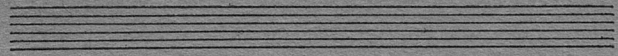


Radio In. B

INSTRUMENT



by

ADVANCE

INSTRUCTIONS FOR TYPE No. **81A**

ADVANCE COMPONENTS LTD.
HAINAULT, ILFORD, ESSEX

DIRECTORS: A. W. STAPLETON (MANAGING) - C. H. STAPLETON - E. BENZIMRA - S. GOODMAN, B.Sc., A.M.I.E.E.

Advance COMPONENTS LIMITED

ELECTRONIC ENGINEERS

ROEBUCK ROAD · HAINAULT · ILFORD · ESSEX · ENGLAND

HAINAULT INDUSTRIAL ESTATE

TELEPHONE: HAINAULT 4444 TELEGRAMS: ATTENUATE · ILFORD

OUR REF.

YOUR REF.

.....

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DATE.....

LOW FREQUENCY

SIGNAL GENERATOR

TYPE 81/A.

I N S T R U C T I O N M A N U A L

"ADVANCE"

LOW FREQUENCY SIGNAL GENERATOR - TYPE 81/A.

The type 81/A is a wide range L.F. Oscillator providing a maximum output of 1 watt into 600 ohms over a frequency range of 15 c/s. to 200 kc/s.

The oscillator comprises a 12 BH7 and 6 AM6 used in a capacitive-resistive Wien bridge network.

The oscillator is stabilised by a thermistor in the anode circuit, a second thermistor provides temperature compensation of the oscillatory output voltage. This stabilisation ensures constancy of output from the oscillator.

The frequency is varied by means of a ganged variable condenser and the frequency reading is calibrated on a drum scale of eight inches in length; a logging scale with vernier is used in conjunction with the main scale.

The oscillatory voltage from the Wien bridge oscillator is fed via the set level potentiometer to the control grid of the two stage buffer amplifier.

The unit attenuator is connected between the buffer amplifier and output stage with the output level meter which consists of a moving coil meter and a rectifier bridge network across the whole of this attenuator. The unit attenuator is tapped off in one dB steps.

The amplified output of the buffer stage is resistive capacity coupled to the final output amplifier.

The application of negative feedback in the amplifier and output stages, together with stabilisation in the oscillator ensures a constant level with change of frequency. The output voltage is controlled by means of the unit and decade attenuators used together with the set level control. The outstanding feature of this instrument is the excellent arrangement of the output terminations and the very convenient mode of attenuator switching. The decade attenuators are balanced pi networks providing full output either balanced or unbalanced, connected to or isolated from earth.

SPECIFICATION

Frequency Range:

15 c/s. to 200 kc/s. in 4 bands.

Frequency Calibration Accuracy:

Ranges A, B and C $\pm(1\% + 1 \text{ c/s.})$; Range D $\pm 2\%$
With logging scale which gives an effective scale
length of 18 inches.

Frequency Stability:

Better than 0.1% at 1 kc/s. after warm-up period. With
mains voltage variation of $\pm 10\%$ drift is less than
0.04% at 1 kc/s.

Distortion:

Total harmonic and hum content compared with fundamental
above 100 c/s.

Better than 40 db down (1%) with meter set a 1 mW
reference level.

Better than 34 db down (2%) with meter set at +5 db(Max.
output).

There is a slight increase in distortion below 100 c/s.
and when the output terminals feed into a high impedance
on the +20 db position of the decade attenuator.

Hum Level:

Hum and noise content is less than 0.25% of maximum
output.

Output:

Calibrated in volts and watts, balanced or unbalanced.

Voltage:

20 mV to 25 V. R.M.S. into 600 ohms in six ranges
indicated by the calibrated meter scales and 10 db
attenuator.

Power:

0-1 watt into 600 ohms, indicated with reference to 1 mW level by 1 db and 10 db step attenuators from -35 db to +25 db; plus 5 db above reference level on the meter.

Amplitude Accuracy:

± 1 db over complete frequency range.

Output Impedance:

600 ohms centre tapped, balanced or unbalanced terminations with respect to earth.

300 ohms unbalanced.

There is a rise in output impedance on the $+20$ db position of the decade attenuator at the high frequency end of the 50-200 kc/s. band.

Attenuator Accuracy (at normal "set" level):

Decade Attenuator: $\pm 1.5\%$ of attenuator reading.

Units Attenuator: $\pm 1\%$ of attenuator reading ± 0.15 db
20 c/s. to 200 kc/s.

Weight:

27 $\frac{1}{2}$ lbs. (12.5 kg.)

Dimensions:

11 $\frac{1}{4}$ in. (28.5 cm.) wide; 15 in. (37.2 cm.) high;
8 $\frac{1}{2}$ in. (21.6 cm.) deep.

CONTROLS AND CONNECTIONS

Mains Switch:

On right of instrument. A red indicator bulb on the left of the instrument indicates when power is on.

Range Switch:

On top right of instrument. Indicates which one of four ranges to read off drum dial.

Set level and output volts:

Top left of instrument. Is used as a set level control indicated by 1 mW. red line on meter scale when db's relative to 1 mW. are required. Is used as a voltage output control when volts into 600 ohms is required.

Units Attenuator:

Bottom left of instrument. Indicates ± 5 db relative to any setting of the decade attenuator. When reading volts into 600 ohms this control should be set to "read volts" position.

Decade Attenuator:

Bottom right of instrument. Indicates in conjunction with units attenuator db's relative to 1 mW. into 600 ohms, or is used as a scale indicator and multiplier when reading volts into 600 ohms.

Set Frequency Control:

Control on instrument below drum dial. A conventional type full wave rectifier power supply is used to provide the type 81/A with the necessary voltages for operation. This is designed for operation at 110-125, 140-160 and 110-250 volts A.C. only at 40-100 c/s, the appropriate taps being provided on the transformer and made accessible by removing the cover plate mounted on the bottom of the instrument.

OPERATION

Frequency:

A signal of any frequency between 15 c/s. and 200 kc/s. is set, using the range switch in conjunction with the calibrated dial.

Continuous adjustment is by means of the slow-motion control situated centrally below the dial.

A logging scale with vernier is incorporated to enable the dial to be reset accurately to any previously used frequency.

Output:

Output into a 600 ohms load is taken from the two red terminals.

The load can be balanced or unbalanced. If balanced, the neutral should be connected to the black terminal situated between the red terminals and slightly above them. The earth terminal, which is the lowest black terminal, may be connected to any part of the external circuit as desired, or the output may be left floating.

Output into a 300 ohm load may be taken from one of the red terminals and the upper black terminal. The output circuit is so arranged that it is unnecessary to load the unused terminals.

The output is set in two different ways:-

1. Volts into 600 ohms.

All appropriate control lettering is engraved in BLACK. Set the units attenuator to the "read volts" position, ie., +5 db. The control marked "read volts" is then used as a fine control to set the output as indicated on one of the two scales of the meter. The appropriate scale to read is then indicated on the decade attenuator by the BLACK engraving.

2. Decibels up and down on 1 mW. into 600 ohms. All appropriate lettering is engraved in RED. To set to 1 mW. output, use "set level" control to set meter pointer to the red line marked 1 mW. Switch both attenuators to 0 db. Decibels up and down on this level are then set by switching the attenuator to the required figure indicated by the red engraving. A further +5 db can be obtained above +25 db by adjusting the meter pointer to the +5 db red line. There is an increase in distortion at this setting. Total distortion is not more than 2%. It should be noted that there is an increase in distortion if the output is unterminated on the 0-25 V. (+20 db) setting of the decade attenuator. Also the output impedance rises towards the upper end of the 50 to 200 kc/s band on the 0-25 V. (+20 db) setting of the decade attenuator.

MAINTENANCE INSTRUCTIONS

1. To remove instrument from its case, lay it face downwards on the guard handles and remove the two rear screws. Lay instrument with front panel up and remove 14 screws around edge of panel. Then lift instrument by means of guard handles vertically from the case.
2. Tube and pilot bulb replacements are then easily carried out.
3. To set output volts correctly a 600 ohm 1W. close tolerance resistor (1%) between the two red terminals and monitor the output voltage. Set dial to 1 kc/s. Set decade attenuator and "Adjust Volts" control to a convenient Output Voltage. (Note: The units attenuator must be set to the "Read Volts" position). Correct the voltage reading of the meter by means of "RV2" which is placed on the upper chassis.
4. To adjust balance of Output Transformer. Set attenuator to -30 db and frequency to 200 kc/s. Measure output volts loaded with one end of the load earthed and centre tap not employed. Measure loaded output volts with earth transferred to other end of the load resistor. Adjust C.29 until readings are identical. In all adjustments involving the use of a voltmeter or other device for monitoring the output volts the input impedance of the measuring device must be high compared with 600 ohms, e.g., 100 k.ohms.

FACTORY SERVICE

Our factory Service Department is at your service should you wish to obtain further repair information by telephone or letter. The type and serial number should always be quoted. We maintain an efficient Service facility, should you wish to return the instrument to our factory for repair.

The instrument is Guaranteed for a period of one year from its delivery to the purchaser for the replacement of defective parts other than valves (tubes) and fuses.

Valves (tubes) are subject to the manufacturer's guarantee.

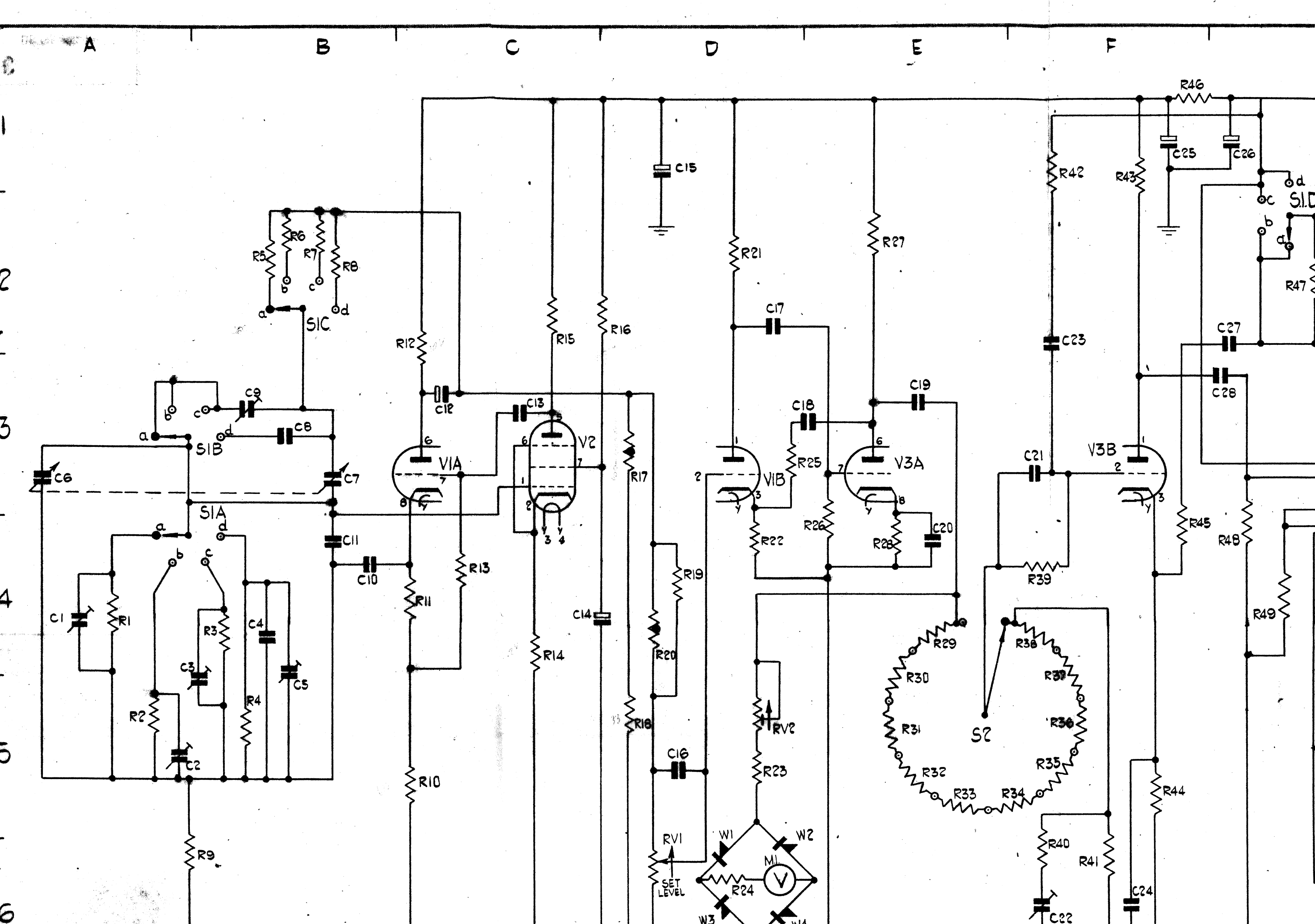
Equipment returned to us for servicing must be adequately packed, preferably in the special box supplied, and shipped with transportation charges pre-paid. We can accept no responsibility for instruments arriving damaged.

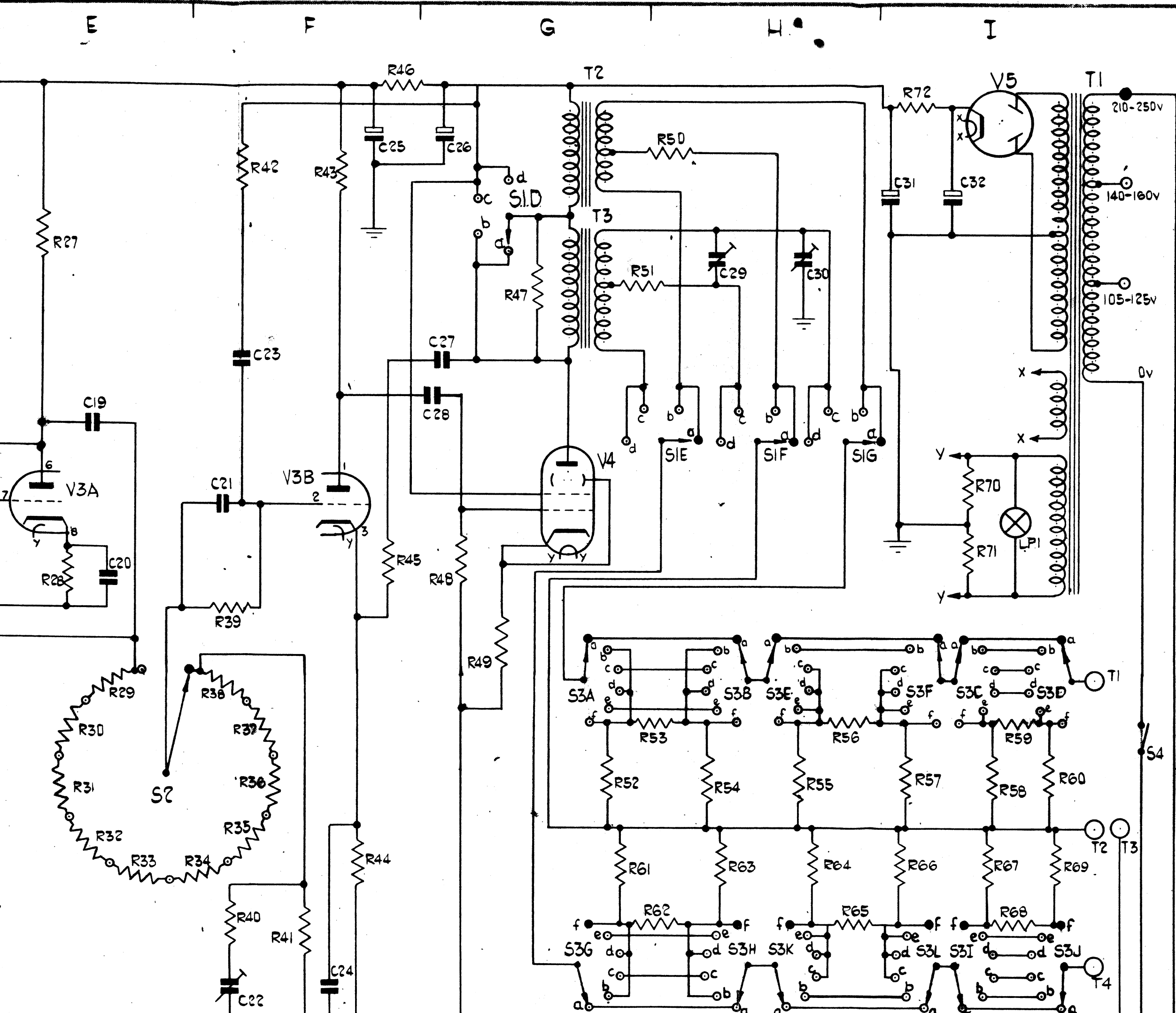
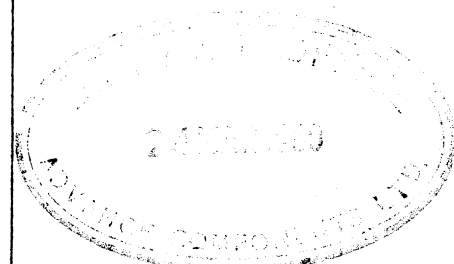
Should the cause of failure during the Guarantee period be due to misuse or abuse of the instrument, or if the Guarantee has expired, the repair will be charged and put in hand without delay unless you instruct otherwise.

OUR SALES, SERVICE AND ENGINEERING DEPARTMENTS
ARE AT YOUR SERVICE AT ALL TIMES.

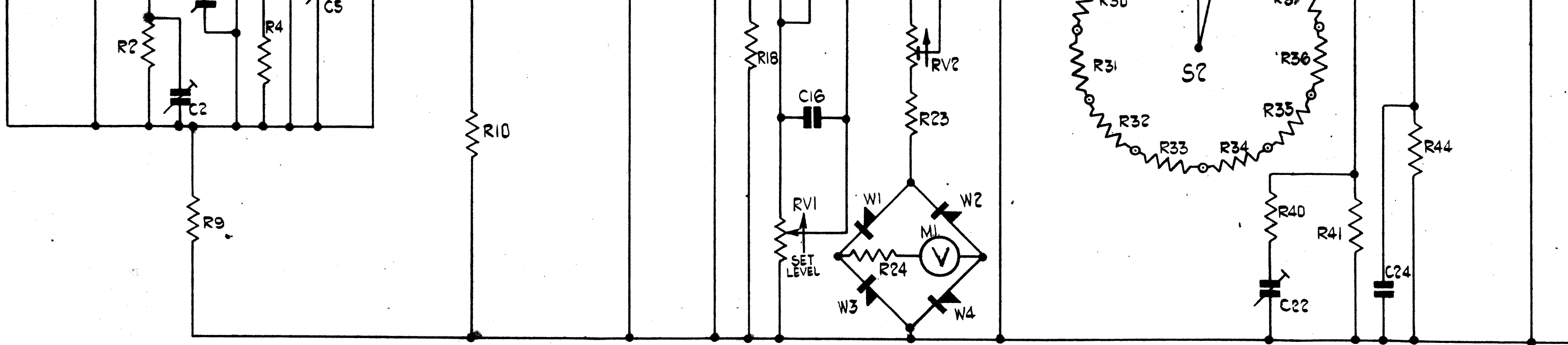
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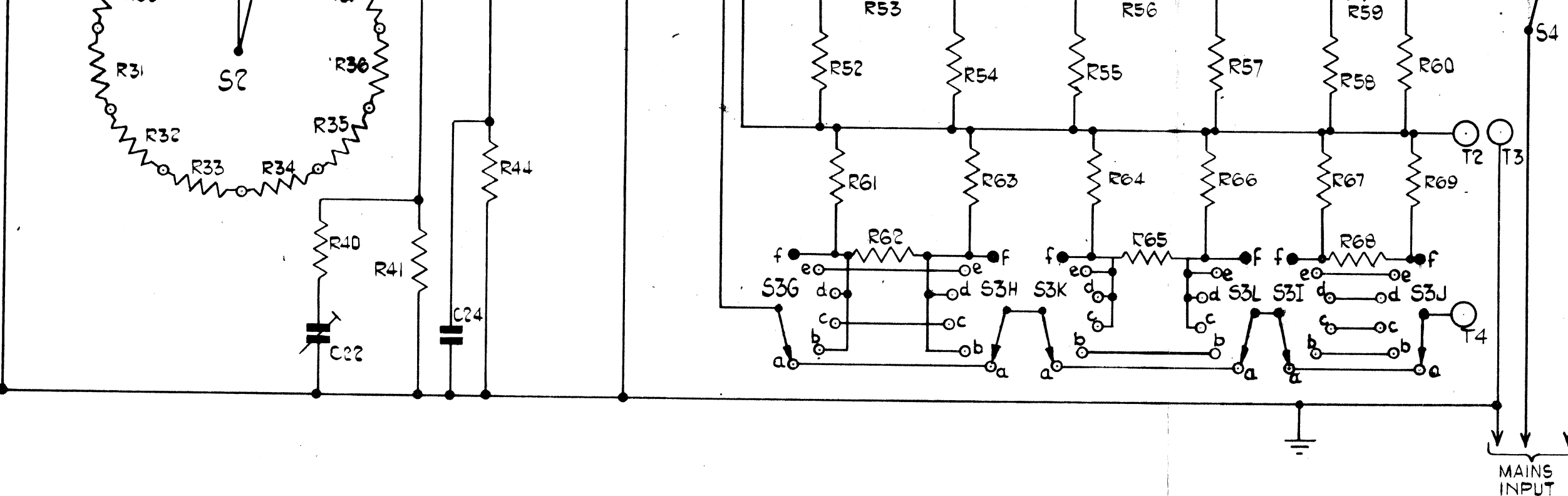
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EVERY EFFORT IS MADE TO KEEP THIS CIRCUIT UP TO DATE BUT THE RIGHT IS RESERVED TO ADJUST THE VALUES OR AMEND THE CIRCUIT

RESISTORS				CAPACITORS			
REF	DESCRIPTION	CIRC REF	P.N°	REF	DESCRIPTION	CIRC REF	P.N°
R1	13M H.S. WELWYN 1% C25 2W	A4	6700	C.1	WIRE TRIMMER	A4	10177
R2	1M H.S. WELWYN 1% C28 1/2W	A5	6701	C.2	WIRE TRIMMER	A5	10177
R3	70K H.S. WELWYN 1% C22 1/2W	B4	6702	C.3	WIRE TRIMMER	B4	10177
R4	5.35K H.S. WELWYN 1% C22 1/2W	B5	9080	C.4	75pF SILVER MICA LEMCO 1510 1%	B4	12187
R5	13M H.S. WELWYN 1% C25 2W	B2	6700	C.5	3-30pF CONCENTRIC TRIMMER-MULLARD	B5	1620
R6	1M H.S. WELWYN 1% C22 1/2W	B2	6701	C.6	532pF 2 GANG POLAR E24 TYPE C16	A3	11859
R7	70K H.S. WELWYN 1% C22 1/2W	B2	6702	C.7	532pF J	B3	
R8	5.35K H.S. WELWYN 1% C22 1/2W	B2	9080	C.8	75pF SILVER MICA LEMCO 1510 1%	B3	12187
R9	150K H.S. WELWYN 1% C21 1/4W	B6	12183	C.9	3-30pF CONCENTRIC TRIMMER-MULLARD	B3	1620
R10	680 ERIE 9 10% 1/2W	C5	7497	C10	.1 PLESSEAL 20%	B4	11860
R11	270 ERIE 9 5% 1/2W	C4	1843	C11	15pF ±1% SILVER MICA	B4	12191
R12	10K ERIE 9 10% 1W	C2	434	C12	30 PLESSEY CE1619 WIRE ENDS 250v WKG.	C3	12189
R13	1M ERIE 9 10% 1/2W	C4	1171	C13	.1 PLESSEAL 20%	C3	11860
R14	2.2K ERIE 9 10% 1/2W	C4	867	C14	30 PLESSEY CE1619 WIRE ENDS 250v WKG.	D4	12189
R15	100K ERIE 9 10% 1/2W	C2	1270	C15	16+16 HUNTS JE413 ELECT. 350v DC. WKG.	D1	7014
R16	220K ERIE 9 10% 1/2W	D2	6703	C16	3pF PEARL TYPE CERAMIC	D5	4843
R17	THERMISTOR S.T.C. TYPE A1522/100	D3	6719	C17	.1 PLESSEAL 20% 350v. DC. WKG.	D2	11860
R18	33 ERIE 9 10% 1/2W	D5	11979	C18	.1 PLESSEAL 20% 350v. DC. WKG.	B3	11860
R19	22K ERIE 9 10% 1/2W	D4	1271	C19	.5 PLESSEAL 20% 350v. DC. WKG.	B3	12096
R20	THERMISTOR S.T.C. TYPE A1451/100	D4	7811	C20	200pF LEMCO 1106 INSUL. 5% 350v. DC. WKG.	B4	11931
R21	15K ERIE 9 10% 1/2W	D2	1177	C21	200pF LEMCO 1106 INSUL. 5% 350v. DC. WKG.	F3	11931
R22	3.3K ERIE 9 10% 1/2W	D4	2736	C22	3-30pF CONCENTRIC TRIMMER-MULLARD	F6	1620
R23	12K ERIE 9 10% 1/2W	D5	12278	C23	.1 PLESSEAL 20% 350v. DC. WKG	F2	11860
R24	10K ERIE 9 10% 1/2W	D6	377				
R25	22K ERIE 9 10% 1/2W	D3	1271				
R26	1M ERIE 9 10% 1/2W	E4	1171				
R27	15K ERIE 9 10% 1/2W	E2	1177				
R28	3.3K ERIE 9 10% 1/2W	E4	2736				
R29	2.72K ERIE 109 1% 1/4W	E4	11901				
R30	2.42K ERIE 109 1% 1/4W	E4	11902				
R31	2.16K ERIE 109 1% 1/4W	E5	11903				
R32	1.93K ERIE 109 1% 1/4W	E5	11904				
R33	1.72K ERIE 109 1% 1/4W	E5	11905				
R34	1.55K ERIE 109 1% 1/4W	F5	11906				
R35	1.34K ERIE 109 1% 1/4W	F5	11907				
R36	1.19K ERIE 109 1% 1/4W	F5	11908				
R37	1.09K ERIE 109 1% 1/4W	F4	11909				
R38	980 ERIE 109 1% 1/4W	F4	11910				
R39	47K ERIE 9 10% 1/2W	F4	2953				
R40	100K ERIE 9 10% 1/2W	F6	1270				
R41	7.9K ERIE 109 1% 1/4W	F6	11911				
R42	680K ERIE 9 10% 1/2W	F1	5024				
R43	22K ERIE 9 10% 1/2W	F1	1271				
R44	3.3K ERIE 9 10% 1/2W	F5	2736				
R45	62K ERIE 9 5% 1/2W	F4	11758				
R46	18K ERIE 9 5% 1/2W	F1	12185				
R47	18K ERIE 9 5% 1/2W	G.2	12185				
R48	1M ERIE 9 10% 1/2W	G.4	1171				
R49	330 ERIE 9 10% 1/2W	G.4	7678				
R50	150 ERIE 9 5% 1/2W	H.1	11929				
R51	150 ERIE 9 5% 1/2W	G.2	11929				
R52	577 ERIE 109 1% 1/4W	G.5	11865				
R53	427 ERIE 109 1% 1/4W	H.4	11864				
R54	577 ERIE 109 1% 1/4W	H.5	11865				
R55	367 ERIE 109 1% 1/4W	H.5	11867				
R56	1.485K ERIE 109 1% 1/4W	H.4	11866				
R57	367 ERIE 109 1% 1/4W	I.5	11867				
R58	367 ERIE 108 1% 1/2W	I.5	11868				
R59	1.485K ERIE 109 1% 1/4W	I.4	11866				
R60	367 ERIE 109 1% 1/4W	I.5	11867				
R61	577 ERIE 109 1% 1/4W	G.5	11865				
R62	427 ERIE 109 1% 1/4W	H.6	11864				
R63	577 ERIE 109 1% 1/4W	H.5	11865				
R64	367 ERIE 109 1% 1/4W	H.5	11867				
R65	1.485K ERIE 109 1% 1/4W	F.6	11866				
R66	367 ERIE 109 1% 1/4W	I.5	11867				
R67	367 ERIE 109 1% 1/2W	I.5	11868				
R68	1.485K ERIE 109 1% 1/4W	I.6	11866				
R69	367 ERIE 109 1% 1/4W	I.5	11867				
R70	22 ERIE 9 10% 1/2W	I.3	4279				
R71	22 ERIE 9 10% 1/2W	I.3	4279				
R72	500 BIRCH W/WOUND 2W	I.1	11759				

REF	DESCRIPTION	CIRC REF	P.N°
C24	75pF SILVER MICA L	I.5	11867
C25	16 PLESSEY C	I.5	11868
C26	16 ELECT. 350v	I.6	11866
C27	.1 PLESSEAL 20%	I.5	11867
C28	.1 PLESSEAL 20%	I.3	4279
C29	450pF TRIMMER C	I.3	4279
C30	3-30pF CONCENTR	I.1	11759
C31	16 PLESSEY CE 60		
C32	16 ELECT. 350v		
MISCELL			
RV1	25K COLVERN CLR		
RV2	25K COLVERN CLR		
S1	FREQUENCY RANGE		
S2	ATTENUATOR UNI		
S3	ATTENUATOR DEC		
S4	MAINS-ARCO-ELECT		
W1	CRYSTAL B.T.H.		
W4			
V1	12BH7		
V2	EF91-6AM6		
V3	12AU7		
V4	6BW6		
V5	EZ80		
T1	MAINS TRANSFORM		
T2	L.F O/P TRANSFO		
T3	H.F O/P TRANSFO		
M1	METER 100µA E		
LP1	LAMP FLASHLIGHT		



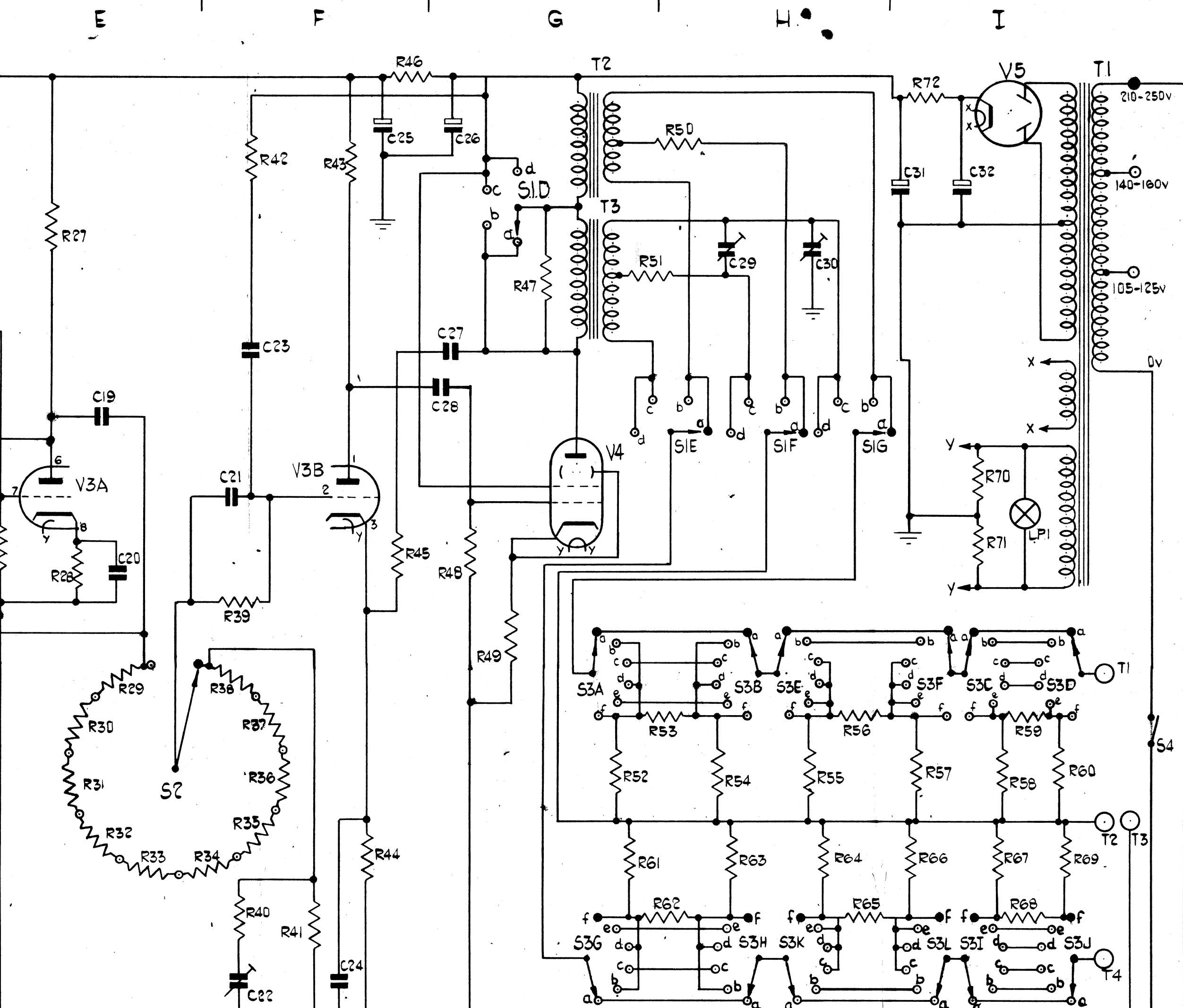
RESERVED TO ADJUST THE VALUES OR AMEND THE CIRCUIT WITHOUT NOTICE.

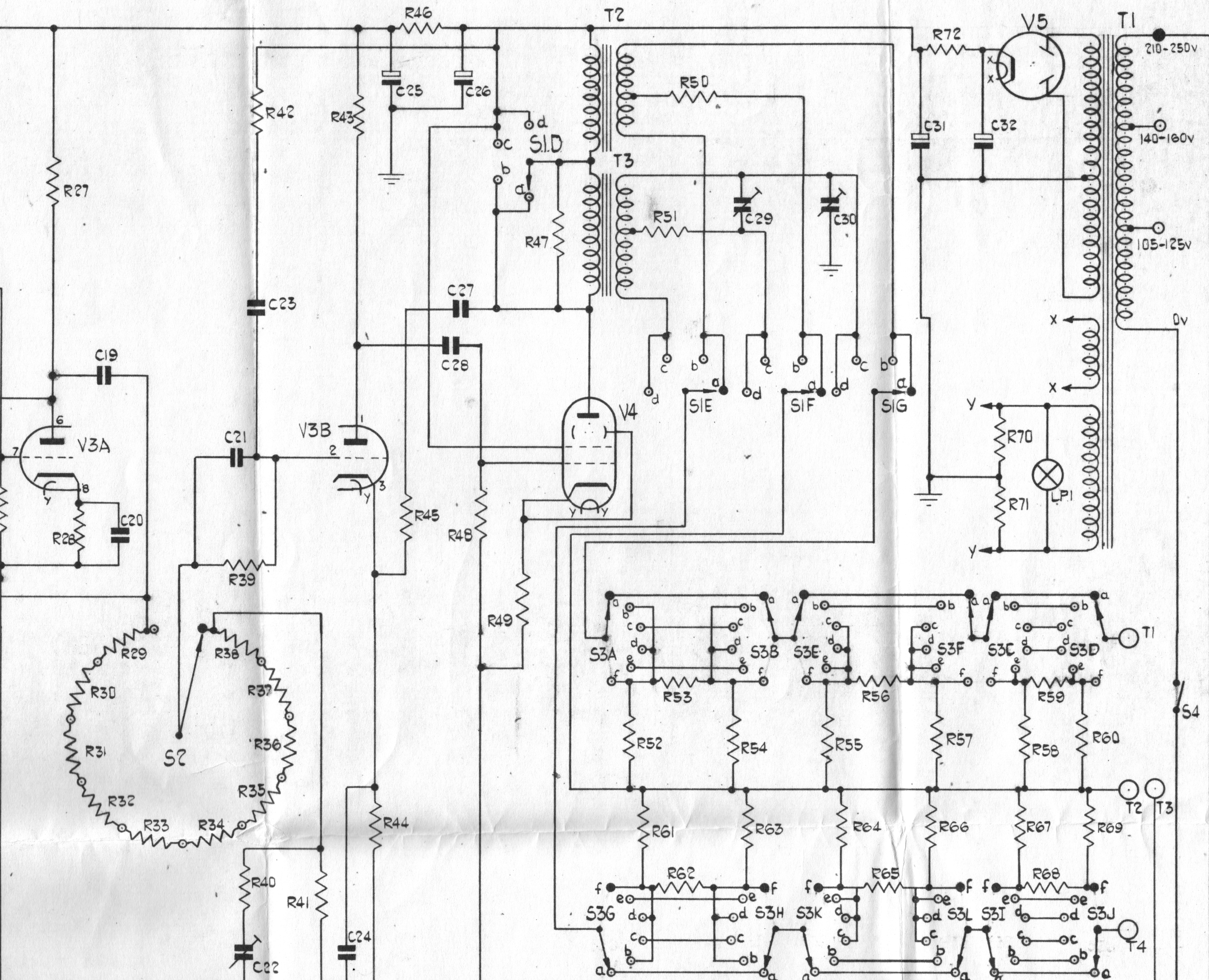
DESCRIPTION	CIRC REF	P. NO	REF	DESCRIPTION	CIRC REF	P. NO
ERIE 109 1% 1/4W	I5	11867	C24	75pF SILVER MICA LEMCO 1510 1%	F6	12187
ERIE 108 1% 1/2W	I5	11868	C25	16 PLESSEY CE 6003	F1	11863
ERIE 109 1% 1/4W	I6	11866	C26	16 ELECT. 350v WKG.	G1	
ERIE 109 1% 1/4W	I5	11867	C27	.1 PLESSEAL 20% 350v. DC. WKG.	G2	11860
ERIE 9 10% 1/2W	I3	4419	C28	.1 PLESSEAL 20% 350v. DC. WKG.	G3	11860
ERIE 9 10% 1/2W	I3	4419	C29	450pF TRIMMER CYLDON 26	H2	12686
BIRCH W/WOUND 2W	I1	11759	C30	3-30pF CONCENTRIC TRIMMER - MULLARD	H2	1620
			C31	16 PLESSEY CE 6003	I1	11863
			C32	16 ELECT. 350v. WKG.	I1	
CAPACITORS						
TRIMMER	A4	10177				
TRIMMER	A5	10177				
TRIMMER	B4	10177				
SILVER MICA LEMCO 1510 1%	B4	12187				
CONCENTRIC TRIMMER-MULLARD	B5	1620				
2 GANG POLAR E24 TYPE C16	A3	11859				
-001342	B3					
SILVER MICA LEMCO 1510 1%	B3	12187				
CONCENTRIC TRIMMER-MULLARD	B3	1620				
ESSEAL 20%	B4	11860				
1% SILVER MICA	B4	12191				
ESSEY CE 1619 WIRE ENDS 250v WKG.	C3	12189				
ESSEAL 20%	C3	11860				
ESSEY CE 1619 WIRE ENDS 250v WKG.	D4	12189				
UNITS JE413 ELECT. 350v DC. WKG.	D1	7014				
CHARL TYPE CERAMIC	D5	4843				
ESSEAL 20% 350v. D.C. WKG.	D2	11860				
ESSEAL 20% 350v. D.C. WKG.	E3	11860				
ESSEAL 20% 350v D.C. WKG.	E3	12096				
LEMCO 1106 INSUL. 5% 350v. D.C. WKG.	E4	11931				
LEMCO 1106 INSUL. 5% 350v. D.C. WKG.	F3	11931				
CONCENTRIC TRIMMER-MULLARD	F6	1620				
ESSEAL 20% 350v. DC. WKG	F2	11860				
MISCELLANEOUS						
			RV1	25K COLVERN CLR 300/11 POT.	D6	11858
			RV2	25K COLVERN CLR 901 POT.	D5	6814
			S.1	FREQUENCY RANGE SELECTOR		A11694
			S.2	ATTENUATOR UNITS		A11696
			S.3	ATTENUATOR DECADE		A11695
			S.4	MAINS-ARCO-ELECTRIC 8040/BT/13 ON/OFF		12180
			W1	CRYSTAL B.T.H - CG6E		5871
			-W4			
			V.1	12BH7		12602
			V.2	EF91-6AM6		7312
			V.3	12AU7		11683
			V.4	6BW6		8251
			V.5	EZ80		11986
			T.1	MAINS TRANSFORMER		MT.355
			T.2	L.F O/P TRANSFORMER		MT.354
			T.3	H.F O/P TRANSFORMER		MT.353
			M.1	METER 100uA E.T.1 325		11937
			L.P.1	LAMP FLASHLIGHT 6.5V .3A		879

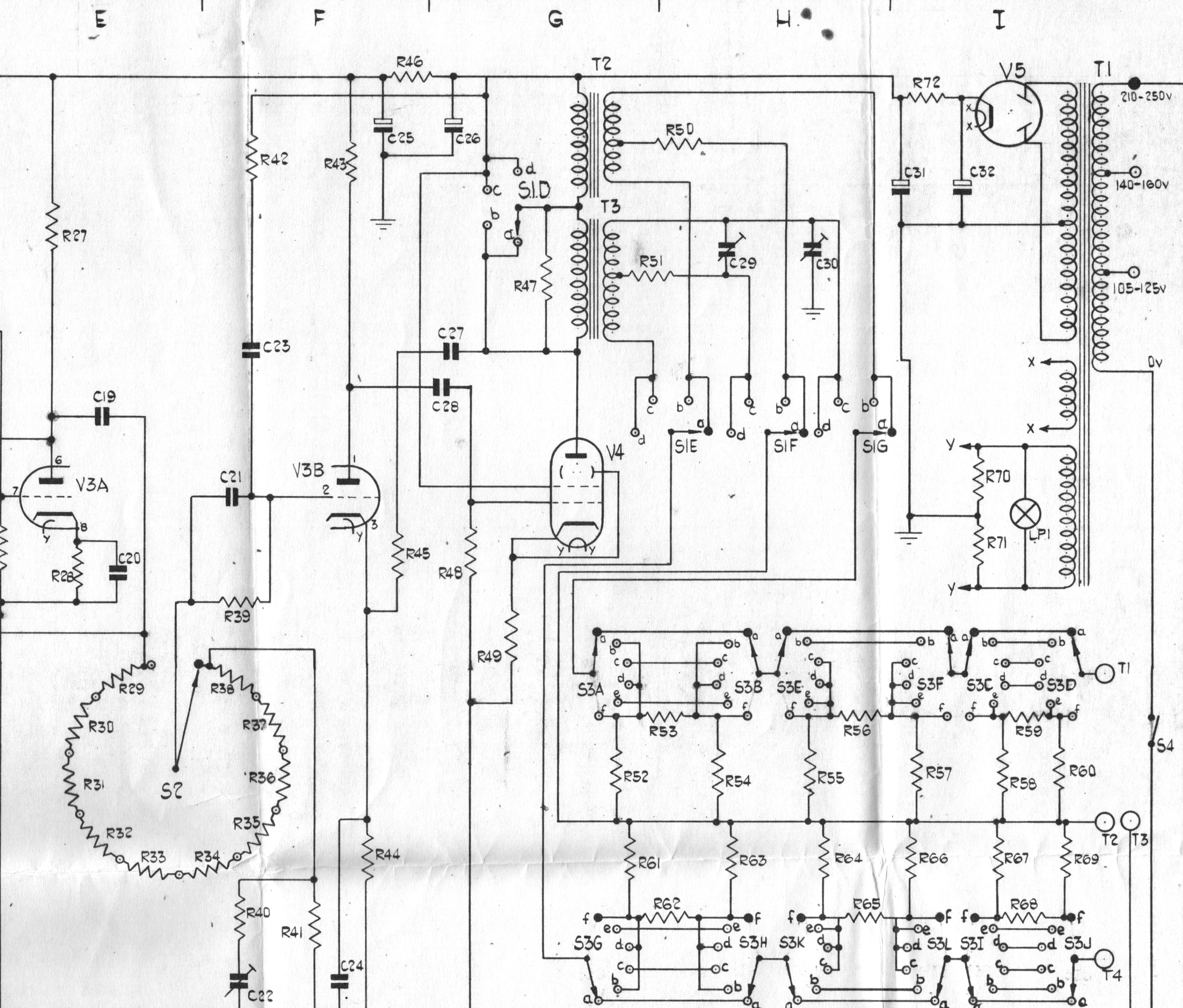
FIRST ANGLE (ENGLISH) PROJECTION

Unlimited Dimensions to be within		No. off per Assy.
Scale	Finish	Part No.
Dr'n. <i>M. H. W.</i>	Material	DRAWING No. C 13558
Ch'd. <i>W. B. L.</i>	First Dept. On	
Date 2-9-59	Description	

ADVANCE COMPONENTS LTD.







ALTERATION
ISSUE I. 7.9.59



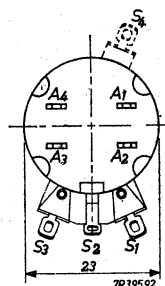
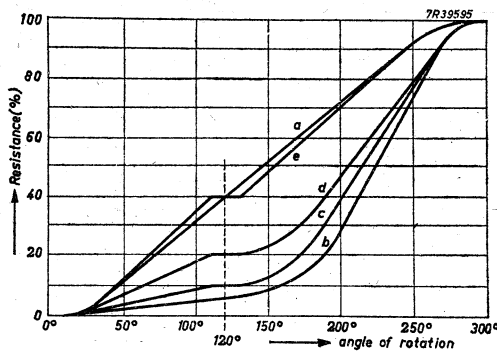


This package contains a genuine Philips carbon potentiometer. This product has been tested three times and complies with international standards. It is guaranteed for long life performance.

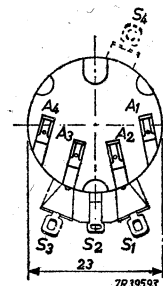
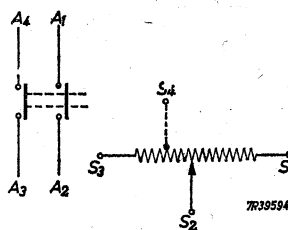
E 098 C./.. ..

- G - without switch
 - D - with rotary double pole switch
1.5 A, 250 V.
 - K - with push-pull double pole switch
1 A, 250 V
 - L - with push-pull double pole switch
2 A, 250 V
- Length of spindle in mm
- C - 6 mm Ø spindle
 - E - 1/4" Ø spindle

Resistance		Grading	Curve
01 - 1	kΩ	linear	a
02 - 2	kΩ	linear	a
03 - 5	kΩ	linear	a
04 - 10	kΩ	linear	a
05 - 20	kΩ	linear	a
06 - 50	kΩ	linear	a
07 - 50	kΩ	logarithmic	b
08 - 100	kΩ	linear	a
09 - 100	kΩ	logarithmic	b
10 - 200	kΩ	linear	a
11 - 200	kΩ	logarithmic	b
12 - 500	kΩ	linear	a
13 - 500	kΩ	logarithmic	b
14 - 50 + 450	kΩ	logarithmic	c
15 - 1	MΩ	linear	a
16 - 1	MΩ	logarithmic	b
17 - 0.2 + 0.8	MΩ	logarithmic	d
18 - 2	MΩ	linear	a
19 - 2	MΩ	logarithmic	b
20 - 0.4 + 1.6	MΩ	logarithmic	d
22 - 0.1 + 0.9	MΩ	logarithmic	c
23 - 40 + 160	kΩ	logarithmic	d
24 - 0.4 + 0.6	MΩ	linear	e
25 - 4 + 16	kΩ	logarithmic	d
26 - 1	kΩ	logarithmic	b
27 - 2	kΩ	logarithmic	b
28 - 5	kΩ	logarithmic	b
29 - 10	kΩ	logarithmic	b
30 - 20	kΩ	logarithmic	b
32 - 0.2 + 1.8	MΩ	logarithmic	c



Push-pull switch



Rotary switch