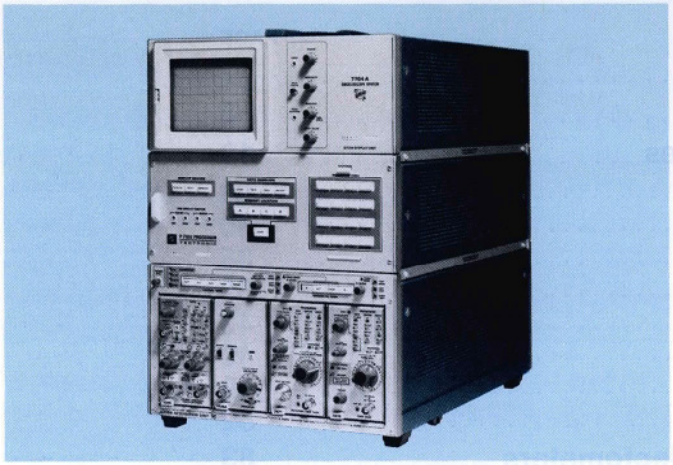
TEKTRONIX®

committed to technical excellence

TEKTRONIX PRODUCTS 1974

7000-SERIES PLUG-IN OSCILLOSCOPES

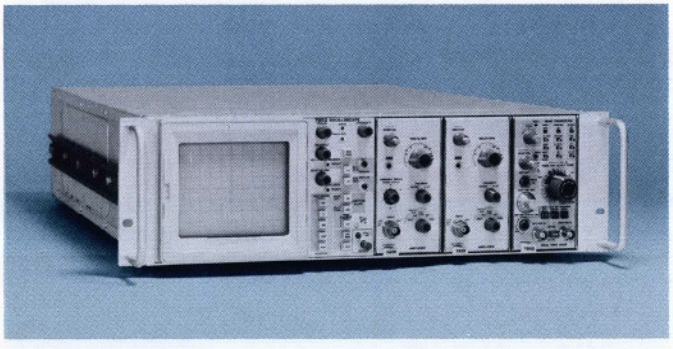


The Digital Processing Oscilloscope consists of three basic sections: Acquisition unit, Display unit, and Processor unit. The acquisition and display units, along with any four of the over 30 plug-ins in the 7000-Series family, comprise a high performance oscilloscope. Adding the Processor unit to this scope greatly expands the waveform measurement capability. The Processor serves as an interface between the oscilloscope and either a minicomputer or a calculator. In addition, the Processor provides realtime analog-to-digital conversion, storage of up to four different waveforms and scale factors in self-contained core memory, and recall and display of stored waveforms.

A wide variety of operations can be performed on waveforms ranging from simple addition or subtraction of two waveforms to sophisticated fast Fourier transforms. The computer has access to the CRT character generator circuits, permitting it to send short messages to the oscilloscope user via the CRT.

Through the use of APD BASIC™ software, the most complicated and sophisticated measurement routines can be easily and quickly programmed. Any one of up to 13 computer-stored measurement routines can be initiated by pressing one of the user-option pushbuttons. The user can assign routines to the pushbuttons from his own programs or programs available from Tektronix, Inc. When not performing in combination, the oscilloscope and the minicomputer or calculator are available for independent use.

For complete description of the Digital Processing Oscilloscope, see page 26.

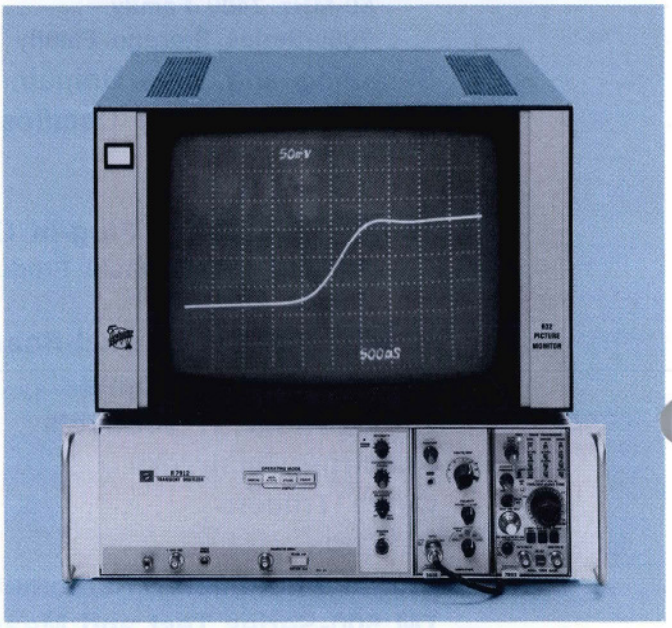


The R7903 Oscilloscope is the widest bandwidth, real-time oscilloscope available in a 5¼-inch rackmount. General-purpose measurements up to 500 MHz at 10 mV/div can be made using the 7A19 Amplifier plug-in. This can be extended to 1 GHz at less than 4 V/div via direct access with the 7A21N Direct Access plug-in. CRT READOUT and vertical amplifier are bypassed and inoperative when direct access is used.

The R7903 accepts any three of over 30 plug-ins available for the 7000 family. CRT READOUT is also available on the R7903 to reduce set-up time and measurement errors. It also increases operator accuracy and speed.

The R7903 accepts any three of over 30 plug-ins available for custom tailoring of the system to meet your measurement requirements.

For complete description of the R7903, see page 35.



The R7912 Transient Digitizer can acquire fast single-shot or repetitive signals and convert them to digital data or to a TV-compatible format. Key component in the instrument is a Tektronix-developed scan-converter tube.

In the digital mode, the R7912 operates as a fast analog-to-digital converter. It takes 512 samples of a waveform in a time window as short as 5 ns. This digital information can be stored in a self-contained memory (optional) or sequenced to a computer or other peripheral such as a digital-to-analog converter for display on an X-Y monitor. Software programs are available from Tektronix, Inc. to assist in your measurements and analysis. In the TV mode, the R7912 processes waveforms into a TV-compatible format (525 lines, 60 Hz field, 2:1 interlace) for bright, large-screen displays on conventional TV monitors such as the TEKTRONIX 630 Series Picture Monitors (as shown in above picture).

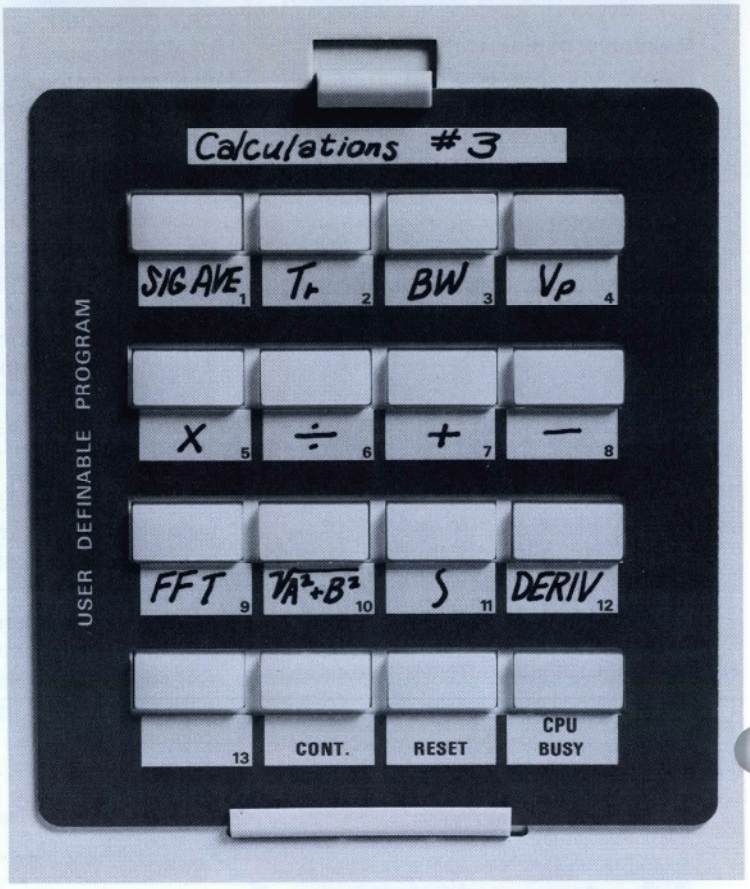
Signals are acquired with standard 7000-Series plug-ins. This provides a very flexible and versatile signal acquisition system, allowing selection from over 30 plug-ins, as well as compatibility with the many other instruments in the 7000-Series family.

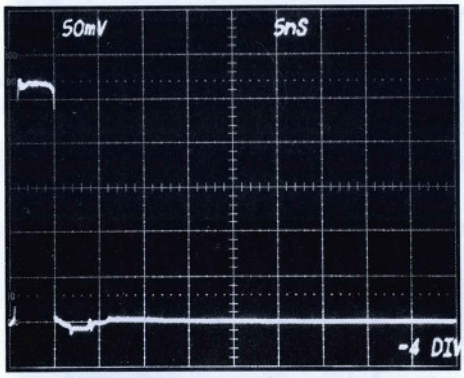
Several options are available to expand the measurement performance of the R7912. The optional semiconductor memory allows the acquired waveform to be stored in the R7912 for

New

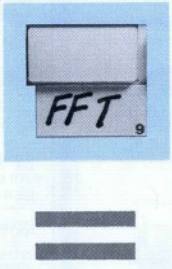
your choice of completely new measurement capabilities with the Digital Processing Oscilloscope.

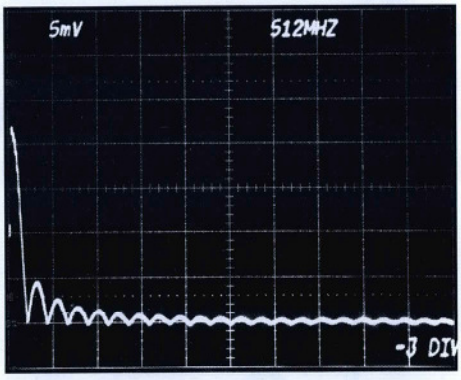
- **ANY WAVEFORM ON THE DISPLAY MAY BE STORED IN MEMORY AND PROCESSED**
- **ALL STORED OR PROCESSED WAVEFORMS MAY BE DISPLAYED ON THE CRT**
- **PUSH-BUTTON ACCESS TO FULL PROCESSING POWER**
- **APPLICATION SOFTWARE INCLUDED**
- **MESSAGE DISPLAY—TWO LINES OF FORTY CHARACTERS**
- **FULL 7000-SERIES SIGNAL ACQUISITION CAPABILITIES**
- **FULL 7704A DISPLAY CAPABILITIES**
- **COMPATIBLE WITH EXISTING 7704A OSCILLOSCOPES**





waveform #1





waveform #2

With the TEKTRONIX Digital Processing Oscilloscope you can perform nearly any type of calculation derived from your waveform. The User Definable Program above is only one of many programs that you can use for processing your waveforms.

The calculation and waveforms shown demonstrate how easy it is to simply push a button (that you preprogrammed) and display your results all in a matter of seconds.

Waveform #1 is a stored high-frequency pulse from a 7S12 TDR Sampling unit. Waveform #2 is the result of a Fast Fourier Transform (FFT) performed on waveform #1. Note: the horizontal scale factor on waveform #2 is 512 MHz/div (0 MHz represents left edge of CRT, 5.12 GHz represents right edge of CRT).

processing . . . the 7000-Series Oscilloscope's new link between acquisition and display.

Display Module—This portion is the top half of a 7704A Oscilloscope System. All data, digital and analog is displayed on its CRT.

Processing Module—This portion and its accompanying PDP-11/05 minicomputer (bottom of SCOPE-MOBILE® cart) along with included software perform analog-to-digital conversions and mathematical operations on variables derived from your waveforms.

Acquisition Module—This portion is the lower half of the 7704A Oscilloscope System. All the 7000-Series plug-ins are compatible for signal acquisition, and greatly contribute to the vast measurement solving power of the Digital Processing Oscilloscope.

Just how significant is this new measurement capability? Very, very significant, because if your variables in a calculation are obtained from waveforms on an oscilloscope, then the Digital Processing Oscilloscope will provide you with your answers. And, you get the advantages of speed, accuracy, lower-cost and convenience over alternate techniques. Often these advantages are so large that alternate techniques will not exist.

The waveform examples on the preceding page dramatize the before-and-after results you can achieve with push-button ease. How many calculations can be performed? We know for sure, that the amount is beyond our ability to count today.

The configuration of your Digital Processing Oscilloscope is determined by your application. For the optimum system and the various unit prices, please consult with your local Tektronix Field Engineer. The configuration shown consists of a 7704A oscilloscope system, a P7001 Processor, vertical plug-ins 7A12, 7A16A, horizontal plug-ins 7B71, 7B72, a DEC PDP-11 computer, and a SCOPE-MOBILE® cart.

The price of this system is $19,245.

TEKTRONIX 7000 Series
. . . more than just an oscilloscope

New

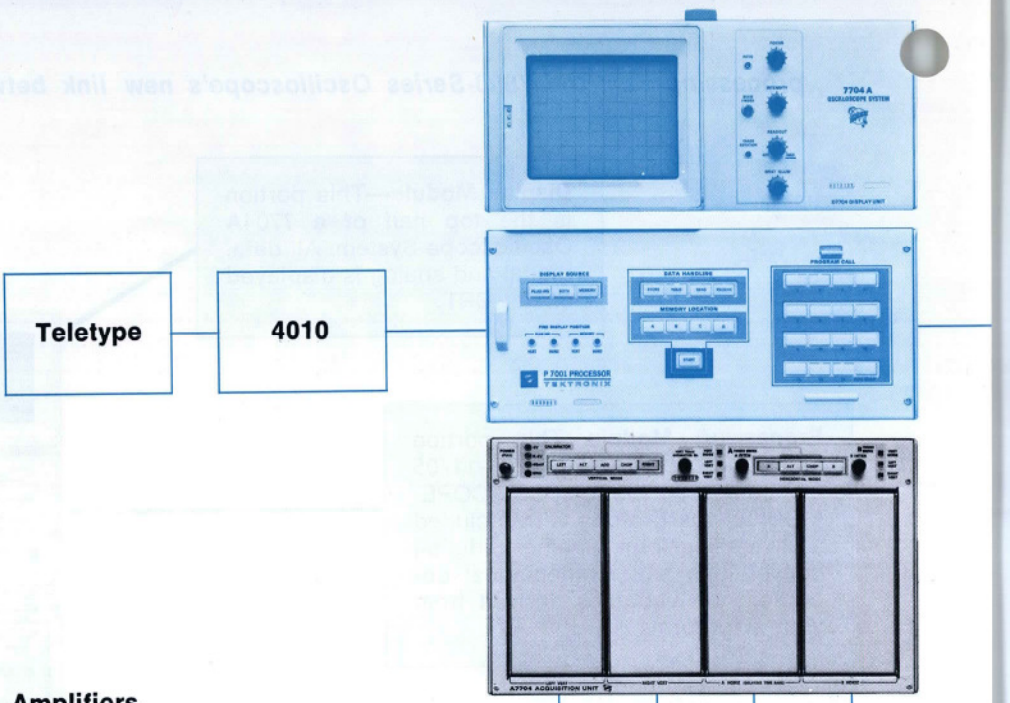
the acquisition system . . .

The TEKTRONIX A7704 Acquisition unit accepts up to four 7000-Series plug-in units. The 7000-Series plug-in family introduced in 1969 now includes 32 plug-ins with more to come. An enormous range and variety of signals may be captured for digital processing. Conventional plug-ins include eight single-trace amplifiers, two dual-trace amplifiers, four single time base units and two dual time base units. Other plug-ins include four digital units, three sampling units, a general-purpose sampling and Time Domain Reflectometry (TDR) unit, a general-purpose sampler, and a spectrum analyzer.

The single- and dual-trace vertical amplifier plug-ins have sensitivities ranging from 10 microvolts per division to many kilovolts per division. Since most all TEKTRONIX Signal Acquisition Probes are usable, signal amplitudes up to 40 kV peak values may be accepted. Signal bandwidths as wide as DC to 175 MHz are available in conventional plug-ins. Sampling offers up to 14 GHz bandwidths.

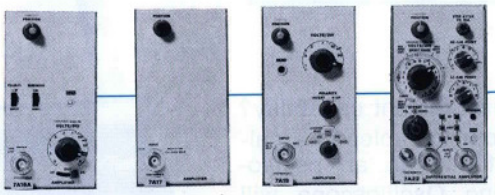
The single time bases available may be operated alone or in pairs when delaying sweep operation is desired. The two dual time base units offer single and delaying sweep operation in a single width plug-in, thereby leaving one horizontal plug-in compartment for other uses. Calibrated sweep speeds range from as fast as 2 ns per division to 10 s per division. Flexible trigger circuits with push-button selection of triggering modes permit accurate and easy triggering.

The four digital plug-in units offer a digital delay with digital delay readout, a digital multimeter capable of measuring DC volts, DC current, resistance and temperature, a 525-MHz digital counter and a universal counter timer which offers oscilloscope control of time and frequency measurements. While these units provide no analog signal on the display unit the results of the digital measurements are visible on the CRT readout. All information visible on the CRT is accessible to the processing system. Therefore, the

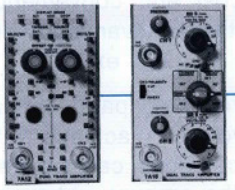


Amplifiers

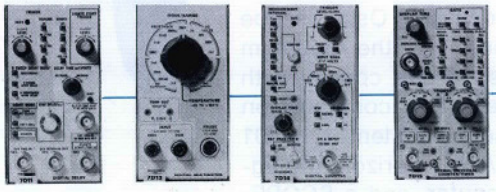
Amplifiers



Dual-Trace Amplifiers



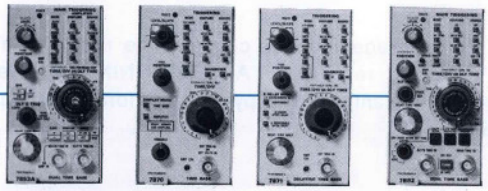
Digital Plug-Ins



Acquisition System lets you choose functions for 4 separate channels

PDP-11/05 — **Nova**

Time Bases



Sampling Plug-Ins

Spectrum Analyzers

TDR

and more plug-ins on the way

digital measurements may be computer processed either alone or in conjunction with P7001 digitized waveform information.

The sampling vertical amplifier and time base units may be operated to provide single- or dual-trace operation at bandwidths from DC up to 14 GHz. The TDR plug-in is used for high resolution cable fault testing with a system risetime of 45 ps and cable distances ranging to 32 feet in any cable. The spectrum analyzer plug-in unit permits fully calibrated frequency displays over a range of 0 to 1800 MHz.

The A7704 Acquisition unit will operate with any combination of up to four of the plug-in units. For time based measurements a vertical amplifier unit and a time base may be paired. At the same time if one parameter is to be plotted as a function of another, a vertical plug-in unit may be installed in a horizontal position of the acquisition unit for an X-Y plot display. X-Y displays may be directly stored for processing provided that Y is a single valued function of X. This ability to use different plug-ins to meet differing requirements provides extreme flexibility. As new 7000-Series plug-ins are announced, this flexibility will further increase.

The Digital Processing Oscilloscope will be useful for those doing research and development measurement work in other than electronic fields such as optics, chemistry, physics, mechanical studies, fluidics, pressure studies, etc. The use of suitable transducers ahead of a vertical amplifier plug-in unit permits quick, easy computer processing of information in many fields. A single Digital Processing Oscilloscope may serve in lieu of many different highly specialized and expensive measuring systems by reconfiguring software and signal acquisition units.

for complete information on the Digital Processing Oscilloscope check the reply card next to inside front cover