Trace brightness 1000 times conventional scopes.

Unsurpassed single-shot capabilities.

Photographic writing speed of 20 cm/ns.

Real-time bandwidth of 1 GHz with 10 mV/div sensitivity.

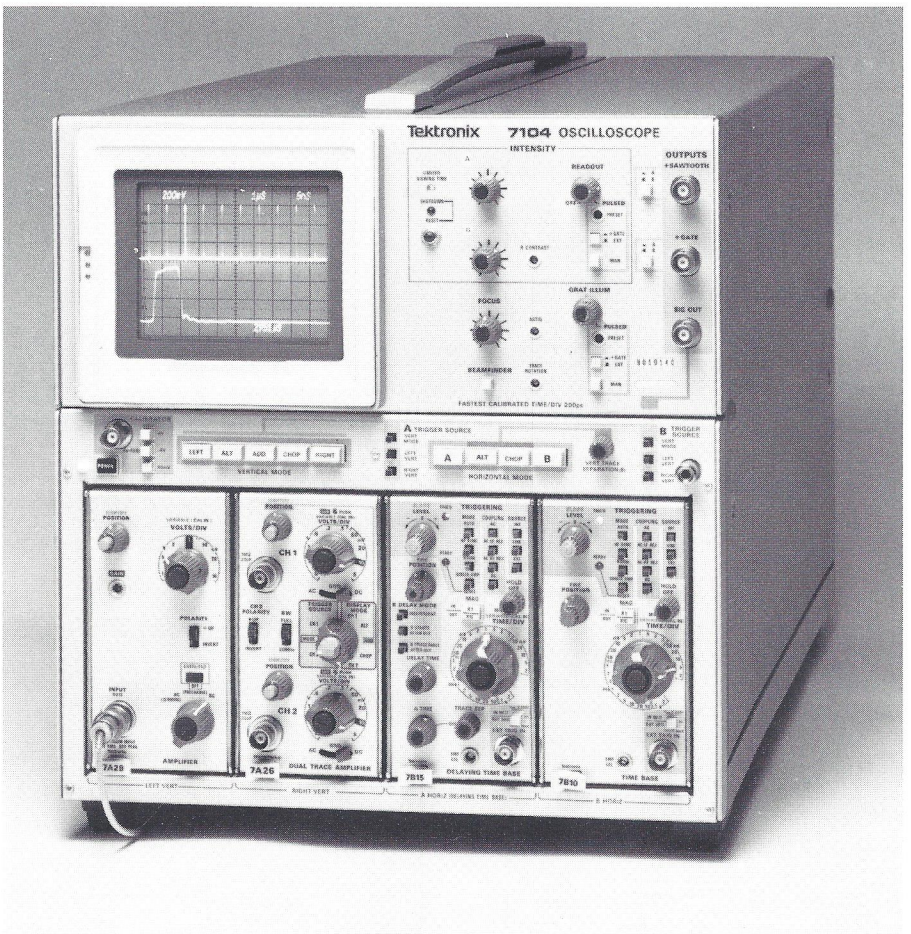
350 ps risetime.

Horizontal bandwidth of 350 MHz.

R7103—7″ Rackmount.

Over 30 compatible plug-ins.

1 GHz GENERAL-PURPOSE OSCILLOSCOPE



Bright trace. A unique microchannel-plate CRT gives the 7104/R7103 a trace brightness about one thousand times conventional scopes, at faster sweep speeds. Additionally, narrow pulse, low rep rate signals can be displayed without annoying "blooming" of the baseline.

Breakthroughs in CRT technology give the 7104/R7103 Oscilloscope both the highest writing speed and highest bandwidth available in a general-purpose oscilloscope today. The result is unmatched measurement capability in a convenient, easy-to-use instrument. That makes the 7104/R7103 the finest laboratory oscilloscope currently available.

Photography of single-shot events using standard cameras and film. The high writing rate means that you can photograph fast signals using standard oscilloscope cameras and film, without special high-speed enhancements.

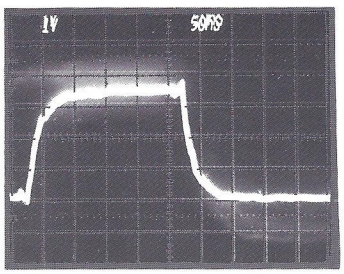
Unsurpassed single-shot capability. The 7104/R7103's outstanding writing speed means that any single-shot signal within the 1 GHz bandwidth can be viewed directly on the CRT in average room light. With 1-GHz bandwidth, 10 mV/div maximum deflection sensitivity, and 200 ps/div sweep, troublesome high-frequency overshoot and pulse ringing can be detected and measured in detail.

Distinct image viewing. When viewing repetitive signals, individual instances of clock jitter or pulses hidden from view on a lower writing-speed scope, can be seen and measured with the unaided eye.

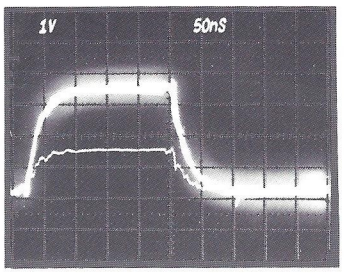
Extremely accurate phase measurements. With a horizontal bandwidth of 350 MHz, fast-switching signals can be displaced and measured with a high degree of phase accuracy. For example, obtain V-I curves for high-speed switching power supply evaluation, or monitor performance of multi-phase digital communication systems. With the phase compensation option (7104 only), phase balance can be obtained at any frequency up to 250 MHz.

Tektronix®
COMMITTED TO EXCELLENCE

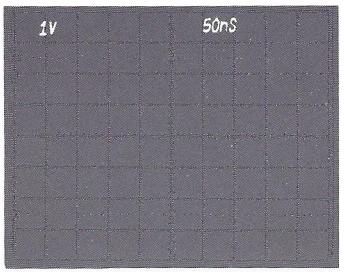
See what you could never see before



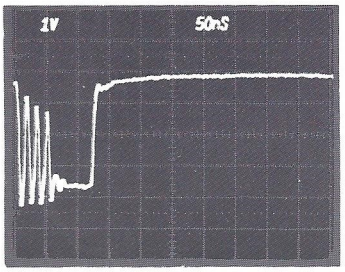
Before—*A pulse train on a Tek 7904A doesn't reveal the low-level glitch occurring every ten-thousandth pulse. (The Tek 7904A was previously the world's fastest-writing-rate scope.)*



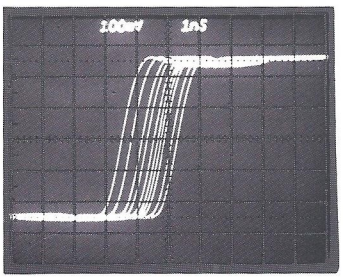
After—*The same pulse train viewed directly on the 7104/R7103 with one-thousand times the brightness of conventional scopes. The researcher can now analyze the pulse with the naked eye and take pictures with ease.*



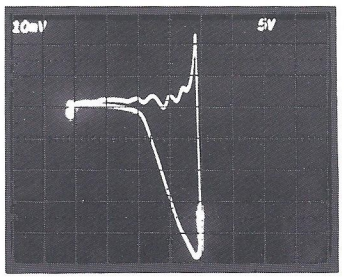
Before—*Low rep-rate pulse is invisible on a conventional oscilloscope.*



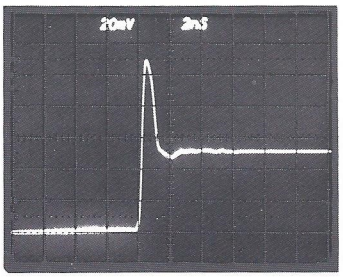
After—*The same pulse as seen on the 7104/R7103 readily indicates that the problem is input signal bounce.*



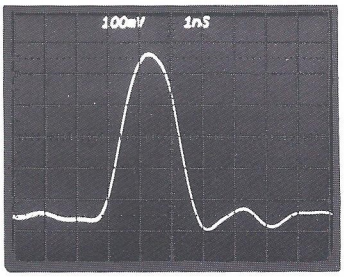
A digital circuit that shows no jitter on a conventional oscilloscope is found to have a 2.0 ns jitter when viewed with the distinct image viewing capability of the 7104/R7103.



The transient load line of a fast switching transistor in a power supply prototype (switching time = 10 ns) is easily measured for compliance with safe operating area. (Horizontal = V; vertical = I).



Circuit faults such as high frequency pulse overshoot and ringing can easily be observed with the 7104/R7103's 1 GHz bandwidth.



View of a single clocking pulse 0.8 ns rise and 2 ns pulse width.

Specifications

7104 and R7103 — Vertical System

Channels — Two left-hand plug-in compartments; compatible with all 7000 Series Plug-ins (except 7D01, 7D02, 7D20). Bandwidth determined by mainframe and plug-in unit.

Vertical Display Modes — LEFT, ALT, ADD, CHOP, RIGHT.

Chopped Mode — Rep rate is ≈ 1 MHz.

Vertical Trace Separation — (7104 only) Operative when any vertical signal is displayed with both A and B time bases. Positions B trace at least 4 divisions above and below A trace.

Delay Line—Permits viewing leading edge of displayed waveform.

7104 — Horizontal System

Channels — Two right-hand plug-in compartments; compatible with the time bases of the 7B10 and 7B80 Series and the 7B50A and 7B92A. The 7B50 Series (except the 7B50A), the 7B70 Series and the 7B92 (non A) are not recommended. 7000 Series Vertical Amplifiers and specialized plug-ins (except 7D01, 7D02, 7D20) may also be used.

Horizontal Display Modes — A, ALT, CHOP, B.

Fastest Calibrated Sweep Rate—200 ps/div with the 7B10 or 7B15.

Chopped Mode — Rep rate is ≈ 200 kHz.

Bandwidth — Dc to 350 MHz. With delay compensation (7104 Option 02 using 7A19s or 7A29s, at least one of which has the Variable Delay Option, B Horizontal compartment only), within 2° from dc to 50 MHz after adjusting variable delay for balance at 35 MHz. Phase balance can be obtained at any frequency up to 250 MHz. Phase shift is within 2° from dc to 50 kHz without delay compensation.

R7103 — Horizontal System

Single Channel—Right-hand plug-in compartment compatible with time bases of the 7B10 and 7B80 Series and the 7B50A and 7B92A. The 7B50 Series (except the 7B50A), the 7B70 Series, and the 7B92 (non-A) are not recommended. 7000 Series Vertical Amplifiers and specialized plug-ins (except 7D01, 7D02, and 7D20) may also be used.

Fastest Calibrated Sweep Speed — 200 ps/div with the 7B10 or 7B15.

Bandwidth — Dc to 350 MHz. Phase shift between vertical and horizontal deflection systems is within 2° from dc to 50 kHz.

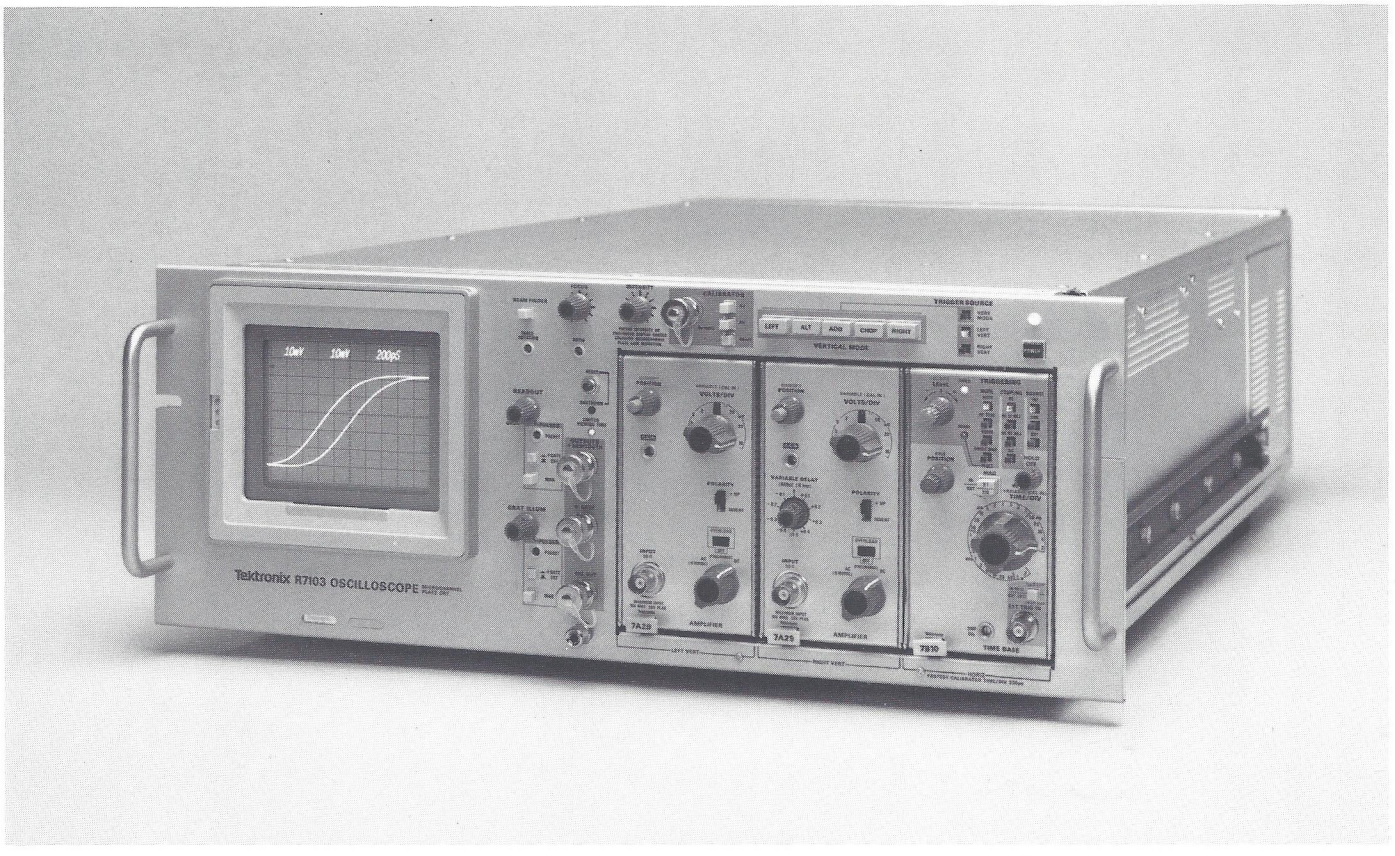
7104 and R7103 — CRT and Display Features

CRT — Internal 8 x 10 division (0.85 cm/div) graticule with variable illumination. Accelerating potential is 12.5 kV with P31 Phosphor standard.

Readout and Graticule Modes — Each continuous or pulsed (pulse source selection by front panel controls: + Gate, external, manual). The pulsed graticule is on for ≈0.5 s.

Minimum Photographic Writing Speed (using Polaroid Film Type 107, 3000 ASA w/out Film Fogging) — 20 cm/ns (w/o mesh or blue filter). Phosphor: standard P31 Camera: Tektronix C-53, f/1.9, 1:0.85 lens.

Autofocus — Reduces the need for additional manual focusing with changes in intensity after focus control has been set.



The R7103 requires only 7 inches of rack height in a standard 19 inch rack. It is fan-cooled and comes complete with slide-out chassis tracks.

Beam finder — Limits display within graticule area.

External Z-Axis Input—2 V p-p for full intensity range. A positive signal blanks the trace. Maximum input voltage is 15 V (dc + peak ac) and p-p ac. Input is dc coupled.

7104 and R7103 — Calibrator

Voltage Output — Squarewave positive-going from ground. Ranges are 40 mV, 0.4 V and 4 V into 100 kΩ, 4 mV, 40 mV and 0.4 V into 50 Ω. Amplitude accuracy is within 1%, rep rate is 1 kHz within 0.25%.

Current Output — 40 mA rectangular waveshape with optional current-loop accessory (012-0341-00) connected to calibrator output. Output R is 450 Ω.

EMC Capability (7104 Option 03 and R7103)

Meets requirements of MIL-STD-461B when tested in accordance with certain test methods of MIL-STD-462. Contact your Tektronix representative for more information.

7104 — Outputs/Inputs

+ Sawtooth — User selectable from A or B horizontal. Output voltage is 50 mV/div (±5%) into 50 Ω. 1 V/div (±10%) into 1 MΩ, Output R is ≈950 Ω.

+ Gate — Positive-going rectangular waveform user selectable from A or B horizontal Output voltage is 0.5 V (±10%) into 50 Ω. 10 V (±10%) into 1 MΩ. Output R is ≈950 Ω.

Sig Out — Selected by B TRIGGER SOURCE switch. Output voltage is 25 mV/div into 50 Ω, 0.5 V into 1 MΩ. Bandwidth depends upon vertical plug-in. Output R is ≈950 Ω.

Camera Power — Three-prong connector to the left of the CRT provides power, ground, and remote single-sweep reset access for C-50 Series Camera.

Probe Power — Two rear-panel connectors provide correct operating voltages for two active probes.

Single-sweep Ready Indicators A and B — +5 V, rear panel BNC outputs for single sweep ready indications.

Graticule/Readout, Single-shot — Ground closure, rear panel BNC input initiates one frame of CRT readout and the GRAT ILLUM is illuminated for ≈0.5 s.

External Single-sweep Reset — Ground closure, rear panel BNC, provides input to reset sweep.

R7103 — Outputs/Inputs

+ Sawtooth — Positive-going ramp waveform. Output voltage is 50 mV/div (±5%) into 50 Ω, 1 V/div (±10%) into 1 MΩ. Output R is ≈950 Ω.

+ Gate — Positive going rectangular waveform. Output voltage is 0.5 V (±10%) into 50 Ω, 10 V (±10%) into 1 MΩ. Output R is ≈950 Ω.

Sig Out—Output voltage is 25 mV/div into 50 Ω, 0.5 V into 1 MΩ. Bandwidth depends upon vertical plug-in. Output R is ≈950 Ω.

Camera Power — Three-prong connector to the left of the CRT provides power, ground, and remote single-sweep reset access for C-50 Series Camera.

Probe Power — Two rear-panel connectors provide correct operating voltage for two active probes.

Single-sweep Ready Indicator — +5 V, rear-panel BNC output for single-sweep ready indication.

Graticule/Readout, Single-shot — Ground closure, rear-panel BNC inputs initiates one frame of CRT read-out and the GRAT ILLUM is illuminated for ≈0.5 s.

External Single-sweep Reset — Ground closure, rear-panel BNC, provides input to reset the sweep. Also initializes the LIMITED VIEW TIME function.

Power Requirements

7104 Power Requirements — Line voltage ranges, 90 to 132 V ac and 180 to 250 V ac. Line frequency, 48 to 440 Hz. Maximum power consumption, 215 W, 3.3 A at 90 V line, 60 Hz.

R7103 Power Requirements — Line voltage ranges, 90 to 132 V ac and 180 to 250 V ac. Line frequency, 48 to 440 Hz. Maximum power consumption, 165 W, 3.3 A to 90 V line, 60 Hz.

Physical Characteristics

	7104		R7103	
Dimensions	**mm**	**in**	**mm**	**in**
Width	305	12.0	483	19.0
Height	345	13.6	177	6.98
Depth	592	23.3	704	27.7
Weight	**kg**	**lb**	**kg**	**lb**
Net	19.8	43.6	20.0	44.0
Shipping	25.4	56.0	30.9	68.0

Plug-in Compatibility

Plug-in compatibility. The 7104 and R7103 are compatible with standard 7000 Series plug-in units.

7A29 — Vertical amplifiers to bw of mainframe, 10 mV/div to 1 V/div vertical sensitivity.

7A42 — Four channel, 350 MHz bandwidth vertical amplifier with Boolean logic triggering capabilities.

7B10 — Delayed timebase with 200 ps/div to 0.2 s/div calibrated sweep speed, triggering up to 1 GHz.

7B15 — Delaying timebase with 200 ps/div to 0.2 s/div calibrated sweep speed, triggering up to 1 GHz; capable of Δ time measurements in conjunction with 7B10.

7B92A — Dual timebase with 500 ps/div to 0.2 s/div calibrated sweep speed; triggering up to 500 MHz; capable of Δ time measurements.

The 7D01, 7D02 and 7D20 plug-ins are not recommended for use with the 7104/R7103 Mainframes. Such use will void the 7104/R7103 warranty.

7104 ORDERING INFORMATION
(Plug-ins Not Included)

7104 Oscilloscope
Option 02 — X-Y Horizontal Comp
Option 03 — EMC Modification

INTERNATIONAL POWER CORDS AND 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

OPTIONAL ACCESSORIES

Rackmount Kit for mounting the 7104 in a standard 19 inch wide rack. Adaptor includes slide out assemblies. Order 040-0611-01.

R7103 ORDERING INFORMATION
(Plug-ins Not Included)

R7103 Oscilloscope

INTERNATIONAL POWER CORDS AND 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

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