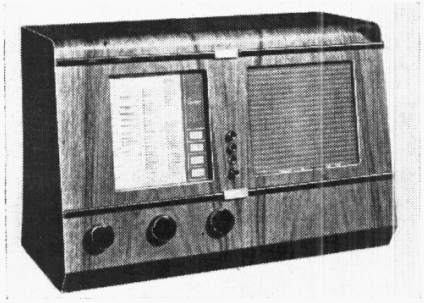
Supplement to The Wireless & Electrical Trader, May 15, 1948

"TRADER" SERVICE SHEET 861

COSSOR 474

WITH PRESS-BUTTON WAVEBAND SWITCHING



The appearance of the Cossor 474 superhet.

PRESS-BUTTON waveband switching and flywheel tuning are features in the Cossor 474, and the power unit is on a separate chassis connected to the main chassis by a plug and socket.

The receiver is a 4-valve (plus rectifier) 3-band superhet operating from A.C. mains of 200-250 V, 40-100 c/s. Provision is made for the connection of a gramophone pick-up and an exernal speaker.

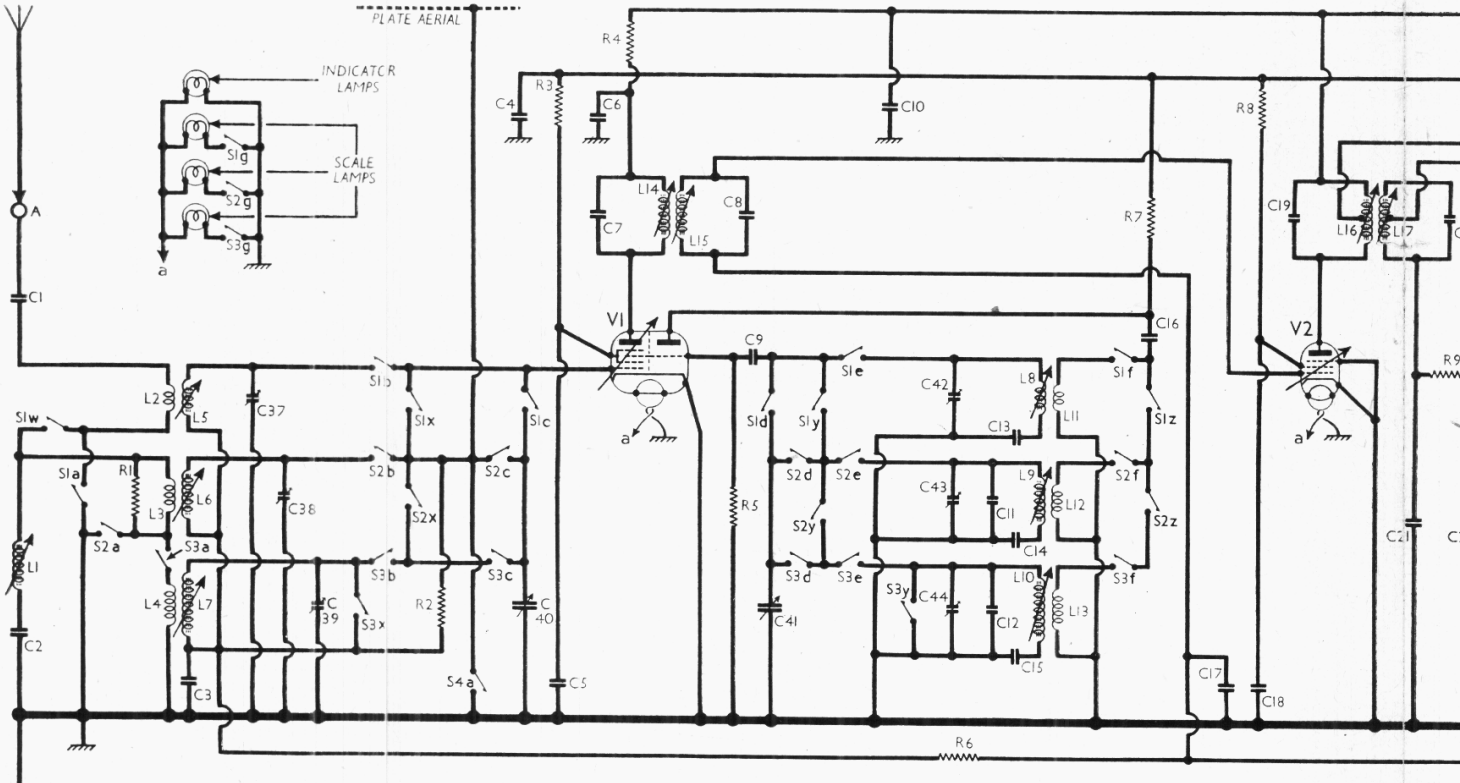
Release date and original price: January, 1948; £26 19*s* 1*d*, *reduced April*, 1948, to £24 18*s* 7*d*, *plus purchase tax in each case.*

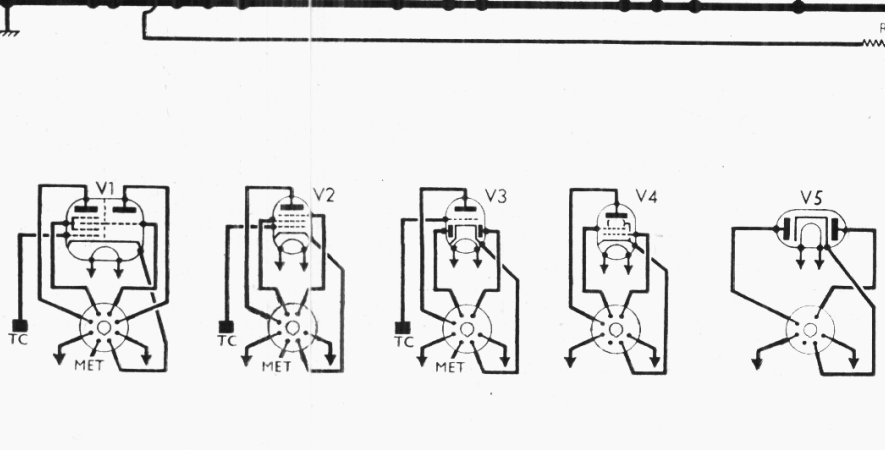
CIRCUIT DESCRIPTION

Waveband selection is achieved by press-button switches **S1a-g, w, x, y, z** to **S3a-g, x, y, z.** These switches are coded with suffix letters to indicate their functions, and are arranged in groups. Two groups are controlled by each press-button, one belonging to the aerial circuit and the other to the oscillator circuit.

All the switches in the two groups belonging to a given press-button bear the same number, the individual switches in each group being identified by the suffix letter. If the suffix is **a, b, c, d, e, f** or **g,** the switch closes when its button is pressed; if the suffix is **w, x, y** or **z,** the switch opens. When a button is released (by pressing another button), its **a, b, c, d, e, f, g** switches open and its **w, x, y, z** switches close.

Aerial input, via series capacitor **C1**





Circuit diagram of the Cossor 474 A.C. t
wave-band switches are press-button op
numbered and coded in our usual style t
explained in " Circuit Description " above.
is seen at the bottom right-hand corner o
connecting pins are indicated by arrows
numbered to represent the pin numbers on
Inset below the circuit diagram on the right
of the tone control switch unit, drawn as
inverted chassis.

and coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.), to single-tuned circuits **L5, C40** (S.W.), **L6, C40** (M.W.) and **L7, C40** (L.W.). I.F. filtering (except on S.W.) by **L1, C2** connected in parallel with aerial coupling coils.

First valve **(V1, Cossor metallized OM10)** is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C41,** with parallel trimming by **C42** (S.W.), **C11, C43** (M.W.) and **C12, C44** (L.W.) and series tracking by **C13** (S.W.), **C14** (M.W.) and **C15** (L.W.). Inductive reaction coupling from anode via **C16,** by coils **L11** (S.W.), **L12** (M.W.), **L13** (L.W.).

Second valve **(V2, Cossor metallized OM6)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C7, L14, L15, C8** and **C19, L16, L17, C20.** **Intermediate frequency 465 kc/s.**

Diode second detector is part of double diode triode valve **(V3, Cossor metallized OM4).** Audio frequency component in rectified output is developed across

Continued Col. 2 overleaf

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)	Locations
R1	Aerial M.W. shunt	6,800	C2
R2	V1 hex. C.G. ...	470,000	C2
R3	V1 S.G. H.T. feed...	82,000	L7
R4	Hex. anode decoup.	10,000	J7
R5	V1 osc. C.G. ...	18,000	L7
R6	V1 hex. C.G. decoup.	470,000	J7
R7	Osc. H.T. feed ...	56,000	L7
R8	V2 S.G. H.T. feed	68,000	J7
R9	I.F. stopper ...	47,000	I7
R10	Volume control ...	500,000	G5
R11	V3 triode C.G. ...	4,700,000	G5
R12	F.-B. coupling ...	27	J7
R13	V3 triode anode load resistors ...	22,000	H7
R14		39,000	H7
R15	A.V.C. decoup. ...	1,000,000	I7
R16	A.V.C. diode load...	1,000,000	H7
R17	Part tone control...	82,000	H7
R18	V4 C.G. resistor ...	470,000	H7
R19	V4 grid stopper ...	1,000	H8
R20	V4 G.B. resistor ...	220	G7
R21	F.-B. coupling ...	220	J7
R22	G.B. decoup. ...	10,000	N9
R23	H.T. smoothing resistors ...	3,900	O10
R24		1,500	N9
R25	V1, V2 G.B. ; A.V.C. delay ...	22	N9

	CAPACITORS	Values (μF)	Locations
C1	Aerial series ...	0·00047	C2
C2	I.F. filter tuning ...	0·0001	L8
C3	V1 hex. C.G. decoup.	0·1	C3
C4	H.T. R.F. by-pass	0·1	L8
C5	V1 S.G. decoup. ...	0·1	L7
C6	Hex. anode decoup.	0·1	J7
C7	1st I.F. trans. tuning ...	0·000225	C4
C8		0·000225	C4
C9	V1 osc. C.G. ...	0·0001	L6
C10	H.T. R.F. by-pass	0·1	J7
C11	M.W. trimmer ...	0·000015	A2
C12	L.W. trimmer ...	0·000068	A2
C13	S.W. tracker ...	0·00675	A2
C14	M.W. tracker ...	0·00075	A2
C15	L.W. tracker ...	0·000185	A2
C16	Osc. anode. coup.	0·0002	L6
C17	V2 C.G. decoup. ...	0·05	I7
C18	V2 S.G. decoup. ...	0·1	I7
C19	2nd I.F. trans. tuning ...	0·00006	E4
C20		0·000075	E4
C21	I.F. by-passes ...	0·0001	I7
C22		0·0001	I7
C23	A.V.C. coupling ...	0·000047	I8
C24	A.F. coupling ...	0·01	G5
C25*	G.B. decoup. ...	20·0	I7
C26	Tone control capacitors	0·01	J6
C27		0·002	J5
C28		0·01	I5
C29		0·01	I6
C30		0·5	H6
C31	A.F. coupling ...	0·01	H7
C32	Tone corrector ...	0·005	G8
C33*	V4 cath. by-pass ...	25·0	G7
C34*	H.T. smoothing capacitors ...	16·0	O10
C35*		16·0	O10
C36*		8·0	O9
C37‡	Aerial S.W. trim....	0·00005	C3
C38‡	Aerial M.W. trim.	0·00005	C3
C39‡	Aerial L.W. trim....	0·00005	C3
C40†	Aerial tuning ...	—	M5
C41†	Oscillator tuning ...	—	M5
C42‡	Osc. S.W. trim. ...	0·00005	A3
C43‡	Osc. M.W. trim.	0·00005	A3
C44‡	Osc. L.W. trim....	0·00005	A3

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	I.F. filter coil ...	6·8	M8
L2	Aerial coupling coils	0·75	C3
L3		15·0	C3
L4		68·0	C3
L5	Aerial tuning coils	Very low	C3
L6		2·0	C3
L7		27·0	C3
L8	Oscillator tuning coils	Very low	A2
L9		2·5	A2
L10		6·5	A2
L11	Reaction coupling coils	0·75	A2
L12		2·25	A2
L13		3·25	A2

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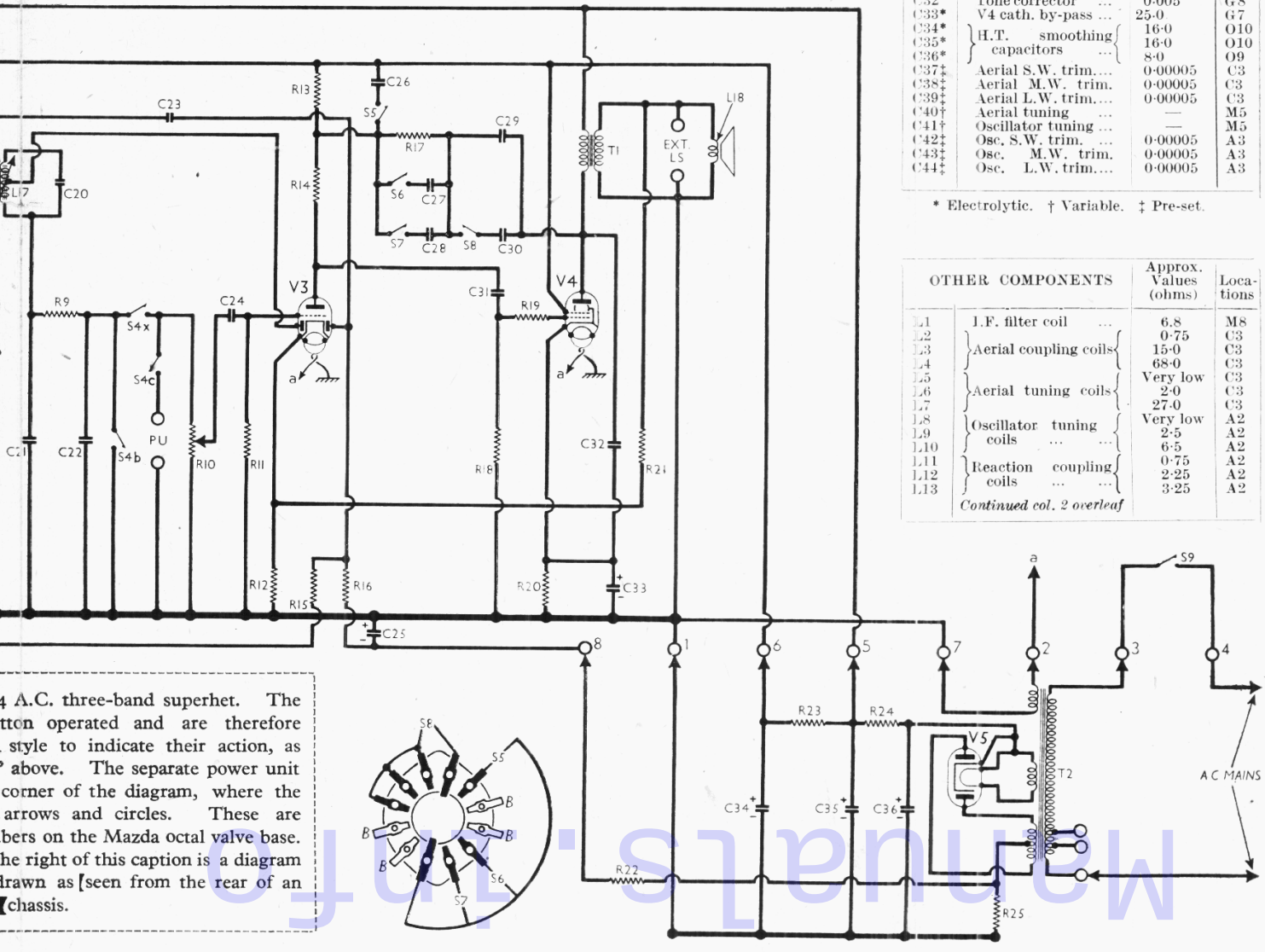
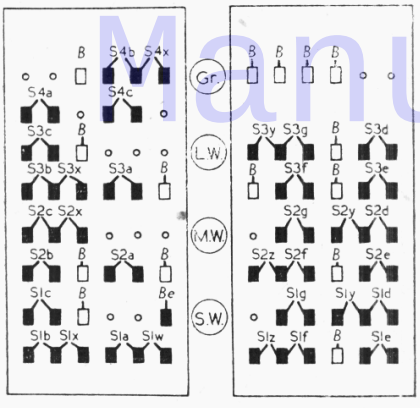


4 A.C. three-band superhet. The tton operated and are therefore style to indicate their action, as ' above. The separate power unit corner of the diagram, where the arrows and circles. These are bers on the Mazda octal valve base. he right of this caption is a diagram drawn as [seen from the rear of an [chassis.



Diagrams of the two sides of the press-button switch unit, drawn as seen when the chassis stands on its base. The adjacent edges are at the front, and the press-buttons are indicated between them.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers, whose receiver was tuned to 500 m and operating from mains of 200 V, using the 200-215 V tapping on the mains transformer.

Voltages were measured with a 1,000 ohms-per-volt meter, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 OM10	240	1·0	60	2·0
	Oscillator			
	50	3·0		
V2 OM6	250	6·5	90	2·0
V3 OM4	75	2·6	—	—
V4 6V6G	240	41·0	210	3·0
V5 6X5G	330†	—	—	—

† Each anode, A.C.

OTHER COMPONENTS (*continued*)			Approx. Values (ohms)	Locations
L14	1st I.F. trans.	Pri.	3·75	C4
L15		Sec.	4·0	C4
L16	2nd I.F. trans. (totals)	Pri.	17·5	E4
L17		Sec.	17·5	E4
L18	Speech coil	...	2·25	—
T1	Output trans.	Pri.	600·0	H5
		Sec.	0·5	H5
T2	Mains trans.	Pri., total	46·0	N10
		Heat. sec., Rect. heat. sec.	Very low	N10
			0·15	N10
		H.T. Sec., total ...	140·0	N10
S1a, b, c, w, x, to S3a, b, c, x	Aerial circuit press-button switches		—	B1
			—	B1
			—	
			—	B1
			—	
S3d, e, f, g, y, S4a, b, c, x	Oscillator circuit press-button switches ...		—	A1½
			—	A1½
			—	A1
	Radio/gram. switches		—	B1
			—	B1

Circuit Description—*continued*

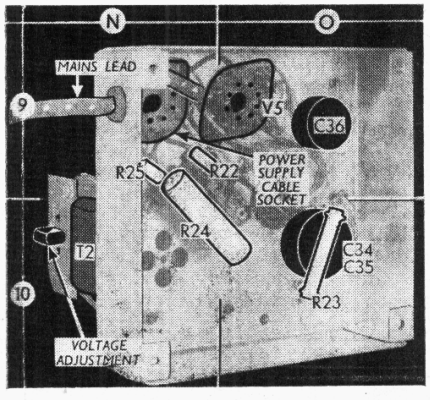
manual volume control **R10,** which is also the diode load resistor, and passed via A.F. coupling capacitor **C24** and C.G. resistor **R11** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C21, R9, C22** in diode circuit, and provision for the connection of a gramophone pick-up across **R10,** via the "Gram" press-button switches **S4a, b, c, x.**

Second diode of **V3,** fed from a tap on **L16** via **C23,** provides D.C. potential which is developed across load resistor **R16** and fed back via decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control.

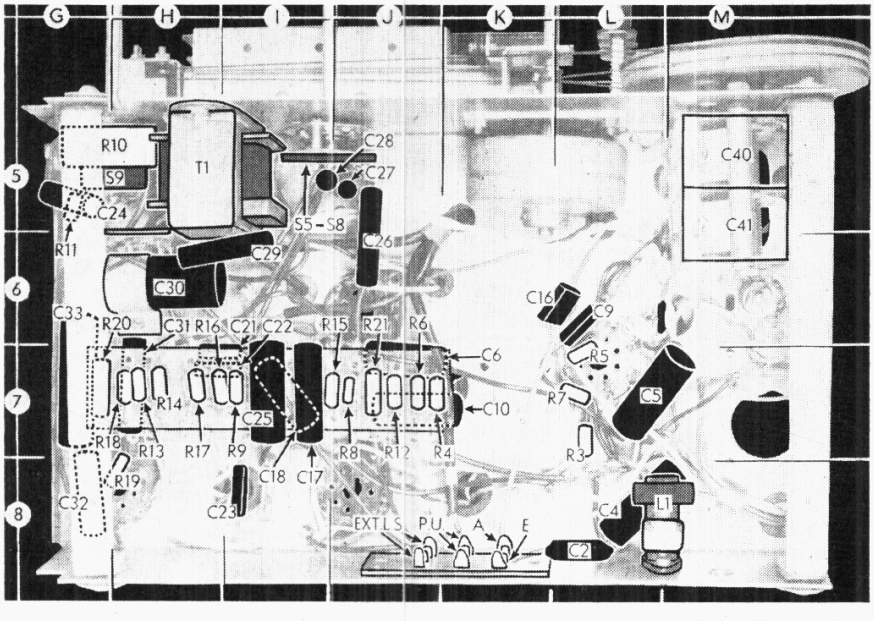
Resistance-capacitance coupling by **R13, R14, C31** and **R18,** via grid stopper **R19,** between **V3** triode and beam tetrode output valve **(V4, Cossor 6V6G).** Fixed tone correction in tetrode anode circuit by **C32,** and provision for the connection of a low-impedance external speaker across **T1** secondary winding. Voltages appearing across this winding are applied to **V3** cathode, via the attenuating resistor **R21,** giving negative feed-back.

Output voltages developed across **T1** primary winding are fed back, via a resistance-capacitance network controlled by a five-position switch **S5-S8,** to a tapping on **V3** triode anode load, for tone control purposes.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Cossor 6X5G).** Smoothing by resistors **R23, R24** and electrolytic capacitors **C34, C35, C36.** Fixed G.B. for **V1, V2** and A.V.C. delay voltage is obtained frfom the drop across **R25** in the H.T. negative lead to chassis.



Three-quarter view of the power unit, in which all the components are visible. The power supply socket is a Mazda octal valve holder.



Underside view of the main chassis. Many small components are mounted on the panel at the left; **C6, C10, C18, C21, C22** and **C31** are shown dotted as they are mounted on the far side of it.

CIRCUIT ALIGNMENT

These operations may be carried out with the chassis in position in the cabinet.

I.F. Stages.—Switch set to M.W., turn gang to minimum capacitance and volume control to maximum, connect signal generator (via an 0.01 μF capacitor in the "live" lead) to control grid (top cap) of **V1** and the **E** socket. Feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L14, L15, L16** and **L17** (location references C4, F4) for maximum output.

R.F. and 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 by rotating the drive drum on the gang spindle after loosening its grub screw. Transfer "live" signal generator lead to **A** socket, via a suitable dummy aerial.

I.F. Filter.—With set still switched to M.W., feed in a 465 kc/s signal and adjust the core of **L1** (B4) for minimum output.

S.W.—Switch set to S.W., tune to 18 Mc/s on scale, feed in an 18 Mc/s (16.67 m) signal, and adjust **C42** (A3) for maximum output, choosing the peak involving the least trimmer capacitance.

Then adjust **C37** (C3) for maximum output while rocking the gang. Tune to 6 Mc/s on scale, feed in a 6 Mc/s (50 m) signal, and adjust the cores of **L8** (A3) and **L5** (C4) for maximum output. Repeat these operations until no improvement results.

M.W.—Switch set to M.W., tune to 214 m on scale, feed in a 214 m (1,402 kc/s) signal, and adjust **C43** (A3) and **C38** (C3) for maximum output. Tune to 522 m on scale, feed in a 522 m (574.6 kc/s) signal, and adjust the cores of **L9** (A3) and **L6** (C4) for maximum output. Repeat these operations until no improvement results.

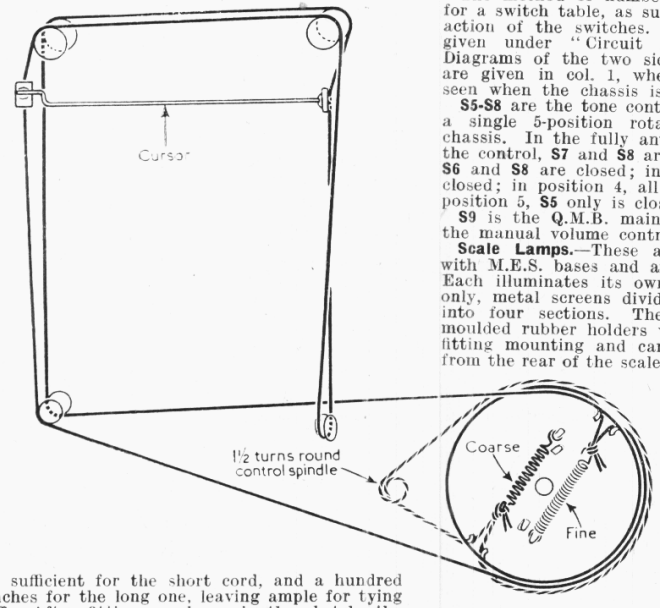
L.W.—Switch set to L.W., tune to 1,153 m on scale, feed in a 1,153 m (260 kc/s) signal, and adjust **C44** (A3) and **C39** (C3) for maximum output. Tune to 1,875 m on scale, feed in a 1,875 m (160 kc/s) signal, and adjust the cores of **L10** (A3) and **L7** (C4) for maximum output. Repeat these operations until no improvement results.

DRIVE CORD REPLACEMENT

Two separate cords are used in this model: a short one, which drives the gang from the control spindle; and a long one, which drives the cursor from the gang drum. The scale must be removed before fitting the cursor drive.

In our sketch below both cords are shown together, but the short one is broken to distinguish it from the long one as they encircle the drum. In the position shown, where the drive is viewed from the front with the gang at maximum, the short cord enters the drum through a slot at the bottom of the drum, and the long cord enters by the opposite slot at the top. The short cord goes round the rear groove in the drum, and the long one round the front groove.

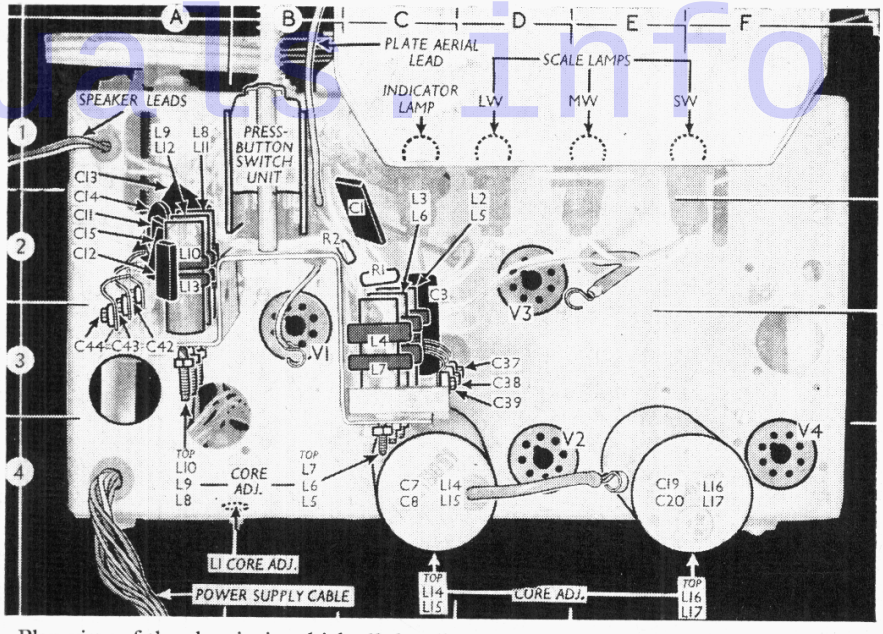
The cord used is Cutty Hunk twine. 20 inches



Sketch showing the courses followed by the two drive cords. The shorter (gang) drive cord is broken to distinguish it from the other.

is sufficient for the short cord, and a hundred inches for the long one, leaving ample for tying off. After fitting as shown in the sketch, the cursor should be clipped on lightly at about the position shown, and finally clamped tight after levelling with the scale in position.

Note that the sliders at each end of the cursor are not alike, being set on rails at 90 deg apart, with a crank at the left-hand end of the cursor. Finally, adjust cursor as instructed under "Circuit Alignment."



Plan view of the chassis, in which all the alignment adjustments are indicated. The R.F. and oscillator coils and associated components are mounted on a vertical assembly with the press-button switch unit.

GENERAL NOTES

Switches.—The waveband and pick-up switches **S1, S2, S3, S4** are comprised in a press-button unit mounted on the chassis deck. The four buttons, reading from top to bottom, are Gram, L.W., M.W., S.W. Each of the waveband buttons controls two groups of switches, one in the aerial circuit and one in the oscillator circuit. The Gram button controls one group only, the contacts of the opposite group on the unit being blank.

The method of numbering removes the need for a switch table, as suffix letters indicate the action of the switches. A full explanation is given under "Circuit Description" overleaf. Diagrams of the two sides of the switch unit are given in col. 1, where they are drawn as seen when the chassis is standing on its base.

S5-S8 are the tone control switches, ganged in a single 5-position rotary unit beneath the chassis. In the fully anti-clockwise position of the control, **S7** and **S8** are closed; in position 2, **S6** and **S8** are closed; in position 3, **S8** only is closed; in position 4, all switches are open; in position 5, **S5** only is closed.

S9 is the Q.M.B. mains switch, ganged with the manual volume control **R10.**

Scale Lamps.—These are four Osram lamps with M.E.S. bases and are rated at 6.5V 0.3A. Each illuminates its own section of the scale only, metal screens dividing up the scale area into four sections. The lamps are fitted to moulded rubber holders which have a bayonet-fitting mounting and can easily be withdrawn from the rear of the scale assembly.

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

Capacitors C34, C35, C36.—These are in two units. **C34, C35** are in a single unit rated at 16μF+16 μF, 450 V peak working, 550 V surge. **C36** is in a separate unit rated at 8μF, 450 V peak working, 550 V surge.

Chassis Interconnections.—The main receiver chassis and power supply are in two separate units, connection between the two being effected by an eight-way cable which is attached to the main receiver chassis.

The cable is terminated by an eight-pin valve base adaptor, which fits in an octal holder on the deck of the power unit. The danger of confusing this socket with the rectifier socket, which is an international octal, is avoided by using a Mazda octal-type holder for the cable plug.

The intersecting points are indicated in our circuit diagram, where the numbers given refer to the normal pin numbers on a valve base. The lead colours to the plug are: 1, black; 2, green; 3 and 4, blue; 5, yellow; 6, red; 7, transparent; 8, pink.

Chassis Divergencies.—In some chassis, a 15pF (0.000015μF) capacitor may be found connected across **C39,** and a 47pF (0.000047μF) capacitor may be connected between the slider of **R10** and chassis. These components are fitted as required but they were omitted from our chassis. They will be found fairly generally in earlier versions of the chassis.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws);
unplug the interconnecting cable from the power unit;
withdraw the long bolt (with washer) located above the tuning scale assembly;
from the underside of the cabinet remove the four cheese-head bolts (with two metal washers each) securing the chassis to the base of the cabinet, and slide out the chassis to the extent of the speaker leads.
To free the chassis entirely, remove the single round-head wood-screw securing the plate aerial lead in the top of the cabinet, and unsolder the two plastic-covered speaker leads.
Removing Power Unit.—Unplug the inter-connecting cable from the receiver chassis;
remove the four cheese-head bolts (with one metal and one rubber washer each) securing the power unit to the base of the cabinet.
When replacing, note that two rubber washers are associated with each fixing bolt, one on each side of the bottom of the cabinet.
Removing Speaker.—Remove the power unit as previously described, and unsolder the two plastic-covered leads from the speech coil connecting panel;
remove the four round-head bolts securing the speaker to the sub-baffle.
When replacing, the connecting panel should be at the top.

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