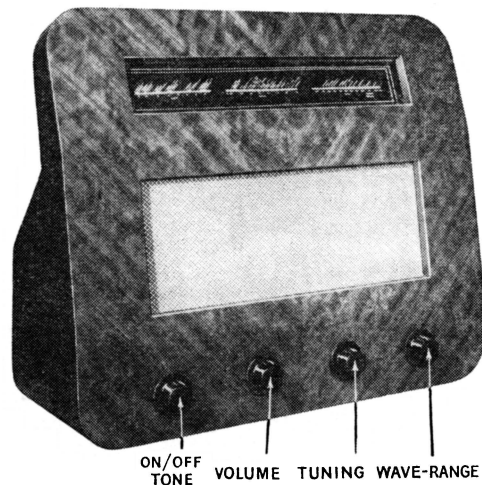


AI22M

AI22M

MURPHY SERVICE INSTRUCTIONS

**MURPHY RADIO LTD
WELWYN GARDEN CITY • HERTS
PHONE: WELWYN GARDEN 800**



- MAINS SUPPLY: 200-250 Volts a.c., 50-100 c/s
- WAVE RANGES: S. 16.5-53 Metres (18.10-5.65 Mc/s)
 M. 190-550 Metres (1580-545 Kc/s)
 L. 1000-2000 Metres (300-150 Kc/s)
- INTERMEDIATE FREQUENCY: 465 Kc/s
- VALVES: MAZDA TH41, VP41, HL41DD, PEN45, and UU6
- PILOT LAMPS: Three 6.2 Volt, 0.3 Amp. (miniature screw)
- SPEECH COIL IMPEDANCE: 3 Ohms
- TOTAL WEIGHT: 25 lb.
- CABINET DIMENSIONS: 24½" wide, 18" high, 8¾" deep
- CONSUMPTION: 57 Watts approx.
- RELEASE DATE: January 1949
- PRICE: £22 os. od. + P.T.

GENERAL NOTES

The circuit. This is a four-valve supersonic heterodyne receiver, having an i.f. amplifier tuned to 465 Kc/s. The triode hexode frequency changer is preceded by a single tuned circuit, and a rejector circuit tuned to the i.f., is inserted in series with the aerial.

Economy in the use of switch wafers has led to a somewhat unusual contact arrangement. This is shown in the underneath view of the chassis, and below the circuit diagram. The diagram is drawn to illustrate the circuit switching and not the mechanical means of carrying it out.

The local oscillator circuit is parallel fed, and takes the form of a modified Colpitts circuit on the long wave band.

The long wave oscillator coil is adjustable by means of a brass core, but there is no provision for medium wave coil adjustments. The short wave coils may be adjusted, when required, by moving the last turn of the winding. This will be necessary when fitting new coils, and the details are given in the circuit alignment table on page 5.

Conventional delayed a.g.c. is used, the delay voltage being produced in the cathode circuit of V₃, with the aid of a bleed resistor from the h.t. line.

Negative feed-back is included on the medium and long wave bands, but removed for the short waves and when switched for a gramophone pick-up, so that the maximum gain will be available.

Mechanical notes. To reduce its movement during transit, the gang capacitor is "tied" to the aerial filter bracket with 18 gauge copper wire. This must be removed before installation.

To take the chassis from the cabinet, first remove the back and the knobs, and free the pointer holder from the drive cord. The chassis can be lifted away, when the chassis bolts have been removed. If it is required to take the chassis away from the cabinet, the pilot lamps and leads can be removed from the scale assembly by pulling off each lamp holder, and disconnecting the earth lead from the reflector.

When reassembling the receiver, the drive cord should be clamped so that it is bowed slightly upwards, in order to retain the pointer holder (48611) on its channel (48445). To obtain correct calibration, set the gang capacitor to maximum

capacitance, and the centres of the tuning pointers exactly to the ends of the scale apertures, before securing the drive cord to the pointer holder.

To prevent the pointer holder from fitting loosely on its channel and possibly causing rattles, it should be slightly bowed, but if it becomes bent or is roughly handled, the pointers may scratch the glass scale.

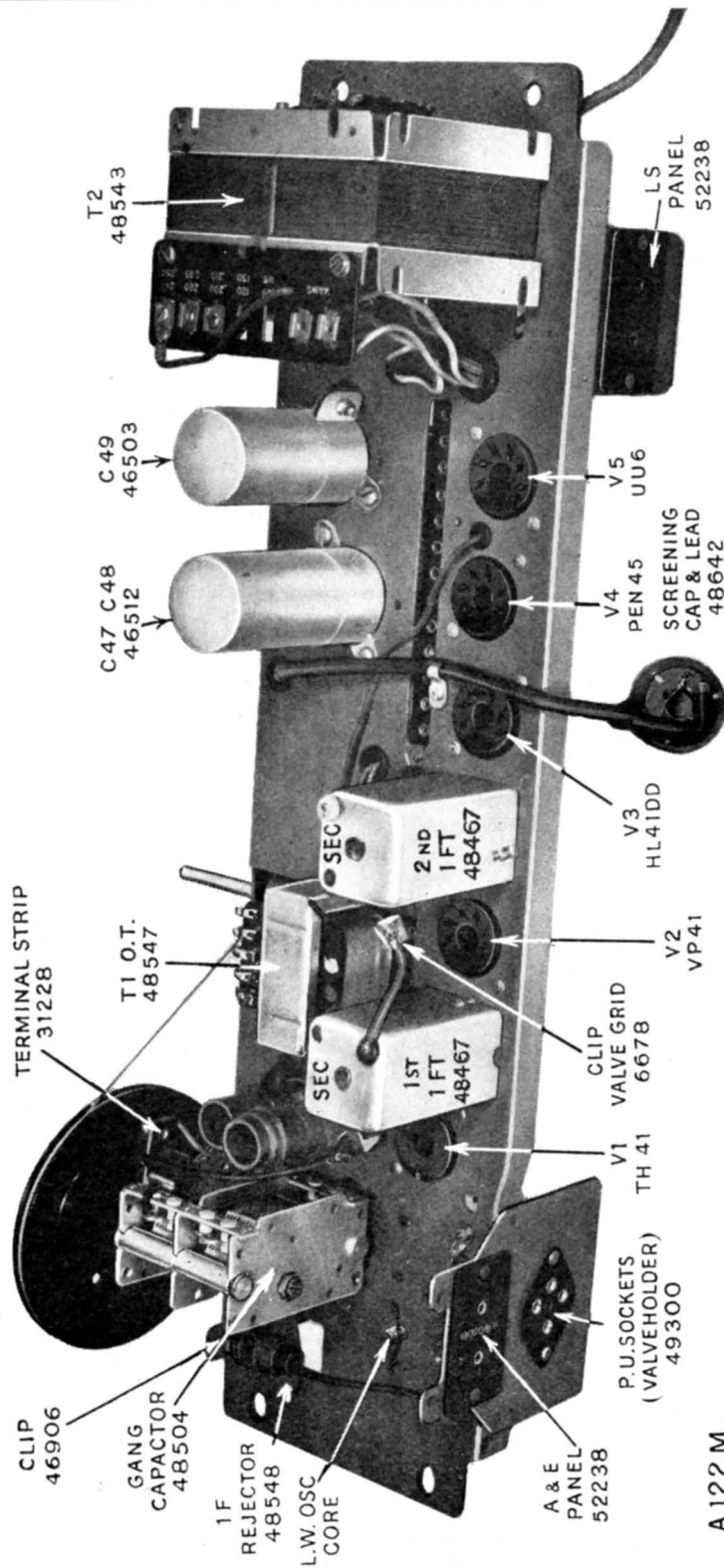
The i.f. assemblies. The iron dust cores of the i.f. transformers are threaded on the outside, and U-shaped pieces of paxolin, fitting into slots in the coil former, hold them in position. It is possible for these cores to be screwed in too far, and they will then become disengaged from these U-shape pieces; if this should occur, the opposite core should be removed, when it will be found possible to re-start the loose core in its thread. To avoid damaging the cores, it is advisable to use a non-metallic screw-driver for all adjustments.

The screening cans may be removed for inspection by bending back the securing tabs and taking out the self-tapping screws. The tabs are accessible through holes in the chassis, below the assemblies.

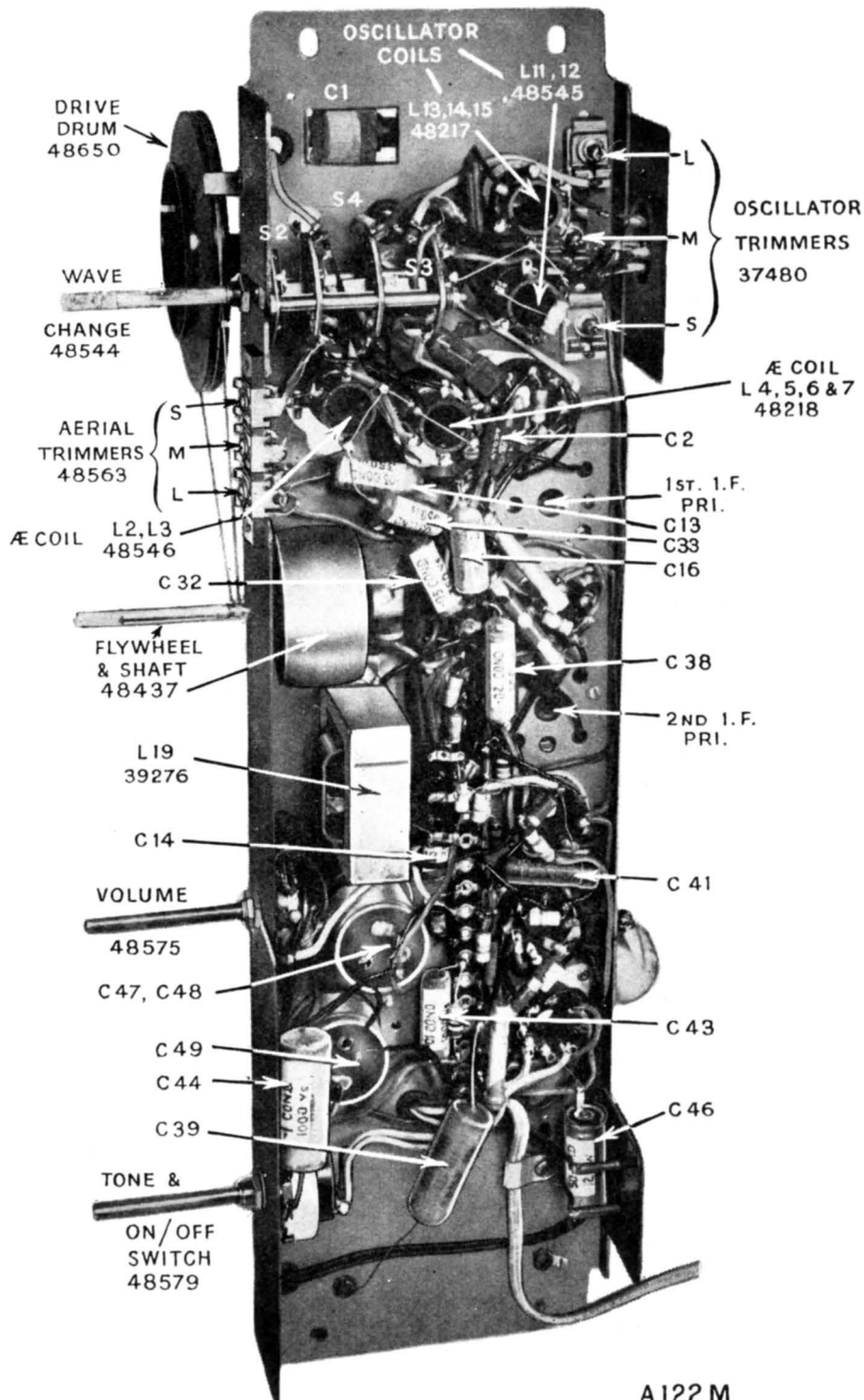
When replacing the cans, first see that the piece of insulating material is wrapped around the assembly to prevent any possibility of a short circuit.

Aerial Filters. When an aerial filter is required, it is fitted to the bracket on which the aerial and earth panel is mounted. It should be tuned for minimum signal from the local stations. Connect an 0-10 Voltmeter between V₁ cathode and chassis. To enable the adjustment to be made without removing the chassis from the cabinet, V₁ cathode is connected to a tag on the output transformer; test points 5 and 16 on the transformer may therefore be used. Tune exactly to the local station, and then adjust the aerial filter for maximum voltage reading. When ordering aerial filters please state the frequencies required.

The i.f. rejector has been accurately adjusted at the factory, and should not need readjustment. If it is necessary, however, the core can be moved with a non-metallic tool and should be adjusted for minimum a.f. output, with a modulated 465 Kc/s signal, fed to the aerial and earth sockets.



Top view of the chassis, showing the principal components and part numbers.
The corresponding diagram is on page 8.



A122M

Underneath view of the chassis, showing the principal components and part numbers.
The corresponding diagram is on page 9.

CIRCUIT ALIGNMENT

The chassis must be taken from its cabinet in order to adjust the r.f. and i.f. circuits; as the tuning scale is fixed in the cabinet, the drive drum is marked in degrees to provide calibration points for trimming purposes.

Important. Before making any adjustments, see that the centre of the indicator "V" registers with "O" on the drive drum, when the gang capacitor plates are fully in mesh.

When replacing the chassis in the cabinet, set the gang capacitor to maximum capacitance, and the centres of the tuning pointers exactly to the ends of the scale apertures, before fitting the drive cord to the pointer holder.

All adjustments are made for maximum a.f. output as indicated by an output meter connected to the l.s.

sockets. The volume and tone controls should be turned fully clockwise, and the signal generator attenuator should be adjusted so that the a.f. output does not exceed 500 mW. (approximately 1 V a.c.).

The local oscillator frequency is higher than the signal frequency on all wavebands.

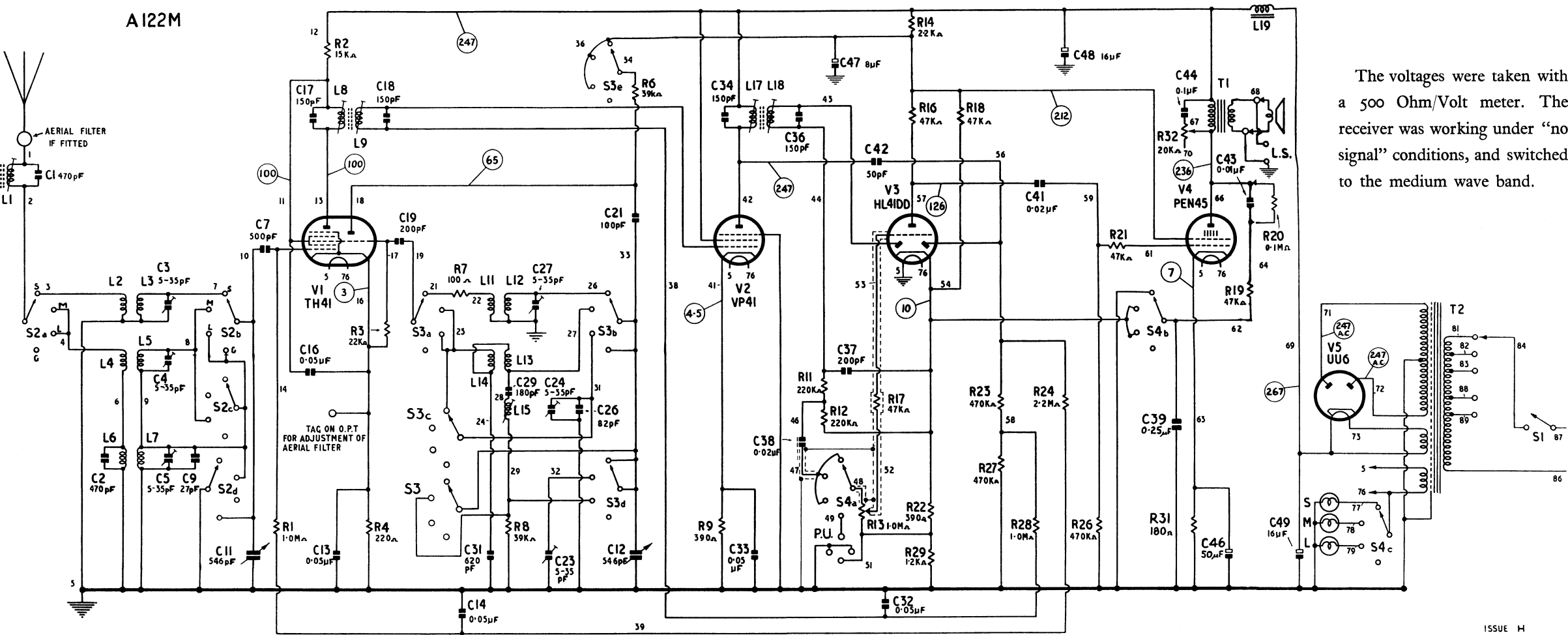
To overcome the effect of oscillator pulling on the short-wave-band, the tuning control should be used to hold the signal while adjusting the aerial circuit.

The short-wave coils should not normally require attention, but in the case of replacements, the end turn on each will need adjustment at 41.4 metres. Follow the alignment table, and repeat the procedure until there is no further improvement; seal the turns.

CIRCUIT ALIGNMENT TABLE

For i.f. adjustments, the signal generator is connected between the grid of V1 and chassis via a 0.1 μ F. capacitor. For all other adjustments, the signal generator is connected to the aerial and earth sockets via a dummy aerial. Further details are given above.

CIRCUIT	NOTES	SIG. GEN. FREQUENCY	RECEIVER SCALE SETTING	DRIVE DRUM SETTING	WAVE-RANGE	ADJUSTMENTS
2nd i.f.t.	Unscrew both cores to fullest extent	465 Kc/s	2050 m.	O	M	L17 (pri.) under chassis L18 (sec.) top of can Do not readjust
1st i.f.t.	Unscrew both cores to fullest extent	465 Kc/s	2050 m.	O	M	L8 (pri.) under chassis L9 (sec.) top of can Do not readjust
L.W.	Unscrew trimmers before adjusting. Repeat these adjustments until no further improvement	300 Kc/s (1000 m.)	1000 m.	167	L	l.w. osc. trimmer (C24) l.w. aerial trimmer (C5)
		158 Kc/s (1900 m.)	1900 m.	31	L	l.w. osc. coil core (L15) (above chassis)
M.W.	See L.W. notes. No coil adjustment provided Check calibration at 300 m. and 500 m.	1363 Kc/s (220 m.)	220 m.	156.5	M	m.w. osc. trimmer (C23) m.w. aer. trimmer (C4)
		1000 Kc/s (300 m.)	300 m.	115.5-117.5	M	—
		600 Kc/s (500 m.)	500 m.	28-30	M	—
S.W.	Unscrew trimmers before adjusting. Lowest capacitance setting correct for osc. trimmer Check calibration at 31.25 m. and 41.4 m.	15.23 Mc/s (19.7 m.)	19.7 m.	155.5	S	s.w. osc. trimmer (C27) s.w. aer. trimmer (C3)
		9.6 Mc/s (31.25 m.)	31.25 m.	95-98	S	—
	See note above	7.25 Mc/s (41.4 m.)	41.4 m.	52.5	S	Adjust end turns on coils if necessary

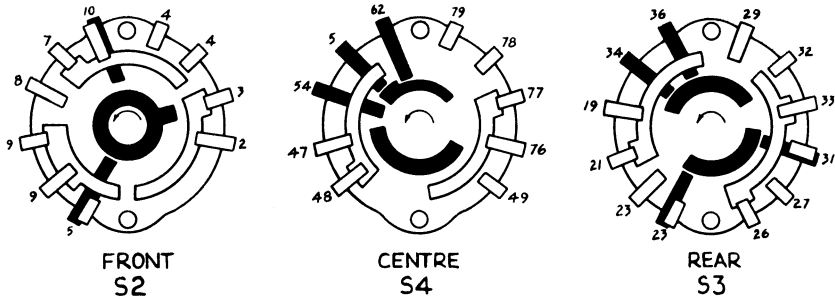


The voltages were taken with a 500 Ohm/Volt meter. The receiver was working under “no signal” conditions, and switched to the medium wave band.

ISSUE H

SWITCH WAFERS

The wave change switches in the circuit diagram do not illustrate their mechanical operation, and the actual contact arrangement is shown below. The black contacts lie on the rear of the wafers, as viewed from the rear of the chassis. The switches are shown in the s.w. position.

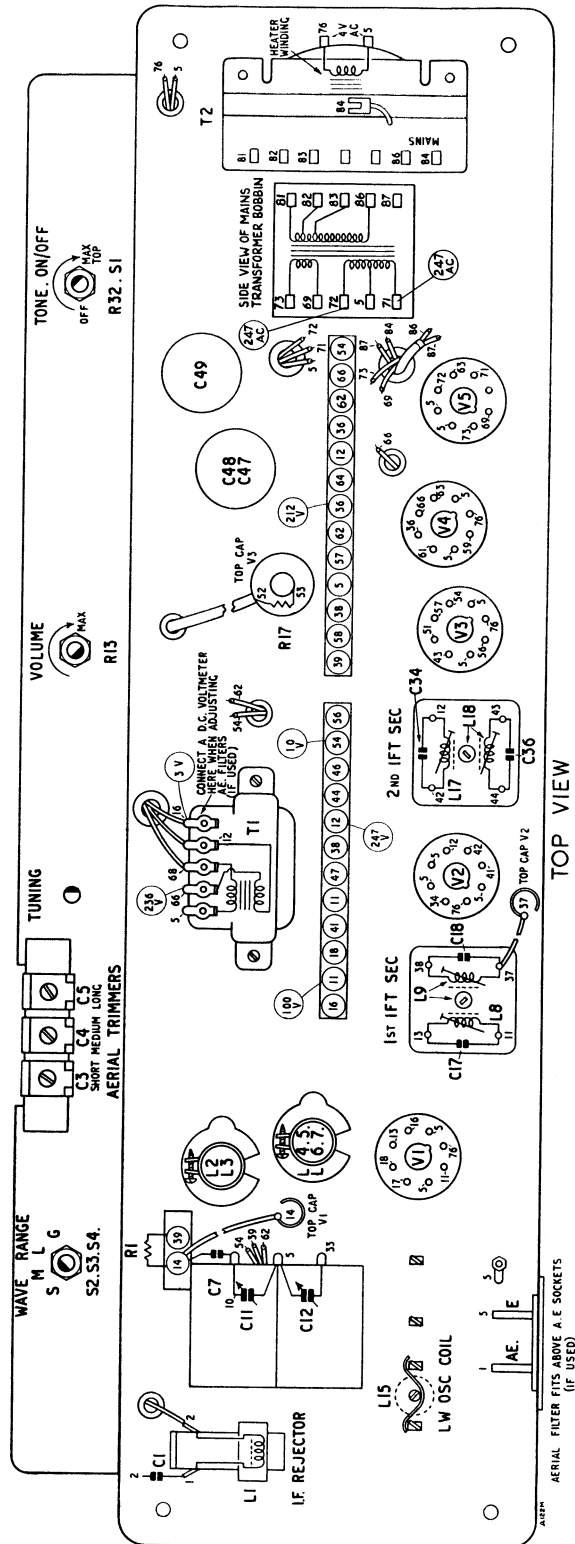


COIL RESISTANCES

Where no figure is given, the resistance is less than 1 Ohm.

COIL CIRCUIT NO.	L1	L2	L3	L4	L5	L6	L7	L8	L9	L11	L12	L13	L14
D.C. RES. IN OHMS.	3	—	—	1	3.5	24	24	6	6	—	—	1.7	—

COIL CIRCUIT NO.	L15	L17	L18	L19	T1 Pri.	T1 Sec.	T2 Pri.	T2 H.T. Sec.	T2 L.T. Sec.
D.C. RES. IN OHMS.	5	6	6	270	320	—	30 + 3 + 3	150 + 160	—

[illegible]

The voltage measurement conditions are given on page 7.

The voltage measurement conditions are given on page 7. When replacing either of the oscillator coils, the “nick” in the former must coincide with the black tag shown in the diagram.

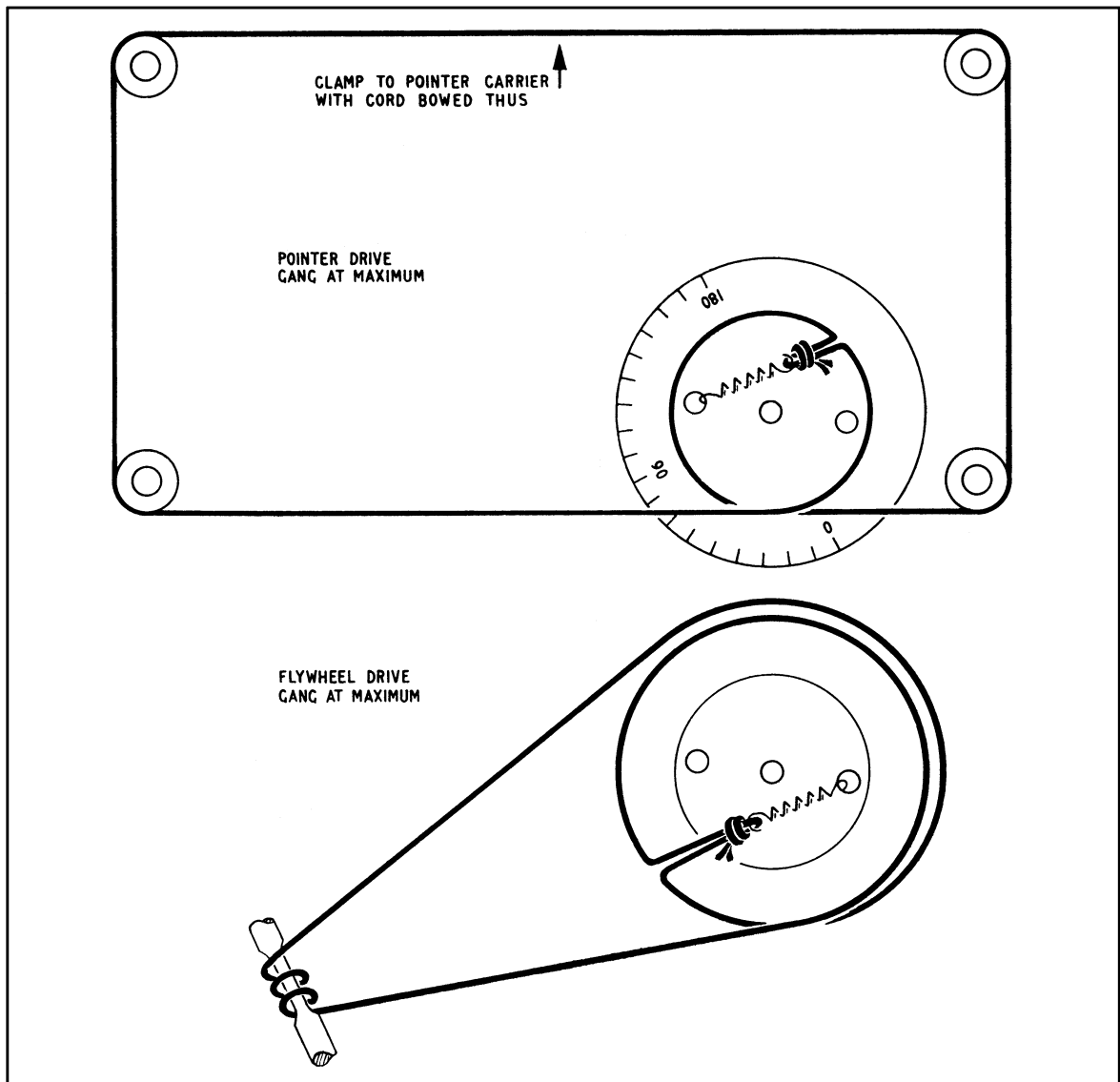
THE CORD DRIVES

The diagrams show the general arrangement of the pointer drive and main tuning drive with the gang capacitor at maximum capacitance. The pointer drive can be replaced, if necessary, without removing the main drive, but the pointer drive should be removed if the main drive has to be replaced. The pointer drive cord can be removed, without untying the knot securing the cord to the tension spring, simply by unhooking the spring from the hole in the drive drum. Calibration errors will occur if the wrong type of drive cord is used.

To fit the main tuning drive, the following procedure may be followed: tie a **spring** (19448) to one end of a 3 ft 6 in. length of drive cord (woven and waxed Italian

hemp cord, Spec. 936), pass the other end through the slot in the **drive drum** (51266) from the inside, and pull the spring to the inside edge of the drum. Pass the free end of the cord round the drum in a clockwise direction, twice round the tuning control spindle and back round the drum to the start, where it is also tied to the spring, the two ends being tied together to prevent any possibility of the knots slipping. The other end of the spring is then hooked through the hole in the drive drum as shown. The springs should be extended to $1\frac{3}{16}$ ".

The pointer drive can be fitted in a similar manner, using a 5 ft length of cord; it should lie in front of the main drive as shown in the diagram.



PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS	PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS
28137	C1	470 pF.	5% p.s.m.	26693	R7	100 Ω	20%
28243	C2	470 pF.	2% p.s.m.	25541	R8	39 KΩ	10%
48563	C3	5-35 pF.	Assembly of three trimmers	24773	R9	390 Ω	10%
48563	C4	5-35 pF.		27333	R11	0·22 MΩ	20%
48563	C5	5-35 pF.		27333	R12	0·22 MΩ	20%
23966	C7	500 pF.	20% m.m.	48575	R13	1 MΩ	Volume control
23673	C9	27 pF.	10% p.s.m.	26957	R14	2·2 KΩ	20%
48504	C11	546 pF.	Gang capacitor	27205	R16	47 KΩ	20%
48504	C12	546 pF.	Gang capacitor	27205	R17	47 KΩ	20%
41403	C13	0·05 μF.	20% tub. 350 Vw.	25596	R18	47 KΩ	10%
41403	C14	0·05 μF.	20% tub. 350 Vw.	27205	R19	47 KΩ	20%
41403	C16	0·05 μF.	20% tub. 350 Vw.	25701	R20	100 KΩ	10%
28169	C17	150 pF.	5% p.s.m.	27205	R21	47 KΩ	20%
28169	C18	150 pF.	5% p.s.m.	24773	R22	390 Ω	10%
23900	C19	200 pF.	20% m.m.	27397	R23	0·47 MΩ	20%
23867	C21	100 pF.	20% m.m.	27525	R24	2·2 MΩ	20%
37480	C23	5-35 pF.	Trimmer	27397	R26	0·47 MΩ	20%
37480	C24	5-35 pF.	Trimmer	27397	R27	0·47 MΩ	20%
28179	C26	82 pF.	5% p.s.m.	27461	R28	1·0 MΩ	20%
37480	C27	5-35 pF.	Trimmer	24965	R29	1·2 KΩ	10%
28242	C29	180 pF.	1% p.s.m.	24653	R31	180 Ω	10%
28241	C31	620 pF.	1% p.s.m.	48579	R32	20 KΩ	Tone control and switch
41403	C32	0·05 μF.	20% tub. 350 Vw.				
41403	C33	0·05 μF.	20% tub. 350 Vw.	PART NO.	CIRCUIT NO.	RESISTANCE	DESCRIPTION
28169	C34	150 pF.	5% p.s.m.	48548	L1	3 Ω	i.f. rejector
28169	C36	150 pF.	5% p.s.m.	48546 {	L2	—	Aerial coil, s.w.
23900	C37	200 pF.	20% m.m.		L3	—	
41402	C38	0·02 μF.	20% tub. 350 Vw.	48218 {	L4	1 Ω	Aerial coil, m.w.
41405	C39	0·25 μF.	20% tub. 350 Vw.		L5	3·5 Ω	
41451	C41	0·02 μF.	20% tub. 500 Vw. sealed		L6	24 Ω	Aerial coil, l.w.
23834	C42	50 pF.	20% m.m.		L7	24 Ω	
41419	C43	0·01 μF.	20% tub. 1000 Vw.	48467 {	L8	6 Ω	1st i.f. pri.
41422	C44	0·1 μF.	20% tub. 1000 Vw.		L9	6 Ω	1st i.f. sec.
31316	C46	50 μF.	+ 50%, —20% elec. 12 Vw.	48545 {	L11	—	Osc. coil, s.w.
	C47	8 μF.	+ 50%, —20% elec. 450 Vw.		L12	—	
46512	C48	16 μF.	+ 50%, —20% elec. 450 Vw.	48217 {	L13	1·7 Ω	Osc. coil, m.w. anode
46503	C49	16 μF.	+ 50%, —20% elec. 450 Vw.		L14	—	Osc. coil, m.w. and l.w. grid
				48467 {	L15	5 Ω	Osc. coil, l.w. anode
27461	R1	1·0 MΩ	20%		L17	6 Ω	2nd i.f. pri.
25404	R2	15 KΩ	10%		L18	6 Ω	2nd i.f. sec.
27141	R3	22 KΩ	20%	39276	L19	260 Ω	Smoother choke
24677	R4	220 Ω	10%	48547	T1 {	320 Ω	t.t. pri.
25564	R6	39 KΩ	10%	48543	T2	—	t.t. sec. m.t., see table

PARTS LIST

(Mechanical Components)

This list contains only those parts which are not included in the electrical parts list; items such as self-tapping screws, bolts, and nuts, etc. may be obtained upon request from Murphy Radio Ltd, Service Department.

PART NUMBER	DESCRIPTION	REMARKS
51989	Back	For cabinet
51986	Bolt, $\frac{1}{4}$ " Whitworth	Chassis fixing
48613	Bracket, with pulley	Long, for pointer drive
48614	Bracket, with pulley	Short, for pointer drive
48447	Bracket, support	For large pulley brackets
48434	Bracket	For tuning shaft
51981	Cabinet	
48642	Cap, screening	With lead, for V3
48445	Channel	For pointers and holder
48223	Clamp	For aerial coils
46906	Clip	For i.f. rejector
43009	Clip	For electrolytic capacitors
Spec. 936	Cord, main drive	42"
	Cord, pointer drive	60"
46911	Core, iron dust	for i.f.t.
—	Core, l.w. osc.	See screw, adjusting
48650	Drive drum (pulley)	Calibrated
48437	Flywheel, with shaft	
48611	Holder for pointers	With brackets
48500	Indicator, calibration	For drive drum scale
18504	Knobs	Plain
48553	Knob, G.L.M.S.	For w.c. switch
16880	Lamp, pilot	6.2 V., 0.3 A.
48496	Lamp holder	For pilot lamps
45388	Loudspeaker	
46741	Panel, component	Without components
41659	Panel, mains tap	For mains transformer
52238	Panel, socket	For a. and e., and l.s.
50735	Plate nut and screw	For cabinet back
43175	Pointer	Tuning
37974	Plug, aerial	
37975	Plug, earth	
45974	Plug, l.s.	
48451	Reflector and brackets	For tuning scale
48505	Rubber packing	For tuning scale
52109	Scale, tuning	Glass, with station names
48222	Screw, adjusting	l.w. osc. coil core
19448	Spring	For drive cord
48228	Spring, anti-backlash	For l.w. osc. coil core
48544	Switch, wave-change	
31228	Terminal strip	Small, on gang capacitor
3975	Valve holder	British Octal
49300	Valve holder	4-pin, for p.u. sockets
49144	Washer, cup	For tuning pointer
34592	Washer, felt	For control knobs
47916	Washer	For chassis bolt