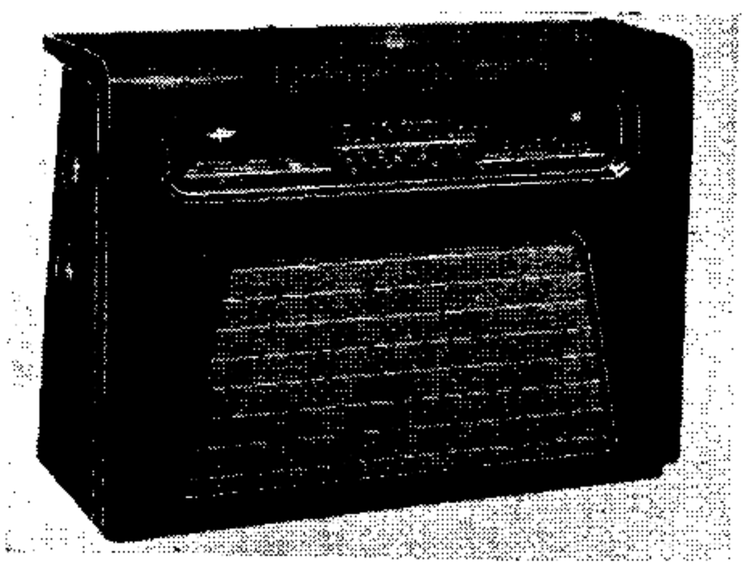
KOLSTER-BRANDES
DR10 SERIES



The appearance of the K.-B. DR10.

SPECIAL attention has been given to accessibility in the K.-B. DR10, whose chassis is of very open design and can be removed from the cabinet in about one minute and can be stood in almost any position without damage. Another commendable feature is the inclusion of an earthing lead in the mains lead, in addition to the normal **E** socket.

The receiver is a 4-valve (plus rectifier) 3-band superhet for operation from A.C. mains of 200-250 V, 50-100 c/s. The waveband ranges are 16.3-51 m, 187-585 m and 740-2,100 m. Provision is made for the connection of a gramophone pick-up and an external speaker.

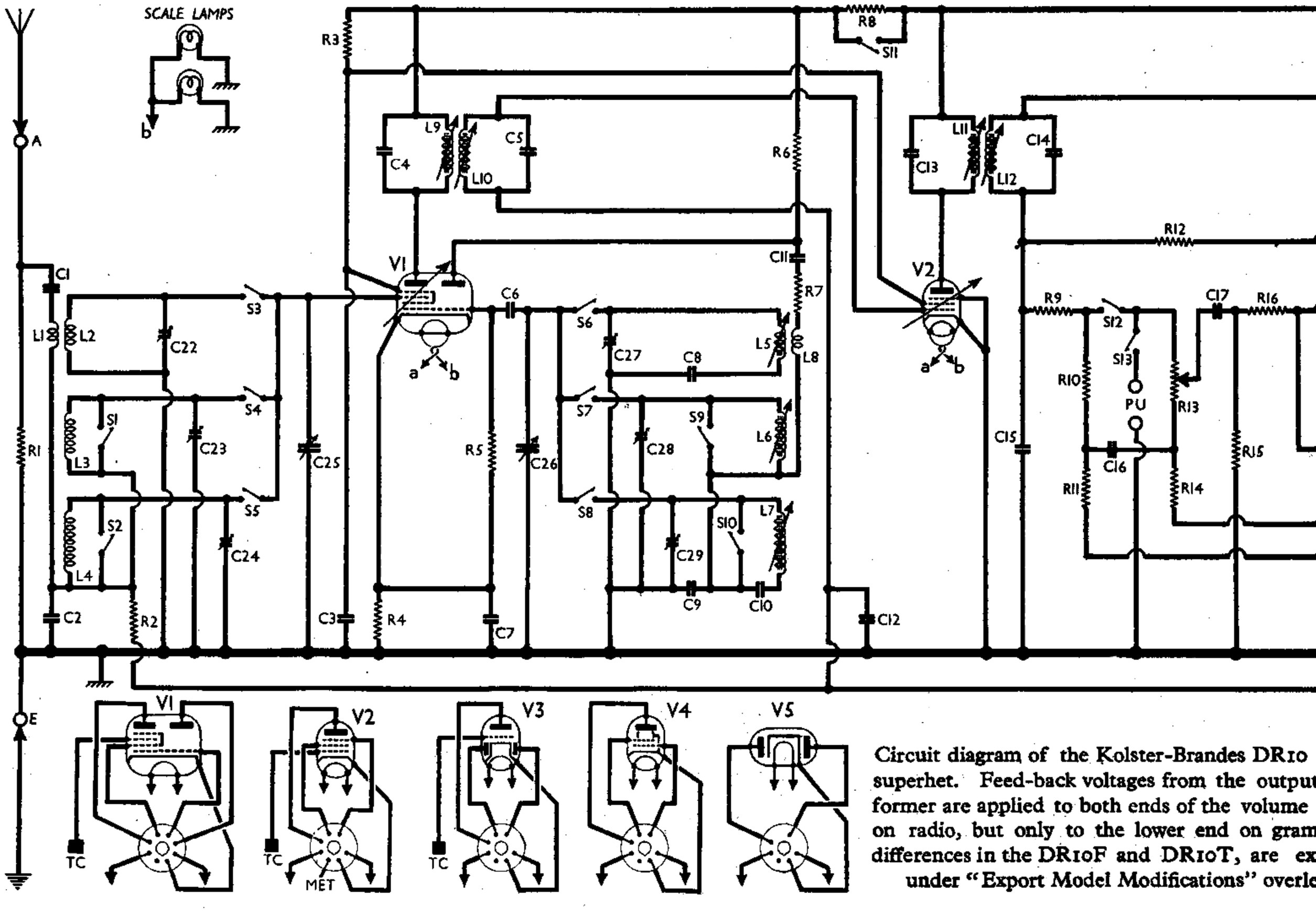
In the DR10F, the S.W. band is 70-190 m, but otherwise the receiver is similar in every respect to the DR10. In the DR10T, there are two S.W. bands, and the L.W. band is omitted. S.W.1 is 45-130 m, and S.W.2 is 14-42 m. The circuit changes involved are described overleaf.

Release date and original price, model DR10 only: October 1948; £16 1*s.* 3*d. plus purchase tax. DR10F and DR10T are export models.*

CIRCUIT DESCRIPTION

Aerial input is inductively coupled by **L1** to the single-tuned circuit **L2, C25** on S.W., and bottom coupled by the capacitative potential divider **C1, C2** to single-tuned circuits **L3, C25** (M.W.) and **L4, C25** (L.W.). A resistor **R1** is shunted across the coupling circuit to prevent modulation hum.

First valve **(V1, Brimar 6K8GT)** is a triode-hexode operating as frequency changer with electron coupling. Triode oscillator grid coils **L5** (S.W.), **L6** (M.W.) and **L7** (L.W.) are tuned by **C26,** with parallel trimming by **C27** (S.W.), **C28** (M.W.) and **C29** (L.W.) and series tracking by **C8** (S.W.), **C9** (M.W.) and **C9, C10** (L.W.). Reaction coupling from anode, via **C11** and stabilizing resistor **R7,** is inductive on S.W. due to **L8,** and capacitative on M.W. and L.W., due to the common impedance of tracker **C9** in grid and anode circuits.



Circuit diagram of the Kolster-Brandes DR10 superhet. Feed-back voltages from the output former are applied to both ends of the volume on radio, but only to the lower end on gram differences in the DR10F and DR10T, are ex under "Export Model Modifications" overle

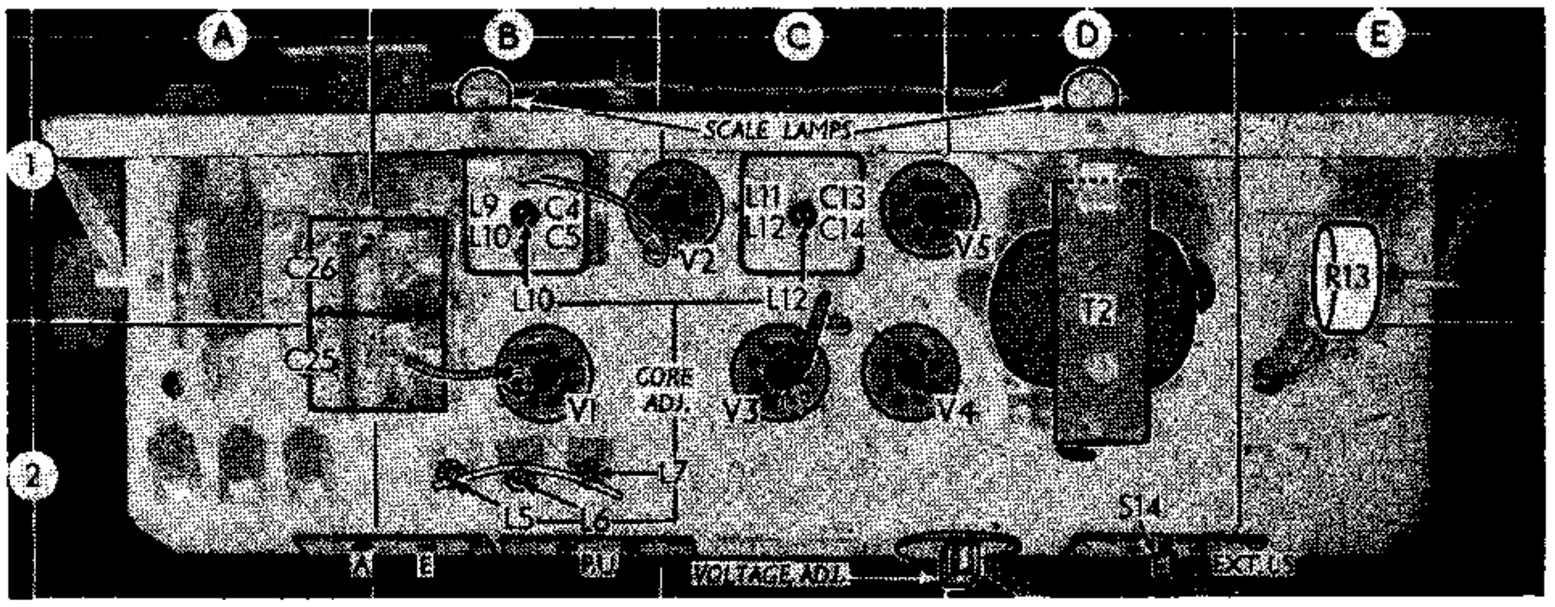
Second valve **(V2, Brimar 6K7GT)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier, with tuned-transformer couplings **C4, L9, L10, C5** and **C13, L11, L12, C14,** in which the tuning capacitors are fixed and alignment adjustments are carried out by varying the positions of the iron-dust cores.

Intermediate frequency 465 kc/s.

Diode second detector is part of double diode triode valve **(V3, Brimar 6Q7GT).** Audio frequency component in rectified output is developed across manual volume control **R13** and fed via A.F. coupling capacitor **C17,** C.G. resistor **R15** and grid stopper **R16** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C15, R9** in diode circuit and **R16** in triode grid circuit, and provision for the connection of a gramophone pick-up across **R13,** via **S13.** Radio is muted by opening **S11, S12.**

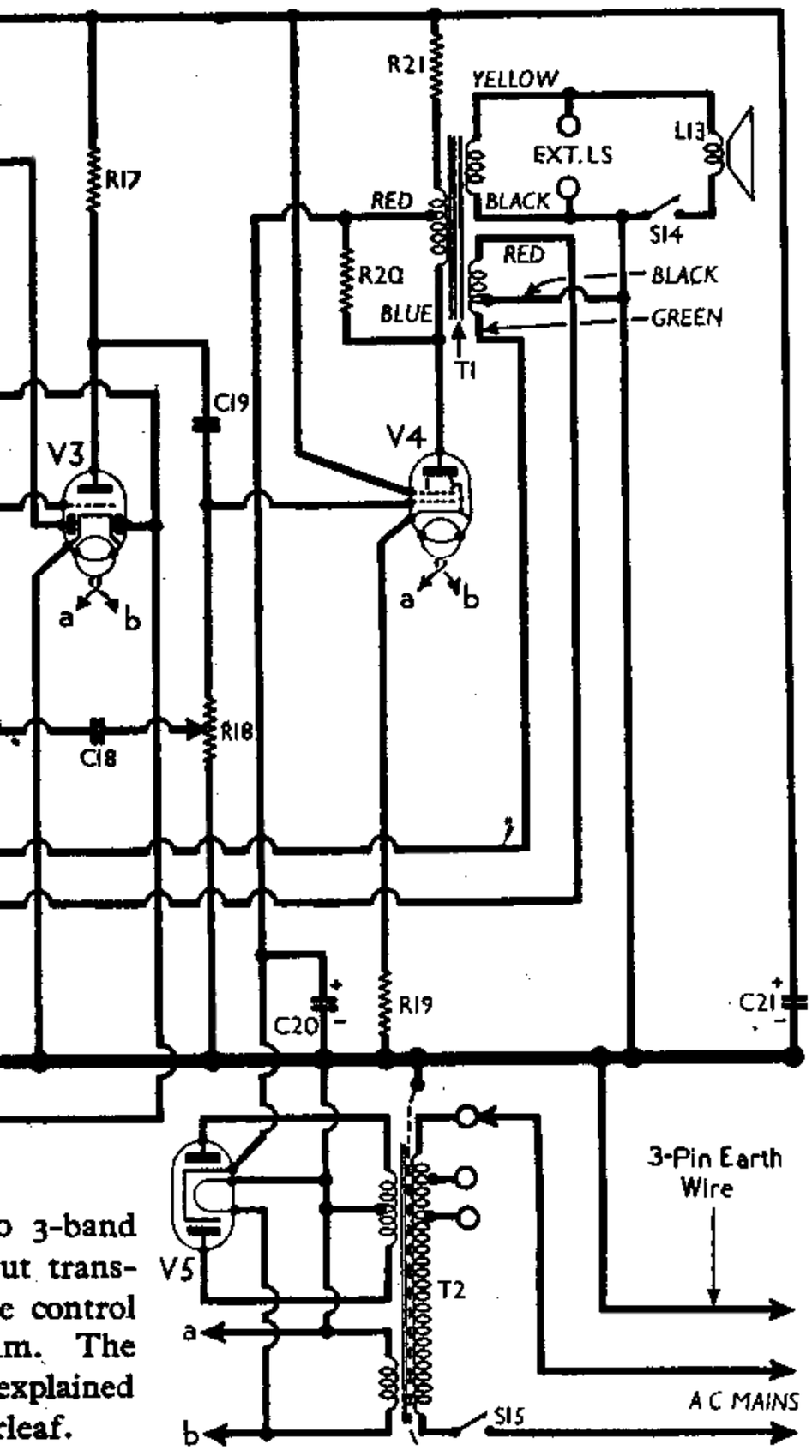
The D.C. potential developed across **R9, R13** in series is tapped off and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic gain control, and the second diode of **V3** is connected to the A.G.C. line to prevent it from ever developing a positive potential.

Resistance-capacitance coupling by **R17, C19, R18** between **V3** triode and beam tetrode output valve **(V4, Brimar 6V6GT),** with negative feed-back tone control by **R18, C18** between **V3-V4** control grids. Provision is made for the connection of a low-impedance external speaker across **T1** secondary winding, and a third winding on this transformer delivers mixed A.F. feed-back voltages to **V3** grid circuit to correct the A.F. response.



Plan view of the chassis. In the DR10T, the core adjustments shown as **L5, L6** and **L7,** would be for S.W.2, S.W.1 and M.W. respectively, instead of S.W., M.W. and L.W. as in the DR10 and DR10F.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Brimar 6X5GT).** Smoothing by resistor **R21** and electrolytic capacitors **C20, C21,** residual hum being neutralized by passing the H.T. current through a portion of **T1** primary winding.



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COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	Aerial input pot. divider	0·005	M5
C2	Aerial input pot. divider	0·003	M4
C3	S.G.'s decoupling	0·02	L4
C4	1st I.F. transformer tuning	0·00015	B1
C5	1st I.F. transformer tuning	0·00015	B1
C6	V1 osc. C.G.	0·0001	L4
C7	V1 cathode by-pass	0·02	K4
C8	Osc. S.W. tracker	0·004	L4
C9	Osc. M.W. tracker	0·00033	L4
C10	Osc. L.W. tracker	0·0002	K4
C11	Reaction coupling	0·0002	K4
C12	V2 C.G. decoupling	0·1	K4
C13	2nd I.F. transformer tuning	0·00015	C1
C14	2nd I.F. transformer tuning	0·00015	C1
C15	I.F. by-pass	0·0001	K3
C16	F.-B. coupling	0·25	J4
C17	A.F. coupling	0·005	F4
C18	Tone control	0·0001	G3
C19	A.F. coupling	0·02	J4
C20*	H.T. smoothing	16·0	G5
C21*	H.T. smoothing	24·0	G5
C22‡	Aerial S.W. trim.	0·00004	M4
C23‡	Aerial M.W. trim.	0·00004	M4
C24‡	Aerial L.W. trim.	0·00004	M5
C25†	Aerial tuning	—	B2
C26†	Oscillator tuning	—	B1
C27‡	Osc. S.W. trim.	0·00004	L4
C28‡	Osc. M.W. trim.	0·00004	L4
C29‡	Osc. L.W. trim.	0·00008	L5

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)	Locations
R1	Aerial shunt	2,200	M5
R2	V1 C.G. decoupling	100,000	M5
R3	S.G.'s H.T. feed	15,000	K3
R4	V1 fixed G.B.	300	K4
R5	V1 osc. C.G.	47,000	L4
R6	V1 osc. H.T. feed	33,000	L4
R7	Reaction stabilizer	100	L5
R8	H.T. limiter	470,000	M3
R9	I.F. stopper	47,000	J3
R10	F.-B. coupling resistors	2,200,000	J3
R11	F.-B. coupling resistors	1,000	J4
R12	A.G.C. decoupling	1,500,000	K3
R13	Volume control	500,000	E1
R14	F.-B. coupling	240	J3
R15	V3 triode C.G.	10,000,000	F3
R16	V3 grid stopper	100,000	F3
R17	V3 anode load	470,000	J4
R18	Tone control	500,000	G4
R19	V4 G.B. resistor	240	J4
R20	Tone corrector	47,000	H4
R21	H.T. smoothing	1,500	J4

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial S.W. coils	Very low	M5
L2	Aerial S.W. coils	Very low	M5
L3	Aerial M.W. coil	3·0	M5
L4	Aerial L.W. coil	21·0	M5
L5	Osc. S.W. tuning	Very low	L5
L6	Osc. M.W. coil	3·0	L5
L7	Osc. L.W. coil	8·5	K5
L8	Osc. S.W. reaction	Very low	L5
L9	1st I.F. trans. Pri.	5·0	B1
L10	1st I.F. trans. Sec.	5·0	B1
L11	2nd I.F. trans. Pri.	5·0	C1
L12	2nd I.F. trans. Sec.	5·0	C1
L13	Speech coil	2·0	—
T1	O.P. trans. Pri., total	520·0	J5
T1	O.P. trans. Spkr. sec.	Very low	J5
T1	O.P. trans. F.-B. sec., total	3·0	J5
T2	Mains trans. Pri., total	49·0	D1
T2	Mains trans. H.T. sec., total	580·0	D1
T2	Mains trans. Heater sec.	Very low	D1
S1-S10	Waveband switches	—	M4
S11-S13	Radio/gram. switches	—	L4
S14	Speaker switch	—	G5
S15	Mains switch, ganged R18	—	G4

DISMANTLING THE SET

Removing Chassis.—Pull off the four control knobs and withdraw the two cheese-head screws (with lock washers) at the rear of the chassis;

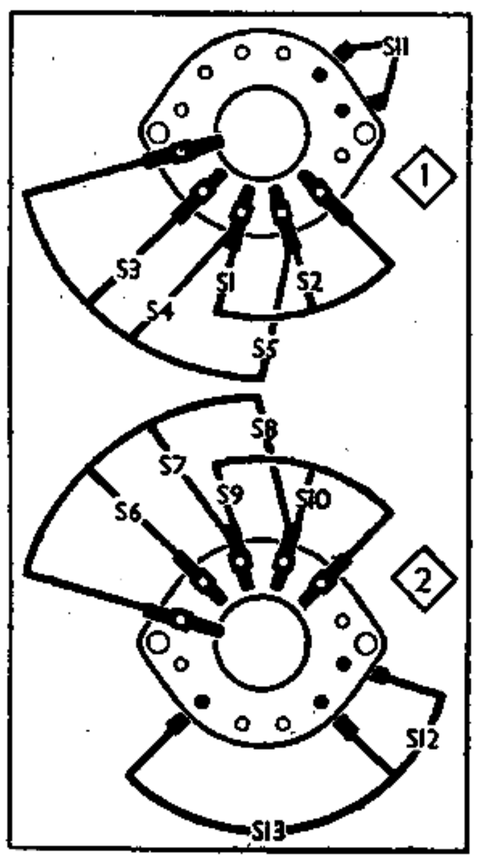
the chassis may now be slid out of the cabinet to the extent of the speaker leads, which is sufficient for most purposes, but these may be unsoldered if desired.

Removing Speaker.—Withdraw the four cheese-head screws (with lock washers) securing the speaker to the sub-baffle, and lift it out.

When replacing, the speech-coil connecting panel should be at the bottom.

Switch Table and Diagrams

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



Diagrams of the waveband switch units drawn as seen in the directions of the arrows in the under-chassis illustration. Note that they face opposite directions.

GENERAL NOTES

Switches.—S1-S10 are the waveband switches, and **S11-S13** are the radio/gram change-over switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view, where arrows show the directions in which they are viewed in the diagrams above, where the units are shown in detail.

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

S14 is the internal speaker switch mounted on the external speaker panel. **S15** is the mains switch, ganged with the tone control **R18.**

Scale Lamps.—These are two M.E.S. type lamps, with clear spherical bulbs, rated at 6.5 V, 0.3 A.

External Speaker.—Sockets are provided at the rear of the chassis for the connection of a low impedance (about 2-4 Ω) external speaker. On the same panel is mounted **S14,** which may be used to mute the internal speaker.

EXPORT MODELS

Models DR10F and DR10T are export versions of the DR10, the differences between the three being limited to the waveband ranges covered.

In the DR10F, the S.W. range is 70-190 m, and in consequence small changes are made in the aerial and oscillator circuits. **L2** is bottom-coupled, like **L3** and **L4, C8** becomes 0.001 μF, **C29** may become 0.00004μF, and **R4** and **C7** are omitted, **V1** cathode going directly to chassis.

In the DR10T, the L.W. band is omitted, the M.W. band taking its place, and there are two S.W. bands, S.W.1 (45-130 m) and S.W.2 (14-42 m).

Electrically, the differences are shown in the diagram below, where the whole of the aerial and oscillator circuits are shown. Here, the wavebands are S.W.2, S.W.1 and M.W., reading from top to bottom. In the chassis, the coils and trimmers will be found in the positions shown in our chassis illustrations for the S.W., M.W. and L.W. circuits, reading in the same order.

As in the DR10F, **R4** and **C7** are omitted. **C29** becomes 0.00004 μF, and the S.W.1 tracker is 0.0015 μF. Otherwise components shown have the same values as in the DR10 circuit overleaf.

VALVE ANALYSIS

Valve voltages and currents in the table (next col.) are those measured in our receiver when it was operating from mains of 227 V, using the 225 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)	Cathode Voltage (V)
V1 6K8GT	220	2·1	100	5·4	2·9‡
	Oscillator				
	82	3·6			
V2 6K7GT	220	12·5	100	2·8	—
V3 6Q7GT	39	1·7	—	—	—
V4 6V6GT	244	38·0	220	2·2	9·5‡
V5 6X5GT	260†	—	—	—	263

† Each anode, A.C. ‡ 10 V meter range.

Voltages were measured on the 400 V scale of a model 7 Avometer, except where otherwise indicated, chassis being the negative connection.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator via an 0.1 μF capacitor in the "live" lead, to control grid (top cap) of **V1** and the **E** socket, switch set to M.W., turn gang and volume control to maximum, and feed in a 465 kc/s (645.16 m) signal. Adjust the cores of **L12, L11, L10** and **L9** (location references C1, J3, B1, L3) for maximum output.

R.F. and Oscillator Stages.—Since the calibrated glass scale is mounted in the cabinet, and alignment adjustments have to be carried out with the chassis on the bench, a series of calibration marks are printed on the front of the scale backing plate, and readings are made against the long centre cursor. The exact positions of the marks with respect to the datum lines, and the wavelengths which they represent, are indicated in our drawings in col. 6, for the three versions of the D.R.10 receiver.

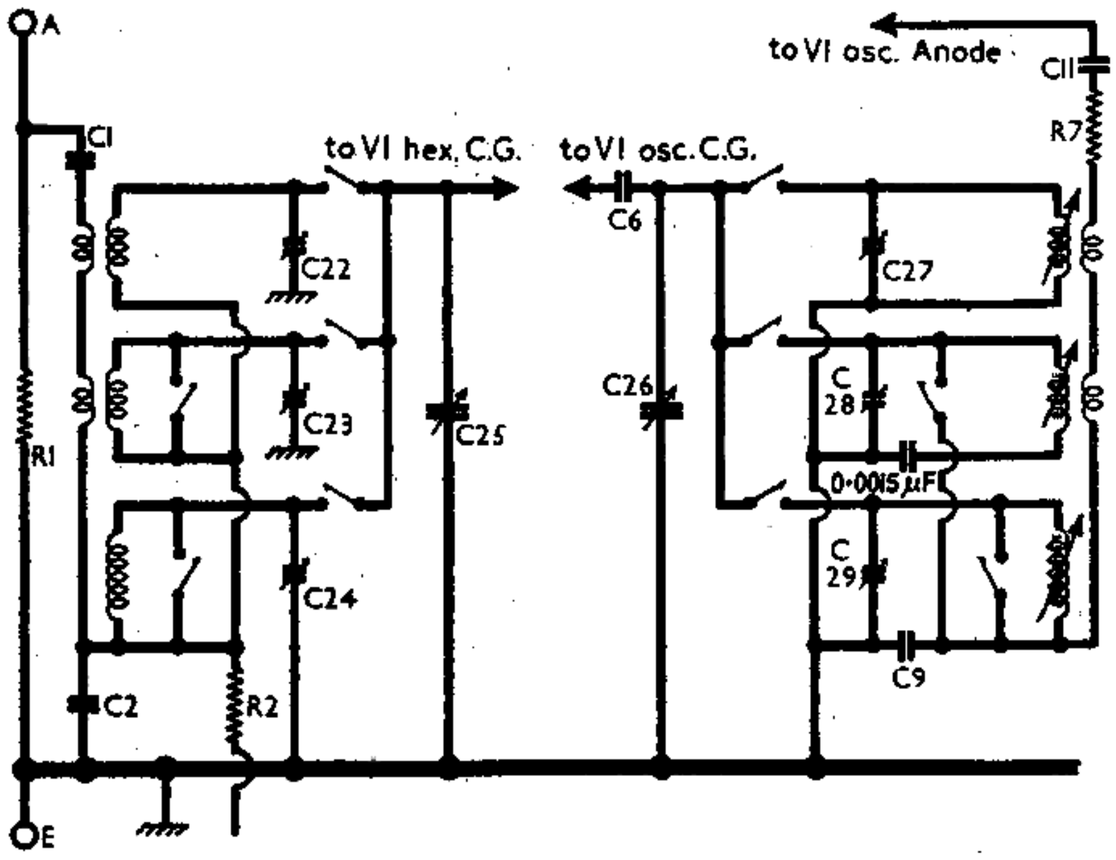
With the gang at maximum capacitance the cursor should coincide with the datum line, and any error may be corrected by rotating the drive drum on its spindle, after slackening the two grub screws. Transfer "live" signal generator lead to **A** socket, via a suitable dummy aerial. The sensitivity is given as better than 150 μV for 50 mW output on all bands.

M.W.—With set switched to M.W., tune to 214 m line, feed in a 214 m (1,400 kc/s) signal, and adjust **C28** (L4) and **C23** (M4) for maximum output. Tune to 500 m line, feed in a 500 m (600 kc/s) signal, and adjust the core of **L8** (B2) for maximum output.

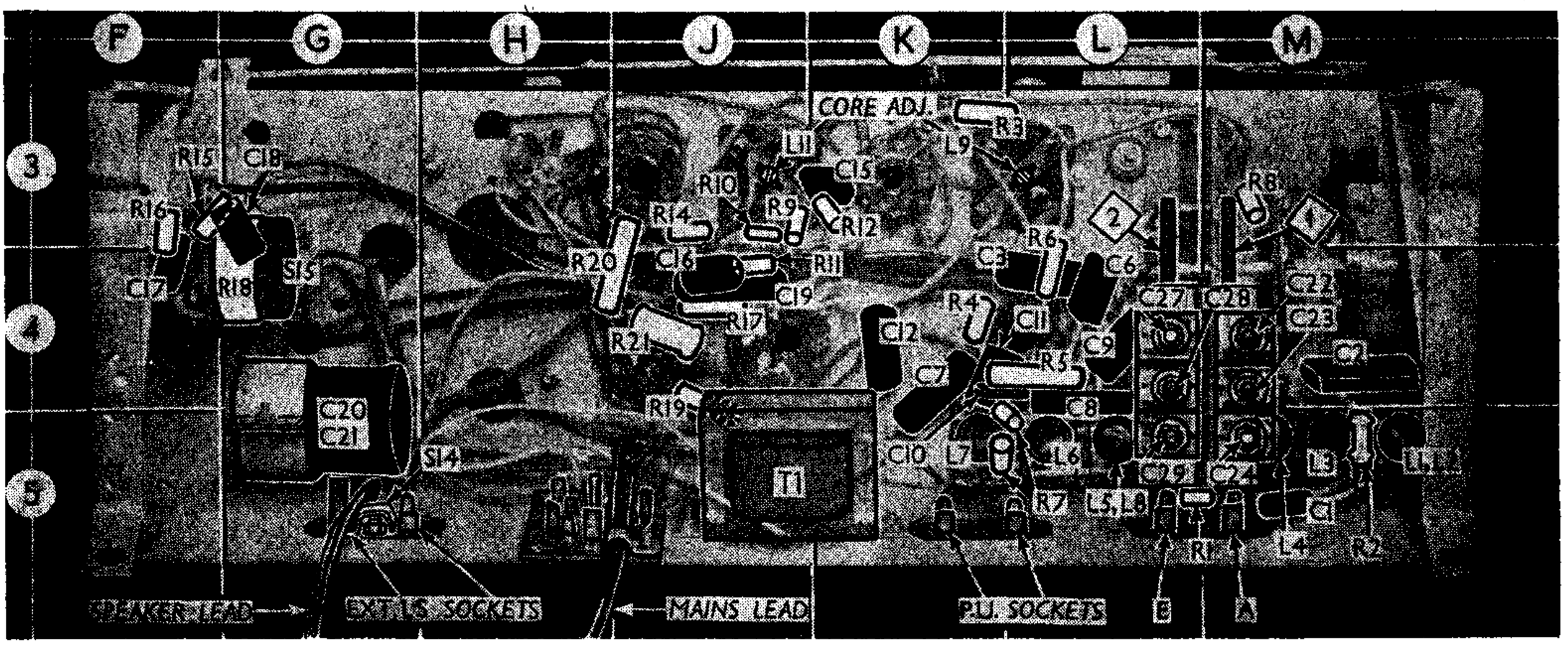
L.W.—Switch set to L.W., tune to 860 m line, feed in an 860 m (348.8 kc/s) signal, and adjust **C29** (L5) and **C24** (M5) for maximum output. Tune to 1,714 m line, feed in a 1,714 m (175 kc/s) signal, and adjust the core of **L7** (B2) for maximum output. Repeat these operations and then re-check the M.W. alignment.

S.W.—Switch set to S.W., tune to 20 m line, feed in a 20 m (15 Mc/s) signal, and adjust **C27** (L4) and **C22** (M4) for maximum output. Tune to 50 m line, feed in a 50 m (6 Mc/s) signal, and adjust the core of **L5** (B2) for maximum output.

For the DR10F, switch set to S.W., tune to 86 m line, feed in an 86 m (3.48 Mc/s) signal, and adjust **C27** (L4) and **C22** (M4) for maximum output. Tune to 176 m line, feed in a 176 m (1.7 Mc/s) signal, and adjust the oscillator coil core (B2) for maximum output.



Diagrams of the aerial and oscillator circuits in the DR10T. Except where differences are shown here, the components are the same as those in the circuit diagram overleaf, but the wavebands are S.W.2, S.W.1 and M.W., reading from top to bottom.



Under-chassis view. The waveband switch units are indicated here by arrows which show the directions in which they are viewed in the diagrams in col. 1. The sequence of the trimmers is the same in all models: shortest waveband at the front, and longest at the rear. The sequence of the coil assemblies is also uniform in the same way.

For the DR10T, switch set to S.W.1, tune to 46 m line, feed in a 46 m (6.52 Mc/s) signal, and adjust **C28** (L4) and **C23** (M4) for maximum output. Tune to 120 m line, feed in a 120 m (2.5 Mc/s) signal, and adjust the oscillator coil core (B2) for maximum output.

Switch set to S.W.2, tune to 14.3 m line, feed in a 14.3 m (20.98 Mc/s) signal, and adjust **C27** (L4) and **C22** (M4) for maximum output. Tune to 37.5 m line, feed in a 37.5 m (8 Mc/s) signal, and adjust the oscillator coil core (B2) for maximum output.

DRIVE CORD REPLACEMENT

Good quality plaited twine is used for the tuning drive, 4ft 6in providing ample length to spare for tying off. It should be run as shown in the sketch above, where the drive system is drawn as seen from the front right-hand corner of the chassis when the gang is at maximum, neglecting the obstruction caused by the scale backing plate.

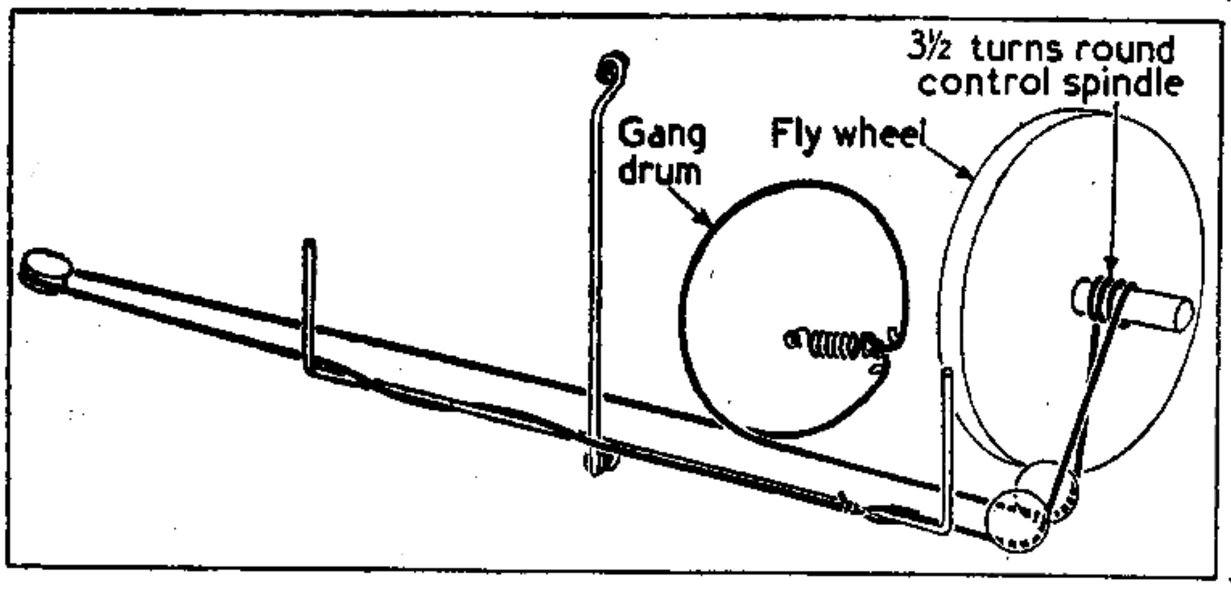
If the cord is to be fitted as shown in our sketch, it must be made up before fitting. To do this, make a loop about ¼in diameter in one end, then loop or knot the tension spring on to the cord 18¾in from the outer end of the loop. Slip the loop over the right-hand cursor, and seal it temporarily in position on the cursor bar with wax, as shown in the sketch.

Pass the cord round the left-hand pulley, and run the cord as shown in the sketch, hooking the spring in position shown on the way, and finally tie the free end to the loop, first winding the cord at the starting end round the cursor rod as shown, and pulling up the slack cord so that the whole system is taut. A series of holes is provided in the drive drum for subsequent adjustment of tension.

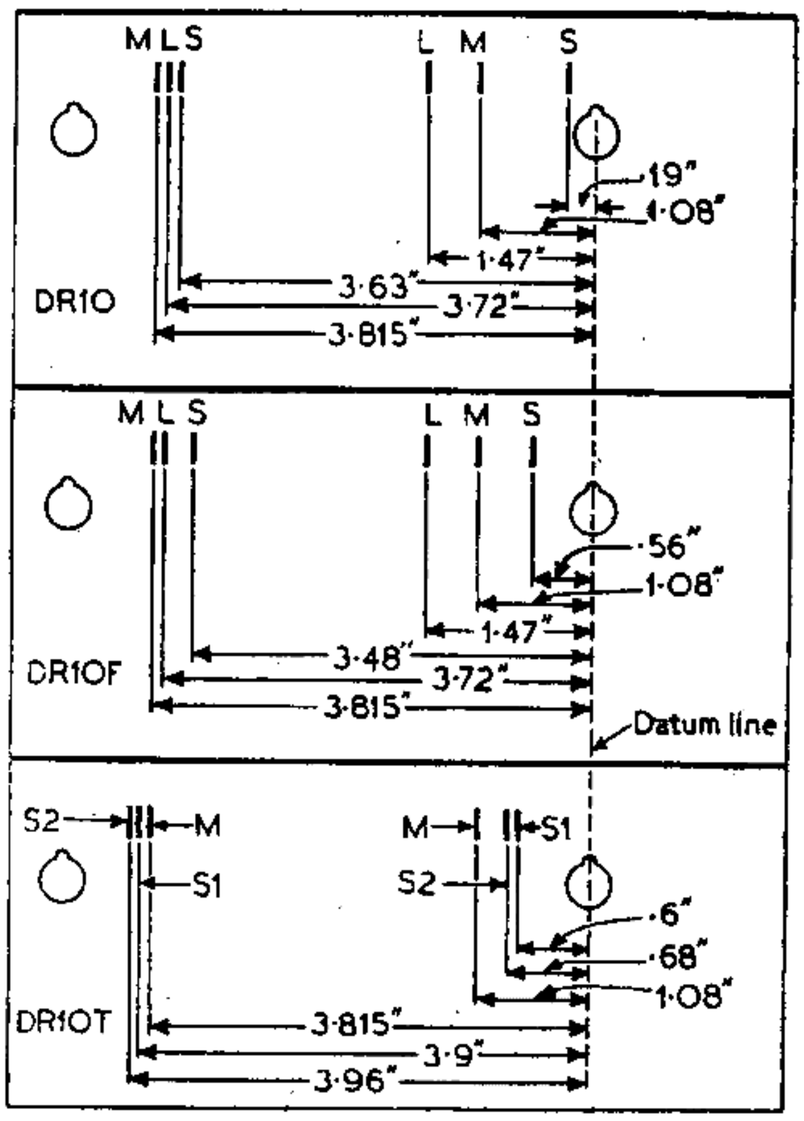
Until the free end of the cord is tied off to the starting loop, the cursor hangs down from the chassis, supported only by the wax by which the starting loop was sealed to it at the commencement of the operation.

An alternative method of running the cord is to start by tying one end to the tension spring and run the cord from there round the whole system, instead of starting at the cursor rod. This avoids the need to make up the cord in advance.

The calibration can be adjusted over a fairly wide range by turning the drum on the gang spindle, but some adjustment is also possible by moving the loop along the cursor bar. The long central cursor should cover the datum line shown in our calibration drawings in col. 6 when the gang is at maximum. After adjustment, wax should be used to seal the cord to each end of the cursor rod.



Sketch of the tuning drive system, viewed from the right-hand front corner. The ends of the cord can be terminated at the cursor bar (as shown) or at the drum.



Calibration diagrams for the three models, showing the exact positions of the calibration marks for alignment purposes as printed on the scale backing plate. Reading from top downwards, they are DR10, DR10F, DR10T.

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