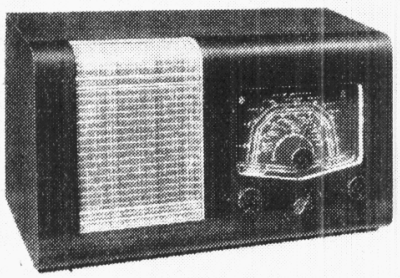
Supplement to The Wireless & Electrical Trader, November 23, 1940

"TRADER" SERVICE SHEET

494

K.B. 870 AND 871 CONSOLE



THE Kolster-Brandes 870 table model is a 4-valve (plus rectifier), 3-band superhet, suitable for operation from 200-250 V or 100-250 V AC mains of 40-60 C/S. The short wave range is 16.5-52 m.

The power unit forms a separate assembly from the receiver chassis, an octal plug and socket being used to connect the two. The points of interconnection, together with a diagram of the plug, are shown in the circuit diagram.

The 871 console has an identical circuit, and is referred to again under "General Notes," but this *Service Sheet* was prepared from an 870 receiver.

Release date, both models, July, 1940.

CIRCUIT DESCRIPTION

Aerial input is developed across shunt resistance **R1** and coupling potential divider comprising condensers **C1** and **C2** and the short wave coupling coil **L1.** On SW, the impedance of **C1** and **C2** is negligible, and practically the whole signal is developed across **L1** and passed to the single-tuned circuit **L2, C25.**

On MW and LW, the impedance of **L1** is negligible, and the signal voltage is divided between **C1** and **C2,** that across **C2,** which is included the tuning circuits, being passed to the single tuned circuits **L3, C25** (MW) and **L4, C25** (LW).

First valve **(V1, Brimar 15D2)** is a heptode operating as frequency changer with electronic coupling. Oscillator grid coils **L5** (SW), **L6** (MW) and **L7** (LW) are tuned by **C26.** Parallel trimming by **C27** (SW), **C28** (MW) and **C6, C29** (LW); series tracking by **C30** (MW) and **C7** (LW). There is no tracking condenser on the SW band.

Reaction coupling is accomplished on the SW band by means of the coupling coil **L8,** and on the MW and LW bands by the common impedance of the tracker **C30** in grid and anode circuits.

Second valve **(V2, Brimar 9D2)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings, **C31, L9, L10, C32** and **C33, L11, L12, C34.**

Intermediate frequency 464 KC/S.

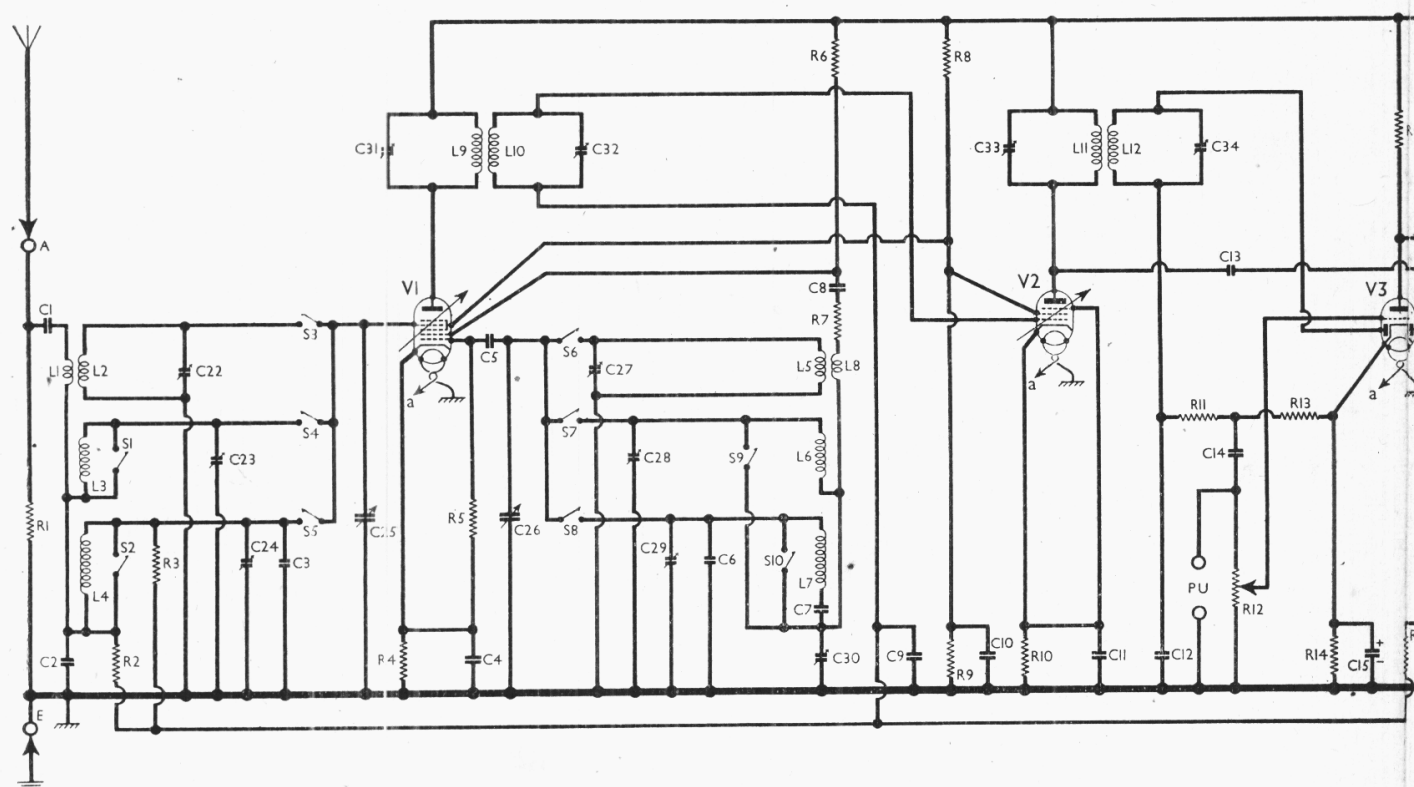
Diode second detector is part of double diode triode valve **(V3, Brimar 11D3).** Audio frequency component in rectified output is developed across load resistance **R13** and passed via AF coupling condenser **C14** and manual volume control **R12** to control grid of triode section, which operates as audio frequency amplifier.

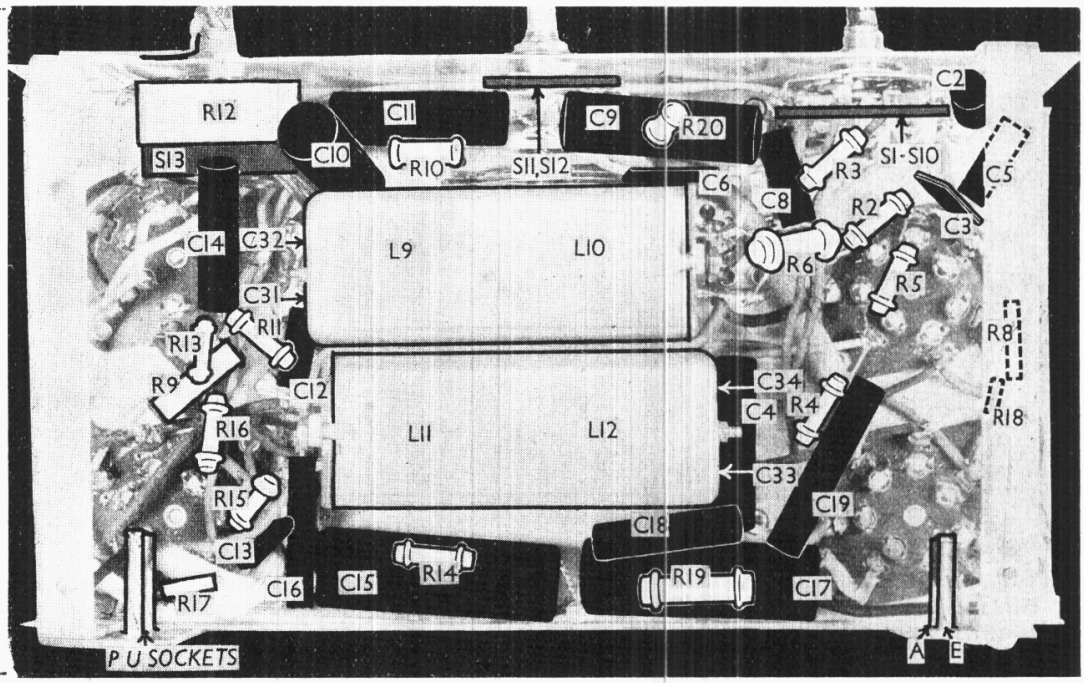
IF filtering by **C12, R11** in diode circuit. Provision for connection of gramophone pick-up by sockets directly across **R12.**

Second diode of **V3,** fed from **V2** anode via **C13,** provides DC potential which is developed across load resistance **R17** and fed back through decoupling circuits as GB to FC (except on SW band) and IF valves, giving automatic volume control. Delay voltage, together with GB for triode section, is obtained from drop along resistance **R14** in cathode lead.

Resistance-capacity coupling by **R15, C16** and **R18** between **V3** triode and pentode output valve **(V4, Brimar 7D5).** Fixed tone correction by **C18** in anode circuit. Three-position tone control by **C19, R20** and the switches **S11** and **S12,** also in anode circuit, in parallel with **C18.** Provision by tags on speaker input transformer **T1** for connection of low impedance external speaker across internal speaker speech coil **L13.**

HT current is supplied by IHC full-wave rectifying valve **(V5, Brimar R2).** Smoothing by speaker field **L15** in conjunction with electrolytic condensers **C20** and **C21.**





Under - chassis view. The IF transformers are mounted horizontally in the centre of the chassis ; their trimmers are indicated, pairs facing opposite directions. The two switch units **S1-S10** and **S11, S12** are indicated by arrows, and are shown in detail in the diagrams in col. 4 overleaf.

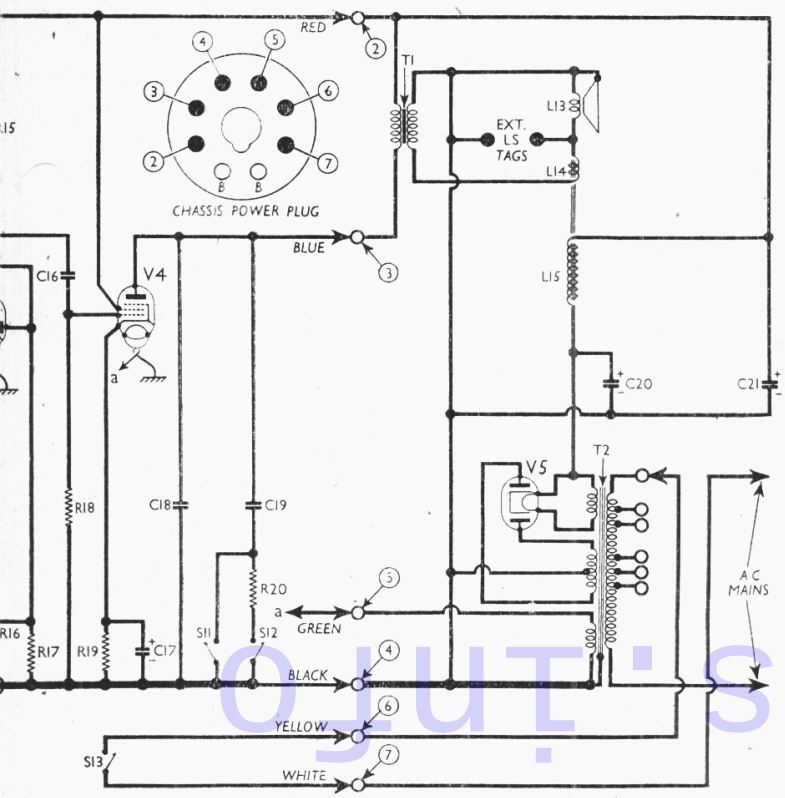
VALVE ANALYSIS

Valve voltages and currents given in the table (col. 5) are those measured in our receiver when it was operating on mains of 230 V, using the 225 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium wave 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 15D2	274	4.0	91	3.9
	Oscillator			
	162	4.7		
V2 9D2	274	8.0	91	1.7
V3 11D3	63	0.3	—	—
V4 7D5	253	40.0	274	6.4
V5 R2	262†	—	—	—

† Each anode, A.C.



Circuit diagram of the Kolster-Brandes 870 AC superhet. The separate power unit is on the right, the points at which it joins the main chassis being indicated by arrows and numbers in circles, which represent the connecting plug and socket. A diagram of the plug, viewing the free ends of the pins, is inset above **V4**. The chassis of the 871 console is identical.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws) from the front of the cabinet, taking care not to lose the felt washer on the tuning control spindle;

withdraw from the power unit the octal plug connecting it to chassis;

remove the two round-head wood screws holding the top of the scale backing plate to the front of the cabinet;

remove the four round-head set-screws (with lock-washers and claw washers) holding the chassis to the bottom of the cabinet.

When replacing, note that two felt washers are fitted to the tuning control spindle, one going between the scale pointer and the celluloid window, and a thinner one between the window and the control knob.

Removing Power Unit.—Withdraw the octal connecting plug;

unsolder the four leads from the speaker transformer;

remove the four round-head set-screws (with large metal washers and hexagon nuts) holding the mains transformer, and two similar screws and washers holding the electrolytic condenser block, to the bottom of the cabinet.

When replacing, the voltage adjustment side of the transformer should face towards the rear of the cabinet.

Connect the four speaker leads as follows, numbering the tags on the speaker transformer from left to right :

1, no external connection;

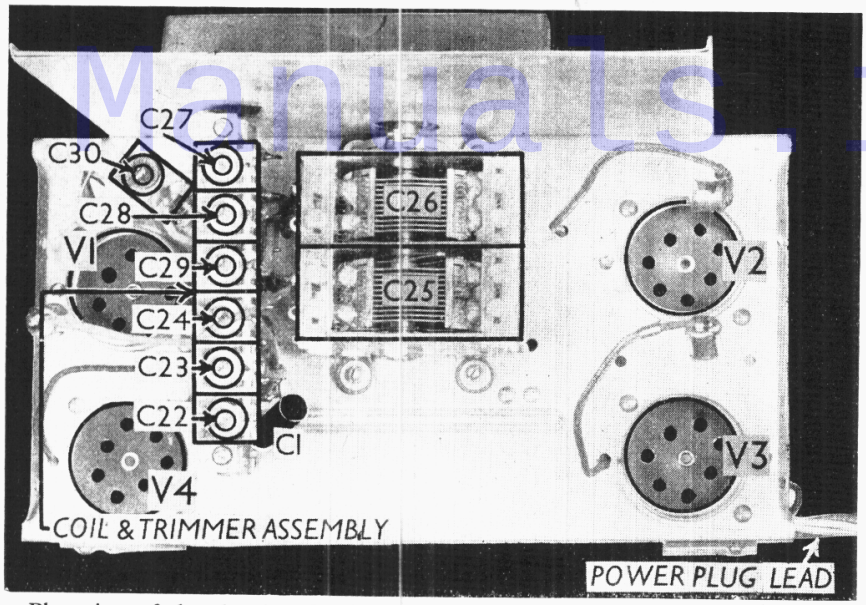
2, blue;

3, red from power unit and red from speaker field;

4, brown.

The black (earthing) lead should be connected to the frame tag on the right at the foot of the transformer.

Do not forget to clamp the mains lead cleat, with the mains lead and its



Plan view of the chassis. A plan view of the coil and trimmer assembly is shown, and the arrow indicates the direction in which it is viewed in the drawing in cols. 4 and 5.

rubber sleeve under it, under the rear right-hand transformer fixing screw, when viewed from the rear of the cabinet.

Removing Speaker.—Unsolder the four connecting leads;

remove the four japanned round-head wood screws (with paxolin washers) holding the speaker assembly to the sub-baffle.

When replacing, see that the transformer is at the top, and connect the leads as described above.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial coupling potential divider condensers	0·005
C2		0·005
C3	Aerial LW fixed trimmer	0·000025
C4	V1 cathode by-pass	0·1
C5	V1 osc. CG condenser	0·0001
C6	Osc. circ. LW fixed trimmer	0·00005
C7	Osc. circuit LW tracker	0·00023
C8	V1 osc. anode coupling	0·01
C9	V2 CG decoupling	0·1
C10	V1, V2 SG's decoupling	0·1
C11	V2 cathode by-pass	0·1
C12	IF by-pass	0·0005
C13	Coupling to V3 AVC diode	0·000025
C14	AF coupling to V3 triode	0·01
C15*	V3 cathode by-pass	25·0
C16	V3 triode to V4 AF coupling	0·02
C17*	V4 cathode by-pass	25·0
C18	Fixed tone corrector	0·005
C19	Part of tone control	0·02
C20*	HT smoothing condensers	16·0
C21*		8·0
C22‡	Aerial circuit SW trimmer	0·00004
C23‡	Aerial circuit MW trimmer	0·00004
C24‡	Aerial circuit LW trimmer	0·00004
C25†	Aerial circuit tuning	—
C26†	Oscillator circuit tuning	—
C27‡	Osc. circuit SW trimmer	0·00004
C28‡	Osc. circuit MW trimmer	0·00004
C29‡	Osc. circuit LW trimmer	0·00008
C30‡	Osc. circuit MW tracker	0·00075
C31‡	1st IF trans. pri. tuning	0·00022
C32‡	1st IF trans. sec. tuning	0·00022
C33‡	2nd IF trans. pri. tuning	0·00022
C34‡	2nd IF trans. sec. tuning	0·00022

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	Aerial circuit shunt	5,000
R2	V1 pentode CG decoupling	500,000
R3	Aerial circuit LW damping	500,000
R4	V1 fixed GB resistance	300
R5	V1 osc. CG resistance	50,000
R6	V1 osc. anode HT feed	20,000
R7	Oscillator reaction damping	68
R8	V1, V2 SG's H.T. potential divider	20,000
R9		50,000
R10	V2 fixed GB resistance	200
R11	IF stopper	50,000
R12	Manual volume control	500,000
R13	V3 signal diode load	500,000
R14	V3 triode GB; AVC delay	5,000
R15	V3 triode anode load	500,000
R16	AVC line decoupling	500,000
R17	V3 AVC diode load	500,000
R18	V4 CG resistance	250,000
R19	V4 GB resistance	400
R20	Part of tone control	10,000

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW coupling coil	0·4
L2	Aerial SW tuning coil	Very low
L3	Aerial MW tuning coil	2·5
L4	Aerial LW tuning coil	30·0
L5	Osc. circuit SW tuning coil	Very low
L6	Osc. circuit MW tuning coil	5·0
L7	Osc. circuit LW tuning coil	16·0
L8	Oscillator SW reaction	0·5
L9	1st IF trans. Pri.	7·5
L10	1st IF trans. Sec.	7·5
L11	2nd IF trans. Pri.	7·5
L12	2nd IF trans. Sec.	7·5
L13	Speaker speech coil	2·5
L14	Hum neutralising coil	0·2
L15	Speaker field coil	1,200·0
T1	Speaker input trans. Pri.	430·0
	Speaker input trans. Sec.	0·3
T2	Mains trans. Pri., total	29·0
	Mains trans. Heater sec.	0·4
	Mains trans. Rect. heat sec.	0·1
	Mains trans. HT sec., total	200·0
S1, S10	Waveband switches	—
S11, S12	Tone control switches	—
S13	Mains switch, ganged R12	—

GENERAL NOTES

Switches.—**S1-S10** are the waveband switches, in a single rotary unit beneath the chassis. This is indicated in our under-chassis view, mounted behind the front member of the chassis. The unit is shown in detail in the lower half of the diagram in col. 4, where it is seen as viewed from the rear of the underside of the chassis.

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

Switch Table

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	C
S3	—	—	C
S4	—	C	—
S5	C	—	—
S6	—	—	C
S7	—	C	—
S8	C	—	—
S9	—	—	C
S10	—	C	C

S11, S12 are the tone control switches. They are comprised in a three-position rotary unit, which is shown mounted at the middle of the front chassis member in our under-chassis view. The unit is shown in the upper half of the diagram in col. 4, where it is seen as viewed from the rear of the underside of the chassis.

In the fully anti-clockwise position of the control spindle, **S11** is closed, giving "deep" response; in the next position, **S12** is closed; in the fully clockwise position, both switches are open, giving maximum treble response.

S13 is the QMB mains switch, ganged with the volume control **R12**. It is, therefore, located in the main chassis, and is connected to the power unit via pins 6 and 7 on the octal power plug.

Coils.—All the RF and oscillator coils **L1** to **L8**, with their associated pre-set trimmers, are mounted unscreened in a row on a single tubular paxolin former running transversely from back to front above the chassis deck. The position of the assembly is indicated in our plan view, where the trimmers are indicated in the usual way, but a drawing of the assembly, showing the positions of the individual coils, is shown in cols. 4 and 5, where it is viewed as seen when looking over **V1** holder, as indicated by the arrow in the plan view. Several other components are also shown in the drawing.

The IF transformer coils **L9, L10;** and **L11, L12,** are mounted in two screened units side by side, facing opposite directions, beneath the chassis deck, with their associated trimmers, whose positions are indicated in our under-chassis view.

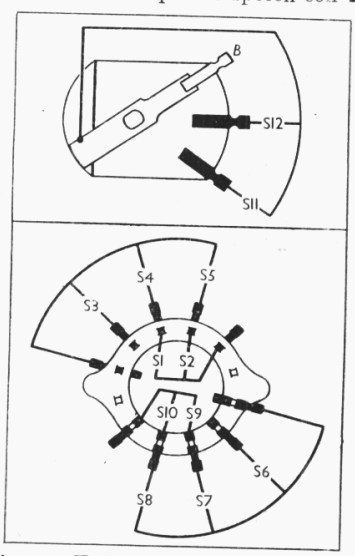
Scale Lamp.—The makers' diagram shows a scale lamp connected in parallel with **V1-V4** heaters, although none was fitted in our chassis. If a scale lamp is fitted, however, it would require to be of the 12-16 V variety, since the valve heaters are of the 13 V type.

Such a lamp is the Tre-Vita MES type, rated at 12-16 V, 0.3 A.

Gramophone Pick-up.—Two sockets are provided at the rear of the chassis for connection of a gramophone pick-up. The lower socket, when viewed from the rear

of the receiver, is connected to chassis, and if a screened lead is employed, the screening should be connected to this socket.

External Speaker.—No sockets are provided for this, but a low impedance (about 2-5 Ω) speaker could be connected to the left-hand tag on the speaker input transformer **T1** and chassis, in parallel with the internal speaker speech coil **L13.**



Diagrams of the two switch units, viewed in the direction of the arrows in the under-chassis view. *Above*, tone control unit; *below*, the wave-band unit.

Condensers C15, C17.—These are two dry electrolytics, in separate cardboard tubular containers, mounted at the rear beneath the chassis. They are both rated at 25 μF, 25 V working, 35 V surge.

Condensers C20, C21.—These are two dry electrolytics in a single rectangular cardboard container, mounted on the floor of the cabinet in front of the power unit. They are indicated in our illustration of the power unit, viewed from the rear.

The red lead is the positive of **C20** (16 μF), and is connected to pin 1 of the power socket; the yellow lead is the positive of **C21** (8 μF), and is connected to pin 2 of the power socket; the black lead (common negative) is connected to pin 4.

Pre-set Condensers.—All the pre-set condensers, excepting the IF trimmers, are on the chassis deck, and are indicated in our plan view. **C22, C23, C24** and **C27, C28, C29** are the RF and oscillator trimmers, mounted in a row above the coil assembly. The only variable tracker, **C30,** is bolted to the chassis deck at the foot of the assembly.

The two fixed trimmers **C3** and **C6** are mounted beneath the chassis, while the fixed tracker **C7** is mounted on the coil assembly above the chassis.

Valve Heater Voltages.—All the valves except the rectifier have 13 V heaters. The rectifier **V5** has 4 V heater.

Transformer T2.—In our chassis, this had the primary winding tapped to suit 100-150 V mains, as well as the usual 200-250 tappings.

The heater secondary voltage is, of course, 13 V, as mentioned above.

Power Plug.—A standard American octal valve type plug and socket is used to connect together the receiver chassis and the power supply unit. The plug is connected to the receiver via six colour-coded leads; two of the pins on the plug are blank. The lead colours are : Pin 1, blank; 2, red; 3, blue; 4, black; 5, green; 6, yellow; 7, white; 8, blank.

The socket is mounted on the power unit, at the side of **V5** holder.

The points at which the connections between the power unit and the chassis occur are indicated in the circuit diagram by numbered circles and arrows, and a diagram of the plug, showing the free ends of the pins, is inset in the circuit diagram above **V4,** where the numbers agree with those in the circuit.

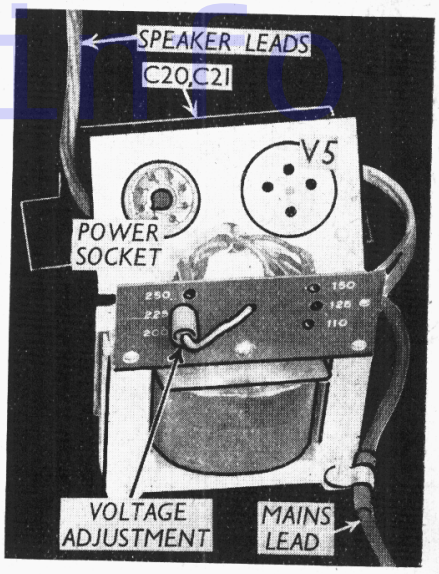
Chassis Divergencies.—In our chassis, **R3** was connected at one end to the AVC line, as shown in our circuit diagram. In the makers' diagram, however, that end of **R3** goes to the junction of **R2, L4** and **C2.** The resistance will perform the same function in either case.

R7 may not be found in some chassis, but it was present in ours.

871 CONSOLE

The same chassis and power unit are employed in the 871 console version of the receiver, while the speaker, although slightly different mechanically, is similar diagrammatically. The position of the power unit is the same relatively to the chassis, but is turned through 90 degrees as compared with the table model.

The 8-inch speaker is, of course, mounted in a different position from that of the table model, but the colour coding of the connecting leads is the same. The circuit diagrams of the two models are identical.



The power unit, viewed from the rear.

CIRCUIT ALIGNMENT

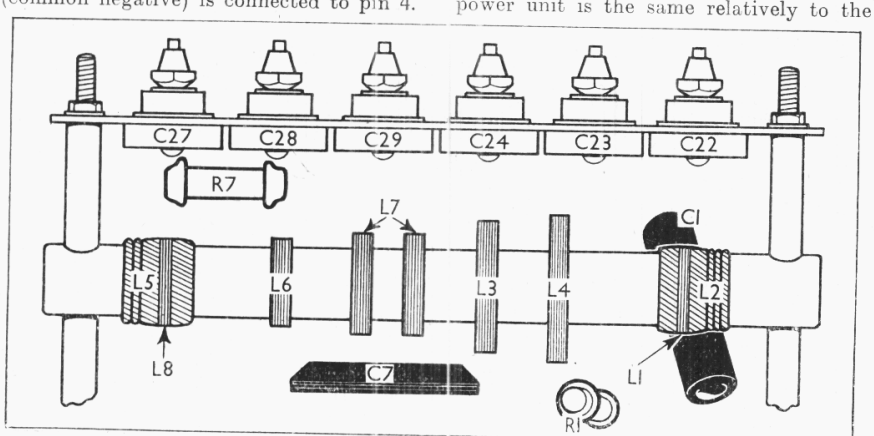
IF Stages.—Short-circuit **C26,** turn volume control to maximum. Connect signal generator to control grid (top cap) of **V1** and chassis. Feed in a 464 KC/S signal, and adjust **C31, C32** and **C33, C34** in turn for maximum output. Re-check these settings. Remove short-circuit from **C26.**

RF and Oscillator Stages.—With the gang at maximum, the pointer should cover the lines at the high-wavelength ends of the scales. Connect signal generator, via a suitable dummy aerial, to **A** and **E** sockets, and keep volume control at maximum.

MW.—Switch set to MW, tune to 214 m (white mark) on scale, feed in a 214 m (1,400 KC/S) signal, and adjust **C28,** then **C23,** for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C30** for maximum output, while rocking the gang for optimum results. Repeat the 214 m adjustment as a check.

LW.—Switch set to LW, tune to 1,200 m (white mark) on scale, feed in a 1,200 m (250 KC/S) signal, and adjust **C29,** then **C24,** for maximum output. There is no variable tracker on this band, but the setting should be checked at 2,000 m (150 KC/S).

SW.—Switch set to SW, tune to 20 m (white mark) on scale, feed in a 20 m (15 MC/S) signal, and adjust **C27** for maximum output. Two peaks will be found : use that involving the lesser trimmer capacity (nearer the fully unscrewed position). Now adjust **C22** for maximum output, rocking the gang very slightly for optimum results. No tracker is provided on this band.



Coil and trimmer assembly, drawn as seen looking in the direction of the arrow in the plan view.

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