

K-B MODEL 560

3-BAND A.C. SUPERHET

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Of the 3-band type, the Kolster-Brandes 560 receiver is a 4-valve (plus rectifier) A.C. superhet suitable for mains of 200-250 V., 40-60 C/S. The short-wave range is 19-52 metres, and provision is made for both a gramophone pick-up and an extension speaker, a plug and socket arrangement allowing the internal speaker to be cut out of circuit, if desired. Provision is also made for using various aerial systems.

CIRCUIT DESCRIPTION

Alternative aerial input connections. On S.W. band input is via coupling coil L7 (for all-wave dipole or open aerials), or via centre-tapped coil L8 (for dipole or low impedance systems such as the K-B Rejectostat) to single-tuned circuit, comprising L9 and C48. On M.W. and L.W. bands input is via socket D to high impedance circuit L1, L2 capacity-coupled by C1 to band-pass filter, or via sockets L and L to low impedance circuits L3 (M.W.) and L5 (L.W.). Band-pass primary coils L4 (M.W.) and L6 (L.W.) are tuned by C44; secondary coils L10 (M.W.) and L11 (L.W.) are tuned by C48; bottom coupling by C5; L.W. top coupling by C3.

First valve (V1, Mullard metallised TH4) is a triode-hexode operating as frequency changer with internal coupling. Oscillator grid coils L12 (S.W.), L14 (M.W.), L16 (L.W.) are tuned by C49; parallel trimming by C50 (S.W.), C51 (M.W.) and C18, C17, C53 (L.W.); series tracking by C14 (S.W.), C15, C52 (M.W.), and C18, C54 (L.W.); oscillator anode reaction coils L13 (S.W.), L15 (M.W.) and L17 (L.W.).

Second valve, a variable-mu H.F. pentode (V2, Brimar 9D2) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings C7, C55, L18, L19, C56, C10 and C22, C57, L20, L21, C58, C24. Small condensers C11 and C21 form capacitive i.f. couplings.

Intermediate frequency 464 KC/S.

Diode second detector is part of double diode triode valve (V3, Mullard metallised TDD4). Audio-frequency component in rectified output developed across load R9 is passed via coupling condenser C25, I.F. stopper R10, and manual volume control, R12 to C.G. of triode section which operates as L.F. amplifier. Provision for connection of gramophone pick-up in C.G. circuit by S50.

Second diode of V3 fed via C33 provides D.C. potential which is developed across R19 and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay

voltage is obtained from drop along V3 cathode resistance R13.

Cathode-ray visual tuning indicator (T.I. Mullard TV4) is operated by A.V.C. potential.

Resistance-capacity coupling by R21, C34 and R22 between V3 triode and pentode output valve (V4, Brimar 7A3). Fixed tone correction in anode circuit by C35; variable tone control by R.C. filter R25, C37. Provision for connection of low-impedance external speaker across secondary of output transformer T1. Plug and socket arrangement enables internal speaker speech coil circuit to be broken.

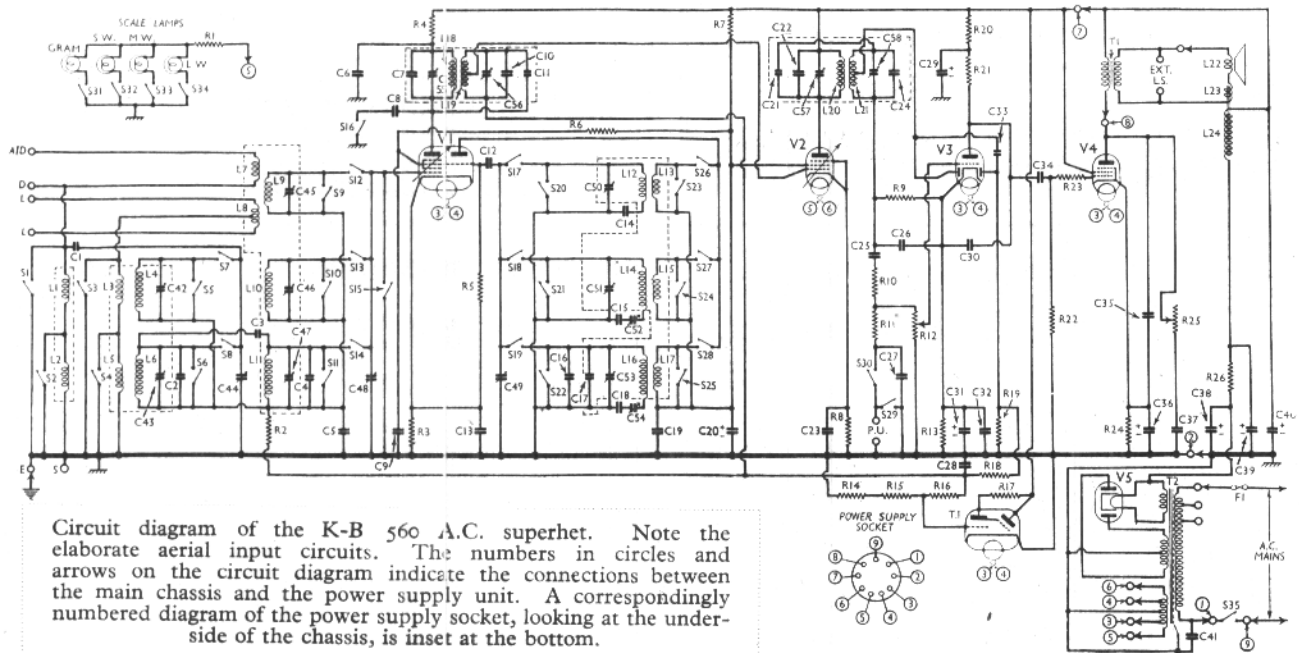
H.T. current is supplied by I.H.C. full-wave rectifying valve (V5, Brimar R2). Smoothing by speaker field coil L24, resistance R26 and dry electrolytic condensers C38, C39, C40. Mains H.F. by-passing by C41.

COMPONENTS AND VALUES

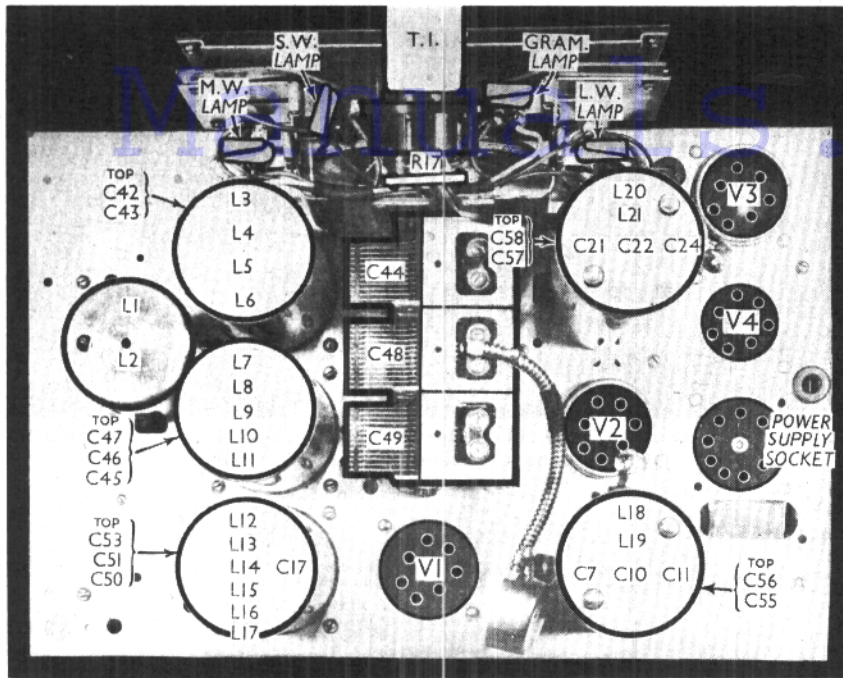
| RESISTANCES | Values (ohms) |
|-------------|---|
| R1 | Scale lamp circuit ballast .. 4 |
| R2 | V1 hexode C.G. decoupling .. 1,000,000 |
| R3 | V1 fixed G.B. resistance .. *140 |
| R4 | V1 hexode anode decoupling .. 5,000 |
| R5 | V1 osc. C.G. resistance .. 25,000 |
| R6 | V1 hexode S.G.'s H.T. feed .. 15,000 |
| R7 | V1 S.G.'s and osc. A. H.T. feed .. 10,000 |
| R8 | V2 fixed G.B. resistance .. 150 |
| R9 | V3 signal diode load .. 500,000 |
| R10 | I.F. stopper .. 100,000 |
| R11 | P.U. circuit H.F. stopper .. 100,000 |
| R12 | Manual volume control .. 500,000 |
| R13 | V3 G.B. resistance .. 1,000 |
| R14 | .. 2,000,000 |
| R15 | T.I. G.B. feed resistances .. 1,000,000 |
| R16 | .. 4,000,000 |
| R17 | T.I. anode H.T. feed .. 2,000,000 |
| R18 | A.V.C. line decoupling .. 100,000 |
| R19 | V3 A.V.C. diode load .. 1,000,000 |
| R20 | V3 triode anode decoupling .. 50,000 |
| R21 | V3 triode anode load .. 50,000 |
| R22 | V4 C.G. resistance .. 100,000 |
| R23 | V4 C.G. I.F. stopper .. 100,000 |
| R24 | V4 G.B. resistance .. 150 |
| R25 | Variable tone control .. 50,000 |
| R26 | H.T. smoothing .. 600 |

* May be 150 Ω.

| CONDENSERS | Values (μF) |
|------------|---|
| C1 | Capacitive aerial coupling .. 0.000018 |
| C2 | L.W. band-pass primary trimmer .. 0.000018 |
| C3 | L.W. band-pass top coupling .. 0.000018 |
| C4 | L.W. band-pass sec. trimmer .. 0.000018 |
| C5 | Band-pass bottom coupling .. 0.02 |
| C6 | V1 hexode anode decoupling .. 0.1 |
| C7 | 1st I.F. trans. pri. fixed tuning .. 0.0001 |
| C8 | V1 hexode anode by-pass (gram.) .. 0.1 |
| C9 | V1 hexode S.G.'s by-pass .. 0.1 |
| C10 | 1st I.F. trans. sec. fixed tuning .. 0.0001 |
| C11 | 1st I.F. cap. coupling .. 0.0000018 |
| C12 | V1 osc. C.G. condenser .. 0.0001 |
| C13 | V1 cathode by-pass .. 0.1 |
| C14 | Osc. S.W. tracker .. 0.01 |
| C15 | Osc. M.W. tracker .. 0.001 |
| C16 | Osc. L.W. trimmers .. 0.000018 |
| C17 | .. 0.0008 |
| C18 | Osc. L.W. tracker .. 0.00025 |
| C19 | V1 S.G.'s and osc. anode decoupling .. 0.1 |
| C20* | .. 10.0 |
| C21 | 2nd I.F. trans. cap. coupling .. 0.0000018 |
| C22 | 2nd I.F. trans. pri. fixed tuning .. 0.0001 |
| C23 | V2 cathode by-pass .. 0.1 |
| C24 | 2nd I.F. trans. sec. fixed tuning .. 0.0001 |
| C25 | L.F. coupling to V3 triode .. 0.02 |
| C26 | I.F. by-pass .. 0.0005 |
| C27 | P.U. circuit H.F. by-pass .. 0.0005 |
| C28 | A.V.C. line decoupling .. 0.1 |
| C29* | V3 triode anode decoupling .. 2.0 |
| C30 | V3 triode anode L.F. by-pass .. 0.0003 |
| C31* | .. 25.0 |
| C32 | V3 cathode by-passes .. 0.00025 |
| C33 | V3 A.V.C. diode feed .. 0.000018 |
| C34 | V3 to V4 L.F. coupling .. 0.02 |
| C35 | Fixed tone corrector .. 0.0005 |
| C36* | V4 cathode by-pass .. 25.0 |
| C37 | Part of T.C. filter .. 0.02 |
| C38* | .. 8.0 |
| C39* | H.T. smoothing .. 8.0 |
| C40* | .. 8.0 |
| C41 | Mains H.F. by-pass .. 0.01 |
| C42* | M.W. band-pass pri. trimmer .. — |
| C43* | L.W. band-pass pri. trimmer .. — |
| C44† | Band-pass primary tuning .. 0.0005 |



Circuit diagram of the K-B 560 A.C. superhet. Note the elaborate aerial input circuits. The numbers in circles and arrows on the circuit diagram indicate the connections between the main chassis and the power supply unit. A correspondingly numbered diagram of the power supply socket, looking at the underside of the chassis, is inset at the bottom.



Plan view of the receiver chassis. The coil trimmers are numbered from the top.

| CONDENSERS (Continued) | | Values (μF) |
|------------------------|--------------------------------|-------------|
| C45† | Aerial S.W. trimmer | — |
| C46† | M.W. band-pass sec. trimmer | — |
| C47† | L.W. band-pass sec. trimmer | — |
| C48† | Band-pass sec. and S.W. tuning | 0.0005 |
| C49† | Oscillator tuning | 0.0005 |
| C50† | Osc. S.W. trimmer | — |
| C51† | Osc. M.W. trimmer | — |
| C52† | Osc. M.W. tracker | — |
| C53† | Osc. L.W. trimmer | — |
| C54† | Osc. L.W. tracker | — |
| C55† | 1st I.F. trans. pri. tuning | — |
| C56† | 1st I.F. trans. sec. tuning | — |
| C57† | 2nd I.F. trans. pri. tuning | — |
| C58† | 2nd I.F. trans. sec. tuning | — |

* Electrolytic. † Variable. ‡ Pre-set.
§ May be 0.0005 μF.

| OTHER COMPONENTS | | Approx. Values (ohms) |
|------------------|---|-----------------------|
| L1 | M.W. and L.W. high-impedance aerial input circuit | 8.0 |
| L2 | Aerial M.W. coupling coil | 30.0 |
| L3 | M.W. band-pass primary | 0.3 |
| L4 | Aerial L.W. coupling coil | 3.0 |
| L5 | L.W. band-pass primary | 0.9 |
| L6 | Aerial S.W. coupling coils | 10.0 |
| L7 | Aerial S.W. tuning coil | 0.25 |
| L8 | M.W. band-pass secondary | 0.25 |
| L9 | L.W. band-pass secondary | 0.05 |
| L10 | Osc. S.W. tuning coil | 3.0 |
| L11 | Osc. S.W. reaction coil | 0.3 |
| L12 | Osc. M.W. tuning coil | 1.8 |
| L13 | Osc. M.W. reaction coil | 2.2 |
| L14 | Osc. L.W. tuning coil | 4.0 |
| L15 | Osc. L.W. reaction coil | 3.5 |
| L16 | 1st I.F. trans. Pri. | 4.5 |
| L17 | 1st I.F. trans. Sec. | 4.5 |
| L18 | 2nd I.F. trans. Pri. | 4.5 |
| L19 | 2nd I.F. trans. Sec. | 4.5 |
| L20 | Speaker speech coil | 1.8 |
| L21 | Hum neutralising coil | 0.1 |
| L22 | Speaker field coil | 1,200.0 |
| T1 | Output trans. Pri. | 450.0 |
| | Sec. | 0.4 |
| | Pri. total | 23.5 |
| | 13 V heater sec. | 0.4 |
| T2 | Mains trans. 4 V heater sec. | 0.15 |
| | Rec. heat. sec. | 0.05 |
| | H.T. sec. total | 145.0 |
| S1-28 | Waveband and muting switches | — |
| S29-30 | Gram. pick-up switches | — |
| S31-34 | Scale lamp switches | — |
| S35 | Mains switch, ganged R12 | — |
| F1 | Mains circuit fuse | — |

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (four countersunk-head wood screws) gives access to most of the under-chassis components.

Removing Chassis.—If it should prove necessary to remove the chassis from the cabinet, remove the three small knobs (pull off), taking care not to lose the springs, and the large tuning knob (two recessed round-head screws). Next remove the six chassis fixing bolts (two with claw washers and four with washers, rubber washers and distance pieces). The former may have been removed already as they are only transit bolts.

Now free the power pack leads from the cleat on the side of the cabinet, when the chassis can be withdrawn, by tilting the back upwards so that the tuning

scale clears the tuning indicator, to the extent of the speaker leads, which should be sufficient for normal purposes.

Before access can be gained to the components between the two vertical screens, the screen secured to them must be removed by removing four round-head screws (with lock washers).

When replacing, screw up the four chassis fixing bolts and then loosen them by three complete turns so that the chassis can float on the rubber washers.

To free the chassis entirely, remove the 9-pin plug from the power pack and remove the tuning indicator and its holder by removing the nuts from the two supporting pillars.

Removing Power Pack.—To remove the power pack from the cabinet, free the mains lead from the cleat on the side of the cabinet, unsolder the three leads to the output transformer and remove the four bolts (with nuts, lock washers, washers, rubber washers and distance pieces). When replacing, connect the leads to the outer row of tags on the output transformer as follows, numbering them from front to back of the chassis: 1, green; 2, blue; 3 and 4, red, joined together.

Alternatively, the power pack and output transformer can be removed together by removing the extension speaker socket panel from the side of the cabinet (two round-head wood screws) and the four bolts (with nuts and washers) holding the shelf to the wooden fillets on the sides of the cabinet. Next unsolder the leads from the speaker terminal panel. When replacing, connect the leads as follows, numbering the tags from bottom to top: 1, yellow; 2, no external connection; 3, yellow; 4, green; 5, red.

Removing Speaker.—If it is desired to remove the speaker, it is first necessary to remove the power pack and output transformer together, as described above. Then unsolder the leads and remove the nuts and lock washers from the four bolts holding the speaker to the sub-baffle. When replacing, see that the terminal strip is on the right and connect the leads as mentioned above.

Alternatively, the speaker and sub-baffle may be removed together by removing the six countersunk-head wood screws holding the sub-baffle to the front of the cabinet.

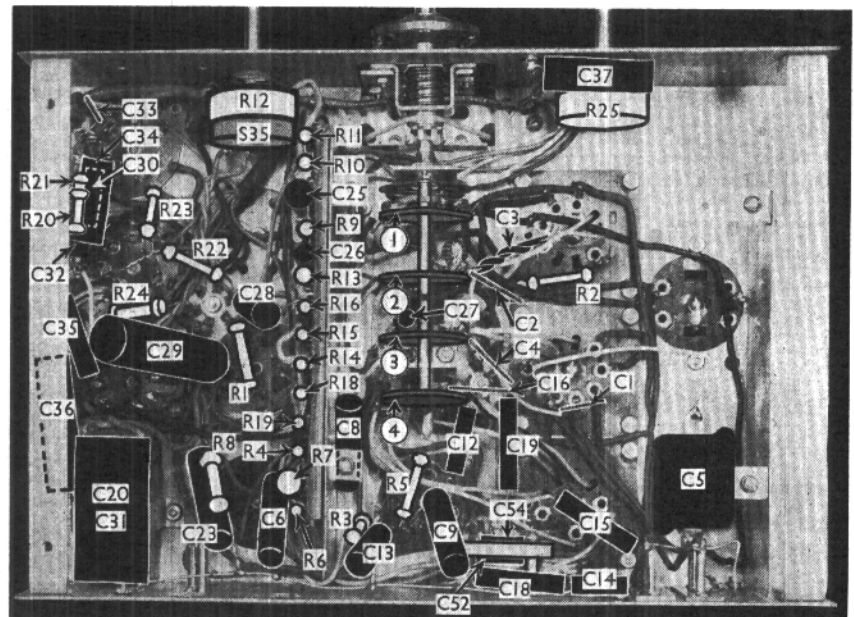
VALVE ANALYSIS

Valve voltages and currents given in the table overleaf are those measured in our receiver when it was operating on mains of 220 V, using the 225 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

Kolster-Brandes recommend that V2 should be

Continued overleaf



Under-chassis view. Note the small fixed condensers C1-C4, C16 and C33, formed of twisted wires. C52 and C54 are two pre-set condensers in a single unit.

K-B 560—Continued

decoupled during measurements by connecting a 0.1 μ F non-inductive condenser between anode and chassis. We did not find this necessary in our case.

| Valve | Anode Voltage (V) | Anode Current (mA) | Screen Voltage (V) | Screen Current (mA) |
|---------|-------------------|--------------------|--------------------|---------------------|
| V1 TH4* | 230 | 2.0 | 55 | 3.7 |
| V2 9D2 | 250 | 8.7 | 110 | 2.2 |
| V3 TDD4 | 65 | 1.6 | — | — |
| V4 7A3 | 235 | 30.0 | 250 | 5.1 |
| V5 R2 | 300† | — | — | — |

* Oscillator anode 110 V, 7.8 mA.
† Each anode, A.C.

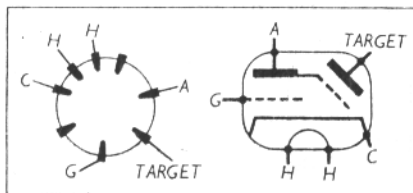
GENERAL NOTES

Switches.—S1-S34 are the waveband, muting and pick-up switches, ganged in four rotary units beneath the chassis, and indicated by numbers in circles in our under-chassis view. The arrows show the directions in which the units are viewed in the diagrams on this page. The table below gives the switch positions for the various control settings, starting from fully anticlockwise. O indicates open, and C closed.

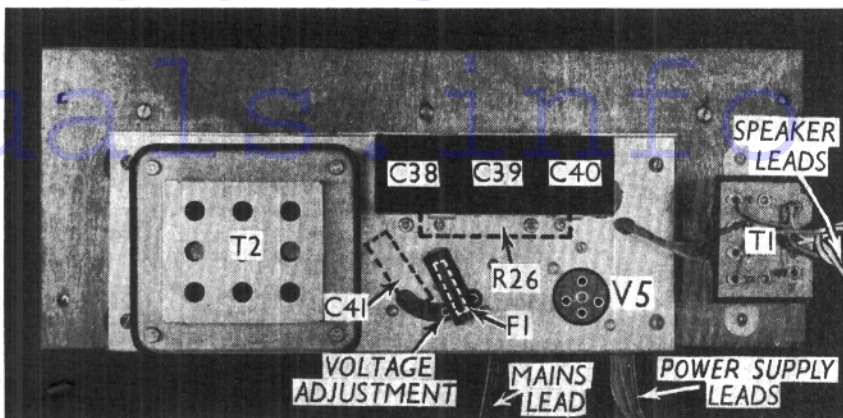
| Switch | Gram. | S.W. | M.W. | L.W. |
|--------|-------|------|------|------|
| S1 | C | C | O | O |
| S2 | C | C | C | C |
| S3 | C | C | C | C |
| S4 | C | C | C | C |
| S5 | C | C | C | C |
| S6 | C | C | C | C |
| S7 | O | O | C | C |
| S8 | O | O | C | C |
| S9 | C | C | C | C |
| S10 | C | C | C | C |
| S11 | C | C | C | C |
| S12 | C | C | C | C |
| S13 | O | O | C | C |
| S14 | O | O | C | C |
| S15 | C | C | C | C |
| S16 | C | C | C | C |
| S17 | O | O | C | C |
| S18 | O | O | C | C |
| S19 | O | O | C | C |
| S20 | C | C | C | C |
| S21 | C | C | C | C |
| S22 | C | C | C | C |
| S23 | C | C | C | C |
| S24 | C | C | C | C |
| S25 | C | C | C | C |
| S26 | C | C | C | C |
| S27 | O | O | C | C |
| S28 | O | O | C | C |
| S29 | O | O | C | C |
| S30 | C | C | C | C |
| S31 | C | C | C | C |
| S32 | O | O | C | C |
| S33 | O | O | C | C |
| S34 | O | O | C | C |

S35 is the Q.M.B. mains switch, ganged with the volume control, R12.

Coils.—L1, L2, L3-L6, L7-L11, and L12-L17 are in four screened units on the chassis deck. The last three of these contain two or three trimmers each, operated through holes in the sides of the coil cans. The plan chassis view indicates these in order from top to bottom. The fourth unit also contains C17. The I.F. transformers, L18, L19 and L20, L21 are in two further screened units on the chassis deck. These each contain their two trimmers, operated through holes in the sides of the cans, and three fixed condensers each. Two of these in each case are in parallel with the corresponding trimmers, while C1 and C21 are very



Connections of the contacts of the tuning indicator, looking at the underside of the base. The electrodes are shown in the diagram on the right.



Plan view of the power unit. R26 and C41 are beneath the chassis deck. F1 is inside the plug forming the mains voltage adjustment.

small disc type ceramic condensers, and are easily identified.

Scale Lamps.—There are four of these, each being an Osram M.E.S. type, rated at 6.2 v, 0.3 A.

External Speaker.—Provision is made by two sockets mounted on the right-hand side of the cabinet, near the top, for a low impedance (about 2 Ω) external speaker. The internal speaker may be disconnected by removing the plug from the top socket on the paxolin strip.

Power Supply Plug.—This has the usual 9-pin arrangement, and plugs into a socket on the chassis. Our circuit diagram has an inset drawing of the socket, from the inside of the chassis (or the plug from the free ends of the pins). This drawing is numbered, and the connections between the power unit and main chassis are indicated in the circuit diagram by similarly numbered circles and arrows.

The colour coding of the connections from the unit to the pins on the plug are: 1, yellow; 2, black; 3, green; 4, green; 5, brown; 6, brown; 7, red; 8, blue; 9, yellow.

Condensers C1-C4, C16, C33.—These are very small fixed condensers formed of spirals of wire wound over straight

wires, except for C3, which is formed of two twisted wires, insulated with yellow sleeving. C16 may not occur in some chassis.

Condensers C38, C39, C40.—These are three 8 μ F dry electrolytics in a single unit on the power supply chassis. There is a common negative (black) lead, and three red positives. These are: C38 to V5 valveholder; C39, to one end of R26; C40, to red rubber-covered lead to power unit plug (H.T. line).

Condensers C20, C31.—These are two dry electrolytics in a single unit beneath the chassis, with a common negative (black) lead. The red lead is the positive of C20 (10 μ F), and the yellow the positive of C31 (25 μ F).

Condensers C52, C54.—These are two pre-set condensers in a single unit. They are adjusted by a nut and screw at the rear of the chassis, the nut adjusting C52 and the screw C54.

Resistance R17.—This is connected across contacts 7 and 8 on the T.I. holder (target and anode).

T.I. Holder.—The colour coding of the connections to the contacts is as follows: 1, blank; 2, brown; 3, brown; 4, black; 5, blank; 6, green; 7, blue (and R17); 8, R17 only.

Fuse F1.—This is a standard 1 1/2 in. Belling-Lec tubular type, rated at 1A. It is inside the mains voltage adjustment plug.

Aerial-Earth Connections.—Six sockets, marked A/D, D, E, L, S and L are provided at the rear of the chassis for different aerial-earth systems, as below.

K-B46r All-wave Rejectostat.—Cable conductors to L and L, screen to S.

Normal aerial (for all bands).—Aerial to A/D, earth to E.

K-B 341 Rejectostat for M.W. and L.W., dipole for S.W.—Aerial pin of receiver Rejectostat to D. C and E pins commoned, and connected to E. Dipole leads to L and L.

Dipole for all bands.—Connect to A/D and D. Earth to E.

Normal aerial for M.W. and L.W., dipole for S.W.—Normal aerial to D, earth to E. Dipole to L and L.

Valve Divergencies.—Note that V2 has a 13 V heater, and is operated from a winding on the mains transformer from which the 4 V supply for the other heaters is tapped. In early models V3 may also have been a 13 V type (Brimar 12D3), but all current models use a 4 V type (Mullard TDD4), the wiring being altered to permit this.

V5 may be an R2 or R3 rectifier.

CIRCUIT ALIGNMENT

The scale pointer should be horizontal with the gang condenser fully meshed. The pointer and station name dial can be adjusted independently by loosening the locking screws on the main condenser drive spindle. The illuminated line above Wilno on the M.W. station name scale can be used to align the scale with the pointer.

I.F. Stages.—Feed a 464 KC/S signal to the control grid (top cap) of V1 and chassis. Adjust C58, C57, C56 and C55 in that order for maximum output, reducing input progressively.

H.F. and Oscillator Stages.—Feed in a 1,400 KC/S (214 m.) signal to the A/D and E sockets, tune to 214 m. on scale, and adjust C51, C42 and C46 for maximum output. Feed in a 600 KC/S (500 m.) signal, set pointer to 500 m. and adjust C52 (nut) for maximum output.

Switch set to L.W., feed in a 175 KC/S (1,714 m.) signal, tune to 1,714 m. on scale, and adjust C54 (screw) for maximum output. Feed in a 250 KC/S (1,200 m.) signal, tune to 1,200 m. on scale, and adjust C53, C43 and C47 for maximum output.

Switch set to S.W., and tune to 50 m. on scale. Feed in a 6 MC/S (50 m.) signal. At the bases of the L7-L11 and L12-L17 coil units, beneath the chassis, two heavy tinned copper wires project. Unsolder these from the tags to which they are fixed, and pull or push both of them gently until a combination of positions is reached where the output is greatest. Then re-solder the wires to the tags without moving them. These wires are attached to inductance matching loops, and it will usually be unnecessary to alter them.

Feed in a 15 MC/S (20 m.) signal, adjust pointer to 20 m. on scale, and adjust C50 and C45 for maximum output. Re-check at 6 MC/S if necessary.