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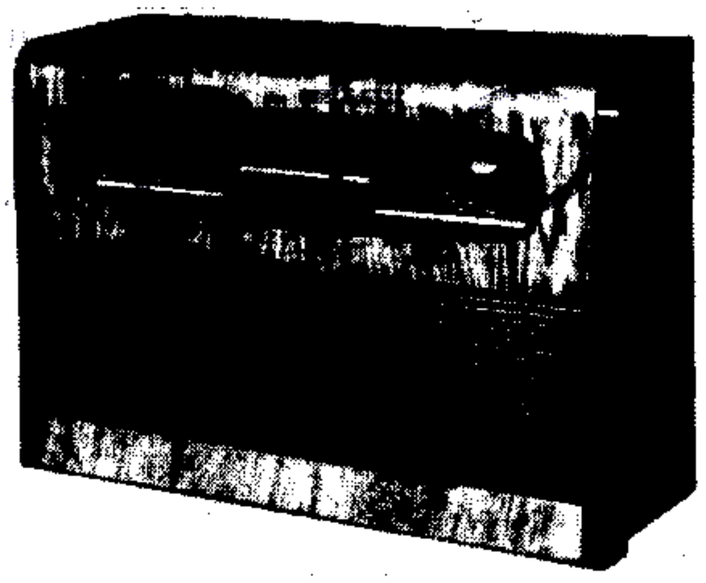
K-B GR15

and associated Models DR15, ER15 and FR15



The appearance of the K-B GR15.

DESIGNED with access for servicing in view, the K.-B. GR15 chassis can be slipped out of its cabinet in the space of a minute, and the layout then gives ready access to all parts. The receiver is a 4-valve (plus rectifier) 3-band superhet operating from A.C. or D.C. mains of 200-250 V, 50-100 c/s. The waveband ranges are: 16.3-51 m, 187-535 m and 740-2,100 m.

The small differences between the GR15 and its associated models, DR15, ER15 and FR15 are explained under "Associated Models" overleaf. This *Service Sheet* was prepared from a GR15.

Release dates and original prices: GR15, August 1951, £19 5*s* 2*d*; *FR15, August* 1950, £16 9*s*; *ER15, August* 1949, £16 1*s* 3*d*; *DR15, October* 1948, £16 1*s* 3*d*. *Purchase tax extra.*

CIRCUIT DESCRIPTION

Aerial input via **L1** (S.W.) and bottom capacitance coupler **C4** (M.W. and L.W.) to single-tuned circuits **L2, C35** (S.W.), **L3, C35** (M.W.) or **L4, C35** (L.W.) which precede triode hexode valve **(V1, Brimar 12K8GT)** operating as frequency changer with internal coupling. **C1, C2** isolate the aerial and earth sockets. **R1, R2** prevent the build-up of static charges on the aerial, and **R3** shunts the aerial input to prevent modulation hum.

Oscillator grid coils **L5** (S.W.), **L6** (M.W.) and **L7** (L.W.) are tuned by **C36.** Parallel trimming by **C37** (S.W.), **C38** (M.W.) and **C39** (L.W.); series tracking by **C12** (M.W.), **C12, C13** (L.W.).

Second valve **(V2, Brimar 12K7GT)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C6, L9, L10, C7** and **C18, L11, L12, C19.**

Intermediate frequency 470 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Brimar 12Q7GT).** Audio frequency component in rectified output is developed across load resistor **R14** and passed via volume control **R15** and **C24** to grid of triode section which operates as A.F. amplifier.

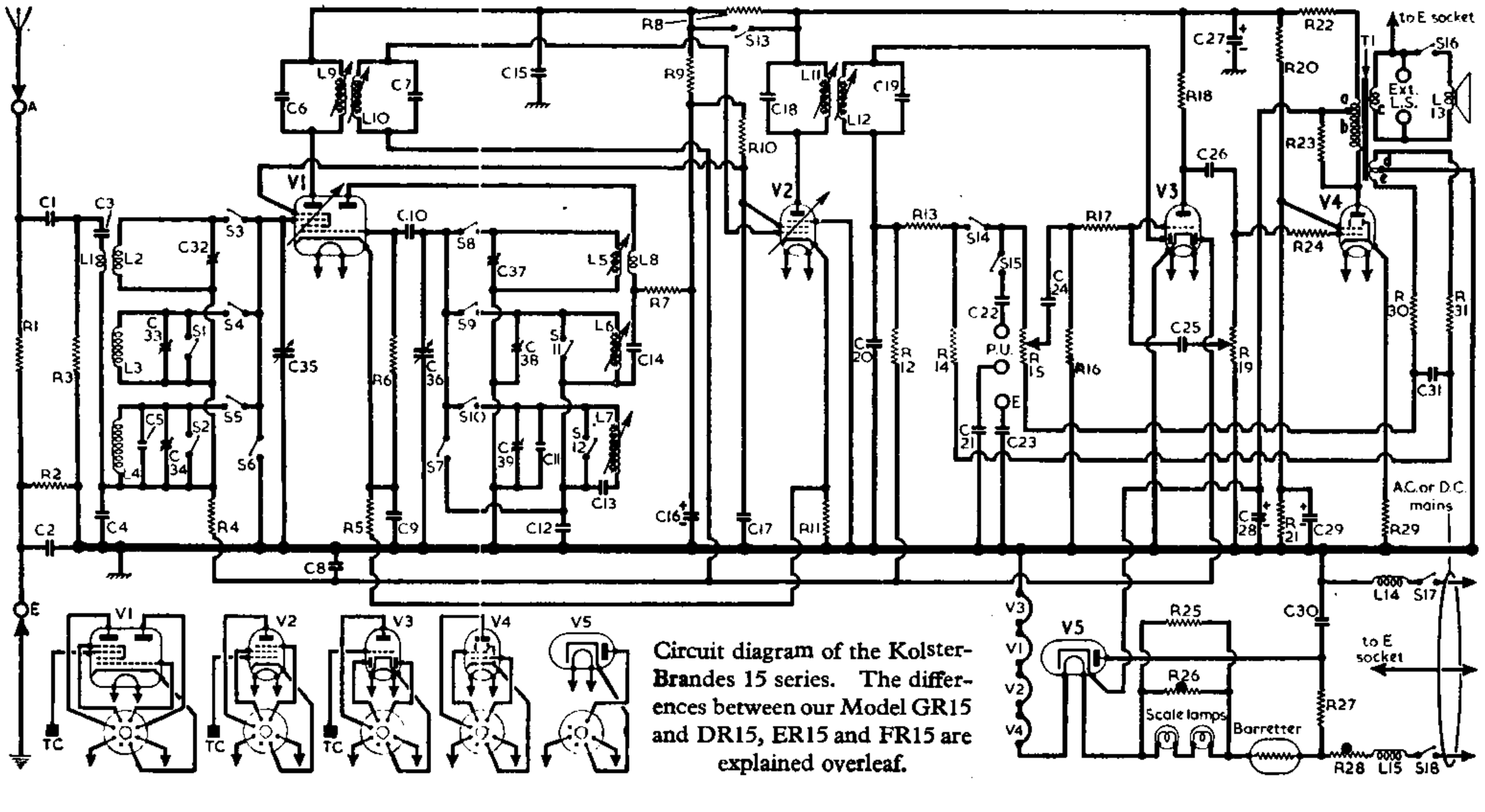
(Continued Col. 1 overleaf)

COMPONENTS AND VALUES

	CAPACITORS	Values	Locations
C1	Aerial and earth isolators	0·001μF	G4
C2		0·01μF	F4
C3	Aerial couplers	0·005μF	G4
C4		0·003μF	G3
C5	L.W. aerial trim.	25pF	G4
C6	1st I.F. trans. tuning	200pF	A1
C7		200pF	A1
C8	A.G.C. decoupling	0·02μF	F4
C9	V1 cath. by pass	0·1μF	F4
C10	V1 osc. C.G.	100pF	F3
C11	L.W. osc. trim.	20pF	F4
C12	M.W. osc. tracker	330pF	F4
C13	L.W. osc. tracker	200pF	F4
C14	Reaction coupling	200pF	F4
C15	H.T. decoupling	0·02μF	F3
C16*		8μF	E4
C17	S.G. decoupling	0·02μF	F3
C18	2nd I.F. trans. tuning	200pF	B1
C19		200pF	B1
C20	I.F. by-pass	100pF	F3
C21	P.U. isolators	0·02μF	F4
C22		0·005μF	F4
C23		0·01μF	F4
C24	A.F. coupling	0·005μF	D3
C25	Part tone control	100pF	D3
C26	A.F. coupling	0·02μF	E4
C27*	H.T. smoothing	24μF	D4
C28*		16μF	D4
C29*	V4 S.G. decoup.	4μF	E4
C30	Mains R.F. filter	0·01μF	E3
C31	Neg. feed-back	0·25μF	E3
C32‡	S.W. aerial trim.	40pF	G4
C33‡	M.W. aerial trim.	40pF	G4
C34‡	L.W. aerial trim.	40pF	G4
C35†	Aerial tuning	—	A2
C36†	Oscillator tuning	—	A1
C37‡	S.W. osc. trim.	40pF	G4
C38‡	M.W. osc. trim.	40pF	G4
C39‡	L.W. osc. trim.	80pF	G4

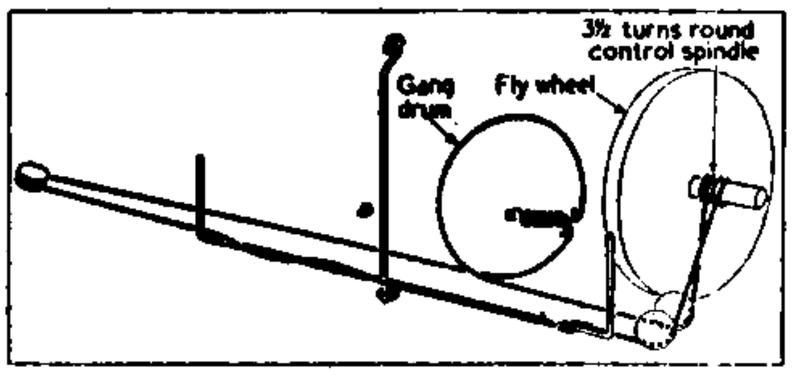
	RESISTORS	Values	Locations
R1	Anti-static leaks	1MΩ	G4
R2		470kΩ	G4
R3	Mod. hum shunt	1kΩ	G4
R4	A.G.C. decoupling	100kΩ	G4
R5	V1 G.B.	100Ω	F3
R6	V1 osc. C.G.	47kΩ	F4
R7	Osc. anode feed	10kΩ	F4
R8	Radio muting	10kΩ	G3
R9	H.T. feed	2·2kΩ	F3
R10	S.G. H.T. feed	4·7kΩ	F3
R11	V2 G.B.	47Ω	F3
R12	A.G.C. decoupling	2·2MΩ	F3
R13	I.F. stopper	47kΩ	F3
R14	Signal diode load	2·2MΩ	E3
R15	Volume control	500kΩ	C1
R16	V3 C.G.	10MΩ	D3
R17	V3 C.G. stopper	100kΩ	D3
R18	V3 anode load	470kΩ	E4
R19	Tone control	500kΩ	D3
R20	V4 S.G. pot. divider	6·8kΩ	E4
R21		10kΩ	E3
R22	H.T. smoothing	1·5kΩ	E3
R23	No-load limiter	47kΩ	E3
R24	V4 C.G. stopper	47kΩ	E4
R25	Scale lamp shunt	680Ω	E3
R26	Brimistor CZ3	—	E3
R27	V5 surge limiter	150Ω	E3
R28	Brimistor CZ3	—	E3
R29	V4 cath. G.B.	180Ω	E4
R30	Neg. feed back	240Ω	E3
R31		1kΩ	E3

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Kolster-Brandes 15 series. The differences between our Model GR15 and DR15, ER15 and FR15 are explained overleaf.

	OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	S.W. aerial coup.		—	G4
L2	Aerial tuning coils		—	G4
L3			2·96	G4
L4			21·06	G4
L5	Oscillator tuning coils		—	F4
L6			3·06	F4
L7			8·47	F4
L8	Osc. reaction coup.		—	F4
L9	1st I.F. trans.	Pri.	5·2	A1
L10		Sec.	5·2	A1
L11	2nd I.F. trans.	Pri.	5·2	B1
L12		Sec.	5·2	B1
L13	Speech coil ...		2·5	—
T1	O.P. trans.	a ...	10·0	E4
		b ...	380·0	
		c ...	0·35	
		d ...	1·7	
		e ...	0·4	
S1-S15	Waveband switches		—	G3
S16	Speaker switch ...		—	D4
S17, S18	Mains s.w., g'd R19		—	D3



Sketch of the tuning drive cord system.

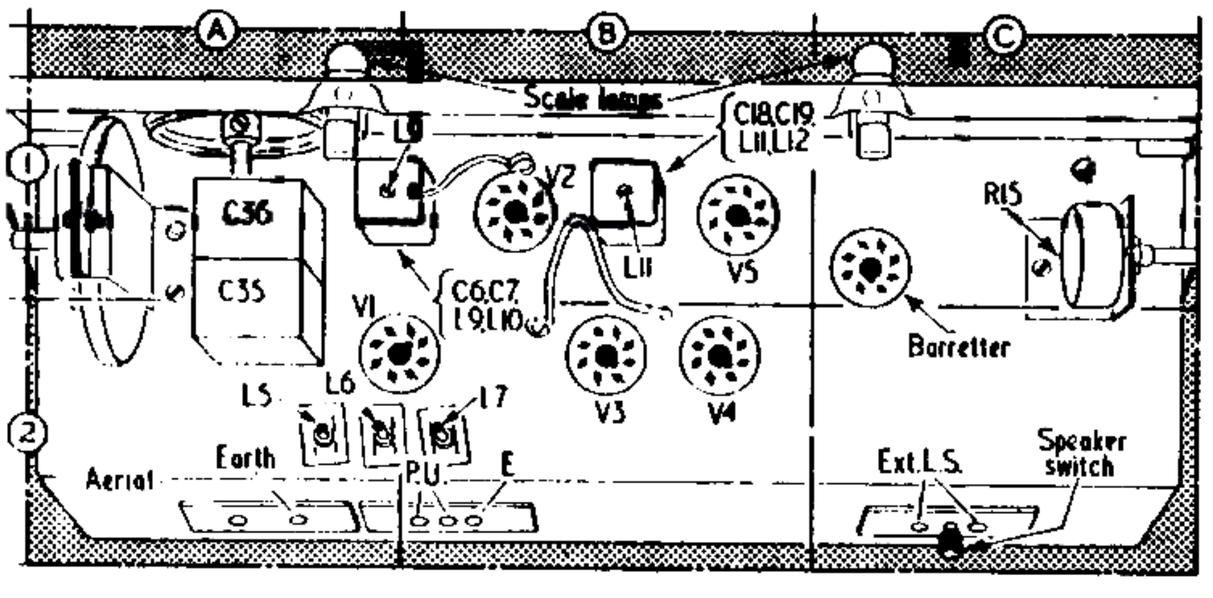
Circuit Description—*continued*

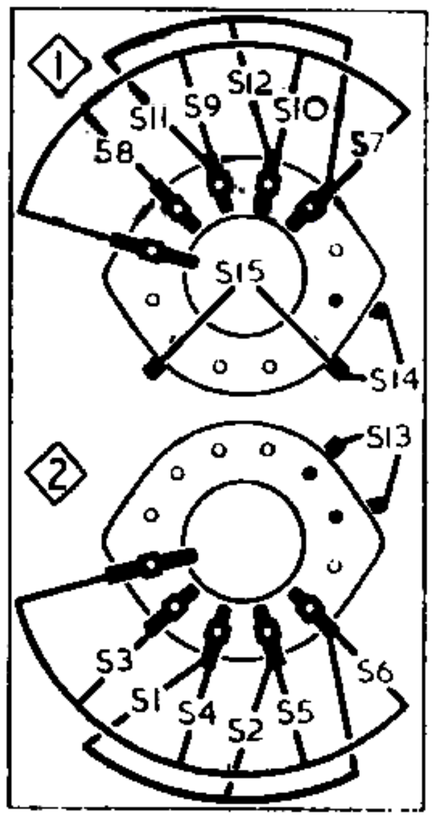
D.C. potential developed across **R14** is fed back as bias to **V1** and **V2** giving automatic gain control. The A.G.C. line is connected to the second diode anode, which prevents it from going positive.

Resistance-capacitance coupling by **R18, C26** and **R19** between **V3** triode and beam tetrode output valve **(V4, Brimar 35L6GT).** Variable tone control by negative feed-back via **R19, C25** between **V3** and **V4** control grid circuits. The voltage developed in a third winding **d, e** on **T1** is fed back in anti-phase via a balanced bridge circuit formed by the two halves of the winding, **R14, R15, R30** and **R31,** thus ensuring that no negative feed-back voltage is applied to **C20** and to the detector diode, which is connected across the zero potential corners of the bridge, while a portion of the available feed back, that across section **e** of the feed-back winding, is applied to **V3** grid. Provision is made for the connection of a low impedance external speaker across speech coil winding **c** on **T1.**

GENERAL NOTES

Switches.—**S1-S12** are the waveband switches, and **S13-S15** are the radio/gram change-over switches, ganged in two rotary units beneath the chassis. These are indicated in our underside view of the chassis, and shown in detail in the diagrams inset beside the plan view, where they are drawn as seen from the rear of an inverted chassis.





Above : Plan chassis drawing. *Right :* Waveband switch unit diagrams.

The table below them gives the switch position for the four control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C,** closed.

Scale Lamps. -These are two M.E.S.-type lamps, with large clear spherical bulbs, rated at 4.5 V, 0.15 A. They are shunted by **R25** and a type CZ3 Brimistor **R26.**

External Speaker. -Two sockets are provided at the rear of the chassis on a panel with **S16** for the connection of a low impedance (about 2-4 Ω) external speaker.

Drive Cord Replacement.—About 4ft 6in of high-grade **flax** fishing line is required for a new drive cord, which leaves an ample margin for tying off. It should be run as shown in the accompanying sketch, where the system is shown as seen from the front right-hand corner of the chassis, neglecting obstructions.

Associated Models.—The electrical differences in the FR15 as compared with the GR15 consist of the omission of **C5, C11** and **R25.** In the ER15, there are additional differences: **R5** becomes **300Ω** and goes directly to chassis, while **R11** is omitted; **C15** and **R24** may be omitted and **C9** is 0.02 μF. The DR15 is like the ER15, but it has a 0.004 μF S.W. osc. tracker; also **C6, C7, C18** and **C19** are 150 pF, while **C8** is 0.1 μF.

Switches	Gram	L.W.	M.W.	S.W.
S1	—	—	—	C
S2	—	—	C	C
S3	—	—	—	C
S4	—	—	C	—
S5	C	—	—	—
S6	C	—	—	—
S7	—	—	—	—
S8	—	—	—	C
S9	—	—	C	—
S10	—	C	—	—
S11	—	—	—	C
S12	—	—	C	C
S13	—	C	C	C
S14	—	C	C	C
S15	C	—	—	—

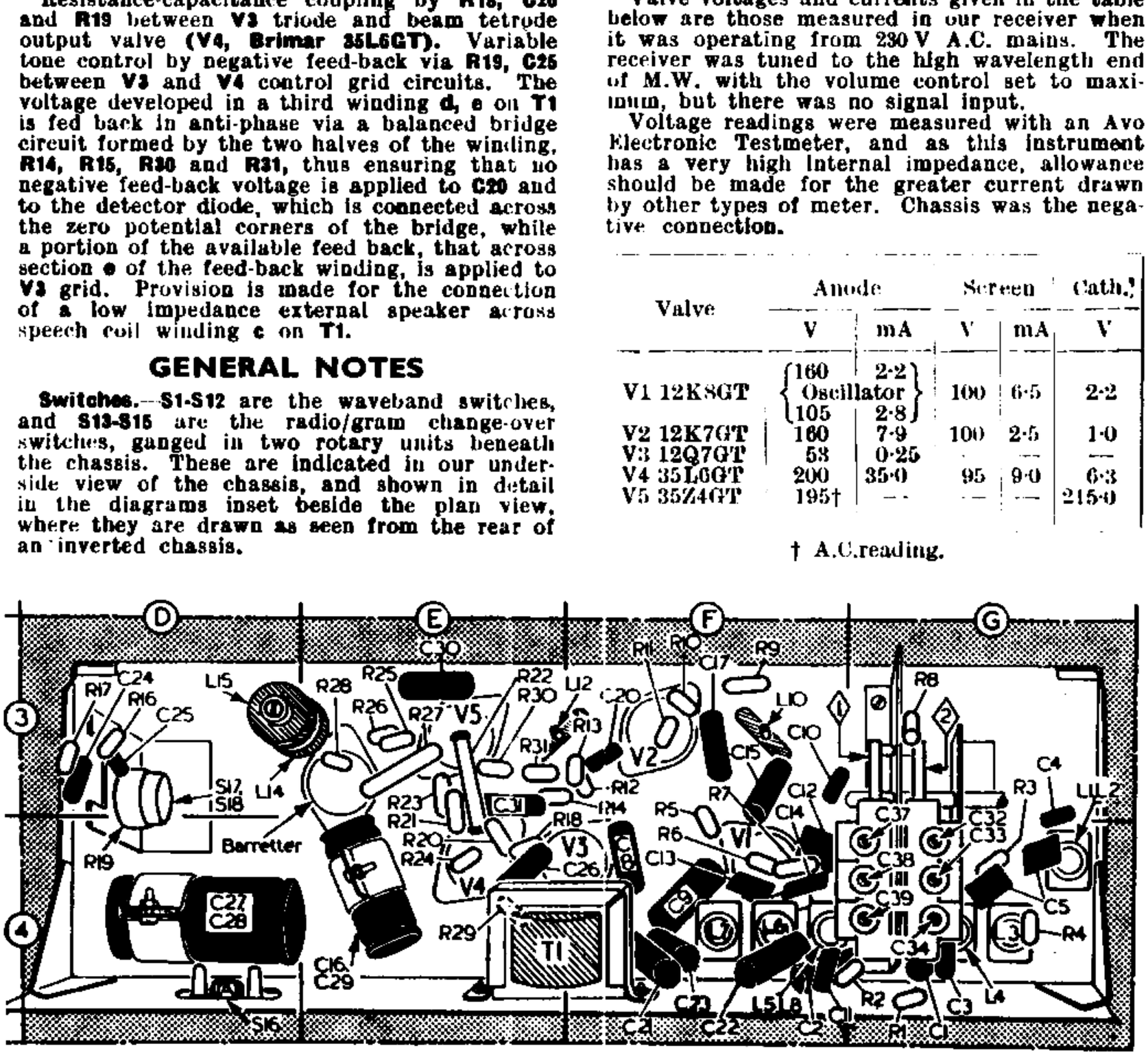
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from 230 V A.C. mains. The receiver was tuned to the high wavelength end of M.W. with the volume control set to maximum, but there was no signal input.

Voltage readings were measured with an Avo Electronic Testmeter, and as this instrument has a very high internal impedance, allowance should be made for the greater current drawn by other types of meter. Chassis was the negative connection.

Valve	Anode V	Anode mA	Screen V	Screen mA	Cath.† V
V1 12K8GT	160 Oscillator 105	2·2 2·8	100	6·5	2·2
V2 12K7GT	160	7·9	100	2·5	1·0
V3 12Q7GT	53	0·25	—	—	—
V4 35L6GT	200	35·0	95	9·0	6·3
V5 35Z4GT	195†	—	—	—	215·0

† A.C.reading.



Underside view of the chassis. Switch units **1, 2** are detailed at the head of col. 3.

CIRCUIT ALIGNMENT

Remove chassis from cabinet and stand it on its volume control end on the bench.

I.F. Stages.—Connect output of signal generator, via an 0.1μF capacitor in each lead, to control grid (top cap) of **V1** and chassis. Switch receiver to M.W., and turn gang to maximum. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L12, L11, L10** and **L9** (location references E3, B1, F3, A1) for maximum output. Repeat these adjustments.

R.F. and Oscillator Stages.—Transfer signal generator leads, via a dummy aerial to **A** and **E** sockets. As the tuning scale remains fixed in the cabinet when the chassis is withdrawn reference must be made to the calibration marks printed on the scale backing plate. If calibration marks are not provided they should be measured out on the backing plate as follows. First of all a datum line should be drawn $2\frac{5}{32}$in to the right of the rivet in the middle of the scale backing plate (viewed from front). The calibration marks are then measured off to the left of the datum line, starting with 50 m (0.19in), 500 m (1.08in), 1,714 m (1.47in), 20 m (3.63in), 860 m (3.72in) and 214 m (3.815in). With the gang at maximum capacitance, check that the centre cursor coincides with the datum line.

M.W.—Switch receiver to M.W., tune to 214 m mark, feed in a 214 m (1,400 kc/s) signal and adjust **C38** (G4) and **C33** (G4) for maximum output. Tune receiver to 500 m mark, feed in a 500 m (600 kc/s) signal and adjust the core of **L6** (A2) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 860 m mark, feed in an 860 m (350 kc/s) signal and adjust **C39** (G4) and **C34** (G4) for maximum output. Tune receiver to 1,714 m mark, feed in a 1,714 m (175 kc/s) signal and adjust the core of **L7** (B2) for maximum output. Repeat these operations until no further improvement results.

S.W.—Switch receiver to S.W., tune to 20 m mark, feed in a 20 m (15 Mc/s) signal and adjust **C37** (G3) and **C32** (G3) for maximum output, rocking the gang while adjusting **C32** for optimum results. Tune receiver to 50 m mark, feed in a 50 m (6 Mc/s) signal and adjust the core of **L5** (A2) for maximum output. Repeat these adjustments until no further improvement results.

Sensitivity.—Overall sensitivity should be better than 250 μV for 50 mW output on all ranges.

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