Simpson

INSTRUMENTS THAT STAY ACCURATE

OPERATOR'S MANUAL

for the

Model 260 and 270, series 5

and the series 5P

VOLT – OHM – MILLIAMMETERS

Bach-Simpson

LIMITED

LONDON CANADA

IN U.S.A. SIMPSON ELECTRIC COMPANY

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ABOUT BACH-SIMPSON

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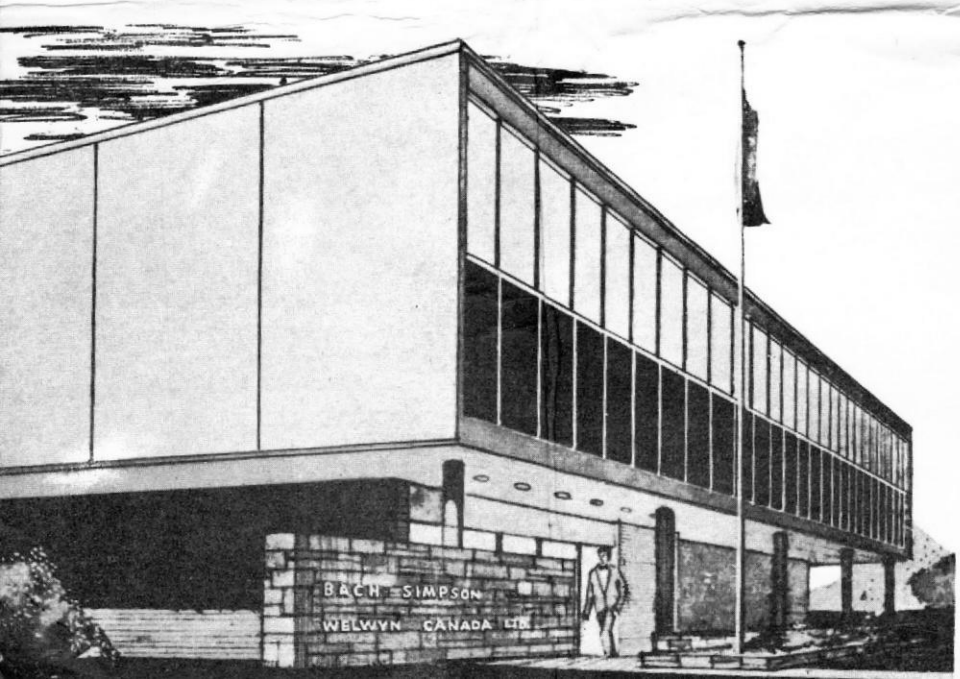
Recognising the growing requirement for precision electrical products of high quality, the range of items has constantly become more diverse ranging from Panel Meters, to complex Measurement and Electronic Control systems. These have gained an enviable international reputation, that is our constant concern to maintain and enhance.



OPERATOR'S MANUAL

for the

Model 260 and 270 (Series 5 & 5P)

VOLT - OHM - MILLIAMMETERS

Designed and Manufactured in Canada

by

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FOREWORD

Because of the similarity in appearance and operation of the Models 260, series 5, the 270-5 and the 260-5P, this one Operator's Manual serves to cover all three Models in the group. Therefore, whenever the data provided in the Manual applies generally to all three, the text simply refers to "all Models" or "the instrument". Otherwise, a specific Model is indicated.

THE SERIES 5 MODEL 260, is an even more rugged, reliable instrument than its predecessors. It is used for the measurement of AC and DC voltages, DC Currents, Resistance, Volume levels, Audio Output, etc. Suitable Fusing and spring-backed jewels provide protection against many of the hazards of day to-day use. Its design is based on many years of experience of multimeter manufacture. It embodies several proven innovations and improvement over previous Models.

THE MODEL 270, in the same convenient physical form as the Series 5 Model 260, offers the same comprehensive series of Ranges, but with enhanced accuracy. This higher accuracy is achieved by the use of special 0.5% Resistors, combined with a premium type meter movement in which unusual precautions have been taken to minimize all errors. To facilitate utilization of the superior accuracy, the meter scale has an anti-parallax mirror and is printed with highly legible type on a Buff-tinted background, for easy, accurate reading and minimum fatigue. (Fig. 2).

The protection provided in the Model 260, in the form of a Fuse and spring backed Jewels, is supplemented in the Model 270, by a special Diode which limits the otherwise damaging acceleration to which the movement and Pointer may be subjected, in the event of overload.

THE MODEL 260-5P is physically comparable to the Model 260-5 and it provides the same ranges and functions. However, all of the ranges with the exception of the 10 Amps DC 1000v and 5000v AC and DC are protected from accidental overload damage, by a unique, re-settable tripping device. The sensing circuit is entirely electronic and is not dependent on mechanical means for actuation and operates at a uniform percentage of overload, on all of the protected ranges.

FIG. 1 - MODEL 260-SERIES 5

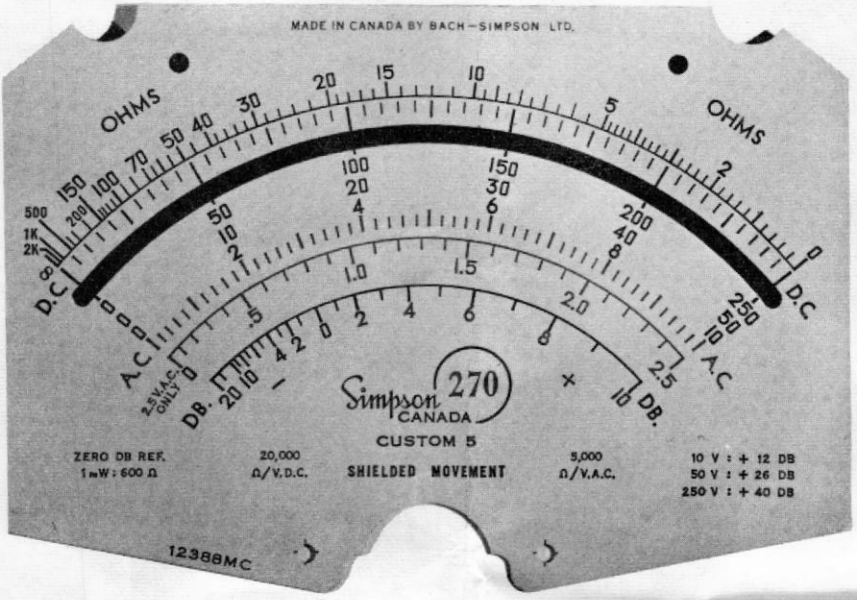


FIG. 2 - 270 SERIES 5 DIAL

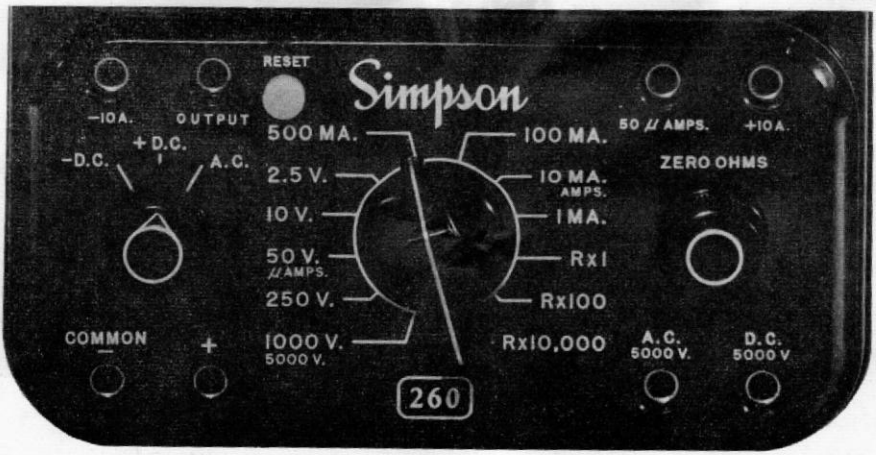


FIG. 3 - 260-5P CONTROL PANEL

PHYSICAL DESCRIPTION - EXTERIOR

All Models are of essentially two piece construction. A front panel assembly carries all components and a rear cover is fastened to it by four recessed screws. Both pieces are molded of durable Black Phenolic, ribbed for additional strength.

Overall dimensions assembled (excluding the carrying handle) are 5-1/4"x7"x3-1/8" (133x178x79 m.m.) Weight is 3-1/2 lbs. (1.6 Kg.)

Each Model uses a self shielding (S) type Core Magnet movement which protects them from the influence of external fields. It also ensures that the 'leakage flux' is so low as to produce negligible disturbance of other sensitive instruments operated nearby and the correspondingly efficient use of the available useful magnetic flux, provides notable improvement in movement performance.

The temperature compensation applied to all Models assures that the rated accuracies will be maintained on all ranges over the span of temperature changes normally encountered in Workshops, Laboratories, etc.

RANGE SWITCH - is located in the center of the Control Panel. It can be rotated through 360°, in either direction, through all 12 positions.

FUNCTION SWITCH - is to the left of the Range Switch and has three positions: AC, +DC, and -DC. For either DC or Resistance measurements, the +DC position is normally used. On all but the 50uA/250mV and 10 Amp ranges, the polarity of the test leads can be reversed by turning the Function switch to the -DC position.

ZERO OHMS CONTROL - is located to the right of the Range switch. Its function is to correct for variations in the voltage of the internal Batteries. It is used to adjust the meter pointer, to scale zero at the right of the dial, with the Test Clips 'shorted' together, before Resistance readings are taken.

CIRCUIT JACKS - There are eight Jack sockets, into which the Test Lead Plugs may be inserted, arranged symetrically around the edge of the Control Panel. The correct selection of the appropriate Jacks, for the various tests, is covered in the Operating Instructions. The Control Panels of the Models 260 and 270, series 5 are identical with that of the 260-5P illustrated in Fig. 3, except that the Overload Reset Button, above and to the left of the Range switch is not present in either 260-5 or 270-5.

OVERLOAD RESET BUTTON - MODEL 260-5P ONLY

This feature is only available on the 260-5P. It is shown above and to the left of the Range Switch in Fig. 3. The shock-proof insulated Button 'pops' up and extends approximately 3/16" above the Panel when an overload of sufficient magnitude is applied. Normally the overload will be removed before re-setting the Button. However, if the Button is inadvertently depressed, or even held down, even though the overload is still present, the device will not allow the tester to be re-connected to the load. This "fool-proof" feature makes it almost impossible to damage the 260-5P under normal overload conditions on the protected ranges. It is not economically practical to add the overload protection feature to other versions of the 260, which were produced without it.

PHYSICAL DESCRIPTION - INTERIOR

With minor exceptions, such as the Batteries, 10 Amp Shunt and Fuse etc. all components are mounted on a single printed circuit board. As a consequence, any necessary maintenance is very much simplified.

BATTERIES - Model 260-5 and 270-5 use one 1.5v "D" size and four 1.5v "AA" Batteries. The "D" cell powers the R x 1 and the R x 100 Ohms ranges and the four size "AA" cells are added in series when the Range switch is turned to the R x 10,000 range.

Model 260-5P only uses one 1.5v "D" cell and one 15v "B" Battery. As in the 260-5 and 270-5, the "D" Cell powers the R x 1 and the R x 100 ranges, the 15v Battery being switched in series for the R x 10,000 range. The 15v Battery also provides the power for the overload protection device. The protective

circuitry is so arranged that it will be operative as long as the Battery can provide sufficient power to enable the meter pointer to be adjusted to end scale on the R x 10,000 range.

It is recommended that the R x 10,000 range be checked each time the tester is used, to be certain that proper zero adjustment is possible, thus confirming the Battery is in good enough condition, to properly operate the overload protection relay.

In each case the proper size of Battery and cell should be used for replacement and installed with the correct polarity corresponding to the markings adjacent to the contact Clips.

FUSE - 260-5 and 270-5 - A one Amp clip-in Fuse is mounted on the circuit board support posts. (Note: Units produced prior to August, 1961 may have a soldered in pig-tail Fuse.)

Model 260-5P - A 10 Amp clip-in Fuse, wired in series with the relay contacts, provides additional protection. Since quite high currents may result if the R x 1 or current ranges are overloaded, the relay contacts could be damaged. The Fuse will avoid this. It is therefore, possible for the Fuse to "blow" in addition to the relay contact opening. If the tester is still inoperative when the overload has been removed and the re-set Button depressed, check for a "blown" fuse.

ELECTRICAL SPECIFICATIONS

RANGES - ALL MODELS

D. C. VOLTAGE (Sensitivity-20K. Ohms/V.)	and	DIRECT CURRENT (Insertion Loss ~ 250m/V)
0-250 millivolts		0-50 micro Amperes
0-2.5 Volts		0-1 milli Amp
0-10 "		0-10 milli Amps
0-50 "		0-100 "
0-250 "		0-500 "
0-1000 "		
0-5Kv		0-10 Amps

ACCURACY: Models 260-5 and 260-5P - ±3% of F. S. for all D. C. Voltage and Current ranges.
Model 270-5 effective range - 10%-100% of full scale.
All Current ranges ±1.25% of F.S. 1Kv. range ±1.75% of F.S.
Voltage to 250v ±1.25% of F.S. 5Kv. range ±2.5% of F.S.

A. C. VOLTAGE
(Sensitivity-5K. Ohms/V.)

0-2.5	Volts	0-250	Volts
0-10	"	0-1000	"
0-50	"	0-5000	"

ACCURACY: Models 260-5 and 260-5P ±5% of full scale.
Model 270-5 over effective range 20%-100% F. S. up to 1000v ±2.25% of F.S. 5000v range ±3% of Full Scale.

D. C. RESISTANCE			WITH VISIBLE INDICATION TO
R x 1	0-200Ω	(12Ω center scale)	2KΩ
R x 100	0-20,000Ω	(1200Ω ")	200KΩ
R x 10,000	0-2MΩ	(120KΩ ")	20MΩ

ACCURACY: Model 260-5 and 260-5P within 3° of arc.
Model 270-5 effective range, 10%-100% full scale.
Accuracy, better than 5% of reading at center scale.
At the limits of the effective range, better than within 10% of reading.

FREQUENCY RESPONSE - is essentially flat from 20 c. p. s. to 50 Kc. Correction curves covering higher frequencies appear in the appropriate section of the Operating Instructions. Calibration on A. C. ranges is for the RMS value of sinusoidal waveforms.

TEMPERATURE - Temperature compensation on all Models assures the maintenance of the rated accuracy on D. C. ranges for all temperatures within the range $\pm 5^{\circ}C$ of $25^{\circ}C$. Additional compensation in the Model 270-5 ensures that the accuracy of the A. C. ranges are maintained over this range of temperature also.

A. F. OUTPUT VOLTAGE (With 0.1 uF internal capacitor)	VOLUME LEVEL(dB) (With 0 dB = to 1 mW/600)
0 - 2.5 Volts	- 20 to + 10 dB
0 - 10 "	- 8 to + 22 dB
0 - 50 "	+ 6 to + 36 dB
0 - 250 "	+ 20 to + 50 dB

OPERATING INSTRUCTIONS - ALL MODELS

GENERAL - Check the zero setting of the pointer before making any measurement. If necessary, adjust pointer to scale zero (left edge of dial) with the tester in the position in which you intend to use it. (It is good instrument practice to use the instrument on its back with the scale horizontal, thus reducing the possibility of it being inadvertently tipped over). If needed, set the Pointer to the center of the scale zero position, using the slotted screw in the lower center of the meter cover. It may be turned freely through 360°.

OBSERVE CAUTION - For your personal protection, form the habit of always turning OFF the power to the circuit under test when making or changing connections. For the protection of your instrument always re-check Jack connections and the position of Function and Range switches before turning ON the power. Turn power off before disconnecting the Test Leads and restoring circuit connections etc.

MODEL 260-5P ONLY - CHECK OVER-LOAD BATTERY

Set the Range Switch to the R x 10,000 position and the Function Switch at either D.C. position. Clip the ends of the test leads together and observe meter Pointer. It should read 0 ohms (uppermost arc). If it doesn't, rotate Zero Ohms Knob until it does. If full rotation of the knob still does not allow pointer to reach zero the 15v Battery should be replaced. The overload protection circuit will not function properly if the Battery voltage is below the minimum needed to zero the R x 10,000 range.

DC VOLTAGE & MILLIAMP MEASUREMENTS

0-250m/V and 0-50 uAmp ONLY. (NOTE: Accidental overloads can be particularly damaging here, in the case of the 260-5. Caution is advisable even with the Diode protected Model 270-5).

Set Function Switch to (+) D.C. and Range Switch to 50 uAmp (common with 50v positions). Insert the Black Test Lead plug into the Common Jack socket (lower left) and the Red plug into the 50 uAmps socket (above and to the right of the Range switch).

With power OFF, connect the Test Leads to the circuit to be measured. Black to Negative and Red to Positive. Turn ON power. If meter shows a reverse deflection, switch off promptly and reverse the test connections. (NOTE: The Function Switch cannot reverse the test lead polarity on this range). Turn power ON again and note reading on the Black arc marked D.C. Use the 0-250 figures and read directly in millivolts or the 0-50 figures for microamperes. Turn power OFF before disconnecting leads.

250 m/V - 1 Kv and MILLIAMPS (See Fig. 4)

Set Function Switch to (+) D.C. and Range Switch to the highest available Voltage or Milliamp range, as desired. Insert the Test Lead Plugs into the Common and (+) Jack Sockets. (Black to Common and Red to Positive). With Power OFF make the appropriate test connections - make sure all capacitors are discharged. Turn ON the power and take a preliminary reading.

If the meter shows a reverse deflection, turn OFF power, turn

Function Swtich to (-) D.C. and restore power. Read the Black arc marked D.C. with the Black figures below.

If necessary, turn OFF power and reset the Range Switch to the lowest SAFE range based on your preliminary reading. Turn ON Power and take a precise reading. Turn OFF Power and restore circuit connections - if necessary.

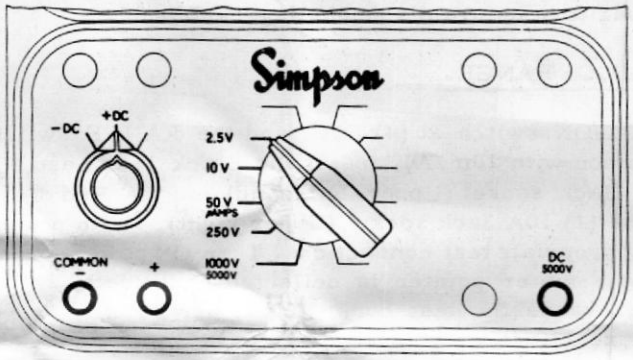


Fig. 4 - Contacts and Switch Positions for D.C. Volts and m/A

For the 2.5v range use the 0-250 figures and divide by 100.
For the 10v, 50v and 250v ranges, read the figures directly.
For the 100v range, use the 0-10 figures and multiply by 100.
For the 1 m/A range, use the 0-10 figures and divide by 10.
For the 10 m/A range, use the 0-10 figures directly.
For the 100 m/A range, use the 0-10 figures and multiply by 10.
For the 500 m/A range, use the 0-50 figures and multiply by 10.

0-5000v D.C. RANGE ONLY.

WARNING: Be extremely careful when working in high voltage circuits. Make sure all Capacitors are discharged before making a hookup. Do not touch the meter or test leads while power is on in the circuit being measured.

Repeat procedure as outlined for D.C. Voltage and Milliamp tests except that the Test Leads are plugged into the Common Jack and the D.C. 5000v (lower left and right hand Jack sockets.) Black lead to Common and Red lead to D.C. 5000v socket. Set Range Switch to 1000v position.

Turn OFF power to circuit, make appropriate test connections - Black to Negative and Red to Positive - restore power and take a reading. Use the Black arc (second from top of dial) and the 0-50 figures. Multiply the reading by 100. Turn OFF power and discharge Capacitors before disconnecting Test Leads.

0-10 AMP D.C. RANGE.

With FUNCTION switch at (+) D.C. and the RANGE switch at 10 Amps (common with 10m/A), insert the Black Test Lead Plug into the (-) 10A Jack socket (Upper left hand) and the Red Test Lead Plug into the (+) 10A Jack socket (Upper right). With power OFF, make the appropriate test connections. Turn ON power and observe meter. If the meter pointer is deflected to the left, switch OFF power and reverse the test connections. (NOTE: The Function Switch has no effect on polarity on the 10Amp range). Use the Black arc and 0-10 figures.

A.C. VOLTAGE MEASUREMENTS

0-1000v A.C. RANGES. Set the FUNCTION Switch at A.C. and the RANGE Switch at either 2.5v, 10v, 50v, 250v or 1000v. When in doubt as to the voltage present, always select the highest voltage range initially, as a protection to the instrument. Insert the Test Leads into the Common and (+) Jack sockets. With Power OFF, connect the test leads across the point to be measured. Turn ON power and observe reading. If necessary, turn RANGE Switch to a lower range.

For the 0-2.5v range, use the special RED figures and the special arc marked 2.5v A.C. only. For the 10v, 50v, and 250v ranges read the RED arc marked AC and the Black figures immediately above. For the 1000v range, use the RED arc and the 0-10 figures. Multiply the reading by 100.

The Simpson Models 260 and 270 measure AC RMS voltage using two germanium diodes in a modified full wave bridge circuit especially designed to give a wide frequency response. They are useful over a range from 10 cycles to 500,000 cycles per second. The curves below show the response of the 2.5, 10 and 50 volt ranges. The 2.5 and 10 volt ranges are within 5% from 10 - 100 Kc/S.

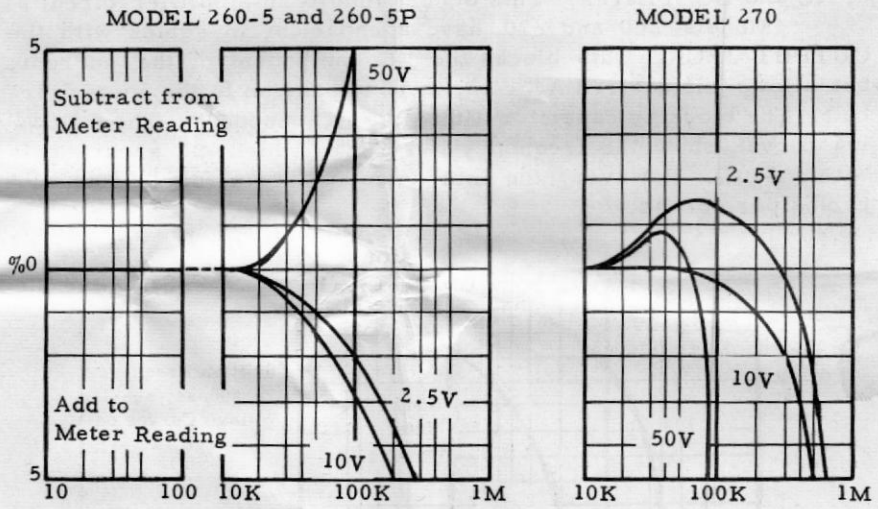


FIG. 5-FREQUENCY CORRECTION CURVES

MEASURING AC VOLTAGE TO 5000 VOLTS

WARNING: Be extremely careful when working on high voltage circuits. Do not touch the meter or test leads while power is on in the circuit being measured.

With Function Switch at A.C. and RANGE Switch at 5000v (1000v) insert the Test Lead plugs into the COMMON and A.C. 5000v Jack sockets. Be sure that power is OFF in the circuit to be measured and that all capacitors are discharged. Then connect the Test Leads to the appropriate test points. Turn ON the power - do not touch the instrument or the Test Leads. Read the voltage on the RED arc marked A.C. Use the Black 0-50 figures and multiply by 100.

MEASURING OUTPUT VOLTAGES

An output voltage is the AC component only, in a mixture of AC and DC voltages. This occurs mostly in amplifier circuits.

Models 260 and 270 have a capacitor in series with the OUTPUT JACK. This blocks the DC component of the current, but allows the desired AC component to pass on to the meter circuit. The blocking capacitor alters the AC response. The following curves show the frequency range over which the accuracy is within ±10%. However, the instrument is useful up to 600 kilocycles per second.

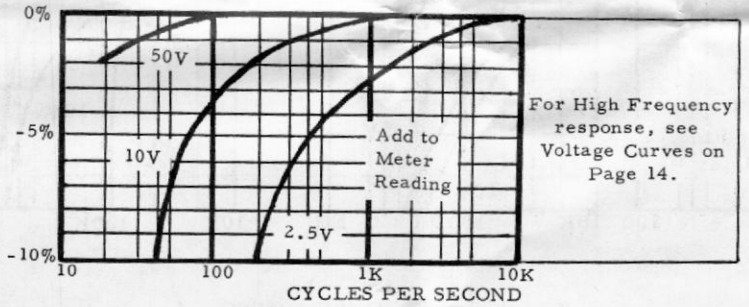


FIG. 6 - CORRECTION CURVES FOR L.F. MEASUREMENTS

Set FUNCTION Switch to AC and RANGE Switch to the desired position. Either 2.5v, 10v, 50v or 250v. Use the COMMON and OUTPUT Jack Sockets (below and to the left and above and to the right of the FUNCTION Switch). With Power OFF connect the BLACK lead to the grounded side of the circuit to be measured and the RED lead to the "hot" side.

Turn ON the power and read off the appropriate AC arcs of

the dial. Use the special RED 0-2.5v arc and figures for the 2.5 v range. Use the RED arc marked AC and the appropriate Black figures above for other ranges. Turn OFF the power before disconnecting leads.

MEASURING DECIBELS

Output voltages and audio frequency voltages are frequently measured in terms of decibels. To do this, proceed according to the instructions for measuring Output or AC voltage as appropriate. Read the dB scale, which is numbered from (-) 20 through 0 to (+) 10, and is the lowest arc on the dial.

The dB readings obtained will be correct on an absolute scale if you are using a Zero d B power level of .001 watt in 600 ohms and if the voltage which you read is measured across 600 ohms.

To obtain absolute dB values across 600 ohms:
For the 10v range read the dB arc and add (+) 12 dB to the reading.
For the 50v range read the dB arc and add (+) 26 dB to the reading.
For the 250v range read the dB arc and add (+) 40 dB.

If the referenced level is Zero dB = .006 watt in 500 ohms, subtract (+) 7 dB from the reading to obtain the absolute value of decibels.

RESISTANCE MEASUREMENTS

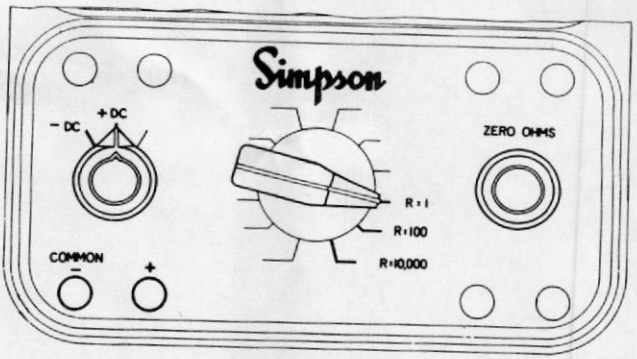


FIG. 7 - CONTACTS & SWITCH POSITIONS FOR RESISTANCES

MEASURING RESISTANCE

Set the RANGE switch to the desired range. Insert the Black Test Lead Plug into the COMMON (-) Jack socket and the RED Test Lead Plug into the (+) Jack Socket. (Lower left corner of panel). 'Short' the Test Clips together and, if necessary, adjust Pointer to OHMS zero (right hand end of scale) with the ZERO OHMS control. NOTE: If full rotation of the control still will not enable the pointer to reach scale zero, the appropriate Battery(s) should be replaced.

MODEL 260-5P ONLY - Battery used for R x 10,000 range is also used to power the overload relay. Replace whenever indicated, to maintain full protection.

Make sure there is no voltage present in the circuit or component to be measured, slip the test leads across the desired pointer and read from the OHMS arc (uppermost). The resistance value will be the figure read from the OHMS scale, multiplied by the factor shown at the switch setting. ("K" equals 1000).

ADDITIONAL APPLICATIONS

In addition to measuring AC and DC Voltages etc., the instrument is capable of performing many additional tests.

RECTIFIER CHECKS: Can be made on Copper-Oxide, Selenium and Crystal Rectifiers, both Power and Signal types using the Ohms ranges. Read the resistance through the Rectifier in both directions. The "Forward Resistance" should be low but the "Reverse Resistance" very high. Note that the actual readings of resistance through the Diode will depend on the R x range used. What is important is not the actual value read, but the Ratio of the two readings. Generally, a ratio of about 10-1 is the minimum acceptable for small Copper Oxide types while Silicon Diodes may have a ratio as high as several thousand to one. The greater the difference between the "Forward" and "Reverse" readings, the better the Rectifier. Low readings in both directions point to a "shorted" Rectifier while high readings in both directions indicate an 'open circuit'.

NOTE: The resistance of such rectifiers will measure different values on different resistance ranges of the 260 and 270. Thus, a crystal diode which measured 80 ohms, for example, on the R x 1 range may measure 300 ohms on the R x 100 range. This is normal and is a result of the diode characteristic. The difference in value does not indicate any fault in the ohmmeter.

TRANSISTOR TESTS: Similar arbitrary but equally useful tests may be made on Transistors. The 'front' and 'back' readings of Emitter to Base, Collector to Base, etc., provide a quick means of locating a defunct unit. Use the R x 1 range and note the ratio between the 'front' and 'back' readings. It should be high. Low readings in both directions indicate a short while high readings in both directions point to an open Transistor.

SIMPLE CAPACITOR CHECKS:

WARNING: DISCHARGE CONDENSER BEFORE TESTING.

The Ohmmeter circuit can also be used to identify GOOD, OPEN or SHORTED Capacitors. Use the R x 10,000 range. A good

Capacitor will allow current to flow, while it is charging up, to the applied voltage. Consequently, the pointer will initially deflect an amount proportional to the size of the condenser in micro-farads. As it charges, the charging current will diminish, thus causing the meter pointer to gradually return to zero. The greater the capacity, the higher the initial deflection and the longer it will take for the pointer to return to an infinite resistance reading and vice-versa.

If the Capacitor is OPEN there will be no pointer deflection since there is infinite resistance. Very small capacitors have only a very small deflection. Anything smaller than about 0.05 mfd will be hard to see. If the Capacitor is SHORTED, a constant meter deflection will occur, indicating a finite resistance.

The above rough tests are simple and quick and will enable suspected condensers to be checked rapidly. Capacitors that test defective may be replaced immediately but test results of others should be confirmed with more conclusive means.

ACCESSORIES AVAILABLE

Various accessories are available for extending the usefulness of your multimeter as well as Leather Cases to provide protection.

LEAD SET (Part No. 3638) - Supplied with the instrument. Consists of two, four feet long leads - one Red, one Black with matching coloured molded right angle connector Plugs and Rubber sleeved Alligator Clips.

LEAD SET (Part No. 3686) - As above, but fitted with Test Prods with threaded ends, instead of Alligator Clips. Threaded Prods accept either threaded Alligator Clips (Part No. 16818-2) or flexible Prods with retractable tip (Part No. 17526 see below).

SCREW ON PROBE with retractable tip (Part No. 17526) - Fully insulated probe, molded of black Phenolic, has spring loaded, retractable tip to allow probing wiring and clipping on to connections in congested locations. Screws on to prods of Lead Set 3686.

ADD-A-TESTER UNITS (Models 650-661) - consist of molded accessory units designed to plug into your instrument Jack sockets and are semi-permanently attached to the tester to form a self-contained, easily transportable package. Range of ADD-A-TESTERS embraces a Transistor Tester, D.C. V.T.V.M., Temperature Tester, A.C. Ammeter, Audio Wattmeter, Battery Tester, Milliohmmeter and D.C. Ammeter. Your present case must be replaced with special case with molded lugs, to lock the ADD-A-TESTER in place. (Model 401 Adaptor Kit).

LEATHER CASE (Part No. 7031-1) - Brown Leather "Eveready" style into which the instrument may be permanently fastened, by means of the handle mounting studs. Front flap lifts up to expose the entire front panel. A pouch type, Black Leather case is also available (Part No. 7237).

ROLL TOP CASE - A special, molded rolling curtain type top case is available (Part No. 7608).

PROBES - A series of High Voltage probes, for extending the maximum voltage ranges of the various Models, specifically for checking T.V. and other C.R.T. High Voltage power supplies, are available.

MAINTENANCE

DIS-ASSEMBLY - Remove the four recessed screws in the back of the unit and lift out the Front Panel assembly complete. Lay the Panel face down on a clean piece of cloth. Meter, Batteries, Printed circuit, etc. are a complete sub assembly and will lift out as a unit.

BATTERY REPLACEMENT - ALL MODELS

When it is no longer possible to adjust the meter pointer to scale zero (right end of dial) on the R x 1 or the R x 100 ranges, replace the large "D" size cell. Note the polarity markings molded into the cell supports, adjacent to the contact clips and insert the cell accordingly. Refer to Fig. 8, page 23.

R x 10,000 RANGE - MODELS 260-5 and 270-5

When it is no longer possible to zero the pointer on the R x 10,000 range, replace the four small penlight cells (size "AA"). Note polarity markings molded in back of panel, beneath the cells and install the new cells the correct way round. It is usually desirable to replace the large "D" cell, when the four small cells are replaced.

R x 10,000 RANGE - SERIES 5P ONLY

When it is no longer possible to zero the pointer on the R x 10,000 range, replace the 15v Battery (Ever Ready type 417 or equivalent). Make sure that the new Battery is installed with the correct polarity.

FUSE REPLACEMENT - MODELS 260-5 and 270-5

Use a 1 Amp 250v Fuse, type 3AG (1-1/4" x 1/4") or equal. Model 260-5P uses a 10 Amp 250v Fuse (Buss type ABC or equivalent).

INSTRUMENT RECTIFIER REPLACEMENT & RECALIBRATION

There are two small rectifiers which are located at the top of the printed circuit, near the large 1.5v cell. These are used to rectify the A.C. voltages for measurement. They are shown as D-1 and D-2 in the overall circuit diagram.

Both rectifiers act in the meter circuit to effectively create a full wave rectifying action. If either or both should fail, the meter will show incorrect indications.

In case of rectifier failure in the 260-5 or 260-5P, replace the defective rectifier with another 1N478, and be sure to observe polarity when you connect it into the circuit. If a type 1N478 is not available, use any good quality small crystal rectifier as a replacement.

In the Model 270-5 it is not advisable to substitute if the original characteristics are to be maintained.

After you replace either or both rectifiers, test the accuracy of AC voltage indications. If necessary, recalibrate the circuit by adjusting rheostate R28 and R31 as follows: (Refer to Fig. 8).

1. Set the Function switch at AC and the Range switch at 250v.
2. Connect the Red test lead in the (+) Jack and the Black test lead in the COMMON (-) Jack.
3. From a standard voltage source, apply 250 volts AC to the Red and Black test leads. Adjust rheostat R31 so the meter reads full scale. Turn power off.
4. Set the Range switch to 2.5 v. Apply 2.5 volts AC to the Red and Black test leads. Adjust rheostat R28 so the meter reads full scale. Turn power off.

If no standard voltage supply is available for the above procedure, use this alternate method:

1. Set the Function switch at AC and the Range switch at 2.5v.
2. Connect the Red test lead in the (+) Jack and the Black test lead in the COMMON (-) Jack.
3. Connect the test leads to a fresh 1.5v flashlight cell. Connect the Red test lead to the positive post of the Battery and the Black test lead to the negative post.
4. Adjust rheostat R28 fully clockwise.
5. Adjust Rheostat R31 so the meter reads 1.8v on the 2.5v AC ONLY arc.
6. Re-adjust R28 so the meter pointer moves back to 1.71v on the same arc, (the pointer will indicate 6 on the OHMS scale when it is in this position).

RESISTOR REPLACEMENT (All Models)

Almost all of the resistors for all of the Models are mounted on the accessible face of the printed circuit board for easy trouble shooting and repair.

When it is necessary to replace any of the resistors in the printed circuit, first obtain an exact equivalent resistor from Bach-Simpson Limited or their Distributors, specifying the description and part number shown in the parts list. Then clip the defective resistor off the printed circuit board, leaving the leads in the board to use as connections for the replacement.

Carefully twist the leads for the new resistor around the leads left from the defective resistor, and solder each connection. Trim away all excess and see that you have not caused any short circuit to any other part nearby.

REMOVING THE PRINTED CIRCUIT (All Models)

It will be necessary to remove the printed circuit board when you require access to its under-side, or to the parts which are located between it and the front panel.

Use the following procedure:

1. Set the Function Switch at (+) DC and the Range Switch at 2.5v.
2. Remove the ZERO OHMS control knob.
3. Remove the two screws through the lower part of the printed circuit board.
4. Remove the two hex nuts from the meter studs on the top of the printed circuit board.
5. Lift the printed circuit board away from the front panel. The entire board, with the switch wafers in place, will come up in one piece.
6. After removal, do not turn knobs on front panel or move any rotors on switches until reassembled.

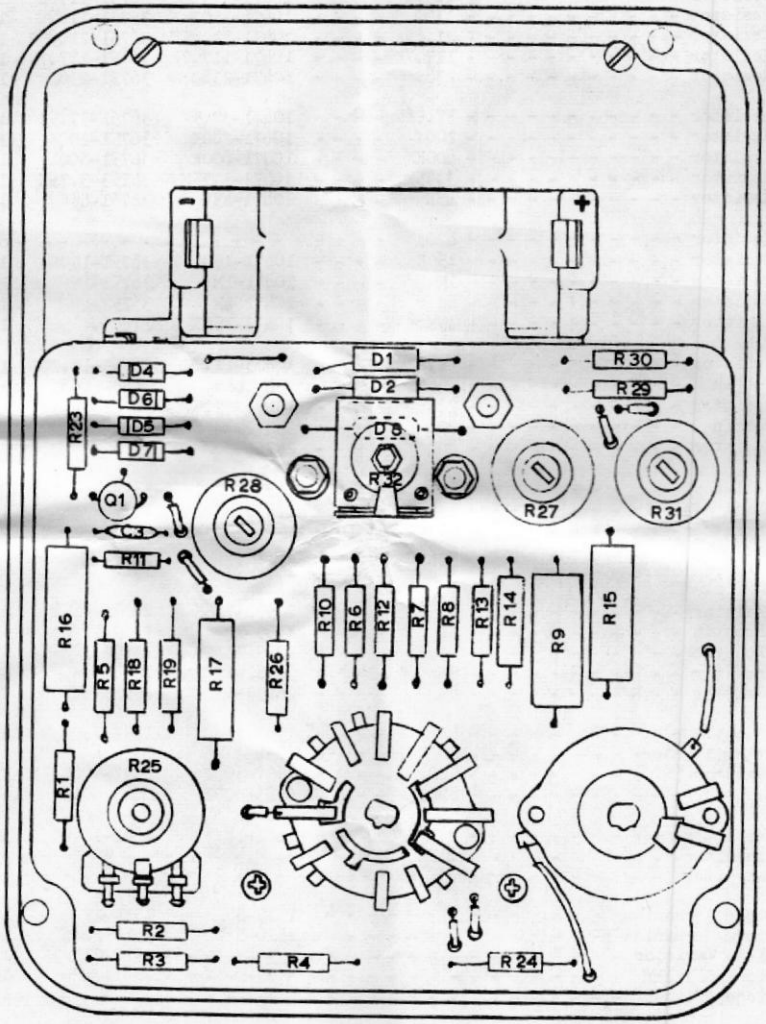
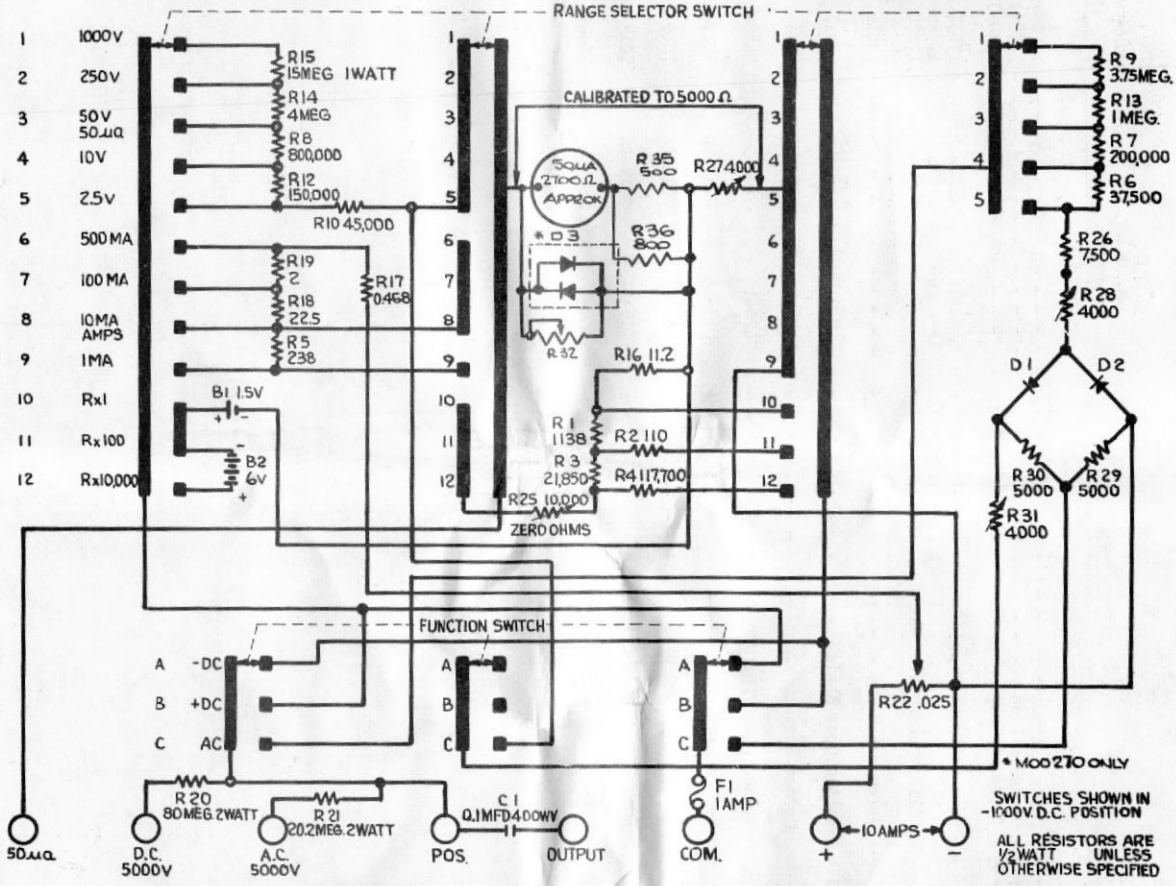


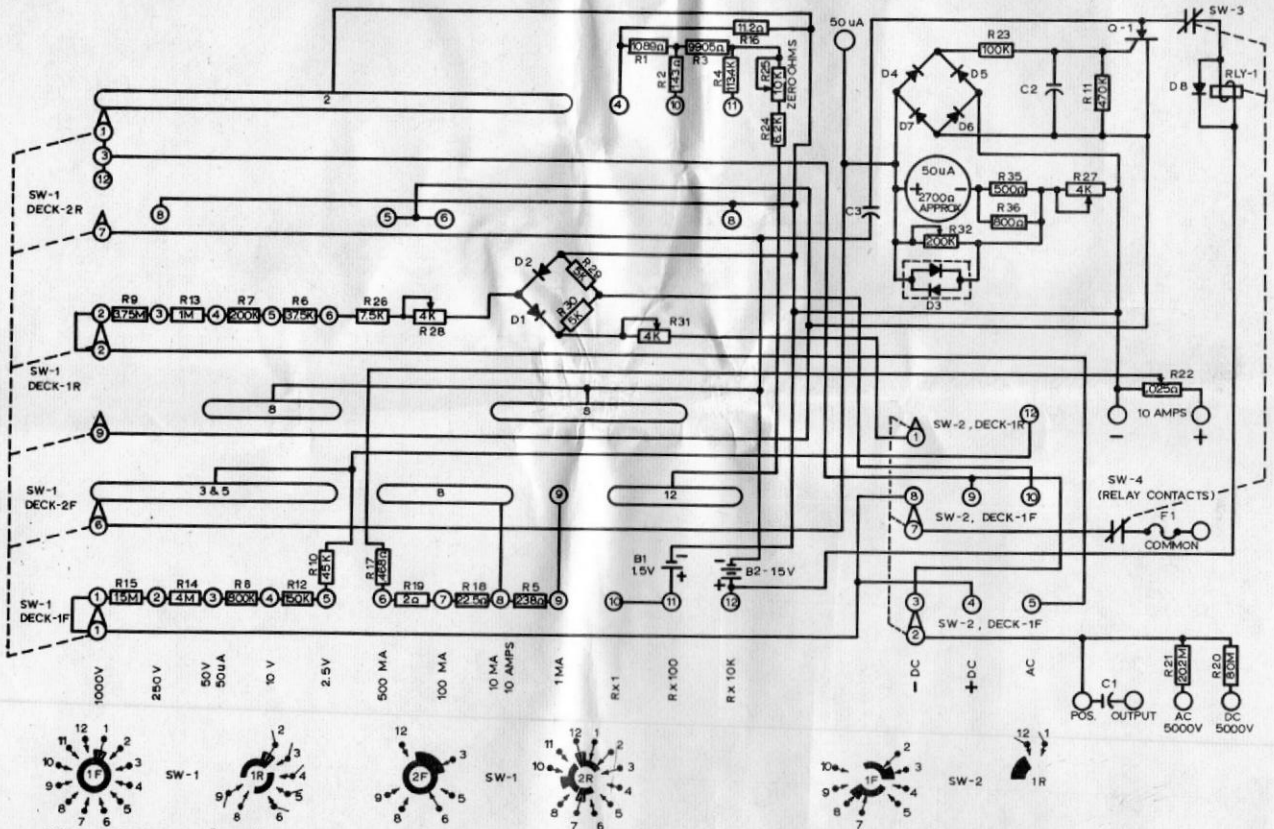
FIG. 8 - INTERIOR VIEW

CIRCUIT SYMBOL	DESCRIPTION	PART NUMBER MODEL 260-5	MODEL 270-5	MODEL 260-5P
R1	Resistor 1138Ω	10471-1138Ω	36751-1138Ω	10471-1.089
2	Resistor 110Ω	10471-110Ω	36751-110Ω	10471-143Ω
3	Resistor 21.85K	10471-21.85K	36751-21.85K	10471-9.905
4	Resistor 117.7K	10471-117.7K	36751-117.7K	10471-113.4
5	Resistor 238Ω	10471-238Ω	36751-238Ω	10471-238Ω
6	Resistor 37.5K	10471-37.5K	36751-37.5K	10471-37.5K
7	Resistor 200K	10471-200K	36751-200K	10471-200K
8	Resistor 800K	10471-800K	36751-800K	10471-800K
9	Resistor 3.75M	10473-3.75M	36753-3.75M	10473-3.75M
10	Resistor 45K	10471-45K	36751-45K	10471-45K
11	Resistor 470K	6934A-470K		
12	Resistor 150K	10471-150K	36751-150K	10471-150K
13	Resistor 1M	10471-1M	36751-1M	10471-1M
14	Resistor 4M	10472-4M	36752-4M	10472-4M
15	Resistor 15M	10473-15M	17605	10473-15M
16	Resistor 11.2Ω	10473-11.2Ω	36753-11.2Ω	10473-11.2
17	Bobbin .468Ω	334-.468Ω	3666-.468Ω	334-.468Ω
18	Resistor 22.5Ω	10471-22.5Ω	36751-22.5Ω	10471-22.5
19	Bobbin 2Ω	334-2Ω	3666-2Ω	334-2Ω
20	Resistor 80M	26944-80M	3595	26944-80M
21	Resistor 20.2	26944-20.2M	3594	26944-20.2
22	Shunt Assembly 10A 0.025Ω	17595	17595	17595
23	Resistor 100K	6934A-100K		
24	Resistor 6.2K	6934A-6.2K		
25	Potentiometer 10K	1542-77	1542-77	1542-77
26	Resistor 7.5K	26931-7.5K	26931-7.5K	10471-7.5K
27	Rheostat 4K	1759-13	1759-13	1759-13
28	Rheostat 4K	1759-13	1759-13	1759-13
29	Resistor 5K	26931-5K	26931-5K	10471-5K
30	Resistor 5K	26931-5K	26931-5K	10471-5K
31	Rheostat 4K	1759-13	1759-13	1759-13
32	Potentiometer 200K	6554	6554	6554
35	Resistor (NTC) 500Ω	3597-500Ω	3597-500Ω	3597-500Ω
36	Resistor 800Ω	6663-800Ω	6663-800Ω	6663-800Ω
C1	Capacitor- 0.1$_u$f 400V	1661-18	1661-18	1661-18
2	Capacitor- .05$_u$f 50V			1663-16
3	Capacitor- .05$_u$f 50V			1663-16
D1	Diode Germanium	1510-5	1510-22	1510-5
2	Diode Germanium	1510-5	1510-22	1510-5
3	Diode Varistor		1510-31	1510-31
4	Diode Silicon			1510-32
5	Diode Silicon			1510-32

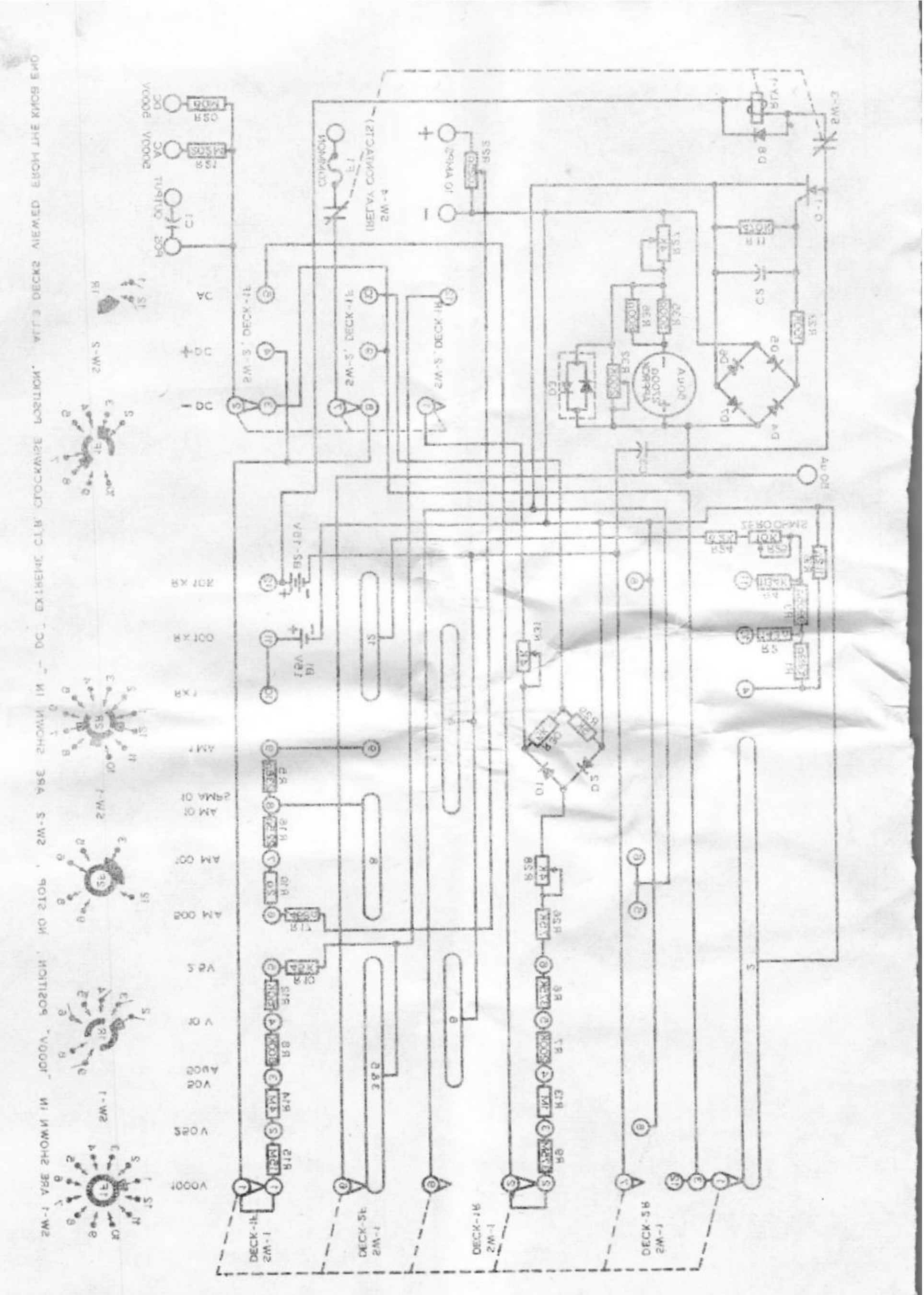
PARTS LIST

CIRCUIT SYMBOL	DESCRIPTION	PART NUMBER MODEL 260-5	MODEL 270-5	MODEL 260-5P
D6	Diode Silicon			1510-32
7	Diode Silicon			1510-32
8	Diode Silicon			1510-32
F1	Fuse (Clip In Type)	4684-16 1Amp 250V	4684-16 1 Amp	17631 10 Amp 250V
Q1	Silicon Controlled Switch			17620
RLY 1	Relay			17614
SW 3	Switch Open Blade			17613
	Molded Phenolic Case	1736-1	1736-1	1736-1
	Leather Carrying Strap	7426-1	7426-1	7426-1
	Knob, Range Switch	7017-1A	7017-1A	7017-1A
	Knob, Function Switch	7016-1A	7016-1A	7016-1A
	Knob, Zero Ohms Control	7015-1A	7015-1A	7015-1A
	Meter Cover	3664-1	3664-1	3664-1


RANGE SELECTOR SWITCH
1 1000V
2 250V
3 50V 50 µa
4 10V
5 2.5V
6 500 MA
7 100 MA
8 10MA AMPS
9 1MA
10 Rx1
11 Rx100
12 Rx10,000
R15 15MEG 1WATT
R14 4MEG
R8 800,000
R12 150,000
R10 45,000
R19 2
R18 22.5
R5 238
R17 0.468
B1 1.5V
B2 6V
CALIBRATED TO 5000 Ω
50µA 2700Ω APPROX
R35 500
R27 4000
* D3
R36 800
R32
R16 11.2
R1 1138
R2 110
R3 21,850
R4 117,700
R25 10,000
ZERO OHMS
R9 3.75MEG.
R13 1 MEG.
R7 200,000
R6 37,500
R26 7,500
R28 4000
D1
D2
R30 5000
R29 5000
R31 4000
FUNCTION SWITCH
A -DC
B +DC
C AC
R22 .025
* MOD 270 ONLY
R20 80 MEG. 2WATT
R21 20.2MEG. 2WATT
C1 0.1MFD 400WV
F1 1AMP
10 AMPS
SWITCHES SHOWN IN -1000V. D.C. POSITION
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED
50µa
D.C. 5000V
A.C. 5000V
POS.
OUTPUT
COM.
+
-



SW-1 ARE SHOWN IN "1000V" POSITION , NO STOP , SW-2 ARE SHOWN IN "– DC" EXTREME CT'R. CLOCKWISE POSITION, ALL 3 DECKS VIEWED FROM THE KNOB END



MODEL 260-5P SCHEMATIC

WARRANTY

BACH - SIMPSON LIMITED warrant this instrument to be free from defects in material and workmanship in normal service. Their obligation under this warranty is limited to making good at their factory any instrument which shall be returned intact to them, or to their authorized representative, with transportation charges prepaid, and which examination shall disclose to their satisfaction to have been thus defective. Any unauthorized prior repair or adjustment may invalidate this warranty.

This warranty is not subject to a fixed time limit. However, at their discretion, Bach-Simpson Limited may request evidence of purchase during the 90 day period preceding return.

OVERSEAS REPRESENTATIVES:

IN THE UNITED KINGDOM

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LONDON, ENGLAND.

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JOHANNESBURG, SOUTH AFRICA.

IN AUSTRALIA

TECNICO ELECTRONICS PTY. LTD.,
566 ELIZABETH ST.,
MELBOURNE, VIC., AUSTRALIA.

IN HONG KONG

GILMORE & COMPANY,
404 HING WAI BUILDING.

IN NEW ZEALAND

TEE VEE RADIO,
P.O. BOX 5029,
AUCKLAND C.I., NEW ZEALAND.

The "Simpson" trade name has been synonymous with quality instrumentation in North America for over fifty years. The association implied by its inclusion in our Company name is a valued one. Bach-Simpson Limited, however, is a completely autonomous Canadian Company producing Simpson instruments and a wide variety of other products in Canada for British Commonwealth markets.