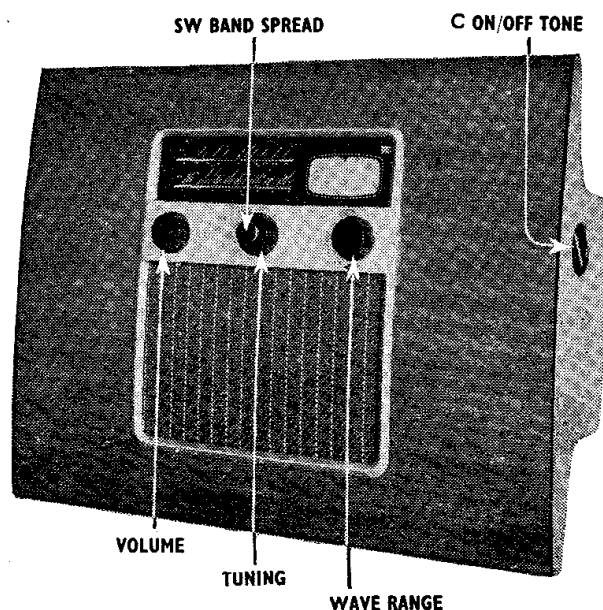


# MURPHY RADIO SERVICE INSTRUCTIONS



MAINS SUPPLY:	200 to 250 volts A.C., 50 to 100 cycles
WAVE RANGES:	S. 15·8 to 53 metres M. 190 to 550 metres L. 1000 to 2000 metres
INTERMEDIATE FREQUENCY:	465 Kc/s
VALVES:	Mazda or Ediswan: TH4I, VP4I, HL4IDD, PEN 45, UU 6
PILOT LAMPS:	Two 6·2 volt, 0·3 amp, miniature screw
SPEECH COIL IMPEDANCE:	3 ohms
TOTAL WEIGHT:	30 lbs
CABINET DIMENSIONS:	24" wide, 18" high, 6½" deep
CONSUMPTION:	65 watts approx.

*Issued by*

**MURPHY RADIO LTD · WELWYN GARDEN CITY**  
**HERTS · ENGLAND**

TELEPHONE · WELWYN GARDEN 800  
Foreign Telegrams & Cables · Radmurphy, London

## THE CORD DRIVES

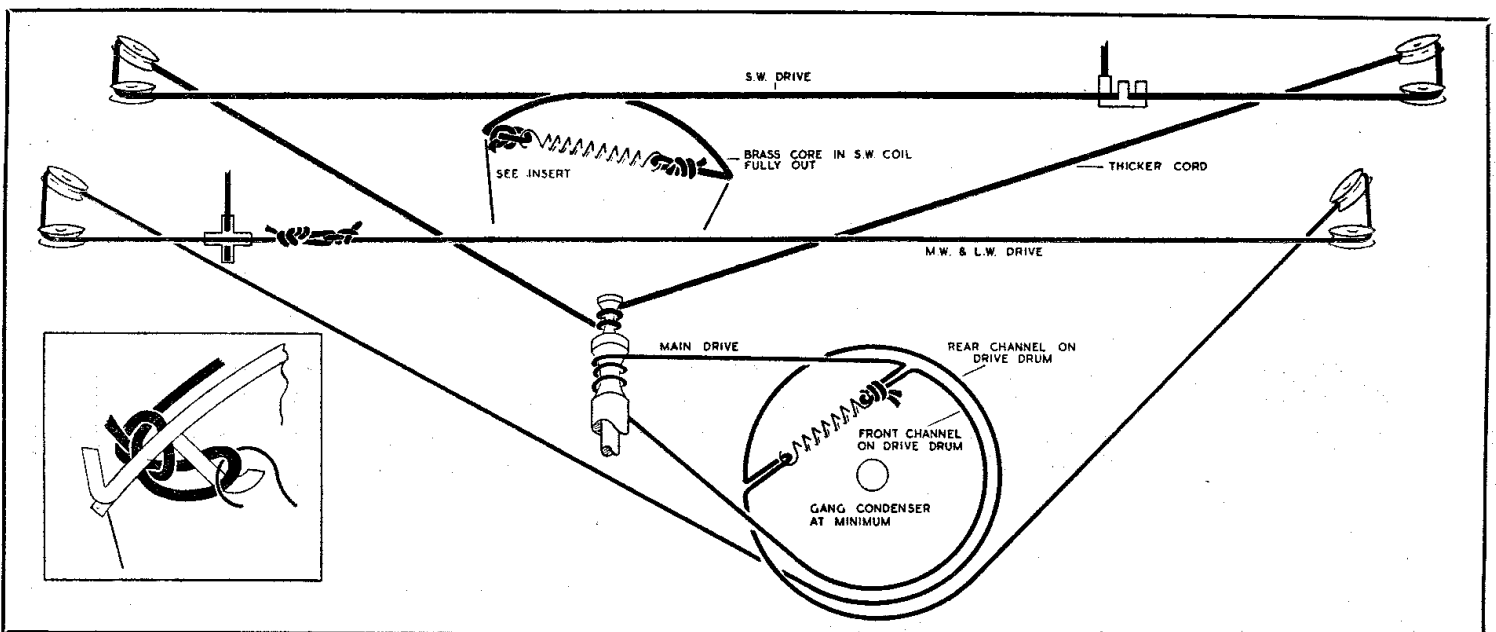
**GENERAL NOTES.** Remove chassis from cabinet, the scale and I.F. valve (V<sub>2</sub>) from chassis, and set the gang capacitor at minimum. With the S.W. coil core fully out, the drives will be in the general position shown in the diagram. The cord now used on all drives is the standard thin drive cord (a plaited and waxed Italian hemp cord) obtainable from Murphy Radio Ltd. (Some of the earlier sets used a thicker cord on the short wave drive.)

The S.W. scale must also be removed in order to replace the main and pointer cord drives. It must be very carefully handled as any marks, fingerprints, etc. are magnified and show clearly on the short wave screen.

**The Main Drive.** Obtain a length of approximately 2 feet of drive cord and securely tie the spring on to one end. Pass the other end through the hole in the front groove on the drive drum, from the inside, and then two and a half times round the main control spindle in an anti-clockwise direction, and so round the drive drum in the front groove, as shown in the diagram, finishing again near the hole. Pass the end through the hole again and tie to the same end of the spring, so that there is less than  $\frac{1}{4}$ " of slack cord inside the drive drum. Note that there is no tension on this drive until the pointer cord has been fitted.

**The Pointer Drive.** Turn the ganged capacitor

about half way to maximum so that the hole in the rear groove is accessible. Obtain a length of approximately  $4\frac{1}{2}$  feet of drive cord, double it at the centre, and pass the doubled end through the hole in the rear groove on the drive drum and hook on to the spring. See that the cord is not twisted and pass the right hand end round the drive drum in the rear groove in a clockwise direction, then round the left hand pulleys. Tie a loop on this end and anchor it on to the right hand edge of the S.W. quadrant, which should be moved over to the left. Pull the other end to take up the slack and pass it round the groove in a clockwise direction, round the right-hand pulleys and under the dial lamp lead. Release the loop from the S.W. quadrant and pass the other end through it and then pull tight so that the spring is extended to  $1\frac{1}{2}$  inches, and knot securely. A small pair of pliers holding the loop will enable this to be more easily accomplished. Turn the control and see that the cord is lying evenly in the drum groove and on the control spindle, and turn the gang capacitor to maximum position. The pointer can now be placed on the cord so that it will line up with the L.F. end of the scales when in position; a rough setting can be made by placing the pointer  $\frac{1}{8}$ " to the left of the bend in the reflector. It can be finally clamped into position after the scale has been refixed. Check operation of the drive and see that there is no tendency to slip. Replace the S.W. scale on the drive drum, so that the cross at the centre is in



alignment with the gang spindle and the 52 metre mark is correctly aligned at maximum capacity.

**Short Wave Drive.** Set the S.W. quadrant so that the brass slug is fully out of the coil, then place the spring on the hook on the left-hand side. Make a slip knot on the end of a length of drive cord approximately  $3\frac{1}{2}$  feet long, and place it also on the hook and pull tight. Bring the other end round the top of the quadrant, under the dial lamp wire, to the right-hand pulleys, then under the optical system bracket, and round the S.W. drive spindle twice, as shown in the diagram, then round the left-hand pulleys, behind the other end of the cord on the quadrant, and back to the spring. Pass this end through the loose end of the spring, pull

tight so that the spring is extended to 1 inch, and secure firmly. Hook the pointer on to the cord, as shown, and slide it along the cord to its correct position.

**All Drives.** Replace main scale and clamps, and see that at maximum gang capacity the main pointer is just visible at the L.F. ends of the scales. If necessary, move the pointer slightly, then finally clamp it tightly on to the cord.

See that the S.W. pointer when moved fully to the left, lines up with the left-hand edge of the S.W. aperture, and check that it also will line up with the right-hand edge; if necessary move the pointer along the cord. Check the optical system and adjust as required.

## ADJUSTMENT OF OPTICAL SYSTEM

**T**HE drawing shows the method of optical projection adopted. Illumination from a lamp passes through a condenser lens and then through a translucent scale; the image from the scale is magnified and projected by a second lens on to an inclined mirror which reflects it back on to the frosted short-wave screen.

As the adjustments are all inter-related it is generally advisable to follow the complete setting-up procedure described below.

1. Check to see that the projection lens is mounted vertically, about  $\frac{1}{4}$  inch behind the scale, and the condenser lens is within one-sixteenth of the front of the scale. Rotate the tuning control to see that the condenser lens does not foul the scale at any point.

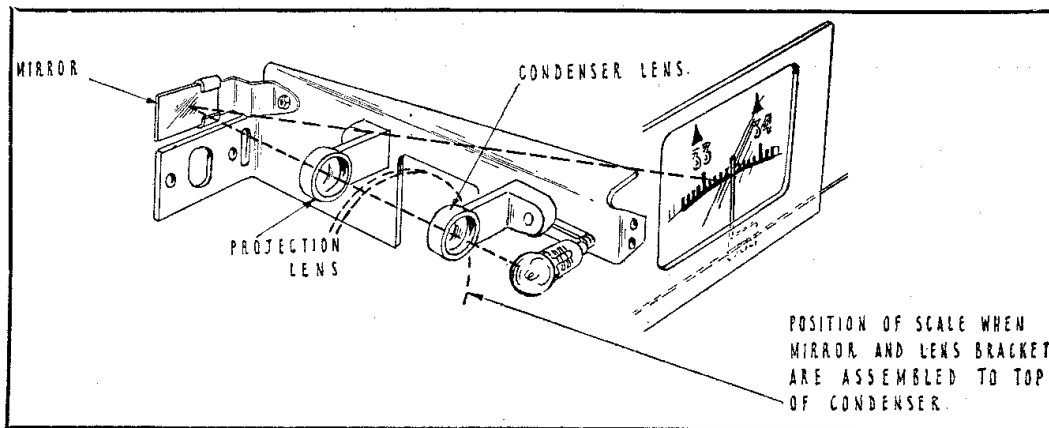
2. Connect the receiver to the supply mains, switch on to the s.w. band and turn the tuning control fully clockwise.

3. Remove the cover plate from above the s.w. pilot lamp and turn the chassis face downwards. The light beam will be seen as a bright spot on the face of the projector lens. Adjust the lamp position so that the light is centrally placed on the face of the projector lens. It may be necessary to rotate the lamp-holder as well as moving it in a horizontal direction.

4. Rotate the wave-range switch to ensure that the lamp-holder does not foul the switch mechanism.

5. Adjust the mirror until the frosted screen aperture is completely filled with light, *i.e.* no dark edges are

visible in the aperture. Vertical adjustment is made by rotating the mirror bracket, and horizontal adjustment by turning the screw at the side. It will be noticed that, with the lamp cover plate removed, the pointer mounting is visible on the screen, but this is of no consequence as it is obscured when the cover is replaced.



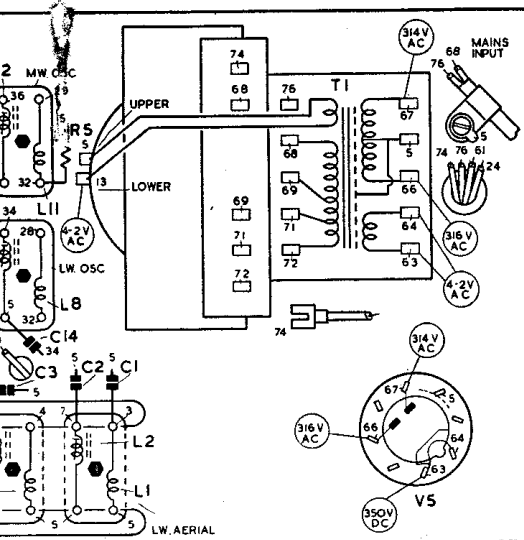
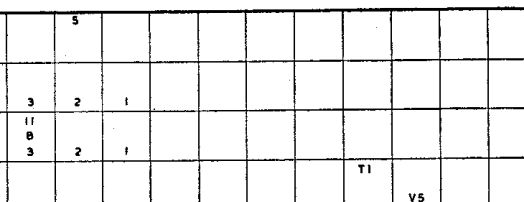
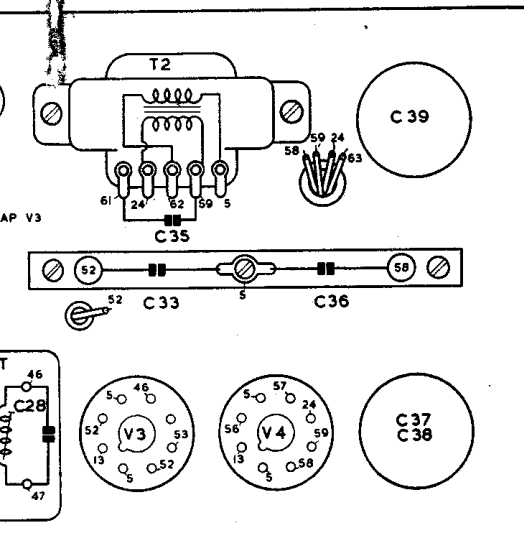
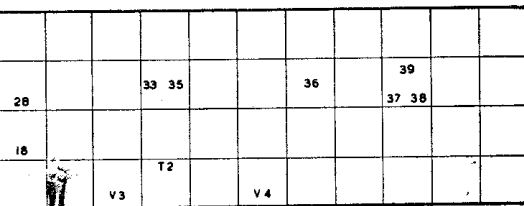
6. Turn the tuning control until the 31 metre band centre index mark coincides with the aperture index mark.

Adjust the mirror until the tips of these index marks appear to touch. When this is so, there must still be no dark edges visible in the aperture. To achieve this it may be necessary, after slackening off two screws on the rear end plate of the ganged capacitor and one on the front panel, to rotate slightly the main assembly bracket, in order to align the condenser lens on the scale, then tighten the screws again.

7. Adjust the projector lens to obtain a clear image on the screen. The image must be sharp, *i.e.* correctly

(Continued on page six)





Receiver switched to M.W.

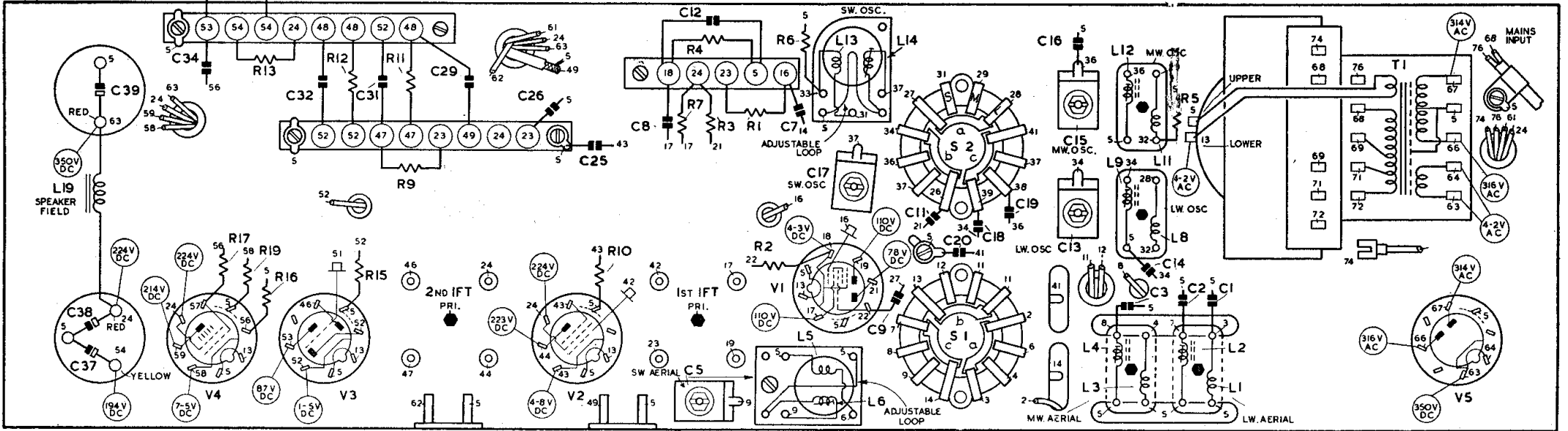
CONNECTIONS TO MAJOR COMPONENTS

IN replacing faulty components the system of numbering employed in the circuit and layout diagrams, and the list of connections given below, provide an almost complete guide for re-wiring, although minor differences will occur. In the R.F. and Oscillator circuits care should also be taken that the correct earth points are used.

COMPONENT	TEST POINT	CONNECTION
Wave Range Switch	2	I.F. Rejector (L7)
	3	L.W. Aerial coil (L2)
	4	M.W. Aerial coil (L4)
	6	S.W. Aerial coil (L6)
S1b	13	V1 heater, and to T1 (13)
	11	M.W. and L.W. dial lamp (PL1)
	12	S.W. Projection lamp (PL2)
S1c	14	Aerial Section Gang Capacitor C21; C7 to V1 (16)
	7	L.W. Aerial coil (L2)
	8	M.W. Aerial coil (L4)
	9	Wire to C5, thence to S.W. Aerial coil (L6)
S2a	27	C9 to V1 (22)
	28	L.W. Osc. coil (L8)
	29	M.W. Osc. coil (L11)
	31	S.W. Osc. coil (L13)
S2b	26	C11 to V1 (21)
	34	C18; C13, thence to L.W. Osc. coil (L9)
	36	C19; C15, thence to M.W. Osc. coil (L14)
	37	C17, thence to S.W. Osc. coil (L14)
	41	Osc. Section Gang Capacitor (C22)
	39	C18 to S2b (34)
	38	C19 to S2b (36)
	37	Link to S2b
S.W. Aerial Coil, L5/6	5	Copper braid from tags 5 to earth tag below S2.
	6	Tag 6 on S1a.
	9	Wire to C5, thence to point 9 on S1c
M.W. Aerial Coil, L3/4	5	Connected to point 5 on other coils, also to earth tag; C3 connected between points 5 and 8.
	8	To tag 8 on S1c; C3 to point 5; C4 trimmer.
	4	To tag 4 on S1a.
L.W. Aerial Coil, L1/2	5	To points 5 on other coils; C1 and C2 to points 3 and 7.
	3	To point 3 on S1a; C1 to point 5.
	7	To point 7 on S1c; C2 to point 5.
S.W. Osc. Coil, L13/14	5	Copper braid in sleeving to earth tag; R6 to point 33.
	31	To point 31 on S2a.
	33	R6 to point 5.
	37	Wire to C17, then to S2b.
M.W. Osc. Coil, L11/12	5	To point 5 on L9, and to earth tag; to R5 and C16.
	29	To point 29 on S2a.
	32	To point 32 on L8; R5 to point 5.
	36	To C15, then to C16 and S2b.
L.W. Osc. Coil, L8/9	5	To L12; C14 to point 34.
	28	To point 28 on S2a.
	32	To L11.
	34	To C13, then to S2b and C14.
Tone Control R18 and on/off Switch, S3	24	Through chassis to T2.
	61	Through chassis to C35 on T2.
	74	Through chassis to panel on T1.
	76	Through chassis to T1.



R				14	13			12	11								10				7	4	3	1	6								5							
C	39		34				32	31		29		26	25		8	12		7		17		11	20	19	18		16	15												
L		38	37													5	6				13	14						12	11		3	2	1							
MISC				V4			V3					V2			VI						S2b	S2c	S1c	S1b	S1a												T1			V5



A104 UNDERNEATH VIEW

Voltages are average figures measured between test points and chassis, using an Avometer type 7, with receiver switched to M.W. and working on 230 volt mains under no signal conditions.

(Continued from page three)

focused over its whole width. Move the lamp away from the condenser lens, if necessary, to obtain this condition.

8. See that there are no peculiar blemishes in the image. They may be due to the following faults:

(a) Blurred, smudgy blemishes can be due to flaws, specks of dust, etc., on: (i) the lamp glass envelope (large round watery smudges will be caused by bubbles of air in the lamp glass, so twist the bulb and holder); (ii) the projector lens; (iii) the mirror (scratches in the mirror).

(b) Sharply defined blemishes can be due to flaws, specks of dust, etc., on (i) the condenser lens; (ii) the scale (small scratches on the scale lettering will show up very clearly).

(c) Scratched paint on the lens holders may cause bands or streaks of light due to reflection from the bright surfaces. Specks of dust, etc., can be removed by a camel hair brush. When other faults occur the offending component must be replaced.

9. Check the magnification as follows: Rotate the main drive until the centre of the 31 metre calibration mark coincides with the left-hand edge of the aperture. The right-hand edge of the aperture must now lie between 33.35 metres and 33.45 metres. If the right-hand edge is above 33.45 metres, the magnification is not great enough and the mirror must be moved back slightly and the image re-focused. Similarly, if the right-hand edge is below 33.35 metres the magnification is too great and the mirror must be moved forward slightly.

10. See that there is no colour fringing the white lettering on the scale. The presence of colour indicates that the lamp filament is not lying on the axis of the lens system. To remove the colour, the lamp must be moved slightly *towards* the edges of the lettering, or figuring, that are tinged with *red*.

11. Tighten the lens holders and the mirror fixing screws and lock the mirror lateral adjustment without upsetting any of the previous adjustments. Replace the s.w. lamp screen.

12. Turn the main drive until the 51 metre index mark coincides with the aperture index mark. Set the s.w. pointer on the 51 metre scale calibration mark. The pointer now coincides with the aperture index mark. Turn the main drive to its fully clockwise position. The s.w. pointer should now lie between 51.95 metres and 52.05 metres, *viz*: within half a smallest division of the 52 metre calibration mark. If necessary, move the s.w. scale very slightly in its clamp, in the opposite direction to which it is desired to move the image.

13. Rotate the scale over its complete range, and see that the base line of the scale does not change its position relative to the tip of the s.w. pointer by more than the height of the smallest calibration marks, *i.e.* the scale line image must remain reasonably steady in the aperture over the whole of its travel.

If the scale image **rises at one end**, turn the scale so that this end is in the aperture and move the scale slightly upwards in its clamp until the effect is removed.

If the scale image **rises in the centre**, set it so that the centre is in the aperture and move the scale slightly upwards in its clamp until the effect is removed.

If the scale image **drops in the centre**, the scale must be moved slightly downwards.

While the above effects are being removed, take care to maintain the 52 index mark coincident with the aperture index mark, within the limits specified when the drive is fully clockwise.

14. Bump the set gently to check that all components are firmly fixed.

Note:—Great care should be taken of the glass s.w. scale if removed, as any marks or fingerprints show very clearly on the screen.

Although the printing on this scale is protected by a coat of lacquer it is very easily marked, and finger-prints are difficult to remove, so it should be handled by the edges only.

The double convex lens is the condenser lens, and the plano convex is the projection lens and it should be mounted with the flat side away from the s.w. scale.

## THE SA104 AND A104PM RECEIVERS

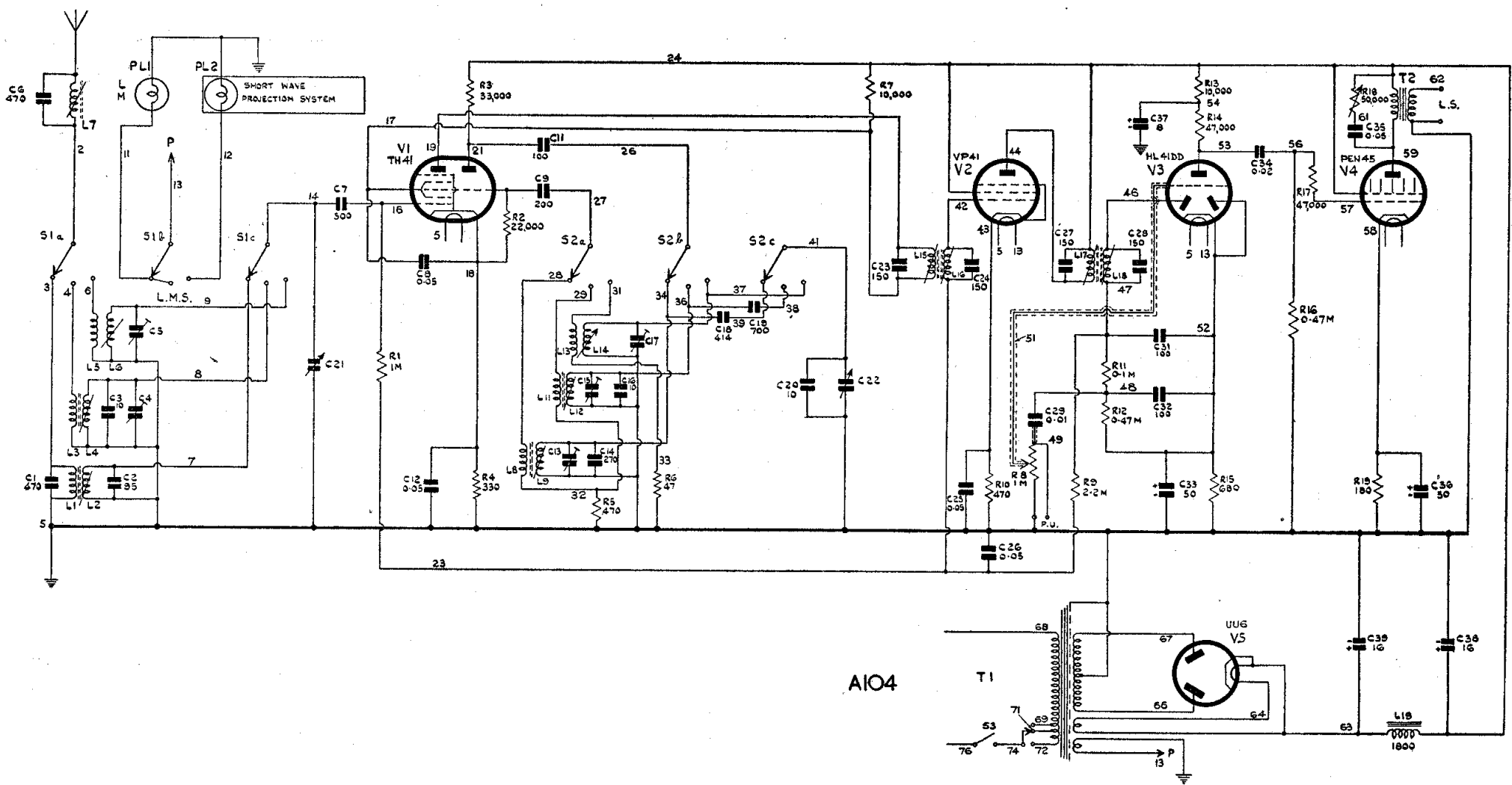
**T**HESE receivers are fitted with permanent magnet loudspeakers, and use chokes (L19) for smoothing purposes, in place of the L.S. fields. The resistance of the choke is rather lower than the speaker field, and further modifications are detailed below.

COMPONENT	A104	A104PM AND SA104
R3	33000—1W	47000—1W
R7	10000—1W	15000—2W
R10	470— $\frac{1}{2}$ W	680— $\frac{1}{2}$ W
R13	10000— $\frac{1}{2}$ W	2700— $\frac{1}{2}$ W
		Also, V4 screen is connected to junction of R13 and R14.
C38	16 mfd	May be 8 mfd. on SA104.

Further the mains and output transformers have been modified and, in the SA104 sub-tropicalized components, sleeving etc., are used.

The SA104 (100 volt) receiver, in addition to the modifications described above, is fitted with a special mains transformer for working on 100-130 volts 50-100 cycle A.C. mains.





A104

Component values subject to alteration without notice.

**TYPICAL COIL RESISTANCES (20% TOLERANCE)**

COILS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L11	L12
OHMS	24	14	.5	2.2	—	—	2.5	.6	1.8	.5	1.3
COILS	L13	L14	L15	L16	L17	L18	L19	T1 HT Sec.	T1 Pri.	T2 Prim.	T2 Sec.
OHMS	—	—	5.5	5.5	5.5	5.5	1800	210/220	30	280	.2

## TRIMMING

**T**HE whole of the I.F. and R.F. trimming adjustments can be carried out without removing the chassis from the cabinet, if the perforated metal back is first removed.

Before commencing trimming, see that the main tuning pointer aligns with the index marks at the extreme L.F. end of the scale when the gang capacitor is at maximum capacity, and the stop on the drive drum is against the gang support stop; in this position the S.W. scale should read exactly 52 metres at the S.W. aperture index mark.

Also see that the S.W. coil "slug" is set so that when fully out of the coil, the distance between the edge of the former and the exposed edge of the of the "slug" is exactly  $\frac{3}{8}$  inch, and check to see that the S.W. pointer moves evenly about the centre index mark on the S.W.

screen. Then set the S.W. pointer to the centre point on the screen. The setting up of the associated optical system is described elsewhere, and may be carried out completely independently.

All adjustments are made for maximum reading on an output meter connected to the L.S. sockets (except for the I.F. rejector circuit, which is tuned to minimum as described) with V/C at maximum and the Signal Generator input adjusted to produce the lowest convenient meter reading, which should be 0.5 watts or less.

A Screwdriver or 7 B.A. box spanner will be required to adjust the variable inductances.

NOTE.—I.F. Primaries are underneath the chassis and I.F. Secondaries on top of the I.F. coil cans. The oscillator frequency is higher than the signal frequency on all bands.

CIRCUIT	NOTES	SIG. GEN. FREQUENCY	SIG. GEN. TERMIN'TN	CONNECT SIG. GEN. TO	RECEIVER DIAL SETTING	ADJUSTMENTS
I.F.	Unscrew 2nd I.F. Prim. and Sec. cores to fullest extent.	465 Kc/s (645 m)	Direct via .1 mfd	V2 Control Grid	M.W. 550 Metres	2nd I.F. Prim. (L17). 2nd I.F. Sec. (L18). DO NOT READJUST
	Unscrew 1st I.F. Prim. and Sec. cores to fullest extent.	465 Kc/s (645 m)	Direct via .1 mfd.	V1 Control Grid	M.W. 550 Metres	1st I.F. Prim. (L15). 1st I.F. Sec. (L16). DO NOT READJUST
I.F. REJECTOR	Trim for MINIMUM reading on output meter.	465 Kc/s (645 m)	Dummy Aerial	Aerial Socket	M.W. 550 Metres	I.F. rejector (L7.)
L.W.	Repeat these adjustments until there is no further improvement.	158 Kc/s (1900 m)	Dummy Aerial	Aerial Socket	L.W. 1900 Metres	L.W. Osc. Coil (L9) for max. L.W. Grid Coil (L2)
		230.8 Kc/s (1300 m)	Dummy Aerial	Aerial Socket	L.W. 1300 Metres	L.W. Osc. Trimmer (C13)
M.W.	Repeat these adjustments until there is no further improvement.	600 Kc/s (500 m)	Dummy Aerial	Aerial Socket	M.W. 500 Metres	M.W. Osc. Coil (L12) M.W. Grid Coil (L14).
		1363 Kc/s (220 M)	Dummy Aerial	Aerial Socket	M.W. 220 Metres	M.W. Osc. Trimmer (C15) M.W. Grid Trimmer (C4).
S.W.	Repeat these adjustments until there is no further improvement. Some "pulling" of the oscillator frequency may be noted. To overcome this, retune receiver after each aerial circuit adjustment.	7.14 Mc/s (42 m)	Dummy Aerial	Aerial Socket	S.W. 42 Metres	S.W. Osc. Coil (L14) and S.W. Grid Coil (L6). By moving adjustable loop with non-metallic object for maximum output.
		15.25 Mc/s (19.7 m)	Dummy Aerial	Aerial Socket	S.W. 19.7 Metres	S.W. Osc. Trimmer (C17) S.W. Grid Trimmer (C5)

When an aerial filter is fitted this should be tuned for minimum signal on the local broadcast station. Connect on 0-10 voltmeter between V2 cathode and chassis; tune exactly to the local station, and then adjust the filter for maximum voltage reading. It is fitted to the left hand chassis bracket with the coils towards the ganged capacitor. When ordering please state frequencies required.

# A104 and A104R

## Circuit Changes and Errata

### Loudspeaker

The energized speaker in the A104 has been replaced by a permanent magnet type, and this necessitated some component value changes as described in the Service Instructions. The A104R uses a permanent magnet speaker and the voltages for the P.M. version of the A104 can, therefore, be taken from the A104R Service Instructions.

### Trimming Instructions

A printing error occurred in the Trimming Instructions in both the A104 and the A104R Service Instructions. Under the heading M.W., L14 (Medium Wave Grid Coil) should be L4.

### A104R Coil Resistance Table

Under the heading P.U. Transformers, the Primary should be  $2\Omega$  and the Secondary  $1550\Omega$ . These figures apply to each unit; the total resistance of the assembly will be double these figures.

### A104R Humbucking Coil

This coil is connected in series with the "earthy" lead and not in the "live" side as shown in the circuit diagram.

### Transit Screws

The motorboard transit screws (heads painted red) have been replaced by bolts and nuts, as it was found that the wood screws had a tendency to pull out. The bolts should be removed before operating the instrument, and replaced for transit purposes in order to avoid damage.

### Other Changes

Some minor modifications have been made because of the present supply position, particularly to the types of electrolytic condensers and some of the paper condensers. Certain of the resistors have also been changed from time to time, but these alterations are usually within about 10 per cent and do not affect the performance of the receiver.

### The Gramophone Pick-up Modifications

Three types of pick-up have been used in the A104R, the Connoisseur ( $25\Omega$ ), the Murphy  $15\Omega$ , and the Murphy  $25\Omega$ ; the associated compensating network was altered in each case as detailed below. The trans-

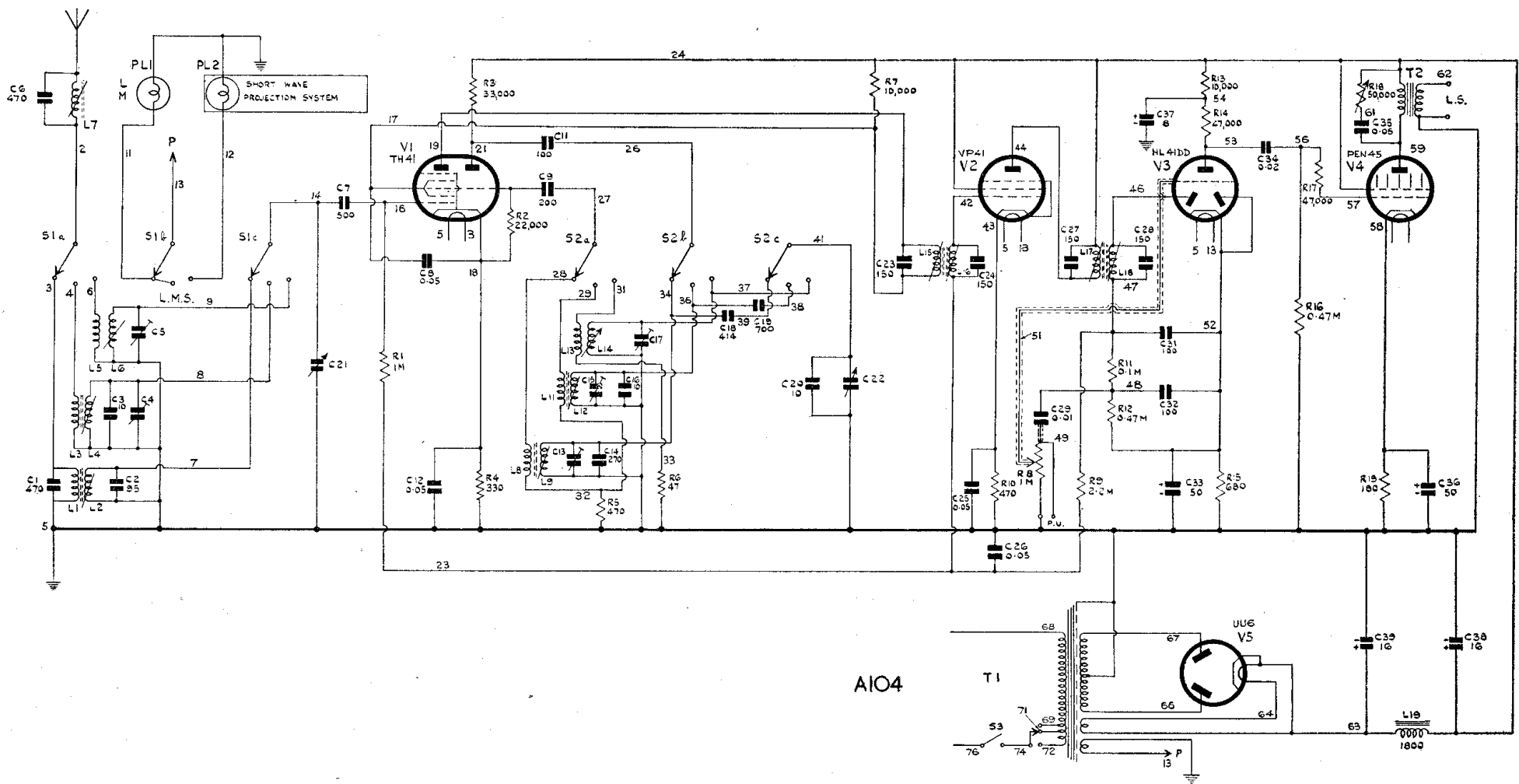
formers were also modified and coded by means of a coloured paint spot. The coding is usually on an inner cheek of one of the transformer units, and after assembling it may not always be immediately visible.

In the cases of Change 2 and Change 3, the output transformer has been moved to the position of the smoothing choke, on the strap below the chassis, and consequently, the choke will be found in the original position of the transformer. The position of the tone control leads should be noted, as any deviation may introduce L.F. instability.

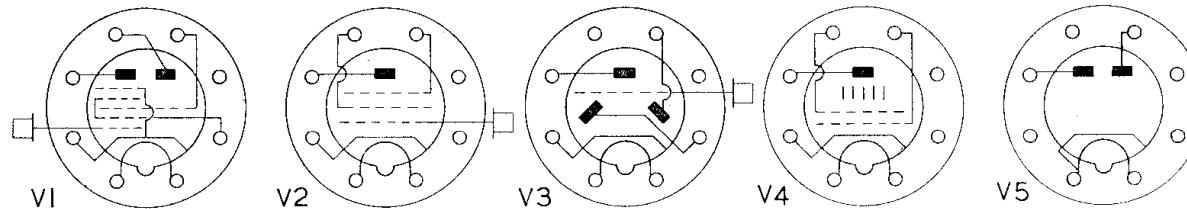
The Murphy 25 Ω pick-up and the Connoisseur pick-up are electrically and mechanically interchangeable though they differ in external appearance.

	PICK-UP	TRANSFORMER	COMPENSATING NETWORK
Original Models	Connoisseur	White spot or no code	As in the Service Instructions
Change I	Connoisseur or Murphy 15 Ω	Coded Red Spot Winding Resistances: Pri: (2.3+2.3)Ω Sec: (1550+1550)Ω	
Change 2 Less than 100 sets	Murphy 15 Ω only	Coded Blue Spot Winding Resistances: Pri: (.4+.4)Ω Sec: (1550+1550)Ω	
Change 3	Connoisseur or Murphy 25 Ω	Coded Yellow Spot Winding Resistances: Pri: (.8+.8)Ω Sec: (1550+1550)Ω	 
		Panel Diagrams (refer to Service Instructions)	

A104



A104



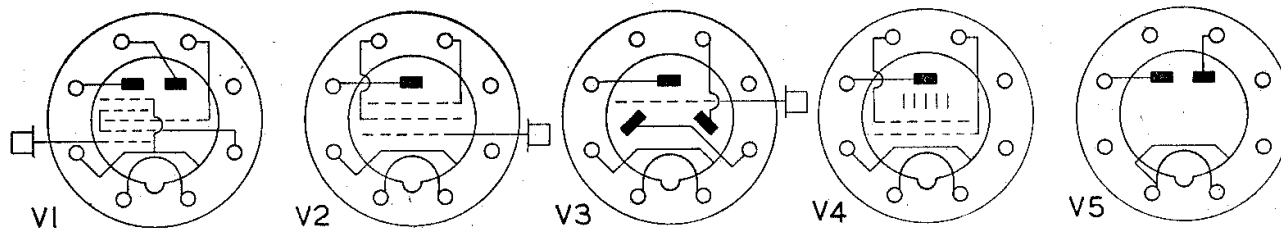
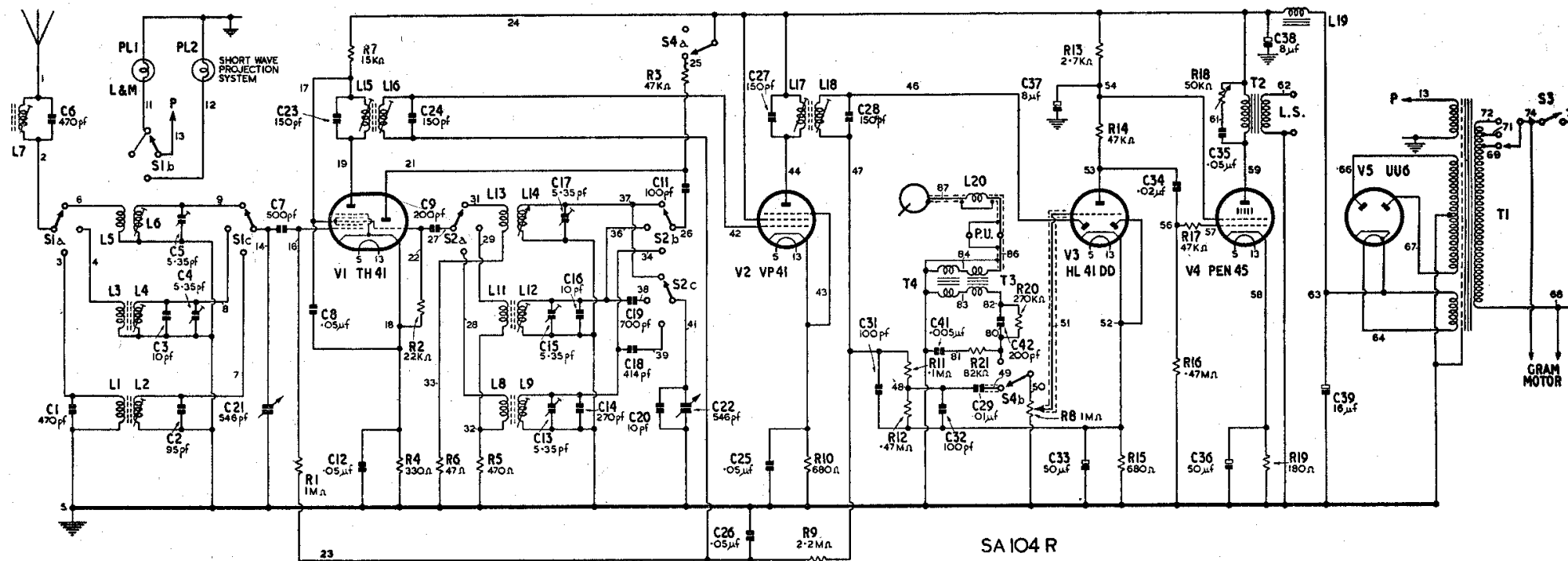
# A104 RECEIVER CIRCUIT

ISSUE 1

Full details of the valves, pilot lamps, wave-range coverage, etc., will be found in the Operating Instructions accompanying the receiver. The I.F. circuits are tuned to 465 Kc/s.

Issued by

MURPHY RADIO LTD, WELWYN GARDEN CITY, HERTS, ENGLAND



## SAI04R RECEIVER CIRCUIT

ISSUE 1

Full details of the valves, pilot lamps, wave-range coverage, etc., will be found in the Operating Instructions accompanying the receiver. The I.F. circuits are tuned to 465 Kc/s.

Since the drawing was produced the following alterations in values have been made. C41 is now 0.0015mfd; R20 is now 0.56M $\Omega$ ; and R21 is now 0.47M $\Omega$ .

Issued by

MURPHY RADIO LTD, WELWYN GARDEN CITY, HERTS, ENGLAND