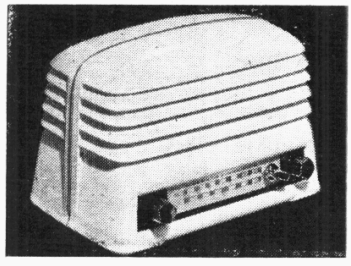
"TRADER" SERVICE SHEET

822

KOLSTER-BRANDES BM20

COVERING ALSO THE BM30



HOUSED in a plastic cabinet of two similar mouldings, the K.B. BM20 has a presentable appearance from back or front. The receiver is a 3-valve (plus rectifier) 2-band superhet, in which one valve performs the three functions of I.F. amplifier, diode detector and reflex A.F. amplifier. It is designed to operate from A.C. mains of 200-250 V, 50-100 c/s. The differences in the BM30 are explained overleaf.

Release date and original prices: February, 1947; *BM20*, £13 15*s*, *plus* £2 19*s* 2*d p.t.*; *BM30*, £13 10*s*, *plus* £2 18*s* 1*d p.t.*

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L2, C21** on M.W., with the addition of loading coil **L3** on L.W., precedes heptode valve **(V1, Brimar 6A8GT)** operating as frequency changer with electron coupling. Provision for the connection of an external aerial via coupling coil **L1.**

Triode oscillator grid coils **L5** (M.W.) and **L4** (L.W.) are tuned by **C22.** Parallel trimming by **C23** (M.W.) and **C6** (L.W.); series tracking by **C8** (M.W.) and **C7** (L.W.). Reaction coupling from anode, via **C9,** is obtained from the common impedance of the M.W. tracker **C8.**

Second valve **(V2, Brimar 6B8GT)** is a double diode variable-mu R.F. pentode. The pentode section operates in a reflex circuit, first as an intermediate frequency amplifier with tuned transformer couplings **C3, L6, L7, C4** and **C12, L8, L9,** and then as a triode A.F. amplifier in which the screen acts as an anode. The second I.F. transformer secondary is untuned.

Intermediate frequency 470 kc/s.

The diode sections of **V2** are strapped in parallel and operate as second detector. Audio frequency component in rectified output is developed across load resistor **R6** and passed, via an I.F. filter circuit **C13, R5** and **C11,** back to the control grid of **V2** pentode section.

The screening grid of **V2,** by-passed from the point of view of I.F. by the low reactance of **C14** at that frequency, is used as a triode anode, and amplified audio frequency voltages developed across **R7** are passed via the A.F. coupling capacitor **C15,** manual volume control **R8,** and grid stopper **R9,** to C.G. of beam tetrode output valve **(V3, Brimar 6V6GT).** Fixed tone correction in anode circuit by **C17.**

D.C. potentials developed across **R6** are fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control.

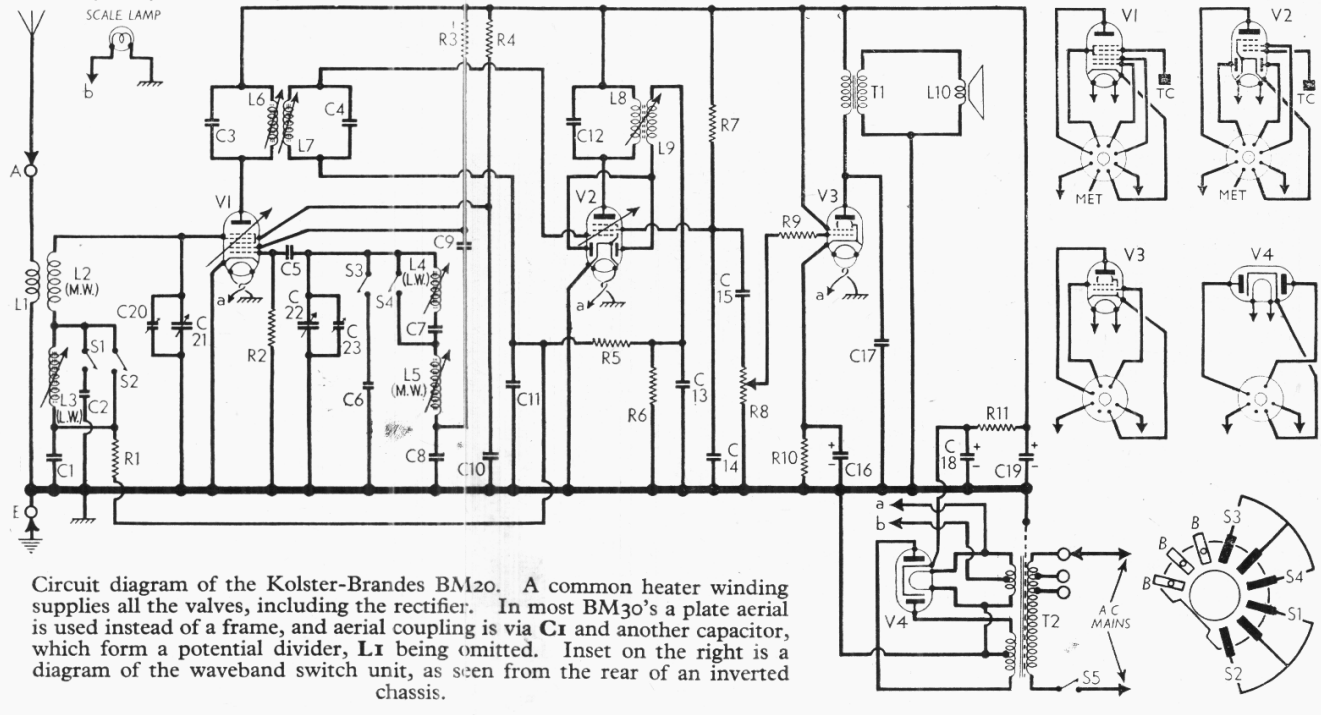
H.T. current is supplied by I.H.C. full-wave rectifying valve **(V4, Brimar 6X5GT).** Smoothing by resistor **R11** and electrolytic capacitors **C18, C19.**

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 tetrode C.G. decoupling	1,200,000
R2	V1 osc. C.G. resistor	47,000
R3	V1 osc. anode H.T. feed	10,000
R4	V1 S.G. H.T. feed	47,000
R5	I.F. stopper	22,000
R6	V2 signal diode load	470,000
R7	V2 S.G. load resistor	100,000
R8	Manual volume control	500,000
R9	V3 C.G. stopper	47,000
R10	V3 G.B. resistor	330
R11	H.T. smoothing resistor	1,000

	CAPACITORS	Values (μF)
C1	V1 tetrode C.G. decoupling	0·1
C2	Aerial circ. L.W. trimmer	0·000025
C3, C4	1st I.F. transformer tuning capacitors	0·00015 each
C5	V1 osc. C.G. capacitor	0·0001
C6	Osc. circ. L.W. trimmer	0·000073
C7	Osc. circ. L.W. tracker	0·000263
C8	Osc. circ. M.W. tracker	0·00038
C9	V1 osc. anode coupling	0·0005
C10	V1 S.G. decoupling	0·02
C11	I.F. by-pass capacitor	0·0005
C12	2nd I.F. trans. pri. tuning	0·0001
C13	I.F. by-pass capacitor	0·0005
C14	V2 S.G. I.F. by-pass	0·0005
C15	A.F. coupling capacitor	0·02
C16*	V3 cathode by-pass	25·0
C17	Fixed tone corrector	0·005
C18*, C19*	H.T. smoothing capacitors	16·0 + 24·0
C20‡	Aerial circ. M.W. trimmer	—
C21†	Aerial circuit tuning	—
C22†	Oscillator circuit tuning	—
C23‡	Osc. circ. M.W. trimmer	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Kolster-Brandes BM20. A common heater winding supplies all the valves, including the rectifier. In most BM30's a plate aerial is used instead of a frame, and aerial coupling is via C1 and another capacitor, which form a potential divider, L1 being omitted. Inset on the right is a diagram of the waveband switch unit, as seen from the rear of an inverted chassis.

OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial coupling coil	...	1·0
L2	Frame aerial winding	...	6·0
L3	Aerial L.W. "loading" coil	...	21·3
L4	Osc. L.W. tuning coil	...	7·1
L5	Osc. M.W. tuning coil	...	3·4
L6	1st I.F. trans. Pri.	...	5·2
L7	1st I.F. trans. Sec.	...	5·2
L8	2nd I.F. trans. Pri.	...	11·0
L9	2nd I.F. trans. Sec.	...	12·1
L10	Speaker speech coil	...	2·6
T1	Output trans. Pri.	...	600·0
	Output trans. Sec.	...	0·5
T2	Mains trans. Pri., total	...	49·7
	Mains trans. Heater sec., total		0·4
	Mains trans. H.T. sec., total		550·0
S1-S4	Waveband switches	...	—
S5	Mains switch, ganged R8		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 225 V tap on the mains transformer.

Voltages were measured on the 400 V scale of a model V Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6A8GT	203	2·6	68	3·0
	Oscillator			
	158	4·9		
V2 6B8GT	203	5·9	68	1·3
V3 6V6GT	192	31·0	203	2·6
V4 6X5GT	244†	—	—	—

†Each anode, A.C.

GENERAL NOTES

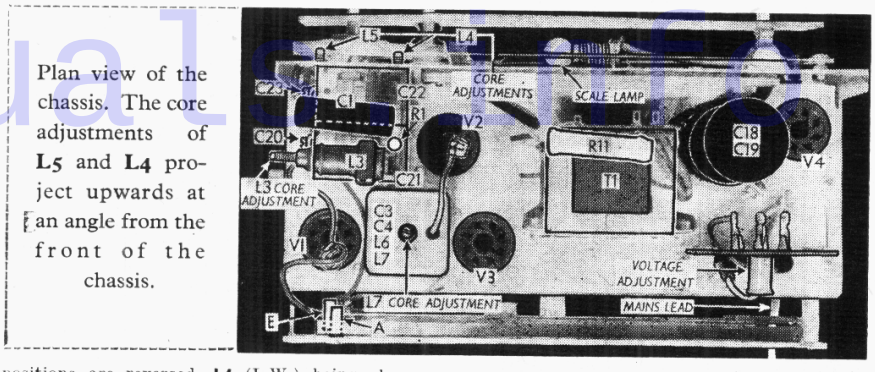
Switches.—**S1-S4** are the waveband switches ganged in a single rotary unit indicated in our under-chassis view. A diagram of the unit, drawn as seen from the rear of an inverted chassis, is inset at the bottom right-hand corner of the circuit diagram overleaf. **S2** and **S4** close on M.W. only, and **S1** and **S3** close on L.W. only. **S5** is the Q.M.B. mains switch, ganged with the volume control **R8.**

Coils.—**L1, L2** are the frame aerial windings, indicated in our under-chassis view. They are wound on the inside of the panel occupying the scale opening in the rear section of the cabinet moulding, which carries the external **A** and **E** sockets. The aerial L.W. loading coil **L3** is mounted on the chassis deck.

L4, L5 are the oscillator circuit coils, mounted beneath the chassis but with their core adjustments projecting through the front chassis member. Note carefully that, while the M.W. aerial coil in our circuit diagram is above the L.W. coil as usual, in the oscillator circuit the positions are reversed, **L4** (L.W.) being above **L5** (M.W.).

Scale Lamp.—This is an Osram M.E.S. type lamp, with a large spherical bulb in a white sprayed finish. It is energized from a part only of the heater secondary, a special tapping being provided for it.

Capacitors C18, C19.—These are two dry electrolytics in a tubular metal container, mounted on the chassis deck. Of the three tags on its base, the red is the positive of **C19** (24 μF), and the yellow, or plain, the positive of **C18** (16 μF); the black tag is the common negative connection. The unit is rated at 350 V peak working.



Plan view of the chassis. The core adjustments of **L5** and **L4** project upwards at an angle from the front of the chassis.

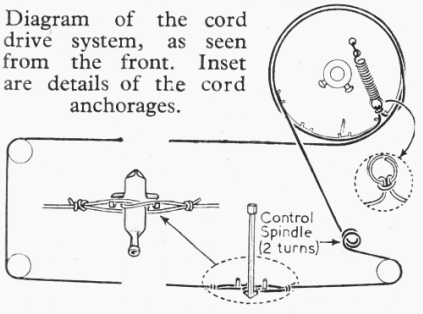
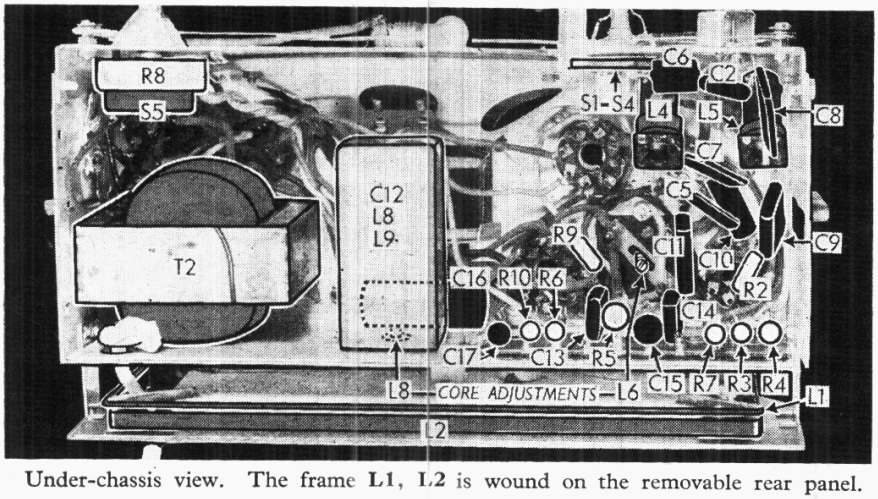


Diagram of the cord drive system, as seen from the front. Inset are details of the cord anchorages.

Resistors R5, R11.—The value of **R5** was originally 47,000Ω, and was later changed to 22,000Ω, so that the early value may be found in some chassis. **R11** is the H.T. smoothing resistor, mounted on the speaker transformer. It is wire-wound and vitreous enamelled, and is rated at 10 W dissipation.

Model BM30.—Most of these models had a plate aerial in the cabinet and a modified aerial circuit with capacitative bottom coupling, with no frame aerial, but otherwise they were electrically identical with the BM20. Subsequent models were identical in every respect except that they were housed in a wooden cabinet, as were all BM30's.



Under-chassis view. The frame **L1, L2** is wound on the removable rear panel.

DISMANTLING THE SET

Removing Chassis.—From the rear of the cabinet, unscrew the two nickel plated nuts located on the left and right edges, beneath the louvres;

the rear cabinet moulding may now be removed, and the chassis slid out of the front moulding as a working unit.

When replacing, the round-head cabinet securing screws should be fitted in the front moulding, and the black plastic band must be rolled on after the two sections have been bolted together.

Both sections of the moulding are of similar shape, but usually the KB insignia goes at the front.

Before inserting chassis, see that the rubber bands are on the metal flanges at the ends of the chassis, as these are clamped by the edges of the mouldings.

DRIVE CORD REPLACEMENT

The cord is of special material made up to quite critical dimensions, the tolerance being ±1/16 inch. It can be obtained made up ready for fitting, from the makers, whose part number for it is 72/153.

It has a loop at each end about 1in long, with non-slip knots, and the overall length is then 43¾ in. exactly. There should be an indelible mark at 15⅝ in. from one end, leaving the remainder at 28⅛ in., with ⅛ in. to be taken up in looping to the tension spring.

Turn gang to maximum, when drum should be as shown in the sketch. Fold cord at the indelible mark, and loop folded end on to the spring as shown inset in the sketch. Take the longer length through the drum slot, and once clockwise round the drum, then follow the sketch. The shorter length goes through the slot, then anti-clockwise round the drum and the control spindle as shown. Both finish up looped over the cursor carriage as shown inset. Finally, hook spring on to its anchorage.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W., turn gang to minimum capacitance and volume control to maximum. Detach frame aerial assembly by removing the countersunk-head screw located behind the manufacturer's label and releasing the spring clips at each end of the assembly, taking care not to damage the windings.

Connect signal generator leads, via a 0.1 μF capacitor, to control grid (top cap) of **V1** and chassis, feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L6, L7** and **L8** for maximum output. Disconnect signal generator leads and replace frame aerial assembly.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the pointer should coincide with the vertical calibration marks at the right hand ends of the two scales. Connect signal generator leads to **A** and **E** sockets via a suitable dummy aerial.

M.W.—Switch set to M.W., tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust the core of **L5** for maximum output. Tune to 217 m on scale, feed in a 217 m (1,380 kc/s) signal, and adjust **C23,** then **C20** for maximum output. Repeat the 500 m and 217 m adjustments until no improvement results.

L.W.—Switch set to L.W., tune to 1,714 m on scale, feed in a 1,714 m (175 kc/s) signal, and adjust the cores of **L4** and **L3** for maximum output. Repeat these adjustments.

Finally, disconnect signal generator leads, tune in a weak signal at the low wavelength end of the M.W. band, and adjust **C20** for maximum output, while rocking the gang.

Printed in England by The Cornwall Press Ltd., Paris Garden, London, S.E.1.