

# 326 SPECIFICATION

## Introduction

The SONY/TEKTRONIX 326 Oscilloscope is a solid-state portable instrument that combines small size and light weight with the ability to make precision waveform measurements.

A dual-trace DC to 10 MHz vertical system provides calibrated deflection factors from 0.01 Volt/Div to 10 Volts/Div (0.001 Volt/Div minimum with reduced frequency response).

The trigger circuit provides stable triggering over the full vertical bandwidth. A 300 ns delay line in the vertical system allows the operator to view the portion of the waveform on which triggering occurs.

The horizontal deflection system provides calibrated sweep rates from 1  $\mu$ s/Div to 1 s/Div. A 10X magnifier extends the sweep rate to 0.1  $\mu$ s/Div.

The 326 can be operated from internal battery, an external DC source, or from the AC line (with battery charger attached).

The following electrical characteristics apply over an ambient temperature range of +20°C to +30°C (+68°F to +86°F). Warmup time for the accuracies given is approximately 10 seconds.

## CHARACTERISTICS VERTICAL AMPLIFIER

### Deflection Factor

Ranges: 10 mV/Div to 10 V/Div in X1 Gain and 1 mV/Div to 1 V/Div in X10 Gain. 10 steps in a 1-2-5 sequence. Accuracy within 3% over the calibrated range.

Variable: Variable between calibrated deflection factor settings. Extends the highest deflection factor to at least 25 V/Div.

Attenuator Compensation: +1%, -1%, or less, 0°C to +55°C (+32°F to +131°F). +2%, -2%, or less, -15°C to 0°C (+5°F to +32°F).

### Frequency Response

Bandwidth (Variable Volts/Div at CAL, 4 division reference) direct coupled: 1X Gain, DC to at least 10 MHz (upper -3 dB point) with the P6049A Probe. Capacitively coupled, 4 division reference: from 10 Hz or less (lower -3dB point) at all deflection factors. 1 Hz or less with the P6049A Probe.

Step Response (risetime), 4 division step input: 36 ns or less in X1 Gain and 72 ns or less with X10 Gain.

Abberations: +2.5%, -2.5% with total of 4% or less in all modes except ADD ALG. +3%, -3% with total of 6% or less in ADD ALG Mode.

### Input

Maximum Voltage: 500 volts direct coupled (DC + peak AC) or capacitively coupled DC voltage.

Resistance: 1 M $\Omega$ , within 2%, direct and 10 M $\Omega$ , within 2%, with the P6049A Probe.

Capacitance: 47 pF within 4 pF direct and 13.5 pF or less with the P6049A.

### Amplifier

Linear dynamic range in Added Mode: Equal to or greater than 8 times the Volts/Div setting for 10% distortion.

Common-Mode Rejection: At least 20:1 at 2 MHz for a common-mode signal of 80 mV peak-to-peak, Volts/Div set at 10 mV and CH 2 set for maximum CMRR at 50 kHz and 10 mV (with display vertically centered on graticule).

### DC Drift

With Time (short term): 0.2 div or less during any minute within the first hour after a 10 second warmup (with temperature and line voltage constant).

Specification—326 (SN 300500-up)

Chopped Mode

Repetition Rate: 110 kHz within 20%.

Repetition Rate: 800 Hz within 250 Hz.

Duty Cycle: 40% to 60%.

Resistance: Approximately 10 k $\Omega$ .

## TIME BASE

### Sweep Time/Div

Calibrated Range: 1 s/Div to 1  $\mu$ s/Div in 19 steps in a 1-2-5 sequence. 10X magnifier extends the displayed sweep time to 0.1  $\mu$ s/Div.

Accuracy, X1 Gain: within 3% over the center eight graticule divisions from 1  $\mu$ s/Div to 0.2 s/Div, increasing to 4% from 0.5 s/Div to 1 s/Div.

X10 Gain: within 5% over any 2 division interval within the center eight graticule divisions 1.0  $\mu$ s/Div to 20 ms/Div. Increasing to 6% at 0.5  $\mu$ s/Div, 0.1  $\mu$ s/Div, 0.1 s/Div, and 50 ms/Div.

Variable: at least 2.5:1.

### Trigger

Internal: DC to 10 MHz on signals causing 1.0, or more, division of vertical deflection and to approximately 1.0 MHz on signals causing 0.3 division of vertical deflection.

External: DC to 10 MHz on signals of 500 mV or more, decreasing to approximately 1.0 MHz on signals of 150 mV.

Coupling: AC attenuates signals below 30 Hz; LF REJ attenuates signals below 50 kHz.

External Level Range: Atten at X1, +0.8 V to -0.8 V; Atten at X10, +8 V to -8 V.

Maximum Input Voltage: 300 V (DC + peak AC).

## CALIBRATOR

### Output

Voltage Accuracy (into a load of 1 M $\Omega$  or greater): 0.5 V, within 1% from +20 $^{\circ}$ C to +30 $^{\circ}$ C (+68 $^{\circ}$ F to +86 $^{\circ}$ F), decreasing to within 2% from -15 $^{\circ}$ C to +20 $^{\circ}$ C (+5 $^{\circ}$ F to +68 $^{\circ}$ F) and +30 $^{\circ}$ C to +55 $^{\circ}$ C (+86 $^{\circ}$ F to +131 $^{\circ}$ F).

## EXTERNAL HORIZONTAL INPUT

### Deflection Factor

Horiz Mag X10, Ext Atten 1X: 15 mV/Div to 25 mV/Div.

Horiz Mag off, Ext Atten 1X: 150 mV/Div to 250 mV/Div.

Horiz Mag X10, Ext Atten 10X: 150 mV/Div to 250 mV/Div.

Horiz Mag off, Ext Atten 10X: 1.5 V/Div to 2.5 V/Div.

### Bandwidth

DC to at least 200 kHz (upper -3 dB point).

### Dynamic Range

At least 20 divisions (+2.5 volts to -2.5 volts) with EXT TRIG OR HORIZ ATTEN switch set to X10, and EXT HORIZ Variable control set to CAL.

### Variable Range

At least 10:1.

## EXTERNAL BLANKING

### Sensitivity

DC Coupled: +5 volts to +20 volts.

### Usable Frequency Range

To approximately 100 kHz.

### Input Voltage

Maximum: 50 V (DC + peak AC).

## CRT DISPLAY



### Graticule Area

8 X 10 one-fourth inch divisions.

### Geometry

Within 0.1 division.

## POWER SOURCE

### Power Line

Voltage Ranges (Battery Charger): 90 V to 136 V and 180 V to 272 V.

Frequency (Battery Charger): 48 Hz to 440 Hz.

Maximum Power Consumption: 35 VA, with 136 volt AC line, a 10 MHz 6-division signal displayed, full intensity, and full charge rate.

### External DC

Voltage Range: +9 V to +32 V.

Maximum Power Consumption: 12 watts, with 10 MHz, 6-division signal displayed and full intensity.

## INTERNAL BATTERY SUPPLY

### Battery

9 size C, 1.5 AH NiCd cells.

### Charge Time

Full Charge (instrument off): at least 16 hours.

### Operating Time

1.5 to 4 hours, depending on control settings and temperature: +20°C to +25°C (+68°F to +77°F) charge temperature and +10°C to +30°C (+50°F to +86°F) operating temperature;

15  $\mu$ A or less cathode current

Calibrator Waveform displayed: 4 hours or greater.

6 divisions of 10 MHz signal displayed: 1.8 hours or greater.

315  $\mu$ A cathode current (full intensity)

Calibrator waveform displayed: 2.5 hours or greater.

6 divisions of 10 MHz signal displayed: 1.5 hours or greater.

## ENVIRONMENTAL

### Temperature

Nonoperating: -40°C to +75°C (-40°F to +167°F).

Operating: -15°C to +55°C (+5°F to +131°F).

Charging: 0°C to +40°C (+32°F to +104°F).

### Altitude

Nonoperating: to 50,000 feet.

Operating: to 15,000 feet. Maximum allowable ambient temperature decreases by 1°C/1000 feet from 5,000 feet to 15,000 feet.

## MECHANICAL

### Construction

Chassis	Aluminum Alloy
Panel	Aluminum Alloy with Anodized Finish
Cabinet	Blue Vinyl-Coated Aluminum

### Dimensions and Weights

Height	4.0 in	10.2 cm
Width with handle	8.7 in	22.2 cm
Depth, handle not extended		
With charger	15.0 in	38.1 cm
Without charger	12.2 in	31.0 cm
Depth, handle extended		
With charger	18.2 in	46.2 cm
Without charger	15.8 in	40.1 cm
Net weight without accessories		
With charger	≈13 lb	≈5.9 kg
Without charger	≈10 lb	≈4.5 kg
Domestic shipping weight	≈21 lb	≈9.5 kg
Export-packed weight	≈29 lb	≈13.1 kg