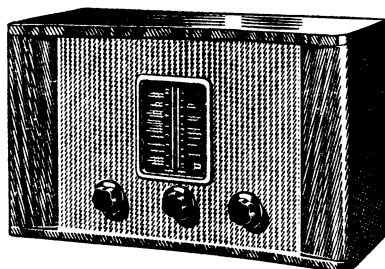


## THE B165 RECEIVER



<b>BATTERY SUPPLY:</b>	111V + 9V. h.t. plus g.b. battery 2 volts accumulator
<b>WAVE RANGES:</b>	LONG: 1000-2050 metres MEDIUM: 182-565 metres
<b>INTERMEDIATE FREQUENCY:</b>	465 Kc/s.
<b>VALVES:</b>	Mazda: TP25, VP23, HL23DD, QP25
<b>PILOT LAMP:</b>	2 volts, 0.06 ampere
<b>SPEECH COIL IMPEDANCE:</b>	3 ohms
<b>EXTENSION LOUDSPEAKER:</b>	3 to 7 ohms
<b>CABINET DIMENSIONS:</b>	11½ in. high, 18½ in. wide, 9¼ in. deep
<b>WEIGHT:</b>	14 lb. (approx.) less batteries
<b>CONSUMPTION:</b>	h.t. 9.5 mA.; l.t. 0.56 A.
<b>RELEASED:</b>	February 1950
<b>PRICE:</b>	£14 14s. 7d. plus P.T.

## ELECTRICAL NOTES

**The waveband coverage.** An exceptionally wide coverage has been provided on the medium waveband by use of a ganged capacitor having a capacitance swing of 580 pF. These units are coded with a red paint spot at the rear, and care should be taken to use the correct component if replacement becomes necessary.

**The output stage.** This receiver has a q.p.p. output stage and, in order to enable it to deliver the greatest possible undistorted output within the limits of the h.t. voltage, battery grid bias is used.

**The h.t. and g.b. battery.** The receiver is designed for use with a combined 111V + 9V battery and the connections are given in the table below, which also shows the original plug colouring.

The h.t. + 1 voltage should never exceed 99 volts.

If it is impossible to obtain a combined h.t. + g.b. battery, a standard 120 volt battery may be used. In this case, the g.b. -ve. plug must be connected to the battery negative socket and the h.t.—ve. plug left disconnected (it should be well insulated). The h.t. + 1 plug should be tapped in at 108 volts and h.t. + 2 plug should be connected to the 120 volt socket. With this method the circuit operates under auto-bias conditions and the resultant voltages are substantially the same as with the recommended battery, but it should be understood that the maximum undistorted output will be considerably less; this will be apparent as obvious distortion if an attempt is made to operate the set at high levels of output.

PLUG CODING	PLUG COLOUR	BATTERY TAPPING	
		Normal	Auto.Bias.
GB-	GREEN	-9V	o
HT-	BLACK	o	Unused
HT + 1	RED	+99V	+108V
HT + 2	YELLOW	+111V	+120V

**H.t. current consumption.** When measuring the total h.t. current consumption, the sum of the currents in the h.t. + 1 and h.t. + 2 leads must be taken and, under “no signal” conditions, should be greater than 8.5 mA but should not exceed 10.5 mA. This method of measurement is necessary since the only current in the h.t. -ve. lead is the difference between the currents in the g.b. and h.t. circuits. Before taking this measurement it is advisable to check for leakage across the h.t. line by removing the valves, inserting a current meter in series with the h.t. + 2 lead, and switching the set “On”. **Warning.** A heavy current surge will take place as the capacitor, C31, charges.

The total current can be brought within the limits quoted above by adjusting the V4 grid bias tap as described below.

**Grid bias adjustment.** *The receiver must be switched off whenever the bias tap is adjusted since an open circuit at this point removes the bias from the output stage and will damage the valve.* To allow for variations between QP25 valves, the grid bias can be adjusted to keep the anode current within the limits specified in the preceding paragraphs. Before making this adjustment, check the h.t. line for leakage current and then, with all the valves replaced, read the h.t. + 2 current with the h.t. + 1 lead disconnected. With an average production model this current was 5 mA (under “no signal” conditions) and any wide difference should be investigated.

With the h.t. + 1 lead replaced, the bias should be adjusted by moving the **connector** (15817) from one to another of the three wires on the bias adjustment panel.

If two taps give total currents that lie between 8.5 mA and 10.5 mA, in the interests of quality of reproduction, the tap giving the higher current should be used.

## MECHANICAL NOTES

**To remove the chassis.** Remove the control knobs and felt washers, the cabinet back, and the batteries. Unsolder the two leads from the aerial and earth panel, and release the three 2 BA nuts which fasten the chassis to the front of the cabinet; one nut is at the top of the scale screen, another is beside the waveband switch, and the remaining one is beside the intervalve transformer (T1). Draw the chassis away from the cabinet front, rest it on the bottom of the cabinet while disconnecting the loudspeaker leads from the output transformer (T2), and then completely withdraw the chassis.

**To fit the chassis.** First check that a 2BA half nut is in place on each one of the lower chassis mounting screws and a 2BA full nut with a plain washer on the upper screw; these space the chassis from the front of the cabinet. Stand the chassis upright just inside the cabinet and connect the loudspeaker leads to tags 42 and 5 on the output transformer. Raise the chassis and fit it against the cabinet front, making sure that the mounting screws are located correctly in the holes at the front of the chassis and at the top of the scale screen. Fasten the 2BA nuts on to the three chassis mounting screws and connect the two leads, from the grommet beside the trimmer, to the aerial and earth panel (the red lead to the upper socket and the black lead to the lower socket). Finally, thread a felt washer on each control spindle and fit the knobs.

**The tuning scale.** When fitting a new scale (55505) make sure that a **channel rubber** (37494) is in place between the glass and each one of the scale clamps.

**The waveband switch.** If the switch requires replacement the **link, for indicator** (48105) may be released by removing the **split pin** (48209). Before fitting a new switch, make sure that with the rotor in the "off" position (i.e. fully anti-clockwise), the arm for operating the indicator link is pointing away from the locating lug on the front of the switch.

**The aerial coil.** The coil former is fastened by a **clamp** (48223) which holds it against a lug bent out from the chassis, a hole in the coil former locating with a projection on the lug. To remove the coil, unsolder the connections, release the clamp and clear it from the lug, then rotate the clamp through 90 degrees so that the coil complete with the clamp may be lifted straight out of the chassis.

**The oscillator coil.** The coil former is fastened to the chassis by two metal **straps** (48193), one end of each strap being threaded through a slot in the chassis and twisted. Backlash in the brass **screw** (48222), which serves to vary the inductance of the long wave winding, is overcome by a **spring, anti-backlash** (48228), which is tensioned against the core by being hooked round the twisted ends of the coil former straps. When replacing the coil see that the notch in the tag end of the former registers with test point 12 in Fig. 3.

**The i.f. transformers.** To examine the capacitors, disconnect the leads to the can, remove the screws fastening the can to the chassis, and withdraw the complete assembly. To examine the coils remove the complete assembly, as above, bend back the tabs fastening the can, and withdraw the can.

## MODIFICATIONS

To overcome instability experienced with some receivers when they were operated under auto bias conditions, C29 was changed from 0.1  $\mu$ F to 0.2

$\mu$ F. (20%, tub., Part No. 41402) and R22 (120 K $\Omega$ , 10%, Part No. 25733) was connected between test points 29 and 31 on the input side of T1.

C	L	R	MISC
			V4
31			
32			T2
			V3
23	11		
24	10		V2
	6		
11	5		V1
12			PL1
		1	
8			
4			
5			
7			
	1 2		
3	3 4		
C	L	R	MISC

BI65

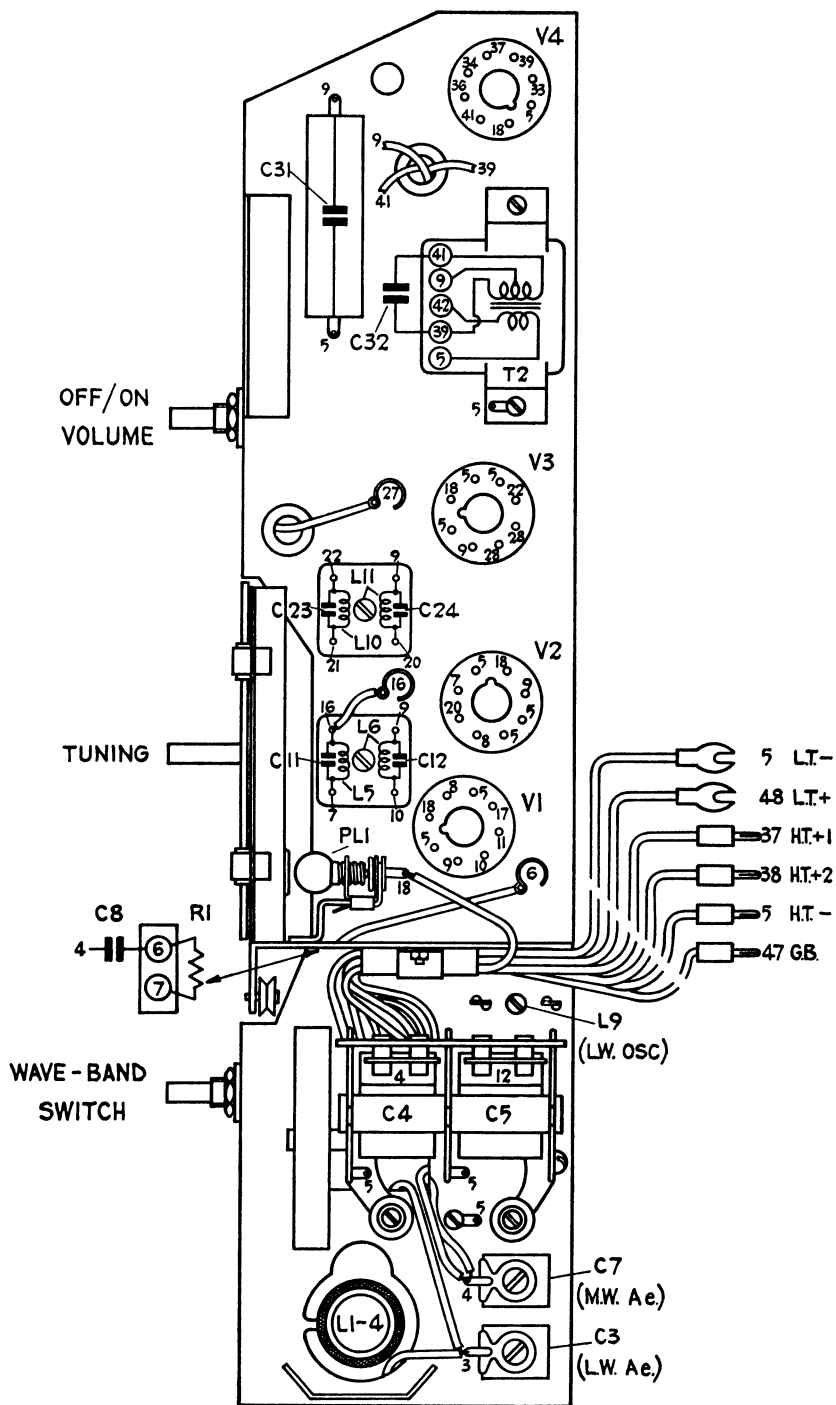


Fig. 1. The layout of the top of the chassis.

## CIRCUIT ALIGNMENT

(The Circuit Alignment Table is on page 8)

**General notes.** For complete re-alignment, the chassis must be removed from the cabinet. All adjustments are made for maximum reading on a low reading alternating voltage meter connected across the loudspeaker speech coil, with the volume control set fully clockwise. Attenuate the signal generator output so that the voltage across the loudspeaker speech coil does not exceed 0.4 volts a.c.

**The i.f. circuits.** A non-metallic screwdriver

must be used for adjustment of the cores in the i.f. transformers. If a core is screwed in too far and becomes disengaged from the thread in the former, remove the opposite core and screw back the loose one into its thread.

**The r.f. circuits.** Before commencing alignment of the oscillator and aerial circuits, check that when the ganged capacitor plates are fully meshed, the cursor registers with the 570 metres calibration mark on the tuning scale.

## AERIAL FILTERS

**General notes.** When a receiver is installed close to a powerful medium wave transmitter, an aerial filter may be required to prevent overloading of the frequency changer and to minimize the generation of whistles during reception of the weaker stations. The following approximate figures may be helpful in deciding if a filter will be required at any particular site.

Transmitter Power (KW):	1	2	10	60	100
Fit filters when distance is less than (miles)	1½	2	4	7	9

Three standard filters are available from Murphy Radio Ltd, Service Department, as follows:

Type	Frequency Range
A	1500-1000 Kc/s (200-300 metres)
B	1000- 700 „ (300-428 „ )
C	700- 500 „ (428-600 „ )

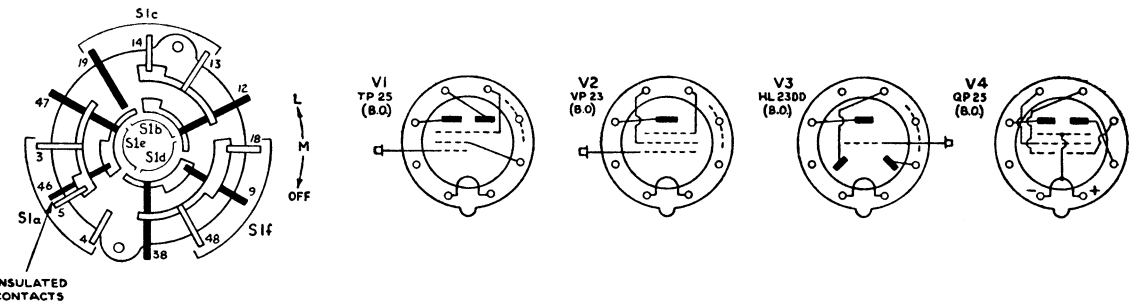
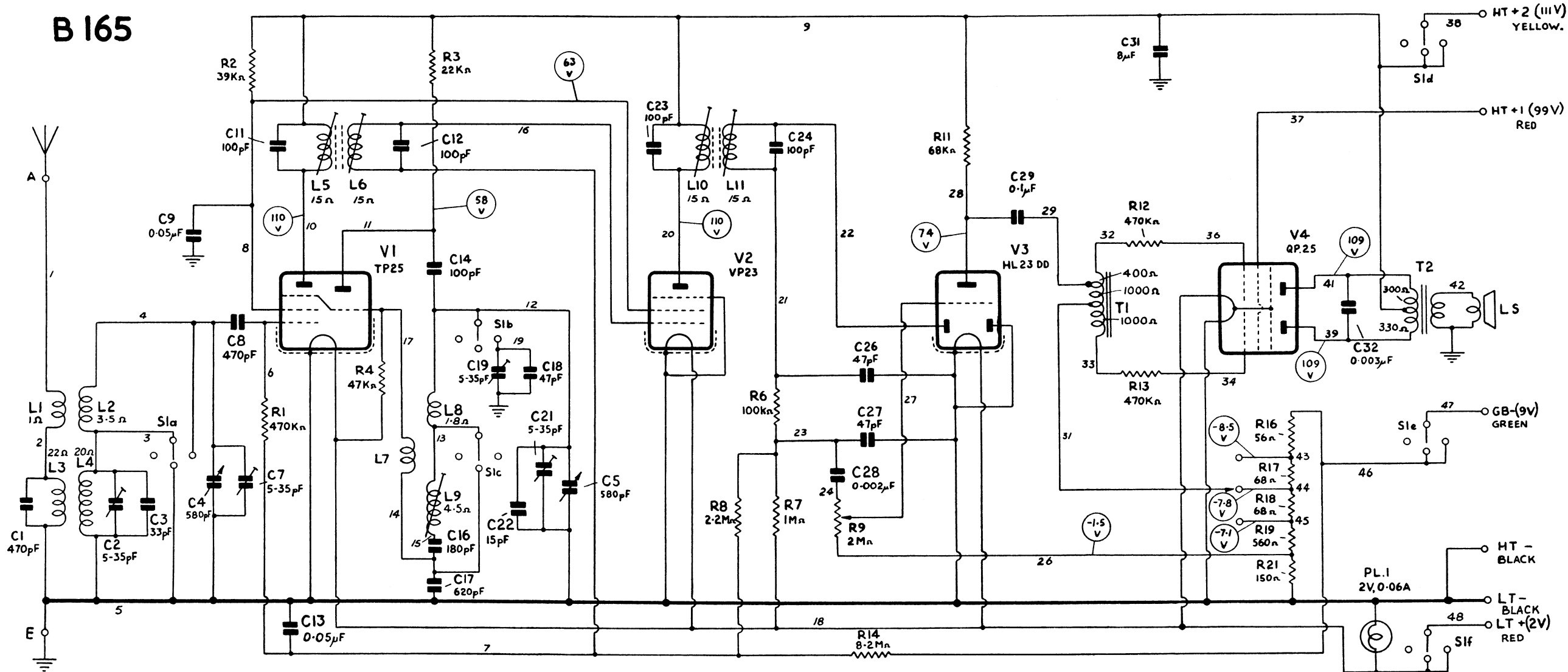
These may be supplied in single units, or the following double units: AA, BB, CC, AB, AC, and BC. When ordering please state the receiver type

and quote the letter or letters required. A **bracket** (50081) for mounting the filter should also be ordered.

**Fitting instructions.** The filter must be attached to the left-hand wooden batten at the rear of the cabinet so that the socket locates centrally behind the ¾ in. diameter hole near the top left-hand corner of the fibre back. First attach the bracket with wood screws, and then fit the filter on to the bracket. Insert the plug, on the end of the flexible lead from the filter, into the receiver aerial socket, and connect the normal aerial to the filter socket.

**Adjustment.** Connect a milliammeter (a 15 mA f.s.d. would be suitable) in series with the h.t. + 2 lead and tune the receiver to the interfering station. Disconnect the h.t. + 1 lead, to prevent the output stage from causing changes in the h.t. current and to make the adjustments more sensitive, and adjust the filter for maximum deflection on the meter.

B 165



Subject to alteration without notice. Issue B.

A 500 ohm/volt meter was used for taking the voltage readings; the receiver was switched to the medium wave band and operating under "no signal" conditions. In those cases where the resistance of a coil is omitted, the value is less than one ohm. The wave range switch is shown in the medium wave position. The switch wafer is viewed from the rear with the chassis upright, the black contacts and inner rotors being on the hidden side.

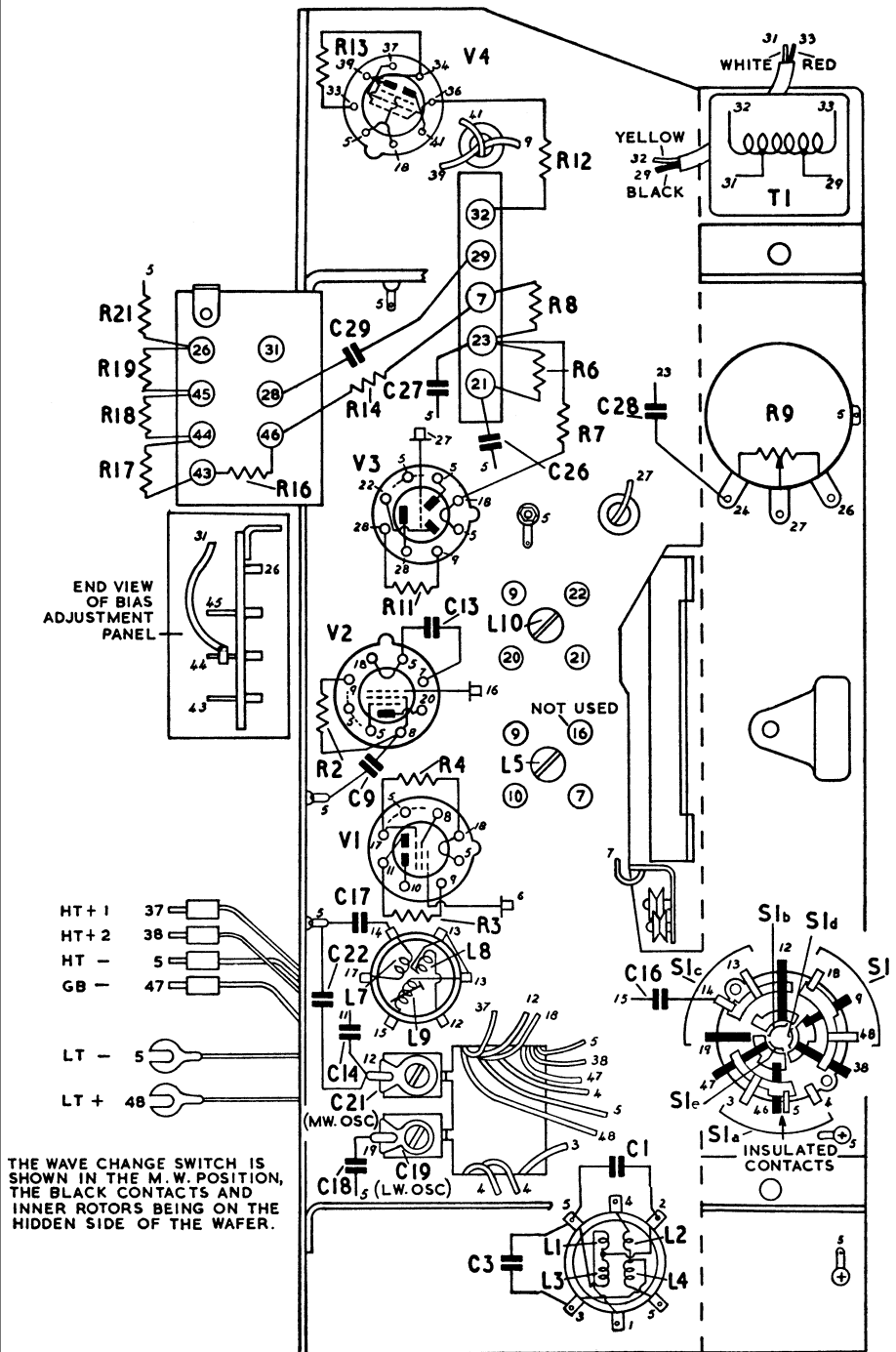
Fig. 2.

## CIRCUIT ALIGNMENT TABLE

Read "Circuit Alignment" on page 5 before proceeding.

CIRCUIT	NOTES	SIG. GEN. FREQUENCY	SIG. GEN. TERMINATION	CONNECT SIG. GEN. TO	RECEIVER SETTING	ADJUSTMENTS
2nd i.f.t.	First unscrew secondary core (top of can) to fullest extent	465 Kc/s	Via 0.1 $\mu$ F. Capacitor	V2 grid 1 (test point 16)	570 metres	L10 (pri.) under chassis L11 (sec.) top of can <b>Do not re-adjust</b>
1st i.f.t.	As above	465 Kc/s	As above	V1 grid 1 (test point 6)	570 metres	L5 (pri.) under chassis L6 (sec.) top of can <b>Do not re-adjust</b>
M.W.	The coils are not adjustable	1363 Kc/s (220 metres)	Dummy Aerial	Aerial (red lead)	220 metres	C21, (osc.) under chassis C7 (ae.) top of chassis
		600 Kc/s (500 metres)	As above	As above	500 metres $\pm 2.5$ metres	
L.W.	The L.W. osc. coil only is adjustable. Repeat these adjustments	158 Kc/s (1900 metres)	As above	As above	1900 metres	L9 (osc.) top of chassis
		300 Kc/s (1000 metres)	As above	As above	1000 metres	C19 (osc.) under chassis C2 (ae.) top of chassis

C	L	R	MISC
		13	V4
		12	T.1
29		21	8
		19	6
27		18	9
28		14	7
		17	V3
26		16	
13	10	11	V2
9	5	2	4
			V1
17		3	
22	8		
16	7		
14	9		SI
21			
19			
18	1		
	1	2	
	3	4	
C	L	R	MISC



B165

Fig. 3. The layout of the underside of the chassis.



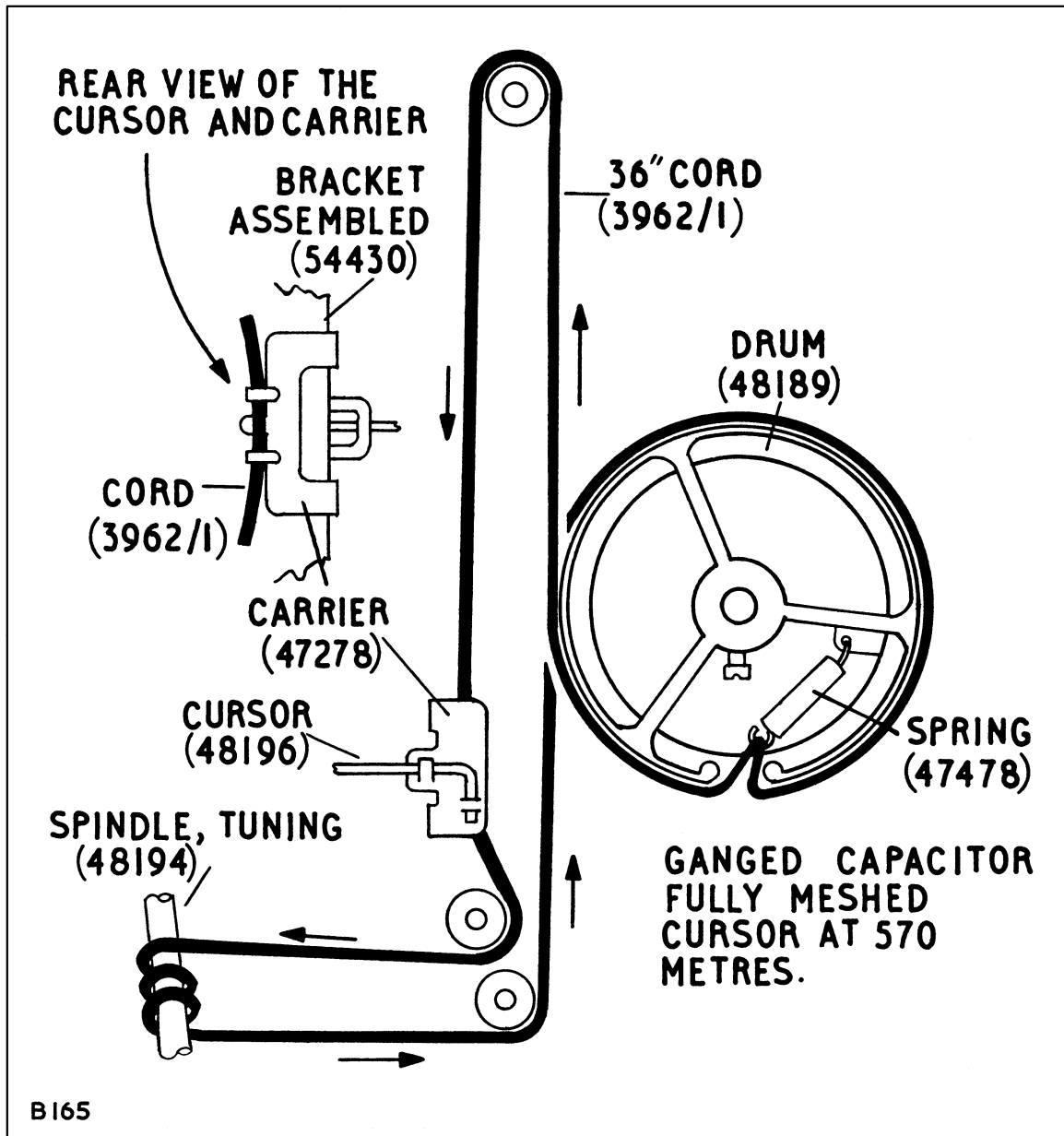


Fig. 4. The cord drive.

## THE CORD DRIVE

To replace the drive cord, hook the spring on to the drum, as shown in Fig. 4, and tie one end of a 36 in. length of cord to the loop at the free end of the spring. Thread the free end of the cord around the drum, pulleys, and tuning spindle, in the direction indicated by the arrows and tie it to the spring, making sure that the spring and cord are under tension.

With the ganged capacitor set at minimum capacitance and the cursor set at approximately  $\frac{1}{16}$  in. from the upper end of its traverse, hook the

cord on to the projections on the carrier as shown, making sure that the cord is pushed up on to the middle projection. With the ganged capacitor fully meshed, check that the cursor is immediately behind the 570 metres calibration point on the scale; reset the cursor if required by gently pushing the carrier along the cord.

Finally, operate the drive a few times through its full traverse, re-check the spring and cord tensions, and re-check the cursor setting at 570 metres with the ganged capacitor fully meshed.

## PARTS LIST (Electrical Components)

All resistors are rated at  $\frac{1}{4}$  watt and all types of capacitors are rated at 350 v.w., unless otherwise stated. The d.c. resistance quoted for the coil and transformer windings is an average figure and should be used as a general guide only; it is omitted where the value is less than one ohm. The coils are supplied without cans or cores, unless otherwise stated.

The following abbreviations are used in the table below:

cer.	—	ceramic	tub.	—	paper tubular
elec.	—	electrolytic	v.w.	—	d.c. voltage working
p.s.m.	—	protected silvered mica			

PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS	PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS
28243	C1	470 pF.	2% p.s.m.				
37480	C2	5-35 pF.	Trimmer (l.w. ae.)	31366	C31	8 $\mu$ F.	+50% -20%, elec., 175 v.w.
23604	C3	33 pF.	10% p.s.m.	51542	C32	0.003 $\mu$ F.	25% tub., 750 v.w.
54500	{ C4 C5	{ 580 pF. 580 pF. }	Ganged capacitor				
37480	C7	5-35 pF.	Trimmer (m.w. ae.)				
54083	C8	470 pF.	20% cer., 500 v.w.	27397	R1	470 K $\Omega$	20%
41403	C9	0.05 $\mu$ F.	20% tub.	25541	R2	39 K $\Omega$	10%
52630	C11	100 pF.	5% p.s.m.	25445	R3	22 K $\Omega$	10%
52630	C12	100 pF.	5% p.s.m.	27205	R4	47 K $\Omega$	20%
41403	C13	0.05 $\mu$ F.	20% tub.	27269	R6	100 K $\Omega$	20%
54070	C14	100 pF.	20% cer., 500 v.w.	27461	R7	1 M $\Omega$	20%
28242	C16	180 pF.	1% p.s.m.	27525	R8	2.2 M $\Omega$	20%
28241	C17	620 pF.	1% p.s.m.	48102	R9	2 M $\Omega$	Volume control
23605	C18	47 pF.	10% p.s.m.	27237	R11	68 K $\Omega$	20%
37480	C19	5-35 pF.	Trimmer (l.w. osc.)	27397	R12	470 K $\Omega$	20%
37480	C21	5-35 pF.	Trimmer (m.w. osc.)	27397	R13	470 K $\Omega$	20%
23602	C22	15 pF.	10% p.s.m.	26437	R14	8.2 M $\Omega$	10%
52630	C23	100 pF.	5% p.s.m.	24453	R16	56 $\Omega$	10%
52630	C24	100 pF.	5% p.s.m.	24485	R17	68 $\Omega$	10%
54066	C26	47 pF.	20% cer., 500 v.w.	24485	R18	68 $\Omega$	10%
54066	C27	47 pF.	20% cer., 500 v.w.	29107	R19	560 $\Omega$	5% high stability
41408	C28	0.002 $\mu$ F.	25% tub., 500 v.w.	29108	R21	150 $\Omega$	5% high stability
41404	C29	0.1 $\mu$ F.	20% tub. (see Modifications)	25733	R22	120 K $\Omega$	10% (see Modifications)
41402		0.02 $\mu$ F.					

PART NO.	CIRCUIT NO.	RESISTANCE (D.C.)	REMARKS	PART NO.	CIRCUIT NO.	RESISTANCE (D.C.)	REMARKS
5442I	{ L1 L2 L3 L4	{ 1 Ω 3·5 Ω 22 Ω 20 Ω	M.w./l.w. ac. coil	54420	{ L7 L8 L9 L10 L11	{ — 1·8 Ω 4·5 Ω 15 Ω 15 Ω	M.w./l.w. osc. coil
52219	{ L5 L6	{ 15 Ω 15 Ω	1st i.f.t.	52219	{ L10 L11	{ 15 Ω 15 Ω	2nd i.f.t.
5443I	T1	2400 Ω	I.v.t.	51275	T2 {	{ 300 + 330 Ω —	{ Pri. Sec. } o.t.

## 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 from Murphy Radio Ltd, Service Department. Where more than one item is used per receiver, the quantity is given in brackets after the description.

PART NO.	DESCRIPTION	REMARKS	PART NO.	DESCRIPTION	REMARKS
54205	Back, for cabinet		48105	Link, for indicator	
54430	Bracket, assembled	for scale screen	54269	Loudspeaker	
48230	Bracket, protection	for aerial coil	44324	Panel, aerial/earth	assembled
50081	Bracket, mounting	for aerial filter	55009	Panel, bias tapping	
55190	Cabinet		16884	Pilot lamp	2 volts, 0·06 amp.
47278	Carrier	for cursor	37974	Plug, aerial	
37494	Channel, rubber (4)	for scale	37975	Plug, earth	
42580	Circlip	for spindle tuning	53474	Plug, HT + 1	
46149	Clamp (4)	for escutcheon	53475	Plug, HT + 2	
37569	Clamp, for scale (2)		53477	Plug, HT —	
14337	Clamp	for C.31	53476	Plug, GB —	
48223	Clamp	for aerial coil	48191	Rivet (2)	for link and disc indicator
14330	Clamp	for battery leads			
37385	Clip	for loudspeaker leads	55505	Scale	
6678	Clip (3)	for valve caps	54011	Screen, for scale	
15817	Connector, clip	for bias tapping	702087	Screw (4)	for escutcheon
3962/1	Cord	for tuning drive	10417	Screw, grub (3)	for knobs
48196	Cursor	for scale	48222	Screw	osc. coil trimming
48190	Disc, indicator	for switch	14711	Spacer, mounting	for bias tapping panel
48189	Drum	for ganged capacitor	33509	Spade, terminal (2)	for l.t. leads
53756	Escutcheon		48194	Spindle, tuning	
15633	Eyelet (2)	for V3 holder	48209	Split pin	for switch link
1829/10	Fabric	for baffle	47478	Spring	for cord drive
3681/b	Felt, adhesive	for cabinet base	48228	Spring, anti-back-lash	for screw (48222)
50060	Foot, front	for ganged capacitor	48193	Strap, fixing (2)	for osc. coil
37563	Foot, rear	for ganged capacitor	48103	Tray, for accumulator	
42844	Grommet (2)	for V3 holder	3975	Valve holder (3)	for V1, V2, V4
48278	Grommet (3)	for ganged capacitor	48639	Valve holder	for V3
42842	Grommet (3)	for chassis leads	34588	Washer, felt (3)	for knobs
54432	Indicator, plastic	for pilot lamp	48195	Washer, spring (2)	for disc indicator
55589	Knob (3)		34611	Washer, bakelite	for loudspeaker leads
54222	Label	"Discard screw"	54429	Wave-band switch	
48496	Lampholder				