

General information

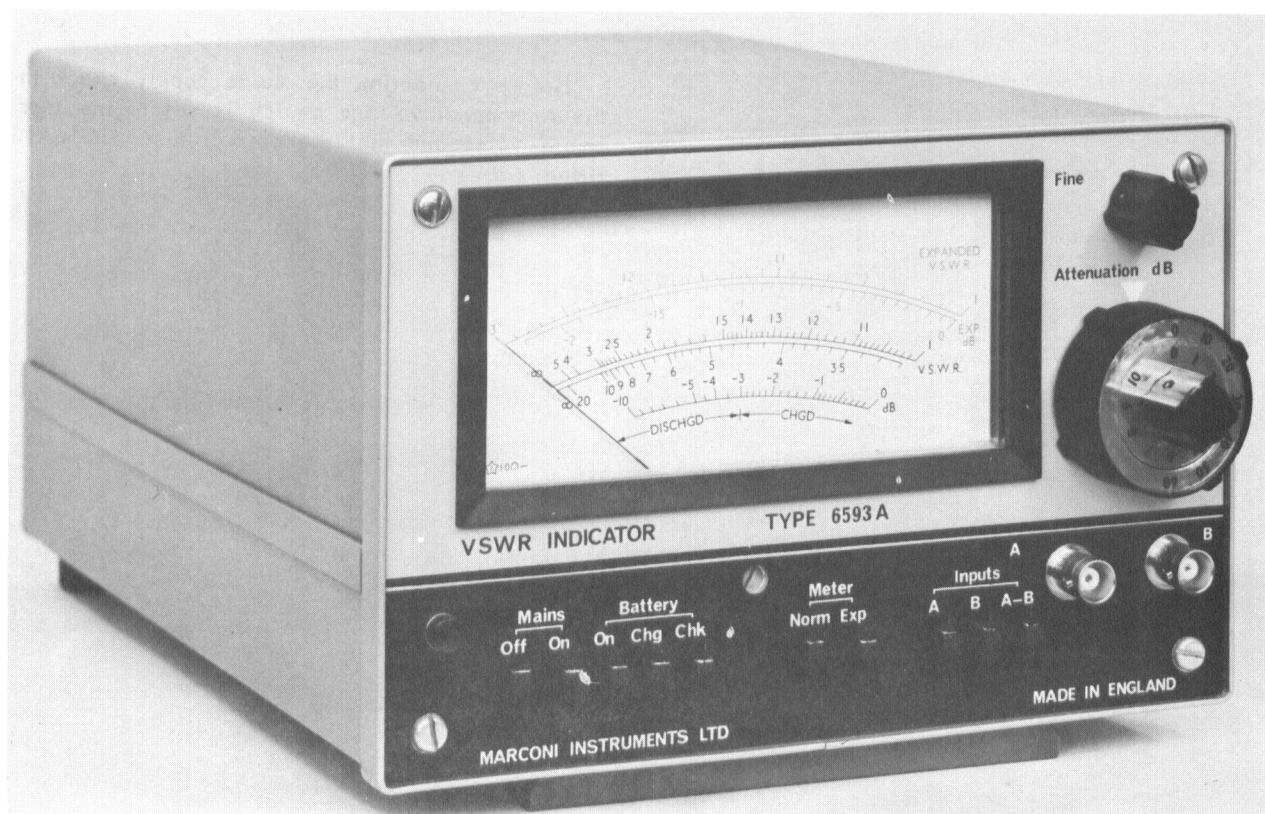


Fig. 1 Marconi Instruments V.S.W.R. Indicator Type 6593A

1.1 SPECIFICATION

AMPLIFIER

Inputs 2 channels, A and B. High impedance. 200 Ω Bolometer input, bias current 4.5mA.

Functions A,B, A-B, Bolometer.

Frequency range 800 Hz-1200 Hz variable.

Selectivity 20 Hz-100 Hz variable.

Sensitivity 0.5 μ V R.M.S. for F.S.D. on channels A and B.
0.15 μ V R.M.S. for F.S.D. on Bolometer input.

Noise level Below -10 dB level on meter at maximum sensitivity and bandwidth with high impedance input terminated in 50 Ω .

Output Proportional to meter indication.
1 volt corresponding to F.S.D.
Output impedance, 100 k Ω .

ATTENUATORS

Coarse 0 to 60 dB in steps of 10 dB $\pm$ 0.1 dB/10 dB. From 0-10dB $\pm$ 0.5 dB.

Medium 0 to 10 dB in steps of 1 dB $\pm$ 0.05 dB/dB.

Fine 0 to 1 dB continuously variable.

METER SCALES

VSWR 1.0 to ∞
3.16 to ∞

Expanded 1.0 to 1.3
dB range 0 to -10dB

Expanded dB range 0 to -2.2 dB

Battery check Discharged/Charged

Meter calibration For square law detector

Scale length 119,5 mm 4.7 in.

POWER REQUIREMENTS

A.C. mains 115 or 230V a.c. 50 to 60 Hz.

DIMENSIONS AND WEIGHT

Height	Width	Depth	Weight
140.5 mm	202 mm	284 mm	2.64 kg
5.53 in	7.95 in	11.2 in	5lb 13 oz

OPTIONAL ACCESSORY

2200186 Internal rechargeable battery pack.
permits use up to 20 hours continuous operation.

1.2 INTRODUCTION

The V.S.W.R. indicator and selective amplifier is basically a low noise, high gain amplifier driving a meter output. The instrument is primarily intended for Laboratory use but its small size and robust construction make it equally suitable for use in the field.

Provision is made for two inputs from crystal detectors. These can be used independently or together for bridge measurements. A separate input is provided with a d.c. bias supply for bolometer operation.

The switched attenuators are adjustable from 0 to 70db in increments of 1db, and a continuously

variable 0-1db attenuator is also provided. Attenuator calibration assumes that the input is from a square law detector.

Either a mains a.c. supply or optional internal batteries can be used to power the instrument which has a very low power consumption.

1.3 INSTALLATION

Before connecting the mains supply check that the rear panel voltage switch is set to the appropriate value and that the correct fuse (160mA) is fitted.

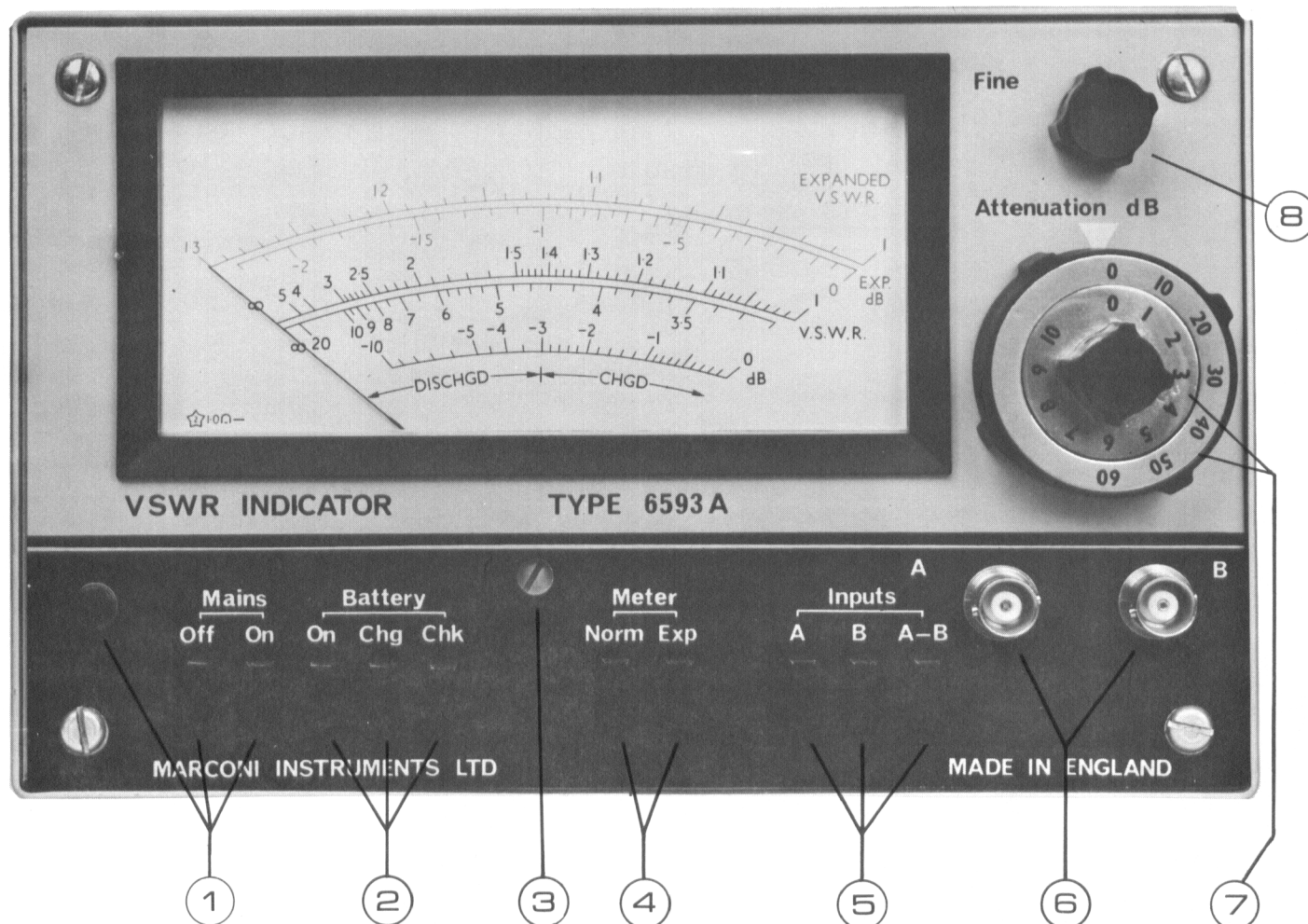


Fig. 2. Front Panel Controls

2.1 FRONT PANEL CONTROLS

1. MAINS SWITCH

Mains supply ON/OFF switch and associated indicator lamp. During battery charge, indicator lamp is lit.

2. BATTERY

A three-position push-button switch which energises the 6593A from the battery pack (optional). It also permits the condition of the battery pack to be checked (BAT CHK button) and charged (BAT CHG button). When the mains is on, a trickle-charge is applied to the battery pack and in the BAT CHG position the power is used for charging purposes with the indicator lamp glowing.

3. METER MECHANICAL ZERO

Set meter indication to zero when mains power is OFF.

4. METER RANGES

Selects normal or expanded meter ranges as indicated on meter.

5. INPUT SELECTOR SWITCHES

Selects alternative high impedance input channels A and B as well as A-B facility for bridge measurements.

6. INPUT SOCKETS

BNC sockets for channels A and B inputs.

7. STEP ATTENUATOR CONTROLS

Coarse 0 to 60dB in steps of 10dB ± 0.1 dB/10dB.
From 0-10dB ± 0.5 dB.
Medium 0 to 10dB in steps of 1dB ± 0.05 dB/dB.

8. CONTINUOUSLY VARIABLE ATTENUATOR CONTROL

Fine 0 to 1 dB continuously variable.

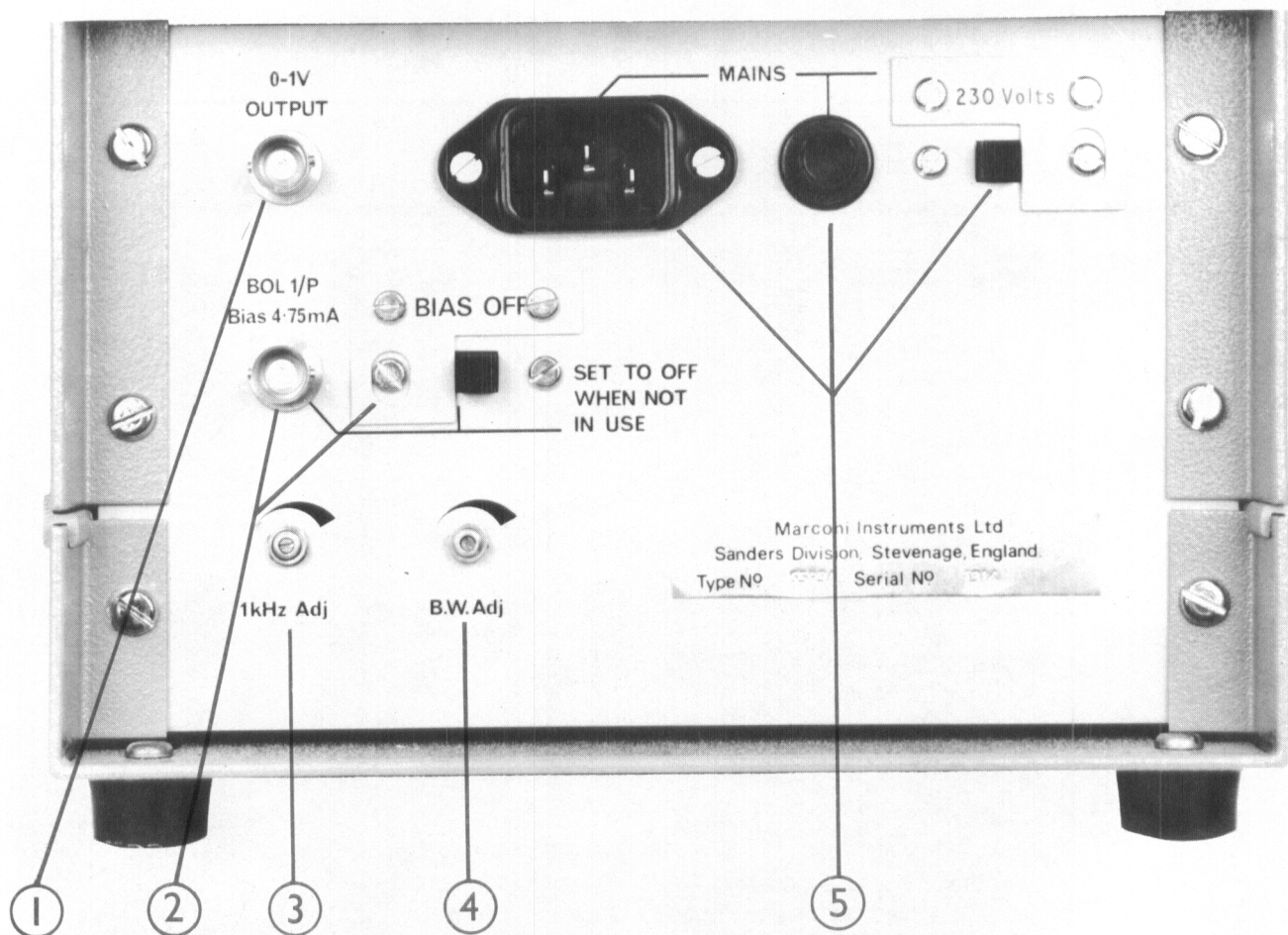


Fig. 3. Rear Panel Controls

2.2 REAR PANEL CONTROLS

1. OUTPUT

0-1V output proportional to meter indication. 1 volt corresponding to f.s.d. Output impedance 100k Ω .

2. INPUT

Bolometer input and associated bias ON/OFF switch.

3. AMPLIFIER TUNING

Tuned amplifier centre frequency adjustment. Clockwise rotation increases frequency.

4. AMPLIFIER BANDWIDTH

Amplifier bandwidth adjustment. Clockwise rotation increases bandwidth.

5. 115 - 230V MAINS

This switch permits the application of either 115V or 230V a.c. power. Insure that the switch position is properly set prior to the application of power to avoid equipment damage. If replacement of the associated fuse (160mA slow blow) becomes necessary, ensure that the replacement conforms with the description given in the Replaceable Parts list.

2.3 OPERATING INFORMATION

2.3.1. V.S.W.R.

For normal V.S.W.R. measurements the instrument is used in the conventional manner. Socket A or B may be used for connection to a crystal, the input selector switch being set appropriately.

BRIDGE APPLICATIONS

If two signals are available from the microwave bench, very small deviations in either of the signals can be accurately measured using bridge techniques. When the two inputs are connected to sockets A and B they complete a bridge network with two primary windings on the input transformer.

Having connected the signals to sockets A and B, proceed as follows:

- 1) Switching INPUT SELECTOR to A and B in turn, adjust attenuators on microwave bench until the two signals are indicated as being of approximately the same level on the V.S.W.R. Indicator.
- 2) Set INPUT SELECTOR TO A - B.
- 3) Switch out attenuation in amplifier to increase the reading to a convenient indication.
- 4) Adjust attenuators on microwave bench to obtain a null on the meter indication.

- 5) Re-adjust one of the microwave attenuators to a position at which the sensitivity of the indication is adequate for the measurement to be performed, at the same time ensuring that the working region for these measurements is confined to one side of the null. If necessary the meter indication can be calibrated against an attenuator in the arm in which variations are being measured.

A simpler, but slightly less accurate application of the bridge balance facility, particularly useful in measuring insertion losses above 0.1dB, is as follows:

- 1) Adjust the two signals, as described above, to obtain a null reading.
- 2) Insert or remove the component, whose insertion loss is to be measured in one arm of the microwave system.
- 3) Adjust the attenuator in that arm of the system to re-establish the null readings. The difference in the two readings of the attenuator is the insertion loss.

2.3.2. MEASUREMENT OF VERY LOW V.S.W.R.

When a V.S.W.R. of less than 1.3:1 is being measured, more accurate readings can be obtained by using the expanded scale facility as follows:-

- 1) Adjust microwave and/or amplifier attenuators to obtain a reading of approximately '1' for the standing wave maximum.

- 2) Depress 'Expand' Button.

- 3) Proceed as if normal V.S.W.R. measurement were being made but read the red EXPANDED V.S.W.R. scale.

2.3.3. MEASUREMENT OF LARGE V.S.W.R.

For measurement of a V.S.W.R. greater than 3.16:1 proceed as follows:-

- 1) Set the instrument inputs and controls for ordinary V.S.W.R. measurements and proceed to make the measurement.
- 2) When the null of the signal is obtained, reduce the attenuation by 10dB and take the V.S.W.R. reading from $3.16-\infty$ scale instead of the $1.0-\infty$ scale.

2.3.4. BOLOMETER OPERATION

To use a Bolometer with the 6593A proceed as follows:-

- 1) Connect Bolometer to Bol.1/P on the rear panel.
- 2) Set the Bolometer Bias switch to ON and select channel B on front panel. Proceed as with other mm measurements.
- 3) It is important to set the Bolometer Bias switch to OFF when not in use, or the input sensitivity on channel B will be degraded.

Technical description

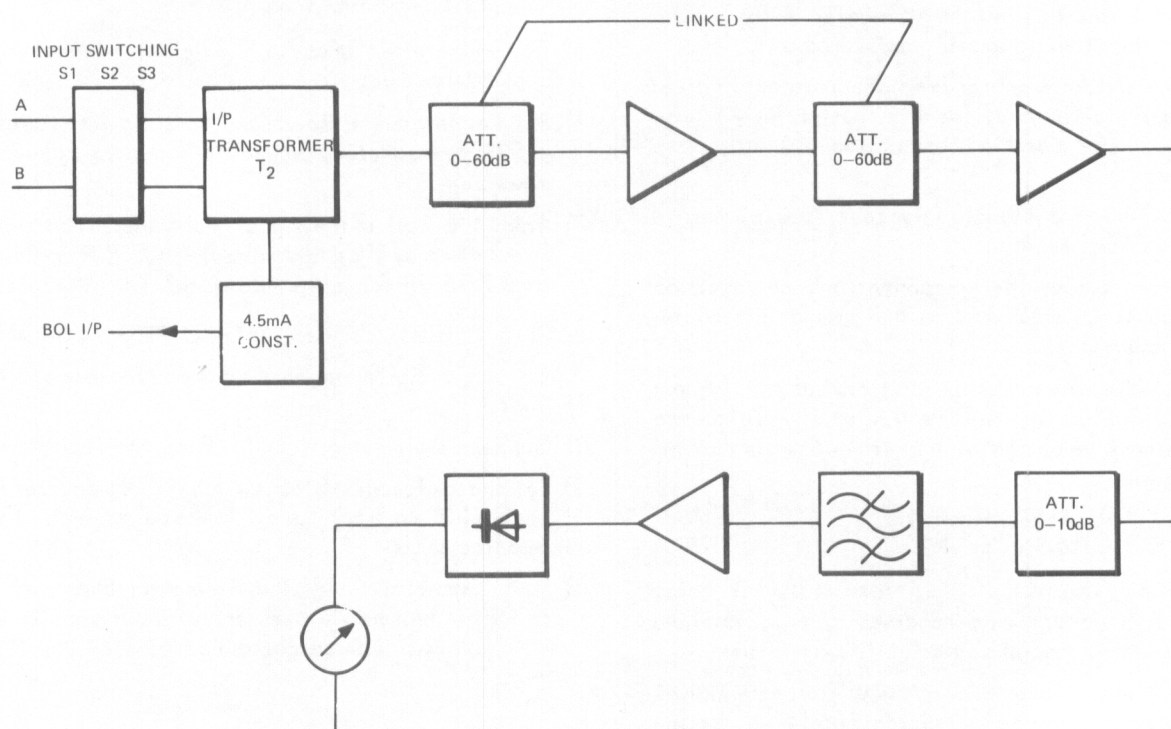


Fig. 4. Block Diagram of 6593A

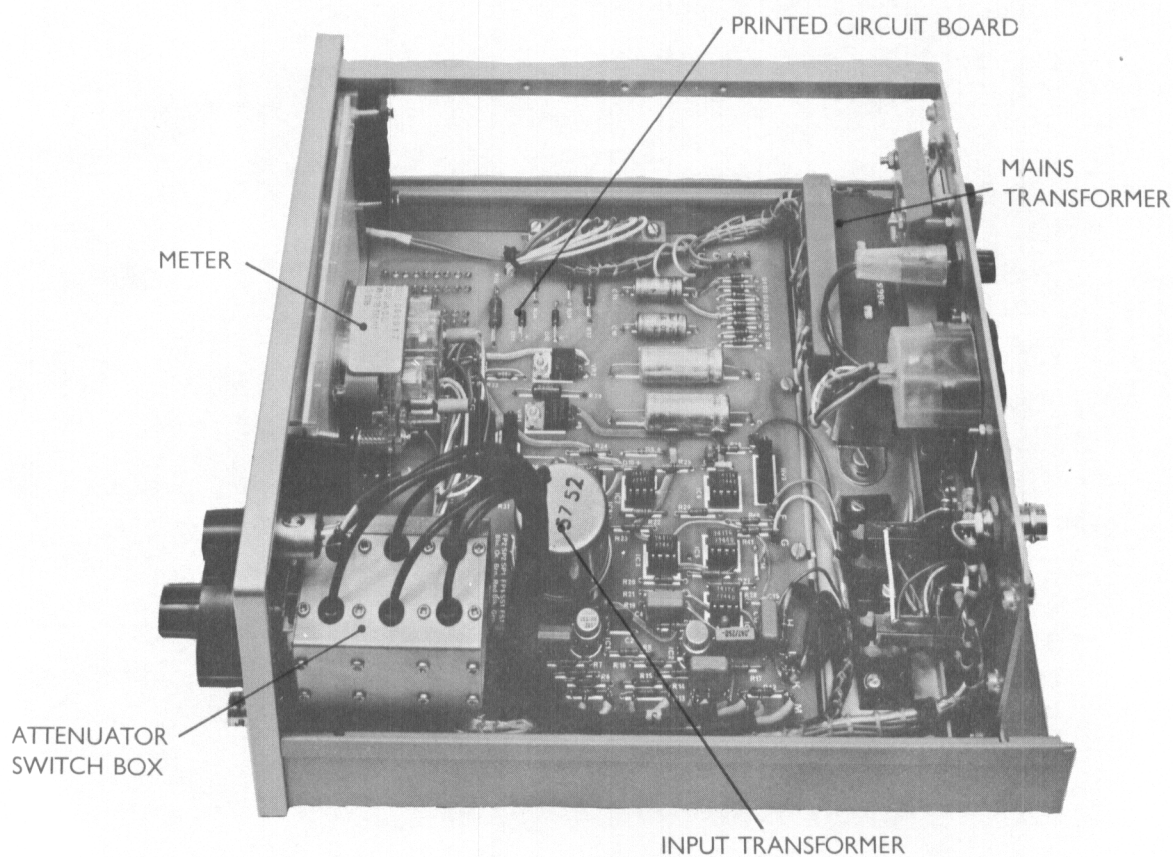


Fig. 5. General Internal Layout