100 MHz @ 5 mV

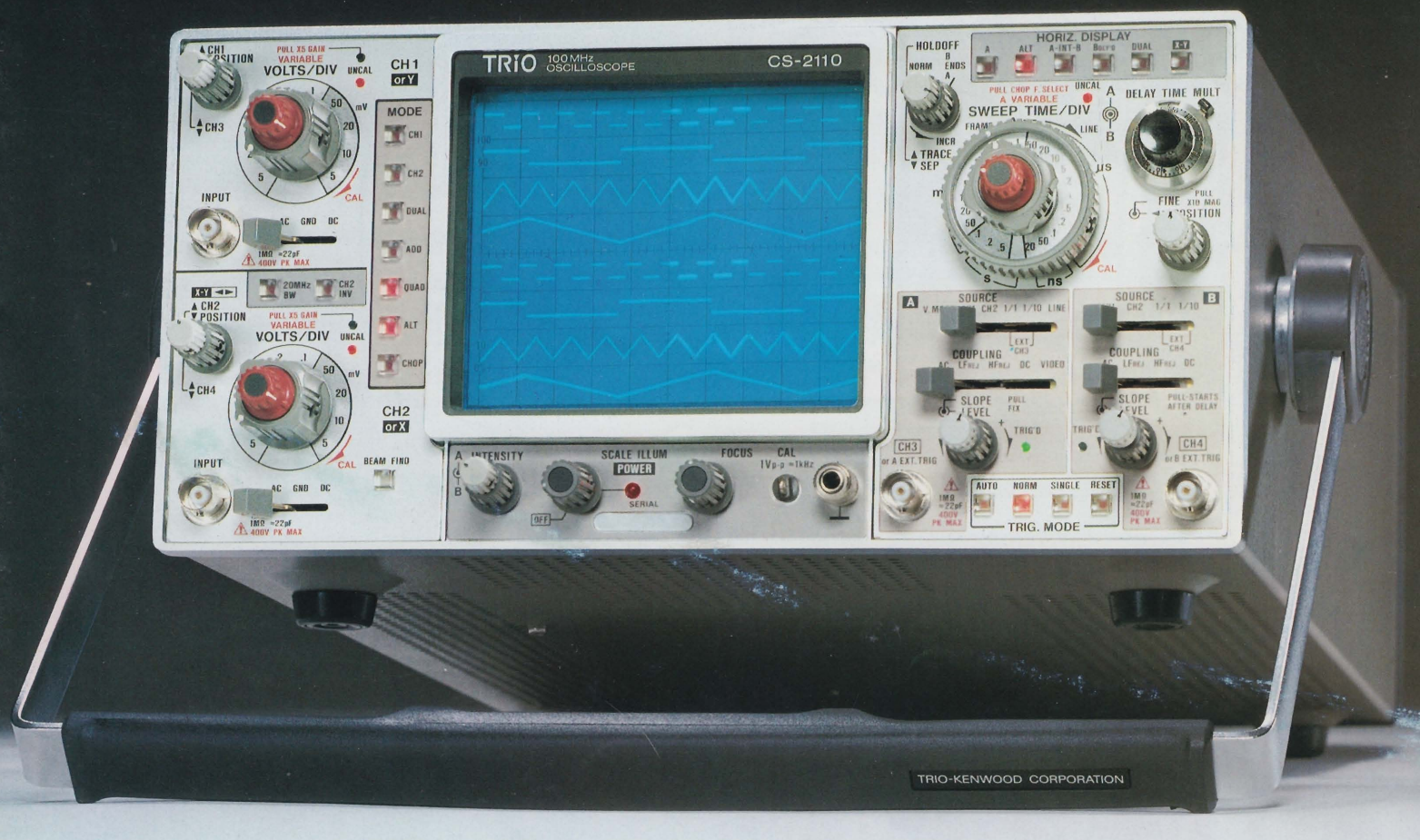
TRIO

100MHz 4-Channel Oscilloscope CS-2110

100MHz 1mV/div

This scope combines the popular 4-channel 8-trace display capability with dual-sweep, the high-intensity CRT and a full range of other functions. It achieves high quality and reliability in a 100MHz scope and represents the ultimate in such scopes for a wide range of applications.

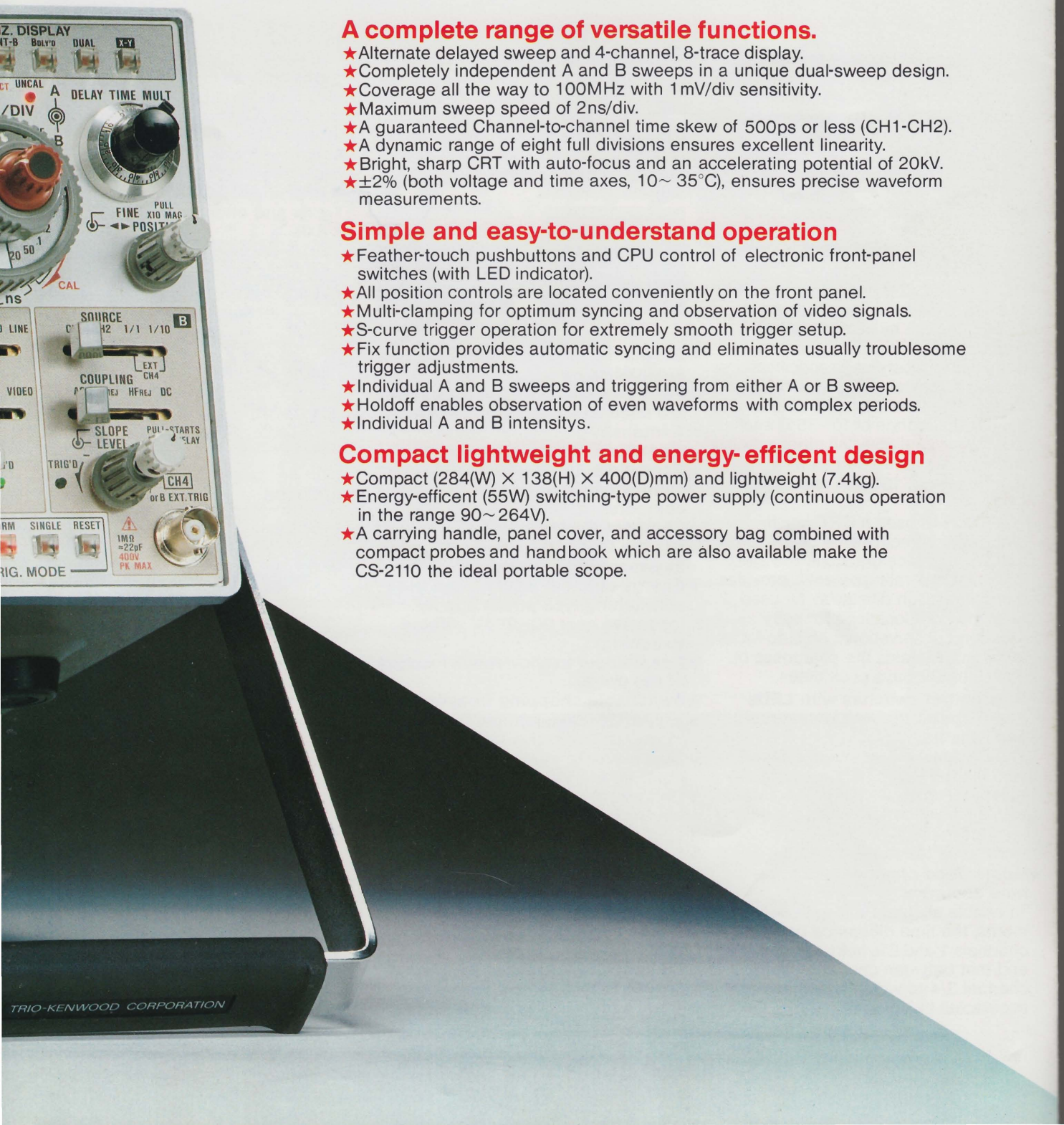
4 Channel 8 Trace



TRIO-KENWOOD CORPORATION

The CS-2110 represents not just an improved version of the popular CS-2100A 100MHz scope, but offers a unique contribution to 100MHz scope technology as the result of Trio's dedication to the quest for quality in oscilloscope performance.

In addition to the basic high performance you would expect from a scope in this class, the CS-2110 features the popular four-channel eight-trace display, alternate delayed sweep, dual sweep, B-INT function, and a high-intensity CRT (20kV) as well as many other features which place it in a class by itself. The CS-2110 was created as an innovative 100MHz scope aimed at changing the industry's standard in this class, and has all the performance demanded by the professional.



A complete range of versatile functions.

★Alternate delayed sweep and 4-channel, 8-trace display.
★Completely independent A and B sweeps in a unique dual-sweep design.
★Coverage all the way to 100MHz with 1mV/div sensitivity.
★Maximum sweep speed of 2ns/div.
★A guaranteed Channel-to-channel time skew of 500ps or less (CH1-CH2).
★A dynamic range of eight full divisions ensures excellent linearity.
★Bright, sharp CRT with auto-focus and an accelerating potential of 20kV.
★±2% (both voltage and time axes, 10~ 35°C), ensures precise waveform measurements.

Simple and easy-to-understand operation

★Feather-touch pushbuttons and CPU control of electronic front-panel switches (with LED indicator).
★All position controls are located conveniently on the front panel.
★Multi-clamping for optimum syncing and observation of video signals.
★S-curve trigger operation for extremely smooth trigger setup.
★Fix function provides automatic syncing and eliminates usually troublesome trigger adjustments.
★Individual A and B sweeps and triggering from either A or B sweep.
★Holdoff enables observation of even waveforms with complex periods.
★Individual A and B intensitys.

Compact lightweight and energy-efficent design

★Compact (284(W) × 138(H) × 400(D)mm) and lightweight (7.4kg).
★Energy-efficent (55W) switching-type power supply (continuous operation in the range 90~264V).
★A carrying handle, panel cover, and accessory bag combined with compact probes and handbook which are also available make the CS-2110 the ideal portable scope.

100MHz 4-Channel Oscilloscope

SPECIFICATIONS CS-2110

CRT DISPLAY 150mm rectangular, post-accelerator type CRT with a graduated inner face
20kV accelerating potential
P31 phosphor
Graduated display area 8 × 10 div (1 div=1cm)

VERTICAL AMPLIFIER (CH1 and CH2 identical)

Operating Modes:
- CH1 CH1 Single channel
- CH2 CH2 Single channel
- DUAL CH1, CH2 Dual channel
- ADD CH1+CH2 added display
- QUAD CH1~CH4 Four channel
- ALT 2 or 4 Channels alternately
- CHOP 2 or 4 Channels chopped

Sensitivity: 5mV/div
1mV/div (×5 GAIN)
Approx. 500μV/div (Cascaded operation)

Attenuator: 0.005V/div~5V/div ±2% (10~35°C)
10 ranges in 1-2-5 steps or continuous adjustment

Bandwidth:
- DC DC~100MHz (−3dB)
  DC~140MHz (−6dB) (except ×5Gain)
  DC~70MHz (−3dB) (Cascaded operation)
- AC 5Hz~100MHz (−3dB)
  5Hz~140MHz (−6dB) (except ×5Gain)
  7Hz~70MHz (−3dB) (Cascaded operation)

Input Impedance: 1MΩ ±1%, 22pF
Risetime: 3.5ns
Signal Delay: 10ns maximum as displayed on the CRT
Polarity: Switchable on CH2
Maximum Input Voltage: 800Vpp or 400V (DC + AC p...)
Distortion-Free Amplitude: 8 CRT divisions, minimum (DC~100MHz)
Bandwidth Limiting: Approx. 20MHz
CHOP Frequency: Approx. 250kHz

VERTICAL AMPLIFIER (CH3 and CH4 identical) √

Sensitivity: 0.1V/div, 1V/div ±2%
Attenuator: 1/1, 1/10
Bandwidth: DC~100MHz (−3dB)
DC~140MHz (−6dB)
Input Impedance: 1MΩ ±1%, 22pF
Input Coupling: DC only
Risetime: 3.5ns
Signal Delay: Same as CH1 and CH2
Maximum Input Voltage: 400V (DC + AC peak)

HORIZONTAL AMPLIFIER

Operating Modes: X-Y Mode is switch selectable
CH1: Y-axis
CH2: X-axis
Sensitivity: Same as vertical CH2
Input Impedance: Same as vertical CH2
Bandwidth:
- DC DC~5MHz (−3dB)
  DC~7MHz (−6dB)
- AC 5Hz~5MHz (−3dB)
  5Hz~7MHz (−6dB)

X-Y Phase Difference: 3% maximum (at 100kHz) √

TIME BASE

Modes:
- A A Sweep
- ALT A (A-INT-B) and B sweeps alternating
- A-INT-B Intensified section of A sweep is displayed as the B sweep
- B DLY'D B Sweep
- DUAL A Sweep and B Sweep as dual, independent sweeps
- X-Y Lissajous mode

Sweep Time (A): 20ns/div~0.5s/div ±2% (10~35°C)
23 ranges in 1-2-5 steps and continuous fine adjustment
Sweep Time (B): 20ns/div~50ms/div ±2% (10~35°C)
20 ranges in 1-2-5 steps
Magnified Sweep: ×10 magnification
Linearity: 3% or better
5% or better (×10 MAG mode)
HOLDOFF: Continuously adjustable for A sweep from NORM to ×5
TRACE SEP: A/B separation adjustment allows 4 div separation
Delay Method: Continuous delay, SYNC delay
Delay Time: 0.2~10 times the sweep time from 200ns/div to 0.5s/div, continuously adjustable
Time Difference Measurement Accuracy: ±(1% of reading + 0.01)
Delay Jitter: 1/20,000 of the fullscale sweep time

SYNCHRONIZATION √

(A Trigger)
Modes: AUTO, NORM, SINGLE, FIX
Sources: V MODE, CH1, CH2, EXT (or CH3), 1/10 EXT (or 1/10 CH3), or LINE
Coupling: AC, LF REJ, HF REJ, DC, VIDEO
Level Adjustment: ±90° adjustment
Polarity: Switchable

(B Trigger)
Modes: STARTS AFTER DELAY
B TRIGGERABLE AFTER DELAY
Sources: CH1, CH2, EXT (or CH4) or 1/10 EXT (or 1/10 CH4)
Coupling: AC, LF REJ, HF REJ, DC
Level Adjustment: ±90° adjustment
Polarity: Switchable
Jitter: 0.5ns

TRIGGERING SENSITITY

Coupling	Frequency Range	Minimum SYNCed Voltage (Amplitude) INT	EXT	EXT 1/10
DC	DC~ 20MHz	0.5 div	50mV	0.5V
	DC~ 50MHz	1 div	100mV	1V
	DC~100MHz	1.5 div	210mV	2.1V
AC	Same as for DC but with increased minimum level for below 20Hz			
AC HF REJ	Increased minimum level for below 20Hz and above 30kHz			
AC LF REJ	Increased minimum level for below 30kHz			
VIDEO	FRAME, LINE	0.5 div	50mV	0.5V

AUTO: Same specifications as above for below 50Hz.
FIX: 40Hz~20MHz 1 div (100mV)
40Hz~100MHz 1.5 div (210mV)

CALIBRATION SIGNAL 1Vpp (1kHz squarewave)
10mApp (1kHz squarewave)

INTENSITY MODULATION

Input Voltage: Modulation at TTL level
Input Impedance: Approx. 10kΩ
Bandwidth: DC~10MHz
Maximum Input Voltage: 50V (DC + AC peak)

VERTICAL AMPLIFIER OUTPUT (CH1)

Output Voltage: 50mV/div (50Ω load)
Output Impedance: Approx. 50Ω
Bandwidth: DC~100MHz (−3dB) (50Ω load)

GATE OUTPUT (Identical specifications for A & B sweeps)

Output Voltage: 1.5V (500Ω load), positive gate

TRACE ROTATION Adjustable

POWER REQUIREMENTS
Switching type, 45~400Hz, Approx. 55W
90~264V

DIMENSIONS 284(W) × 138(H) × 400(D) mm

WEIGHT Approx. 7.4kg

ACCESSORIES Instruction Manual 1 pc, Probes (PC-29) 2 pcs, Handbook 1 pc, Panel Cover (MD-85) 1 pc, Probe Holder 1 pc and Power Cord 1 pc

Sold and Supported By
PARAMETERS PTY LTD
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TRIO-KENWOOD CORPORATION
TEST INSTRUMENT DIVISION
SHIONOGI SHIBUYA BLDG.,
17-5, 2-CHOME, SHIBUYA, SHIBUYA-KU, TOKYO 150, JAPAN
CABLE: TRIOINSTRUMENT TOKYO TELEX: 242-3446 TRITES

*Specifications and design subject to change without notice for improvements.

1983.07.30 (B20) Printed in Japan.

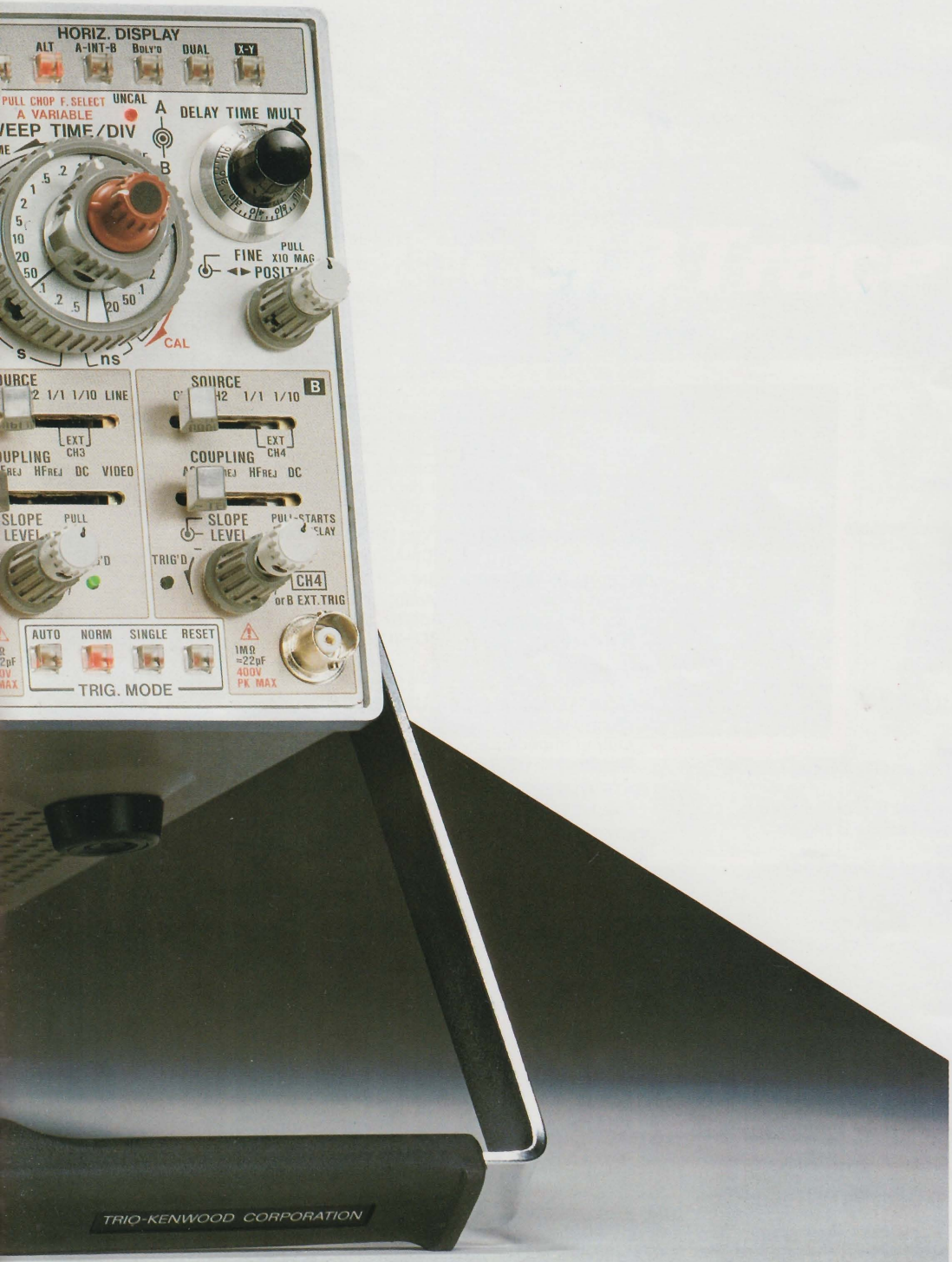
Four-Channel, Eight-Trace Innovation-packed 100MHz oscilloscope

The CS-2110 in performa and will be t others must

100MHz 4-Channel Oscilloscope

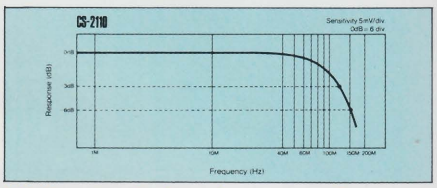
CS-2110

100MHz 1mV/div

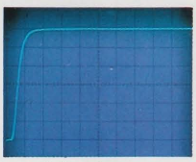


★High-sensitivity design ensure sensitivity of 1mV/div all the way to 100MHz.

The CS-2110 is capable of observing extremely low-level signals with complex waveforms, providing high accuracy measurements. And it does this with frequency response to spare, having a guaranteed response up to 140MHz (−6dB point).

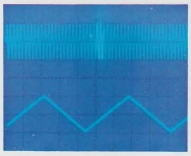


★High-speed signals are easily observable using the 2ns/div maximum sweep speed.



The sweep time is continuously variable from 0.5s/div through 20ns/div. A delay line is provided internally to enable the accurate observation and measurement of the leading edge of high-frequency signals.

★Delayed sweep for partial waveform expansion



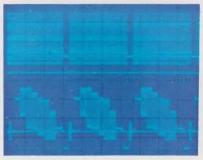
Alternate delayed sweep provides partial magnification of an intensified portion of the waveform simultaneous with the original waveform.

★Four-channel eight-trace capability and a wide range of waveform display functions.

Channels 1, 2, 3, and 4 input signals can be swept simultaneously with the main sweep. In addition, each of the corresponding delayed signals can be displayed simultaneously using the alternate delay sweep function.

) clearly represents a new standard nce for 100MHz scopes he benchmark against which t be measured.

★A dual sweep function enables the simultaneous observation of two signals varying widely in frequency.



The A sweep is used only for channel 1 and the B sweep only for channel 2 in this dual sweep mode. This enables the ideal sweep times to be selected for each of two signals varying widely in frequency.

★Accuracy of ±2% provides extremely precise waveform measurements.

To ensure high reliable waveform measurements, these scopes are designed to satisfy major specifications, including vertical axis sensitivity and sweep time to within ±2% over a temperature range of 10~35°C and up to a humidity of 85%. All other specifications are guaranteed as well.

★Bright, sharp, 150mm rectangular CRT.

The CS-2110 uses a CRT which features an effective area of 8 × 10 div and an inner-face graticule. The use of 20kV of accelerating potential provides a bright enough display to be used even in bright locations for easy waveform observations. An auto-focus function maintains the sharpness of waveform displays at all times.

★Pushbutton switches with LEDs make operating both pleasurable and reliable.

The CS-2110 is human engineered with feather-touch LED-lighted push-button switches. A memory backed up with a lithium battery holds the switch settings in the CPU control section even when the power is removed.

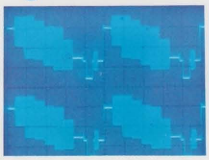
★Guaranteed channel-to-channel time accuracy.

To enable accurate timing measurements, the time difference between channels 1 and 2 is held within 500ps, and that between channel 1/2 and channel 3/4 to within 1ns, these accuracies being guaranteed.

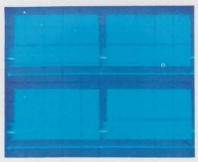
★All position controls are conveniently located on the front panel.

The convenient grouping of position controls on the front panel greatly facilitates movement of waveform displays.

★Optimum multi-clamping of video signals.



Horizontal Video Signal



Vertical Video Signal

★A dynamic range of eight divisions at 100MHz.
★Parts carefully selected for stability are used to ensure high reliability.
★B intensity control for bright, magnified waveforms.
★Bandwidth limiting to 20MHz to eliminate unwanted high-frequency components.
★Compact, lightweight (7.4kg) design lets the CS-2110 follow you anywhere in the field.
★Energy-efficient 55W design uses a switching-type power supply (operates over 90~264V without switching).
★Beam finder to allow quick location of the trace.
★Switchable chopping frequency.
★Holdoff for observation of waveforms with complex periods.
★Single-sweep mode for one-time or other suddenly occurring events.
★Channel 1 output for use with a frequency counter.
★LINE sync.
★S-Curve system for smooth trigger adjustment.
★Automatic sync (FIX) eliminates troublesome trigger adjustments.
★A gate and B gate synchronized to A sweep and B sweep.
★Calibration loop for use with current probes (10mA 1kHz squarewave).
★Trace separation is usable to drop the waveform delayed with respect to the mainsweep up to four divisions.
★B ENDS A used to increase the intensity of the delayed portion of a waveform.
★High-frequency Lissajous measurements with channel 1 feeding the Y axis and channel 2 feeding the X axis.

★ probe

probe PC-29

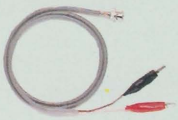
*Not of all has these probes.

★ opitions

accessory bag MC-78

probe PC-24
DC~100MHz, 10:1, 10MΩ 18pF

cable
CA-43



cable
CA-41

50Ω Throuline. termination
TA-57
Impeadance 50Ω
V.S.W.R. 1.1(DC~500MHz)
1.2(DC~1GHz)

scope cart MB-86
Maximum Load 12kg