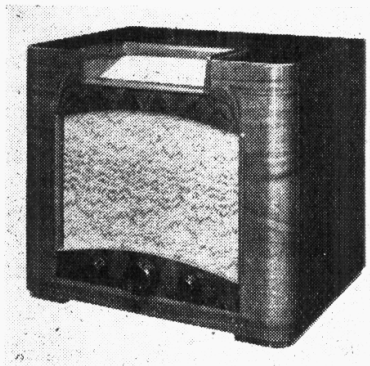
'TRADER' SERVICE SHEET 310

K.B. 652, 642

AC/DC 3-BAND SUPERHETS



The K.B. 652 table receiver

SUITABLE for mains of 195-270 V (40-60 C/S in the case of AC), the K.B. 652 is a 4-valve (plus rectifier) AC/DC 3-band superhet with a short-wave range of 16.5-50 m.

The 642 is identical electrically, but the controls are in slightly different positions owing to the use of a different type of tuning dial. This *Service Sheet* was prepared on a 652.

CIRCUIT DESCRIPTION

Aerial input via isolating condenser **C1,** coupling condenser **C3** and LW choke **L1,** to coupling coil **L2** (SW), and condenser **C4** (MW and LW) and single tuned circuits **L3, C29** (SW), **L4, C29** (MW) and **L5, C29** (LW). On SW and MW **L1** is short-circuited by **S1.**

First valve (**V1, Mullard metallised TH22C**), is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L6** (SW), **L7** (MW) and **L8** (LW) are tuned by **C30**; parallel trimming by **C33** (SW), **C34** (MW) and **C11, C35** (LW); tracking by **C31** (MW) and **C32** (LW). Reaction by coils **L9** (SW), **L10** (MW) and **L11** (LW).

Second valve (**V2, Brimar 9D2**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C36, L12, L13, C37,** and **C38, L14, L15, C39.**

Intermediate frequency 464 KC/S.

Diode second detector is part of double-diode triode valve (**V3, Brimar 11D3**). Audio frequency component in rectified output is developed across load resistance **R12** and passed via IF stopper **R10,** AF coupling condenser **C16** and manual volume control **R11** to CG of triode section, which operates as AF amplifier.

Second diode of **V3,** fed from **V2** anode via **C14,** provides DC potential which is developed across load resistance **R17** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop along **R13** in cathode circuit.

Resistance-capacity coupling by **R15, C20, R18** between **V3** triode and pentode output valve (**V4, Brimar 7D6**). Fixed tone correction in anode circuit by **C21.** Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1.**

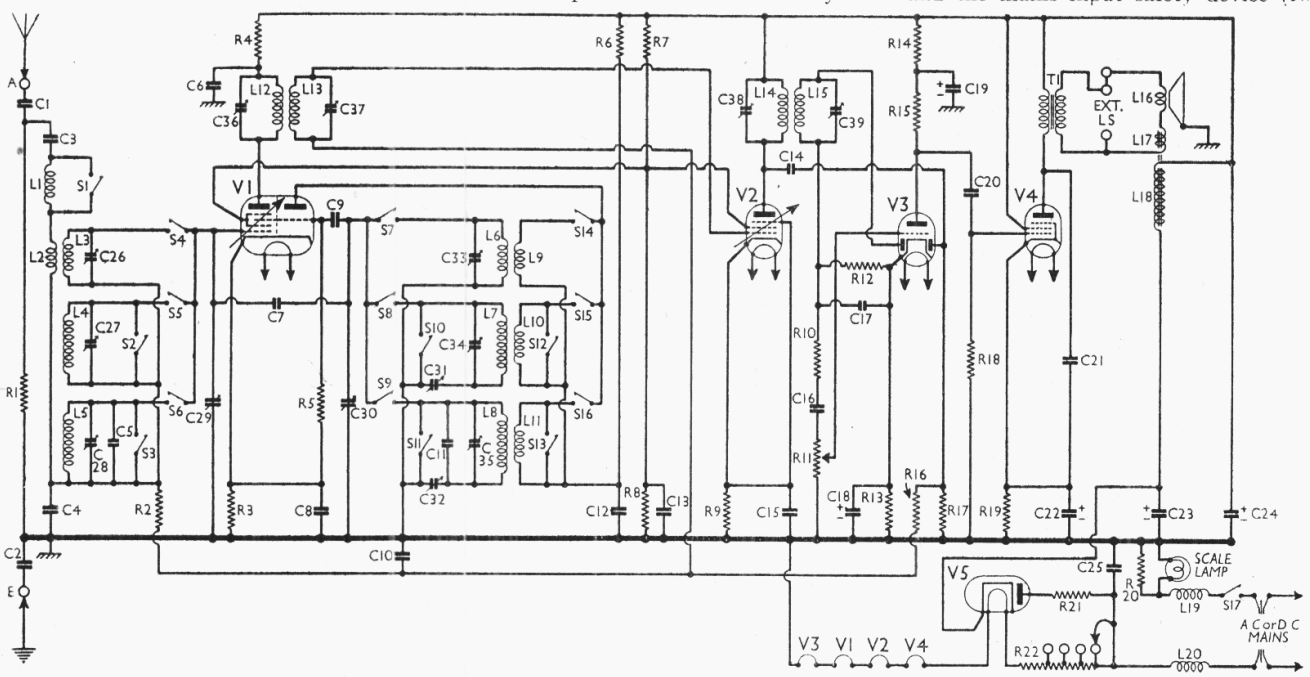
When the receiver is used with AC mains HT current is supplied by half-wave rectifying valve (**V5, Brimar 1D5**) which, with DC supplies, behaves as a low resistance. Smoothing is effected by speaker field **L18** and dry electrolytic condensers **C23, C24.**

Valve heaters are connected in series together with voltage dropping resistance **R22** across mains input. Scale lamp, with shunt resistance **R20,** is connected in series with mains lead to chassis so that it is energised by total HT and heater current. Filter comprising **L19, L20** and **C25** suppresses mains-borne interference. Safety device breaks both poles of mains input circuit when back of cabinet is removed. For servicing, the panel carrying the shorting tags may be removed from the back of cabinet and inserted into its socketed counterpart.

DISMANTLING THE SET

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

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, first remove the three control knobs (recessed grub screws) and then the detachable bottom (six countersunk-head wood screws). Now remove the four bolts (with claw washers and lock washers) holding the chassis to the bottom of the cabinet which are thus exposed, and the mains input safety device (two



Circuit diagram of the K.B. 652 and 642 receivers. **C5** may not be used in some chassis.

round-head wood screws with fibre washers).

Next free the mains lead from the cleat holding it to the side of the cabinet (round-head wood screw), remove the mains switch from the escutcheon on the side of the cabinet (nut and lock nut) and unsolder the speaker leads. The chassis may now be withdrawn by tilting the back upwards.

When replacing, note that the small control knob with a white dot goes on the spindle of the wave-change switch and connect the speaker leads as follows, numbering the tags from left to right :—1, brown ; 2 and 4 joined, red ; 3, no external connection ; 5, blue ; 6, 7 and 8, no external connections. The black lead goes to a tag on the left-hand screw holding the transformer to the speaker frame.

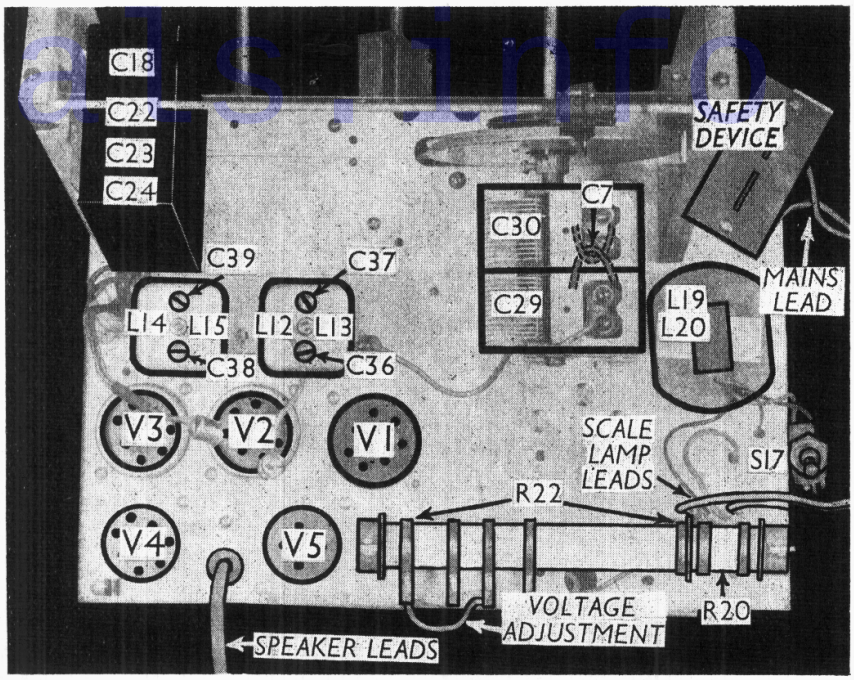
Removing Speaker.—To remove the speaker from the cabinet, first remove the chassis and then the nuts and lock-washers from the four screws holding the speaker to the sub-baffle. *When replacing*, see that the transformer is at the top and connect the leads as above.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit shunt	5,000
R2	V1 hexode CG decoupling	100,000
R3	V1 fixed GB resistance	65
R4	V1 hex. anode HT feed	5,000
R5	V1 osc. CG resistance	50,000
R6	V1 osc. anode HT feed	20,000
R7	V1, V2 SG's HT potential divider	20,000
R8		50,000
R9	V2 fixed GB resistance	250
R10	IF stopper	1,000,000
R11	Manual volume control	500,000
R12	V3 signal diode load	500,000
R13	V3 GB and AVC delay	10,000
R14	V3 triode anode decoupling	50,000
R15	V3 triode anode load	250,000
R16	AVC line decoupling	500,000
R17	V3 AVC diode load	500,000
R18	V4 CG resistance	100,000
R19	V4 GB resistance	150
R20	Scale lamp shunt	75
R21	V5 anode current limiter	75
R22	Heater circuit ballast	*750

* Tapped at 410+115+95+130.

	CONDENSERS	Values (μF)
C1	Aerial isolating condenser	0·01
C2	Earth isolating condenser	0·01
C3	Aerial coupling condenser	0·0005
C4	MW and LW aerial coupling	0·005
C5	Aerial LW fixed trimmer	Very low
C6	V1 hex. anode decoupling	0·1
C7	Small coupling	Very low
C8	V1 cathode by-pass	0·1
C9	V1 osc. CG condenser	0·0001
C10	AVC line decoupling	0·1
C11	Osc. circuit LW fixed trimmer	0·00007
C12	V1 osc. anode decoupling	0·1
C13	V1, V2 SG's decoupling	0·1
C14	Coupling to V3 AVC diode	0·00005
C15	V2 cathode by-pass	0·1
C16	AF coupling to V3 triode	0·02
C17	IF by-pass	0·0005
C18*	V3 cathode by-pass	25·0
C19*	V3 triode anode decoupling	2·0
C20	V3 triode to V4 AF coupling	0·02
C21	Fixed tone corrector	0·005
C22*	V4 cathode by-pass	25·0
C23*	HT smoothing	8·0
C24*		16·0
C25	Mains RF by-pass	0·01
C26‡	Aerial circuit SW trimmer	—
C27‡	Aerial circuit MW trimmer	—
C28‡	Aerial circuit LW trimmer	—
C29†	Aerial circuit tuning	0·0005
C30†	Oscillator circuit tuning	0·0005
C31‡	Osc. circuit MW tracker	—
C32‡	Osc. circuit LW tracker	—
C33‡	Osc. circuit SW trimmer	—



Plan view of the chassis. Note the small capacity **C7**. **R20** and **R22** (the latter being tapped) are wound on the same former.

	CONDENSERS (*Continued*)	Values (μF)
C34‡	Osc. circuit MW trimmer	—
C35‡	Osc. circuit LW trimmer	—
C36‡	1st IF trans. pri. tuning	—
C37‡	1st IF trans. sec. tuning	—
C38‡	2nd IF trans. pri. tuning	—
C39‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW choke	16·5
L2	Aerial SW coupling coil	0·1
L3	Aerial SW tuning coil	0·05
L4	Aerial MW tuning coil	3·0
L5	Aerial LW tuning coil	13·0
L6	Osc. circuit SW tuning coil	0·05
L7	Osc. circuit MW tuning coil	3·5
L8	Osc. circuit LW tuning coil	7·25
L9	Oscillator SW reaction coil	0·1
L10	Oscillator MW reaction coil	1·8
L11	Oscillator LW reaction coil	2·25
L12	1st IF trans. Pri.	7·5
L13	1st IF trans. Sec.	7·5
L14	2nd IF trans. Pri.	7·5
L15	2nd IF trans. Sec.	7·5
L16	Speaker speech coil	2·0
L17	Hum neutralising coil	0·2
L18	Speaker field coil	1,000·0
L19	Mains filter chokes	4·0
L20		4·0
T1	Speaker input trans. Pri.	400·0
	Sec.	0·4
S1-S16	Waveband switches	—
S17	Mains switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on AC mains of 230 V, using the 225 V tapping on the mains resistance. 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 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TH22C	172	2·0	65	3·7
	Oscillator			
	80	5·3		
V2 9D2	186	3·3	65	0·9
V3 11D3	57	0·1	—	—
V4 7D6	176	21·0	186	4·3
V5 1D5†	—	—	—	—

† Cathode to chassis 240 V, DC

GENERAL NOTES

Switches.—**S1-S16** are the waveband switches, ganged in three rotary units beneath the chassis, which are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII, where they are drawn as seen looking in the directions of the arrows in the under-chassis view.

The table (p. VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C**, closed.

S17 is the QMB mains switch mounted on the left-hand side of the cabinet.

Safety Device.—a paxolin panel, mounted by brackets on the inside of the cabinet at the rear, carries two pairs of spring contacts, one for each pole of the mains input, and when the back of the cabinet is in place, two metal plates, mounted in a suitable position on it, short circuit each pair of contacts and so connect the mains to the receiver, via **S17**. When the back of the cabinet is removed, both mains connections are broken.

For testing the chassis, the contact plates can be removed from the back of the cabinet, and used to short the spring contacts.

Coils.—The choke **L1** is in an unscreened unit beneath the chassis, while **L2-L11** are in six tubular units in screened com-

Continued overleaf

K.B. 652—*Continued*

partments beneath the chassis, each unit having a trimmer on the top of it.

The IF transformers **L12, L13** and **L14, L15** are in two screened units on the chassis deck, with their trimmers.

The two mains chokes **L19, L20** are in a single unit on the chassis deck, the black leads belonging to **L19** and the yellow one to **L20.**

Scale Lamp.—This is an MES type, rated at 6.2 V, 0.3 A, and is connected in parallel with **R20**, wound on the same former as **R22** (on the chassis deck).

External Speaker.—No sockets are provided for this, but a low impedance (about 2 O) external speaker could be connected across the secondary of **T1.** By breaking the existing link between two tags on **T1** and inserting a switch, the internal speaker can be muted if desired.

In addition, a 0.01 μF blocking condenser must be connected in series with the earthing lead to the speaker chassis.

Condenser C7.—This is a very low capacity, formed by the leads to the stators of **C29** and **C30** being looped round each other.

Condensers C18, C22, C23, C24.—These are four dry electrolytics in a single carton mounted inside one of the tuning scale supports. The black lead is the common negative of **C23** and **C24.** The yellow lead is the positive of **C23** (8 μF) and the red is the positive of **C24** (16 μF).

The brown lead is the common negative of **C18** and **C22** (25 μF each). The green lead to **R13** is the positive of **C18,** and the green lead to **V4** holder is the positive of **C22.**

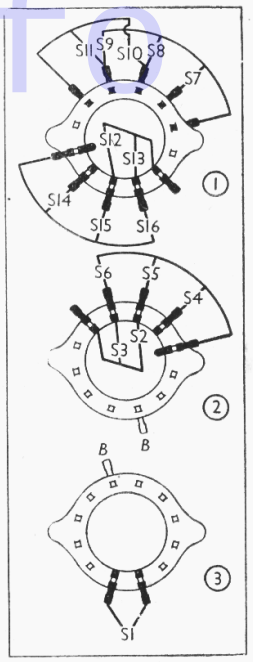
Trackers C31, C32.—These are in a single unit beneath the chassis, adjusted by a nut and screw. The nut adjusts **C31** and the screw **C32.**

Condenser C5.—This is a small trimmer, formed by one insulated wire being spiralled over another. It may not be present in some chassis.

Condenser C25.—This was 0.01 μF in our chassis, not 0.1 μF as indicated by the makers.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	LW	MW	SW
S1	—	C	C
S2	—	—	C
S3	—	C	C
S4	—	—	C
S5	—	C	—
S6	C	—	—
S7	—	—	C
S8	—	C	—
S9	C	—	—
S10	—	—	C
S11	—	C	C
S12	—	—	C
S13	—	C	C
S14	—	—	C
S15	—	C	—
S16	C	—	—



Diagrams of the three switch units, as seen from the underside of the chassis, looking in the directions of the arrows in the under-chassis view.

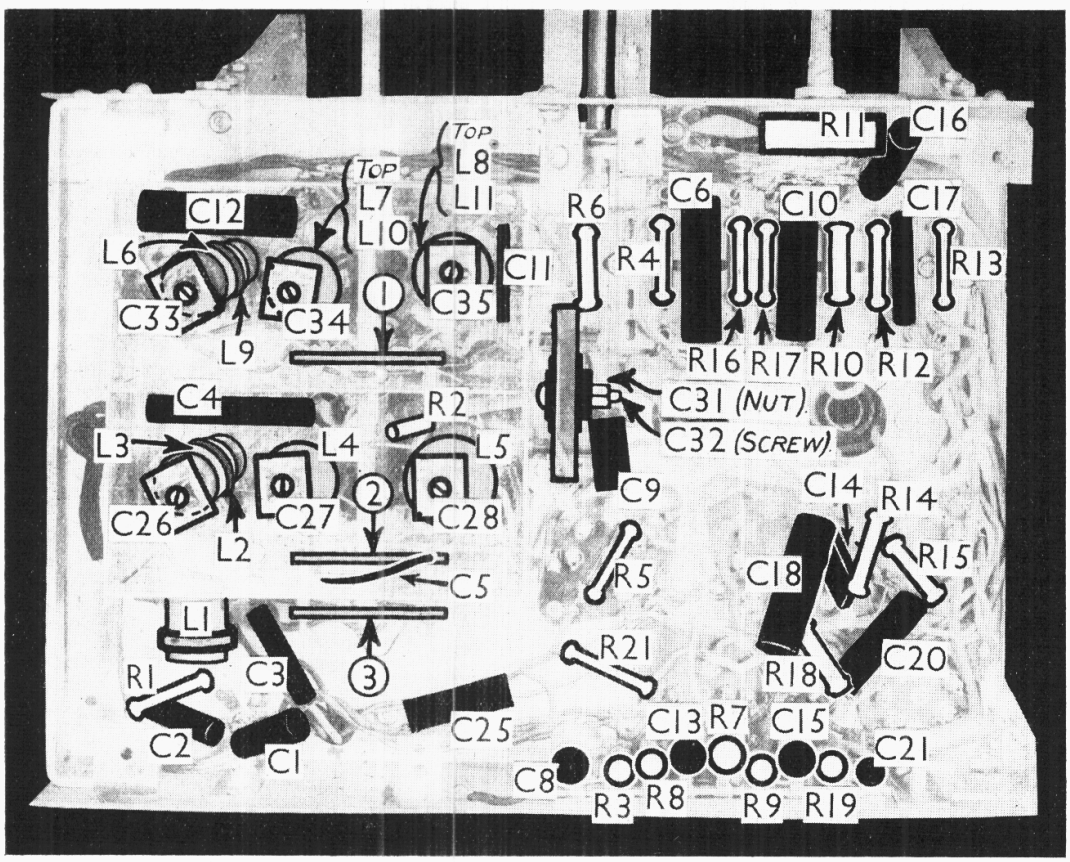
CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis, and feed in a 464 KC/S signal. Adjust **C39, C38, C37** and **C36** in turn for maximum output.

RF and Oscillator Stages.—MW—Connect signal generator to **A** and **E** sockets, and feed in a 214m (1,400 KC/S) signal. Switch set to MW, tune to 214 m on scale, and adjust **C34,** then **C27,** for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C31** (nut) for maximum output, rocking the gang slightly for optimum results.

LW—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust **C35,** then **C28,** for maximum output. Feed in a 1,714 m (175 KC/S) signal, tune it in, and adjust **C32** (screw) for maximum output, while rocking the gang for optimum results.

SW—Switch set to SW, tune to 17.6 m on scale, feed in a 17.6 m (17 MC/S) signal, and adjust **C33,** then **C26,** for maximum output. Check the adjustments and calibration at 50 m (6 MC/S).



Under-chassis view. The three switch units are indicated, and shown in detail in Col. 3. The small fixed trimmer **C5** may not be present in some chassis.

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