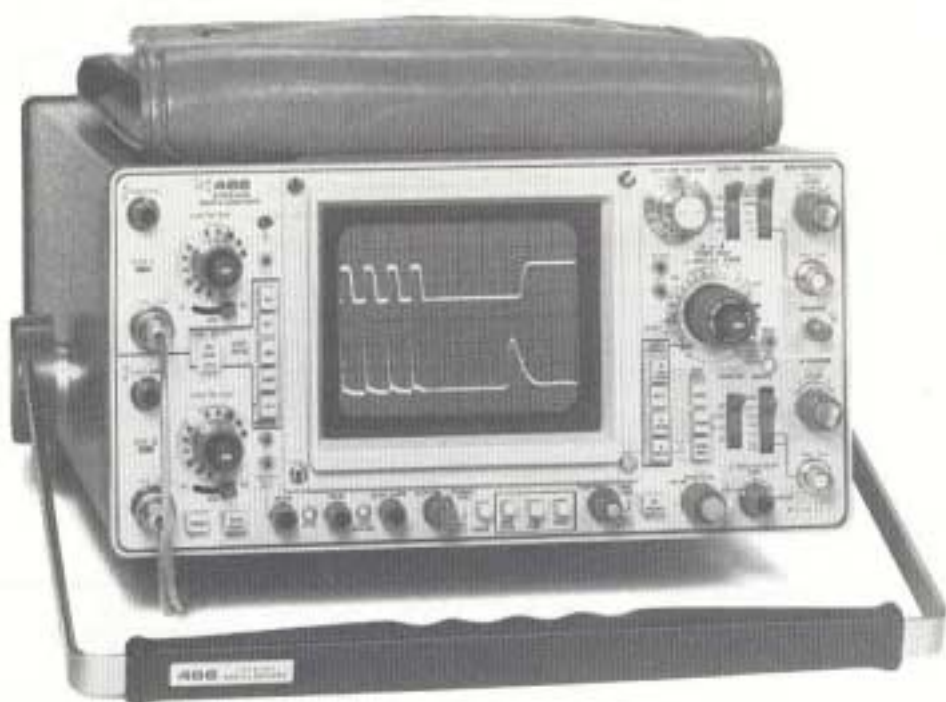


TEK 100 MHz DUAL TRACE STORAGE OSCILLOSCOPES



466/464

100 MHz at 5 mV/div

5 ns/div Sweep Rate with X10 Sweep Magnifier

Variable Persistence and Fast Mesh Transfer Storage Modes

3000 div/ μ s Stored Writing Speed (466)

Battery Operation (optional)

Third Channel Trigger View now available on 466 and 464

Weighs ~ 11.8 kg, (26 lb)

The 466 and 464 Portable Storage Oscilloscopes are both designed to display nonrepetitive or slow moving signals. And with the exception of increased stored writing speed on the 466, both instruments offer similar performance.

Operating in a reduced scan mode, the stored writing speed of the 466 is 3000 div/ μ s (1350 cm/ μ s). The lower cost 464 doesn't offer a reduced scan mode and stores at 110 div/ μ s. Both instruments feature two modes of storage — variable persistence and fast transfer.

The bright 8 x 10 div CRT on both instruments comprises 0.90 cm/divisions. In the 466, reduced scan graticule is superimposed over the center of the main graticule, measuring 8 x 10 divisions with 0.45 cm/division. All graticules are etched onto the inner face of the CRT to eliminate parallax problems. A third channel trigger view option is now available for the 466 and 464. This option allows the simultaneous display of channels 1 and 2 with the external A trigger.

TEKTRONIX P6062B Probes provide operator convenience of 1X or 10X input attenuation at the probe tip. The correct deflection factor is automatically indicated on the 464 or 466 front panel when the probe attenuation factor is switched.

Light weight plus the ability to use optional, external dc power makes both the 466 and 464 sufficiently portable for virtually all field measurement applications. The snap-on 1106 Battery Pack is also useful in isolating these oscilloscopes from noisy or intermittent power sources.

CHARACTERISTICS

All characteristics apply to both the 466 and 464, except where indicated.

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
Do to 100 MHz, <3.5 ns	Do to 85 MHz, <4.15 ns

*Measured at -30dB down. Bandwidth may be limited to ~20 MHz by bandwidth limit switch. Lower -3 dB point, ac coupling 1X probe; 10 Hz or less. 10X probe; 1 Hz or less.

Deflection Factor — 5 mV/div to 5 V/div (1-2.5 sequences), accurate \pm 3%. Uncalibrated, continuously variable between steps and to \pm 12.5 V/div. In cascade mode sensitivity is \sim 1 mV/div. Cascaded bandwidth is at least 50 MHz when signal out is terminated in 50 Ω .

Display Modes — Ch 1, Ch 2 (normal or inverted), alternate, chopped (\sim 250 kHz), added, X-Y

CMRR — Common-mode rejection ratio at least 20 dB at 20 MHz for common-mode signals of 5 div or less.

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

Input R and C — 1 M Ω \pm 2% parallel by \sim 20 pF.

Max Input Voltage —

Dc coupled	200 V (dc + peak ac)
	500 V (p-p ac at 1 kHz or less)
Ac coupled	500 V (dc + peak ac)
	500 V (p-p ac at 1 kHz or less)

Delay Line — Permits viewing leading edge of distorted waveform.

HORIZONTAL DEFLECTION

Time Base A — 0.05 μ s/div to 0.5 s/div (1-2.5 sequences). X1 mag extends sweep rate to 5 ns/div.

Time Base B — 0.05 μ s/div to 50 ms/div (1-2.5 sequences). X10 mag extends sweep rate to 5 ns/div.

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

Time Base A and B Accuracy — Full 10 div.

	+20°C to +30°C	-15°C to +55°C
Unmagnified	\pm 2%	\pm 3%
Magnified	\pm 3%	\pm 4%

Horizontal Display Modes — A, mixed sweep, A interrupted & delayed, B ends A for increased intensity in the delayed mode.

Calibrated Mixed Sweep — Displays A sweep for period as terminated by DELAY TIME POSITION control, then displays sweep for remainder of horizontal sweep.

CALIBRATED SWEEP DELAY

Delay Time Range — 0.2 to X10 delay time/div settings (25 ns to 0.5 s (minimum delay time is 200 ns).

Differential Time Measurement Accuracy —

Delay Time Setting	+15°C to +35°C	-15°C to +55°C
over one or more major dial div	\pm 1%	\pm 2.5%
less than one major dial div	\pm 0.01 major dial div	\pm 0.025 major dial div

Jitter — One part or less in 50,000 (0.002%) of X10 delay sweep time/div setting.

TRIGGERING A and B

A Trigger Modes — Normal (sweep runs when triggered), automatic (sweep free-runs in the absence of a triggering signal) and for signals below 30 Hz. Single Sweep (sweep runs on time on the first triggering event after the reset selector is pressed). 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. At least 10 variation.

B Trigger Modes — B starts after delay time (starts automatically at the end of the delay time). 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	
	Int	Ext	Ext \times 10	Ext \times 10
Dc	0.3 div deflection	1.5 div deflection	50 mV	150 mV
	50 mV	150 mV	500 mV	1.5 V
	500 mV	1.5 V		
Ac	Requirements increase below 60 Hz	Requirements increase below 50 kHz	Requirements increase below 30 Hz and above 50 kHz	

Jitter — 0.5 ns or less at 100 MHz and 5 ns/div (X10 mag).

A Trigger View — A spring-loaded pushbutton overrides other vertical controls and 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. The deflection factor is ~ 50 mV/div (0.5 V/div with external ~ 10 source).

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 — F and C ~ 1 M Ω parallel by ~ 20 pF, 250 V (dc + peak ac) max input.

Third Channel Trigger View Specifications (Option 10) — Deflection Factor (Dc trigger coupling only)

EKT 100 mV/div $\pm 5\%$

EKT ~ 10 1 V/div $\pm 5\%$

Delay difference (to Ch 1 or Ch 2) 3.5 ns ± 1 ns

Trigger point is approximately center screen.

Realtime ~ 5 ns

Aberation $\sim 10\%$ p-p.

X-Y OPERATION

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

DISPLAY

CRT — 8×10 div display, each div is 0.9 cm (normal), 0.45 cm/div reduced scan (466 only). 8.5 kV accelerating potential, normal-mode, 10 kV reduced scan (466 only). P31 Phosphor.

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

Beam Finder — Compresses trace to within graticule area for ease in determining the location of an off-screen 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.

STORED WRITING SPEEDS

	466	464	Storage* View Time
Full Scan (Center 8×8 div; 0.9 cm/div)			
FAST	150 div/ μ s	110 div/ μ s	$>15s$
VARIABLE PERSISTENCE	0.5 div/ μ s	0.5 div/ μ s	$>15s$
Reduced Scan (Center 8×10 div; 0.45 cm/div)		Reduced Scan not available on 464	
FAST	3,000 div/ μ s		$>15s$
VARIABLE PERSISTENCE	3 div/ μ s		$>15s$

*These times are at full-stored display intensity; they can be extended at least 25 times using reduced intensity in SAVE Display Mode.

ENVIRONMENTAL CAPABILITIES

Ambient Temperature — Operating: -15°C to $+55^\circ\text{C}$. Nonoperating: -55°C to $+75^\circ\text{C}$. Forced air ventilation is provided.

Altitude — Operating: to 15,000 ft; max allowable ambient temperature decreased by $1^\circ\text{C}/1000$ ft from 5000 to 15,000 ft. Nonoperating to 50,000 ft.

Vibration — Operating: 15 minutes along each of the three axes, 0.05 cm (0.025 in) p-p displacement (4 g's at 55 Hz) 10 to 50 to 10 Hz in 1 minute cycles.

Humidity — Operating and nonoperating: 5 cycles (120 hours) to 95% relative humidity referenced to MIL-E-16400F (par 4.5.9 through 4.5.9.5.1, class 4).

Shock — Operating and nonoperating: 30 g's, 1/2 sine, 11 ms duration, 2 shocks per axis in each direction for a total of 12 shocks.

OTHER CHARACTERISTICS

Amplitude Calibrator —

Output Voltage	0.3 V	1%
		0°C to $+40^\circ\text{C}$
Output Current	30 mA	2%
		$+20^\circ\text{C}$ to $+30^\circ\text{C}$
Frequency	Approx 1 kHz	

Vertical Signal Output — Ch 1 vertical signal is dc to at least 50 MHz and ~ 25 mV/div terminated into 50 Ω , and ~ 50 mV/div terminated into 1 M Ω .

Gate Outputs — Positive gates from both time bases (~ 5 V).

Power Requirements — Quick-change line voltage selector provides six ranges: 110 V, 115 V, 120 V, 220 V, 230 V, and 240 V, each $\pm 10\%$, 48 to 440 Hz, 100 W max at 115 V and 60 Hz. Operation from 12 to 24 V dc is available with Option 07.

PHYSICAL CHARACTERISTICS

Dimensions	in	cm
Height (w/o pouch)	6.2	15.9
Width (with handle)	13.1	33.0
Depth (with panel cover)	21.7	55.0
Depth (handle extended)	23.8	59.7
Weights (approx)	lb	kg
Net (without panel cover or accessories)	26.0	11.8
Net (with panel cover and accessories)	29.8	13.5
Shipping	41.5	18.8

INCLUDED ACCESSORIES

Two P6062B Probes (010-6062-13), like accessory pouch (016-0535-02), clear pouch (016-0537-00), CRT light filter (337-1674-01), two 1 1/2-amp fuses (159-0016-00), one 3/4-amp fuse (159-0042-00), adapter, ground wire (134-0215-01), viewing hood (016-0592-00).

ORDERING INFORMATION

466 Storage Oscilloscope

466 DM 44 Storage Oscilloscope/DMM

DM 44 Multimeter info on p.233

464 Storage Oscilloscope

464 DM 44 Storage Oscilloscope/DMM

DM 44 Multimeter info on p.233

INSTRUMENT OPTIONS

Option 01 Delete DM 44 Temperature Probe (466 DM 44, 464 DM 44 only)

Option 04 Enc Modification

Option 05 TV Sync Separator (Provides triggering on TV field)

Option 07 Ext Dc Operation (Option 07 cannot be ordered with DM 44)

Option 10 Third Channel Trigger View (Option 10 cannot be ordered with Option 05)

Option 11 100:200 VAC Operation

INTERNATIONAL POWER CORDS AND PLUG OPTIONS

Option A1 Universal Euro 220 V/16A

Option A2 UK 240 V/13A

Option A3 Australian 240 V/10A

Option A4 North American 240 V/15A

Modification kits for field conversion of existing 466s and 464s to Option 07 or DM 44 equipped scopes are available. These are typically more expensive than when the option is ordered with the instrument. Contact your Tektronix Sales Engineer, Distributor, or Representative for information.

OPTIONAL ACCESSORIES

Probes —

Probe Type	Attenuation	Input Impedance	Bandwidth* with 464/466
P6062B 6 ft	1X Switchable 10X	1 M Ω 105 pF 10 M Ω 14 pF	6 MHz 90 MHz
P6202 FET Probe 2 Meter	10X 100X Head Ac Head	10 M Ω 2 pF 10 M Ω 2 pF 10 M Ω 4 pF	100 MHz
Current Probe	Calibration	Insertion Impedance	Bandwidth with 464/466
P6022	1 mA/mV 10 mA/mV (Selectable)	0.03 Ω @ 1 MHz increasing to 0.2 Ω @ 120 MHz	65 MHz

*Bandwidths are measured at the upper -3 dB point, and apply only to the cable length shown. Generally, shorter cable lengths increase bandwidth, longer ones decrease bandwidth.

OPTIONAL ACCESSORIES



1105 Battery Pack (used with Option 07)

1105 Battery Power Supply

Mesh Filter — Improves display contrast in high ambient light. Order 378-0725-01

Protective Cover — Waterproof vinyl. For 464/466 Order 016-0365-00

Folding Viewing Hood — Order 016-0592-00

Folding Binocular Hood — Order 016-0565-00

Polarized Collapsible Viewing Hood — Order 016-0180-00

SCOPE-MOBILE® Cart — Occupies <18 inches aisle space, has storage area in base. Order 200 C

Rock Adapter — Order 016-0575-00 (Not for DM 44)

RECOMMENDED CAMERA

C-308P Option 01 General Purpose Camera — Includes 016-0301-01 mounting adapter/correction lens.

Order C-308P Option 01

Camera Adapter — Mounts C-308 Series Camera to 464/466 Oscilloscopes.

Order 016-0301-01

For further information see Camera section.