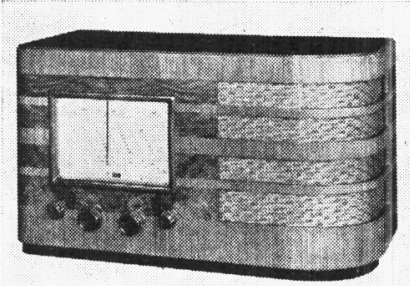


"TRADER" SERVICE SHEET

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# K.B.720

## 3-BAND BATTERY SUPERHET



**C**OVERING a short-wave range of 16.5-52 m, the Kolster-Brandes 720 is a 4-valve battery 3-band superhet with an octode frequency changer, a variable-mu pentode IF amplifier, a double-diode triode and a pentode output valve. Provision is made for both a gramophone pick-up and an extension speaker.

Release date: April, 1938.

### CIRCUIT DESCRIPTION

Two alternative aerial input sockets **A1**, **A2** are provided. Input from **A1** on MW and LW is via **L5**, high impedance aerial coils **L1**, **L2** and **C2** to capacity coupled band-pass filter. Primary coils **L3**, **L4** are tuned by **C18**; secondaries **L7**, **L8** by **C21**; coupling by bottom capacity **C1**. On SW, when **S2** is closed, input is via coupling coil **L5** to single tuned circuit **L6**, **C21**. Input from **A2** socket is fed to **A1** socket via resistance **R1** for reception of local transmissions.

First valve (**V1**, Mullard metallised **FC2A**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C22**; parallel trimming

by **C25** (MW) and **C26** (LW); series tracking by **C23** (MW) and **C24** (LW). Reaction by coils **L12** (SW), **L13** (MW) and **L14** (LW).

Second valve (**V2**, Mullard metallised **VP2**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C27**, **L15**, **L16**, **C28** and **C29**, **L17**, **L18**, **C30**.

Intermediate frequency 464 KC/S. Diode second detector is part of double diode triode valve (**V3**, Mullard metallised **TDD2A**) whose diode anodes are strapped together. Audio frequency component in rectified output is developed across load resistance **R7** and passed via IF stopper **R8**, plug **X**, AF coupling condenser **C10**, manual volume control **R10** and further AF coupling condenser **C11** to CG of triode section, which operates as AF amplifier. Provision is made for connection of gramophone pick-up by removing plug **X** from its socket, where it is replaced by one lead from the pick-up, the other side of which is inserted into an adjacent socket connected to chassis. Plug **X** is then inserted into a third socket to mute radio.

DC potential developed at diode anodes is fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control.

Resistance-capacity coupling by **R12**, **C12** and **R14** between **V3** triode and pentode output valve (**V4**, Mullard **PM22A**). Fixed tone correction in anode circuit by **C14**. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1** by means of a jack-switch which permits the internal speaker to be muted or not as desired.

Grid bias potentials for **V3** triode and **V4** are automatically obtained from resistances **R15**, **R16** which form a potential divider in the HT negative lead to chassis.

### DISMANTLING THE SET

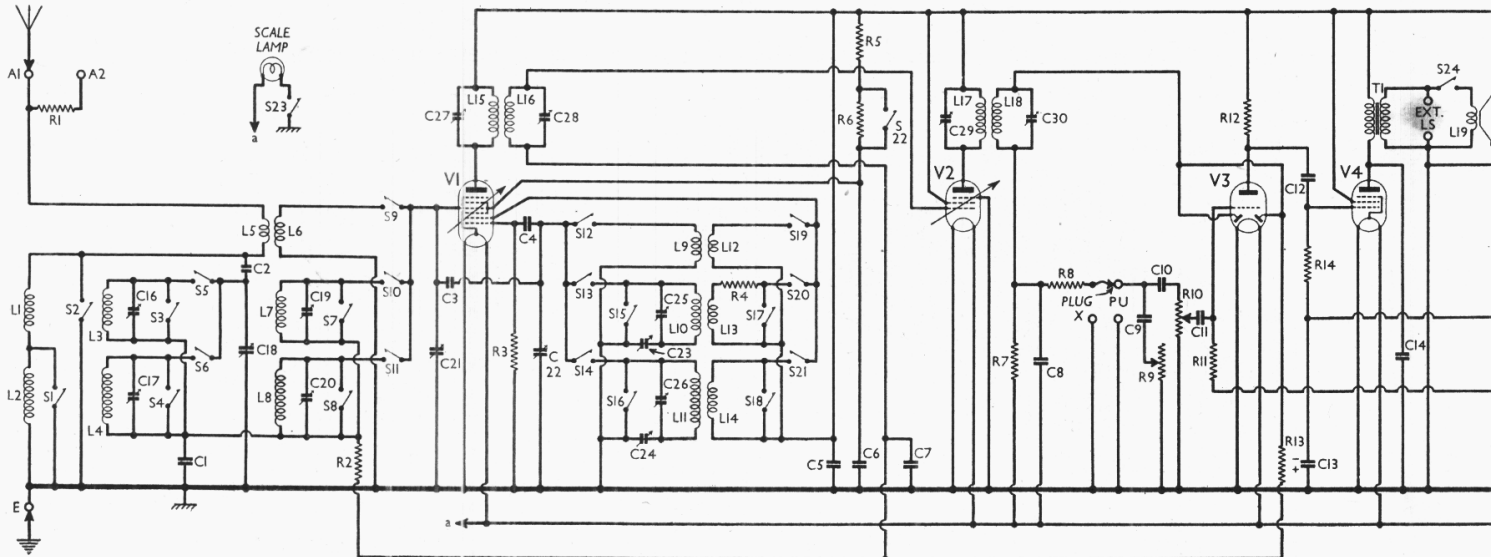
A detachable bottom is fitted to the cabinet and upon removal (two round-head wood screws) gives access to most of the components and trimmers.

**Removing Chassis.**—If it is necessary to remove the chassis from the cabinet, remove the four control knobs (recessed grub screws), the four bolts (with washers and lock washers) holding the chassis to the bottom of the cabinet, and the two round-head wood screws holding the scale assembly to the front of the cabinet.

The chassis can now be withdrawn to the extent of the leads. *When replacing* the larger knobs go on the centre spindles.

To free the chassis entirely, remove the scale lamp holder from its bracket, the panel from the accumulator compartment (two countersunk-head wood screws) and unsolder the speaker leads. *When replacing*, connect the tags from left to right:— 1, brown; 2, red; 3, blue. The black lead goes to the speaker frame and the green lead goes to the bearer tag on the right of the speaker.

**Removing Speaker.**—To remove the speaker from the cabinet, remove the panel in the accumulator compartment (two countersunk-head wood screws), unsolder the speaker leads and slacken the three clamps (nuts and lock washers) holding the speaker to the sub-baffle. *When replacing*, see that the transformer is at the bottom and connect the leads as above.



# Radio

The receiver was tuned to the lowest wave-  
new HT battery reading 135 V on load.  
our receiver when it was operating with a  
the table above are those measured in  
Valve voltages and currents given in

## VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC7A	128	0.5	35	0.9
V2 VP2	128	2.2	—	—
V3 TDDA	128	0.4	—	—
V4 PM22A	126	2.6	128	0.4

Component	Value	Notes
L1	13.5	High impedance aerial coils
L2	35.0	Band-pass primary coils
L3	3.5	Aerial SW coupling coil
L4	20.0	Aerial SW tuning coil
L5	0.1	Band-pass secondary coils
L6	2.75	Osc. circuit SW tuning coil
L7	20.0	Osc. circuit MW tuning coil
L8	4.5	Osc. circuit LW tuning coil
L9	14.0	Oscillator MW reaction
L10	0.1	Oscillator LW reaction
L11	3.8	Oscillator SW reaction
L12	6.6	Oscillator MW reaction
L13	70.0	1st IF trans.
L14	70.0	2nd IF trans.
L15	70.0	1st IF trans.
L16	70.0	2nd IF trans.
L17	70.0	1st IF trans.
L18	70.0	2nd IF trans.
L19	3.5	Speaker input
L20	850.0	Speaker speech coil
L21	0.8	Waveband switches
L22	—	Scale lamp switch
L23	—	Internal speaker switch
L24	—	HT circuit switch
L25	—	LT circuit switch
L26	—	LT circuit switch

## OTHER COMPONENTS

Approx. Values (ohms)

\* Electrolytic. † Variable. ‡ Pre-set.

Component	Value	Notes
C1	0.01	Band-pass coupling
C2	0.00018	Aerial MW and LW coupling
C3	Very low	Small coupling
C4	0.0001	V1 osc. CG condenser
C5	0.001	HT circuit RF by-pass
C6	0.001	V1 SG decoupling
C7	0.1	V2 CG decoupling
C8	0.001	IF by-pass
C9	0.001	Part of variable tone control
C10	0.005	AF coupling condensers to V3 triode
C11	0.02	V3 triode to V4 AF coupling
C12	50.0	Auto CB by-pass
C13	0.02	Fixed tone corrector
C14	2.0	HT reservoir condenser
C15	0.0002	Band-pass pri. MW trimmer
C16	0.0005	Band-pass sec. MW trimmer
C17	0.0005	Band-pass pri. LW trimmer
C18	0.0005	Band-pass sec. LW trimmer
C19	0.0005	Aerial SW tuning
C20	0.0005	Oscillator circuit tuning
C21	0.0005	Osc. circuit MW tracker
C22	0.0005	Osc. circuit LW tracker
C23	—	Osc. circuit MW trimmer
C24	—	Osc. circuit LW trimmer
C25	—	1st IF trans. pri. tuning
C26	—	1st IF trans. sec. tuning
C27	—	2nd IF trans. pri. tuning
C28	—	2nd IF trans. sec. tuning
C29	—	and IF trans. pri. tuning
C30	—	and IF trans. sec. tuning

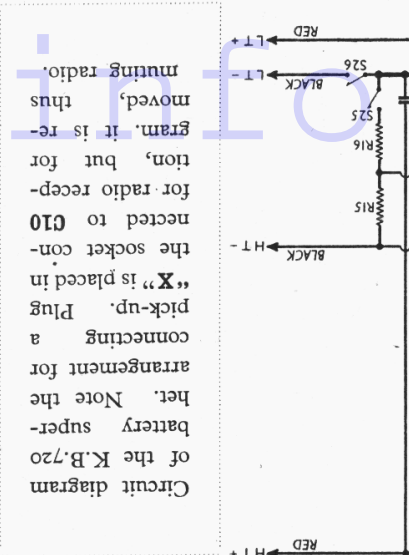
## CONDENSERS

Values (μF)

Component	Value	Notes
R11	1,000,000	V3 triode CG resistance
R12	50,000	V3 triode anode load
R13	500,000	AVC line decoupling
R14	500,000	V4 CG resistance
R15	300	V3 triode and V4 automatic
R16	200	GB resistances

## RESISTANCES

Values (ohms)



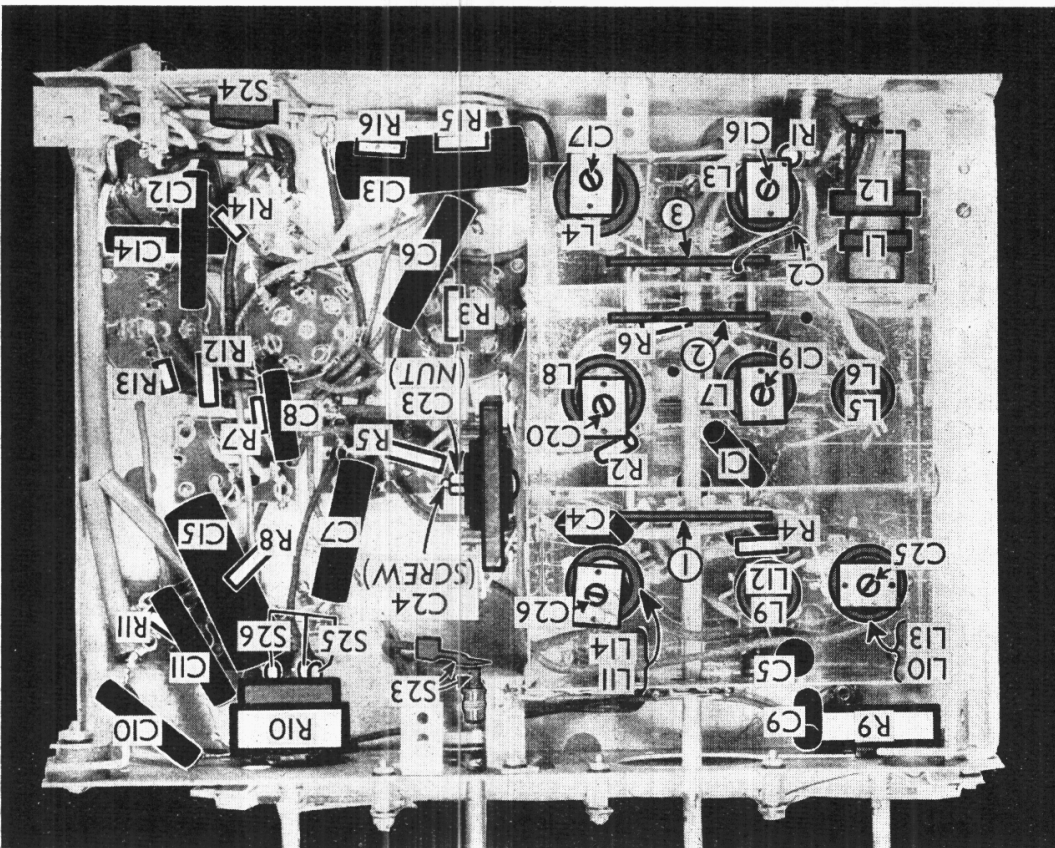
Circuit diagram of the K.B.720 battery super-heterodyne receiver. Note the arrangement for connecting a pick-up. Plug "X" is placed in the socket connected to G10 for radio reception, but for gram, it is removed, thus mounting radio.

Component	Value	Notes
R1	100,000	Az aerial series resistance
R2	100,000	V1 pentode CG decoupling
R3	20,000	V1 osc. CG resistance
R4	2,000	Osc. MW reaction damping
R5	50,000	V1 SG HT feed resistances
R6	50,000	V3 signal diode load
R7	100,000	IF stopper
R8	500,000	Variable tone control
R9	500,000	Manual volume control

## RESISTANCES

Values (ohms)

## COMPONENTS AND VALUES



Under - chassis view. Diagrams of the switch in the direction of the arrows, are in col. 3 over-leaf. S23 is the scale lamp switch, operated by pushing in the tuning knob. C23 and C24 are in a dual unit, adjusted by a nut and screw respectively.

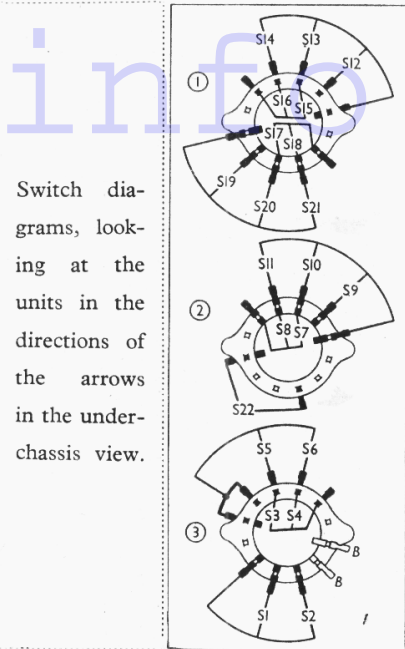
Supplement to The Wireless & Electrical Trader, March 11, 1939

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TABLE AND DIAGRAMS OF SWITCH UNITS

Switch	LW	MW	SW
S1	---	C	C
S2	---	---	C
S3	---	---	C
S4	---	C	C
S5	---	C	---
S6	C	---	---
S7	---	---	C
S8	---	C	C
S9	---	---	C
S10	---	C	---
S11	C	---	---
S12	---	---	C
S13	---	C	---
S14	C	---	---
S15	---	---	C
S16	---	C	C
S17	---	---	C
S18	---	C	C
S19	---	---	C
S20	---	C	---
S21	C	---	---
S22	---	---	C



Switch diagrams, looking at the units in the directions of the arrows in the under-chassis view.

length 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.

GENERAL NOTES

**Switches.**—S1-S22 are the waveband switches, in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3, where the first two units are as seen from the front of the underside of the chassis, and the third from the rear. The table (col. 2) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and C closed.

S23 is the scale lamp switch, of the leaf type, which closes when the tuning knob is pushed in.

S24 is the internal speaker muting switch, associated with the external speaker sockets at the rear of the chassis. When the special plug is inserted, and rotated anti-clockwise, S24 opens and breaks the internal speaker speech coil circuit.

S25, S26 are the OMB HT and LT circuit switches, ganged with the volume control R10. They have one common tag, and their positions are indicated in the under-chassis view.

**Coils.**—The RF and oscillator coils L1-L14 are disposed in nine unscreened units beneath the chassis, and are identified in our under-chassis view. Six of the units are fitted with trimmers. The IF transformers L15, L16 and L17, L18 are in two screened units on the chassis deck, with their associated trimmers.

**Scale Lamp.**—This is an MES type, rated at 2.5 V (the current is not indicated). It is switched into circuit by pressing in the tuning knob and so closing S22.

**External Speaker.**—Sockets are provided at the rear of the chassis for a low impedance (2-5 O) external speaker.

A special plug is provided, and by rotating it after insertion, S24 can be caused to mute the internal speaker.

**Pick-up Connections.**—There are three sockets and a plug (X) on a flying lead at the rear of the chassis, for connecting a pick-up and muting radio. The plug should be in the lowest socket for radio; when using a pick-up, pull out the plug, and plug the pick-up into the centre and bottom socket, with the screen plugged into the top socket. If the screen is joined to one of the two pick-up plugs, this plug should be in the centre socket, the top socket being left blank, or used for plug X, thus connecting R8 to chassis. The bottom socket is connected to C9, C10; the other two are connected to chassis.

**Condensers C2, C3.**—These are two small condensers, formed by twisted insulated wires. C2 is beneath the chassis, supported on number 3 switch, unit, while C3 is between the C21 and C22 units of the gang, above the chassis.

**Trackers C23, C24.**—These are in a dual unit beneath the chassis. The nut adjusts C23, and the screw C24.

**Chassis Divergency.**—C8 is shown as 0.0005 μF by the makers, but was 0.001 μF in our chassis.

**Batteries.**—Recommended batteries are LT, Exide GFG4C, Fuller MYG, Oldham ZLG3; HT, Drydex H1131, Ever Ready Portable 53, G.E.C. BB371, Siemens Full o'Power 1314, Fuller S 854. The LT is a 2 V cell, and the HT a 135 V dry battery. GB is automatic.

**Battery Leads and Voltages.**—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2 V; black lead and plug, HT negative; red lead and plug, HT positive 135 V.

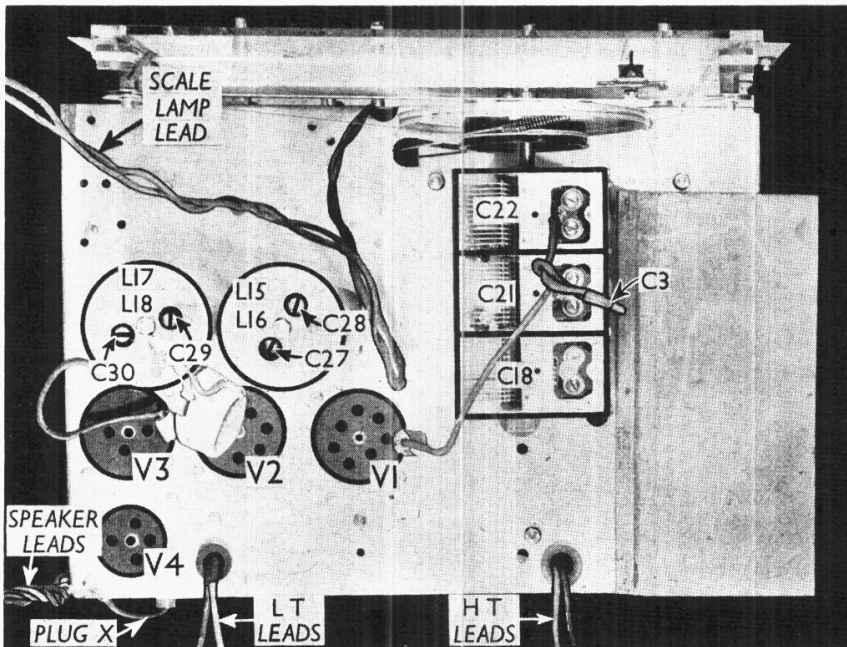
CIRCUIT ALIGNMENT

**IF Stages.**—Connect signal generator to control grid (top cap) of V1 and chassis. Feed in a 464 KC/S signal, and adjust C30, C29, C28, C27 for maximum output.

**RF and Oscillator Stages.**—With gang at maximum, pointer should coincide with the right hand vertical line of each scale. Connect signal generator to A1 and E sockets, via a suitable dummy aerial.

**MW.**—Switch set to MW, and tune to 214 m (black dot) on scale. Feed in a 214 m (1,400 KC/S) signal, and adjust C25, then C19 and C16 for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C23 (nut) for maximum output, while rocking the gang for optimum results. Re-check the settings of C25, C19 and C16 at 214 m.

**LW.**—Switch set to LW, and tune to 1,000 m on scale. Feed in a 1,000 m (300-KC/S) signal, and adjust C26, then C20 and C17, for maximum output. Feed in a 1,714 m (175 KC/S) signal, tune it in, and adjust C24 (screw) for maximum output, while rocking the gang for optimum results. Re-check the settings of C26, C20 and C17 at 1,000 m. There are no SW alignment adjustments.



Plan view of the chassis. Plug "X" is for radio muting on gram. It is normally in the lowest of the three sockets. C3 is a small twisted wire condenser.