TELTRON

Atomic Physics Educational Apparatus

TEL 807 Ratemeter Monitor

A general purpose ratemeter fully metered, especially suitable for use with the educational X-ray instrument, the TEL-X-OMETER, TEL 580.

A built-in variable polarising supply permits the direct connection of Geiger-Mueller tubes for α, β, γ and X radiation experiments; the large meter can be switched to monitor both the G.M. Tube polarising voltage and an external current source up to 100 μA fsd.

An Auxiliary Connection is incorporated to permit the alternative use of a solid-state detector and head amplifier (HEAD AMPLIFIER MODULE TEL 841).

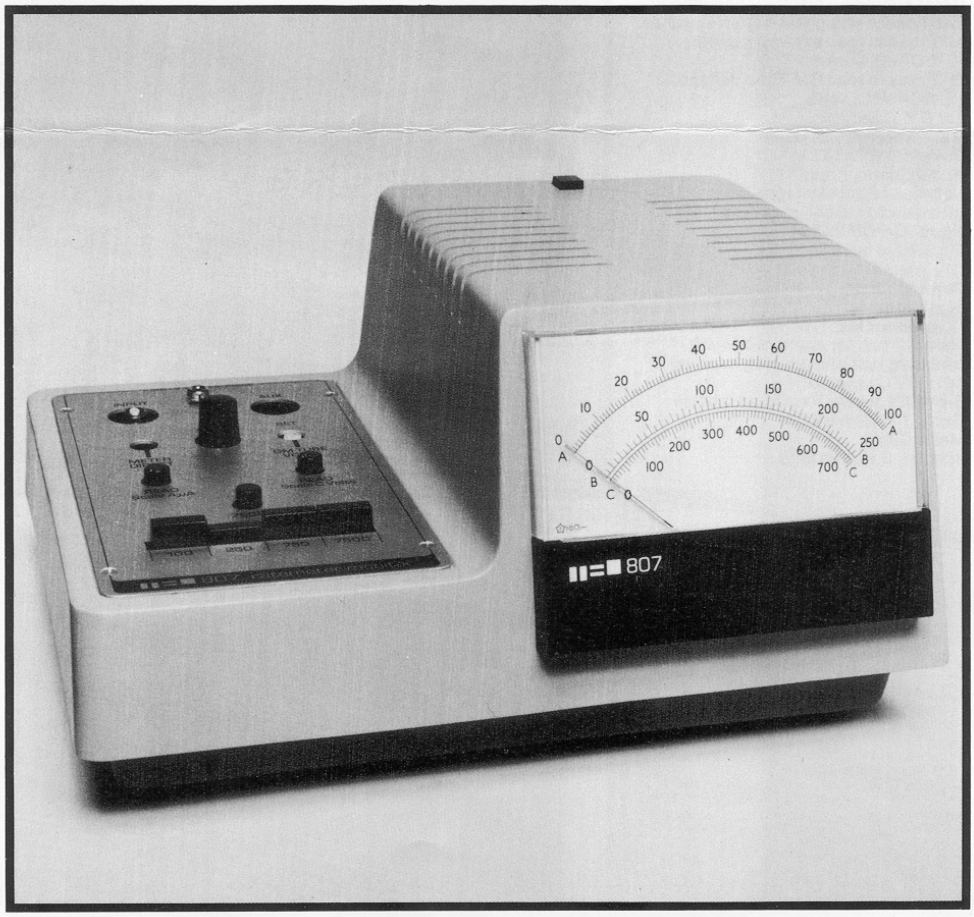
Signal Input
Square and Sinusoidal Waveforms and pulses.
Sensitivity
Squarewaves and pulses: 50mV.
Sinusoidal waves: 250mV.
Resolution
Better than 1.0 μS.
Frequency
10 Hz-75 kHz.

Metering
Calibration: Scale A: 0-100.
Scale B: 0-250.
Scale C: 0-750.
Scale length:
119mm, 100 μA, linear.
Accuracy
Better than ±2% of fsd.
Drift
Less than ±2% of fsd in 1 hour.

Power Input
110, 220, 240V ±10%, 50/60 Hz.
Power Selector
Situated underneath.
Power On Neon indicator lamp.

General
Housing: Glass fibre reinforced resin moulding on cast aluminium base.
Ambient Temp: 35°C (95°F) max.
Dimensions
W: 280; D: 230; H: 150mm.
Weight: 2.7Kg.

See control layout overleaf



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TEL 807 Ratemeter Monitor

Controls

Meter Function Selector (Primary)
Four press-button switches, interlocked:

1) 100; count rate range 0-100 counts per second, time constant: 20 seconds.
2) 250; count rate range 0-250 counts per second, time constant: 10 seconds.
3) 750; count rate range 0-750 counts per second, time constant: 10 seconds.
4) 7500; count rate range 0-7500 counts per second, time constant: 10 seconds.

Additional press-button for frequency measurements:

5) 75000; count rate range 0-75000 counts per second, time constant: 10 seconds.

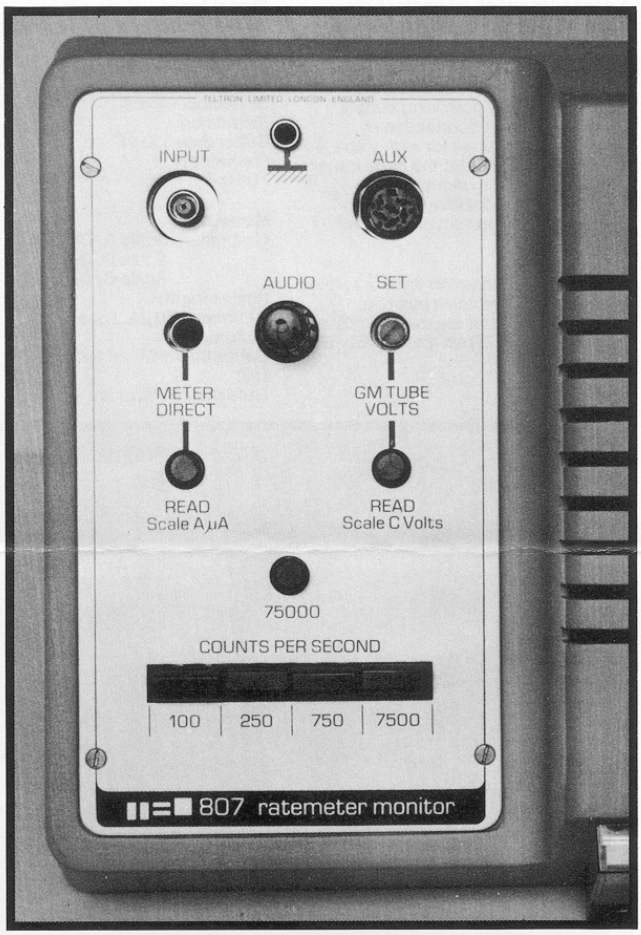
Meter Function Selectors (Secondary)
Two non-locking press-button switches:

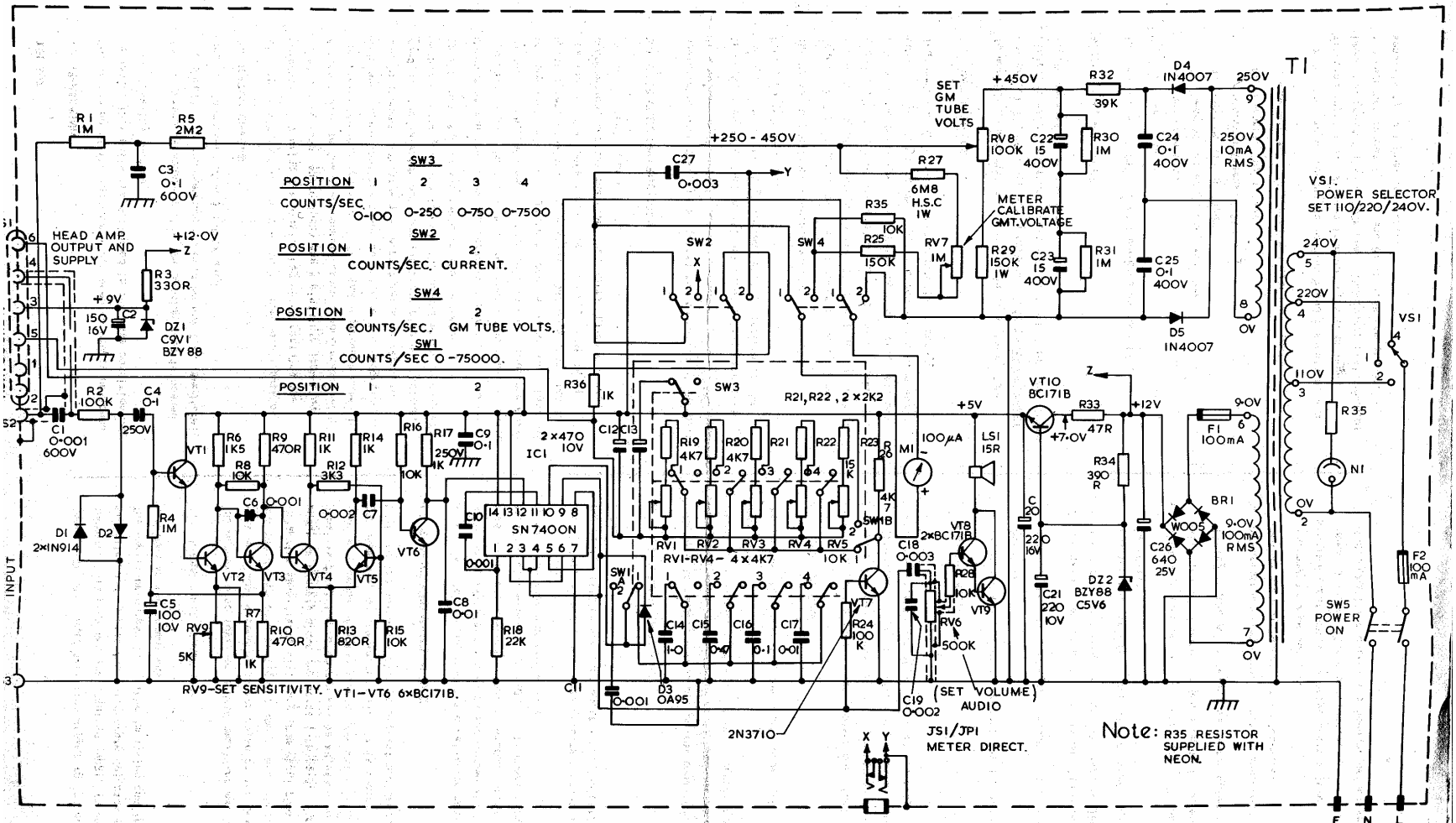
1) Press to read external current, SCALE A, μA.
2) Press to read GM Tube Voltage, SCALE C, volts.

Set GM Tube Volts
A screw-driver slot preset:
350-450 volts DC.
Audio Control Knob
Volume control of integral loudspeaker giving audio indication of count rate.
Power On/Off Switch
Situated at back.

Connections

Signal Input
Co-axial socket, type PET. 142.
Meter Direct, for external current:
Miniature jack socket; plug supplied.
Auxiliary Connector
6-pin DIN socket for add-on module.
Earth: 1 × 4mm socket.
Mains Cable:
Integral, 2 metres long.





RATEMETER MONITOR. TEL.807 - CIRCUIT DIAGRAM.

1.0 UNPACKING

The packaging of the instrument has been carefully designed to ensure that units are delivered in the same condition as they leave the factory.

If any damage is apparent when the packing case is opened the supplier of the equipment should be notified immediately and the instrument should not be used.

2.0 INITIAL CHECKS

Lift the instrument out of the box and remove all packing materials, including the plastic bag which contains the power supply lead, spare fuses and a miniature jack-plug. Attach a plug to the power supply cable in accordance with the wiring instruction sheet. Tilt the instrument onto its side and ensure that the power selector on the underside of the instrumenf indicates the correct mains voltage; to readjust the selector pull out the black plug and replace, with the arrow pointing towards the legend which corresponds to the power supply available in the laboratory.

Check that the power fuse is securely screwed in. Connect the mains supply to the unit by depressing the Power On switch (WHITE) on the back panel. When this is performed, the Power On Lamp (RED) will be illuminated and the meter will indicate a count rate provided that a signal source is connected to the input and a correct range is selected. With input unconnected, depress the G.M. Tube volts button and read 450 volts (scale C on meter).

3.0 OPERATING INSTRUCTIONS

Having completed the initial checks the operation of the unit will become self-evident.

The G.M. Tube INPUT and AUXILLIARY input sockets are clearly labelled. Note that high voltage bias is present on the G.M. Tube INPUT socket.

The Normal operational sequence would be as follows :-

Connect a G.M. Tube to the coaxial input socket. Depress the G.M. Tube Volts button to read bias voltage. Adjust if necessary by means of the control panel preset. Select the required countrate range by depressing the appropriate push button. Turn Audio Volume Control clockwise to give audio indication of countrate. Read countrate on meter.

3.1 METER DIRECT

To monitor an external d.c. current (such as X-Ray tube current of TEL 580) connect a screened lead to METER DIRECT miniature jack socket and press button to read current, 100mA F.S.D. on scale A of the meter.

3.2. AUXILLIARY INPUT

This is a 6 - pin DIN socket connected as follows :-

Pin 1. Not connected
2. Not connected
3. Head Amplifier Supply, +9V, 5mA
4. Head Amplifier Input
5. Recorder Common (+5V)
6. Recorder Input (+5V)

Screen - common connected to instrument earth

The recorder to be connected to pins 5 and 6 should have a floating input i.e. isolated from earth, and an input impedance greater than a 100K ohm. The source resistance of the recorder output (pins 5 and 6) is 1.3K ohm and its sensitivity is 130 mV for F.S.D.

Connect TEL 841, Head Amplifier direct to the auxillary socket. This provides the required supply to energise the amplifier and to bias the solid-state detector in the probe. The amplifier output is further amplified and the count rate obtained in the normal way.

3.3 SIGNAL INPUT SENSITIVITY

The output noise level of a Head Amplifier may be between 20mV and 200mV depending on the noise of the detector used, and the design of a particular amplifier. Thus, the required ratemeter sensitivity will vary from about 50mV to 500mV in order to operate above the noise threshold. The input sensitivity of the ratemeter may be adjusted between these limits by means of potentiometer RV9 which is accessible on the underside of the instrument. It is factory preset at 50mV and the spindle locked to prevent accidental adjustment.

4.0 SERVICE AND MAINTENANCE

As with all Teltron equipment the ratemeter monitor has been designed to withstand the abuse and misuse which all apparatus used for course demonstration and student practical work traditionally experiences and it will operate for long periods without the need for maintenance.

Some items, however, will require attention at some time during the useful life of the instrument - the indicator lamp and the fuses.

4.1 REPLACEMENT OF 'POWER FUSE'

This fuse is readily accessible on the underside of the instrument and will only require replacement if a fault occurs in the power supply or if an incorrect fuselink has been used.

The correct fuselink is 100mA, QUICK BLOW TYPE.

4.2 FAULT FINDING

It is recommended that unless professional facilities are available the rectification of only minor and obvious faults are attempted by the user; for correction of more obscure faults the user should seek advice of the supplier.

ELEMENTARY FAULTS

A. Indicator Lamp fails to operate but the meter functions normally.

Power Indicator Lamp and/or associated wiring defective.

B. Indicator Lamp fails to operate and the meter does not indicate either countrate or G.M. Tube voltage.

Mains plug, Indicator Lamp and/or Power Fuse (FS.2) defective.

C. Indicator Lamp on but the meter does not read anything when input is connected and a range is selected.

Wiring to the meter defective; Meter defective.

D. Ratemeter working normally but no audio output when volume control turned fully clockwise.

Incorrect range selected.
Signal input frequency above audible level (greater than 16 kHz or 16 K counts/sec.).
Audio Amplifier defective; Speaker defective.