Philips BX645A

Translated from the Dutch.

THE PHILIPS TYPE BX 645A AC RECEIVER

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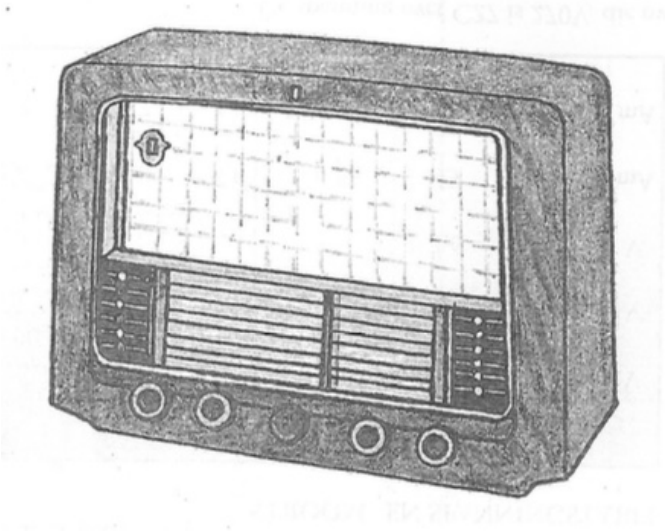


The receiver type BX 645A from 1954 is a superheterodyne receiver with the following range:
shortwave KG2a : 11.36 - 17.00m _ (26.4-17.6 MHz);
shortwave KG2b : 17,00 - 25,87m (17.6-11.6 MHz);
shortwave KG2c : 23,07 - 32,96m (13.0-9.1 MHz);
shortwave KG2d : 32.25 - 60.00m (9.3-5.0 MHz);
shortwave KG3 : 60,00 - 187,00m (5.0-1.604 MHz);
medium wave MG : 187.00 - 580.00m (1605-517 kHz).

The device is suitable for connection to alternating voltages of 90-110-125-180-200 and 225V. The following tubes have been used: pentode EF41 (B1) as radio frequency amplifier, triode-heptode ECH81 (B2) as oscillator-modulator, double diode pentode EBF80 (B3) as detector and intermediate frequency amplifier, double diode triode EBC41 (B4) as low frequency amplifier and rectifier at the service of the wave range switch, and pentode EL84 (B5) as audio frequency power amplifier. The type EZ80 (B6) serves as a rectifier and the cathode ray indicator EM34 (B7) has been used for optical tuning. For the scale lighting, 2 lights 8045D-00 (6.3V - 0.32A) and for the indication of the set wave range there are 6 lamps 8023N-00 (GV - 0.18A).

HIGH FREQUENCY

The coils of the first HF circuit, S6 for KG2a, S7 for KG2b and S8 for KG2c, are inductively coupled with the antenna coils S1, S2 and S3. They are tuned with C1, which is connected in series with C2 to reduce the tuning capacity. S6, S7 and S8 are connected in parallel to C3 via sch.4 and connected to B1's control grid via

C4. The coils S9 for KG2d and S10 for KG3 are inductively coupled with the antenna coils S4 and S5. They are tuned with C1 and connected via C4 to B1's control grid. S11/S11a for MG is a ferroceptor *), which is connected to the control grid on the one hand and is grounded via C5 on the other hand. It is tuned with C1. The anode of B1 is connected via C6 with the coils of the second HF circuit, S13 for KG2a, S14 for KG2b and S15 for KG2c, which are tuned with C7. This is connected in series with C8 to reduce the tuning capacity. S13, S14 and S15 are connected via sch.3 in parallel with C9 and via C1O with the control grid of the heptode part of B2. The SI6 coils for KG2d, S17 for KG3 and S18 for MG, are matched with C7. S16 and S17 are connected to the anode of B1 via C6. S16 is connected via C10 to the control grid of the heptode part of B2, S17 and S18 via the series circuit of C8 and CIO. S18 is inductively coupled with S12, which is incorporated into B1's anode circuit via C6.

**) A ferroceptor is a rotatably arranged ferroxcube rod on which the antenna coils are mounted, and which has the same properties as a window antenna.*

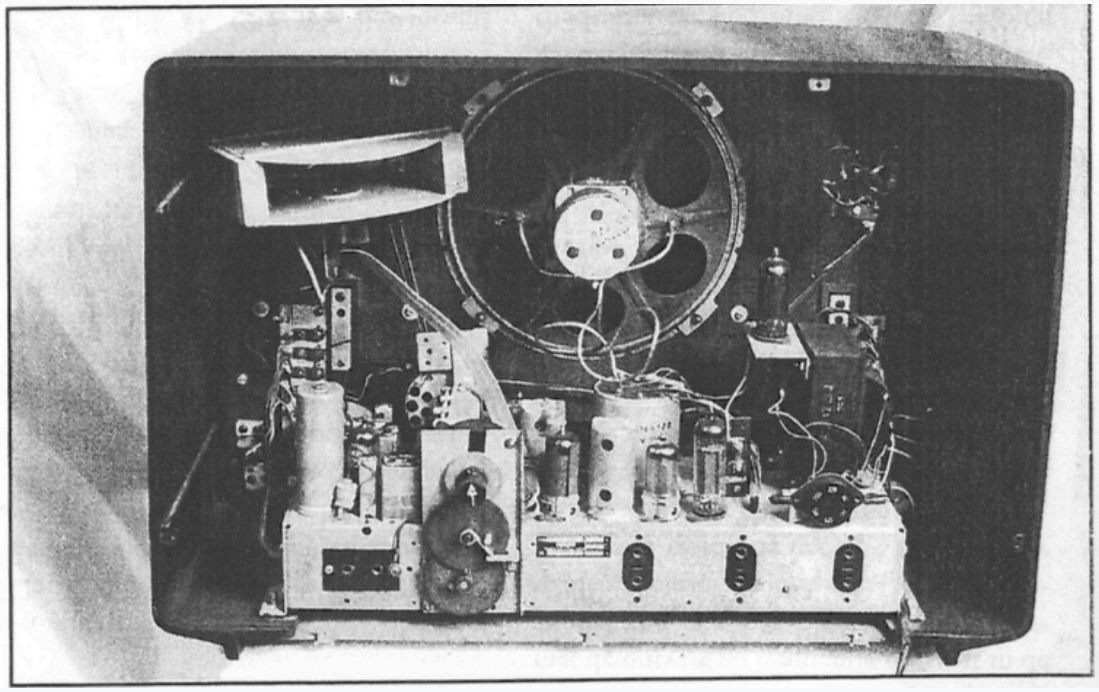
The oscillator circuits are the following:
KG2a: the combination S23-C11-S29-C12 is on the one hand with the grid, on the other hand via C13 with the anode of the triode part of B2 and is therefore self-generating (ultra audio switching). In tune is connected in series with C14, with C15.
KG2b: as with KG2a, but with S24 instead of S23.
KG2c: as with KG2a, but with S25 instead of S23.
KG2d: the combination S26-C16-S30 is connected via C13 with the anode of the triode part of B2. In tune with C14. The feedback combination S19- C17-S20 is connected via C18 with the grid of the triode.
KG3: S27 with the padder C19 is sent via the series connection of C13 and C15 with the anode of the triode. Resonance occurs with C14. The feedback coil S21 is connected via R1 and C20 with the grid of the triode.

MG: S28 with the padder C21 is through the series connection of C13 and C15 with the anode of the triode part of B2. It is tuned with C14. The return coupling coil S22 is connected to the grid of the triode.

MID AND LOW FREQUENCY

The third grid of the heptode part of B2 is connected to the grid of the triode. By mixing the auxiliary frequency with the received frequency, we get in the anode circuit of the heptode part a difference frequency of 452 kHz. This intermediate frequency is passed through the first IF bandpass filter S31- S32 on the control grid of the pentode part of B3. Via the second IF bandpass filter S33- S34 comes the amplified IF signal onto the 2nd diode plate of that tube. This is where detection takes place, as a result of which by R2, R15 and the potentiometer R3/R4 (the volume control) DC with the superimposed audio alternating current will flow. The audio voltages across the volume control are passed via C22 for

amplification to B4's control grid. Final amplification takes place with the pentode B5, passing through R5, R6 and R. The potentiometer R8/R9, connected via C23 with the anode of B4, serves for the tone control on the control grid of B5. For AVR (automatic volume control) the first diode plate from B3 through C24 is connected to the anode of that tube. The alternating DC voltage that arises over RIO, is regarded as a negative voltage via R11 to the control grid of B3, and further via R12 to the control grid of the heptode part of B2 and via R13 to the control grid of Bl. C25 is used for smoothing.
In series with R14, a portion of the primary winding of the loudspeaker transformer is used as a choke in the smoothing circuit of the anode and screen grid supplies.

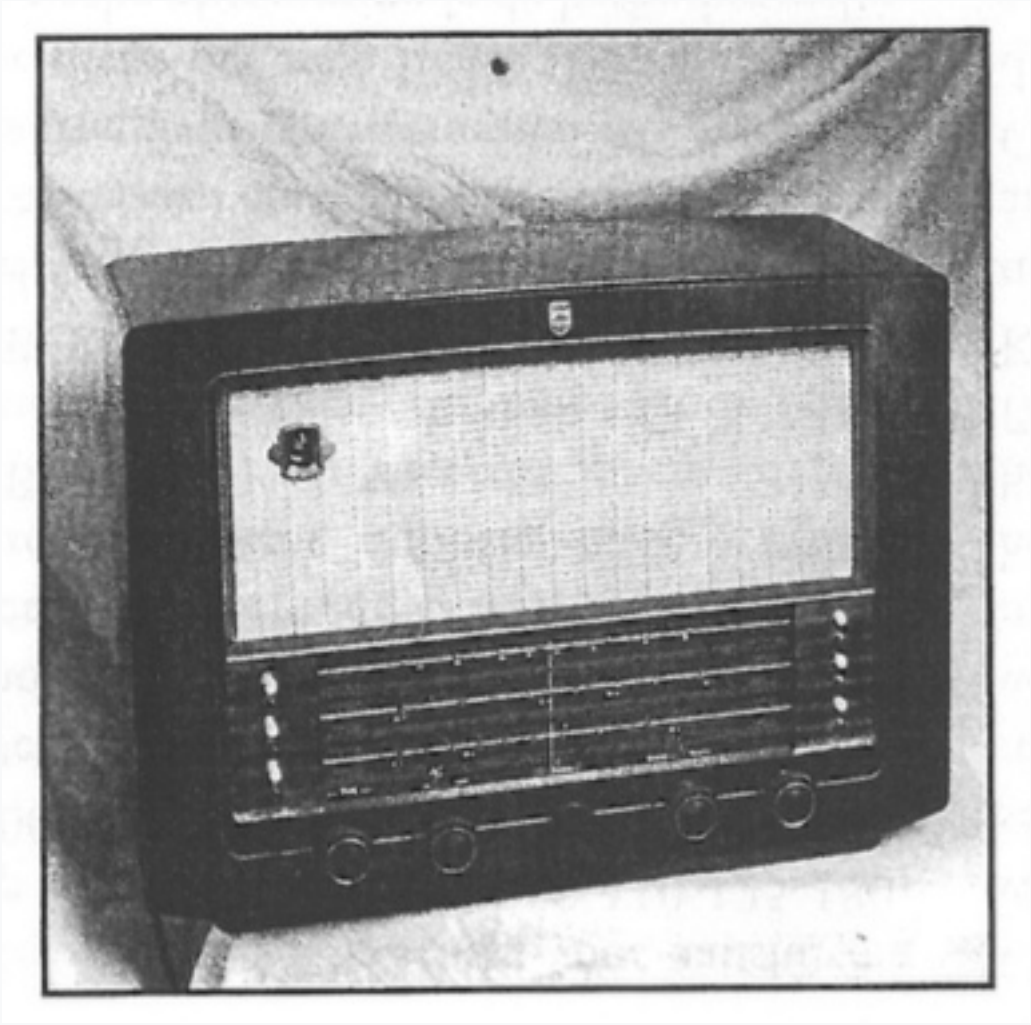


THE WAVE RANGE SWITCH

The waveband switch (sch. 1 to 5) is powered by the electric motor M, set by switches sh. 6. There are 6 pushbuttons D1 to 6. If, for example, D2 (KG2b) is pressed, D1 (KG2a), which is currently closed (mechanically) opens. The alternating current, taken from S35 of the power supply transformer, then goes through ZI, the mother contact m, the rotor jumper contact A, the rotor contact 2 and D2 to the motor M and then back to S35. The engine turns, driving the coupled sh.6 on. As soon as the recess in A for contact 2 has come, the circuit becomes disconnected and the engine stops. The wavechange switch then stays in position 2 (KG2b), which is indicated by the indicator lamp L2, which receives current through the rotor contact B, connected to A. If the rotor of sch.6 is moved one position place, for example from 1 to 2, then the motor grinds one revolution. sh interrupts the power once per rotation of sch.6 on the moment the recess is in A for one of contacts 1 to 6. This always guarantees the correct

position of sch 6. If the current circuit is broken a little too early due to a slightly incorrect position of a stator contact, then sch7 will remain closed until the motor has made a full revolution.

To avoid disturbing noises during switching, the alternating current of S35 via C26 is rectified with the parallel switched diodes from B4. The resulting negative voltage is applied to the grid of B4. This prevents flow of anode-current through B4.



THE SERVICE

The receiver has on the front five control knobs, from left to right: 1. the volume control, combined with the mains switch, 2. the tone control, 3. the fine tuning, which takes place by shifting the iron core in S29 for KG2a, KG2b and KG2c and those in S30 for KG2d. Knob 4 is for setting the ferroceptor and turning it on and off from the antenna. Knob 5 is for normal tuning. At the top left of Knob 1 are the push buttons for controlling the waveband switch and to the right above knob 5 are the relevant indicator lights. The speech music switch (sch.8) and the radio gramophone switch (sch.9) are located respectively behind the volume

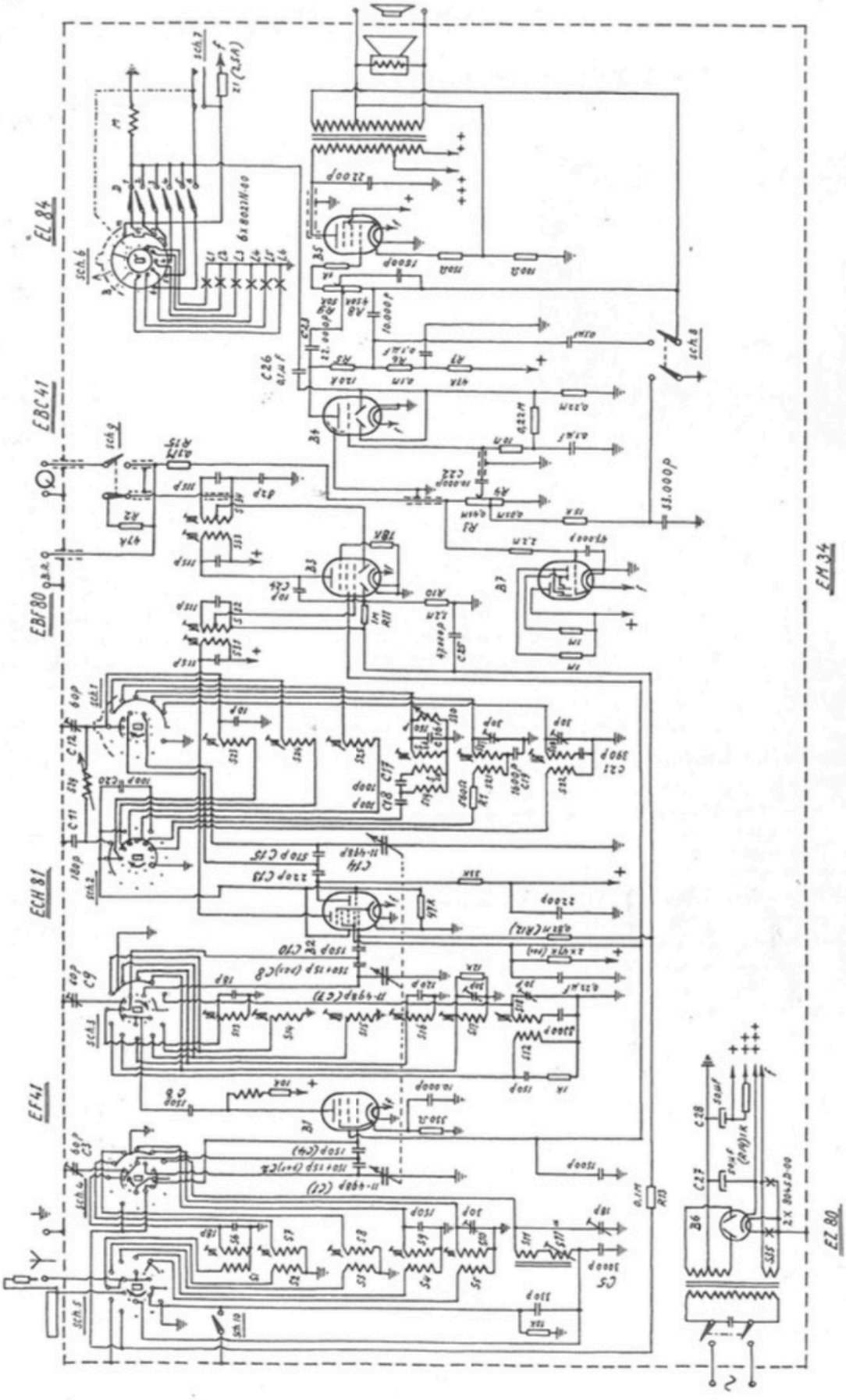
power switch knob and the tone control knob. Sh.10 is the antenna ferroceptor switch.

CURRENT AND VOLTAGE TABLE

	B1	B2	B3	B4	B5	B7	
	EF41	ECH81	EBF80	EBC41	EL84	EM34	
Va	210 T 90	H 240	240	75	245	240	V
Vg2(+4)	75 -	H 75	75	-	240	d1=40 d2=25	V
Vk	1,2 -	-	-	-	7,6	-	V
Ia	2,8	H 2,0 T 4,3	5,0 -	0,58 -	45	-	mA
Ig2(+4)	0,7 -	H 4,7	1,6	-	4,8	d1=0,1 d2=0,11	mA

The voltage across C27 is 270V, that across C28 is 245V. The consumption of the receiver is approx. 53W.

Keywords: Ferroceptor, Wave range switch with motor, Receiver BX645A.



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