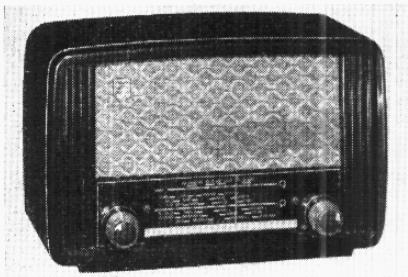
"TRADER" SERVICE SHEET

1115

PHILIPS 131U

Covering also Mod



Appearance of the 131U "Starlet."

A LOW-IMPEDANCE frame aerial is a feature of the Philips 131U "Starlet," a 4-valve plus rectifier 2-band A.C./D.C. superhet for mains of 110-250 V, 50-100 c/s in the case of A.C. Waveband ranges are 185-580m and 1,150-2,000 m. The frame aerial consists of a solid aluminium strip.

Model 210U is an earlier 3-band version of the 131U with a S.W. band coverage of 16.5-50.5m. The differences between the two models are fully covered in the circuit diagram below.

Release dates and original prices: Model 131U, June 1953, £11 18s 5d; Model 210U, August 1952, £13 19s 5d. Purchase tax extra.

CIRCUIT DESCRIPTION

Aperiodic frame aerial input from **L1** via **L5** and **L6** to single-tuned circuits **L4, C27** (M.W.) and **L7, C27** (L.W.). A S.W. band is provided in Model 210U, and has an internal plate aerial which is coupled via **L15** to single-tuned circuit **L16, C27.**

Provision is made for the connection of an external aerial, via I.F. filter **L2, C3,** to S.W. coupling coil **L15** (Model 210U only), M.W. coupling coil **L3,** and L.W. bottom capacitance coupling **C5.**

The complete R.F. and oscillator circuit of Model 210U is drawn to the left of the main circuit diagram below.

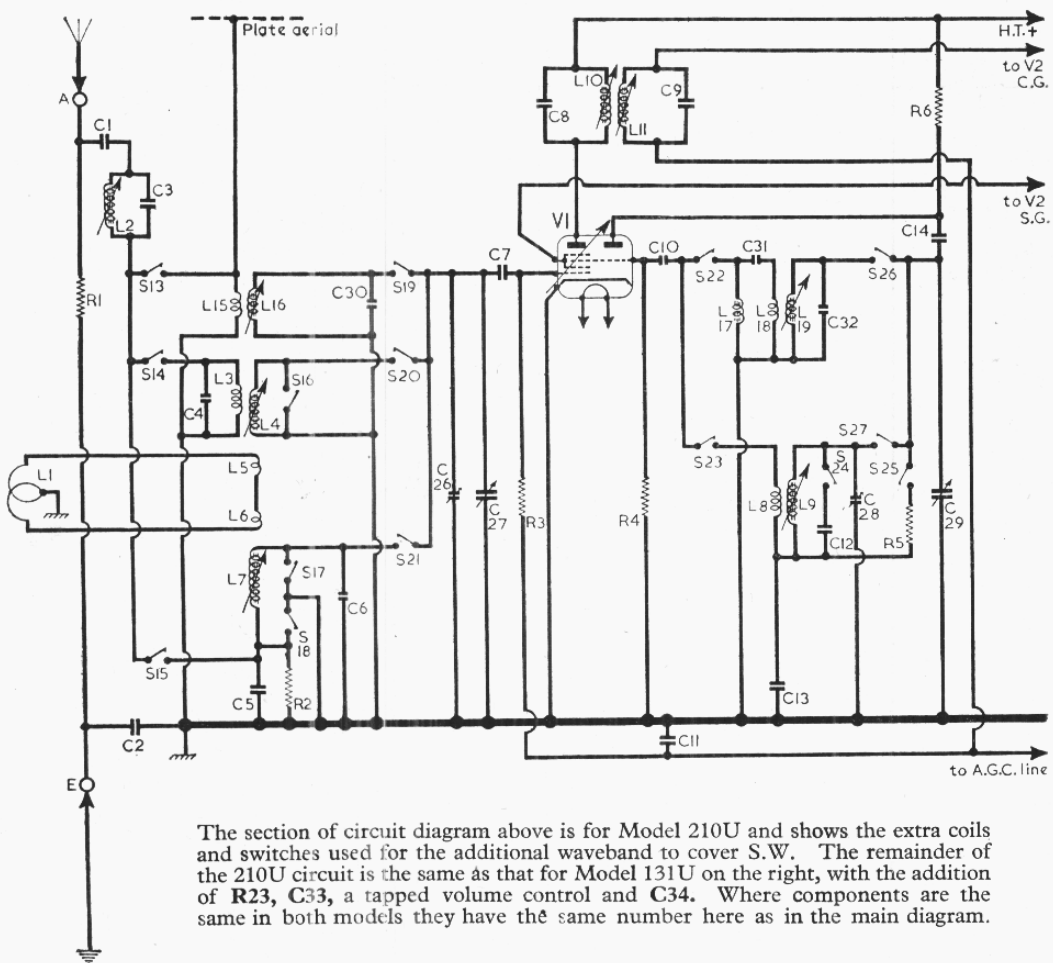
First valve (**V1, Mullard UCH42**) is a triode hexode operating as frequency changer with internal coupling. Single oscillator anode coil **L9** is tuned by **C29** for M.W. and L.W. operation. Parallel trimming by **C28** (M.W.) and **C12, C28** (L.W.); series tracking by **C13** (M.W. and L.W.). Reaction coupling from grid circuit by **L8,** with additional coupling across the common impedance of tracker **C13.** In Model 210U, the S.W. coil **L19** is tuned by **C29.** Reaction coupling comprises a double resonant circuit **L17, C31, L18** which resonates at both ends of the band to maintain a constant oscillator output over this range.

Second valve (**V2, Mullard UF41**) is a variable-mu R.F. pentode, operating as intermediate frequency amplifier with tuned transformer couplings **C8, L10, L11, C9** and **C16, L12, L13, C17.**

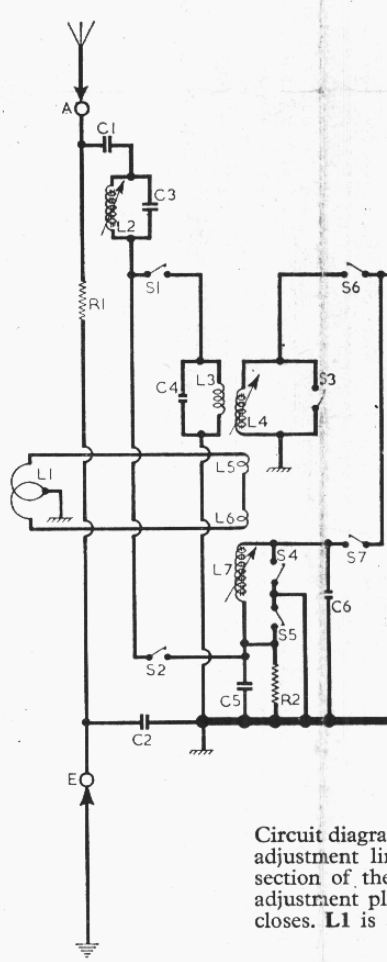
Intermediate frequency 470 kc/s

Diode signal detector is part of double diode triode valve (**V3, Mullard UBC41**). Audio frequency component in rectified output is developed across volume control **R9** and passed via **C19** to grid of triode section. In Model 210U, tone correction at low level settings of the volume control is provided by **R21, C33.**

D.C. potential developed across the volume control is fed back as bias to **V1** and **V2,** giving automatic gain control.



The section of circuit diagram above is for Model 210U and shows the extra coils and switches used for the additional waveband to cover S.W. The remainder of the 210U circuit is the same as that for Model 131U on the right, with the addition of **R23, C33,** a tapped volume control and **C34.** Where components are the same in both models they have the same number here as in the main diagram.



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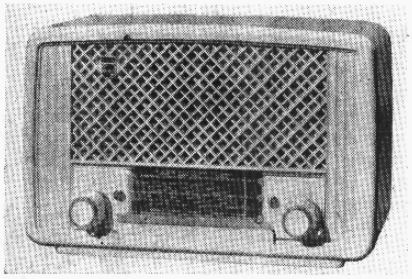


Appearance of Model 210U.

Resistance-capacitance coupling by **R12, C20** and **R13** between **V3** and pentode output valve (**V4, Mullard UL41**). Tone correction in anode circuit by **C22.** Two-position tone control by **S10** and **C21** which feeds back speech coil voltages from **T1** secondary winding to **V3** grid.

H.T. current is supplied by half-wave I.H.C. rectifying valve (**V5, Mullard UY41**). Smoothing by **R16** and electro-

(*Continued col. 1 overleaf*)

COMPONENT VALUES AND LOCATIONS

CAPACITORS		Values	Locations
C1	Chassis isolators ...	0·001μF	G4
C2	Chassis isolators ...	0·0047μF	F4
C3	I.F. filter tuning ...	270pF	G3
C4	M.W. aerial shunt	82pF	G4
C5	L.W. aerial coup....	0·0018μF	G4
C6	L.W. aerial trim. ...	75pF	F4
C7	V1 C.G.	100pF	F3
C8	1st I.F. trans.	115pF	B2
C9	1st I.F. trans. tuning	115pF	B2
C10	V1 osc. C.G. ...	47pF	F3
C11	A.G.C. decoupling	0·047μF	E3
C12	L.W. osc. trim. ...	412pF	G3
C13	Oscillator tracker...	440pF	G3
C14	Osc. anode coup. ...	470pF	F3
C15	S.G. decoupling ...	0·1μF	E4
C16	2nd I.F. trans.	110pF	B2
C17	2nd I.F. trans. tuning	110pF	B2
C18	I.F. by-pass ...	100pF	E4
C19§	A.F. coupling ...	0·0047μF	D4
C20	A.F. coupling ...	0·01μF	E3
C21¶	Part tone control ...	82pF	C1
C22	Tone corrector ...	0·022μF	C1
C23*	H.T. smoothing ...	50μF	A2
C24*	H.T. smoothing ...	50μF	A2
C25	Mains R.F. filter ...	0·033μF	D4
C26‡	M.W. aerial trim....	30pF	A2
C27†	Aerial tuning ...	500pF	A2
C28‡	M.W. osc. trim. ...	30pF	B1
C29†	Oscillator tuning ...	500pF	A1
C30	S.W. aerial trim. ...	12pF	—
C31	S.W. osc. coup. ...	68pF	—
C32	S.W. osc. trim. ...	18pF	—
C33	Tone corrector ...	0·015μF	—
C34	I.F. by-pass ...	330pF	—

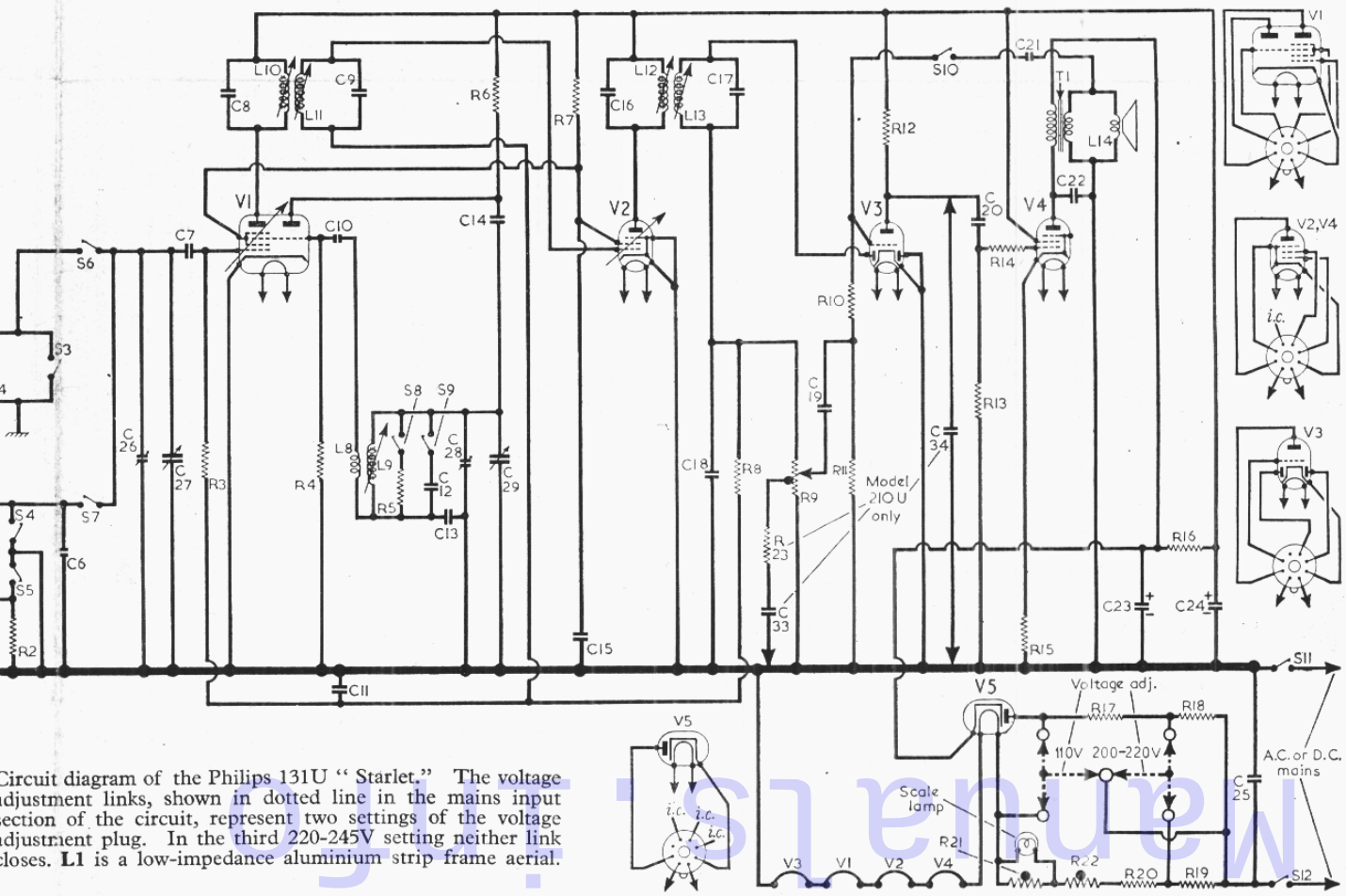
* Electrolytic. † Variable. ‡ Pre-set. § 0·0022μF in Model 210U. ¶ 100pF in Model 210U.

RESISTORS		Values	Locations
R1	Anti-static shunt...	1MΩ	G4
R2	L.W. aerial shunt...	10kΩ	G4
R3	V1 C.G.	680kΩ	F4
R4	V1 osc. C.G. ...	22kΩ	F3
R5	M.W. osc. limiter...	10kΩ	G3
R6	Osc. anode feed ...	22kΩ	E3
R7	S.G. H.T. feed ...	18kΩ	F3
R8	A.G.C. decoupling	1·5MΩ	F4
R9*	Volume control ...	500kΩ	D3
R10	V3 C.G. stopper ...	100kΩ	E3
R11	V3 C.G.	4·7MΩ	E4
R12	V3 anode load ...	220kΩ	E4
R13	V4 C.G.	680kΩ	E3
R14	V4 C.G. stopper ...	1kΩ	E3
R15	V4 G.B.	150Ω	E4
R16	H.T. smoothing ...	1kΩ	D3
R17	Voltage adjustment resistors...	180Ω	C2
R18	Voltage adjustment resistors...	60Ω	C2
R19	Voltage adjustment resistors...	250Ω	C2
R20	Voltage adjustment resistors...	538Ω	C2
R21	Thermistor ...	†	F3
R22	Thermistor ...	‡	B1
R23	Tone corrector ...	15kΩ	—

* Tapped at 50kΩ from chassis in Model 210U.
† Type 49.379.67. 8kΩ–15kΩ cold.
‡ Type 49.379.62. 2kΩ–3·5kΩ cold.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Frame aerial ...	—	C2
L2	I.F. filter	8·0	A1
L3	M.W. aerial coup.	40·0	A2

(*Continued col. 1 overleaf*)



Circuit diagram of the Philips 131U "Starlet." The voltage adjustment links, shown in dotted line in the mains input section of the circuit, represent two settings of the voltage adjustment plug. In the third 220-245V setting neither link closes. **L1** is a low-impedance aluminium strip frame aerial.

OTHER COMPONENTS (Continued)		Approx. Values (ohms)	Locations
L4	M.W. aerial tuning	2·0	A2
L5, L6	Frame aerial coupling coils	—	A2
L7	L.W. aerial tuning	23·0	A2
L8	Osc. reaction coil	8·6	A1
L9	Osc. tuning coil	10·5	A1
L10	1st I.F. trans. Pri.	7·0	B2
L11	1st I.F. trans. Sec.	7·0	B2
L12	2nd I.F. trans. Pri.	13·0	B2
L13	2nd I.F. trans. Sec.	13·0	B2
L14	Speech coil	2.6	—
L15	S.W. aerial coup.	1·5	—
L16	S.W. aerial tuning	0·2	—
L17, L18	Oscillator S.W. reaction coils	0·7 0·8	— —
L19	S.W. osc. tuning	0·3	—
T1	O.P. trans. Pri.	360·0	C1
	O.P. trans. Sec.	0·8	
S1-S9	Waveband switches	—	F4
S10	Tone control switch	—	C1
S11, 12	Mains sw., g'd R9	—	D3
S13-27	W/band s.w. (210U)	—	—

Circuit Description—*continued.*

lytic capacitors **C23** and **C24.** Thermistor **R21** maintains the heater circuit in the event of a scale lamp failure, and thermistor **R22** protects the valve heater and scale lamp from current surges when switching on.

In the 110V position, the voltage adjustment plug short-circuits ballast resistors **R17-R20** and thermistors **R21, R22;** or in the 200-220V position it short-circuits **R18** and **R19,** as indicated by dotted lines in the mains input section of the circuit diagram.

GENERAL NOTES

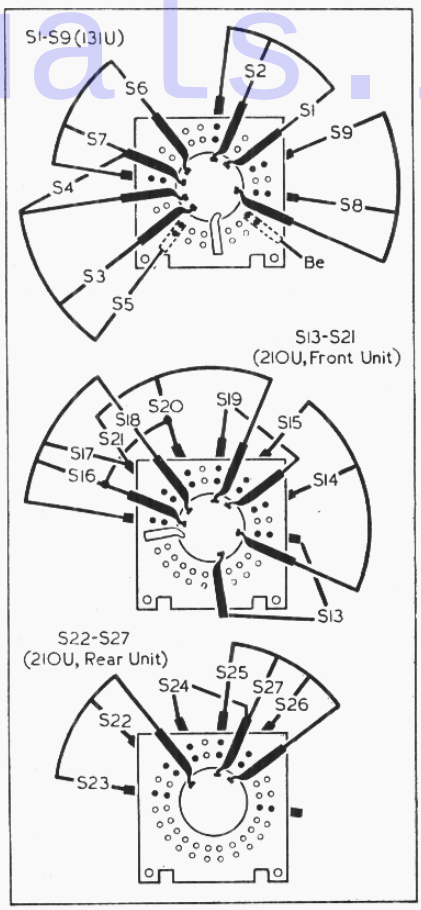
Switches.—S1-S9 are the waveband switches ganged in a single rotary unit beneath the chassis. This unit is indicated in our underside view of the chassis and shown in detail in column 2, where it is drawn as seen from the rear of an inverted chassis. The associated switch table appears in column 3, and gives the switch positions for the two control settings, starting from the fully anti-clockwise setting of the control knob—not the switch spindle. A dash indicates open and **C** closed.

S10 is the tone control switch and is one half of a double-pole Q.M.B. switch mounted in front of the volume control **R9.** It is operated by a lever-type control, mounted concentrically with the volume control knob.

S11, S12 are the normal Q.M.B. mains "on/off" switches, mounted on the rear of the volume control and operated by it.

S13-S27 are the waveband switches used in Model 210U, and appear in a separate circuit to the left of the main circuit diagram. They are ganged together in two rotary units beneath the chassis and are shown in detail beneath the switch diagram for Model 131U in column 2 above, where they are viewed from the rear of an inverted chassis.

WAVEBAND SWITCH DIAGRAMS



Diagrams of the waveband switch units, drawn as seen from the rear of an inverted chassis. The associated switch tables appear on the right.

Their associated switch table appears below that for Model 131U (below).

Model 210U.—This is an earlier 3-band version of Model 131U on which this *Service Sheet* is based. The main difference between the two lies in the R.F. and oscillator circuits, and this section has been completely re-drawn for the 210U and appears to the left of the main circuit diagram overleaf. Other small differences that occur are indicated in the main circuit diagram and in the component tables.

The two units of the waveband switch employed in model 210U appear in column 2 beneath the 131U switch unit. Both units are drawn as seen from the rear of an inverted chassis, and their associated switch table appears at the foot of this column.

Apart from these differences the chassis of the two models are identical and both use the same drive cord system.

Frame Aerial.—L1 is a loop of aluminium strip $\frac{3}{8}$in wide. This forms a low impedance loop, which is suitably coupled by **L5, L6** to the tuning coils.

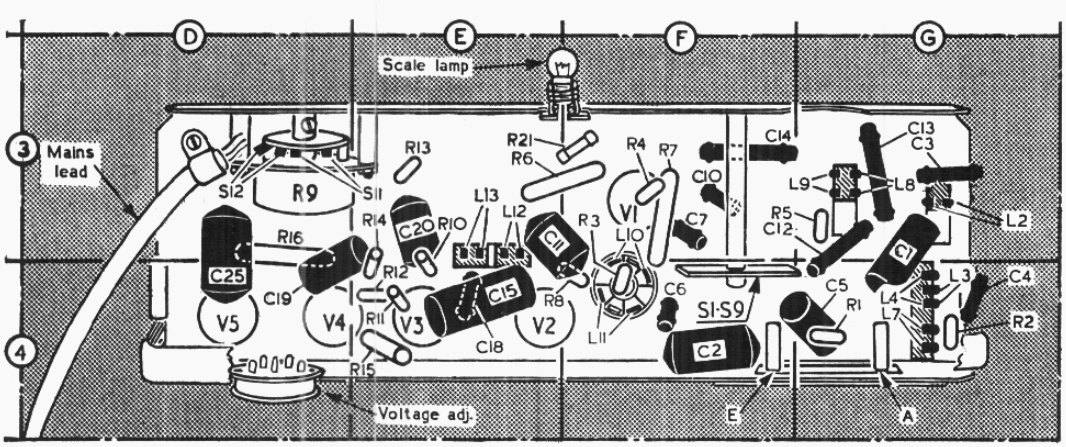
Scale Lamp.—This is a Philips lamp with a tubular bulb and an M.E.S. base. It is rated at 19 V, 0.09 A.

Model 131U Switch Table

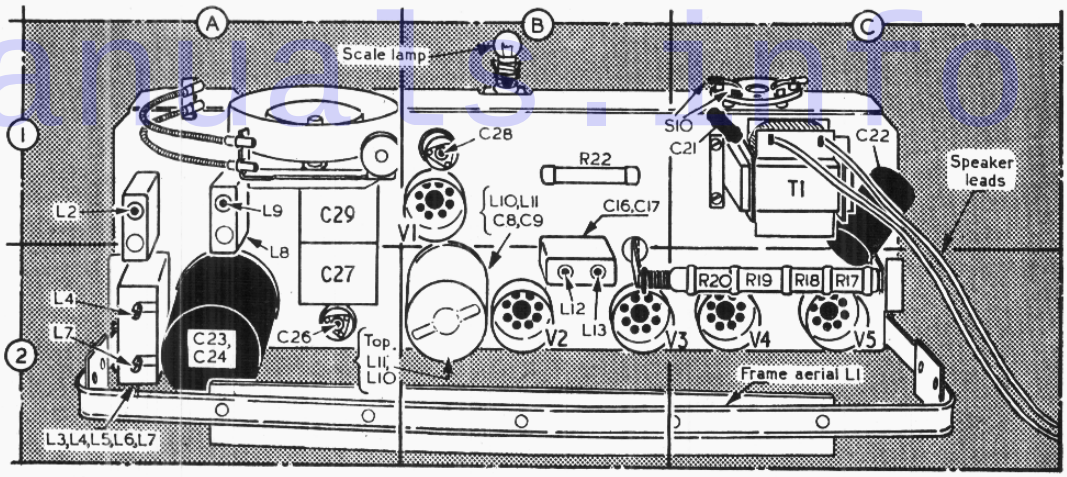
Switch	L.W.	M.W.
S1	—	C
S2	C	—
S3	C	—
S4	—	C
S5	—	C
S6	—	C
S7	C	—
S8	—	C
S9	C	—

Model 210U Switch Table

Switch	L.W.	M.W.	S.W.
S13	—	—	C
S14	—	C	—
S15	C	—	—
S16	C	—	C
S17	—	C	C
S18	—	C	—
S19	—	—	C
S20	—	C	—
S21	C	—	—
S22	—	—	C
S23	C	C	—
S24	C	—	C
S25	—	C	—
S26	—	—	C
S27	C	C	—



Underside view of the chassis. The various coil tags have been identified to facilitate continuity checks. **R21** in location reference F3 is a thermistor, and in the event of scale lamp failure it carries the full heater current.



Plan view of the chassis, showing all the R.F. and I.F. adjustments. Care should be taken not to buckle the low impedance frame aerial **L1** when handling the receiver on the bench. **S10** in location reference C1 is the tone control switch.

DRIVE CORD REPLACEMENT

As detailed by the makers, materials required are 3½ feet of drive cord, part No. G6.608.28; two 8.5 cm lengths (about 6.7 inches altogether) of flexible tubular outer casing, part No. 08.010.54/85 mm and a few metal end collars.

Using the cord, make up a length 105.5 cms (41.53 inches) overall, with a loop at each end, threading on the two lengths of outer casing before tying off the loops. The makers tie off after clamping on a collar.

Turn the gang to maximum capacitance. Fit the two lengths of outer casing in position and wind the free ends of the cord round the top pulley and drive drum, attaching both end-loops to the spring as shown in the drive cord sketch.

Wind the remaining loop of drive cord round the tuning spindle, one turn for the rear run and two turns for the front run, then, stretching the spring, pull the drive cord loop over the left-hand pulley. The cursor is mounted as indicated in the drive cord sketch, on the top drive cord run.

CIRCUIT ALIGNMENT

All the following adjustments can be made accessible by removing the cabinet back and base cover. As the tuning scale is fixed to the cabinet, the R.F. and oscillator adjustments should be carried out with the chassis in the cabinet.

I.F. Stages.—Switch receiver to M.W. and turn gang to minimum capacitance. Unscrew the cores of **L10, L11, L12** and **L13** (location reference B2) to their fullest extent. Connect signal generator output, via an 0.05 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L13, L12, L11** and **L10** for maximum output. Repeat these adjustments until no further improvement results.

I.F. Filter.—Transfer "live" lead to **A** socket, and, feeding in a 470 kc/s signal, adjust the core of **L2** (A1) for minimum output.

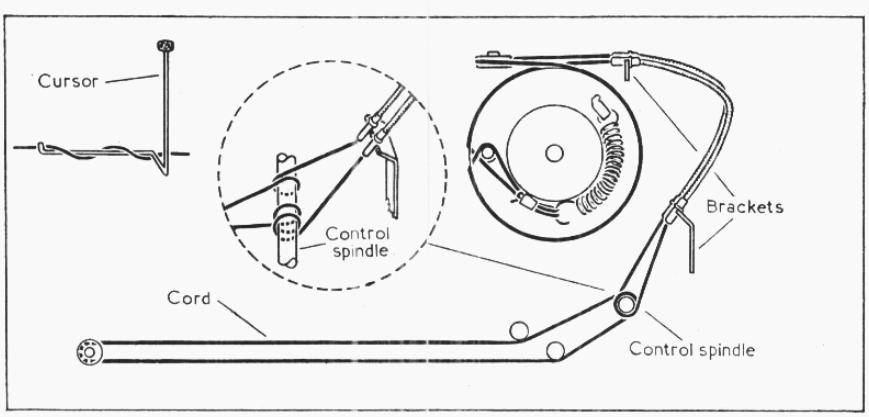
R.F. and Oscillator Stages.—With the gang at minimum capacitance, check that the centre line of the cursor coincides with the left-hand edge of the Third programme calibration mark at the low wavelength end of the M.W. tuning scale (in Model 131U) or with the "1" in "Monte Carlo" (in Model 210U).

The location references given in the following instructions apply to Model 131U. On Model 210U, changes in positions of the following trimming cores should be noted: **L2** takes the place of **L9** in our plan view of the chassis, and **L16** is located in the empty position immediately below it; the coil can which contains **L2** in our plan view is turned through 90 degrees, the left-hand core adjustment becoming **L9** and the right-hand one **L19.**

M.W.—Switch receiver to M.W., tune cursor to cover the letter "n" in "Lyons" on the tuning scale, feed in a 550 kc/s (545.4 m) signal and adjust the cores of **L9** (A1) and **L4** (A2) for maximum output. Turn gang to minimum capacitance, feed in a 1,630 kc/s (184 m) signal and adjust **C28** (B1) and **C26** (A2) for maximum output. Repeat these adjustments until calibration is correct at both ends of band.

L.W.—Switch receiver to L.W. and tune cursor to cover the letter "n" in "Lyons" on the tuning scale. Feed in a 152 kc/s (1,974m) signal and tune signal generator around this frequency to obtain maximum output. Then adjust **L7** (A2) for maximum output.

S.W. (Model 210U only).—Switch receiver to S.W. and tune cursor to cover the letter "R" in "R. Eireann" on the tuning scale. Feed in a 6.2 Mc/s (48.39 m) signal and adjust **L19** and **L16** for maximum output.



Sketch of the tuning drive system, with a separate enlarged diagram showing the direction and number of turns on the tuning control spindle. Further details are given under "Drive Cord Replacement."

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information and were measured with a 20,000 ohms-per-volt meter. Allowance should be made for the current drawn by meters with a lower internal resistance. Chassis was the negative connection for all voltage measurements. The figures quoted in the table apply to both models covered.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 UCH42	182 (Oscillator) 92	2·6 3·5	78	3·15	—
V2 UF41	182	5·5	78	1·6	—
V3 UBC41	70	0·5	—	—	—
V4 UL41	196	48·0	182	8·5	8·2
V5 UY41	210*	—	—	—	210·0†

* A.C. reading. † Cathode current 72mA.

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