MURPHY A100

(Not Covering Frame Aerial Model A100F)

ALTHOUGH reference is made to the front and rear of the chassis, the front being identified by the position of the speaker, the Murphy A100 when complete is double sided, the scale markings and speaker apertures being duplicated on each side.

The receiver is a 4-valve (plus rectifier) 2 band superhet of very compact dimensions, designed to operate from A.C. mains of 200-250 V., 50-100 c/s. The heaters are series-connected and the chassis is "live" to the mains, but power is obtained from an auto-transformer. A third conductor in the mains lead provides capacitative coupling for mains aerial operation.

This *Service Sheet* covers only model A100. NOT model A100F. Model A100F is covered separately in *Service Sheet* 906.

Release date and original price: March, 1947; £12 plus purchase tax.

CIRCUIT DESCRIPTION

Input from mains or external aerial via isolating capacitor **C1** is inductively coupled by **L1, L2** to single-tuned circuits **L3, C27** (M.W.) and **L3, L4, C27** (L.W.), which precede a triode-heptode valve **(V1, Mazda 10C1)** operating as frequency changer with internal coupling.

Triode oscillator coils **L5** (M.W.) and **L5, L6** (L.W.) are tuned by **C30,** with parallel trimming by **C28** (M.W.), **C10, C29** (L.W., and series tracking by **C9** (M.W.), **C8, C9** (L.W.). Reaction coupling to C.G. on M.W. by **L6, C9,** but for L.W. operation **L5, L5** in series are connected in a Colpitts circuit.

Second valve **(V2, Mazda 10F9)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-transformer coupling **C5, L7, L8, C6** and **C15, L9, L10, C16.**

Intermediate frequency 465 kc/s.

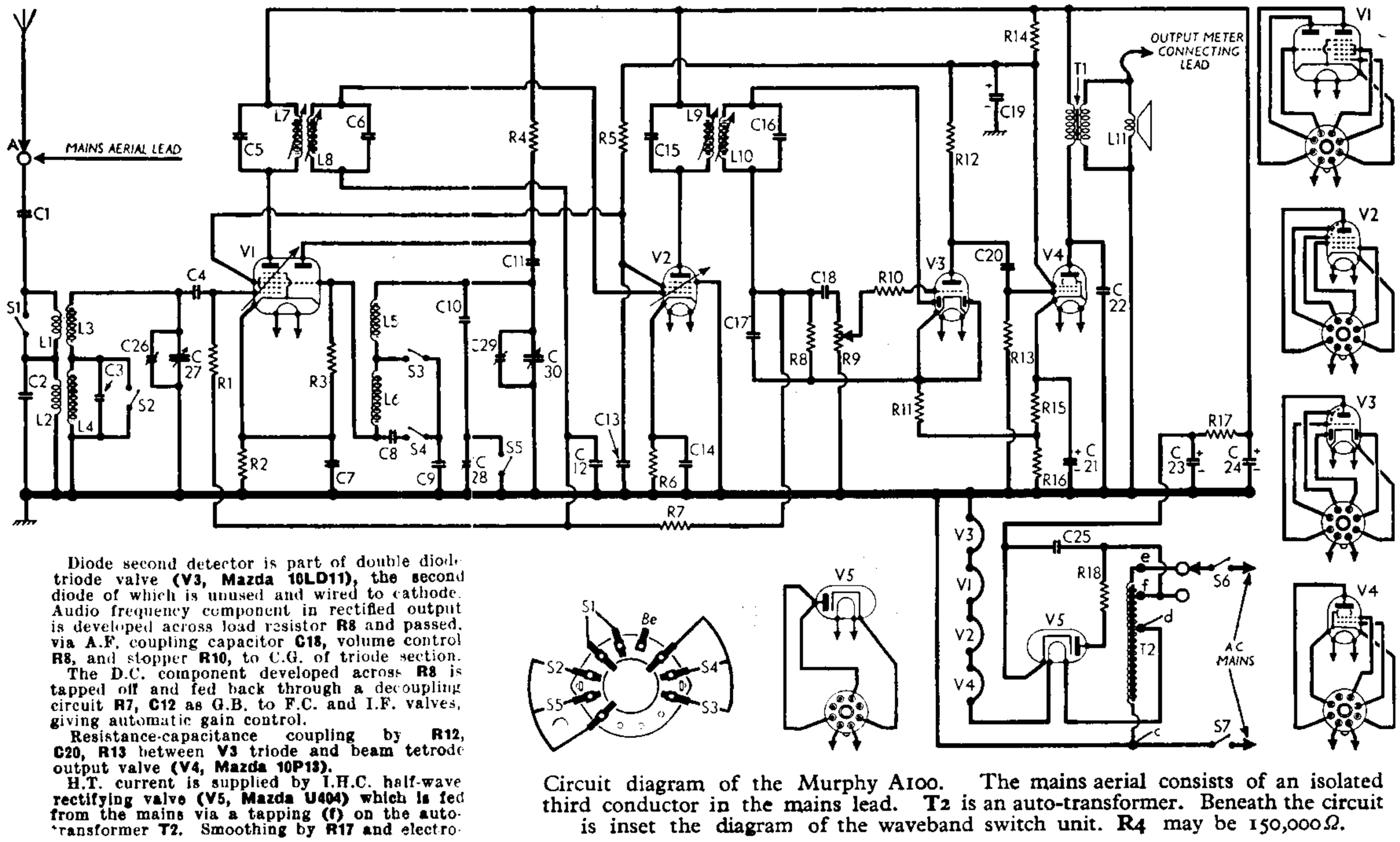
lytic capacitors **C23, C24,** and H.T. R.F. filtering by **C25.** The heaters of all valves are connected in series and supplied from a section of **T2** between tappings **c** and **d.**

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	Aerial isolater ...	0·0005	A3
C2	Aerial L.W. shunt	0·00047	B2
C3	Aerial L.W. trimmer	0·000042	B2
C4	V1 Hept. C.G. ...	0·0005	L6
C5	1st I.F. transformer tuning ...	0·0001	B3
C6		0·0001	B3
C7	V1 cath. by-pass ...	0·01	L6
C8	Oscillator tracking capacitors	0·001	L5
C9		0·00044	B2
C10	Osc. L.W. trimmer	0·000195	A2
C11	Osc. anode coup. ...	0·0001	K6
C12	A.G.C. decoupling	0·01	K4
C13	S.G.'s H.T. decoup.	0·01	M6
C14	V2 cath. by-pass ...	0·01	J6
C15	2nd I.F. transformer tuning	0·0001	C3
C16		0·0001	C3
C17	I.F. by-pass ...	0·0002	G6
C18	A.F. coupling ...	0·01	G5
C19*	H.T. feed decoup.	16·0	F4
C20	A.F. coupling ...	0·01	F6
C21*	V4 cath. by-pass ...	10·0	J6
C22	Tone corrector ...	0·01	D3
C23*	H.T. smoothing capacitors	16·0	J4
C24*		16·0	F6
C25	Mains R.F. by-pass	0·02	G4
C26‡	Aerial M.W. trim ...	0·00004	L5
C27†	Aerial tuning ...	—	A2
C28‡	Osc. M.W. trim ...	0·00004	A2
C29‡	Osc. L.W. trim ...	0·00004	L4
C30†	Oscillator tuning ...	—	B2

	RESISTORS	Values (ohms)	Locations
R1	V1 hept. C.G. ...	1,000,000	K5
R2	V1 fixed G.B. ...	560	M6
R3	V1 osc. C.G. ...	22,000	L6
R4	Osc. anode load ...	220,000	J6
R5	S.G's H.T. feed ...	15,000	J6
R6	V2 fixed G.B. ...	560	J6
R7	A.G.C. decoupling	2,200,000	H5
R8	Diode load ...	470,000	G6
R9	Volume control ...	1,000,000	D1
R10	V3 grid stopper ...	100,000	G6
R11	Part V3 G.B. ...	100	H6
R12	V3 triode load ...	47,000	F6
R13	V4 C.G. resistor ...	220,000	E5
R14	H.T. feed resistor...	4,700	H6
R15	V3, V4 G.B. resistors	270	H5
R16		15	H6
R17	H.T. smoothing ...	1,000	G5
R18	V5 surge limiter ...	100	D2

* Electrolytic. † Variable. ‡ Pre-set.



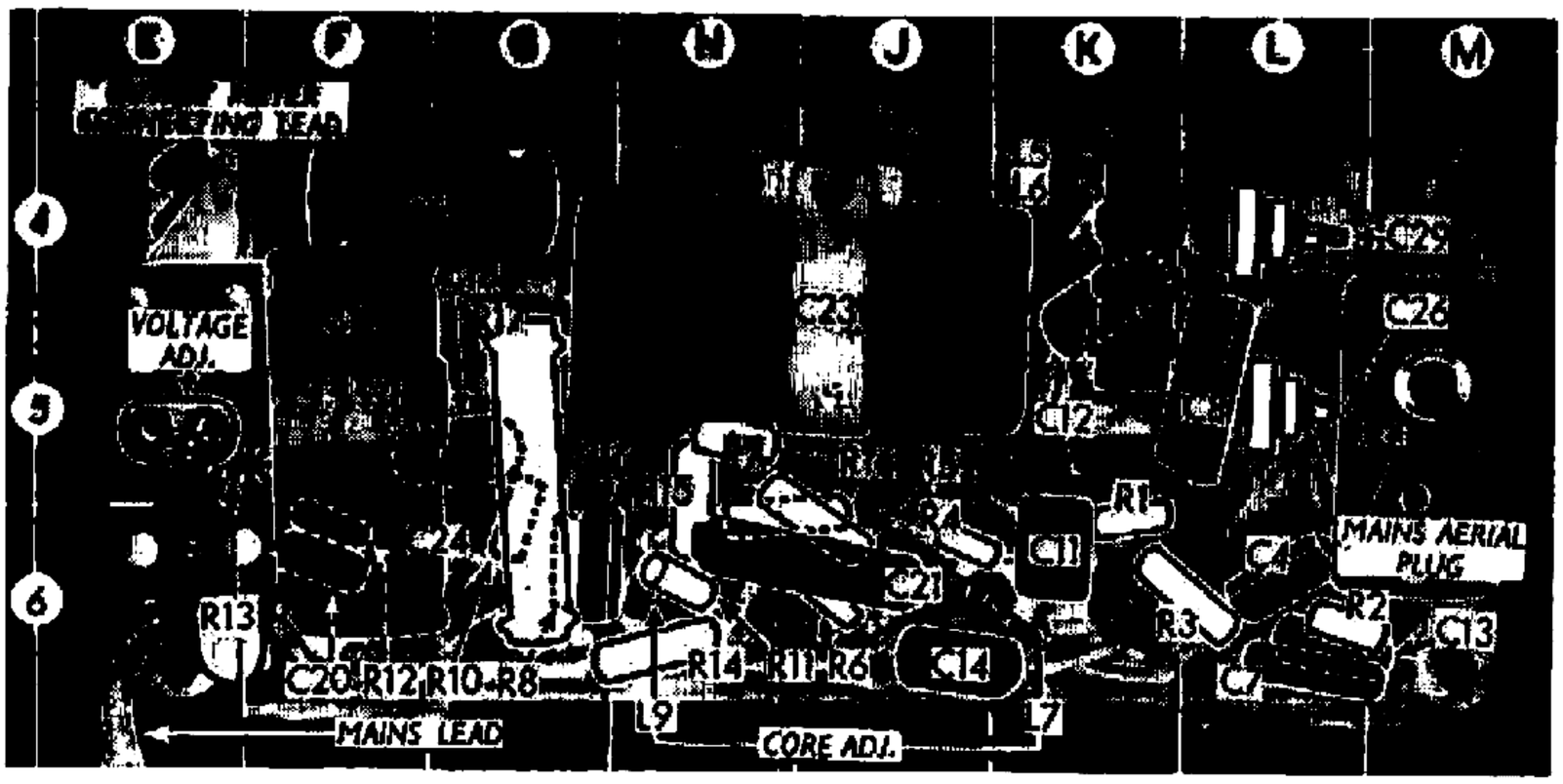
Diode second detector is part of double diode triode valve **(V3, Mazda 10LD11),** the second diode of which is unused and wired to cathode. Audio frequency component in rectified output is developed across load resistor **R8** and passed, via **A.F.** coupling capacitor **C18,** volume control **R8,** and stopper **R10,** to C.G. of triode section.

The D.C. component developed across **R8** is tapped off and fed back through a decoupling circuit **R7, C12** as G.B. to F.C. and I.F. valves, giving automatic gain control.

Resistance-capacitance coupling by **R12, C20, R13** between **V3** triode and beam tetrode output valve **(V4, Mazda 10P13).**

H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Mazda U404)** which is fed from the mains via a tapping **(f)** on the auto-transformer **T2.** Smoothing by **R17** and electro-

Circuit diagram of the Murphy A100. The mains aerial consists of an isolated third conductor in the mains lead. **T2** is an auto-transformer. Beneath the circuit is inset the diagram of the waveband switch unit. **R4** may be 150,000Ω.



Under-chassis view. The mains aerial plug is shown in the "On" position; the lower socket is "Off." The undersides of V4 and V5 holders are obscured here by the mains voltage adjustment panel.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Aerial coupling coils	0·5	A2
L2		22·0	B1
L3	Aerial tuning coils	2·5	A2
L4		15·0	B1
L5	Oscillator tuning coils	1·7	K4
L6		2·0	K4
L7	1st I.F. trans. Prl.	18·0	B3
L8	1st I.F. trans. Sec.	18·0	B3
L9	2nd I.F. trans. Prl.	18·0	C3
L10	2nd I.F. trans. Sec.	18·0	C3
L11	Speech coil	2·4	—
T1	Output trans. Prl.	310·0	D3
	Output trans. Sec.	1·0	
T2	Mains auto-trans. a–f	30·0	C2
	Mains auto-trans. f–d	70·0	
	Mains auto-trans. d–c	140·0	
S1–S5	W/band switches	—	A2
S6, S7	Mains switch	—	D2

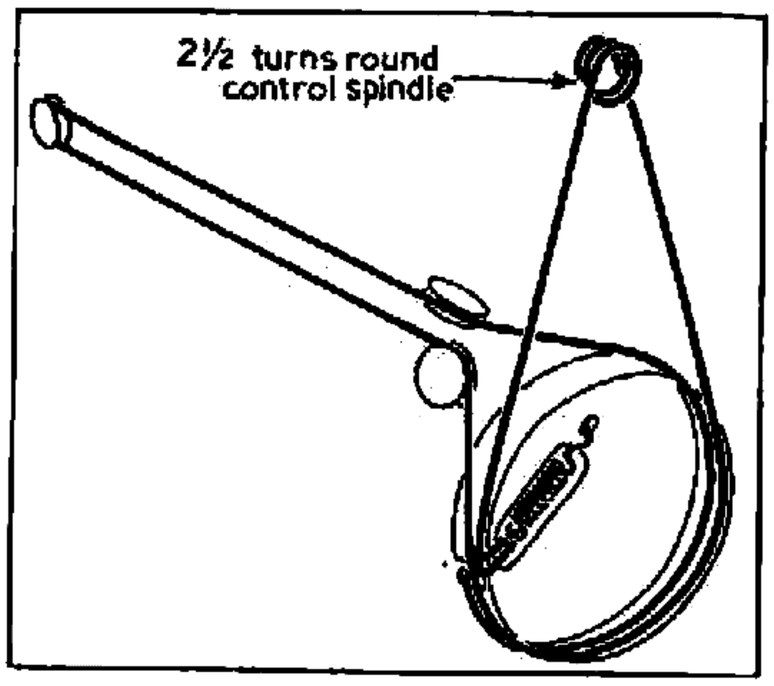
GENERAL NOTES

Switches.—**S1-S5** are the waveband switches ganged in a single rotary unit mounted on one of the chassis uprights, just below its control knob. The unit is indicated in our rear view of the chassis, where an arrow indicates the direction in which it is viewed in the diagram inset beneath the circuit diagram overleaf, where the unit is shown in detail. **S2** and **S3** close on M.W., while **S1**, **S4** and **S5** close on L.W.

S6, S7 are the Q.M.B. mains switches, which are mounted on one of the chassis uprights, directly beneath the control knob.

Coils.—The M.W. aerial coils **L1**, **L3** are in a small unscreened unit on one side of one of the uprights on the chassis deck, and the L.W. coils **L2**, **L4** are in a similar unit, on the other side of the same upright but near the front of the chassis, just over the gang. Both units are on the left of our rear chassis illustration, but the L.W. unit is obscured by other components.

The oscillator circuit coils **L6**, **L8** are in a single unscreened unit beneath the chassis. On L.W. they are connected in series to provide the total tuning inductance, but on M.W., the L.W. coil **L6** acts as the reaction coupling winding to the M.W. tuning coil **L5**.



Sketch showing the tuning drive system, as seen from the upper right-hand front corner of the chassis with the gang at maximum.

Drive Cord Replacement.—The cord used for the tuning drive is thin plaited and waxed Italian hemp cord, and 4 ft is ample, leaving a comfortable margin for tying off. Access to the cursor portion of the cord is obtained most conveniently by removing the channel-section scale (4 self-tapping screws).

The course followed by the cord is shown in the sketch (col. 2), in which the receiver is viewed from above its front right-hand corner with the gang at maximum, when the drive drum should be hard against its stop.

It is advisable to commence by making the 2½ turns round the control spindle, and it is helpful to use strips of adhesive tape to hold the cord to the flat rim of the drum until the work is completed.

DISMANTLING THE SET

Removing Chassis.—Remove the tuning and volume control knobs (recessed grub screws), the four 2BA screws securing the plastic bottom cover, and the four insulating pillars which are then revealed at the corners of the chassis, and lift out the chassis.

To extract **V1**, **V2** and **V3** it is necessary to remove the chassis back cover (four self-tapping screws) and press the valve spigots upward from the chassis underside with a suitable tool.

When replacing, the chassis back cover should be fitted with its upper edge almost level with the tops of its supporting brackets; note that a plastic washer goes between the chassis and the cabinet at each fixing point, and a steel washer between each pillar and the chassis.

CIRCUIT ALIGNMENT

Before commencing these operations the iron-dust cores of the I.F. transformers should be fully unscrewed (anti-clockwise). A lead, connected to the "live" side of **T1** secondary winding will be found coiled up beneath the voltage adjustment panel, and an output meter should be connected between this point and chassis.

I.F. Stages.—Switch set to M.W., turn gang and volume control to maximum, connect signal generator, via an 0.1 μF capacitor in the "live" lead to C.G. (pin 6) of **V2** and chassis, feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L10** (location reference C2) and **L9** (H6) for maximum output. Transfer "live" signal generator lead to C.G. (pin 6) of **V1** and chassis and adjust the cores of **L8** (B2) and **L7** (K6) for maximum output. Do not repeat these operations.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the cursor should coincide with the dots beneath the high wavelength ends of the L.W. scales. It may be adjusted in position by sliding the cursor carriage along the drive cord.

L.W.—Switch set to L.W., tune to 1,300 m on scale, feed in a 1,300 m (230.8 kc/s) signal, and adjust **C29** (L4) for maximum output.

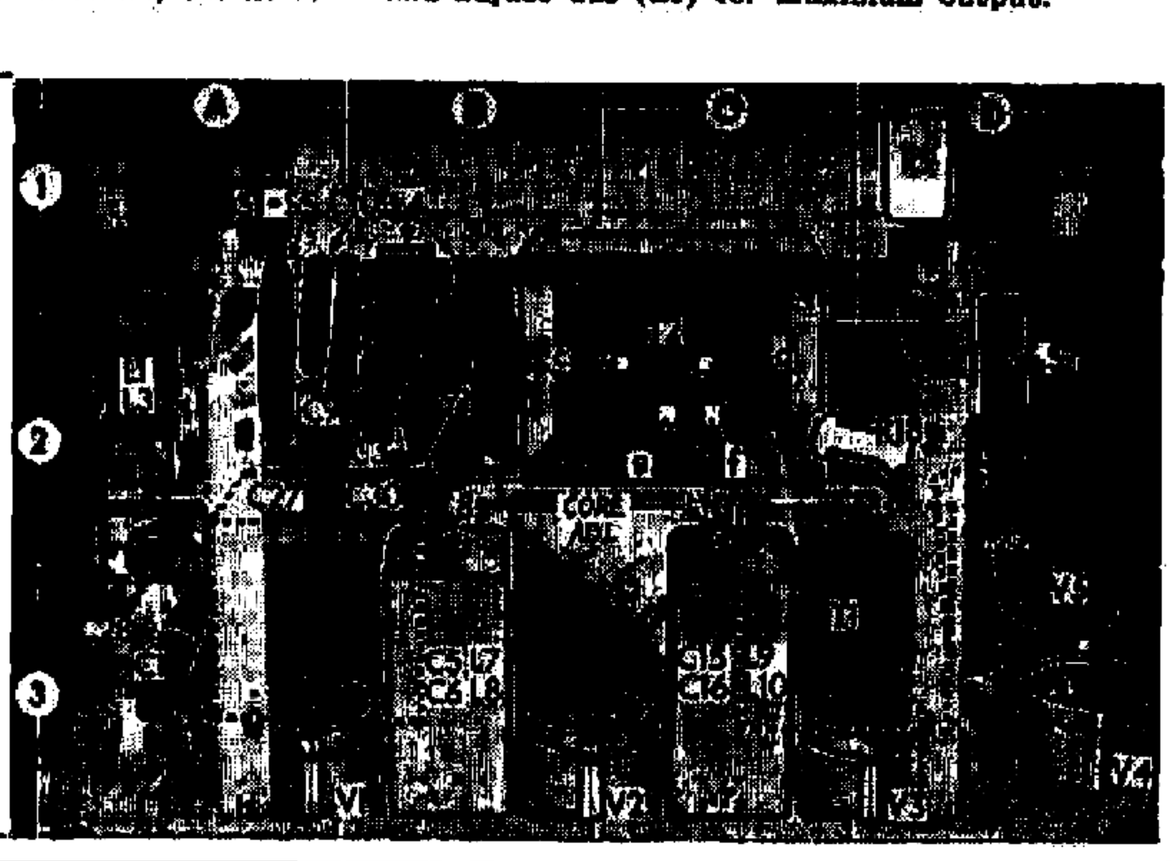
M.W.—Switch set to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C28** (A2) for maximum output. Transfer "live" signal generator lead to **A** socket, via an 0.0001 μF capacitor, feed in a 200 m signal, and adjust **C25** (L5) for maximum output.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from mains of 226 V, using the 200-220 V mains tapping. The receiver was tuned to the lowest wavelength on the M.W. 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 Avometer, except where otherwise indicated, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (ma)	Cathode Voltage (V)
V1 10C1	200	2·1	95	2·3	3·0‡
	Oscillator				
	20	1·1			
V2 10F9	200	3·9	95	1·2	3·2‡
V3 10LD-11	43	2·0	—	—	0·8‡
V4 10P13	100	29·0	152	5·0	8·9‡
V5 U404	218†	—	—	—	247

† Each anode, A.C. ‡ 10 V meter range.



Rear view of the upper side, with T2 tappings identified. Several components normally obscured by the scale are drawn in. V2 has a close fitting shield.

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