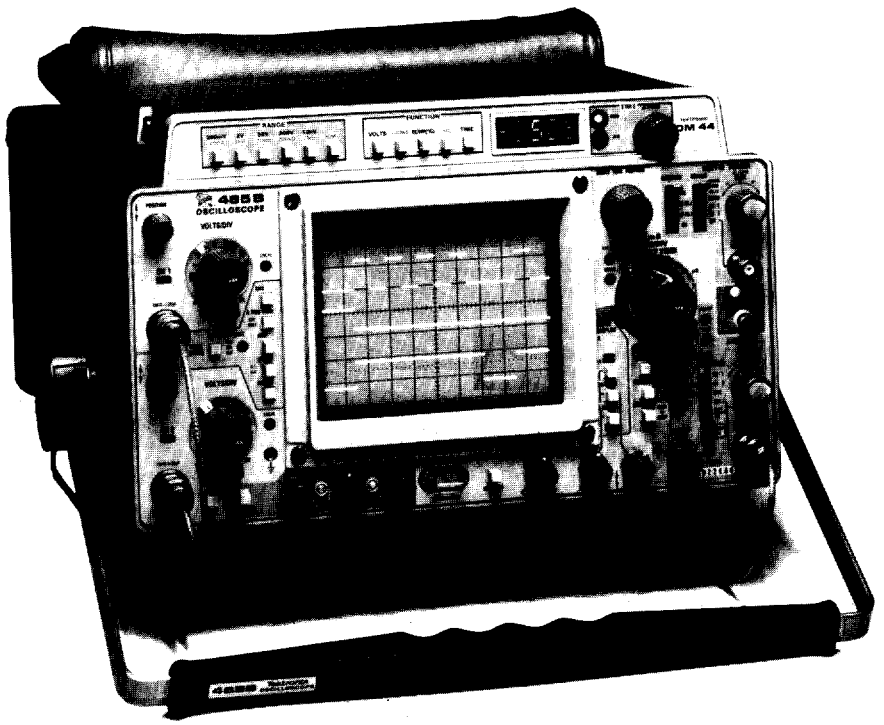
100 MHz Dual Trace Oscilloscope



465B44 Oscilloscope/DMM Shown Above Includes DM44 Digital Multimeter.

465B

100 MHz at 5 mV/div

2 ns/div Sweep Rate with X10 Sweep Magnifier

Trigger View

Versatile Trigger Selection

Alternate Sweep

The new 465B offers upgraded performance to match advancements in technology, while providing improved trace quality, easier maintenance, and greater operator flexibility.

Improved trace selection versatility allows you to choose channel 1 and/or channel 2, sum or difference, and A trigger view in any combination.

In addition, the 465B has all the features of the original 465: 5 mV/div vertical sensitivity, dual trace, delayed sweep, the differential time/DMM option, and a sharp, bright 8 x 10 cm CRT.

VERTICAL DEFLECTION

(2 Identical Channels)

Bandwidth* and Rise Time — (at all deflection factors from 50 Ω terminated source)

−15°C to +40°C	+40°C to +55°C
Dc to 100 MHz, 3.5 ns	85 MHz, 4.1 ns

*Measured at −3 dB. Bandwidth may be limited to approx 20 MHz by bandwidth limit switch.

Cascaded bandwidth is at least 50 MHz when signal out is terminated in 50 Ω.

Lower −3 dB point, ac coupling 1X probe: 10 Hz or less. 10X probe: 1 Hz or less.

Deflection Factor at BW
5 mV/div to 5 V/div.

1-2-5 sequence, accurate ±3%. Uncalibrated, continuously variable between steps and to at least 12.5 V/div. LED warning light indicates uncalibrated setting. In cascade mode sensitivity is approx 1 mV/div.

Display Modes — Ch 1; Ch 2 ADD (normal and inverted), alternate, chopped—approx 500 kHz rate, in any combination electronically switched.

CMRR — Common-mode rejection ratio at least 20 dB at 20 MHz for common-mode signals of 6 div or less.

Automatic Scale Factor — Probe tip deflection factors for 1X or 10X coded probes are indicated by two readout lights behind knob skirts. LEDs are off when channel not displayed. Ground reference display selectable at probe (when dc coupled).

Input R and C — 1 MΩ ±2% paralleled by approx 20 pF.

Max Input Voltage

Dc coupled	250 V (dc + peak ac) 500 V (p-p ac at 1 kHz or less)
Ac coupled	250 V (dc + peak ac) 500 V (p-p at 1 kHz or less)

Delay Line — Permits viewing leading edge of displayed waveform.

HORIZONTAL DEFLECTION

Time Base A — 0.02 μs/div to 0.5 s/div (1-2-5 sequence). X10 mag extends max sweep rate to 2 ns/div. LED indicates X10 mag.

Time Base B — 0.02 μs/div to 50 ms/div (1-2-5 sequence). X10 mag extends max sweep rate to 2 ns/div. LED indicates X10 mag.

Variable Time Control — Time Base A provides continuously variable uncalibrated sweep rates between steps and to at least 1.25 s/div. LED warning light indicates uncalibrated setting.

Time Base A and B Accuracy, full 10 cm

	+20°C to +30°C	−15°C to +55°C
Unmagnified	±2%	±3%
Magnified	±3%	±4%

Horizontal Display Modes — A, A intensified, B delayed. B ends A for increased intensity in the delayed mode. Electronic switching between intensified and delayed sweep. A sweep and B sweep may be viewed simultaneously.

CALIBRATED SWEEP DELAY

Delay Time Range — 0.2 to X10 delay time/div settings of 200 ns to 0.5 s.

Differential Time Measurement Accuracy —

Delay Time Setting	+15°C to +35°C
over one or more major dial divisions	±1%
less than one major dial division	±0.01 major dial divisions

Jitter — 1 part or less in 50,000 (0.002%) of 10X the A sweep time/div setting. 1 part in 20,000 when operating from 50 Hz line.

TRIGGERING A AND B

A Trigger Modes — Normal (sweep runs when triggered), automatic (sweep runs in the absence of a triggering signal and for signals below 30 Hz), Single Sweep (sweep runs one time on the first triggering event after the reset selector is pressed). LED lights indicate when sweep is triggered and when single sweep is ready.

A Trigger Holdoff — Adjustable control permits a stable presentation of repetitive complex waveforms.

B Trigger Modes — B runs after delay time (starts automatically at the end of the delay time) and B triggerable after delay time (runs when triggered). The B (delayed) sweep runs once, in each of these modes, following the A sweep delay time.

Time Base A and B Trigger Sensitivity and Coupling —

COUPLING	to 25 MHz	At 100 MHz
Dc: Internal	0.3 div deflection	1.5 div deflection
Dc: External	50 mV	150 mV
Dc: External ÷10	500 mV	1.5 V
Ac	Requirements increase below 60 Hz	
Ac Lf Reject	Requirements increase below 50 kHz	
Ac Hf Reject	Requirements increase below 60 Hz and above 50 kHz	

Jitter — 0.5 ns or less at 100 MHz and 2 ns/div.

A Trigger View — Electronically switched trigger view displays the external signal used for A sweep triggering. This provides quick verification of the signal and time comparison between a vertical signal and the trigger signal which can be displayed simultaneously. The deflection factor is approx 100 mV/div (1 V/div with external ÷10).

Level and Slope — Internal, permits selection of triggering at any point on the positive or negative slope of the displayed waveform. Level adjustment through at least ±2 V in external, through at least ±20 V in external ÷10.

A Sources — Norm, Ch 1, Ch 2, line, external, and external ÷10.

B Sources — Starts after delay, norm, Ch 1, Ch 2, and external.

External Inputs — R and C approx 1 MΩ paralleled by approx 20 pF. 250 V (dc + peak ac) max input.

X-Y OPERATION

Full-sensitivity X-Y (Ch 1 Horiz, Ch 2 Vert) — 5 mV/div to 5 V/div, accurate ±4%. Bandwidth is dc to at least 4 MHz. Phase difference between amplifiers is 3° or less from dc to 50 kHz.

DISPLAY

CRT — 8 x 10 cm display. Horizontal and vertical centerlines further marked in 0.2 cm increments. P31 phosphor standard; P11 optional. 18 kV accelerating potential.

Graticule — Internal, nonparallax; variable edge lighting; markings for measurement of rise time.

Beam Finder — Compresses trace to within graticule area for ease in locating an offscreen signal. A preset intensity level provides a constant brightness.

Z-Axis Input — Dc coupled, positive-going signal decreases intensity; 5 V p-p signal causes noticeable modulation at normal intensity; dc to 50 MHz.

ENVIRONMENTAL CAPABILITIES

Ambient Temperature — Operating: −15°C to +55°C. Nonoperating: −62°C to +85°C. Filtered forced air ventilation is provided.

Altitude — Operating: to 15,000 ft; max allowable ambient temperature decreased by 1°C/1000 ft from 5000 to 15,000 ft. Nonoperating to 50,000 ft.

Vibration — Operating: 15 minutes along each of the three axes, 0.06 cm (0.025 in) p-p displacement (4 g's at 55 Hz) 10-55 — 10 Hz in 1 minute cycles.

Humidity — Operating and nonoperating: 5 cycles (120 hours) to 95%-97% relative humidity as specified in MIL-T-28800B (par 3.9.2.2).

Shock — Operating and nonoperating: 30 g's ½ sine, 11 ms duration, 3 shocks per axis in each direction for a total of 18 shocks.