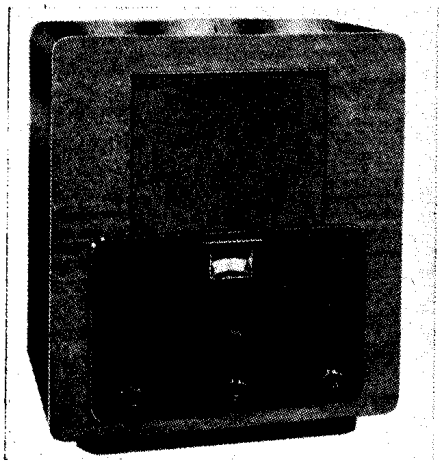
Supplement to The Wireless & Electrical Trader, September 22, 1945

"TRADER" SERVICE SHEET

740

MURPHY A26

TABLE, CONSOLE & RADIOGRAM



The appearance of the table version of the Murphy A26 series.

TWO separate valve heater secondary windings are used to eliminate modulation hum in the Murphy A26, a 4-valve (plus rectifier), 2-band superhet designed for use on AC mains of 200-250 V, 50 c/s. Two special models cater for mains of 200-250 V, 25 c/s and 100-120 V, 50 c/s.

These three chassis are also used in the A26C console model and the A26RG radiogram. In both cases a larger speaker is fitted, and in the A26RG the circuit of the chassis is modified to accommodate the pick-up. The differences here are explained under "Radiogram Modifications" overleaf.

Release date, all models, 1935.

Original prices: *A26*, £11; *A26C*, £14 15*s*.; *A26RG*, £24 10*s*. (50 *c/s*), £25 15*s*. (*other frequencies*).

CIRCUIT DESCRIPTION

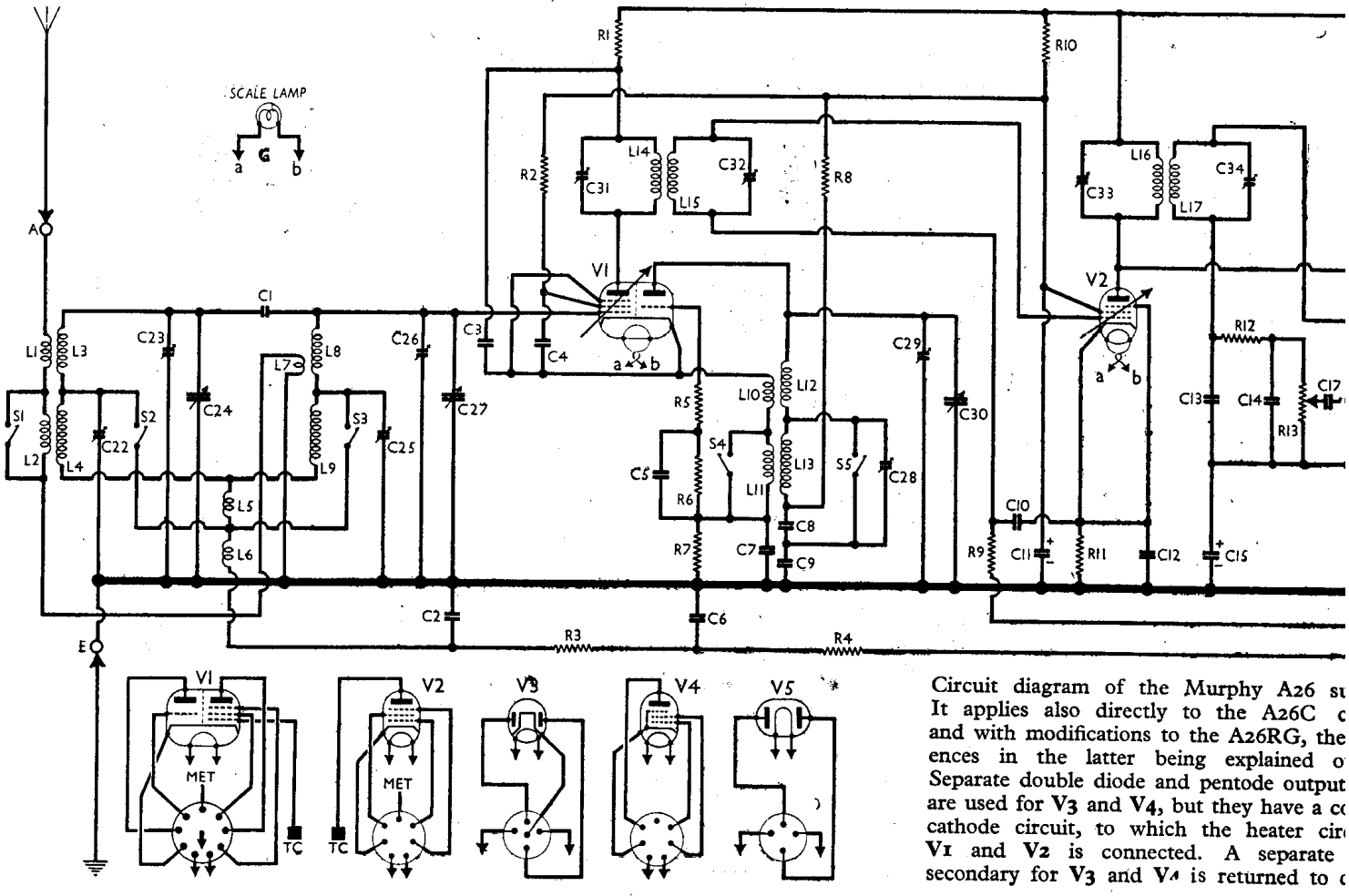
Aerial input via coupling coils **L1** (MW) and **L2** (LW) to inductively coupled band-pass filter. Primary coils **L3** (MW) and **L4** (LW) are tuned by **C24**; secondary coils **L8, L9** are tuned by **C27.** Coupling by coils **L6** (MW), **L5, L6** (LW) and **C2.** Image suppression by **L7, C1.**

First valve **(V1, Mazda metallised AC/TP)** is a triode pentode operating as frequency changer with cathode circuit mixing. Triode oscillator anode coils **L12** (MW) and **L13** (LW) are tuned by **C30.** Parallel trimming by **C29** (MW) and **C28** (LW); series tracking by **C9** (MW) and **C8, C9** (LW). Reaction coupling by cathode coils **L10** (MW) and **L11** (LW), the control grid RF potential being held down to chassis via **C5, C7.**

Second valve **(V2, Mazda metallised AC/VP1)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C31, L14, L15, C32** and **C33, L16, L17, C34.**

Intermediate frequency 117 kc/s.

Diode second detector is part of separate double diode valve **(V3, Mazda metallised V914).** Audio frequency component in rectified output is developed across the



Circuit diagram of the Murphy A26 su
It applies also directly to the A26C c
and with modifications to the A26RG, the
ences in the latter being explained o
Separate double diode and pentode output
are used for V3 and V4, but they have a cc
cathode circuit, to which the heater cir
V1 and V2 is connected. A separate
secondary for V3 and V4 is returned to c

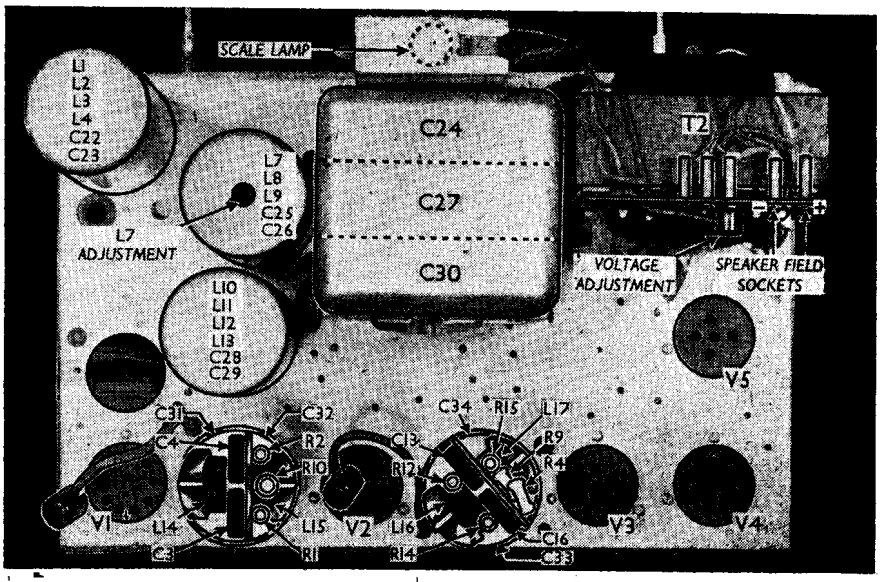
manual volume control **R13,** which also operates as load resistor, and passed via AF coupling capacitor **C17** and grid stopper **R18** to control grid of pentode output valve **(V4, Mazda AC/2Pen).**

Second diode of **V3,** fed from **V2** anode via **C16,** provides DC potentials which are developed across load resistors **R14** and **R15** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for **V4,** is obtained from the drop along resistors **R19** and **R20** in the common cathode lead of **V3, V4.**

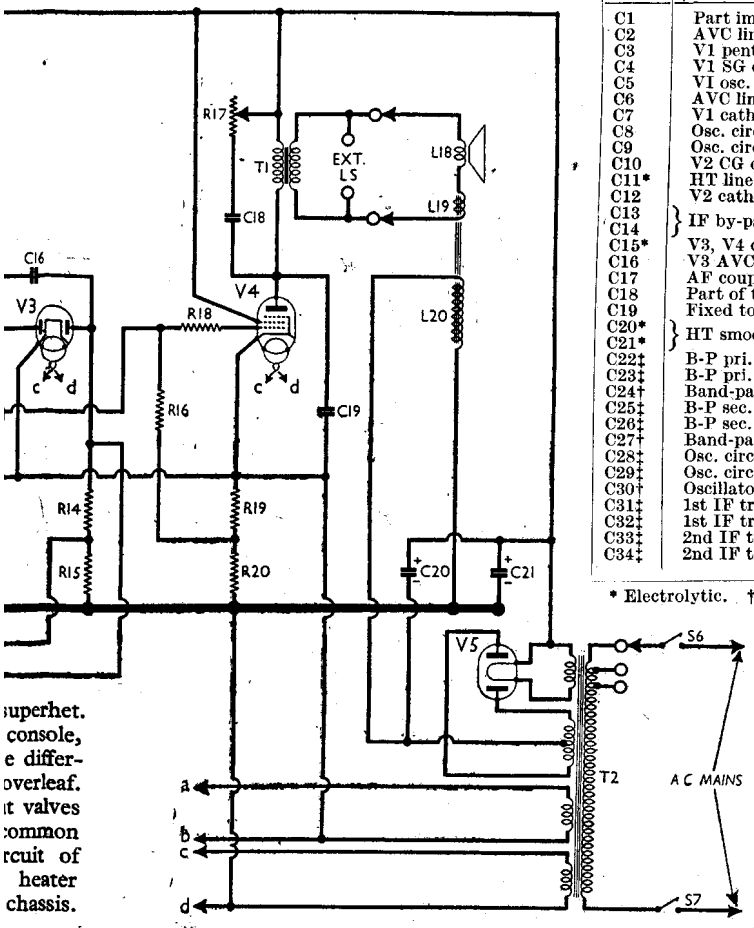
IF filtering by **C13, R12** and **C14.** Fixed tone correction by **C19,** and variable tone control by **R17, C18,** in **V4** anode circuit. Provision for connection of low impedance external speaker across secondary winding of output transformer **T1.**

HT current is supplied by full-wave rectifying valve **(V5, Marconi-Osram U12).** Smoothing by speaker field **L20** in the negative HT lead to chassis, and electrolytic capacitors **C20, C21.**

V1 and **V2** heaters, together with the scale lamp, are energised from one LT secondary winding (marked **a, b** in the diagram), while **V3** and **V4** heaters are energised from another secondary (marked **c, d**) which is separate from the first. One side of the **c, d** secondary winding is connected to chassis; while one side of the **a, b** winding is connected to **V3, V4** cathode to eliminate modulation hum.



Plan view of the chassis. The components inside the two IF transformer units are shown as seen when the covers are withdrawn.



COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Part image suppressor ...	0·000002
C2	AVC line decoupling ...	0·1
C3	V1 pent. anode decoupling	0·002
C4	V1 SG decoupling ...	0·0014
C5	V1 osc. CG capacitor ...	0·0005
C6	AVC line decoupling ...	0·01
C7	V1 cathode by-pass ...	0·1
C8	Osc. circ. LW tracker ...	0·001373
C9	Osc. circ. MW tracker ...	0·002
C10	V2 CG decoupling ...	0·05
C11*	HT line decoupling ...	8·0
C12	V2 cathode by-pass ...	0·1
C13	IF by-pass capacitors ...	0·0001
C14		0·0002
C15*	V3, V4 cathodes by-pass	25·0
C16	V3 AVC diode coupling	0·0001
C17	AF coupling to V4 ...	0·005
C18	Part of tone control ...	0·025
C19	Fixed tone corrector ...	0·002
C20*	HT smoothing capacitors	8·0
C21*		8·0
C22‡	B-P pri. LW trimmer ...	0·00008
C23‡	B-P pri. MW trimmer	0·00005
C24†	Band-pass pri.tuning ...	0·0005
C25‡	B-P sec. LW trimmer	0·00008
C26‡	B-P sec. MW trimmer ...	0·00005
C27†	Band-pass sec. tuning ...	0·0005
C28‡	Osc. circ. LW trimmer	0·00008
C29‡	Osc. circ. MW trimmer...	0·00005
C30†	Oscillator circuit tuning	0·0005
C31‡	1st IF trans. pri. tuning	0·00014
C32‡	1st IF trans. sec. tuning	0·00014
C33‡	2nd IF trans. pri. tuning	0·00014
C34‡	2nd IF trans. sec. tuning	0·00014

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 pent. anode HT feed	7,500
R2	V1 SG HT feed	20,000
R3	AVC line decoupling ...	5,100
R4		1,000,000
R5	V1 osc. CG stabiliser ...	3,200
R6	V1 osc. CG resistor ...	50,000
R7	V1 fixed GB resistor ...	1,000
R8	V1 osc. anode HT feed...	100,000
R9	V2 CG decoupling ...	1,000,000
R10	HT line decoupling ...	5,000
R11	V2 fixed GB resistor ...	300
R12	IF stopper	100,000
R13	Manual volume control; V3 signal diode load	500,000
R14	V3 AVC diode load re-	800,000
R15	sistors	600,000
R16	V4 CG resistor	1,000,000
R17	Variable tune control ...	50,000
R18	V4 grid stopper ...	700
R19	V4 GB and AVC ...	140
R20	delay resistors ...	320

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial coupling coils ...	1·0
L2		7·0
L3	Band-pass primary coils	5·0
L4		12·0
L5	Band-pass coupling coils	2·75
L6		0·75
L7	Image suppressor coil ...	0·25
L8	Band - pass secondary	5·0
L9	coils	12·0
L10	Oscillator cathode coup-	1·0
L11	ling coils	2·5
L12	Oscillator circuit tuning	4·0
L13	coils	8·0
L14	1st IF trans. Pri. ...	40·0
L15	Sec. ...	40·0
L16	2nd IF trans. Pri. ...	40·0
L17	Sec. ...	40·0
L18	Speaker speech coil ...	2·0
L19	Hum neutralising coil ...	0·1
L20	Speaker field coil ...	2,300·0
T1	Output trans. Pri. ...	650·0
	Sec. ...	0·25
T2	Mains trans. Pri., total	29·0
	Heat. sec. a, b ...	0·1
	Heat. sec. c, d ...	0·1
	Rect. heat. sec. ...	0·1
	HT sec., total ...	510·0
S1-S5	Waveband switches ...	—
S6, S7	Mains switches, ganged R13	—

The makers request dealers who use our "Service Sheet" to mention the fact when ordering spares, to avoid confusion between our component numbers and those in their own manual, which are different.

...uperhet. console, e differ- ...overleaf. ...t valves ...ommon ...rcuit of heater chassis.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' service manual. They represent conditions to be expected in the average receiver when it is operating with the mains voltage adjustment correctly set, with no signal input.

Voltages were measured on the 250 V scale of a meter having an internal resistance of 1,000 ohms per volt (total resistance 250,000 Ω), its negative lead being connected to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/TP	200	5·0	180	1·5
	Oscillator			
	75	1·4		
V2 AC/VP1	240	7·0	220	1·5
V3 V914	—	—	—	—
V4 AC/2 Pen	220	28·0	240	7.0
V5 U12†	—	—	—	—

† DC output measured between heater and HT negative, 355V.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (concentric domed nuts);

withdraw the speech coil plug from the "Int. LS" sockets at the rear of the chassis, and the two speaker field coil plugs from their sockets on the mains transformer;

remove the three slotted hexagon bolts (with large metal washers) holding the chassis to the bottom of the cabinet.

When replacing, particularly if more than one of the same model are undergoing repair, see that the chassis number (on a plate on the rear member) agrees with that on the plate on the back of the cabinet.

Removing Speaker.—Lay the cabinet face-downwards on a soft cloth on the bench;

free the speech coil and field coil leads from the two cleats each (held by one wood screw each) holding them to the wooden batten, and from one further cleat each on the sides of the cabinet;

remove the ¼in. Whitworth hexagon bolt (with clamp plate) from the centre of the batten;

withdraw the speaker, together with a dished distance-piece, towards the bottom of the cabinet.

When replacing, the connecting panel should be at the bottom.

Fit the distance-piece, open side up, to the back of the magnet, with its central hole fitted snugly on the ridge behind the pole-piece of the magnet, and ease the whole assembly into position, sliding it between the batten and the front of the cabinet.

The speech coil lead should run through its cleats to the left, and the field coil lead to the right, when viewed from the rear.

GENERAL NOTES

Switches.—S1-S5 are the waveband switches, ganged in a cam-operated unit beneath the chassis. The unit is seen in our under-chassis view, where the switches are identified individually. They all close on MW, and open on LW.

S6 and **S7** are the QMB mains circuit switches, ganged with the manual volume control **R13.**

Coils.—The aerial coupling and band-pass primary coils **L1-L4**; the band-pass secondary coils **L8, L9** and image suppressor coil **L7**; and the oscillator circuit coils **L10-L13** are in three screened units on the chassis deck. The screen covers are a sliding fit on the coil bases, and can easily be lifted off for inspection.

The associated pre-set trimmers form a circular unit in the base of each assembly, and their adjustments are reached through holes in the chassis deck as indicated in our under-chassis view.

The band-pass coupling coils **L5, L6** are in a small flat unscreened unit beneath the chassis, mounted on the front member.

The IF transformer coils **L14, L15** and **L16, L17** are in two further screened units on the chassis deck whose covers can be easily removed as in the case of the other three units previously mentioned. These units contain, in addition to their coils, their associated pre-set trimmers and several other components which are all clearly shown in our plan view. The trimmer adjustments are reached from beneath the chassis, and are indicated in our under-chassis view.

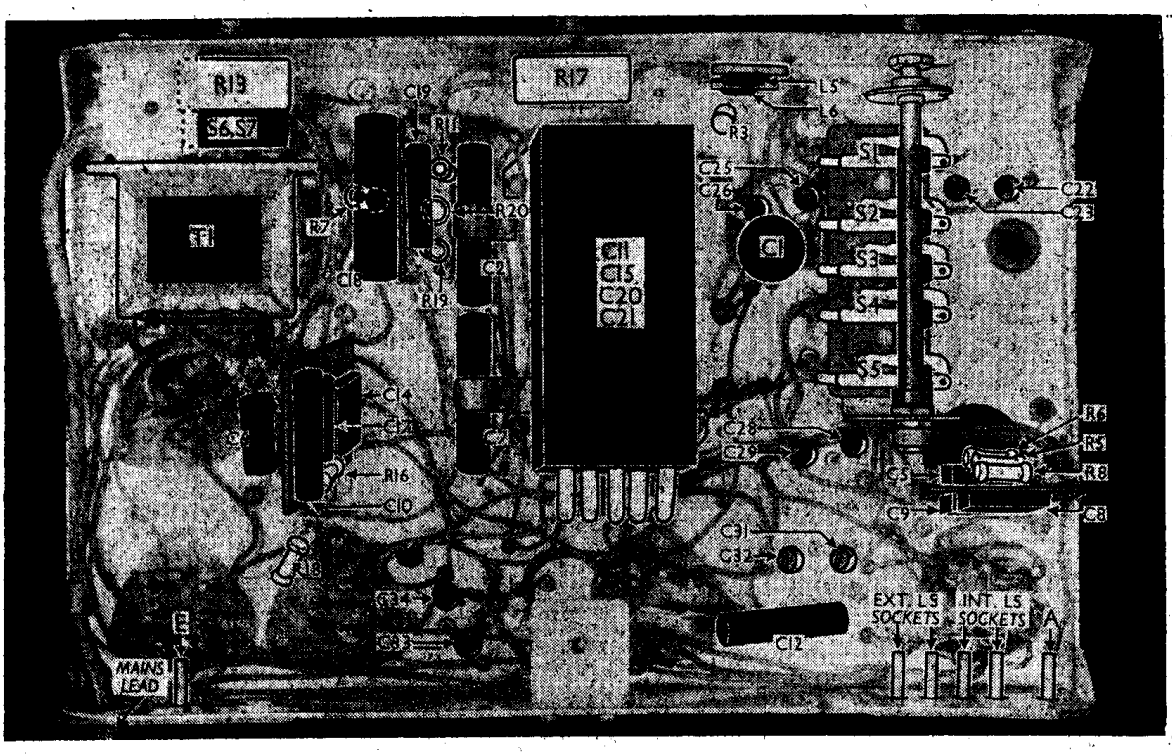
Scale Lamp.—This is an MES type lamp, with a large clear spherical bulb, rated at 6.2 V, 0.3 A. It can be removed from the chassis for replacement purposes if the clip attached to its holder is drawn away to the right, when viewed from the rear of the set. The lamp is energised from the **a, b** low-tension secondary on the mains transformer **T2.**

External Speaker.—Four sockets are provided on a panel at the rear of the chassis for the connection of low-impedance speakers. Two of the sockets, marked "Int. LS", are for the internal speaker plugs, while the other two, marked "Ext. LS", are for an external speaker of about 4 Ω impedance. Either speaker can be muted by the withdrawal of one of the plugs.

Component Assemblies.—Most of the small components are mounted in compact groups, two of these being inside the IF units and three of them consisting of small panel assemblies mounted vertically beneath the chassis deck.

In each case the individual components are identified in our chassis illustrations, but in the case of the assemblies beneath the chassis, these have been tilted artificially to show the components clearly in our under-chassis view.

Capacitors C11, C15, C20, C21.—These



Under-chassis view. The switches are all indicated here, those on the waveband unit being identified individually. Most of the small components are grouped on three assemblies. A diagram in Col 4 shows the internal connections of the capacitor block in the centre.

are four electrolytics in a single rectangular container fitted near the centre of the underside of the chassis deck. Its type number is **W2030.**

The internal connections, with the exception of those which go to the case, are brought out to five connecting tags at the rear end-face of the unit, lettered A, B, C, D, F.

The diagram below shows the circuit of the unit. All capacitors except **C20** have one side connected to the case; **C20** is connected between tags B (positive side) and F (negative side). In our chassis, tag A was connected to chassis, but the makers' information shows it as blank. **C21** was connected between A and B.

Mains Transformer T2.—Two separate heater secondary windings, in addition to that provided for the rectifier heater, are fitted on the mains transformer, permitting **V1, V2** and **V3, V4** to be energised from isolated sources.

That for **V1** and **V2** is marked **a, b** in the circuit diagram, and one side of it is connected to **V3, V4** cathode line; that for **V3, V4** is marked **c, d** and one side of it is connected to chassis. The scale lamp is connected to the **a, b** winding.

Special Models. — The provision of special models for low voltage and low frequency mains involves the use of special mains transformers, whose windings will have a DC resistance different from those shown in our table.

The only difference in the low voltage model (100-120 V, 50 c/s mains) is that the total resistance of the primary winding is 6 Ω, instead of 29 Ω.

In the low-frequency model (200-250 V, 25 c/s mains), the total primary resistance is 43 Ω, instead of 29 Ω, and the resistance of the HT secondary winding (anode to anode) is 796 Ω instead of 510 Ω.

RADIOGRAM MODIFICATIONS

In the table model, no provision is made for the use of a gramophone pick-up. In the A26RG the intermediate frequency amplifying valve **V2** is used on gram to provide pre-amplification of the pick-up

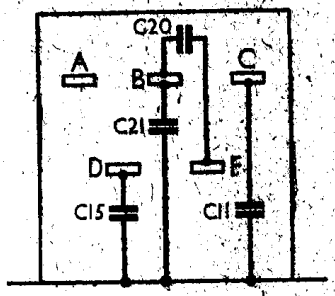


Diagram showing the internal connections of the capacitor block, drawn as seen from the rear of the underside of the chassis. The letters beside the tags are those engraved on the actual unit. In our sample, **C21** was connected between tags **A** and **B.**

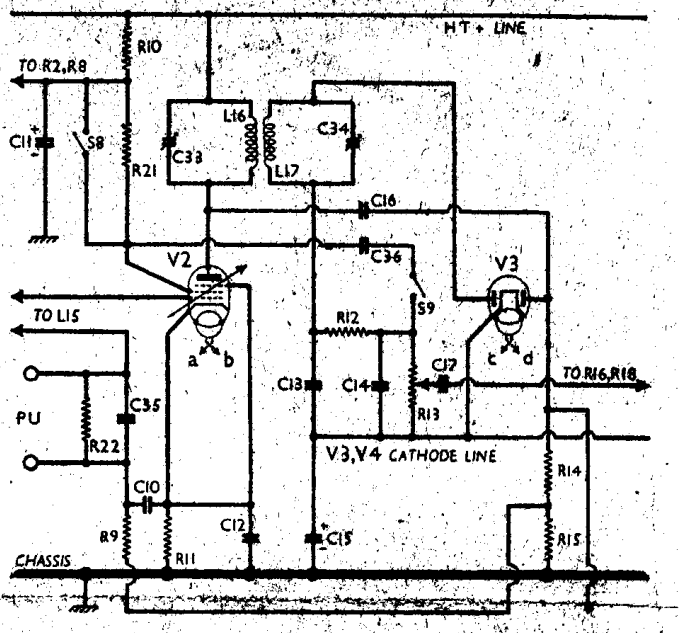
output before handing it on to the output valve.

To achieve this, **V2** screen is used as the anode of a triode valve, having its own load resistor and coupling capacitor. This involves circuit changes in the radiogram chassis as compared with the table model, and the modified arrangement is shown in the diagram below, where part of the circuit diagram of the table model overleaf is redrawn with the modifications included.

The pick-up is inserted in the lead from **L15** to **R9, C10,** so that it is in the control grid circuit of **V2,** where it is shunted by a 0.001 μF capacitor **C35** which effectively short-circuits it at intermediate frequency. Switching is therefore unnecessary here.

The amplified signal is developed across the screen (triode anode) load resistor

Part of the circuit diagram overleaf redrawn to show the modifications introduced to accommodate the gramophone pick-up in the A26RG. **V2** operates as a triode AF amplifier, its screen acting as the anode.



R21, which on radio is short-circuited by **S8,** and is then passed via the coupling capacitor **C36** and the switch **S9** (closed on gram) to the top of **R13,** and thus to the control grid of the output valve.

Two further differences from the table model chassis concern the introduction of two more switches: one, which closes on gram, between **V1** cathode and the bottom of **L11,** short-circuiting the oscillator cathode coupling coils on gram to mute radio; and the other, which opens on gram, inserted in series with **V1** screen lead, breaking the HT supply to the screen on gram to mute radio. This switch is connected on one side to the screen, and on the other to the junction of **R2** and **C4.**

The change-over switch consists of a four-pole toggle switch, fitted on the **E** socket panel on the rear chassis member. Of the additional components **R21** and **C36** are mounted on an additional component assembly panel in the rear corner of the chassis near the mains lead entry, while **R22** and **C35** are added to the existing panel containing **C6, C10, C14, C17** and **R16,** between **V3** and **V5** holders.

The values of the added components are as follows:—

R21	50,000 Ω	**C35**	0.001 μF
R22	99,000 Ω	**C36**	0.05 μF

One final difference in the RG as compared with the table model is that, although the two separate heater secondary windings are retained on **T2,** one side of each winding now goes to chassis: neither is taken to **V3, V4** cathode line.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, and short-circuit **L10** or **L12** to prevent **V1** triode from oscillating. (A simple method is to connect **V1** cathode to the junction of **R7** and **C7).** Connect signal generator leads, via a dummy aerial, to control grid (pin 2) of **V2** and chassis, and turn the volume control to maximum.

Feed in a 117 kc/s (2,564.2 m) signal, and adjust **C34** and **C33** for maximum output. Transfer signal generator leads to control grid (top cap) of **V1** and chassis, and adjust **C32** and **C31** for maximum output. Remove short-circuit from oscillator.

RF and Oscillator Stages.—Transfer signal generator leads to **A** and **E** sockets, via the dummy aerial. With the gang at maximum the pointer line should cover the line crossing the two scales at their high-wavelength ends.

MW.—With set switched to MW, tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C29** for maximum output. Now adjust **C23,** then **C26,** for maximum output, without disturbing the gang setting. Return to **C23,** then to **C26,** and so on until no improvement can be obtained.

LW.—Switch set to LW, tune to 950 m on scale, feed in a 950 m (315.8 kc/s) signal, and adjust **C28** for maximum output. Now adjust **C22,** then **C25,** for maximum output, without disturbing the gang setting. Return to **C22,** then **C25,** and so on until no improvement can be obtained.

Image Suppressor.—Switch set to MW, tune to 450 m on scale, feed in a 333 m (900 kc/s) signal, and adjust **L7** (erinoid screw) in the top of the **L7-L8** can for **minimum** output. The makers recommend using the speaker as an indicator for this adjustment, as an aural indication is more satisfactory than is an output meter.

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