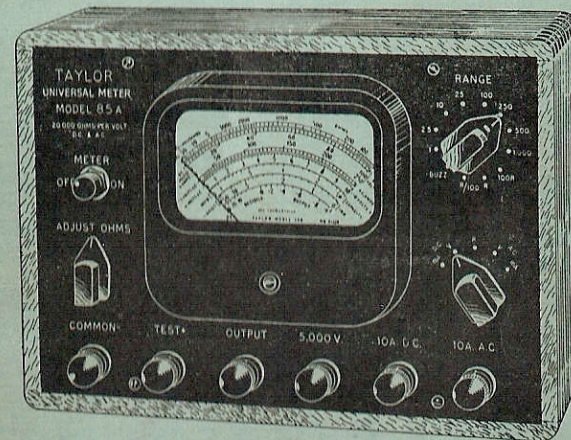


# INSTRUCTION MANUAL

## TAYLOR MODEL 85A Series I

Serial No. BM. 27,501 and up



### TAYLOR ELECTRICAL INSTRUMENTS LIMITED 419/424 MONTROSE AVENUE SLOUGH . . . . . BUCKS

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# INSTRUCTIONS

## TAYLOR MODEL 85A

### 1. GENERAL.

These instruments are self-contained multirange instruments of very high sensitivity and have a total of 90 ranges available. The sensitivity on all A.C. and D.C. volt ranges is 20,000 ohms per volt corresponding to a full scale consumption of 50  $\mu$ A only.

### 2. METER.

The meter used in these instruments is a Taylor Model 400 moving coil having a full scale consumption of 40  $\mu$ A. These meters, although extremely sensitive, are robust and will stand any reasonable amount of overload without damage. For best accuracy the meter should always be read with the scale in a horizontal position.

### 3. ZERO ADJUSTER.

In the centre of the meter cover is a small moulded screw which is used to reset the meter pointed exactly to zero on Scale B.

### 4. METER SCALES.

The meter has seven scales marked at each end A, B, C, D, E, F, and G respectively.

(A) **Ohms.** The outer scale is calibrated 0 to 200,000 ohms and the meter reads correctly on this scale when the instrument is switched to range "R." On ranges 100R and R/100 the scale readings must be multiplied or divided by 100 respectively.

In view of the logarithmic shape of this scale, particular care must be taken in reading the meter. It will be seen that there are ten divisions between zero and 100 ohms so that each division represents 10 ohms. Between 100 and 200 ohms there are five divisions so that each division represents 20 ohms and so on.

(B) The second scale is used on all D.C. measurements and also for A.C. volts 0-25 and up and for the 50  $\mu$ a. A.C. range. The scale has fifty evenly spaced divisions and has two rows of figures below marked 0-100 and 0-250.

- (C) The third scale is for all A.C. current measurements (except the 50  $\mu$ A range) and the 2.5 volt A.C. range and has 45 sub-divisions. The first tenth of the scale is not sub-divided. The two rows of figures above the scale should be used when taking readings.
- (D) This scale is for use on the 10-volt A.C. range only and has fifty sub-divisions each representing 0.2 volts.
- (E) The fifth scale is marked from 0.1 to 10 mfd. This scale is used in conjunction with Taylor Model 313C Capacity and Inductance adaptor to measure Capacity.
- (F) This scale is marked from 1 to 100 henries the lowest reading being 0.2 henry. This scale is used when the instrument is used for Inductance measurements with the Taylor Model 313C adaptor.
- (G) The innermost scale is for Power level measurement and is scaled from -20 to plus 9 decibels. The reference level is 1.73 volts (which corresponds to 6 mw output into a 500 ohms load).

#### CONTROLS.

There are four controls on the panel.

- (a) **Range Selector.** The top right hand switch has twelve positions eight of which are marked from 1 to 1,000 and the remaining four marked 100R, R, R and Buzz.  
100
- (b) **A.C./D.C. Selector.** The lower right hand switch has five positions as follows.
  1. D.C. mA.
  2. D.C. V.
  3. R.
  4. A.C. V.
  5. A.C. mA.
- (c) **Meter Switch.** On the left of the instrument is a push button switch which can be used to switch the meter off while making adjustments to prevent the meter being accidentally overloaded.  
The switch also protects the rectifier but is ineffective above 1,000-volt peak owing to the small gap between the switch contacts.

The switch can be operated in two ways :—

- (1) The knob is turned to the OFF position and when a reading is required the knob is pressed.
- (2) The knob is normally left in the OFF position and is rotated to the ON position to take a reading.

(d) **Adjust Ohms.** The bottom left-hand control is used for adjusting the zero on the ohms scale on resistance measurements. Full details of its use will be found in paragraph dealing with resistance measurements.

#### 6. RANGE SELECTION.

To select any volt or current range the bottom selector should be set to either DC. mA, DC. V., AC. V. or AC. mA, and the top switch at the full scale reading required. Thus for 250 volts A.C. the top switch is set on 250 and the lower on A.C. V.

For resistance measurements or continuity testing with the buzzer the bottom selector should be set on "R."

There are three resistance ranges available on the top selector marked 100R, R, and R/100 respectively. These cover from 0-20 megohms, 0-200,000 ohms and 0-2,000 ohms respectively. Select whichever range will bring the pointer nearest the centre of the scale.

#### 7. TERMINALS.

There are six terminals on the instrument marked COMMON—, TEST+, OUTPUT, 5,000 V, 10A D.C. and 10A A.C. The first two terminals are used for all measurements except :—

- (1) **Output.** Measurements of A.C. voltage when the circuit also carries D.C. are made by selecting the appropriate A.C. volt range and using the COMMON— and OUTPUT terminals. A condenser of 0.01 mfd. 1,000-volt peak rating in the instrument is in series with the meter and prevents the D.C. volts present interfering with the A.C. measurements.
- (2) **5,000 Volts.** To measure 5,000 volts set the lower selector to either A.C. or D.C. volts and use the COMMON— and 5,000 V. terminals.

*It is extremely important when measuring high voltages that every precaution must be taken to avoid electric shock, and it is*

*strongly recommended that extra heavy insulated leads are used, as the insulation of the usual test leads is not always sufficient protection.*

- (3) **10 Amperes.** When measuring 10 amperes A.C. or D.C. set the instrument up to measure either 1,000 mA. A.C. and D.C. and use the COMMON— terminal and the appropriate 10A terminal.

## 8. RESISTANCE MEASUREMENTS.

The instrument has two batteries incorporated for use on resistance measurements. One is a  $1\frac{1}{2}$ -volt U2 cell and the other is a 9-volt grid battery. On the ranges R and  $\frac{R}{100}$

U2 cell only is used giving a maximum test voltage of 1.5 and on the 100R range the 9-volt battery is automatically switched into circuit.

To measure resistance select a suitable range on the upper selector, set the lower selector on "R" and short circuit the two test leads. Turn the ADJUST OHMS control until the meter pointer reads zero on the ohms scale. Unshort the test leads and apply them to the resistance to be measured. On range "R" the meter scale is direct reading and on ranges 100R and  $\frac{R}{100}$  the meter readings must be multiplied by 100 or divided

by 100 respectively. When the resistance range is changed the zero on the ohms scale must be checked and the ADJUST OHMS control readjusted if necessary, as its setting will probably vary on the different ranges.

Care must be taken that the resistance to be measured has no current passing through it, as otherwise incorrect readings will be obtained as it is possible to damage the meter.

## 9. 1,000 R Range.

To measure resistances over 20 megohms up to 200 megohms a 60-volt battery and a 940,000 ohms series resistance are required.

The positive terminal of the battery should be connected to one side of the resistor and the other side of the resistor to the COMMON— terminal. The two test leads should then be connected to the TEST+ terminal of the instrument and the negative terminal of the battery. Set up the instrument on the "100R" range and adjust the zero in the usual way.

When measuring resistance the meter readings must be multiplied by 1,000. This gives a maximum resistance reading of 200 megohms on this range.

## 10. 10,000R Range.

For resistance measurements over 200 megohms up to 2,000 megohms the same procedure is necessary as for the 1,000R range except that a D.C. supply of 600 volts and a series resistor of 10.3 megohms are required.

When taking readings on this range the meter readings must be multiplied by 10,000 giving a maximum reading of 2,000 megohms.

Great care must be taken when using this range as 600 volts can give a severe shock, if applied without the protection of the 10.3 megohm series resistor.

## 11. BUZZER.

For low resistance continuity tests a buzzer is incorporated into the instrument and in conjunction with the 9-volt battery gives audible indication of continuity. The lower selector should be set on "R" and the upper selector on "BUZZ." The instrument can be used for morse practice by connecting a morse key to the COMMON— and TEST+ terminals while switched to "BUZZ."

## 12. BATTERY CONSUMPTION.

The battery consumption on all ranges is proportional to the meter pointer movement and is a maximum when the external resistance is zero. When the batteries are fresh this current amounts to 72  $\mu$ A on the 100R range and 1.44 mA and 144 mA on R and 100R ranges respectively. The consumption of the buzzer is from 20 to 50 mA approximately.

## 13. BATTERY REPLACEMENT.

When it is no longer possible to reset the zero on either range R or  $\frac{R}{100}$  the U2 cell needs replacing and when the zero

cannot be reset on range 100R the 9-volt battery needs replacement.

To replace the batteries turn the instrument over carefully and unscrew the screw holding the battery cover.

This can then be removed and uncover the battery compartment. When replacing the batteries make sure that the U2 cell is replaced with the centre contact of the battery making contact with the spring contact marked in red.

The red and black flexible leads must be plugged into the + and  $-7\frac{1}{2}$ -volt sockets of the 9-volt battery.

#### 14. DECIBELS.

The decibel ranges are obtained by setting the instrument on A.C. volts and using the COMMON— terminal and either the TEST+ or the OUTPUT terminals. The nine ranges are obtained by using the A.C. volt ranges. The reference level is 1.73 volts. This is the voltage which when impressed on a resistance of 500 ohms gives a power output of 6 milliwatts. This power level is referred to as 0 db. The scale correction for the various A.C. ranges is as follows.

1-volt range.	Deduct	14 db.
2.5 " "	" "	6 db.
10 " "	Add	6 db.
25 " "	" "	14 db.
100 " "	" "	26 db.
250 " "	" "	34 db.
500 " "	" "	40 db.
1,000 " "	" "	46 db.
5,000 " "	" "	60 db.

If it is desired to refer back to a reference level of 1 volt an extra 2 db. should be added to the meter readings.

The decibel scale can be used when measuring A.C. volts or output volts although in the latter case allowance may have to be made for the impedance of the 0.01 mfd. series condenser.

#### 15. OVERLOAD PROTECTION.

A special non-linear resistance is fitted in the instrument to act as a protection to the meter against severe overloads. The resistance is wired across the meter and at the normal working voltages across the meter acts as a very high resistance and passes very little current. When a severe overload is applied to the meter the resistance of the special resistance drops to a very low value and shunts away as much as 99% of the overload. The resistance functions equally well on an overload in the reverse direction and also on A.C. overloads. The protection given by the resistance is instantaneously in effect. The instrument rectifier, resistors and shunts are not protected and to save them from damage full use should be made of the meter switch as explained in paragraph 2.

#### 16. A.C. VOLTS.

When measuring A.C. volts on the 100-volt range or on higher ranges at 50 cycles a small amount of stray capacity can have a serious effect on the meter accuracy. It is advisable to ensure that the COMMON— terminal is connected to the earth side of the voltage being measured. When this is not known

readings should be taken with the leads reversed and the lower reading is most probably correct. At higher frequencies the error on the volt ranges is increased and to measure volts accurately up to 10 Kc/S it is preferable to switch the instrument to 1 or 10 mA A.C. range and use a volt box in series to give the required range meter readings should be taken in this case on scale "C." Alternatively the instrument could be switched say to the 1 mA. D.C. range and a suitable rectifier and volt box coupled to the instrument. By using non-inductive resistors accurate readings should be possible at all audio frequencies.

#### 17. ADDITIONAL RANGES.

50 $\mu$ A. D.C.	Switch to 1 volt D.C. and read on scale "B."
100 $\mu$ A. D.C.	Switch to R/100 and D.C.mA. and read on scale "B."
250 $\mu$ A. D.C.	Switch to Buzz and D.C. mA. and read on scale "B."
0.05 volt D.C.	Switch to R/100 and D.C. mA. and read on scale "B."
0.1 volt D.C.	Switch to 10 mA. D.C. and read on scale "B."
50 $\mu$ A. A.C.	Switch to 1 volt A.C. and read on scale "B."
250 $\mu$ A. A.C.	Switch to Buzz and A.C. mA. and read on scale "C."

#### 18. 1 VOLT A.C.

Although when the instrument is switched to 1 volt A.C. it will read correctly at full scale, it will not read accurately at lower voltages, so for measurement under 1 volt use 10 mA. A.C. range and read on scale "C."

#### 19. TEST LEADS.

The instruments are supplied with three test leads, one end of one is fitted with a test prod and one end of the others with crocodile clips. The other end of the leads are fitted with spade connections to connect to the instrument terminals.

TAYLOR MODEL 85A  
90 RANGES.

Range	Top Selector	Bottom Selector	Meter Scale	Terminals
0-0.05 Volts D.C.	R/100	D.C. mA.	B	COMMON— and TEST+
0-0.1 Volts D.C.	10	D.C. mA.	B	
0-1 Volt D.C.	1	D.C. V.	B	
0-2.5 Volts D.C.	2.5	D.C. V.	B	
0-10 Volts D.C.	10	D.C. V.	B	
0-25 Volts D.C.	25	D.C. V.	B	
0-100 Volts D.C.	100	D.C. V.	B	
0-250 Volts D.C.	250	D.C. V.	B	
0-500 Volts D.C.	500	D.C. V.	B	
0-1,000 Volts D.C.	1,000	D.C. V.	B	
0-5,000 Volts D.C.	1,000	D.C. V.	B	COMMON— and 5,000 V.
0-50 $\mu$ A. D.C.	1	D.C. V.	B	COMMON— and TEST+
0-100 $\mu$ A. D.C.	R/100	D.C. mA.	B	
0-250 $\mu$ A. D.C.	Buzz	D.C. mA.	B	
0-1 mA. D.C.	1	D.C. mA.	B	
0-2.5 mA. D.C.	2.5	D.C. mA.	B	
0-10 mA. D.C.	10	D.C. mA.	B	
0-25 mA. D.C.	25	D.C. mA.	B	
0-100 mA. D.C.	100	D.C. mA.	B	
0-250 mA. D.C.	250	D.C. mA.	B	
0-500 mA. D.C.	500	D.C. mA.	B	
0-1,000 mA. and 1 Amp. D.C.	1,000	D.C. mA.	B	COMMON— and 10A D.C.
0-10 Amps. D.C.	1,000	D.C. mA.	B	

Range	Top Selector	Bottom Selector	Meter Scale	Terminals
0-1 Volts A.C.	10	A.C. mA.	C	COMMON— and TEST+
0-2.5 Volts A.C.	2.5	A.C. V.	C	
0-10 Volts A.C.	10	A.C. V.	D	
0-25 Volts A.C.	25	A.C. V.	B	
0-100 Volts A.C.	100	A.C. V.	B	
0-250 Volts A.C.	250	A.C. V.	B	
0-500 Volts A.C.	500	A.C. V.	B	
0-1,000 Volts A.C.	1,000	A.C. V.	B	COMMON— and 5,000 V.
0-5,000 Volts A.C.	1,000	A.C. V.	B	

For Output Volts use same settings as for A.C. volts but use terminals COMMON— and OUTPUT.

RANGES—continued.

Range	Top Selector	Bottom Selector	Meter Scale	Terminals
0-50 $\mu$ A. A.C.	1	A.C. V.	B	COMMON— and TEST+
0-250 $\mu$ A. A.C.	Buzz	A.C. mA.	C	
0-1 mA. A.C.	1	A.C. mA.	C	
0-2.5 mA. A.C.	2.5	A.C. mA.	C	
0-10 mA. A.C.	10	A.C. mA.	C	
0-25 mA. A.C.	25	A.C. mA.	C	
0-100 mA. A.C.	100	A.C. mA.	C	
0-250 mA. A.C.	250	A.C. mA.	C	
0-500 mA. A.C.	500	A.C. mA.	C	
0-1,000 mA. A.C. and 1 Amp. A.C.	1,000	A.C. mA.	C	
10 Amps. A.C.	1,000	A.C. mA.	C	

Decibel Range.	Range.	Selector.	Scale Adjustment.	Meter Scale.	Terminals.
-34 to -5	1	A.C. volts	Deduct 14 db.	G	COMMON— and either TEST+ or OUTPUT. COMMON— and 5,000 V.
-26 to +3	2.5	A.C. volts	Deduct 6 db.	G	
-14 to +15	10	A.C. volts	Add 6 db.	G	
-6 to +23	25	A.C. volts	Add 14 db.	G	
+6 to +35	100	A.C. volts	Add 26 db.	G	
+14 to +43	250	A.C. volts	Add 34 db.	G	
+20 to +49	500	A.C. volts	Add 40 db.	G	
+26 to +55	1,000	A.C. volts	Add 46 db.	G	
+40 to +69	5,000	A.C. volts	Add 60 db.	G	

†Range.	Top Selector.	Bottom Selector.	Meter Scale.	Scale Factor.	Terminals.
0.1-10- 2,000 ohms	R/100	R.	A.	$\div 100$	COMMON— and TEST+
10-1,000- 200,000 ohms	R.	R.	A.	$\times 1$	
*001-0.1-20 megohms	100R.	R.	A.	$\times 100$	
*01-1- 200 megohms	100R.	R.	A.	$\times 1,000$	
*0.1-10- 2,000 megohms	100R.	R.	A.	$\times 10,000$	

**RANGES—continued.**

The following additional ranges are available with this instrument when used with either external shunts or special adaptors.

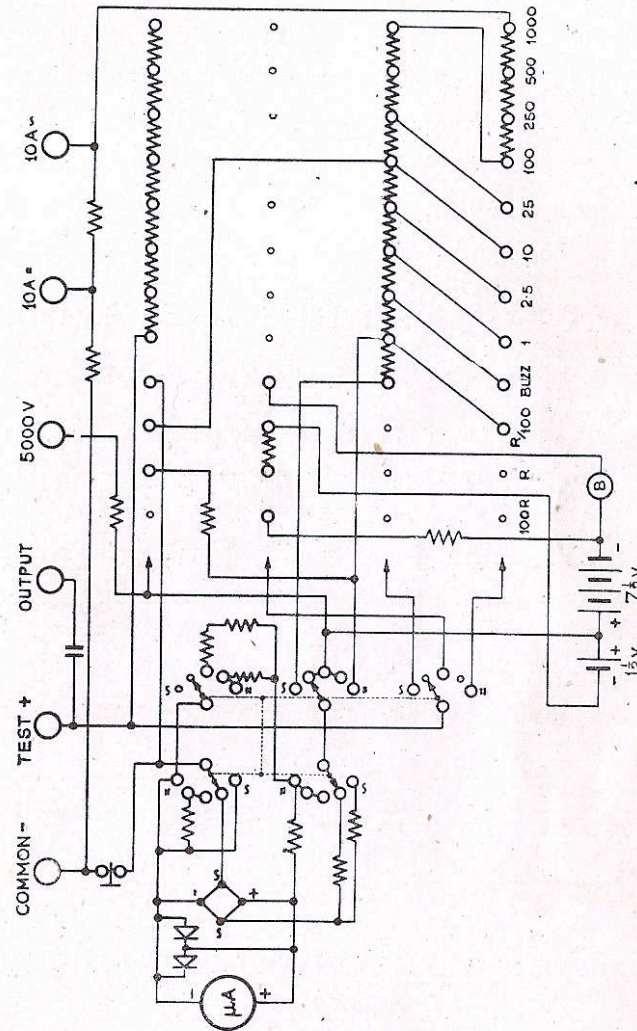
D.C. Current.	A.C. Current.	†Capacity.	†Inductance.
2.5 Amps.	0-2.5 Amps.	·0002-·002-0.1 $\mu$ F.	0.2-2-100 H.
5 Amps.	0-5 Amps.	·0002-·02-1 $\mu$ F.	2-20-1,000 H.
25 Amps.	0-25 Amps.	·02-0.2-10 $\mu$ F.	
50 Amps.	0-50 Amps.	0.2-2-100 $\mu$ F.	
100 Amps.	0-100 Amps.		
250 Amps.	0-200 Amps.		

†Low Resistance.	High Volts.	A.C. Millivolts.
0.01-1-100 ohms	10,000 volts D.C. 10,000 volts D.C.	0-25 0-100 0-250

\*See paragraphs 9 and 10.

†The three values of Resistance, Capacity and Inductance given indicate the lowest, centre of scale and highest readings respectively.

**TAYLOR MODEL 85A  
CIRCUIT DIAGRAM**



RANGE	TOP SELECTOR	BOTTOM SELECTOR	METER SCALE	TERMINALS.
0-0.05 VOLTS D.C.	R/100	D.C. MA	B	COMMON - AND TEST +
0-0.1 VOLTS D.C.	10	D.C. MA	B	
0-1 VOLT D.C.	1	D.C. V.	B	
0-2.5 VOLTS D.C.	2.5	D.C. V.	B	
0-10 VOLTS D.C.	10	D.C. V.	B	
0-25 VOLTS D.C.	25	D.C. V.	B	
0-100 VOLTS D.C.	100	D.C. V.	B	
0-250 VOLTS D.C.	250	D.C. V.	B	
0-500 VOLTS D.C.	500	D.C. V.	B	
0-1000 VOLTS D.C.	1000	D.C. V.	B	
0-5000 VOLTS D.C.	1000	D.C. V.	B	COMMON-AND 5000V
0-50 MA. D.C.	1	D.C. V.	B	COMMON - AND TEST +
0-100 MA. D.C.	R/100	D.C. M.A.	B	
0-250 MA. D.C.	Buzz	D.C. M.A.	B	
0-1 MA. D.C.	1	D.C. M.A.	B	
0-2.5 MA. D.C.	2.5	D.C. M.A.	B	
0-10 MA. D.C.	10	D.C. M.A.	B	
0-25 MA. D.C.	25	D.C. M.A.	B	
0-100 MA. D.C.	100	D.C. M.A.	B	
0-250 MA. D.C.	250	D.C. M.A.	B	
0-500 MA. D.C.	500	D.C. M.A.	B	
0-1000 MA. D.C.	1000	D.C. M.A.	B	COMMON AND 10A. D.C.
0-10 AMPS D.C.	1000	D.C. MA	B	

RANGE	TOP SELECTOR	BOTTOM SELECTOR	METER SCALE	TERMINALS.	
0-1 VOLTS A.C.	10	A.C. MA	C	COMMON - AND TEST +	
0-2.5 VOLTS A.C.	2.5	A.C. V.	C		
0-10 VOLTS A.C.	10	A.C. V.	D		
0-25 VOLTS A.C.	25	A.C. V.	B		
0-100 VOLTS A.C.	100	A.C. V.	B		
0-250 VOLTS A.C.	250	A.C. V.	B		
0-500 VOLTS A.C.	500	A.C. V.	B		
0-1000 VOLTS A.C.	1000	A.C. V.	B		
0-5000 VOLTS A.C.	1000	A.C. V.	B		COMMON-AND 5000 V

RANGE	TOP SELECTOR	BOTTOM SELECTOR	METER SCALE	TERMINALS.
0-50 MA. A.C.	1	A.C. V.	B	COMMON - AND TEST +
0-250 MA. A.C.	Buzz	A.C. MA	C	
0-1 MA. A.C.	1	A.C. MA	C	
0-2.5 MA. A.C.	2.5	A.C. MA	C	
0-10 MA. A.C.	10	A.C. MA	C	
0-25 MA. A.C.	25	A.C. MA	C	
0-100 MA. A.C.	100	A.C. MA	C	
0-250 MA. A.C.	250	A.C. MA	C	
0-500 MA. A.C.	500	A.C. M.A.	C	
0-1000 MA. A.C.	1000	A.C. MA	C	
0-10 AMPS A.C.	1000	A.C. MA	C	COMMON-AND 10A. A.C.

DECIBEL RANGE	RANGE	SELECTOR	SCALE ADJUSTMENT	METER SCALE	TERMINALS.
-34 TO -5	1	A.C. VOLTS	DEDUCT 14 db.	G	COMMON - AND EITHER TEST + OR OUTPUT
-26 TO +3	2.5	A.C. VOLTS	" 6db.	G	
-14 TO +15	10	A.C. VOLTS	ADD 6db.	G	
-6 TO +23	25	A.C. VOLTS	" 14db.	G	
+6 TO +35	100	A.C. VOLTS	" 26 db.	G	
+14 TO +43	250	A.C. VOLTS	" 34db.	G	
+20 TO +49	500	A.C. VOLTS	" 40db.	G	
+26 TO +55	1,000	A.C. VOLTS	" 46db.	G	
+40 TO +69	5000	A.C. VOLTS	" 60db.	G	

RANGE	TOP SELECTOR	BOTTOM SELECTOR	METER SCALE	SCALE FACTOR	TERMINALS
0.1-10-2000 OHMS	R/100	R	A	÷ 100	COMMON
10-1000-200,000 OHMS	R	R	A	X 1	AND TEST +
0.001-0.1-20 MEGOHMS	100 R	R	A	X 100	