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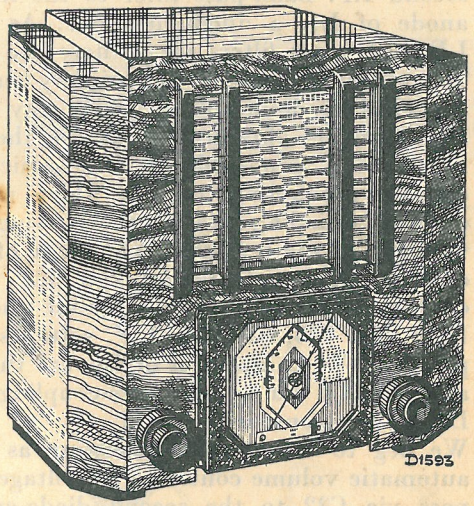
PHILIPS

SERVICE BULLETIN

MULTI-INDUCTANCE RECEIVING APPARATUS

338 A

FOR A.C. MAINS.



GENERAL REMARKS

The 338 A is a superheterodyne receiver with a built-in moving-coil speaker and is suitable for reception of the following frequency bands:
short waves: 16.5—51 metres (18.18 Mc—5.88 Mc);
medium waves: 199—580 metres (1508 kc—517.2 kc).
The set has four control knobs. The small knob on the left operates the volume control, whilst with the large knob fitted concentrically to the small one the continuously variable tone-filter can be regulated. The small knob on the right serves for tuning and the large knob operates the wave-length and mains switch. The receiver is provided with A.V.C., connecting sockets for the gramophone pick-up and for an extra speaker with a high impedance. A safety contact on the rear panel ensures that the receiver is "dead" when opened.

DESCRIPTION OF THE CIRCUIT

In the first place the circuit will be described as switched for reception on the medium wave band. The voltages induced in the aerial are applied across the coils S7 and S9 and are induced in S10, which forms part of the circuit S10, the trimmer C11, the tuning condenser C7 and C22. C21 has practically no influence during reception on the medium wave-band and is only of significance for short-wave reception. C22 serves for preventing a short-circuit of the neg. grid bias, which is applied to the first grid of L1 via R11. L1 is a variable mu pentode amplifier valve. The A.C. voltages across C7 reach the first grid of L1, are then amplified and finally applied to S11 and S13. These voltages are induced in S14. S14, with the trimmer C13 and the tuning condenser C8 form the second tuning circuit. The voltages across C8 now pass across R13, which is only of significance for short-wave reception, to the 4th grid of L2, the octode converter valve. The tuning circuit of the oscillator, comprising S17, the parallel trimmer C15, the series or padding trimmers C16 and C28 and the tuning condenser C9, is connected to the first grid of L2. The coil S18, which is connected to the 2nd grid, is reaction-coupled to S17. The cathode, the first- and second grid of L2 are to be considered as an oscillating triode whose frequency is 475 kc higher than the frequency to which the H.F. circuits are tuned. The frequency difference between the oscillator and H.F. circuits is kept constant by means of the padding condensers. The parallel padding condenser ensures equalisation at the bottom of the wave-band and the series padding does the

same at the top of the wave-band. C27 is the grid condenser, R15 the leak resistance, whilst R14 serves for preventing parasitic oscillation. Through the combination in L2 of the amplified aerial voltages and the voltages generated by the oscillator a merging is produced causing the sum- and difference frequencies in the anode circuit of L2. The circuit S19-C17, the primary of the first I.F. band-pass filter (which is included in the anode circuit of L2) is tuned to the difference frequency of 475 kc. The voltages across S19 are induced in S20. S20, S21 and C18 together form the secondary of the first I.F. band-pass filter. The strength of the coupling between S19 and S20 determines the band width of the band-pass filter. The voltage across C18 is now further amplified in L3, likewise a variable mu pentode, and then passes via the second I.F. band-pass filter to the first auxiliary anode of L4, a duodiode-triode. As regards the I.F. band-pass filters please note the following:

The coupling between the primary and secondary is exclusively inductive, in which way a favourable I.F. curve is obtained, whilst at the same time it is made impossible for harmonics due to a capacitive coupling to pass, which might be the cause of whistling interferences. Owing to the A.C. voltages on the first auxiliary anode of L4 a direct current with a superimposed L.F. alternating current is produced in the circuit anode-cathode, R17, R18, S23, S24. The L.F. voltages across R17, pass via C34 to the grid of L4, are then amplified and applied via a resistance-coupling element to L5 (power pentode).

We beg to observe the following as regards the automatic volume control. The voltages across C19 pass via C32 to the second diode-anode of L4, in which way a current occurs in the circuit anode-cathode, R1, R21, R23, R22. At a more powerful signal the current will increase, and the voltage drop across R21, R23 and R22 will become greater. This voltage is applied as extra negative grid bias via R16 to L 3 and via R11 to L1. The condensers C37, C29, along with the resistances R21, R16 and R11, serve for decoupling. Through the voltage drop across R1 the second diode-anode is negative, so that only a current, i.e. an extra negative voltage occurs for L1 and L3 when the I.F. voltages have attained a certain threshold value. In this way the A.V.C. is delayed. The various valves receive their negative bias as follows:

The voltage difference across R1 is applied via R21, R23, R16 to L3 and again via R11 to L1. The voltage difference across the cathode resistance R8 serves for negative grid bias for L2. R8 is decoupled by C5. The negative bias for the grid of L4 is likewise obtained by the voltage drop across R1 which is applied via R21, R20 and R19. This voltage is decoupled by C36.

R9, which is included in the cathode lead of L5, serves for the negative grid bias and is decoupled by means of the electrolytic condenser C3.

C41, S27, C42 and S25 together form a tone filter, by which the frequencies above 6000 cycles are cut off.

C43, R28 and R19 form the continuously variable tone-filter. C39, R25 and R27 form an I.F. and also a L.F. filter, by means of which better reproduction of speech is obtained.

The working of the H.F. and oscillator part is quite different for reception on the short wave-band. The oscillator frequency has been selected 475 kc lower than the frequency to which the H.F. circuits are tuned, because this has advantages for short-wave reception. As a consequence the padding condensers have also been included in the H.F. section. For short-wave reception the circuit is as follows:

The aerial voltages pass across S7 and C21 and are induced in S8. S8 with the parallel padding condenser C10, the series padding condenser C23 and the tuning condenser C7 form the first tuning circuit. The voltages amplified by L1 pass via S11, are induced in S12, of the circuit S12, C12 (parallel padding condenser), C24 (series padding condenser), C8 (tuning condenser) and pass via R13 to the fourth grid of L2. R12 in parallel with C24 serves for connecting the circuit of the fourth grid of L2 to the cathode. For short waves the oscillator circuit is as follows: 1st grid circuit S15, C14, C9 tuning condenser; second grid circuit S16.

Between the aerial and earth contacts there is an I.F. filter, consisting of S6 and C6. This filter is tuned to a frequency of 475 kc, so that signals of this frequency do not enter the I.F. section and therefore cannot cause any interference.

L6 is the two-phase rectifier valve; C1, S5 and C2 form the smoothing filter. The resistance R10 which is included in the negative lead before C1 ensures that L6 does not become defective when switching on, which might occur through too great a charging current for C1.

COILS

Desig-nation	Description	Codenumber	Price
S1 S2 S3 S4	Mains transformer	28.529.580	
S5	Choke	28.546.050	
S6 C6	I.F. wavetrap 12-170 μμF	28.570.260	
S7 S8 C10	Aerial coil I 2,5—30 μμF	28.570.270	
S9 S10 C11	Aerial coil II 2,5-30 μμF	28.570.280	
S11 S12 C12	Anode-grid coil I 2,5-30 μμF	28.571.020	
S13 S14 C13	Anode-grid coil II 2,5-30 μμF	28.571.030	
S15 S16 C14	Oscill. coil I 2,5-30 μμF	28.570.710	
S17 S18 C15	Oscill. coil II 2,5-30 μμF	28.570.300	
S19 S20 C17	I.F. coil 12-170 μμF	28.570.990	
S21 C18	I.F. coil 12-170 μμF	28.571.010	
S22 S23 C19	I.F. coil 12-170 μμF	28.571.000	
S24 C20 C33	I.F. coil 12-170 μμF 400 μμF	28.570.980	
S28	Loudspeaker coil	28.951.190	
S25 S26 S27	Loudspeaker Transformer	28.529.370	

VALVES

L1	L2	L3	L4	L5	L6	L7	L8
EF5	EK2	EF5	EBC3	EL3	EZ3	8044-99	8044-99

338 A

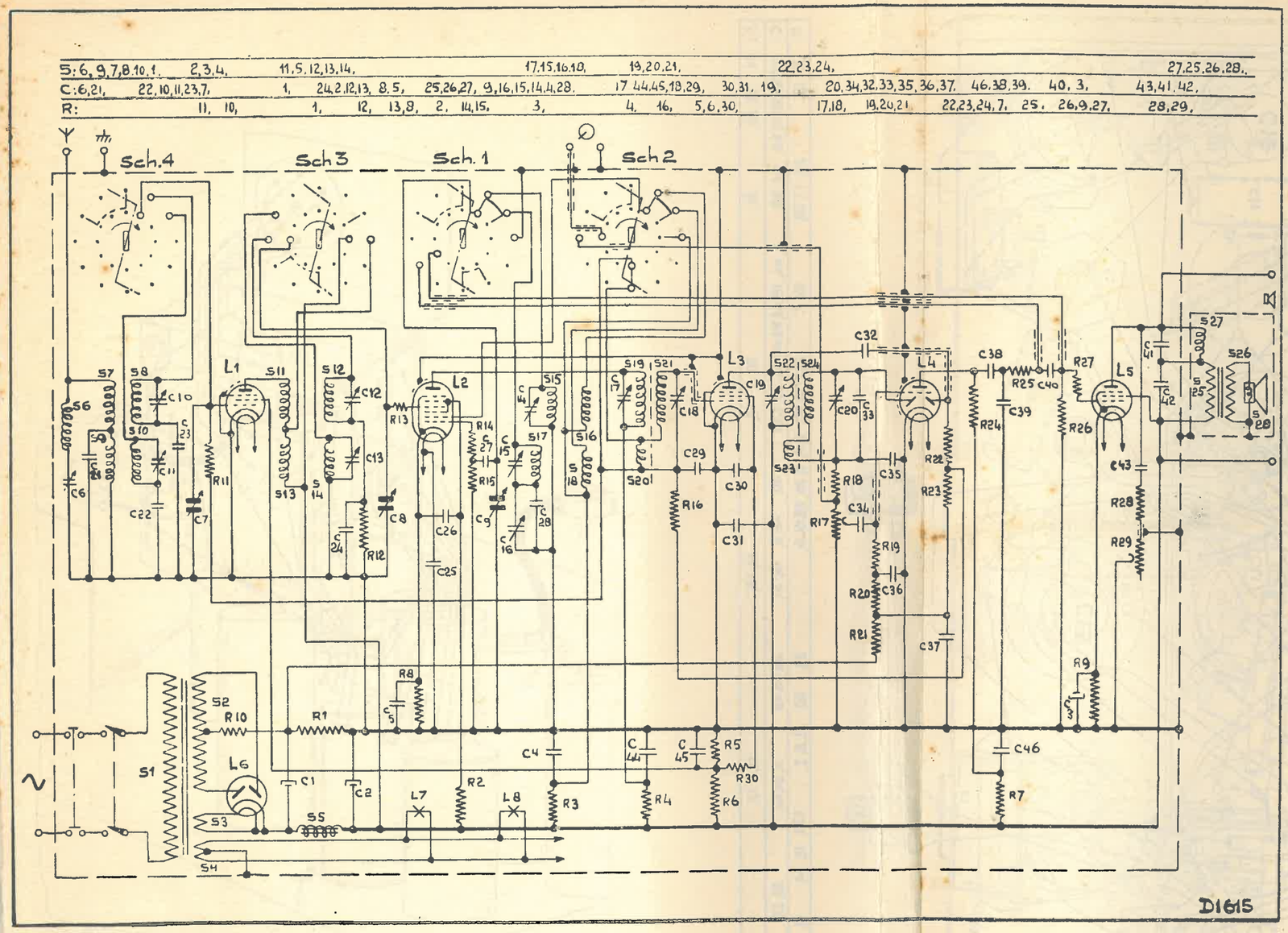


Fig. 15

TABLE OF VOLTAGES AND CURRENTS MEASURED WITH THE UNIVERSAL MEASURING APPARATUS TYPE 4256

	L1	L2	L3	L4	L5	
Va	260	220	260	65	220	Volt
Vg′	75	g3-5=60 g2=190	35		260	Volt
-Vg	—	1.8			6	Volt
Ia	6.6	2.1	1.95	0.6	35	mA
Ig′	2	g3-5=1.31 g2=2.35	0.46		4	mA

These voltages were measured with a voltmeter taing practically no current (Resistance 2000 Ω/Vc). The values are averages of a large number of measurements. When measuring with other voltmeers other values are found, dependent on the restance after which measuring takes place and thecurrent consumption of the meter itself.
As he values indicated are averages of measuremers conducted on other receivers, some values and voltages may differ considerably from the abo without this necessary being an indication of a fault.

Designation	Description	Codenumber	Price
C1	32 µF	28.180.130	
C2	32 µF	28.180.130	
C3	50 µF	28.182.160	
C4	0,1 µF	28.198.200	
C5	50000 µµF	28.198.170	
C7	11-488 µµF		
C8	11-488 µµF	28.211.420	
C9	11-488 µµF		
C16	12-170 µµF	28.211.150	
C21	80 µµF	28.190.120	
C22	0,1 µF	28.198.200	
C23	4500 µµF	28.192.220	
C24	4500 µµF	28.192.220	
C25	10000 µµF	28.198.100	
C26	50000 µµF	28.198.170	
C27	100 µµF	28.190.130	
C28	400 µµF	28.190.400	
C29	50000 µµF	28.198.170	
C30	50000 µµF	28.198.170	
C31	50000 µµF	28.198.170	
C32	100 µµF	28.190.130	
C34	20000 µµF	28.198.130	
C35	100 µµF	28.190.130	
C36	0,1 µF	28.198.200	
C37	0,1 µF	28.198.200	
C38	20000 µµF	28.198.130	
C39	320 µµF	28.190.180	
C40	1000 µµF	28.190.230	
C41	2000 µµF	28.199.200	
C42	3200 µµF	28.199.220	
C43	0,1 µF	28.199.370	
C44	50000 µµF	28.198.170	
C45	50000 µµF	28.198.170	
C46	0,1 µF	28.198.200	

Designation	Description	Codenumber	Price
R1	32 ohm	28.770.100	
R2	0,16 M.ohm	28.770.470	
R3	25000 ohm	28.771.040	
R4	50000 ohm	28.770.420	
R5	40000 ohm	28.771.060	
R6	40000 ohm	28.771.090	
R7	0,1 M.ohm	28.770.450	
R8	320 ohm	28.770.200	
R9	160 ohm	28.770.820	
R10	100 ohm	28.770.850	
R11	1 M.ohm	28.770.550	
R12	0,5 M.ohm	28.770.520	
R13	40 ohm	28.770.110	
R14	64 ohm	28.770.130	
R15	20000 ohm	28.770.380	
R16	0,5 M.ohm	28.770.520	
R17	0,5 M.ohm	28.810.760	
R18	0,1 M.ohm	28.770.450	
R19	1 M.ohm	28.770.550	
R20	0,1 M.ohm	28.770.450	
R21	0,1 ohm	28.770.450	
R22	1,25 M.ohm	28.770.560	
R23	1,25 M.ohm	28.770.560	
R24	0,2 M.ohm	28.770.480	
R25	50000 ohm	28.770.420	
R26	0,64 M.ohm	28.770.530	
R27	50000 ohm	28.770.420	
R28	500 ohm	28.770.220	
R29	50000 ohm	28.811.310	
R30	0,1 M.ohm	28.770.450	