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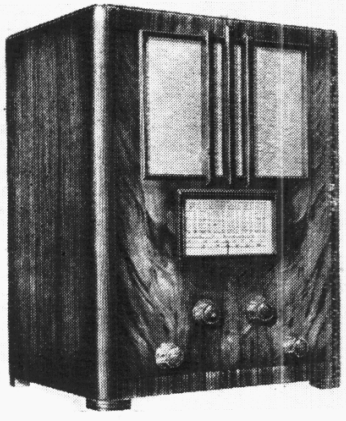
692

HALCYON "BRITON FIVE" & BLUE SPOT "POPULAR"



The Halcyon Briton Five table model. The radiogram has an additional knob below those seen here.

THREE wavebands are employed in the Halcyon Briton Five receiver, with a band-pass input circuit on MW and LW. The SW range is 16.5 to 50 m.

The receiver is a 4-valve (plus rectifier) superhet designed for use with AC or DC mains of 195-260 V. No provision is made for a gramophone pick-up.

The Blue Spot Popular employs an identical chassis, while in the Briton Five radiogram a modified chassis, fully described overleaf under "Radiogram Modifications," is used.

Release date, all models: 1936.

Original prices: Halcyon Briton Five, table model, £10 10*s.*; *Radiogram,* £18 18*s.*; *Blue Spot Popular,* £10 10*s.*

CIRCUIT DESCRIPTION

Aerial input on MW and LW via isolating capacitor **C1** and coupling coils **L1, L2** to inductively coupled band-pass filter. Primary coils **L3, L4** are tuned by **C22**; secondaries **L8, L9** are tuned by **C24.** Coupling by coils **L5, L6.**

On SW, input is via **C1** and coupling capacitor **C3** to single tuned circuit **L7, C24,** and **L8, L9** are short-circuited by **S4.**

First valve **(V1, Tungsram metallised VO13)** is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L10** (SW), **L12** (MW) and **L13** (LW) are tuned by **C25.** Parallel trimming by **C26** (MW); series tracking by **C6, C28** (MW), while **C27** is added in series with them on LW. Reaction coupling from anode by coils **L11** (SW) and **L14, L15** (MW and LW), **S8** short-circuiting the latter pair on SW.

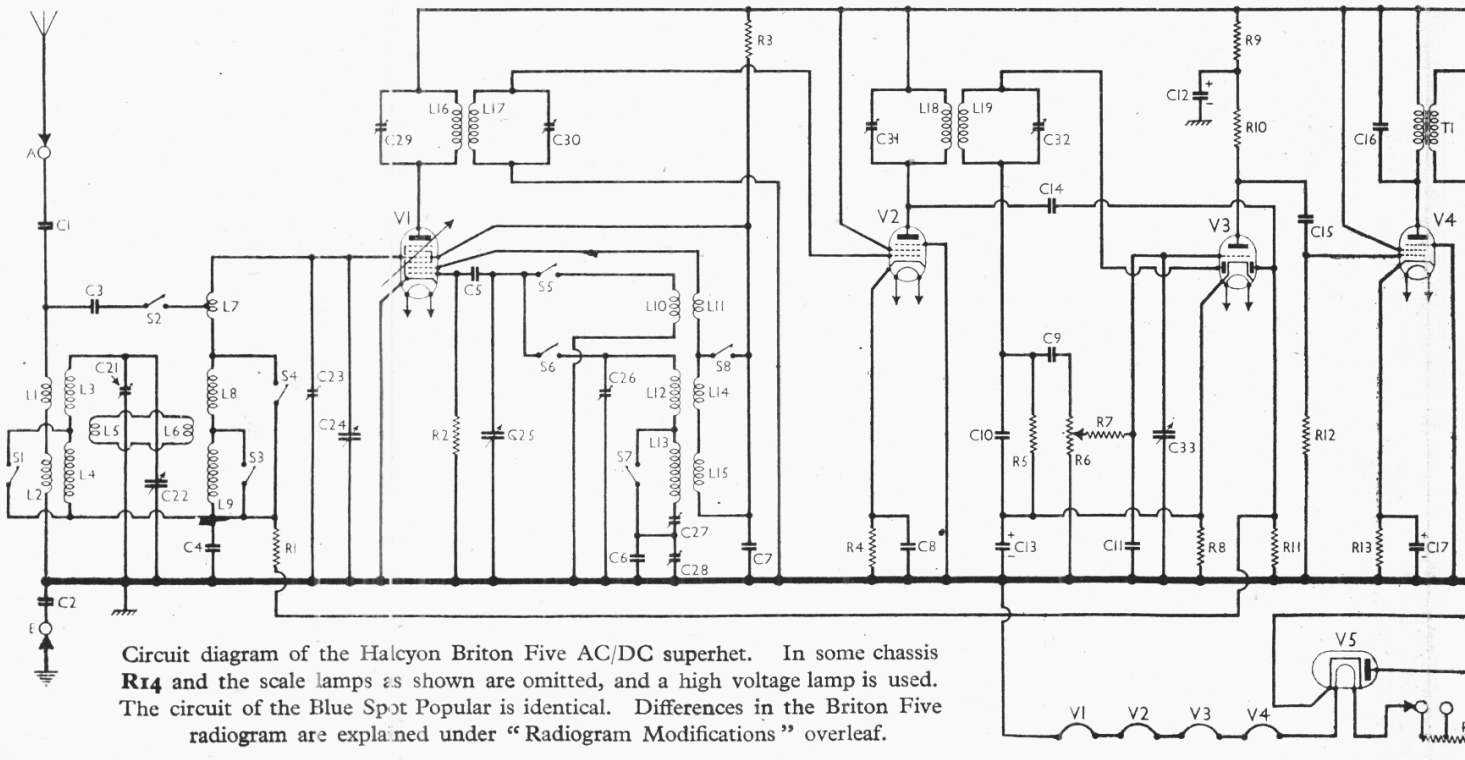
Second valve **(V2, Tungsram metallised VP13B)** is a variable-mu RF pentode operating with fixed grid bias, derived from the drop along **R4,** as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C29, L16, L17, C30** and **C31, L18, L19, C32.**

Intermediate frequency 130.5 kc/s.

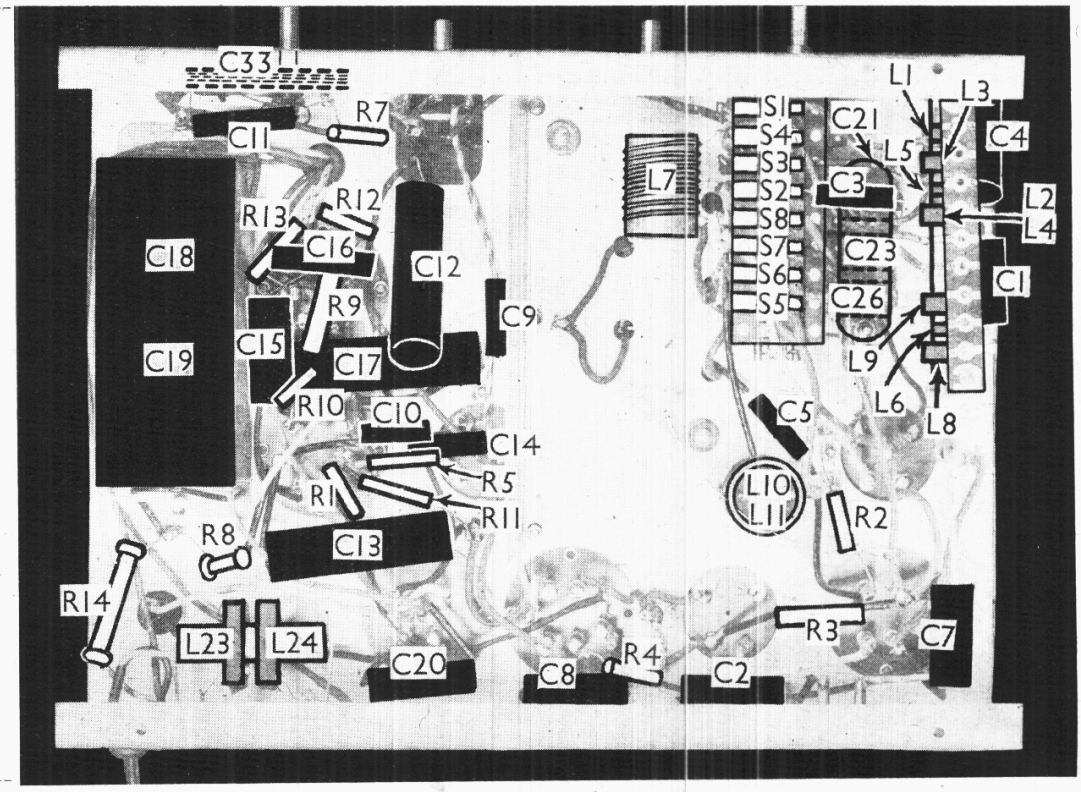
Diode second detector is part of double diode triode valve **(V3, Tungsram metallised DDT13).** Audio frequency component in rectified output is developed across load resistor **R5** and passed via AF coupling capacitor **C9,** manual volume control **R6** and series resistor **R7** to control grid of triode section, which operates as AF amplifier.

IF filtering by **C10, R7** and **C11. R7** also acts in conjunction with variable capacitor **C33** to form the variable tone control in the manner of a potential divider, the comparatively low impedance of **C33** when at maximum capacity, as compared with **R7,** shunting the control grid circuit heavily at upper audio frequencies and thus emphasising the bass frequencies, while the effect is less emphatic when **C33** is at minimum.

Second diode of **V3,** fed from **V2** anode via **C14,** provides DC potential which is developed across load resistor **R11** and fed back through a decoupling circuit as GB to frequency changer valve, giving automatic volume control. Delay voltage, together with GB for triode section, is obtained from the drop along **R8** in cathode lead to chassis.



Circuit diagram of the Halcyon Briton Five AC/DC superhet. In some chassis **R14** and the scale lamps as shown are omitted, and a high voltage lamp is used. The circuit of the Blue Spot Popular is identical. Differences in the Briton Five radiogram are explained under "Radiogram Modifications" overleaf.

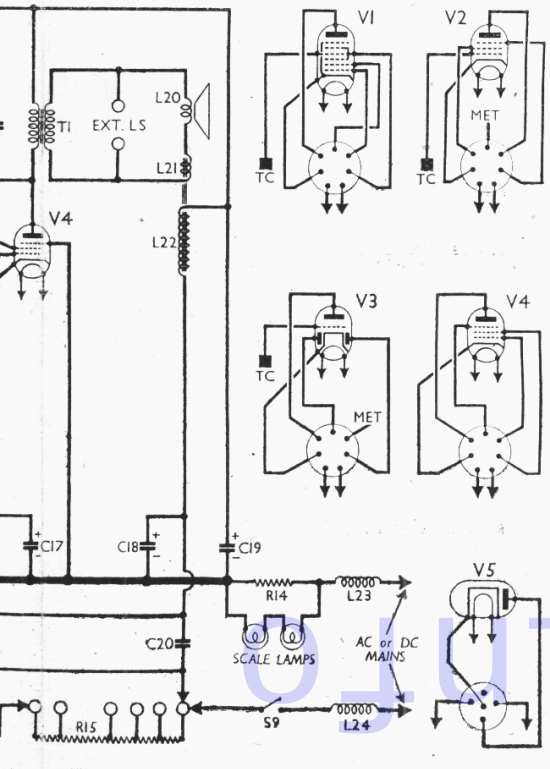


Under-chassis view. The waveband switches are all individually identified here. The trimmers **C21**, **C23** and **C26** are also indicated, but their adjustments are reached through holes in the chassis deck.

Resistance-capacity coupling by **R10, C15** and **R12** between **V3** triode and pentode output valve **(V4, Tungsram PP36** or **Mullard Pen 36C).** Fixed tone correction by **C16** in anode circuit. Provision for connection of low impedance external speaker by sockets across the secondary of the internal speaker input transformer **T1.**

When the receiver is operating from AC mains, HT current is supplied by half-wave rectifying valve **(V5, Tungsram V30)** which, with DC mains, behaves as a low resistance. Smoothing is effected by speaker field **L22** and electrolytic capacitors **C18, C19.**

Valve heaters, together with scale lamps (which are shunted by **R14),** and tapped ballast resistor **R15,** are connected in series across mains input circuit. RF filtering by chokes **L23, L24** and **C20,** which by-passes the rectifier.



DISMANTLING THE SET

The cabinet is fitted with a detachable bottom, upon removal of which (six countersunk head wood screws) access may be gained to most of the components beneath the chassis.

Removing Chassis.—remove the four control knobs (recessed grub screws);

unsolder from the speaker and input transformer the four leads connecting them to chassis;

remove the four self-tapping screws (with washers) holding the chassis to the bottom of the cabinet.

When replacing, connect the speaker leads as follows: Blue lead with yellow tracer to upper tag on right of transformer and upper tag on speaker field coil panel; yellow lead with black tracer to lower tag on transformer; red lead to lower tag on speaker field coil panel; brown lead with green tracer and earthing tag to one of the speaker fixing screws.

Removing Speaker.—Remove the nuts (with washers) from the three screws holding the speaker to the sub-baffle.

When replacing, the transformer should be on the right, and if the leads have been unsoldered they should be connected as described previously.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial isolator	0·0005
C2	Earth isolator	0·1
C3	Aerial SW coupling ...	0·0005
C4	V1 pent. CG decoupling	0·1
C5	V1 osc. CG capacitor ...	0·0001
C6	Osc. fixed MW tracker ...	0·0015
C7	V1 HT feed decoupling	0·1
C8	V2 cathode by-pass ...	0·1
C9	V3 triode AF coupling...	0·0005
C10	} If by-pass capacitors ... {	0·0001
C11	} {	0·0001
C12*	V3 triode anode decoupling	2·0
C13*	V3 cathode by-pass ...	50·0
C14	V3 AVC diode coupling...	0·0001
C15	AF coupling to V4 ...	0·1
C16	Fixed tone corrector ...	0·005
C17*	V4 cathode by-pass ...	50·0
C18*	} HT smoothing capacitors {	16·0
C19*	} {	16·0
C20	Mains RF by-pass ...	0·05
C21‡	B-P pri. MW trimmer ...	0·000035
C22†	Band-pass pri. tuning ...	0·000456
C23‡	B-P sec. MW trimmer ...	0·000035
C24†	Band-pass sec. tuning ...	0·000456
C25†	Oscillator circuit tuning	0·000456
C26‡	Osc. circ. MW trimmer...	0·000035
C27‡	Osc. circ. LW tracker ...	0·00075
C28‡	Osc. circ. MW tracker ...	0·00075
C29‡	1st IF trans. pri. tuning	0·000175
C30‡	1st IF trans. sec. tuning	0·000175
C31‡	2nd IF trans. pri. tuning	0·000175
C32‡	2nd IF trans. sec. tuning	0·000175
C33†	Variable tone control ...	0·0005

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 pent. CG decoupling	250 000
R2	V1 osc. CG resistor ...	50 000
R3	V1 SG and osc. HT feed	10 000
R4	V2 GB resistor	300
R5	V3 signal diode load ...	1,000 000
R6	Manual volume control	1,000 000
R7	IF stopper and part tone control	1,000 000
R8	V3 GB and AVC delay...	1 000
R9	V3 triode anode decoupling	10 000
R10	V3 triode anode load ...	50 000
R11	V3 AVC diode load ...	1,000 000
R12	V4 CG resistor	250 000
R13	V4 GB resistor	150
R14	Scale lamps shunt ...	20
R15	Heater circuit ballast ...	760†

† Tapped at 50 Ω + 425Ω + 100Ω + 100Ω + 85Ω from V5 heater end.

	OTHER COMPONENTS	Approx. values (ohms)
L1, L2	Aerial coupling coils, total	4·5
L3	Band-pass primary coils	2·6
L4	Band-pass primary coils	28·5
L5	Band pass coupling coils...	Very low
L6	Band pass coupling coils...	Very low
L7	Aerial SW tuning coil ...	Very low
L8	Band-pass secondary coils	2·3
L9	Band-pass secondary coils	28·0
L10	Osc. SW tuning coil ...	Very low
L11	Osc. SW reaction coil ...	0·2
L12	Osc. MW tuning coil ...	2·2
L13	Osc. LW tuning coil ...	20·0
L14	Oscillator MW and LW	
L15	reaction coils, total ...	3·5
L16	1st IF trans. Pri. ...	65·0
L17	1st IF trans. Sec. ...	65·0
L18	2nd IF trans. Pri. ...	65·0
L19	2nd IF trans. Sec. ...	65·0
L20	Speaker speech coil ...	1·6
L21	Hum neutralising coil ...	0·1
L22	Speaker field coil ...	650·0
L23	Mains RF filter chokes ...	3·2
L24	Mains RF filter chokes ...	3·2
T1	Speaker input trans. Pri. ...	360·0
	Speaker input trans. Sec. ...	0·5
S1–S8	Waveband switches ...	—
S9	Mains switch, ganged R6 ...	—

but tuned to the lowest wavelength on the MW band.

Voltages should be measured with a high resistance meter whose negative lead is connected to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VO13	192	2·9	102	5.4
	Oscillator			
	102	3·3		
V2 VP13B	192	6·7	192	2·1
V3 DDT13	75	1·8	—	—
V4PP36	178	41·0	192	5·3
V5 V30	240†	—	—	—

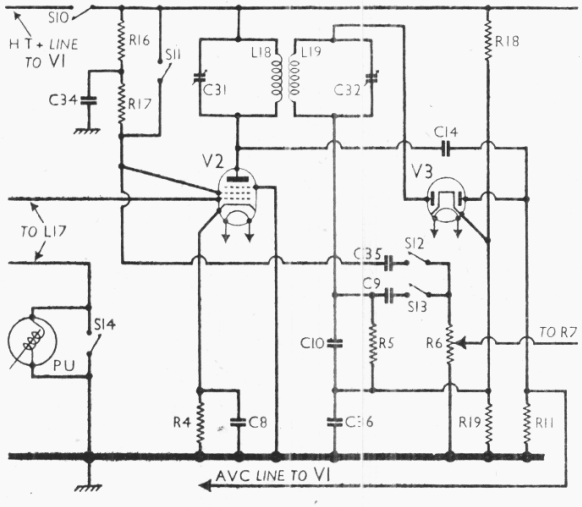
† Cathode to chassis, DC.

GENERAL NOTES

Switches.—S1-S8 are the waveband switches, ganged in a single three-position rotary unit beneath the chassis. The switches are individually identified in our under-chassis view, while the switch positions for the three control settings are shown in the table below, starting from the SW position of the control spindle and turning clockwise. A dash indicates open, and **C** closed.

Switch	SW	MW	LW
S1	C	C	—
S2	C	—	—
S3	C	C	—
S4	C	—	—
S5	C	—	—
S6	—	C	C
S7	C	C	—
S8	C	—	—

Coloured spots on the control knob indicate the switch position. These are green (SW), black (MW) and red (LW), and the scale markings are coloured to agree with them.



A section of the circuit diagram overleaf, redrawn to show the modifications in the radiogram version. **V3** becomes a double diode, and **V2** operates on gram as an AF amplifier. The potential divider **R18, R19** is introduced to provide the AVC delay potential.

VALVE ANALYSIS

Valve voltages and currents in the table (next col.) are approximately those to be expected in an average chassis when the receiver is operating with the voltage adjustment correctly set, the volume control at maximum, with no signal input,

S9 is the QMB mains switch, ganged with the manual volume control **R6.**

Coils.—All the MW and LW aerial circuit and band-pass coils, **L1-L6** and **L8, L9,** are wound on a common wooden former and mounted beneath the chassis beside the switch unit. **L2** is wound underneath **L4.** The SW aerial and oscillator circuit coils **L7** and **L10, L11** are also beneath the chassis, **L11** being the fine winding on the oscillator unit, interwound with **L10.**

The MW and LW oscillator circuit coils **L12-L15,** and the IF transformers **L16, L17** and **L18, L19,** are in three screened units on the chassis deck, with associated pre-set capacitors. The tracker adjustments **C27, C28** in the oscillator unit are covered by a small fibre strip, and the fixed tracker **C6** is housed inside the unit.

The mains RF filter chokes **L23, L24** are wound on a common wooden former and mounted on the rear member beneath the chassis.

Capacitors C12, C13, C17.—These are three dry electrolytics in separate tubular cardboard containers mounted in the wiring beneath the chassis. **C12** is rated at 2μF, 250 V working; **C13** and **C17** are rated at 50 μF, 12 V working.

Capacitors C18, C19.—These are two dry electrolytics in a single rectangular waxed cardboard container beneath the chassis, having a common negative (black) lead. The red lead is the positive of **C18,** and the yellow lead that of **C19.** Both sections are rated at 16 μF, 300 V working.

Scale Lamps.—These are two Osram MES types, with clear spherical bulbs, rated at 3.5 V, 0.15 A. They are connected in series with the mains lead to chassis, so that they are energised by both heater and HT current, and are shunted by **R14.** See note under "Chassis Divergencies."

External Speaker.—Provision is made for the connection of a low impedance (about 3-5 Ω) external speaker.

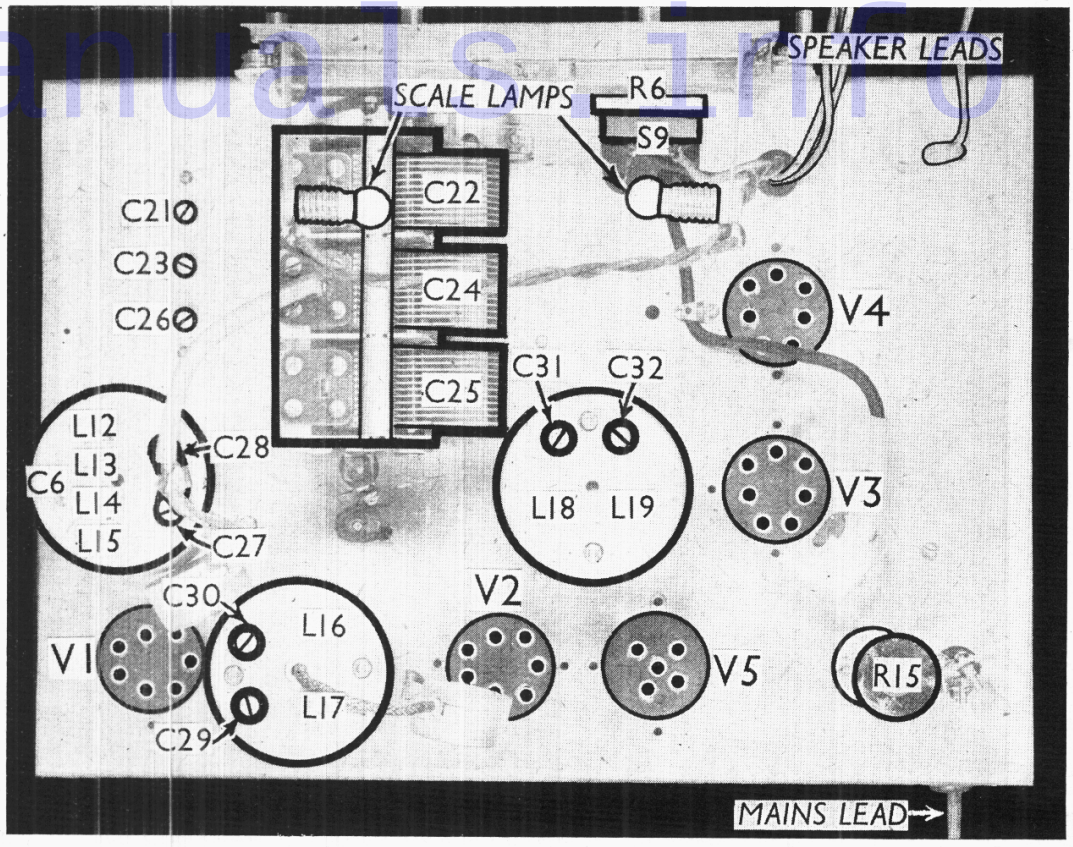
Mains Voltage Adjustment. — The heater circuit ballast resistor **R15** is provided with six tappings, including one at each end, for mains voltage adjustment. Four of these, grouped at one end of the unit, provide "coarse" adjustment for mains of 190 V, 210 V, 230 V and 260 V respectively, reading from the centre outwards, while a "fine" adjustment for intermediate voltages is obtained by including or omitting the section between the two tappings at the other end, which drops an additional 10 V if included.

Two leads are used at the "coarse" end, one from the mains and one to **V5** anode. If the former is connected to the appropriate tapping, the latter may be attached to the next tag, or next but one, to safeguard the valve from current surges and, in the case of 250-260 V mains, reduce the voltage applied to the rectifier.

Some chassis are fitted with a different kind of resistor, having only one tapping at one end and five or six at the other. In these cases no separate "fine" adjustment is needed, as sufficiently close rating is obtained from the increased number of tappings in the first group.

Chassis Divergencies.—Apart from the alternative arrangement of **R15,** several other modifications may be found. **C1** may be 0.01 μF, instead of 0.0005 μF. **V4** may be a Mullard Pen 36C valve. The scale lamps shown in our information may be omitted, and a high-voltage lamp substituted for them.

When this is done, **R14** is short-circuited, and an MES lampholder on a



Plan view of the chassis. The oscillator tracker adjustments **C27, C28** are covered by a small fibre strip which is swivelled clear for adjustment. In some models the scale lamps shown are replaced by a high voltage lamp mounted on the rear member of the gang assembly.

small bracket is bolted to the rear member of the tuning gang, through which the holder shell is connected to chassis. The "pip" contact of the holder is taken via a flying lead to the voltage adjustment tapping on **R15,** where it might well be fixed permanently to, say, the 210 V setting lug.

A suitable lamp would be the Ismay type C, rated at 230 V, 10 W.

Where the Pen 36C valve is used as **V4,** the suppressor will, of course, be returned internally to the cathode instead of pin 1. No wiring modification is necessary.

Some chassis employed a Tungsram DD13, and in these models the circuit will be like that shown for the radiogram, but the gram switching will be omitted and **V2** not operate as an AF amplifier.

RADIOGRAM MODIFICATIONS

In the radiogram version the chassis is modified to permit the IF amplifier **V2** to operate as an AF pre-amplifier for the pick-up. The double diode triode valve **V3** is replaced by a double diode valve **(Tungsram DD13),** and the AF output on gram from **V2** is fed via the manual volume control directly to **V4.** On radio, the circuit is little different from our diagram overleaf except that the triode section of **V3** is omitted and the output from the diode circuit is fed via **R6** directly to the output valve.

The gramophone motor is connected to the mains input circuit, but normally an AC motor is fitted. Unless, therefore, a universal motor has been fitted, **the radiogram must not be connected to DC mains** until the motor has been disconnected, when the receiver may be used on radio only.

The revised part of the circuit is shown in the diagram in cols. 1 and 2 opposite.

Components occupying the same positions and having the same values as in the receiver diagram overleaf still bear the same numbers. Other components in the radiogram circuit bear numbers higher than the highest in the tables (col. 6 overleaf and col. 1 opposite); their values are given in the table below.

The pick-up is inserted in the return lead from **V2** CG, between **L17** and chassis, and **S14** short-circuits it on radio . **V2** operates as a triode, the screen acting as an anode with **R17** as load resistor. **R16** and **C34** decouple the circuit.

The AF output is coupled via **C35, S12** and **R6, R7, C33** to **V4** CG.

S10, S11, S13 and **S14** close on radio, while **S12** opens. On gram, the positions are reversed.

In order to obtain delay bias for AVC, **V3** cathode is taken to the junction of **R18** and **R19,** which form a potential divider across the HT circuit.

Physically, the radio/gram change-over switch is an additional unit fitted centrally on the front member of the chassis.

Additional Components

Resistors			Capacitors		
R16	...	10,000Ω	C34	...	2μF
R17	...	50,000Ω	C35	...	0·1μF
R18	...	100,000Ω	C36	...	0·1μF
R19	...	†50,000Ω			or 0·25μF

† May be 15,000Ω.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V1** and **E** socket, feed in a 130.5 kc/s (2,299 m) signal, and adjust **C32, C31, C30** and **C29** for maximum output, keeping the volume control at maximum and the input signal low to avoid AVC action. The output should now be checked at 5 kc/s above and below 130.5 kc/s (135.5 kc/s and 125.5 kc/s), where the output readings should be approximately equal. If they are not, repeat the adjustments.

RF and Oscillator Stages.—Transfer signal generator leads to **A** and **E** sockets, via a suitable dummy aerial. With the gang at maximum, the pointer should cover the 50 m mark on the SW scale.

MW.—Switch set to MW, tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C26,** then **C21** and **C23** for maximum output. If two peaks are found for **C26,** select that involving the lesser trimmer capacity.

Feed in a 500 m (600 kc/s) signal, tune it in, and adjust **C28** for maximum output while rocking the gang for optimum results.

LW.—Switch set to LW, feed in a 1,900 m (158 kc/s) signal, tune it in, and adjust **C27** for maximum output while rocking the gang for optimum results.

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