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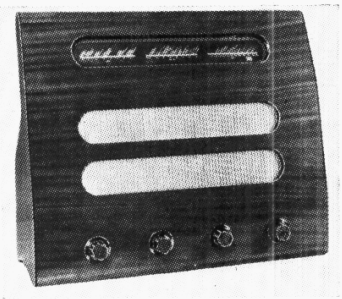
"TRADER" SERVICE SHEET

962

MURPHY A122

Covering also Models SA122, A122C & A122M



The appearance of the A122 and SA122 receivers. An illustration of the A122M appears overleaf.

FOUR models are included in the Murphy 122 series: the A122, the A122C, the SA122 and the A122M. They are all 4-valve (plus rectifier) 3-band superhets designed to operate from A.C. mains of 200-250 V, 50-100 c/s. The SA122 is an export model, and it has tappings at 105 V and 150 V, while its highest tapping is rated at 260 V.

A separate tuning scale is provided for each waveband, each with its own cursor and scale lamp, the illuminated scale being the one in use. Provision is made for the use of a gramophone pick-up, which may be left permanently connected, and an external speaker.

This *Service Sheet* was prepared from an A122, but it covers the whole series, the differences between the A122 and the others being explained under "Associated Models" overleaf.

Release dates and original prices: A122, June, 1947, £22; *A122C, July*, 1947, £27 10*s.*; *A122M, January*, 1949, £22. *Purchase tax extra.*

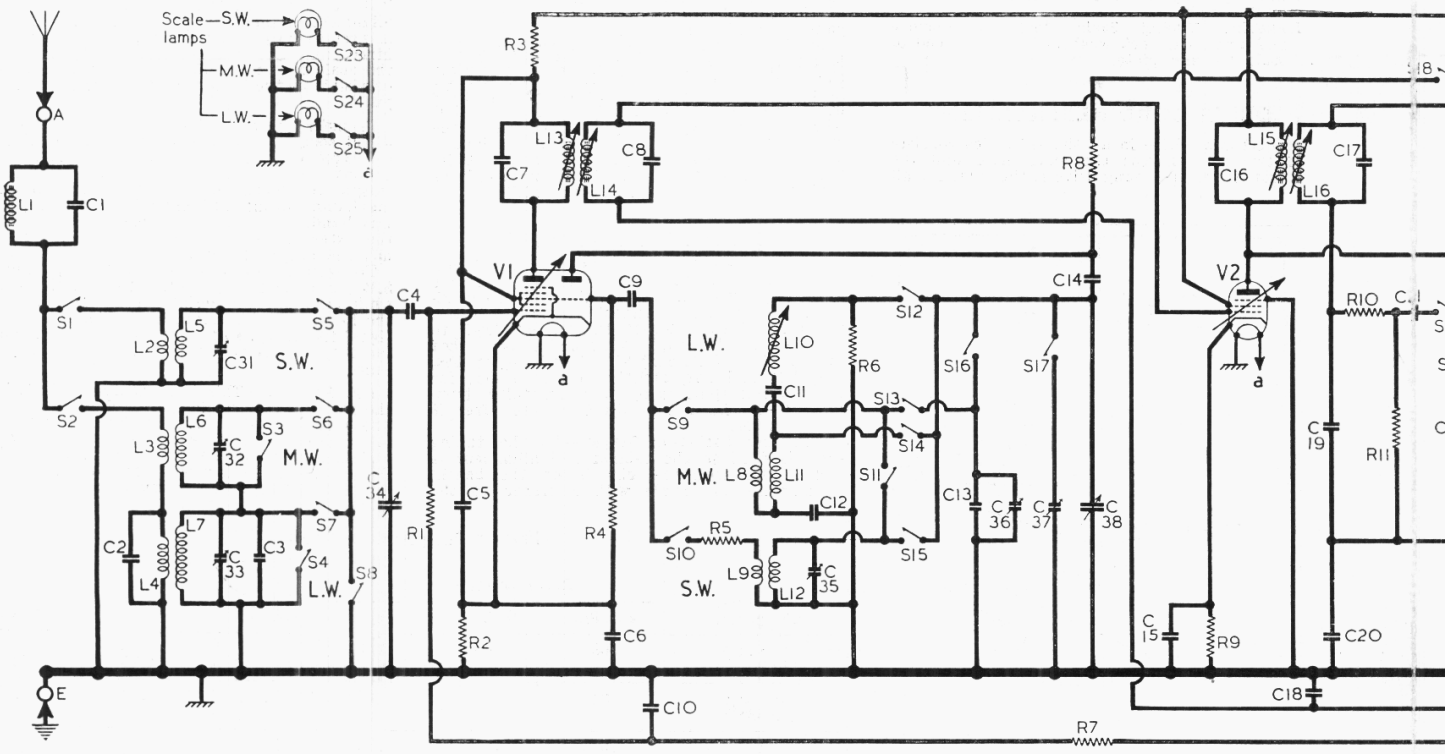
CIRCUIT DESCRIPTION

Aerial input via I.F. rejector **L1, C1** and coupling coils **L2, L3, L4,** to single-tuned circuits **L5, C34** (S.W.), **L6, C34** (M.W.) and **L7, C34** (L.W.) which precede triode-heptode valve **(V1, Mazda metallized TH41)** operating as frequency changer with internal coupling. Image suppression on L.W. by **C2** connected across **L4. S3, S6** and **S7** close on L.W., short-circuiting **L6,** and **S3** closes on gram. On M.W., **S6** closes and **S7** opens, but **S4** closes to short-circuit **L7.**

Oscillator anode coils **L12** (S.W.), **L11** (M.W.) and **L10** (L.W.) are tuned by **C38,** but on L.W. the circuit actually becomes a Colpitts type. Owing to the unusual nature of the circuit, the S.W. band is shown in our diagram below the M.W. band, and the L.W. band is shown above it, as otherwise the circuit looks very complicated.

S11 and **S13** are incidental in the design of the switch wafers, and can be neglected when reading the diagram. **S10** and **S15** close for S.W., and the circuit is quite straightforward. **S9, S12, S14** and **S17** close for M.W., connecting the trimmer **C37** and short-circuiting **L10, C11.** For L.W. **S9, S12** and **S16** close, connecting the trimmers **C13, C36.**

For alignment adjustments, **L10** is provided with a pre-set brass core, but the



Circuit diagram of the Murphy A122 receiver. The only addition in the SA122 is a pair of tappings at 105 V and 150 V on primary. The differences in the A122C and A122M are described overleaf. The order of wavebands in the aerial circuit reading our diagram is S.W., M.W. and L.W. as usual, but in the oscillator circuit it is reversed to simplify the diagram. Although switches **S1** effect when coil resistances are being checked, they are actually only incidental in the switching action, and can be neglected wh

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M.W. and S.W. coils are not adjustable, although the bottom turns of **L5** and **L12** may be moved if the S.W. band is badly out of alignment.

Second valve **(V2, Mazda metallized VP41)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C7, L13, L14, C8** and **C16, L15, L16, C17.**

Intermediate frequency 465 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Mazda metallized HL41DD).** Audio frequency component in rectified output is developed across **R10** and **R11,** which are of equal value, that across **R11** being passed via **C21, S19,** manual volume control **R13** and grid stopper **R14** to control grid of triode section, which operates as A.F. amplifier. The value of **C20** is chosen to suit the A.F. response of the speaker and cabinet.

I.F. filtering by **C19,** the screening capacitance and **R14** in association with the input capacitance of **V3.** Provision for the connection of a gramophone pick-up across **R13** via **S20** and D.C. isolating capacitor **C23. S18, S19** open on gram to mute radio.

Second diode of **V3,** fed via **C22** from **V2** anode, provides D.C. potentials which are developed across load resistors **R18, R19.** The total potential is fed back to F.C. valve, and a proportion of it, de-

(*Continued in col.* 6)

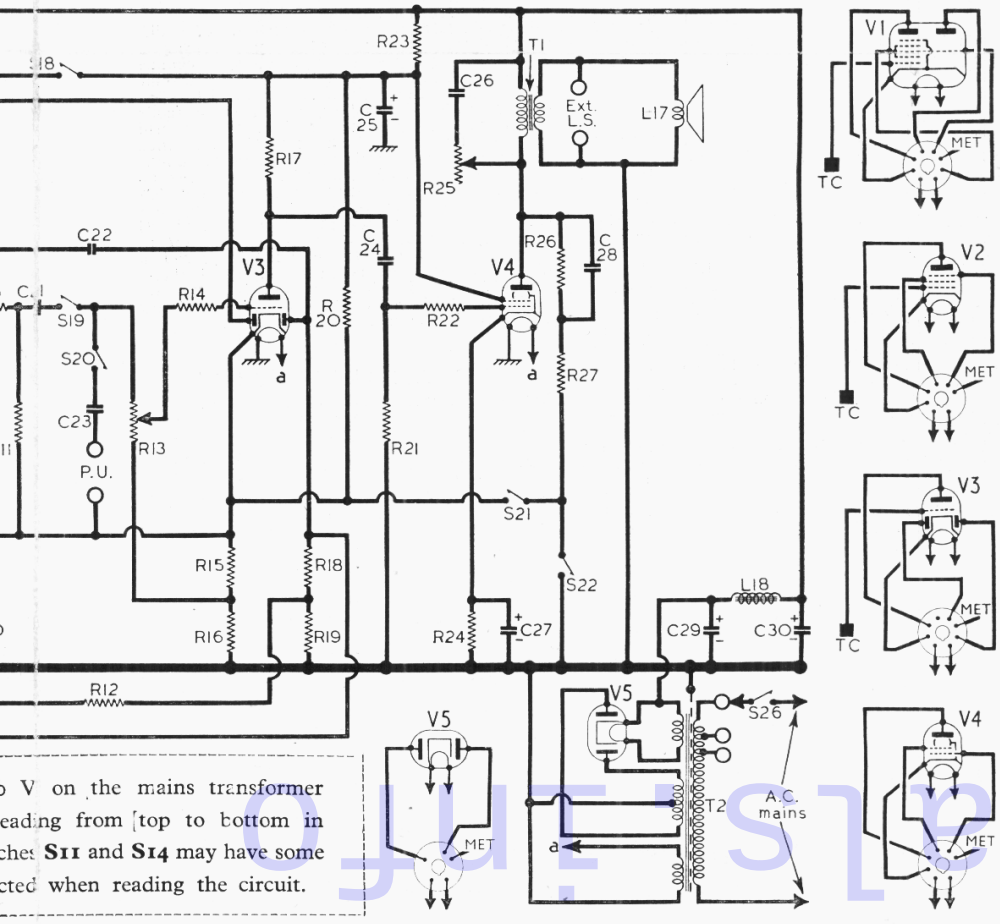
COMPONENTS AND VALUES

	CAPACITORS	Values	Locations
C1	I.F.rejector tune ...	470pF	A1
C2	L.W. aerial shunt	470pF	H4
C3	L.W. fixed trim....	27pF	H3
C4	V1 C.G.	500pF	A1
C5	V1 H.T. decoup ...	0·05μF	H4
C6	V1 cath. by-pass ...	0·05μF	H4
C7	1st I.F. trans. tuning ...	150pF	B2
C8	1st I.F. trans. tuning ...	150pF	B2
C9	V1 osc. C.G. ...	200pF	H4
C10	V1 A.G.C. decoup.	0·05μF	F4
C11	L.W. osc. tracker	180pF	J4
C12	M.W. osc. tracker...	620pF	J5
C13	L.W. fixed trim....	82pF	J4
C14	Osc. anode coupling	100pF	H4
C15	V2 cath. by-pass ...	0·05μF	H4
C16	2nd I.F. trans. tuning ...	150pF	B2
C17	2nd I.F. trans. tuning ...	150pF	B2
C18	V2 A.G.C. decoup.	0·05μF	G4
C19	I.F. by-pass ...	200pF	G4
C20	V3 cath. by-pass...	0·25μF	E4
C21	A.F. coupling ...	0·02μF	G4
C22	A.G.C. coupling ...	50pF	G5
C23	P.U. coupling ...	0·05μF	J4
C24	A.F. coupling ...	0·02μF	F5
C25*	H.T. decoupling ...	8μF	C1
C26	Part tone control ...	0·1μF	F3
C27*	V4 cath. by-pass...	50μF	E5
C28	Negative feed-back	0·01μF	F4
C29*	H.T. smoothing	16μF	D1
C30*	H.T. smoothing	16μF	C1
C31‡	S.W. aerial trim. ...	35pF	H3
C32‡	M.W. aerial trim.	35pF	H3
C33‡	L.W. aerial trim. ...	35pF	H3
C34†	Aerial tuning ...	§546pF	A1
C35‡	S.W. osc. trimmer	35pF	H5
C36‡	L.W. osc. trimmer	35pF	J5
C37‡	M.W. osc. trimmer	35pF	J5
C38†	Osc. tuning ...	§546pF	A1

	RESISTORS	Values	Locations
R1	V1 C.G.	1MΩ	A1
R2	V1 G.B.	220Ω	H5
R3	V1 H.T. decoup. ...	15kΩ	G5
R4	V1 osc. C.G. ...	22kΩ	H5
R5	S.W. osc. stopper	100Ω	J4
R6	L.W. osc. shunt ...	39kΩ	J5
R7	V1 A.G.C. decoup.	2.2MΩ	G5
R8	V1 osc. H.T. feed	39kΩ	H5
R9	V2 G.B.	390Ω	G5
R10	Signal diode load ...	220kΩ	G4
R11	Signal diode load ...	220kΩ	G4
R12	V2 A.G.C. decoup.	1MΩ	F4
R13	Volume control ...	1MΩ	F3
R14	V3 grid stopper ...	47kΩ	C2
R15	V3 G.B. and ...	390Ω	F5
R16	A.G.C. delay ...	1·2kΩ	G5
R17	V3 triode load ...	47kΩ	F4
R18	A.G.C. diode load	390kΩ	G4
R19	A.G.C. diode load	390kΩ	G4
R20	A.G.C. delay ...	47kΩ	E4
R21	V4 C.G.	470kΩ	F5
R22	V4 grid stopper ...	47kΩ	F5
R23	H.T. decoup. ...	2·2kΩ	F4
R24	V4 G.B.	180Ω	F5
R25	Tone control ...	20kΩ	E3
R26	Negative feed-back	270kΩ	F4
R27	Negative feed-back	47kΩ	F4

	OTHER COMPONENTS	Approx. values (ohms)	Locations
L1	I.F. rejector ...	3·0	A1
L2	Aerial coupling coils S.W.	Very low	B1
L3	Aerial coupling coils M.W.	1·0	B1
L4	Aerial coupling coils L.W.	24·0	B1
L5	Aerial tuning coils S.W.	Very low	B1
L6	Aerial tuning coils M.W.	3·5	B1
L7	Aerial tuning coils L.W.	24·0	B1
L8	Reaction coils M.W.	0·6	J5
L9	Reaction coils S.W.	Very low	J5
L10	Osc. tuning coils L.W.	5·0	J5
L11	Osc. tuning coils M.W.	1·7	J5
L12	Osc. tuning coils S.W.	Very low	J5
L13	1st I.F. trans Pri. ...	6·0	B2
L14	1st I.F. trans Sec. ...	6·0	B2
L15	2nd I.F. trans. Pri.	6·0	B2
L16	2nd I.F. trans. Sec. ...	6·0	B2
L17	Speech coil ...	2·1	—
L18	Smoothing choke...	270·0	G3
T1	Output trans. Pri.	320·0	B1
T1	Output trans. Sec. ...	Very low	B1
T2	Total primary ...	36·0	
T2	Total H.T. sec.	310·0	
T2	6·3 V heater ...	Very low	D1
T2	Rect. heater ...	Very low	
S1-S25	Waveband and P.U. switches ...	—	J3
S26	Mains sw. g'd R25	—	E3

* Electrolytic. † Variable. ‡ Pre-Set.
§ "Swing" value, minimum to maximum.



...o V on the mains transformer ...eading from [top to bottom in ...ches **S11** and **S14** may have some ...cted when reading the circuit.

Circuit Description—*continued*

veloped across **R19,** is fed back to I.F. valve, giving automatic gain control. Delay voltage, together with G.B. for triode section, is obtained from the potential divider **R20, R15** and **R16.**

Resistance-capacitance coupling by **R17, C24** and **R21** between **V3** triode and beam tetrode output valve **(V4, Mazda Pen45).** Variable tone control by **C26** and **R25** in anode circuit. Fixed negative feed-back on M.W. and L.W. between **V4** anode and **V3** cathode by **R26, C28** and **R27,** via **S21.** On S.W., **S21** opens and **S22** closes, disconnecting the feed-back circuit and shunting **R26, C28** and **R27** across the output circuit. Provision is made for the connection of a low-impedance speaker across **T1** secondary winding.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mazda metallized UU6).** Smoothing by iron-cored choke **L18** and electrolytic capacitors **C29** and **C30.**

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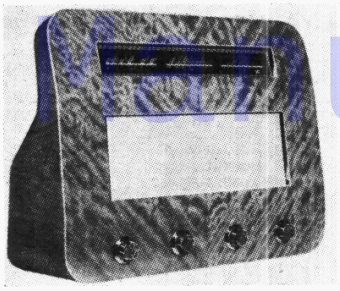


The appearance of the Murphy A122M receiver. It has a slightly different tuning scale from the A122.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on A.C. mains of 230 V, using the 220-230 V adjustment tapping. The receiver was tuned to the highest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input. Voltages, with the exception of cathode readings, were measured on the 400 V scale of a Model 7 Avometer, chassis being the negative connection.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 TH41	155 Oscillator 56	1·8 3·6	155	5·0	2·2
V2 VP41	260	6·5	260	1·7	3·0
V3 HL41DD	112	1·8	—	—	9·5
V4 Pen 45	246	37·0	222	6·8	7·5
V5 UU6	250†	—	—	—	275·0

Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S25** are the waveband, radio/gram and scale lamp switches, ganged in three rotary units. These are indicated in our underchassis illustration, where they are identified by the numbers **1, 2, 3** in diamonds. Arrows show the direction in which they are viewed in the diagrams in col. 2 where they are shown in detail.

The table (col. 3) 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.

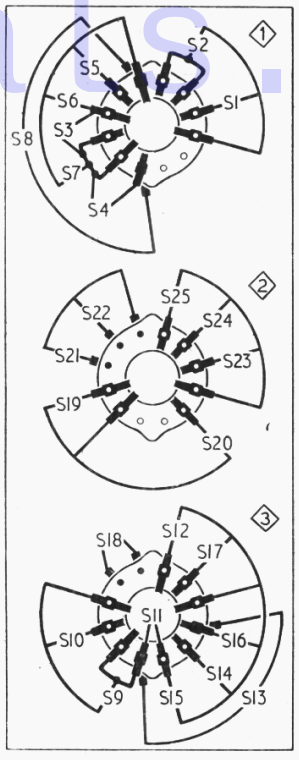
S26 is the Q.M.B. mains switch, ganged with the variable tone control **R25.**

Scale Lamps.—These are three Osram M.E.S. types, with large clear spherical bulbs, rated at 6.2 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (3-7 Ω) external speaker.

Aerial Rejectors.—A mounting bracket is provided above the **A** and **E** sockets for an aerial rejector when one is required to avoid overloading **V1** on the local station. To connect it, the existing lead from the **A** socket is cut and its ends are connected to the tags of the rejector, so that it is in series with the I.F. rejector, **L1, C1.**

Waveband Switch Diagrams and Table



Diagrams of the waveband switch units, drawn as seen from the rear of an inverted chassis. The associated switch table is seen on the right of the diagrams.

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

To adjust it, connect an 0-10 V meter between **V1** cathode and chassis, tune in the local station (low meter reading), then adjust the rejector for maximum meter reading. To provide a convenient connection for the meter, **V1** cathode is taken to one of the end tags of **T1** (location reference B1), while the opposite end tag goes to chassis.

I.F. Transformer Cores.—The I.F. coil iron-dust core threads are engaged in a U-shaped slot of paxolin which in turn is held in slots in the coil former, and sometimes when the cores are screwed well in, they pass right through the slotted paxolin and idle loosely beyond them. They can then be re-engaged by removing the opposite core and applying the trimming tool to them from the opposite end, as they each have a trimmer groove on each face.

Chassis Divergencies.—Our chassis was an A122, and its circuit was as shown in our circuit diagram. In some chassis the lower pick-up socket will be returned to the junction of **R15** and **R16,** and **C23** will be omitted. **R17** may be 50 kΩ, and **R18, R19** may each be 470 kΩ instead of 390 kΩ.

ASSOCIATED MODELS

As compared with the A122 receiver, on a sample of which this *Service Sheet* was prepared, the difference in the SA122 is simply that the mains voltage adjustment tappings are arranged for 105-150 V and 210/260 V.

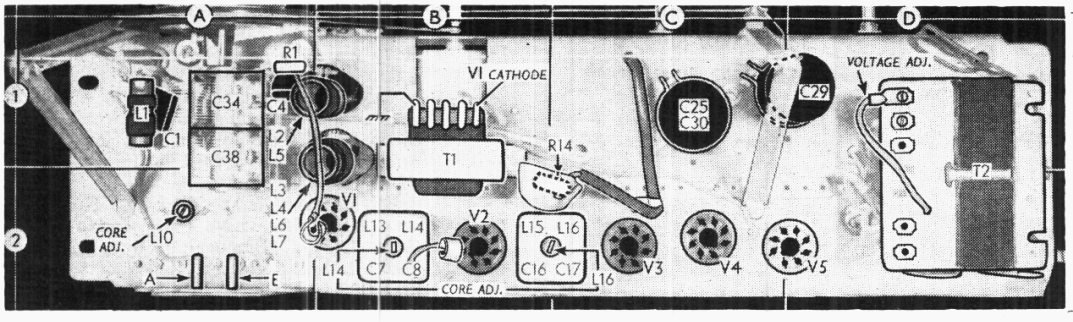
In the **A122C console,** the negative feed-back circuit is modified to suit the different cabinet and speaker, **R26** being omitted and **C28** becoming 0.05 μF. The speaker is a 10-in model, instead of the 8-in one in the table receiver. The chassis is mounted in an inverted position, necessitating a different kind of cursor drive cord system, which is described under "Drive Cord Replacement." The inversion reverses the order of the control knobs as compared with the table model, and the waveband switch control knobs are not alike.

In the **A122M,** the baffle cabinet is of a different design from the A122, and the tuning scales are slightly different, involving a change in gang settings as explained under "Circuit Alignment." The pick-up socket consists of a 4-pin English valve holder, in which the anode pin is the "live" pick-up socket, and the grid pin the earthy one. The filament pins are joined together and to chassis to earth the braiding.

The negative feed-back switch **S21** opens on Gram, muting the feed-back circuit, but **S22** still closes only on S.W. **V3** cathode by-pass capacitor **C20** is moved to the junction of **S21** and **S22,** so that on Gram it returns **R27** to chassis, and as **V3** cathode is not by-passed, a degree of feed-back is thus introduced there. On S.W., **C20** is short-circuited by **S22.** On M.W. and L.W., when **S21** is closed, the circuit is effectively the same as in the A122.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws);
remove three scale lamps (pull off) from scale assembly, and release earthing tag from left-hand end (secured by nut and lock-washer);
release scale lamp leads from spring cleat in top left-hand corner of cabinet;
slacken nut at bottom of cursor carriage and release drive cord;



Plan view of the chassis. **V1** cathode is brought out to a spare tag on the output transformer **T1** for the convenience of connecting a meter when adjusting a local station rejector, when fitted.

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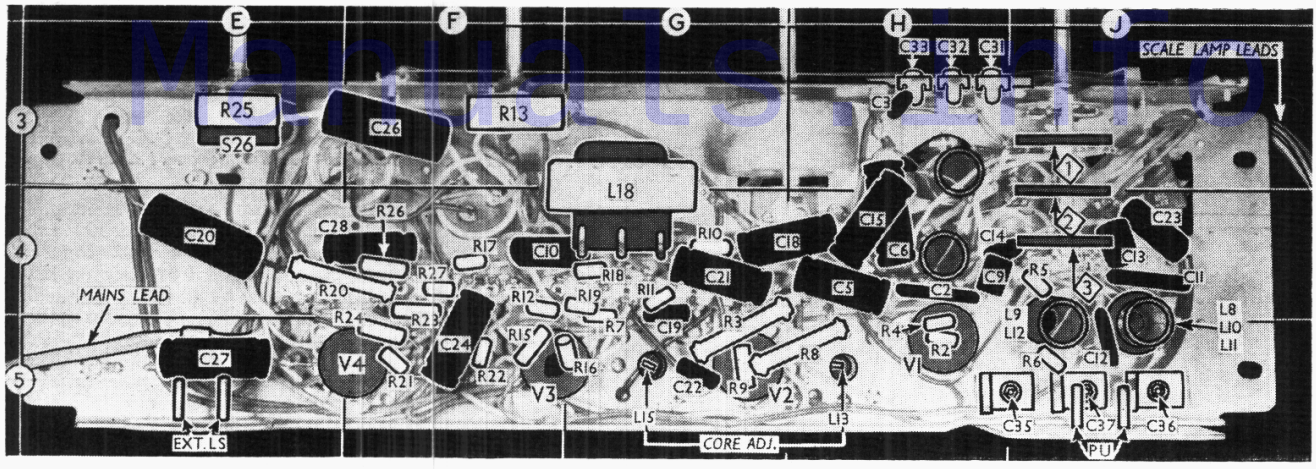


Under-chassis view. The waveband switch units are identified by diamonds numbered **1, 2** and **3.** They are shown in detail in the diagrams in col. 2. Many of the small components are mounted on a central tag strip.

unplug speaker leads from sockets at right-hand end of chassis;
remove four chassis-fixing bolts (with large washers above and small below) securing end flanges of chassis to cabinet, and withdraw chassis.

When replacing, the cursors should coincide with the extreme right-hand edges of the scales with the gang at maximum capacitance, and the cord should bow slightly upwards to hold cursor carriage firmly to guide rail.

Removing Speaker.—Release speaker leads from spring cleats on right-hand side of sub-baffle; remove four 4BA nuts (with lock-washers) holding speaker to sub-baffle.

When replacing, the speech coil tags should be on the right.

Removing Tuning Scale Assembly.—Remove 2BA nut (with lock washer) from each end of scale backing plate.

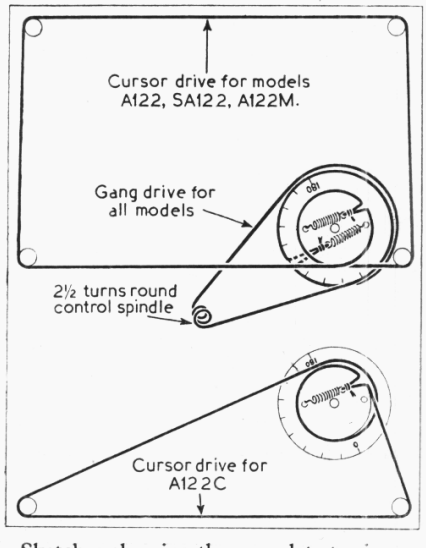
DRIVE CORD REPLACEMENT

The tuning drive in all the 122 series consists of two cord drives: the gang drive and the cursor drive. The gang drive is the same for all types, but in the console the cursor drive is different from the table models.

In the A122, SA122 and A122C, the cord used originally was type 5, spec. 935, but it was changed later for a thinner cord (type 3, spec. 936) which involved a change of tuning scale grading. The former cord is used if the scale panel is type 48539/1 (see under "Circuit Alignment"), and the latter (finer cord) for scale panel type 48559/2. Calibration errors will occur if the wrong type of cord is used.

In the A122M, the finer cord only is used, and it is described as woven and waxed Italian hemp. The course taken by each cord is shown clearly in the sketches in col. 4, where in each case the drive is drawn as seen from the front of the chassis standing on its base, with the gang at maximum capacitance.

The length of cord required for the main drive is 3ft 6in in all models; 5ft is required for the cursor drive in the table models, and 4ft in the console. Where both cords are to be fitted, the gang drive should be fitted first, but where the gang drive only is to be fitted, the cursor drive should be slipped off its anchorage and the slack cord dropped temporarily off its pulleys. Calibration should be adjusted as explained under "Circuit Alignment."



Sketches showing the complete tuning drive system for the table models (above) and the cursor drive only for the console (below). They are both viewed from the front of the chassis with the gang at maximum.

CIRCUIT ALIGNMENT

I.F. Stages.—Remove chassis from cabinet, switch set to M.W., turn the volume and tone controls fully clockwise and the gang to maximum capacitance. Connect signal generator, via a 0.1 μF capacitor in the "live" lead, to control grid (top cap) of **V1** and chassis, feed in a 465 kc/s (645.16 m) signal and adjust **L16, L15, L14** and **L13,** strictly in that order, for maximum output, using a non-metallic trimming tool. Do not readjust a core after it has been set.

R.F. and Oscillator Stages.—As the tuning scale is fixed to the cabinet and alignment is carried out with the chassis on the bench, adjustments are made with reference to the scale printed on the front of the tuning drive drum. This scale is divided into 180 degrees, and readings are taken against the "V" slot in the bracket fixed to the front member of the chassis. With the gang at maximum capacitance, the scale should read zero, and if necessary the bracket can be adjusted upon slackening its fixing screw.

In models A122, SA122 and A122C either one of two types of tuning scale may be found (No. 48559/2 or No. 48539/1) and in model A122M a third type (No. 52109) is used. Each of these scales has a separate set of calibration references for the drive drum scale, and in the alignment table these references are given under "Drive Drum Setting." Before commencing alignment on models A122, SA122 and A122C it is necessary to know the type of tuning scale fitted, and this may be checked by removing the scale assembly, when the type number will be visible at the bottom centre edge of the scale panel.

Transfer "live" signal generator lead to aerial socket, using a 400 Ω resistor on S.W. or a 200 pF capacitor on M.W. and L.W. as a dummy aerial. Adjust R.F. and oscillator stages as shown in the alignment table for maximum output, switching to the appropriate waveband. Use an output meter connected to the external speaker sockets, and do not permit the output to exceed 0.5 W (about 1.0 V).

To overcome the effect of oscillator pulling on S.W., use the tuning control to hold the signal while adjusting the aerial circuit. On all bands the local oscillator frequency is higher than the signal frequency, so that if two peaks are found for **C35,** use that involving the smaller capacitance.

I.F. Rejector.—This is accurately adjusted at the factory and should not need readjustment. The core is held in position by waxed thread packing, but it can be moved if necessary by easing forward or backwards with a suitably shaped non-metallic tool. It should be adjusted at 465 kc/s for minimum output.

Circuit Alignment Table

Sig. Gen. Frequency	Drive Drum Setting			Switch Set to	Adjustments	Locations
	48559/2	48539/1	52109			
300 kc/s (1,000m)	168	166	167	L.W.	**C36 C33**	J5 H3
158 kc/s (1,898m)	31	31	31	L.W.	**L10**	A2
1,363 kc/s (220m)	157·5	154	156·5	M.W.	**C37 C32**	J5 H3
15·23 Mc/s (19·7m)	156·5	153	155·5	S.W.	**C35 · C31**	J5 H3
7·24 Mc/s (41·4m)	53	52·5	52·5	S.W.	"Bottom" turns **L5, L12**	B1 J5

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