

Model 8103



Rear Panel

ALTERNATE/DELAYED SWEEP

Delayed sweep allows a segment of the Main (A) sweep to be expanded using a shorter B sweep that is placed in position with the DLY (delay) control. The time span of the B sweep is shown highlighted on the A trace and the B trace can be observed by itself. Alternate sweep shows both the highlighted A trace and the B trace simultaneously. With 3 channels and alternate sweep in use, a total of 6 traces can be set up (8 traces if CH1, CH2 sum or difference is also selected). Delay time for the B trace appears on-screen in the Model 8104.

SYNCHRONIZATION

The sync reference may be sourced from channel 1, 2, 3 or the power LINE. But with the SOURCE set to VERT the selection is automatic and depends upon the channel(s) in use. Sync MODE settings include AUTO, NORM, FIX and SINGLE. The FIX mode tracks signal amplitude to keep the trigger point within the p-p span and maintains hold despite level changes. Coupling choices include AC, HF

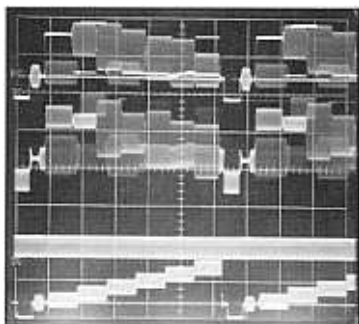
REJ, DC, TV-V and TV-H. The last two employ dedicated sync separators to ensure rock-solid video waveforms.

EXTRAS

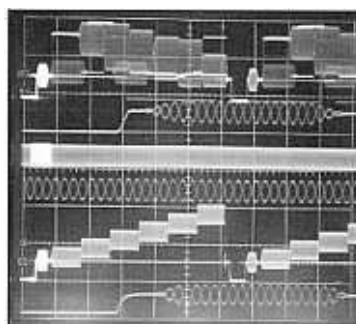
Features worthy of consideration include X-Y operation needed for Lissajous patterns of stereo signals or setup of raster displays, triggered-delayed sweep where the B trace waits for the next trigger after the delay time, SINGLE SWEEP where the trace is armed and ready to catch random or one-time events, CH1 output (rear panel) that allows the CH1 amplifier to be used as a high-gain, calibrated preamp, Z-AXIS INPUT (rear panel) for blanking and/or marker-spot injection in sweep work and in raster displays and an internally-etched illuminated graticule with continuously variable ILLUM control.

KEY POINT

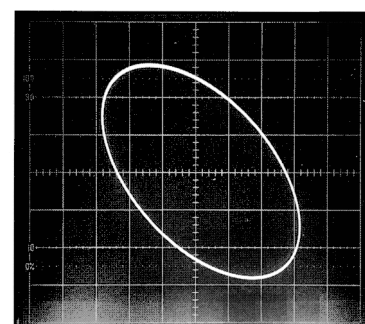
THE 8104 AND 8103 ARE IDENTICAL EXCEPT THAT THE 8104 OFFERS CRT READOUT AND CURSORS



Top to Bottom:
CH1, CH1-CH2, CH2, CH3



CH1, CH2, CH3
Alternate A & B Traces



X-Y Stereo
Lissajous Pattern

100-MHZ 3-CHANNEL OSCILLOSCOPES

KEY SPECIFICATIONS (MODELS 8104, 8103)

CRT READOUT FUNCTION

(8104)

Setting Conditions

Vertical

Scale factors for CH1, CH2 and CH3

Corrects X10 probe

Input Coupling V-UNCAL, INVert, ADD

Horizontal

A & B TIME BASE scale factors

includes MAG conversion, H-UNCAL,

MAG X10, delay time (when cursors not used), X-Y

CURSOR MEASUREMENTS

Number of Cursors

2 cursors (vertical or horizontal)

Voltage Difference (ΔV)

Voltage between Δ and REF cursors

Voltage Difference ($\Delta V\%$)

Voltage difference in % between Δ and REF cursors with a full scale of 5 div = 100%

Time Difference (ΔT)

Time interval between the Δ and REF cursors

Time Difference Ratio ($\Delta T\%$)

The time ratio in % between the Δ and REF cursors with a full scale of 5 div = 100%

Frequency (1/ ΔT)

Frequency between Δ and REF cursors

Phase Difference

Indicates the difference in degrees between the Δ and REF cursors with a full scale of 5 div = 360°

VERTICAL DEFLECTION

Bandwidth (-3 dB)

5 mV/div - 5 V/div, CH1/CH2

dc coupled: dc to 100 MHz

ac coupled: 5 Hz to 100 MHz

1 mV/div - 2 mV/div

dc coupled: dc to 20 MHz

ac coupled: 5 Hz to 20 MHz

0.1 V/div, CH3

dc coupled: dc to 100 MHz

Rise Time (All Channels)

3.5 ns (5 mV/div - 5 V/div)

17.5 ns (1 mV/div - 2 mV/div)

Signal Delay (All Channels)

Displays fast trigger edges

Deflection Coefficients (CH1/CH2)

1 mV/div to 5 V/div in 12 calibrated steps, 1-2-5 sequence (20 MHz bandwidth at 1 mV/div and 2 mV/div settings)

Deflection Coefficient (CH3)

0.1 V/div

Accuracy, CH1/CH2

± 3%, 5 mV/div - 5 V/div

± 5%, 1 mV/div - 2 mV/div

Accuracy, CH3

± 3%

Input Coupling

AC, HF-REJECT, DC, TV-V, TV-H, DC, CH3

Input Impedance

1 M Ω ± 2%, 25 pF approx.

Maximum Input

250 V (dc plus ac peak), CH1/CH2

50 V (dc plus ac peak), CH3

Display Modes

CH1, CH2, ALternate, CHOP, ADD, subtract (CH2 invert)

CH3, CH1/CH2/CH3, add (8 trace)

Chop Frequency

250 kHz

Output

CH1 output on rear panel, 50 mV per div of CRT deflection into 50 Ω 100 Hz - 100 MHz

EXTERNAL HORIZONTAL

DEFLECTION

(X-Y MODE)

X-Axis

Via CH2 vertical amplifier

Y-Axis

CH1

Sensitivity

Same as CH1/CH2

Input Impedance

Same as CH1/CH2

X-Axis Bandwidth (-3 dB)

dc: dc to 1 MHz

ac: 5 Hz to 1 MHz

Phase Shift

< 3° at 100 kHz

INTERNAL HORIZONTAL

DEFLECTION

Display Modes

Main time base, main time base intensified by delayed time base, Main and delayed alternate time base, delayed time base, delayed time base triggered

Main Time Base

50 ns/div to 0.5 s/div in 22 steps,

1-2-5 sequence

Delayed Time Base

50 ns/div to 50 ms/div in 19 steps,

1-2-5 sequence

Accuracy

± 3%, ± 5% with X10 MAG on, ± 8% with X10 MAG, 50 ns/div to 0.5 μ s/div

Magnifier

X10 mag sets max sweep rate to 5 ns/div

Delay Time Jitter

1 part in 10,000

Delay Time

Numerically indicated on CRT (8104)

MAIN TIME BASE TRIGGERING

Sources

CH1, CH2, CH3, VERT (alternate), Line

Modes

AUTO, NORMal, FIX (p-p), SINGLE

Coupling

AC, HF-REJECT, DC, TV-V, TV-H

type

+ or - (also applies to video polarity)

Sensitivity

	Freq. Range	Sensitivity
NORM	dc - 50 MHz	1 div
	dc - 100 MHz	1.5 div
AUTO	40 Hz - 50 MHz	1 div
	40 Hz - 100 MHz	1.5 div
FIX	40 Hz - 50 MHz	1.5 div
	40 Hz - 100 MHz	2 div
AC	At 10 Hz or lower, the minimum trigger amplitude increases	
HF-REF	At 10 Hz or lower and 30 kHz or higher, the minimum trigger amplitude increases	
TV-V, TV-H	1.5 div	

Relative Holdoff

Permits stable triggering on complex and long wave trains

DELAYED TIME BASE TRIGGERING

Modes

Immediate

Delayed time base begins immediately after delay

Triggered

Delayed time base begins on the first trigger after delay

Z-AXIS (INTENSITY) MODULATION

Input Level

TTL compatible (blanked at TTL high)

Maximum Input

50 V (dc plus ac peak)

Input Impedance

10 k Ω approx.

Bandwidth

dc - 5 MHz

INTERNAL CALIBRATION

Output

1.0 V p-p ± 3%

Waveform

Squarewave, 1 kHz nominal

CRT DISPLAY

Graticule

Internal, illuminated 8 x 10 div

Accelerating Potential

12 kV/2 kV (PDA)

Focus

Front panel FOCUS and ASTIGmatism

Trace Alignment

Front panel trace rotation control

POWER REQUIREMENTS

100, 120, 220, 240 V ac ± 10%

50/60 Hz, 48 W (8104)

43 W (8103)

PHYSICAL

Size (W x H x D)

12 x 6 x 15³/₄ in.

300 x 150 x 400 mm

Weight

19.1 lbs., 8.7 kg

SUPPLIED ACCESSORIES

2 Probes (LP-103) Model 8104

(LP-102) Model 8103

Adjusting Screwdriver

1 Spare Fuse

AVAILABLE ACCESSORIES

Probe Pouch (LP-2088)

Rackmount Adapter (LR-2428I)

Front Cover (LC-2136)

Probe (LP-100X)