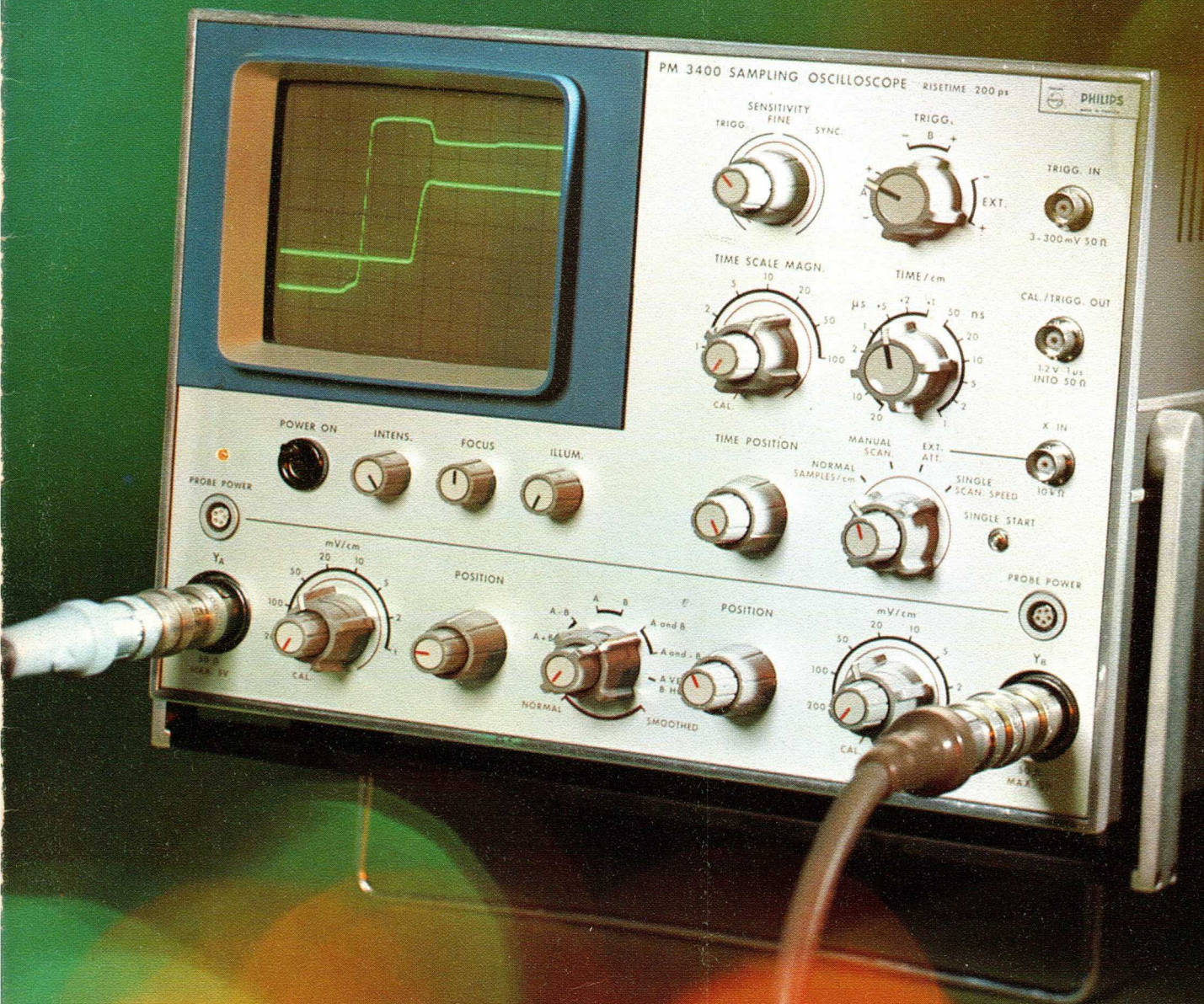




# PHILIPS

## Simple sampling: as easy as real time operation



# This new Philips 200 ps (1.7. GHz) compact sampling oscilloscope has six special features to make sampling easier, more accurate and more versatile than ever before.

**High Sensitivity:** the PM 3400 features 1 mV/cm input sensitivity, combined with triggering sensitivity of 3 mV external, 20 mV internal.

**Minimal noise:** because method of sequential sampling is used smoothing facilities could be provided; by incorporating short delay lines, permitted by specially designed fast trigger circuit, bandwidth of 1.7 GHz is realized.

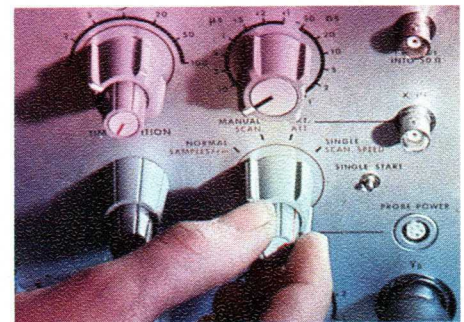
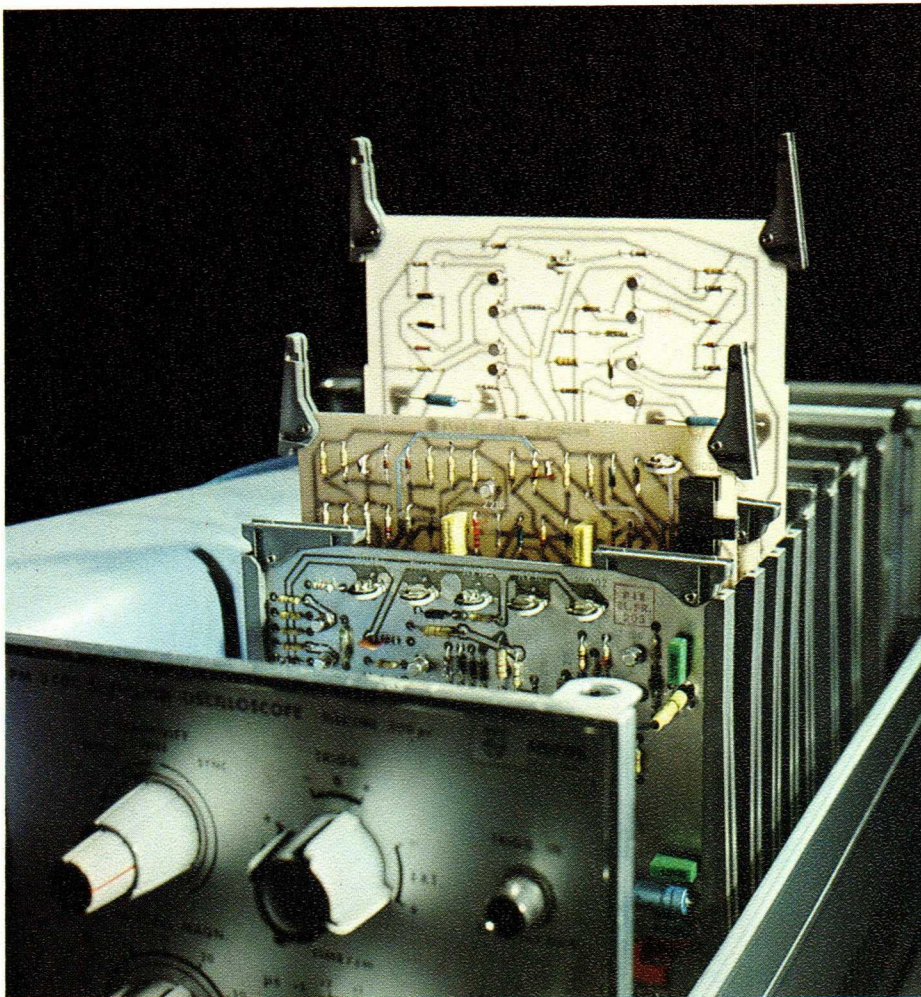
**No flicker:** a unique combination of continuously-variable samples/cm control plus special phosphor persistence provides optimum display and virtually eliminates flicker.

**Maximum detail:** magnification of max. 200 screens combined with dc shift of max.  $\pm 200$  screens for vertical axis and 100 screens combined with dc shift of max.  $\pm 100$  screens for horizontal axis permit close

observation of any signal detail.

**See leading edges:** the use of delay lines in both channels ensures that the time base starts before the signal is applied to the sampling gate.

**Easy to use:** ergonomic design and elimination of plug-in interface problems make the PM 3400 as easy to operate as a real time instrument.



Front panel detail, above, shows clear layout of controls. Combination of circuit design, and ergonomics makes the PM 3400 as easy to operate as a real time oscilloscope.

Interior detail photo, left, shows that the PM 3400 is as well designed inside as out. Clearly identified circuits plug-in for easy servicing.

Oscillogram, far left, shows some typical double pulses with rise times of around 3 ns.

Oscillogram, centre, shows a detail of one of these pulses with a vertical and a horizontal magnification of X 100. The noise level however makes the display virtually meaningless.

Third oscillogram shows the same display, but with the introduction of smoothing. This feature is only possible on a sequential sampling instrument such as the PM 3400.

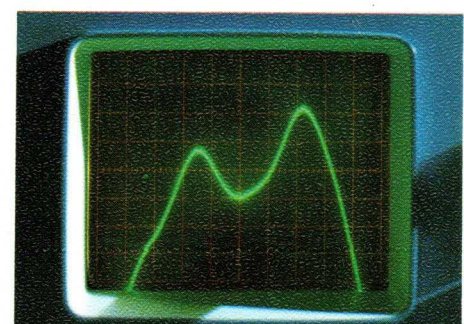
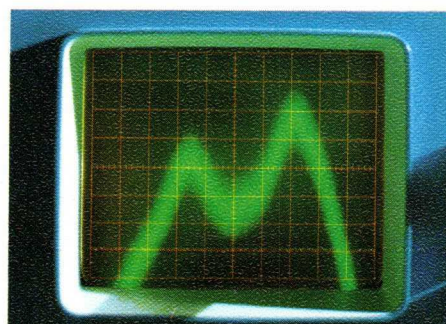
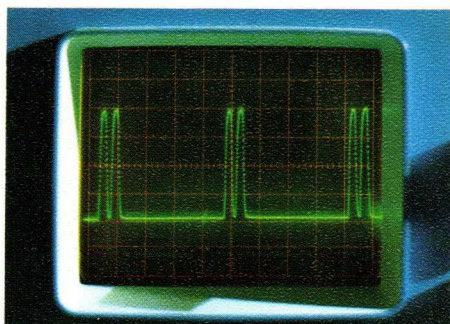


Photo top right shows the PM 3400 in laboratory use for examining high frequency pulses. Note that the PM 3400 combines all the advantages of delay lines and sequential sampling with no significant bandwidth reduction i.e. 1.7 GHz (which is an equivalent rise time of 200 ps) is more than adequate for almost all laboratory applications.

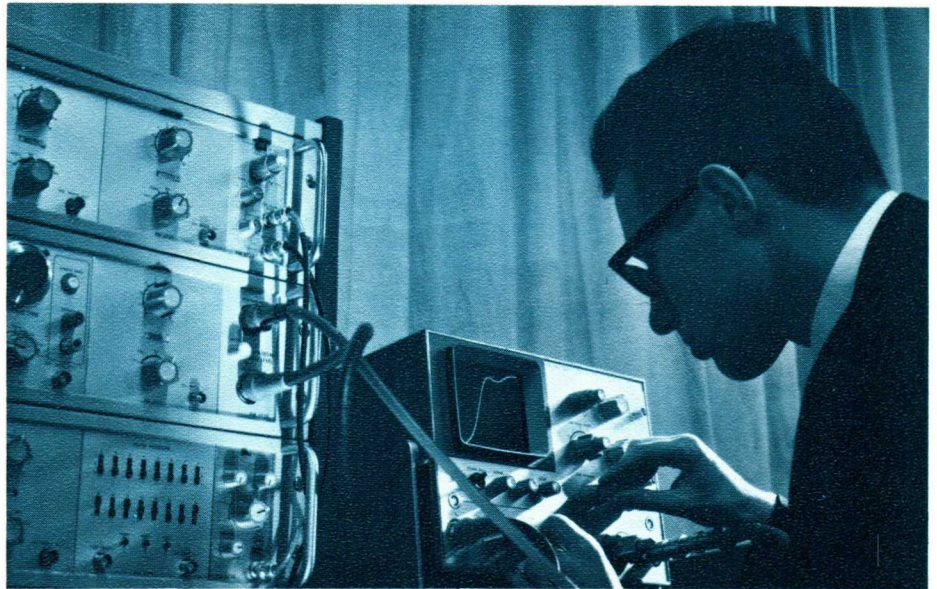
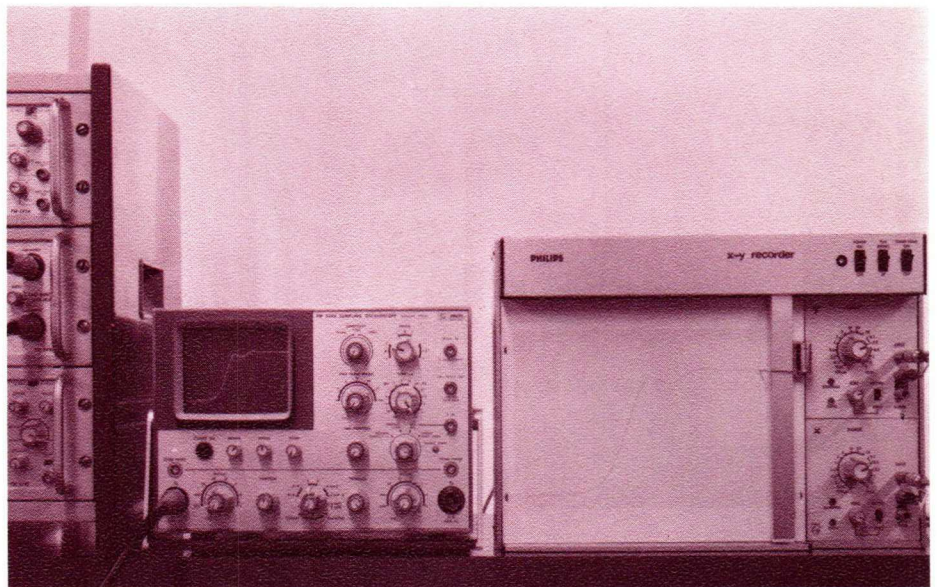


Photo bottom left demonstrates the versatile and extremely accurate triggering properties of this oscillo scope. The display is of an HF modulated carrier envelope and it can only be achieved on a Philips PM 3400.

The third photo, bottom right, illustrates another useful feature of the



PM 3400; the X-Y output. Shown here is the Philips X-Y recorder PM 8120 making a permanent record of the HF display.



well-known TL family is used all over the world, and extra-fast versions are also available.

Motorola emitter-coupled logic is widely used in computer hardware. The MECL 4 circuits which were recently introduced have stage delays of about 0.7 ns and their switching times are of the same order. All these new components need appropriate measuring equipment for development, testing and servicing.

#### Measurements on integrated circuits with PM 3400

TTL circuits are so fast that it is impossible to make accurate measurements on them with 50-MHz oscilloscopes. Standard TTL families have switching times of the order of 7 ns, and a 50 MHz oscilloscope with its 7 ns rise time will give an error of about 40% in measuring this. The fast TTL's need even faster oscilloscopes; the PM 3400 is thus a logical choice for such applications.

#### More of the Philips range

Unit	Bandwidth	Sensitivity
PM 3221 *	10 MHz	10 mV/cm
PM 3200	10 MHz	2 mV/cm
PM 3230 +	10 MHz	20 mV/cm
PM 3231 + *	15 MHz	10 mV/cm
PM 3210 + + *	25 MHz	1 mV/cm
PM 3250 + + *	50 MHz	2 mV/cm
PM 3370 + + + *	150 MHz	1 mV/cm

- + double gun
- + + double trace
- + + + plug-in
- \* with delay lines

#### Applications in solid-state

An important application area for the PM 3400 is in the solid state devices. Advances in solid-state technology have made it possible to produce transistors with a cut-off frequency of more than 1 GHz. These can be used to construct e.g. very fast switching circuits and telecommunication systems.

This opened up the VHF band (up to 174 MHz) and later the UHF band (up to 470 MHz) for telecommunication purposes.

Integrated circuits have also become faster, cheaper and more reliable. The



**Recorder outputs:** Channel A, channel B and Y. Output amplitude 0.5 volts/cm. Source resistance 1 k $\Omega$ . BNC-connectors.

**Horizontal amplifier**

**Sweep speed:**  
14 calibrated ranges, 1 ns/cm to 20  $\mu$ s/cm in 1 - 2 - 5 sequence. Tolerance  $\pm$  3%  
**Magnification:** 7 calibrated ranges, X1 to X100 in 1 - 2 - 5 sequence. A variable control permits uncalibrated, continuous adjustment between ranges. Intensity and

External 3 mV to 300 mV peak to peak

**Frequency range:** Up to 1.8 GHz

**LF-synchronization:** 10 Hz... 10 kHz, by applying signal  $>$  + 1 V to X-in

**Time jitter:**  $<$  30 ps + 0.2% of unmagnified time/cm for pulses with  $<$  300 ps rise time and 10 mV on external input or 100 mV in int. mode

**Trigger "kickback":**  $<$  3 mV amplitude on the EXT input connector

**Safe overload:**  $\pm$  3 volts peak

**Trigger output:**

**Technical specification**

**Cathode ray tube**

**Type:** D 14 - 120

**Graticule:** internal with 10% and 90% dotted lines

**Graticule illumination:** continuously variable

**Phosphor:** P 39 (long persistence)

**Useful screen area:** 8 x 10 cm

**Total acceleration voltage:** 10 kV

**Vertical amplifier**

**Modes of operation:**

1. Channel A alone
2. Channel B alone
3. Channel A and channel B
4. Channel A and inverted channel B
5. Channel A plus channel B
6. Channel A minus channel B
7. Channel A vertical and channel B horizontal

**Bandwidth:** DC to 1.7 GHz

**Rise time:** 200 ps  $\pm$  10%

**Overshoot:** Less than 3%

**Deflection coefficients:** 8 calibrated ranges, 1 mV/cm to 200 mV/cm in 1 - 2 - 5 sequence. A variable control permits uncalibrated, continuous adjustment between ranges and extends deflection coefficients to less than 400  $\mu$ V/cm

**Attenuator tolerance:**  $\pm$  3%

**Noise:** Less than 2 mV with NORMAL-SMOOTHED switch in NORMAL position and less than 0.8 mV in SMOOTHED position. Automatic smoothing in the 1 and 2 mV/cm positions

**Isolation between channels:**

More than 60 dB up to 1 GHz

**Input impedance:** 50  $\Omega$ . Input connectors GR 874 locking recessed

**Signal delay:** Appr. 30 ns delay time for each channel. 7 - 10 ns visible

$<$  30 ps difference in delay between the channels

**Dynamic range:** 1.6 volts. Small signals on top of DC-levels up to  $\pm$  1.6 volts can be viewed at any sensitivity

**Position:** Coarse and fine controls provide vertical shift of  $\pm$  1.6 volts

**Maximum input voltage:**  $\pm$  5 volts DC

**Probe power:** Connectors on both channels for active probes

sample density remain constant when display is magnified. Tolerance within  $\pm$  5% at all magnified settings. The centre of magnification is at midscreen or at the left-hand side of the screen depending on the position of an internal switch.

**Time position:** Coarse and fine controls provide time position equal to one unmagnified screen width

**X deflection:**

1. Repetitive from 5 to  $>$  1000 samples/cm continuously variable
2. Manual scan
3. External scan
4. Single scan 5 to 60 s per sweep.

One continuous control for all functions

**Recorder output (X out):** 0.5 volts/cm. Source resistance 1 k $\Omega$ . BNC-connector

**Trigger functions**

**Trigger mode:** triggered or synchronised  
**Trigger source:**  $\pm$  channel A,  $\pm$  channel B, and  $\pm$  external

**Amplitude range:**

Internal 20 mV to 2 V peak to peak

Usable as calibration voltage

**Pulse amplitude:** 1.2 V  $\pm$  2% into 50  $\Omega$

**Rise and fall time:** approx. 4 ns

**Pulse width:** 1  $\mu$ s  $\pm$  2%

**Supply**

**Voltage:** 110, 125, 145, 200, 220, 245 V

**Frequency:** 50 - 400 Hz

**Power:** 80 VA

**Dimensions and weight**

**Height:** 22 cm

**Width:** 32 cm

**Depth:** 47 cm

**Weight:** 18 kg (40 lbs)

**Optional accessories**

PM 9345 Cathode follower probe

PM 9341 Set of attenuator heads for PM 9345

PM 9342 Passive probe 1 : 10

PM 9343 Passive probe 1 : 100

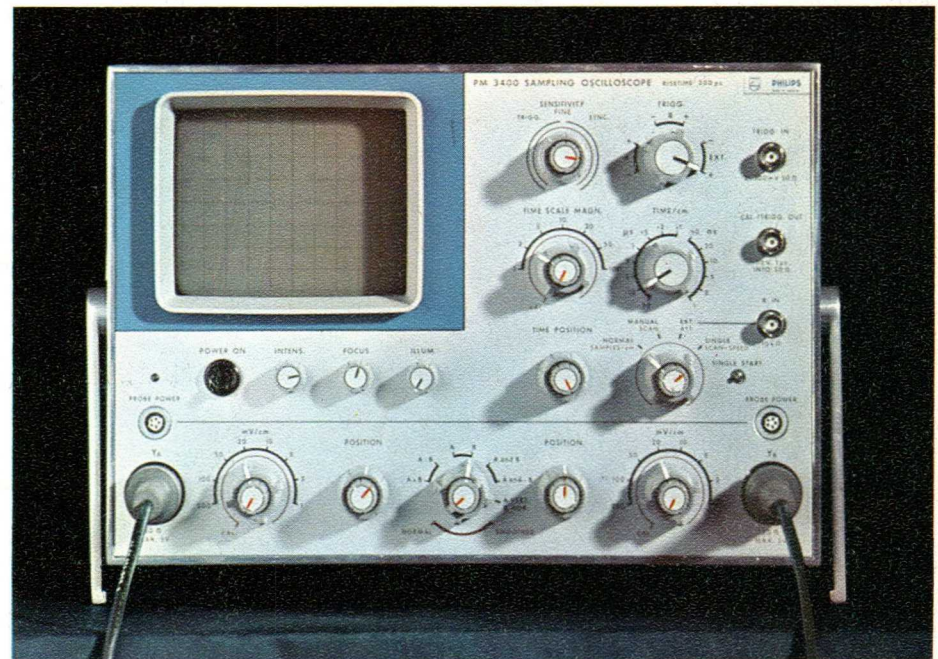
PM 9344 T-piece

PM 9380 Oscilloscope camera

PM 9394 Carrying case

PM 9395 Trolley

PM 9364 19" rackmount adapter



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Wilt u

- een afspraak maken voor een bezoek/demonstratie
- nadere gegevens zenden over de sampling oscilloscoop PM 3400
- nadere gegevens zenden over het Philips programma oscilloscopen
- een aanbieding doen voor

AFZENDER

Firma/instelling

t.a.v.

functie:

Adres:

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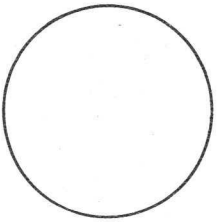
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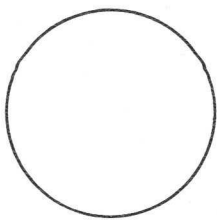
Kan ongefrankeerd  
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**ANTWOORDKAART**  
**MACHTIGING nr. 35**  
**EINDHOVEN**

PHILIPS NEDERLAND n.v.  
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