TEK STORAGE INSTRUMENTS

SELECT THE RIGHT KIND OF STORAGE FOR YOUR APPLICATION

Tektronix®
COMMITTED TO EXCELLENCE
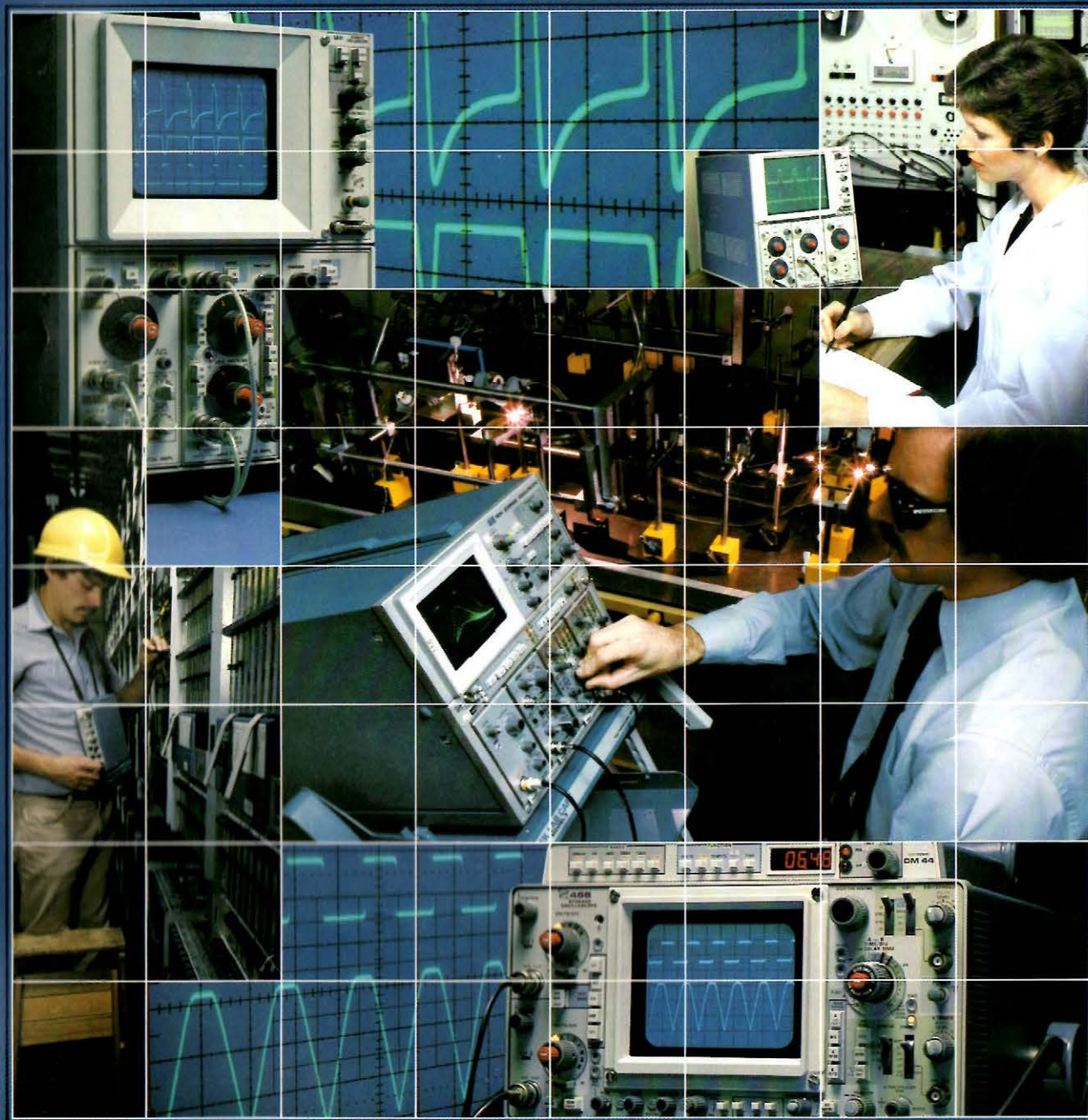
CHOOSING THE RIGHT KIND OF STORAGE FOR YOUR APPLICATIONS.

When you should consider using storage instruments.

Storage is the most efficient and convenient way to perform many kinds of measurements. It allows you to acquire a complete display of a slowly occurring signal, so you can see the entire waveform at once. Or to capture and save a very fast, one time only event for analysis later. Or to keep a reference signal on the oscilloscope crt, for comparison with an incoming signal. And much more.

You can also use storage to:
- Observe signal changes during circuit adjustment.
- Reduce flicker or noise.
- Babysit a transient event.
- Ease the tasks of photography and other recording techniques.
- View pretrigger data.
- Digitize waveforms for processing or transmission over the IEEE-488 interface.

Several storage techniques are currently available. This selection guide will help you determine which storage instrument best suits your measurement requirements.

Why choose Tektronix storage?

A wide range of instruments for all your storage needs. Tektronix offers the broadest selection of storage products available anywhere. You can choose from digital storage and three kinds of crt storage scopes, in either

laboratory plug-in or portable configurations. Or you can choose state-of-the-art waveform digitizers for use in complete Signal Processing Systems.

And we back every product we make with the service and support you expect from Tektronix. Over 140 Tektronix service locations staffed with more than 1,100 highly skilled technicians provide fast, convenient service worldwide for all your storage instruments.

Making your choice.

Selecting the best instrument for your applications depends on several factors, which are discussed in the next few sections. You'll find selection charts and product summaries for all our storage instruments inside this folder.

If you would like the benefits of both plug-in and storage flexibility, consider our 7000 Series with over 30 plug-ins and seven storage mainframes, including two programmable, IEEE-488 compatible waveform digitizers. Or our cost-efficient 5000 Series with five storage mainframes and over 15 plug-ins.

If you perform tests in several locations, or in remote areas where power is not available, choose from our wide selection of portable scopes.

Tek's four newest digital storage instruments

1. The 400 MHz 7854 Oscilloscope offers waveform measurements at the touch of a button. It's ideal for repeatable data analysis in engineering and manufacturing environments.

2. The 10 MHz 5223 features X-Y displays and memory outputs for analog plotters. It's an excellent scope for physical, mechanical, and biomedical applications.

3. The 468, with the high speed digitizer and 100 MHz real time performance is the most versatile portable scope available.

4. The 7612D is an 8-bit, 200 MHz waveform digitizer that provides full programmability and two independent channels.

For more information contact a Tektronix Sales Engineer at the sales office nearest you. They can help you select the storage instrument that's just right for your application.

Tek offers both digital storage and crt storage.

Digital storage provides unlimited storage time and access to stored information. Digital storage oscilloscopes digitize a signal, store this data in digital memory and then display it either immediately or later upon command. Traces are reconstructed from digitized information, so they stay bright and crisp for as long as necessary.

Digital storage oscilloscopes give you easy to use pushbutton controls and the ability to reposition and expand stored signals on the crt. Plus, stored data can be transmitted for documentation or processing via the IEEE-488 interface.

With digital storage:
- Pretrigger data can be retrieved and displayed, to help you track down the problem that caused triggering to occur.

- On-screen cursors make it possible to measure time and voltage between points quickly and easily.
- Signal averaging lets you capture more useful data, because it can reduce unwanted noise, increasing both the resolution and the accuracy of your measurements.
- With multiple trace capability, you can keep a reference signal in memory for as long as necessary and compare it with newly acquired data.
- For making phase measurements, X-Y display capability allows you to plot one stored signal versus another.
- The roll mode in the 5223 Digitizing Oscilloscope lets you take a comprehensive view of slow sweep speed signals. This feature continuously updates memory and presents a display similar to a strip chart recording.
- The 468 Portable Storage Oscilloscope's envelope mode allows you to hunt for glitches or fast spikes on slow signals, or to watch for any amplitude or frequency variations of a signal. All automatically.
- With stored and real-time display capability in one instrument, you can choose the measurement approach that's best for the task at hand.

Our digital storage scope customers are using these new instruments for many applications, including calibrating X-ray units, testing load cell stress, gathering pain threshold data and babysitting service problems.

Waveform digitizers let you acquire data quickly and conveniently for processing. Waveform digitizers are optimized for computer interface and processing. Typically used as acquisition components in Signal Processing Systems, waveform digitizers transmit signal data to separate display and processing components.

Waveform digitizers offer the acquisition capability needed for capturing high or low speed, single-shot or repetitive signals for waveform characterization in scientific research, engineering design, or automated quality control. Programmability allows you to maximize throughput and handle large amounts of data automatically, to increase your productivity.

Crt storage provides immediate, direct viewing of signals. In crt storage, the signal is stored directly on the crt screen, or on high-speed mesh and then transferred to the screen. Two basic kinds of crt storage, bistable and variable persistence, are currently available. And our FAST transfer technique can combine the two in a single instrument, for increased storage writing speeds.

Bistable. Bistable storage offers an economical approach to many measurement requirements. It can help you view signals for an extended period of time; store multiple nonrecurring events; or reconstruct waveforms from slow, repetitive signals with fast rise times. It can also provide high resolution and bright displays.

Our bistable storage scopes are used for adjusting automated machinery, analyzing speech impairments, viewing thyristor turn-on in large AC motors, studying relay operating characteristics and many other applications.

Variable Persistence. Variable persistence is useful for suppressing random signal noise or flicker, comparing repetitive signals and producing bright, high contrast displays of fast signals recurring at slow periodic rates.

Our variable persistence customers use their scopes for viewing pressure, RPM and vibration in mechanical devices, studying data link and radar signals, tracing interference from adjacent equipment, calibrating instrumentation and many other measurements.

FAST Transfer. FAST transfer storage makes it possible to obtain the highest writing speeds available in storage oscilloscopes. And it offers multiple storage modes, such as FAST bistable, FAST variable persistence, bistable and variable persistence. All in one oscilloscope.

Our customers find high speed FAST transfer storage scopes essential for troubleshooting switch noise or bounce, checking timing sequences and rise times in fast logic trains. And also for other testing that requires storing a signal at an extremely high writing speed, such as laser fusion or high energy research.

Selection parameters for storage scopes.

Digital storage. Digital storage scopes are characterized in terms of Useful Storage Bandwidth and Equivalent Storage Bandwidth.

Useful Storage Bandwidth measures the highest frequency sinewave that can be stored in a single sweep and displayed in a visually useful manner. It is dependent on both the maximum digitizing rate and on the display reconstruction technique used: Dot displays, dots joined by vectors or interpolated displays.

For a full scale sinusoidal signal, Useful Storage Bandwidth is defined as:

$$USB_{(MHZ)} = \frac{MAXIMUM\ DIGITIZING\ RATE_{(MHZ)}}{K}$$

Where K equals approximately:
- 25 for dot displays
- 10 for vector displays
- 2.5 for interpolated displays

These factors apply to oscilloscopes where visual representation is necessary. If signal processing capabilities are available a limit of at least two samples per cycle are needed to fully define a sinewave, as defined by sampling theory and the Nyquist frequency.

Equivalent Storage Bandwidth indicates the fastest repetitive signal that can be stored using equivalent time sampling techniques. For scopes with equivalent time sampling capability, the equivalent bandwidth generally equals the scope's analog bandwidth.

The table on the inside of this folder shows the Useful and Equivalent Storage Bandwidths for Tek digital storage instruments.

Crt Storage. Conventional crt storage scopes are characterized in terms of stored writing speed, which determines the maximum frequency or fastest step response signal that can be displayed with a desired amplitude. The chart on the inside of this folder allows you to easily determine the stored writing speed you need. The writing speeds of FAST multimode storage scopes, which vary in speed according to the storage mode used, are indicated in the matrix.
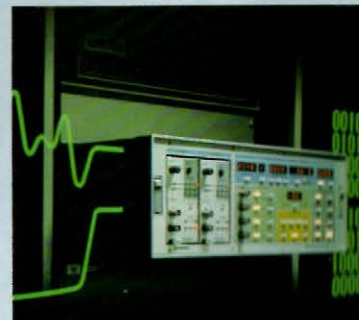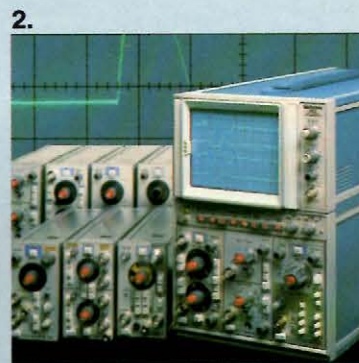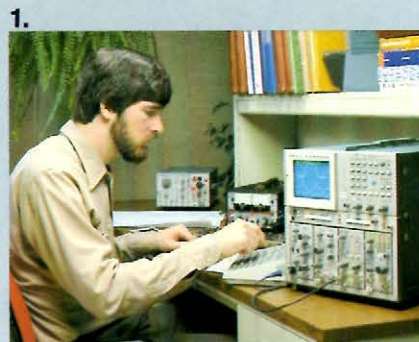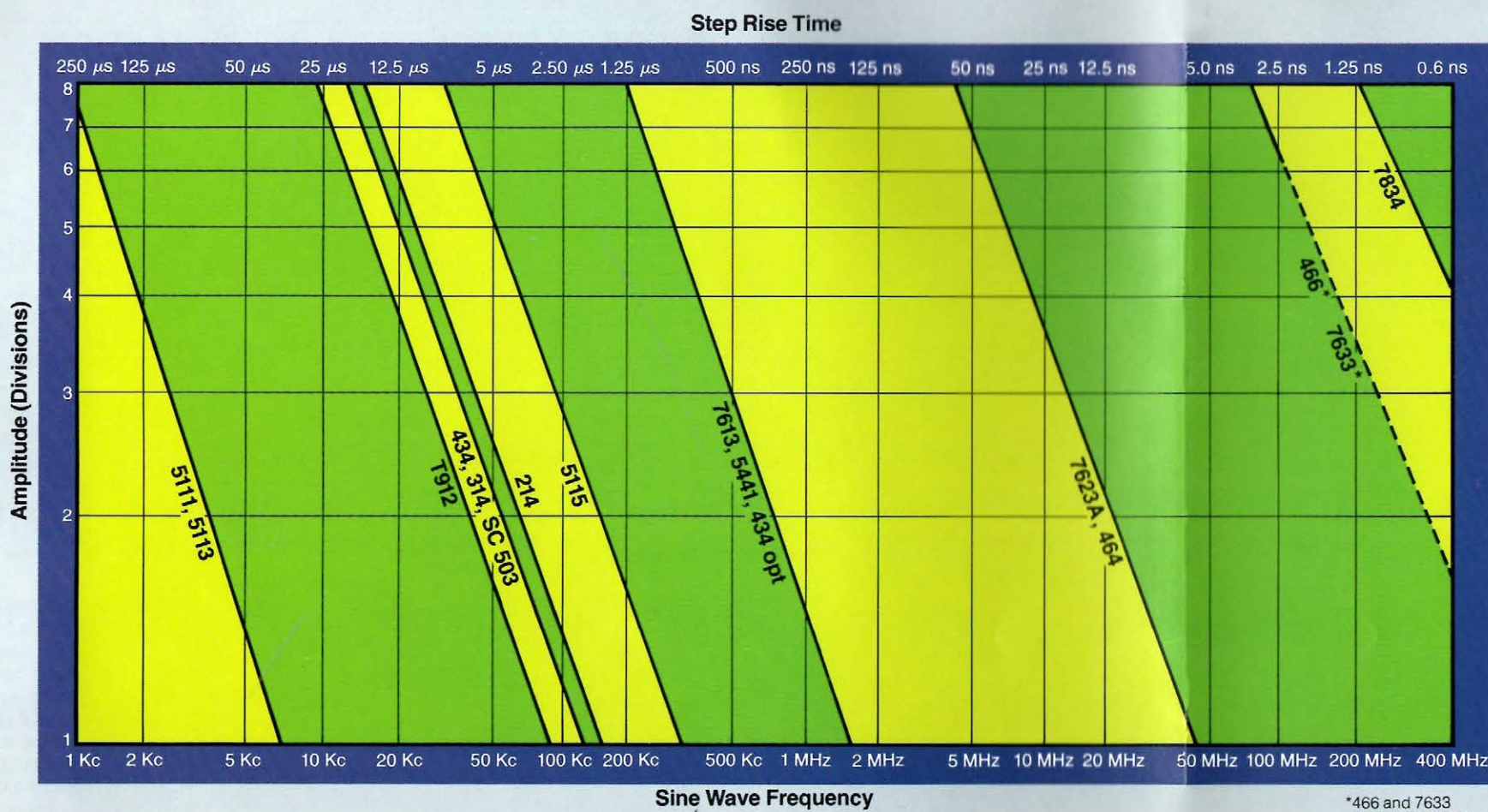
CRT STORAGE PERFORMANCE

Step Rise Time

Amplitude (Divisions) vs Sine Wave Frequency

Step Rise Time scale: 250 µs 125 µs 50 µs 25 µs 12.5 µs 5 µs 2.50 µs 1.25 µs 500 ns 250 ns 125 ns 50 ns 25 ns 12.5 ns 5.0 ns 2.5 ns 1.25 ns 0.6 ns

Sine Wave Frequency scale: 1 Kc 2 Kc 5 Kc 10 Kc 20 Kc 50 Kc 100 Kc 200 Kc 500 Kc 1 MHz 2 MHz 5 MHz 10 MHz 20 MHz 50 MHz 100 MHz 200 MHz 400 MHz

Curves: 5111, 5113; 434, 314, SC 503; T912; 214; 5115; 7613, 5441, 434 opt; 7623A, 464; 466, 7633; 7834

*466 and 7633 limited to 100 MHz vertical bandwidth

DIGITAL STORAGE PERFORMANCE

	468	5223	7854	7912AD	7612D
Analog BW	100 MHz	10 MHz	400 MHz	500 MHz	80 MHz
Max Dig Rate	25 MHz	1 MHz	500 kHz Ext Clock	100 GHz	200 MHz
Vert. Res.	8 Bit	10 Bit	10 Bit	9 Bit	8 Bit
Data Words per Waveform	512 in Alt. 256 in chop	1024/plug-in	Up to 1024	512	Up to 2048
Max No. Stored Waveform	4	4	40	1	16
Useful* Storage BW (SS)	10 MHz	100 kHz	50 kHz	500 MHz	50 MHz
Equiv** Stor BW (rep)	—	10 MHz	400 MHz	500 MHz	—

*Useful Storage Bandwidth is a measure of the highest frequency sinewave that can be stored in a single sweep and displayed in a visually useful manner. This is dependent on both the maximum digitizing rate as well as the display reconstruction technique used.

**Equivalent Storage Bandwidth indicates the highest frequency repetitive signal that can be stored and displayed with less than 3 dB loss of signal amplitude using equivalent time digitizing techniques.

7834 Basic System Multimode Storage
Bistable, Variable Persistence, Fast Transfer
- 5500 div/µs Stored Writing Speed (reduced scan — 45 cm/div)
- 300 div/µs Stored Writing Speed (0.9 cm/div CRT)
- DC-400 MHz Bandwidth
- 3 Vertical Channels
- Delta time CRT Readout

7633 Basic System Multimode Storage
Bistable, Variable Persistence, Fast Transfer
- 2200 div/µs Stored Writing Speed (reduced scan — .45 cm/div)
- 150 div/µs Stored Writing Speed (0.9 cm/div CRT)
- DC-100 MHz Bandwidth
- 5 mV/div Vertical sensitivity
- CRT Readout

7623A Basic System Multimode Storage
Bistable, Variable Persistence, Fast Transfer
- 150 div/µs Stored Writing Speed (0.9 cm/div CRT)
- DC-100 MHz Bandwidth
- 5 mV/div Vertical sensitivity
- Dual trace
- CRT Readout

7613 Basic System Variable Persistence Storage
- 5 div/µs Stored Writing Speed (0.9 cm/div CRT)
- DC-75 MHz
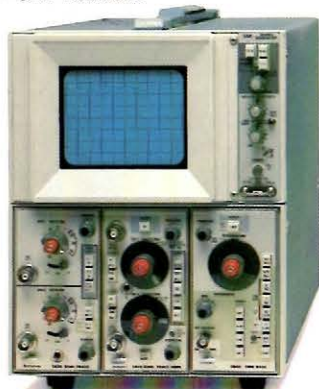- 5 mV/div Vertical sensitivity
- Dual Trace
- CRT Readout

7854 Waveform Parameters at the Touch of a Key
- Stores Repetitive Waveforms up to 400 MHz
- Signal Averaging
- Pretrigger (with 7B87 Time Base)
- Keystroke Programming (up to 1000 lines)
- IEEE 488 Interface (Standard)

5223 Digital Storage (with 5B25N)
- Stores Repetitive Waveforms up to 10 MHz
- Pretrigger
- Roll Mode
- X-Y Plotter Output with Penlift
- IEEE 488 Interface (Optional)

5441 Basic System Variable Persistence Storage
- 5 div/µs Stored Writing Speed (0.9 cm/div CRT)
- DC-50 MHz
- Four Vertical Channels
- 1 mV/div Vertical sensitivity to 25 MHz
- CRT Readout

5115 Basic System Split Screen Bistable Storage
- 800 div/ms Stored Writing Speed (1.27 cm/div CRT)
- DC-2 MHz Mainframe
- 1 mV/div Vertical sensitivity
- Dual trace
- Dual time base

5113 Basic System Split Screen Bistable Storage
- 20 div/ms Stored Writing Speed (1.27 cm/div CRT)
- 200 div/ms with Opt 03
- DC-2 MHz Bandwidth
- Dual Beam
- Six Vertical Channels

5111 Basic System Split Screen Bistable Storage
- 30 div/ms Stored Writing Speed (1.27 cm/div CRT)
- DC-2 MHz
- Three Vertical Channels
- Vertical Sensitivity to 10 µV/div
- Dual Time Base

468 Digital Storage
- 10 MHz Useful Storage Bandwidth
- 100 MHz Non-Storage Bandwidth
- Cursors for Time and Voltage Measurements
- Envelope Mode
- Signal Averaging and IEEE 488 Interface Options

466 Variable Persistence and Fast Transfer Storage
- 3000 div/µs stored writing speed. (Reduced scan 0.45 cm/div.)
- 150 div/µs stored writing speed. (0.9 cm/div CRT.)
- DC-100 MHz Bandwidth
- 5 mV/div Vertical sensitivity
- DMM Option

464 Variable Persistence and Fast Transfer Storage
- 110 div/µs stored writing speed.
- 0.9 cm/div CRT
- DC-100 MHz Bandwidth
- 5 mV/div Vertical sensitivity
- Dual trace
- DMM Option

434 Split Screen Bistable Storage
- 400 div/ms Stored Writing Speed. (0.97 cm/div CRT)
- 5000 div/ms with Option 1
- DC-25 MHz Bandwidth
- Dual trace
- Wide Range Magnifier

7612D Programmable Waveform Digitizer
- 200 MHz Maximum Sampling Rate, each Time Base
- Two Channels, Two Independent Time Bases
- 8 Bit Resolution, 2048 Words per Channel
- Pretrigger and Posttrigger Operation
- Fully Programmable over IEEE 488 Bus For System Oriented Operation

T912 Bistable Storage
- 250 div/ms Stored Writing Speed. (1 cm/div CRT)
- DC-10 MHz
- 2 mV/div Vertical Sensitivity
- Dual trace
- Delay Line

314 Bistable Storage
- 400 div/ms Stored Writing Speed. (0.6 cm/div CRT)
- DC-10 MHz Bandwidth
- 1 mV/div Vertical sensitivity
- Dual trace
- Lightweight ≃10.5 lbs.

214 Bistable Storage
- 500 div/ms Stored Writing Speed (0.52 cm/div CRT)
- DC-500 KHz
- Dual trace
- Battery operated
- Ultra lightweight ≃3.5 lbs.

SC503 Bistable Storage
- 400 div/ms Stored Writing Speed (0.64 cm/div CRT)
- DC-10 MHz Bandwidth
- 1 mV Vertical sensitivity
- Dual trace
- Configurable with TM 500 Plug-ins and Mainframes

7912AD Programmable Waveform Digitizer
- Digitize Signals from ms to sub-ns duration
- 500 MHz Bandwidth at 10 mV/div (200 MHz Fully Programmable)
- 500 ps/div Fastest Calibrated Sweep Rate
- Built-In Signal Averaging Capability
- Fully Programmable over IEEE 488 Bus For System Oriented Operation

Tektronix
COMMITTED TO EXCELLENCE

Tektronix®
COMMITTED TO EXCELLENCE