

# UNIT DESCRIPTION

## CENTRAL UNIT

## FOR NSM-PHONOGRAPHS

ES IV-CD TECHNOLOGY

to  
Technical Information, Assy

174 903	SILVER CITY
174 831	SILVER SKY
174 486	FASCINATION
175 274	SOUNDMASTER
175 040	FIREBIRD/COUNTRY
176 046	THE PERFORMER "GRAND"

**NSM**  
Aktiengesellschaft  
Saarlandstraße 240  
6530 Bingen am Rhein

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## 1 FUNCTION

The power supply, fan controls, stereo amplifier with inputs for microphone, CD and tape are all integrated on one circuit board.

The output stages and the fan are connected to the central unit via ST 209, ST 210, ST 211. The music power per channel is 200 watts when matched to a loudspeaker impedance of 2 ohms.

### 1.1 Power Supply

The power transformer supplies 22 V, 2 x 11,5 V and 2 x 43 V from three separate secondary coils. The supply voltage for the output stages is supplied with 2 x 43 V by a two-way rectifier (D 206) and the center tap of the transformer.

The supply voltage for the voltage regulator VR 201, +5 V is supplied with 2 x 11,5 V by a two-way rectifier (D 201/202) and the center tap on the transformer. The low voltage recognition is accomplished by D 204 and D 205. Fusing is accomplished with Si 201 and Si 202. Fusing for the output stage is accomplished with Si 204 and Si 205.

The non-controlled voltage +14 V for the display and key illumination is being picked up at capacitor C 201.

The control voltage of +15 Va, for the pickup driver, coin mechanism, control unit, remote control, luminous effects as well as the supply voltage for the preamplifier of +15 Vb, are supplied by the 22 V transformer coil and rectified by D 207 through 210 and VR 203. Fusing is accomplished by Si 203.

The LED's indicate the following supply voltages at the same intensity:

LED 201 = + 5 V

LED 202 = +60 V

LED 203 = +15 V a

LED 204 = +15 V b

The TRIAC TIC 200 controls the output stage fan depending upon the operational state of the amplifier (REJECT); i.e. the fan only runs when the amplifier is not muted.

### 1.2 Amplifier

The stereo amplifier is equipped with two tone control IC's, one AF switch IC, 50 diodes and 17 transistors.

The output stage is designed without induction coils or transformers and is therefore ironless.

At full volume level the music power is 200 watts per channel.

### 1.3 Signal path

The input signal MIC goes to microphone amplifier T 230 and background mixer of TA, TR 231 to Pins 4 and 8 of IC 230. The TB input is connected to Pins 3 and 7. The CD input is connected to Pin 2 and Pin 6.

In the play mode the signal goes from Pin 2 to Pin 15 respectively through Pin 6 and Pin 9.



When the microphone switch is actuated, the signal goes from Pin 4 to Pin 15 or from Pin 8 to Pin 9.

In the tape mode (TB/Pin 6 to ground) the signal goes from Pin 3 to Pin 15 or Pin 7 to Pin 9 when the switch is actuated. In the MIC, CD or TB stage, muting is switched off regardless of the operating state of the phonograph. The stage "MIC" has priority switching.

From the AF switch (IC 230) the signal goes via an AVC (automatic volume control) T 250, T 251 at Pin 9 of the tone control IC 251 with associated bass booster. Treble control is accomplished with TR 252 and bass control with TR 253. The control voltage for the volume and muting is on Pin 5; approx. 2,5 V at full volume, approx. 0 V while muting.

The DC signal for the volume setting is supplied by the control unit. Signal Output Pins 3 and 6 of IC 251 are routed through a network to the driver stage for the output stage.

The parallel complementary power Darlington transistors T 151 through T 154 in the output stage allow a minimum loudspeaker impedance of 2 ohms. Quiescent current compensation and thermic stabilization is accomplished with T 150, the quiescent current setting with TR 250. The amplifier is equipped with three protective circuits against overload mismatching, thermic overload.

1.) T 155 acts as a threshold switch for the electronic fuse. When the emitter current of the output transistors exceeds a certain value, T 252 is switched through by T 155 switching on the muting and thereby limiting the current.

2.) The actuation of the electronic fuse at collector T 252 is controlled by the control unit. When its fuse is tripped a number of times within a certain period, the volume is reduced automatically by one step each time until the electronic fuse is no longer activated.

3.) The thermal switch on the heat sink switches off the power supply to the output stage when the heat sink temperature reaches approx. 90 C (cooling malfunctioning). LED 150 is dark. The switch-on point (following cooling down) is approx. 60 C (switch-on hysteresis).

The terminating impedance at the loudspeaker output should not be less than 2 ohms. In the case of mismatching (less than 2 ohms), or short-circuit in the loudspeaker cable, the limiting circuit is actuated.

The result is distorted sound reproduction or reduction of the volume. After elimination of the mismatch the amplifier is ready for operation and the volume can be readjusted.

The volume difference between the two channels is compensated at the factory by setting the leveling potentiometer TR 254.

## 1.4 Adjustment of Controls

TR 230 = microphone volume  
TR 231 = music fade-in for microphone mode  
TR 252 = treble control  
TR 253 = bass control

TR 230 for setting the microphone amplifier:

This adjustment is dependent upon the position of the phonograph in relation to the microphone and required microphone volume.

In case of feedback while paging, the control must be turned counterclockwise or the microphone be positioned in another direction to the speakers.

TR 231 for music fade-in in microphone mode:

There the desired music volume level during paging can be controlled.

TR 252 R and TR 252 L, treble controls, are to be set according to the locations.

The maximum position is suggested in acoustically balanced rooms only.

TR 253 R and TR 253 L, bass controls, must also be set according to the locations and the desired bass reproduction.

## 1.5 MIC socket, Microphone Connection

A dynamic microphone with an impedance of 200 ohms - 600 ohms with switch for relay control can be used.

NSM option accessories:

Microphone	Order No.	224 223
Connection cable	Order No.	171 880 (10 m long)

## 1.6 TB Socket

### 1.6.1 Tape Recorder Connection

The TB socket allows the music from the phonograph to be recorded on a tape recorder as well as music from a tape recorder to be played by the phonograph.

The AF signal (analog signal) for recording with a tape recorder is on Contacts 1 and 4 and can be connected directly with a stereo diode cable; Contacts 2, 7 and 8 (8 is ground).



## 1.6.2 Connection of Auxiliary Amplifier

An auxiliary amplifier can be connected to the TB socket. The AF signal can be fed directly from the TB socket (Contacts 1 and 4) to be input of the amplifier with a stereo diode cable.

The input sensitivity of the external amplifier should be 200 mV at a minimum input impedance of 47 KOhms.

**Note:** A stereo diode cable with a 5-pin plug is suitable for the above connections. In this plug Pin 1 must be connected to Pin 1; 3 to 3; etc.

The stereo recording cable is **not suitable** because in such cables Pin 1 is connected to 3 and 4 to 5 (crossed).

## 2 Adjustment Instructions for Trimmer of Central Unit and Output Stage

TR 150 for quiescent current adjustment of the output stage: The quiescent current must be set to 40 mA +5 mA. After replacement of the output transistor T 151 through T 154 a correction may be required.

**Important!** Muting is to be switched off for measuring and setting. The lift will be put in play position, the volume control is set at 0 and Si 150 or the thermal switch are replaced by an ampere meter.

TR 201 and TR 202 for adjustment of volume control voltage:

Maximum volume for regularly selected titles in program step P 28 must be programmed to "31" (full volume).

Take measurements at test points TP-L and TP-R to ground; nominal value = 2,6 V (factory setting),

The internal resistance of the measuring instrument must be greater than 1 MOhm!

After replacement of IC 251 a correction may be required.

TR 254 R and TR 254 L, level controls for adjustment of the total amplification: Set at factory to correspond to the output voltage of the CD player.

Muting must be switched off. Volume, treble and bass set to maximum.

The output voltage on the loudspeaker connection with a load of 4 ohms is approx. 10 V = 25 W power per channel, with the AVC at full level. At minimum impedance of 2 ohms the RMS output corresponds to 100 W RMS or 200 W music power at disc playing.

### 3 Repair Aid

Amplifier integrated in central unit ES IV

**Malfunction:** No sound, no output power:

It is assumed that LD 201 to LD 204 glow with the same intensity and that the power supply is therefore O.K., the CD is on the CD player being played, and normal volume was set in program step P28 to "31".

#### 3.1 Output Stage

LD 150 on the output stage circuit board is dark. Malfunction probably located in the output stage; check SI 150 and replace if required. If the fuse blows again, the output transistors are defective.

Remove output stage unit, pull out cover plates on the bottom. Check for short-circuit on transistors T 151/T 152 T 153/T 154 with ohmmeter. Since the transistors are connected in parallel, it is only possible to test them in pairs.

For individual testing one transistor must be unsoldered from the defective pair. After replacement of the defective transistors the quiescent current must be readjusted with TR 150 according to the adjustment instructions.

#### 3.2 Control of Volume and Muting

In the play mode approx. 2,6 V must be measured on Pin 5 of IC 251 (for full volume).

If the voltage is near 0 V, T 252 or the control "volume L and R" from the computer must be checked (reject line).

#### 3.3 Tracing Sound Signal

Trace the sound signal arriving at CD plug according to the table.

The point where the signal is missing is probably the cause of the malfunction.

AF Signal Point	Cause of Malfunction When Signal Missing
C 237, C 238	IC 230
IC 251, L/R Pin 9	T 250 / T 251 (AVC)
R 269, L/R (2,6 V am IC 251/ Pin 5)	IC 251 L/R
T 255 L/R (collector)	T 253 L/R

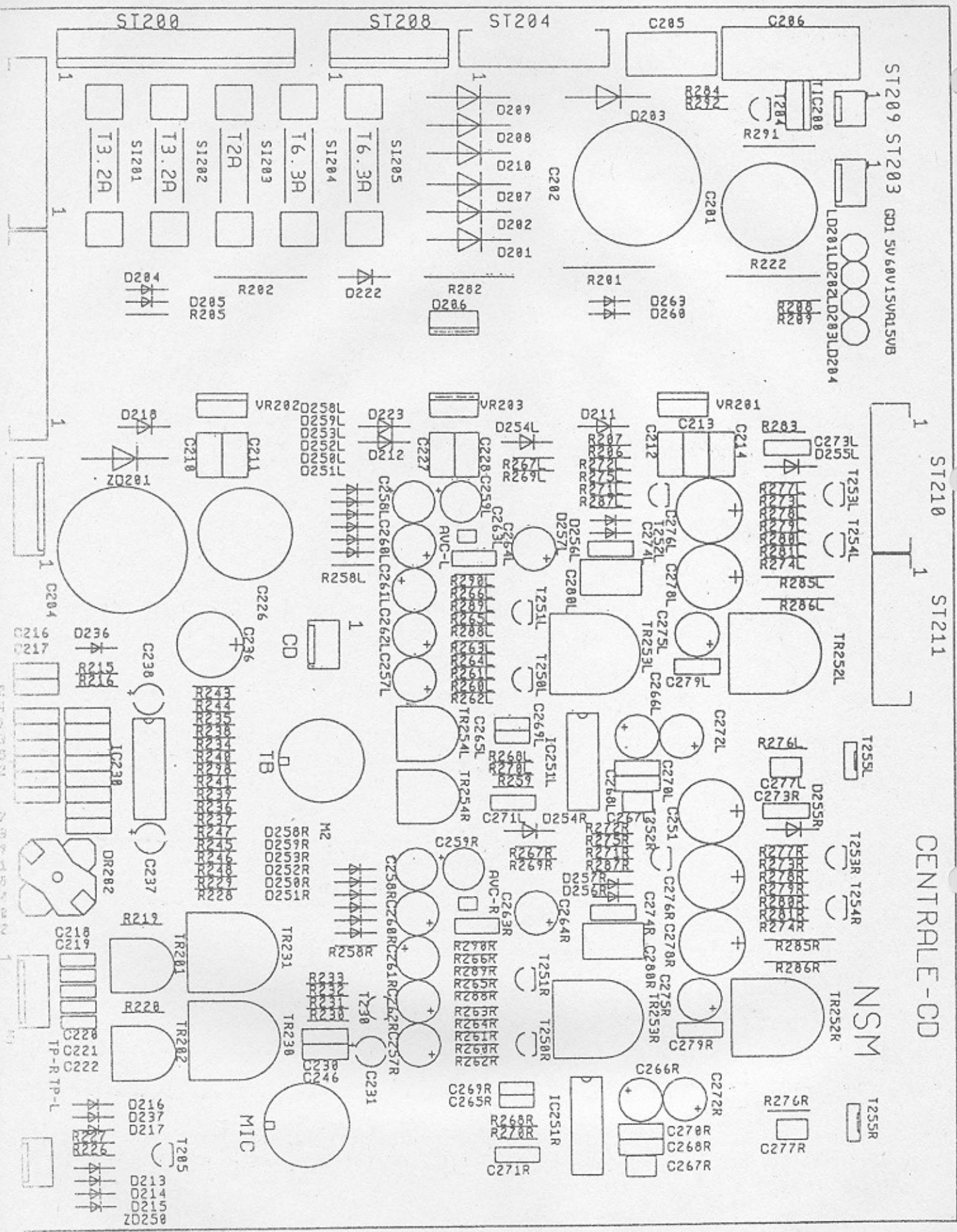
If the signal is there up to T 255, but no output signal arrives at the output stage, plug connectors ST 210/211 as well as the output stage have to be checked.



ST202  
ST201

ST201

ST202  
ST203  
ST204  
ST205  
ST206  
ST207  
ST208  
ST209



CENTRALE-CD

NSM



# SPARE PARTS LIST

POS.	PART-No.	DESCRIPTION	DATA	QTY
	173 666	<u>CENTRAL UNIT, ASSY</u>	50/60 Hz	
SI 203	225 538	FUSE	by 50 Hz T 2,5 A	1
SI 201, 202	225 029	FUSE	T 3,15 A	2
SI 204, 205	225 374	FUSE	T 6,3 A	2
SI 203	225 220	FUSE	by 60 Hz T 2,0 A	1
SI 201, 202	225 225	FUSE	T 3,2 A	2
SI 204, 205	225 218	FUSE	T 6,25 A	2
	173 730	COOLING PLATE		1
SI 201-205	225 689	FUSE HOLDER		10
	173 698	PROFILE, ASSY		2
	173 944	SHIELDING COVER		1
MIC	225 244	SOCKET	S 5 prongs	1
TB	225 749	SOCKET	Mab 8 SV	1
ST 209	225 439	PIN PLUG	RM 2,5 3 prongs	1
ST 203,				>
206, CD	225 418	PIN PLUG	RM 2,5 4 prongs	3
ST 205	225 443	PIN PLUG	RM 2,5 6 prongs	1
ST 208	225 804	PIN PLUG	RM 3,96 6 prongs	1
ST 207	225 444	PIN PLUG	RM 2,5 8 prongs	1
ST 200	225 807	PIN PLUG	RM 3,96 12 prongs	1
ST 204,				>
210, 211	225 654	PIN PANEL	RM 2,5 10 prongs	3
ST 202	225 714	PIN PANEL	RM 2,5 12 prongs	1
ST 201	225 656	PIN PANEL	RM 2,5 15 prongs	1
VR 201	221 572	IC-VOLTAGE	+ 5 V 1 A	1
VR 202, 203	221 476	IC-VOLTAGE	+15 V 1,5 A	2
IC 230	231 236	IC-LINEAR	TDA 1029	1
IC 251 RL	231 089	IC-LINEAR	TDA 4290-2	2
D 201-203,				>
207-120	221 463	SI-DIODE	BY 251	7
D 211, 212,				>
218, 222,				>
223, 254				>
RL, 255 RL	221 115	SI-DIODE	1 N 4004	9
D 204, 205,				>
213-217,				>
236, 237,				>
251-253 RL,				>
256 RL	221 114	SI-DIODE	1 N 4148	27
D 206	231 202	SI-DUO-DIODE	BYV 32/100	1
ZD 201	221 821	TRANSZORB-DIODE	TVS 515	1
LD 201-204	221 466	LIGHT EMITTING DIODE	LR 3160-F	4
TIC 200	231 028	TRIAC	TIC 206 D	1

# SPARE PARTS LIST

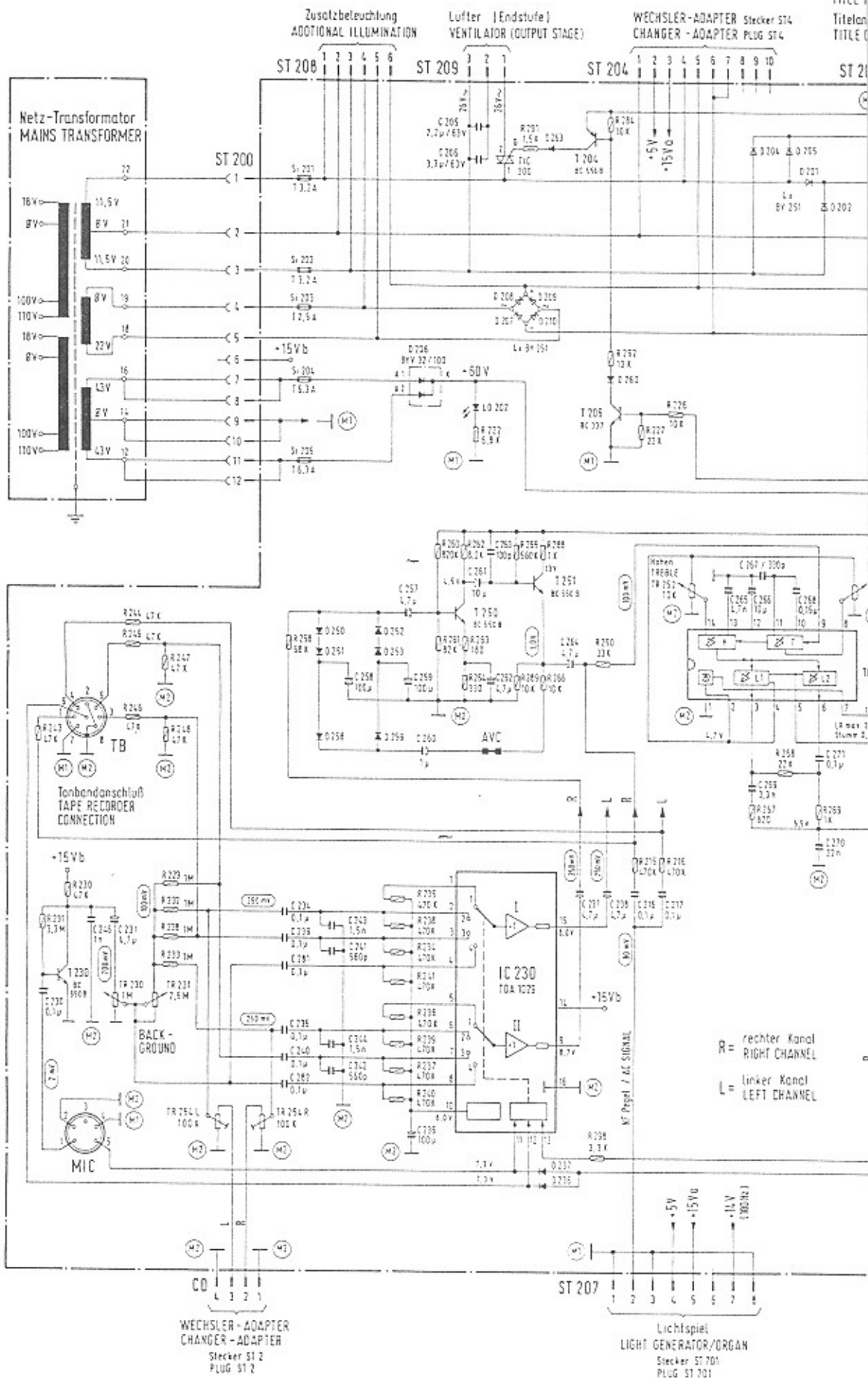
POS.	PART-No.	DESCRIPTION	DATA	QTY
T 204, 253				>
RL	221 459	SI-TRANSISTOR	PNP BC 556 B	3
T 230, 250				>
RL, 251 RL	221 249	SI-TRANSISTOR	NPN BC 550 B	5
T 255 RL	221 488	SI-TRANSISTOR	NPN BD 139-10	2
T 252 RL,				>
205	221 332	SI-TRANSISTOR	NPN BC 337-16	3
C 263 RL	220 342	CER.-CAPACITOR	100 pF	2
C 277 RL	220 185	CER.-CAPACITOR	270 pF	2
C 267 RL	220 274	CER.-CAPACITOR	330 pF	2
C 241, 242	220 241	CER.-CAPACITOR	560 pF	2
C 246	220 263	CER.-CAPACITOR	1 nF	1
C 243, 244	220 400	KT-CAPACITOR	1,5 nF	2
C 269 RL	220 401	KT-CAPACITOR	3,3 nF	2
C 218-222,				>
265 RL,				>
279 RL	220 435	KT-CAPACITOR	4,7 nF	9
C 268 RL	220 429	MKT-CAPACITOR	0,15 $\mu$ F 100 V	2
C 270 RL	220 335	MKT-CAPACITOR	0,022 $\mu$ F 63 V	2
C 216, 217,				>
230, 234,				>
235, 239,				>
240, 271 RL,				>
273 RL, 281,				>
282	220 334	MKT-CAPACITOR	0,1 $\mu$ F 63 V	13
C 274 RL	220 333	MKT-CAPACITOR	0,22 $\mu$ F 63 V	2
C 210-214,				>
227, 228,				>
280 RL	220 332	MKT-CAPACITOR	0,33 $\mu$ F 63 V	9
C 205	220 336	MKT-CAPACITOR	2,2 $\mu$ F 63 V	1
C 206	220 460	MKT-CAPACITOR	3,3 $\mu$ F 63 V	1
C 258 RL,				>
259 RL	220 243	TAN-CAPACITOR	SF 100 $\mu$ F 3 V	4
C 260 RL	220 249	LYTIC	1 $\mu$ F 63 V	2
C 231, 237,				>
238, 257 RL,				>
262 RL, 264				>
RL	220 159	LYTIC	4,7 $\mu$ F 63 V	9
C 261 RL,				>
266 RL, 275				>
RL	220 162	LYTIC	10 $\mu$ F 63 V	6
C 272 RL	220 389	LYTIC	47 $\mu$ F 10 V	2
C 276 RL,				>
278 RL	220 158	LYTIC	47 $\mu$ F 40 V	4
C 236	220 160	LYTIC	100 $\mu$ F 10 V	1
C 251	220 250	LYTIC	100 $\mu$ F 25 V	1
C 226	220 289	LYTIC	1000 $\mu$ F 40 V	1
C 201	220 283	LYTIC	2200 $\mu$ F 25 V	1
C 202	220 286	LYTIC	4700 $\mu$ F 25 V	1
C 204	220 287	LYTIC	4700 $\mu$ F 40 V	1



# SPARE PARTS LIST

POS.	PART-No.	DESCRIPTION	DATA	QTY
R 276 RL	221 095	RESISTOR	6,8 Ω	$\frac{1}{2}$ W 2
R 259, 279				>
RL, 287 RL	221 611	RESISTOR	10 Ω	$\frac{1}{2}$ W 5
R 206	221 620	RESISTOR	22 Ω	$\frac{1}{2}$ W 1
R 277 RL	221 096	RESISTOR	56 Ω	$\frac{1}{2}$ W 2
R 270 RL	221 600	RESISTOR	100 Ω	$\frac{1}{2}$ W 2
R 263 RL	221 635	RESISTOR	180 Ω	$\frac{1}{2}$ W 2
R 264 RL	221 614	RESISTOR	330 Ω	$\frac{1}{2}$ W 2
R 208	221 099	RESISTOR	470 Ω	$\frac{1}{2}$ W 1
R 267 RL	221 622	RESISTOR	820 Ω	$\frac{1}{2}$ W 2
R 205, 207,				>
269 RL, 288				>
RL	221 029	RESISTOR	1 KΩ	$\frac{1}{2}$ W 6
R 275 RL	221 030	RESISTOR	1,5 KΩ	$\frac{1}{2}$ W 2
R 209, 283	221 031	RESISTOR	2,2 KΩ	$\frac{1}{2}$ W 2
R 278 RL,				>
298	221 033	RESISTOR	3,3 KΩ	$\frac{1}{2}$ W 3
R 262 RL	221 172	RESISTOR	8,2 KΩ	$\frac{1}{2}$ W 2
R 266 RL,				>
226, 284,				>
289 RL, 292	221 035	RESISTOR	10 KΩ	$\frac{1}{2}$ W 7
R 219, 220	221 501	RESISTOR	18 KΩ	$\frac{1}{2}$ W 2
R 268 RL,				>
227	221 604	RESISTOR	22 KΩ	$\frac{1}{2}$ W 3
R 290 RL	221 037	RESISTOR	33 KΩ	$\frac{1}{2}$ W 2
R 230, 243-				>
248, 271 RL	221 038	RESISTOR	47 KΩ	$\frac{1}{2}$ W 9
R 274 RL	221 039	RESISTOR	56 KΩ	$\frac{1}{2}$ W 2
R 258 RL	221 629	RESISTOR	68 KΩ	$\frac{1}{2}$ W 2
R 261 RL	221 044	RESISTOR	82 KΩ	$\frac{1}{2}$ W 2
R 273 RL	221 048	RESISTOR	100 KΩ	$\frac{1}{2}$ W 2
R 272 RL	221 045	RESISTOR	150 KΩ	$\frac{1}{2}$ W 2
R 215, 216,				>
234-241	221 049	RESISTOR	470 KΩ	$\frac{1}{2}$ W 10
R 265 RL	221 981	RESISTOR	560 KΩ	$\frac{1}{2}$ W 2
R 260 RL	221 041	RESISTOR	820 KΩ	$\frac{1}{2}$ W 2
R 228, 229,				>
232, 233	221 009	RESISTOR	1 MΩ	$\frac{1}{2}$ W 4
R 231	221 982	RESISTOR	3,3 MΩ	$\frac{1}{2}$ W 1
R 285 RL	221 230	RESISTOR	470 Ω	$\frac{1}{2}$ W 2
R 291	221 183	RESISTOR	1 KΩ	$\frac{1}{2}$ W 1
R 286 RL	221 210	RESISTOR	1,5 KΩ	$\frac{1}{2}$ W 2
R 201, 202,				>
282	221 692	WIRE WOUND RESISTOR	1Ω	1 W 3
R 222	231 232	WIRE WOUND RESISTOR	6,8 KΩ	1 W 1
TR 252 RL,				>
253 RL	231 086	TRIMMER RESISTOR	10 KΩ	0,15 W 4
TR 230	231 233	TRIMMER RESISTOR	1 MΩ	0,15 W 1
TR 231	231 234	TRIMMER RESISTOR	2,5 MΩ	0,15 W 1
TR 252 RL,				>
253 RL, TR				>
230, TR 231	231 235	SHAFT	rot Nr. 5214	6
TR 201, 202	221 278	TRIMMER RESISTOR	10 KΩ	0,1 W 2
TR 254 RL	221 414	TRIMMER RESISTOR	100 KΩ	0,1 W 2

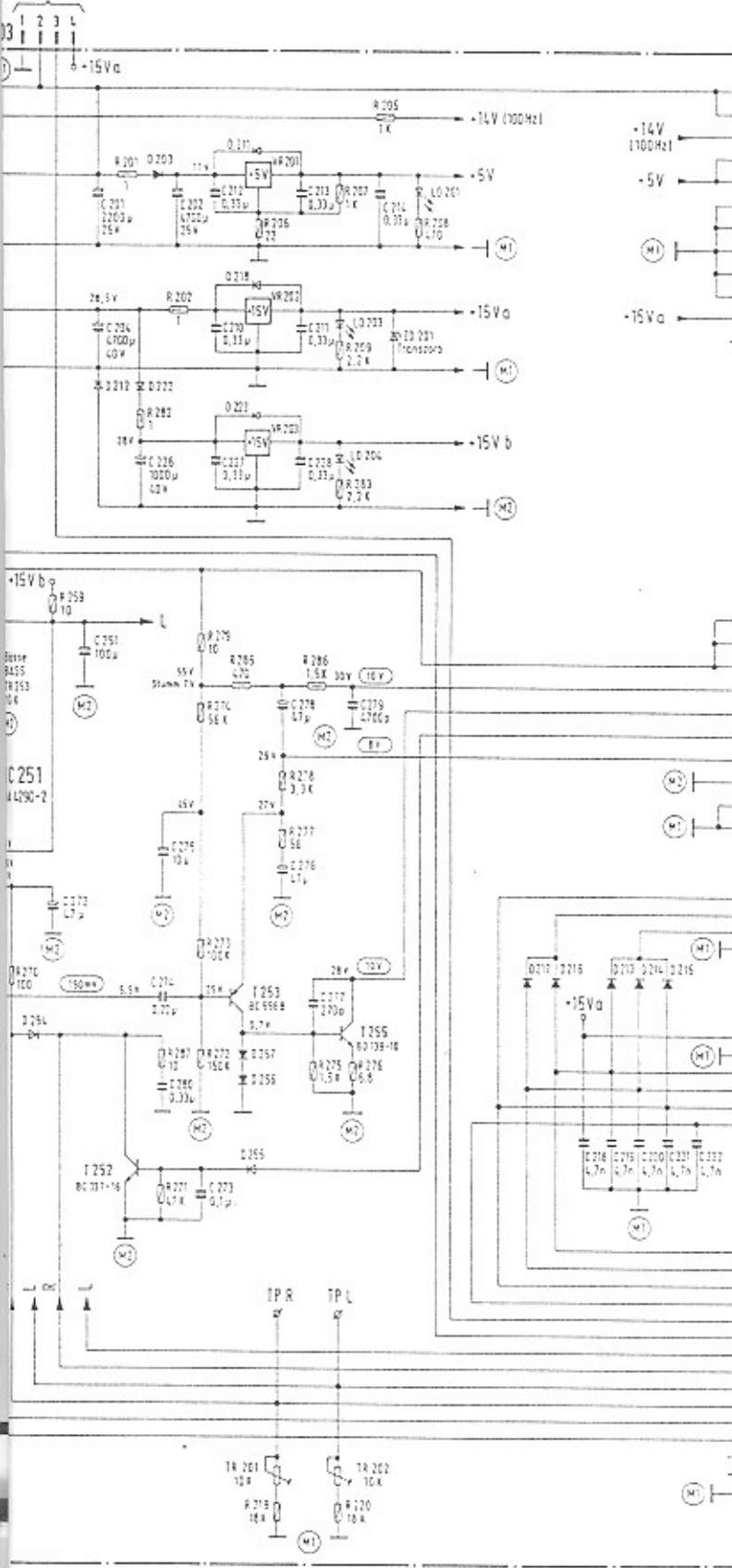




174 902 / 174 830 / 174 486 / 175 275 / 175 039 / 175 046  
 174 903 / 174 831 / 174 486 / 175 274 / 175 040 / 175 046  
 175 532 / 175 594 / 175 599 / 175 043 / 175 593 / 175 047

MT-Pegel bei 1kHz Lautstärke  
 Höhen und Bässe max. 1mV AC  
 Gleichspannung gemessen mit  
 AC SIGNAL VOLTAGES AT 1000Hz  
 BASSES MAX. WITH AVC MEAS.  
 DC VOLTAGES MEASURED WITH

Zeige II Stecker ST 1  
 INDICATOR II PLUG ST 1  
 Zeige (LP Programmteil Stecker ST 601)  
 ROM (CB PROGRAM LID PLUG ST 601)



**ST 202**  
 2 +14V  
 3 -14V  
 8 -14V (100Hz)  
 10 +5V  
 11 -5V  
 12 GND  
 9 GND  
 7 GND  
 4 GND  
 1 GND  
 5 +15Va  
 6

Spannungserkennung  
 UNDERVOLTAGE PERCEPTIBILITY

CONTROL UNIT CD  
 Stecker ST 1  
 PLUG ST 1

**ST 210** linker Kanal / LEFT CHANNEL  
**ST 211** rechter Kanal / RIGHT CHANNEL  
 10 +60V  
 9 +60V  
 8 +60V  
 7 Basis 1151 / BASE 1151  
 6 Basis 1153 / BASE 1153  
 5 elektron. Sicherung / ELECTRON FUSE  
 4 Mittenspannung / CENTER VOLTAGE  
 3 GND  
 2 GND  
 1 GND

Endstufe  
 OUTPUT STAGE  
 Stecker ST 150  
 PLUG ST 150

**ST 206**  
 1  
 2  
 3  
 4  
 Lautstärksteller (Tasten)  
 VOLUME CONTROL KEYS

**ST 205**  
 1  
 2  
 3  
 4  
 5  
 6  
 Fernbedienung  
 REMOTE CONTROL

**ST 201**  
 7 L Fernbedienung  
 5 3 Eingang  
 5 2 REMOTE CONTROL  
 1 1 INPUT  
 15 Titelanzeige / TITLE DRUM  
 13 NF - SELECT 1  
 8 links / LEFT Verstärkerschutz  
 9 rechts / RIGHT AMPLIFIER PROTECT.  
 2 links / LEFT Lautstärke / VOLUME  
 3 rechts / RIGHT Lautstärke / VOLUME  
 12 NF - SELECT 2  
 10 Mikrofonschalter / MICROPHONE SWITCH  
 11  
 14  
 1  
 1 GND

CONTROL UNIT CD  
 Stecker ST 2  
 PLUG ST 2

Sicherungen nur durch solche mit gleichen Werten ersetzen.  
 REPLACE FUSES ONLY BY THOSE OF THE SAME VALUE.

ÄNDERUNGEN IM SINNE DES TECHN. FORTSCHRITTES VORBEHALTEN,  
 JEDOCH KEINE NACHRÜSTPFLICHT!  
 SUBJECT TO TECHNICAL MODIFICATION WITHOUT OBLIGATION  
 TO MODIFY EQUIPMENT ALREADY DELIVERED!

**MUSIKAUTOMATEN PHONOGRAPHS ES IV-CD TECHNOLOGY**

Schaltbild WIRING DIAGRAM **CENTRALE-CD**

BR 12.06.82 GPC Braun Franck  
 621

von unten gesehen  
 BOTTOM VIEW  
 Draufsicht  
 TOP VIEW  
 Ersetze nur max.  
 jenseits mit elektronischem Voltmeter  
 Ersetze nur max.  
 jenseits mit elektronischem Voltmeter  
 Ersetze nur max.  
 jenseits mit elektronischem Voltmeter  
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 jenseits mit elektronischem Voltmeter  
 Ersetze nur max.  
 jenseits mit elektronischem Voltmeter  
 Ersetze nur max.  
 jenseits mit elektronischem Voltmeter

- TN 420L
- TN 420B
- 1/2 W
- 1/4 W
- 10 Trimmer-Widerstand  
TRIMMER RESISTOR
- 13 Leuchtrohre  
LIGHT EMITTING DIODE
- TRIC TRIAC
- VR Spannungsteiler  
VOLTAGE REGULATOR
- BC 137-16
- BC 550B, BC 550B
- BC 139-10
- VR 201
- VR 202
- VR 203
- Gate
- TIC 200
- AZ
- D 206