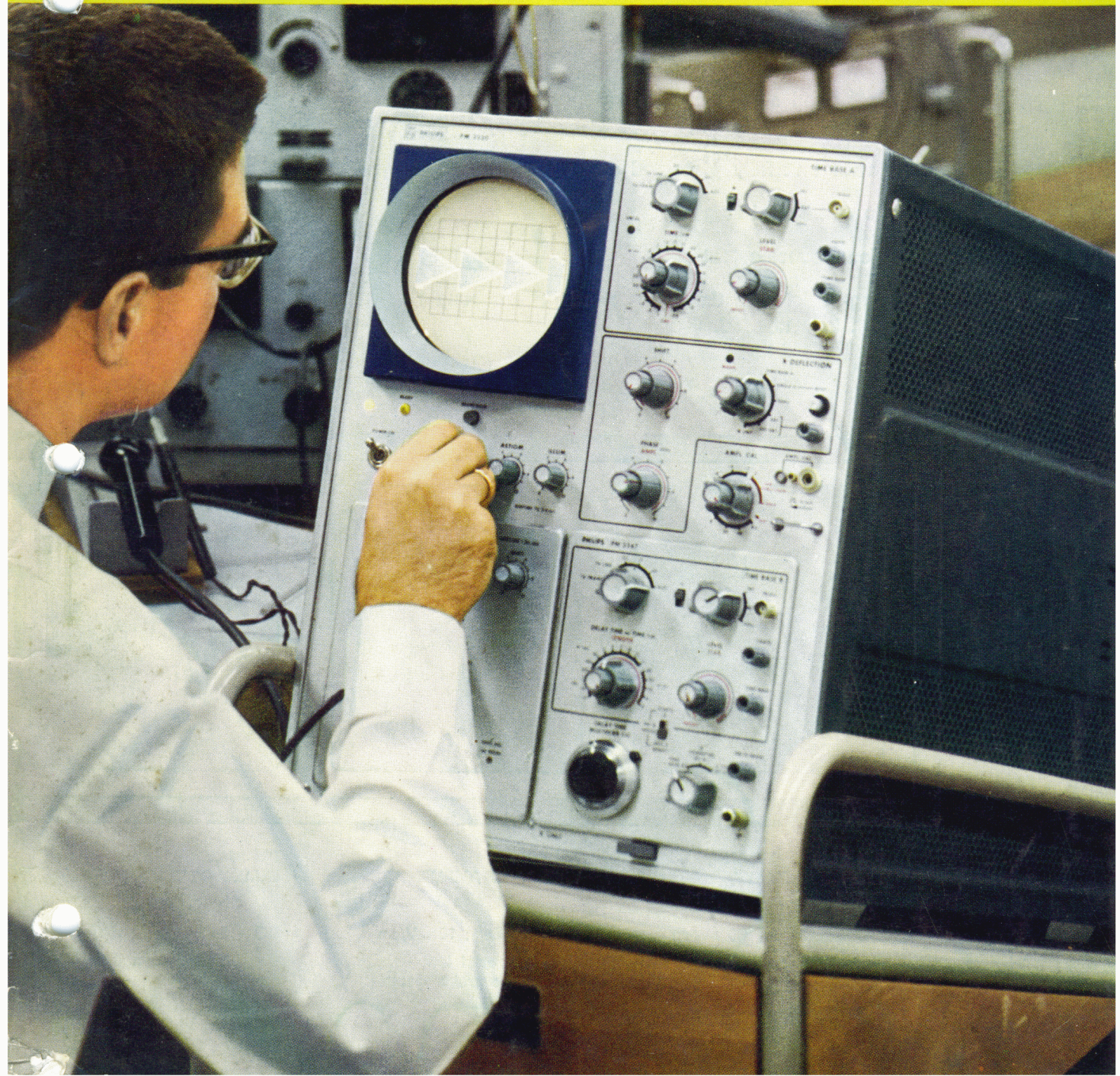
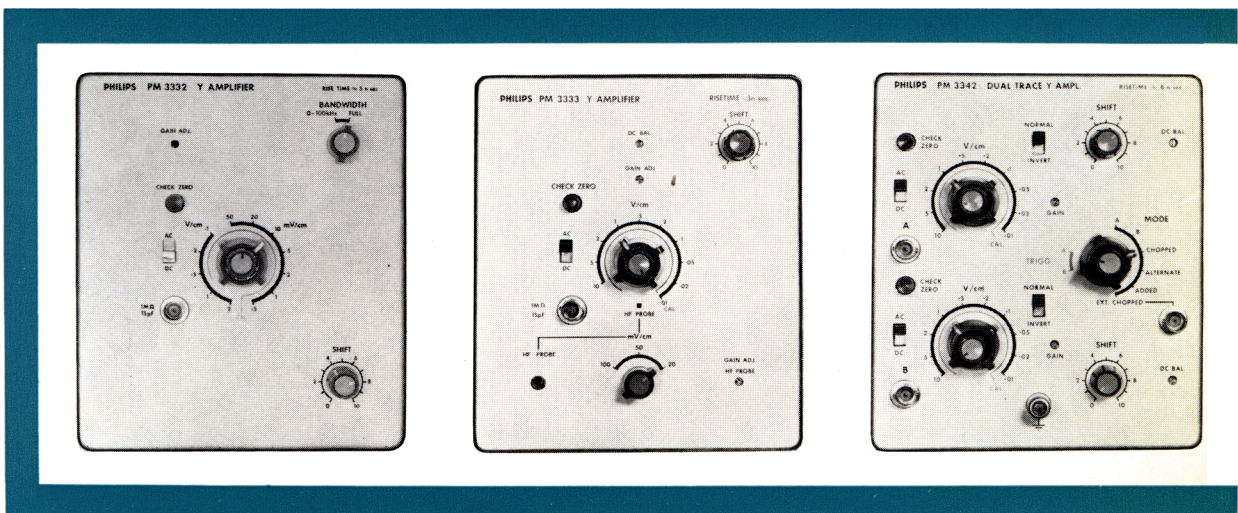


PHILIPS

**60 Mc/s
plug-in
oscilloscope
PM 3330**



- ★ Cathode ray tube with 6 x 10 cm useful scan, illuminated internal graticule and 10 kV accelerating voltage.
- ★ Beamfinder ensures quick trace adjustment.
- ★ Calibrated sweep speeds up to 10 ns/cm with fast and stable tunnel diode triggering.
- ★ Power unit fully protected against overloads.
- ★ No distributed amplifier.
- ★ Clear, concise text plate.
- ★ Plug-in delaying time base need not be bought until it is needed.



**PM 3332 WIDEBAND,
HIGH-SENSITIVITY,
DRIFT-FREE AMPLIFIER**

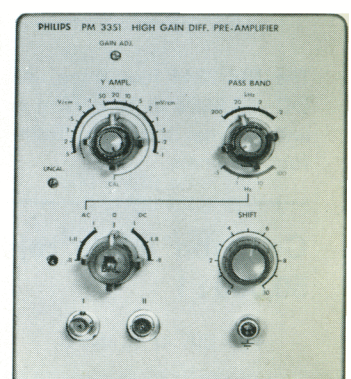
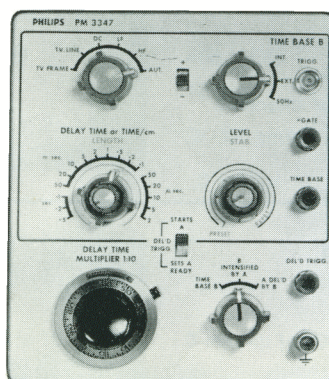
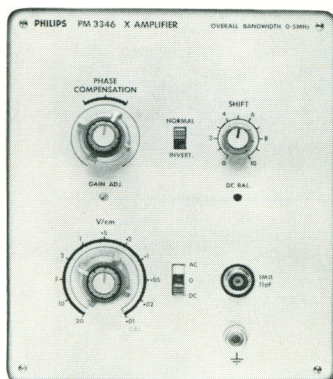
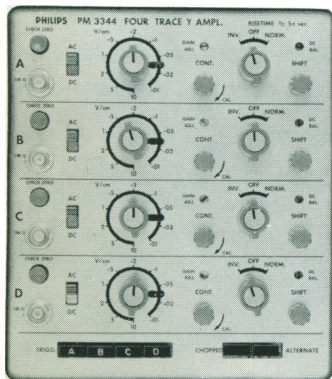
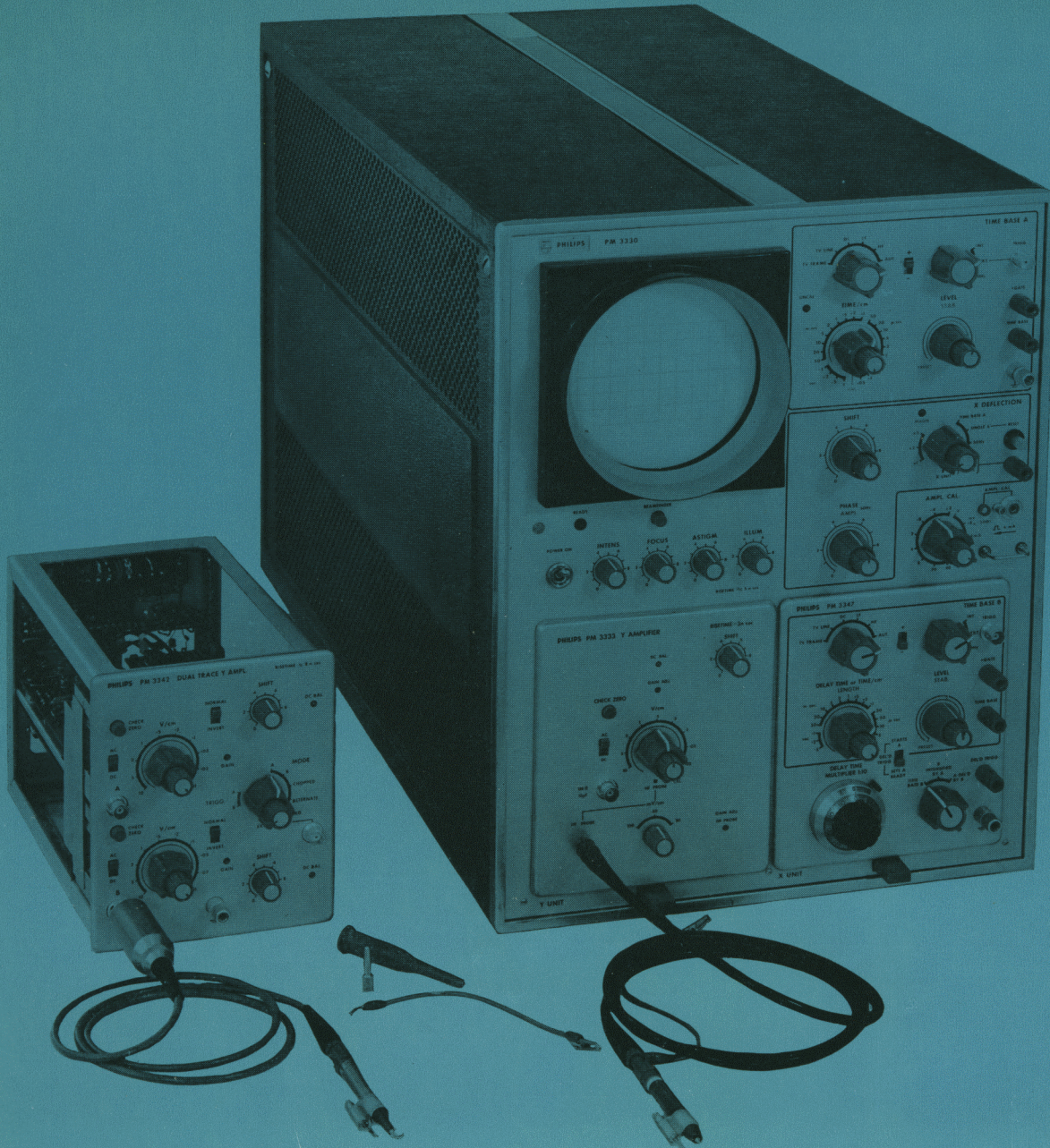
DC - 50 Mc/s; 500 μ V/cm
Full sensitivity available at full bandwidth
Drift less than 1 cm/week

**PM 3333
WIDEBAND AMPLIFIER**

DC - 60 Mc/s; 10 mV/cm
Uses a special low capacitance probe system

**PM 3342
DUAL TRACE AMPLIFIER**

DC - 35 Mc/s; 10 mV/cm
Can be used as a differential amplifier



PM 3344
FOUR TRACE AMPLIFIER

PM 3346
HORIZONTAL AMPLIFIER

PM 3347 SWEEP
DELAYING TIME BASE

PM 3351 LF DIFFERENTIAL
AMPLIFIER

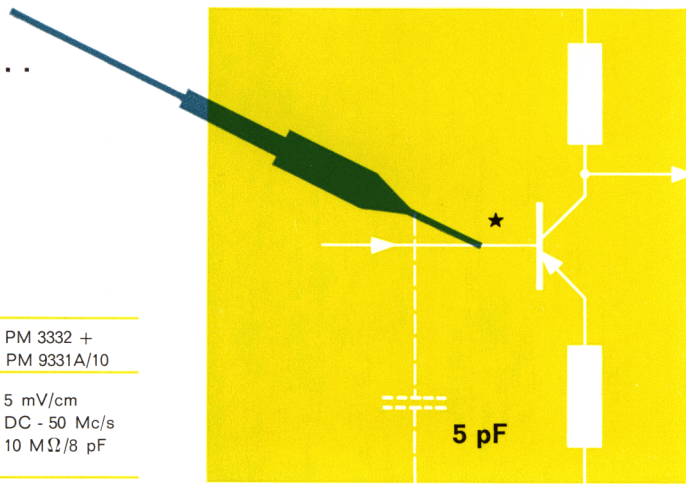
DC - 50 Mc/s; 10 mV/cm
Internal triggering from any
of the four channels

DC - 5 Mc/s; 10 mV/cm

Delay 2 μ s to 5 s
Jitter 0.005 % of full scale
value; TV line and frame
sync separator

DC - 200 kc/s; 100 μ V/cm
Common mode rejection
50,000 : 1
Servo system for DC balance

Get to the base of your trouble...

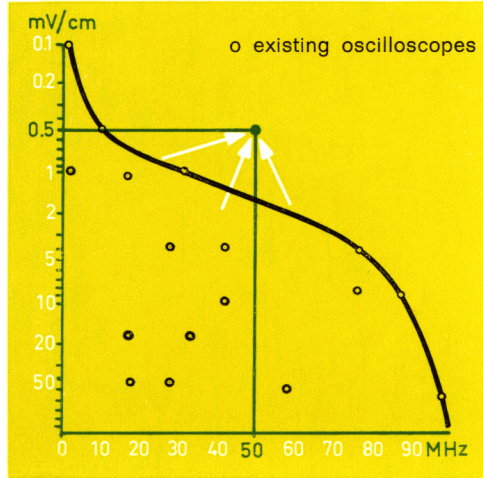


★	PM 3333 + PM 9332	PM 3332 + PM 9331A/10
Tip sensitivity	20 mV/cm	5 mV/cm
Bandwidth	30 c/s - 50 Mc/s	DC - 50 Mc/s
Loading	100kΩ/5 pF	10 MΩ/8 pF

A break-through in the sensitivity/bandwidth barrier for real-time* oscilloscopes

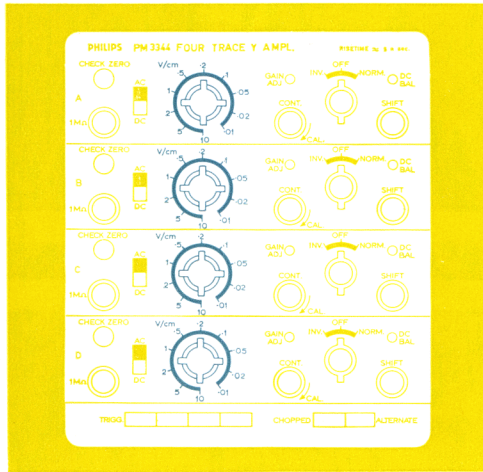
* not sampling

500 μV/cm at DC- 50 Mc/s and a drift of less than 1 cm/week with the PM 3332 high-sensitivity amplifier



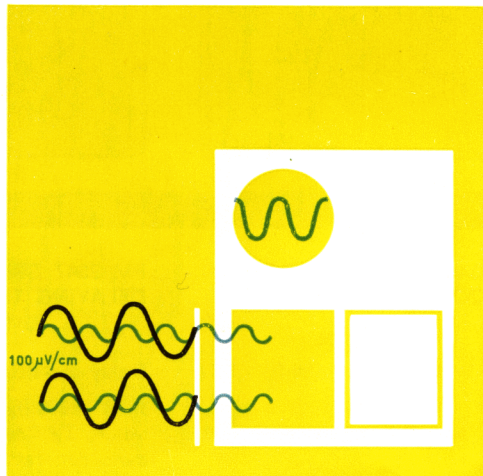
Now you can do on four channels what you could previously only do on two

The PM 3344 four trace unit provides: DC - 50 Mc/s at 10 mV/cm on all four channels and internal triggering from any of the four channels.



Common mode rejection 50,000 : 1

Sensitivity 100 μV/cm
 Bandwidth DC - 200 kc/s
 Servo system for DC balance
 Obtainable with the PM 3351 differential amplifier



Bandwidth (DC coupled)¹
 (AC coupled)
 (AC coupled via 10:1 Probe)

Filters low pass
 high pass

Rise time¹

Sensitivity¹

Attenuator, calibrated

Tolerance

Overshoot

Input impedance

Mode of operation

Common mode rejection

Maximum common mode signal¹

Maximum input voltage AC coupled

Minimum deflection Midband

Shift range $\frac{f_{3dB}}{3}$

DC Drift DC coupled
 AC coupled

Noise at full sensitivity

Internal trigger sensitivity

Probe type³

Dimensions (h x w x d)

Weight

¹ Data are valid when units are used in combination with the main frame Philips PM 3330

PM 3332
HF high sensitivity

PM 3333
wideband

PM 3342
dual trace

PM 3344
four trace

PM 3351
LF differential

DC - 50 Mc/s 1.6 c/s - 50 Mc/s 0.16 c/s - 50 Mc/s	Input I DC - 60 Mc/s 1.6 c/s - 60 Mc/s 0.16 c/s - 60 Mc/s	Input II ² — 30 c/s - 50 Mc/s —	DC - 35 Mc/s 1.6 c/s - 35 Mc/s 0.16 c/s - 35 Mc/s	DC - 50 Mc/s 1.6 c/s - 50 Mc/s 0.16 c/s - 50 Mc/s	DC - 200 kc/s 0.5 c/s - 200 kc/s 0.05 c/s - 200 kc/s
100 kc/s —	— —	— —	— —	— —	0.2, 2, 20 and 200 kc/s ⁴ 100, 10, 1 and 0.5 c/s ⁴
7 ns	6 ns	7 ns	10 ns	7 ns	—
500 μ /cm	10 mV/cm	20 mV/cm at probe tip	10 mV/cm	10 mV/cm	100 μ V/cm
500 μ V/cm - 2 V/cm	10 mV/cm - 10 V/cm	20, 50 and 100 mV/cm at probe tip	10 mV/cm - 10 V/cm	10 mV/cm - 10 V/cm	100 μ V/cm - 5 V/cm
1, 2, 5 series	1, 2, 5 series	1, 2, 5 series at probe tip	1, 2, 5 series	1, 2, 5 series	1, 2, 5 series
3 %	3 %	3 %	3 %	3 %	3 %
<2 %	<2 %	<2 %	<2 %	<2 %	<2 %
1 M Ω shunted by 15 pF	1 M Ω shunted by 15 pF	100 k Ω shunted by 5 pF at tip	1 M Ω shunted by 15 pF	1 M Ω shunted by 15 pF	1 M Ω shunted by 50 pF
—	—	—	\pm channel A or B only added \pm A \pm B alternate \pm A and \pm B chopped between \pm A and \pm B at 20 or 500 kc/s int. or up to 100 kc/s ext.	\pm channel A to D separately or in combination, alternate or chopped at 2 Mc/s	AC coupled input I, II or I - II DC coupled input I, II or I - II
—	—	—	100 : 1 at 1 Mc/s	—	at 0.1 - 10 mV/cm 50,000 : 1 for 50 c/s at 0.1 - 10 mV/cm over 1,000 : 1 for 200 kc/s at 20 mV - 5 V/cm over 2,000 : 1 for 50 c/s
—	—	—	at 10 mV/cm 0.1 V	—	at 0.1-10 mV/cm 10 V at 20 mV/cm 20 V at 50 mV/cm 50 V etc. up to 500 V max.
400 V DC	400 V DC	400 V DC	400 V DC	400 V DC	500 V DC
18 cm	18 cm	18 cm	18 cm	18 cm	18 cm
>12 cm	>12 cm	>12 cm	>12 cm	> 12 cm	>12 cm
1 cm/week 1 cm/week	—	—	—	3 mV/hr	500 μ V/hr after 1st hr. 5 μ V/hr after 1st hr.
SC \leq 3 mm, OC \leq 4 mm at 50 Mc/s SX \leq 0.7 mm, OC 1.5 mm at 100 kc/s	—	—	—	—	SC 2 mm at 200 kc/s
3 mm up to 10 Mc/s 1 cm up to 30 Mc/s 1 cm 10 c/s - 1 Mc/s 'AUT' 2 cm for TV	3 mm up to 10 Mc/s 1 cm up to 30 Mc/s 1 cm 10 c/s - 1 Mc/s 'AUT' 2 cm for TV	—	3 mm up to 10 Mc/s 2 cm up to 20 Mc/s 1 cm 10 c/s - 1 Mc/s 'AUT' 2 cm for TV	3 mm up to 10 Mc/s	3 mm up to 200 kc/s 1 cm 10 c/s - 200 kc/s 'AUT'
PM 9331A/10	PM 9331A/10	PM 9332	PM 9331A/10	PM 9331 A/10	PM 9324A/10
17.5 x 15 x 27.5 cm (7" x 6" x 11")	17.5 x 15 x 27.5 (7" x 6" x 11")	—	17.5 x 15 x 27.5 (7" x 6" x 11")	17.5 x 15 x 27.5 cm (7" x 6" x 11")	17.5 x 15 x 27.5 (7" x 6" x 11")
2 kg (4½ lbs)	2 kg (4½ lbs)	—	3 kg (6½ lbs)	3 kg (6½ lbs)	4 kg (9 lbs)

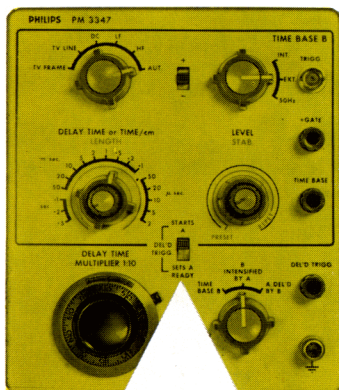
² N.B. Input II can only be used with the HF probe Philips PM 9332

³ For details see page 7

⁴ 3 dB

Is there time jitter* on your long duration signal ?

Even when there is you won't need an external connection for the second trigger with the PM 3347 sweep delaying time base.



**Just throw
this little
switch !**

When it is "up" the PM 3347 provides a calibrated time delay; starting the fast sweep after a precise delay interval. When it is "down" the PM 3347 acts as a timed gate for trigger signals to the fast sweep.

* Of course you can measure the time jitter too, as that of the PM 3347 is only 0.005 %.

PM 3347 delaying time base

Display modes

Time Base "B"
B intensified by A
A delayed by B

Time base B (as a main time base)

Mode : free running or triggered

Sweep speeds : 2 μ s/cm - 0.5 s/cm
(1, 2, 5 series)

Tolerance : 3 %

Expansion : 2 or 5 times (via main frame)

Length : 4 to 10 cm

Time base outputs : sawtooth + 90 V from zero level, gate + 35 V from zero level

Trigger source : internal, external or mains-supply with adjustable phase

Trigger slope : positive or negative

Trigger mode : automatic 10 c/s - 1 Mc/s
(manual level and stability out of circuit),
DC, LF over 3 c/s

high pass filter (RC time 56 ms),
HF over 200 c/s high pass filter
(RC time 1 ms), TV frame and TV line
(manual level and stability out of circuit)

Trigger sensitivity (internal) : 3 mm up to
1 Mc/s, 1 cm automatic, 2 cm for TV

Trigger sensitivity (external) : 0.5 V_{p-p}
up to 1 Mc/s, 1 V_{p-p} automatic, 1 V_{p-p} for TV

Trigger level : internally adjustable over 6 cm,
externally adjustable over 6 V

Trigger input impedance : 1 M Ω shunted
by 55 pF

A delayed by B (as a delaying time base)

Delay range (calibrated) : 2 μ s - 5 s
(1, 2, 5 series)

Tolerance : 3 % + 200 ns

Intermediate adjustment : calibrated 10 turn
helipot

Tolerance : 0.2 % of full scale time

Jitter : less than 0.005 % of full scale time

Delayed trigger output pulse : 3 V_{p-p}

Dimensions and weight

Height : 17.5 cm (7")

Width : 15 cm (6")

Length : 27.5 cm (11")

Weight : 2 kg (4½ lb)

PM 3346 horizontal amplifier

Bandwidth

DC coupled : 0 - 5 Mc/s

AC coupled : 1.6 c/s - 5 Mc/s

Risetime 70 ns

Sensitivity 10 mV/cm

Attenuator (calibrated)

10 mV/cm - 20 V/cm; 1, 2, 5 series

Tolerance : 3 %

Overshoot : < 5 %

Input impedance 1 M Ω //15 pF

Max. input voltage (AC coupled)
400 V

Maximum deflection

up to a picture width of 30 cm

Phase adjustment

up to $\pm 9^\circ$ at 5 Mc/s

Dimensions and weight

Height : 17.5 cm (7")

Width : 15 cm (6")

Length : 27.5 cm (11")

Weight : 2 kg (4½ lb)

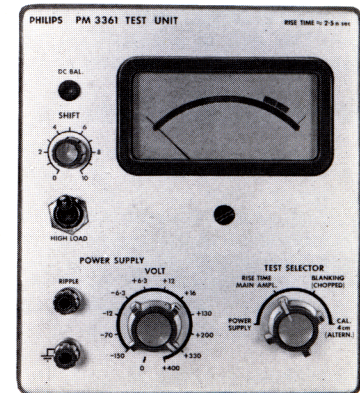
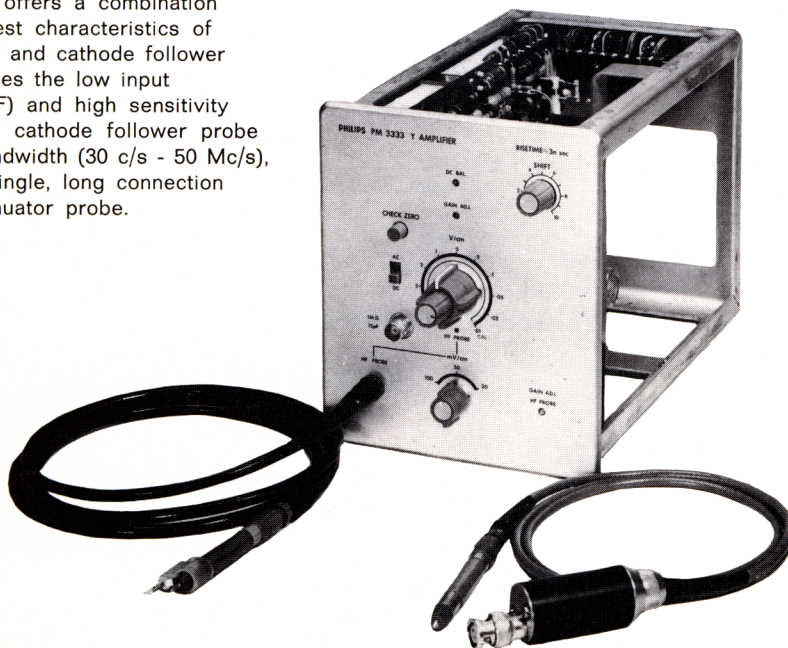
Type number	PM 9332	PM 9331A/10	PM 9324A/10 *
Coupling	AC	DC	DC
Attenuation	—	10 : 1	10 : 1
Tolerance	—	3 %	3 %
Input impedance	100 k Ω //5pF	10 M Ω //8pF	10 M Ω //12pF
Max. input voltage			
DC coupled	—	1000 V DC	1000 V DC
AC coupled	400 V DC	400 V DC	500 V DC

* Siamesed low noise cable available for use with the PM 3351 in conjunction with 1:1 probe heads.

For types PM 9332 and PM 9331A/10, probe tip to BNC adapters are available.

The new PM 9332 HF probe system

Use of the PM 9332 HF probe in conjunction with the wideband plug-in PM 3333 offers a combination which has the best characteristics of attenuator probes and cathode follower probes. It combines the low input capacitance (5 pF) and high sensitivity (20 V/cm) of a cathode follower probe with the wide bandwidth (30 c/s - 50 Mc/s), small size, and single, long connection cable of an attenuator probe.



This plug-in facilitates testing of the main frame, output amplifier, power unit and blanking circuit. It provides the following facilities:

I. A symmetrical square wave for testing the rise time of the vertical output amplifier.

Amplitude: 1.2 V_{p-p} ; 4 cm deflection

Risetime: 2.5 ns

Frequency: 100 kc/s and 500 kc/s

Shift: via front panel control

Zero level: a press button on the front panel connects the output amplifier input to the zero level reference voltage.

II. An alternate display, with two traces 4 cm apart for adjusting the output amplifier sensitivity and checking the performance of time base switching pulses as used by multitrace amplifiers.

This display is obtained by driving the square wave oscillator from the time base, thus all data other than frequency is identical to I above.

III. A built-in voltmeter with a selector switch selecting input and range for each supply rail, facilitates rapid testing of the power unit. The output voltage can be checked for normal load and maximum permitted load.

At the same time ripple voltage can be measured by connecting an oscilloscope to the front panel sockets.

IV. Blanking pulses are available to check that the main frame blanking circuit, used in the chopped mode of the dual trace unit, is functioning satisfactorily.

PM 3330 main frame

Cathode ray tube

Diameter: 13 cm (5")

Acceleration voltage: 10 kV

Internal graticule: 6 x 10 cm, illuminated

Type: D 13 — 16 GH/1

Phosphors available: GH, BE, GP

Vertical amplifier

Coupling: DC

Risetime: 5 ns

Signal delay: 150 ns

Visible delay: 60 ns

Max. deflection: 6 cm over the full bandwidth

Calibration voltage

Amplitude: 0.2 mV - 80 V (2, 4, 8 series)

Tolerance: 1 %

Frequency: 2 kc/s square wave

Calibration current

Amplitude: 4 mA_{p-p}

Tolerance: 1 %

Frequency: 2 kc/s square wave

Horizontal amplifier

Bandwidth: DC - 1 Mc/s (external)

Sensitivity: 500 mV/cm and 5 V/cm (external)

X-deflection selector: time base A, single shot,

mains supply (adjustable phase and amplitude),

external 1 : 1 and 1 : 10 and X plug-in

Time base generator

Mode: free running or triggered

Sweep speeds (calibrated): 50 ns/cm - 1 s/cm

(1, 2, 5 series)

(uncalibrated): continuous adjustment

between steps

Tolerance: 3 %

Expansion: 2 x and 5 x (giving max. sweep

of 10 ns/cm)

Tolerance of expansion: 2 %

Time base outputs: sawtooth + 90 V from zero

level, gate + 35 V from zero level

Triggering

Source: internal (using dual trace unit channel

A or B or A+B when added) external or mains

supply (with adjustable phase)

Slope: positive or negative

Mode: automatic 10 c/s - 1 Mc/s (manual level

and stability out of circuit)

DC, LF over 3 c/s, HF over 200 c/s

high pass filter, RC time 1 ms), TV frame

and TV line (manual level and stability

out of circuit)

Sensitivity (internal):

3 mm up to 10 Mc/s

1 cm up to 30 Mc/s

1 cm in "automatic" 10 c/s - 1 Mc/s

2 cm p-p video for TV

Sensitivity external:

0.4 V up to 50 Mc/s

1 V up to 100 Mc/s

1 V in "automatic" 10 c/s - 1 Mc/s

1 V p-p positive video for TV

Input impedance: 1 M Ω //55pF (except for TV

positions)

Level: internally adjustable over 6 cm;

externally adjustable over 6 V

Z modulation

Sensitivity: 15 V_{p-p} above 300 c/s

Input impedance: 25 k Ω //35pF

Source: external or internal from multitrace

unit chopper (selected by a switch on

rear panel)

Mains supply

Voltages: 110, 125, 145, 200, 220 and 245 V

Frequency: 40 - 100 c/s (below 50 c/s the

voltage must be no more than the nominal)

Voltage variations: 10 % variations can be

tolerated with negligible effect

Max. power consumption: 500 VA

Dimensions (overall), and weight

Height: 46 cm (18 inch)

Width: 34.5 cm (13½ inch)

Length: 68 cm (31 inch)

Weight (main frame only): 42 kg (92 lb)

A first-class oscilloscope deserves a first-class camera

For use with the PM 3330 the following camera types are recommended

HIGH-PRECISION RECORDING CAMERA PP 1021

An oscilloscope camera - made by Zeiss - with an extremely wide range of accurate film speeds (20 metres of film in 5 seconds ...or in 5 days...) and facility for single-frame exposures with automatic film transport.

Further features such as simple speed switch, record-time presetting, interchangeable cassettes, automatic film stop in case of exhausted film supply, remote control and, in addition, convenient push-button operation, make this unique camera suitable for the most complicated problems in photographic recording. A drum cassette with additional control unit extends the field of applications to timed and synchronized record of non-recurrent phenomena with film speeds up to 51 m/sec. The lens is a Zeiss-Sonnar f/1.5, the shutter speeds range from 1 - 1/125 sec, "T" and "B".

STANDARD RECORDING CAMERA PM 1014

A camera for cine and single-frame exposures on 35 mm film or paper, featuring: accurate film speeds by synchronous motor; ease of operation by the coupling of self-cocking shutter to the film transport mechanism; sharp focussing on a ground glass screen with magnifying glass and one-turn crank for single-frame film transport. The lens is a Lytax - Acron f/3.2, shutter speeds range from 1 - 1/125 sec, "T" and "B".

DIRECT RECORDING CAMERA SET PM 9300

A versatile camera set, of astonishing simplicity and flexibility, producing a brilliant record on Polaroid-Land* or standard film. The basic camera is a Rolleicord** - which may also be used for normal photography in the laboratory or factory. Constant observation of the picture on the ground glass focussing screen is possible; moreover the camera-support can be hinged aside for direct observation of the oscilloscope screen. The lens is a Schneider-Xenar f/3.5; shutter speeds: 1 sec - 1/500 sec and "B".

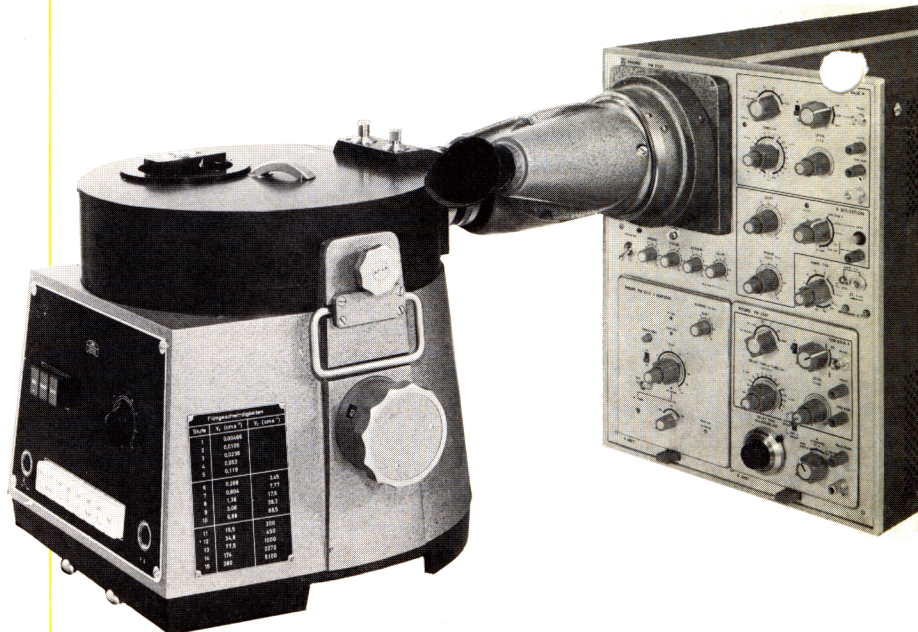
* registered trademark of Polaroid-Land Corporation, U.S.A.

** registered trademark of Rollei-Werke, Franke & Heidecke, Germany.

Further details will gladly be furnished on request, together with the booklet "Photographic Recording" which contains a wealth of useful hints and tips.

Further accessories for the PM 3330

PM 9314 Adaptor for American cameras
PM 9316 Polarisation filter
PM 9319 Trolley
M7 13698 13 cm viewing hood

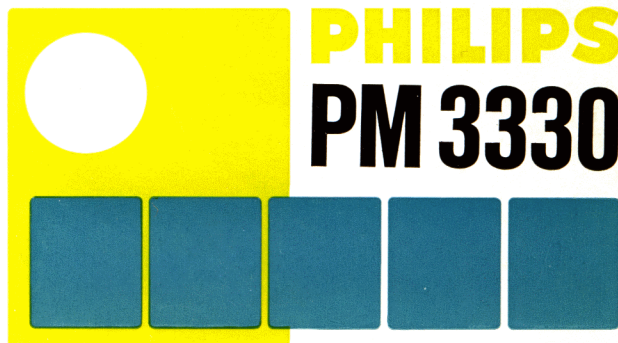


Carefully designed and tested ...

The value of a measuring instrument depends on two main factors; the specification and, just as important, the stability and reliability. With these points in mind Philips started some years ago on the studies for the PM 3330 plug-in oscilloscope system. Thus new circuits providing new features could be introduced and subjected to longer testing times to guarantee reliability as good as that of the classical circuits.

For example, by using a specially developed CRT a distributed amplifier was made unnecessary and a simple one with special framegrid tubes could be used. Furthermore, the well known circuits with proven reliability have had their reliability enhanced by ensuring that most of the components are used at no more than 70 % of their rating. By using components with equal and/or opposite temperature coefficients, a change in temperature can not influence the characteristics.

This care for quality ensures that the instrument meets its specification not only at the time of delivery but for many years to come.





DC to 50 Mc/s at 500 μ V/cm
and a drift of less than
1 cm/week with PM 3332
plug-in

Four trace amplifier, PM 3344,
with 10 mV/cm sensitivity
over the full bandwidth of
DC to 50 Mc/s and internal
triggering from any of the
four channels

DC to 60 Mc/s at 10 mV/cm
with fast recovery from
overloads up to ± 5 screen
heights without shift of the
baseline with PM 3333 plug-in

Special mini-probe system for
PM 3333 unit affording 5 pF input
impedance and 20 mV/cm
sensitivity at the probe tip

100 μ V/cm sensitivity, DC to
200 kc/s bandwidth, common
mode rejection of 50,000 : 1
and push button control for DC
balance with PM 3351 LF
differential plug-in

Special plug-in test unit for
quick and accurate testing of
mainframe, output amplifier,
power unit and blanking circuit