

100MHz four-channel oscilloscope

Advanced display facilities for realtime analysis up to 100MHz

Multi-source triggering

Trigger view as fifth channel

Simultaneous display of MTB and DTB

Portable with battery operation for field use

The PM 3264 offers a unique solution to many timing problems in digital electronics. Simultaneous display of 4 or 5 input signals provides a quick and convenient method for realtime analysis of digital signals both at component and system level.

A versatile deflection system provides many user-benefits. For example, any combination of up to five input signals and two different modes can be selected by push-buttons. The sensitivity of the channels includes 2mV/div up to 400V per screen, using the standard 1:10 attenuator probes.

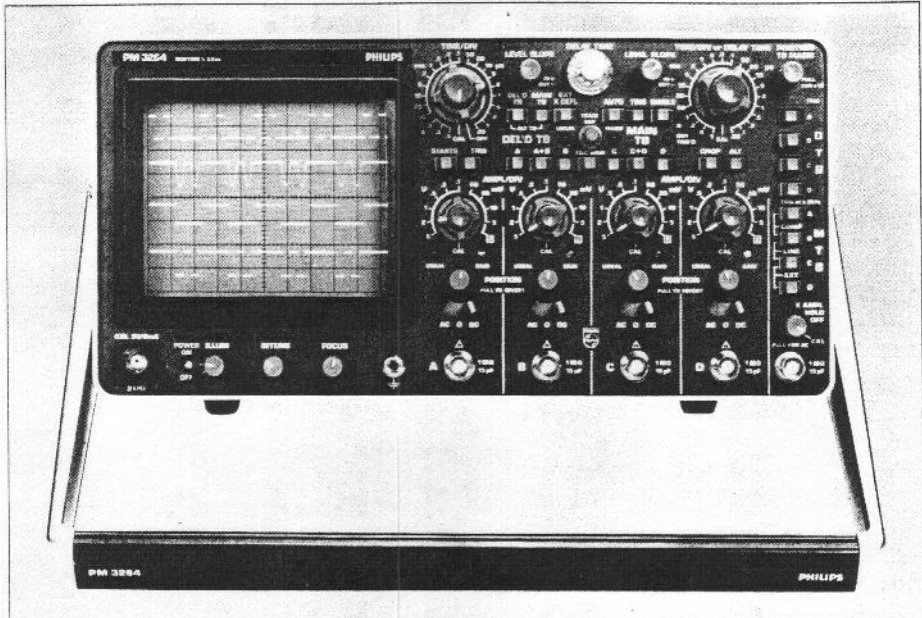
A flexible triggering system allows the main and delayed time bases to be triggered independently by any of the four input channels. Also, an external trigger and composite trigger are provided.

The alternate time base facility permits a quick reference for magnified displays with respect to the original waveform. The multiple trace display demands a CRT with very high light output. Philips has designed a special tube with 17kV pda which provides a more than-adequate sharp, bright, spot. With all the foregoing facilities, the PM 3264 remains a typically compact, portable, oscilloscope which is also extremely simple to use.

The various facilities are summarized as follows:

- four channels to show signal relationship in time
- multi-source triggering to add display flexibility
- trigger-view to relate triggering *directly* to the four-channel display
- other features like differential displays and composite triggering to extend performance
- two time bases to allow signal detail to be picked out from the data stream
- alternate time base mode to allow signal details to be *directly* related to data stream

Moreover, facilities can be permutated, with virtually no limitation. For example, main and delayed time bases can be *independently* triggered from any of the four channels. Or the alternate time base mode can be employed with a differential display



and the original four channels to give a 12-trace display.

Trigger view

PM 3264 features the ultimate in multi-sourced triggering, with independent selection of main and delayed time bases from any of the four channels plus composite, line and external triggering on the main time base. It is therefore essential that the relationship between the various displays and the triggering signal is always clear and this is provided by the trigger view facility. At the touch of a button the actual trigger signal is displayed as a "fifth" channel, so that there can be no possibility of display ambiguity.

Alternate time base mode

This mode is obtained simply by pushing both the main and delayed time base controls together. It enables the delayed time base signal details to be displayed at the same time as the intensified main time base signals. In this way signal details can be *directly* related to the data stream.

X-Y displays

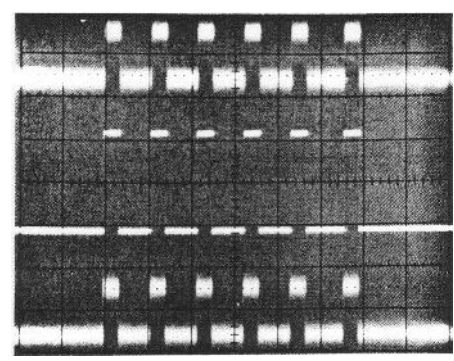
X-Y displays are further evidence of the advanced display capability of the PM 3264. The independent triggering facilities allow

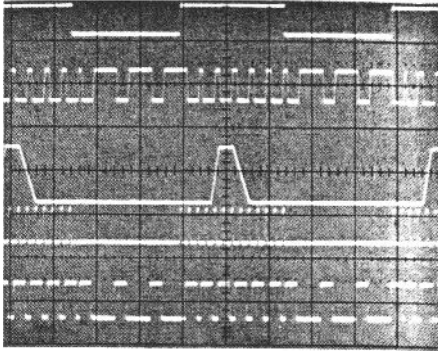
any one of four channels to be displayed against an X-input signal or against any of the four vertical inputs.

Composite triggering

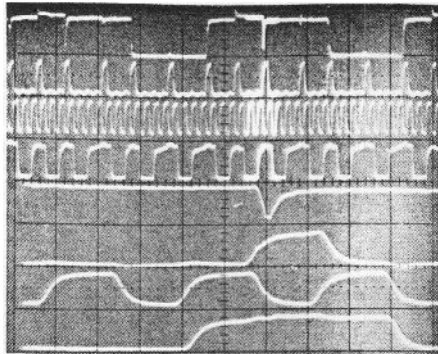
Single-channel triggering shows the exact relationship between the displayed signals. Composite triggering, however, allows signals that are not related in time or phase to be displayed and compared. This facility can be used in a variety of ways, for example rise times or waveform aberrations can be compared and measured regardless of the

All channels can be inverted and combined for obtaining differential displays. The oscillogram shows how noise is suppressed by addition of two balanced signals displayed on channel A and -B.

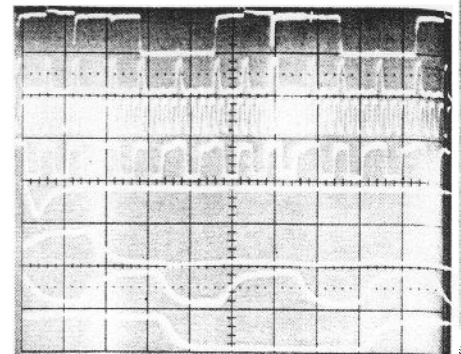




4-channel display with trigger view showing relationship of all signals to the external triggering source. Note the high light output levels.



Glitch has been picked out from channel A and is clearly displayed using the alternate time base mode.



Fully independent triggering allows delayed time base to be set to trigger on channel A, which allows detailed investigation at any time base speed.

time span between signals or the frequency relationship.

Logic triggering too

The PM 3264 is the ideal complement to a logic analyzer since it shows realtime relationships and signal details, such as glitches, in their actual, analog waveform.

Very easy operation

PM 3264 is a highly sophisticated instrument but the front panel could not possibly be simpler or more logical. Channel selection is made, for example, directly above the relevant channel controls. Trigger selection for main and delayed time bases is also logically grouped. This simplifies and speeds up measurements and allows the oscilloscope to be used for virtually all applications and production testing.

In addition the PM 3264 is light, easy to transport and hence ideal for field work, a facility that can be extended via the optional battery pack.

TECHNICAL SPECIFICATION

CRT

Type
Philips rectangular domed mesh-type tube with 17kV acceleration potential and metal-backed phosphor

Screen type
P31 (GH phosphor standard)

Useful screen area
8 x 10div. of full centimeters

Graticule
Internal graticule with centimeter divisions and 2mm subdivisions along the central axes. 10% and 90% lines are indicated. Illumination continuously variable.

VERTICAL OR Y-AXIS

Response
DC: 0 Hz...100 MHz (35 MHz at 2mV)
AC: 7 Hz...100 MHz

Rise time
3.5ns

Deflection coefficients
2mV...5V/div.
in steps in 1-2-5 sequence. Uncalibrated continuous control between steps 1: > 2.5

Display modes

- Channel A, B, C or D
- A + B, C + D, Trigger view
- any combination of these channels
- Multiple display chopped at 1 MHz or Alternate
- Any channel may be inverted except Trigger view

CMRR
> 100:1 up to 2 MHz
> 20:1 at 50 MHz

Input impedance
1 MΩ ± 2% in parallel with 15pF approx. RC time, AC coupled: 22ms

Maximum input voltage
400V_{DC} + AC_{pk}, derating above 500kHz

Maximum deflection
Undistorted deflection of 24div. up to 35MHz Shift range 16div.

Signal delay
15ns visible delay

Trigger view
Display: External or internal trigger signal
Deflection coefficient external: 100 mV/div
Trigger point: Screen centre ± 0.3div.
Time delay between vertical input and external input: 3ns

HORIZONTAL OR X-AXIS

Horizontal deflection can be obtained from either the main time base or the delayed time base or a combination of the two, or from the signal source selected for X-deflection.

In this case X-Y diagrams can be displayed using A, B, C, or D the EXT connector or the Line as a signal source.

Horizontal display modes

- Main time base
- Main time base intensified by delayed time base
- Delayed time base
- Main time base and delayed time base simultaneously displayed (alternate)
- X-Y operation with X-deflection by A, B, C, D line or EXT source

HORIZONTAL AMPLIFIER

Response
DC...2MHz (-3dB)

Deflection coefficient
50mV/div. using EXT connector.
Uncalibrated continuous control 1: > 3.
When A, B, C or D are used, sensitivity is 2mV...5V/div.

Measuring accuracy
± 3%

Phase error
3° at 100kHz

MAIN TIME BASE MODES

- Auto
- Triggered (RC time 100ms)
- Single shot

Time coefficient

1s...50ns/div. in 23 calibrated steps, in 1-2-5 sequence. Uncalibrated continuous control between steps (with UNCAL warning lamp should delayed time base be set out of calibration). x 10 magnifier extends max. sweep rate to 5ns/div.

Accuracy
± 2% (+20°C...+30°C)
± 3% (+ 5°C...+40°C)
Additional error for magnifier ± 1%

Variable hold-off
Sweep hold-off time can be increased by a factor of 10

DELAYED TIME BASE

Modes

Delayed time base starts, either immediately after the delay time or, upon arrival of the first trigger pulse after the delay time.

Time coefficients

0.5s...50ns/div. in 22 calibrated steps, 1-2-5 sequence. Uncalibrated continuous control between steps. (with UNCAL warning lamp should main time base be set out of calibration). x 10 magnifier extends max. sweep rate to 5ns/div.

Accuracy

± 2% (+20°C...+30°C)
± 3% (+ 5°C...+40°C)
Additional error for magnifier ± 1%

Calibrated sweep delay

Continuous calibrated control between 0 and 10 x main time base setting.

Incremental delay time accuracy

0.2% typical

Delay time jitter

Better than 1:30 000

TIME BASE TRIGGERING

Trigger source

Internal A, B, C, D Composite, line, External.

Slope

+ or -

Level range

Internal: 24div.
External: + 1.2V to - 1.2V

Trigger sensitivity

	30MHz	100MHz
	0.5div	1.5div
Ext	50mV	150mV

Trigger coupling

DC: DC...full bandwidth
AC: 100Hz...full bandwidth

Ext. trigger input impedance

1 MΩ ± 2% in parallel with 15pF approx.

Maximum allowable input voltage

400V_{DC} + AC_{pk}

Trigger jitter

Better than 0.5ns

DELAYED TIME BASE TRIGGERING

Trigger source

Internal: A, B, C or D
For **Slope, Level range** and **Sensitivity** see MAIN TIME BASE TRIGGERING

CALIBRATION

Calibrated voltage

3V_{p-p} ± 1% square wave

Calibrated current

6mA_{p-p} ± 2% square wave

Z-MODULATION

Input

DC-coupled, TTL compatible, "HIGH" level blanks the display

Input impedance

Maximum input voltage

50V

Response time

35ns

POWER

Line voltages and frequencies

AC: 100...127V and 220...240V, 46...440Hz
DC: 250...350V

Power consumption

50W at nominal line voltage

Dimensions and weight

(wxhxd) 316 x 154 x 460mm
(12.4 x 6.1 x 18-in)
11kg (24lb)

ENVIRONMENTAL CAPABILITIES

The environmental data is valid only if the instrument is checked in accordance with the official checking procedure. Details of these procedures and failure criteria are supplied on request by the PHILIPS organization in your country, or by PHILIPS TEST AND MEASUREMENT DEPARTMENT, EINDHOVEN, THE NETHERLANDS.

Ambient temperatures

Rated range of use: +5°C to +40°C
Limits for operation: -10°C to +55°C
Storage and transport: -55°C to +75°C

Altitude

Operating: to 5000m (15 000ft)
Non-operating: to 15 000m (45 000ft)

Humidity

21 days cyclic damp heat 25°C...40°C R.H. 95%

Shock

30g: half sinewave shock of 11 ms duration:
2 shocks per direction for a total of 12 shocks

Vibration

Vibrations in three directions with a maximum of 15min per direction; 5...55 Hz and amplitude of 0.7mm_{p-p} and 4g max. acceleration.
Unit mounted on vibration table without shock absorbing material.

Recovery time

Operates within 30 minutes coming from -10° C soak, going into 60% relative humidity at +20°C room conditions.

Electromagnetic interference

Meets VDE 0871 and VDE 0875
(Grenzwertklasse B)

Safety

Safety class I according to IEC 348

ACCESSORIES SUPPLIED

Front cover with storage space
Operating and service manual
BNC-banana adapter
Contrast filter
4 x 10:1 attenuator probe PM 8928/00
Collapsible viewing hood
Cal terminal - BNC adapter

ORDERING INFORMATION

PM 3264 100 MHz oscilloscope

Power options: Philips oscilloscopes are normally delivered in accordance with local power requirements. If an alternative power option is required, the instrument can be supplied fitted with a different power setting and power cord option. In such cases, purchase orders should specify one of the following options:

- Universal Euro 220V/16A Option 001
- North American 120V/15A Option 003
- United Kingdom 240V/15A Option 004

OPTIONAL ACCESSORIES

PM 8924/00	Passive probe 1:1 (1.5m)
PM 8924/20	Passive probe 1:1 (2.5m)
PM 8928/00	HF passive probe 10:1 (1.5m)
PM 8931/00	Passive probe 100:1; 2pF (1.5m)
PM 8960/03	19-in rackmount adapter
PM 9381	Oscilloscope camera
PM 8976	Camera adapter for fixed use
PM 9366	Collapsible viewing hood
PM 8980	Long type viewing hood
PM 8991	Oscilloscope trolley
PM 8992/66	Accessory pouch
PM 8999	Stand
PM 8901	Battery pack for 3 hours continuous operation
PM 8910	Polaroid anti-glare filter