TYPE 533A

DC-to-15 MHz OSCILLOSCOPE

- ***X100 SWEEP MAGNIFIER***
- ***6 x 10-cm DISPLAY***
- ***ACCEPTS MULTI-TRACE, DIFFERENTIAL, SAMPLING, AND SPECTRUM ANALYZER PLUG-IN UNITS***

The Type 533A is a DC-to-15 MHz oscilloscope with a wide range of application coverage through use of versatile Tektronix Plug-In Units. Six different degrees of sweep magnification are available. Sweep lockout and high writing rate are combined for best results in one-shot recording.

Operating convenience results from functionally-grouped controls, a single-knob direct-reading sweep selector, warning lights for uncalibrated sweep-rate and sweep-magnifier settings, beam-position indicators, and built-in blanking for switching transients in multi-trace operation.

CHARACTERISTIC SUMMARY

VERTICAL

Vertical deflection characteristics are extremely flexible through use of the 1-Series and Letter-Series Plug-In Units.

HORIZONTAL

CALIBRATED TIME BASE—0.1 μs/cm to 5 s/cm.

SWEEP MAGNIFIER—X2, X5, X10, X20, X50, X100. Extends calibrated time base to 20 ns/cm.

EXTERNAL INPUT—0.1 V/cm to 10 V/cm (calibrated) DC to 500 kHz.

CRT

DISPLAY AREA—6 x 10 cm.

ACCELERATING VOLTAGE—10 kV.

PHOSPHOR—P2

OTHER

AMPLITUDE CALIBRATOR—0.2 mV to 100 V; 1-kHz square wave.

POWER REQUIREMENTS—108, 115, 122, 216, 230, or 244 V (±9% on each range). 500 watts maximum.

TYPE 533A

VERTICAL PLUG-IN UNITS				
PLUG-IN UNIT	MINIMUM DEFLECTION FACTOR	BANDWIDTH (—3 dB)	T_R	
MULTIPLE TRACE				
1A1 Dual-Trace	50 mV/cm 5 mV/cm ≈500 μV/cm	DC to 15 MHz DC to 14 MHz 2 Hz to 10 MHz	24 ns 25 ns 35 ns	
1A2 Dual-Trace	50 mV/cm	DC to 15 MHz	24 ns	
CA Dual-Trace	50 mV/cm	DC to 13 MHz	27 ns	
1A4 Four-Trace	10 mV/cm	DC to 15 MHz	24 ns	
M Four-Trace	20 mV/cm	DC to 14 MHz	25 ns	
SINGLE TRACE				
B	50 mV/cm 5 mV/cm	DC to 14 MHz 2 Hz to 10 MHz	25 ns 35 ns	
H	5 mV/cm	DC to 11 MHz	32 ns	
K	50 mV/cm	DC to 15 MHz	24 ns	
L	50 mV/cm 5 mV/cm	DC to 15 MHz 3 Hz to 14 MHz	24 ns 25 ns	
SPECIAL PURPOSE				
O Operational	50 mV/cm	DC to 14 MHz	25 ns	
Q Strain Gage	10 μstrain/div	DC to 6 kHz	60 μs	
DIFFERENTIAL				
1A5 Comparator	5 mV/cm 1 mV/cm	DC to 15 MHz DC to 14 MHz	24 ns 25 ns	
1A6	1 mV/cm	DC to 2 MHz	0.18 μs	
1A7A High-Gain	10 μV/cm	DC to 1 MHz Selectable	350 ns	
D	1 mV/cm (to 50 mV/cm)	DC to 300 kHz (DC to 2 MHz)	0.18 μs	
E	50 μV/cm (to 10 mV/cm)	0.06 Hz to 20 kHz (to 60 kHz) Selectable	6 μs	
G	50 mV/cm	DC to 14 MHz	25 ns	
W Comparator	1 mV/cm 50 mV/cm	DC to 7 MHz DC to 13 MHz	50 ns 27 ns	
Z Comparator	50 mV/cm	DC to 10 MHz	35 ns	
SPECTRUM ANALYZERS				
1L5	10 μV/cm	10 Hz to 1 MHz		
1L10	—100 dBm	1 MHz to 36 MHz		
1L20	—110 to —90 dBm	10 MHz to 4.2 GHz		
1L30	—105 to —75 dBm	925 MHz to 10.5 GHz		
WIDE-BAND SAMPLING				
1S1	2 mV/cm	DC to 1 GHz	350 ps	
1S2 TDR	5mρ/cm	140 ps system risetime		
	5 mV/cm	DC to 3.9 GHz	90 ps	

VERTICAL DEFLECTION

BANDWIDTH
DC to 15 MHz at 3-dB down, depending on plug-in unit. See chart.

RISETIME
24 ns, depending on plug-in unit. See chart.

DELAY LINE
Permits viewing leading edge of displayed waveform.

SIGNAL OUTPUT
<10 Hz to >5 MHz at 3-dB down, no load (cathode follower output). At least 1.5 V for each centimeter of displayed signal.

HORIZONTAL DEFLECTION

TIME BASE
0.1 μs/cm to 5 s/cm in 24 calibrated steps (1-2-5 sequence), accurate within 3%. Uncalibrated, continuously variable between steps and to approx 12 s/cm. Warning light indicates uncalibrated setting.

MAGNIFIER
X2, X5, X10, X20, X50, or X100 magnification. Magnified time base accurate within 5% up to 20 ns/cm. Warning light indicates when magnified time base exceeds 20 ns/cm (uncalibrated).

OPERATING MODES
Normal, single sweep.

EXTERNAL INPUT
0.1, 1, and 10 V/cm, accurate within 5%. Uncalibrated, continuously variable between steps and to approx 100 V/cm. DC to ≥500 kHz at —3 dB. 50-V maximum input (DC + peak AC) in most sensitive position. Input RC approx 1 MΩ paralleled by approx 40 pF.

SIGNAL OUTPUTS
Gate (positive going from 0 to at least +20 V), sawtooth (positive going from 0 to at least +130 V). Cathode follower outputs.

TRIGGER

MODES
Automatic mode or manual level selection; high-frequency sync. Automatic operation is useful between approx 50 Hz and 2 MHz, minimizes trigger adjustments for signals of different amplitudes, shapes, and repetition rates. With no input (or input less than 40 Hz), automatic triggering occurs at an approx 50-Hz rate, providing a convenient reference trace. High-frequency sync assures a steady display of sinewaves from less than 5 to 30 MHz.

COUPLING
AC, DC or AC LF reject.

SOURCES
Internal (from oscilloscope vertical amplifier), external, or line. External trigger input RC approx 1 MΩ (except 91 kΩ in AC LF reject) paralleled by approx 40 pF. 50-V maximum input (DC + peak AC).

REQUIREMENTS
0.2-cm deflection or 0.2-V external from 150 Hz to 2 MHz, increasing to 1-cm deflection or 1-V external at 5 MHz. Requirements increase below 150 Hz with AC coupling, below 10 kHz with AC low-frequency reject. DC coupling requires 0.4-cm deflection or 0.2-V external from DC to 2 MHz, increasing to 2-cm deflection or 1-V external at 5 MHz. Automatic operation requires 0.2-cm deflection or 0.2-V external from 50 Hz to 1 MHz, increasing to 1-cm deflection or 1-V external at 2 MHz. High-frequency sync requires 2-cm deflection or 2-V external between approx 5 and 30 MHz. ±10-V trigger level selection.

CRT

TEKTRONIX CRT

5-in metallized screen, helical post accelerating anode, 10-kV accelerating potential for bright displays. P2 phosphor normally supplied. Z-axis input is AC coupled to CRT cathode, requires 20 V peak to peak for beam modulation at normal intensity.

GRATICULE

External; variable edge lighting. 6 x 10-cm display area. Vertical and horizontal center lines marked in 2-mm divisions.

DISPLAY FEATURES

Beam-position indicators show direction of CRT beam when off screen. Multi-trace blanking eliminates switching transients from display when multi-trace plug-in unit is operated in chopped mode.

OTHER CHARACTERISTICS

AMPLITUDE CALIBRATOR

0.2-mV to 100-V squarewave, 18 calibrated steps (1-2-5 sequence), accurate within 3%, approx 1-kHz repetition rate.

POWER REQUIREMENTS

Wired for 115-V RMS ±9%; transformer taps permit operation 108, 115, 122, 216, 230, or 244 V (±9% on each range); 50 to 60 Hz. 500 W maximum power consumption. Can be factory wired for any of the above nominal voltages, if so indicated on order.

DIMENSIONS AND WEIGHTS

Height	17 in	43.2 cm
Width	$12\frac{15}{16}$ in	32.9 cm
Depth	$23\frac{7}{8}$ in	60.7 cm
Net weight	$57\frac{1}{2}$ lb	26.2 kg
Domestic shipping weight	≈76 lb	≈34.6 kg
Export-packed weight	≈95 lb	≈43.2 kg

INCLUDED STANDARD ACCESSORIES

Two P6006 10X Probes (010-0127-00); BNC-to-BNC 18-in patch cord (012-0087-00); BNC-to-banana plug 18-in patch cord (012-0091-00); BNC-post jack (012-0092-00); 3 to 2-wire adapter (103-0013-00); 3-conductor power cord (161-0010-03); smoke-gray light filter (378-0567-00); two instruction manuals (070-0258-00).

OPTIONAL ACCESSORIES

Optional accessories increase measurement capability and provide added convenience. Cameras, probes, Scope-Mobile® Carts and other major accessories are completely described in the catalog accessory pages.

CAMERA

The standard C-12 camera satisfies most trace-recording requirements. For applications that might require a different viewing system, lens, or back, refer to camera descriptions or consult your field engineer, representative, or distributor. Standard C-12: f/1.9—1:0.85 lens, no-parallax viewing, Polaroid Land* Pack-Film back

Type 533A to C-12 Camera adapter, order 016-0226-00

PROBES

The standard 10X probes supplied with the instrument satisfy most measurement requirements; however, optional probes (recommended on plug-in unit pages) may be better suited for particular applications.

SCOPE-MOBILE® CART

Model 202-2: storage drawer, carrier for 2 plug-in units, 9-position tilt-lock oscilloscope tray

RACK-MOUNT ADAPTER

Consists of cradle to support the Type 533A in any standard 19-in relay rack, and mask to fit around the front panel. Requires $17\frac{1}{2}$-in panel height, order 040-0281-00

TV ACCESSORIES FOR GENERAL-PURPOSE OSCILLOSCOPES

In addition to the Tektronix line of television instruments, accessories are available for use with many Tektronix general-purpose oscilloscopes. A TV Sync Separator provides stable triggering for the display of composite video signals. A Video Staircase Differentiator allows the amplitude linearity of television systems and their components to be measured. See the catalog accessory pages for additional information.

*Registered Trade-Mark, Polaroid Corporation

Please refer to Terms and Shipment, General Information page.