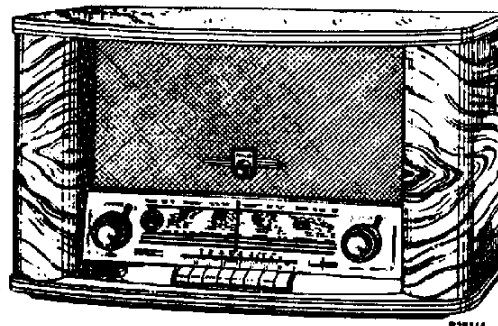


# PHILIPS

## SERVICE NOTES

for the receiver

### BX 732 A



1954.

For A.C. operation

#### GENERAL

##### Waveranges

F.M.	: 3.0 - 3.43	m	(100 - 87.5	Mc/s)
S.W.1	: 16.65 - 27.3	m	(18 - 11	Mc/s)
S.W.2	: 30.6 - 50.8	m	(9.8 - 5.9	Mc/s)
S.W.3	: 50 - 96.8	m	(6 - 3.1	Mc/s)
M.W.	: 186 - 583	m	(1612 - 515	kc/s)
L.W.	: 1090 - 2025	m	(275 - 148	kc/s)
Local	: 186 - 583	m	(1612 - 515	kc/s)

I.F.: for A.M.: 452 kc/s  
for F.M.: 10.7 Mc/s

##### Mains voltages

110, 125, 220 and 245 V~.

##### Consumption

Approx. 110 W (220V-50 c/s)

##### Fuses

110-125 V : 1.6 A

220-245 V : 0.8 A

##### Loudspeakers

2 x 9770 M

Z = 2 x 5 Ω

##### Dial lamps

L1 : 8045D-00

L2 : 8045D-00

##### Control knobs

a) 8 push buttons, from left to right:  
off; L.W.; M.W.; S.W.3; S.W.2; S.W.1;  
Local (selected station); F.M.

b) Dual knob, right:

Large knob: tuning (pushed in: A.M.  
(pulled out: F.M.

Small knob: treble control + bandwidth switch.

Lever: radio - P.U. - tape recorder switch.

c) Dual knob, left:

Large knob : volume control.

Small knob : bass control.

Lever : Ferroceptor drive.

##### Dimensions and weight

Length : 76 cm

Depth : 28 cm

Height : 41 cm

Weight : ca. 18 kg.

##### Valves

B1 : EF80

B2 : EC92

B3 : ECH81

B4 : EF41

B5 : EBF80

B6 : EB41

B7 : ECC40

B8 : EL84

B9 : EL84

B10 : EM34

B11 : EZ80

B12 : EZ80

B13 : EF86

DESCRIPTION OF CIRCUIT

A. F.M. Section

The signal arriving via the dipole aerial is fed to the balanced input circuit S52-S52'-C10-C11 and S10. Coil S10 is inductively coupled to S11 which is in the grid circuit of B1. Together with the wiring capacitance and the input capacitance of B1, S11 forms a tuned circuit which resonates in the middle of the band, i.e. 93 Mc/s. The tuned anode circuit of B1 is made up of S12-S12' and C20. B2 functions as mixer. The oscillator circuit consists of an inductive feedback circuit S13-S13' and S14-S14'.

The aerial signal amplified by B1 is injected via C15 into the oscillator, so that across the 1st I.F. band-pass filter (S15-C22 and S16-C24) there appears an I.F. signal with a centre frequency of 10.7 Mc/s.

The heptode section of B3 functions as amplifier; the triode section is rendered inoperative due to the grid being short-circuited. The second I.F. band-pass filter is formed by the tuned circuits S53-C73 and S54-C74. The third stage comprises B4 and the third band-pass filter S61-C91 and S62-C92. After further amplification in B5 the signal is fed to the discriminator.

As detector a ratio detector is used so that no separate limiting stage is needed. The electrolytic capacitor C117 functions as limiter. The A.F. signal appearing across C115 is fed via the volume control R51-R52 to the control grid of B7.

B. A.M. Section

Apart from the normal M.W. band, this receiver has a second M.W. range. This has its own set of coils (S19-S20 and S29-S30) and a separate 2-gang variable capacitor (C40-C41). This capacitor can be adjusted to a desired station (mainly a local station) by means of a knob located at the back of the set. By pressing in the station selector push button, the station is received without having to make use of the normal tuning knob.

On all bands except M.W. and L.W., the aerial signal is coupled inductively to g1B3 as follows:

selected station band : via S19-S20  
S.W. bands 1,2 and 3 : via S21-S22; S23-S24  
and S25-S26 respectively.

On the M.W. and L.W. bands the aerial signal is fed via S17 and S18 to g1B13. Coils S17 and S18 are mounted on a rotatable ferroxcube rod. This combination, the Ferroceptor, possesses the properties of a loop aerial which can be connected in circuit by means of a switch.

The amplified aerial signal is fed via S27 or S28 in the anode circuit of B13 to the control grid of the mixer (B3).

The first I.F. band-pass filter consists of two symmetrically coupled band-pass filters (S55, C75; S56, C76 and S58, C78; S59, C79). Capacitive coupling is effected by means of C121, C124. S57 and S60 are included for the purpose of bandwidth control. The second I.F. stage is formed by B4 and the second I.F. band-pass filter S63-C93, S64-C94 plus S65 for bandwidth control. The third I.F. stage comprises B5 and the third I.F. band-pass filter S66-C96 and S67-C97.

### C. A.F. Section

The A.F. signal coming from the F.M. receiver, the A.M. receiver, the pick-up or from a tape recorder is applied to the volume control R51-R52 via the gramophone switch. Connected across the volume control are filters for physiological tone correction, C100-R49 for the treble and R50-C101 for the bass notes. The A.F. signal reaches g1B7 via C102. In order to obtain current negative feedback, the cathode resistors R57 and R58 are unbypassed. Furthermore negative feedback voltages derived from S73-S74 are fed via C11, R60, C106 and R59 to the cathodes of B7 (voltage feedback).

The tone control is obtained in two ways as follows: a voltage derived from S73-S74 is fed to the potentiometers R71 and R72. The slider of R71 is connected to a low-pass filter so that the low frequency response can be altered with this potentiometer. The slider of R72 is connected to a high-pass filter. This potentiometer thus controls the feedback for the treble response. The A.F. signal is then fed to the push-pull output stage B8 and B9.

No separate phase inverter valve is used for driving the push-pull output stage. The phase difference of  $180^\circ$  between g1B8 and g1B9 is obtained as follows:

The A.F. signal is applied to g1B8 and amplified by that valve. A voltage which is  $180^\circ$  out of phase with the voltage at g1B8 is obtained from the secondary winding S73 of the output transformer and fed to the cathodes of B8 and B9. This voltage serves as signal voltage for B9. By proper dimensioning of the components B9 receives a signal voltage equal to that of B8  $180^\circ$  out of phase.

### TRIMMING PROCEDURE

#### A.M.-SECTION

##### A. I.F. band-pass filters

1. Volume control to maximum.
2. Bass control to maximum.
3. Treble control to minimum.
4. Bandwidth switch to "narrow".
5. Connect output voltmeter via trimming transformer to extension loudspeaker sockets.
6. Turn Ferroceptor switch to external aerial.
7. Press in M.W. push button and turn the tuning capacitor to maximum.
8. Apply a modulated signal of 452 kc/s via a 33 000-pF capacitor to g1B4.
9. Screw the cores of S67 and S63 almost full out.
10. Trim S66, S67, S64 and S63 in that order for maximum output voltage.

11. Now apply the 452-kc/s signal via the 33.000-pF capacitor to g1B3.
12. Damp S58 with a 33.000-Ω resistor.
13. Trim S59 and S56 for maximum output voltage.
14. Remove damping resistor from S58 and shunt it across S56.
15. Trim S55 and S58 for maximum output voltage.
16. Remove damping resistor from S56 and seal the cores.

B. I.F. Wavetrap

1. Proceed as outlined in the first 7 steps under A.
2. Apply a modulated signal of 452 kc/s via a standard dummy aerial to the aerial socket.
3. Trim S51 to minimum output voltage.
4. Seal the core of S51.

C. R.F. and oscillator circuits

Before beginning to trim these circuits make certain that the pointer is correctly adjusted. The pointer should coincide with the right-hand trimming point when the tuning capacitor is turned to maximum.

All signals are to be applied to the aerial socket for A.M. via a standard dummy aerial.

The Ferroceptor has to be switched to external aerial;  
 The volume control and bass control both to maximum;  
 The treble control to maximum and the bandwidth switch to "narrow";  
 A voltmeter should be connected, via a trimming transformer, to the extension loudspeaker sockets.

The trimming can now be done in accordance with the following table, keeping strictly to the order given:

1.	Press in push button....	M.W.	LOC.	L.W.	S.W.1	S.W.2	S.W.3
2.	Turn pointer to trimming point for.....	550 kc/s	Var. cap to max.	147 kc/s	10.9 Mc/s	5.85 Mc/s	3.0 Mc/s
3.	Apply signal of.....	550 kc/s	510 kc/s	147 kc/s	10.9 Mc/s	5.85 Mc/s	3.0 Mc/s
4.	Adjust for maximum output voltage.....	S41 S27	S30 S20	C62 S28	S33 S22	S36 S24	S39 S26
5.	Apply signal of.....	1550 kc/s	1550 kc/s	260 kc/s	18.3 Mc/s	9.9 Mc/s	6.1 Mc/s
6.	Turn pointer to trimming point for.....	1550 kc/s	tune to approx. 1550 kc/s	tune to approx. 260 kc/s	18.3 Mc/s	9.9 Mc/s	6.1 Mc/s
7.	Adjust for maximum output voltage.....	C59 C43 C27	C37	C44 C28	C54 C38	C56 C39	C58 C42
8.	Repeat the points.....	1-7	-	-	1-7	1-7	1-7
9.	Seal the coils..... and trimmers.....	S41 S27 C59 C43 C27	S30 S20 C37	S28  C62 C44 C28	S33 S22 C54 C38	S36 S24 C56 C39	S39 S26 C58 C42

F.M. SECTIONA. I.F. circuits

1. Turn volume control, bass switch and treble control to maximum.
2. Press in F.M. push button.
3. Turn variable capacitor to maximum.
4. Connect voltmeter via trimming transformer to extension loudspeaker sockets.
5. Connect diode voltmeter between junction of R45-R48 and earth. During trimming the reading of the diode voltmeter should be kept at about -2V; this can be done by constantly reducing the strength of the input signal.

With F.M. service oscillator

1. Apply a signal of 10.7 Mc/s, modulated with 500 c/s and sweep of 15 kc/s, via a 10 000 pF capacitor to g1B4.
2. Screw core of S62 almost full in.

With A.M. service oscillator

1. Apply an unmodulated signal of 10.7 Mc/s via a 10 000 pF capacitor to g1B4.
2. Screw core of S62 almost full in.

3. Trim S68, S61 and S62 for max. deflection of the diode voltmeter.
4. Trim S69 for max. output voltage.
5. Feed the modulated signal via a 10 000 pF capacitor to g1B1.
6. Screw in the cores of S54 and S16.
7. Trim S53, S54, S15 and S16, in that order, for max. deflection of the diode voltmeter.
8. Repeat step 4.
9. Connect an oscilloscope between junction of C119-R46 and earth. Feed a balanced 10.7 Mc/s signal, modulation frequency 50 c/s, sweep 150 kc/s, to the dipole aerial sockets. Adjust the strength of the input signal so that the diode voltmeter reads - 5 V.
10. The discriminator curve should be flat over a range of + and - 75 kc/s. Switch in an A.M. signal of 100 c/s 30% modulated. The flat part of the curve should now remain unaltered.
11. Seal the coil cores.
3. Trim S68, S61 and S62 for max. deflection of the diode voltmeter.
4. Connect the diode voltmeter between junction of C115-C116 and the mid-point of two series-connected resistors (220 k $\Omega$ , tol.1%) which have to be shunted across C115-C116. The core of S69 has to be adjusted for minimum deflection of the diode voltmeter.
5. Reconnect the diode voltmeter between junction of R45-R48 and earth, and feed the modulated signal via a 10 000 pF capacitor to g1B1.
6. Screw in the cores of S54 and S16.
7. Trim S53, S54, S15 and S16, in that order, for max. deflection of the diode voltmeter.
8. Repeat step 4.
9. Reconnect the diode voltmeter between junction of R45-R48 and earth. Vary the tuning of the service oscillator to find the max. deflection of the diode voltmeter. Adjust the strength of the input signal so that the diode voltmeter reads -2V. The frequency at which max. deflection is found should be between 10.68 and 10.72 Mc/s.
10. Connect the diode voltmeter between mid-point of the 220 k $\Omega$  resistors and junction of C115-C116. Vary the frequency found under 9 to + and - 75 kc/s. In both cases the deflection of the diode voltmeter must be the same. If this is not the case S68 and S69 must be retrimmed.
11. Remove the 220 k $\Omega$  resistors and seal the coil cores.

#### B. R.F. and oscillator circuits

Set volume, bass and treble controls to maximum.

Press in F.M. push button.

Feed the balanced F.M. signal from the service oscillator to the F.M. aerial sockets and modulate with 500 c/s (frequency sweep 15 kc/s).

Trimming is carried out in accordance with the following tables: