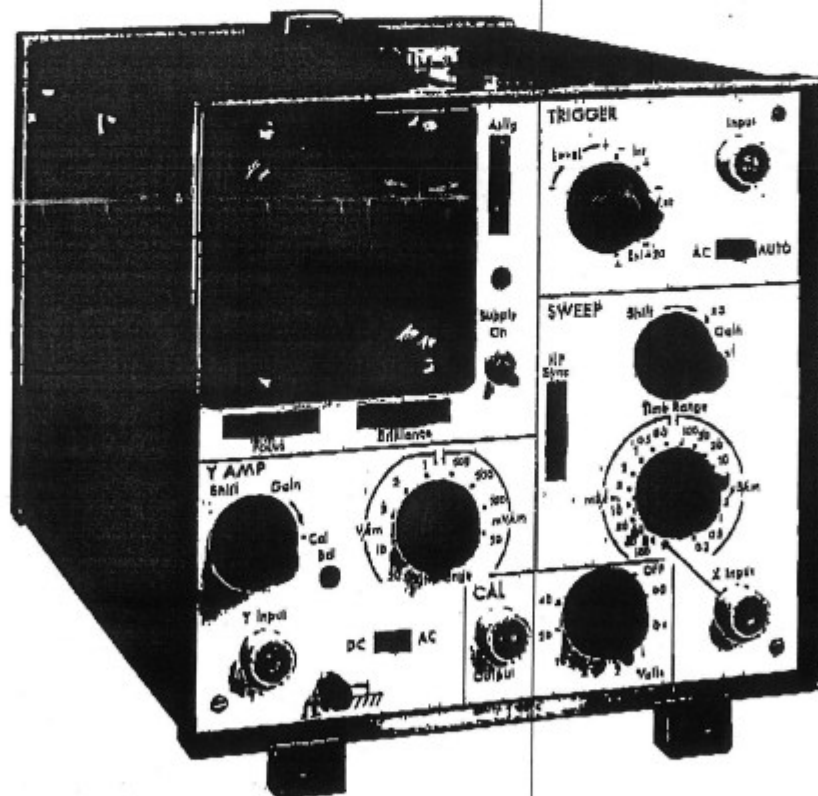


Oscilloscope



- Light Weight
- Full 15 Mc/s Bandwidth
- Stable Trigger Over Full Bandwidth
- Long Term Reliability
- Low Power Consumption
- Battery Operatlon



Oscilloscope TF 2203 is intended to meet the increasing demand for an accurate, portable, but inexpensive oscilloscope. An ergonomically designed front panel presents a neat appearance, coupled with the minimum number of operations to produce a steady display. Transistors have been used to achieve high performance, low power consumption, and long term reliability. Compactness and easy servicing is made possible by the use of printed boards, thereby reducing maintenance costs.

The vertical amplifier is d.c. coupled, with a 3 dB bandwidth extending to 15 Mc/s. Voltage measurement, to an accuracy better than 5%, is carried out using a removable perspex graticule, ruled in centimetre squares. The input circuit of the amplifier has an impedance of 1 MΩ in parallel with 28 pF. Constant input capacitance is maintained on each of the attenuator ranges, a useful feature when using the instrument in conjunction with a frequency compensated, high impedance probe. To avoid damage when a large unattenuated voltage is inadvertently applied, a cathode-follower valve is used to couple the signal to the input transistors. Adequate overscan of the screen without distortion is possible, and a shift of at least 15 cm is available.

The internal horizontal sweep generator has 18 preset calibrated sweep speeds, from 100 msec/cm to 200 nsec/cm. By using the X5 sweep expansion the range can be extended to 40 nsec/cm. Measurement of time is made using the ruled graticule, giving an accuracy better

than 5%. The horizontal amplifier is d.c. coupled with a 3 dB bandwidth of 4 Mc/s at a sensitivity of 1.5 V/cm. In the X5 position a sensitivity of 300 mV/cm can be realised with a reduced bandwidth.

The sweep generator may be triggered with a pulse obtained from an external source or derived internally from the waveform being examined. Provision is made for level control to allow triggering at any selected level on positive or negative going transients. The simplest mode of operation is with the sweep generator free running, made possible by setting the AC/AUTO switch to AUTO. In this mode the repetition rate of the sweep generator is varied in three steps, depending on the sweep range selected.

Sensitivity is 0.2 cm on internal and 0.2 V on external, and stable triggering is obtainable from 5 c/s to 15 Mc/s. If the amplitude of a large external signal is beyond the range of the level control, a 20:1 attenuator may be switched into circuit.

VERTICAL DEFLECTION SYSTEM

Y-AMPLIFIER

Bandwidth: d.c. to 15 Mc/s (-3dB).
Rise time: 23 nsec.
Overshoot: less than 1%.
Sensitivity: 50 mV/cm.
Maximum usable input: a signal producing a deflection of ±7.5 cm peak, when the fine gain control is set to maximum, can be displayed without distortion.

INPUT SELECTION

An a.c./d.c. coupling slider switch is included. The a.c. response is -3 dB at 8 c/s.

Input Impedance: 1 MΩ in parallel with 28 pF.
Connectors: U.H.F. 83.

AMPLITUDE CONTROLS

Fine gain: 3:1 in combination with the attenuator enables sensitivity to be continuously adjusted over the range 30 mV/cm to 60 V/cm.
Attenuator: a 9 position switch gives calibrated sensitivities of 50 mV/cm to 20 V/cm in a 1-2-5-10 sequence.
Maximum input: 300 V d.c. or d.c. + a.c. peak.

MEASUREMENT AND SHIFT

Voltage measurement accuracy: better than ±5%.
Y-shift range: at least 18 cm.

HORIZONTAL DEFLECTION SYSTEM

INTERNAL TIME BASE

Sweep speeds (unexpanded): An 18-position switch gives calibrated speeds from 200 nsec/cm to 100 msec/cm in 1-2-5-10 sequence.
Sweep expansion: continuously variable up to X8, calibrated at X1 and X5.
Linearity: ±2%.
Sweep mode: triggered with variable hold-off time for steady locking.

MEASUREMENT AND SHIFT

Measurement accuracy: better than ±5%.
X-shift range: at least 18 cm of shift available.

TRIGGER FACILITIES

Sources: External signal, internal signal, or external attenuated 20:1, positive or negative in each case.
Modes: A.C.: (level control operative).
 Automatic: (level control inoperative).

Bandwidth: 5 c/s to 15 Mc/s.

Sensitivity: Internal: 0.2 cm.
 External: 0.2 V.

Input Impedance: 1 MΩ in parallel with 28 pF approximately at X1 and 5 pF at 20:1.

EXTERNAL TIME BASE

X amplifier bandwidth: d.c. to 4 Mc/s (-8 dB) at X1.
Input sensitivity: 1.5 V/cm approximately at X1.
Input Impedance: 2000 Ω approximately.

VOLTAGE CALIBRATOR

Frequency: 7 kc/s approximately.
Rise time: less than 1 μsec.
Levels: 200 mV, 400 mV, 1 V, 2 V, 4 V, 10 V, 20 V, and 40 V.
Accuracy: The 40 V level can be accurately set by reference to an external d.c. voltmeter. All other levels are related to it with a maximum error of ±2%.

ADDITIONAL FACILITIES

Z modulation: Facilities are provided for an external input. Approximately 50 V fully modulates the brilliance of the display.

CATHODE RAY TUBE

Type: (EMI) 3 inch diameter, high resolution flat screen.
Display area: 5 cm x 8 cm.
E.H.T.: 3 kV approximately.

POWER SUPPLIES

110 V a.c. nominal (97 V to 132 V absolute), 50-60 c/s or 220 V a.c. nominal (195 V to 265 V absolute), 50-60 c/s or 12 V d.c. nominal (11 V to 14 V absolute), positive side earthed.
Consumption: 25 W a.c., or 20 W d.c.
Fuses: 1A when operated on a.c. 3A when operated on 12 V d.c.

DIMENSIONS AND WEIGHT

Height	Width	Depth	Weight
21.6 cm	21.6 cm	35.8 cm	6.80 Kg
8½ in	8½ in	18 in	15 lb approx

ACCESSORIES

For details of all accessories see page 62

Supplied: Two U.H.F. plugs, type 83.
 One B.N.C. female/U.H.F. male adapter.

Optional: TM 8110 X1-X10 Attenuator Probe.
 TM 8120 Low capacitance Probe.
 TM 8591 A Pre-Amplifier 3 c/s-100 kc/s.