

1500,-

EM4-A1

PHILIPS

High Frequency Oscilloscope Type GM 5601



2577

Features

- D.C. coupled vertical amplifier up to 5 Mc/s
- Sensitivity 100 mV_{p-p}/cm
- Calibrated attenuator with an accuracy within 3 %
- Sweep speeds between 0.5 μ sec/cm and 200 msec/cm, accuracy within 3 %
- Horizontal magnification up to $\times 5$
- Very stable triggering with adjustable trigger level
- 10 cm flat screen tube with 2 kV acceleration voltage

Industrial equipment division
Electronic measuring apparatus
High frequency oscilloscope
Type GM 5601



Description

The vertical amplifier consists of a cathode-coupled pre-amplifier and a push-pull output stage. Coupling between the amplifier stages and to the deflector plates is effected via cathode followers. D.C. balance and hum compensation can be varied by screwdriver adjustment.

The input is provided with a D.C. - A.C. switch. The step attenuator and attenuator probe are calibrated. The continuous gain control is not calibrated, with the exception of the extreme position 1:1. If necessary, the nominal sensitivity of the amplifier can be readjusted by means of a screwdriver adjustment and with the aid of the calibration voltage available in the apparatus.

The horizontal amplifier is D.C. coupled and consists of a cathode-coupled push-pull stage. The input sensitivity can be varied by means of a continuous-control attenuator and a fixed 10 to 1 voltage divider.

The Miller time base is controlled by a Schmitt trigger circuit. This time base has been perfected through the addition of a number of cathode followers. The saw-tooth voltage is available at an output socket, via a cathode follower. The trigger signal, which is derived from the vertical amplifier or supplied externally, is passed to a Schmitt-trigger circuit via a trigger amplifier. In this trigger amplifier, the polarity of the trigger signal can be selected; moreover the trigger level circuit has been incorporated here. The Schmitt trigger circuit converts the signal into a pulse-shaped voltage. By means of differentiation very narrow pulses are obtained for controlling the time base. The time base becomes free-running when the trigger stability control is reduced to the minimum.

The unblanking of the cathode ray tube is D.C. coupled. The controls for focussing, astigmatism and intensity are on the front panel, next to the cathode ray tube. External brightness modulation can be effected by means of a modulation signal or by means of an external contact.

In the supply unit, practically all voltages are stabilized electronically; as a result the apparatus is very insensitive to mains voltage fluctuations.

The oscilloscope utilises a number of printed wiring units. The sides and top of the case are easily re-

moved, as a result of which the interior is easily accessible. The graticule holder, graticule, contrast intensifying filter, and cathode ray tube, can be replaced quickly if desired (e.g. for the purpose of photographic recording).

Applications

The GM 5601 has been designed for use in laboratories and for serviceing professional equipment.

The direct calibration of the vertical deflection, the time base and the very stable and sensitive triggering make the oscilloscope comfortable to operate and further more make the GM 5601 suitable for general laboratorial applications.

The small size and easy operation are additional advantages for field laboratories, e.g. for local examination and repair of electronic equipment.

It is particularly in connection with pulse applications that the specific properties of this oscilloscope — d.c. amplifier, stable triggering with trigger level adjustment, horizontal amplification and the large time base range — will be appreciated to the full.

Technical Data

CATHODE RAY TUBE

DH 10-78, 10 cm tube with an accelerating voltage of 2 kV.

Maximum deflection

Undistorted up to 6 cm for vertical deflection and 8 cm for horizontal deflection.

Available screen types

H (short persistence, green), N (medium persistence, green) and P (long persistence, yellow).

VERTICAL AMPLIFIER

Frequency range

DC coupled 0 ... 5 Mc/s (—3 dB)

AC coupled 3 c/s ... 5 Mc/s (—3 dB)

Risetime 75 m μ sec

Sensitivity

100 mV/cm (accurately adjustable by means of a screwdriver adjustment)

Attenuator

The calibrated attenuator enables the sensitivity to be adjusted in 6 steps from 100 mV/cm to 5 V/cm.

Accuracy of attenuation 3 %.

With the un-calibrated gain control an additional attenuation of 3 \times is possible.

Input

The input is provided with an AC-DC switch.

Input impedance 0.5 M Ω in parallel with 35 pF

Max. input voltage, DC coupled 90 V_{p-p}

AC coupled 90 V_{p-p} with a DC component of max. 300 V.

Shift

The shift control enables a DC component of at least 2.5 \times screen diameter to be compensated

CALIBRATING VOLTAGE

For the adjustment of the gain of the vertical amplifier a clipped sine wave with mains frequency is provided.

Amplitude 400 mV

Accuracy 1 %.

HORIZONTAL AMPLIFIER

Frequency range

DC - 300 kc/s (—3 dB)

Sensitivity

1 V/cm

Attenuator

The sensitivity can be adjusted between 1 V/cm and 50 V/cm by means of a fixed attenuator 1 : 10 and continuously.

Input

Input impedance: socket 10 : 1 1 M Ω in parallel with 5 μ F

Socket 1 : 1 0.1 M Ω in parallel with 30 μ F

Maximum input voltage 350 V (DC + peak AC)

Magnification

The magnification is continuously adjustable up to maximum 5 \times

Shift

The shift control enables every portion of the signal at 5 times magnification to be displayed.

TIME-BASE UNIT

The time-base can be operated free running or triggered.

Sweep speed

The sweep speed can be adjusted in 18 calibrated steps from 0.5 μ sec/cm to 200 msec/cm.

Accuracy 3 %

Magnifier

\times 1 or \times 5 calibrated with an accuracy of 3 %.

The max. sweep speed with 5 \times magnification is 0.1 μ sec/cm.

Sawtooth voltage

The sawtooth voltage is externally available with an amplitude of 45 V_{p-p} and an average DC component of 20 V. Maximum load 0.1 M Ω in parallel with 50 μ F.

TRIGGERING

The oscilloscope can be triggered on positive or negative edges. The trigger stability and the trigger level can be adjusted.

Operating functions

Internal from vertical amplifier, internal from mains or external.

Trigger requirements

5 mm amplitude at internal, or 1 V from external source.

Frequency range

Internal "HF" and internal "LF" 1 c/s ... 1 Mc/s.

External "DC" 0 ... 1 Mc/s, external "HF" 30 c/s ... 1 Mc/s.

External "Trigger" input

Input impedance $1\text{ M}\Omega$ in parallel with $40\ \mu\text{F}$.
The max. AC component is $3\text{ V}_{\text{p-p}}$. The max. DC component in the "HF" position is 350 V

HORIZONTAL DEFLECTION WITH MAINS FREQUENCY

A sine wave voltage with mains frequency can be switched to the input of the horizontal amplifier. The amplitude can be controlled with the continuous attenuator.

BEAM CONTROL

The unblanking during the sweep time is DC coupled.

Beam modulation

Requisite voltage at least 30 V
Input impedance $0.6\text{ M}\Omega$ in parallel with $25\ \mu\text{F}$.

Focussing and astigmatism

Controls are to be found on the front panel.

SUPPLIES

Mains voltages 110, 127 or 220 V
Frequencies 40 to 100 c/s
Power consumption 135 W

DIMENSIONS AND WEIGHT

$30 \times 21.5 \times 40\text{ cm}$, 14 kg .

VALVES

DH 10-78	ECF 80 (9 ×)
EAA 91	EF 80 (2 ×)
EC 92	EL 86 (2 ×)
ECC 83	EY 51
ECC 85	6BA6
ECC 88	85 AZ

ACCESSORIES

Attenuator probe (specification below)
Connection cable, rubber viewing hood, mains cable
Operating instructions.

ATTENUATOR PROBE

An attenuator probe, type GM 4601/A10 is delivered with the oscilloscope.

Attenuation

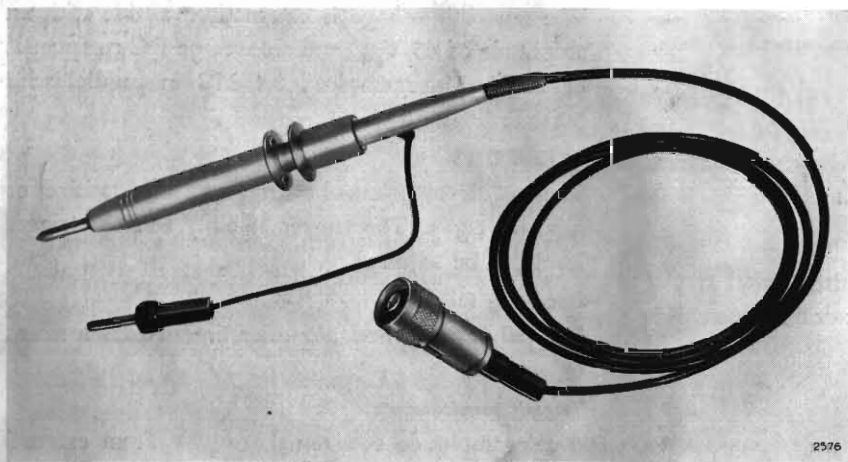
10 : 1

Accuracy

5 %

Input impedance

$4.5\text{ M}\Omega$ in parallel with $10\ \mu\text{F}$
The probe pin has a diameter of 4 mm and is provided with a jaw-construction which can be opened by pushing both the rings around the barrel together. The square wave reproduction of the probe can be adjusted by rotating one of the rings.



*Attenuator Probe,
type GM 4601/A10.*