



# EKCO



**NOT TO BE COPIED.**

**SERVICE DEPT., E. K. COLE LTD., ESSEX, ENGLAND.**

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Cables: Ekco, Southend-on-Sea.

**GENERAL DESCRIPTION:** Model EX401 is a 5 valve (including rectifier) 3 waveband superheterodyne receiver covering 24 Mcs. to 550 Kcs., for use on 100/135 volt or 200/250 volt 40/60 cycle A.C. mains.

**VALVES** (Philips or Mullard): V1—ECH3 (frequency changer); V2—EF9 (I.F. amplifier); V3—EBC3 (demodulator—A.V.C.—L.F. amplifier); V4—EL3 (power amplifier). The heater voltage for these valves is 6.3v. V5—AZ1 (rectifier), heater voltage 4v.

**WAVE RANGES:** Band 1—24 to 6.6 Mcs., Band 2—7.5 to 2.7 Mcs., Band 3—1600 to 550 Kcs.

**INTERMEDIATE FREQUENCY:** 126.5 Kcs.

**MAINS CONSUMPTION:** 48 watts (208 MA at 230v.).

**PILOT LAMP:** 6.5v. 0.35 amp. type (A5767). It is important that lower rated lamps are not used as the supply is 6.3v. R.M.S.

**CIRCUIT DETAILS:** For Band 1 reception the aerial is inductively coupled to the tuned grid circuit of V1, whilst for Band 2 the aerial is inductively coupled to Bandpass input tuning circuits. On Band 3 (M.W.), Bandpass input circuits are also used but the aerial is connected to the tapping of 1st B.P. coil. The oscillator circuit is conventional, using the triode portion V1. Two signals of different frequencies (aerial and oscillator) applied to V1, beat together and the resultant signal of 126.5 Kcs. (I.F.) is transformer coupled to V2 where it is amplified and again transformer coupled to a diode of V3. Here the signal is demodulated, the L.F. component being taken off from the fixed potentiometer (R15 & R16) by C32 and applied to the triode portion of V3 for L.F. amplification.

A small percentage of the signal voltage is transferred by C27 to the remaining diode of V3. The D.C. voltage output of this diode circuit is for A.V.C., being applied to the grid circuits of V1 and V2.

The anode output of V3 is R.C. coupled to the power amplifier V4 the output of which is transformer coupled to a permanent magnet moving coil speaker. Across the latter transformer's secondary are connected the EXT.L.S. sockets, the output impedance being 3 to 4 ohms. Beneath the EXT.L.S. sockets on the chassis is a bakelite headed screw which operates S2 switch enabling the internal speaker to be silenced if desired whilst an external speaker is in use.

Should only one external loudspeaker be required, the same type as fitted in the receiver is recommended.

In the circuit diagram, C21 is shown as a single unit whereas in a few instances this may be found

to comprise a trimmer and a small fixed condenser in series (see Top-View of chassis). This point is mentioned to avoid any possible confusion.

**CHASSIS REMOVAL:** Switch OFF. Remove the back cover and the control knobs. Then remove the four 2BA screws in the base of the cabinet and draw chassis clear.

**CIRCUIT ALIGNMENT:** *This operation must only be carried out in conjunction with a service oscillator of known accuracy. To ensure reliable results the calibration and output levels of service oscillators should be checked frequently, and in any event not less often than once every six months.*

*The "on load" voltage of batteries in battery driven oscillators should be regularly measured, and new batteries fitted as soon as the voltage falls below the rated pressure.*

**I.F. ALIGNMENT:** The trimmers of the second I.F. transformer are located at the bottom of the assembly and are adjustable from beneath the chassis.

Fully mesh the gang, switch to Band 3 (M.W.) then connect a suitable output meter to the external speaker sockets. Insert one service oscillator lead into "E" of chassis and the other through a .02 mfd. condenser to the grid of the ECH3, leaving the existing grid lead in place. Inject 126.5 kcs. signal with input of 50 microvolts, adjust and reduce volume control until meter has about half scale deflection. Adjust the second I.F. trimmers, then the 1st I.F. cores for maximum output. Remove the .02 mfd. condenser and insert the service oscillator lead into "A" of chassis. Repeat adjustment.

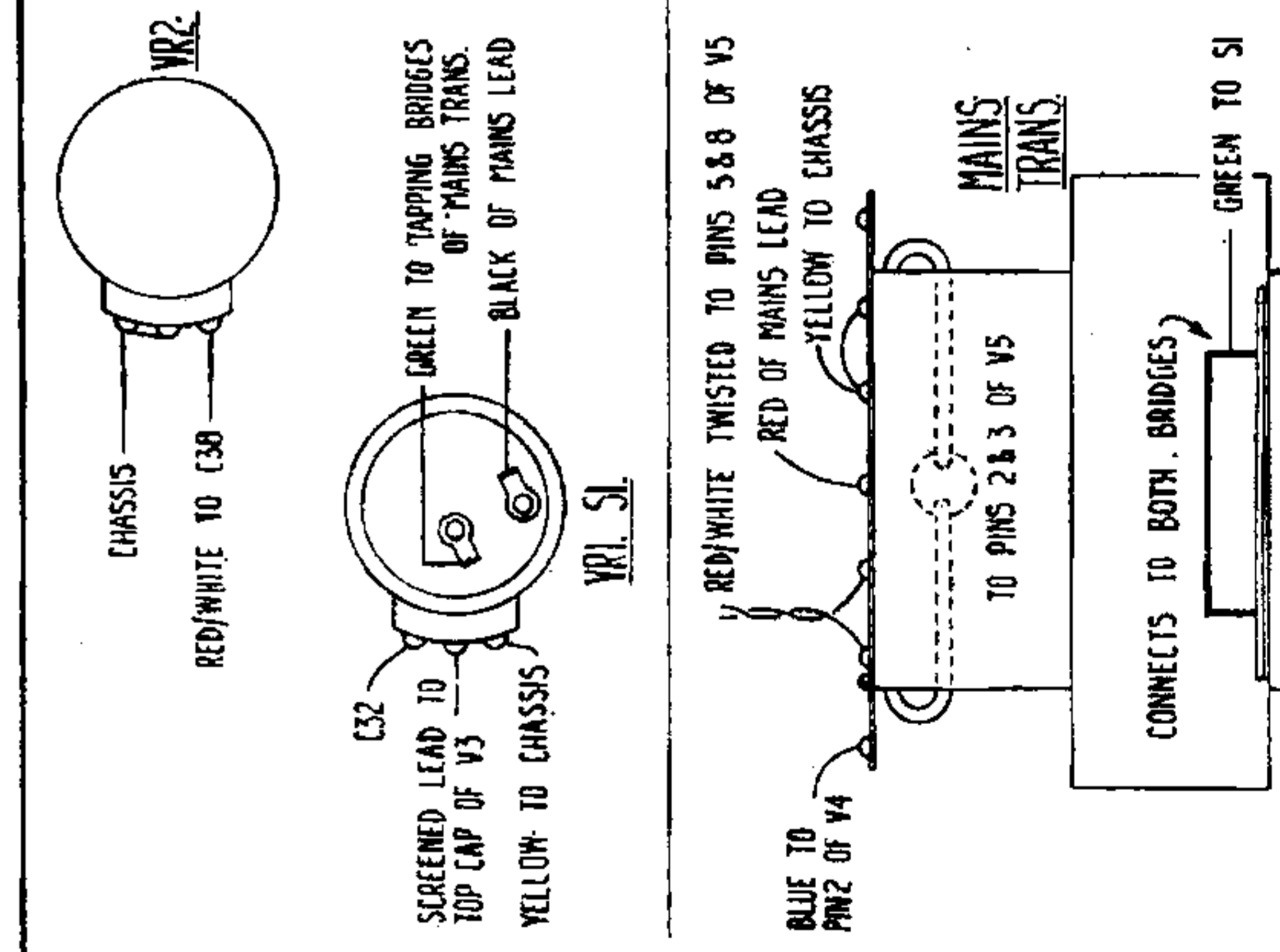
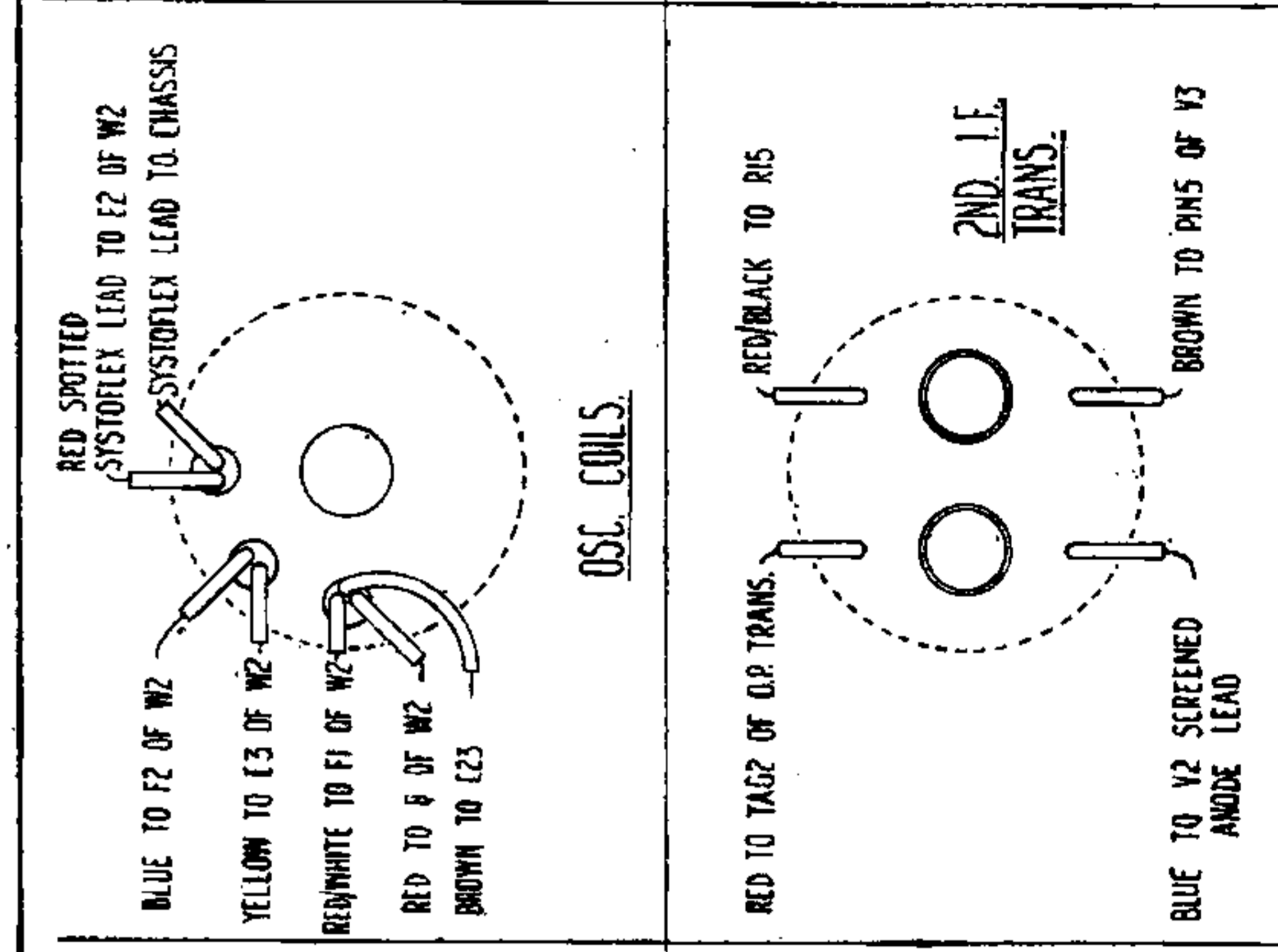
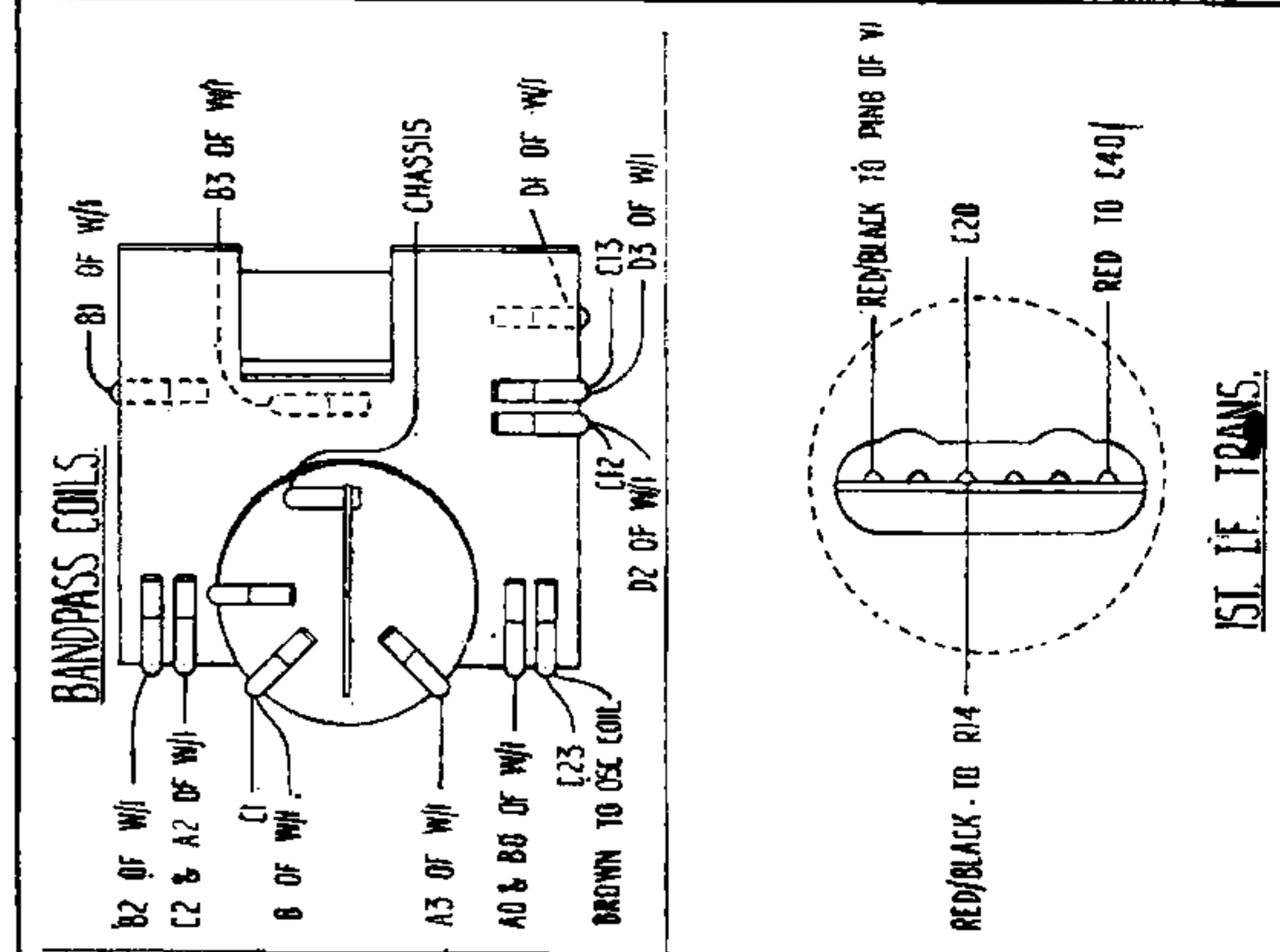
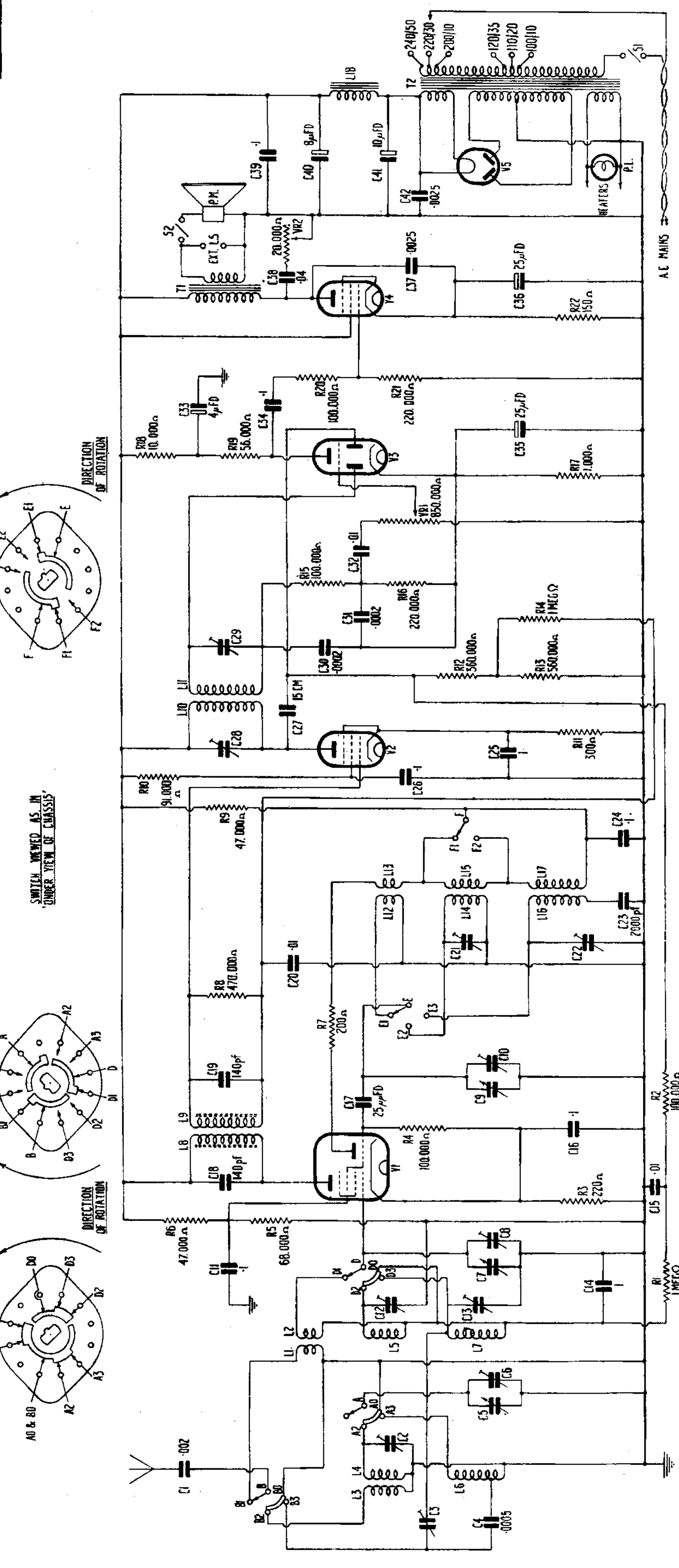
**CALIBRATION:** (1) With the gang fully meshed check the pointer position. This should be parallel to the line terminating the right-hand ends of the scale.

(2) Switch to Band 1. Adjust the receiver and service oscillator to 21 mcs., then reset the gang trimmer C10. Of the two possible settings of this trimmer choose the one with the least capacity.

(3) Reset the gang trimmer C8 for maximum output.

(4) Switch to Band 3. Adjust receiver and service oscillator to 1200 kcs., then reset the trimmer C22 (alongside gang).

(5) The image trimmer C3 (which may be adjusted through a hole in the front of the chassis) should now be set at minimum capacity.



**VOLTAGE & CURRENT READINGS.**

V	PIN	HEX. ANODE	OSC. ANODE	S.G.	CATHODE	ANODE	S.G.	CATHODE	ANODE	CATHODE	M.A.
1	8	250	100	90	1-7	250	100	1-8	106	2-25	1-55
2	5	100	90	1-7	250	100	1-8	106	2-25	2-3	3-1
3	7	90	1-7	250	100	1-8	106	2-25	2-3	2-65	7-4
4	4	1-7	250	100	1-8	106	2-25	2-3	2-3	7-4	6-1
5	8	250	100	1-8	106	2-25	2-3	2-3	2-3	1-8	7-9
6	7	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3	2-3
7	4	1-7	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3
8	8	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3
9	4	1-7	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3
10	8	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3
11	7	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3	2-3
12	4	1-7	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3
13	8	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3
14	7	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3	2-3
15+17	4	1-7	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3
16	8	250	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3
18	7	100	1-8	106	2-25	2-3	2-3	2-3	2-3	2-3	2-3

RECEIVER SET AT 1,000 KCS. NO SIGNAL INPUT. CHASSIS TAKEN AS NEGATIVE. HIGH RESISTANCE VOLTMETER USED.

**D.C. RESISTANCE OF WIREWOUND COMPONENTS.**

L. NO.	BAND MEASURE BETWEEN	RES. Ω
1	C1 & CHASSIS	BELOW 1
2	C7 STATOR & CHASSIS	BELOW 1
3	C1 & CHASSIS	BELOW 1
4	C5 STATOR & CHASSIS	BELOW 1
5	C7 & C14	2-5
6	C5 & CHASSIS	2-5
7	C7 & C14	2-5
8	PIN 8 OF V1 & C40	46
9	TOP CAP OF V2 & C20	46
10	PIN 8 OF V2 & C40	70
11	PIN 5 OF V3 & R15	70
12	C9 STATOR & CHASSIS	BELOW 1
13	INNER TAGS OF L2, L3 ASSEMBLY	BELOW 1
14	C9 STATOR & CHASSIS	BELOW 1
15+17	L15 TAG & C24	1-8
16	C9 STATOR & C23	6
18	L18 TAGS	630
DP	DP TRANSFORMER TAGS	325
TRANS	EXT. L.S. SOCKETS (WITH S2 OPEN)	BELOW 1

A.C. MAINS

RED SPOTTED SYSTEMEX LEAD TO E2 OF W2  
SYSTEMEX LEAD TO CHASSIS

CHASSIS  
RED/WHITE TO C30

SCREENED LEAD TO TOP CAP OF V3  
GREEN TO TAPPING BRIDGES OF MAINS TRANS.  
BLACK OF MAINS LEAD  
YELLOW TO CHASSIS

RED/WHITE TWISTED TO PINS 5 & 8 OF V5  
RED OF MAINS LEAD  
YELLOW TO CHASSIS

BANDPASS COILS  
B2 OF W1  
C2 & A2 OF W1  
B OF W1  
A3 OF W1  
A0 & B0 OF W1  
BROWN TO OSC. COIL  
D2 OF W1  
C13  
D3 OF W1

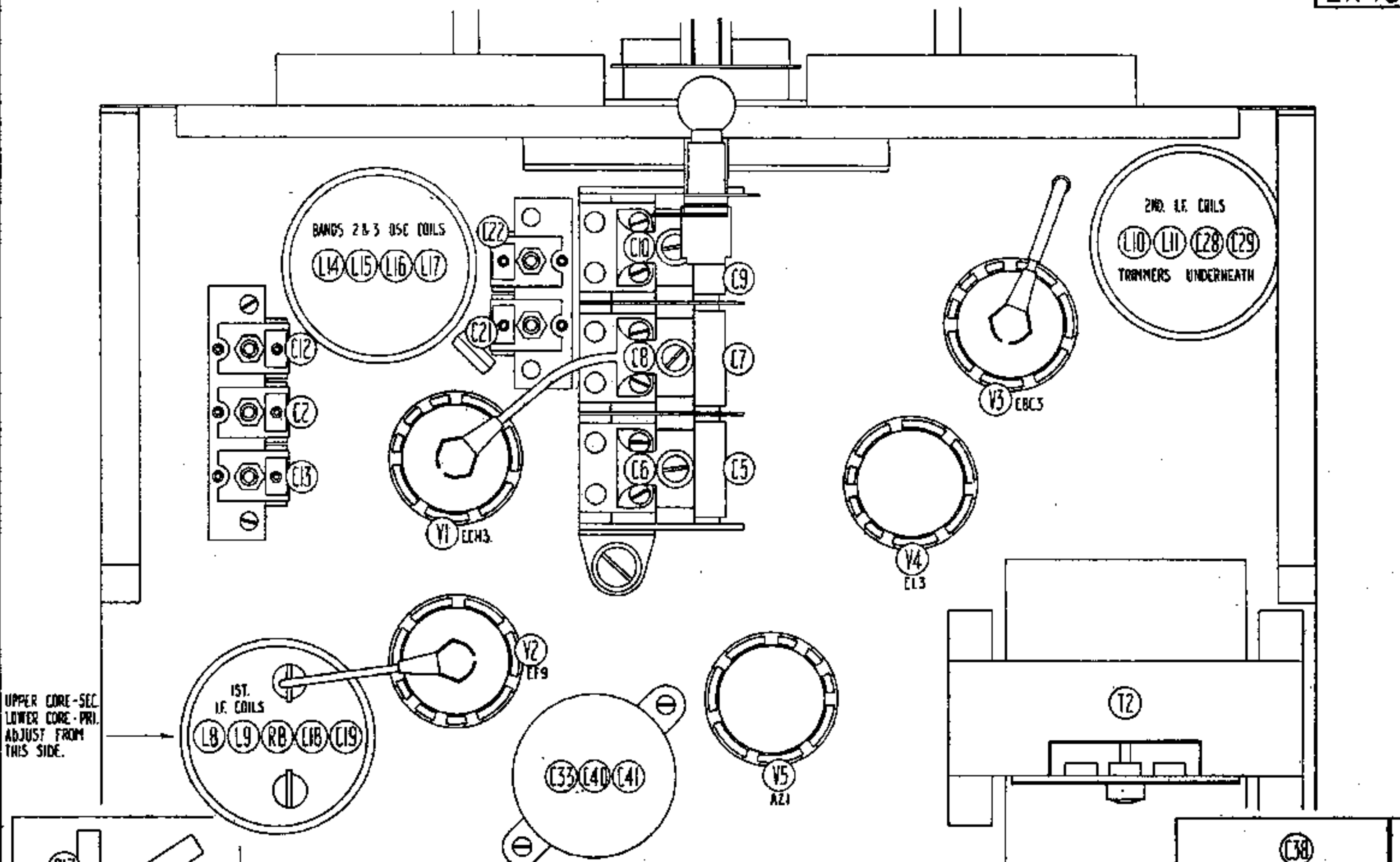
OSC. COILS  
RED TO TAG2 OF O.P. TRANS.  
RED/BLACK TO R15  
BROWN TO PINS OF V3  
BLUE TO V2 SCREENED ANODE LEAD

MAINS TRANS.  
TO PINS 2 & 3 OF V5  
CONNECTS TO BOTH BRIDGES  
GREEN TO S1

RED/BLACK TO R14  
L20  
RED TO C40

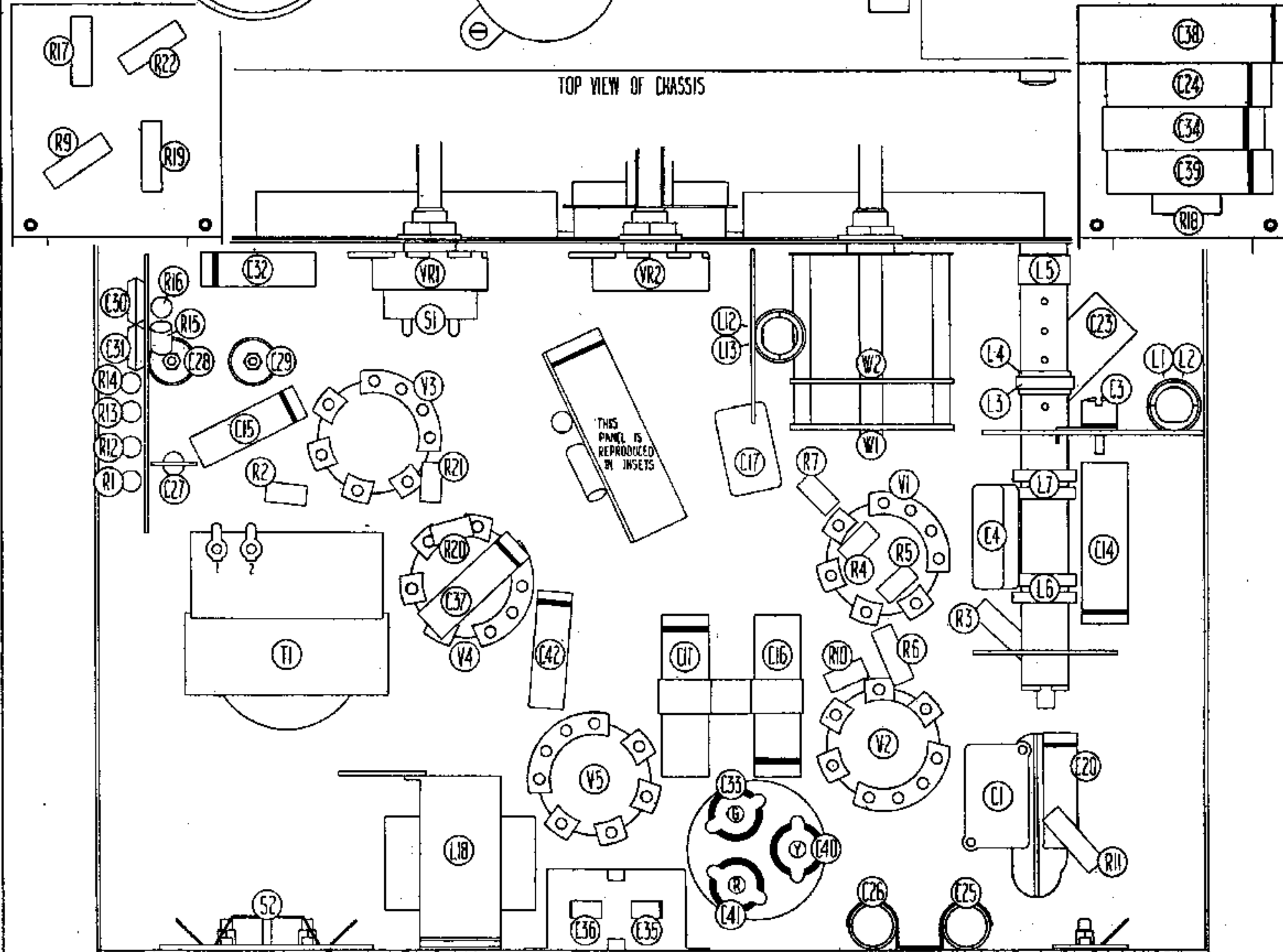
2ND I.E. TRANS.  
BROWN TO PINS OF V3

1ST I.F. TRANS.



UPPER CORE - SEC.  
LOWER CORE - PRI.  
ADJUST FROM  
THIS SIDE.

TOP VIEW OF CHASSIS



UNDER VIEW OF CHASSIS

THIS PANEL IS  
REPRODUCED BY  
INSETS



- (6) With the receiver and service oscillator adjusted to 1200 kcs., reset gang trimmer C6 then trimmer C13 for maximum output.
- (7) Set the service oscillator to 1,000 kcs. then tune the receiver to the neighbourhood of 747 kcs. until the image frequency is tuned accurately, then adjust C3 for maximum rejection (lowest meter reading). Repeat operation No. 6.
- (8) Switch to Band 2. Adjust receiver and service oscillator to 6 Mcs. then reset trimmer C21 (alongside gang).
- (9) Reset trimmers C2 and C12 for maximum output.

**NOTE:** Slipping drive. This condition is invariably due to insufficient tension of the lateral rollers on the cup. To correct, release the set screw in the heavy brass centre piece of the drive assembly and with reasonable pressure ease the brass wheel assembly into the cup and reset the set screw.

Grit or other similar matter on any of the drive surfaces may cause slipping.

The pointer saddle (on gang shaft) should be clear of the stationary support plate, otherwise erratic drive action may result.

### PRICE LIST.

#### MISCELLANEOUS.

Description.		Part No.	Price	Description.		Part No.	Price
Back Cover	...	E10387		Knob—W/C	...	DP2400	
Baffle	...	E10205/1		Loudspeaker	...	D8761/2	
Cabinet	...	DP2397		Mains Lead	...	DP1718/1	
Coil Assembly—Bandpass L1, 2, 3, 4, 5, 6, 7, C3	...	SA356		Pilot Lamp	...	A5767	
Coil Assembly—Oscillator (band 2 & 3)	...	SA357		Pilot Lamp Holder	...	A6227/1	
Coil Assembly—Oscillator (band 1)	...	DP2440		Pointer	...	A10186/1	
Coil Assembly—1st I.F.	...	SA301/2		Scale	...	D10356	
Coil Assembly—2nd I.F.	...	DP2417		Tone Control	...	C10219	
Choke L.F.	...	SA278/2		Transformer—mains	...	SA358	
Knob—Tuning	...	DP2409		Transformer—Output	...	SA242/6	
Knob—T/C	...	DP2399		Valve holder "E" type 8	...	A4126	
Knob—V/C	...	DP2091		Volume Control and Switch	...	C10218	
				Wavechange Switch	...	C10209	
				Window	...	C10152	

#### CONDENSERS.

Description.		Part No.	Price	Description.		Part No.	Price
C1	.002 mfd.	A6516		C24	.1 mfd.	B10383	
C2, 12, 13	Triple Trimmer Assembly	B10204		C25	.1 mfd.	B10383	
C3	See Band Pass Coils	—		C26	.1 mfd.	B10383	
C4	.0005 mfd.	A6516		C27	15 cms.	A5925	
C5-10	Gang Condenser (and Drive)	C10171		C28, 29	See 2nd I.F. Coils	—	
C11	.1 mfd.	B10383		C30	.0002 mfd.	B8905	
C14	.1 mfd.	B10383		C31	.0002 mfd.	B8905	
C15	.01 mfd.	B10384		C32	.01 mfd.	B10384	
C16	.1 mfd.	B10383		C33, 40, 41	4-8-10 mfd. Wet Electrolytic	C10207	
C17	25 mmfd.	A5747		C34	.1 mfd.	B10383	
C18	140 mmfd.	B8735		C35, 36	25-25 mfd. Dry Electrolytic	C10360	
C19	140 mmfd.	B8735		C37	.0025 mfd.	B10389	
C20	.01 mfd.	B10384		C38	.04 mfd.	B10386	
C21, 22	Double Trimmer Assembly	B10608		C39	.1 mfd.	B10383	
C23	2000 pf.	B8412		C42	.0025 mfd.	B10389	

#### RESISTORS.

Description.		Part No.	Price	Description.		Part No.	Price
R1	1 megohm	31/9		R12	560,000 ohms	95/9	
R2	100,000 ohms	86/9		R13	560,000 ohms	95/9	
R3	220 ohms	54/8		R14	1 megohm	31/9	
R4	100,000 ohms	86/9		R15	100,000 ohms	86/9	
R5	68,000 ohms	84/9		R16	220,000 ohms	90/9	
R6	47,000 ohms	82/8		R17	1,000 ohms	62/8	
R7	200 ohms	142/9		R18	10,000 ohms	74/8	
R8	470,000 ohms	94/9		R19	56,000 ohms	83/8	
R9	47,000 ohms	82/8		R20	100,000 ohms	86/9	
R10	91,000 ohms	206/9		R21	220,000 ohms	90/9	
R11	300 ohms	55/8		R22	150 ohms	139/8	