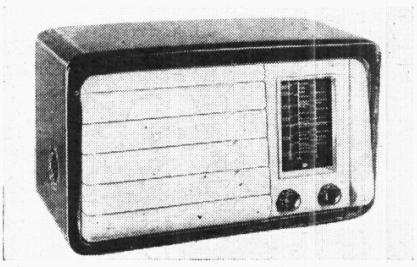
Supplement to The Wireless & Electrical Trader, September 20, 1947

"TRADER" SERVICE SHEET 829

MASTERADIO D111

THREE-BAND A.C. SUPERHET



IRON-DUST cores are used in all tuning coils in the Masteradio DIII, a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. mains of 200-250 V, 40-100 c/s. The S.W. range is 16-50 m.

Release date and original price: July, 1946; £17 17s, plus £3 19s 4d purchase tax; increased May, 1947, to £21 0s, plus £4 13s 4d purchase tax.

CIRCUIT DESCRIPTION

Aerial input is via I.F. rejector **L1, C2** and coupling coils **L2** (S.W.), **L3** (M.W.) and directly to tap on tuning coil via **L4** (L.W.) to single-tuned circuits **L5, C32** (S.W.), **L6, C32** (M.W.) and **L7, C32** (L.W.). Coil **L4** is a M.W. rejector.

First valve **(V1, Mazda metallized TH41)** is a triode-heptode operating as frequency changer with internal coupling. Triode oscillator anode coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.) are tuned by **C36.** Parallel trimming by **C33** (S.W.), **C34** (M.W.) and **C11, C35** (L.W.); series tracking by **C9** (M.W.) and **C10** (L.W.), adjustments being made by variable iron-dust cores on all bands. Reaction coupling by grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.).

Second valve **(V2, Mazda metallized VP41)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C5, L14, L15, C6** and **C15, L16, L17, C16.** All the tuning capacitors are fixed, and alignment is effected by varying the positions of the iron-dust cores.

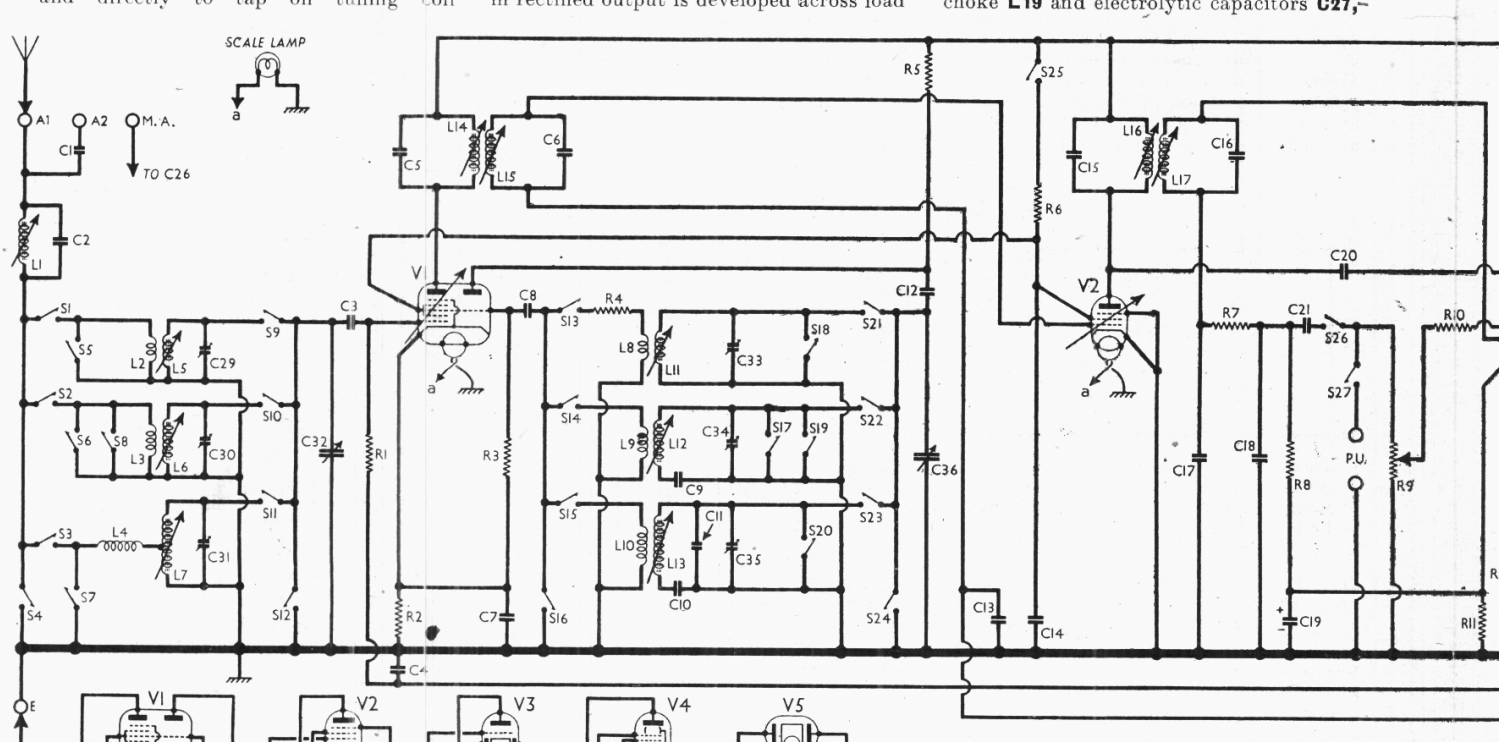
Intermediate frequency 465 kc/s.

Diode second detector is part of double diode triode valve **(V3, Mazda metallized HL42DD).** Audio frequency component in rectified output is developed across load resistor **R8** and passed, via A.F. coupling capacitor **C21,** switch **S26,** manual volume control **R9** and grid stopper **R10** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C17, R7, C18** in diode circuit. Provision for the connection of a gramophone pick-up across **R9,** via **S27.**

Second diode of **V3,** fed from **V2** anode via **C20,** provides D.C. potentials which are developed across load resistors **R16, R17** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage, together with G.B. for **V3** triode section, is obtained from the drop along **R11** in **V3** cathode lead to chassis.

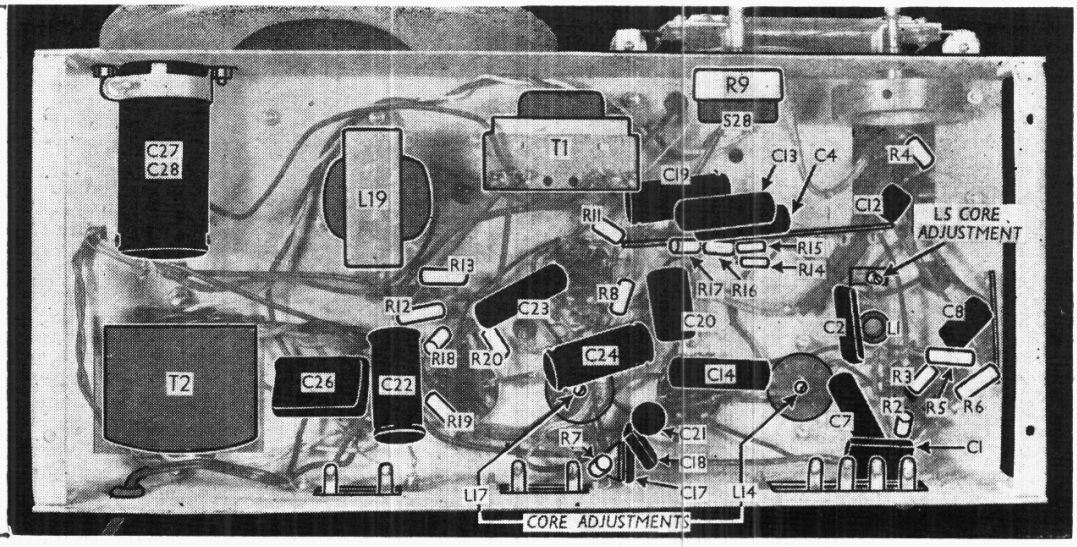
Resistance-capacitance coupling by **R13, C23** and **R18,** via grid stopper **R19,** between **V3** triode and beam tetrode output valve **(V4, Mazda metallized PEN45).** Variable tone control by **C25** and **R21** in anode circuit. Provision for the connection of a low-impedance external speaker across the secondary winding of the output transformer **T1.**

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mazda metallized UU6).** Smoothing by iron-cored choke **L19** and electrolytic capacitors **C27,**—



Circuit diagram of the Masteradio DIII 3-band A.C. superhe connected between one side of the mains and the mains aeri socket on the aerial panel, where a metal link connects **M.A** for mains aerial operation. Differences in the diode circuit chassis are shown in the diagram in col. 4 overleaf.

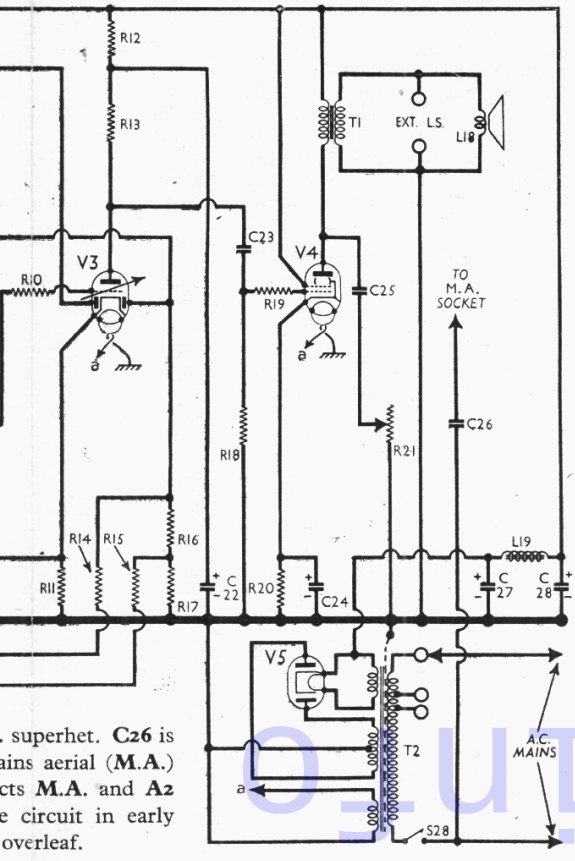
Under - chassis view. The core adjustments for **L5** and the I.F. transformer coils **L14**, **L17**, are indicated here. Five more core adjustments and six pre-set capacitor trimmers are shown in the sketch of the tuning assembly at the foot of cols. 1 and 2 overleaf.



C28. Mains aerial connection via capacitor **C26,** which can be linked to aerial terminal **A2.**

DISMANTLING THE SET

Removing Chassis.—Remove the two front-panel control knobs (recessed grub screws); from the rear of the cabinet insert a long-bladed screwdriver and slacken the grub screws securing the extension spindles of the remaining control knobs (one on each side of the cabinet) and withdraw the knobs complete with spindles;
from the underside of the cabinet remove the four round head bolts (with metal washers); when the chassis and speaker may be withdrawn as a single unit.



. superhet. **C26** is ains aerial (**M.A.**) cts **M.A.** and **A2** e circuit in early overleaf.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 hept. C.G. resistor ...	1,000,000
R2	V1 fixed G.B. resistor ...	270
R3	V1 osc. C.G. resistor ...	33,000
R4	V1 osc. S.W. stabiliser ...	15
R5	V1 osc. anode H.T. feed ...	47,000
R6	V1, V2 S.G.'s H.T. feed ...	25,000
R7	I.F. stopper	47,000
R8	V3 signal diode load ...	1,000,000
R9	Manual volume control ...	500,000
R10	V3 triode C.G. stopper ...	47,000
R11	V3 G.B. ; A.V.C. delay ...	470
R12	V3 triode H.T. decoupling	25,000
R13	V3 triode anode load ...	47,000
R14	A.V.C. line decoupling ...	1,000,000
R15	V2 C.G. decoupling ...	1,000,000
R16, R17	V3 A.V.C. diode load resistors	470,000 / 470,000
R18	V4 C.G. resistor	470,000
R19	V4 C.G. stopper	47,000
R20	V4 G.B. resistor	180
R21	Variable tone control ...	50,000

	CAPACITORS	Values (μF)
C1	Aerial series	0·00005
C2	I.F. rejector tuning ...	0·0005
C3	V1 hept. C.G. capacitor ...	0·0005
C4	A.V.C. line decoupling ...	0·1
C5, C6	1st I.F. transformer fixed tuning capacitors ...	0·00015 / 0·00015
C7	V1 cathode by-pass ...	0·1
C8	V1 osc. C.G. capacitor ...	0·0001
C9	Osc. M.W. fixed tracker ...	0·00056
C10	Osc. L.W. fixed tracker ...	0·00015
C11	Osc. L.W. fixed trimmer ...	0·000082
C12	V1 osc. anode coupling ...	0·0001
C13	V2 C.G. decoupling ...	0·1
C14	V1, V2, S.G.'s decoupling	0·1
C15, C16	2nd I.F. transformer fixed tuning capacitors ...	0·00015 / 0·00015
C17	I.F. by-pass capacitors ...	0·0001
C18		0·0001
C19*	V3 cathode by-pass ...	50·0
C20	V3 A.V.C. diode coupling	0·0001
C21	A.F. coupling capacitor ...	0·1
C22*	V3 triode H.T. decoupling	4·0
C23	A.F. coupling to V4 C.G. ...	0·1
C24*	V4 cathode by-pass ...	50·0
C25	Part variable tone control	0·05
C26	Mains aerial coupling ...	0·00005
C27*, C28*	H.T. smoothing capacitors	16·0 / 16·0
C29‡	Aerial circ. S.W. trimmer	0·00007
C30‡	Aerial circ. M.W. trimmer	0·00007
C31‡	Aerial circ. L.W. trimmer	0·00007
C32†	Aerial circuit tuning ...	—
C33‡	Osc. circ. S.W. trimmer ...	0·00007
C34‡	Osc. circ. M.W. trimmer ...	0·00007
C35‡	Osc. circ. L.W. trimmer ...	0·00097
C36†	Oscillator circuit tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial I.F. rejector coil ...	6·5
L2	Aerial S.W. coupling coil ...	0·2
L3	Aerial M.W. coupling coil ...	1·6
L4	M.W. harmonic rejector ...	1·7
L5	Aerial S.W. tuning coil ...	Very low
L6	Aerial M.W. tuning coil ...	2·7
L7	Aerial L.W. tuning coil ...	16·0
L8	Osc. S.W. reaction coil ...	0·1
L9	Osc. M.W. reaction coil ...	1·0
L10	Osc. L.W. reaction coil ...	1·5
L11	Osc. S.W. tuning coil ...	Very low
L12	Osc. M.W. tuning coil ...	1·6
L13	Osc. L.W. tuning coil ...	6·0
L14	1st I.F. trans. Pri. ...	15·0
L15	1st I.F. trans. Sec. ...	15·0
L16	2nd I.F. trans. Pri. ...	15·0
L17	2nd I.F. trans. Sec. ...	15·0
L18	Speaker speech coil ...	2·0
L19	H.T. smoothing choke ...	270·0
T1	Output trans. Pri.	230·0
	Output trans. Sec.	0·4
T2	Mains trans. Pri., total ...	26·0
	Mains trans. Heater sec. ...	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. H.T. sec., total	430·0
S1-S2	Waveband switches ...	—
S28	Mains switch, ganged R9 ...	—

VALVE ANALYSIS

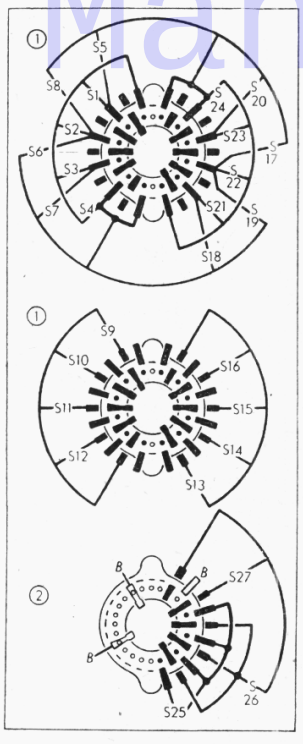
Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 229V, using the 220-230V tapping on the mains transformer.

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 400V scale of a model 7 Avometer, chassis being the negative connection.

Valve		Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1	TH41	272	1·0	87	6·8
		Oscillator 76	3·6		
V2	VP41	272	4·6	87	1·1
V3	HL42DD	67	2·7	—	—
V4	PEN45	262	41·0	272	9·4
V5	UU6	267†	—	—	—

† Each anode, A.C.

Switch Diagrams and Table



Switch	S.W.	M.W.	L.W.	Gram.
S1	C	—	—	—
S2	—	C	—	—
S3	—	—	C	—
S4	—	—	—	C
S5	—	—	C	—
S6	C	—	—	—
S7	C	C	—	—
S8	—	—	—	C
S9	C	—	—	—
S10	—	C	—	—
S11	—	—	C	—
S12	—	—	—	C
S13	C	—	—	—
S14	—	C	—	—
S15	—	—	C	—
S16	—	—	—	C
S17	C	—	C	—
S18	—	—	C	C
S19	—	—	—	C
S20	C	C	—	—
S21	C	—	—	—
S22	—	C	—	—
S23	—	—	C	—
S24	—	—	—	C
S25	C	C	C	—
S26	C	C	C	—
S27	—	—	—	C

Diagrams and table of the two waveband switch units. The two upper diagrams are of the same unit (No. 1), but only the switches whose tags are on the facing side are identified in the top diagram, and the remainder in the centre diagram. The bottom diagram is the No. 2 unit complete. All diagrams are drawn as seen from the speaker end of the chassis deck.

GENERAL NOTES

Switches.—**S1-S24** are the waveband switches, and **S26, S27** the radio/gram change-over switches, ganged in two rotary units beneath the chassis. These are indicated by numbers **1** and **2** in circles in our plan view, where arrows show the direction in which they are viewed in the diagrams above, where they are shown in detail.

Three diagrams are shown: the first indicates the switches whose tags emerge on the near, or obverse, side of the No. 1 unit, while the second indicates the switches whose tags emerge on the far, or reverse, side of No. 1 unit, both diagrams being viewed from the near side, and indicated by the arrow in our plan view. It is not possible to view the far side of the unit directly. The third diagram indicates the switch tags of the No. 2 unit in the normal manner.

The table above gives the switch positions for the four control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

Tuning Assembly.—The M.W. and L.W. aerial and oscillator circuit coils **L3-L7** and **L9-L13** are mounted in an assembly fitted at one end of the chassis deck, near the tuning gang. In the assembly also are the oscillator S.W. coils **L8, L11,** all the pre-set capacitor trimmers, resistors **R1** and **R4,** and the waveband switch units. All alignment adjustments except those of **L1, L5** and the I.F. transformers are located in the assembly

The two sides of this assembly are shown in the sketches in cols. 1 and 2, the components being seen in one view, which is drawn as seen from the far end of the chassis deck, and the six pre-set capacitor and five core adjustments are identified in the other.

The I.F. rejector coil **L1** is beneath the chassis deck, but its core adjustment is reached from above; the **L2, L5** coil unit is above the chassis deck, but its core adjustment is beneath it. The I.F. transformers **L14, L15** and **L16, L17** are in two screened units on the chassis deck, their core adjustments projecting above and below them.

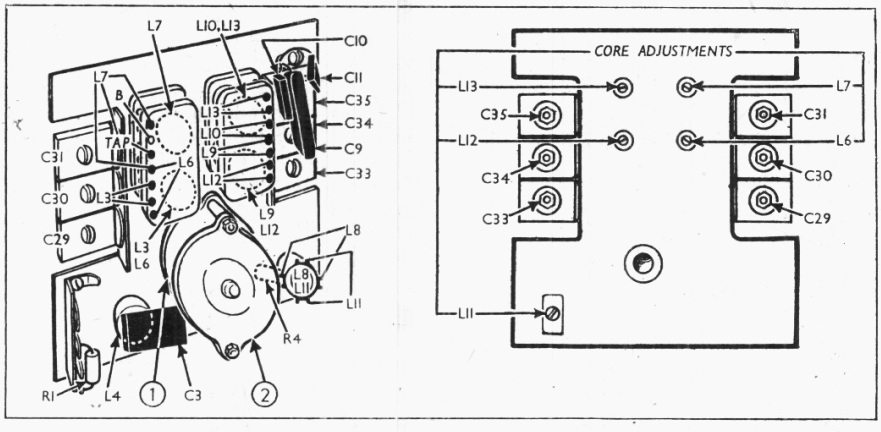
Mains Aerial Coupling.—The mains aerial coupling capacitor **C26** is taken to one of the four terminals on the aerial/earth connecting-strip (third from the left, marked "**MA**" on the back cover), and slotted metal link being provided as a convenient means of connecting this terminal to the second one (marked "**A2**"). If a replacement for **C26** is needed, it should be observed that the insulation rating of the original component is 2,200 V D.C. test. Its value is 50 $\mu\mu$F (0.00005 μF).

S28 is the Q.M.B. mains switch, ganged with the manual volume control **R9.**

Scale Lamp.—This is an Osram M.E.S. type, with a large clear spherical bulb, rated at 6.2 V, 0.3 A.

External Speaker.—Two terminals are provided at the rear of the chassis for the connection of a low-impedance (3-4 Ω) external speaker.

Chassis Divergencies.—Our chassis was one of recent production, whose circuit was as shown in our diagram overleaf. In early models the volume control circuit was different, diode current flowing through the volume control. A diagram of the early arrangement is shown in col. 4.



Sketches showing both sides of the tuning assembly. *Left*, the inner side, as seen from the far end of the chassis deck. *Right*, the outer side, showing six capacitors and five core adjustments.

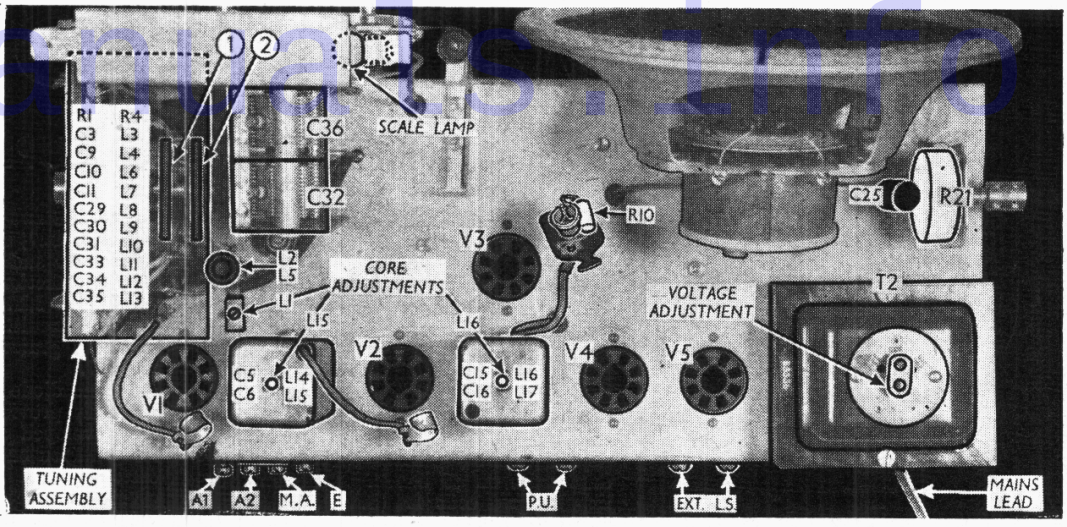
CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator leads to control grid (top cap) of **V1** and chassis, leaving existing connector in position. Switch set to M.W., and turn volume control to maximum and gang to minimum capacitance. Feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L14, L15, L16** and **L17** for maximum output. Repeat these adjustments

I.F. Filter.—Transfer "live" signal generator lead to **A** socket, feed in a 465 kc/s signal, and adjust the core of **L1** for minimum output.

R.F. and Oscillator Stages.—Instead of the normal practice in which the oscillator, and then the R.F., circuits are adjusted for each band in turn, the makers recommend adjusting first the oscillator circuits for the three bands in turn, and then the aerial circuits, as described in the following.

Oscillator Stages.—With the gang at maximum capacitance, the cursor should coincide with the high wavelength ends of the three scales. It may be adjusted in position if the drive drum fixing



Plan view of the chassis. All the components contained in the tuning assembly are listed here in two columns but their positions are shown in the left-hand sketch of the tuning assembly at the foot of cols. 1 and 2. Detailed diagrams of the two waveband switch units, drawn as seen in the same sketch, are given at the top of col. 1.

screws are slackened. Transfer "live" signal generator lead to top cap of **V1.**

M.W.—With set still switched to M.W., tune to 550 m on scale, feed in a 550 m (545 kc/s) signal, and adjust the core of **L12** for maximum output. Tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C34** for maximum output. Repeat these adjustments until correct calibration is maintained.

L.W.—Switch set to L.W., tune to 2,000 m on scale, feed in a 2,000 m (1,500 kc/s) signal, and adjust the core of **L13** for maximum output. Tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C35** for maximum output. Repeat these adjustments until correct calibration is maintained.

S.W.—Switch set to S.W., tune to 50 m on scale, feed in a 50 m (6 Mc/s) signal, and adjust the core of **L11** for maximum output. Tune to 16 m on scale, feed in a 16 m (18.75 Mc/s) signal and adjust **C33** for maximum output, choosing the peak involving the lesser trimmer capacitance. Repeat these adjustments until satisfactory calibration is obtained.

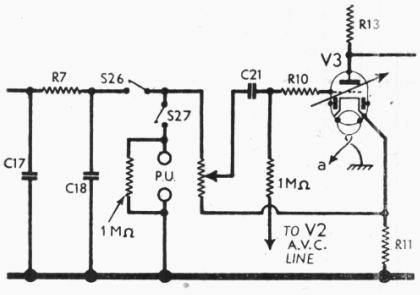


Diagram showing the diode circuit used in early chassis, when the volume control acted as the signal diode load resistor. The triode section is controlled from the A.V.C. line.

R.F. Stages.—Transfer "live" signal generator lead to **A2** socket.

M.W.—Switch set to M.W., tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust the core of **L6** for maximum output. Tune to 230 m on scale, feed in a 230 m (1,300 kc/s) signal, and adjust **C30** for maximum output. Repeat these adjustments until no increase in sensitivity can be obtained.

L.W.—Switch set to L.W., tune to 2,000 m on scale, feed in a 2,000 m signal, and adjust the core of **L7** for maximum output. Tune to 1,000 m on scale, feed in a 1,000 m signal, and adjust **C31** for maximum output. Repeat these adjustments until no increase in sensitivity can be obtained.

S.W.—Switch set to S.W., tune to 40 m on scale, feed in a 40 m (7.5 Mc/s) signal, and adjust the core of **L5** for maximum output. Tune to 16 m on scale, feed in a 16 m (18.75 Mc/s) signal and adjust **C29** for maximum output, choosing the peak involving the greater trimmer capacitance. Repeat these adjustments until no increase in sensitivity can be obtained.

Finally, seal all adjustments with a cellulose fixative.

DRIVE CORD REPLACEMENT

Fifty inches of Cutty Hunk twine, "Swan" brand Grade O, of tubular cross-section, non-stretching and with a breaking strain of 30lb, is used for the drive cord. Replacement lengths can be obtained from the manufacturers of the receiver.

To obtain access to the drive system, the transparent plastic scale panel and its black backing plate must be removed, and before this can be done, the light mask, which forms a box-like cover at the top of the assembly and the scale lamp, must be removed (two round-head set-screws with lock-washers at the back of the assembly).

Warning.—When removing the light mask, do not remove its fixing screws; they need only be slackened, and the mask can be lifted off. If they are removed, and the scale is also removed, the drive cord suspension will collapse.

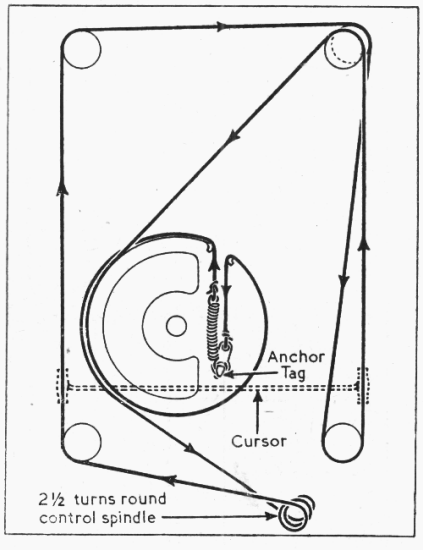
Having tightened these two screws, remove the four round-head set-screws (with lock-washers) holding the four corner-clamps to the scale panel, then lift away the scale and ease out the backing plate from behind the cursor bar (if in position). The drive system is then exposed as depicted in the sketch in col. 6, where it is drawn as seen from the front of the chassis when the gang is at maximum.

To fit the cord, tie one end securely to one end of the tension spring, and pass the free end of the cord through the groove slot in the rim of the drive drum, so that the spring is inside the drum, and hook the free end of the spring to the anchor tag.

Run the cord anti-clockwise round the drum for about half a turn, then under the control spindle, round the spindle waist 2½ turns, under the left-hand bottom pulley, over the top left pulley, then over the top right (rear) pulley and down, going half-way round the bottom right-hand pulley in an anti-clockwise direction and up again, this time to the top right front pulley, over it and diagonally down to the drive drum.

The cord goes anti-clockwise for nearly a complete circle round the drum and enters the groove slot. Inside the drum, it is tied to a tag (it is like a 4BA soldering tag) and the tag ring is slipped on to the anchor tag in the drum face. A more convenient fit is obtained if the tag goes on to the anchor before the spring.

Finally, attach the cursor bar lightly to the two outer (vertical) strands of the cord, and slide it approximately to where we show it in our sketch. Then, after replacing the scale fittings, check that the gang is at maximum, slide bar to a level position and see that it registers with the top of the black margin at the bottom of the scale panel, then pinch up the clamps firmly to the cord.



Sketch of the cord drive tuning drive system, drawn as seen from the front of the chassis when the gang is at maximum. Both ends of the cord are anchored to the same tag.

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