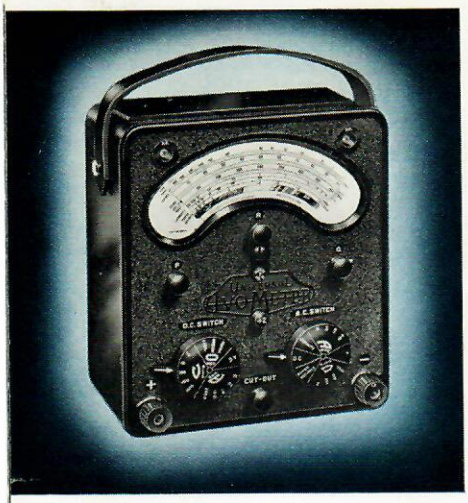
Electrical and Electronic

MEASURING INSTRUMENTS



AVOMETER Model 7 Mk. 2

A 50 range general purpose multi-range meter having a basic sensitivity of 1,000 Ω/V. Range selection is effected by means of two rotary switches which are electrically interlocked. A cut-out provides a high degree of protection should the instrument be inadvertently overloaded.

In order to achieve the high degree of accuracy, each instrument is hand calibrated and the scaleplate is fitted with an untarnishable mirror to obviate parallax errors. Whilst the limits of accuracy are only applicable up to 2kc/s, the instrument is reasonably accurate up to 10 kc/s.

Current:	a.c./d.c. 0–10A in 10 ranges.
Voltage:	a.c./d.c. 0–1,000V in 12 ranges.
Resistance:	0.5Ω – 40MΩ in 5 ranges.
A.F. Power:	0–2W.
Decibels:	−25dB to +16dB Relative to 50mW.
Capacitance:	0.01μF to 20μF.
Accuracy:	d.c. voltage and current ±1% of f.s.d. a.c. voltage and current ±2.25% of f.s.d.
Sensitivity:	1,000Ω/V a.c./d.c.

A wide range of accessories is available. Details of these are given on the back page.

Size: 8×7¼×4½ in. (204×185×115 mm.) Weight 6¾ lb. (3.05 kg.) (including leads)

A Braille model is also available for the use of the blind.

Leather Case available—see p. 11.

For Panclimatic Version see p. 4.

Avometers 7, 8, 9 & 40 all meet the requirements of the U.K. Air Registration Board and the Merchant Shipping (Radio) Rules 1952.

AVOMETER Model 8 Mk. 3

This multi-range instrument has been designed to meet the requirements of radio, television and electronics engineers needing an accurate, sensitive, yet robust instrument.

The Avometer Model 8 Mk. 3 incorporates the famous Avo automatic cut-out and also includes a fused ohms circuit, thus giving additional protection from accidental overloads. Temperature compensation enables the instrument to be used for a.c. current measurements (up to 400A) using external shunts, The frequency response has been improved enabling the instrument to be used between 8c/s and 15kc/s.

Current:	a.c. 100mA to 10A f.s.d. in 4 ranges. d.c. 50μA to 10A f.s.d. in 7 ranges.
Voltage:	a.c. 2.5V to 2,500 V f.s.d. in 7 ranges. d.c. 2.5V to 2,500V f.s.d. in 8 ranges.
Resistance:	0 to 200MΩ (First indication 0.5Ω).
Decibels:	−15dB to +15dB.
Accuracy:	a.c. Voltage and Current ±2.25% of f.s.d. d.c. Voltage ±2% of f.s.d. d.c. Current ±1% of f.s.d.
Sensitivity:	a.c. Voltage ranges 1,000Ω/V (10V upwards). d.c. Voltage ranges 20,000Ω/V (all ranges).

Size: 8×7¼×4½ in. (204×185×115 mm.) Weight: 6½ lb. (2.95 kg.) (including leads)

Leather Case available—see p. 11.

For Panclimatic Versions see p. 4.

AVOMETER Model 9 Mk. 2

A multi-range instrument designed primarily for the electronic, radio and television engineer. It is a high sensitivity instrument similar in specification to the already well-established Universal Model 8 and, indeed, it incorporates many of the design features of this famous instrument including automatic cut-out mechanism and interlocked range switching. In addition it accepts a range of external shunts and is fused for protection on the resistance ranges.

The ranges of the instrument have been chosen to be in line with what is becoming the generally accepted ideal method of scaling a multi-range instrument, viz., basic units of 10 and 3. We have found this scaling has become increasingly popular with our overseas customers.

One very important new feature of the instrument is that all range switches, controls and terminals are identified with symbols which in general follow the requirements of the International Electrotechnical Commission (I.E.C.).

Current:	a.c. 10mA to 10A f.s.d. in 4 ranges. d.c. 50μA to 10A f.s.d. in 7 ranges.
Voltage:	a.c. 3V to 3kV f.s.d. in 7 ranges. d.c. 3V to 3kV f.s.d. in 8 ranges.
Resistance:	O to 20MΩ in 3 ranges (First-indication 0.5Ω).
Accuracy:	a.c. Voltage ±2.25% of f.s.d. (25-200c/s). d.c. voltage ±2% of f.s.d. a.c. Current ±2.25% of f.s.d. d.c. Current ± 1% of f.s.d.
Sensitivity:	a.c. Voltage 1,000Ω/V (100 volt range upwards). d.c. Voltage 20,000Ω/V (all ranges).

Size: 8×7¼×4½ in. (204×185×115 mm.) Weight: 6½ lb. (2.95 kg.) (including leads)

Leather Case available—see p. 11.

Avometers 7, 8, 9 & 40 all meet the requirements of the U.K. Air Registration Board and the Merchant Shipping (Radio) Rules 1952.

AVOMETER Model 40

A self-contained multi-range a.c./d.c. instrument providing 40 ranges of current, voltage and resistance. Higher ranges are obtainable with the aid of external shunts, transformers or multipliers.

Range selection is accomplished by means of a.c. and d.c. switch knobs and, in addition, a ÷2 press button halves the value of any current or voltage range. Full scale deflection on voltage ranges is obtained with a consumption of 3mA or 6mA according to whether the press button is used or not. Total resistance of the meter is 200,000 ohms.

The instrument is similar in design and appearance to the Model 7 Avometer, and is fitted with an automatic overload cut-out.

Current:	a.c. 6mA to 12A f.s.d. in 8 ranges. d.c. 3mA to 12A f.s.d. in 9 ranges.
Voltage:	a.c. 6V to 1,200V in 8 ranges. d.c. 60mV to 1,200V in 12 ranges.
Resistance:	0-1MΩ in 3 ranges (First indication 0.1Ω).
Accuracy:	d.c. voltage and current —1% of f.s.d. a.c. voltage and current —2.25% of f.s.d.
Sensitivity:	333Ω/V a.c./d.c.

Size: 8×7¼×4½ in. (204×185×115 mm.) Weight: 6½ lb. (2.85 kg.) (including leads)

Leather Case available—see p. 11. For Panclimatic Version see p. 4.

Model 8(S)X Avometer
A specialised version of the Model '8X' Avometer embodying the following additional features:—
The meter is fitted with an anti-magnetic shield, which enables the instrument to be used in the vicinity of a strong magnetic field.
All operating spindles and shafts are fitted with grommets, thus rendering the instrument splash-proof.

These special instruments only differ from standard models to the extent stated and therefore the pages describing the Models 7, 8 and 9 Avometers may be consulted for detailed information regarding ranges, technical data, etc.

PANCLIMATIC AVOMETERS

Models 7X, 8X, 8(S)X and 9(S)X

Experience gained over a period of 30 years has shown that the standard Avometer can be relied on to give excellent service in any climate. Nevertheless, when the instrument is used in locations where atmospheric conditions are constantly bad from the point of view of high relative humidity or tropical cycling of temperature, then it is desirable that certain components should be given special protection.

The panels of standard Avometers (and also the cases of the Model 8 and Model 8S Avometers) are produced from a very high grade moulding powder. Even so, under tropical conditions, mouldings have been known to absorb sufficient moisture to form measurable electric leakage paths across their surfaces and through their texture. However, this problem has now been overcome by the development of a new moulding powder which, although more expensive, does reduce leakage by a very substantial amount, when used as the moulding material. Mouldings produced from the new powder are also resistant to fungus growth.

All instruments can be calibrated at any reasonable ambient temperature (normally 20°C. for temperate climates). Instruments will automatically be supplied calibrated at this temperature unless otherwise requested.

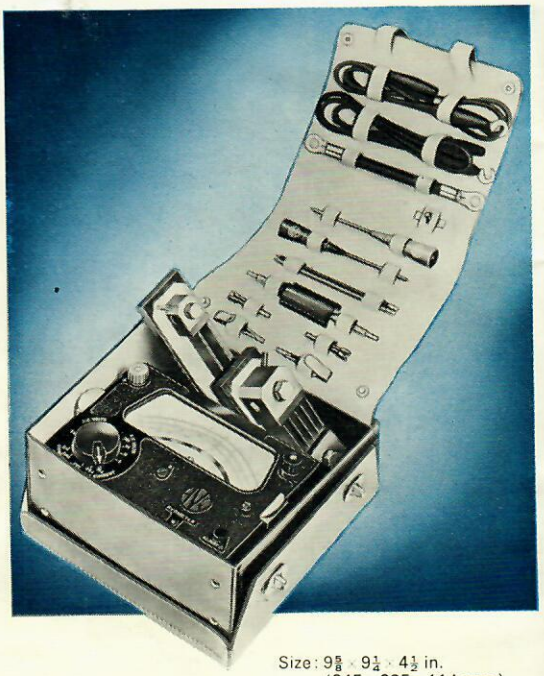
Panclimatic Avometers are provided with a pair of rubberised leads and are delivered with a separate pack containing the batteries.

AVOMETER Model 12 AUTO ELECTRICAL TEST SET

A robust and compact portable multi-range instrument specially developed in collaboration with leading car and electrical manufacturers to enable the automobile engineer to cope with the problems which arise from the complexity of modern automobile electrical equipment.

Enables every type of test to be made on 6, 12 and 24-volt systems, using only one pair of terminals and a single range-selection switch. The instrument can be used without removal from its leather carrying case, which is fitted with a captive tool roll carrying a range of specialised accessories comprising Long Reach Safety Clips, Test Prods, Voltage Regulator Clips, Holdtite Clips and Battery Piercing Prods with 2 spare Prod Needles. Also supplied: Oil-resistant rubber leads fitted with hook ends and socket ends, and a 90A or 900A shunt for measurement in excess of 36A d.c.

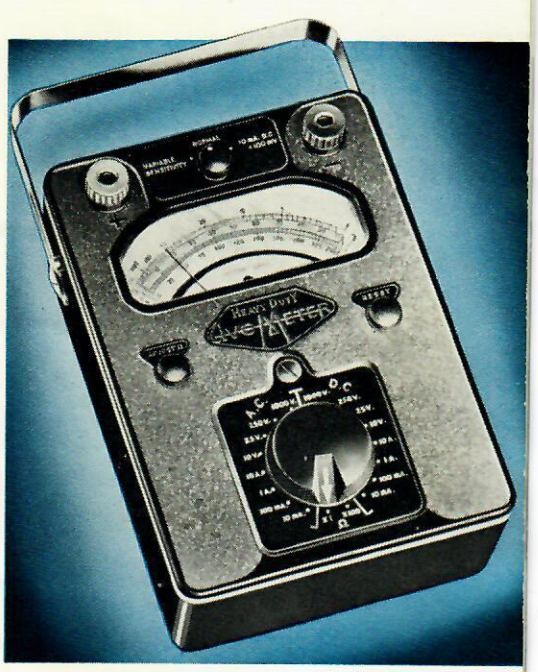
Accuracy: d.c. Voltage and Current ±1% of f.s.d.
a.c. Voltage ±2.25% of f.s.d.
Sensitivity: d.c. Voltage 200Ω/V.
a.c. Voltage 90Ω/V.



Size: $9\frac{3}{8} \times 9\frac{1}{4} \times 4\frac{1}{2}$ in. (245 × 235 × 114 mm.)

Weight: 7 lb. 6 oz. (3.35 kg.)

HEAVY DUTY AVOMETER



A multi-range a.c./d.c. instrument of specially robust construction designed for outdoor work and where conditions of rough usage exist. The instrument is housed in a moulded case and the movement has been designed to withstand severe shock without damage. An automatic cut-out is provided to avoid damage due to overload.

It is a moving-coil meter with a knife-edge pointer and an anti-parallax mirror to facilitate accurate reading. The $3\frac{1}{4}$-inch scale is very open and clear and the accuracy of the meter is in accordance with B.S.S. 89/1954. Current consumption is 1mA at full scale deflection on d.c. volts and 2mA on a.c. volts.

Supplied complete with specially designed leads and interchangeable clips and prods.

Size: $7\frac{1}{2} \times 5\frac{1}{4} \times 4$ in. ($190 \times 139 \times 102$ mm.) Weight: Approx. $5\frac{1}{2}$ lb. (2.49 kg.)

Ever-ready Leather Case available — see p. 11.

The Heavy Duty Avometer meets the requirements of the Merchant Shipping (Radio) Rules 1952.

Current:	a.c. Current 10mA to 10A f.s.d. in 4 ranges. d.c. Current 10mA to 10A f.s.d. in 4 ranges.
Voltage:	a.c. Voltage 10V to 1,000V f.s.d. in 4 ranges. d.c. Voltage 10V to 1,000V f.s.d. in 4 ranges.
Resistance:	0.50,000Ω (First indication 0.5Ω).
Sensitivity:	d.c. Voltage ranges 1,000Ω/V. a.c. Voltage ranges 500Ω/V (25V upwards).
Accuracy:	a.c. Voltage and Current 2.25% of f.s.d. d.c. Voltage and Current 1.75% of f.s.d.

AVO INDUSTRIAL TEST SET

A comprehensive and robust multi-range test set which will enable an inspecting engineer to carry out tests on apparatus differing widely in current and voltage rating, and requiring an extension of the ranges incorporated in the meter.

For this specific use the Avo Industrial Test Set has been evolved and is supplied in a strong hardwood carrying case.

The Test Set comprises:—

A Model 40 Universal Avometer	1—120 amp Shunt.
1—4,800 volt Multiplier.	1—480 amp Shunt.
	1—60/240 amp Transformer.

With this combination the instrument can be used for measurements of a.c. and d.c. voltages of all values up to 4,800 volts, for a.c. current up to 240 amps and for d.c. current up to 480 amps. The wide scope of these ranges facilitates dealing with practically all measurements likely to be encountered in normal industrial or marine use.

This Test Set can be supplied incorporating Model 7 Avometer and associated accessories.

AVO MULTIMINOR Mk. 4

The Mark 4 is an entirely new version of this famous Avo instrument styled on modern lines, with new high standards of accuracy, improved internal assemblies, and incorporating panclimatic properties. It will measure a.c. and d.c. voltage, d.c. current and resistance. A single rotary switch selects any one of the 19 ranges. One scale is provided for current and voltage readings and another for resistance measurements.

All d.c. voltage ranges have a sensitivity of 10,000 Ω/V rendering the instrument suitable for use on the latest electronic apparatus, radio and television receivers, commercial and private motor vehicles, and other similar applications. The maximum voltage drop on the higher current ranges is in the order of 250mV.

A.C. voltage ranges have a sensitivity of 1,000 Ω/V, and are eminently suitable for servicing of domestic appliances, workshop apparatus and other similar equipment.

The instrument is supplied in an attractive black carrying case, which also houses a pair of leads with interchangeable prods and clips, and an instruction booklet. It is packed in an attractive display carton. Robust real leather cases are available in two sizes, if required, one to take the instrument with leads, clips and prods, and the other to house these together with a high voltage multiplier and a d.c. shunt.

Size (including case):	Weight (including case):
$7\frac{3}{4} \times 4 \times 1\frac{5}{8}$ in. approx.	$1\frac{1}{2}$ lb.
(197×102×41 mm.)	(0.675 kg.) approx.

This instrument meets the requirements of the Merchant Shipping (Radio) Rules 1952.

Current:	100μA to 1A f.s.d. in 5 ranges.
Voltage:	a.c. 10V to 1,000V in 5 ranges. d.c. 100mV to 1,000V f.s.d. in 7 ranges.
Resistance:	0 to 2MΩ in 2 ranges (First indication 5Ω).
Sensitivity:	d.c. Voltage ranges 10,000Ω/V. a.c. Voltage ranges 1,000Ω/V.
Accuracy:	a.c. Voltage and current ranges 2.75% of f.s.d. d.c. Voltage and Current ranges 2.25% of f.s.d.

AVO LIGHT METER Model 3

The field of application for this type of instrument has become increasingly more widespread. To meet this demand, the Avo Light Meter Model 3 has new features incorporated in its design, adding to its already high degree of usefulness.

This photo-electric cell meter gives direct indication of illumination in both foot candles and lux units. It has two ranges which are selected by means of a switch, the operation of which automatically indicates the multiplying factor to be used.

The scale is marked 0–50 foot candles, and 0–500 lux, the scaling being of logarithmic form which enables readings down to 1 foot candle to be easily made. This range covers practically all measurements commonly required, but to meet the exceptional needs of certain situations, a ×5 multiplier enables readings up to 250-foot candles and 2,500 lux to be obtained.

The calibration is direct for tungsten filament or incandescent gas lighting, whilst for other form of illumination such as fluorescent, a table of multiplying factors is provided. The use of these factors is necessary, since the spectral output of discharge lamps differs considerably from that of tungsten lamps.

Size: $2\frac{3}{4} \times 2\frac{3}{16} \times 1\frac{1}{16}$ in. (70×56×27 mm.

Weight: 7 oz. (200 gm.)

An essential instrument to ensure compliance with the Offices, Shops and Railway Premises Act, 1963.

AVO EDUCATIONAL INSTRUMENT

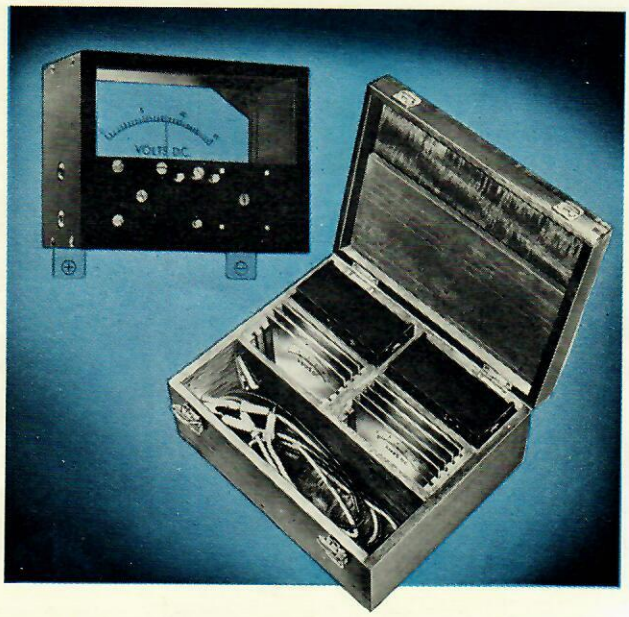
This instrument has been specially designed for use in conjunction with an overhead projector, to provide a means of displaying the functions of an instrument pictorially, as an aid to technical education. The instrument can be placed on the platform of an overhead projector and positioned in relation to any circuit diagram which may be drawn with chinagraph pencil on the platform surface.

The image of the instrument and the circuit is projected on to a screen and by means of this pictorial representation, the functioning of the instrument can be demonstrated whilst describing the operation of a circuit. The meter movement, circuitry and pointer are assembled within a sealed case with clear sheet apertures in the scaleplate position. Connection to the operating circuit may be made from either or both sides of the casing.

Scales covering the following ranges are available:—

D.C. VOLTAGE	D.C. CURRENT
150V, 15V and 3V f.s.d.	5A, 1A and 1mA f.s.d.
75-0-75V centre zero.	2.5-0-2.5A centre zero.
7.5-0-7.5V centre zero.	500-0-500mA centre zero.
1.5-0-1.5V centre zero.	250-0-250mA centre zero.

Provision is made for a selection of interchangeable scale-plates (either voltage or current scales) which slide into position to correspond with the needle pointer deflection. Each scaleplate is provided with dummy terminals to indicate connections to a circuit diagram. The range is automatically set by selecting the correct scale to suit the particular circuit under discussion.



Size:
Single Instrument $4 \times 3\frac{1}{8} \times 1$ in. (100×78×25 mm.)
Single Instrument Case $9\frac{3}{8} \times 5\frac{1}{4} \times 4\frac{3}{8}$ in. (247×133×120 mm.)
Double Instrument Case $9\frac{3}{8} \times 7\frac{3}{4} \times 4\frac{3}{8}$ in. (247×196×120 mm.)

Weight:
Single Instrument 10 oz. (284 gm.)
Single Instrument Case 3 lb. (1.36 kg.)
Double Instrument Case $3\frac{1}{2}$ lb. (1.61 kg.)

AVO MULTIMETER Type HI 108

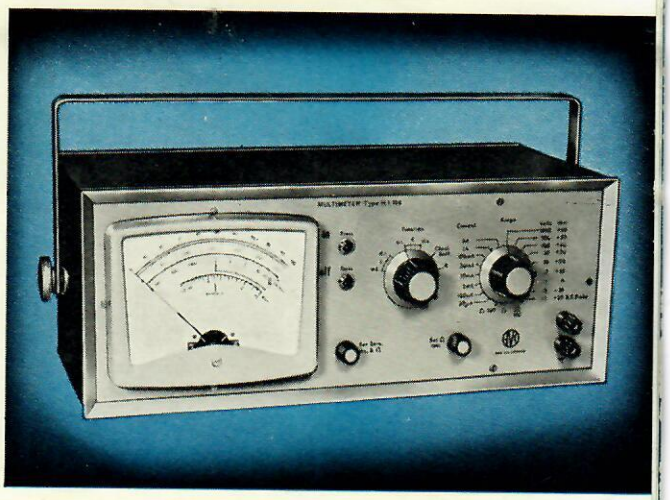
A self-contained, battery operated, multi-range instrument for measuring a.c./d.c. voltage, a.c./d.c. current, resistance and decibels, with provision for measuring r.f. voltage using an external probe.

Two transistorised amplifiers, one for a.c. and one for d.c. form the basis of the multimeter. The d.c. amplifier, used for d.c. measurements, is a differential long tailed pair, stabilised by heavy negative feedback against supply voltage and temperature variations.

A dual input transistor reduces zero drift with temperature to a negligible value of the order of 24μV/°C., thus minimising operation of the set d.c. zero control.

A separate a.c. amplifier, used for a.c. measurements is also stabilised by a high degree of negative feedback which also ensures the linearity of the a.c. scales. Using an r.f. probe and multiplier unit, r.f. voltage may be measured between 300mV and 10V f.s.d. at frequencies up to 250 Mc/s.

Size: $16 \times 7\frac{1}{4} \times 6\frac{1}{2}$ in. (405×183×158 mm.)
Weight: $10\frac{1}{2}$ lb. (4.76 kg.)



Current:	a.c./d.c. 1μA to 3A f.s.d. in 9 ranges.
Voltage:	a.c./d.c. 100mV to 1,000V f.s.d. in 9 ranges.
Resistance:	0 to 20MΩ in 3 ranges. (First indication 0.5Ω).
R.F. voltage:	300mV to 10V f.s.d. in 4 ranges.
Decibels:	−20 to +60 dbm in 9 ranges. (0dB = 0.774V into 600Ω.)
Accuracy:	a.c. Voltage and Current ranges ±4% of f.s.d. d.c. Voltage and Current ranges ±3% of f.s.d.
Input resistance:	1MΩ/V up to 30V a.c./d.c. thereafter constant 30MΩ.
Frequency response:	a.c. Voltage r.m.s. } approx. 25c/s to 50kc/s a.c. Current r.m.s. } r.f. Voltage approximately 20kc/s to 250 Mc/s.
Stability:	Zero-drift with temperature does not exceed 24μV/°C.

AVO TRANSISTOR ANALYSER Mk. 2

A portable direct-reading instrument, simple to operate and moderately priced, yet capable of giving accurate transistor measurements in the grounded emitter configuration. An extension lead enables measurements to be carried out on transistors which cannot be accommodated by the front panel test sockets, e.g. high power and switching types requiring heat sink and types fitted with soldering lugs.

The instrument is available with either mains or battery operated power units which are mechanically interchangeable, and is supplied complete with the Avo International Transistor Manual providing test data for approximately 5,200 transistors.

Collector voltage:	Mains power unit: 0.05V to 12V d.c. in 4 overlapping ranges. Battery power unit: 1.5V to 10.5V in 5 steps. Using either Power unit: External voltages up to 150V may be applied.
Base current:	0-1mA or 1-40mA.
Collector current:	0-100μA to 0-1A f.s.d. in 5 ranges. (Battery power unit should be limited to 250mA.)
Turnover voltage:	Means are provided for checking turnover voltage utilising the internal movement, the collector voltage being applied from an external source.

I'co: This can be checked by pressing a button.

Beta: 0–25 and 0–250, ±5% (measured at 1,000 c/s.).

Noise: Peak a.f. noise can be measured, the range being 1–40dB with a bandwidth of 10 kc/s.

Size: 15¼ × 9½ × 5 in. (390 × 241 × 127 mm.)

Weight: Battery Operated Instrument 12 lb. (5.5 kg. approx.)
Mains Operated Instrument 16 lb. (7.2 kg. approx.)

AVO IN-CIRCUIT TRANSISTOR TESTER Type TT162

A portable, battery operated Transistor Tester for the "In-Circuit" testing of signal or medium power p.n.p. or n.p.n. transistors. Carefully designed circuits balance out the shunting effect of components external to the transistor under test. A d.c. bridge circuit balances out the in-circuit components connected to the transistor collector and enables the collector current and voltage to be set to the required value. An a.c. bridge circuit balances out the in-circuit components connected to the base of the transistor under test and enables beta to be measured at the a.c. bridge frequency of approximately 1,000 c/s.

A battery check facility ensures that the supply voltages do not fall below the limit required for satisfactory operation. Overload protection is provided internally.

Size: 16 × 7¼ × 6¼ in. (405 × 183 × 158 mm.)

Weight: 10½ lb. (4.76 kg.)

Collector voltage:	*(In-Circuit and Out-of-Circuit)* 0-10V continuously variable.
Collector current:	*(In-Circuit and Out-of-Circuit)* 0-10mA continuously variable in additive steps of 10mA up to approximately 30mA.
Current gain (Beta):	*(In-Circuit and Out-of-Circuit)* 0-150 and 0-300 ±5% between ⅓ f.s.d. and f.s.d. where external base loading is above 400Ω.
Leakage current I'co:	*(Out-of-Circuit only)* 0-100μA and 0-1mA f.s.d.

In-Circuit TRANSISTOR TESTER TT164

The In-Circuit Transistor Tester Type TT164 is a development of the TT162 described above. This new instrument incorporates all the features of the Type TT162, and also includes two extra "leakage current" ranges that make possible the testing of silicon transistors.

AVO VALVE CHARACTERISTIC METER Mk. 4

This compact and most comprehensive Valve Tester sets a new high standard of accuracy for instruments of its type. It will quickly test any standard receiving or small transmitting valve on any of its normal characteristics and under conditions corresponding to a wide range of d.c. electrode voltages. A new method of measuring mutual conductance ensures that the instrument can deal adequately with high-slope Television valves.

The instrument will produce all the necessary data to enable Ia/Va, Ia/Vg, Ia/Vs, etc., curves to be drawn, measures mutual conductance up to 60mA/V., determines inter-electrode insulation with the heater hot or cold and enables "gas" checks to be made. Adequate compensation is provided for mains voltage fluctuations. Tests rectifying and signal diodes under reservoir load conditions, and covers the majority of normal heater voltages up to 117 volts.

A relay protects the instrument against damage through overloading the h.t. circuits and also affords a high measure of protection to the valve under test. The unique Avo rotary selector switch enables basing data of any valve to be set up in a few seconds. A comprehensive Instruction Book and a detailed Valve Data Manual are provided.

Heater voltage:	Comprises two additive sections: Fine, 0.625 to 7.5V in 10 steps. Coarse, 10V to 110V in 11 steps.
Anode voltage:	12.6V-400V in 16 steps.
Screen voltage:	12.6V to 300V in 16 steps.
Grid Voltage:	Continuously variable between 0 and −101V.
Anode current:	2.5mA to 100mA f.s.d. on a 3.5 in. meter.
Mutual conductance:	0.1 to 60mA/V in 2 ranges.
Grid current:	0 to 100μA.
Rectifying valves and Signal Diodes:	These are tested under full load conditions with an 8μF reservoir capacitor. Load currents are between 1mA and 180mA in 7 steps.

Size: 16½ × 13½ × 14½ in. (420 × 345 × 370 mm.)

Weight: 34 lb. (15.5 kg.)

The instrument operates on a.c. mains 100-128 volts and 190-250 volts, 50-60 c/s.

AVO UNIVERSAL MEASURING BRIDGE Type 1

This is a self-contained mains operated instrument incorporating 24 calibrated ranges.

One sweep of the main calibrated dial covers four decades and assures a very rapid search for balance. This, combined with an automatic scale expansion device, enables the two lower accuracy decades of the main scale to be read at full scale accuracy.

Leakage currents can be measured down to 0.01μA at 450V, thus representing an ability to read up to 45,000 MΩ. Balance indication is clearly shown by a panel meter operating in conjunction with a valve voltmeter circuit.

For production checking, the Bridge has been fitted with a ±10% comparison scale for use with external standards.

Resistance measurements employ d.c. When measuring inductance and capacitance, the Bridge network is fed from an internal 1,000 c/s oscillator. Internal capacitance strays have been eliminated electronically.

The instruction manual provided shows how components can be tested *in situ*.

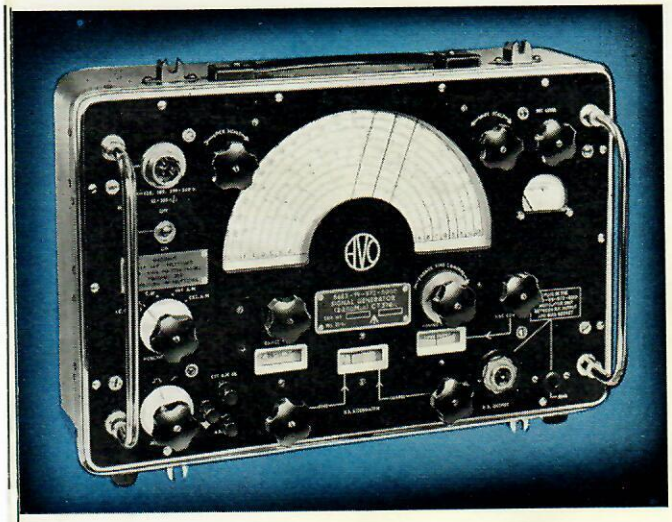
Resistance:	6 calibrated ranges covering 0.1Ω to 1,000MΩ. (Accuracy ±1% at midscale).
Capacitance:	6 calibrated ranges covering 1pF. 1,000μF. (Accuracy ±1% at midscale).
Inductance:	6 calibrated ranges covering 1mH to 1,000H. (Accuracy ±2% at midscale).
Insulation/Polarising Voltage:	5-450 v in 10 steps.

Power Supply: 100-110V. and 200-250V. a.c. 40-65 c/s.

Size: 15¼ × 10½ × 10 in. (390 × 266 × 255 mm. approx.) with lid closed.

Weight: 16 lb. (7.2 kg.)

These instruments meet the requirements of the U.K. Air Registration Board.



Frequency ranges:	2Mc/s to 250Mc/s on fundamentals. 160Mc/s to 500Mc/s on harmonics.
Scale calibration accuracy:	±1% except at scale extremities where error does not exceed 2%.
Output:	1μV to 25mV continuously variable into 75Ω. 1μV to 12.5mV into 50Ω using fixed attenuator pad.
Modulation: (sine or square wave)	Depth 30%. External modulation between 200c/s and 10kc/s depth up to 60%. Unwanted f.m. for 30% modulation is less than 3kc/s up to 150Mc/s, above 150Mc/s it is less than 5kc/s. Pulse modulation is possible using an external plug-in pulse modulator unit.

AVO SIGNAL GENERATOR 378A

The Avo Signal Generator Type 378A has been designed to provide r.f. signals between 1μV and 25mV into a 75-ohm load at any frequency between 2 Mc/s and 250 Mc/s, this being accomplished in 7 ranges. Each range has been chosen so that the generally accepted intermediate frequencies of communication receivers, radar equipment, etc. can be checked for centre frequency and bandwidth without the necessity for range switching.

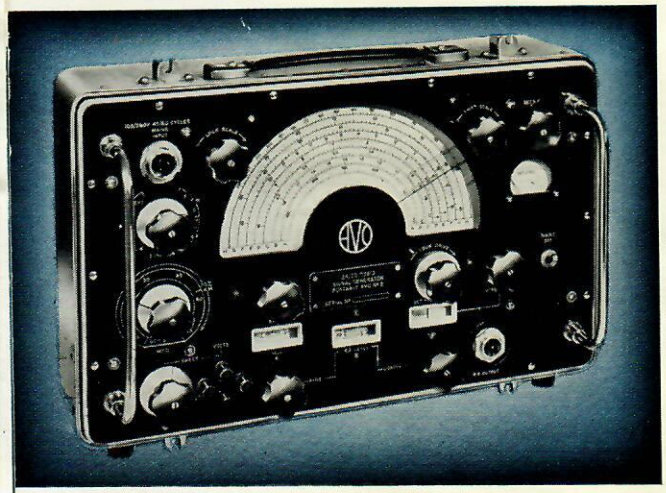
OUTPUT:

The output impedance is nominally 75 ohms from 1μV to 25mV continuously variable.
Accuracy ±2dB ±1μV up to 150 Mc/s.
±3dB ±2μV from 150 Mc/s to 250 Mc/s.

Harmonic range—the output is approximately 10% of indicated level. A set carrier level meter is provided. A fixed unmodulated signal of approximately 200mV from a high output impedance is also available (force output).

The attenuator and modulator circuits have been so designed as to give negligible frequency shift with attenuator variation and on changing from c.w. to a.m.

Size: 15⅛×9⅞×11¼ in. (385×251×286 mm.)
Weight: 25 lb. (11.4 kg.)



Frequency ranges:	AM 450kc/s — 225Mc/s in 8 ranges. FM 20Mc/s — 100Mc/s in 2 ranges.
Modulation:	(a) Amplitude sine and square wave modulation variable 0-40% calibrated at 30%. Modulation frequency 400c/s. (b) Frequency modulation. Continuously variable up to 75kc/s sine wave at 400c/s. Sweep facilities with a phasing control are provided for oscillograph display of discrimination response curves. (c) External amplitude modulation. The instrument may be amplitude modulated from an external source between 50c/s and 10kc/s.
R.F. Accuracy:	± 1% over the 72 inches of calibrated scale, ± 2% at scale extremes.

AVO SIGNAL GENERATOR Type AFM2

The AVO Signal Generator Type AFM2 has been designed to provide r.f. signals, amplitude or frequency modulated for use with communications equipment in the m.f. and v.h.f. frequency spectrum.

The equipment meets the general requirements of the U.K Inter-Service Specification, K.114 and is also constructed to meet the Ministry of Defence Specification DEF 5000.

R.F. OUTPUT:

An R.F. carrier level meter is provided to set the signal into the attenuator which is variable between 1μV and 50mV into 75 ohms. A fixed unmodulated signal of less than 200mV open circuit from a high output impedance is also available (Force Output). Termination and attenuator pads can also be supplied.

A.F. OUTPUT:

A 400c/s sine or square wave output is obtainable from the instrument.

Size: 15¾×11×9¾ in. (400×280×260 mm.) approx.
Weight: 30 lb. (14 kg.) approx.

Size: 12×8½×5½ In. approx. (310×220×140 mm.)
Weight: 7½ lb. (3.4 kg.)

AVO SIGNAL GENERATOR Type 3

An inexpensive general purpose a.m. Signal Generator of entirely new design for the Service Engineer. Operates on Fundamentals and provides six frequency bands covering 150 kc/s—220 Mc/s. Accuracy ±1%, except at scale extremities.

150 kc/s — 500 kc/s
500 kc/s — 1.6 Mc/s
1.6 Mc/s — 5.5 Mc/s
5.5 Mc/s — 18 Mc/s
18 Mc/s — 70 Mc/s
70 Mc/s — 220 Mc/s

Continuous wave or modulated l.f. signal at 1,000 c/s., available for test purposes.

A new type of attenuator ensures close adherence of the output to the attenuator calibration. The instrument provides a force output of 250mV, whilst the following outputs are available via the attenuator.

Minimum to 100μV, ×10, ×100, ×1,000,
Output impedances—80Ω, 200Ω and 400Ω.

Double screening is employed to ensure minimum random radiation. The instrument is supplied complete with output lead and pad. It operates on 100—120, 200—260V, 50—60 c/s. mains supply.

LEATHER CASES FOR AVO INSTRUMENTS

Leather carrying cases are available for nearly all instruments illustrated in this booklet. For the Avo Valve Characteristic Meter (shown on page 9), a hardwood carrying case can be made to order.

AVOMETER
Carrying Case

9¾ in. high×8 in. wide×5¼ in. deep (247×203×127 mm.)

For the
MULTIMINOR
Illustrated on page 6
6×5¼×1¾ in. (152×133×44 mm.)

Ever-ready type
Carrying Case for
AVOMETERS

An instrument can be used whilst still retained in this ever-ready type case.

For the
HEAVY DUTY AVOMETER
Illustrated on page 5

An instrument can be used whilst still retained in this ever-ready type carrying case.

8 in. high×6½ in wide×4¼ in. deep. (203×159×108 mm.)

ACCESSORIES FOR AVO INSTRUMENTS

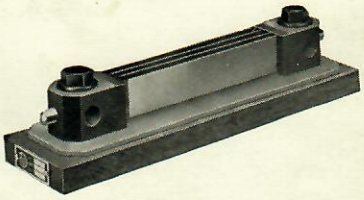
RESISTANCE RANGE EXTENSION UNITS

Instrument	*Range*		*First Indication*
Model 7 Avometer ..	0–1Ω	0–10Ω	.. 0.01Ω
Model 8 Avometer ..	0–2.5Ω	0–200MΩ	.. 0.025Ω
Model 40 Avometer ..	0–1.2Ω	0–12Ω	.. 0.01Ω
Heavy Duty Avometer	0–1Ω		.. 0.02Ω

Model 8 Avometer Resistance Range Extension Unit.

This useful device complete with its own control switch and containing internal batteries, can be used to obtain two additional resistance ranges, 0—2.5Ω and 0—200MΩ, the limits of measurement being 200MΩ and 0.025Ω. (In some cases this accessory is supplied less batteries.)

AVOMETER SHUNTS FOR D.C. CURRENT

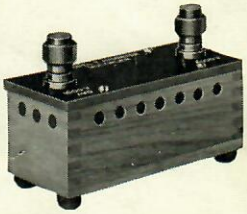


480 amp., 240 amp., 120 amp., 60 amp. } For the D.C., 36-range Universal and Model 40 Avometers.

400 amp., 200 amp., 100 amp., 50 amp. } For Model 7, Model 8 Mk III, and Heavy Duty Avometers.

30, 100 and 300 amp. for the Model 9 Mk II Avometer.

AVOMETER VOLTAGE MULTIPLIERS



For measurement of both a.c. and d.c. Voltages.

4,800 volt, 2,400 volt } For the D.C., 36-range Universal and Model 40 Avometers.

4,000 volt, 2,000 volt } For the Model 7 Avometer.

HIGH VOLTAGE D.C. MULTIPLIERS COMPLETE WITH LEADS

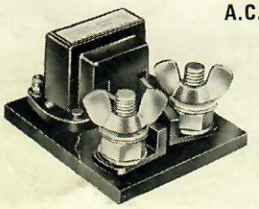
25kV D.C. Multiplier

10kV and 25kV Multipliers are available for the Avo Electronic Test Meter, and the Model 8 Mk III.

10kV and 30kV Multipliers are also available for the Model 9 Mk II Avometer.

(When ordering please state for which instrument the Multiplier is required.)

AVOMETER TRANSFORMERS FOR A.C. CURRENT MEASUREMENTS



480 amp., 240 amp., 120 amp., 60 amp., 240/60 amp. } For the 36-range Universal and Model 40 Avometers.

400 amp., 200 amp., 100 amp., 50 amp., 200/50 amp. } For Model 7, 8 and 9 Mk II, and Heavy Duty Avometers.

ADAPTORS FOR THE AVO VALVE TESTER AND VALVE CHARACTERISTIC METER

Adaptors have been specially designed for plugging into existing sockets on any Avo Valve Tester Panel which is fitted with a rotary selector switch. The following types, covering valve bases not provided for on the existing Valve Panel are now available:

Adaptor No. 1	B7G and B8A.
Adaptor No. 2	B9G (EF50, etc.).
Adaptor No. 3	B8B (American Loctal).
Adaptor No. 4	Hivac 4 and 5 pin and midget diode.
Adaptor No. 5	Blank.
Adaptor No. 6	SM7 (6A7 etc.).
Adaptor No. 7	B9A.
Adaptor No. 8	F8 (Continental 8 pin).
Adaptor No. 9	B7A.
Adaptor No. 10	5 and 7 pin Acorn.
Adaptor No. 11	B5A.
Adaptor No. 12	B9D.
Adaptor No. 13	B10B.

These are also available for the Avo Valve Tester, type 160.

(When ordering please state for which instrument the Adaptor is required.)

AVO LONG REACH SAFETY CLIPS Mk. II

These patented spring-loaded Safety Clips are invaluable for reaching and holding test points which are difficult of access, and for use as insulated prods. The sharp steel point easily pierces protective varnish on printed circuits, etc. They are designed for use with standard Avometer leads and can also be used with the special Multiminor leads.

MULTIMINOR D.C. SHUNTS

5, 10 and 25 amp. Shunts are available for the Multiminor when used on its 100 mA (0.1mA) range.

MULTIMINOR VOLTAGE-MULTIPLIER

Range 0—2,500 volts d.c.

AVO VALVE AND TRANSISTOR DATA MANUALS

The Avo Valve Data Manual is fully up-to-date and lists Valve Data in numerical and alphabetical sequence. (Approx. 8,000 types are listed.) The Avo International Transistor Data Manual lists approximately 5,200 transistors which are capable of being checked on the Avo Transistor Analyser.

AVO LTD

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