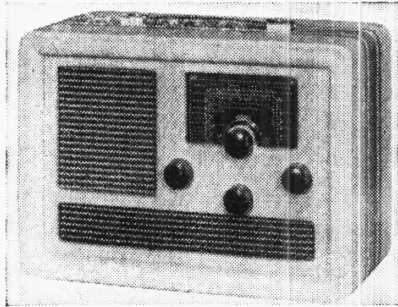


"TRADER" SERVICE SHEET

556

DOUBLE DECCA MB5

(Original Version without Suffix Letter)



THIS version of the Double Decca receiver, the original MB5, is not to be confused, from the point of view of service work, with the subsequent versions MB5A, B and C, which were covered in our *Service Sheet* 473. It is distinguishable from the later versions by the absence of a suffix letter after the model number, by the presence of both a vitreous enamelled voltage adjustment resistance (R17) and a line cord (R16), and by the different arrangement of the valve holders.

The receiver is a transportable 4-valve (plus rectifier) 3-band superhet fitted with frame aerials. It is designed to operate from a self-contained all-dry combined HT and LT battery unit or from AC or DC

mains, the change-over being effected by a manually operated control.

Release date: February, 1939.

CIRCUIT DESCRIPTION

Tuned frame aerial input on MW and LW by L4 (MW) plus L5 (LW) and C26 to heptode valve (V1, Brimar 1A7GT), which operates as frequency changer with electron coupling. Provision for connection of an external aerial and an earth via isolating condensers C1, C2 and coupling coil L2 on both bands.

On SW, the signal is picked up either from the external aerial or the MW and LW frame windings by the SW coupling coil L1 and fed to single tuned circuit L3, C26, and then applied to V1.

V1 oscillator grid coils L6 (SW), L7 (MW) and L8 (LW) are tuned by C27. Parallel trimming by C6, C28 (MW) and C7, C29 (LW); series tracking by fixed condensers C8 (SW), C9 (MW) and C10 (LW). Reaction from anode by coils L9 (SW) and L10 (MW and LW).

Second valve (V2, Brimar 1N5GT) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned transformer couplings L11, L12, C30 and C31, L13, L14, C32.

Intermediate frequency 382 KC/S.

Diode second detector is part of single diode triode valve (V3, Brimar 1H5GT). Audio frequency component in rectified output is developed across manual volume control R7, which also operates as load

resistance, and passed via AF coupling condenser C15 and CG resistance R8 to CG of triode section, which operates as AF amplifier. IF filtering by C14, R6 in diode circuit, and C16.

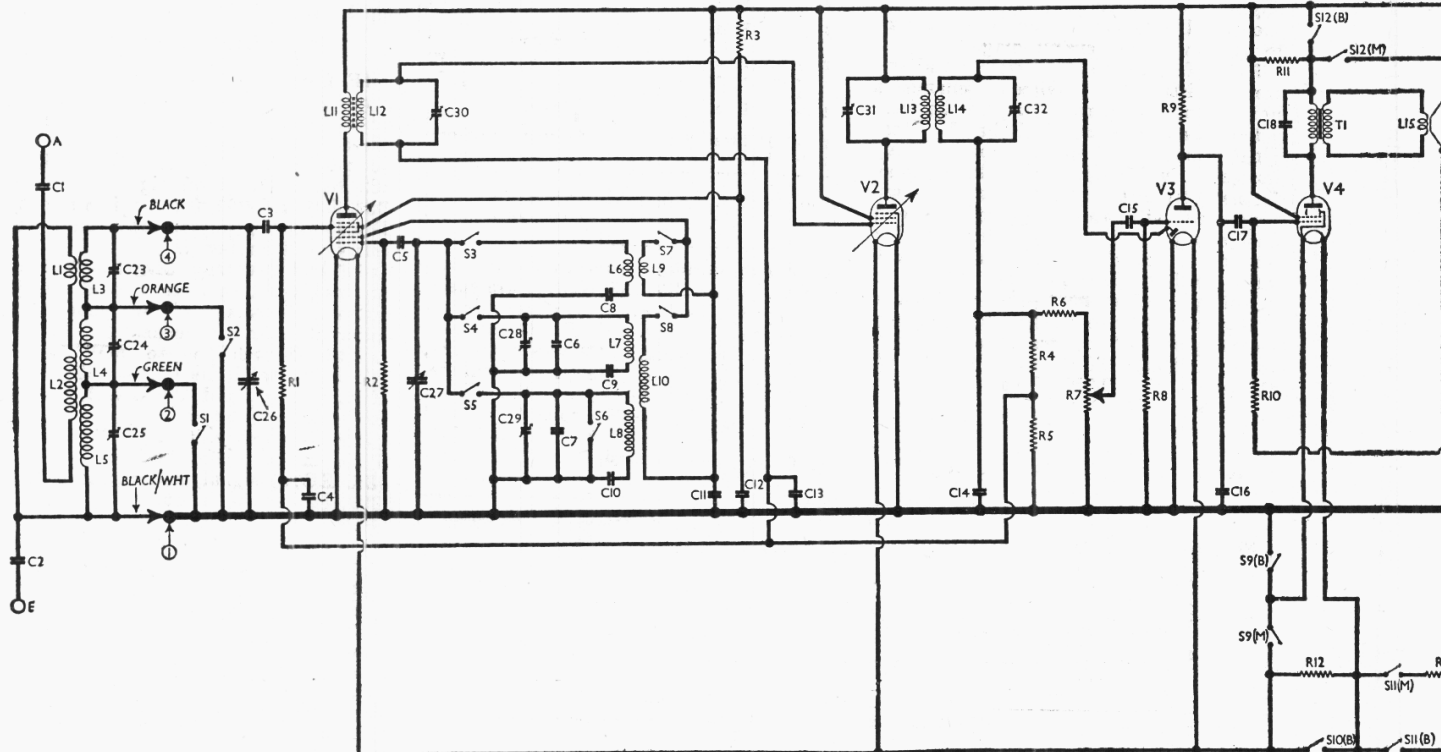
DC potential developed across R6, R7 appears also across the resistances R4, R5, which form a potential divider across them. The potential at the junction of R4 and R5 is tapped off and fed back as GB to FC and IF valves, giving automatic volume control; decoupling is effected by condensers C4, C13, and R4.

Resistance-capacity coupling by R9, C17 and R10 between V3 triode and tetrode or pentode output valve (V4, Brimar 1Q5GT or 1C5GT). Fixed tone correction by C18 in anode circuit.

POWER SUPPLIES

This receiver is designed to operate from AC or DC mains or its own self-contained combined HT and LT dry battery unit. The foregoing description relates only to the receiving circuits, and is the same irrespective of whether the source of power is mains or battery. Following is a description of the power supply circuits and the method of changing over from one source to the other.

The change-over is accomplished by a manually operated rotary switch unit comprising switches S9 to S14, which, with the exception of S10, have been numbered off in pairs, in which one switch of each pair closes when the other opens. The



Radio

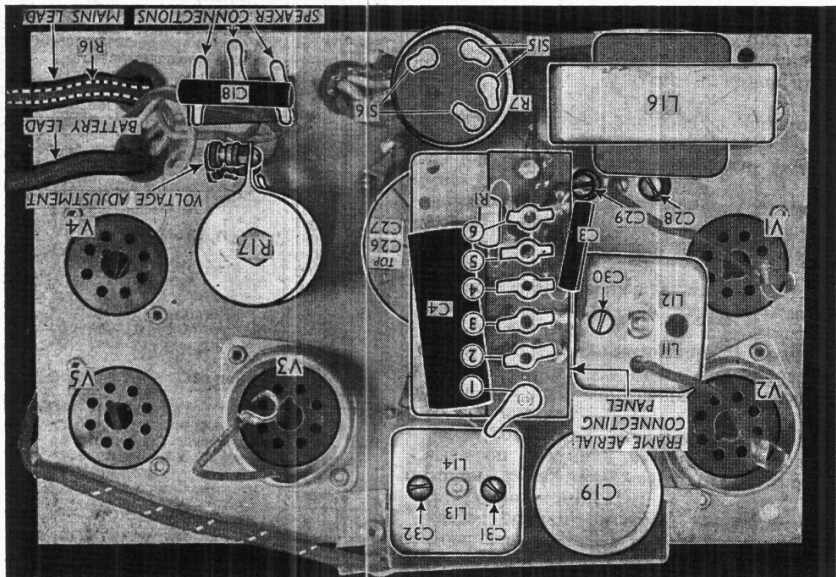
* Value if V4 is 1Q5GT: 800 Ω for 1Q5GT.
 † Value if V4 is 1Q5GT: 43 Ω for 1Q5GT.
 ‡ Tapped at 80 Ω + 135 Ω + 100 Ω from R16

RESISTANCES		Values (ohms)
R1	V1 pentode CG resistance	500,000
R2	V1 sec. CG resistance	250,000
R3	V1 SG HT feed	75,000
R4	AVC feed potential divider	10,000,000
R5	resistances	3 000 000
R6	IF stopper	25,000
R7	Manual volume control:	
	V3 diode load resistance	500,000
	V3 CG resistance	10,000,000
	V3 triode anode load	1,000,000
	V4 CG resistance	2,000,000
	HT smoothing resistance	8,000
R12	V4 filament shunt (on mains)	30
	V4 filament shunt (on HT)	700
R13	V4 automatic GB resistances	400*
R14	V4 automatic GB resistances	700
R15	V5 heater ballast (line ances)	22†
R16	V5 heater ballast (line cord)	620
R17	Mains voltage adjustment resistance, total	315‡

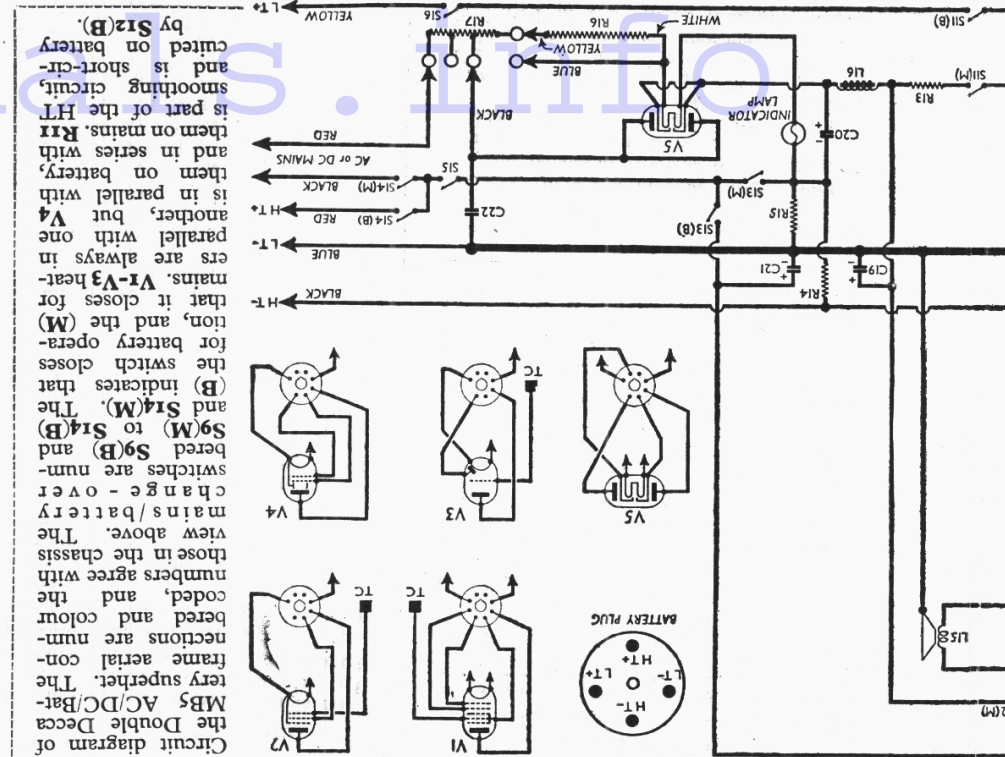
COMPONENTS AND VALUES

by-passes the supplies 0.05 A. The total filament current of V1-V3 is about 2 V positive with respect to chassis. Additional GB is available to V4 via R14 and R10 as GB to V4 control the voltage drop across R15 being applied the mains via S13(M), S15 and S14(M), recombining with the HT current, back to is then returned via chassis and R15, with one another. The filament current in parallel with it via S9(M), to V1-V3 filament, and if the power is switched on, S16 closes, and the LT control is in the battery position, the LT in conjunction with electrolytic condensers C19, C20 and C21, the last one acting as HT reservoir condenser on battery operation. The indicator lamp performs the dual function of illuminating the scale and indicating that the receiver is on mains. When the receiver is switched on, S16 closes, and if the power is switched on, S16 closes, and the LT control is in the battery position, the LT positive socket of the battery is connected via S16, S11(B) and S10(B) to the

View of the rear or gang condenser side of the chassis. R16 is in the mains lead.



556
 DOUBLE DECCA
 MBS



ing when the control was turned to mains, components to work again. Smoothing is effected by L16 and R11 in conjunction with electrolytic condensers C19, C20 and C21, the last one acting as HT reservoir condenser on battery operation. The indicator lamp performs the dual function of illuminating the scale and indicating that the receiver is on mains. When the receiver is switched on, S16 closes, and if the power is switched on, S16 closes, and the LT control is in the battery position, the LT positive socket of the battery is connected via S16, S11(B) and S10(B) to the

single elements of each pair are marked with a lettered suffix to indicate when the switch closes. Thus: in the case of the pair marked S9, that element marked S9(B) closes when the control is turned to the battery position, whereas the second element, marked S9(M), closes when the control is turned to "Mains," while S9(B) opens. The "Master" switches S15, S16 are normally. They are ordinary QMB switches, ganged together and with R7, and they are used to switch the receiver on or off, controlling mains and battery circuits. HT circuit.—When the receiver is switched on, S15 is closed, and if the power control is turned to the battery position, the HT positive socket of the HT battery is connected via S14(B), S15 and S13(B) to the HT positive line; V4 anode circuit is connected to the HT positive line via S12(B). The HT negative socket of the battery is connected directly to R14, through which it is returned via R15 to chassis. The passage of HT current through these resistances provides a voltage drop which is applied to V4 control grid circuit as grid bias. If the power control is now turned to the mains position, the (M) switches close and the (B) switches open. R17, R16 (the line cord resistance), V5 heater and the indicator lamp are all connected in series directly across the mains input circuit, and V5 heater begins to warm up. The cathode is connected via the HT smoothing choke L16 and S12(M) to V4 anode circuit, and to the rest of the receiver, including V4 screen, via the smoothing resistance R11 and the HT positive line, and when HT current begins to flow, the receiver, which stopped work-

Supplement to The Wireless
 Electrical Trader, February 14, 1942

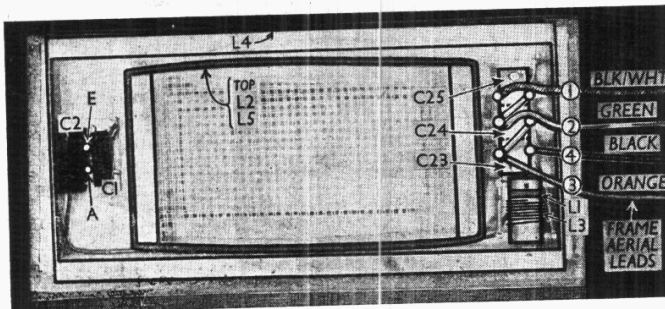
CONDENSERS		Values (μ F)
C1	External aerial isolator ...	0.001
C2	Earth isolator ...	0.01
C3	V1 pentode CG condenser	0.0001
C4	V1 pentode CG decoupling	0.1
C5	V1 osc. CG condenser ...	0.0001
C6	Osc. circ. MW fixed trimmer	0.00003
C7	Osc. circ. LW fixed trimmer	0.0002
C8	Osc. circ. SW tracker ...	0.005
C9	Osc. circ. MW tracker ...	0.000821
C10	Osc. circ. LW tracker ...	0.0003855
C11	HT circuit RF by-pass ...	0.01
C12	V1 SG decoupling ...	0.1
C13	V2 CG decoupling ...	0.02
C14	IF by-pass ...	0.0001
C15	AF coupling to V3 triode...	0.001
C16	IF by-pass ...	0.0001
C17	V3 triode to V4 coupling...	0.01
C18	Fixed tone corrector ...	0.001
C19*	HT smoothing condensers {	100.0
C20*		16.0
C21*		8.0
C22	Mains RF by-pass ...	0.01
C23†	SW aerial circuit trimmer	—
C24†	Frame aerial MW trimmer	—
C25†	Frame aerial LW trimmer	—
C26†	Frame aerial circuit tuning	—
C27†	Oscillator circuit tuning...	—
C28†	Osc. circ. MW trimmer ...	—
C29†	Osc. circ. LW trimmer ...	—
C30†	1st IF trans. sec. tuning...	—
C31†	2nd IF trans. pri. tuning...	—
C32†	2nd IF trans. sec. tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Ext. aerial SW coupling coil ...	2.0
L2	Ext. aerial coupling coil	0.6
L3	Aerial SW tuning coil...	Very low
L4	Tuned frame aerial ...	2.0
L5	MW and LW windings {	4.75
L6	Osc. circ. SW tuning ...	Very low
L7	Osc. circ. MW tuning ...	2.25
L8	Osc. circ. LW tuning ...	5.25
L9	Oscillator SW reaction	0.25
L10	Osc. MW and LW reaction ...	5.0
L11	1st IF trans. { Pri. ...	19.0
L12		Sec. ...
L13	2nd IF trans. { Pri. ...	9.0
L14		Sec. ...
L15	Speaker speech coil ...	2.7
L16	HT smoothing choke ...	150.0
T1	Speaker input { Pri. ...	650.0
	trans. { Sec. ...	0.4
S1-S8	Waveband switches ...	—
S9 (M, B) to S14 (M, B)	Mains/battery change-over switches ...	—
S15	HT and mains (ganged) circuit switch R7	—
S16	LT circuit switch	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws); remove the two large flat hexagon nuts (with lock-washers) sunk into the front of the case behind the left-hand and right-hand control knobs;



View of the frame aerial assembly on back of the receiver. Note the three trimmers and other components.

remove the back cover (four round-head wood screws in the corners of the unhinged portion) on which are mounted the frame windings;

unsolder from the vertical connecting strip on the gang assembly the four leads connecting the frame assembly to the chassis;

remove the two countersunk-head wood screws holding the upper edge of the chassis to the mounting blocks at the top of the case, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, free the mains lead from the cleat (round-head wood screw) on the side of the case;

unsolder from the small connecting panel below the mains resistance the two speaker leads and the speaker earthing lead.

Before certain of the components beneath the chassis can be reached, the scale backing plate must be removed by removing two press-studs and two self-tapping screws, taking care that the press-studs do not fly off and become lost.

When replacing, refit the scale backing plate with its dull side outwards.

Connect the green speaker lead to the left-hand tag on the connecting panel; connect the brown lead to the right-hand tag;

connect the black earthing lead to the centre tag.

The frame aerial leads should be connected as follows, numbering the tags on the vertical connecting strip on the chassis from top to bottom;

- 1 (under fixing nut), black/white;
- 2, green;
- 3, orange;
- 4, black;
- 5 and 6, no external connection.

Do not forget to replace the felt washers, one going on each control spindle between the knob and the cabinet.

Removing Speaker.—Unsolder the two connecting leads from the panel on the chassis;

remove the three nuts (with lock-washers) holding the speaker to the sub-baffle.

When replacing, the transformer should point towards the bottom right-hand corner of the case, and the tag of the black earthing lead from chassis should be fitted under the lower left-hand fixing nut.

The two leads from the input transformer should be connected as indicated above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are approximate. They represent values to be expected in an average chassis, whether operated from battery or mains, when the voltage adjustment has been properly set. When making measurements, C26 should be short-circuited and a high resistance meter, with its negative lead connected to chassis, should be used. There will, of course, be no voltage reading at V5 cathode on battery operation.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 1A7GT	{ 90 Oscillator 90	{ 0.25 1.0	40	0.8
V2 1N5GT	90	1.1	90	0.3
V3 1H5GT	15	0.03	—	—
V4 1Q5GT	86	7.0	90	0.8
V5 25Z6GT	112†	—	—	—

† Cathode to chassis, DC.

GENERAL NOTES

Switches.—S1-S8 are the waveband switches, in a rotary unit mounted on the right-hand bracket on the control panel side of the chassis. This is indicated in our illustration in cols. 5 and 6. A diagram of the unit is seen below, but this is drawn as seen looking from the chassis deck side of the switch unit. It is rather difficult to see the switch unit from this side, but by removing the bracket fixing screws, and rotating the bracket slightly, the switching can be checked. The table gives the S1-S8 switch positions in the three control settings, starting from the fully anti-clockwise position of the switch knob. A dash indicates open, and C, closed.

Switch Table and Diagram
(Waveband Unit)

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

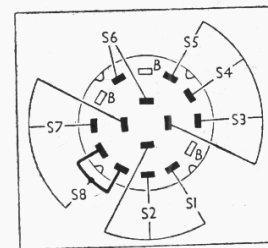


Diagram of the S1-S8 unit, looking at the side facing the chassis deck. The table is above.

S9 (B) and (M) to S14 (B) and (M) are the mains to battery change-over switches in a double-sided unit mounted on the left-hand bracket on the control panel side of the chassis.

The diagram of this unit appears in col. 4, drawn as seen when viewed directly as shown in our illustration of the control panel side of the chassis.

The action of these switches is clearly indicated in the circuit diagram, where

an (M) indicates that the switch closes for mains operation, while a (B) indicates that it closes for battery operation.

S15, S16 are the master switches, controlling the mains, HT and LT supplies to the receiver. They are of the QMB type, and are ganged with the manual volume control R7.

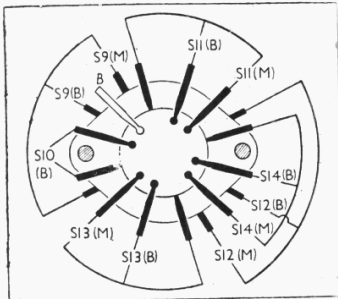


Diagram of the mains/battery change-over switch unit, as seen when viewed from the rear.

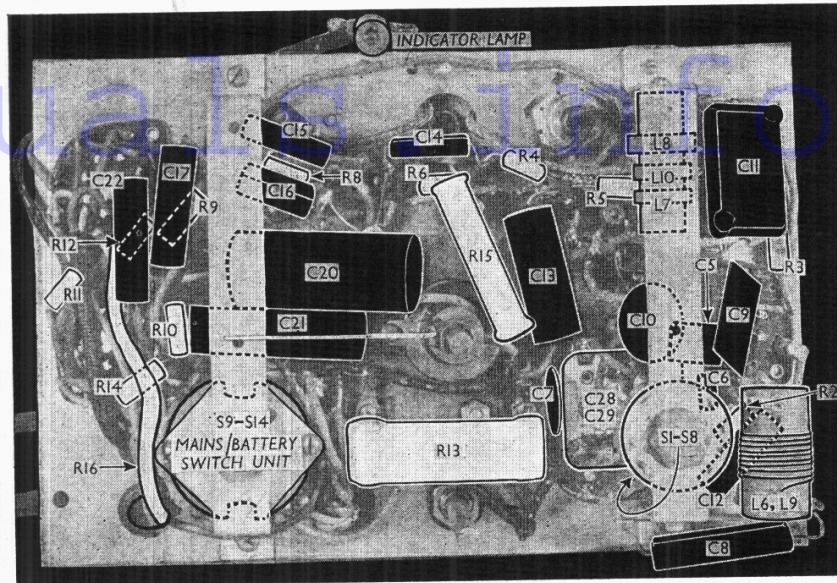
Indicator Lamp.—This is an Osram MES type, with a small spherical bulb, rated at 6.5 V, 0.3 A. It is connected in series with the heater of V5, and lights as a signal that the receiver is operating from the mains.

R16.—This is the line cord ballast resistance for V5 heater, and is located in the mains lead to the receiver. Since the pair of mains conductors is taken directly to the chassis without contact with R16, and R16 is in the mains lead, two further conductors emerge from the chassis end of the mains lead, so that four leads in all emerge from the cable at the chassis end, while only two enter it from the mains end. The colours of the leads are indicated in the circuit diagram, while in the sketch below, the physical arrangement of the leads is shown. The colour coding is given here to agree with the circuit diagram.

R17.—This is the mains voltage adjustment resistance in a vitreous enamelled unit mounted perpendicularly on the gang side of the chassis deck. It has four tapings brought out to lugs spaced along its length, while a fifth lug, the end one, farthest from the chassis deck, is unconnected with the resistance element, and merely provides a convenient anchor for one of the voltage adjustments leads when the latter is out of use.

Voltage Adjustment.—A complicated system of adjustable leads and tapings on R17 permits fairly critical adjustments to be made for AC mains of 200-260 V, DC mains of 190-250 V and AC or DC mains of 110-120 V.

A table showing the various combinations is pasted on the inside of the flap at the bottom of the back cover, but as



View of the chassis from the front or control spindle side. The two switch units are indicated.

the adjustment would be difficult to carry out if the table were missing or illegible, the table is repeated below.

The lead colours in the table agree with those given in the circuit diagram, while the tapping numbers are those of the lugs on R17, starting with the top (blank) lug as No. 1, and finishing with No. 5 at the bottom, nearest the chassis deck.

Voltage Adjustment Table

Mains	Tapping				
	1	2	3	4	5
AC 200-220	Blue	—	Black	Red and yellow	—
220-240	Blue	Black	—	Red and yellow	—
240-260	Blue	Black	—	Red and yellow	Yellow
DC 190-210	Blue	Black	—	Red and yellow	—
210-230	Blue	Black	—	Red	Yellow
230-250	Blue	Black	—	Red	Yellow
AC/DC 110-120	Yellow	Blue	—	Black and red	—

V4 Alternatives.—Two alternative output valves, 1Q5GT and 1C5GT, are specified by the makers for use in this receiver, but they are not directly replaceable. In our chassis, V4 was a tetrode, 1Q5GT; but if the alternative pentode, 1C5GT is used, the values of the GB resistances R14 and R15 become 800 Ω and 43 Ω respectively, instead of 400 Ω and 22 Ω as in our chassis.

Chassis Divergency.—In our chassis, C9 was 821 μF (0.000821 μF), but in the makers' diagram it is given as 221 μF (0.000221 μF).

Battery.—This is a combined 1.5 V LT and 90 V HT dry battery (Ever Ready All-Dry No. 3). It is fitted with a built-in socket for connections, the battery lead from the receiver terminating in a 4-pin plug to fit. A diagram of the plug, looking at the free ends of the pins, is inset in the circuit diagram.

The colour coding of the connections to the plug in our chassis was: LT negative, blue; LT positive, yellow; HT negative, black; HT positive, red.

CIRCUIT ALIGNMENT

IF Stages.—Remove back of receiver, remove connection to tag 4 on frame aerial connection strip, and connect signal generator to this tag and the E socket. Switch set to SW, feed in a 382 KC/S (785.5 m) signal, and adjust C32, C31 and C30 for maximum output. Disconnect signal generator and replace frame lead on tag 4.

RF and Oscillator Stages.—With gang at maximum, pointer should be horizontal. Connect signal generator to external A and E sockets.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust C28, then C24, for maximum output.

LW.—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust C29, then C25, for maximum output.

SW.—Switch set to SW, tune to 16 m on scale, feed in a 16 m (18.75 MC/S) signal, and adjust C23 for maximum output.

Finally, replace back of set and adjust C23, C24 and C25 accurately for maximum sensitivity on their respective bands.

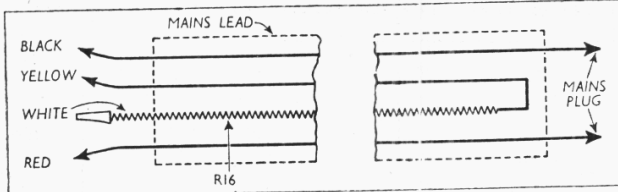


Diagram showing the arrangement of the line cord, giving the colour coding of the leads at the chassis end.