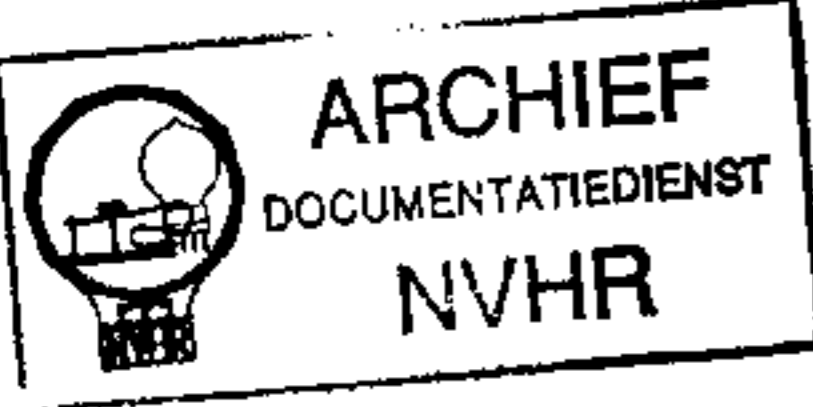


Ned. Ver. v. Historie v/d Radio



# KOLSTER-BRANDES FB10

**C**HARACTERISTIC of the "occasional" type of receiver, the K-B FB10 is a 4-valve (plus rectifier) 2-band superhet midget with a self-contained aerial. An unusual midget feature is the use of a mains auto-transformer, which avoids the generation of a considerable amount of heat.

The receiver is designed to operate from A.C. mains of 200-250 V, 50 c/s, and the consumption is quoted at 40 W.

Release date and original price: September 1950; £8 17s. 1d. Purchase tax extra.

## COMPONENTS AND VALUES

CAPACITORS		Values	Locations
C1	Aerial coupling ...	0.001μF	G5
C2	L.W. trimmer ...	70pF	F3
C3	1st I.F. trans. ...	88pF	B2
C4	tuning	88pF	B2
C5	L.W. tracker ...	440pF	F4
C6	M.W. tracker ...	550pF	G3
C7	L.W. trimmer ...	120pF	F4
C8	V2 cath. by-pass	0.05μF	F4
C9	A.G.C. decoupling	0.1μF	F5
C10	2nd I.F. trans. ...	88pF	B2
C11	tuning	88pF	B2
C12	I.F. by-pass ...	330pF	E4
C13	H.T. decoupling ...	0.1μF	E5
C14	A.F. coupling	0.01μF	D4
C15		0.003μF	D4
C16*	H.T. smoothing	32μF	B1
C17*		32μF	B1
C18	Tone correction ...	0.03μF	E3
C19	Mains R.F. ...	0.1μF	C1
C20†	M.W. aerial trim	60pF	A1
C21†	Aerial tuning ...	---	A1
C22†	M.W. osc. trimmer	60pF	A1
C23†	Oscillator tuning	---	A1

\* Electrolytic. † Variable. ‡ Pre-set.

RESISTORS		Values (ohms)	Location
R1	V1 osc. C.G. ...	22 k.	G4
R2	Osc. stabiliser ...	220	G4
R3	V2 G.B. ...	47	F4
R4	A.G.C. decoup. ...	2.2 M	E4
R5	Volume control ...	500 k	C1
R6	V3 C.G. ...	10 M	D4
R7	V3 grid stopper ...	220 k.	D4
R8	V3 anode load ...	220 k.	E5
R9	V4 C.G. ...	470 k.	D5
R10	H.T. smoothing	* 5.9 k.	E3
R11		1.8 k.	E3
R12	V4 G.B. ...	240	D5
R13	V5 surge limiter ...	† 113	C2

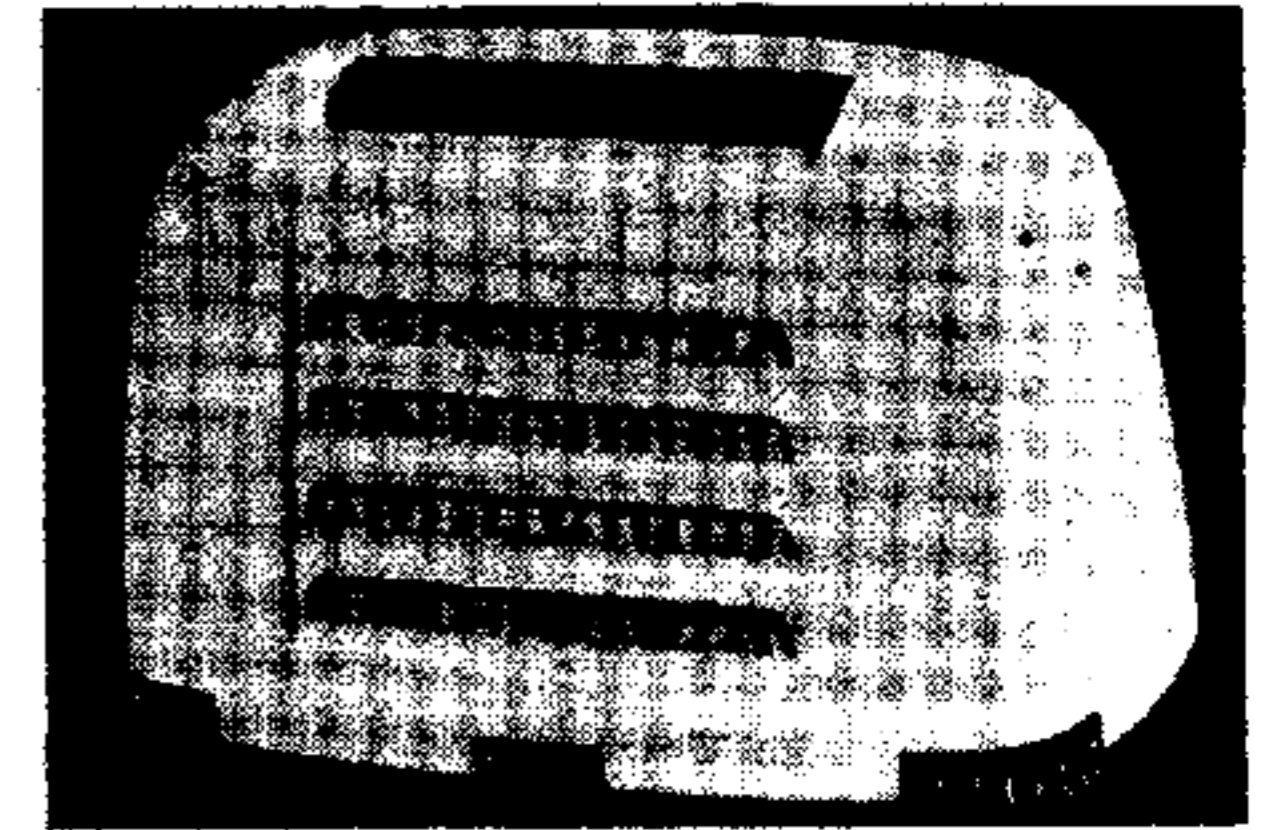
\* Comprising two 8,200 ohms resistors in parallel in series with a 1,800 ohms resistor. † Comprising 150 ohms and a 470 ohms resistor in parallel.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Aerial coupling ...	Very low	B2
L2	Frame aerial ...	Very low	B2
L3	L.W. loading coil	110	A2
L4	Osc. coil, total ...	7.0	G3
L5	1st I.F. trans.	Pri. 20.0	B2
L6		Sec. 20.0	B2
L7	2nd I.F. trans.	Pri. 20.0	B2
L8		Sec. 20.0	B2
L9	Speech coil ...	3.0	B1
T1	Primary, total ...	400.0	B2
T2	Secondary ...	Very low	---
S1-S5	Mains trans., total	153.0	C1
S6, S7	Waveband switches	---	F3
			C1

## CIRCUIT DESCRIPTION

Tuned frame aerial input by L2, C21 for M.W., or with loading coil L3 for L.W. Provision for the connection of an external aerial via C1 and L1. First valve (V1, Brimar 6BE6) is a heptode operating as frequency changer with electron coupling.

A single oscillator coil L4, tuned by C23, is used for M.W. and L.W. bands, but it is tapped via S4 for waveband



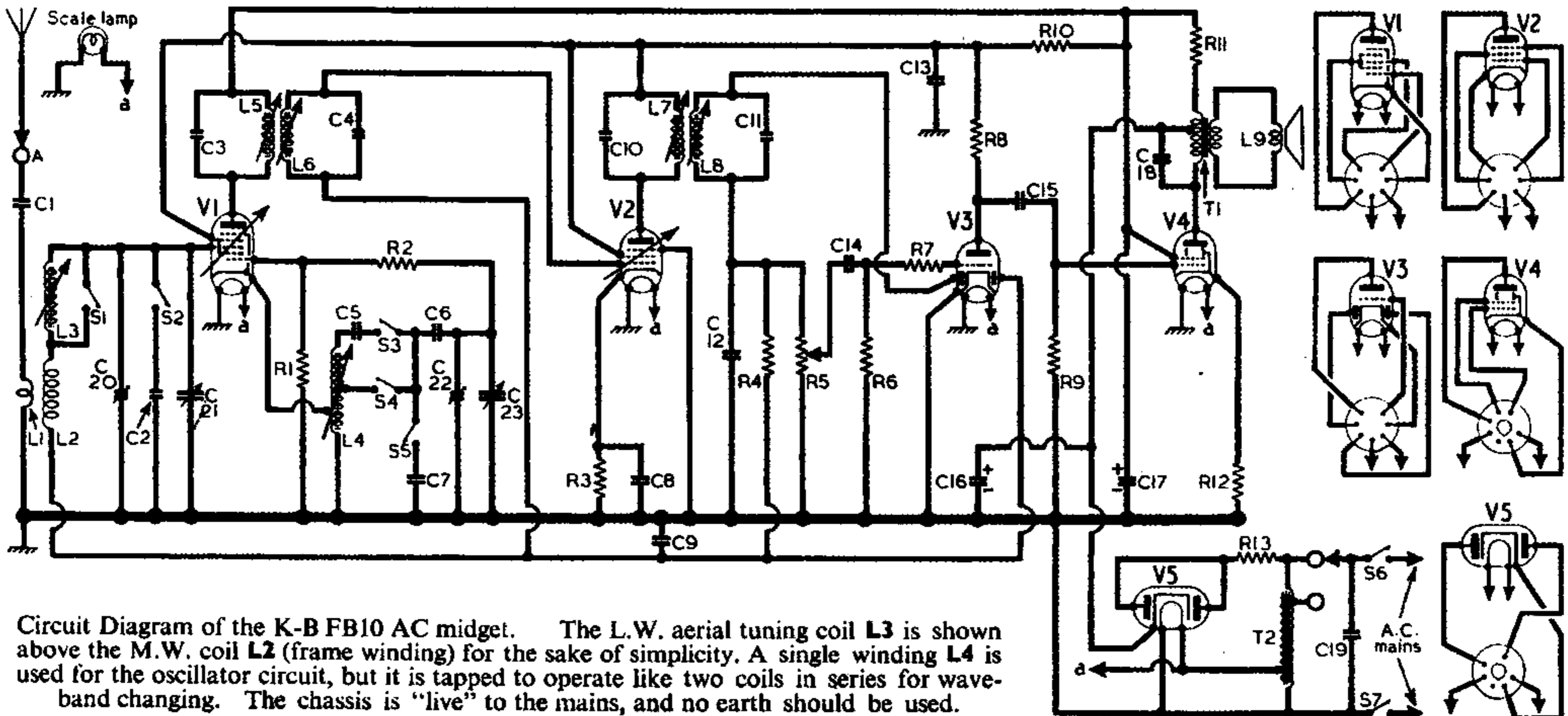
switching, only the lower section being for M.W. A second tapping, to V1 cathode, provides reaction coupling.

Second valve (V2, Brimar 6BA6) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings C3, L5, L6, C4 and C10, L7, L8, C11.

Intermediate frequency 422 kc/s. Diode signal detector is part of double diode triode valve (V3, Brimar 6AT6). Audio frequency component in rectified output is developed across manual volume control R5, which is also the diode load, and passed via coupling capacitor C14 and stopper R7 to grid of triode section, which acts as A.F. amplifier. I.F. filtering by C12.

The D.C. potential across R5 is fed back via decoupling resistor R4 to the F.C. and the I.F. stages, giving automatic volume control. The A.G.C. line is connected to the second diode, which prevents it from acquiring a positive potential.

Resistance-capacitance coupling by R8, C15 and R9 between V3 triode and beam pentode output valve (V4, Brimar 6V6GT). Fixed tone correction in



Circuit Diagram of the K-B FB10 AC midget. The L.W. aerial tuning coil L3 is shown above the M.W. coil L2 (frame winding) for the sake of simplicity. A single winding L4 is used for the oscillator circuit, but it is tapped to operate like two coils in series for waveband changing. The chassis is "live" to the mains, and no earth should be used.

Circuit Description Continued

anode circuit by C18. A measure of negative feed-back is introduced in the output stage by the omission of the usual cathode by-pass capacitor.

H.T. current is supplied by I.H.C. rectifying valve (V5, Brimar 6X5GT), which is fed from the same heater tapping on the autotransformer T2 as the rest of the valves. Smoothing by R10, R11 and electrolytic capacitors C16, C17. Residual hum is neutralised by passing H.T. current to the early stages through part of the output transformer T1 primary winding.

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those measured in our receiver while it was operating from mains of 230 V. The receiver was tuned to about 200 m., and the volume control was at maximum, but there was no signal input.

Voltage measurements were made with an Avo Electronic Testmeter, which introduces no appreciable voltage drop, and allowances must be made for other meters. Currents were measured at points of low potential, but it was necessary to shunt the meter leads with a 0.1 μF capacitor while measuring V1 screen voltage.

Valve	Anode		Screen		Cath
	V	mA	V	mA	
V1 6BE6	205	2.5	100	2.8*	—
V2 6BA6	100	7.6	100	3.4	0.5
V3 6AT6	55	0.18	—	—	—
V4 6V6GT	235	34.0	205	3.0	9.0
V5 6X5GT	225†	—	—	—	250.0

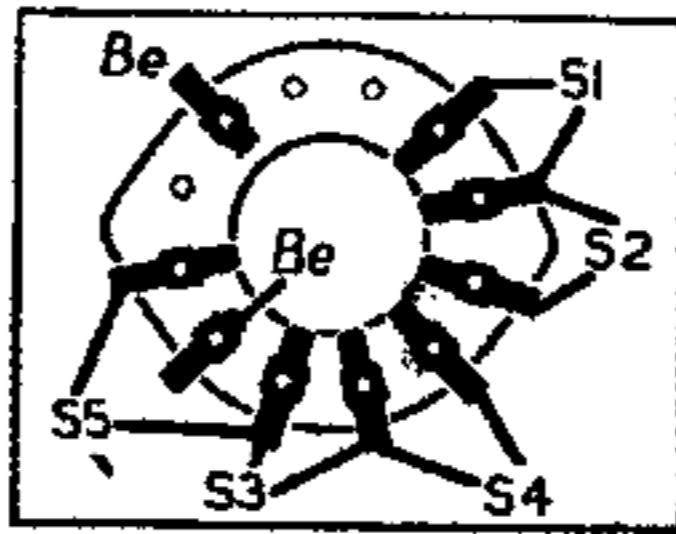
\* By-pass meter with 0.1 μF capacitor when taking this reading. † Each anode A.C.

**DISMANTLING THE SET**

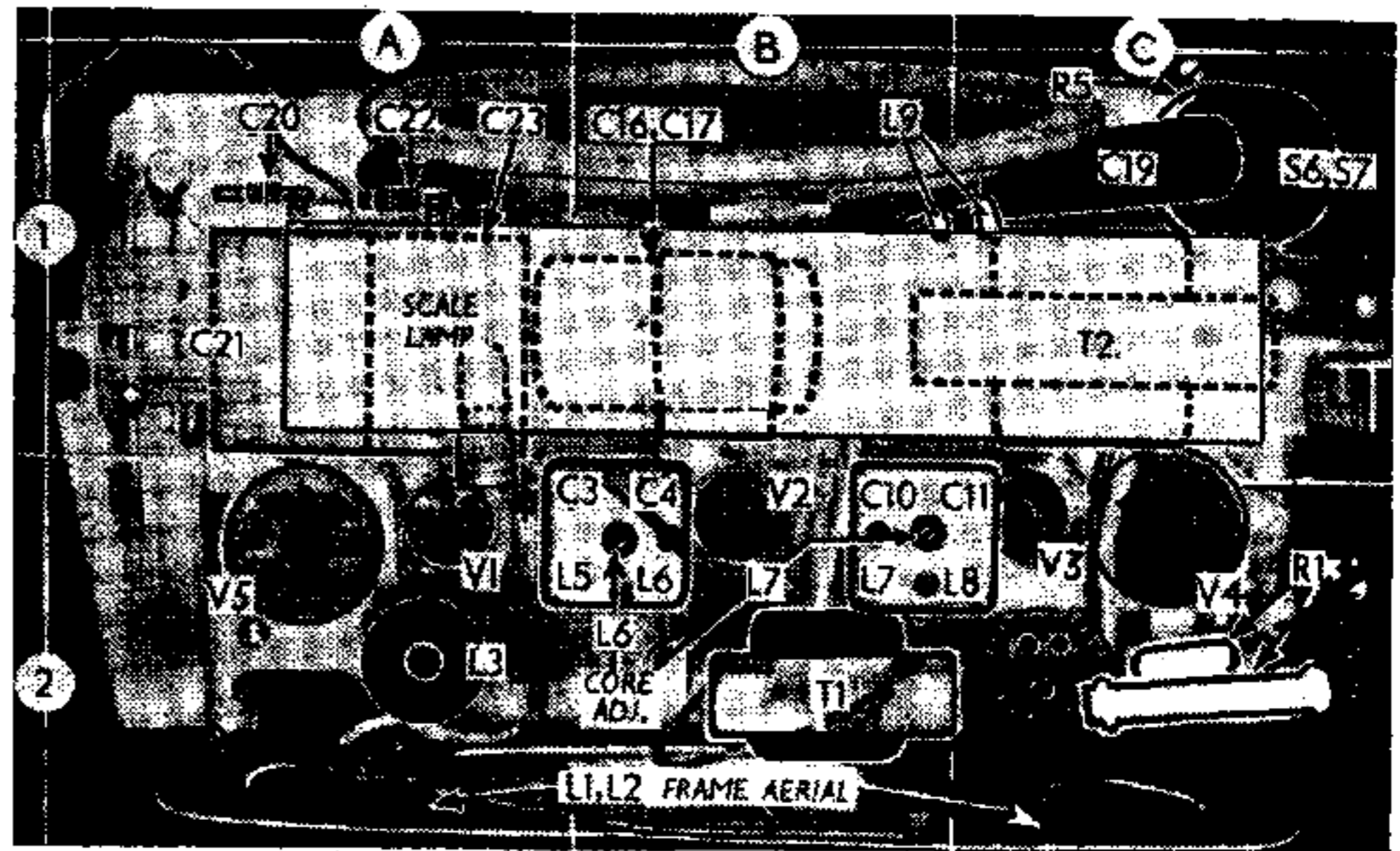
**Removing Chassis.**—Remove the three 4BA bolts with washers securing the chassis and black base cover to the carrying case, and withdraw chassis.

*When replacing,* lay the carrying case face-downwards on the bench, position the chassis in the case and replace the base cover with the semi-circular projections at the top and the rubber feet outside.

**Removing Speaker.**—Remove white scale backing plate by springing its two fixing brackets slightly towards each other; remove the 4BA nut and bolt with shake-proof washer holding bracket at top of speaker to metal strip supporting cursor carriage; unsolder speaker leads and pivot speaker



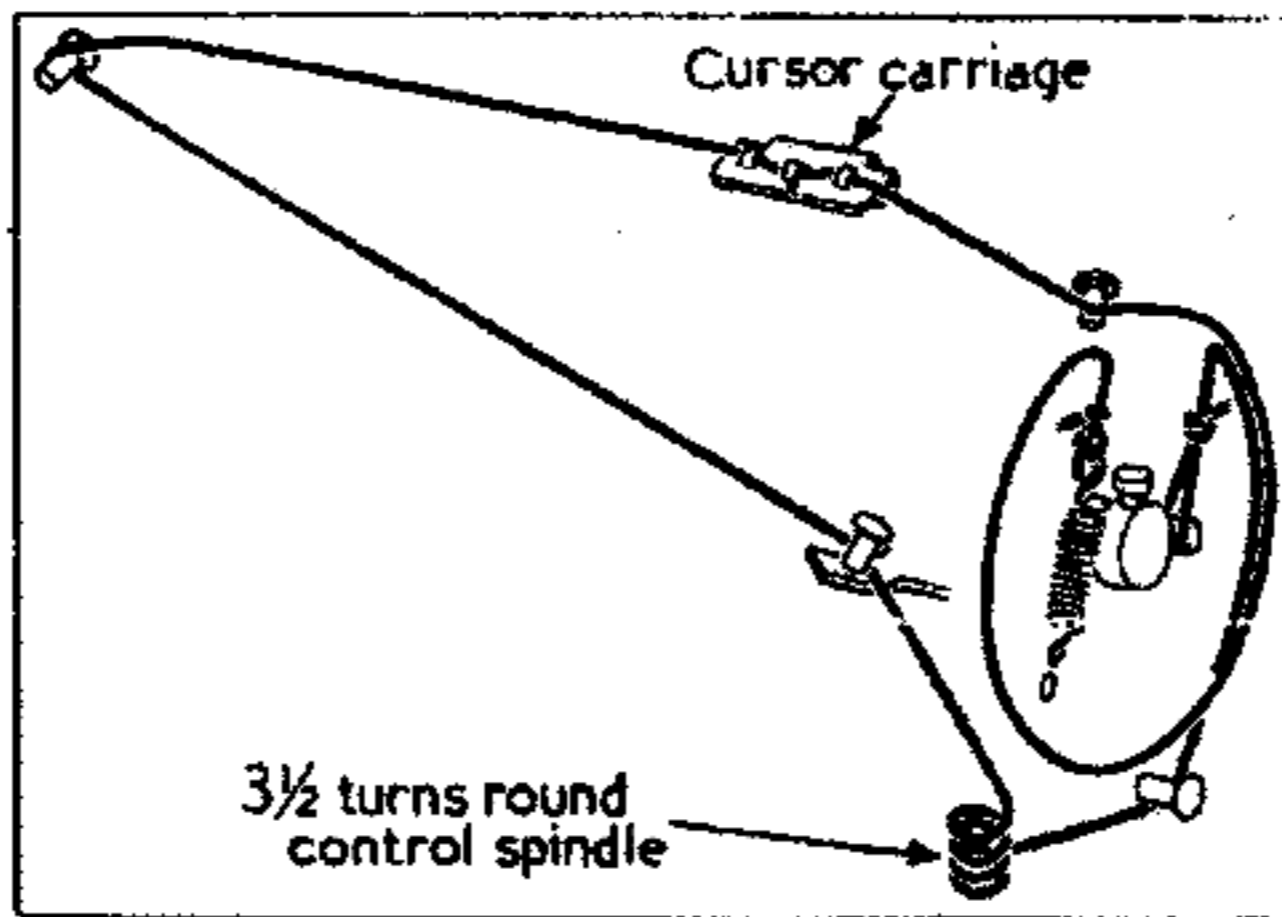
**Right.** Plan view of the chassis, with the speaker and frame windings in position. C20 and C22 are made of wire. **Above.** Diagram of the waveband switch unit, as seen in the under-chassis view below.



forward to disengage it from the lower chassis clip. *When replacing,* the speech coil tags should be at the top right-hand corner, viewed from rear of chassis.

**GENERAL NOTES**

**Switches.**—S1—S5 are the waveband switches, ganged in a rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram



Sketch of the tuning drive system, as seen from front with gang at maximum.

inset on the left of our plan view. Here it is drawn in the same position as it occupies in the underside view.

On M.W. (control lever to the left, moving switch rotor anti-clockwise as seen in our diagram) S1 and S4 close; on L.W., S2, S3 and S5 close.

S6, S7 are the Q.M.B. mains switches, ganged with the manual volume control R5. **Oscillator Coil L4.**—This is a single wind-

ing tapped for M.W. operation and for reaction coupling. The total D.C. resistance is 7 ohms, of which the upper section in our diagram accounts for 4 ohms and the lower section 3 ohms. The cathode tapping is something less than 1 ohm up the lower winding.

**Scale Lamp.**—This has a clear tubular bulb and an M.E.S. base. It is rated at 6.5 V. 0.3A. Its holder rides on the cursor carriage.

**Chassis Divergencies.**—In the makers' manual, V2 cathode is taken directly to chassis. R3 and C8 have been added to the circuit since it was printed. R10 may be a single resistor of about 6,000 ohms or it may be made up of two or more resistors. In our chassis it was made up of two 8,200 ohm resistors in parallel, connected in series with one of 1,800 ohms. In the same way, R13 in our sample was made up of a 150 ohm and a 470 ohm resistor connected in parallel.

**Drive Cord Replacement.**—About four feet of high quality flax fishing line, plaited and waxed, is required for a new drive cord. It is run as shown in the sketch (col. 2) where the complete system is shown as it would be seen from the front right-hand corner of the chassis when the gang is at maximum capacitance.

A start is made by looping the end over one of the boss screws on the gang drum, so that the cord can be pulled against the gang stop to keep it taut. The cord runs over four smooth guide posts, no pulleys being used.

**CIRCUIT ALIGNMENT**

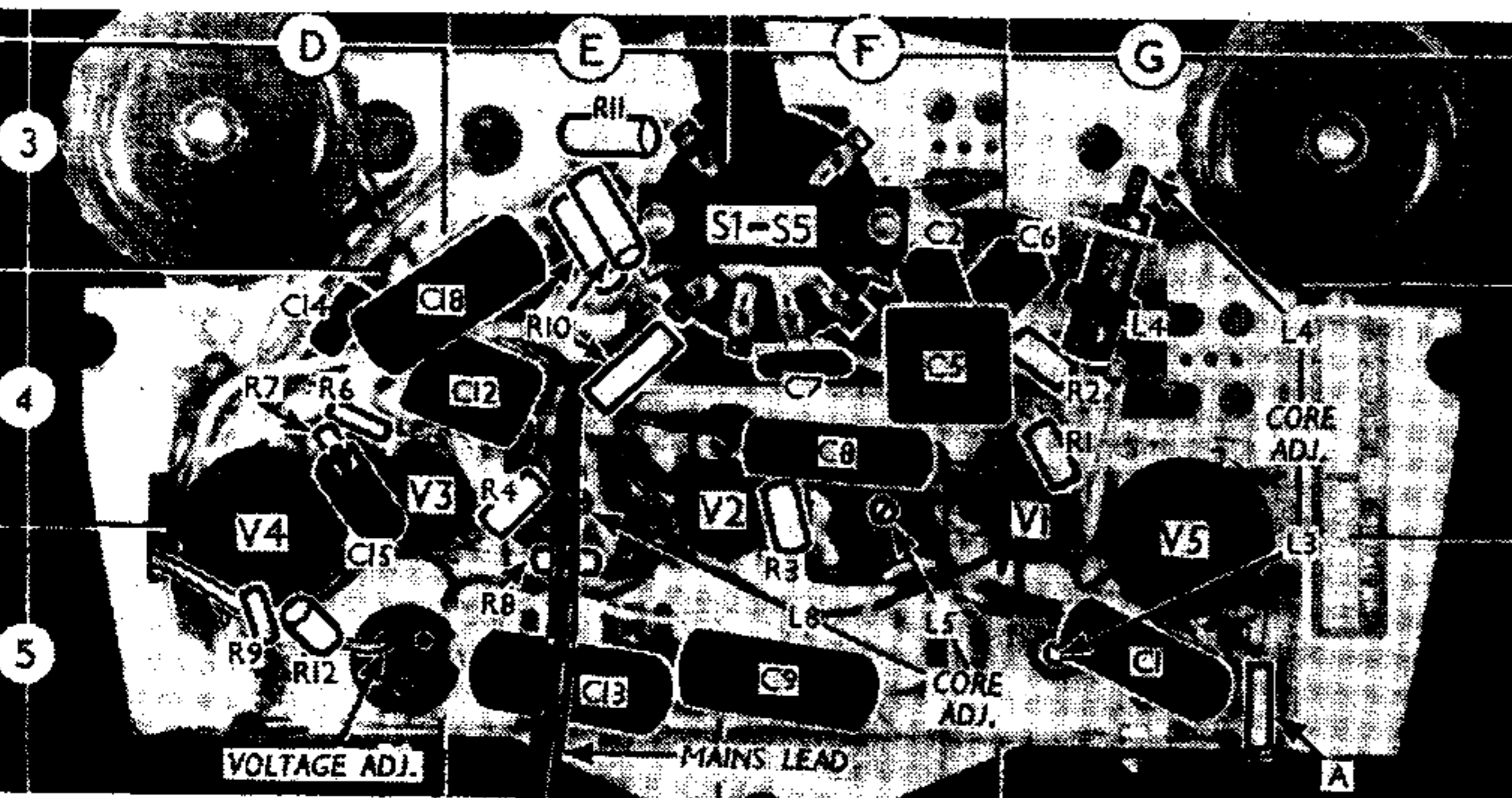
To gain access to the core and trimmer adjustments, the chassis should be removed from its carrying case, and as the tuning scale remains in the case alignment points are marked on the white celluloid scale backing plate.

**I.F. Stages.**—Switch set to M.W., turn volume control to maximum and gang to minimum, and connect signal generator, via a 0.1 μF capacitor in each lead, to control grid (pin 7) of V1 and chassis. Feed in a 422 kc/s. (710.8 m) signal and adjust the cores of L8, L7, L6 and L5 (location references E4, B2 and F4), in that order, for maximum output, reducing the input as the circuits come into line to avoid A.G.C. action. Repeat these adjustments.

**R.F. and Oscillator Stages.**—Check that with the gang at maximum capacitance, the cursor coincides with the mark at the right hand end of the white celluloid scale backing plate. C20 and C22 are trimmed by adjusting the amount of wire with which they are wound, although very small changes can be made by sliding the outer wire along the inner. Transfer "live" signal generator lead to aerial socket and replace its 0.1 μF capacitor with one of 200 pF.

**M.W.**—Switch set to M.W., tune to the 500 m. alignment mark on scale backing plate, (right centre), feed in a 500 m. (600 kc/s.) signal and adjust the core of L4 (G3) for maximum output. Tune to the 214.3 m. alignment mark (extreme left), feed in a 214.3 m. (1,400 kc/s.) signal, and adjust C22, C20 (A1) for maximum output. Repeat these adjustments.

**L.W.**—Switch set to L.W., tune to the 1,714 m. mark (left centre), feed in a 1,714 m. (175 kc/s.) signal and adjust the core of L3 (G5) for maximum output.



Under-chassis view. A detailed diagram of the S1-S5 switch unit appears beside our plan view.