TELTRON

Atomic Physics Educational Apparatus

TEL 806 Scaler Monitor

A very versatile digital scaler, particularly applicable to atomic physics investigations; a built-in variable polarising supply permits the direct connection of Geiger-Mueller tubes for α, β, γ and X radiation experiments; a miniature secondary meter displays the G.M. Tube polarising voltage and can be switched to monitor external current sources up to 100 μA fsd.

The unit is especially suitable for use with the educational X-ray instrument, the TEL-X-OMETER, TEL 580.

Low cost add-on modules are available to adapt the Scaler Monitor for "lapsed time" and "gated event" applications (TIMER MODULE TEL 805) and to employ 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 Range
10 Hz-200 kHz

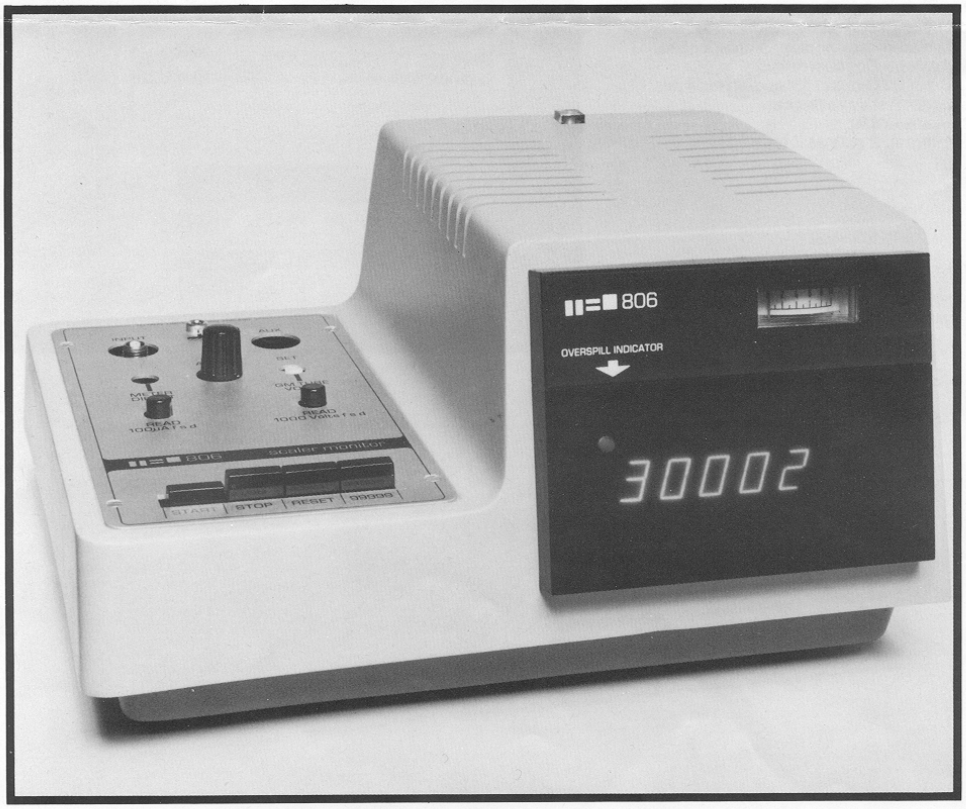
Display
Visual
Five in-line seven segment digital indicators, height 14mm, with non-reflecting, high definition, red filter and 100 degree viewing angle.
Count Range
0-99999, with suppression of leading zeros and overspill indicator for final 9.
Timer Range (with Timer Module TEL 805) 0-9.9999 seconds, with decimal point and all zeros displayed and overspill indicator on final nine.

Meter
Calibration: 0-10
Scale length:
25mm, 100 μA, linear.

Power Input
110, 220, 240V ±10%, 50/60Hz.
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: 3.5Kg.

See control layout overleaf



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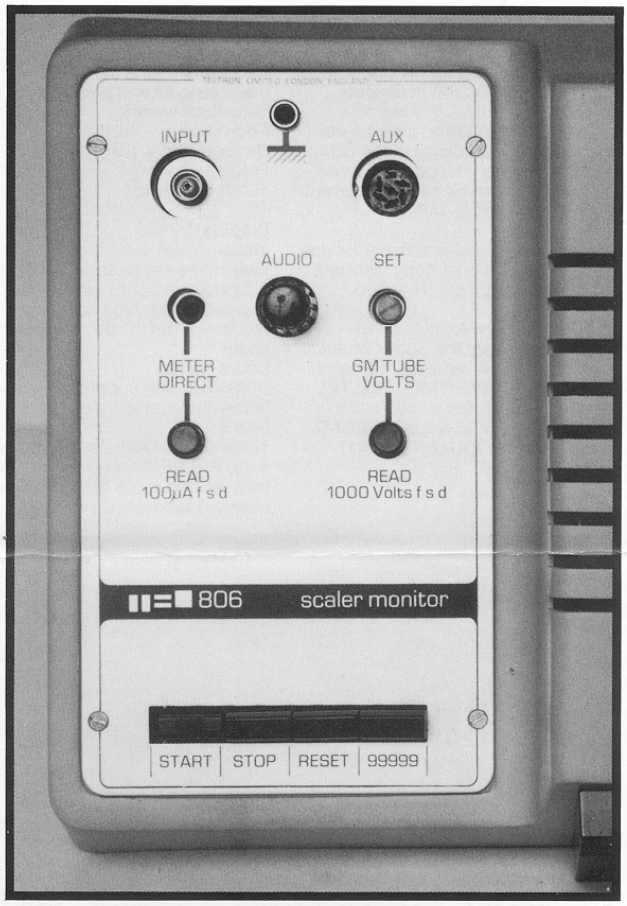
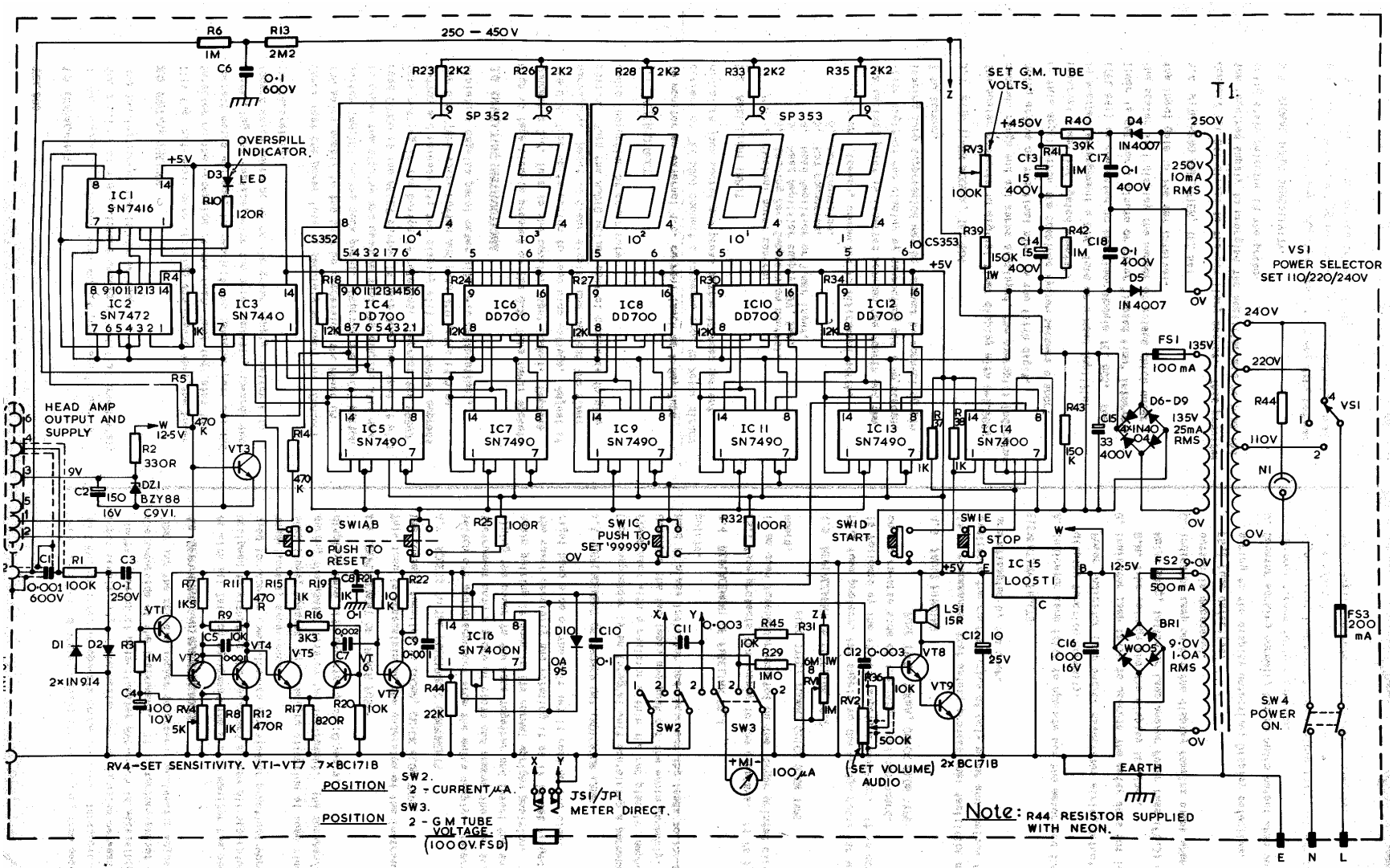
TEL 806 Scaler Monitor

Controls
Display
Four press-button switches:
1) and 2) START and STOP, interlocked.
3) RESET — non-locking;
displaying five zeros when depressed,
blank screen on release.
4) 99999 — non-locking;
displaying five nines both when depressed
and when released.
Meter Function Selectors
Two non-locking press-button switches:
1) Press to read external current,
100 μA fsd.
2) Press to read GM Tube Voltage,
1000 Volts fsd.
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 modules.
Earth: 1 × 4mm socket.
Mains Cable:
Integral, 2 metres long.





SCALER MONITOR. TEL 806 - CIRCUIT DIAGRAM.

1.0 UNPACKING

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

Tilt the instrument onto its side and ensure that the Power Selector on the underside of the instrument 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 be depressing the Power On switch (WHITE) on the back panel. Depress the RESET button to clear the display and observe that the display will now read 00000 if the RESET button is held down and that it will show nothing if the button is released. Depress the 99999 button and release it; the display will read 99999; depress the G.M. Tube Volts button and read 450 volts (4.5 on miniature edgwise panel meter with 0-10 calibration).

3.0 OPERATING INSTRUCTIONS

High voltage bias is present on the G.M. Tube INPUT socket. Connect a G.M. Tube to the coaxial input socket. Depress the G.M. Tube volts button to read bias voltage. Adjust if necessary. Reset to clear display and depress the START button. Turn the AUDIO volume control clockwise to give audio indication of count rate.

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.

3.2 AUXILLIARY INPUT

Pin 1. Decimal point control.
2. Leading Zero Suppression control.
3. Head Amplifier supply +9V, 5mA.
4. Head Amplifier or Timer input.
5. Not connected.
6. Not connected.

Screen - Common, connected to instrument earth.

The decimal point is inserted between the fourth and the fifth digit of the display by connecting pin 1 to screen. Leading zero suppression may be removed by connecting pin 2 to screen.

3.3 WITH TIMER MODULE, TEL 804

The scaler converts to digital timer display with 0-9.9999 seconds range and all zeros displayed, the overspill indicator being active on the final nine in the fifth digit.
In this application the combined system becomes a short interval timer for 'gated events'.
In another arrangement a G.M. Tube or a Head Amplifier (TEL 841) is connected to the Timer Module TEL 805. The Timer is set for 1 minute or other 'lapsed time' interval; the scaler will display the number of pulses which enter the input gate in the set interval.

3.4 WITH HEAD AMPLIFIER, TEL 841

Connect TEL 841 direct to the auxiliary socket. This provides the required supply to energise the amplifier and to bias the solid state detector in the probe.

3.5 SIGNAL INPUT SENSITIVITY

The output noise level of a Head Amplifier may vary between 20mV and 200mV depending on the noise of the detector used and the design of a particular amplifier.

Thus the required scaler sensitivity will vary from about 50mV to 500mV in order to operate above the noise threshold. The input sensitivity of the scaler may be adjusted between these limits by means of potentiometer RV4 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 SERVICING AND MAINTENANCE

As with all Teltron equipment the scaler monitor has been designed to withstand the abuse and misuse all apparatus used for course demonstration and student practical work traditionally experiences.
Some items, however, will require attention at some time during the useful life of the instrument. The Beckman/Sperry displays have life expectancy of 10 years.

4.1 REPLACEMENT OF 'POWER FUSE'

This fuse is accessible on the underside of the instrument. The correct fuselink is 200mA, QUICK BLOW TYPE.

4.2 ACCESS TO THE ELECTRONIC COMPONENTS

Switch off and disconnect from the mains supply. Invert the instrument onto a piece of cloth and remove the four screws fixing the cover to the base together and invert the unit again putting it down in its normal upright position. Lift the cover carefully and rotating it as if it was hinged at the right hand side of the unit let it rest on its side.

4.3 REPLACEMENT OF 'POWER ON' INDICATOR LAMP

Each lampholder is an integral unit containing a permanently fixed neon with a resistor within the red plastic lampholder. Unsolder the two leads and push out the whole assembly. Push hard in a new indicator and reconnect the leads to the same points.

4.4 REPLACEMENT OF FUSELINK FS.1

FS.1 fuse protects the supply to the displays. It is fitted in an open fuseholder mounted on the larger printed circuit board.

FUSE TYPE: 100mA, QUICK BLOW TYPE

4.5 REPLACEMENT OF FUSELINK FS.2

FS.2 fuse protects the supply to the bridge rectifier which is followed by the +5 volt supply stabiliser. It is mounted on the reverse side of the larger printed board.

FUSE TYPE: 500mA, QUICK BLOW TYPE

4.6 FAULT FINDING

It is recommended that unless professional facilities are available the rectification of only minor and obvious faults are attempted by the user.

ELEMENTARY FAULTS

A. Indicator Lamp fails to operate but the meter and the display function normally.
Power Indicator Lamp and/or associated wiring defective.

B. Indicator Lamp fails to operate the meter does not indicate G.M. Tube voltage and the display is blank.
Mains plug, Indicator Lamp and/or Power Fuse (FS.3) defective.

C. Indicator Lamp on but the display remains blank when 99999 button is depressed.
FS.1 fuse defective.
Wiring to the display defective; Display defective.

D. Counter working normally but no audio output when volume control turned fully clockwise.
Signal input frequency above audible level (16 kHz or 16 K counts/sec.).
Audio Amplifier defective; Speaker defective.