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200MHz SCOPE PM3320

FAST 200 MHz DIGITAL SCOPE WITH 250 MS/s

FINAL PHILIPS DESIGN

Breaking the barriers in digital storage oscilloscope performance

PHILIPS

PHILIPS Test & Measurement

The design challenge: a new concept in digital storage oscilloscopes

High-tech. specification: analog bandwidth 200 MHz, sampling rate 250 MS/s for 4 ns single-shot resolution and synchronous clocking for 2 channels, 10-bit vertical resolution;

New, easier-to-use front panel using a combination of direct-action keys and softkeys for fast, clear and secure selection of over 150 functions;

Semi-automatic measurements: a single measurement or a sequence of measurements must be repeatable without the need to reset the controls;

Automatic measurements: the oscilloscope must be completely remote-controllable via IEEE-488 (IEC 625) bus, RS-232 interface and even over a long distance (by telephone). Programming must be simple and easy to understand.

Make use of the full bandwidth: if the timebase speed requires a sampling frequency above that of the ADC, a good equivalent sample system is needed to store, analyze and measure signals at full bandwidth;

Pre- and post-triggering: as well as post-triggering, pre-triggering must also be possible, for example when timebase speed requires equivalent sampling;

Fast detail search at full resolution: a built-in system must be able to search for signal details quickly, after which these can be recorded at full bandwidth;

Separate display areas for text and traces: the trace display area is kept free of text, except for channel identification. And the separate text display area is free of traces, for clear reading.

Autoset: the Philips multi-parameter Autoset function makes conventional beamfinders look outdated and inadequate! Autoset sets timebase, amplitude and triggering, for instant and optimum display of input signals.

With the PM 3320, our design team started with a clean sheet. But also with a lot of experience in high-speed sampling techniques. The challenge? To create a new concept in digital storage oscilloscopes. In performance. In speed. In ease and security of operation.

250 MS/s sampling (4 ns); 10-bit vertical resolution

The result is a high-technology instrument that sets the new standard in leading-edge digital storage oscilloscopes. With a 200 MHz bandwidth, and a 250 MS/s sampling rate giving a 4 ns single-shot resolution, plus glitch-catcher circuitry to reveal 3 ns wide spikes if lower timebase speeds are required, PM 3320 is made-to-measure for the most demanding applications, like R&D and production-line quality control.

Choice of waveform displays

The central 8x10 cm area of the 10x12 cm screen is reserved for an uncluttered display of the waveforms. Channel identification is provided for each trace. The top two lines of the screen always show actual acquisition parameters, along with the measured results.

The softkeys in the right margin of the screen allow selection of traces from each of the four memories, or of their inverted displays. Also, the position controls can be assigned the function of influencing the entire display, or selected individual traces only.

In addition, the bottom two lines can either show additional actual acquisition parameters, or can present the full acquisition settings which were valid at the moment of recording.
This information is stored for all waveforms in each of the registers.

Autoset plus 8 x 10 cm dedicated signal area

It goes without saying that PM 3320 has Philips' established Autoset function for instant signal display. In addition, softkeys provide simple, direct access to over 150 functions from on-screen menus.

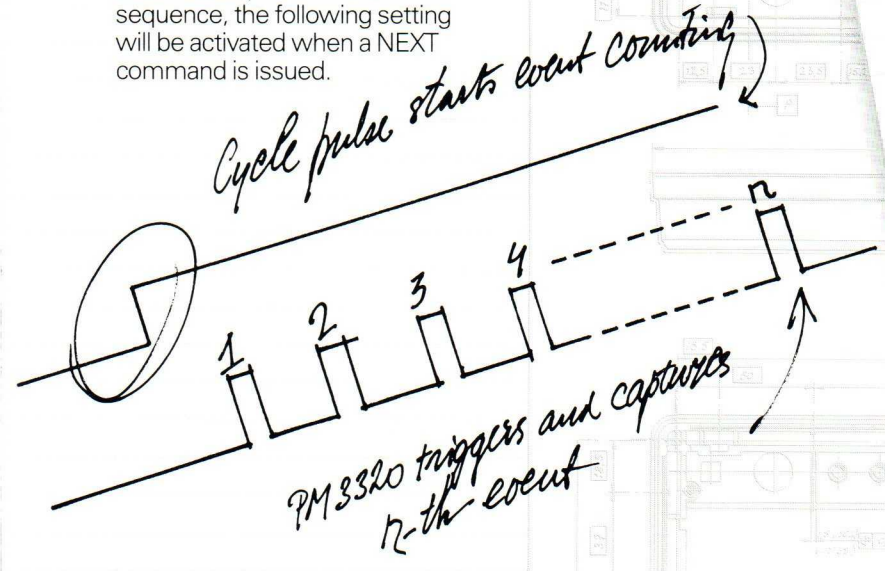
Those menus won't disturb the recorded waveform, since the 10 x 12 cm tube has a regular-size 8 x 10 cm signal display area and separate, dedicated information fields: softkey assignments at the right, settings, status and instant read-outs of cursor measurements at the top, and waveform-specific parameters at the bottom.

All without any loss of 'trace space', ensuring that signal information always has optimal legibility.

77 stored front-panel settings

No less than 77 combinations of front-panel settings can be stored under individual numbers.
The stored settings can be recalled instantly whenever they are needed, saving setting-up time and simplifying operation. The procedure for saving and recalling settings is clearly indicated by the softkey labels.

These front-panel settings can if required be combined, so that sequences of measurements can be carried out automatically. Within one sequence, the following setting will be activated when a NEXT command is issued.



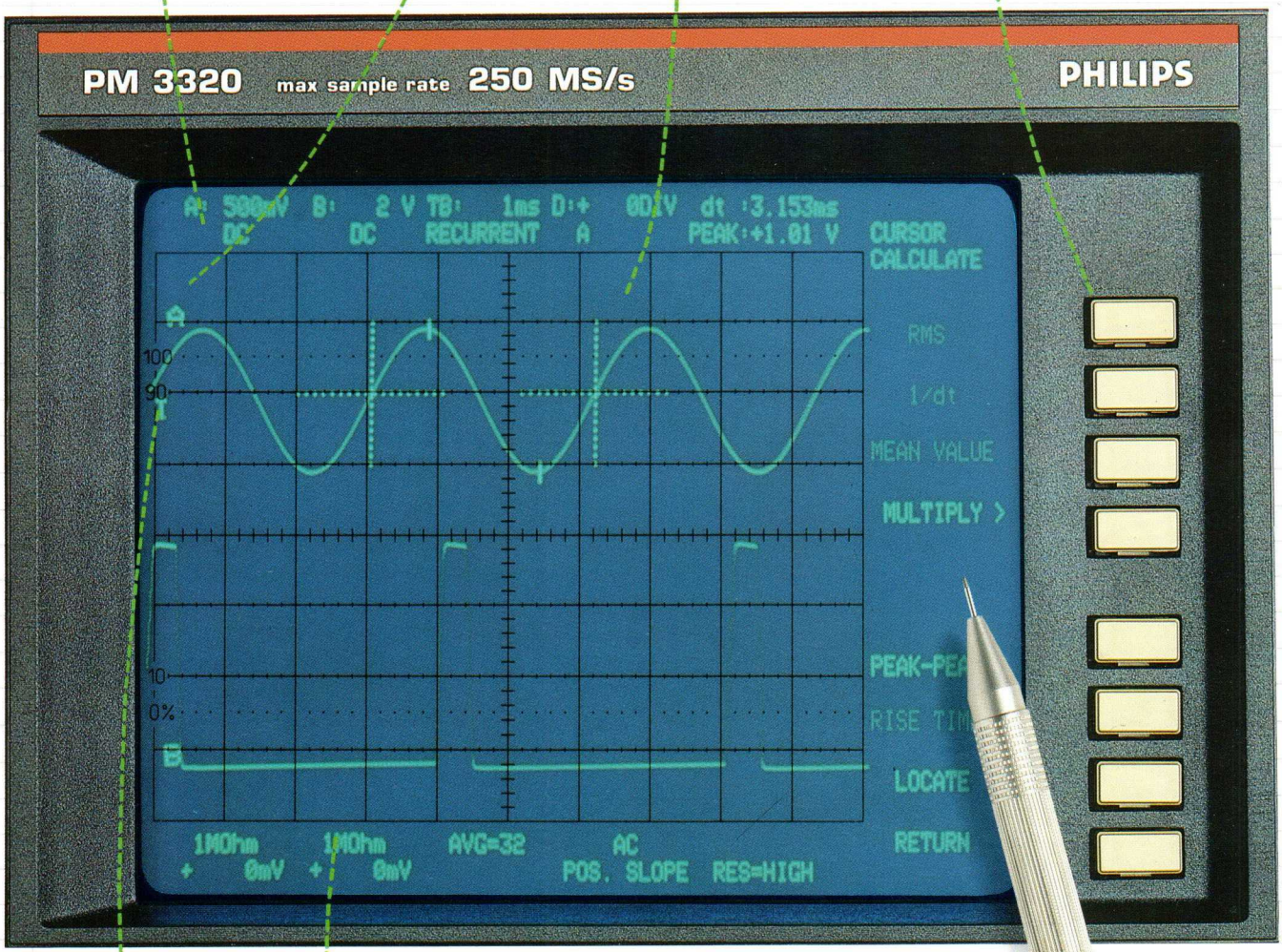
High-resolution signal capture and informative display presentation

Dedicated, switchable text display fields at top and bottom for at-a-glance information on 'scope status, settings and cursor measurement read-outs

Clear channel indications on the displayed signals themselves

On-screen cursors for signal measurements with direct on-screen read-outs of results

Eight softkeys with separate text display field for softkey labels at right of screen



Trigger level indication. Shown here is I for Internal (other indications are E = Event, X = External, L = Line).

Large 10 x 12 cm screen CRT with separate 8 x 10 cm signal display area

Autoset
Another way in which Philips leads the way in oscilloscope ease and speed of operation: the Autoset function automatically sets timebase, amplitude and triggering to bring any input signal within range and onto the display instantly.

1,2 | **See both the ns pulse and the ms carrier**

A 3 ns glitch hidden in a lower-frequency signal can be detected with the MIN/MAX active. The low-frequency signal is recorded and the glitch is made visible. If a faster timebase setting is selected, the glitch can be captured with a 100 ps resolution, so that the pulse is built-up of 30 samples.

3 | **Capture and store the 200 MHz (1.75 ns) signal**

PM 3320's 200 MHz bandwidth and 1.7 ns risetime must be capable of being used in the required application. Above the timebase speed at which the maximum sampling rate is used (200 ns/div), the oscilloscope automatically makes use of a random sampling system. This means that the oscilloscope's own risetime can be stored, while even at these high speeds pre-triggering can still be performed.

4 | **Measure and multiply the signals**

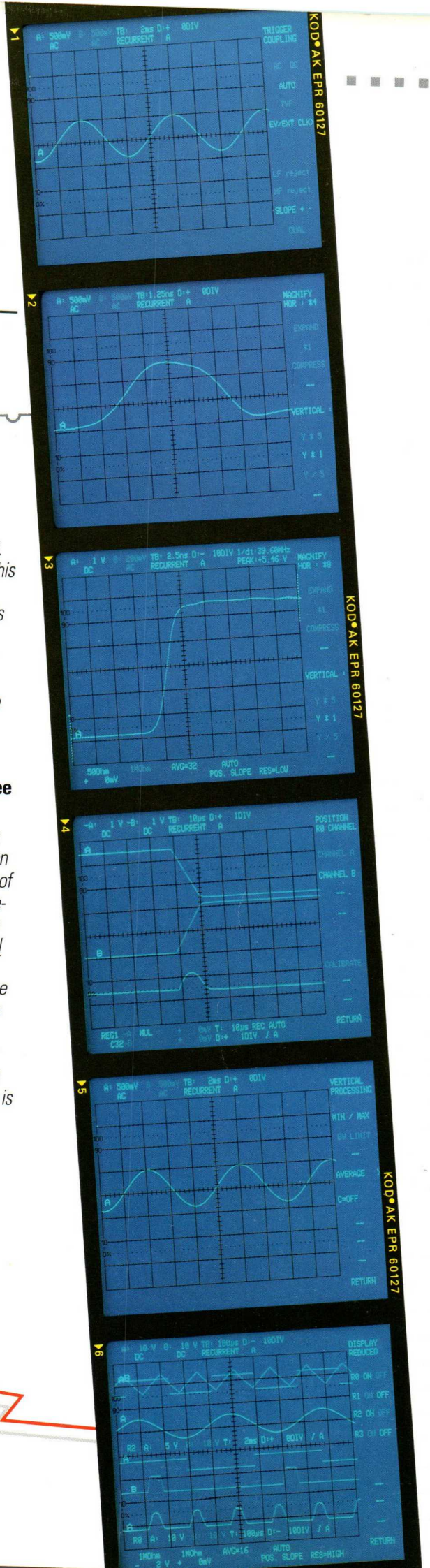
Measurements can be made on-screen and on-line. The time and voltage can be read-out directly from the screen, and the built-in data processing unit can calculate frequency, risetime, peak-peak, RMS and mean values, as well as carrying out ongoing multiplication, thereby allowing both the original signals and their products to be displayed.
Extra markers can indicate samples with which the maximum and minimum values, or the 10% and 90% values, of the risetime can be measured.

5 | **10-bit or 50 uV (0.1%) vertical resolution**

The ADC has a 10-bit vertical resolution, allowing an absolute accuracy of 50 uV to be achieved. Normally, with oscilloscopes of this bandwidth the natural noise is relatively high, even if the input is properly matched to 50 ohm. However, the average mode can reduce this noise, allowing the available vertical resolution to be used optimally.

6 | **Keep what you catch - and see what you keep!**

PM 3320 has three extra, built-in memories. Signals that have been recorded can be copied into one of these memories. Cursor measurement can be performed on these stored waveforms. In addition, all parameters belonging to these waveforms are stored, and can be displayed. A choice can be made from a display of virtually all parameters from one register, or brief information from more than one register (or both - the choice is yours!).



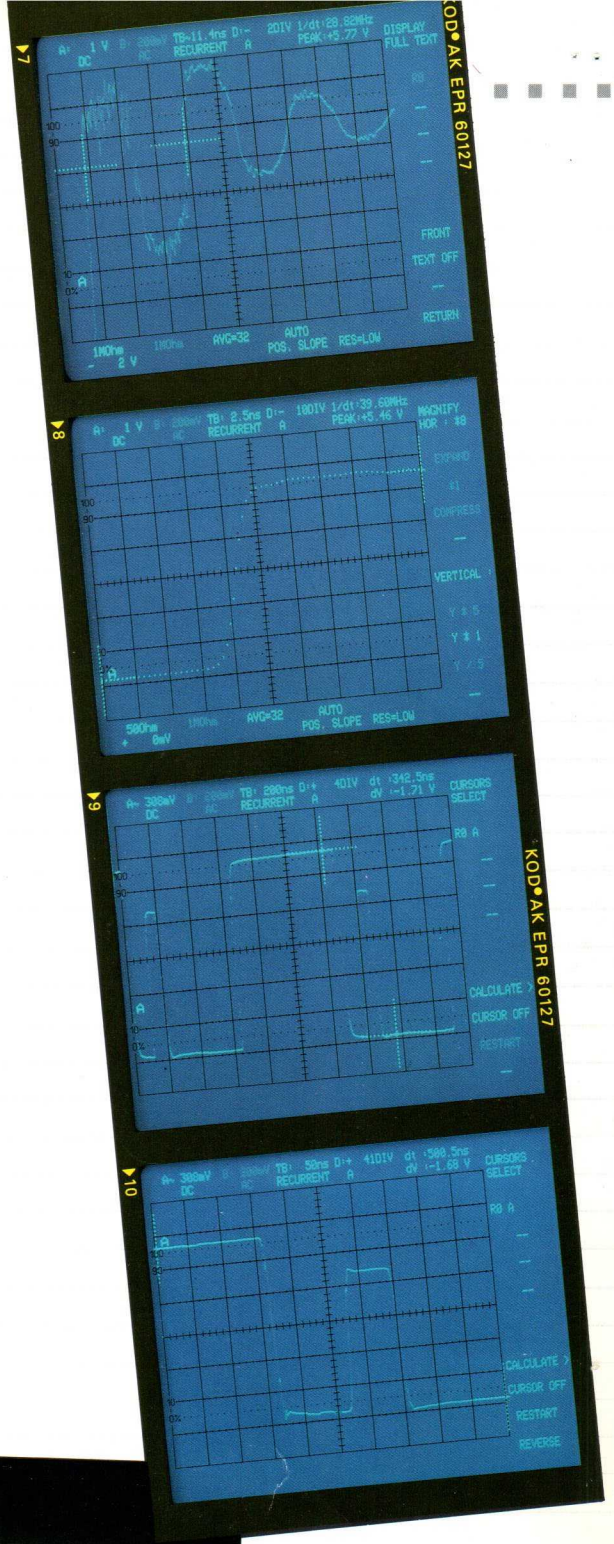
7,8 | **The truth - and nothing but the truth!**

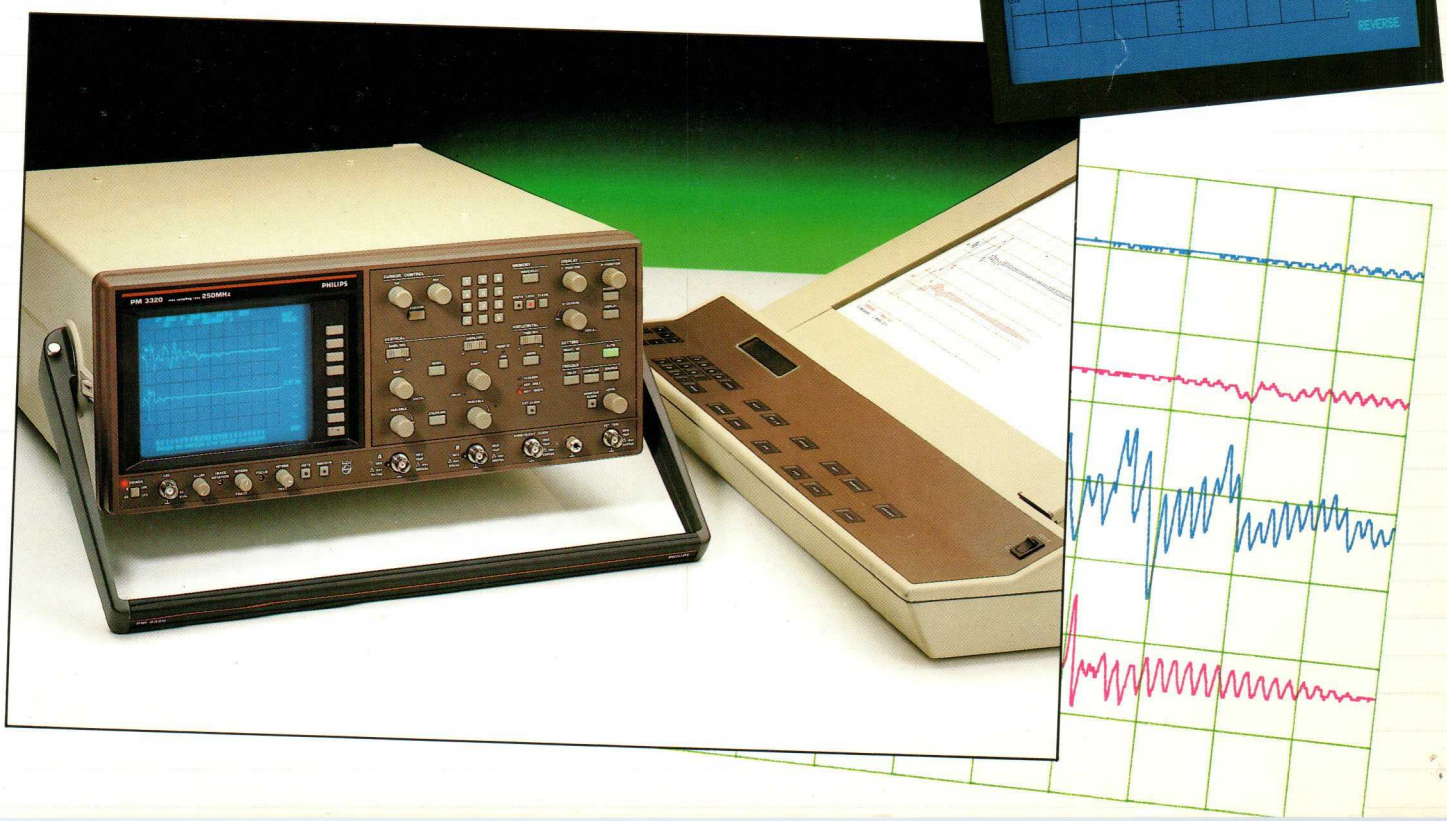
In many situations, it's reassuring to know that the trace displayed on PM 3320's screen looks like that of a conventional analogue oscilloscope.
For this reason, the dots are often interpolated; sometimes linearly, and sometimes with filtering. If too few measured samples are available in the memory, more dots are calculated and inserted between the measured dots. However, at any time it only takes a press of the DOTS button to suppress the interpolated dots and show only the real measured samples.

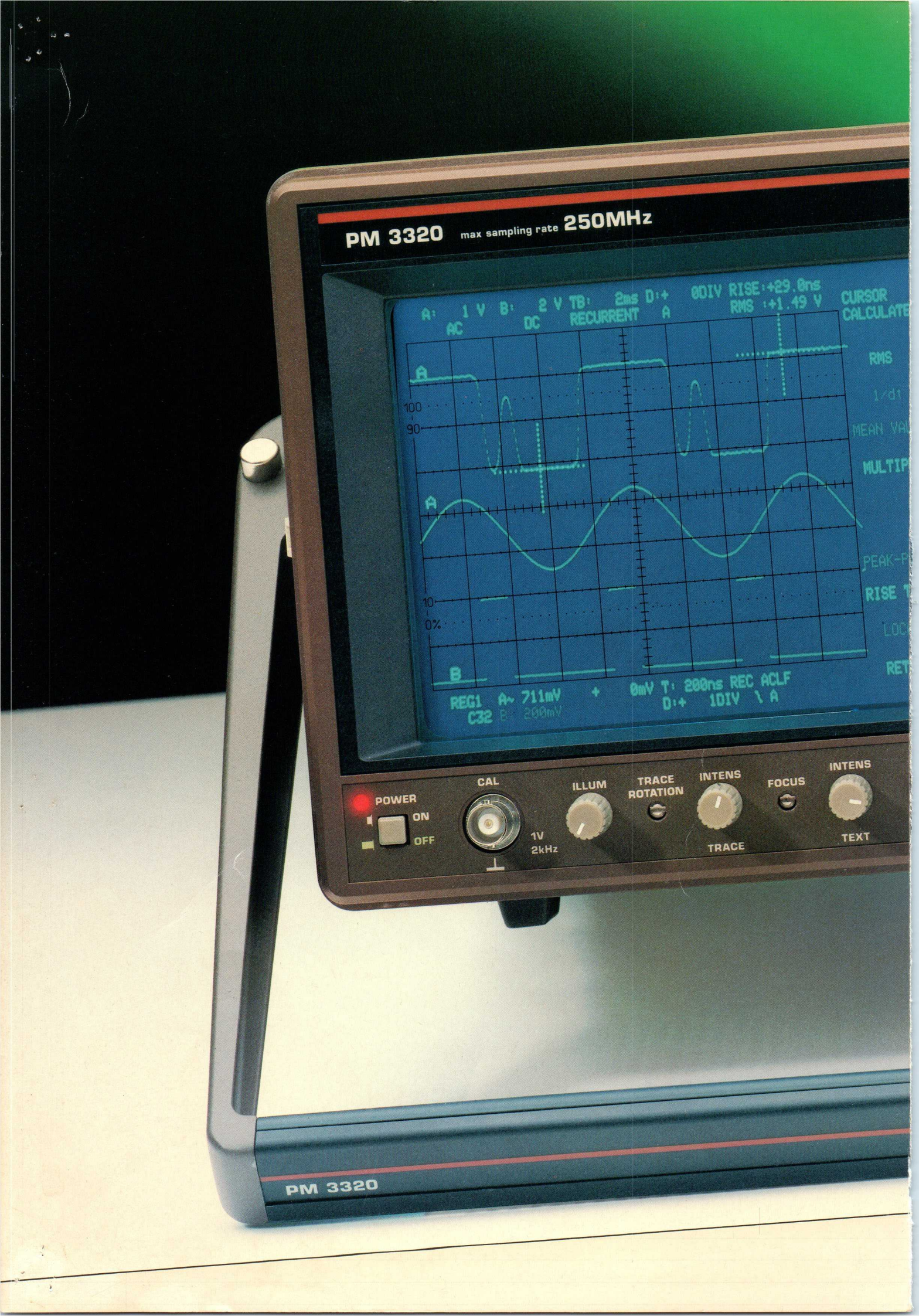
9 | *RESTART improves performance of the function referred to as delayed timebase (DTB): just set the cursors on the part of the trace to be examined in more detail, push the RESTART key...*

10 | *...and on the next trigger pulse, an extended-resolution recording of the selected part of the trace will be shown. This action can be repeated by zeroing the cursors and pressing RESTART again. Alternatively, you can go back to the previous setting by pushing REVERSE.*

Hard copies of displayed traces can be made simply and directly via the analog plot output. Or if the interface option is fitted, the digital plot output (IEEE or RS232) can be used.
During analog plotting, a moving dot at the bottom of the screen indicates the progress or plotting. Plotting speed is maximized under software control: if larger amplitude steps are plotted, the speed of plotting decreases, while if the vertical differences are small, the plotting speed will increase. Registers can be positioned individually across the screen, and it is even possible to position individual traces both horizontally and vertically before plotting is started.






PM 3320 max sampling rate 250MHz
A: 1 V B: 2 V TB: 2ms D:+ 0DIV RISE:+29.0ns
AC DC RECURRENT A RMS :+1.49 V
CURSOR
CALCULATE
RMS
100
90
10
0%
REG1 A~ 711mV + 0mV T: 200ns REC ACLF
C32 B 200mV D:+ 1DIV \ A
POWER
ON
OFF
CAL
1V
2kHz
ILLUM
TRACE ROTATION
INTENS
TRACE
FOCUS
INTENS
TEXT
PM 3320