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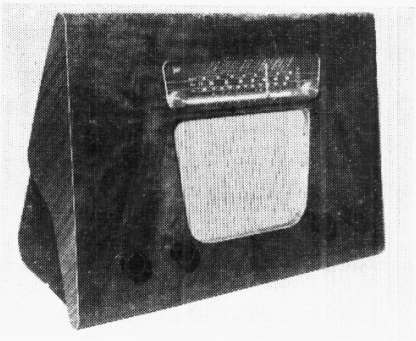
"TRADER" SERVICE SHEET

994

MURPHY A130 & U130

A.C. and A.C./D.C. Versions



TWO models are covered in this Service Sheet, the Murphy A130 and U130. These are A.C. and A.C./D.C. versions of the same basic chassis, and our sample was an A130. The differences between the A.C. and A.C./D.C. models, which are fully explained, were derived from information supplied by the makers.

Both models are designed to operate from mains of 200-250 V, 50-100 c/s where A.C. is concerned in either case. The waveband ranges are 17-51 m, 190-555 m and 900-2,050 m. The A.C. version uses a mains auto-transformer, so that in both versions the chassis is "live" to the mains.

In the A.C./D.C. version no scale lamps are employed, but in both versions the scale lamp housings are connected to the isolated side of a split earth socket, so that if no plug is inserted in the earth socket, they and the cursor guide rail are entirely isolated from the rest of the chassis. Certain points in the circuit go to the other side of the socket.

Provision is made for the insertion of a rejector circuit in the aerial lead if required to prevent overloading in the neighbourhood of a powerful transmitter.

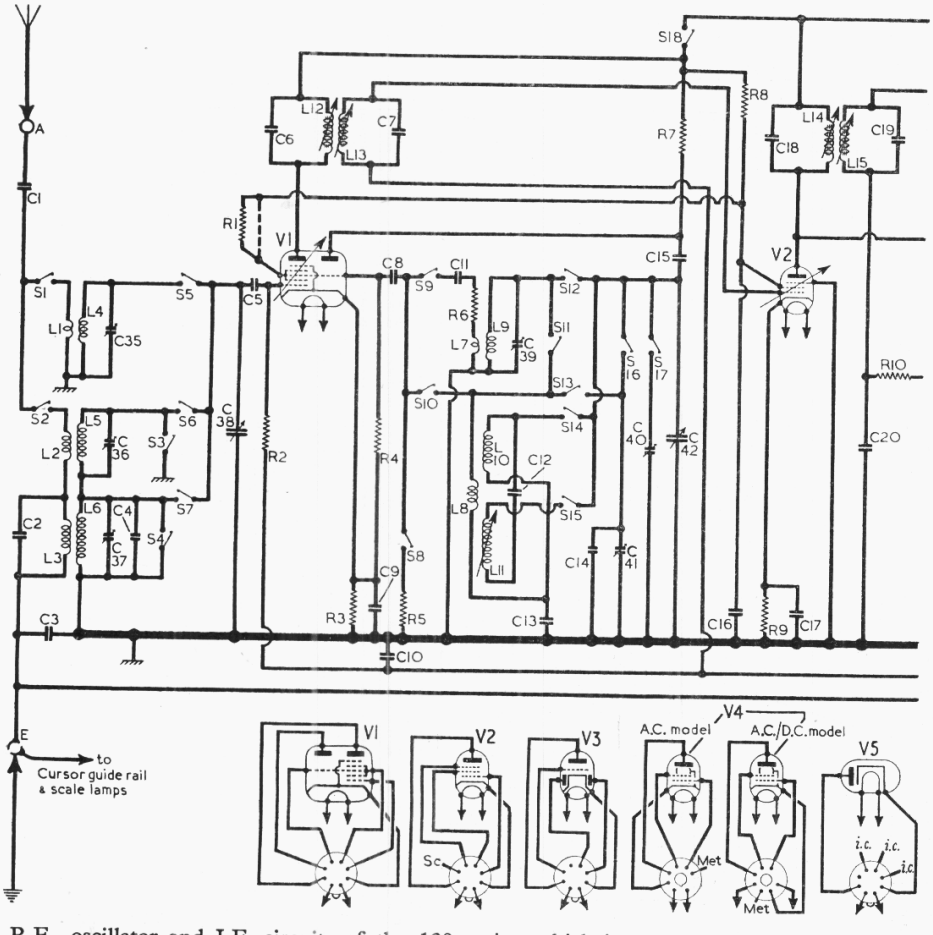
Release dates: A130, June 1949; U130, August 1949. Original price, both models, £17 7s 6d plus purchase tax.

CIRCUIT DESCRIPTION

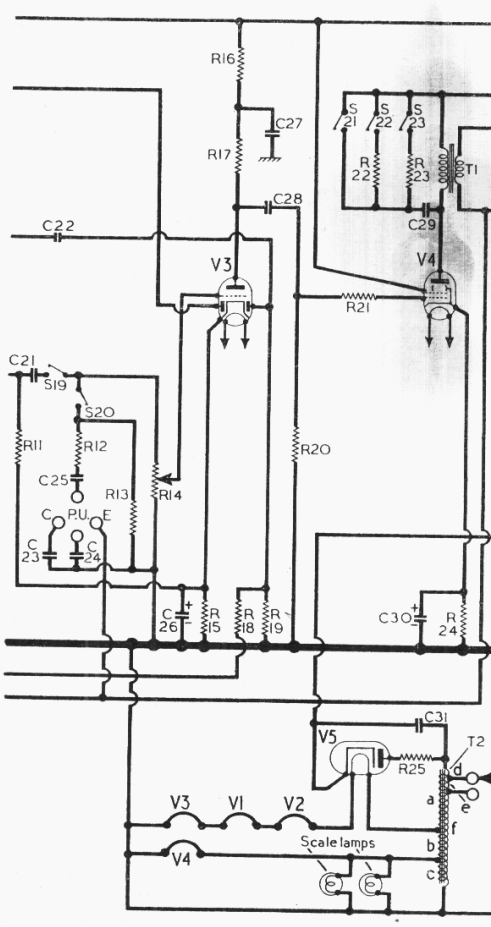
Aerial input via **C1** and coupling coils **L1** (S.W.), **L2** (M.W.) and **L3** (L.W.) to single tuned circuits **L4, C38** (S.W.), **L5, C38** (M.W.) and **L6, C38** (L.W.) which precede triode heptode valve **(V1, Mazda 10C1),** operating as frequency changer with internal coupling.

Provision is made for connecting a Murphy aerial filter in series with the aerial lead to be tuned to the wavelength of any transmitter which is powerful enough to overload **V1** and produce whistles in the receiver output.

Triode oscillator anode coils **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.) are tuned by **C42.** Parallel trimming by **C39** (S.W.), **C40** (M.W.) and **C14, C41** (L.W.); series tracking by **C11** (S.W.), **C13** (M.W.) and **C12** (L.W.). Reaction coupling from grid by **L7** (S.W.) and **L8** (M.W. and L.W.)



R.F., oscillator and I.F. circuits of the 130 series, which is common to both A.C. and A.C./D.C. versions. The dotted line to **V1** screen indicates that **R1** is omitted in the U130.



Detector, A.F., output and power supply circuit version only. Full precautions are taken against a

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with additional coupling on M.W. and L.W. across the common impedance of **C13.** S.W. stabilization by **R6.**

S13 closes on S.W. to shunt **C14** and **C41** across **L8,** tuning the coil resonance outside the S.W. band. **S14** closes in the normal manner to connect up **L10** for M.W. operation, but at the same time **S15** closes, so that **S14** and **S15** together short-circuit **L11.** **R5** is shunted across the reaction circuit on M.W. only, when **S8** closes.

Second valve **(V2, Mazda 10F9)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C6, L12, L13, C7** and **C18, L14, L15, C19.**

Intermediate frequency 465 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Mazda 10LD11).** A.F. component in rectified output is developed across diode load resistor **R11** and passed via **C21** and volume control **R14** to grid of triode section. I.F. filtering by **C20, R10** and the capacitance of the screened leads.

Provision is made for the connection of a gramophone pick-up across **R14** via **S20,** which closes in the Gram position of the waveband switch. **S18** and **S19** open on Gram to mute radio. **R12, R13, C25** provide tone correction, and **C24** isolates the pick-up from the chassis. Socket **C** con-

(*Continued col.* 1 *overleaf*)

COMPONENTS AND VALUES

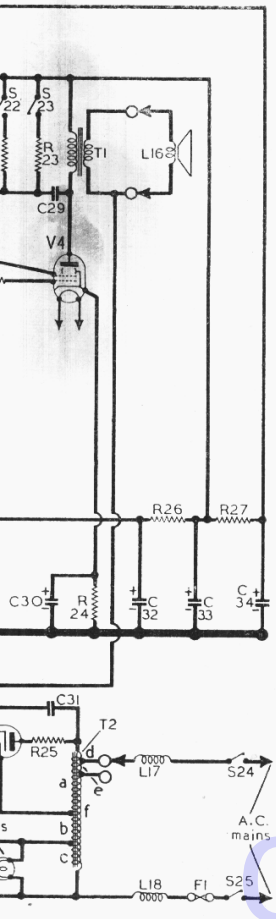
RESISTORS	A.C. MODEL Values	A.C. MODEL Locations	A.C./D.C. MODEL Values
R1	22Ω	H3	—
R2	470kΩ	H3	470kΩ
R3	270Ω	H3	180Ω
R4	47kΩ	H3	47kΩ
R5	3·9kΩ	J3	3·9kΩ
R6	82Ω	H4	82Ω
R7	33kΩ	H3	22kΩ
R8	12kΩ	G3	8·2kΩ
R9	270Ω	G4	330Ω
R10	330kΩ	G3	330kΩ
R11	180kΩ	G3	180kΩ
R12	1MΩ	B2	1MΩ
R13	220kΩ	B2	220kΩ
R14	1MΩ	F3	1MΩ
R15	3·3kΩ	G4	—
R16	47kΩ	F4	—
R17	100kΩ	F4	—
R18	1MΩ	G3	1MΩ
R19	1MΩ	G4	1MΩ
R20	470kΩ	F3	470kΩ
R21	47kΩ	F3	47kΩ
R22	3·9kΩ	E3	—
R23	22kΩ	E3	—
R24	150Ω	F3	180Ω
R25	47Ω	E4	47Ω
R26	560Ω	G4	—
R27	1·8kΩ	G3	1·8kΩ
R28	—	—	1·5kΩ
R29	—	—	1kΩ
R30	—	—	47kΩ
R31	—	—	4·7kΩ
R32	—	—	33kΩ
R33	—	—	700Ω
R34	—	—	200Ω
R35	—	—	80Ω
R36	—	—	50Ω

CAPACITORS	A.C. MODEL Values	A.C. MODEL Locations	A.C./D.C. MODEL Values
C1	270pF	A1	270pF
C2	470pF	J3	470pF
C3	0·01μF	J3	0·01μF
C4	27pF	J3	27pF
C5	500pF	H3	500pF
C6	150pF	B2	150pF
C7	150pF	B2	150pF
C8	220pF	H3	220pF
C9	0·05μF	H3	0·05μF
C10	0·05μF	H4	0·05μF
C11	100pF	H3	100pF
C12	180pF	H4	180pF
C13	620pF	H4	620pF
C14	87pF	H4	82pF
C15	100pF	H3	100pF
C16	0·05μF	G3	0·05μF
C17	0·05μF	H4	0·05μF
C18	150pF	C2	150pF
C19	150pF	C2	150pF
C20	220pF	G4	220pF
C21	0·005μF	G4	0·005μF
C22	33pF	G4	33pF
C23	0·01μF	A2	0·01μF
C24	0·01μF	A2	0·01μF
C25	0·001μF	B2	0·001μF
C26*	50μF	F4	50μF
C27	0·25μF	F4	—
C28	0·01μF	F4	0·01μF
C29	0·05μF	F3	—
C30*	50μF	F4	50μF
C31	0·05μF	E3	0·05μF
C32*	16μF	D2	16μF
C33*	32μF	A2	32μF
C34*	32μF	A2	16μF
C35‡	35pF	J3	35pF
C36‡	35pF	J3	35pF
C37‡	35pF	J3	35pF
C38†	546pF	A1	546pF
C39‡	35pF	J4	35pF
C40‡	35pF	H4	35pF
C41‡	35pF	H4	35pF
C42†	546pF	A1	546pF
C43	—	—	0·005μF
C44	—	—	0·05μF

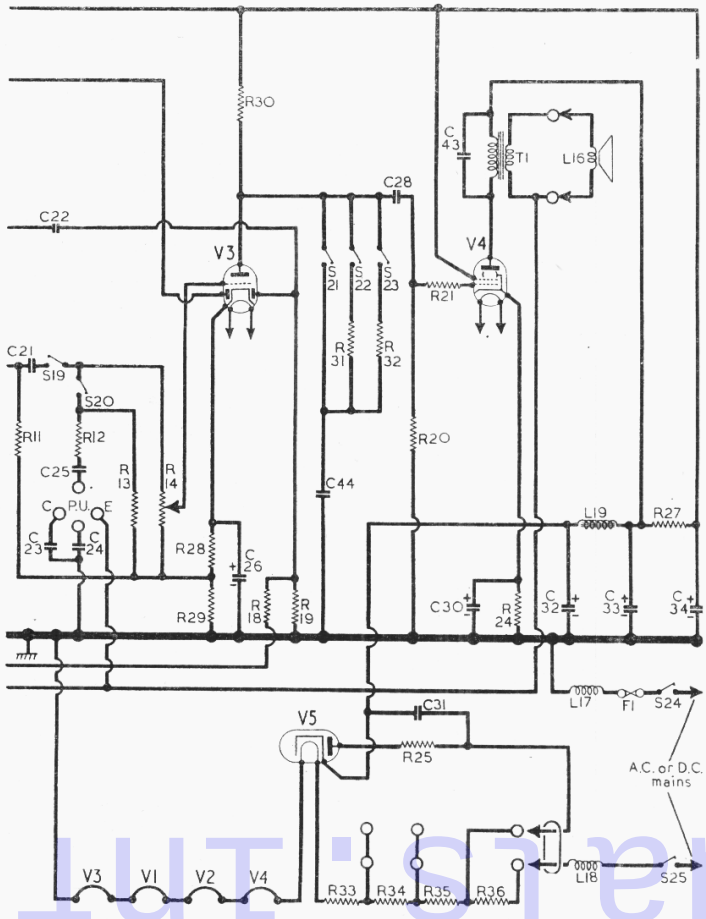
* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Values Approx. (ohms)	Locations
L1	Aerial coupling coils	Very low	A1
L2		1·0	A1
L3		20·5	A1
L4	Aerial tuning coils	Very low	A1
L5		3·5	A1
L6		21·0	A1
L7	Oscillator reaction coils	Very low	J3
L8		Very low	H3
L9	Oscillator tuning coils	Very low	J3
L10		2·0	H3
L11		5·2	H3
L12	1st I.F. trans. Pri.	6·0	B2
L13	1st I.F. trans. Sec.	6·0	B2
L14	2nd I.F. trans. Pri.	6·0	C2
L15	2nd I.F. trans. Sec.	6·0	C2
L16	Speech coil	2·5	—
L17	Mains filter chokes	7·5	E3
L18		7·5	E3
L19	H.T. choke (U130)	270·0	—
T1	Primary	290·0	G3
	Secondary	0·5	
T2	Mains auto-trans. (A130) a	95·0	D1
	b	75·0	
	c	Very low	
	d	10·0	
	e	20·0	
	f	140·0	
F1	Fuse, 500 mA	—	D1
S1-S20	Waveband switches	—	H3
S21–S23	Tone switches	—	E3
S24, S25	Mains sw., g'd R14	—	F3

If the component numbers given in the above tables are used when ordering replacement parts, dealers are advised to mention the fact on the order, as these numbers may differ from those used in the manufacturers' diagram.



supply circuits of the A.C. ken against accidental shock.



Detector, A.F., output and power supply circuits of the A.C./D.C. version only. The mains voltage adjustment is a 2-pin plug.

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Circuit Description—*continued*

nects the screening of the pick-up lead via **C23** to chassis and socket **E** takes the gramophone motor board, etc., directly to the earth socket.

Second diode of **V3**, fed from **V2** anode via coupling capacitor **C22**, provides D.C. potential which is developed across load resistor **R19** and fed back as bias to F.C. and I.F. stages, giving automatic gain control. Delay voltage, together with G.B. for triode section, is obtained from the drop along **R15**.

Resistance-capacitance coupling by **R17, C28** and **R20** between **V3** triode and beam tetrode output valve **(V4, Mazda Pen45** (A.C. model) or **10P14** (A.C./D.C. model)**)**. Three-position tone control is provided by **R22, R23, C29** and switches **S21, S22, S23** in **V4** anode circuit (A.C. model) or **R31, R32, C44** in **V3** anode circuit (A.C./D.C. model). Provision is made for the connection of a low impedance external speaker by sockets in the internal speaker plugs.

H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Mazda U404)**. R.F. filtering by **C31** and **L17, L18.**

In the A.C. model smoothing is effected by **R26, R27** and electrolytic capacitors **C32, C33, C34.** The heaters of **V1, V2, V3** and **V5** are connected in series across sections **b** and **c** of mains auto-transformer **T2**, while **V4** heater and the scale lamps are connected in parallel across section **c.**

In the A.C./D.C. model, H.T. smoothing is effected by choke **L19,** resistor **R27** and electrolytic smoothing capacitors **C32, C33, C34.** The valve heaters, together with ballast resistors **R33, R34, R35, R36,** are connected in series across the mains input.

CIRCUIT ALIGNMENT

The receiver may be completely aligned without removing the chassis, provided that a special trimming tool is used to adjust **C35, C36** and **C37.** A suitable tool may be made from a length of steel or Tufnol rod by drilling a 6BA clearance hole in one end. If the tool is then placed over the protruding threaded ends of the aerial trimmers they may be adjusted by turning the tool while applying a sideways pressure on it.

If, however, a major adjustment is required, it will be found simpler to remove the chassis from its baffle so that free access is obtained to these trimmers. A substitute scale is provided on the gang.

I.F. Stages.—The I.F. trimming cores are rather fragile and care should be taken when adjusting them. Connect the output of the signal generator, via a 0.1μF capacitor in the "live" lead to control grid (pin 6) of **V2** and chassis. Switch set to M.W., turn gang to maximum and fully unscrew the cores of **L15** (location reference C2) and **L14** (G4). Feed in a 465 kc/s (645.16 m) signal and adjust the cores of **L15, L14** for maximum output. Do not re-adjust. Transfer "live" signal generator lead to junction of **C5, C38,** fully unscrew the cores of **L13** (B2) and **L12** (H4) and then adjust them, in that order, for maximum output. Do not re-adjust.

R.F. and Oscillator Stages.—If the chassis is withdrawn from its baffle, reference must be made to the substitute scale printed on the front of the gang drum, and readings taken on this scale, against the fixed metal cursor, are given in brackets after the tuning scale readings in the following alignment instructions. Check that with the gang at maximum the cursor coincides with the 52 m mark on the S.W. scale or that substitute scale reads 0 degrees.

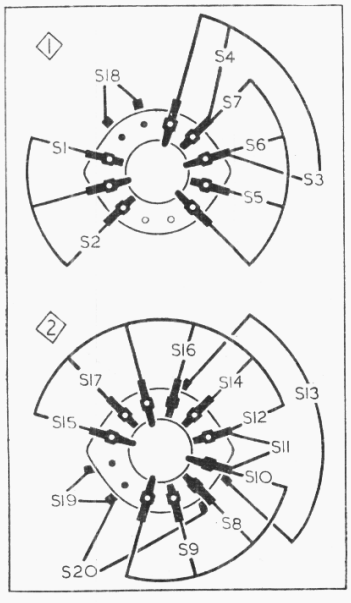
L.W.—Switch set to L.W. and transfer signal generator leads, via a dummy aerial, to **A** and **E** sockets. Tune set to 1,000 m (167.5 deg. on substitute scale) and feed in a 1,000 m (300 kc/s) signal. Unscrew **C41** (H4) and **C37** (J3) and then adjust them, in that order, for maximum output. Tune set to 1,900 m (31.0 deg.), feed in a 1,900 m (158 kc/s) signal and adjust the core of **L11** (B1) for maximum output. Repeat these adjustments until no further improvement results.

M.W.—Switch set to M.W., tune to 220 m (155 deg.) and feed in a 220 m (1,363 kc/s) signal. Unscrew **C40** (H4) and **C36** (J3), and then adjust them, in that order, for maximum output. Check calibration at 300 m (114.5-116.5 deg.) and 500 m (27-29 deg.).

S.W.—Switch set to S.W., tune to 20 m (154.5 deg.) and feed in a 20 m (15 Mc/s) signal. Unscrew **C39** (J4) and **C35** (J3), and then adjust them in that order for maximum output. Rock the gang when adjusting **C35** to obtain optimum results. Check the calibration at 31.25 m (92-95 deg.) and 41.9 m (46.5 deg.) and if the error is large adjust the position of the end turns of **L9** (J3) and **L4** (A1). Repeat these adjustments.

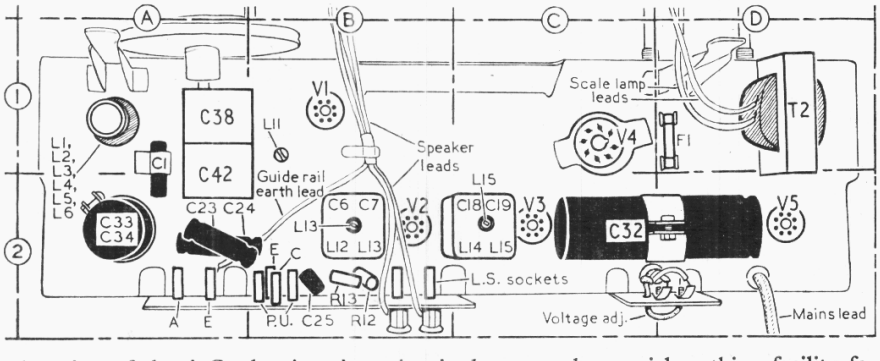
Aerial Filter.—Where one of these is fitted, connect a voltmeter between the cathode of **V2** and chassis, switch to the 10 V D.C. range, tune the receiver to the interfering station, and adjust the rejector core for maximum reading on the meter.

Waveband Switch Diagrams



Diagrams of the waveband switch units, as seen from the rear of an inverted chassis. The associated table is below.

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



Plan view of the A.C. chassis. Attention is drawn to the special earthing facility for the cursor guide rail and scale lamp housings on the split **E** socket.

GENERAL NOTES

Switches.—**S1-S17** are the waveband switches, and **S18-S20** are the radio/gram change-over switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view, by numbers **1** and **2** in diamonds, with arrows to indicate the direction in which they are viewed in the diagrams in col. 2, where they are shown in detail.

The table below the diagrams 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.

S21-S23 are the tone control switches, ganged in a single 3-position unit beneath the chassis. This is indicated in our under-chassis view and shown in detail in the diagram in col. 4, where it is drawn as seen from the rear of an inverted chassis. In the fully anti-clockwise position of the control, **S21** is closed for deep tone, and in the fully clockwise position **S23** closes for maximum treble response.

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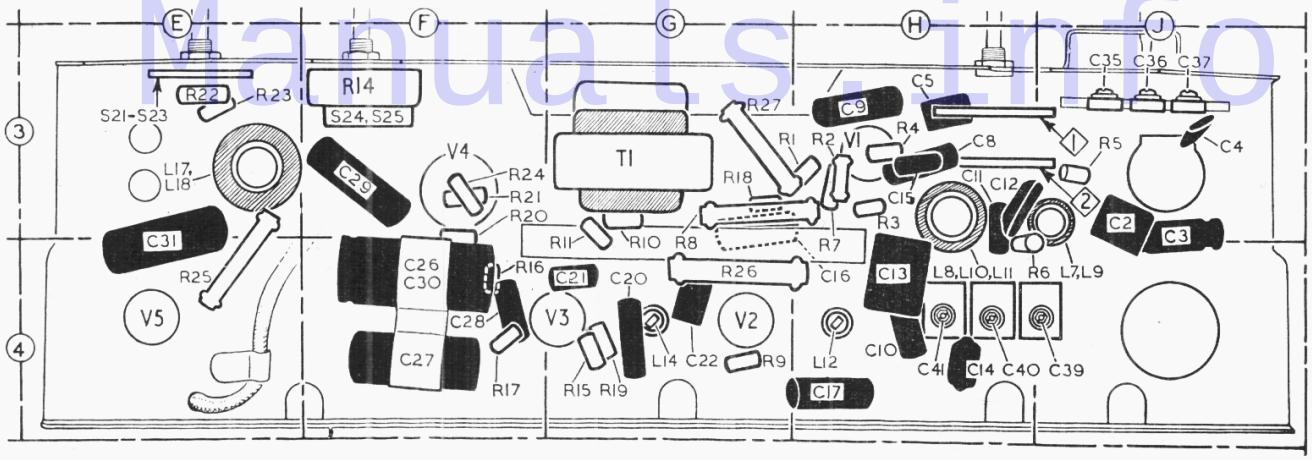


Underside view of the A.C. chassis, in which the waveband switch units are indicated by the numbers **1** and **2** in diamond surrounds. Detailed diagrams appear in col. 2. The general layout in the A.C./D.C. chassis is similar, but some small components change position.

S24, S25 are the Q.M.B. mains switches, ganged with the volume control **R14.**

Scale Lamps.—These are fitted only in the A.C. version. They are two Philips or Osram lamps, with large clear spherical bulbs and M.E.S. bases, rated at 6.2 V, 0.3 A. They are held in rubber-covered holders which are a push-fit into the metal housings which support the plastic tuning scale.

The bulbs should be pressed gently home until maximum light is transmitted to the scale, when a slight turn will secure them. Care must be taken not to press them in too far, or the glass bulbs will break. The rubber moulding should be examined, as if it is damaged the lamp housings may become "live."

External Speaker.—A low impedance external speaker (3-7 Ω) may be connected to the socketed plugs of the internal speaker, when both speakers will operate. The internal speaker plugs may be replaced by the external ones, when the former speaker will be muted.

Aerial Filters.—In some areas close to a powerful M.W. transmitter, the frequency-changer may be overloaded. This can be avoided by fitting a rejector tuned to the frequency of the transmitter, and the makers supply units for this purpose.

They have a fixing bracket which is just screwed to the inside of the wooden end member of the cabinet, and the rejector unit is then fitted to the bracket. The lead from the unit is plugged into the aerial socket of the receiver, and the aerial is plugged into a socket on the unit. Instructions for adjustment are given at the end of "Circuit Alignment."

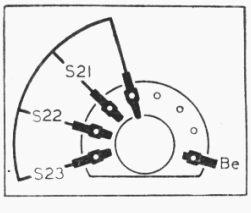


Diagram of the tone control switch unit, which is the same in A.C. and A.C./D.C. versions.

Gram Pick-up.—Four sockets are provided at the rear of the chassis for the connection of a gramophone pick-up. They are arranged in exactly the same order with respect to each other as the pins of the old English 4-pin valve base, the grid and anode pins being the actual pick-up connections. The pick-up should be of the crystal type, and others are not recommended with this receiver.

The two filament sockets are used for earthing. To one of them, labelled "C," should be connected the screening, from the leads; to the other, labelled "E," should be connected earthing leads from the motorboard, pick-up arm, and so on.

Safety Devices.—In order to protect the user from shock with this as with any receiver "live" to the mains, it is important that a good earth connection should be provided. **C3** isolates the earth socket from the mains, and exposed metal parts such as the pick-up arm, speaker sockets, etc., are connected directly to the earth socket.

It is, however, a split socket in the sense that it is of two parts that are connected only when a plug is inserted. This is achieved by attaching to it an insulated contact to which is connected a lead from the cursor guide rail and metal scale lamp housings.

These latter support the scale and are exposed to possible contact with the user, and with this arrangement they are completely isolated from the rest of the receiver unless an earth plug is inserted, when they are automatically connected to true earth.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws);
withdraw the speaker plugs from their sockets and free their leads from the clip on the chassis deck;
unsolder from the earth socket the lead to the cursor guide rail;
remove scale lamps by withdrawing them (rearwards) from their clamps, and disengage the drive cord from the cursor carriage;
remove four large bolts (with two nuts and two cupped washers each), and lift out chassis.
When replacing, a cupped washer should be fitted to either side of the chassis grommets.
The earthing lead from the scale lamp housings and cursor guide rail should be connected to the auxiliary tag which is tied to the earth socket with insulating binding tape, not to the main body of the socket.
The scale lamps should be carefully pushed into their clamps until maximum brilliance is obtained on the scale, care being taken not to press hard enough to break them.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from 230 V A.C. mains. The set was tuned to the highest wavelength end of M.W. and the volume control was turned to maximum, but there was not signal input.

Voltage readings were measured with an Avo Electronic Test Meter which causes no appreciable voltage drop, and allowance must be made for the current drawn by other meters. Chassis was the negative connection in all cases.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 10C1	185	2·6	96	5·8	3·2
	Oscillator				
	65	3·6			
V2 10F1	185	7·0	96	2·0	2·4
V3 10LD11	82	0·6	—	—	2·4
V4 Pen 45	225	34·0	185	6·0	6·0
V5 U404	240†	—	—	—	270·0

† A.C. reading.

DRIVE CORD REPLACEMENT

There are two drive cords in this receiver: the tuning drive, and the cursor drive. It is advisable to fit the cursor drive cord before the tuning drive cord. About six feet of cord is required altogether for both cords, and suitable material (spec. No. 936) can be obtained from the Service Department, Murphy Radio, Ltd., Welwyn Garden City, Herts. Before fitting it should be stretched by suspending a weight of 3 or 4 lb for an hour or so.

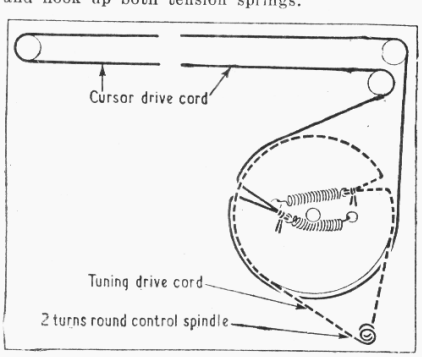
The two cords are seen in the sketch below, where the system is drawn as seen from the front with the gang at maximum. The tuning drive cord is drawn in broken line to distinguish it from the other.

Cursor Drive.—Take about four feet of cord and make up a loop which when stretched between two pins stuck in the bench measures 22⅝in. The spring should be tied in the knot, and the cord is then threaded through the appropriate holes in the side of the drum, leaving the spring inside. Then run the cord as shown in our sketch, but the spring should not be hooked up until the tuning drive cord is fitted.

Tuning Drive.—Take about two feet of cord and make up a loop which, when stretched between two pins stuck in the bench measures 9in, the spring being tied in the knot. Thread the loop through the appropriate holes in the drum, leaving the spring inside the drum. Remove the retaining spring from the end of the tuning control spindle and withdraw the spindle. Make 2¼ turns round a rod or finger as we show round the spindle, and put the control spindle back, passing it through the turns.

The retaining spring should now be replaced, straining it against one side of the spacing collar under the aerial trimmer assembly and the opposite side of the tuning control spindle, and slipping the hooked end of it into a hole near the bottom edge of the chassis member.

Finally, run the cord round the drum as shown, and hook up both tension springs.



Sketch of the tuning drive system, as seen from the front, with gang at maximum.

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