

KENWOOD

OSCILLOSCOPES



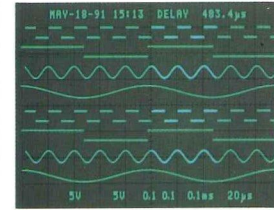
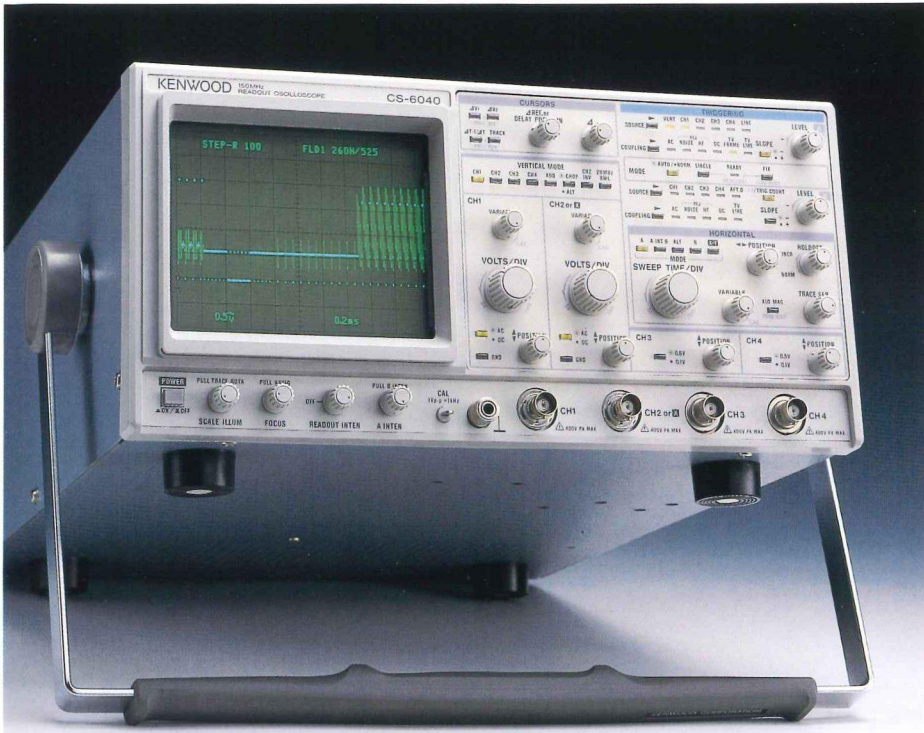
TEST & MEASURING INSTRUMENT

COMPARISON FIGURES OF OSCILLOSCOPES

	CS-6040	CS-6030	CS-5275 CS-5270	CS-5265 CS-5260	CS-5235 CS-5230	CS-5175 CS-5170	CS-5165 CS-5155	CS-5140	
Bandwidth	150MHz	100MHz	100MHz	60MHz	40MHz	100MHz	60MHz/ 50MHz	40MHz/ 100MHz	
Deflection Factor	1mV/div to 20MHz 5mV/div to 150MHz	1mV/div to 20MHz 5mV/div to 100MHz	1mV/div to 20MHz 5mV/div to 100MHz	1mV/div to 20MHz 5mV/div to 60MHz	1mV/div to 20MHz 5mV/div to 40MHz	1mV/div to 20MHz 5mV/div to 100MHz (CS-5175) to 60MHz (CS-5170)	1mV/div to 20MHz 5mV/div to 60MHz (CS-5165) to 50MHz (CS-5155)	1mV/div to 5MHz 5mV/div to 40/100MHz	
No. of Channels	4-Channel/ 10-Trace	4-Channel/ 10-Trace	3-Channel/ 8-Trace	3-Channel/ 8-Trace	3-Channel/ 8-Trace	2-Channel/ 4-Trace	3-Channel/ 6-Trace	2-Channel	
CRT (Accelerating Voltage)	20kV	17kV	12kV	12kV	12kV	12kV	12kV	12kV	
Digital Readout & Cursor	○	○	○ (CS-5270only)	○ (CS-5260only)	○ (CS-5230only)	○ (CS-5170only)		○	
Max. Sweep Speed	20ns/div	20ns/div	50ns/div	50ns/div	0.1μs/div	50ns/div	50ns/div	10ns/div	
Delayed Sweep	○	○	○	○	○	○	○	○	
Delay Line	○	○	○	○	○	○	○	○	
V-Mode Alternate Trigger			○	○	○	○	○	○	
Single Sweep	○	○	○	○	○	○	○	○	
Magnified Sweep	○	○	○	○	○	○	○	○	
Automatic Triggering (Fix)	○	○	○	○	○	○	○	○	
Intensity Modulation	○	○	○	○	○	○	○	○	
Vertical-axis Signal Output	○	○	○	○	○	○	○	○	
Variable Holdoff	○	○	○	○	○	○	○	○	
Video Sync	○	○	○	○	○	○	○	○	
Line Sync	○	○	○	○	○	○	○	○	
Power Requirements	AC	AC	AC	AC	AC	AC	AC	AC	
Dimensions (W × H × D) mm	310×150×400	310×150×400	300×150×400	300×150×400	300×150×400	319×132×380	319×132×380	319×132×380	
Weight	9.0kg	9.0kg	8.7kg	8.7kg	8.7kg	9.0kg 9.2kg	9.2kg	9.5kg	
Page	3	3	5	7	9	16	16	13	

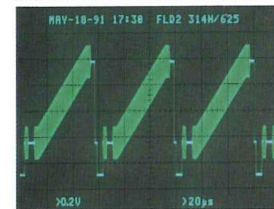
	CS-5135 CS-5130	CS-4035	CS-4026 CS-4025	CS-3076	CS-3067 CS-3066	CS-3027	CS-3026	CS-3025	CS-1575A	CO-1305	CO-1506
	40MHz	40MHz	20MHz	100MHz	60MHz	20MHz	20MHz	20MHz	5MHz	5MHz	1.5MHz
	1mV/div to 15MHz 5mV/div to 40MHz	1mV/div to 5MHz 5mV/div to 40MHz	1mV/div to 5MHz 5mV/div to 20MHz	5mV/div to 100MHz	5mV/div to 60MHz	5mV/div to 20MHz	5mV/div to 20MHz	5mV/div to 20MHz	10mV/div to 5MHz	10mV/div to 5MHz	20mV/div to 1.5MHz
	2-Channel/ 4-Trace	2-Channel	2-Channel	2-Channel	2-Channel	2-Channel	2-Channel	2-Channel	2-Channel	1-Channel	1-Channel
	12kV	12kV	12kV 2kV*	1.7kV	12kV	1.7kV	1.7kV	1.8kV	2kV	1.4kV	1.8kV
	○ (CS-5130only)										
	0.2μs/div	0.2μs/div	0.2μs/div 0.5μs/div	50ns/div	0.2μs/div	0.2μs/div	0.2μs/div	0.2μs/div	10μs/div	100kHz	100kHz
	○				○	○					
	○			○	○	○	○	○			
	○			○	○	○	○	○	○		
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	○	○	○	○	○	○	○	○		○	
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	○	○	○	○	○	○	○	○			
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	○	○	○	○	○	○	○	○			
	○			○	○	○	○	○			
	AC	AC	AC	AC	AC&DC (CS-3067) AC (CS-3066)	AC&DC	AC	AC	AC	AC	AC
	319×132×380	290×150×380	290×150×380	230×75×290	230×75×290	230×75×290	230×75×290	216×89×298	260×190×375	130×190×280	150×220×410
	8.5kg 9.0kg	6.8kg	6.8kg	4.0kg	4.7kg 4.0kg	4.7kg	4.0kg	4.0kg	8.0kg	3.5kg	6.2kg
	16	15	15	17	17	17	17	17	19	19	20

*P-7 Long Persistence CRT version is also available.



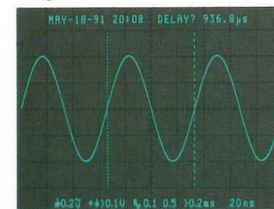
TV line counter

An NTSC/PAL TV line counter is provided as standard. This enables the line signal of video signals to be specified for each field.



Readout Function

Vertical-axis sensitivity, sweep time, delay time, input selection and other settings are instantly readable on the CRT screen together with waveforms.

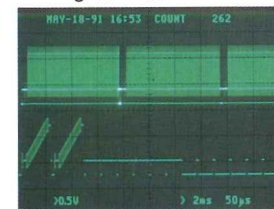


Cursor Measurement

By setting two cursor lines on the CRT screen, it is possible to provide a digital readout of voltage, time, voltage ratio, time ratio, frequency, and phase difference on the CRT screen.

Trigger Counter

It enables the setting of a delay as a count with respect to the main sweep. This makes possible not only observation of VITS signals including video signals but observation of a digital circuit plus timing as well.



Trigger Mode Automatically Sets by Selecting the Vertical Mode

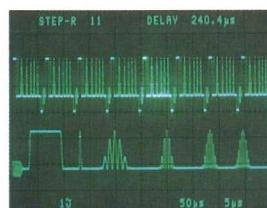
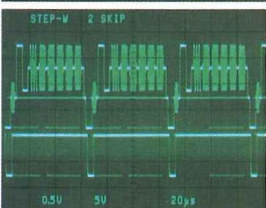
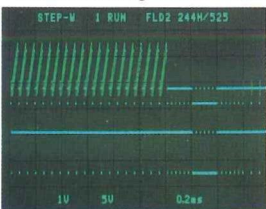
Setting the trigger source is as simple as switching the vertical mode. This eliminates having to set the trigger source independently.

100 Programmable Steps and NTSC/PAL TV Line Counter Functions Provided as Standard

The CS-6040/6030 features a maximum of 100 programmable steps of front-panel setting values (20 steps×5 blocks), which can be read out as required, a TV line counting function extremely valuable in video signal waveform observation, and a trigger counter function useful in digital waveform observation. In addition, these scopes display setting values using a CRT readout function, and have cursor functions for digital measurements of waveform. The CS-6040 features four channels and bandwidth to 150MHz, while the CS-6030 has a bandwidth of 100MHz, and a high-intensity 20kV CRT (17kV for the CS-6030). Almost all functions are controlled by logic-type panel controls, thereby greatly enhancing reliability and operational simplicity in these high-performance oscilloscopes.

100 program steps

Up to 100 steps (20 steps×5 blocks) of front-panel setting values can be programmed and read out using the programming function. Since the cursor, vertical sensitivity, sweep time, and trigger-related setting values can be programmed,



by simply programming repeatedly used settings, these can be recalled for quick setup when required. In addition, a rear-panel footswitch connector is provided for remote control.

4-Channel, 10-Trace

The CS-6040/6030's four channels easily provide the display capability for operation of complex digital or video signals. In addition, the alternate delayed sweep function can be used to magnify an arbitrarily selected portion of the main sweep waveform for simultaneous 4-channel, 10-trace display.

150MHz Response on all Four Channels

All four channels have DC to 150MHz response guaranteed (to 100MHz for the CS-6030). In addition, these scopes both have 1mV/div sensitivity for CH1 and CH2 (0.5V and 0.1V attenuator switching for CH3 and CH4).

Independent A and B Trigger Modes

A and B trigger coupling and source are independently settable, enabling independent settings of trigger conditions for stable waveform observations.

Guaranteed Channel-to-Channel Time Matching

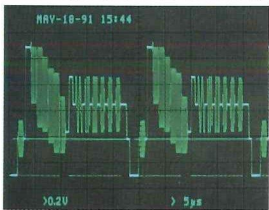
Time matching to 0.5ns or better between CH1 and CH2 and 1ns or better between CH1/2 and CH3/4 are guaranteed, and important specification in accurate timing measurements of logic circuitry.

Trace Separation Shifts the Delayed Swept Waveform

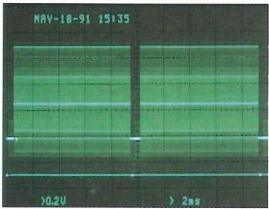
Using the ALT sweep, the delay swept waveform can be shifted downward up to four divisions with respect to the main swept waveform, enabling easy observation without annoying waveform overlap.

Dedicated Video Clamp Triggering for Video Signals Eliminates Triggering Adjustments

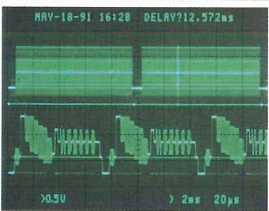
A video clamp feature provides instant triggering on vertical or horizontal video signals. Compared to previous systems, this eliminates triggering adjustments and provides a stable triggered display. By triggering on the main sweep frame signal, it is possible to observe a stable display of any expanded portion of the line signal with the delayed sweep.



Horizontal Video Signal



Vertical Video Signal



Frame Signal (Top),
Line Signal (Bottom)

±2% Accuracy Ensures Accurate Measurements

To ensure measurements of the highest reliability, these scopes guarantee an accuracy of ±2% for vertical-axis sensitivity and sweep time, with other specifications within specified limits as well.

Unique × 10 MAG for Delayed Sweep

Independent of the Main Sweep × 10 MAG, a separate × 10 MAG, is provided which operates on only the delayed sweep, without affecting the main sweep during alternate delayed sweep.

Automatically Converted Measurement Voltages, Even When Using a Probe

When using the standard PC-31 probe, the readout display is automatically converted to reflect the attenuation ratio of 10:1, eliminating reading errors and troublesome calculations.

Single Sweep for Waveform Photography

A one-shot illumination feature enables scale illumination and readout to be switched on momentarily. This eliminates the problem of over exposure caused by readouts and other illumination.

ΔV1 and ΔV2 Cursor Measurements Even in the X-Y Mode

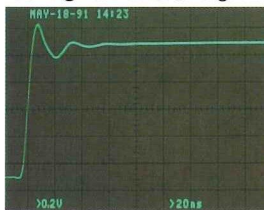
In addition to such measurements in the normal sweep mode, ΔV2 and ΔV1 measurements are possible with the vertical and horizontal cursors, especially, in the X-Y measurement mode as well.

0.02% Delay Time Resolution

A 12 bit DAC is used to provide an additional bit of DAC resolution to eliminate the use of software and provide a delay-time resolution of 0.02% of full scale.

Maximum Sweep Speed of 2ns/div (using × 10 MAG)

Sweep time is continuously switchable in the range 0.5s to 20ns/div. In addition, a signal delay line is provided to enable accurate observation of the rising edge of fast signals and of high-frequency signals.



Vertical-Axis Signal Output

This output provides a signal delivered from the input signal circuitry. Its amplitude is approximately 50mV/div with respect to the displayed signal, enabling its connection to a frequency counter for highly accurate frequency measurements of minute-level signals.

Variable Holdoff for Observation of Waveforms with Complex Periodicities

The holdoff time can be varied to ensure stable triggering on even digital signals and burst signals having complex periodicities.

Individual A and B Intensity and Readout Adjustments for Optimum Display Setups

The delayed sweep intensity can be

adjusted independently of the main sweep intensity using the B-INT adjustment. This ensures an easy-to-view display even when the magnification is changed.

20MHz Bandlimiting Cuts out High-Frequency Components

By limiting the bandwidth of the vertical-axis amplifier to approximately 20MHz, it is possible to eliminate high-frequency noise and pulse-type overshoot contained on the signal being observed, thereby providing an easier-to-observe waveform display.

8-Division Dynamic Range for Precision, Distortion-free Waveform Display

Dynamic range to spare is the key to waveform display linearity, enabling distortion-free waveform display up to the limit of scope frequency response.

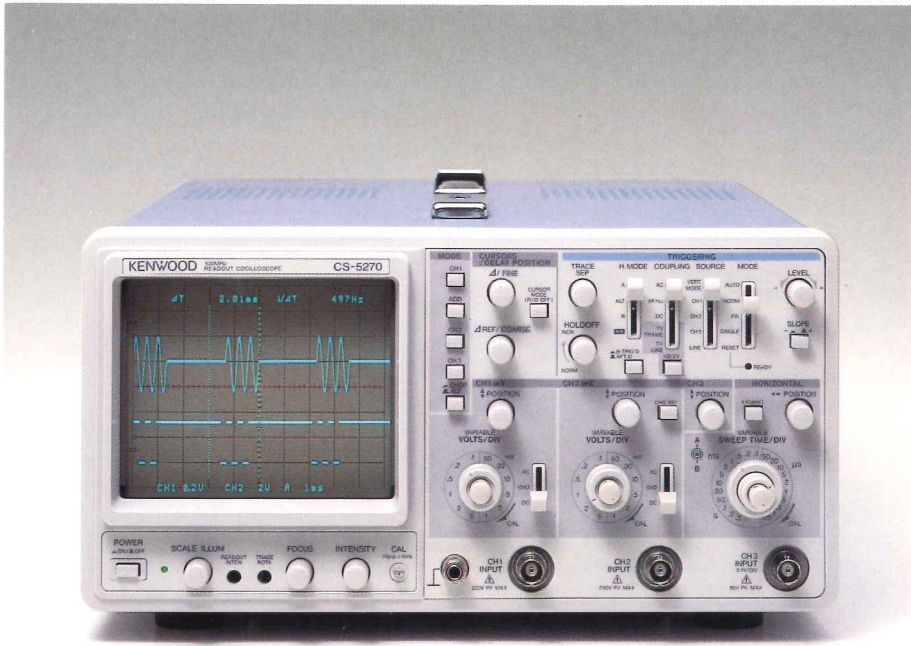
SPECIFICATIONS

CRT:	150mm Rectangular, Phosphor P31 Accelerating voltage 20kV*17kV
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, CH3, CH4, ADD, ALT & CHOP
Attenuator:	1mV/div to 5V/div (12 ranges)
Freq. response:	DC to 150MHz (−3dB) *100MHz 5Hz to 150MHz (−3dB) *100MHz
Input impedance:	1MΩ, 20pF
Signal delay line:	Enables CRT display of leading edges
Polarity inversion:	CH2 only
Vertical amplifier (CH3 & CH4 identical)	
Sensitivity:	0.1V/div, 0.5V/div
Freq. response:	DC to 150MHz (−3dB) *100MHz
Input impedance:	1MΩ, 20pF
Horizontal amplifier (CH2 input)	
Sensitivity:	Same as vertical CH2
Freq. response:	Same as vertical CH2
Time base	
Sweep mode:	A, A-INT-B, ALT, B & X-Y
Sweep time (A):	20ns/div to 0.5s/div (23 ranges)
Sweep time (B):	20ns/div to 50ms/div (20 ranges)
Magnified sweep:	× 10
Triggering	
A trigger mode:	AUTO, NORM, SINGLE & FIXED
Trigger source:	V.MODE, CH1, CH2, CH3, CH4 & LINE
Coupling:	AC, NOISErej, HFrej, DC, TV-frame & TV-line
B trigger mode:	Starts after delay, B triggerable after delay & trigger count
Trigger source:	CH1, CH2, CH3 & CH4
Coupling:	AC, NOISErej, HFrej, DC & TV-line
Trigger sensitivity:	
INT:	1 div (DC to 50MHz), 1.5 div (DC to 150MHz) *100MHz
TV-Frame & TV-Line:	1 div (140IRE)
Calibration voltage:	1Vp-p (1kHz)
Intensity modulation:	0 to +5V
Vertical axis signal out:	50mVp-p (50Ω load)
Power requirements:	100/120/220/240VAC, 73W
Dimensions:	310(W) × 150(H) × 400(D) mm
Weight:	9kg
Accessories:	Instruction manual (1), Probes PC-31 (2)
Readout	
Calendar function:	Year/month/day/hour/minute
Setting & setting value:	● CH1 thru CH4 scale factor ● AC/DC & GND ● V-UNCAL ● ADD, INVERT & BW ● A/B sweep scale factor ● Sweep variable UNCAL ● X-Y (CH2-X) ● Delay time ● Trig count ● TV count

Cursor functions

Cursor modes:	ΔV1, ΔV2, ΔT, 1/ΔT, Ratio & Phase
Program mode	
Program capacity:	20 steps × 5 blocks
Program contents:	● Cursor (Cursor mode/Cursor) ● Vertical (vert. mode/ATT/AC, DC, GND) ● Horizontal (Hori. mode/Sweep time) ● Position (Hori. position) ● Delay time ● Triggering (A source/A couple/A slope/B source/B couple/B slope) ● Sweep mode

(*for the CS-6030)



Operation Panel Laid Out for Easy Operation

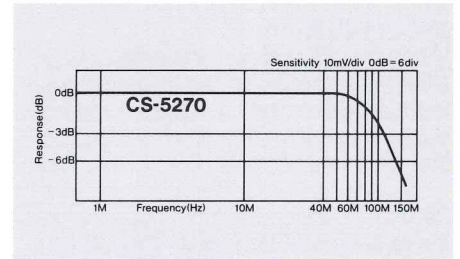
Lever switches and push-button switches are provided to set functions with a single action. And the operation panel is designed so you can see the set conditions at a glance. These oscilloscopes were designed emphasizing easy operation.

Kenwood's Original Hybrid ICs

For higher quality, Kenwood-designed hybrid ICs are widely used to stabilize performance and increase reliability.

High-Sensitivity Design for a Maximum Vertical Axis Sensitivity of 1 mV/div

The vertical axis sensitivity can be switched over continuously from 1 mV/div to 5 V/div using an attenuator. This 1 mV/div sensitivity makes these oscilloscopes ideal for the measurement of low-level and complex signals. (The frequency response at 1 mV/div is from DC to 20 MHz (-3 dB).)

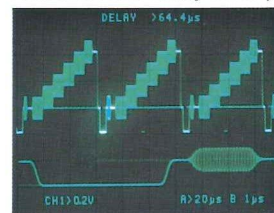


Automatic Triggering (FIX) to Solve Complicated Triggering Problems

The sync level is controlled automatically according to the amplitude of the waveform to maintain accurate synchronization. With this function, complicated sync setting becomes unnecessary.

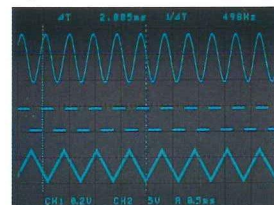
Delay Sweep for Expanded Waveforms

The expanded part of the main sweep (A) is intensity-modulated for easy identification; this can be observed at the same time as the expanded waveform of delay sweep (B). This makes these machines real alternate delay sweep scopes.



Three Signals can be Exactly Synchronized in the V Mode

Even when the frequencies of the CH1, CH2 and CH3 signals are different, accurate synchronization is provided for each signal, for an ultra-stable waveform display.

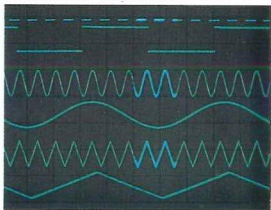


3-Channel Oscilloscopes Combining Accuracy with Simple Operation

CS-5270 and CS-5275 are 3-channel, 8-trace 100 MHz oscilloscopes which are simple to operate but which can measure high-speed signals with great precision and stability. With the CS-5270's digital read-outs and cursor functions and the excellent performance shared by both scopes, they have the specifications necessary for easy, high-precision measurement. They are provided with a number of enhanced function including delay sweep for the observation of expanded waveforms, video clamp for the precise observation of TV signals and auto synchronization to solve complex triggering problems. They're high-performance scopes featuring easy operation.

3-Channel, 8-Trace Scopes for a Variety of Waveform Displays

In addition to CH1 and CH2, these 3-channel, 8-trace oscilloscopes also display CH3. The input signals of all three channels can be observed simultaneously as main sweep waveforms (A). Also, alternate delay sweep is employed to display delay sweep (B) waveforms of all channels at the same time.



Synchronization with Composite Video Signals (NTSC, PAL and HDTV)

To meet current requirements, in addition to a TV sync circuit meeting the specs of conventional NTSC and PAL composite TV signals, an HDTV switch is provided to synchronize with MUSE TV signals. By selecting the TV mode to COUPLING with this switch ON, the oscilloscope will synchronize with MUSE composite

video signals. With an exclusive circuit used for high-grade TV signal triggering, stable synchronization for FRAME and LINE, from small amplitude to large amplitude, can be achieved without any adjustment.

High-precision Digital Measurement with Cursors (only CS-5270)

With two cursors, the digital measurement of voltages, voltage ratios and phase differences of waveforms displayed on the CRT screen is simple. By just moving the cursors to the required points, the data can be read directly from the screen. Also, for delay sweep, the delay time is displayed, so that human errors resulting from visual checking can be avoided and accurate results can be acquired.

Three-channel Readout (only CS-5270)

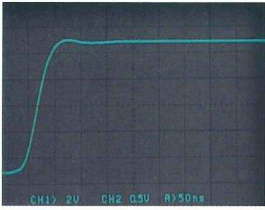
In addition to the ordinary cursor read-out function, the CS-5270 has a 3-channel read-out function which enables cursor measurements of the CH3 signal. In this way, detailed data measurement becomes easier.

150-mm Rectangular CRT with Internal Graticule and Illuminated Scales

These oscilloscopes have a large diameter, rectangular, dome-mesh, post-accelerator CRT. This CRT combines high intensity with high resolution so that visual measurements are less subject to errors. Auto-focus is employed for sharp waveforms at all times.

Maximum Sweep Time 5 ns/div (at X10 MAG)

The sweep time can be switched from 0.5 s/div to 50 ns/div. A signal delay line is provided, so that accurate measurement of the rise time of high-speed signals and high-frequency signals is possible.

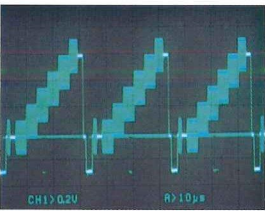


Single Sweep for the Measurement of Transient Events

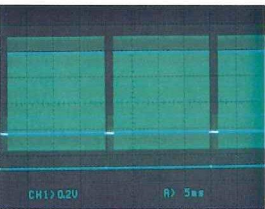
This single sweep shows its capability for the measurement of the waveforms of one-time and transient events or unexpected phenomena. Usually, cameras are used for the observation of these waveforms rather than direct observation.

Special Video Signal Clamp Eliminates Triggering Adjustments

Video signal clamp is provided for the observation of vertical and horizontal video signals with one-touch operation. An advantage of these oscilloscopes over conventional scopes is that stable triggering is possible without complicated adjustments.



Horizontal Video Signal

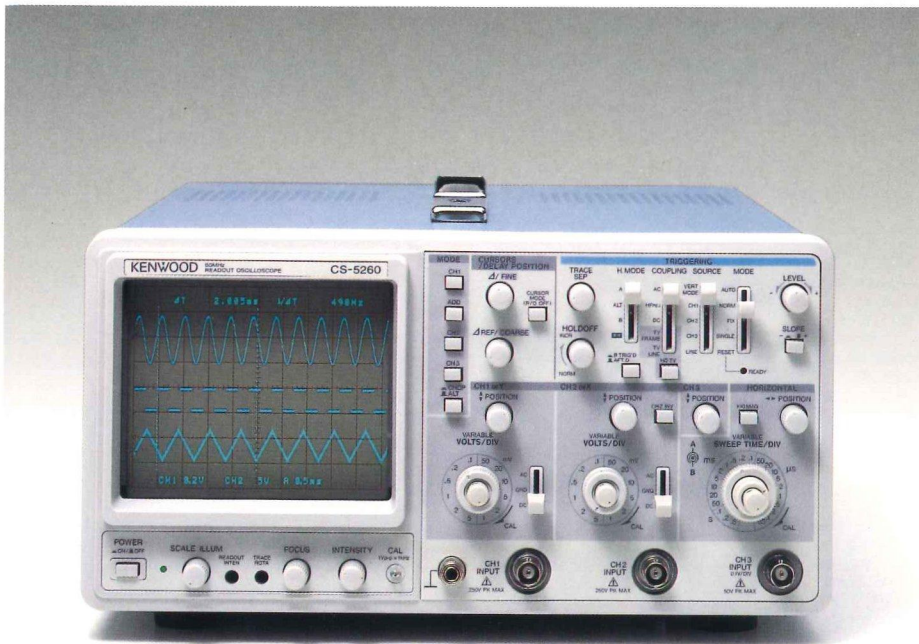


Vertical Video Signal

- Variable hold-off to observe complex sync waveforms
- With vertical axis signal terminals
- High-precision of $\pm 3\%$ for measurements with greater accuracy

SPECIFICATIONS

CRT:	150-mm, rectangular with internal graticule Accelerating voltage approx. 12kV
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, CH3, ADD, ALT & CHOP
Attenuator:	1mV, 2mV/div: $\pm 5\%$ 5mV—5V/div: $\pm 3\%$
Freq. response:	DC to 100MHz (-3dB)
(5mV—5V/div)	5Hz to 100MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Signal delay line:	Enables CRT display of leading edges
Polarity inversion:	CH2 only
Vertical amplifier (CH3)	
Sensitivity:	0.1V/div: $\pm 3\%$
Freq. response:	DC to 100MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Horizontal amplifier (CH2 input, not using $\times 10$ MAG)	
Sensitivity:	Same as vertical axis (CH2)
Freq. response:	Same as vertical axis (CH2)
Time base	
Sweep mode:	A, ALT, B, X-Y
Sweep time (A):	0.5s—50ns/div $\pm 3\%$, in 1-2-5 steps (22 ranges) with fine adjustment
Sweep time (B):	50ms—50ns/div $\pm 3\%$, in 1-2-5 steps (19 ranges)
Magnified sweep:	10 times $\pm 5\%$ ($\pm 8\%$ for over 0.5us/div)
Triggering	
Trigger mode:	AUTO, NORM, FIX, SINGLE, RESET
Trigger source:	VERT, CH1, CH2, CH3, LINE
Coupling:	AC, HFrej, DC, TV FRAME, TV LINE
Trigger sensitivity:	
INT:	NORM/1 div (DC to 50MHz), FIX/1.5 div (DC to 50MHz) NORM/1.5 div (50MHz to 100MHz), FIX/2 div (50MHz to 100MHz)
TV-Frame & TV-Line:	1.5 div
Calibration voltage:	1Vp-p, $\pm 3\%$ (1kHz)
Intensity modulation:	0 to 5V
Vertical axis signal out:	50mVp-p/div (50 Ω load)
Power requirements:	100/120/220V AC $\pm 10\%$, 207V—250V, 50Hz/60Hz 300(W) \times 150(H) \times 400(D)mm approx. 8.7kg
Dimensions:	
Weight:	
Accessories:	CS-5720/Probes PC-31 (2) CS-5275/Probes PC-39 (2)
Readout (CS-5270 only)	
Setting & setting value:	CH1/CH2 scale factor* (including detection of probe setting), CH3 scale factor (0.1V/div fixed, without probe detection) V-UNCAL, ADD, INVERT, A/B sweep scale factor (MAG conversion), SWEEP-UNCAL, DELAY TIME, TRIG'D X-Y
Cursor modes:	$\Delta V1$ /Displays the voltage difference after converting using the CH1 scale factor $\Delta V2$ /Displays the voltage difference after converting using the CH2 scale factor $\Delta V3$ /Displays the voltage difference after converting using the CH3 0.1V/div ΔT /Displays the time difference after converting using A sweep scale factor RATIO/Displays the voltage ratio and time ratio with 5 divs on the screen as 100%. PHASE/Display the phase difference with 5 divs on the screen as 360 \times .
Cursor measurement:	Resolution/10-bit Measuring error/ $\pm 4\%$ Measuring range/ ± 3.6 div or more from the center of the screen in the vertical direction ± 4.6 div or more from the center of the screen in the horizontal direction



Kenwood's Original Hybrid ICs

For higher quality, Kenwood-designed hybrid ICs are widely used to stabilize performance and increase reliability.

High-precision Digital Measurement with Cursors (only CS-5260)

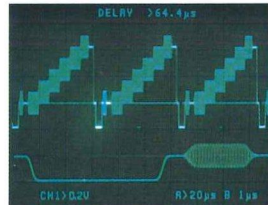
With two cursors, the digital measurement of voltages, voltage ratios and phase differences of waveforms displayed on the CRT screen is simple. By just moving the cursors to the required points, the data can be read directly from the screen. Also, for delay sweep, the delay time is displayed, so that human errors resulting from visual checking can be avoided and accurate results can be acquired.

Operation Panel Laid Out for Easy Operation

Lever switches and push-button switches are provided to set functions with a single action. And the operation panel is designed so you can see the set conditions at a glance. These oscilloscopes were designed emphasizing easy operation.

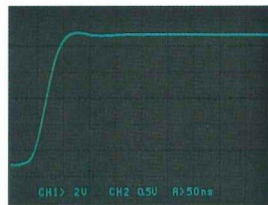
Delay Sweep for Expanded Waveforms

The expanded part of the main sweep (A) is intensity-modulated for easy identification; this can be observed at the same time as the expanded waveform of delay sweep (B). This makes these machines real alternate delay sweep scopes.



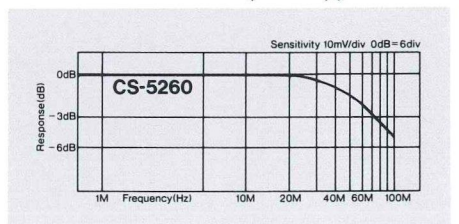
Maximum Sweep Time 5 ns/div (at X10 MAG)

The sweep time can be switched from 0.5 s/div to 50 ns/div. A signal delay line is provided, so that accurate measurement of the rise time of high-speed signals and high-frequency signals is possible.



High-Sensitivity Design for a Maximum Vertical Axis Sensitivity of 1 mV/div

The vertical axis sensitivity can be switched over continuously from 1 mV/div to 5 V/div using an attenuator. This 1 mV/div sensitivity makes these oscilloscopes ideal for the measurement of low-level and complex signals. (The frequency response at 1 mV/div is from DC to 20 MHz (-3 dB).)

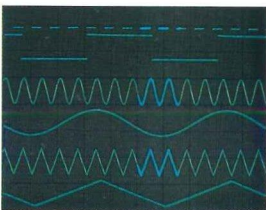


Powerful 3-Channel Oscilloscopes: Second-to-none in Quality and Performance

The CS-5260 and CS-5265 are powerful oscilloscopes designed for true quality using the latest technology to provided a full range of functions. They combine an excellent basic performance with 3-channel, 8-trace operation. Various other features include real delay sweep, high intensity CRT, high sensitivity, etc. Their functions and performance set them apart from the competition. They will show their full power when used as engineering tools.

3-Channel, 8-Trace Scopes for a Variety of Waveform Displays

In addition to CH1 and CH2, these 3-channel, 8-trace oscilloscopes also display CH3. The input signals of all three channels can be observed simultaneously as main sweep waveforms (A). Also, alternate delay sweep is employed to display delay sweep (B) waveforms of all channels at the same time.



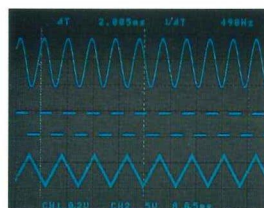
Three-channel Readout (only CS-5260)

In addition to the ordinary cursor read-out function, the CS-5270 has a 3-channel read-out function which enables cursor measurements of the CH3 signal.

Three Signals can be Exactly Synchronized in the V Mode

Even when the frequencies of the CH1, CH2 and CH3 signals are different, accu-

rate synchronization is provided for each signal, for an ultra-stable waveform display.



Synchronization with Composite Video Signals (NTSC, PAL and HDTV)

To meet current requirements, in addition to a TV sync circuit meeting the specs of conventional NTSC and PAL composite TV signals, an HDTV circuit is provided to synchronize with MUSE TV signals. By selecting the TV mode to COUPLING with this switch ON, the oscilloscope will synchronize with MUSE composite video signals. With an exclusive circuit used for high-grade TV signal triggering, stable synchronization for FRAME and LINE, from small amplitude to large amplitude, can be achieved without any adjustment.

Automatic Triggering (FIX) to Solve Complicated Triggering Problems

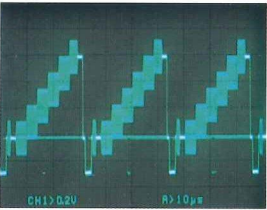
The sync level is controlled automatically according to the amplitude of the waveform to maintain accurate synchronization. With this function, complicated sync setting becomes unnecessary.

150-mm Rectangular CRT with Internal Graticule and Illuminated Scales

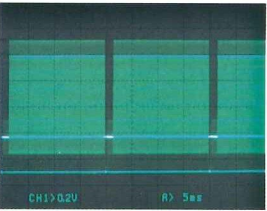
These oscilloscopes have a large diameter, rectangular, dome-mesh, post-accelerator CRT. This CRT combines high intensity with high resolution so that visual measurements are less subject to errors. Auto-focus is employed for sharp waveforms at all times.

Special Video Signal Clamp Eliminates Triggering Adjustments

Video signal clamp is provided for the observation of vertical and horizontal video signals with one-touch operation. An advantage of these oscilloscopes over conventional scopes is that stable triggering is possible without complicated adjustments.



Horizontal Video Signal



Vertical Video Signal

Single Sweep for the Measurement of Transient Events

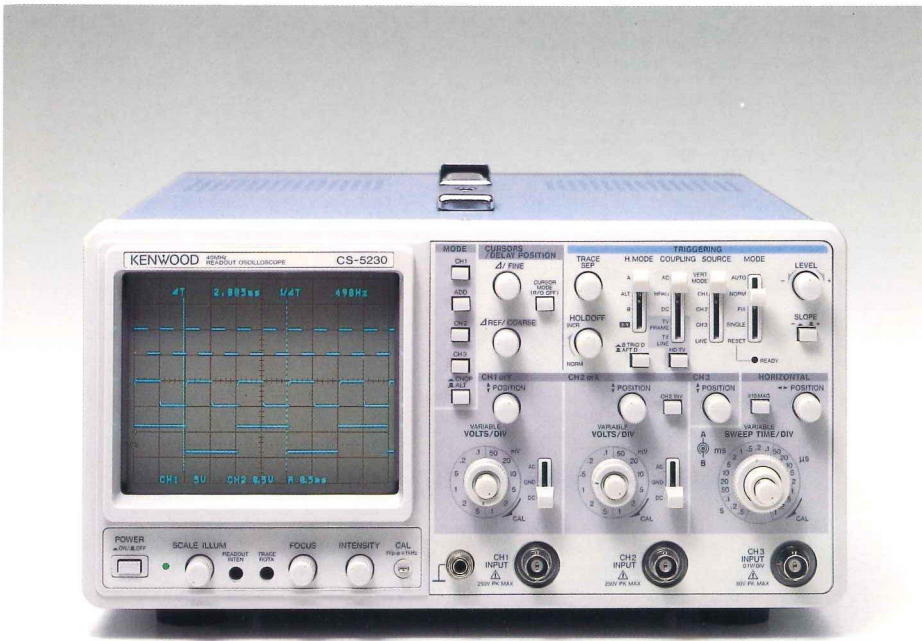
This single sweep shows its capability for the measurement of the waveforms of one-time and transient events or unexpected phenomena. Usually, cameras are used for the observation of these waveforms rather than direct observation.

■ **Variable hold-off to observe complex sync waveforms**

■ **High-precision of $\pm 3\%$ for measurements with greater accuracy**

SPECIFICATIONS

CRT:	150-mm, rectangular with internal graticule Accelerating voltage approx. 12kV
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, CH3, ADD, ALT & CHOP
Attenuator:	1mV, 2mV/div: $\pm 5\%$ 5mV—5V/div: $\pm 3\%$
Freq. response:	DC to 60MHz (-3dB) (5mV—5V/div) 5Hz to 60MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Signal delay line:	Enables CRT display of leading edges
Polarity inversion:	CH2 only
Vertical amplifier (CH3)	
Sensitivity:	0.1V/div: $\pm 3\%$
Freq. response:	DC to 60MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Horizontal amplifier (CH2 input, not using $\times 10$ MAG)	
Sensitivity:	Same as vertical axis (CH2)
Freq. response:	Same as vertical axis (CH2)
Time base	
Sweep mode:	A, ALT, B, X-Y
Sweep time (A):	0.5s—50ns/div $\pm 3\%$, in 1-2-5 steps (22 ranges) with fine adjustment
Sweep time (B):	50ms—50ns/div $\pm 3\%$, in 1-2-5 steps (19 ranges)
Magnified sweep:	10 times $\pm 5\%$ ($\pm 8\%$ for over 0.5us/div)
Triggering	
Trigger mode:	AUTO, NORM, FIX, SINGLE, RESET
Trigger source:	VERT, CH1, CH2, CH3, LINE
Coupling:	AC, HFrej, DC, TV FRAME, TV LINE
Trigger sensitivity:	
INT:	NORM/1 div (DC to 40MHz), FIX/1.5 div (DC to 40MHz) NORM/1.5 div (40MHz to 60MHz), FIX/2 div (40MHz to 60MHz)
TV-Frame & TV-Line:	1.5 div
Calibration voltage:	1Vp-p, $\pm 3\%$ (1kHz)
Intensity modulation:	0 to 5V
Vertical axis signal out:	50mVp-p/div (50 Ω load)
Power requirements:	100/120/220V AC $\pm 10\%$, 207V—250V, 50Hz/60Hz
Dimensions:	300(W) \times 150(H) \times 400(D)mm
Weight:	approx. 8.7kg
Accessories:	CS-5260/Probes PC-31 (2) CS-5265/Probes PC-39 (2)
Readout (CS-5260 only)	
Setting & setting value:	CH1/CH2 scale factor (including detection of probe setting), CH3 scale factor (0.1V/div fixed, without probe detection) V-UNCAL, ADD, INVERT, A/B sweep scale factor (MAG conversion), SWEEP-UNCAL, DELAY TIME, TRIG'D X-Y
Cursor modes:	$\Delta V1$ /Displays the voltage difference after converting using the CH1 scale factor $\Delta V2$ /Displays the voltage difference after converting using the CH2 scale factor $\Delta V3$ /Displays the voltage difference after converting using the CH3 0.1V/div ΔT /Displays the time difference after converting using A sweep scale factor RATIO/Displays the voltage ratio and time ratio with 5 divs on the screen as 100%. PHASE/Display the phase difference with 5 divs on the screen as 360 \times .
Cursor measurement:	Resolution/10-bit Measuring error/ $\pm 4\%$ Measuring range/ ± 3.6 div or more from the center of the screen in the vertical direction ± 4.6 div or more from the center of the screen in the horizontal direction

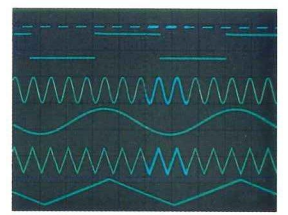


3-Channel Oscilloscopes with Outstanding Precision and Convenience

The CS-5230 and CS-5235 are powerful oscilloscopes which fulfill the basic functions of an oscilloscope to ensure stable observation of even high-speed signals. To meet the needs of simultaneous observation of various kinds of signals, a 3-channel 8-trace function is employed which enables the observation of the waveforms of three signals at the same time. Also, to meet the needs of the today's TV engineers, they incorporate circuitry able to handle HDTV video signals. To simplify measurement, push-button switches and lever switches are used so that functions can be set with a single action.

3-Channel, 8-Trace Scopes for a Variety of Waveform Displays

In addition to CH1 and CH2, these 3-channel, 8-trace oscilloscopes also display CH3. The input signals of all three channels can be observed simultaneously as main sweep waveforms (A). Also, alternate delay sweep is employed to display delay sweep (B) waveforms of all channels at the same time.



Synchronization with Composite Video Signals (NTSC, PAL and HDTV)

To meet current requirements, in addition to a TV sync circuit meeting the specs of conventional NTSC and PAL composite TV signals, an HDTV switch is provided to synchronize with MUSE TV signals.

By selecting the TV mode to COUPLING with this switch ON, the oscilloscope will synchronize with MUSE composite video signals. With an exclusive circuit used for high-grade TV signal triggering, stable synchronization for FRAME and LINE, from small amplitude to large amplitude, can be achieved without any adjustment.

High-precision Digital Measurement with Cursors (only CS-5230)

With two cursors, the digital measurement of voltages, voltage ratios and phase differences of waveforms displayed on the CRT screen is simple. By just moving the cursors to the required points, the data can be read directly from the screen. Also, for delay sweep, the delay time is displayed, so that human errors resulting from visual checking can be avoided and accurate results can be acquired.

Three-channel Readout (only CS-5230)

In addition to the ordinary cursor read-out function, the CS-5230 has a 3-channel read-out function which enables cursor

measurements of the CH3 signal. In this way, detailed data measurement becomes easier.

Operation Panel Laid Out for Easy Operation

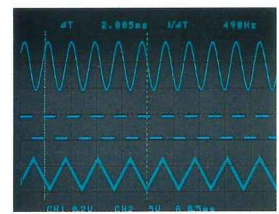
Lever switches and push-button switches are provided to set functions with a single action. And the operation panel is designed so you can see the set conditions at a glance. These oscilloscopes were designed emphasizing easy operation.

Kenwood's Original Hybrid ICs

For higher quality, Kenwood-designed hybrid ICs are widely used to stabilize performance and increase reliability.

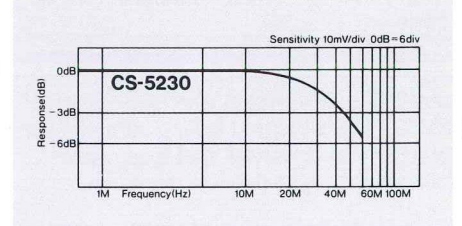
Three Signals can be Exactly Synchronized in the V Mode

Even when the frequencies of the CH1, CH2 and CH3 signals are different, accurate synchronization is provided for each signal, for an ultra-stable waveform display.



High-Sensitivity Design for a Maximum Vertical Axis Sensitivity of 1 mV/div

The vertical axis sensitivity can be switched over continuously from 1 mV/div to 5 V/div using an attenuator. This 1 mV/div sensitivity makes these oscilloscopes ideal for the measurement of low-level and complex signals. (The frequency response at 1 mV/div is from DC to 20 MHz (-3 dB).)

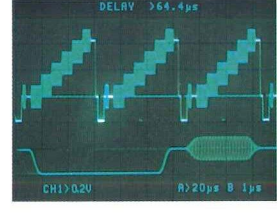


Automatic Triggering (FIX) to Solve Complicated Triggering Problems

The sync level is controlled automatically according to the amplitude of the waveform to maintain accurate synchronization. With this function, complicated sync setting becomes unnecessary.

Delay Sweep for Expanded Waveforms

The expanded part of the main sweep (A) is intensity-modulated for easy identification; this can be observed at the same time as the expanded waveform of delay sweep (B). This makes these machines real alternate delay sweep scopes.

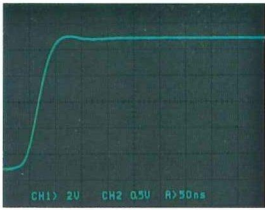


150-mm Rectangular CRT with Internal Graticule and Illuminated Scales

These oscilloscopes have a large diameter, rectangular, dome-mesh, post-accelerator CRT. This CRT combines high intensity with high resolution so that visual measurements are less subject to errors. Auto-focus is employed for sharp waveforms at all times.

Maximum Sweep Time 10 ns/div (at X10 MAG)

The sweep time can be switched from 0.5 s/div to 50 ns/div. A signal delay line is provided, so that accurate measurement of the rise time of high-speed signals and high-frequency signals is possible.

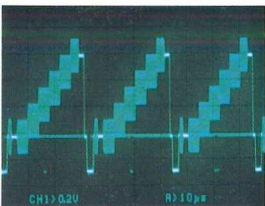


Single Sweep for the Measurement of Transient Events

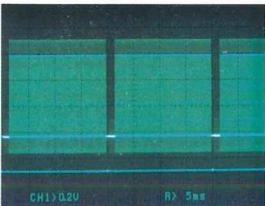
This single sweep shows its capability for the measurement of the waveforms of one-time and transient events or unexpected phenomena. Usually, cameras are used for the observation of these waveforms rather than direct observation.

Special Video Signal Clamp Eliminates Triggering Adjustments

Video signal clamp is provided for the observation of vertical and horizontal video signals with one-touch operation. An advantage of these oscilloscopes over conventional scopes is that stable triggering is possible without complicated adjustments.



Horizontal Video Signal

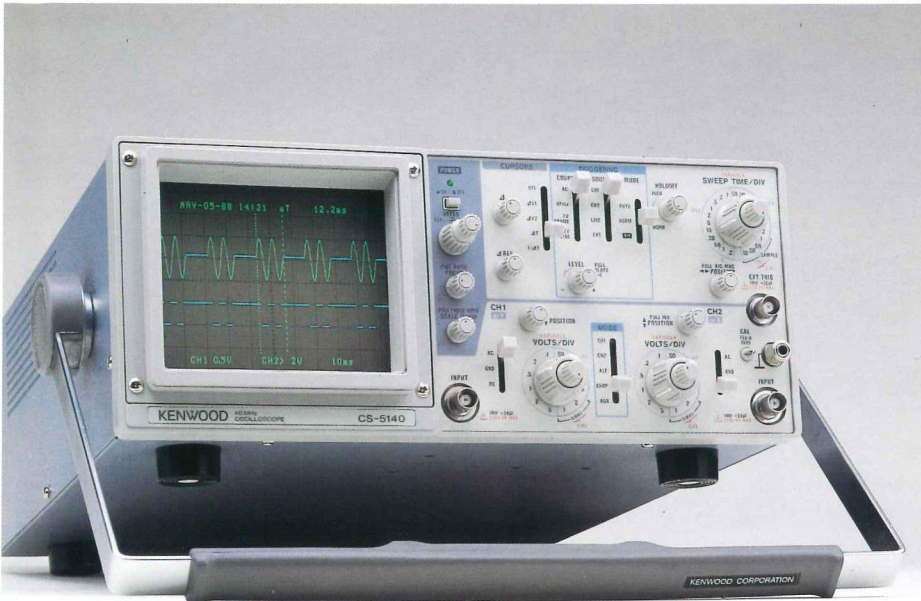


Vertical Video Signal

- Variable hold-off to observe complex sync waveforms
- With vertical axis signal terminals
- High-precision of $\pm 3\%$ for measurements with greater accuracy

SPECIFICATIONS

CRT:	150-mm, rectangular with internal graticule Accelerating voltage approx. 12kV
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, CH3, ADD, ALT & CHOP
Attenuator:	1mV, 2mV/div: $\pm 5\%$ 5mV—5V/div: $\pm 3\%$
Freq. response: (5mV—5V/div)	DC to 40MHz (-3dB) 5Hz to 40MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Signal delay line:	Enables CRT display of leading edges
Polarity inversion:	CH2 only
Vertical amplifier (CH3)	
Sensitivity:	0.1V/div: $\pm 3\%$
Freq. response:	DC to 40MHz (-3dB)
Input impedance:	1M Ω , $\pm 2\%$, approx. 25pF
Horizontal amplifier (CH2 input, not using $\times 10$ MAG)	
Sensitivity:	Same as vertical axis (CH2)
Freq. response:	Same as vertical axis (CH2)
Time base	
Sweep mode:	A, ALT, B, X-Y
Sweep time (A):	0.5s—50ns/div $\pm 3\%$, in 1-2-5 steps (22 ranges) with fine adjustment
Sweep time (B):	50ms—50ns/div $\pm 3\%$, in 1-2-5 steps (19 ranges)
Magnified sweep:	10 times $\pm 5\%$ ($\pm 8\%$ for over 0.5us/div)
Triggering	
Trigger mode:	AUTO, NORM, FIX, SINGLE, RESET
Trigger source:	VERT, CH1, CH2, CH3, LINE
Coupling:	AC, HFrej, DC, TV FRAME, TV LINE
Trigger sensitivity:	
INT:	NORM/1 div (DC to 20MHz), FIX/1.5 div (DC to 20MHz) NORM/1.5 div (20MHz to 40MHz), FIX/2 div (20MHz to 40MHz)
TV-Frame & TV-Line:	1.5 div
Calibration voltage:	1Vp-p, $\pm 3\%$ (1kHz)
Intensity modulation:	0 to 5V
Vertical axis signal out:	50mVp-p/div (50 Ω load)
Power requirements:	100/120/220V AC $\pm 10\%$, 207V—250V, 50Hz/60Hz 300(W) \times 150(H) \times 400(D)mm
Dimensions:	
Weight:	approx. 8.7kg
Accessories:	CS-5230/Probes PC-33 (2) CS-5235/Probes PC-35 (2)
Readout (CS-5230 only)	
Setting & setting value:	CH1/CH2 scale factor (including detection of probe setting), CH3 scale factor (0.1V/div fixed, without probe detection) V-UNCAL, ADD, INVERT, A/B sweep scale factor (MAG conversion), SWEEP-UNCAL, DELAY TIME, TRIG'D X-Y
Cursor modes:	$\Delta V1$ /Displays the voltage difference after converting using the CH1 scale factor $\Delta V2$ /Displays the voltage difference after converting using the CH2 scale factor $\Delta V3$ /Displays the voltage difference after converting using the CH3 0.1V/div ΔT /Displays the time difference after converting using A sweep scale factor RATIO/Displays the voltage ratio and time ratio with 5 divs on the screen as 100%. PHASE/Display the phase difference with 5 divs on the screen as 360° .
Cursor measurement:	Resolution/10-bit Measuring error/ $\pm 4\%$ Measuring range/ ± 3.6 div or more from the center of the screen in the vertical direction ± 4.6 div or more from the center of the screen in the horizontal direction



Readout Function Provides a Display of all Essential Data Along with the Waveform— All of this and Observation to 100MHz.

The CS-5140 uses a sampling technique at high sampling speeds (faster than 0.1μs/div) to achieve periodic-waveform observation up to 100MHz. At low sweep speeds (0.2μs/div and slower), the CS-5140 reverts automatically to operation as a conventional oscilloscope, thereby maintaining the normal operational feel of a conventional scope over a broad frequency range. This convenience is further augmented by such functions as readout and cursor measurement, making the CS-5140 a truly new-concept scope from those who should know about new concepts—Kenwood.

Equivalent sampling enables periodic-waveform observation up to 100MHz (–3dB)

When the sweep time is set to 0.1μs/div or faster, the CS-5140 automatically goes into the equivalent sampling mode, enabling continuous observations of waveforms up to 100MHz (In this mode, however, it is not possible to observe non-periodic signals such as glitches and fast transient events).

Automatically switching to conventional 40MHz oscilloscope mode frees the operation to observe waveforms rather than the oscilloscope

At sweep ranges of 0.2μs/div or slower, the CS-5140 automatically switches to operation as a conventional 40MHz oscilloscope. This happens even if the scope was operating in the sampling mode, without the operator having to worry about when to switch modes. It thus preserves the “feel” of a conventional

scope, while offering the benefits of sampling.

Readout function provides easy-to-interpret and record measurement conditions settings

Conditions such as vertical and horizontal range setting, VARIABLE, UNCAL and sweep time settings are clearly displayed on the CRT screen with the observed waveform. This enables easy checking during measurement and means that a single photograph of the screen provides a complete record of the measurement, including such vital setting information. When the PC-31 probe is used, the displayed vertical sensitivity is automatically scaled to $\times 10$.

Cursor function enables easy digital measurement of voltage, time, frequency and phase differences

Two cursor lines can be used to measure voltage, voltage difference, time differ-

ence, time ratio, frequency and phase differences from the waveform displayed on the CRT screen, with results indicated on the CRT screen digitally. Simply move the cursor to the desired point and read the data value. This greatly simplifies the usually troublesome task of making readings from the CRT screen, thereby reducing errors as well.

Maximum sweep speed of 10ns/div (1ns/div when using $\times 10$ MAG) ensures high-accuracy measurement of even high-speed waveforms

The CS-5140 features a sweep speed of 10ns/div to 0.1μs/div in the sampling mode and 0.2μs/div to 0.2s/div in the real-time mode, enabling observations of waveforms up to 100MHz, without manual mode switching. And using sweep magnification ($\times 10$), the horizontal axis can be instantly expanded 10-fold, enabling detailed observations of the most complex signal.

- **Wide dynamic range and broad bandwidth combine with a sampling technique which improves display intensity**
- **High intensity CRT (12kV accelerating voltage)**
- **High sensitivity—1mV/div (DC to 5MHz)**

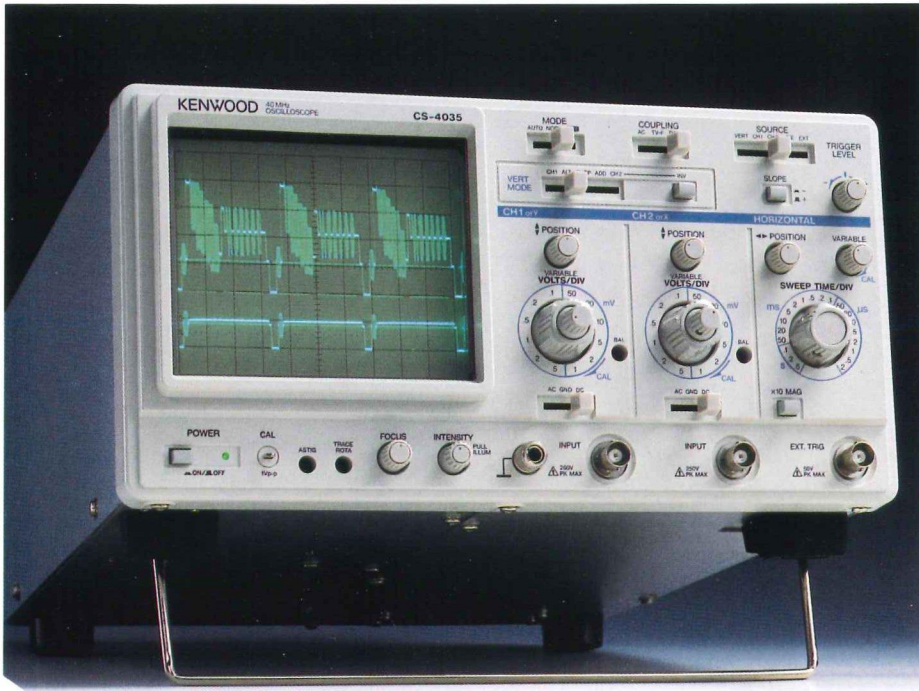
SPECIFICATIONS

CRT:	150mm Rectangular, Phosphor P31 Accelerating voltage 12kV
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, ALT, CHOP & ADD
Attenuator:	1mV/div to 5V/div (12 ranges)
Freq. response:	
Real-time mode:	DC to 40MHz (–3dB) 5Hz to 40MHz (–3dB)
Equivalent sampling mode:	DC to 100MHz (–3dB) 5Hz to 100MHz (–3dB)
Input impedance:	1MΩ, 22pF
Polarity inversion:	CH2 only
Horizontal amplifier (CH2 only)	
Sensitivity:	Same as vertical CH2
Freq. response:	DC to 500kHz (–3dB)
Time base	
Sweep mode:	Norm & Auto
Sweep time:	10ns/div to 0.2s/div (23 ranges)
Magnified sweep:	$\times 10$
Triggering	
Mode:	AUTO, NORM, FIX & SINGLE-RESET
Source:	CH1, CH2 & EXT
Coupling:	AC, HFrej, TV-frame & TV-line
Sensitivity:	
INT:	1 div (10Hz to 100MHz)
EXT:	0.1Vp-p (10Hz to 100MHz)
Calibration voltage:	1Vp-p (1kHz)
Intensity modulation:	0 to +5V
Power requirements:	100/120/220/240VAC, 50/60Hz, 53W
Dimensions:	319(W) \times 132(H) \times 380(D) mm
Weight:	9.5kg
Accessories:	Instruction manual (1), Probes PC-31 (2)
Readout	
Calendar function:	Year/month/day/hour/minute
Setting & setting value:	● CH1 & CH2 scale factor ● V-UNCAL ● ADD ● INVERT ● Sweep scale factor ● H-UNCAL ● X-Y
Cursor functions	
Cursor modes:	$\Delta V1$, $\Delta V2$, ΔT , $1/\Delta T$, Ratio & Phase

CS-4035 40MHz 2-Channel Oscilloscope
CRT (12kV) with illuminated scales

CS-4026 20MHz 2-Channel Oscilloscope
CRT (12kV) with illuminated scales

CS-4025 20MHz 2-Channel Oscilloscope
CRT (2kV)



tenfold, enabling detailed observation of just the desired portion of complex waveforms.

Convenient vert mode

A vert mode is provided which automatically switches the sweep trigger source to the vertical-axis mode. Thus, when the vertical mode is CH1 or CH2, the trigger source is the CH1 or CH2 signal, respectively. For the ALT, CHOP and ADD modes, the CH1 signal is used as the trigger source.

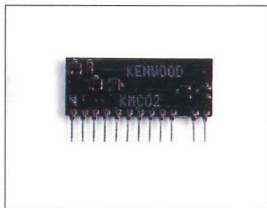
- Sufficient dynamic range enables accurate waveform display free from distortion
- Vertical axis signal output
- Observation of intensity-modulated waveforms
- Trace rotation adjustment from the front panel

Hybrid ICs Ensure High Quality and Reliability

By adopting the same design philosophy as used in top-of-the-line scopes, the Kenwood design team has produced the CS-4000 Series with the quality that makes it truly worthy of the name Kenwood. To ensure this level of quality, Kenwood used a large number of original hybrid ICs.

Unique Kenwood Hybrid IC Technology

In-house designed hybrid ICs are used for the main circuitry of the CS-4000 Series, thereby ensuring stable, uniform performance.



The large CRT (12kV) with illuminated scales and inner graticule

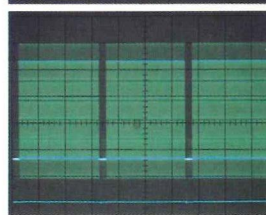
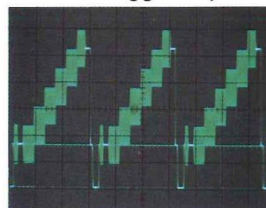
The large, dome-mesh, post-accelerator (12kV) type CRT of these scopes provides a both high intensity and excellent resolution, while completely eliminating parallax (except CS-4025).

High sensitivity: 1mV/div (DC to 5MHz)

Vertical-axis sensitivity is continuously switchable from 1mV/div to 5V/div using an attenuator. The 1mV/div sensitivity is extremely powerful in measurements on complex, low-level signals.

Instantly selectable TV sync

Horizontal and vertical video signals can be instantly selected for observation, with stable triggering achieved without the need for trigger adjustment.



Fast sweep: 20ns/div (using x 10 MAG)

The sweep time can be continuously switched from 0.5s/div to 0.2µs/div (0.5s/div to 0.5µs/div for CS-4025). In addition, sweep expansion (x 10 MAG) can be used to infinitely expand the sweep

SPECIFICATIONS

CRT:	150mm Rectangular, Phosphor P31 Accelerating voltage 12kV*2kV
Vertical amplifier (CH1 & CH2 identical)	Operating modes: CH1, CH2, ALT, CHOP & ADD Attenuator: 1mV/div to 5V/div (12 ranges) Freq. response: DC to 40MHz (-3dB) ** *20MHz 10Hz to 40MHz (-3dB) ** *20MHz
Input impedance:	1MΩ, 28pF
Polarity inversion:	CH2 only
Horizontal amplifier (CH2 input)	Sensitivity: Same as vertical CH2 Freq. response: DC to 500kHz (-3dB)
Time base	Sweep mode: Norm & Auto Sweep time: 200ns/div to 0.5s/div (20 ranges) *500ns/div to 0.5s/div (19 ranges) x 10
Triggering	Mode: AUTO & NORM Source: CH1, CH2, LINE & EXT Coupling: AC, TV-frame & TV-line Sensitivity: INT: 1.5 div (10Hz to 20MHz), 2 div (20MHz to 40MHz) ** *1.5 div (10Hz to 10MHz), ** *2 div (10MHz to 20MHz) 0.25Vp-p (10Hz to 20MHz), 0.3Vp-p (20MHz to 40MHz) ** *0.2Vp-p (10Hz to 10MHz), ** *0.3Vp-p (10MHz to 20MHz)
EXT:	0.25Vp-p (10Hz to 20MHz), 0.3Vp-p (20MHz to 40MHz) ** *0.2Vp-p (10Hz to 10MHz), ** *0.3Vp-p (10MHz to 20MHz)
Calibration voltage:	1Vp-p (1kHz) *1Vp-p (Line freq.)
Intensity modulation:	0 to +5V
Power requirements:	100/120/220/240VAC, 50/60Hz, 30W *29W
Dimensions:	290(W)x150(H)x380(D) mm
Weight:	6.8kg
Accessories:	Instruction manual (1), Probes PC-35 (2)

(*for the CS-4025 and **for the CS-4026)



Variable Hold-off Time for Still Display of Phase Relationship of Logic Signals

The burst components of digital signals and video signals which are complex and repetitive and which are difficult to synchronize using conventional scopes can be stably synchronized by changing the hold-off time.

Real Alternate Delay Sweep

The intensity-modulated, expanded part of the main sweep (A) and the expanded waveform of the delay sweep (B) can be observed at the same time.

Unique Tilt Stand

A tilt stand with two tilt angles is provided as standard for flexibility. This is particularly convenient for demonstrations at clients' sites and field servicing.

Other features

- CH1 output signal convenient for buffer amp
- Any power supply voltage from 90 AC to 250 V can be used without switching (only CS-3027, 3067)
- In AC operation, battery charging can be done at the same time as waveform observation (only CS-3027, 3067)
- An external 10—20 V DC power supply can be connected, ideal for making waveform observations in an automobile, etc. Connect a rechargeable battery for operation anytime, anywhere (only CS-3027, 3067)

Scopes that Combine an Outstanding Performance with Go-anywhere Portability

“From the work bench to the field” CS-3000 series oscilloscopes are compact oscilloscopes designed with this in mind. You can take them with you anywhere, anytime. They combine excellent specifications with a great performance, packed in a compact body. By attaching a battery pack, they demonstrate their excellent performance when used in the field. A newly-developed power supply circuit which operates from 90 V to 250 V AC without switching, a Ni-Cd battery charging circuit and a 3-way free power supply for DC/battery operations are provided. They are the ideal oscilloscopes for the field servicing of various electronic components and office, factory and home automation equipment including computers, facsimile units and copiers.

Compact and light portable oscilloscopes

Oscilloscopes you can take to field service sites for precise measurements you can trust.



95-mm (3.5-inch) Rectangular CRT with Internal Graticule (CS-3025: 90mm)

95-mm rectangular post-accelerator CRT with internal graticule and a metal back is used, to combine high intensity with high resolution so that visual measurements with less errors are possible. Auto-focus is employed for sharp waveforms at all times.

TV-V and TV-H sync Ensure Stable Video Waveform Displays

A TV sync. separation circuit is employed for the observation of vertical and horizontal TV signals. Stable sync. can be achieved at all times. Delay sweep (B) becomes TV-H automatically when main sweep (A) is set to TV-V or TV-H, so that the signals for 1 field and 1 line can be observed simultaneously. The vertical axis sensitivity can be switched over continuously from 1 mV/div to 5 V/div with an attenuator. The 1 mV/div sensitivity is effective for the measurement of weak and complex signals. (The frequency response at 1 mV/div is from DC to 20 MHz (-3 dB).)

ALT trigger for the Synchronization of Two Signals

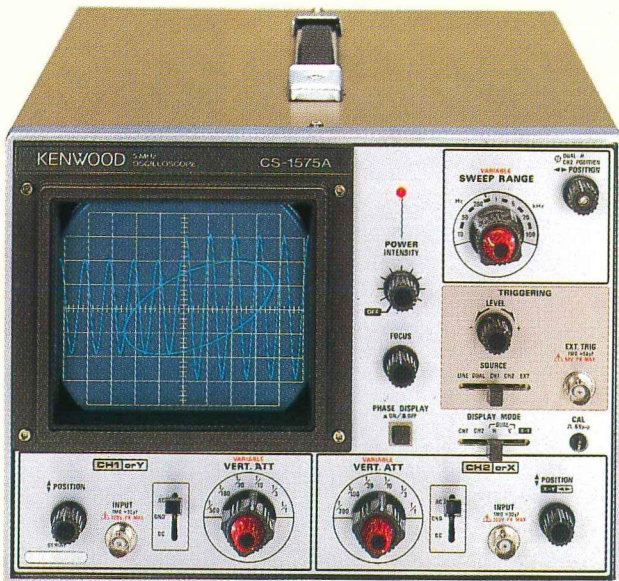
Even when the CH1 and CH2 signals have different frequencies, the alternate trigger system accurately synchronizes each signal for the observation of stable waveforms.

Options



SPECIFICATIONS

Model	CS-3025 20MHz		CS-3026 20MHz		CS-3066 60MHz		CS-3076 100MHz		CS-3027 20MHz 3-way power supply		CS-3067 60MHz 3-way power supply			
CRT														
Type	90-mm, rectangular				95-mm, rectangular									
Accelerating potential	1.8kV				1.7kV				12kV		1.7kV		12kV	
Effective area	8x10 div (1 div=635 mm)													
Vertical amplifier (common to CH1 and CH2)														
Operating modes	CH1, CH2, ALT, CHOP, ADD													
Sensitivity	1 mV/div (when x5 MAG is used)													
Frequency response														
5mV/div ~ 5V/div	DC	DC ~ 20MHz		DC ~ 20MHz		DC ~ 60MHz		DC ~ 100MHz		DC ~ 20MHz		DC ~ 60MHz		
	AC	5Hz ~ 20MHz		10Hz ~ 20MHz		10Hz ~ 60MHz		10Hz ~ 100MHz		10Hz ~ 20MHz		10Hz ~ 60MHz		
1mV/div, 2mV/div	DC	DC ~ 4MHz		DC ~ 5MHz										
	AC	5Hz ~ 4MHz		10Hz ~ 5MHz										
Input impedance	1MΩ, approx. 40pF		1MΩ, approx. 30pF		1MΩ, approx. 30pF		1MΩ, approx. 26pF		1MΩ, approx. 30pF		1MΩ, approx. 30pF			
Rise time	5mV/div ~ 5V/div		17.5ns		17.5ns		5.8ns		3.5ns		17.5ns		5.8ns	
1mV/div ~ 2mV/div	87.5ns		70ns											
Polarity inversion	CH2 only													
Maximum input voltage	400 V (DC + AC peak)													
Horizontal amplifier (CH1 input, not using x10 MAG)														
Operating modes	SWEEP range allows selection of X-Y display mode, CH1: Y axis, CH2: X axis													
Sensitivity	Same as vertical axis (CH2)													
Input impedance	Same as vertical axis (CH2)													
Frequency response	DC	DC ~ 200kHz		DC ~ 1MHz										
	AC	5Hz ~ 200kHz		5Hz ~ 1MHz										
X-Y phase difference	3°C or less (at 10 kHz)		3°C or less (at 100 kHz)											
Maximum input voltage	Same as vertical axis (CH2)													
Time base														
Sweep modes	A		A		A, ALT, B		A		A		A, ALT, B			
Sweep time	A	0.2μs/div ~ 1s/div ± 3%		0.2μs/div ~ 0.2s/div ± 3%		0.2μs/div ~ 0.2s/div ± 3%		50ns/div ~ 0.2s/div ± 3%		0.2μs/div ~ 0.2s/div ± 3%		0.2μs/div ~ 0.2s/div ± 3%		
	B	—		—		0.2μs/div ~ 0.5ms/div ± 3%		50ns/div ~ 0.5ms/div ± 3%		—		0.2μs/div ~ 0.5ms/div ± 3%		
Magnified sweep	5 times ± 5%		—		10 times ± 5%		—		5 times ± 5%		10 times ± 5%			
Delay method	—		—		Continuous delay, SYNC delay		—		—		Continuous delay, SYNC delay			
Delay jitter	—		—		10000:1		—		—		10000:1			
Hold-off	A sweep: Continuously adjustable from NORM position													
Triggering														
Trigger source	CH1, CH2, ALT, LINE, EXT													
Mode	AUTO, NORM													
Trigger coupling	AC, DC, TV-V, TV-H													
Trigger sensitivity														
NORM	INT	10Hz ~	0.5 div	30Hz ~	0.5 div	10Hz ~	0.5 div	10Hz ~	0.5 div	30Hz ~	0.5 div	10Hz ~	0.5 div	
		EXT	2MHz	0.1Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p
	EXT	10Hz ~	1 div	2Hz ~	1.5 div	2Hz ~	1.5 div	2Hz ~	1.5 div	2Hz ~	1.5 div	2Hz ~	1.5 div	
		INT	20MHz	0.2Vp-p	20MHz	0.6Vp-p	60MHz	0.6Vp-p	100MHz	0.6Vp-p	20MHz	0.6Vp-p	60MHz	0.6Vp-p
AUTO	INT	50Hz ~	0.5 div	30Hz ~	0.5 div	30Hz ~	0.5 div	30Hz ~	0.5 div	30Hz ~	0.5 div	30Hz ~	0.5 div	
		EXT	2MHz	0.1Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p	10MHz	0.2Vp-p
	EXT	50Hz ~	1 div	30Hz ~	1.5 div	30Hz ~	1.5 div	30Hz ~	1.5 div	30Hz ~	1.5 div	30Hz ~	1.5 div	
		INT	20MHz	0.2Vp-p	20MHz	0.6Vp-p	60MHz	0.6Vp-p	100MHz	0.6Vp-p	20MHz	0.6Vp-p	60MHz	0.6Vp-p
TV Sync	Extracts sync pulse from composite video signal to trigger													
Calibration voltage	1Vp-p(1kHz Square wave)		0.5Vp-p ± 2% (1kHz Square wave)											
Power requirements	50/60Hz AC100/120/220/240V						AC90V ~ 250V 50/60Hz DC12V							
Power Consumption	22W		30W		25W		30W		26W		29W			
Case dimensions	216(W)×89 (H)×298(D)mm				230(W)×75(H)×290(D)mm									
Weight	approx. 4kg													
Accessories														
Probe	PC-30 (2)		PC-30 (2)		PC-32 (2)		PC-32 (2)		PC-30 (2)		PC-32 (2)			
Carrying case	—													
Panel cover	Standard													
Hood	Standard													
Battery	—													



CS-1575A

Simultaneous Waveform and Phase Observation!

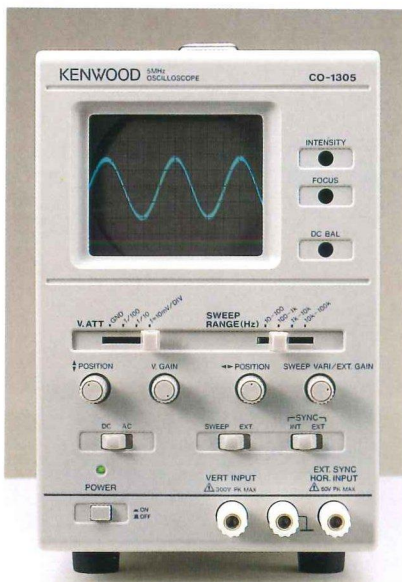
In addition to the conventional dual trace display, the CS-1575A features a new left/right waveform display and a lissajous display function which enables convenient measurement of the phase difference between two signals, overlaid with the normal waveform display. These features make the CS-1575A a truly multi-purpose oscilloscope.

Simultaneous dual-trace and lissajous pattern display

When display two traces, a lissajous pattern, enabling convenient measure-

ment of the phase between the two signals, may be displayed simultaneously with the waveforms.

High-Quality Scopes with All the Sensitivity.



The CO-1305 is a compact, lightweight oscilloscope using a 75mm CRT. It features high sensitivity of 10mV/div, and a wide frequency response of DC to 5MHz. The sweep frequency covers the range of 10Hz to 100kHz, in addition to internal sync, external sync may also be used. By disabling the sweep, Lissajous patterns may also be displayed.

CO-1305

Zero degree phase and lissajous pattern display

When only the lissajous pattern is being displayed, the zero degree waveform (raised intensified line at the right) may be simultaneously displayed, if desired.

Convenient dual trigger

For single and dual-trace displays, automatic trigger source selection is performed. Also, an auto free-run function is provided for CH1 and CH2 independently, enabling stable triggering for one waveform even if the other waveform is not present.

- Automatic switching of CHOP and ALT depending upon the sweep range
- LINE sync
- High-sensitivity X-Y display using CH1 to drive the Y axis and CH2 to drive the X axis
- Auto free-run mode enables the display of the trace even with no signal present

SPECIFICATIONS

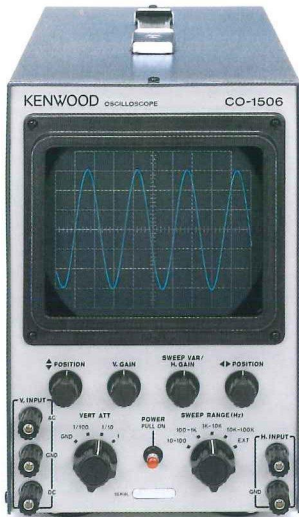
CRT:	130mm Round type, Phosphor P31
Vertical amplifier (CH1 & CH2 identical)	
Operating modes:	CH1, CH2, Dual-H, Dual-V & X-Y
Attenuator:	1/1, 1/3, 1/10, 1/30, 1/100 & 1/300 (6 ranges)
Freq. response:	DC to 5MHz (-3dB) 5Hz to 5MHz (-3dB)
Input impedance:	1M Ω , 30pF
Horizontal amplifier (CH2 input)	
Sensitivity:	Same as vertical CH2
Freq. response:	DC to 1MHz (-3dB)
Time base	
Sweep mode:	Auto free-run sweep
Sweep freq.:	10Hz to 100kHz (6 ranges)
Triggering	
Source:	CH1, CH2, LINE, DUAL & EXT
Coupling:	AC
Sensitivity:	
INT:	1 div (20Hz to 5MHz)
EXT:	1Vp-p (20Hz to 5MHz)
Calibration voltage:	0.6Vp-p (Line freq.)
Power requirements:	100/120/220/240VAC, 50/60Hz, 25W
Dimensions:	260(W) x 190(H) x 375(D) mm
Weight:	8kg
Accessories:	Instruction manual (1), Cable CA-41 (2)

- High-sensitivity vertical axis (10mV/div) and a wide frequency bandwidth of DC to 5MHz.
- This model is small in size and lightweight, the panel is designed vertical.

This enables to put in narrow space and in suitable for use production benches and portable applications.

SPECIFICATIONS

CRT:	75mm Round type, Phosphor P31
Vertical amplifier	
Sensitivity:	10mV/div
Attenuator:	1/1, 1/10, 1/100 & GND
Freq. response:	DC to 5MHz (-3dB) 2Hz-5MHz (-3dB)
Input impedance:	1M Ω 50pF
Horizontal amplifier	
Sensitivity:	300mV/div
Freq. response:	DC to 250kHz
Sweep freq.:	10Hz to 100kHz(4ranges)
Trigger source:	INT & EXT
Power requirements:	100/120/220/240V AC 50/60Hz 15W
Dimensions:	130(W) x 190(H) x 280(D)mm
Weight:	3.5kg
Accessories:	Instruction manual(1), Cable CA-46(1)



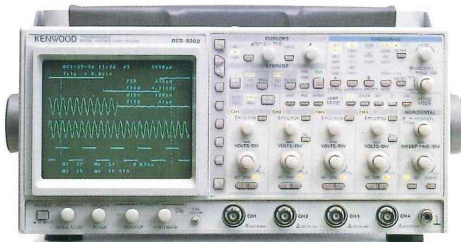
CO-1506

The CO-1506 is an oscilloscope employing a 130mm cathode ray tube. Its vertical sensitivity is 20mV/div and its frequency bandwidth of DC to 1.5MHz. This oscilloscope is ideal for observing waveforms. It can be used in a wide range of application for not only production process but also service and educational purposes.

- It has a high vertical sensitivity of 20mV/div and a wide frequency bandwidth of DC to 1.5MHz
- This model is small in size and light weight, the panel is designed vertical. This enables to put in narrow space and in suitable for use in production benches.

SPECIFICATIONS

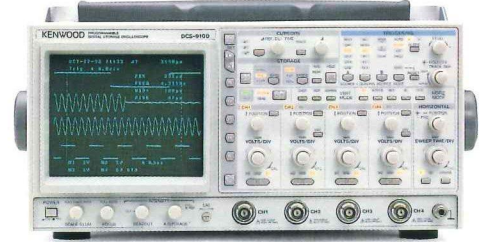
CRT:	130mm Round type, Phosphor P31
Vertical amplifier	
Sensitivity:	20mV/div
Attenuator:	1/1, 1/10, 1/100 & GND
Freq. response:	DC to 1.5MHz (-3dB)
	2Hz to 1.5MHz (-3dB)
	1MΩ, 35pF
Horizontal amplifier	
Sensitivity:	500mV/div
Freq. response:	DC to 250kHz
Sweep freq.:	10Hz to 100kHz (4 ranges)
Trigger source:	INT & EXT
Power requirements:	100/117/230VAC, 50/60Hz, 15W
Dimensions:	150(W)×220(H)×410(D) mm
Weight:	6.2kg
Accessories:	Instruction manual (1), Cable CA-46 (1)



DCS-9300 (100MS/s simultaneous 4ch)
16K word/ch memory 100MHz 4ch real time



DCS-9320 (100MS/s simultaneous 2ch)
16K word/ch memory 100MHz 4ch real time



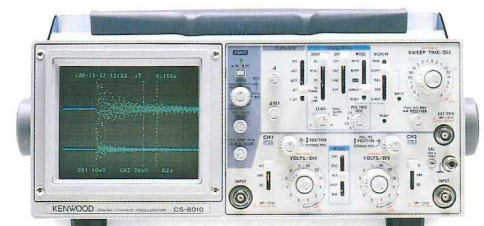
DCS-9100 (40MS/s simultaneous 4ch)
16K word/ch memory 100MHz 4ch real time



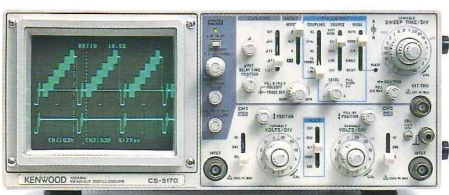
DCS-9120 (40MS/s simultaneous 2ch)
16K word/ch memory 100MHz 4ch real time



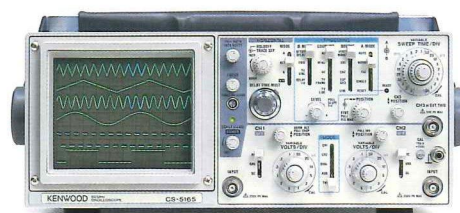
DCS-8200 (20MS/s simultaneous 2ch)
16K word/ch memory 50MHz 2ch real time



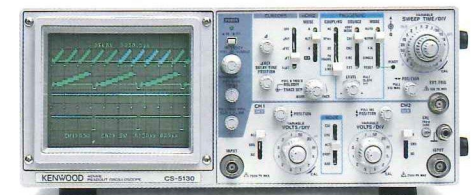
CS-8010 (10MS/s simultaneous 2ch)
2K word/ch memory 20MHz 2ch real time



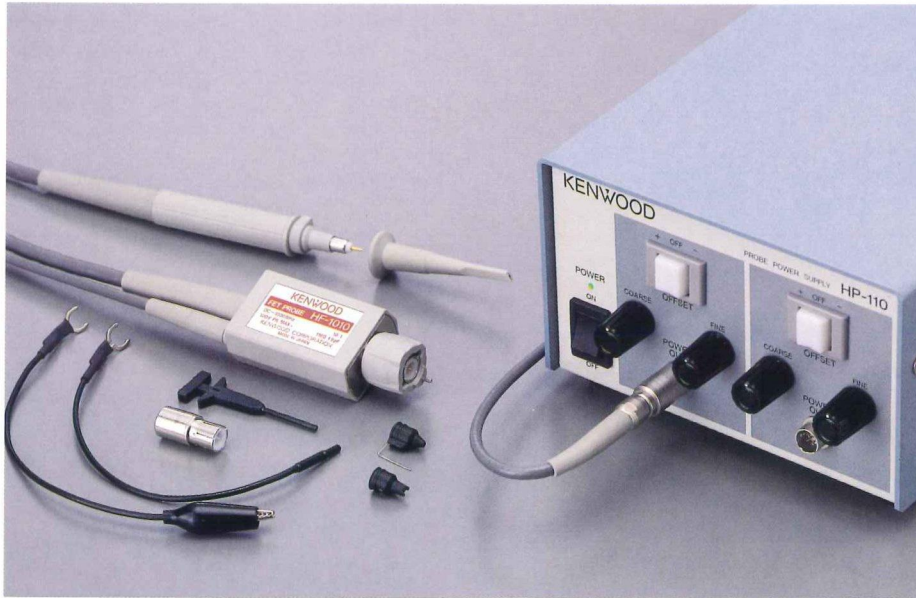
CS-5170 (100MHz/1mV 2ch)
CS-5175 (100MHz/1mV 2ch)



CS-5165 (60MHz/1mV 3ch)
CS-5155 (50MHz/1mV 3ch)



CS-5130 (40MHz/1mV 2ch)
CS-5135 (40MHz/1mV 2ch)



Capture High-frequency signals reliably HF Series low-capacity FET probes

To take a best advantage of the performance of an oscilloscope, the characteristics of the probe through which the signal enters the oscilloscope are most important. Most oscilloscope probes have a large input capacity and this imposes a load on non-measuring circuits, which has an adverse influence when measuring high-speed pulses and high-frequency signals. To solve this problems, Kenwood has developed a series of low-capacity FET probes. By utilizing its long experience with high frequency technology, Kenwood employs an high impedance and low capacity high-frequency FET in the input sections of its HF Series probes to suppress any influence on the circuits not used for measurement and to acquire measured values from the actual signal waveform.

- Input capacity is low, so that when measuring high-speed pulses and high-frequency signals there is no adverse influence on non-measuring circuits.
- By employing protective circuitry, damage caused by static electricity and excessive inputs can be avoided to the maximum extent.
- The probes have a wide frequency response, so that high-frequency signals can be transmitted with high reliability.
- The output impedance of the probe is set to 50 ohm, so that it can be directly connected to high frequency measurement equipment.
- By connecting a TA-63 feed-through 50-ohm terminal resistor, it can be connected to an oscilloscope with an input impedance of 1 Mohm.
- A variety of adapters are provided for different purposes.

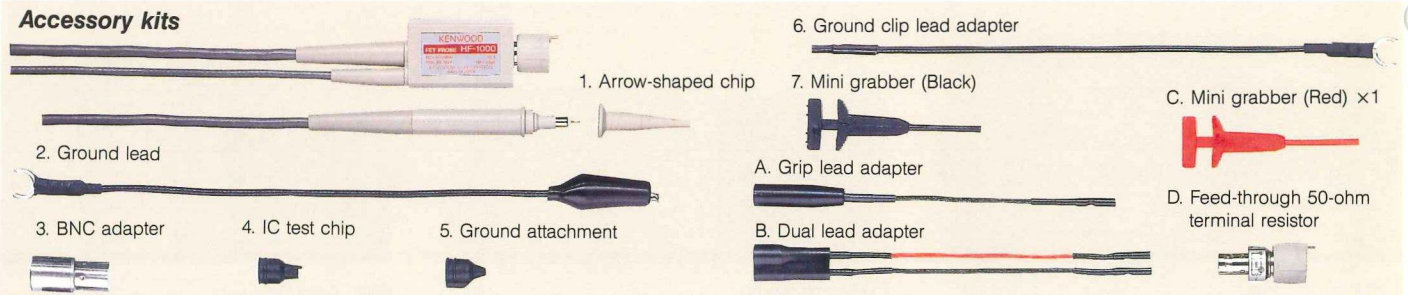
Regulated power supply HP-100/HP-110 for probes



SPECIFICATIONS

Corresponding models (HP-100).....	HF-500/HF-800/HF-1000
(HP-110).....	HF-510/HF-810/HF-1010
DC offset.....	Without function (HP-100)/with function (HP-110)
Output voltage.....	DC $\pm 12V$, $\pm 5\%$
Ripple voltage.....	less than 5mVp-p
Terminal.....	2
Power supply.....	110V AC (90 ~ 132V AC) 50/60Hz 230V AC (198 ~ 250V AC) 50/60Hz
Power consumption.....	10W
Dimensions (mm).....	HP-100: 134(W) \times 60(H) \times 181(D) HP-110: 134(W) \times 80(H) \times 181(D)
Weight.....	approx. 1kg (HP-100) / approx. 1.2kg (HP-110)

Accessory kits



SPECIFICATIONS

Models	HF-500	HF-510	HF-800	HF-810	HF-1000	HF-1010
Frequency band	DC ~ 500MHz (-3dB)		DC ~ 800MHz (-3dB)		DC ~ 1000MHz (-3dB)	
Rise time	less than 700ps		less than 438ps		less than 350ps	
Damping ratio	1/10 $\pm 2\%$					
Input impedance	1M Ω $\pm 5\%$					
Input capacity	2.15PF ± 0.3 PF			1.9PF ± 0.3 PF		
Output offset voltage	less than ± 15 mV					
Maximum input voltage	$\pm 100V$ (DC+AC peak)					
*Dynamic range	0 ~ $\pm 7.0V$					
DC offset voltage	—	0 ~ $\pm 20V$	—	0 ~ $\pm 20V$	—	0 ~ $\pm 20V$
Regulated voltage	DC $\pm 12V$ ~ 15V $\pm 5\%$ (± 74 mA)					

Cable length: 1.5 m, Weight: approx. 180 g (probe itself: 35g)

*Note: Connectors with different standards are provided for units with DC offset and without DC offset. The same parts as TA-61 are supplied with the probe.

Accessory kits

- TA-61
 1. Arrow-shaped chip
 2. Ground lead
 3. BNC adapter
 4. IC test chip
 5. Ground attachment
 6. Ground clip lead adapter
 7. Mini grabber (Black)
- TA-62
 - A. Grip lead adapter
 - B. Dual lead adapter
 - C. Mini grabber (Red) $\times 1$
 7. Mini grabber (Black) $\times 1$
- TA-63
 - D. Feed-through 50-ohm terminal resistor

ACCESSORIES/OPTION PARTS

Description	Model	CS-6040	CS-6030	CS-5275	CS-5270	CS-5265	CS-5260	CS-5235	CS-5230	CS-5175	CS-5170	CS-5165	CS-5155	CS-5140	CS-5135	CS-5130	CS-4035	CS-4026	CS-4025	CS-3067	CS-3027	CS-3025	CS-3026	CS-3066	CS-3076	CS-1575A	CO-1305	CO-1506			
Cable	CA-36																												•	•	
Cable	CA-41	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Cable	CA-43	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Cable	CA-46																										•	•			
Scope Cart	MB-87	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•									•					
Probe	PC-30													•							•	•	•			•					
Probe	PC-31	•	•		•		•		•			•																			
Probe	PC-33							•						•																	
Probe	PC-35															•	•	•													
Probe	PC-39			•		•			•		•	•							•					•	•						
Rack Mount Adapter	RK-1005									•	•	•	•	•	•																
Rack Mount Adapter	RK-1006															•	•	•													
Rack Mount Adapter	RK-2003	•	•	•	•	•	•	•																							
Terminal Adapter	TA-54	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
ThruLine Termination	TA-57	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
Pouch	MC-78	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•														
Battery	NP-23																		•	•											
Carrying Case	MC-81																						•								
Carrying Case	MC-82																						•								
Carrying Case	MC-84																							•	•	•					
Carrying Case	MC-85																		•	•											
Panel Cover	MD-88								•	•	•	•	•	•																	
Panel Cover	MD-89	•	•																•	•			•	•	•						
Panel Cover	MD-97																		•	•			•	•	•						
Panel Cover	MD-98			•	•	•	•	•																							
Hood	BF-7																			•	•		•	•	•						



KENWOOD



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