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"TRADER" SERVICE SHEET 686

MURPHY A8

AC SUPERHET

TWO stages of intermediate frequency amplification, using three IF transformers, an RF amplifier and a push-pull diode detector, are employed in the Murphy A8, while the valve heaters are energised from two secondary windings on the mains transformer in the interests of stability.

As some of the original valves are now obsolete, a table included under "General Notes" overleaf gives suitable replacement types.

The receiver is an 8-valve (plus rectifier), 2-band superhet designed to operate from AC mains of 200-250 V, 50 c/s. Special models cater for AC mains of 100-120 V, 50 c/s and 200-250 V, 25 c/s.

Release date and original prices: 1932, £31 10*s.*, *with pedestal; reduced November*, 1932, *to* £24 *with pedestal, or* £22 8*s. without. Pedestal alone*, £2 2*s.*

CIRCUIT DESCRIPTION

Aerial input via series MW trimmer condenser **C24** to single-tuned circuit **L1, C26** (MW), plus **L2** (LW), which precedes a variable-mu RF tetrode valve **(V1, Marconi/Osram VMS4),** which operates as signal frequency amplifier.

RF transformer coupling by coupling coil **L3** and **L4, L5,** via capacity coupled band-pass filter, between **V1** and a second variable-mu RF tetrode valve **(V2, Mazda Metallised AC/S1VM),** which operates as frequency changing mixer in conjunction with separate triode oscillator valve **(V3, Mazda Metallised AC/HL).**

Primary band-pass coils **L4, L5** are tuned by **C29;** secondary coils **L6, L7** by **C32.** Coupling by fixed condenser **C2.**

V3 anode circuit coils **L10** (MW) and **L11** (LW) are tuned by **C35.** Parallel trimming by **C34** (MW) and **C33** (LW); series tracking by **C7** (MW) and **C6** (LW). Reaction coupling by grid coil **L9** on both bands. Cathode injection coupling to mixer valve **V2** via **L8** in **V2** cathode lead to chassis.

The two following valves **(V4, V5, Mazda metallised AC/S1VMs)** are further variable-mu RF tetrodes, operating this time as intermediate frequency amplifiers with tuned-primary, tuned-secondary transformer couplings **C36, L12, L13, C37; C38, L14, L15, C39;** and **C40, L16, L17, C41.** Each tuned circuit is shunted by a damping resistor to reduce the "peaking" effect.

Intermediate frequency 120 kc/s.

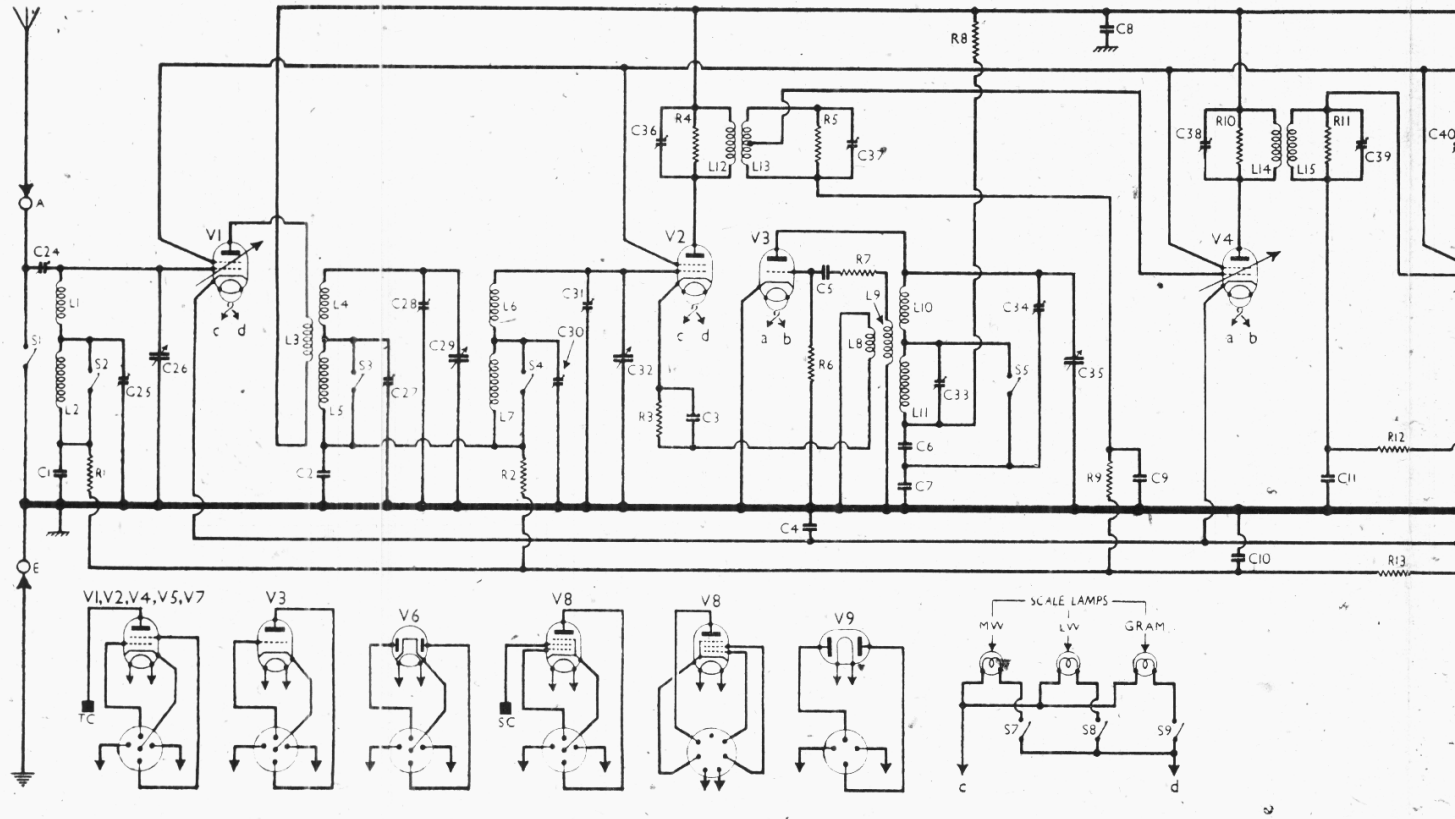
Push-pull diode second detector is a separate double diode valve **(V6, Mazda metallised AC/DD).** Audio frequency component in rectified output is developed across load resistors **R16, R17** and passed via AF coupling condenser **C13** and manual volume control **R18** to CG of a fith RF tetrode valve **(V7, Marconi/Osram VMS4),** this one operating as an AF amplifier.

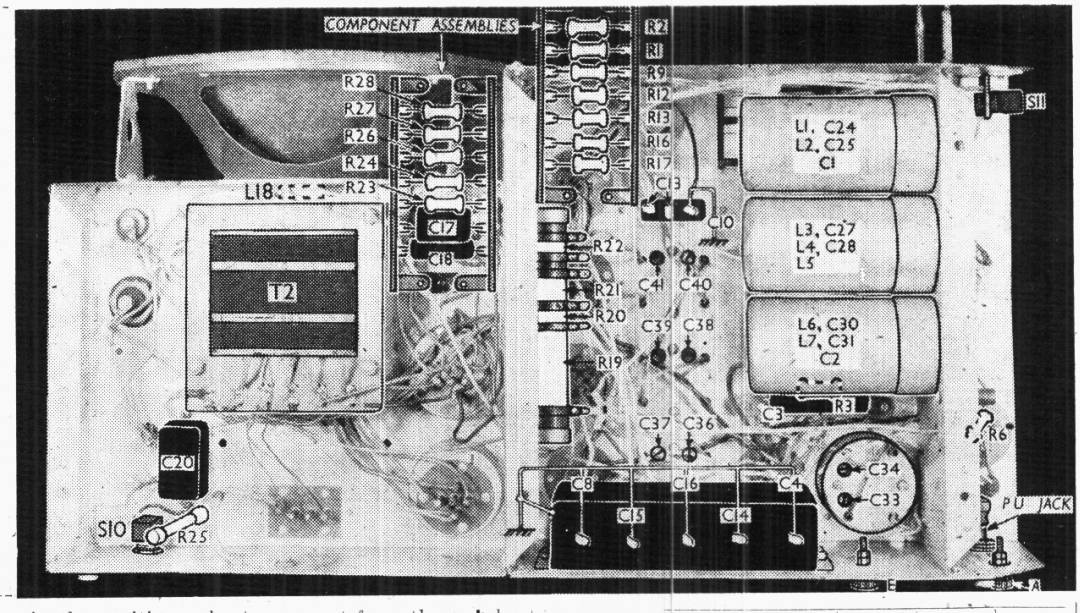
IF filtering by **C12** in diode circuit and **C17** in **V7** anode circuit. Provision for connection of gramophone pick-up via **S6** across **R18.** When the switch control is turned to gram, **S6** closes to connect the pick-up, and **S1** closes to mute radio. **S9** also closes to light the "Gramophone" indicator in the scale escutcheon. On radio, **S7** & **S8** closes, so that its associated scale lamp indicates the waveband employed.

DC potential developed across **R16, R17** is tapped off and fed back through decoupling circuits as GB to **V1, V2** and **V4,** giving automatic volume control, while a fraction of the potential is tapped off at the junction of **R16** and **R17** and fed back to **V5** for the same purpose.

Resistance-capacity coupling by **R23, C18** and **R24** between **V7** and pentode output valve **(V8, Mazda AC/Pen),** which is fitted with a 5-pin base. Two-position tone control by **C20, R25** and switch **S10.**

HT current is supplied by full-wave rectifying valve **(V9, Marconi/Osram U12** or **Philips 1807).** Smoothing by speaker field **L19,** in negative HT lead to chassis,





Under-chassis view. Most of the small components are mounted either on the two component assemblies or enclosed with the coil units. The waveband switches and some trimmer adjustments are seen only from the right-hand end-on view of the chassis as seen here, and are shown in an illustration overleaf.

and iron-cored choke **L20,** in the positive HT lead, in conjunction with electrolytic condensers **C21, C22, C23.**

Negative GB for **V7** and **V8** is obtained from a potential divider formed by resistors **R26, R27, R28,** connected in series across **L19.** Another potential divider, comprising **R19, R20, R21** and **R22,** supplies HT to **V1, V2, V4, V5, V7** screens and provides a biasing potential for the cathodes of **V1, V4** and **V5.** In order to avoid feed-back coupling via the heater circuits, **V3, V4, V5** and **V8** receive their heater current from the **a, b** heater secondary on **T2,** while **V1, V2, V6, V7** and the scale lamps receive theirs from a separate secondary winding, **c, d.**

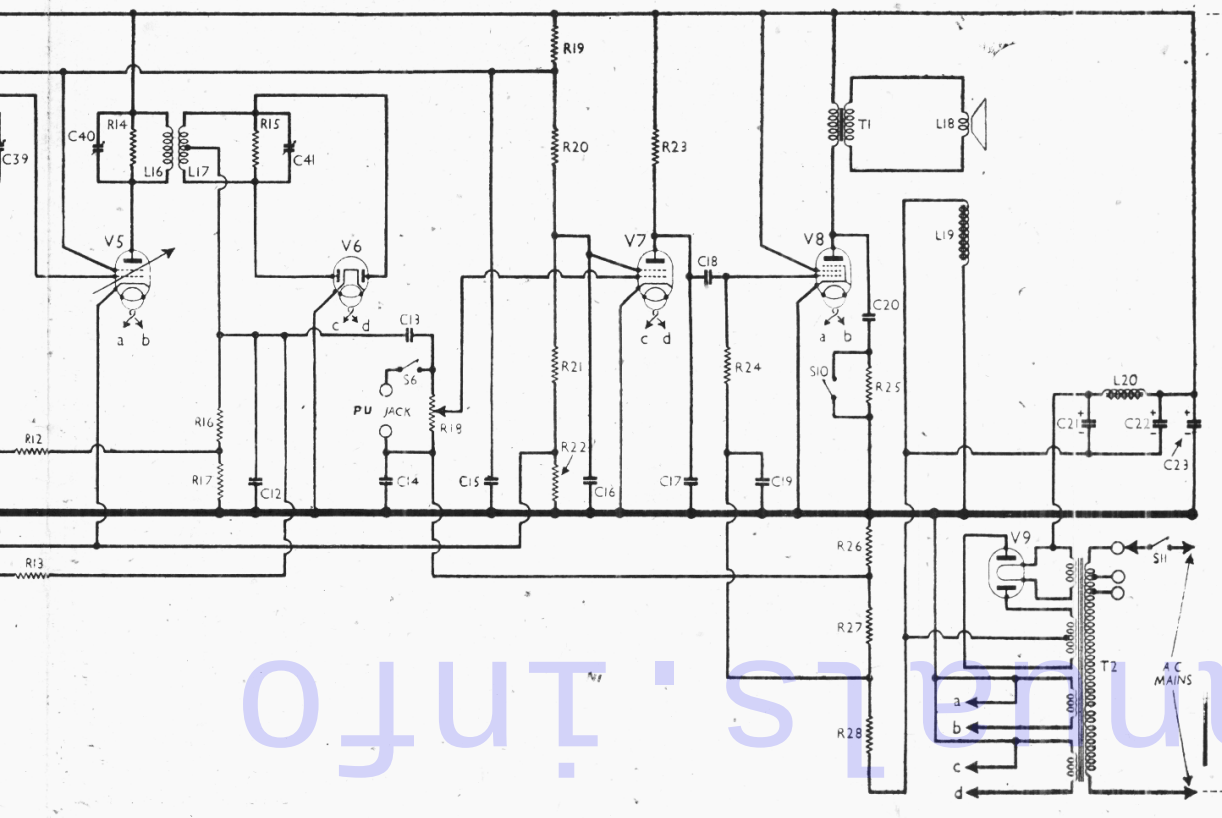
VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' manual. Screen currents are not quoted. Measurements were made with no signal input to the receiver. Readings on an average chassis should agree within ±20 per cent. with those quoted.

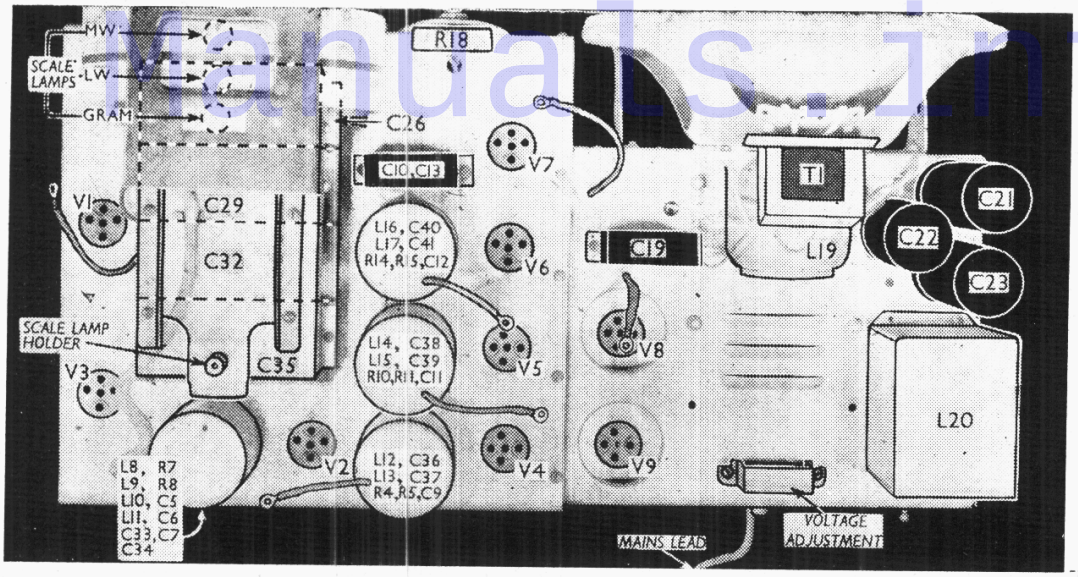
Voltages should be measured on a suitable scale of a high resistance meter, the negative lead of which is connected to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)
V1 VMS4 ...	200	4·0	50
V2 AC/S1VM ...	200	1·5	50
V3 AC/HL ...	60	2·5	—
V4 AC/S1VM ...	200	4·0	50
V5 AC/S1VM ...	200	4·0	50
V6 AC/DD ...	—	—	—
V7 VMS4 ...	120	2·0	40
V8 AC/Pen ...	190	27·0	200
V9 1807 ...	250†	—	—

† Computed value, each anode, AC. (Not quoted in maker's manual.)



Circuit diagram of the Murphy A8 superhet. A separate oscillator valve V3 is used, cathode injection coupling to the mixer **V2** being effected via **L8.** There are two stages of IF amplification, with three tuned transformers. **V6** is the push-pull diode detector. The speaker is not fitted with a hum neutralising coil, but two smoothing inductances **L19, L20** are used.



Plan view of the chassis. Components contained in the coil units are indicated. The scale lamp holder can be withdrawn if the thumbscrew indicated by an arrow is slackened a turn.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (concentric domed nuts) from the front of the cabinet;

Remove the six hexagonal bolts (with flat washers) holding the chassis to the bottom of the cabinet. This will require a ¼in. box spanner, unless the wooden battens (held by wood screws), into which the heads are sunk, are first removed. If the bolt heads are slotted, a screwdriver may be used.

The chassis may now be withdrawn as a single unit, complete with speaker.

When replacing, note that the knob with corrugated sides goes on the switch spindle.

GENERAL NOTES

Switches.—**S1-S6** are the waveband, pick-up and radio muting switches, and **S7-S9** are the scale lamp switches, ganged in a barrel-operated assembly at one end of the chassis. The assembly is seen in our end-on view of the inverted chassis in cols. 5 and 6, just beyond **V1** and **V2** holders.

The table below gives the switch positions for the three working settings, starting from the "OFF" position, where all switches are open, and turning the control clockwise. A dash indicates open, and **C**, closed.

S10 is the QMB tone control switch, mounted on the rear chassis member. **S11** is the QMB mains switch, operated by the waveband control.

Coils.—All the tuning coils are in screened containers, four units being mounted on the chassis deck, and three units on the back of the partition on which the switch assembly is mounted. Each unit contains one or more associated components in addition to its trimmers, and each screen can be lifted off, the freedom of those with top cap connectors, however, being limited to the length of the lead.

The trimmers in every case are inside the coil unit, and their adjustments are reached through holes in the chassis beneath the units. Six of these appear beneath the switch assembly (seen above it in our illustration) and eight beneath the chassis deck.

Oscillator Coil Unit.—In addition to the four coils and trimmers, this unit contains also the fixed trackers **C6, C7** and **R7, R8** and **C5.** In order to show the approximate positions of these components, therefore, and the method of connection, we reproduce in col. 2 a sketch showing an expanded view of the inside of the unit, from which it will be seen that **C6** and **C7** each consist of two units in parallel, and that **L8** is on a separate former inside the main former. The outgoing lead colours are also indicated as shown in the makers' manual, but the colours are subject to alteration on some chassis.

The HT smoothing choke **L20** is in a metal container on the chassis deck.

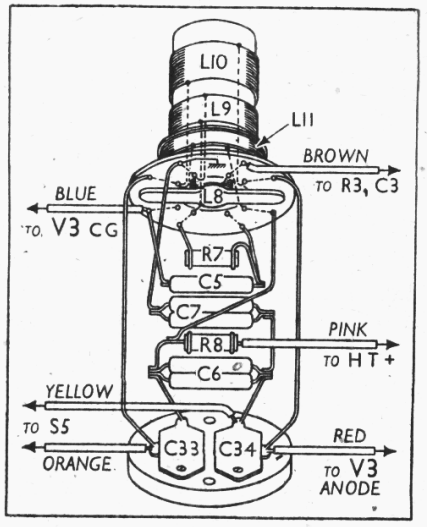
Valve Replacements.—Generally speaking, replacement valve type requirements in the A8 are not critical. Most of the valves used originally are now obsolete, but the makers quote in their recent booklet *Service Instructions* a large number of recommended replacements for each valve.

Some of these, none of which requires any modification to the receiver, are given below.

In the case of **V8,** which was originally a Mazda AC/Pen with a five-pin base, this has since been standardised as being fitted with a seven-pin base. Replacements would thus entail the fitting of a seven-pin holder, and for this reason two valve base connection diagrams are shown for **V8** beneath our circuit diagram overleaf.

Switch Table

Switch	MW	LW	Gram.
S1	—	—	C
S2	C	—	—
S3	C	—	—
S4	C	—	—
S5	C	—	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C



Expanded view of the oscillator coil unit, showing the approximate disposition of the components inside the can.

Replacement Valve Table

Valve	Marconi Osram	Mazda	Cossor	Mullard
V1	VMS4B —	AC/SGVM AC/S1VM	— MVSG	MM4V —
V2, V4, V5	VMS4 VMS4B	AC/SGVM	MVSG —	MM4V —
V3	MH4 —	HL41 —	41MHL 41MHF	354V 224V
V6	D41 —	V914 —	DD4 DL4	2D4A —
V7	VMS4B —	AC/SGVM AC/S1VM	— MSVG	MM4V —
V8	MKT4 —	— —	MP/Pen —	Pen4V Pen 4VA
V9	U12/14 MU12/14	UU3 UU4	442BU 431U	DW3 DW4/350

COMPONENTS AND VALUES

The makers ask us to state that, in order to avoid confusion between the component numbers in our diagram and those in makers' diagram, which are different, dealers using our "Service Sheet" should mention the fact when ordering spares.

	RESISTORS	Values (ohms)
R1	V1 CG decoupling ...	500,000
R2	V2 CG decoupling ...	500,000
R3	V2 fixed GB resistor ...	2,500
R4	1st IF transformer damping resistors	250,000
R5		250,000
R6	V3 CG resistor	100,000
R7	Oscillator reaction damping	1,800
R8	V3 anode HT feed ...	50,000
R9	V4 CG decoupling ...	500,000
R10	2nd IF transformer damping resistors	250,000
R11		250,000
R12	V5 CG decoupling ...	500,000
R13	AVC line decoupling ...	250,000
R14	3rd IF transformer damping resistors	80,000
R15		250,000
R16	Signal diode load resistors	400,000
R17		120,000
R18	Manual volume control ...	500,000
R19	V1, V2, V4, V5, V7 SG and V1, V4, V5 fixed GB	9,000
R20		1,860
R21		3,000
R22	HT potential divider ...	25
R23	V7 anode load	50,000
R24	V8 CG resistor	100,000
R25	Part of tone control ...	15,000
R26	Speaker field shunt resistors; V7, V8 GB	50,000
R27		250,000
R28	potential divider ...	2,000,000

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial tuning coils	7·5
L2		18·0
L3	V1 anode coupling coil ...	4·5
L4	Band-pass primary coils ...	7·5
L5		18·0
L6	Band-pass secondary coils	7·5
L7		18·0
L8	V2 cathode osc. coupling ...	3·5
L9	Oscillator reaction coupling	4·5
L10	Osc. MW tuning coil ...	6·0
L11	Osc. LW tuning coil ...	10·0
L12	1st IF trans. Pri. ...	96·0
L13	sec., total	96·0
L14	2nd IF trans. Pri. ...	96·0
L15	Sec. ...	96·0
L16	3rd IF trans. Pri. ...	35·0
L17	Sec., total	96·0
L18	Speaker speech coil ...	1·6
L19	Speaker field coil	1,000·0
L20	HT smoothing choke ...	190·0
T1	Speaker input trans. Pri. ...	680·0
	Sec. ...	0·35
T2	Mains trans. Pri., total ...	30·0
	Heat, sec. : a, b	0·02
	Heat, sec. : c, d	0·02
	Rect. heat. sec.	0·06
	HT sec., total	310·0
S1-S6	Waveband and PU switches	—
S7-S9	Scale lamp switches ...	—
S10	Tone control switch ...	—
S11	Mains switch	—

	CONDENSERS	Values (μF)
C1	V1 CG decoupling ...	0·025
C2	Band-pass coupling ...	0·025
C3	V2 cathode by-pass ...	0·2
C4	V1, V4, V5 cathodes by-pass	2·0
C5	V3 CG condenser... ...	0·0002
C6	Osc. circ. LW tracker ...	0·001373
C7	Osc. circ. MW tracker ...	0·001772
C8	HT circuit RF by-pass ...	1·0
C9	V4 CG decoupling ...	0·01
C10	AVC line decoupling ...	0·01
C11	V5 CG decoupling ...	0·01
C12	IF by-pass	0·0005
C13	AF coupling to V7 ...	0·05
C14	V7 CG decoupling ...	1·0
C15	V1, V2, V4, V5 SG's decoupling	1·0
C16	V7 SG decoupling ...	1·0
C17	IF by-pass	0·0002
C18	V7 to V8 AF coupling ...	0·01
C19	V8 CG decoupling ...	1·0
C20	Part of tone control ...	0·035
C21*	HT smoothing condensers	4·0
C22*		8·0
C23*		8·0
C24‡	Aerial MW trimmer ...	0·00007
C25‡	Aerial LW trimmer ...	0·00007
C26†	Aerial circuit tuning ...	0·0005
C27‡	B-P pri. LW trimmer ...	0·00007
C28‡	B-P pri. MW trimmer ...	0·00007
C29†	Band-pass pri. tuning ...	0·0005
C30‡	B-P sec. LW trimmer ...	0·00007
C31‡	B-P sec. MW trimmer ...	0·00007
C32†	Band-pass sec. tuning ...	0·0005
C33‡	Osc. circ. LW trimmer ...	0·000085
C34‡	Osc. circ. MW trimmer ...	0·00007
C35†	Oscillator circuit tuning...	0·0005
C36‡	1st IF trans. pri. tuning...	0·00014
C37‡	1st IF trans sec tuning	0·00014
C38‡	2nd IF trans. pri. tuning	0·00014
C39‡	2nd IF trans. sec. tuning	0 00014
C40‡	3rd IF trans. pri. tuning	0·0007
C41‡	3rd IF trans. sec. tuning	0·00014

* Electrolytic. † Variable. ‡ Pre-set.

Scale Lamps.—These are three MES types, with large clear spherical bulbs. Suitable replacements should be rated at 6.2 V, 0.3 A. The lamps are mounted on a sliding platform which forms the holder indicated in our plan view. If the clamp screw is slackened, the assembly, which is connected by a flexible cable, can be withdrawn, giving access to the lamps.

Condensers C10, C13.—These are in a dual unit mounted on the chassis deck. The three connecting tags are identified in our under-chassis view, one side of **C10** going to chassis via the metal case. The unit is marked V617 and D32.

Condensers C4, C8, C14, C15, C16.—These are in a multiple unit beneath the chassis. The connecting tags are identified in our under-chassis view, indicating one side of each condenser. The other side of each goes to the casing, and thus to chassis. The unit is marked W619 and D32.

Condenser C19.—This is in a single unit on the chassis deck. It is marked V618 and D32.

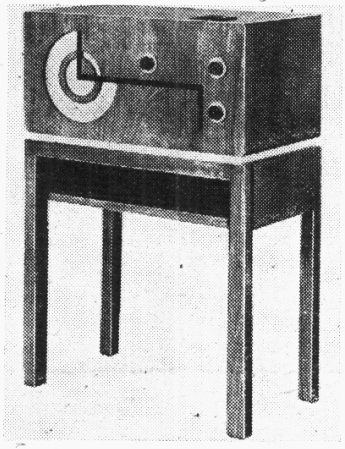
Component Assemblies.—Apart from those inside the coil units, most of the small components are mounted in two assemblies beneath the chassis, one in the RF compartment and one in the AF and power compartment. These assemblies are actually mounted to the front chassis members, but in order to make their positions clear, they have been redrawn in our under-chassis view, as seen from the rear with the chassis inverted.

Condensers C21, C22, C23.—These are three electrolytics in three separate tubular metal containers mounted on the chassis deck. It should be noted that the cases of **C21** and **C22,** which form their negative connections, are insulated from the chassis.

CIRCUIT ALIGNMENT

IF Stages.—Remove **V3** from its socket, and connect signal generator leads, via a MW dummy aerial (or a 0.0002 μF condenser) to **V5** control grid and chassis. Feed in a 120 kc/s (2,500 m) signal, and adjust **C41** and **C40** for maximum output. Keep input as low as possible. Transfer signal generator lead from **V5** to the control grids of **V4** and **V2** in turn, and adjust **C39** and **C38,** then **C37** and **C36,** in that order, for maximum output.

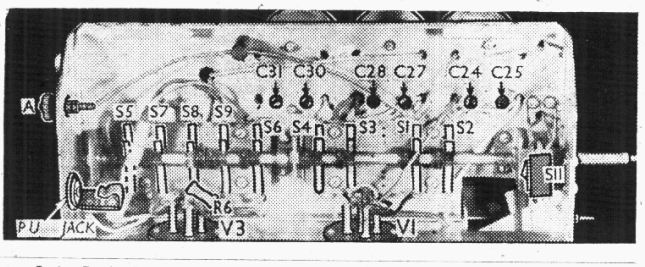
RF and Oscillator Stages.—With the gang at minimum and maximum, the gap between the pointers and the ends of the scales should be about equal. If it is not, the scale drum may be adjusted if the two set screws at right angles in its boss are slackened. Transfer signal generator leads, via the dummy aerial, to **A** and **E** sockets, and replace **V3** in its holder.



The appearance of the Murphy A8 superhet, with its pedestal. The two units are separable, and in some cases the receiver proper may be found without the pedestal.

MW.—Switch set to MW, tune to 230 m on scale, feed in a 230 m (1,304 kc/s) signal, and adjust **C34,** then **C24,** for maximum output. Now adjust **C31** and **C28,** in that order, for maximum output.

LW.—Switch set to LW, tune to 1,100 m on scale, feed in a 1,100 m (273 kc/s) signal, and adjust **C33,** then **C25, C30** and **C27** in that order, for maximum output.



End-on view of the inverted chassis, as viewed when looking at the V1, V3 end of the chassis.

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