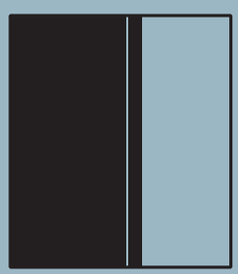
BeoLab 4000

Type 6636, 6637, 6638, 6639, 6640

BeoLab 4000 New version and Corrections

From serial no.: 12893602



BANG & OLUFSEN

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8-1 SPECIFICATION GUIDELINES 8-1

TECHNICAL SPECIFICATIONS	
BeoLab 4000	Type 6636 (EU), 6637 (GB)
	6638 (USA-CDN), 6639 (J), 6640 (AUS)
System data:	
Frequency response	55-20.000 Hz
Sound Pressure Level (SPL)	97 dB/IEC noise
	3 m/stereo/room
Input impedance	47 kΩ
Harmonic distortion	<6% 97 dB SPL/1 m/250-1000 Hz
	<2% 97 dB SPL/1 m/1000-5000 Hz
Input sensitivity	125 mV (88 dB SPL per channel)
Electronics:	
Active crossover network	Linkwitz/Riley
High pass filter	30 dB/octave, 51 Hz
Low frequency equalization	51 Hz/+10 dB
Acoustics and cabinet:	
Cabinet principle	Bass Reflex
Woofer	11.4 cm 4½"
Tweeter	1.8 cm ¾"
Magnetic schield	Yes
Crossover frequency	3.3 kHz
Net. volume	4 litres
Power amplifier:	
Signal to noise ratio	≥84 dBA (1 W in woofer)
Input sencitivity/impedance:	
Power Link sockets	1 V/47 kΩ
Power Link channel separation	>55 dB/10,000 Hz
Standby function	Automatic ON-Standby
Longterm maximum output power	52 W
Connections:	
Power Link	2 x 8-pin socket
Line	Phono socket
Power supply	230 Volts (6636, 6637), 120 Volts (6638)
	100 Volts (6639), 240 Volts (6640)
Power consumption	23 Watts (IEC 65), typical 8 Watts (SPL = 70 dB)
Stand-by	<0.5 Watts
Finish	Aluminium, Black, Green
Front cloth	Grey, Black, Green
Total dimensions W x H x D with wall bracket	28 x 32 x 16 cm
Weight	5.7 kg
Accessories:	
Stand	1206466
Front cloth	3320309, Grey
	3320308, Green
	3320310, Black
Subject to change without notice	

EXPLANATION OF DIAGRAM

Type numbers of transistors and ICs are indicated on the diagrams. If the position is followed by an asterisk the spare part number must always be used because the component in question has been specially selected, e.g. IC4*.

Component print and coordinate system

The largest PCBs have component prints and a coordinate system on both the primary and the secondary side.
On the diagrams every component has a coordinate number. This indicates in which coordinate on the PCB the component is situated. The coordinate numbers are written in smaller print types than the position numbers.

= C27 is placed on the primary side in coordinate 1A.

= R10 is placed on the secondary side in coordinate 2B.

Control circuit

In certain control circuits the active mode is indicated by a function term or by an abbreviation. This may be e.g. ST.BY. = low in the stand-by mode or ST.BY. = high in the stand-by mode.

Signal paths and IC markings

The signal paths are shown in the diagrams by means of semibold lines and arrow heads.
As shown, two different types of arrow head are used:


= Video, luminance and chrominance signals


= Sound signal

The arrow heads shown in the IC pins tell whether the pin indicated is an input or an output.

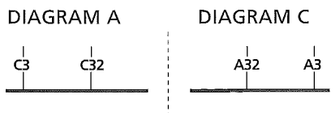
Wiring connections

The wiring connections on the diagrams are assembled in 'bundles'. The individual wires are provided with one of the following codes:

INTERNAL CONNECTION ON ONE DIAGRAM PAGE

Internal connections on a diagram page are indicated by a number. The bend of the wire indicates in wich direction the other end of the wire is found.

CONNECTION TO ANOTHER DIAGRAM PAGE



A connection to another diagram page is indicated by a number as well as by a letter of the diagram to which the connection leads.

Ground symbols

Four different ground symbols are used in the set.


= Ground


= Chassis

Symbol of safety components


When replacing components with this symbol, components with identical part numbers must be used. The new component must be mounted in the same way as the one replaced.

Measuring conditions

All DC voltages have been measured in relation to ground with a voltmeter with an input impedance of 10 Mohms.

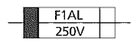
The DC voltages are stated in volts (V), e.g. 0.7V.

All oscillograms and AC voltages have been measured in relation to ground with an oscilloscope or a voltmeter with an input resistance of 1Mohm.

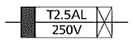
AC voltages are stated in millivolts (mV), e.g. 660mV.

Explanation of the fuse symboles used in the set

Replace with the same type 1 ampere 250 volts quick acting fuse.

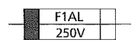


Replace with the same type 2.5 ampere 250 volts slow acting fuse.



Explanation des symboles de fusible utilisés dans l'appareil

Remplacer par un fusible rapide de même type et de 1 ampères 250 volts.



Remplacer par un fusible retardè de même type et de 2.5 ampères 250 volts.

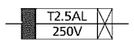


DIAGRAM A INPUT AND CROSSOVER

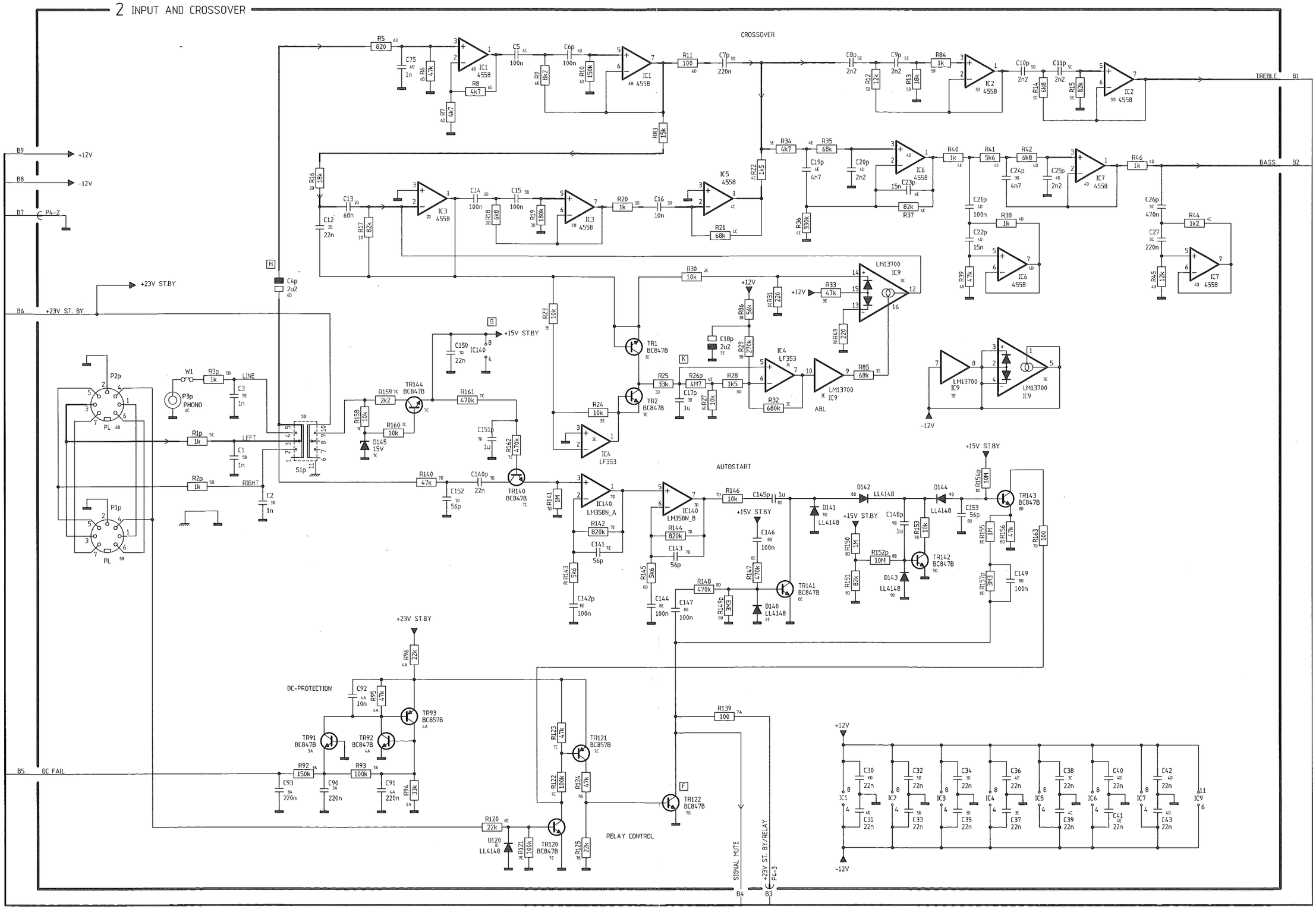
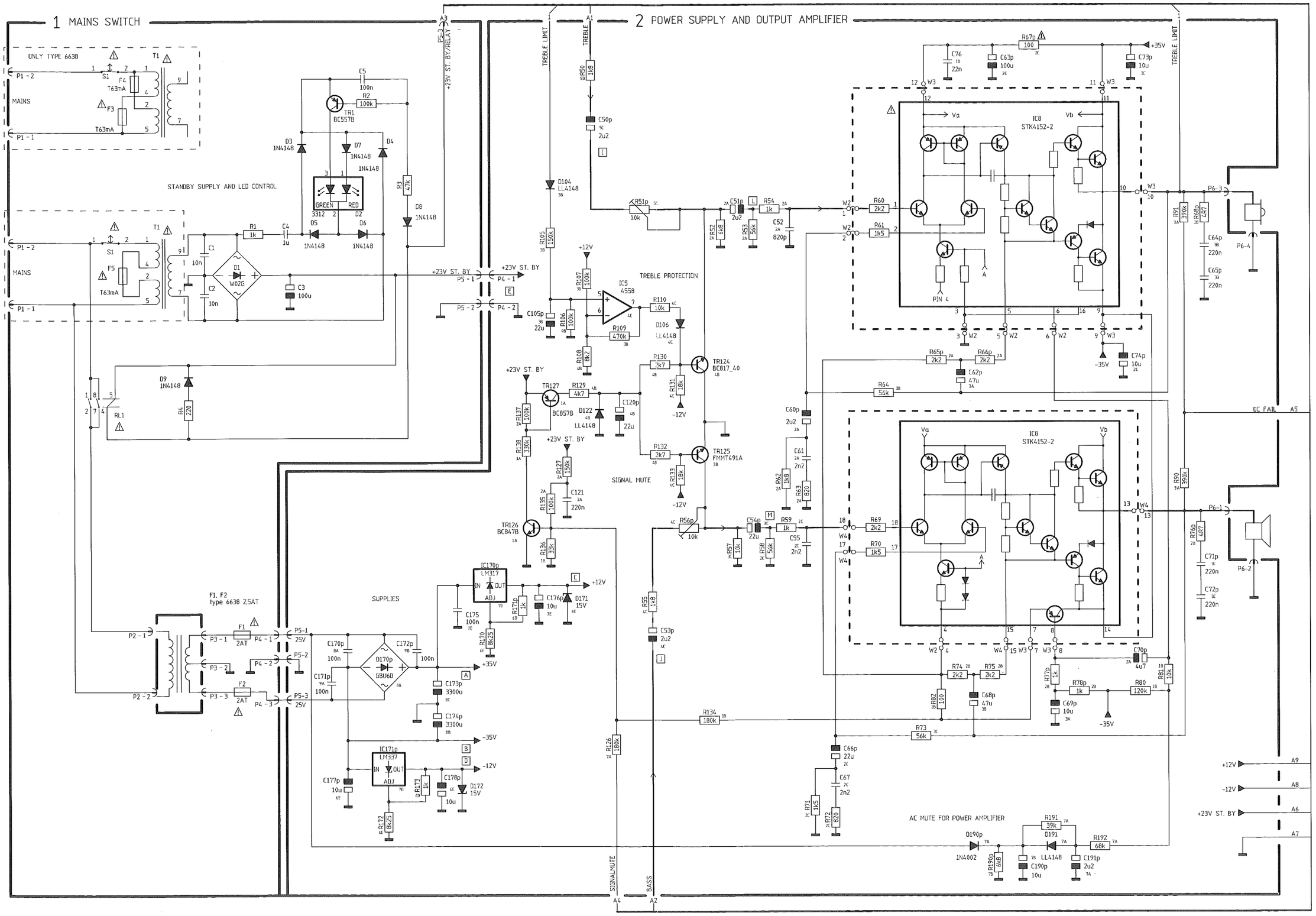
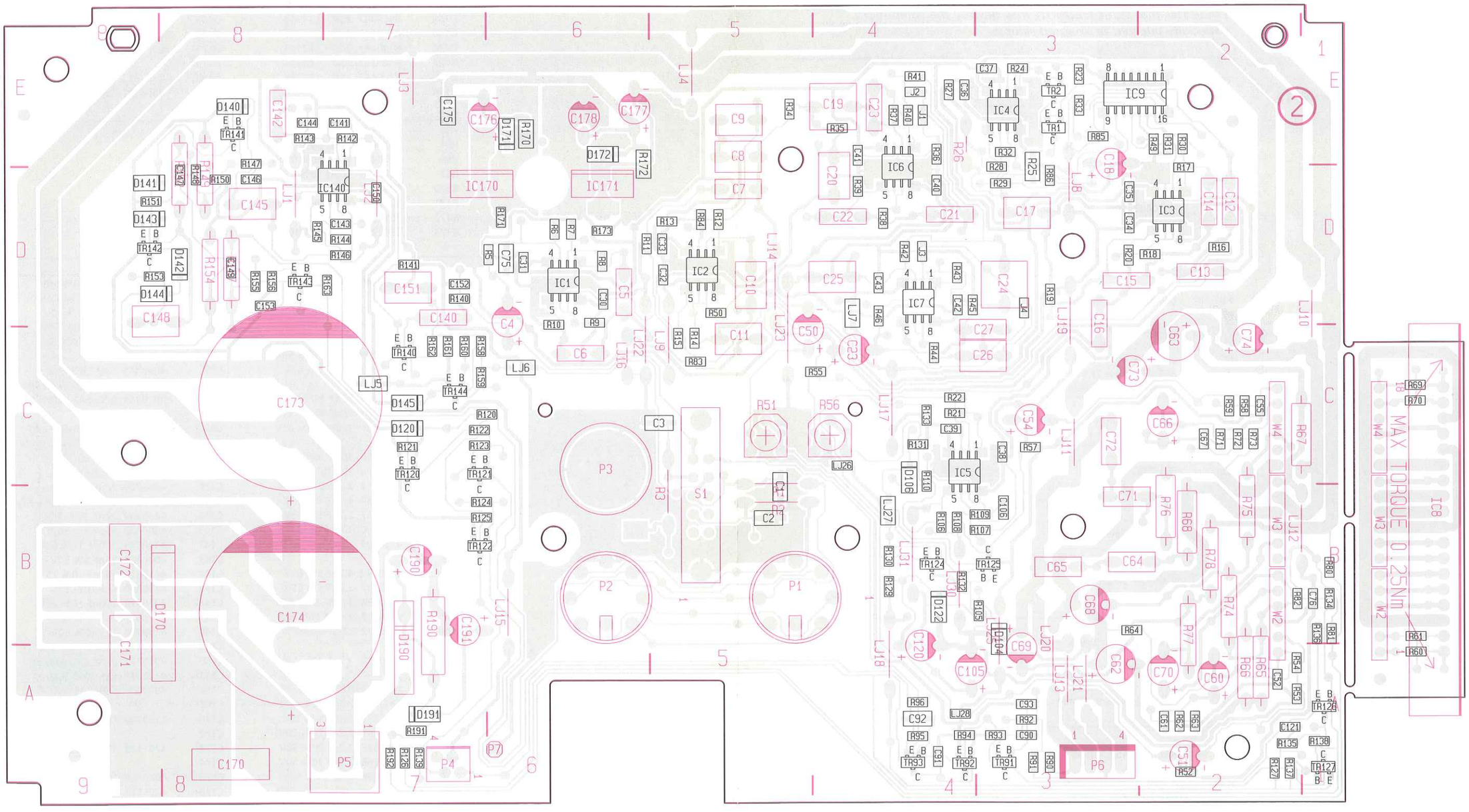


DIAGRAM B MAINS SWITCH & POWER SUPPLY AND OUTPUT AMPLIFIER

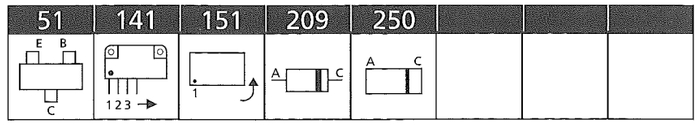


PCB 2, POWER SUPPLY AND OUTPUT AMPLIFIER AND CROSSOVER



10-1 LIST OF ELECTRICAL PARTS

LIST OF ELECTRICAL PARTS



Resistors not referred to are standard, see page x-xx
Δ Indicates that static electricity may destroy the component.
** Specially selected or adapted sample.*

PCB 1, 8006148
8006154 f. type 6639
Main switch

TR1	8320503	**051**	BC557B
D1	8300466		B125C1500
D2	8330401		BICOLOR
D3-D9	8300058	**250**	1N4148
C1-	4010403		10nF -20+80% 50V
C2			
C3	4201264		100µF 20% 50V
C4	4130070		1µF 10% 50V
C5	4130230		100nF 20% 63V
F1-	6600066		Fuse 2A 250V
F2			
	6600081		Fuse T2.5A 125V f. type 6638
F5	6600113		Fuse T63mA 250V
	6600150		Fuse T63mA 125V f. type 6638
S1	7450098		Switch 6A 250V
T1	8013582		Trafo
	8013595		Trafo f. type 6639
RL1	7600106		Relay
FH1-FH8	7200064		Single cont
P1-	7220406		Plug, 2 pole
P2			
P3-	7220185		Plug, 3 pole
P4			
P5	7211053		Socket, 4 pole

PCB 2, 8006149
Power supply, crossover output amplifier

IC1-	8341022	**151**	4558	IC8Δ	8350089	**141**	Hybrid STK4152-2
IC3Δ				IC9Δ	8341411	**151**	LM13700
IC4Δ	8341033	**151**	LF353	IC140Δ	8341098	**151**	LM358
IC5-	8341022	**151**	4558	IC170Δ	8343080	**151**	LM317
IC7Δ				IC171Δ	8340547	**151**	LM337

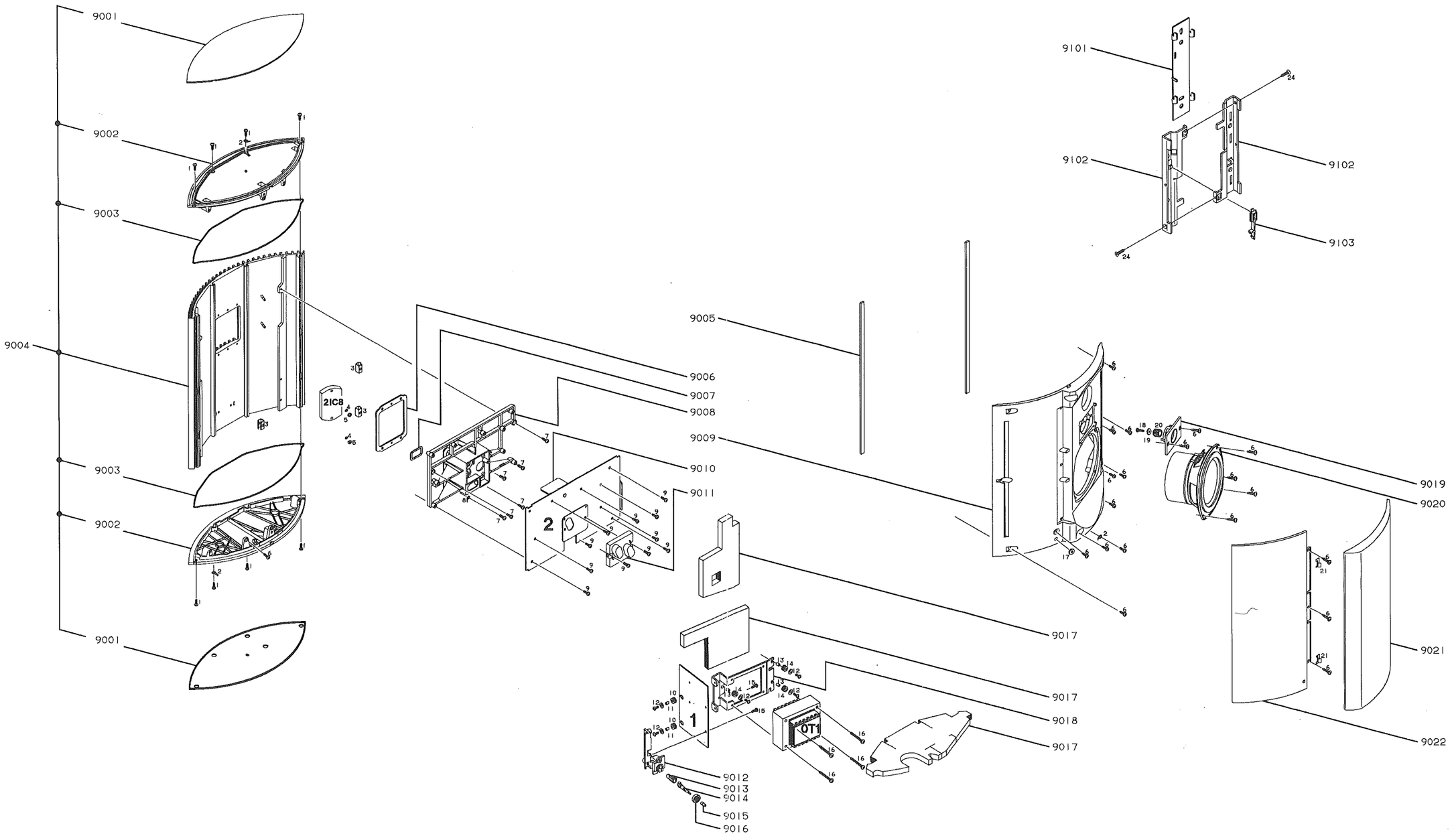
TR1-	8320755	**051**	BC847B	TR122	8320755	**051**	BC847B
TR2				TR124	8320752	**051**	BC817-40
TR91-	8320755	**051**	BC847B	TR125	8321080	**051**	FMMT491ATA
TR92				TR126	8320755	**051**	BC847B
TR93	8320811	**051**	BC857B	TR127	8320811	**051**	BC857B
TR120	8320755	**051**	BC847B	TR140-	8320755	**051**	BC847B
TR121	8320811	**051**	BC857B	TR144			
D104	8300482	**250**	LL4148	D145	8300584		Z15.0V 5%
D106	8300482	**250**	LL4148	D170	8300938		GBU6D
D120	8300482	**250**	LL4148	D171-	8300584		Z15.0V 5%
D122	8300482	**250**	LL4148	D172			
D140-	8300482	**250**	LL4148	D190	8300023	**209**	1N4002
D144				D191	8300482	**250**	LL4148
R51	5370474		10kΩ 30% 0.3W				
R56	5370474		10kΩ 30% 0.3W				
R67	5020159		100Ω 10% 0.3W				
R170	5011996		8.25kΩ 1% 1/8W				
R171	5012230		1kΩ 1% 1/10W				
R172	5011996		8.25kΩ 1% 1/8W				
R173	5012230		1kΩ 1% 1/10W				
C1-	4000345		1.0nF 5%	C67	4010263		2.2nF 10% 50V
C3				C68	4200688		47µF 20% 50V
C4	4200517		2.2µF 20% 50V	C69	4201173		10µF 20% 50V
C5-	4130306		100nF 10% 63V	C70	4201172		4.7µF 20% 50V
C6				C71-	4130308		220nF 10% 63V
C7	4130308		220nF 10% 63V	C72			
C8	4100237		2.2nF 5% 63V	C75	4000345		1.0nF 5% 50V
C11				C76	4010272		22nF -20+80% 50V
C12	4130304		22nF 10% 63V	C90-	4010314		220nF -20+80% 25V
C13	4130231		68nF 10% 63V	C91			
C14-	4130306		100nF 10% 63V	C92	4010176		10nF -20+80% 50V
C15				C93	4010314		220nF -20+80% 25V
C16	4130265		10nF 10% 63V	C105	4200824		22µF 20% 50V
C17	4130070		1µF 10% 50V	C106	4000409		56pF 5% 50V
C18	4200517		2.2µF 20% 50V	C120	4200824		22µF 20% 50V
C19	4100239		4.7nF 5% 63V	C121	4010314		220nF -20+80% 25V
C20	4100237		2.2nF 5% 63V	C140	4130304		22nF 10% 63V
C21	4130306		100nF 10% 63V	C141	4000409		56pF 5% 50V
C22-	4130303		15nF 10% 63V	C142	4130306		100nF 10% 63V
C23				C143	4000409		56pF 5% 50V
C24	4100239		4.7nF 5% 63V	C144	4010316		100nF 10% 25V
C25	4100237		2.2nF 5% 63V	C145	4130070		1µF 10% 50V
C26	4130234		470nF 10% 63V	C146-	4010316		100nF 10% 25V
C27	4130308		220nF 10% 63V	C147			
C30-	4010272		22nF -20+80% 50V	C148	4130070		1µF 10% 50V
C43				C149	4010316		100nF 10% 25V
C50-	4200517		2.2µF 20% 50V	C150	4010272		22nF -20+80% 50V
C51				C151	4130070		1µF 10% 50V
C52	4000423		820pF 10% 50V	C152-	4000409		56pF 5% 50V
C53	4200517		2.2µF 20% 50V	C153			
C54	4200525		22µF 20% 10V	C170-	4130103		100nF 20% 250V
C55	4010263		2.2nF 10% 50V	C172			
C60	4200517		2.2µF 20% 50V	C173-	4201139		3300µF 20% 50V
C61	4010263		2.2nF 10% 50V	C174			
C62	4200688		47µF 20% 50V	C175	4010166		100nF -20+80% 50V
C63	4201264		100µF 20% 50V	C176-	4201173		10µF 20% 50V
C64-	4130308		220nF 10% 63V	C178			
C65				C190	4201173		10µF 20% 50V
C66	4200525		22µF 20% 10V	C191	4200517		2.2µF 20% 50V
HS170	3358343		Heatsink				

10-2 LIST OF ELECTRICAL PARTS 10-2

S1	7400371	Switch
P1-P2	7210929	Socket, 8 pole
P3	7211100	Socket, phono
P4	7211053	Socket, 4 pole
P5	7220185	Plug, 3 pole
P6	7221211	Plug, 4 pole

11-1 LIST OF MECHANICAL PARTS

EXPL. VIEW



LIST OF MECHANICAL PARTS

01 modul	8006148	Main switch
	8006154	Main switch f. type 6639
02 modul	8006149	Power supply, crossover output amplifier
2IC8	8350089	Hybrid
	3340142	Gasket f. primary side
	3340135	Gasket f. secondary side
	3340143	Gasket f. capacitor
0T1	8013569	Trafo, 230 V, for type 6636, 3637
	8013577	Trafo, 100 V, for type 6639
	8013578	Trafo, 120 V, for type 6638
	8013579	Trafo, 240 V, for type 6640

9001	3456225	Top/bottom, green
	3456226	Top/bottom, grey
	3456227	Top/bottom, black
9002	3458958	Top/Bottom plate
9003	3340141	Gasket
9004	3358351	Heat sink, green
	3358352	Heat sink, grey
	3358353	Heat sink, black
9005	3947350	Foam tape by the meter
9006	3340136	Gasket
9007	3340090	Gasket
9008	3169199	Bracket
9009	3440182	Baffle, right
	3440183	Baffle, left
9010	3358343	Heat sink
9011	3160105	Cover
9012	3151432	Holder
9013	2576328	Spacer
9014	6150006	Optic
9015	2938320	Bushing
9016	3340134	Gasket
9017	3332075	Foam
9018	3151428	Holder
9019	8480243	Tweeter
9020	8480261	Woofer
9021	3320308	Cloth front, green
	3320309	Cloth front, grey
	3320310	Cloth front, black
9022	2569485	Profil right, green
	2569486	Profil right, grey
	2569487	Profil right, black
	2569490	Profil left, green
	2569491	Profil left, grey
	2569492	Profil left, black

Survey of screws etc.

1	2013177	Screw, 3.0 x 13
2	2816298	Solder spring
3	2816214	Clips
4	2624013	Spring washer
5	2380011	Nut
6	2015139	Screw, 3.5 x 16
7	2039008	Screw, 3 x 6
8	7530087	Solder tag
9	2013159	Screw, 3 x 14
10	2930130	Bushing
11	2576278	Spacer
12	2058031	Screw w. washer
13	2576333	Spacer
14	2930143	Bushing
15	2015132	Screw, 3.5 x 10
16	2056002	Screw, 3.5 x 35
17	3340137	Gasket
18	2038103	Screw, 3 x 12
19	2622247	Washer, ø3.2 x 10.2 x 1
20	3358305	Heat sink
21	2816309	Clips

Wall bracket

9101	3031601	Bracket for wall
9102	3031620	Bracket for speaker
9103	2816297	Clips
22	2042053	Screw, 4 x 16

Parts not shown

	6277219	Wire bundle
	6100245	Mains cable, type 6636
	6100328	Mains cable, type 6637
	6100306	Mains cable, type 6638
	6100247	Mains cable, type 6639
	6100248	Mains cable, type 6640
	3392504	Outer carton
	3397996	Foam packing

3538892 10-98

Setting-up Guide

3506217	Danish
3506218	Swedish
3506219	Finnish
3506220	English
3506221	German
3506222	Dutch
3506223	French
3506224	Italien
3506225	Spanish

LIST OF MECHANICAL PARTS

New colours

9001	3456228	Top/bottom, yellow
	3456217	Top/bottom, blue
	3456229	Top/bottom, red
9021	3320311	Cloth front, yellow
	3320318	Cloth front, blue
	3320312	Cloth front, red
9022	2569488	Profil right, yellow
	2569495	Profil right, blue
	2569489	Profil right, red
	2569493	Profil left, yellow
	2569496	Profil left, blue
	2569494	Profil left, red

Parts not shown

	3103326	Rubber foot

CORRECTIONS

PCB1, Main switch, page 10-1, 15-4

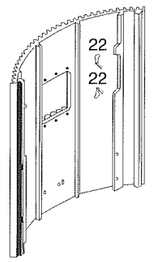
D2	8330236	BICOLOR

Survey of screws etc., page 11-2

6	2015144	Screw, 3,5 x 12
12	2058034	Screw, 3 x 10
22	2058032	Screw, 3 x 16

Wall bracket, page 11-2

24	2042053	Screw, 4 x 16



12-1 ADJUSTMENTS, ENGLISH

ADJUSTMENT

Adjustment of bass/treble levels

When replacing a speaker unit these levels have to be adjusted. On the back of the new unit will be printed a rated value for the sensitivity of that particular unit. The rated value is stated in dB.

This value must be used in connection with the adjustment.

The speaker units need not be connected during the adjustment.

1. Connect an audio oscillator to either:
   - pin 5 (switch in position RIGHT) of the POWER LINK socket. +5V must be present at pin 4.
   - pin 3 (switch in position LEFT) of the POWER LINK socket. +5V must be present at pin 4.
   - the phono socket (switch in position PHONO).

Signal levels
When adjusting the tweeter a signal of 10kHz - 100mV must be applied.

When adjusting the woofer a signal of 1kHz - 100mV must be applied.

2. Connect an AC voltmeter across the connection terminals for the replaced unit.

   Tweeter: P6-3 / P6-4
   Woofer: P6-1 / P6-2

3. Adjust to the voltage corresponding to the rated value in dB according to table 1.

Adjust the treble level by means of 2R51 and the bass level by means of 2R56. These two resistors are accessible via two holes in the socket well, see fig. 1.

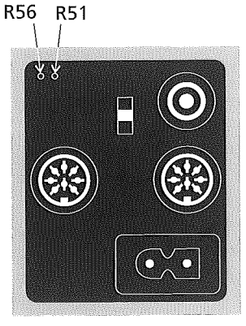


Fig. 1

Rated value in dB	Treble	Bass
2.00	1.96 V	1.79 V
1.75	2.02 V	1.84 V
1.50	2.08 V	1.89 V
1.25	2.14 V	1.95 V
1.00	2.20 V	2.00 V
0.75	2.26 V	2.06 V
0.50	2.33 V	2.12 V
0.25	2.40 V	2.18 V
0.00	2.47 V	2.25 V
-0.25	2.54 V	2.31 V
-0.50	2.61 V	2.38 V
-0.75	2.69 V	2.45 V
-1.00	2.77 V	2.52 V
-1.25	2.85 V	2.60 V
-1.50	2.93 V	2.67 V
-1.75	3.02 V	2.75 V
-2.00	3.11 V	2.83 V

Table 1

Replacement of PCB2

- Measure the resistors 2R51 and 2R56 in the "old" PCB.
- Adjust 2R51 and 2R56 in the "new" PCB to the same values as in the "old" PCB.

REPAIR TIPS

If the stand-by indicator (red LED) will not go on, then:

- check the mains switch.
- check the fuse on the stand-by transformer.
- check the supply to the LED via R1 and C4.

If the speaker will not go ON (green LED) in power link mode, then:

- check that the lead between P5 (PCB1) and P4 (PCB2) is installed.
- check that the DC error circuit (2TR92 and 2TR93) has not gone into a locked state due to the presence of DC at the output of the power amplifiers.
- check that 2TR120, 2TR121 and 2TR122 are all pulled on.

If the speaker will not go ON (green LED) when the line input is used, then:

- check the above for power link mode.
- check that the switch is in the correct position.
- check that the supply voltage +15 Vstby is on (2IC140-8); used in line mode only.
- check that approx. 7.5 VDC is present at 2IC140-3.
- check the AC signal at the input (2IC140-3) and at the output (2IC140-7). The circuit must start up for signals >100 µVAC.
- check 2TR143.

Other: the circuit containing 2TR142 and C148 determines the time constant from the disappearance of the signal to the switching-off of the speaker - typically 100 seconds.

Is the speaker ON (green LED) but not outputting any sound, then:

- check that the switch is in the correct position.
- check the supplies plus and minus 12 VDC.
- check the signal path. Observe in particular whether the mute transistors are off.
- is there a signal input into the power amplifiers but not a signal output out of then, then check the supply voltages at pins 9, 11, 12 and 14 of the hybrid 2IC8.
- check the safety resistor 2R67.

Test points

A number of test points (A - M) are located on PCB2. The table below indicates what should be measured at the individual points.
The measuring conditions are as follows:

Stand-by: Mains: 230 V
Signal: 0 V

On: Mains: 230 V
Signal: Input level: 50 mV
Frequency, bass: 100 Hz (output level approx. 1.6 V)
Frequency, treble: 10 kHz (output level approx. 1.3 V)
The speaker units need not be connected.

Reference: P7

Test point	Coordinate	Component	Test result, stand-by	Test result, on
A	C8	2C173 (+)	0 V	+33 VDC
B	B8	2C174 (-)	0 V	-33 VDC
C	D7	2IC170 (2)	0 V	+12 VDC
D	E6	2C178 (-)	0 V	-12 VDC
E	A7	P4-1	27.75 VDC	23.7 VDC
F	B7	2TR122-C	27.65 VDC	150 mVDC
G	C7	2TR144-E	0 V (phono plug/ line mode: 14.4 VDC)	0 V (phono plug/ line mode: 14.4 VDC)
H	D6	2C4	0 V	50 mVAC
I	C5	2C50	0 V	approx.75 mVAC /10 kHz*
J	C4	2C53	0 V	approx.107 mVAC /100 Hz*
K	D3	2C17	0 V	565 mVDC (ABL not active)
L	A2	2C51	0 V	approx.37 mVAC /10 kHz*
M	C3	2C54	0 V	approx.48 mVAC /100 Hz*

*Depending on the adjustment of 2R51/2R56.

Description of crossover network, including ABL:

Common path.
2IC1 is an input buffer and high-pass filter. Centre frequency approx. 55 Hz.

Bass section.
The first half of 2IC3 is a band-bass filter with adjustable amplification. This, in conjunction with 2IC4 and 2IC9, constitutes the ABL concept. In the first half of 2IC4 the (bass) signal is rectified. The second half of 2IC4 determines the level (approx. 950 mVDC) at which the ABL shall step into operation. This level corresponds to 6-8 W (100 Hz) at the output of the power amplifier.
The adjustment is controlled by means of a current from 2IC9-9 to 2IC9-16. The voltage at 2IC9-9 is approx. -11 VDC when the ABL is not in operation. When the ABL steps into operation the voltage moves towards positive.
2IC3-2 cannot be measured, because it is virtual ground.
The second half of 2IC3 is a high-pass filter. The centre frequency is approx. 55 Hz.

2IC5 is a differential stage that compensates for the band-pass filter.
2IC6 is an active suction circuit (gyrator coupling) that generates a dip at approx. 200 Hz.
2IC7 is an active suction circuit (gyrator coupling) that generates a dip at approx. 700 Hz.

Treble section.
Two high-pass filters (Linkwitz-Riley configuration) have been built up around 2IC2.
The crossover frequency between bass and treble is approx. 3.3 kHz.
Please note that negative feedback and thus the amplification in the power amplifiers is frequency-dependent. 30 dB of raw amplification is generated up to approx. 80 kHz. After that point it increases to 40 dB.

EINSTELLUNG

Einstellung der Tiefen/Höhen

Beim Austausch einer Lautsprechereinheit ist der Pegel einzustellen. Jede neue Einheit besitzt auf der Rückseite einen aufgedruckten Wert für die Empfindlichkeit der jeweiligen Einheit (Wertangabe in dB).

Dieser Wert ist bei der Einstellung zu benutzen.

Es ist nicht notwendig, daß die Lautsprechereinheiten während des Einstellvorgangs angeschlossen sind.

1. Einen Tongenerator anschließen entweder an:
   - Anschluß 5 (Schalter in Stellung RIGHT) der 'POWER LINK'-Steckverbindung.
     Am Anschluß 4 muß eine Spannung von +5V anliegen.

   - Anschluß 3 (Schalter in Stellung LEFT) der 'POWER LINK'-Steckverbindung.
     Am Anschluß 4 muß eine Spannung von +5V anliegen.

   - Phonosteckverbindung (Schalter in Stellung PHONO).

Signalpegel
Beim Einstellen des Hochtonlautsprechers ist ein Signal von 10 kHz - 100 mV zuzuführen.

Beim Einstellen des Tieftonlautsprechers ist ein Signal von 1 kHz - 100 mV zuzuführen.

2. Ein AC-Voltmeter über die Anschlußklemmen für die ausgetauschte Einheit anschließen.

   Höhen: P6-3 / P6-4
   Tiefen: P6-1 / P6-2

3. Es ist auf die Spannung einzustellen, die dem angegebenen Wert in dB gemäß Tabelle 1 entspricht.

Der Höhenpegel wird mit 2R51 eingestellt; der Tiefenpegel wird mit 2R56 eingestellt. Diese Widerstände sind durch 2 Löcher in der Steckermulde erreichbar, siehe Abb. 1.

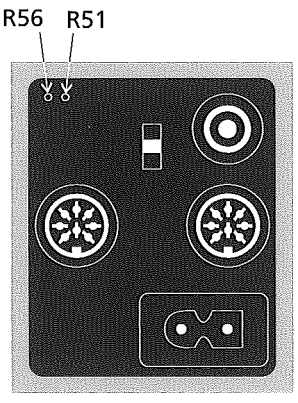


Abb. 1.

Wert in dB	Höhen	Tiefen
2,00	1,96 V	1,79 V
1,75	2,02 V	1,84 V
1,50	2,08 V	1,89 V
1,25	2,14 V	1,95 V
1,00	2,20 V	2,00 V
0,75	2,26 V	2,06 V
0,50	2,33 V	2,12 V
0,25	2,40 V	2,18 V
0,00	2,47 V	2,25 V
-0,25	2,54 V	2,31 V
-0,50	2,61 V	2,38 V
-0,75	2,69 V	2,45 V
-1,00	2,77 V	2,52 V
-1,25	2,85 V	2,60 V
-1,50	2,93 V	2,67 V
-1,75	3,02 V	2,75 V
-2,00	3,11 V	2,83 V

Tabelle 1

Austausch von PCB 2

- Die Widerstände 2R51 und 2R56 auf der "alten" Platine messen.
- 2R51 und 2R56 auf der "neuen" Platine auf die gleichen Werte wie die der "alten" Platine einstellen.

Referenz: P7

Testpunkt	Koordinate	Komponente	Testergebnis Standby	Testergebnis ON
A	C8	2C173 (+)	0 V	+33 VDC
B	B8	2C174 (-)	0 V	-33 VDC
C	D7	2IC170 (2)	0 V	+12 VDC
D	E6	2C178 (-)	0 V	-12 VDC
E	A7	P4-1	27,75 VDC	23,7 VDC
F	B7	2TR122-C	27,65 VDC	150m VDC
G	C7	2TR144-E	0 V (phono plug/ line mode: 14,4 VDC)	0 V (phono plug/ line mode: 14,4 VDC)
H	D6	2C4	0 V	50 mVAC
I	C5	2C50	0 V	approx.75 mVAC /10 kHz*
J	C4	2C53	0 V	approx.107 mVAC /100 Hz*
K	D3	2C17	0 V	565 mVDC (ABL nicht aktiv)
L	A2	2C51	0 V	approx.37 mVAC /10 kHz*
M	C3	2C54	0 V	approx.48 mVAC /100 Hz*

* Hängt von der Einstellung der Widerstände 2R51/2R56 ab.

Referenz: P7

Testpunkt	Koordinate	Komponente	Testergebnis Standby	Testergebnis ON
A	C8	2C173 (+)	0 V	+33 VDC
B	B8	2C174 (-)	0 V	-33 VDC
C	D7	2IC170 (2)	0 V	+12 VDC
D	E6	2C178 (-)	0 V	-12 VDC
E	A7	P4-1	27,75 VDC	23,7 VDC
F	B7	2TR122-C	27,65 VDC	150m VDC
G	C7	2TR144-E	0 V (phono plug/ line mode: 14,4 VDC)	0 V (phono plug/ line mode: 14,4 VDC)
H	D6	2C4	0 V	50 mVAC
I	C5	2C50	0 V	approx.75 mVAC /10 kHz*
J	C4	2C53	0 V	approx.107 mVAC /100 Hz*
K	D3	2C17	0 V	565 mVDC (ABL nicht aktiv)
L	A2	2C51	0 V	approx.37 mVAC /10 kHz*
M	C3	2C54	0 V	approx.48 mVAC /100 Hz*

* Hängt von der Einstellung der Widerstände 2R51/2R56 ab.

Beschreibung der Frequenzweiche einschl. ABL:

Gemeinsamer Signalweg

2IC1 bildet zugleich Eingangs-Puffer und Hochpaß. Mittenfrequenz ca. 55 Hz.

Tieftonteil:

Die erste Hälfte von 2IC3 ist ein Bandpaß mit regelbarer Verstärkung. Dies bildet zusammen mit 2IC4 und 2IC9 das adaptive Baß-Linearisierungs-Konzept (ABL).
Inder ersten Hälfte von 2IC4 wird das (Tiefton-)Signal gleichgerichtet. In der zweiten Hälfte des 2IC4 wird der Pegel (ca. 950 mVDC) festgelegt, bei dem der ABL-Kreis in Funktion treten soll. Der Pegel entspricht 6-8 W (100 Hz) am Ausgang des Leistungsverstärkers.
Die Regelung wird mit einem Strom von 2IC9-9 zu 2IC9-16 gesteuert. Die Spannung am 2IC9-9 liegt bei ca. -11 VDC, wenn der ABL-Kreis nicht in Funktion ist. Wenn der ABL-Kreis aktiv wird, bewegt sich die Spannung gegen positiv.
Es kann am 2IC3-2 nicht gemessen werden, da es sich bei diesem Anschluß um 'Virtual Ground' handelt.
Die zweite Hälfte von 2IC3 ist ein Hochpaß. Mittenfrequenz ca. 55 Hz.
2IC5 ist eine Differenzstufe, die den Bandpaß kompensiert.
2IC6 ist ein aktiver Saugkreis (Gyrator-Schaltung), der bei ca. 200 Hz einen Abfall bewirkt.
2IC7 ist ein aktiver Saugkreis (Gyrator-Schaltung), der bei ca. 700 Hz einen Abfallbewirkt.

Hochtonteil:

Um 2IC2 sind zwei Hochpässe aufgebaut (Linkwitz-Riley-Konfiguration).
Die Übernahmefrequenz zwischen Tiefen und Höhen liegt bei ca. 3,3 kHz.
Es sei an dieser Stelle darauf hingewiesen, daß die Gegenkopplung und damit die Verstärkung in den Leistungsverstärkern frequenzabhängig sind. Es gibt 30 dB-Rohverstärkung bis ca. 80 kHz. Danach steigt sie auf 40 dB.

REGLAGES

Réglage du niveau des graves et des aigus

Il convient de régler ce niveau lors du remplacement d'une enceinte. Une valeur exprimée en dB et traduisant la sensibilité de l'enceinte est estampée sur la face arrière de la nouvelle enceinte.

Utiliser cette valeur pour procéder au réglage.

Il n'est pas nécessaire de raccorder les enceintes pour ce réglage.

1) Raccorder un oscillateur BF à :
   - la borne 5 (sélecteur en position RIGHT) de la fiche POWER LINK (la borne 4 doit présenter une tension de +5V), à
   - la borne 3 (sélecteur en position LEFT) de la fiche POWER LINK (la borne 4 doit présenter une tension de +5 V) ou à
   - la prise phono (sélecteur en position PHONO).

Niveau des signaux
Appliquer un signal de 10 kHz - 100 mV pour régler le HP d'aigu.

Appliquer un signal d'1 kHz - 100 mV pour régler le HP de grave.

2) Raccorder un voltmètre ca au bornier de la nouvelle enceinte.

   Aigus : P6-3 / P6-4
   Graves : P6-1 / P6-2

3) Régler pour obtenir la tension indiquée dans le tableau 1 en regard de la valeur exprimée en dB.

Régler le niveau des aigus à l'aide de 2R51 et celui des graves avec 2R56. 2 orifices pratiqués dans le puits à fiches permettent d'y accéder. Voir fig. 1.

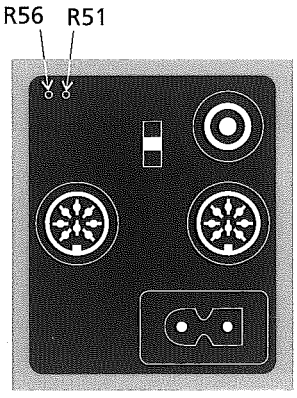


Fig. 1.

Valeur assignée en dB	Aigus	Graves
2,00	1,96 V	1,79 V
1,75	2,02 V	1,84 V
1,50	2,08 V	1,89 V
1,25	2,14 V	1,95 V
1,00	2,20 V	2,00 V
0,75	2,26 V	2,06 V
0,50	2,33 V	2,12 V
0,25	2,40 V	2,18 V
0,00	2,47 V	2,25 V
-0,25	2,54 V	2,31 V
-0,50	2,61 V	2,38 V
-0,75	2,69 V	2,45 V
-1,00	2,77 V	2,52 V
-1,25	2,85 V	2,60 V
-1,50	2,93 V	2,67 V
-1,75	3,02 V	2,75 V
-2,00	3,11 V	2,83 V

Tableau 1

Remplacement de la carte PCB 2

- Mesurer la résistance de 2R51 et de 2R56 surl'"ancienne" carte.
- Sur la "nouvelle" carte, régler 2R51 et 2R56 sur les valeurs précédemment mesurées.

CONSEILS DE REPARATION

Refus d'allumage du voyant lumineux de veille (DEL rouge) :

- Vérifier la position de l'interrupteur d'alimentation.
- Vérifier l'état du fusible du transformateur de veille.
- Contrôler l'alimentation de la DEL passant par R1 et C4.

Refus de l'enceinte de se mettre en marche (ON) (DEL verte) en mode Power Link :

- Vérifier que le fil reliant P5 (carte PCB 1) et P4 (carte PCB 2) est branché.
- Vérifier que le circuit détectant les anomalies de type cc (2TR92 et 2TR93) n'a pas commuté en position de verrouillage suite à la présence d'un courant continu à la sortie des amplificateurs de puissance.
- Vérifier que 2TR120, 2TR121 et 2TR122 sont tous à l'état passant.

Refus de l'enceinte de se mettre en marche (ON) (DEL verte) en utilisant l'entrée de ligne :

- Vérifier les points ci-dessus applicables au mode Power Link.
- Vérifier la position de l'interrupteur.
- Vérifier la présence de la tension d'alimentation +15 Vstby (2IC140-8). Cette alimentation n'est mise en oeuvre qu'en mode ligne.
- Vérifier la présence d'une tension continue de 7,5 Venv. à la borne 2IC140-3.
- Contrôler le signal ca à l'entrée (2IC140-3) et à lasortie (2IC140-7). Le circuit doit se déclencher en présence de signaux > 100 µVca.
- Vérifier 2TR143.

Divers : Le circuit construit autour de 2TR142 et C148 définit la constante de temps correspondant à la période qui s'écoule entre la disparition du signal et la coupurede l'enceinte (généralement, 100 secondes).

Enceinte en marche (ON) (DEL verte) mais aucune restitutionsonore :

- Vérifier la position de l'interrupteur.
- Contrôler les alimentations + et - 12 Vcc.
- Contrôler la voie du signal. Vérifier notamment si les transistors de coupure du son sont à l'état bloqué.
- Si un signal entre dans les amplificateurs de puissance mais n'en ressort pas, contrôler les tensions d'alimentation aux bornes 9, 11, 12 et 14 du CI hybride 2IC8.
- Vérifier l'état de la résistance de protection 2R67.

Points de mesure

La carte PCB 2 présente plusieurs points de mesure (de A à M). Le synoptique ci-dessous permet de préciser les valeurs susceptibles d'être mesurées aux divers points.
Conditions de mesure :

Mode veille : Secteur : 230 V
Signal : 0 V

Mode marche : Secteur : 230 V
Signal : niveau d'entrée : 50 mV
Fréquence, graves : 100 Hz (niveau de sortie: 1,6 V env.)
Fréquence, aigus : 10 kHz (niveau de sortie 1,3 V env.)
Le raccordement des enceintes n'est pas indispensable.

Référence : P7

Point de mesure	Coordonnées	Composant	Résultat de la mesure, mode veille	Résultat de la mesure, mode marche
A	C8	2C173 (+)	0 V	+33 Vcc
B	B8	2C174 (-)	0 V	-33 Vcc
C	D7	2IC170 (2)	0 V	+12 Vcc
D	E6	2C178 (-)	0 V	-12 Vcc
E	A7	P4-1	27,75 Vcc	23,7 Vcc
F	B7	2TR122-C	27,65 Vcc	150 mVcc
G	C7	2TR144-E	0 V (prise phono/ mode ligne : 14,4 Vcc)	0 V (prise phono/ mode ligne : 14,4 Vcc)
H	D6	2C4	0 V	50 mVca
I	C5	2C50	0 V	env. 75 mVca/ 10 kHz*
J	C4	2C53	0 V	env. 107 mVca/ 100 Hz*
K	D3	2C17	0 V	565 mVcc (ABL inactif)
L	A2	2C51	0 V	env. 37 mVca/ 10 kHz*
M	C3	2C54	0 V	env. 48 mVca/ 100 Hz*

* Selon le réglage de 2R51/2R56.

Description du filtre séparateur (fonction ABL comprise) :

Voie commune

2IC1 constitue le tampon d'entrée et le filtre passe-haut. La fréquence centrale est calée sur 55 Hz env.

Etage des graves

La première moitié de 2IC3 est un filtre passe-bande au gain réglable. Associé à 2IC4 et 2IC9, l'ensemble forme l'ABL (linéarisation adaptative des graves).

Le signal (des graves) est redressé dans la première moitié de 2IC4. La seconde moitié de 2IC4 se charge de définir le niveau (950 mVcc env.) d'entrée en action de l'ABL. Ce niveau correspond à une valeur comprise entre 6 et 8 W (100 Hz) à la sortie de l'amplificateur de puissance.

La régulation est gérée par le courant allant de 2IC9-9 à 2IC9-16. La tension présente à la borne 2IC9-9 avoisine -11 Vcc quand l'ABL n'est pas en service. Cette tension évolue vers une valeur positive quand l'ABL entre en action.

Il est impossible de procéder à une mesure à la borne 2IC3-2 car il s'agit d'une terre virtuelle.

La seconde moitié de 2IC3 est un filtre passe-haut. La fréquence centrale est calée sur 55 Hz env.

2IC5 représente l'étage différentiel compensant le filtre passe-bande.

2IC6 est un circuit actif de filtrage (couplage d'un gyrateur) présentant un creux à 200 Hz env.

2IC7 est un circuit actif de filtrage (couplage d'un gyrateur) présentant un creux à 700 Hz env.

Etage des aigus

Deux filtres passe-haut (configuration de Linkwitz-Riley) s'articulent autour de 2IC2.

La séparation des graves et des aigus s'effectue aux environs de 3,3 kHz. Noter que le circuit de contre-réaction, et par là même le gain des amplificateurs de puissance, est fonction de la fréquence. Le gain brut est de 30 dB jusqu'à 80 kHz env. Au-delà, il atteint 40 dB.

REGOLAZIONI

Regolazione del livello dei bassi/alti

Quando si sostituisce un diffusore, occorre eseguire la regolazione del livello dei bassi e degli alti.
Sul lato posteriore del nuovo diffusore è stampigliato il valore nominale della sensibilità di quellaparticolare unità.

Tale valore è espresso in dB e deve essere assunto come riferimento per l'esecuzione della regolazione.

I diffusori non devono essere collegati durante la procedura di regolazione.

1. Collegare un oscillatore acustico a:

   - pin 5 (commutatore in posizione DESTRO (RIGHT)) della presa POWER LINK.
     Sul pin 4 deve essere presente una tensione di +5 V.

   - pin 3 (commutatore in posizione SINISTRO (LEFT)) della presa POWER LINK.
     Sul pin 4 deve essere presente una tensione di +5 V.

   - presa fono (interruttore in posizione PHONO).

Livelli di segnale
Quando si esegue la regolazione del tweeter, occorre applicare un segnale da 10 kHz - 100 mV.

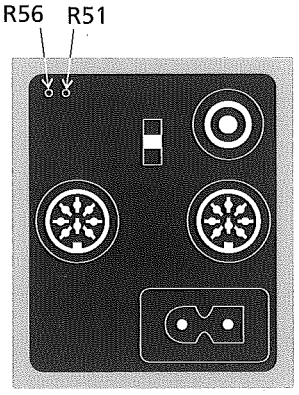
Quando si esegue la regolazione del woofer, occorre applicare un segnale da 1 kHz - 100 mV.

2. Collegare un voltmetro per c.a. fra i terminali di collegamento dell'unità da sostituire.

   Tweeter: P6-3 / P6-4
   Woofer: P6-1 / P6-2

3. Eseguire la regolazione alla tensione corrispondente al valore nominale in dB indicato nella tabella 1.

Regolare il livello degli alti mediante 2R51 ed il livello dei bassi mediante 2R56. Questi due resistori sono accessibili attraverso due fori che si trovano nel pozzetto della presa (vedi fig. 1).



Valore nominale in dB	Alti	Bassi
2,00	1,96 V	1,79 V
1,75	2,02 V	1,84 V
1,50	2,08 V	1,89 V
1,25	2,14 V	1,95 V
1,00	2,20 V	2,00 V
0,75	2,26 V	2,06 V
0,50	2,33 V	2,12 V
0,25	2,40 V	2,18 V
0,00	2,47 V	2,25 V
-0,25	2,54 V	2,31 V
-0,50	2,61 V	2,38 V
-0,75	2,69 V	2,45 V
-1,00	2,77 V	2,52 V
-1,25	2,85 V	2,60 V
-1,50	2,93 V	2,67 V
-1,75	3,02 V	2,75 V
-2,00	3,11 V	2,83 V

Tabella 1

Sostituzione di PCB2

- Eseguire una misurazione sui resistori 2R51 e 2R56 della "vecchia" PCB.
- Regolare 2R51 e 2R52 della "nuova" PCB agli stessi valori misurati sulla "vecchia" PCB.

SUGGERIMENTI PER LE RIPARAZIONI

Se l'indicatore di stand-by (LED rosso) non si accende:

- controllare l'interruttore di rete.
- controllare il fusibile sul trasformatore di stand-by.
- controllare l'alimentazione al LED attraverso R1 e C4.

Se il diffusore non si accende (LED verde) in modo PowerLink:

- verificare che il filo fra P5 (PCB1) e P4 (PCB2) sia installato.
- verificare che il circuito di errore c.c. (2TR92 e 2TR93) non sia entrato in uno stato di blocco dovuto alla presenza di c.c. all'uscita degli amplificatori di potenza.
- verificare che 2TR120, 2TR121 e 2TR122 siano attivi.

Se il diffusore non si accende (LED verde) quando si utilizza l'ingresso di linea:

- controllare se il diffusore si accende in modo Power Link.
- verificare che il commutatore sia nella posizione corretta.
- verificare che sia attiva la tensione di alimentazione di +15 Vstby (2IC140-8), utilizzata nel solo modo linea.
- verificare che su 2IC140-3 sia presente una tensione di ca. 7,5 V c.c..
- controllare il segnale di c.a. in ingresso (2IC140-3) e in uscita (2IC140-7). Il circuito deve attivarsi per segnali > 100 µV c.a..
- controllare 2TR143.

Altro: il circuito contenente 2TR142 e C148 determina la costante temporale calcolata dalla sparizione del segnale al disinserimento del diffusore (normalmente 100 secondi).

Il diffusore è acceso (LED verde) ma non emette suoni:

- verificare che il commutatore sia nella posizione corretta.
- verificare le alimentazioni a più e meno 12 V c.c..
- controllare il percorso del segnale. In particolare, verificare che i transistor di silenziamento non siano attivi.
- se è presente il segnale in ingresso agli amplificatori di potenza ma non il segnale di uscita, controllare la tensione di alimentazione sui pin 9, 11, 12 e 14 dell'ibrido 2IC8.
- controllare il transistor di sicurezza 2R67.

Punti di prova

Sulla PCB2 si trova una serie di punti di prova (A - M). La tabella riportata di seguito indica i valori che dovrebbero essere rilevati in ogni punto.
Le misurazioni devono essere eseguite nelle condizioni seguenti:

Stand-by:	Rete:	230 V
	Segnale:	0 V
Acceso:	Rete:	230 V
	Segnale:	Livello d'ingresso: 50 mV Frequenza, bassi: 100 Hz (livello di uscita ca. 1,6 V) Frequenza, alti: 10 kHz (livello di uscita ca. 1,3 V) I diffusori non devono essere collegati.

Riferimento: P7

Punto di prova	Coordinata	Componente	Risultato della prova, stand-by	Risultato della prova, acceso
A	C8	2C173 (+)	0 V	+33 V c.c.
B	B8	2C174 (-)	0 V	-33 V c.c.
C	D7	2IC170 (2)	0 V	+12 V c.c.
D	E6	2C178 (-)	0 V	-12 V c.c.
E	A7	P4-1	27,75 V c.c.	23,7 V c.c.
F	B7	2TR122-C	27,65 V c.c.	150m V c.c.
G	C7	2TR144-E	0 V (modo inea/fono: 14,4 V c.c.)	0V (modo linea/fono: 14,4 V c.c.)
H	D6	2C4	0 V	50 mV c.a.
I	C5	2C50	0 V	ca. 75 mV c.a./ 10 kHz*
J	C4	2C53	0 V	ca. 107 mV c.a. /100 Hz*
K	D3	2C17	0 V	565 mV c.c. (ABL non attivo)
L	A2	2C51	0 V	ca. 37 mV c.a./ 10 kHz*
M	C3	2C54	0 V	ca. 48 mV c.c./ 100 Hz*

* a seconda della regolazione di 2R51/2R56

Descrizione del circuito separatore di frequenza, compreso ABL

Percorso comune.

2IC1 è un buffer di ingresso e un filtro passa-alto. La frequenza vettrice è ca. 55 Hz.

Sezione bassi.

La prima metà di 2IC3 è un filtro passa-banda con amplificazione regolabile. Insieme a 2IC4 e 2IC9, esso costituisce il sistema ABL.
Nella prima metà di 2IC4 il segnale (bassi) viene raddrizzato. La seconda metà di 2IC4 determina il livello (ca. 950 mV c.c.) al quale l'ABL entra in funzione. Questo livello corrisponde a 6-8 W (100 Hz) all'uscita dell'amplificatore di potenza.
La regolazione viene controllata dalla corrente da 2IC9-9 a 2IC9-16. La corrente su 2IC9-9 è ca. -11 V c.c. quando l'ABL non è in funzione. Quando l'ABL entra in funzione, la tensione si avvicina al segno positivo. 2IC3-2 non può essere misurato in quanto terra virtuale.
La seconda metà di 2IC3 è un filtro passa-alto. La frequenza vettrice è ca. 55 Hz.
2IC5 è uno stadio differenziale che compensa il filtro passa-banda.
2IC6 è un circuito di aspirazione attivo (accoppiamento del giratore) che genera una depressione a ca. 200 Hz.
2IC7 è un circuito di aspirazione attivo (accoppiamento del giratore) che genera una depressione a ca. 700 Hz.

Sezione alti.

Attorno a 2IC2 sono presenti due filtri passa-alto (configurazione Linkwitz-Riley).
La frequenza di transizione fra bassi e alti è ca. 3,3 kHz.
La retroazione negativa e quindi l'amplificazione degli amplificatori di potenza dipende dalla frequenza. Fino a 80 kHz vengono generati 30 dB di amplificazione.
Oltre questo livello, l'amplificazione aumenta a 40 dB.

AJUSTE

Ajuste de los niveles de graves/ agudos

Al sustituir un altavoz, es necesario ajustar los niveles de graves y agudos. El valor nominal de la sensibilidad del altavoz se indica en decibelios (dB) en la parte posterior de cada altavoz.

Este es el valor que se utilizará para el ajuste.

Al efectuar el ajuste, no es necesario que los altavoces estén conectados.

1. Conecte un oscilador de audio:
   - al pin 5 (conmutador en posición RIGHT (= derecha)) del conector POWER LINK.
     En el pin 4 tiene que existir una tensión de +5 V.

   - o al pin 3 (conmutador en posición LEFT (= izquierda)) del conector POWER LINK.
     En el pin 4 tiene que existir una tensión de +5 V.

   - o bien, al enchufe de fono (conmutador en posición PHONO)

Niveles de señal
Al ajustar el altavoz de agudos, deberá aplicarse una señal de 10 kHz - 100 mV.

Al ajustar el altavoz de graves, deberá aplicarse una señal de 1 kHz - 100 mV.

2. Conecte un voltímetro de corriente alterna a los terminalesde conexión del altavoz sustituido.

   Altavoz de agudos: P6-3 / P6-4
   Altavoz de graves: P6-1 / P6-2

3. Efectúe el ajuste a la tensión que corresponda al valor nominal en dB, de acuerdo con la tabla 1.

Ajuste el nivel de agudos mediante 2R51 y el nivel de graves accionando 2R56. Estas dos resistencias son accesibles a través de dos orificios en la caja de conexiones, véase figura 1.

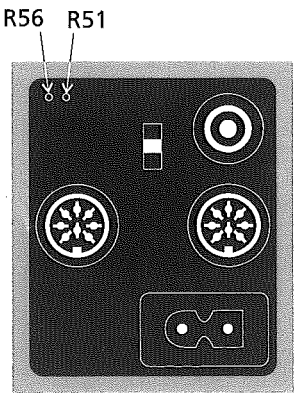


Figura 1.

Valor nominal en dB	Agudos	Graves
2,00	1,96 V	1,79 V
1,75	2,02 V	1,84 V
1,50	2,08 V	1,89 V
1,25	2,14 V	1,95 V
1,00	2,20 V	2,00 V
0,75	2,26 V	2,06 V
0,50	2,33 V	2,12 V
0,25	2,40 V	2,18 V
0,00	2,47 V	2,25 V
-0,25	2,54 V	2,31 V
-0,50	2,61 V	2,38 V
-0,75	2,69 V	2,45 V
-1,00	2,77 V	2,52 V
-1,25	2,85 V	2,60 V
-1,50	2,93 V	2,67 V
-1,75	3,02 V	2,75 V
-2,00	3,11 V	2,83 V

Tabla 1

Sustitución de la PCB 2

- Mida los valores en las resistencias 2R51 y 2R56 de la PCB "antigua".
- Ajuste las resistencias 2R51 y 2R52 de la "nueva" PCB a los valores medidos en la "antigua".

CONSEJOS PARA REPARACION

Si no se enciende el indicador de stand-by (piloto rojo), haga losiguiente:

- Compruebe el interruptor de alimentación de la red.
- Compruebe el fusible del transformador stand-by.
- Compruebe la alimentación de corriente al diodo a través de R1 y C4.

Si no se enciende (ON) el altavoz (piloto verde) en el modo Power Link, haga lo siguiente:

- Compruebe si está instalado el cable entre P5 (PCB 1) y P4 (PCB2).
- Compruebe si el circuito de error de C.C. (2TR92 y 2TR93) ha pasado al estado de "bloqueado", debido a la presencia de corriente continua a la salida de los amplificadores de potencia.
- Compruebe si los transistores 2TR120, 2TR121 y 2TR122 están todos activados.

Si no se activa (ON) el altavoz (piloto verde) al utilizar laentrada de línea, haga lo siguiente:

- Haga las mismas comprobaciones que en el caso de "Power Link".
- Compruebe si el interruptor está en la posición correcta.
- Compruebe si está activada la tensión de alimentación de +15 Vstby (2IC140-8); se utiliza sólo en modo de línea.
- Compruebe la presencia en 2IC140-3 de una tensión de 7,5 V C.C. aprox.
- Compruebe la señal de corriente alterna a la entrada (2IC140-3) y a la salida (2IC140-7). El circuito deberá responder a señales > 100 µV C.A.
- Compruebe el 2TR143.

Otros: El circuito que contiene 2TR142 y C148 determina la constante de tiempo desde la desaparición de la señal hasta la desconexión del altavoz - normalmente 100 segundos.

Si el altavoz está conectado (ON) (piloto verde), pero no emite ningún sonido, haga lo siguiente:

- Compruebe si el interruptor está en la posición correcta.
- Compruebe las alimentaciones de ± 12 V c.c.
- Compruebe el trayecto de la señal, comprobando en particular si los transistores de silenciamiento están desactivados.
- Si la señal de entrada a los amplificadores de potencia está presente, pero no hay una señal de salida, compruebe las tensiones de alimentación en los pines 9, 11, 12 y 14 del circuito híbrido 2IC8.
- Compruebe la resistencia de seguridad 2R67.

Puntos de medida

En la PCB 2 hay una serie de puntos de medida (A - M). La tabla siguiente indica qué deberá medirse en cada uno de estos puntos.
Las condiciones de medición serán las siguientes:

Stand-by:	Alimentación de la red:	230 V
	Señal:	0 V
Encendido:	Alimentación de la red:	230 V
	Señal:	Nivel de entrada: 50 V Frecuencia, graves: 100 Hz (nivel de salida 1,6 V aprox.) Frecuencia, agudos: 10 Hz (nivel de salida 1,3 V aprox.) No es necesario que los altavoces estén conectados.

Referencia: P7

Punto de medida	Coordenada	Componente	Resultado del test, stand-by	Resultado del test, encendido
A	C8	2C173 (+)	0 V	+33 V C.C.
B	B8	2C174 (-)	0 V	-33 V C.C.
C	D7	2IC170 (2)	0 V	+12 V C.C.
D	E6	2C178 (-)	0 V	-12 V C.C.
E	A7	P4-1	27,75 V C.C.	23,7 V C.C.
F	B7	2TR122-C	27,65 V C.C.	150 mV C.C.
G	C7	2TR144-E	0 V (clavija fono/ modo línea: 14,4 V C.C.)	0 V (clavija fono/ modo línea: 14,4 V C.C.)
H	D6	2C4	0 V	50 mV C.C.
I	C5	2C50	0 V	75 mV C.C./ 10kHz aprox.*
J	C4	2C53	0 V	107 mVC.C./ 100 Hz aprox.*
K	D3	2C17	0 V	565 mV C.C. (ABL inactivo)
L	A2	2C51	0 V	37 mV C.C./ 10kHz aprox.*
M	C3	2C54	0 V	48 mV C.C./ 100Hz aprox.*

*En función de los ajustes efectuados en las resistencias2R51/2R56.

Descripción de la red de enlace, incluido ABL:

Trayecto común:

2IC1 es un buffer de entrada y filtro de paso alto. Frecuencia central 55 Hz aprox.

Sección de graves:

La primera mitad del circuito 2IC3 es un filtro de paso de banda con amplificación ajustable. Junto con 2IC4 y 2IC9, constituye el concepto ABL.

En la primera mitad del 2IC4 se rectifica la señal (de graves). La segunda mitad del 2IC4 determina el nivel (950 mV C.C. aprox.) al que el ABL ha de entrar en funcionamiento. Este nivel corresponde a 6-8 W (100 Hz) a la salida del amplificador de potencia.

El ajuste se controla por medio de una corriente entre 2IC9-9 y 2IC9-16. Cuando el ABL no está funcionando, la tensión en 2IC9-9 es de unos -11 V C.C. Cuando el ABL entra en funcionamiento, la tensión pasa a ser de signo positivo.

No es posible medir el 2IC3-2, porque se trata de masa virtual.

La segunda mitad del 2IC3 es un filtro de paso alto, con una frecuencia central de unos 55 Hz.

El 2IC5 es una etapa diferencial que compensa el filtro de paso de banda.

El 2IC6 es un circuito de absorción activo (acoplamiento giratorio) que genera una caída a 200 Hz aprox.

El 2IC7 es un circuito de absorción activo (acoplamiento giratorio) que genera una caída a 700 Hz aprox.

Sección de agudos:

Alrededor del 2IC2 se han creado dos filtros de paso alto (configuración Linkwitz-Riley).

La frecuencia de cruce entre graves y agudos es de unos 3,3 kHz.

Tenga en cuenta que la realimentación negativa, y por tanto la amplificación en los amplificadores de potencia, depende de la frecuencia. Hasta los 80 kHz aprox. se genera una amplificación sin tratamiento de 30 dB. Por encima de dicha frecuencia, la amplificación aumenta a 40 dB.

DISMANTLING

ZERLEGUNG

DESASSEMBLAGE

SMONTAGGIO

DESMONTAJE

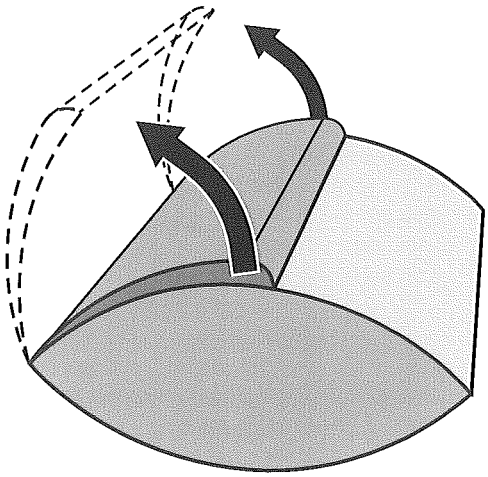


Fig. 1.

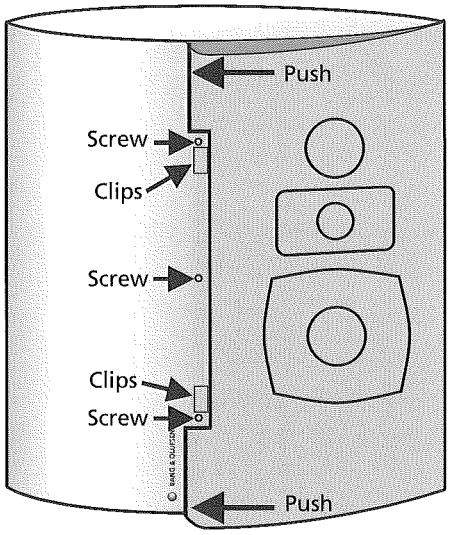


Fig. 2.

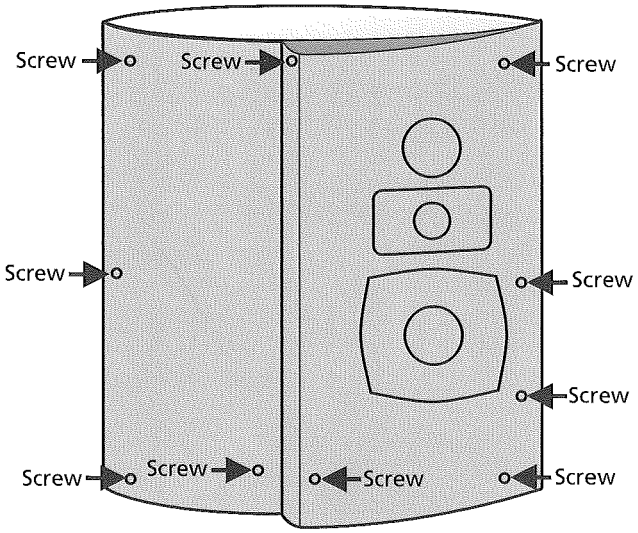
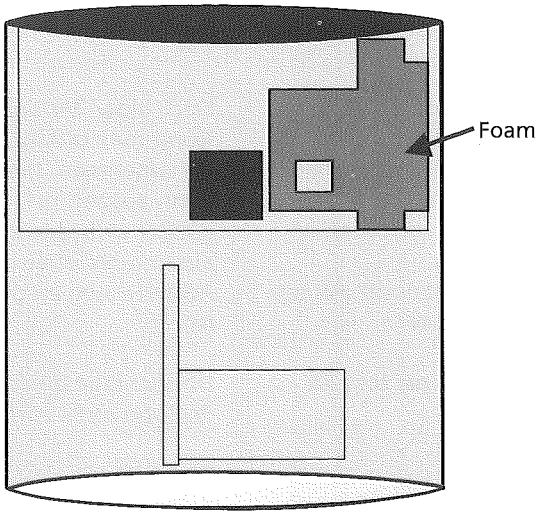
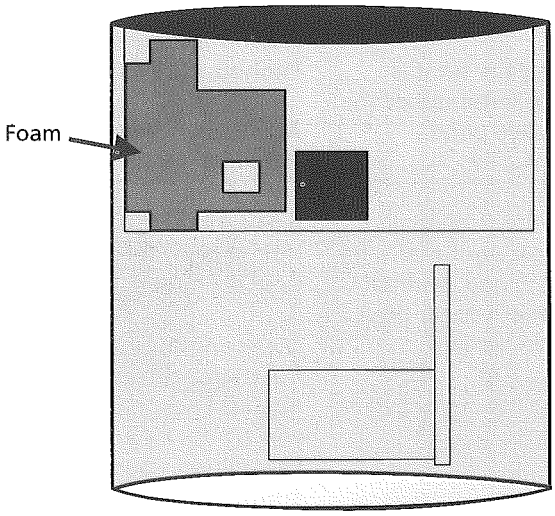


Fig. 3.



Right speaker



Left speaker

Fig. 4.

INSULATION TEST

Each set must be insulation tested after having been dismantled. Make the test when the set has been reassembled and is ready to be returned to the customer.

Flashovers must not occur during the testing procedure!

Make the insulation test as follows:

Short-circuit the two pins of the mains plug and connect them to one of the terminals of the insulation tester.Connect the other terminal of the insulation tester to ground in the Phono socket (LINE IN).

NOTE!
To avoid damaging the set it is essential that both terminals of the insulation tester have good contact.

Slowly turn the voltage control of the insulation tester until a voltage of 1.1-1.3 kV is obtained. Maintain that voltage for one second, then slowly turn it down again.

During the testing the current must not exceed 10 mA.

ISOLATIONSPRÜFUNG

Nach einer Zerlegung ist bei jedem Gerät eine Isolationsprüfung vorzunehmen. Die Prüfung wird dann ausgeführt, wenn das Gerät wieder vollständig zusammengebaut und zur Auslieferung an den Kunden bereit ist.

Überschläge dürfen während der Prüfung nicht vorkommen!

Die Isolationsprüfung in folgender Weise durchführen:

Die beiden Steckerstifte am Netzstecker kurzschließen und an eine der Anschlußklemmen des Isolationsprüfers anschließen. Die andere Anschlussklemme des Isolationsprüfers an die Masse der Phonobuchse (LINE IN) anschließen.

ACHTUNG!
Um Beschädigungen des Gerätes zu vermeiden, ist es wichtig, daß beide Anschlußklemmen des Isolationsprüfers einen sehr guten Kontakt haben.

Die Spannungsregelung des Isolationsprüfers langsam nach oben drehen, bis eine Spannung von 1,1-1,3 kV erreicht wird. Diese Einstellung 1 Sekund aufrechterhalten, und anschließend die Spannung wieder langsam nach unten drehen.

Der Strom darf während der Prüfung nicht 10 mA übersteigen.

TEST D'ISOLEMENT

Il convient de soumettre l'appareil à un test d'isolement après l'avoir désassemblé. Ce test est effecturé après avoir réassemblé l'appareil et avant de la remettre au client.

Aucun amorçage doit se produire lors du test!

Procéder au test d'isolement comme suit:

Court-circuiter les deux broches de la fiche secteur et les raccorder à une des bornes du testeur d'isolement. Raccorder l'autre borne à la broche de la douille phono (LINE IN).

ATTENTION
Pour éviter d'endommager l'appareil, il est important que les deux bornes du testeur d'isolement possèdent un bon contact.

Tourner lentement la tension sur le testeur d'isolement jusqu'à arriver à 1,1-1,3 kV.
Maintenir cette tension pour 1 seconde, puis la diminuer lentement de nouveau.

Pendant le test le courant ne faut pas excéder 10 mA.

BANG & OLUFSEN

BeoLab 4000 New version

and Corrections
From serial no.: 12893602

3538879 12-97 Paste into Service Manual Loudspeaker (3538816)

SERVICE MANUAL

TECHNICAL SPECIFICATIONS, corrections

Connections:

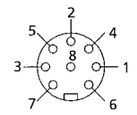
Power Link	2x8 pin socket	
	Pin 1	Power up/down (grey) (on>2.5 V)
	Pin 2	GND (shield)
	Pin 3	Left in, signal (brown) (0 to 2 V_{RMS})
	Pin 4	Speaker on/off (yellow) (ON>2.5 V)
	Pin 5	Right in, signal (green) (0 to 2 V_{RMS})
	Pin 6	Datalink (white) (High>4 V, Low<0.2 V)
	Pin 7	Datalink GND (shield)
	Pin 8	Not used (pink)
RCA phono socket	Signal	(0 to 2 V_{RMS})
		Speaker on/off > 0.1 mV/1 kHz

DIAGRAM A INPUT AND CROSSOVER, FROM SERIAL NO. 12893602

2 INPUT AND CROSSOVER

CROSSOVER

B9 +12V
B8 -12V
B7 P4-2
B6 +23V ST. BY
+23V ST.BY
+15V ST.BY
-12V
B5 DC FAIL
B4 SIGNAL MUTE
B3 +23V ST. BY/RELAY P4-3
B2 BASS
B1 TREBLE

P2p PL 6B
P1p PL 5B
P3p PHONO 6C
W1
LINE
RIGHT
LEFT
S1p

IC1 4558
IC2 4558
IC3 4558
IC4 LF353
IC5 4558
IC6 4558
IC7 4558
IC9 LM13700
IC140 LM358N_A
IC140 LM358N_B

TR1 BC847B
TR2 BC847B
TR3 PMEF4392
TR4 PMBF4392
TR91 BC847B
TR92 BC847B
TR93 BC857B
TR120 BC847B
TR121 BC857B
TR122 BC847B
TR141 BC847B
TR142 BC847B
TR143 BC847B
TR144 BC847B

D120 LL4148
D140 LL4148
D141 LL4148
D142 LL4148
D143 LL4148
D144 LL4148
D145 15V

ABL
AUTOSTART
DC-PROTECTION
RELAY CONTROL

DIAGRAM B MAINS SWITCH & POWER SUPPLY AND OUTPUT AMPLIFIER, FROM SERIAL NO. 12893602

1 MAINS SWITCH

2 POWER SUPPLY AND OUTPUT AMPLIFIER

ONLY TYPE 6638

STANDBY SUPPLY AND LED CONTROL

TREBLE PROTECTION

SIGNAL MUTE

SUPPLIES

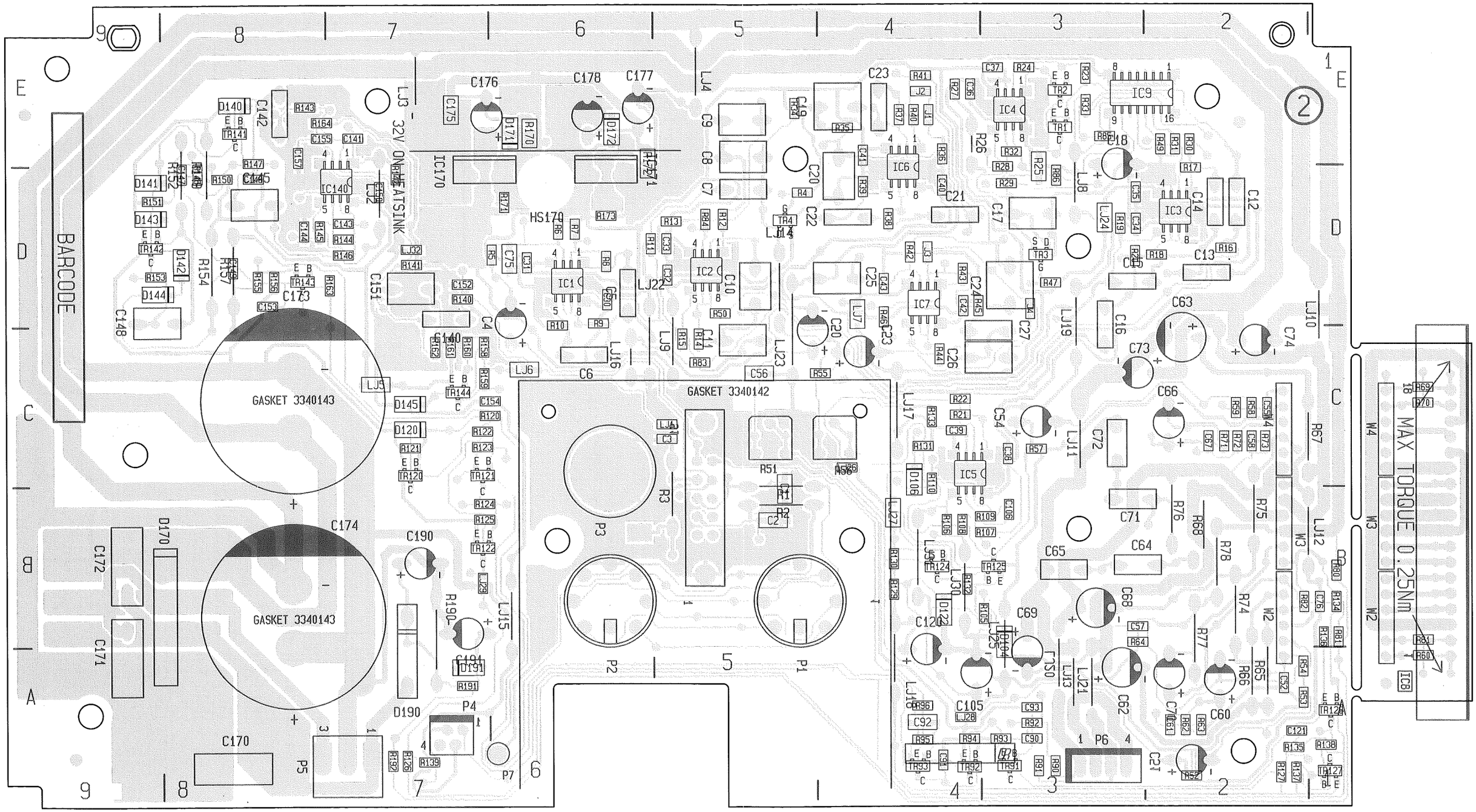
AC MUTE FOR POWER AMPLIFIER

F1, F2 type 6638 2,5AT

	6636(EU)	6637(GB)	6638(USA-GND)	6639(J)	6640(AUS)
F1	2AT	2AT	2,5AT	2AT	2AT
F2	2AT	2AT	2,5AT	2AT	2AT
F3			T63mA		
F4			T63mA		
F5	T63mA	T63mA		T63mA	T63mA
0T1	8013569	8013569	8013578	8013577	8013579
1T1	8013582	8013582	8013582	8013595	8013582

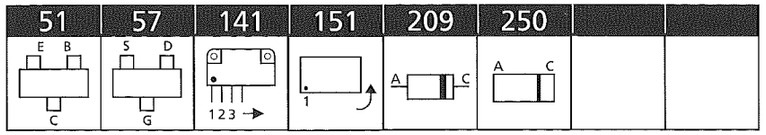
15-3 LIST OF ELECTRICAL PARTS

PCB 2, POWER SUPPLY & OUTPUT AMPLIFIER AND CROSSOVER, from serial no. 12893602



15-4 LIST OF ELECTRICAL PARTS 15-4

LIST OF ELECTRICAL PARTS



Resistors not referred to are standard, see page 3-4 and 15-5
Δ Indicates that static electricity may destroy the component.
** Specially selected or adapted sample.*

PCB 1, 8006148
8006154 f. type 6639
Main switch

TR1	8320503 **051**	BC557B
D1	8300466	B125C1500
D2	8330401	BICOLOR
D3-D9	8300058 **250**	1N4148
C1-C2	4010403	10nF -20+80% 50V
C3	4201264	100µF 20% 50V
C4	4130070	1µF 10% 50V
C5	4130230	100nF 20% 63V
F1-F2	6600066	Fuse 2A 250V
	6600081	Fuse T2.5A 125V f. type 6638
F3-F4	6600150	Fuse T63mA 125V f. type 6638
F5	6600113	Fuse T63mA 250V
S1	7450098	Switch 6A 250V
L1	8022295	Coil, mains filter, 2x0.4 mH
T1	8013582	Trafo
	8013595	Trafo f. type 6639
RL1	7600106	Relay
FH1-FH8	7200064	Single cont
P1-P2	7220406	Plug, 2 pole
P3-P4	7220185	Plug, 3 pole
P5	7211053	Socket, 4 pole

PCB 2, 8006149
Power supply, crossover output amplifier

IC1-IC3Δ	8341022	**151**	4558	IC8Δ	8350089	**141** Hybrid STK4152-2
IC4Δ	8341033	**151**	LF353	IC9Δ	8341411	**151** LM13700
IC5-IC7Δ	8341022	**151**	4558	IC140Δ	8341098	**151** LM358
				IC170Δ	8343080	**151** LM317
				IC171Δ	8340547	**151** LM337

TR1-TR2	8320755 **051**	BC847B	TR121	8320811 **051**	BC857B
			TR122	8320755 **051**	BC847B
TR3-TR4	8320758 **057**	PMBF4392	TR124	8320752 **051**	BC817-40
			TR125	8321080 **051**	FMMT491ATA
TR91-TR92	8320755 **051**	BC847B	TR126	8320755 **051**	BC847B
			TR127	8320811 **051**	BC857B
TR93	8320811 **051**	BC857B	TR141-TR144	8320755 **051**	BC847B
TR120	8320755 **051**	BC847B			

D104	8300482 **250**	LL4148	D145	8300584	Z15.0V 5%
D106	8300482 **250**	LL4148	D170	8300938	GBU6D
D120	8300482 **250**	LL4148	D171-	8300584	Z15.0V 5%
D122	8300482 **250**	LL4148	D172		
D140-D144	8300482 **250**	LL4148	D190	8300023 **209**	1N4002
			D191	8300482 **250**	LL4148

R51	5370474	10kΩ 30% 0.3W			
R56	5370474	10kΩ 30% 0.3W			
R67	5020159	100Ω 10% 0.3W			
R170	5011996	8.25kΩ 1% 1/8W			
R171	5012230	1kΩ 1% 1/10W			
R172	5011996	8.25kΩ 1% 1/8W			
R173	5012230	1kΩ 1% 1/10W			

C1-C2	4000345	1.0nF 5% 50V	C66	4200525	22µF 20% 10V
			C67	4010263	2.2nF 10% 50V
C3	4010237	1nF 10% 50V	C68	4200688	47µF 20% 50V
C4	4200517	2.2µF 20% 50V	C69	4201173	10µF 20% 50V
C5-C6	4130306	100nF 10% 63V	C70	4200517	2.2µF 20% 50V
			C71-C72	4130308	220nF 10% 63V
C7	4130308	220nF 10% 63V			
C8-C11	4100237	2.2nF 5% 63V	C75	4000345	1.0nF 5% 50V
			C76	4010272	22nF -20+80% 50V
C12	4130304	22nF 10% 63V	C90-C91	4010314	220nF -20+80% 25V
C13	4130231	68nF 10% 63V			
C14-C15	4130306	100nF 10% 63V	C92	4010176	10nF -20+80% 50V
			C93	4010314	220nF -20+80% 25V
C16	4130265	10nF 10% 63V	C105	4200824	22µF 20% 50V
C17	4130070	1µF 10% 50V	C106	4000409	56pF 5% 50V
C18	4200517	2.2µF 20% 50V	C120	4200824	22µF 20% 50V
C19	4100239	4.7nF 5% 63V	C121	4010314	220nF -20+80% 25V
C20	4100237	2.2nF 5% 63V	C140	4130304	22nF 10% 63V
C21	4130306	100nF 10% 63V	C141	4000409	56pF 5% 50V
C22-C23	4130303	15nF 10% 63V	C142	4130306	100nF 10% 63V
			C143	4000409	56pF 5% 50V
C24	4100239	4.7nF 5% 63V	C144	4010316	100nF 10% 25V
C25	4100237	2.2nF 5% 63V	C145	4130070	1µF 10% 50V
C26	4130234	470nF 10% 63V	C146-C147	4010316	100nF 10% 25V
C27	4130308	220nF 10% 63V			
C30-C43	4010272	22nF -20+80% 50V	C148	4130070	1µF 10% 50V
			C149	4010316	100nF 10% 25V
C50-C51	4200517	2.2µF 20% 50V	C150	4010272	22nF -20+80% 50V
			C151	4130070	1µF 10% 50V
C52	4000423	820pF 10% 50V	C152-C153	4000409	56pF 5% 50V
C53	4200517	2.2µF 20% 50V			
C54	4200525	22µF 20% 10V	C154	4010274	100nF -20+80% 25V
C55	4010263	2.2nF 10% 50V	C155	4000416	220pF 5% 50V
C56	4000345	1nF 5% 50V	C157	4010237	1nF 10% 50V
C57-C58	4000400	10pF 5% 50V	C170-C172	4130103	100nF 20% 250V
C60	4200517	2.2µF 20% 50V	C173-C174	4201139	3300µF 20% 50V
C61	4010263	2.2nF 10% 50V			
C62	4200688	47µF 20% 50V	C175	4010166	100nF -20+80% 50V
C63	4201264	100µF 20% 50V	C176-C178	4201173	10µF 20% 50V
C64-C65	4130308	220nF 10% 63V			

15-5 LIST OF ELECTRICAL PARTS AND CORRECTIONS

C190	4201173	10µF 20% 50V	
C191	4200517	2.2µF 20% 50V	
HS170	3358343	Heatsink f. IC170 and IC171	
	2816195	Clips f. IC	
S1	7400371	Switch	
P1-P2	7210929	Socket, 8 pole	
	2011023	Screw f. socket, 2.2 x 6.5 mm	
P3	7211100	Socket, phono	
	2625046	Washer f. socket, 10.3 x 6.5 x 0.5 mm	
P4	6277275	Cable, 4 pole	
P5	7220185	Plug, 3 pole	
P6	7221211	Plug, 4 pole	

List of mechanical parts

0T1	8013569	Trafo, 230 V f. type 6636, 6637
	8013577	Trafo, 100 V f. type 6639
	8013578	Trafo, 120 V f. type 6638
	8013579	Trafo, 240 V f. type 6640

Survey of screws

	2058032	Screw 3 x 16 mm. f. mounting of 2IC8
21	2816309	Clips (new type from s/n 12825802)

Corrections

PCB 1, page 10-1

L1	8022295	Coil mains filter, 2 x 0.4 mH	New

PCB 2, page 10-1

TR3-TR4	8320758	**057**	PMBF4392	New
TR140	8320755	**051**	BC847B	Removed
R4	5011956	10kΩ 5% 1/10W		New
R47	5011956	10kΩ 5% 1/10W		New
R164	5011944	1kΩ 5% 1/10W		New
C3	4010237	1nF 10% 50V		Changed
C56	4000345	1nF 5% 50V		New
C57-C58	4000400	10pF 5% 50V		New
C70	4200517	2.2µF 20% 50V		Changed
C154	4010274	100nF -20+80% 25V		New
C155	4000416	220pF 5% 50V		New
C157	4010237	1nF 10% 50V		New
P4	6277275	Cable, 4 pole		Changed

Mechanical parts, page 11-2

Wall bracket

24	2042053	Screw, 4 x 16 mm.

Resistors SMD 5% 1/10W

Glue dots, approx. 200, part no. 3181932

	x1	x10	x100	x1k	x10k	x100k	x1M	x10M
0.0	6000072							
1.0		5011920	5011932	5011944	5011956	5011968	5011980	5012275
1.2	5012326	5011921	5011933	5011945	5011957	5011969	5012267	
1.5	5012379	5011922	5011934	5011946	5011958	5011970	5012268	
1.8	5012380	5011923	5011935	5011947	5011959	5011971	5011989	
2.2		5011924	5011936	5011948	5011960	5011972	5012220	
2.7		5011925	5011937	5011949	5011961	5011973	5012269	
3.3		5011926	5011938	5011950	5011962	5011974	5012261	
3.9		5011927	5011939	5011951	5011963	5011975	5012270	
4.7		5011928	5011940	5011952	5011964	5011976	5012271	
5.6		5011929	5011941	5011953	5011965	5011977	5012272	
6.8		5011930	5011942	5011954	5011966	5011978	5012273	
8.2		5011931	5011943	5011955	5011967	5011979	5012274	

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