

Dual

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Dual HS 51 Service Manual



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Technical data

Output power

(measured at 4 Ohm for 1 % distortion)

music power 12 Watt/channel
continuous tone at 1 kHz 9 Watt/channel

Frequency range

30 Hz - 20 kHz

Intermodulation distortion

250 Hz/8000 Hz 4/1 at nominal output 2,5 %

Inputs

	sensitivity
tuner	340 mV at 470 kOhm
tape	340 mV at 470 kOhm

Frequency response

(measured with tone controls in their mechanical centers)

phono	20 Hz - 20 kHz \pm 3 dB
tuner and tape inputs	20 Hz - 20 kHz \pm 1,5 dB

Tone control

bass	+ 13 - 16 dB at 50 Hz
treble	+ 12 - 16 dB at 15 kHz

Volume control

with switchable contour control

Balance control

control range 14 dB

Mono/stéreo switch

Outputs

2 loudspeaker jacks DIN 41 529, 4 Ohm impedance
1 Stereo jack 1/4" for headphones

Signal/noise-ratio

phono:
signal/injected-noise ratio \cong 35 dB
signal/random-noise ratio \cong 55 dB
tuner and tape:
referred to $N_a = 2 \times 50$ mW \cong 50 dB
referred to nominal power \cong 70 dB

Crosstalk damping at 1000 Hz

phono	\cong 20 dB
tuner and tape	\cong 45 dB

Power consumption

approx. 55 VA

Line voltages

110/130/150/220/240 V

Fuses

at 110/130/150 V	630 mA slow-blow
at 220/240 V	315 mA slow-blow

Dimensions

control unit with dust cover CH 20
16 1/2" x 14 7/8" x 8 7/8"

Weight

control unit with dust cover CH 20
27,5 lbs.

Complement

preamplifier:	4 silicon transistors
control-amplifier:	4 silicon transistors
power amplifier	
with power supply:	6 silicon transistors
	4 silicon power transistors
	2 silicon diodes
	1 silicon rectifier
	2 C-Fuses 1 A medium blow for protection of final stages

Speaker box

Frequency range

50 Hz - 20 000 Hz, according to DIN 45 500

Resonance

85 Hz

Nominal impedance

4 Ohm

Power handling capacity

20 Watt

Maximum power handling capacity

35 Watt

Minimum power required

(measured under room conditions)
3 Watt

Distortion

according to DIN 45 500
measured at rated power:

250 Hz - 600 Hz	\cong 2 %
600 Hz - 20 kHz	\cong 1 %

Complement

1 special woofer 7 11/16" dia., 1" voice coil, air-gap induction 12 000 gauss, magnetic flux 57 000 maxwell
1 special tweeter 4 1/8" x 2 3/4", 5/8" voice coil, air-gap induction 10 000 gauss, magnetic flux 21 000 maxwell
2 LC filters, crossover at 1200 Hz
Attenuation 12 dB/octave

Connection

recessed standardized socket, according to DIN 41 529

Dimensions

14 5/16" x 9 1/16" x 6 3/8" (H x W x D)

Gross volume

3 gallons

Weight

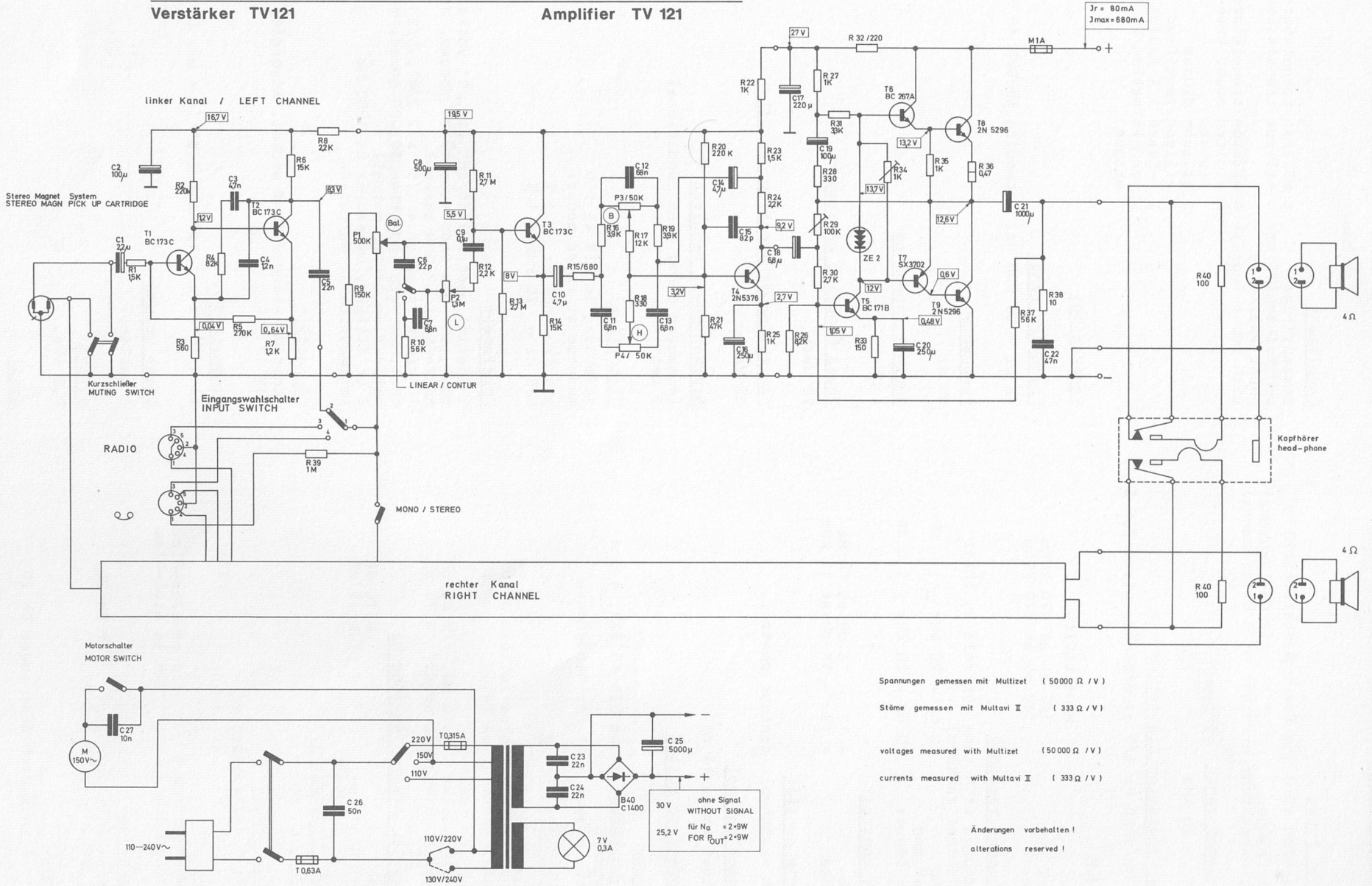
9,3 lbs.

Grill

anodized aluminium

Schaltchema
Verstärker TV121

WIRING DIAGRAM
Amplifier TV 121



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Adjustment- and test datas

Power consumption

at 220 V unloaded approx. 170 mA
 at 220 V under full load approx. 350 mA

Operating voltages

preamplifier approx. 16,7 V
 control amplifier approx. 19,5 V
 power amplifier approx. 27 V

Symmetry and none-signal current of the output stages

turn back control R 34 to 0 Ohm on a switched off unit (about 70° F) then switch the unit on and adjust the none-signal current to 70 mA.

Now adjust center voltage (measured from C 21 and against chassis) to 12.5 V with control R 29. Check and adjust none-signal current once again. After the unit warms up (after about 5 minutes) the none-signal current should reach a maximum of 80 mA.

Output power / headphones

feed 1000 Hz signal to radio or tape input, both channels driven, volume control at max., balance control and tone controls in center position.

Tune output signal to 6 V (9 W).

Input signal approx. 340 mV, on the tape recorder output (pin 1/2 and 4/2): about 3,4 mV, 10kOhm should be available. On headphones: 4,3 - 5,3 V/400 Ohm

Distortion

see fig. 3

Bass and treble lift and attenuation

see fig. 4

Physiological volume control

see fig. 5

Balance control

control range 14 dB

Pre-amplifier frequency response

measured on the tape recorder output, terminating resistance 100 kOhm. Feed 10 mV/1000 Hz on to the PU-magnetic input.

Output voltage at 1000 Hz on tape output: 75-95 mV.

Bass lift at 100 Hz 11 - 14 dB

treble attenuation at 10 kHz 15 - 18 dB

Input sensitivity

measurement frequency 1000 Hz. Necessary input signal for 6 V output signal:

Tuner: approx. 340 mV

Tape: approx. 340 mV

Fluctuation voltage measurement

switch on "linear" position, turn the volume control, bass, treble and balance control on electrical center:

maximum 1,4 mV/channel.

Input selector switch on position "Tuner" volume control on maximum, tone controls on maximum, balance control on electrical center, radio input with 100 kOhm closed:

maximum 2 mV/channel.

Input selector switch on position "Phono", volume control on maximum, balance control on electrical center. Automatic changer switched on. Tonearm on support:

maximum 30 mV $\hat{=}$ 46 dB.

Fig. 2 Power bandwidth, according to DIN 45 500

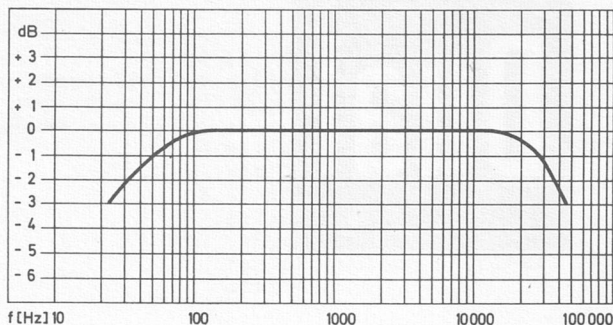


Fig. 3 Distortion at 60 Hz, 1000 Hz and 10 000 Hz plotted against output power

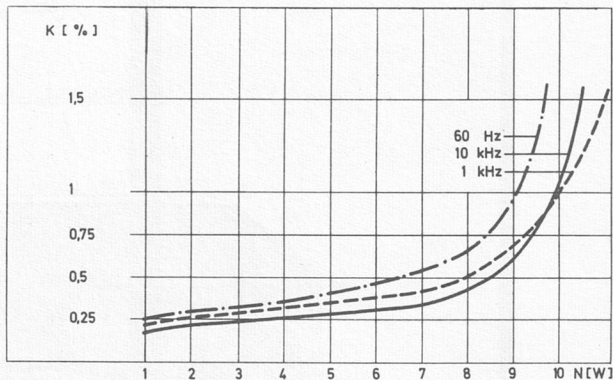


Fig. 4 Range of tone controls, 0 dB reference with controls at zero

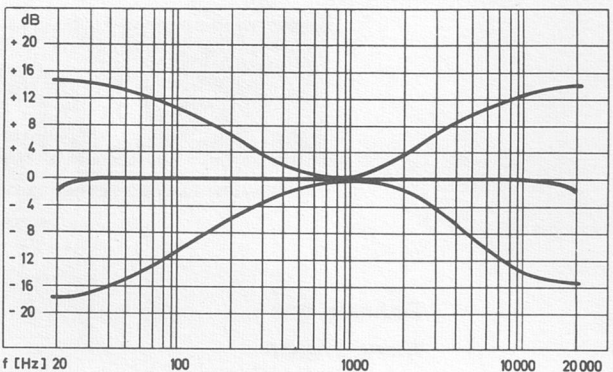


Fig. 5 Characteristics of loudness compensation 0 dB line indicates volume control at maximum

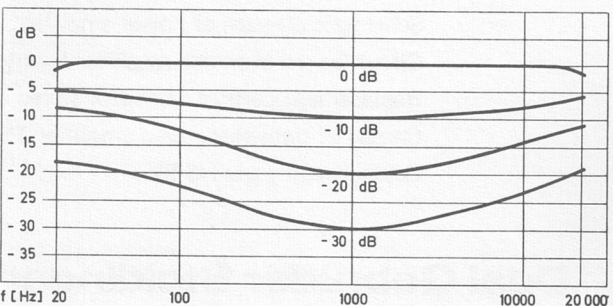


Fig. 6 Schematic diagram of preamplifier

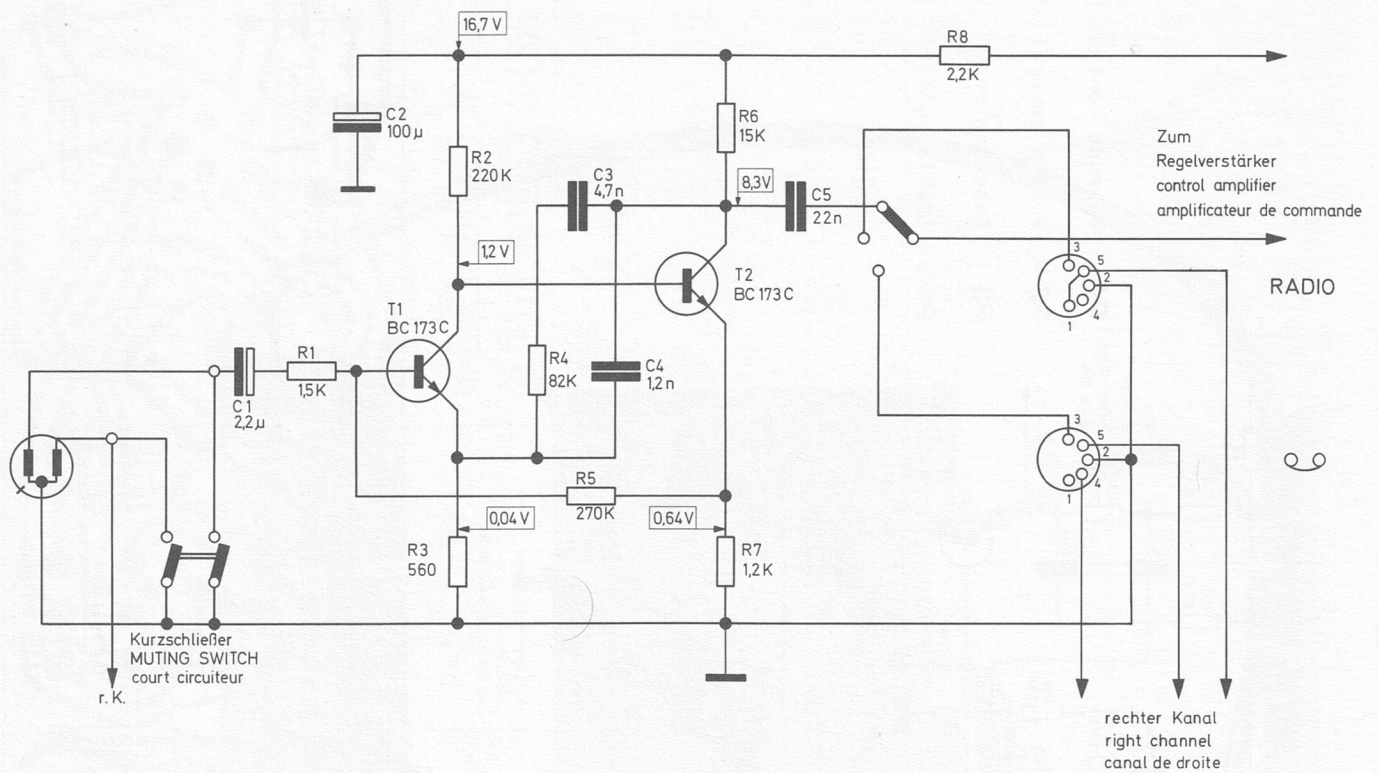


Fig. 7 Circuit-board of preamplifier 217 650 (printed wiring side)

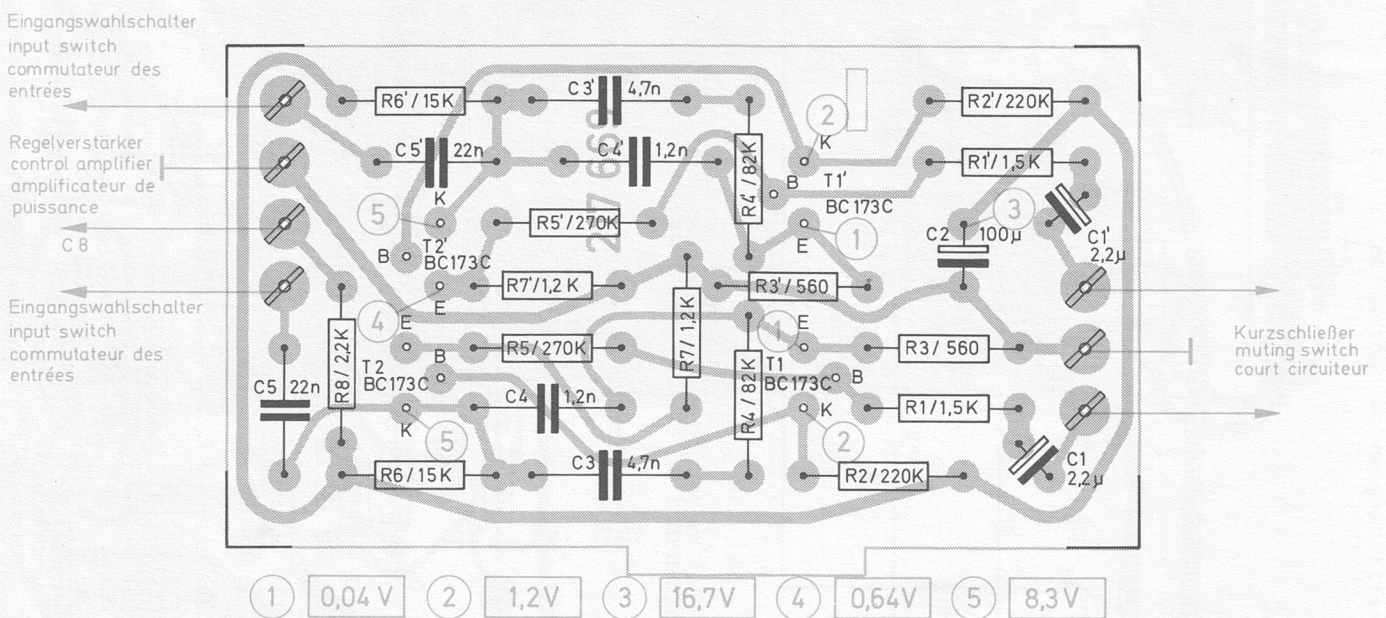


Fig. 8 Schematic diagram of control amplifier

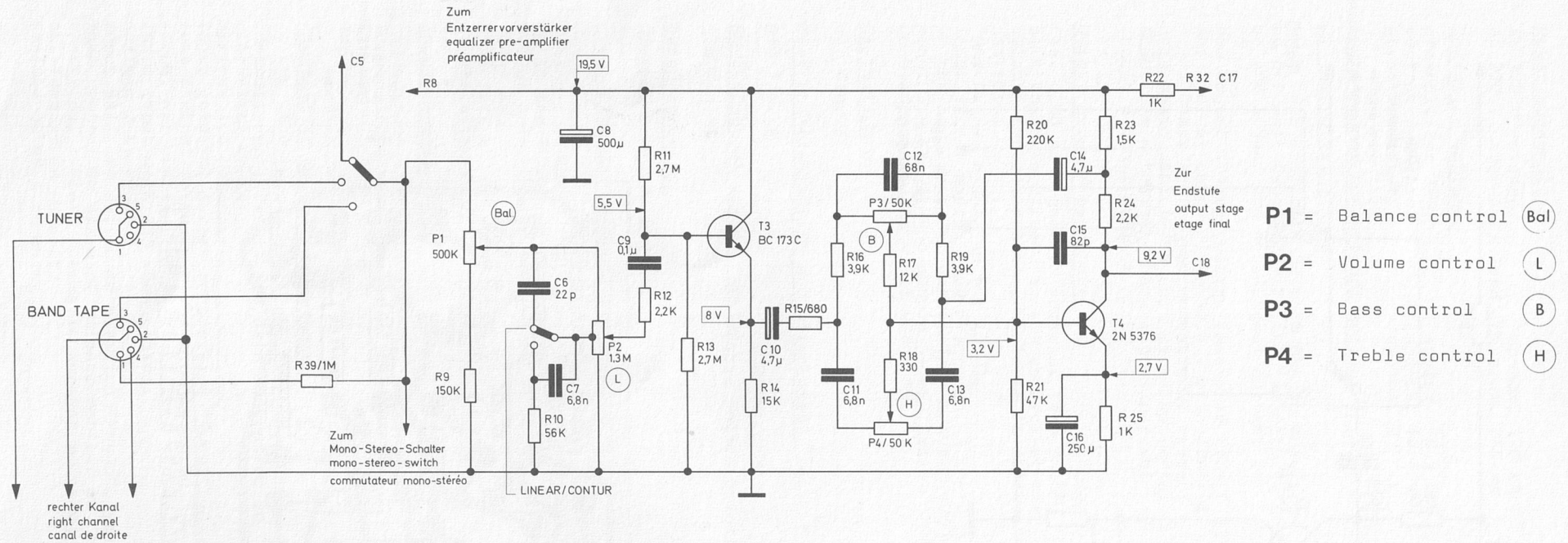


Fig. 9 Circuit-board of control amplifier 220 225 (printed wiring side)

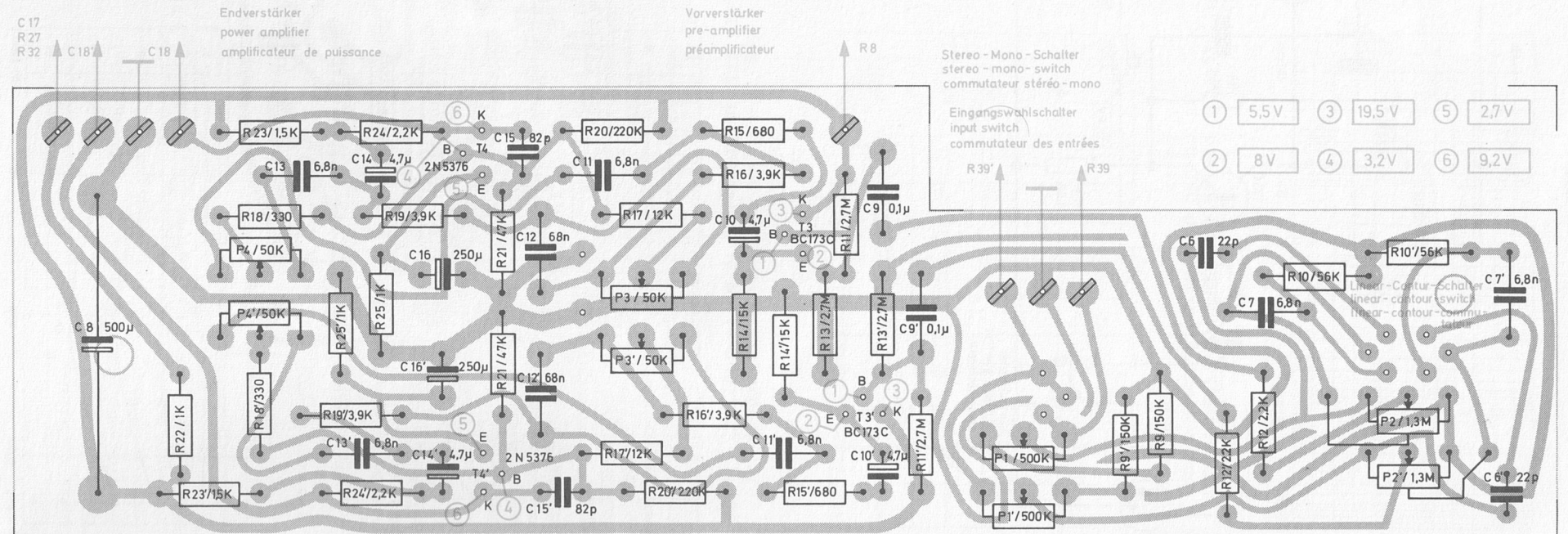


Fig. 10 Schematic diagram of power amplifier

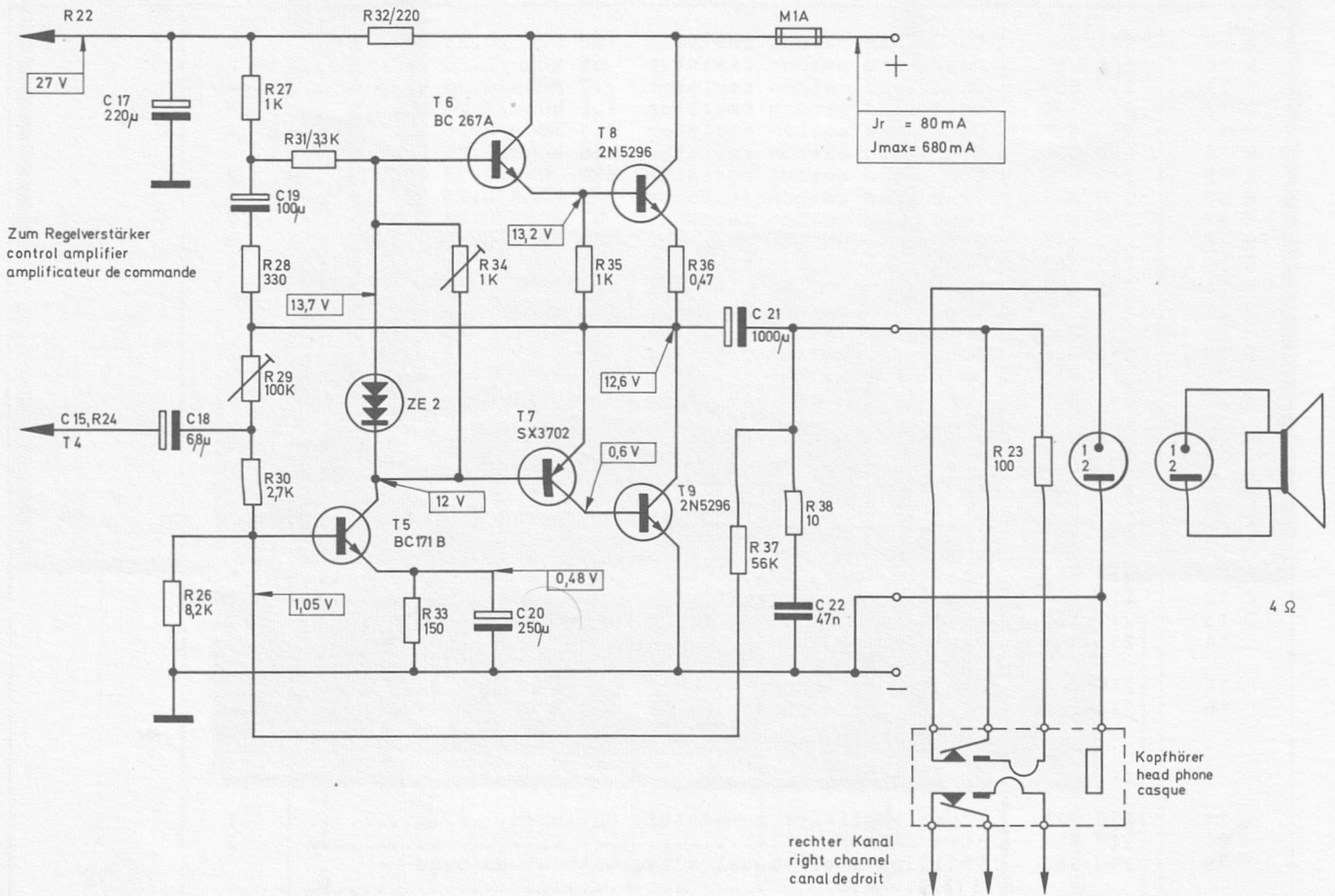
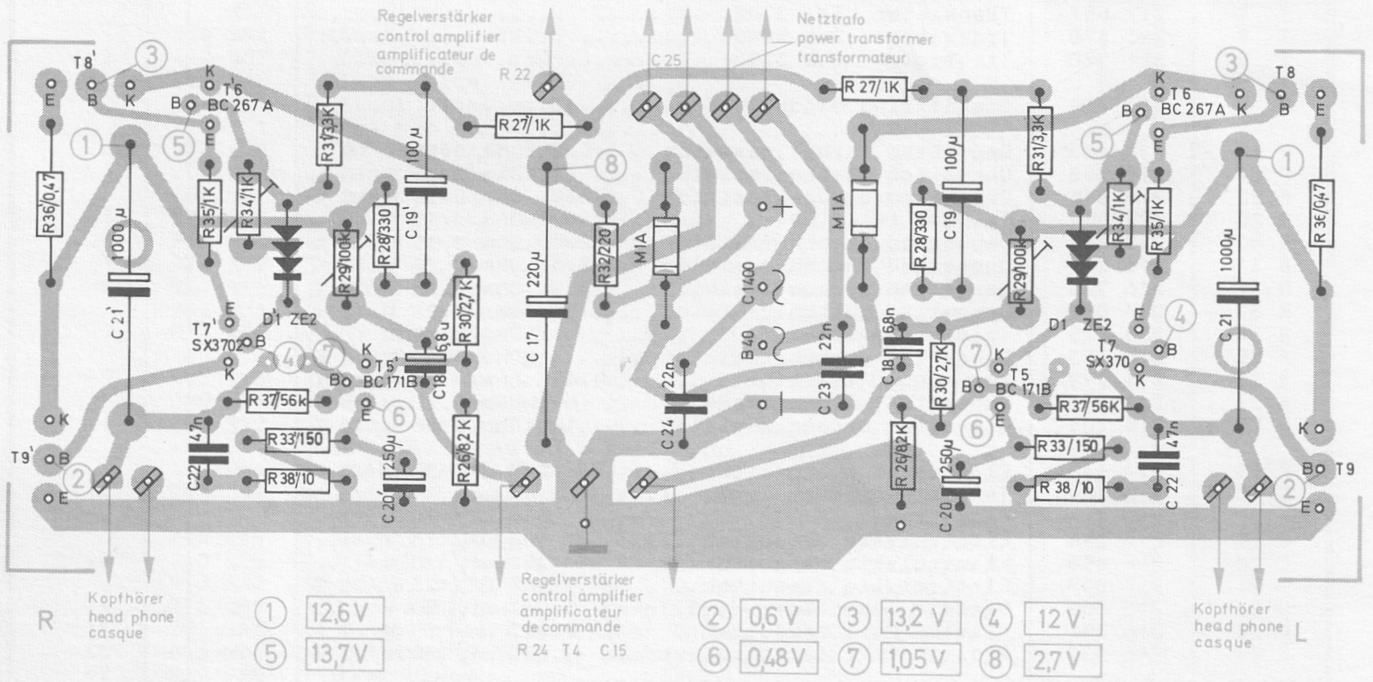


Fig. 11 Circuit-board of power amplifier 220 227 (printed wiring side)



Replacement parts Dual TV 121

Pos.No.	Part No.	Description	Quantity
1	217 647	Connection frame, complete	1
	205 168	Connection plate	1
2	209 470	Speaker socket	2
3	212 228	Printed circuit board, complete with voltage selector	1
	217 661	Fuse equipment plate	1
4	217 884	Line fuse 315 mA slow-blow (220/240 V)	1
5	217 883	Line fuse 630 mA slow-blow (110/150 V)	1
6	204 722	Clamp	1
7	217 658	Transformer cable, 7 leads	1
8	209 632	Power switch	1
9	209 656	Stepped input selector switch	1
10	210 113	Lamp socket E 10	1
11	209 439	Lamp E 10, 7 V/0.3 A	1
12	205 237	Shielded cable, 6 leads	1
13	217 481	Socket plate, complete	1
	205 176	Connection plate	1
14	209 461	Standardized 5-pole socket	2
15	220 228	Power transformer, complete	1
16	210 512	Cylinder-head screw AM 4 x 5	4
	209 977	Solder lug	1
	210 639	Washer 4.2/10/0.5 St	1
17	220 141	Line cable, complete	1
18	218 254	Shielded cable with flat prong plug	1
19	217 667	Support nut	2
	217 668	Spacer ring	1
20	210 283	Phillips sheet-metal screw with cross head B 2.9 x 6.5	5
21	223 948	Headphone-socket	1
R 39	216 415	Deposited carbon resistor 1 MOhm/0.25 W/10 %	2
R 40	216 704	Deposited carbon resistor 100 Ohm/0.25 W/10 %	2
C 25	217 677	Electrolytic capacitor 5000 µF/ 35 V	1
C 26	216 314	Paper capacitor 0.05 µF/250 V~/20 %	1
<u>Preamplifier</u>			
22	217 650	Preamplifier completely equipped	1
T 1	209 863	Transistor BC 173 C	6
T 2	209 863	Transistor BC 173 C	6
R 1	216 322	Deposited carbon resistor 1.5 kOhm/0.25 W/10 %	2
R 2	216 381	Deposited carbon resistor 220 kOhm/0.25 W/10 %	4
R 3	217 868	Deposited carbon resistor 560 Ohm/0.25 W/ 5 %	2
R 4	216 383	Deposited carbon resistor 82 kOhm/0.25 W/ 5 %	2
R 5	217 869	Deposited carbon resistor 270 kOhm/0.25 W/10 %	2
R 6	216 355	Deposited carbon resistor 15 kOhm/0.25 W/10 %	4
R 7	217 860	Deposited carbon resistor 1.2 kOhm/0.25 W/10 %	2
R 8	211 179	Deposited carbon resistor 2.2 kOhm/0.25 W/10 %	3
C 1	217 871	Tantalum electrolytic capacitor 2.2 µF/ 16 V ..	2
C 2	216 333	Electrolytic capacitor 100 µF/ 35 V ..	1
C 3	217 981	Plastic foil capacitor 0.0047 µF/ 63 V/ 5%	2
C 4	217 873	Plastic foil capacitor 0.0012 µF/120 V/ 5%	2
C 5	216 332	Plastic foil capacitor 0.022 µF/160 V/20%	4
<u>Control amplifier</u>			
23	220 225	Control amplifier, completely equipped	1
P 1	217 664	Dual potentiometer 2 x 500 kOhm flat (balance control)	1
P 2	217 665	Dual potentiometer 2 x 1.3 MOhm pos.log. (volume control)	1
P 3	217 666	Dual potentiometer 2 x 50 kOhm flat (bass control)	2
P 4	217 666	Dual potentiometer 2 x 50 kOhm flat (treble control)	2
T 3	209 863	Transistor BC 173 C	6
T 4	217 979	Transistor 2 N 5376	2

Pos.No.	Part No.	Description	Quantity
R 9	211 251	Deposited carbon resistor 150 kOhm/0.25 W/10 %	2
R 10	220 253	Deposited carbon resistor 56 kOhm/0.25 W/10 %	2
R 11	217 858	Deposited carbon resistor 2.7 MOhm/0.25 W/10 %	4
R 12	211 179	Deposited carbon resistor 2.2 kOhm/0.25 W/10 %	3
R 13	217 858	Deposited carbon resistor 2.7 MOhm/0.25 W/10 %	4
R 14	216 355	Deposited carbon resistor 15 kOhm/0.25 W/10 %	4
R 15	216 700	Deposited carbon resistor 680 Ohm/0.25 W/10 %	2
R 16	217 859	Deposited carbon resistor 3.9 kOhm/0.25 W/ 5 %	4
R 17	216 694	Deposited carbon resistor 12 kOhm/0.25 W/10 %	2
R 18	216 675	Deposited carbon resistor 330 Ohm/0.25 W/10 %	4
R 19	217 859	Deposited carbon resistor 3.9 kOhm/0.25 W/ 5 %	4
R 20	216 381	Deposited carbon resistor 220 kOhm/0.25 W/10 %	4
R 21	211 228	Deposited carbon resistor 47 kOhm/0.25 W/10 %	2
R 22	216 353	Deposited carbon resistor 1 kOhm/0.25 W/10 %	7
R 23	216 838	Deposited carbon resistor 1.5 kOhm/0.25 W/ 5 %	2
R 24	217 861	Deposited carbon resistor 2.2 kOhm/0.25 W/ 5 %	2
R 25	216 353	Deposited carbon resistor 1 kOhm/0.25 W/10 %	7
C 6	217 862	Ceramic capacitor 22 pF/500 V/10 %	2
C 7	217 863	Plastic foil capacitor 0.0068 μF/400 V/10 %	6
C 8	217 864	Electrolytic capacitor 500 μF/ 25 V	1
C 9	216 671	Plastic foil capacitor 0.1 μF/100 V/20 %	2
C 10	216 407	Tantalum electrolytic capacitor 4.7 μF/ 16 V	4
C 11	217 863	Plastic foil capacitor 0.0068 μF/400 V/10 %	6
C 12	216 402	Plastic foil capacitor 0.068 μF/100 V/10 %	2
C 13	217 863	Plastic foil capacitor 0.0068 μF/400 V/10 %	6
C 14	216 407	Tantalum electrolytic capacitor 4.7 μF/ 16 V	4
C 15	216 404	Ceramic capacitor 82 pF/500 V/10 %	2
C 16	216 656	Electrolytic capacitor 250 μF/ 3 V	4
<u>Power amplifier</u>			
24	220 227	Power amplifier completely equipped	1
25	217 854	Fuse 250 mA	2
26	210 286	Phillips sheet-metal screw with cross head B 2,9 x 9,5	4
	217 679	Heat shield for transistors T8 and T9	4
	217 680	Insulating material for transistors T8 and T9	4
27	217 849	Silicon rectifier B 40 C 1400	1
T 5	213 186	Transistor BC 171 B	2
T 6	217 656	Transistor BC 267 A	2
T 7	217 657	Transistor SX 3702	2
T 8	221 370	Transistor 2 N 5296	4
T 9	221 370	Transistor 2 N 5296	4
D 1	217 654	Stabilizing diode ZE 2	2
R 26	216 433	Deposited carbon resistor 8.2 kOhm/0.25 W/10 %	2
R 27	216 353	Deposited carbon resistor 1 kOhm/0.25 W/10 %	7
R 28	216 675	Deposited carbon resistor 330 Ohm/0.25 W/10 %	4
R 29	209 658	Trimmer resistor 100 kOhm/0.15 W	2
R 30	217 841	Deposited carbon resistor 2.7 kOhm/0.25 W/ 5 %	2
R 31	216 697	Deposited carbon resistor 3.3 kOhm/0.25 W/10 %	2
R 32	216 703	Deposited carbon resistor 220 Ohm/0.25 W/10 %	2
R 33	217 842	Deposited carbon resistor 150 Ohm/0.25 W/10 %	2
R 34	209 625	Trimmer resistor 1 kOhm/0.15 W	2
R 35	216 353	Deposited carbon resistor 1 kOhm/0.25 W/10 %	7
R 36	211 279	Wire-wound resistor 0.47 Ohm/ 1 W/10 %	2
R 37	217 843	Deposited carbon resistor 56 kOhm/0.25 W/ 5 %	2
R 38	216 701	Deposited carbon resistor 10 kOhm/0.25 W/10 %	2
C 17	217 845	Electrolytic capacitor 220 μF/ 35 V	1
C 18	216 409	Tantalum electrolytic capacitor 6.8 μF/ 20 V	2
C 19	211 054	Electrolytic capacitor 100 μF/ 15 V	2
C 20	216 656	Electrolytic capacitor 250 μF/ 3 V	4
C 21	217 847	Electrolytic capacitor 1000 μF/ 25 V/10 %	2
C 22	216 389	Ceramic capacitor 0.047 μF/ 50 V	2
C 23	216 332	Plastic foil capacitor 0.022 μF/160 V/20 %	4
C 24	216 332	Plastic foil capacitor 0.022 μF/160 V/20 %	4

Fig. 13 Home stereo unit



Replacement parts Dual HS 51

Pos.No.	Part No.	Description	Quantity
1	218 991	Dust cover CH 20	1
2	223 567	Case walnut, compl.	1
	223 568	Case white, compl.	1
3	223 573	Front panel compl.	1
	210 361	Hex nut M 3	8
	210 586	Washer 3,2/7/0,5 St	4
4	203 763	Light rod	1
	200 444	Spring washer	1
5	222 335	Dual symbol for front panel	1
6	222 178	Cover bushing for headphone jack	1
7	221 912	Knob	1
8	221 913	Knob	5
9	202 371	Clip for spindle	1
	210 286	Philips sheet metal screw with cross head B 2,9 x 9,5	2
10	203 315	Cover frame	2
	210 345	Philips sink screw with cross head BM 3 x 18 ...	4
11	203 317	Cover washer	1
	210 271	Philips screw AM 3 x 4	1
	210 554	Washer 2,4/6/0,3 Ps	1
12	210 289	Philips sheet metal screw with cross head B 3,5 x 16	8
	210 648	Washer 4,2/14/1 St	8
13	210 525	Cylinder head screw AM 4 x 25	1
	210 638	Washer 4,2/10/0,5 Ps	1
14	216 488	Line cable, compl. (amplifier-phono chassis) ...	1
15	205 344	Audio cable for speaker connection CA 3 compl. .	1
16	215 594	Protecting felt (8 washers)	1
17	222 540	Type plate	1
18	220 689	Shipping carton compl.	1
19	222 539	Operating manual	1

Pos.No.	Part No.	Description	Quantity
		<u>Replacement parts loudspeaker</u>	
20	223 569	Case walnut, compl.	1
	223 570	Case white, compl.	1
21	215 888	Dual escutcheon for loudspeaker	1
	221 455	Locking disc	1
22	223 571	Rear cover compl.	1
	217 590	Special sink screw with cross head 4 x 25	6
23	203 925	Hull for speaker jack compl.	1
	213 589	Speaker jack	1
	216 481	Sheet metal sink screw with cross head B 2,9 x 9,5	4
24	222 401	Woofers 7 11/16" dia.	1
	220 072	Spacer	4
	211 556	Washer 4,3/9/0,8 St	4
	210 367	Hex nut M 4	4
25	221 534	Tweeter 4 1/8" x 2 3/4"	1
	210 609	Washer 3,2/10/1 St	4
	210 361	Hex nut M 3	4
26	222 130	Low frequency coil 1,5 mH	1
	218 306	Holder for coil	1
27	213 330	High frequency coil 0,38 mH	1
	218 307	Holder for coil	1
28	202 198	Solder lug board (5 lugs)	2
29	210 639	Washer 4,2/10/0,5 St	2
	217 556	Cylinder head screw M 4 x 45	1
	217 557	Cylinder head screw M 4 x 30	1
30	203 953	Foam mat 13 1/4" x 8" x 2"	2
31	203 929	Voice frequency electrolytic capacitor 60 µF/35 V/20 %	1
32	203 930	Voice frequency electrolytic capacitor 8 µF/35 V/20 %	1
33	204*032	Wire-wound resistor 2,7 Ohm/5 W/10 %	1

Alterations reserved

You will find replacement parts, funktion description and the trouble-shooting chart in the Dual 1218 Service Manual.

Dual

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