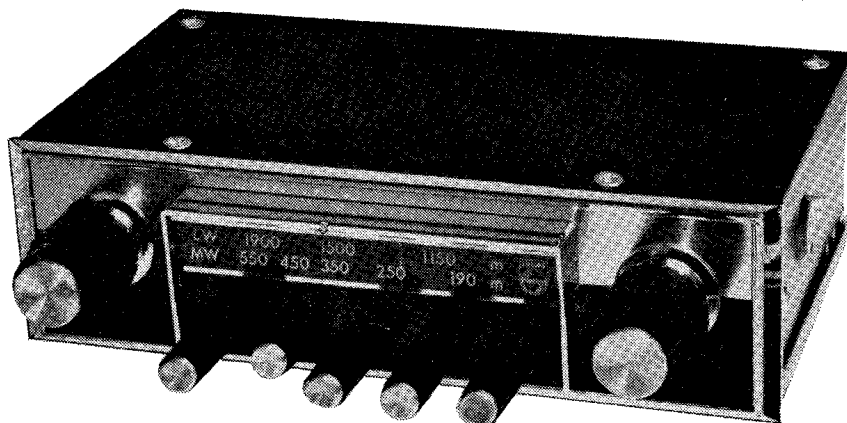


# SERVICE INFORMATION FOR THE

# PHILIPS

## CAR RADIO — Type 13RN368



### INTRODUCTION

The 13RN368 is a two waveband (M.W. and L.W.) push-button car radio designed for operation from a 12 volt positive or negative earth supply. Five rotatable push-buttons are provided for tuning. A 5 pin DIN socket is fitted on a 10" fly-lead to the rear of the case for tape recording and playback using the Philips NP1630 car tape recorder. The same socket is used in conjunction with the Philips AG2101 Auto-Mignon car record player, the N2600 tape cassette player, or other battery operated record players having connections for playing through an external amplifier (see section D.) The loudspeaker required for use with this receiver should have an impedance of 5Ω.

### A—INSTALLATION

Special mounting kits covering most makes of cars are available from the General Sales Division of Philips Electrical Limited.

### B—SPECIFICATION

Transistor types		Function
T1	AF117	R.F. amplifier
T2	AF117	Mixer/oscillator
T3	AF117	I.F. amplifier
T4	AC127	A.F. amplifier
T5	AC128	Driver
T6	AD149	Output
Diode types		Function
X1	OA79 or AA119	A.G.C.
X2	OA70 or OA90	Detector
Dial lamp		14 volt L.E.S.
Power supply		12 volts (either pole earthed)
Consumption		1 amp.
Fuse rating		2 amps.
Output		3 watts
Waveband ranges	M.W.	185–585 metres
	L.W.	1,200–2,000 metres
Dimensions		Height 2". Width 7". Depth 4".
Weight		2½ lbs.

---

**COMBINED ELECTRONIC SERVICES LTD.**

**QUEENSWAY WADDON FACTORY ESTATE CROYDON CR9 4DR**

**TELEPHONES :**

Spare part orders: 01-686 7311

General service enquiries: 01-688 7722

**After business hours:** Recorded messages on both lines

**TELEX:** 262308

## C—TRIMMING INSTRUCTIONS

### (a) General

Output should be observed with an output meter set for 5Ω load, trimming level 500mW. Disconnect the loudspeaker, set the volume control to maximum and the tone switch to 'normal'.

### (b) Adjustment of C18

To decrease the capacity of C18, carefully unwind the wire from the ceramic tube until the correct tuning point is reached, then cut off the surplus wire (capacity should not be increased by rewinding the wire). If more capacity is required, C18 must first be replaced with a new capacitor of the same type (see spare parts list). With C18 fully wound (max. capacity) proceed as above.

### I.F. alignment

Connect the signal generator via a 470KpF capacitor to the collector of T1. Switch to M.W. and set the pointer to the high frequency end of the scale. Inject a signal of 470kHz, 30% modulation, and adjust the cores of L13-14, L11/12 and L9-10, in that order, for maximum output.

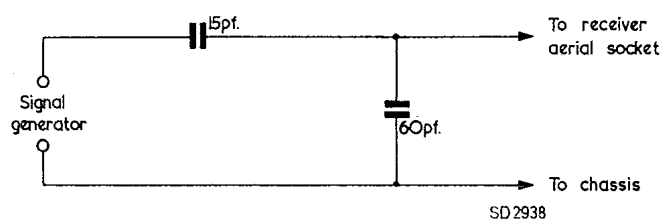


Fig. 1. Dummy Aerial

### R.F. alignment

Switch to M.W. and tune to minimum inductance. Inject a signal of 1,620kHz from the generator to the collector of T1 via a 470KpF capacitor and trim C20 for maximum output. Switch to L.W. and tune to maximum inductance, reset the generator to 148kHz and trim C18 for maximum output (see para. (b) above). Remove the 470KpF capacitor from T1 and reconnect the generator to the aerial socket via the dummy aerial (see Fig. 1). Set the generator to 1,500 kHz, switch to M.W. and tune in the receiver, then trim C11 and C1 for maximum output. Switch to L.W., retune the generator to 190kHz and tune in the receiver, then trim L2 and L4 for maximum output.

## D—CONNECTIONS TO THE TAPE SOCKET

The car radio is provided with a shorting plug for the tape socket which, when fitted, connects the detector output at pin 1 to the volume control feed at pin 2. When external tape recorders or

record players are used in conjunction with the car radio, the shorting plug must be removed but not discarded. Its use will be required to enable the radio to operate when external apparatus is disconnected, or in cases where the apparatus does not incorporate a radio/gram switch. The polarity of the supply voltage at pin 4 of the tape socket is not affected by the polarity adjustment plug on the radio, but remains the same as the car battery.

### Connecting the AG2101D (car record player) to the tape socket

The connecting cable from the AG2101D is terminated in a 5 pin DIN plug. Check that the connections to this plug are as shown in Fig. 2. It may be necessary to reverse the leads to pins 1 and 4. Next, check that the voltage and polarity of the motor is correctly adjusted, then remove the shorting plug from the tape socket and in its place connect the DIN plug from the record player. The extension cable and socket assembly supplied with the player is not required.

### Connecting the NP1630 car tape recorder (with the EL3794D/00, EL3794D/00A, or EL3794D/00B mounting unit) to the tape socket.

The mounting unit EL3794D/00 may be connected to the tape socket using the socket and cable assembly supplied with the unit, in conjunction with a 5 pin DIN plug (Code No. 978/5×270). The cable should be wired to the DIN plug as shown in Fig. 2, then the unit may be connected to the tape socket.

The mounting unit EL3794D/00A is fitted with a connecting cable terminated in a 5 pin DIN plug for connection to the tape socket. Modification of the pin connections to the DIN plug must be made before connecting the unit to the radio, as follows: Dismantle the DIN plug and reverse the leads to pins 1 and 4. The wiring of the plug should then appear as shown in Fig. 2.

The mounting unit EL3794D/00B is wired to the DIN plug as shown in Fig. 2, and may be connected directly to the tape socket.

The N2600 tape cassette player may be connected directly to the tape socket on the radio without alteration to the wiring of the plug.

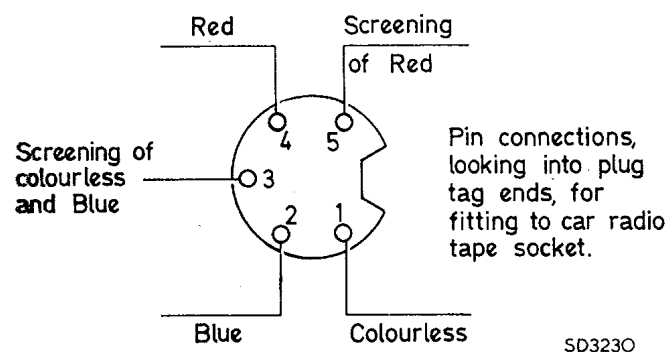


Fig. 2.

## E—MAINTENANCE NOTES

### 1. Removal of the cover plates

To remove the top cover plate, withdraw the four screws from the top of the plate which may then be lifted off. The bottom cover plate is removed in the same way.

### 2. Removal of the escutcheon and scale assembly

Pull off the volume, tone and wavechange knobs, remove the ornamental bushes (pull and unscrew action) and unscrew the nuts from each spindle. The chromium escutcheon together with the scale may now be withdrawn.

### 3. Scale lamp replacement

Remove the escutcheon and scale assembly (see para. 2 above) and detach the scale backplate to gain access to the lamp.

### 4. Removal of the push-button unit

Unsolder six leads from the unit, pull off the five push-button knobs and unclip the pointer. Withdraw the two screws and spacers which secure the unit to the rear of the case, and the two screws securing the front of the unit. The push-button unit complete, may now be lifted clear of the case.

### 5. Printed panel

To gain access to components on the printed panel, remove the push-button unit as described in para. 4 above.

### 6. Tone switch mechanism

To remove the moulded switch link, gently unclip the lever from the switch slider and the switch operating lever.

### 7. Wavechange mechanism

To remove the wavechange moulded link, gently unclip the link from the wavechange switch slider. Remove the circlip from the rear end of the operating spindle, and withdraw the two rear bracket securing screws. Pull the spindle forward  $\frac{1}{4}$ " and move the bracket sideways  $\frac{1}{8}$ ", allowing the moulded link to disengage the moulded cam (care should be taken to ensure that the two steel balls in the

cam do not drop out). The moulded link may now be removed. Reassemble in reverse order.

### 8. Replacing the output transistor T6

When replacing the output transistor T6, a coating of silicone grease (DP2623) should be applied to both sides of the mica insulating washer.

## F—ADJUSTMENTS

### 1. Push-buttons

To preset the push-buttons proceed as follows:— Set the wavechange switch to the appropriate waveband, then depress one of the push-buttons and tune in the desired station by rotating the depressed button. The remaining four buttons may be preset in the same way.

### 2. Polarity adjustment

To adjust the receiver for positive earth operation, insert the polarity plug with the arrow on the back of the plug pointing towards the + sign (see Fig. 3). For negative earth operation, remove the polarity plug, rotate it anti-clockwise through 90°, then reinsert with the arrow pointing to the — sign.

### 3. Adjustment of T6 collector current (R27)

Connect the receiver to a 14.5 volt supply, no signal input. Insert a milliammeter in series with the collector of T6 and adjust R27 to obtain a collector current of 630mA.

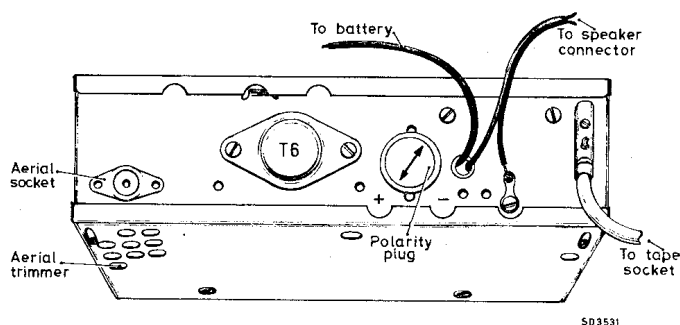
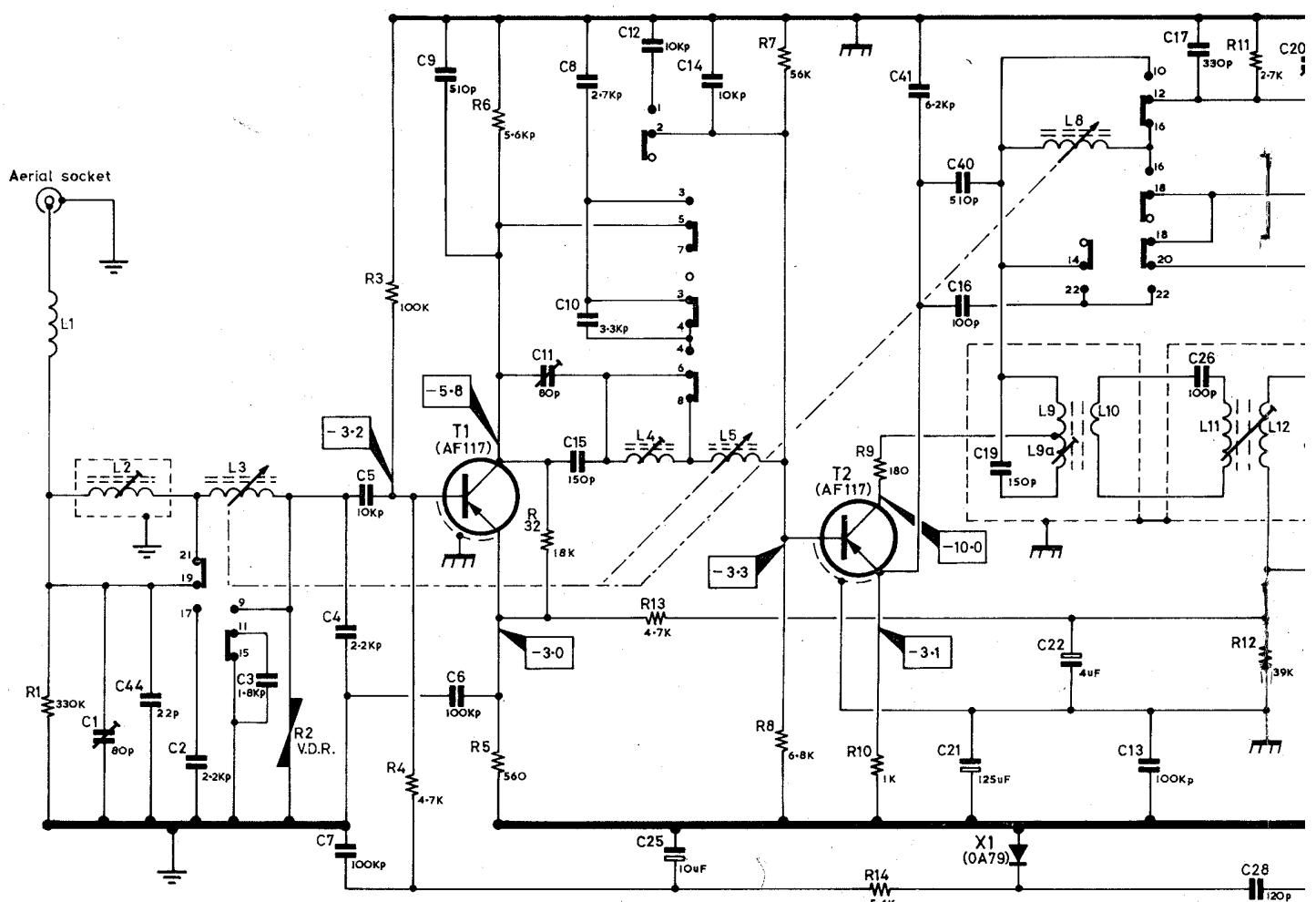


Fig. 3.

## D.C. RESISTANCE OF COILS

Coil No.	Ohms	Coil No.	Ohms
L1	1	L10	<1
L2	6	L11	16.2
L3	8	L12	<1
L4	5.8	L13	2.2
L5	3.5	L13a	8
L6	6	L14	1.5
L7	5.4	L15	1.6
L8	8	L16	<1
L9	5.2	L18	<1
L9a	7		

C	1.	44.	2.	3.	4.	5.	6.	9.	11.	8.	10.	12.	14.	41.	40.	19.	21.	22.	13.	17.	26.	28.	
R	1.		2.	3.	4.	5.	6.	32.	13.	7.	8.	9.	10.	14.								11.	12.
MISC	L1.	L2.	L3.				T1.		L4.	L5.		T2.					X1.	L8.	L9.	L9a.	L10.	L11.	L12.

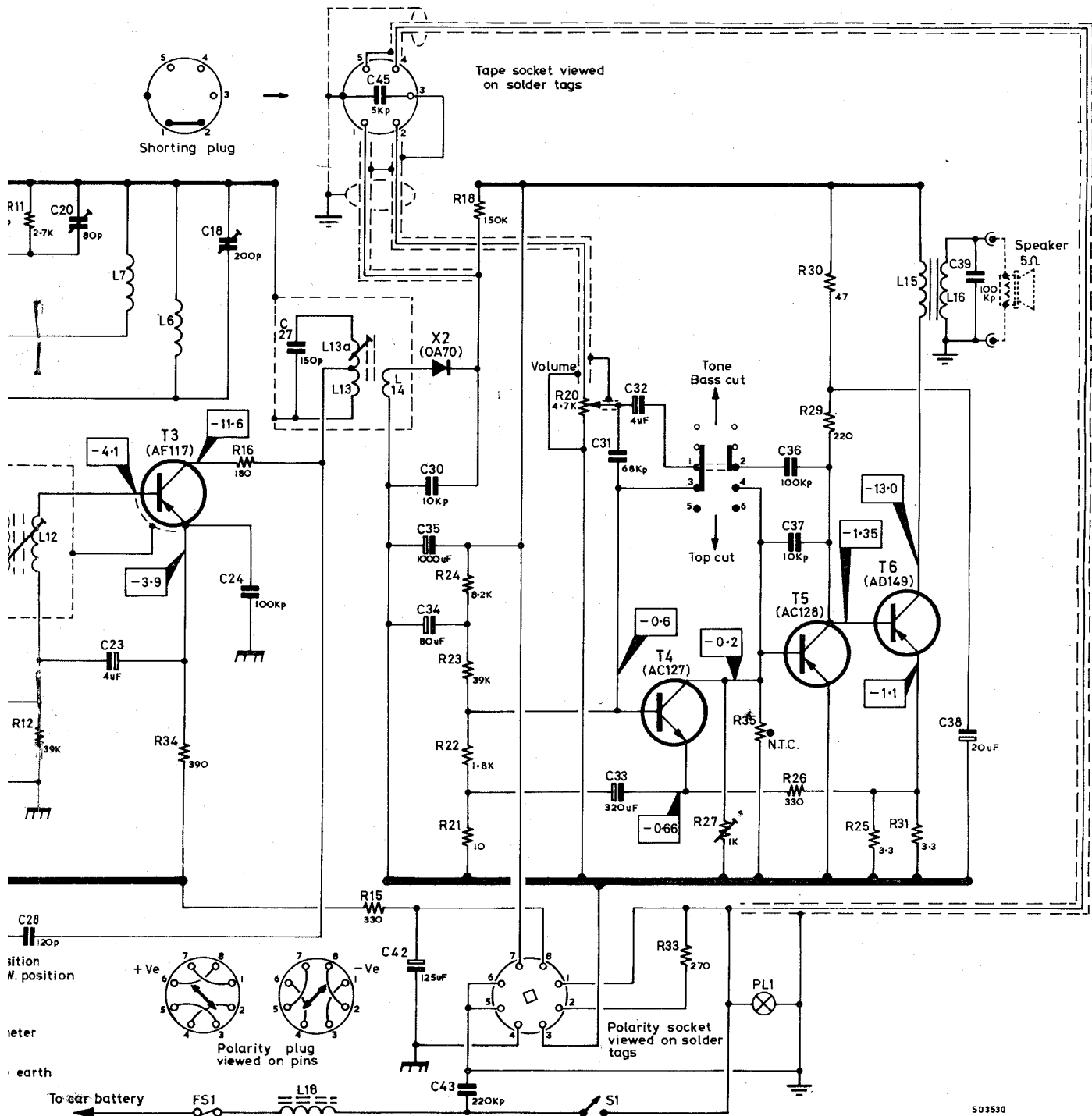


Tone switch shown in normal position  
Wavechange switch shown in M.W. position  
Indicates negative line  
Indicates case  
Voltages taken with a 100K $\Omega$ /V meter  
+Ve lead to receiver case  
No signal input  
Voltage supply 14.5V.D.C. positive earth

**NOTE :** Additional capacitor C46, 100KpF, connected between T6 collector and case (some sets only).

Fig. 4. CIRCUIT

20.	23.	18.	24.	27.	45.	30.	32.	36.	39.	C <sup>f</sup>
28.	11.				42.	35.	31.	37.	38.	
12.		34.	16.	15.		24-18.	20.	35.	30.	R
						23.		26.	29.	
						21.		33.	27.	MISC
									31.	
11. L12.	L7.	L6.		L13a.	X2.				L15. L16.	L17.
	T3.	F1.	L18.	L13.	L14.	S1.	T4.	PL1.	T5.	T6.



CIRCUIT DIAGRAM

C	1.	44.	6.	11.	7.	2.	3.	9.	18.	10.	40.	16.	25.	28.	27.	21.	34.	38.	37.	43.	39.	35.	C
			15.	5.	20.	4.	12.	14.	26.	13.		41.		23.	24.	22.	30.	33.	31.	32.		45.	
R			32.	4.	1.		2.		8.	9.	7.	14.	34.	10.	16.	12.	18.	33.	29.	31.	25.	20.	R
			6.	5.	3.	11.						15.		22.	21.	23.	24.	30.	26.	35.			
Misc	L1.		T1.			L2.			L12.	L7.	L6.	T6.	T3.	L13.	L14.	X1.	X2.	T5.	T4.	S1.	L18.	L16.	Misc
						L3.	L8.	L5.	L10.	L9.	L9a.	L4.	T2.					PL1.					

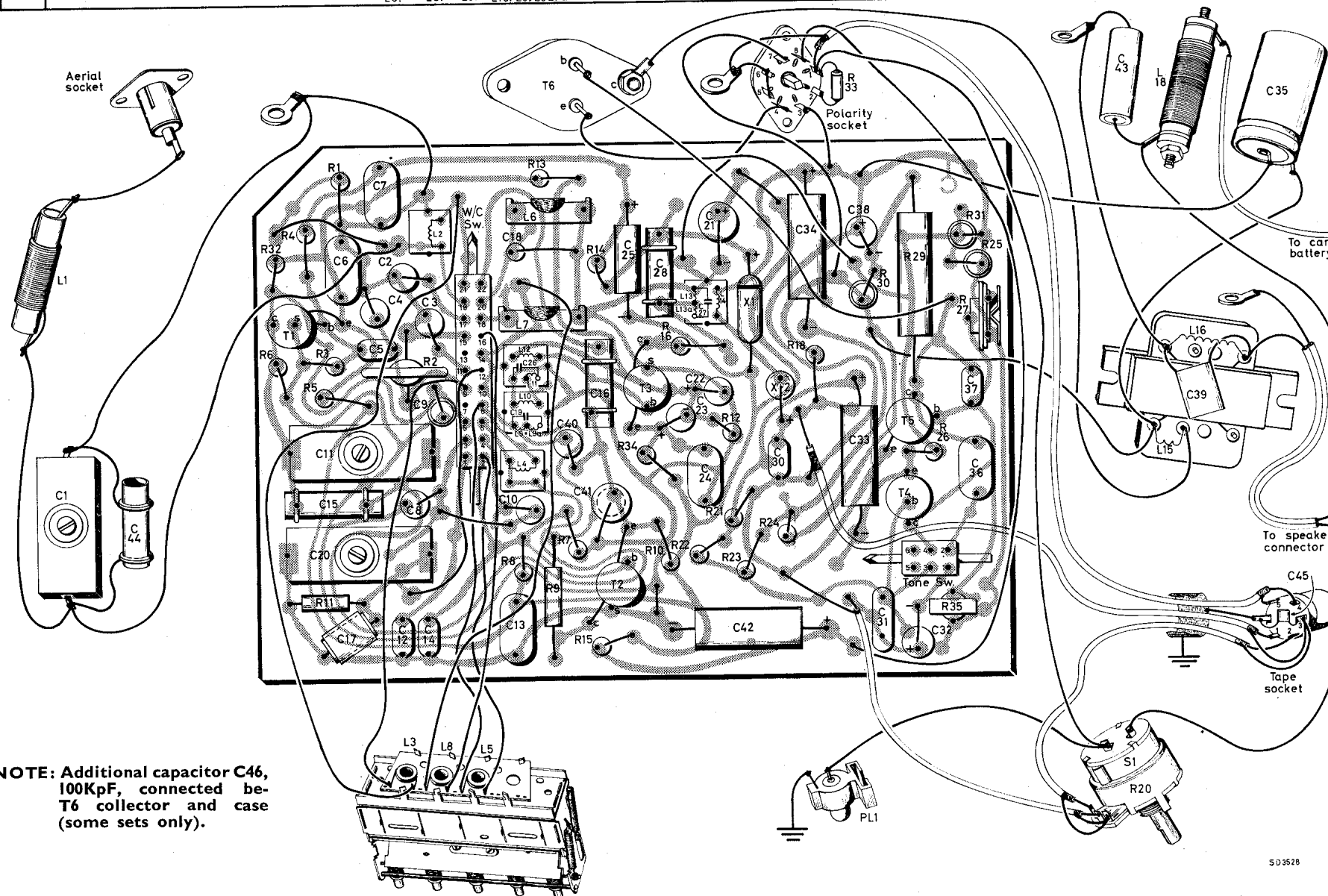


Fig. 5. WIRING DIAGRAM

## SPARE PARTS LIST

**SUPPLY OF SPARE PARTS:** To ensure correct interpretation of requirements, please include the following information on orders for spare parts.

1. The full type number recorded on the type number plate, including any suffix. **Do not use the commercial abbreviations which may be misleading.**
2. Whenever possible, quote the serial number of the car radio. In some models the components have been changed during production.
3. **Always give a brief description** and colour where applicable.
4. Quote part number.

If it is necessary to return components, always include full identification on the accompanying advice note.

### CASE ASSEMBLY

1	Top cover ... ..	3113.108.12550
2	Bottom cover ... ..	3113.108.12540
3	Screw for items 1 & 2 (8) ... ..	B070.ZZ/861
4	Ornamental plate—black ... ..	3113.105.11750
5	Ornamental plate—silver ... ..	3113.105.11760
6	Ornamental plate—black and silver ... ..	3113.105.11620
7	Escutcheon for scale ... ..	3113.108.12570
8	Nut retaining items 4, 5, 6 and 7 (2) ... ..	3113.101.61560
9	Ornamental bush for item 8 (2) ... ..	3113.108.12590
10	Station scale ... ..	3113.105.00860
12	Polarity warning label ... ..	3113.106.03640

### CONTROL KNOBS

15	Volume and On/Off ... ..	3113.108.12610
16	Spring clip for item 15 ... ..	MK.752.00
17	Tone ... ..	3113.104.05280
18	Waveband—small ... ..	3113.108.12600
19	Spring clip for item 18 ... ..	MK.991.81
20	Waveband—large ... ..	3113.104.05260
21	Push button (5) ... ..	3113.108.12580
22	Spring clip for item 21 (5) ... ..	3113.101.01210

### PUSH BUTTON UNIT

25	Push button unit complete ... ..	3113.108.52620
26	Spindle compression spring (5) ... ..	FS.180.43
27	Spring for latch bar (2) ... ..	FS.180.46
28	Screw for item 25 (2) 8BA $\times \frac{1}{4}$ " ... ..	B808.AD/8N $\times \frac{1}{4}$ "
29	Lockwasher for item 25 (2) 2.6mm. ... ..	B053.AD/2.6
30	Spacer for item 25 (2) ... ..	3113.101.61550
31	Screw for item 25 (2) 6BA $\times 2$ " ... ..	B808.AD/6N $\times 2$ "
32	Lockwasher for item 25 (2) 6BA ... ..	B051.TD/6N
33	Pointer ... ..	3113.108.12520

### TONE SWITCH ASSEMBLY

40	Switch ... ..	3113.108.40420
41	Spindle assembly ... ..	3113.108.12480
42	Moulded switch link ... ..	3113.104.05200
43	Cover for item 40 ... ..	3122.993.31280
44	Metal switch lever ... ..	3113.101.24390
45	Spring and pin for item 44 ... ..	3113.108.12470
46	Screw for item 44 ... ..	B070.AD/5N $\times \frac{1}{4}$ "
47	Steel ball ... ..	89.205.02

### WAVEBAND SWITCH ASSEMBLY

50	Switch ... ..	3113.108.40360
51	Spindle ... ..	3113.101.24730
52	Moulded link ... ..	3113.104.05920
53	Moulded cam ... ..	3113.104.05910
54	Circlip—rear—for item 51 2.3 mm. ... ..	B108.AF/2.3
54a	Circlip—front—for item 51 4mm. ... ..	B108.AF/4
55	Spring for item 52 ... ..	3113.101.01290

56	Steel ball (2) ... ..	89.205.02
57	Cover for item 50 ... ..	3122.993.31310
58	Mounting bracket ... ..	3113.101.24720
59	Screw for item 58 (2) No. 5 $\times \frac{3}{16}$ ST ... ..	B070.AD/5N $\times \frac{3}{16}$

### CHASSIS ASSEMBLY

65	Diffusion screen ... ..	3113.108.13910
66	Front mounting plate ... ..	3113.108.12450
67	Mounting bracket for R20 ... ..	3113.108.13320
68	Screw for above (2) No. 5 $\times \frac{1}{4}$ ST ... ..	B070.AD/5N $\times \frac{1}{4}$
69	Lampholder ... ..	MK.957.84
70	Holder for T1 ... ..	3113.104.05180
71	Aerial socket ... ..	3113.100.20000
72	Plug for item 71 ... ..	978/3 $\times$ 40
73	Polarity socket ... ..	3113.108.70870
74	Plug for item 73 ... ..	3113.108.70880
75	Solder tag (4) 3mm. ... ..	B201.AF/3
76	Rivets for items 70/71/73/75 (8) ... ..	B002.AF/3 $\times$ 0.3 $\times$ 5
77	Spring clip for C35 ... ..	3113.101.01230
78	Rivet for item 77 ... ..	B014.TD/11N $\times \frac{3}{16}$
79	Washer 3mm. for item 77 ... ..	B050.AD/3
80	Screw 3 $\times$ 6mm. ... ..	B054.ED/3 $\times$ 6
81	Lockwasher 3mm. ... ..	B053.AD/3
82	Nut ... ..	B020.ED/3
83	Screw (2) 3 $\times$ 10mm. ... ..	B054.ED/3 $\times$ 10
84	Washer Plain (2) 3mm. ... ..	B050.AD/3
85	Lockwasher (2) 3mm. ... ..	B053.AD/3
86	Nut (2) 3mm. ... ..	B020.ED/3
87	Mica washer ... ..	56201B
88	Nylon bush (2) ... ..	56201A
89	Screw 3 $\times$ 40mm. ... ..	999/3 $\times$ 50
90	Insulating bush (2) ... ..	3113.104.00050
91	Plain washer 3mm. ... ..	B050.CD/3
92	Lockwasher 3mm. ... ..	B053.AD/3
93	Nut 3mm. ... ..	B020.ED/3
94	Solder tag (2) ... ..	960/4.3
95	Screw (2) 3 $\times$ 8mm. ... ..	B054.ED/3 $\times$ 8
96	Lockwasher (2) 3mm. ... ..	B053.AD/3
97	Nut (2) ... ..	B020.ED/3
98	Speaker lead assembly ... ..	3113.108.70100
99	Battery lead—receiver end ... ..	3113.108.70390
100	Battery lead—car end ... ..	3113.108.02300
101	Lead and plug—tape input ... ..	3122.108.16810
102	Connection plug for item 101 ... ..	978/5 $\times$ 270
103	Shorting pug for item 101 ... ..	3122.300.20510
104	Clamp for item 101 ... ..	MK.070.58
105	Screw for item 104 3 $\times$ 10mm. ... ..	B054.ED/3 $\times$ 10
106	Screw for rear bracket (2) No. 5 $\times \frac{1}{4}$ ST ... ..	B070.AD/5N $\times \frac{1}{4}$

### PRINTED PANEL

111	Screw for printed panel (3) ... ..	B070.AD/5N $\times \frac{1}{4}$
116	Solder tag (9) ... ..	A3.157.38
117	Sleeving ... ..	K558.LB/size
118	Mounting bush for Caps. and Res. (12) ... ..	MK.146.47

### FUSE AND LAMP

PL1	Lamp ...	...	...	...	...	...	...	...	...
FS1	Fuse 2 AMP	...	...	...	...	...	...	...	...

PP4767  
974/2000

### TRANSISTORS AND DIODES

T1	...	...	...	...	...	...	...	...	...
T2	...	...	...	...	...	...	...	...	...
T3	...	...	...	...	...	...	...	...	...
T4	...	...	...	...	...	...	...	...	...
T5	...	...	...	...	...	...	...	...	...
T6	...	...	...	...	...	...	...	...	...
X1	...	...	...	...	...	...	...	...	...
X2	...	...	...	...	...	...	...	...	...

AF117  
AF117  
AF117  
AC127  
AC128  
AD149  
OA79 or AA119  
OA70 or OA90

### COILS AND TRANSFORMERS

L1	Aerial filter coil	...	...	...	...	...	...	A3.115.77
L2	Aerial loading coil L.W.	...	...	...	...	...	...	3113.108.22760
L3/5/8	Tuner unit	...	...	...	...	...	...	3113.108.52620
L4	R F loading coil L.W.	...	...	...	...	...	...	3113.108.22760
L6	Oscillator loading coil L.W.	...	...	...	...	...	...	3113.108.22840
L7	Oscillator loading coil L.W.	...	...	...	...	...	...	3113.108.22830
L9/10	1st I.F. coil	...	...	...	...	...	...	3113.108.22770
L11/12	2nd I.F. coil	...	...	...	...	...	...	3113.108.22780
L13/14	3rd I.F. coil	...	...	...	...	...	...	3113.108.22790
L15/16	Output transformer	...	...	...	...	...	...	3103.118.30440
L18	R.F. filter choke	...	...	...	...	...	...	MK.550.31

### CAPACITORS

		Value pF	
C1	Trimmer	80	3113.108.05080
C2	Styroflex	2.2K	2012.303.00595
C3	Styroflex	1.8K	2012.303.00533
C4	Styroflex	2.2K	2012.303.00595
C5	Ceramic	10K	MK.199.27
C6	Ceramic	100K	BI.532.32
C7	Ceramic	100K	BI.532.32
C8	Styroflex	2.7K	MK.999.16
C9	Styroflex	510	069.00557
C10	Styroflex	3.3K	069.00554
C11	Trimmer	80	MK.211.32
C12	Ceramic	10K	MK.199.27
C13	Ceramic	100K	BI.532.32
C14	Ceramic	10K	MK.199.27
C15	Ceramic	150	C304.GH/C150E
C16	Ceramic	100	C304.GH/A100E
C17	Styroflex	330	I21.50045
or C17	Ceramic	300	I20.11094
C18	Trimmer	45—275	907/45E-275E
C19	...	150	In L9/10
C20	Trimmer	80	MK.211.32
C21	Elco	125uF	C426.AR/E125
C22	Elco	4uF	C426.AR/G4

		Value pF	
C23	Elco	4uF	C426.AR/G4
C24	Ceramic	100K	BI.532.32
C25	Elco	10uF	C426.AR/E10
C26	...	100	In L11/12
C27	...	150	In L13/14
C28	Ceramic	120	C304.GH/B120E
C30	Ceramic	10K	MK.199.27
C31	Foil	68K	C280.BE/A68K
C32	Elco	4uF	C426.AR/G4
C33	Elco	320uF	C426.AR/A320
C34	Elco	80uF	I24.20216
C35	Elco	1,000uF	MK.185.60
C36	Ceramic	100K	MK.199.29
C37	Ceramic	10K	MK.199.27
C38	Elco	20uF	C426.AR/E20
C39	Ceramic	100K	BI.532.32
C40	Styroflex	510	069.00557
C41	Polystyrene	6.2K	C295.AA/C6K2
C42	Elco	125uF	C426.AR/E125
C43	Polyester	220K	906/L220K
C44	Ceramic	22	C304.GH/A22E
C45	Ceramic	5K	069.006.27
C46	Foil (some sets only)	100K	2022.303.00003

### RESISTORS

		Value Ω	
R1	...	330K	902/K330K
R2	V.D.R.	...	E299.DD/P220
R3	...	100K	902/A100K
R4	...	4.7K	902/A4K7
R5	...	560	902/A560E
R6	...	5.6K	902/A5K6
R7	...	56K	902/A56K
R8	...	6.8K	902/A6K8
R9	...	180	902/A180E
R10	...	1K	902/A1K
R11	...	2.7K	902/A2K7
R12	...	39K	902/A39K
R13	...	4.7K	902/A4K7
R14	...	5.6K	902/A5K6
R15	...	330	902/A330E
R16	...	180	902/A180E

		Value Ω	
R18	...	150K	902/A150K
R20	Volume control (log)	4.7K	3113.100.50430
R21	...	10	902/A10E
R22	...	1.8K	902/A1K8
R23	...	39K	902/A39K
R24	...	8.2K	902/A8K2
R25	...	3.3	2322.201.43338
R26	...	330	902/A330E
R27	Pre-set	1K	E086.AC/1K
R29	...	220	B8.031.07B/220E
R30	...	47	902/K47E
R31	...	3.3	2322.201.43338
R32	...	18K	902/A18K
R33	...	270	902/A270E
R34	...	390	902/A390E
R35	N.T.C.	...	E201.BC/A500E