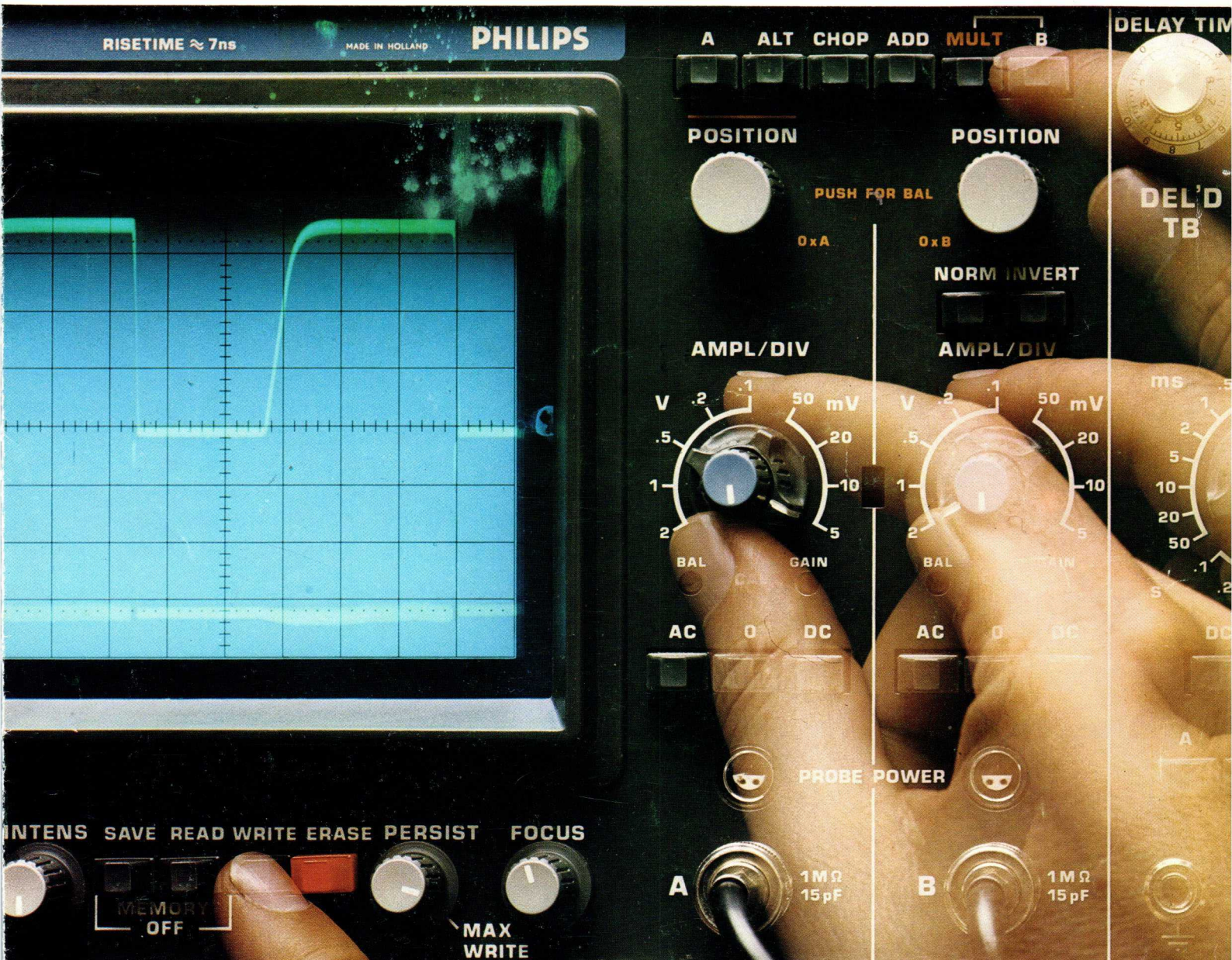


All-round 50 MHz performance plus storage plus 40 MHz multiplication



Test & Measuring
Instruments

PHILIPS



Versatile dual-trace displays to 50 MHz at 5 mV...

PM 3243 is a remarkable instrument. By combining analog multiplication with variable persistence and storage it opens up entirely new display and measurement areas. But what is really remarkable is that it gives you these advanced facilities on top of an all-round performance.

Look above at the universal triggering facilities on main and delayed timebases. The choice of channels on which to trigger. And the independent triggering of the main and delayed timebases.

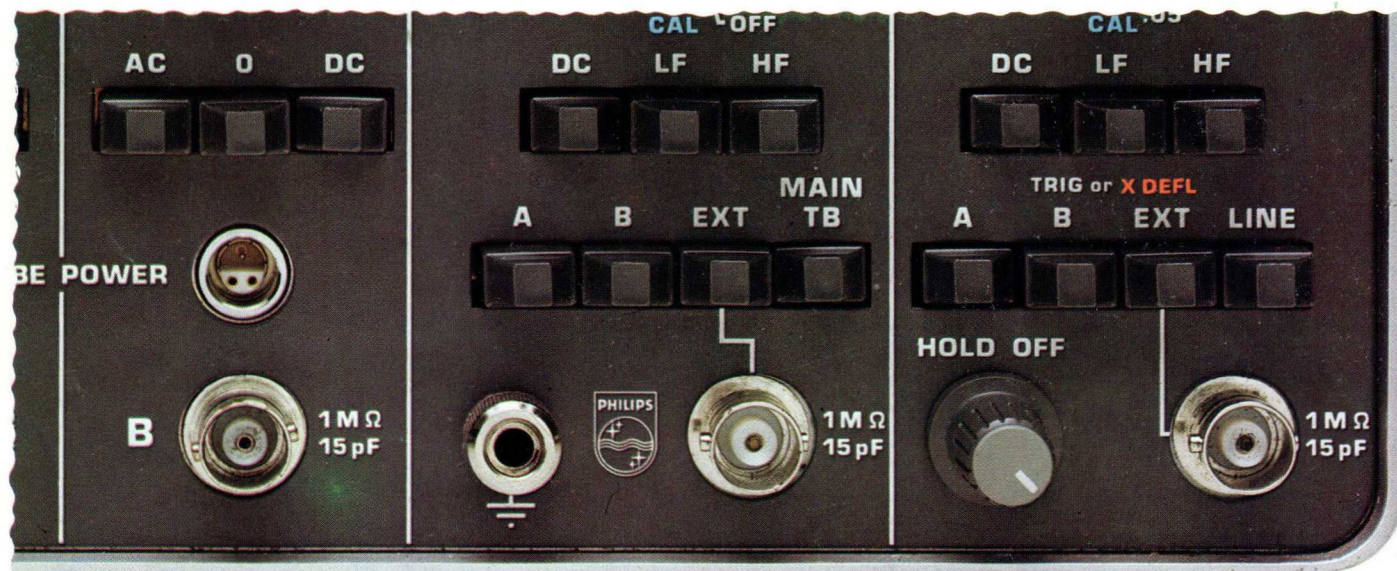
Everything you need is there. Layed out in a logical manner.

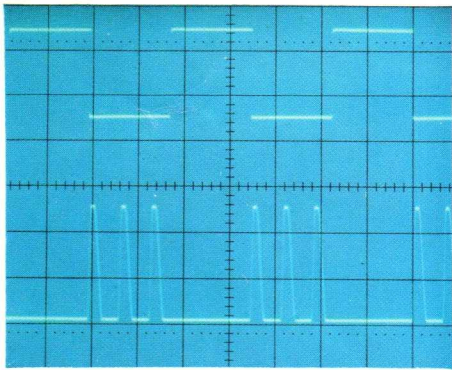
Everything is there in a compact, 10.6 kg construction

for go-anywhere, all-round performance. From almost any AC or DC supply, including an optional rechargeable battery pack.

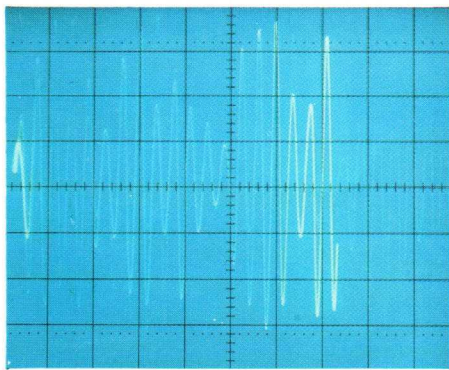
In no way and at no time does the PM 3243 sacrifice specification for its special facilities. So in this way your investment in an advanced R&D instrument is spread around and thereby improved.

... in compact 10.6 kg construction

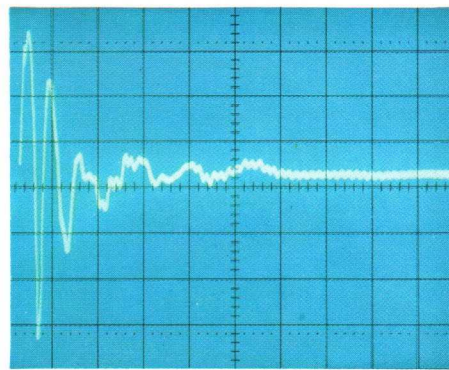




PM 3243 used as a conventional dual-trace instrument. Note the small spot size and excellent resolution.



Example of how variable persistence can be set so that a trend is displayed, the old trace fading away as a new one is written.



A classical use of storage to hold a single-shot event for subsequent analysis.

... plus variable persistence and storage

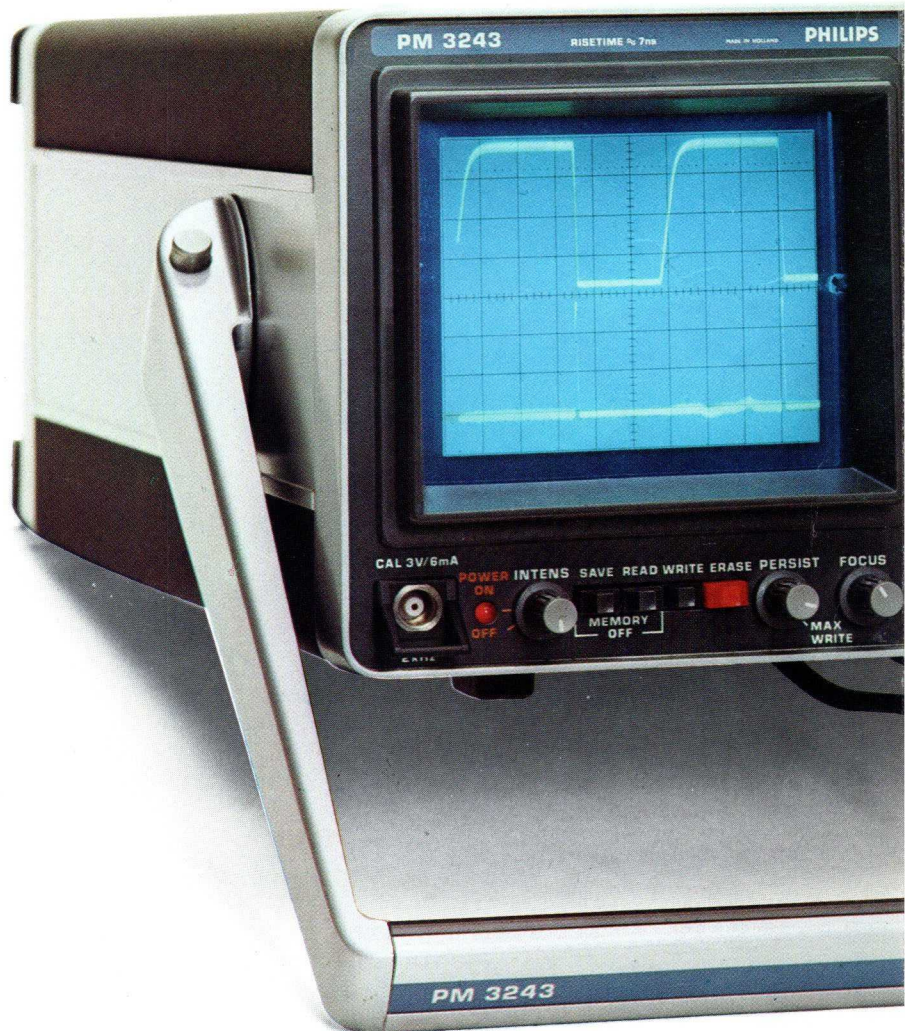
In addition to an all-round performance the PM 3243 also offers the dual advantages of variable persistence and variable storage. This allows, for example, low frequency signals to be displayed without flicker and clear displays of fast pulses with low repetition rates to be obtained.

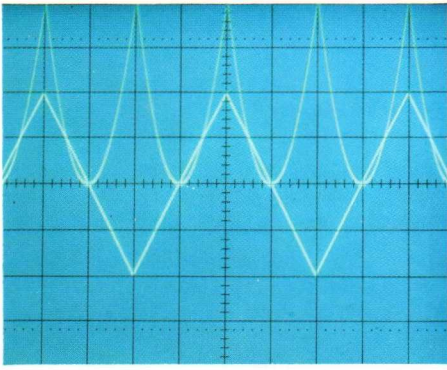
The variable persistence control can be set to give a conventional display or a display having a variable persistence from 0.3 s to 1.5 min. If the trend of a signal is changing, the persistence can be adjusted to display the trend. Several signals can be shown together, or the controls set to allow the old trace to fade away as a new trace appears.

Transients can also be displayed and analysed easily. Setting the persistence to maximum allows retention of the signal up to 1.5 min. And by using a storage save control, up to 15 min. of storage is possible. A fast

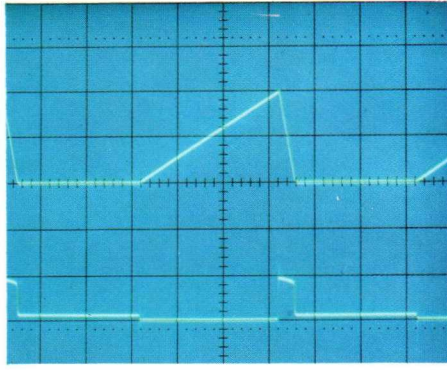
write mode allows even very fast risetime signals to be stored with ease. Power transients measured with the multiplying facility can also be

stored for later analysis, a feature that is ideal for destructive testing applications.

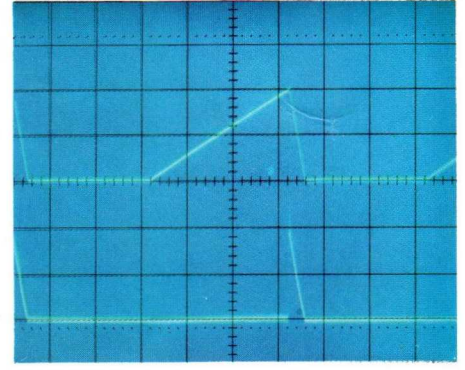




Basic multiplication example. On one channel $f(x) = x$ and $-x$ in a triangular waveform. On the other channel the product $f(x) = x^2$ (the parabolic shape). Note that both waveforms are displayed simultaneously.



A practical example of multiplication. The first oscillogram shows V_{ce} and I_c of a transistor used in an integration circuit (conventional dual-trace display). In the second oscillogram the product is shown i.e.



the power dissipated in the transistor, together with V_{ce} (I_c alternatively possible). With suitable attenuator scaling, powers can be displayed and measured over the range μW to kW .

... plus 40 MHz analog multiplier

The built-in multiplier of the PM 3243 has an impressive 40 MHz bandwidth, which is much higher than that of even the most expensive external

multipliers that are typically 5 or 10 MHz. It uses a much improved version of the variable transductance principle. The heart of the system

is a single monolithic chip containing a double differential amplifier with cross-coupled collectors. It is of the four quadrant type, ensuring correct representation of all incoming polarities.

The multiplying facility can be used for a wide variety of applications, enabling accurate measurements of power, phase differences, power factors and other products of any two parameters. The combination of real-time multiplication and storage is ideal for measurements such as power transients and for destructive testing of circuits and components.

The PM 3243 allows both the product to be displayed and one of the original signals, which is particularly useful for signal analysis and for making time comparisons. A separate output at the rear of the instrument gives the multiplied signal which can be measured, for example, on a DC voltmeter. This combination is then functioning as a high-frequency wattmeter.



Technical specification PM 3243

C.R.T.

Type

Philips L14-110 rectangular post accelerator half tone storage tube.

Screen type

P 31 phosphor

Total acceleration voltage

8.5 kV

Useful screen area

8 x 10 div., 1 div. equalling 0.9 cm

Graticule

Internal

Persistence

Normal: Natural persistence of P 31 phosphor (10 μ s ... 1 ms).

Variable: Continuously variable from ≤ 0.3 sec. to ≥ 1.5 min.

Storage time

In max. persistence mode: ≥ 1.5 min.

In "read" mode: ≥ 3 min.

In "save" mode: ≥ 15 min.

Writing speed

Normal: 0,2 div./ μ s

Max. write: 2 div./ μ s

Erase:

Push button operated, erasure takes approx. 600 ms

Y-AXIS

Response

DC: 0 Hz ... 50 MHz

AC: 10 Hz ... 50 MHz

Risetime: 7 ns

Deflection coefficients

5 mV/div. ... 2V/div. 1-2-5-sequency

Uncalibrated, continuous control between the steps 1: ≥ 2.5 .

Accuracy

$\pm 3\%$

Input impedance

1 M Ω /15 pF

RC time, AC coupled: 22 ms

Display modes

A only

B only, normal and inverted

Chopped (1 MHz)

Alternated

Added (channel B normal and inverted)

Multiply (A x B)

A x B and B chopped

Maximum input voltage

400V (DC + AC peak)

Maximum deflection

Undistorted deflection of 24 div. for sine wave signals with frequencies of up to 15 MHz.

Shift range

16 div.

Signal delay

20 ns

CMR-factor

100:1 at 1 MHz

MULTIPLIER

Bandwidth

0 ... 40 MHz (-3 dB)

Risetime

9 ns

Multiplication factor

1 \pm 0.02

The product of signal A with A cm and signal B with B cm is displayed with A x B cm \pm 2%.

Dynamic range

Signal A:

8 cm

(\pm 4 cm from centre of screen)

Signal B: 8 cm

(\pm 4 cm from centre of screen)

Product A x B:

8 cm

(\pm 4 cm from centre of screen)

Signal delay

8 ns between product and signal B

Product offset

0.2 cm at 23°C

Display modes

A x \pm B

A x \pm B and \pm B chopped

Multiplier output

BNC socket at the rear of the instrument, DC coupled.

Output voltage:

50 mV/div. into 50 Ω

100 mV/div. into 10 k Ω

Bandwidth: DC ... 40 MHz (-3 dB)

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 Y_A, Y_A, the Ext. connector or the mains as a signal source for horizontal deflection.

Display modes

Main time base

Main time base intensified

by delayed time base

Delayed time base

X-Y or X-Y/Y operation with X-

deflection by: Y_A, Y_B, External or

Mains (line).

Horizontal amplifier

Bandwidth

DC ... 1 MHz (-3 dB) over 6 div.

Deflection coefficient

≤ 450 mV/div. using Ext. connector.

Vertical attenuator coefficients apply when Y_A or Y_B is used for X-deflection.

Measuring accuracy

$\pm 10\%$ using Y_A or Y_B input

Phase error

3° at 100 kHz

Main time base

Modes

Auto-Triggered-Single shot

Time coefficients

0.5 s/div. ... 50 ns/div. 1-2-5 sequence.

Uncalibrated continuous control

between steps 1: ≥ 2.5 .

x5 magnifier extends max. sweep

rate to 10 ns/div.

Variable hold-off

Sweep hold-off time can be increased by at least a factor of 5.

Accuracy

$\pm 3\%$

Additional error for magnifier $\pm 2\%$.

Delayed time base

The delayed time base either starts immediately after delay time or is triggerable after delay time, by the selected delayed time base trigger source.

Time coefficients

0.2 s/div. ... 50 ns/div. 1-2-5 sequence

Uncalibrated control between steps

1: ≥ 2.5

x5 magnifier extends max. sweep

rate to 10 ns/div.

Accuracy

$\pm 3\%$

Additional error for magnifier $\pm 2\%$.

Sweep delay

In steps variable with main time base.
Continuously variable with 10-turn potentiometer between 0.2 x and 10 x the time coefficient of the main time base.

Delay time jitter

≤ 1: 20,000

Incremental delay time error:

0.5%

Main time base triggering**Trigger source**

Internal Y_A, Y_B, Line, External

Slope

+ or -

Trigger mode

Auto: 10 Hz ... 50 MHz

DC: 0 Hz ... 50 MHz

LF: 0 Hz ... 50 kHz

HF: 50 kHz ... 50 MHz

Trigger sensitivity

Internal: 0.5 div. typical

External: typical 150 mV

Delayed time base triggering**Trigger source**

Internal: Y_A, Y_B; External

Other trigger specifications of delayed time base are identical to that of the main time base.

CALIBRATION**Calibrated voltage**

3V_{p-p} ± 1% square wave

Calibrated current

6 mA_{p-p} ± 1%

Frequency

2 kHz ± 2%

POWER**Line voltages**

Accepts any voltage between 100 and 240V ± 10%, and any frequency between 46 and 440 Hz in one range, without switching.

DC power source

Accepts any DC-voltage between 100V and 200V

Power consumption

39W

Probe power

Two sockets at vertical amplifiers providing + 24 and - 24V for active probes.

ENVIRONMENTAL CAPABILITIES

N.B.: The environmental data are valid only if the instrument is checked in accordance with the official checking procedure. Details on these procedures and failure criteria are supplied on request by the Philips organisation in your country, or by N.V. Philips Gloeilampenfabrieken, Test and Measuring Department, Eindhoven, Holland.

Ambient temperatures

+ 5°C ... + 40°C rated range of use

- 10°C ... + 55°C operating

- 40°C ... + 70°C storage and transport

Altitude

To 5,000 m operating

To 15,000 m not operating

Humidity

Meets IEC 68 Db requirements

Bump

1000 bumps of 10 g, ½ sine, 6 ms duration, in each of 3 directions

Vibration

30 minutes in each of three directions, 10-150 Hz; 0.7 mm_{p-p} and 5 g max. acceleration

Electromagnetic interference

Meets VDE, Störgrad K

Recovery time

Operates within 15 minutes coming from - 10°C soak, going into 60% relative humidity at + 20°C room conditions.

DIMENSIONS AND WEIGHT

Height: 154 mm

Width: 316 mm

Depth: 460 mm

Weight: approx. 10.6 kg (23.5 lb)

INSTRUMENT OPTIONS

The following are available as service modifications. Contact your local Philips office for details.

- Main time base sweep output
- Main time base gate output
- Delayed time base sweep output

STANDARD ACCESSORIES

Contrast filter

Front cover

Collapsible viewing hood PM 9366

BNC-banana adaptor PM 9051

Cal. terminal to BNC adaptor

Operating and service manual

OPTIONAL ACCESSORIES

PM 9335 Passive probe set 1:1 (1.5 m)

PM 9335L Passive probe set 1:1 (2.5 m)

PM 9350 50 MHz passive probe set 10:1 (1.5 m)

PM 9350L 50 MHz passive probe set 10:1 (2.5 m)

PM 9358 150 MHz HV probe set 100:1

PM 9352 Micro miniature probe

PM 9353 Active FET probe 150 MHz

PM 9355 Current probe

PM 8910 Polaroid anti glare filter

PM 9380 Oscilloscope camera

PM 8971 Camera adaptor

PM 8960 19" Rack mount adaptor

PM 9366 Collapsible viewing hood

PM 8980 Closed, long type viewing hood

PM 8901 Rechargeable battery pack 140V_{DC}

PM 8991 Trolley

PM 8992 Accessory pouch

Steinheil Oscillophot® system:

Oscilloscope camera's M3, M4 and M5 can be mounted on oscilloscope using Steinheil adaptor 1820/50.