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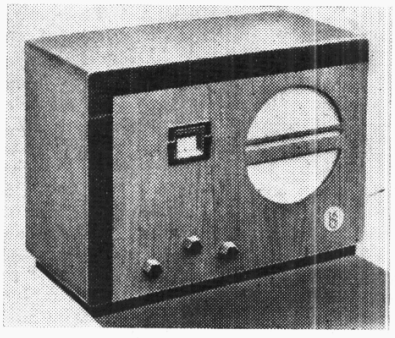
"TRADER" SERVICE SHEET 535

K-B444 & K-B444A, STANDARD 40 AND K-B357 SW CONVERTER



The K-B444 receiver

THE functions of selectivity and fidelity are combined with normal purpose in the volume control of the Kolster-Brandes K-B444 receiver. The IF amplifier also is unusual, in that only one transformer is used and has incorporated with it a reaction circuit. Provision is made for the connection of a gramophone pick-up and an external speaker, and a fuse is included in the mains lead.

The receiver is a 3-valve (plus rectifier) 2-band superhet, operated from AC mains of 200-250 V, 40-100 C/S. It is designed to work in conjunction with the K-B357 Short Wave Converter, a description of which follows this *Service Sheet.*

The K-B444A is similar in every respect, except that its mains voltage range is 100-130 V.

A similar chassis is employed in the Standard model 40, which was available with a 100-130 V or 200-250 V mains transformer.

The valves quoted are all Micromesh types, but a list of equivalent types in other makes is given at the end of "General Notes."

Release date : 1934.

CIRCUIT DESCRIPTION

Aerial input via **L1** and **L2** to capacitatively coupled band-pass filter. Primary coils **L3** (MW) and **L4** (LW) are tuned by **C18;** secondaries **L5** (MW) and **L6** (LW) are tuned by **C20.** Coupling by fixed condenser **C3,** which is common to primary and secondary circuits. Condenser **C1** in series with aerial lead to receiver, in conjunction with switch **S1,** provides the local/distant control.

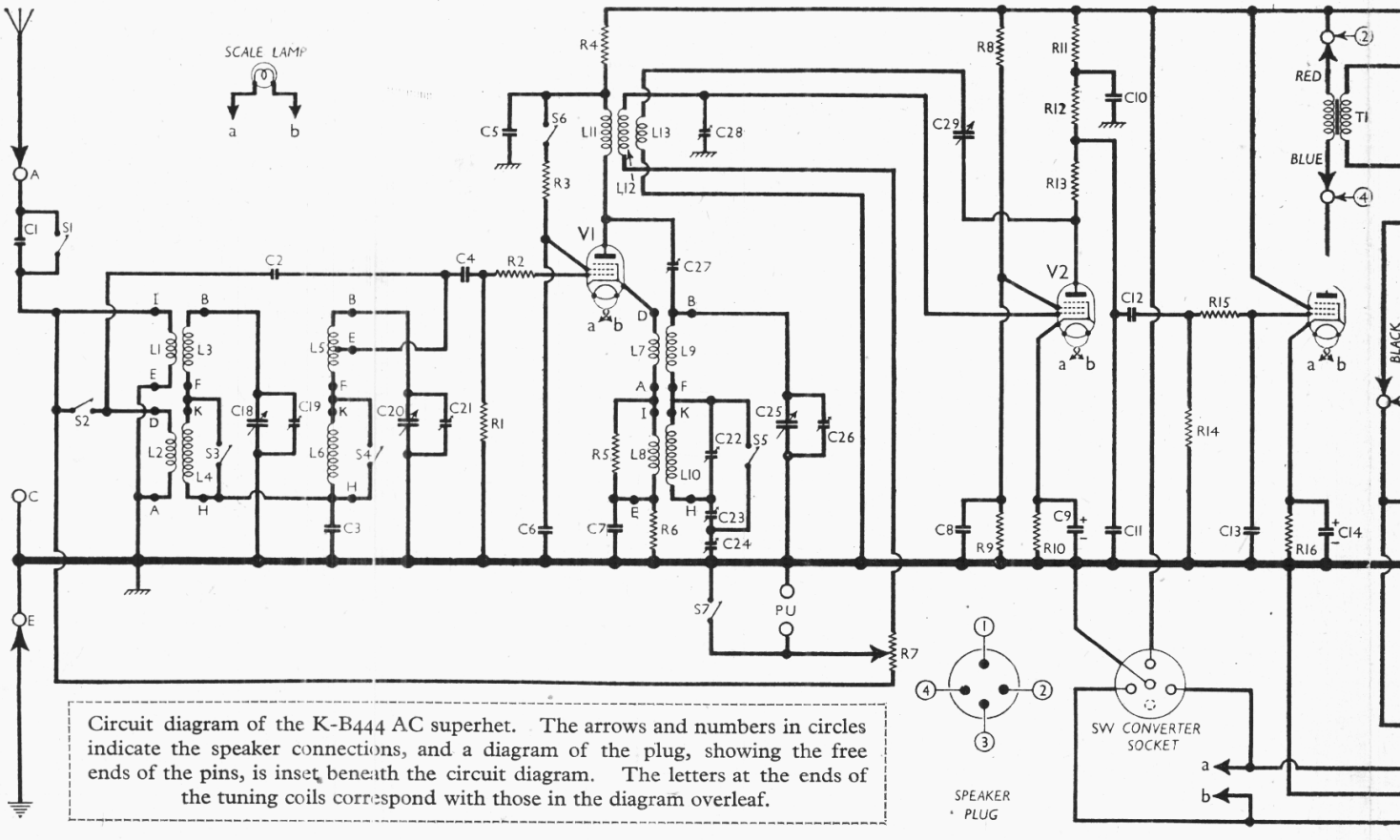
For LW operation, coupling coil **L1** only is used, but on MW, **S2** closes and connects **L1** and **L2** in parallel. Image suppression is accomplished via the small coupling condenser **C2.**

First valve **(V1, Micromesh 8A1)** is an RF pentode operating with fixed grid bias potential as frequency changer, oscillation being produced by coupling the anode and cathode circuits. Anode circuit coils **L9** (MW) and **L10** (LW) are coupled via pre-set condenser **C27** and tuned by **C25.** Parallel trimming by **C26** (MW) and **C22** (LW); series tracking by **C24** (MW) and **C23** (LW). Reaction coupling from cathode circuit via coils **L7** (MW) and **L8** (LW) in series with GB circuit **C7, R6.**

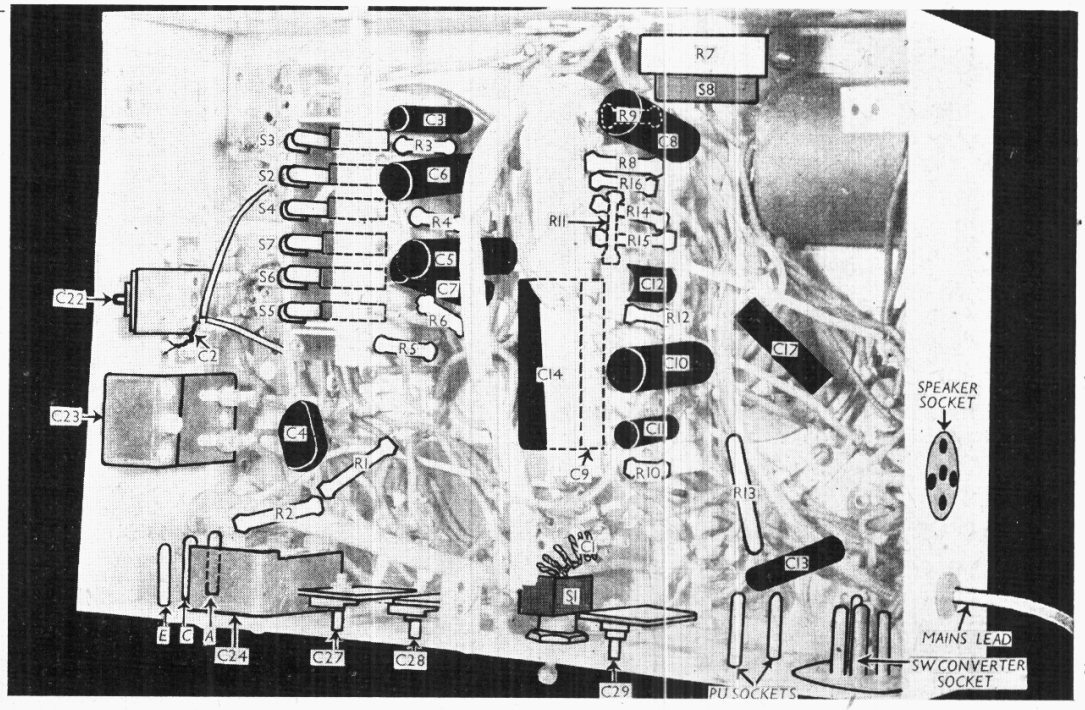
Tuned-primary, tuned-secondary intermediate frequency transformer coupling by **L11, L12,** tuned by **C27** and **C28** respectively, between **V1** and a second RF pentode valve **(V2, Micromesh 8A1),** which operates as second detector, working on the anode bend principle, and audio frequency amplifier.

Intermediate frequency 130 KC/S.

Reaction is applied from the anode circuit via the reaction coil **L13,** which forms a third winding on the single intermediate



Circuit diagram of the K-B444 AC superhet. The arrows and numbers in circles indicate the speaker connections, and a diagram of the plug, showing the free ends of the pins, is inset beneath the circuit diagram. The letters at the ends of the tuning coils correspond with those in the diagram overleaf.



Under - chassis view. Most of the small components are mounted on two paxolin panels. The switch unit is indicated, and the individual switches are identified. The SW converter socket is seen in the bottom right - hand corner, with the speaker socket just above it on the side member of the chassis. **C1** and **C2** are very small condensers, made of enamelled wires twisted together.

frequency transformer, and is controlled by the pre-set condenser **C29,** which requires adjustment only during alignment or when a valve has been replaced. IF filtering by **R13, C11** in anode circuit.

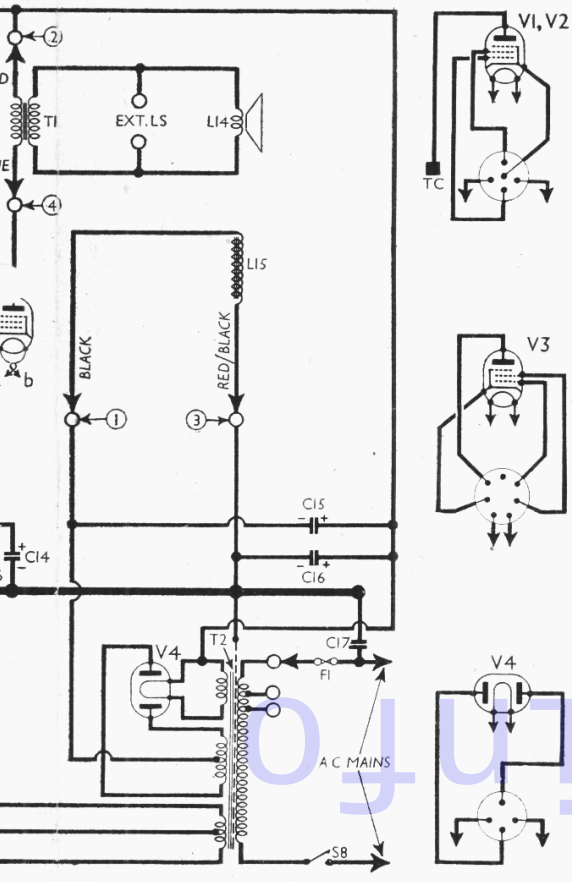
Volume control is manual only, and it is effected by means of a potentiometer **R7** which is connected between the low potential end of **L12** in **V2** control grid circuit and the high potential end of the aerial circuit; the slider is connected via a switch **S7** to chassis. As the control is advanced to increase volume, the slider moves towards the **L12** end of the control, thus progressively reducing both the shunting effect across the aerial circuit and the series damping in **V2** grid circuit. Since the damping effect increases in both circuits as the control is retarded, the band-width is increased, thus combining in its action the functions of volume and fidelity control.

Where interference is experienced, **R7** can also be used to improve the selectivity of the receiver. This is done by setting **S1** to the "distant" position and advancing the control to restore the volume. The reduced damping then results in improved selectivity.

For gramophone pick-up operation, a pair of sockets is connected between the slider of **R7** and chassis; the aerial end of **R7** is connected via **L4,** which at audio frequencies has a negligible impedance, to chassis; so that **R7** works in the same direction on gramophone as it does on radio. When the waveband switch control is turned to the gramophone position, **S6** and **S7** open, and radio is muted.

Resistance-capacity coupling by **R12, C12** and **R14,** via grid stopper **R15,** between **V2** and pentode output valve **(V3, Micromesh 7A2).** Socketed tags are provided on the speaker assembly for the connection of a low impedance external speaker.

HT current is supplied by a full-wave rectifying valve **(V4, Micromesh R2).** Smoothing is effected by the speaker field **L15,** connected in the negative HT lead to chassis, and dry electrolytic condensers **C15, C16.** Mains RF filtering by **C17.** Fuse **F1,** in the mains voltage adjustment plug, affords protection against short-circuits.

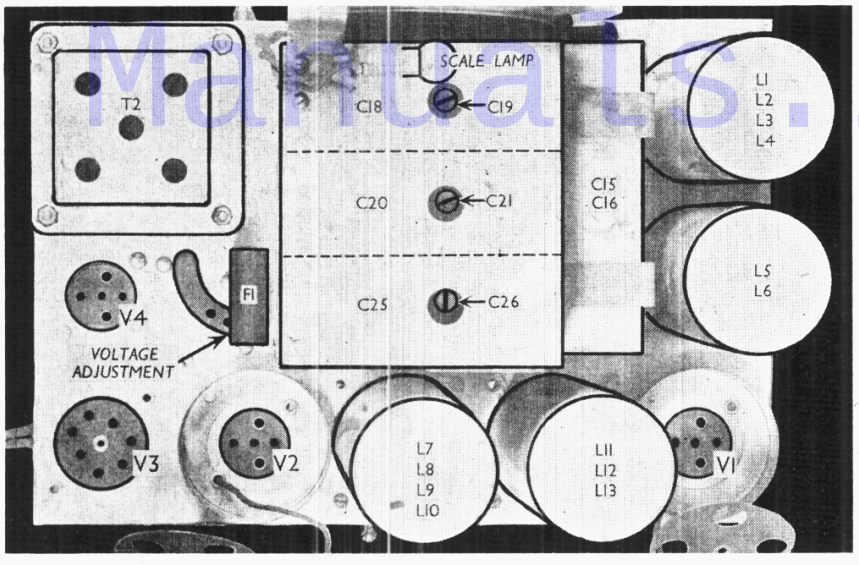


COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Local/distant coupling ...	0·000015
C2	Image suppresser ...	0·000005
C3	Band-pass coupling ...	0·01
C4	V1 CG condenser ...	0·0002
C5	V1 anode decoupling ...	0·1
C6	V1 SG decoupling ...	0·1
C7	V1 cathode by-pass ...	0·01
C8	V2 SG decoupling ...	0·1
C9*	V2 cathode by-pass ...	25·0
C10	V2 anode decoupling ...	0·1
C11	IF by-pass	0·0003
C12	V2 to V3 AF coupling ...	0·01
C13	IF by-pass	0·0001
C14*	V3 cathode by-pass ...	25·0
C15*, C16*	HT smoothing condensers	8·0, 8·0
C17	Mains RF by-pass ...	0·01
C18†	Band-pass pri. tuning ...	0·0005
C19‡	B-P pri. MW trimmer ...	—
C20†	Band-pass sec. tuning ...	0·0005
C21‡	B-P sec. MW trimmer ...	—
C22‡	Osc. circuit LW trimmer ...	—
C23‡	Osc. circuit LW tracker ...	—
C24‡	Osc. circuit MW tracker ...	—
C25†	Oscillator circuit tuning ...	0·0005
C26‡	Osc. circuit MW trimmer	—
C27‡	IF trans. pri. tuning ...	—
C28‡	IF trans. sec. tuning ...	—
C29‡	Reaction control	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	V1 CG resistance	1,000,000
R2	V1 grid stopper	200
R3, R4	V1 anode and SG HT feed resistances	500,000, 50,000
R5	Osc. LW reaction damping	400
R6	V1 GB resistance	3,000
R7	Volume control potentiometer	20,000
R8, R9	V2 SG HT feed potential divider	250,000, 50,000
R10	V2 GB resistance	5,000
R11	V2 anode decoupling ...	50,000
R12	V2 anode load	250,000
R13	IF stopper	25,000
R14	V3 CG resistance	500,000
R15	V3 grid stopper	100,000
R16	V3 GB resistance	250



Plain view of the chassis. F1 is in the voltage adjustment plug.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coils	8·0
L2		3·0
L3	Band-pass primary coils	5·0
L4		19·0
L5	Band-pass secondary coils	5·0
L6		19·0
L7	Oscillator reaction coils	1·5
L8		1·75
L9	Osc. circ. MW tuning coil	3·5
L10	Osc. circ. LW tuning coil	12·0
L11	IF trans. Pri.	60·0
L12	IF trans. Sec.	60·0
L13	Reaction coil	1·5
L14	Speaker speech coil	0·8
L15	Speaker field coil	1,500·0
T1	Speaker input trans. Pri.	400·0
	Speaker input trans. Sec.	0·2
T2	Mains trans. Pri., total	90·0
	Mains trans. Heater sec.	0·1
	Mains trans. Rect. heat. sec.	0·15
	Mains trans. HT sec., total	800·0
S1	Local/distant switch	—
S2-S5	Waveband switches	—
S6	Radio muting switch	—
S7	Pick-up muting switch	—
S8	Mains switch, ganged R7	—
F1	Mains circuit fuse	—

VALVE ANALYSIS

Valve voltages and currents given in the table below have been computed from information given in the makers' manual.

When measurements are being made, the volume control should be at maximum, and there should be no signal input. To obtain voltage readings, a high resistance voltmeter should be used, with its negative lead connected to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 8A1	161	0·5	51	0·2
V2 8A1	100	0·15	31	0·05
V3 7A2	181	23·0	194	3·0
V4 R2	300†	—	—	—

† Each anode, AC.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (pull-off) from the front of the cabinet;

withdraw the speaker plug from its socket on the side of the chassis;

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

If it is so desired, the speaker leads are long enough to permit the plug to remain in its socket, so that the speaker remains connected for test purposes.

If it is desired to remove **V1** or **V2** without first removing the chassis, this should be done by lifting the screen a little, then easing the valve from its socket and withdrawing both valve and screen bottom foremost.

Removing Speaker.—Withdraw the connecting plug from its socket on the chassis;

using a ¼-inch Whitworth spanner, remove the two hexagon-headed screws holding the speaker magnet to its vertical wooden support.

GENERAL NOTES

Switches.—**S1** is the QMB local/distant toggle switch, mounted on the rear member of the chassis.

S2-S5 are the waveband switches, and **S6, S7** the radio/gram switches, in a single cam-operated rotary unit beneath the chassis. The unit is indicated in our under-chassis view, where the individual switches are identified. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control spindle. A dash indicates open, and **C**, closed.

S8 is the QMB mains switch, ganged with the volume control **R7.**

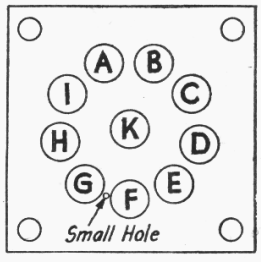
Switch Table

Switch	MW	LW	Gram
S2	C	—	—
S3	C	—	—
S4	C	—	—
S5	C	—	—
S6	C	C	—
S7	C	C	—

Coils.—The aerial, band-pass and oscillator coils **L1-L10** and the IF transformer **L11, L12,** with the reaction coil **L13,** are in four screened units on the chassis deck.

The diagram below shows the layout of the connecting tags of the aerial, band-pass and oscillator units when viewed from beneath the units. The ten tag positions in the diagram are lettered A to K (J is omitted) and they correspond with the letters in the circuit diagram, where these identify the ends of each coil. In each coil base a small hole is drilled as a key to an otherwise symmetrical layout; this hole is always between F and G.

Diagram of the coil bases referred to above. The letters indicate the tag positions.



Scale Lamp.—This is an Osram MES type, rated at 5.5 V, 0.3 A, with a spherical bulb. A 6.2 V, 0.3 A lamp could very well be used as a replacement.

External Speaker.—Socketed tags are provided for all the speaker connections on a panel mounted on the input transformer. In our chassis, the speech coil and **T1** secondary wire connected to the tags marked A and G, and B was unconnected. A low impedance (about 1 O) external speaker could be connected to A and G.

In some models, however, the speech coil lead at G is taken instead to B, and connected via a plug and flying lead to socket G. An external speaker can in these cases be connected to A and B; or if it is desired to mute the internal speaker, the speech coil plug can be withdrawn from G and inserted in B, while the external speaker leads go to A and G. This modification could be carried out in chassis in which it is not already incorporated.

Speaker Plug.—The speaker is connected to the chassis via a 4-pin valve-base type plug attached to the speaker leads. The points of intersection are indicated in the circuit diagram by arrows and circles, which are numbered to agree with pin numbers in the diagram of the plug inset beneath the circuit diagram, where it is drawn as seen when viewed from the free ends of the pins. The colour coding of the leads to the plug is: 1, black; 2, red; 3, red/black; 4, blue. The speaker socket is indicated in our under-chassis view, on one of the side members of the chassis.

Condensers C1, C2.—These are both condensers of very small value, made by twisting together two pieces of enamelled wire. They are indicated in our under-chassis view.

Condensers C9, C14.—These are both dry electrolytics, rated at 25 μF, 25 V.

Condensers C15, C16.—These are two dry electrolytics in single cardboard container. They are both rated at 8 μF, 450 V peak working, 500 V surge.

The black leads are the negative connections, and the red lead is the common positive.

Fuse F1.—This is a 1¼in. 800 mA cartridge type fuse, fitted in the body of the mains voltage adjustment plug.

SW CONVERTER UNIT

K-B357

The K-B357 short wave converter is an auxiliary unit, designed for use with the K-B444 to enable the receiver to work on SW transmissions. It can also be used with K-B666, 888, 365 and 378 receivers. The waverange is 14-80 m, in two bands : SW1, 14-40 m; SW2, 35-80 m. A three-position control switch selects the desired band in two positions, and changes over the combination from SW to the broadcast bands, cutting out the converter unit, in the third (fully clockwise) position.

The diagram below shows the circuit of the converter. When the control is turned to the SW1 and SW2 positions, **S11, S12** and **S14** close, and **S13** opens. Aerial input is then via coupling coil **L16** to single tuned circuits **L17, C36** (SW1) or **L18, C36** (SW2), which precede an RF pentode valve operating as frequency changer, whose control grid lead is tapped down **L17** via **R17** to prevent pulling between the aerial and oscillator circuits.

Except for the tracking arrangements, the action of the frequency changer is similar to that of **V1** in the main receiver; anode coils **L20** (SW1) and **L21** (SW2), coupled via **C42**, are tuned by **C40**; parallel trimming by **C41** (SW1) and **C38** (SW2); series tracking by **C30, C35** (SW1) and **C39** (SW2). Reaction by cathode coil **L19.**

	COMPONENTS	Values
R17	Control grid stopper ...	20 Ω
R18	HT feed resistance ...	5,000 Ω
R19	GB resistance	500 Ω
C30	SW1 fixed tracker ...	0·0005 μF
C31	Anode and SG decoupling	0.5 μF
C32	Cathode by-pass ...	0·01 μF
C33	Heater circuit by-pass condensers	0·01 μF
C34		0·01 μF
C35‡	SW1 tracker	—
C36†	Aerial circuit tuning ...	—
C37‡	Aerial SW1 trimmer ...	—
C38‡	Osc. circ. SW2 trimmer	—
C39‡	SW2 tracker	—
C40†	Oscillator circuit tuning	—
C41‡	Osc. circ. SW1 trimmer	—
C42‡	IF trans. pri. tuning ...	—
S9, S10	Waveband switches ...	—
S11-S14	Change-over switches ...	—

† Variable. ‡ Pre-set.

The frequencies involved are different from those in the K-B444, of course, but a less obvious difference is that, whereas in the K-B444 the oscillator frequency is the sum of the signal and IF frequencies, in the K-B357 it is the difference between them. The intermediate frequency in the K-B357 is 1,400 KC/S (214 m).

Power supply for the converter is taken from the receiver via the SW converter plug and socket; the output at 1,400 KC/S is developed across the IF transformer **L22, L23** and conveyed from its secondary via **S12** and the A, C, E plug to the aerial input sockets on the receiver, whose tuning scale is then set to the "SW Converter" mark on the scale. From this point onwards through the receiver the signal is accepted as a 214 m signal. Component values are given in the table below.

OPERATION

To instal the converter, insert the A, C, E and SW converter plugs into the appropriate sockets on the receiver; connect together the two aerial sockets on the twin panel and triple panel respectively; connect together the **C** and **E** sockets on the triple panel and the **E** socket on the twin panel; connect an ordinary aerial and earth system to the **A** and **E** sockets.

If a K-B Rejectostat system is used, this interconnection of sockets must be omitted, and a separate aerial and earth must be connected to the **A** and **E** sockets on the twin aerial panel. The rejectostat plug is then inserted in the A, C, E sockets on the converter.

To operate the converter, switch the main receiver to MW, and turn to "SW converter" mark on scale. Switch the converter to the required band, and tune as usual on SW bands. To revert to the normal broadcast bands, switch the converter to "Off," when **S11, S12** and **S14** will open, muting the converter, and **S13** will close, connecting the receiver straight through to whatever aerial system is employed.

Alternative Valves.—The valves quoted throughout this *Service Sheet* are micromesh types, but the following valves are equivalent types, and may be used as replacements.

V1 and V2.—Mullard SP4 (5-pin), Mazda AC/S2Pen, Cossor MSPen, Philips E446.

V3.—Mullard Pen4VA (7-pin), Mazda AC/Pen, Marconi or Osram MPT4 (7-pin), Cossor MP/Pen (7-pin).

V4.—Mullard DW3 or DW4/350, Mazda UU120/350 or UU4, Marconi or Osram U12, Cossor 442BU, Philips 1807.

The Mazda AC/S2 Pen is fitted with a 7-pin base, and would therefore require a 7-pin holder. The Mullard SP4 and Pen4VA, Marconi or Osram MPT4 and Cossor MP/Pen are available with 5- or 7-pin bases.

In addition to the above, Brimar valves similar to the Micromesh types quoted could be used.

CIRCUIT ALIGNMENT

IF Transformer.—Switch set to LW, and turn the volume control and gang to maximum. Connect signal generator leads via a 0.1 μF to the tag of **C4** which is remote from **V1** CG, and chassis, and short-circuit **L7** and **L8** (tags D and E). Slacken off fully the adjustments of **C27, C28** and **C29.**

Feed in a 130 KC/S (2307.7 m) signal, and screw up **C28,** then **C27,** for maximum output. Remove the short-circuit from **L7, L8.**

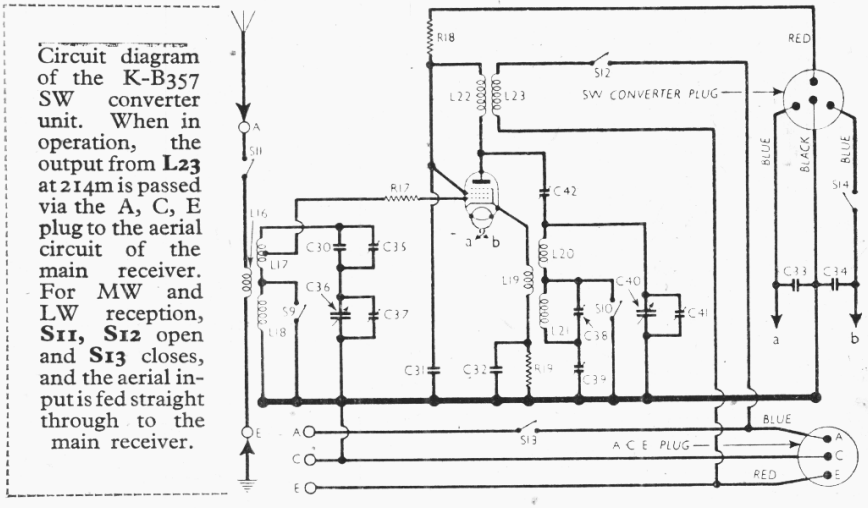
RF and Oscillator Stages.—With the scale indicators adjusted so that their points exactly cover the vertical centre-line through the gang spindle, and the scale turned fully anti-clockwise, the line at the end of the scale should coincide with the indicator points. Fully unscrew **C26,** and tighten up fully **C19** and **C21.**

MW.—Switch set to MW, tune to 214 m (marked "SW Converter" on scale), feed in a 214 m (1,400 KC/S) signal, and adjust **C26** for maximum output. If two peaks are observed, select that involving the lesser trimmer capacity. Now adjust **C21,** then **C19,** for maximum output. Re-adjust **C26** for maximum output.

Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C24** for maximum output, while rocking the gang for optimum results. Re-set MW pointer so that it indicates 500 m on scale. Now tune to 214 m on scale, feed in a 1,400 KC/S signal, and re-adjust **C19, C21** and **C26** for maximum output. Turn gang to maximum, and adjust **C29** until oscillation occurs; slacken off the adjustment to a point about half a turn past where oscillation ceased.

LW.—Switch set to LW, tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C22** for maximum output. Feed in a 1,700 m (175 KC/S) signal, tune it in, and adjust **C23** for maximum output, while rocking the gang for optimum results. Re-adjust the LW pointer to coincide with the "7" in 1,700 m mark on scale. Return to 1,000 m, feed in a 300 KC/S signal, and re-adjust **C22** for maximum output.

Check over the whole of each waveband carefully for instability and, if necessary, re-adjust **C29** to stabilise the receiver.



Circuit diagram of the K-B357 SW converter unit. When in operation, the output from **L23** at 214m is passed via the A, C, E plug to the aerial circuit of the main receiver. For MW and LW reception, **S11, S12** open and **S13** closes, and the aerial input is fed straight through to the main receiver.

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