

**5116**

**Three Color, High Resolution Digital Storage Display with 5D10**

**Convergence Not Required, Single Beam Design**

**Accepts Full Range of 5100 Series Amplifiers for Preconditioning or Noncolor Applications**

The 5116 Oscilloscope, when used with the 5D10 digital storage plug-in unit, provides a unique three-color display of the digital storage capabilities and features of the 5D10.

Color enhances individual trace and readout identification, thereby providing a much improved user interface. The coding capabilities afforded by color allow for interpretation and differentiation of data more quickly, reduced measurement time, fewer errors, and improved resolution by using the full screen for overlapping signals. See page 45 for a color photo of the 5116 with the 5D10.

Permanent color records may be obtained with either a Tektronix camera (see pages 403-416) or with the 5D10 plotter output.

The 5D10 occupies the center and right plug-in compartments of the mainframe with which it is used. The left-hand plug-in compartment may be used to house an additional 5100 Series amplifier plug-in whose signal may be displayed through the unique Channel 2 left plug-in display capability of the 5D10. In this mode of operation, the signal from the additional amplifier plug-in unit is digitized and displayed on screen in place of Channel 1 of the 5D10. In this way, the 10  $\mu$ V/div 5A22N may be used to provide a digitally stored display of a very low level differential signal. Or, a dual trace amplifier

such as the 5A26, may be used in the left-hand plug-in compartment to permit the simultaneous color display of three signals, with color-coded cursor measurements available on each of the three.

In addition to its color operation with the 5D10 digital storage unit, the 5116 mainframe may also be used with any of the other 5100 Series plug-in units, with exactly the same functionality as the 5110 mainframe (see mainframe/compatibility chart on page 239).

**CHARACTERISTICS**

The following characteristics are in addition to those listed previously.

**CRT AND DISPLAY FEATURES**

**Standard CRT** — Internal 8 x 10 div (1.27 cm/div) parallax-free, illuminated graticule.

**Accelerating Potential** — 4.5 kV.

**Color Shutter** — With 5D10: Three-color display of blue-green, orange, and neutral. Without 5D10: Blue-green display.

**Beam Finder** — Positions beam on screen regardless of vertical and horizontal position control settings.

**ORDERING INFORMATION**

(PLUG-INS NOT INCLUDED)

**5116 Oscilloscope** **\$2,460**  
**Includes:** Power cord (161-0066-00); instruction manual (070-4544-00).

**OPTIONS**

**Option 02** — Protective Panel Cover. The cover protects the front panel and knobs during transportation and storage. **+\$40**  
**Option 07** — Add Rear Panel Signals Out. **+\$130**

**CONVERSION KITS**

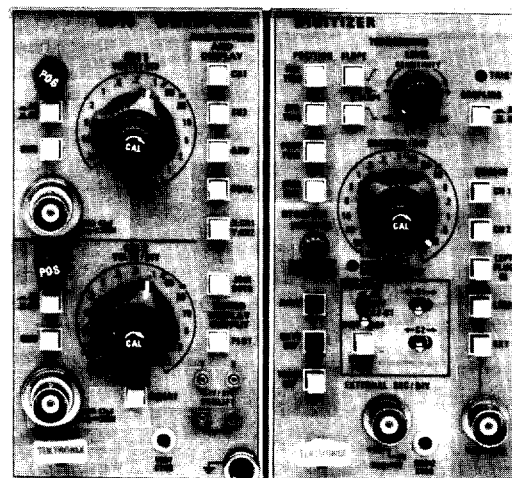
**Cabinet-to-Rackmount Conversion Kit** — Order 040-0583-03 **\$155**  
**Rackmount-to-Cabinet Conversion Kit** — Order 040-0584-04 **\$180**  
**Protective Panel Cover Kit** — Order 040-0620-00 **\$38**  
**Rear Panel Signal Outputs Conversion Kit (Option 07)** — Order 040-0915-02 **\$230**

**INTERNATIONAL POWER PLUG OPTIONS**

**Option A1** — Universal Euro 220 V/16 A, 50 Hz.  
**Option A2** — UK 240 V/13 A, 50 Hz.  
**Option A3** — Australian 240 V/10 A, 50 Hz.  
**Option A4** — North American 240 V/15 A, 60 Hz.  
**Option A5** — Switzerland 220 V/10 A, 50 Hz.

**For 5D10 Waveform Digitizer see next page.**

**For recommended cameras see page 406.**  
**For a description and photos of color display technology see page 45.**



**5D10**

**Compatible with all 5000 Series Mainframes**

**Digital Storage**

**CRT Readout**

**Powerful Triggering Capability**

**1% Accuracy**

**Dual Channel**

**1 MHz Sample Frequency**

**Save Reference Waveforms**

**X-Y Recorder Output**

**Signal Conditioning Via Left Vertical Plug-In**

**Color Signal Source for 5116 Oscilloscope**

The 5D10 enhances all Tektronix 5000 Series mainframes by providing storage for transient events with frequency components up to 100 kHz for a single channel acquisition and up to 50 kHz for dual channel acquisition, all in a compact two-wide plug-in.

**Color/Waveform Digitizing System**

Together, the 5D10 and the Tektronix 5116 Oscilloscope create a system of high resolution color\*1 and waveform digitizing for superior trace and readout clarity. Digital storage provides clear, crisp, bright displays which can be viewed indefinitely. And also the following additional features:

**Cursors** permit convenient single-point and point-to-point measurement of time, amplitude, and frequency for fast, accurate, and reliable answers.

\*1 Three-color display requires a 5D10 with serial number B020000 or higher. A field installable kit is available to upgrade earlier 5D10's. Contact your local Tektronix representative for details.

**CRT Readout** displays all pertinent instrument settings, cursors, and waveform levels. Lets you read out complete operational status at a glance.

**Pretrigger** allows viewing information prior to the trigger event so you can see all your data. Center and posttrigger selection is also provided.

**Free Run** optimizes the data presentation for low speed phenomena, much like a stripchart recorder.

**1% Accuracy** improves measurement quality in both vertical and horizontal modes.

**Dual Samplers** ensure time coincidence between the two input channels.

**Bi-Slope Triggering** assures triggering when the slope of a transient event is not known.

**1 MHz Sample Frequency** stores single-shot events to approximately 100 kHz in bandwidth with 8-bit vertical resolution.

**Storage View-Time** control from 1 second to infinity.

**Save Reference** permits comparisons of signals stored at different times.

**X-Y Displays** provide less than 1° phase shift up to 100 kHz of parametric related signals.

**X-Y Recorder Output** provides inexpensive, archivable hard copies complete with readout, graticule, and displayed waveforms in full color.

**Preconditioning** of up to two signals for Channel 2 by using the left vertical plug-in (when used in 5100 Series mainframes only).

For example, plug-ins such as the 5A21N, 5A22N and 5A26 can provide differential performance with sensitivities ranging to 10  $\mu$ V/div (5A22N). The 5D10 can acquire a total of three signal channels when using the Channel 2 left plug-in acquisition feature.

**CHARACTERISTICS**  
**VERTICAL**

**Vertical Modes** — CH 1, CH 2, Add, Dual, X-Y.

**Channel 2 Modes** — V/div, Left plug in.

**Deflection Factor** — 1 mV/div to 20 V/div in 14 calibrated steps (1-2-5 sequence).

**Accuracy** — Input to Readout Numbers: 5 mV/div to 1 V/div  $\pm$ 1%; 1 mV/div to 2 mV/div  $\pm$ 2%; 2 V/div to 20 V/div  $\pm$ 2%; Input to CRT graticule  $\pm$ 2%. From Left Vertical Plug-in: Add  $\pm$ 1% to above specifications. Add Mode: Add  $\pm$ 1% to above specifications.

**Input R and C** — 1 M $\Omega$   $\pm$ 0.5% paralld by  $\approx$ 47 pF.

**Maximum Input** — 250 V (dc + peak ac); 250 V p-p ac at 1 kHz or less.

**Bandwidth** — Single Channel: Suitable from dc to 100 kHz. Dual Channel: Suitable from dc to 50 kHz. Ac Coupling: 3 dB point—10 Hz or less (1 Hz with 10X probe).

**Common-Mode Rejection** — At least 50:1, dc to 100 kHz.

**Resolution** — Vertical: X-Y or Y-T; 0.04 div (8-bit digitizer). Horizontal: Y-T; 0.01 div (1024 memory locations shared among all traces displayed).

**Phase Shift** —  $\leq$ 1.0° phase shift between CH 1 and CH 2, dc to 100 kHz.

**Display Output (to X-Y Recorder)** — Amplitude: 0.2 V/div  $\pm$ 2%. Speed: Compatible with X-Y recorders with 20 in/s slew rate, or faster. Pen Lift: Isolated switch contacts, SPST (floating); normally open or normally closed selected by internal jumper.

**TIME BASE**

**Sweep Rates** — 0.1 ms to 50 s/div in 18 calibrated steps 1-2-5 sequence (to 10  $\mu$ s/div with 10X magnifier).

**Accuracy** — Within  $\pm$ 1% of readout numbers.

**External Input** — Allows external pulse generator to determine acquisition rate. Accepts TTL levels up to 1 MHz rate.

**Possible Under-Sampling Indicator** — Indicator lights when fewer than eight sample pulses occur during interval between successive threshold crossing of triggering signals.

**TRIGGERING**

**Sources** — CH 1, CH 2, left plug-in (via mainframe), line, external.

**Coupling** — Dc, ac.

**Sensitivity** — External: 100 mV; dc to 50 kHz or pulsewidth  $>$ 5  $\mu$ s; 250 mV 50 kHz to 250 kHz or pulsewidth  $>$ 1  $\mu$ s. CH 1, CH 2, Left Plug-in: 0.4 div, dc to 50 kHz or pulsewidth  $>$ 5  $\mu$ s; 1.0 div, 50 kHz to 250 kHz or pulsewidth  $>$ 1  $\mu$ s.

**Bi-Slope Trigger** — Amplitude, frequency, and pulsewidth specifications apply to absolute value of signal (rectified).

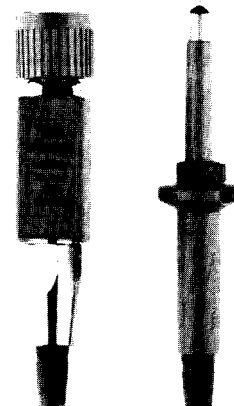
**External Trigger Input** — Input R and C: 1 M $\Omega$   $\pm$ 2% paralleled by  $\approx$ 47 pF. Maximum input 250 V (dc + peak ac). 250 V p-p ac at 1 kHz or less.

**ORDERING INFORMATION**

**5D10 Waveform Digitizer** **\$2,045**

**Includes:** Diagnostics manual (070-4323-00); operator manual (070-3696-01); service manual (070-3697-00).

**P6102A 10X Probe**



Dc to 60 MHz

Scale Factor Readout Coding

Fully Compatible with all 5100 Series

The P6102A is a miniature 10X passive probe specially designed for use with all 5100 Series amplifier plug-ins, TM 500 Series SC 501, SC 502, and SC 503 plug-in oscilloscopes, and other scopes having nominal 47 pf inputs. Compensation range is 38 pf to 55 pf.

The P6102A automatically codes CRT readout-equipped scopes to show the correct scale factor and the knob-skirt readout on plug-ins with this feature. A ground reference button is included to provide easy location of ground position on the CRT and an easy means of identifying channels on multi-channel displays.

The P6102A employs modular construction featuring just three snap-together modules. This means easy user repair and low maintenance costs.

**CHARACTERISTICS**

**Length** — 2 m.

**Attenuation** — 10X  $\pm$ 3%.

**Input R and C** — 10 M $\Omega$ , 13.2 pf.

**Bandwidth** — Dc to  $>$ 60 MHz.

**Risetime** —  $<$ 5.9 ns.

**Aberrations** —  $\pm$ 3%, 5% p-p.

**Compensation Range** — 38 pf to 55 pf.

**Maximum Nondestructive Input Voltage** — 500 V (dc + peak ac).

**ENVIRONMENTAL**

**Ambient Temperature** — Operating:  $-15^{\circ}$ C to  $+75^{\circ}$ C. Nonoperating:  $-62^{\circ}$ C to  $+85^{\circ}$ C.

**Humidity** — Five cycles (120 hours total) at 95% to 97%.

**Altitude** — Operating: To 4,600 m (15,000 ft). Nonoperating: To 15 000 m (50,000 ft).

**ORDERING INFORMATION**

**P6102A Miniature 10X Probe** **\$75**

**Includes:** Retractable hook tip (013-0107-05); ground cover sleeve (166-0404-01); 130 mm ground lead (175-0124-01); 300 mm ground lead (175-0125-01); miniature alligator clip (344-0046-00); IC testing tip (015-0201-06); black marker band (334-2794-00); white marker band (334-2794-01); silver-grey marker band (334-2794-02); adjusting tool (003-1364-00); accessory pouch (016-0708-00); instruction manual (070-5824-00).