Double auto reverse deck 70FC931/00S/01S/17S

Service
Service
Service

Service Manual

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Safety regulations require that the set be restored to its orginal condition and that parts which are identical with those specified be used.

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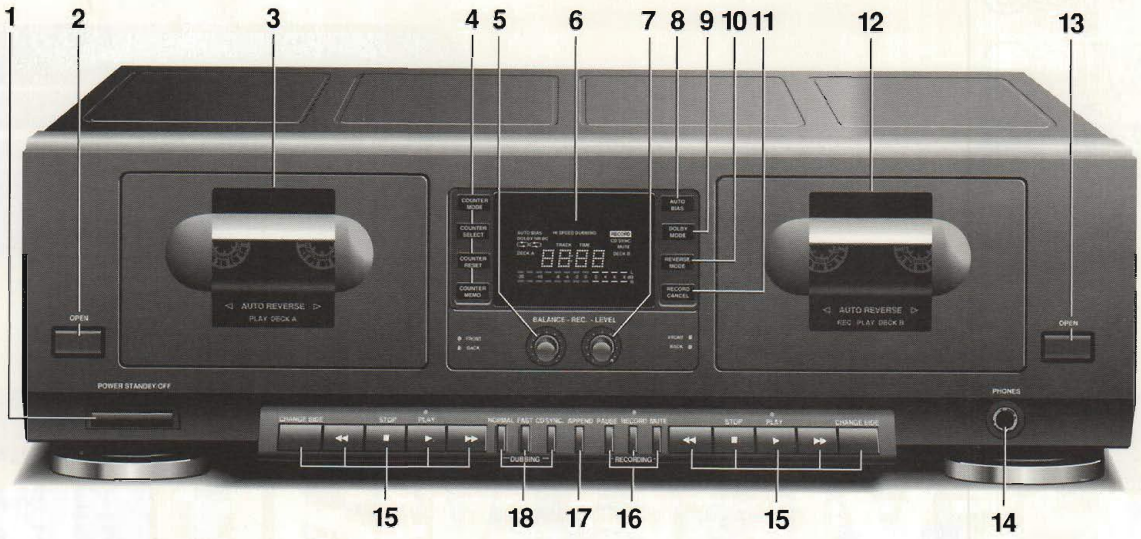
Subject to modification 4822 725 23018

CS 33 148

PHILIPS

CONNECTIONS AND CONTROLS



1 POWER STANDBY/OFF – for switching the cassette deck on and off

2 OPEN – for opening cassette holder **3** of deck A

3 Cassette holder A – for playback in both directions

4 COUNTER

- **COUNTER MODE** – for selecting display to show the tape counter, the total playing time or the track playing time
- **COUNTER SELECT** – for selecting the tape counter to count for deck A or deck B
- **COUNTER RESET** – for returning the tape counter in the display to 0000
- **COUNTER MEMO** – for storing the actual counter reading in the memory

5 REC BALANCE – for adjusting the recording balance

6 Display

7 REC LEVEL – for adjusting the recording volume

8 AUTO BIAS – for starting the automatic procedure which adjust correct recording bias for the tape in deck B.

9 DOLBY MODE – for switching the Dolby Noise Reduction system on and off and selecting Dolby B or Dolby C

Dolby noise reduction and HX Pro headroom extension manufactured under license from Dolby Laboratories Licensing Corporation. Hx Pro originated by Bang and Olufsen. DOLBY, the double-D symbol ⧈ and HX Pro are trademarks of Dolby Laboratories Licensing Corporation.

10 REVERSE MODE:

⇄ – the tape stops at the end of each side.
⇄ – playback (+ recording for deck B) of both cassette sides, after which the tape stops at the end of the second side.
(⇄) – continuous playback of both cassette sides
(⇄) (⇄) – for continuous playback of both cassette sides on both decks

11 RECORD CANCEL – for cancelling the current recording. The set will go back to the beginning of the current recording and enter the record pause mode.

12 Cassette holder B – for recording and playback in both directions

13 OPEN – for opening cassette holder **12** of deck B

14 PHONES – socket for stereo headphones
You can connect a pair of stereo headphones with 6.3 mm plug to this socket.

15 Keyboard for deck A and deck B

- ◀◀ – for fast winding in the opposite direction to that in which the tape is travelling or for searching for previous tracks when pressing this key briefly during playback
- STOP ■ – for stopping the tape transport
- PLAY ▶ – for starting playback
- ▶▶ – for fast winding in the tape travel direction or for searching for next tracks when pressing this key briefly during playback
- **CHANGE SIDE** – for reversing the tape travel direction of the playing deck (A or B) or reversing the tape travel direction of both decks when they are in STOP mode. After switching on the power, the unit always automatically displays the last directions chosen.

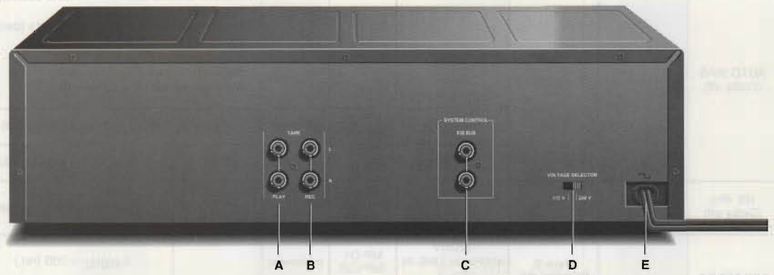
16 RECORDING

- **RECORD** – for starting recording.
- **MUTE** – for recording a pause (silent passage)
- **PAUSE** – for preparing or interrupting a recording

17 APPEND – for searching for a blank space on the tape in deck B of at least 20 seconds suitable for recording

18 DUBBING

- **NORMAL** – for dubbing from deck A to B at normal speed
- **FAST** – for dubbing from deck A to B at high speed
- **CD SYNC.** – for synchro start of deck B and a CD player when recording from a Compact Disc (provided the CD player is connected via its ESI bus to your Philips system 900 series).



DISPLAY

The display shows:
- ⟲ ⟲ – when the reverse-mode continuous playback of both cassette sides on both decks is activated;
- 88:88 – tape transport counter or time of deck A and deck B;
- **DOLBY B/C** – when Dolby Noise Reduction System B or C is switched on;
- **AUTO BIAS** – during the automatic bias adjustment procedure
- **MUTE** – during recording mute;
- **RECORD** – during any recording or dubbing;
  Starts flashing during recording pause mode;
- **CD SYNC.** – during a synchronized CD recording;
- **DUBBING** – during dubbing at normal speed;
- **HI SPEED DUBBING** – during high-speed dubbing;
- **DECK A/B** – indicating that the tape transport counter is counting for deck A or deck B; blinks when COUNTER MEMO is activated.
- **Peak level meters** – indicating the output or recording level which can be adjusted with the REC BALANCE and REC LEVEL controls.

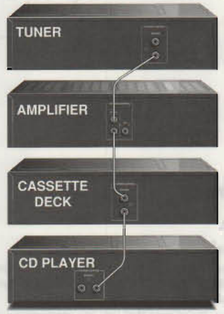
CONNECTIONS

A PLAY – output sockets for connection to the TAPE input sockets of your amplifier.

B REC – input sockets for connection to the TAPE output sockets of your amplifier.

C ESI BUS (Enhanced System Intelligence)
Remote control sockets for connecting up the equipment when you are incorporating the cassette deck in a HiFi system with ESI BUS connection (e.g. Philips 900 series)
Connect the ESI socket to the socket of the external equipment that uses the ESI remote-control system.

ESI BUS CONNECTIONS



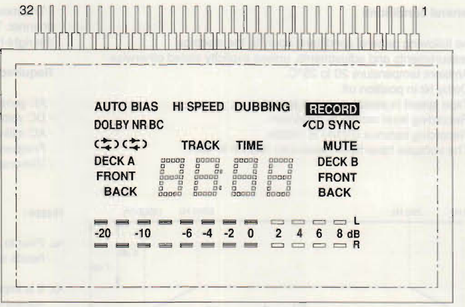
D Voltage selector 115 V/230 V – for selecting the mains voltage (not on all versions)

E MAINS – mains lead

SPECIFICATION

	Nominal value	Typical value	
Motor	: 12V - DC	: 12V - DC	
Cassette system	: Compact cassette		
Number of tracks	: 2x2 (stereo)		
Tape speed	: 4.76 cm/sec	: 4.76 cm/sec	
Speed deviation	: ± 2% (DIN)	: ± 1.5%	
Wow and flutter	: 0.3% (DIN)	: 0.15% (DIN)	
Fast wind time (C60)	: < 100 sec	: < 100 sec	
Bias and erase frequency	: 85kHz ± 5%	: 85kHz ± 5%	
Frequency range	DIN 45500:	IEC:	NAB:
Metal - type IV	: 40 - 15,000 Hz	: 30 - 17,000 Hz	30 - 18,000 Hz
Chromium - type II	: 40 - 15,000 Hz	: 30 - 17,000 Hz	30 - 18,000 Hz
Normal - type I	: 40 - 14,000 Hz	: 30 - 15,000 Hz	30 - 16,000 Hz
Signal/noise	DIN 45500:	IEC/DIN:	NAB:
Metal	: > 53 dB	: 58 dB	60 dB
Chromium	: > 56 dB	: 58 dB	60 dB
Normal	: > 53 dB	: 57 dB	59 dB
Improvement with Dolby B	: > 8.5 dB (CCIR)	: 10 dB	
Improvement with Dolby C	: > 18 dB (CCIR)	: 20 dB	
Distortion	: < 3%	: < 2%	

DISPLAY



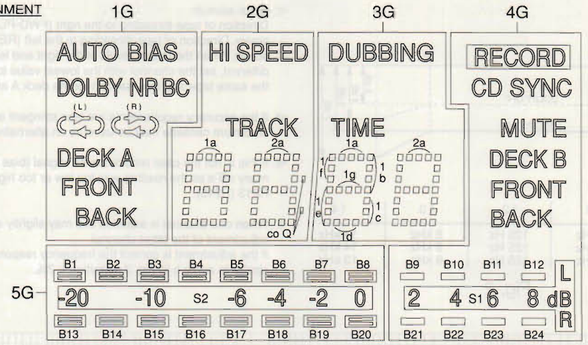
NOTE 1) F1, F2 – – – Filament
2) NP – – – – No pin
3) NC – – – – No connection
4) DL – – – – Datum Line
5) 1G~5G – – Grid

PIN CONNECTION

PIN NO.	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
CONNECTION	F2	F1	NP	P7	P6	P5	P4	P3	P2	P1	P0	P9	P8	P7	P6	P5

PIN NO.	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CONNECTION	P4	P3	P2	P1	NC	NC	NC	NC	1G	2G	3G	4G	5G	NF	F1	F1

GRID ASSIGNMENT



ANODE CONNECTION

	1G	2G	3G	4G	5G
P1	BACK	1a	1a	BACK	B1
P2	FRONT	1b	1b	FRONT	B2
P3	DECK A	1c	1c	DECK B	B3
P4	(L) ☾	1d	1d	B9	B4
P5	(L) ⇨	1e	1e	B10	B5
P6	(L) ⇦	1f	1f	B11	B6
P7	(L) ☽	1g	1g	B12	B7
P8	(R) ⟲ ⟲	2a	2a	S1	B8
P9	-	2b	2b	B21	B13
P10	-	2c	2c	B22	B14
P11	-	2d	2d	B23	B15
P12	-	2e	2e	B24	B16
P13	-	2f	2f	-	B17
P14	C	2g	2g	-	B18
P15	B	coQ	-	MUTE	B19
P16	DOLBY NR	TRACK	TIME	CD SYNC	B20
P17	AUTO BIAS	HI SPEED	DUBBING	RECORD	S2

ALIGNMENT

General conditions

The following general conditions apply to the electrical measurements and adjustments, unless explicity stated otherwise.
- Ambient temperature 20 to 25°C.
- Dolby Nr in position off.
- Tape speed in position normal speed.
- Recording level control at maximum.
- Recording balance control at middle.
- The voltages have been measured relative to earth.

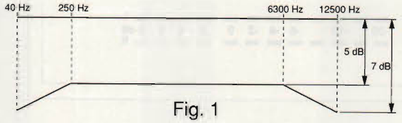
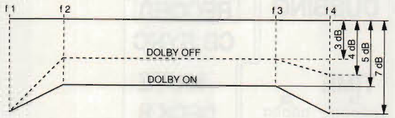


Fig. 1



	f 1	f 2	f 3	f 4
Metal	40 Hz	125 Hz	8 kHz	14 kHz
Cr	40 Hz	125 Hz	8 kHz	14 kHz
Normal	40 Hz	125 Hz	8 kHz	13 kHz

Fig. 2

- The measurements and adjustments are related to the left-hand channel. The corresponding test points and adjusting elements for the right-hand channel are given in brackets.

Required test equipment and test cassettes

- AF generator
- DC voltmeter (DC-meter)
- AC millivoltmeter (mV-meter)
- Frequency counter
- Universal test cassette SBC419Cr-4822 397 30069 (250 nWb/m)

Notes:

•a. Prior to any measurement or adjustment with the tape running, heads and tape guides should be degaussed and cleaned.

•b. It is important that first the high speed is adjusted and hereafter the normal speed. The difference of speed between deck A and B may be 1% at the utmost, both for normal speed and high speed.

•c. Head azimuth
Direction of tape-threading to the right (FWD-PLAY) left-hand screw. Direction of tape-threading to the left (REV-PLAY) righthand screw. When the output levels of the right and left channel are different, set the channel with the lowest value to maximum. Use the same tape and tape section for the deck A and the deck B.

•d. If the accuracy requirements are less stringent a high quality chromium cassette may be used as an alternative.

•e. If this is not the case reduce the AF-signal (bias disabled) by as many dB`s as the reading was too low or too high by means of R213 (R215).

•f. When one channel is adjusted this may slightly affect the adjustment of the other channel.
If the adjustment is correct the frequency response curve will be similar to curve b in Fig. 3 distortion < 2%.

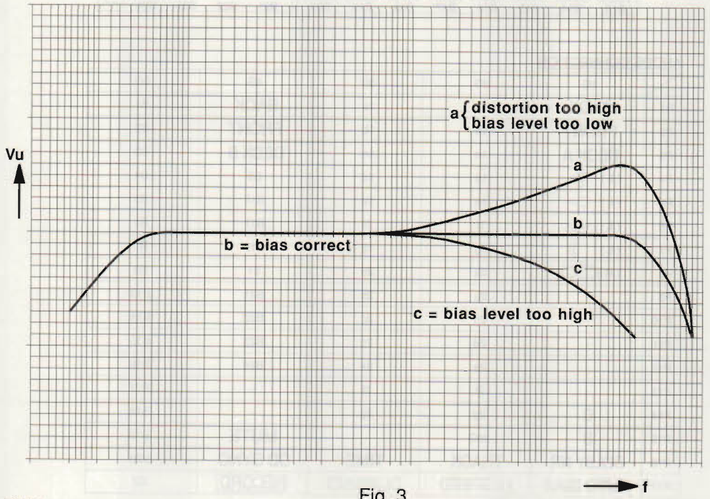
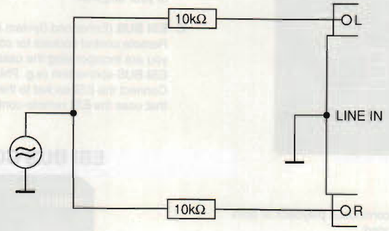


Fig. 3

Adjustment	Cassette	Recorder in position	Apply signal to	Measure	Read on	Adjust	Value
Tape speed (Dolby off) •b High speed	SBC419 3150Hz	Play (deck A or B)	-	MP-D1 (MP-D2)	Frequency counter	**To switch to high speed:** - Power off - Press simultaneously ◁◁ (deck A) and □ (deck B) and switch on with the power button. - Pressing ▷ (deck B): sets Deck B to line-out - Pressing ▷▷ (deck B): sets Deck A to line-out - At the end switch off and then on.	
						VR54 (A-deck)	6300Hz ± 0.1%
						VR61 (B-deck)	6300Hz ± 0.1%
						At the end make power off and then on.	
Normal speed	SBC419 3150Hz	Play (deck A or B)	-	MP-D1 (MP-D2)	Frequency counter	VR51 (A-deck)	3150Hz ± 0.1%
						VR58 (B-deck)	3150Hz ± 0.1%
Head azimuth	SBC419 10kHz	Play (deck A or B)	-	MP-D1 (MP-D2)	mV-meter	Head azimuth adjust screw •c	Max. output
Playback sensitivity (Dolby off)	SBC419 315Hz - 0 dB	Play (deck A or B)	-	MP-D1 (MP-D2)	mV-meter	R395 (R397) A-deck	490mV ± 0.5dB
						R353 (R354) B-deck	490mV ± 0.5dB
Playback frequency response (Dolby off)	SBC419 40Hz, to 18kHz	Play (deck A or B)	-	MP-D1 (MP-D2)	mV-meter	-	**A-deck** If Vout from the ratio 315Hz to 12.5kHz is +1 ±0.5dB open bridges **B7** (C351) / **B8** (C325) / **B9** (C327) left channel or **B10** (C352) / **B11** (C326) / **B12** (C328) right channel **B-deck** If V_{out} from the ratio 315Hz to 12.5kHz is +1 ±0.5dB open bridges **B1** (C301) / **B2** (C305) / **B3** (C313) left channel or **B4** (C303) / **B5** (C306) / **B6** (C315) right channel See graph Fig. 1
f-osc	Metal cassette	Deck B REC/PAUSE	-	MP R242	Frequency counter	L106	85kHz ± 1kHz
Recording calibration (Dolby off)	SBC419 side 2 •d	Deck B REC	500mV 400Hz, to LINE IN Fig. 4	MP-D1 (MP-D2)	mV-meter	Adjust REC. LEVEL POT.	120mV
				Make a recording and play it back			
		Play	-	MP-D1 (MP-D2)	mV-meter	-	120mV ±0.5dB •e
BIAS (Dolby off)	SBC419 side 2 •d	Deck B REC	500mV f_1 = 400Hz and f_2 = 12.5kHz, to LINE IN Fig. 4	MP-D1 (MP-D2)	mV-meter	Adjust REC. LEVEL POT.	22mV
				Make a recording and play it back			
		Play	-	MP-D1 (MP-D2)	mV-meter	-	The levels V_{out} (f_1 = 400Hz) and V_{out} (f_2 = 12.5kHz) must not differ by more than ±0.5dB. If V_{out} (f_1 = 400Hz) to V_{out} (f_2 = 12.5kHz) is greater than 1dB, adjust the **BIAS** with **R231 (R257)**. See graph Fig. 2 •f
BIAS filters	Metal cassette	Deck B REC (REC. LEVEL POT. min.)	-	MP R213 (MP R215)	mV-meter	F103 (F104)	Adjust for minimum voltage

Adjustment	Cassette	Recorder in position	Apply signal to	Measure	Read on	Adjust	Value
AUTO BIAS (Dolby off)	-	-	-	-	-	**To switch on and test 400Hz/12kHz oscillator:** - Power off - Press simultaneously ◁◁ (deck A) and ▷ (deck B) and switch on with the power button. - Pressing ▷ (deck B): sets to 400Hz - Pressing ▷▷ (deck B): sets to 12kHz - At the end switch off and then on.	
			Set 400Hz	MP-D1 (MP-D2)	mV-meter	-	f(400Hz ±10%) = 38.8mV = 0dB (ref.)
			Set 12kHz	MP-D1 (MP-D2)	mV-meter	R337	f(12kHz ±10%) = 0dB ±0.5dB
HX -Pro (Dolby off)	Metal cassette	Deck B REC/PAUSE	-	IC104 MP PIN6 (MP PIN13)	DC-meter	L105 (L108)	Adjust for minimum voltage
MULTIPLEX filters (Dolby off)	Arbitrary cassette	Deck B REC/PAUSE (REC. LEVEL POT. max.)	120mV 400Hz, to LINE IN Fig. 4	MP-D1 (MP-D2)	mV-meter	-	$f_{(400Hz)}$ = 0dB (ref.)
			120mV 19kHz, to LINE IN Fig. 4	MP-D1 (MP-D2)	mV-meter	F101 (F102)	$f_{(19KHz)} \leq$ -30dB

Fig. 4



SERVICING HINTS

1. ESD

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential. See Service Information A86 - 1000 for this.

2. Warning

If the set is connected to mains voltage, there is a risk of shock-hazard voltages after the set is decased.

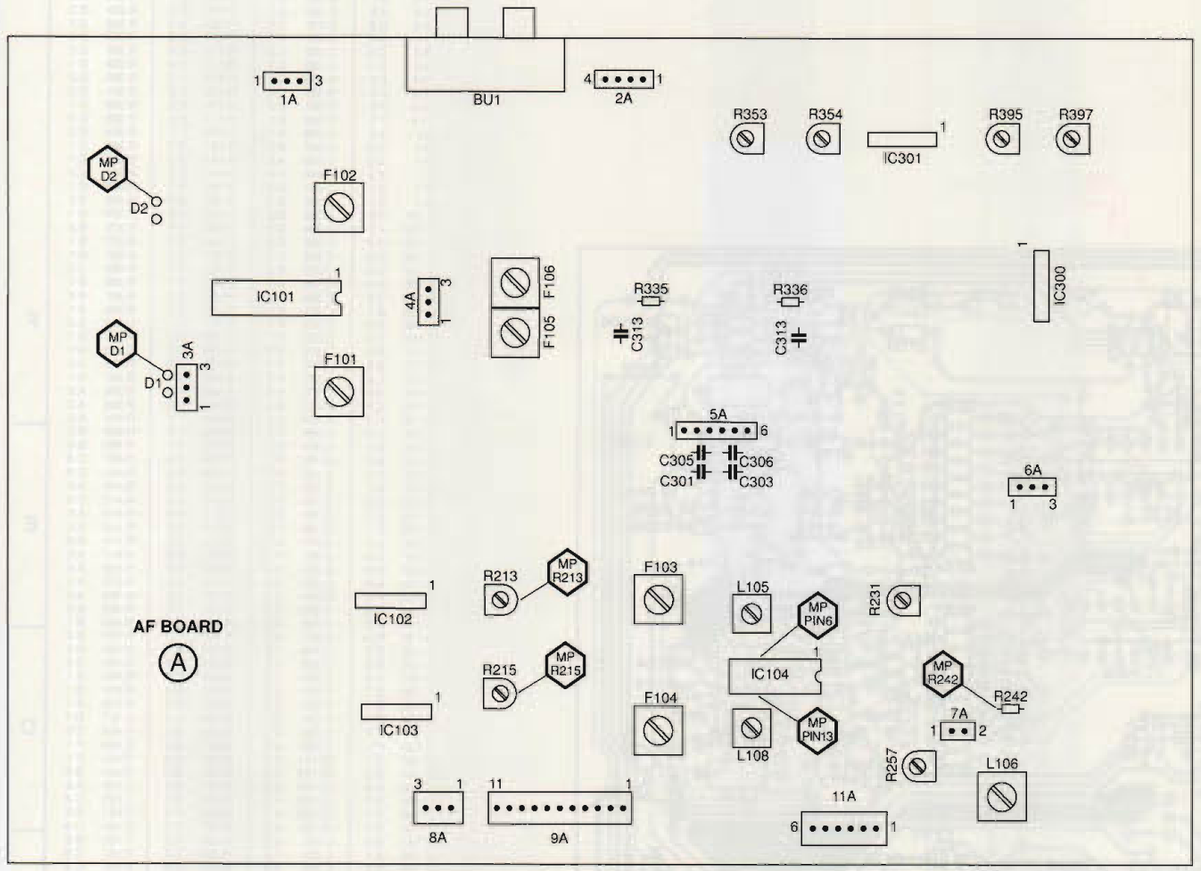
2. DOLBY HINTS

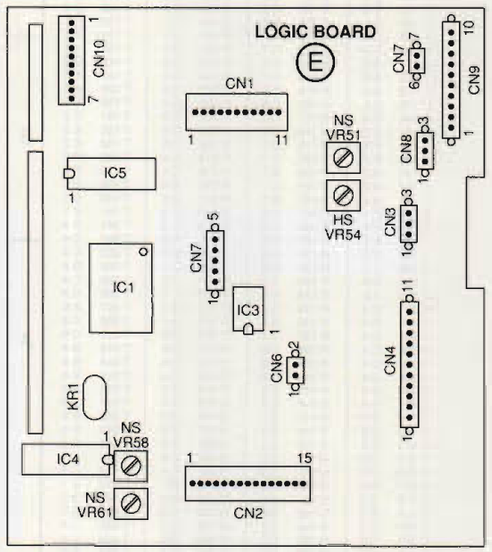
Dolby noise reduction and HX PRO headroom extension manufactured under license from Dolby Laboratories Licensing Corporation.
"Dolby", the double-D symbol DOLBY B-C NR HX PRO are trademarks of Dolby Laboratories Licensing Corporation.

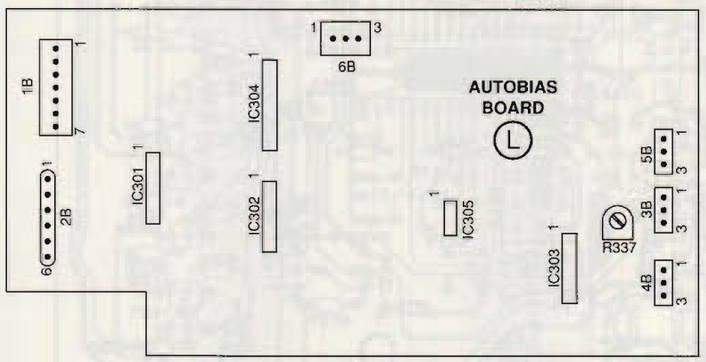
3. ELUCIDATIONS

⎔ Measuring point
○ Trimming element

ALIGNMENT LAYOUTS







MECHANICAL ADJUSTMENT AND CHECKS

The tape deck cannot be adjusted without mechanism control circuit.

The torque values

Place a torque test cassette (e. g. test cassette 4822 395 30054) in the set.
The torque values to be measured are specified as follows:

- play take-up torque	40-70	grcm
- supplying reel drag	2-6	grcm
- FF/REW torque	85-170	grcm

MAINTENANCE AND LUBRICATION INSTRUCTIONS

It is advised to clean the tape deck and lubricate the principal points after approx. 500 hours of operation.

1. To be cleaned with alcohol or spirit

- Heads
- Capstan and pressure roller
- Pulleys
- Belts

Clean the heads, using a soft cloth or a wadded stick.

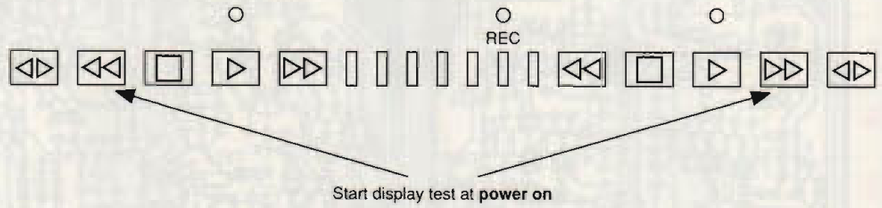
2. Lubrication instructions

- Shell Alvania 2 4822 389 10001
  (To be used for ball bearings, gearwheels, shafts.)
- Shell Clavis 15 4822 390 10048
  (To be used for shafts and plain bearings.)
- Silicon grease 5322 390 20011
  (To be used for lubricating plastic parts.)
- BP super visco static 20W/50 4822 390 10069
  (To be used for lubricating flywheel bearing.)

DISPLAY TEST MODE

To start the Display Test press and hold the buttons "◁◁" (rewind key on deck A) and "▷▷" (forwind key on deck B) simultaneously while switching on with the "POWER STAND BY / OFF" button.

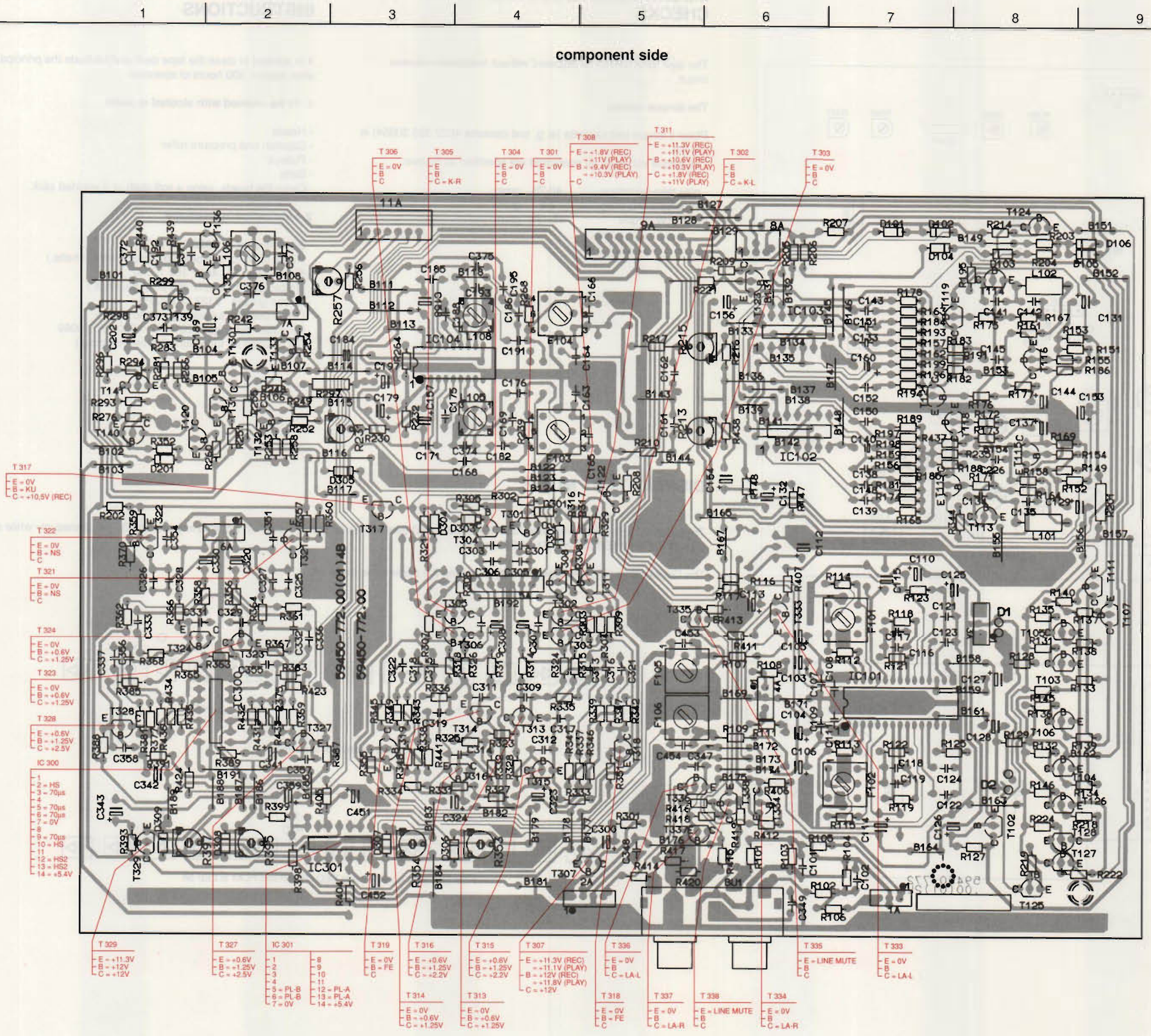
The Display Test can be stopped only by switching the cassette recorder off.



If the EEPROM is not working REC LED off and **PLAY B LED on**

AF PCB

component side



1A	A7	C 328	C 1	R 165	D 7	R 354	A 3
2A	A 5	C 329	C 2	R 167	E 8	R 355	B 3
3A	C 8	C 330	C 2	R 169	D 8	R 356	C 2
4A	B 6	C 331	C 1	R 171	D 8	R 357	D 2
5A	C 4	C 332	C 2	R 172	E 8	R 358	C 2
6A	D 2	C 333	C 1	R 173	D 8	R 359	D 1
7A	E 2	C 336	C 2	R 174	D 7	R 360	D 2
8A	F 6	C 337	C 1	R 175	E 8	R 361	C 2
9A	F 5	C 341	B 2	R 176	E 8	R 362	C 1
11A	F 3	C 342	B 1	R 177	E 8	R 363	C 2
BU 1	A 6	C 343	A 1	R 178	F 7	R 364	C 2
D 1	C 8	C 347	B 5	R 181	D 7	R 365	C 1
D 2	B 8	C 348	A 5	R 182	E 8	R 366	C 1
L 1	E 2	C 349	A 6	R 183	E 8	R 367	C 2
P 1	E 1	C 351	D 2	R 184	E 7	R 368	C 1
P 2	E 1	C 352	D 1	R 185	D 7	R 369	B 2
C 101	A 6	C 353	D 2	R 186	E 8	R 370	D 1
C 102	A 7	C 354	D 1	R 188	D 7	R 375	B 2
C 103	C 6	C 355	C 2	R 189	E 7	R 377	B 1
C 104	B 6	C 356	C 1	R 191	E 8	R 381	B 1
C 105	C 6	C 357	B 2	R 193	E 7	R 383	C 2
C 106	B 6	C 358	B 1	R 194	E 7	R 385	B 1
C 107	C 6	C 359	B 2	R 195	F 8	R 387	B 2
C 108	B 7	C 371	F 1	R 196	E 7	R 388	B 1
C 109	B 6	C 372	F 1	R 197	D 7	R 389	B 2
C 110	C 7	C 373	E 1	R 198	D 7	R 391	B 1
C 111	B 7	C 374	D 4	R 199	E 7	R 393	A 1
C 112	D 6	C 375	F 4	R 201	D 9	R 395	A 2
C 113	C 6	C 376	F 2	R 202	D 1	R 397	A 1
C 114	A 7	C 377	F 2	R 203	F 8	R 398	A 2
C 115	C 7	C 451	B 3	R 204	F 8	R 399	A 2
C 116	C 7	C 452	A 3	R 205	F 6	R 404	A 3
C 117	C 7	C 453	C 5	R 206	F 6	R 405	B 2
C 118	B 7	C 454	B 5	R 207	F 7	R 406	B 6
C 119	B 7	D 101	F 7	R 208	D 5	R 407	C 6
C 121	C 7	D 102	F 7	R 209	F 6	R 411	C 6
C 122	B 7	D 103	F 8	R 210	D 5	R 412	A 6
C 123	C 7	D 104	F 7	R 213	E 5	R 413	C 6
C 124	B 7	D 105	F 9	R 214	F 8	R 414	A 5
C 125	C 7	D 106	F 9	R 215	E 5	R 415	A 6
C 126	A 7	D 201	D 1	R 216	E 6	R 416	B 5
C 127	C 8	D 301	D 4	R 217	E 5	R 417	A 5
C 128	B 8	D 302	D 4	R 218	A 9	R 418	A 5
C 129	D 8	D 303	D 4	R 219	A 8	R 419	A 6
C 131	F 9	D 304	D 3	R 221	F 6	R 420	A 5
C 132	D 6	D 305	D 3	R 222	A 9	R 423	B 2
C 134	D 8	D 306	A 3	R 224	A 8	R 424	B 1
C 135	D 8	D 307	A 3	R 230	E 3	R 431	B 2
C 135	E 7	D 308	A 2	R 231	E 3	R 432	B 2
C 136	E 5	D 309	A 1	R 232	E 3	R 433	B 2
C 137	E 8	F 101	C 7	R 235	D 7	R 434	B 1
C 138	D 7	F 102	B 7	R 239	E 4	R 435	B 1
C 139	D 7	F 103	D 4	R 242	E 2	R 436	B 1
C 140	D 7	F 104	E 4	R 248	E 2	R 437	D 7
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C 157	E 3	R 101	A 6	R 276	E 1	T 115	D 8
C 158	F 3	R 102	A 6	R 281	E 1	T 116	E 8
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C 182	D 4	R 117	C 6	R 307	C 3	T 131	E 2
C 184	E 3	R 118	C 7	R 308	C 4	T 132	E 2
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C 188	E 3	R 122	B 7	R 315	C 4	T 136	F 2
C 189	E 2	R 123	C 7	R 316	D 4	T 139	E 1
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C 300	A 5	R 134	B 9	R 326	C 4	T 306	C 4
C 301	D 4	R 135	C 8	R 327	B 4	T 307	A 5
C 303	D 4	R 136	B 8	R 328	B 4	T 308	C 4
C 305	C 4	R 137	C 9	R 329	D 5	T 311	C 5
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C 309	B 4	R 145	B 8	R 334	B 3	T 316	B 4
C 311	B 4	R 146	B 8	R 335	B 4	T 317	D 3
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C 313	C 5	R 148	D 6	R 337	B 5	T 319	B 3
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C 319	B 3	R 155	E 8	R 344	D 8	T 328	B 1
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C 324	B 4	R 161	E 8	R 349	B 3	T 336	B 5
C 325	C 2	R 162	E 7	R 351	B 5	T 337	A 5
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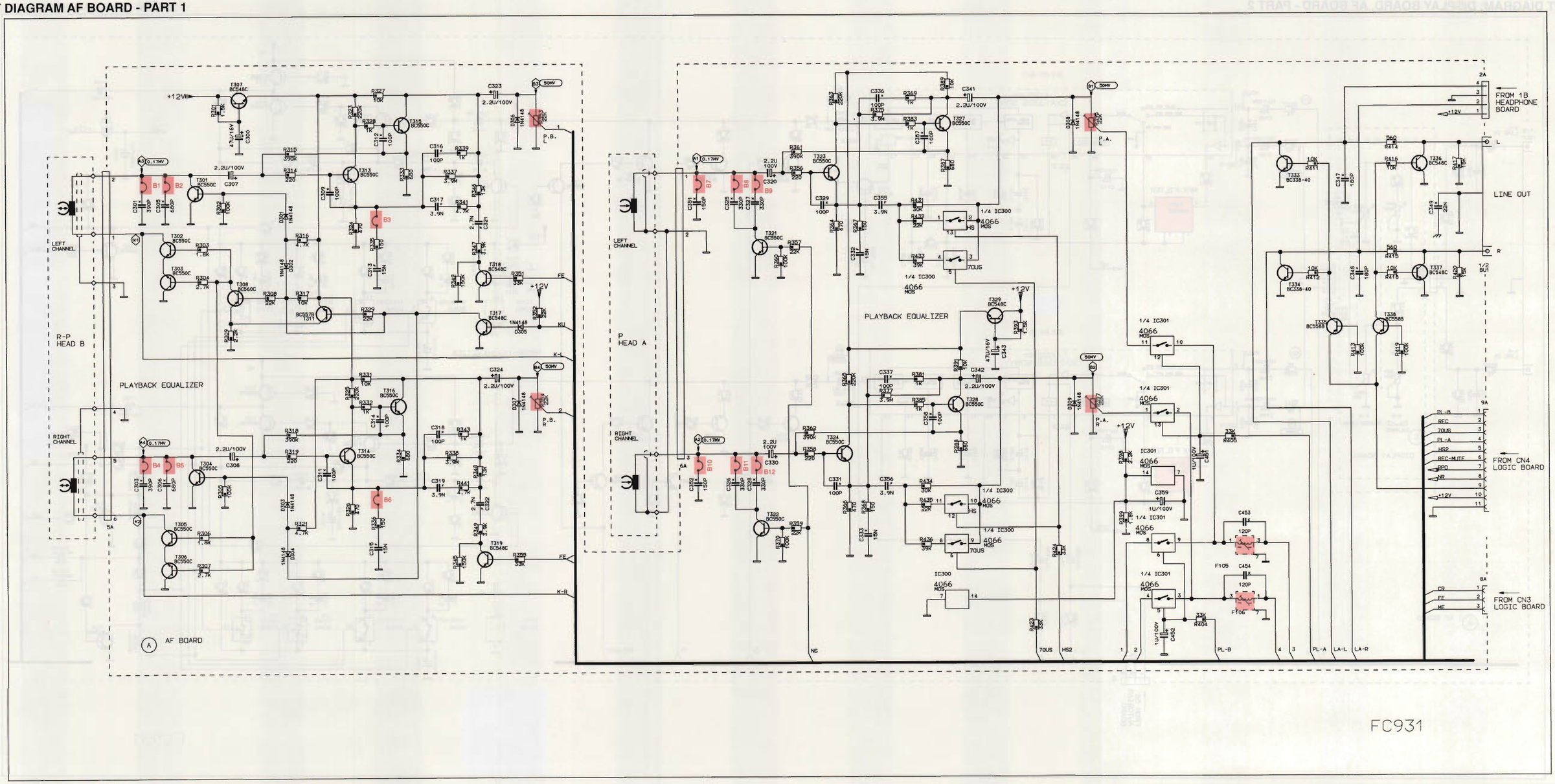
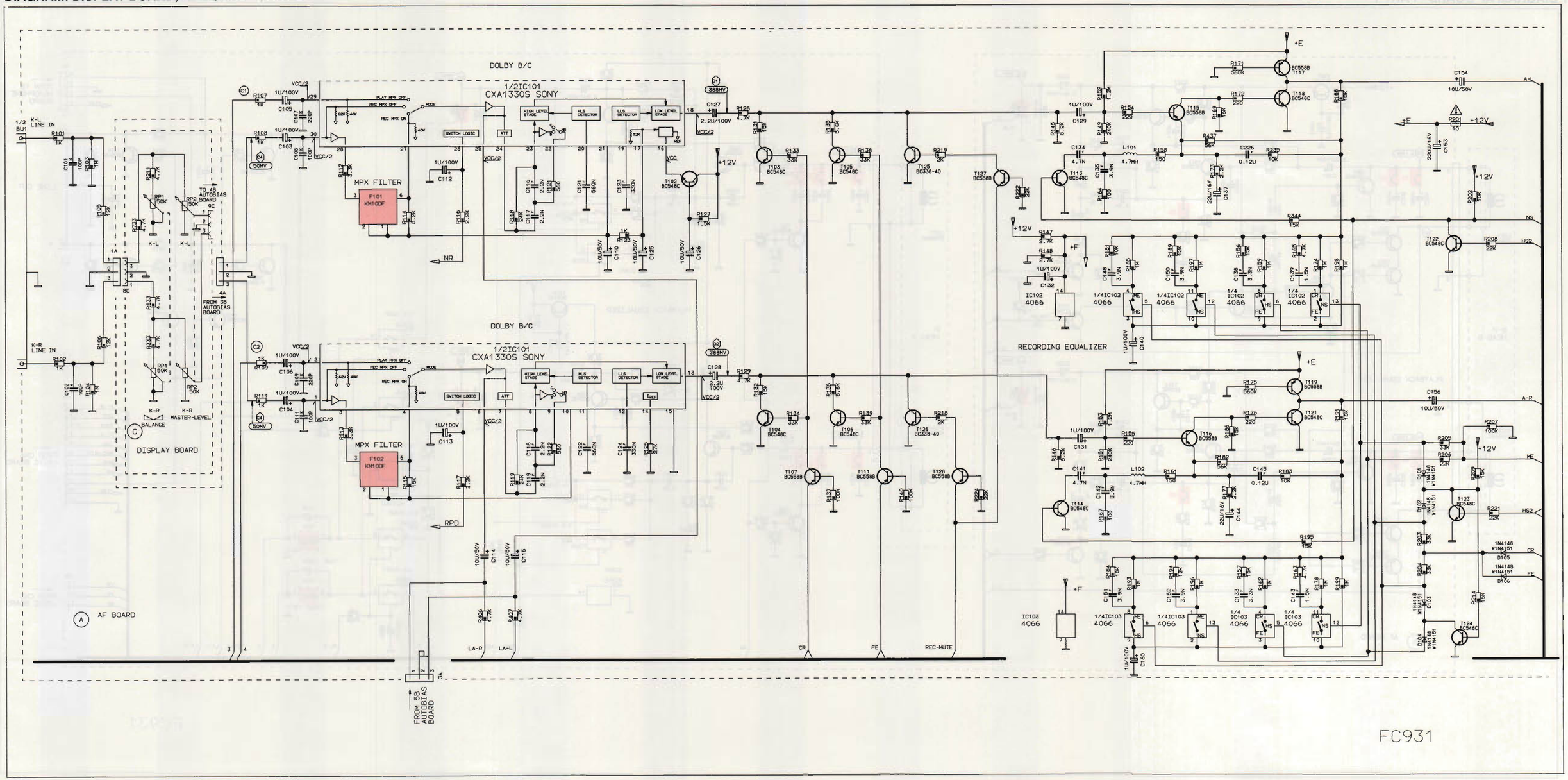
CIRCUIT DIAGRAM AF BOARD - PART 1

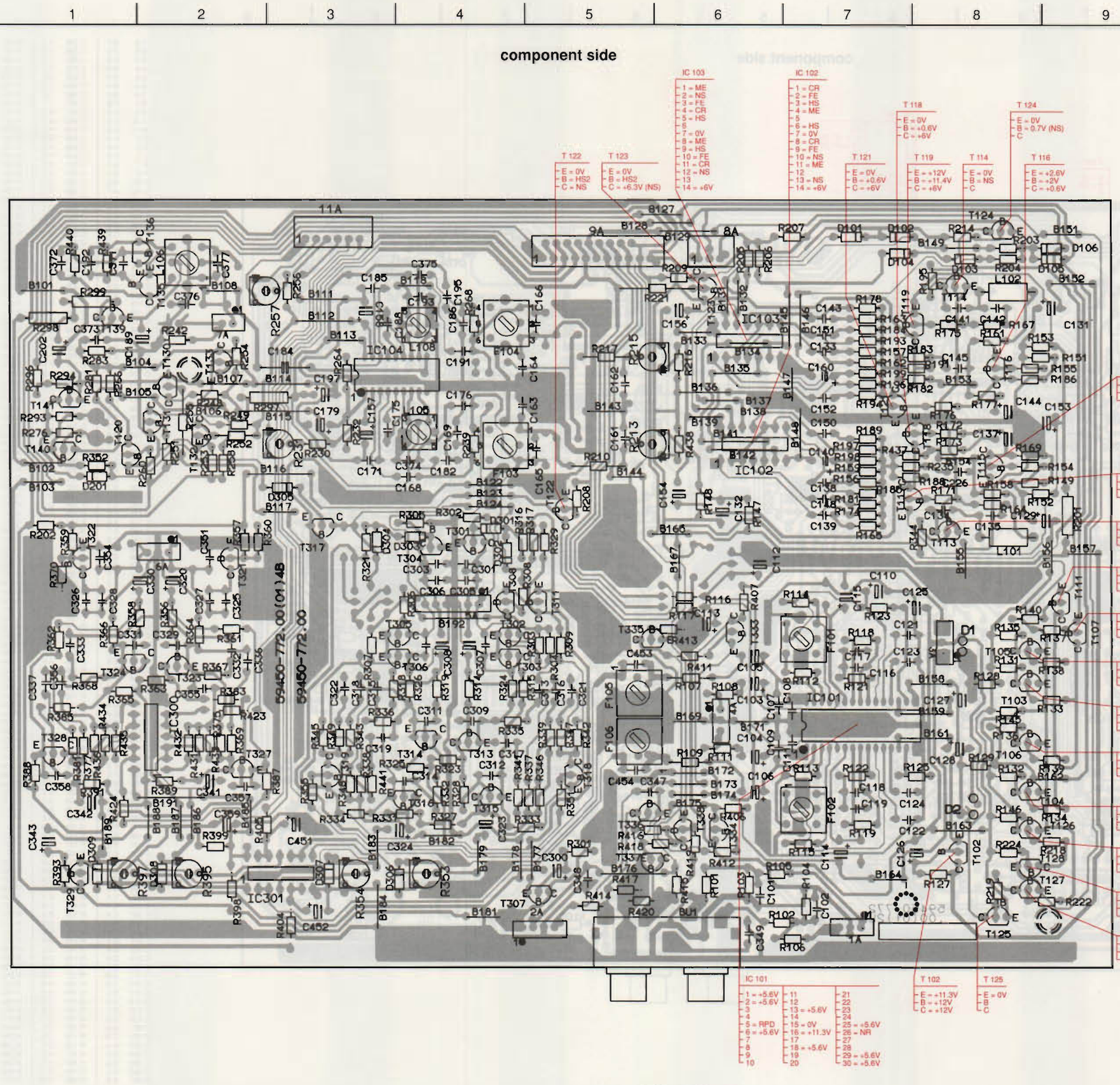


CIRCUIT DIAGRAM: DISPLAY BOARD, AF BOARD - PART 2



AF PCB

component side



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4 A	B 6	C 331	C 1	R 171	D 8	R 357	D 2
5 A	C 4	C 332	C 2	R 172	E 8	R 358	C 2
6 A	D 2	C 333	C 1	R 173	D 8	R 359	D 1
7 A	E 2	C 336	C 2	R 174	D 7	R 360	D 2
8 A	F 6	C 337	C 1	R 175	E 8	R 361	C 2
9 A	F 5	C 341	B 2	R 176	E 8	R 362	C 1
11 A	F 3	C 342	B 1	R 177	E 8	R 363	C 2
BU 1	A 6	C 343	A 1	R 178	F 7	R 364	C 2
D 1	C 8	C 347	B 5	R 181	D 7	R 365	C 1
D 2	B 8	C 348	A 5	R 182	E 8	R 366	C 1
L 1	E 2	C 349	A 6	R 183	E 8	R 367	C 2
P 1	E 1	C 351	D 2	R 184	E 7	R 368	C 1
P 2	E 1	C 352	D 1	R 185	D 7	R 369	B 2
C 101	A 6	C 353	D 2	R 186	E 8	R 370	D 1
C 102	A 7	C 354	D 1	R 188	D 7	R 375	B 2
C 103	C 5	C 355	C 2	R 189	E 7	R 377	B 1
C 104	B 6	C 356	C 1	R 191	E 8	R 381	B 1
C 105	C 6	C 357	B 2	R 193	E 7	R 383	C 2
C 106	B 6	C 358	B 1	R 194	E 7	R 385	B 1
C 107	C 6	C 359	B 2	R 195	F 8	R 387	B 2
C 108	B 7	C 371	F 1	R 196	E 7	R 388	B 1
C 109	B 6	C 372	F 1	R 197	D 7	R 389	B 2
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C 122	B 7	D 103	F 8	R 210	D 5	R 412	A 6
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C 126	A 7	D 201	D 1	R 216	E 6	R 416	B 5
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C 128	B 8	D 302	D 4	R 218	A 9	R 418	A 5
C 129	D 8	D 303	D 4	R 219	A 8	R 419	A 6
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C 134	D 8	D 306	A 3	R 224	A 8	R 424	B 1
C 135	D 8	D 307	A 3	R 230	E 3	R 431	B 2
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C 142	F 8	F 106	B 5	R 251	D 2	R 439	F 1
C 143	E 7	IC 101	B 7	R 252	E 2	R 440	F 1
C 144	E 8	IC 102	D 6	R 253	D 2	R 441	B 3
C 145	E 8	IC 103	E 6	R 254	E 2	T 102	A 8
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C 158	E 3	R 102	A 6	R 281	E 1	T 116	E 8
C 160	E 7	R 103	A 6	R 283	E 1	T 117	E 7
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C 165	D 5	R 108	C 6	R 298	E 1	T 122	D 5
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C 179	E 3	R 116	C 6	R 306	C 4	T 130	E 2
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C 192	F 1	R 127	A 8	R 318	C 3	T 141	E 1
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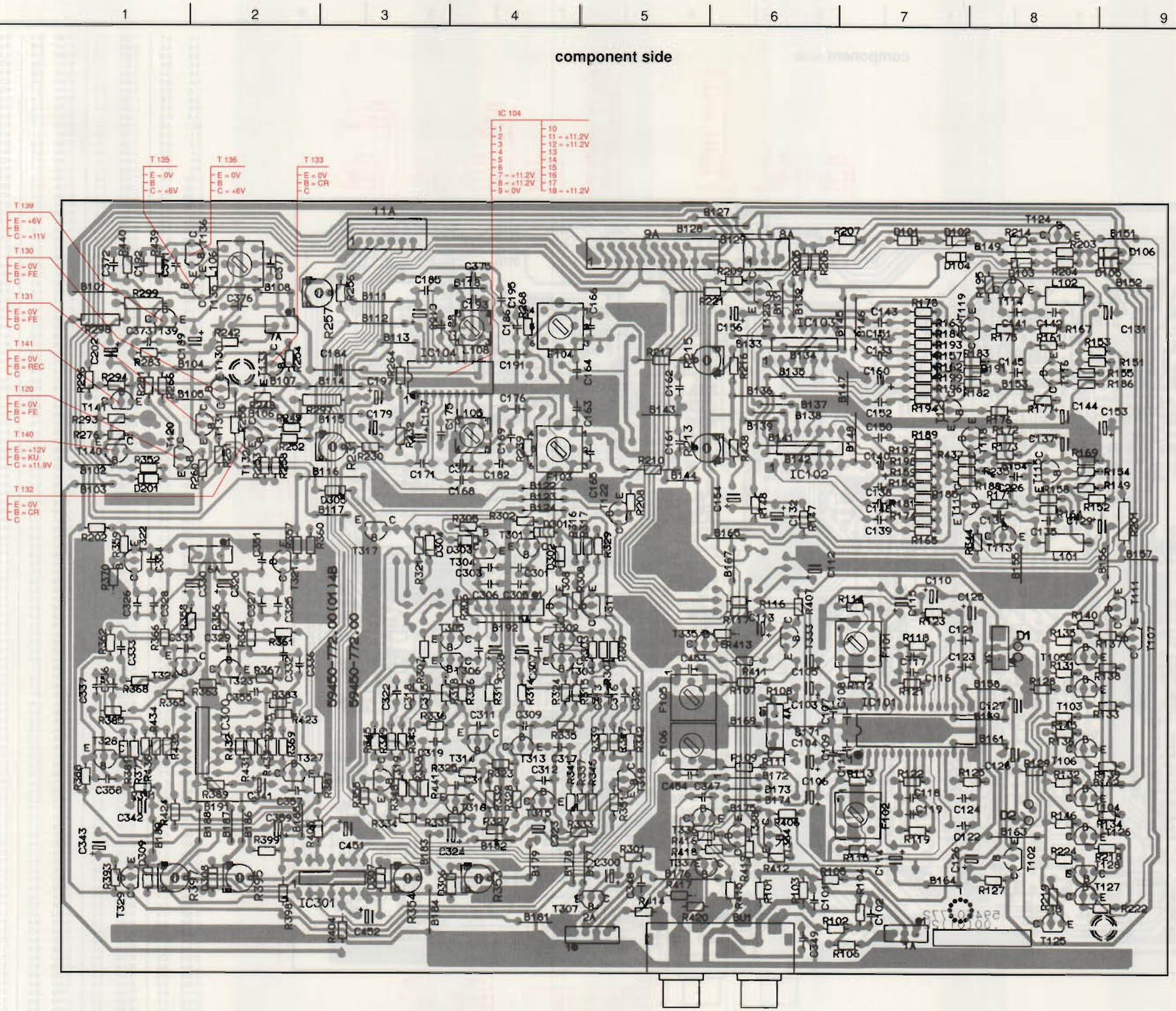
AF PCB

component side



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8 A	F 6	C 337	C 1	R 175	E 8	R 361	C 2
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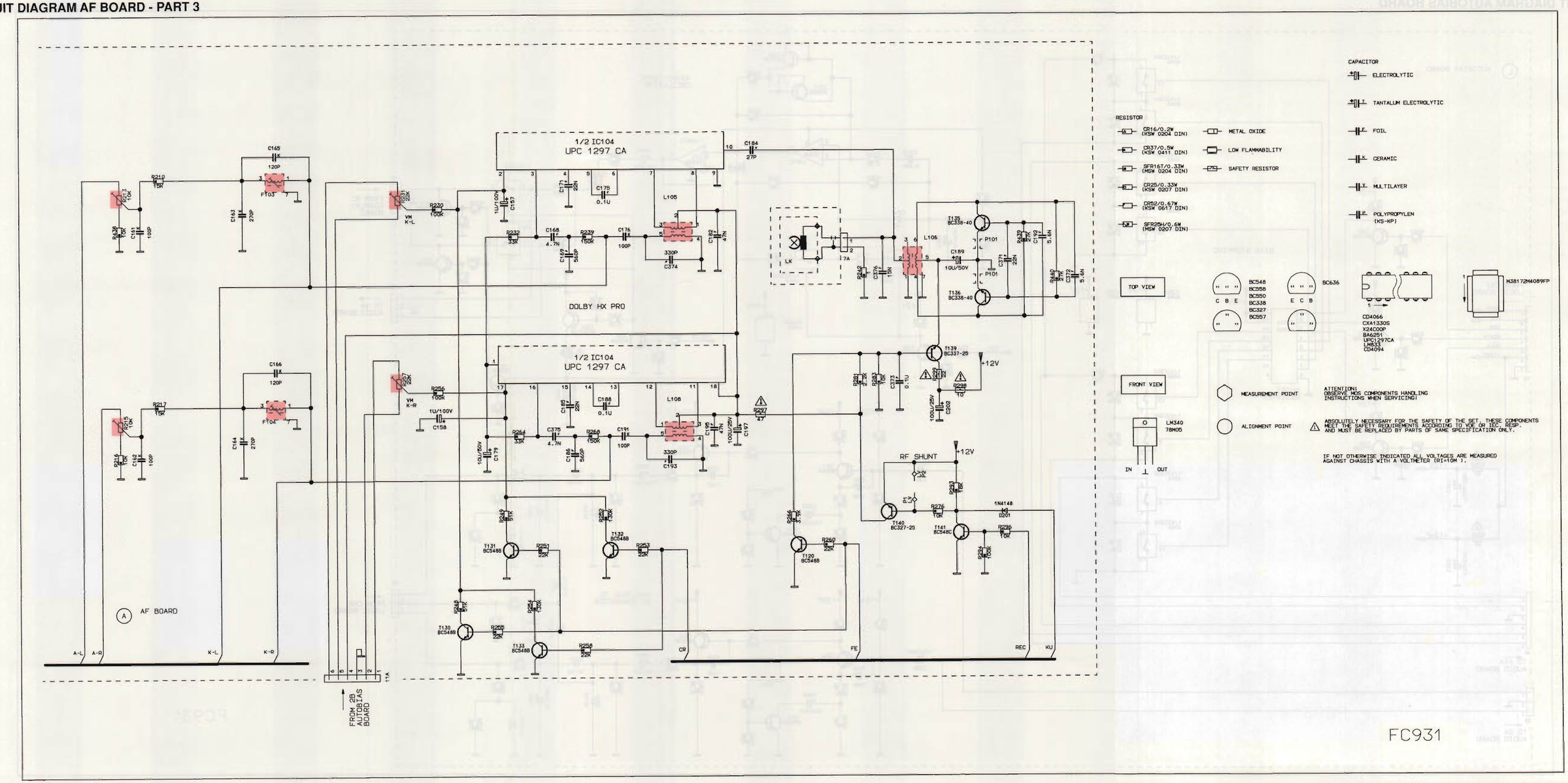
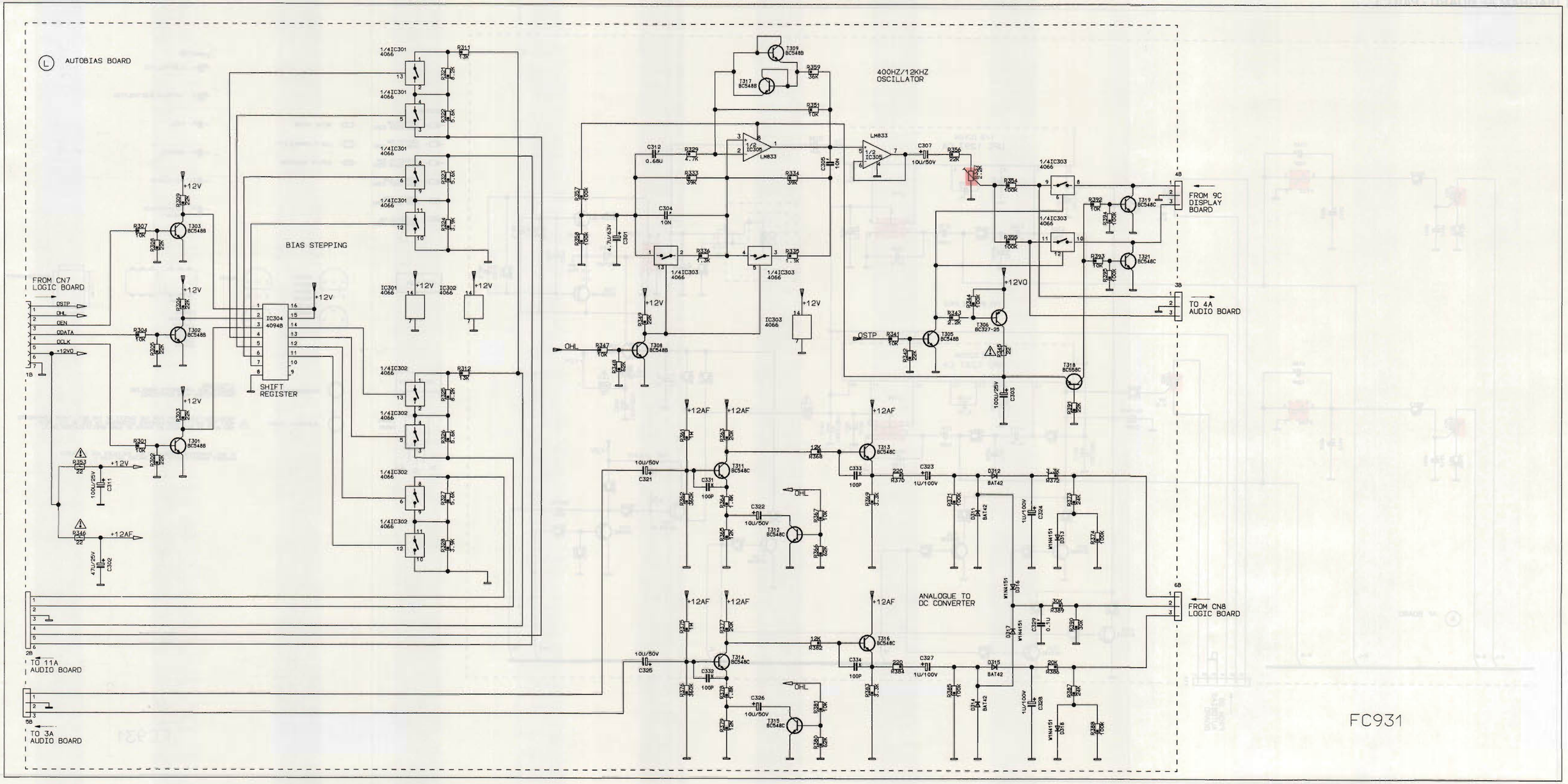
C 323	B 4	R 159	D 7	R 348	B 3	T 335	C 5
C 324	B 4	R 161	E 8	R 349	B 3	T 336	B 5
C 325	C 2	R 162	E 7	R 351	B 5	T 337	A 5
C 326	C 1	R 163	E 7	R 352	D 1	T 338	B 6
C 327	C 2	R 164	D 8	R 353	A 4		

CIRCUIT DIAGRAM AF BOARD - PART 3

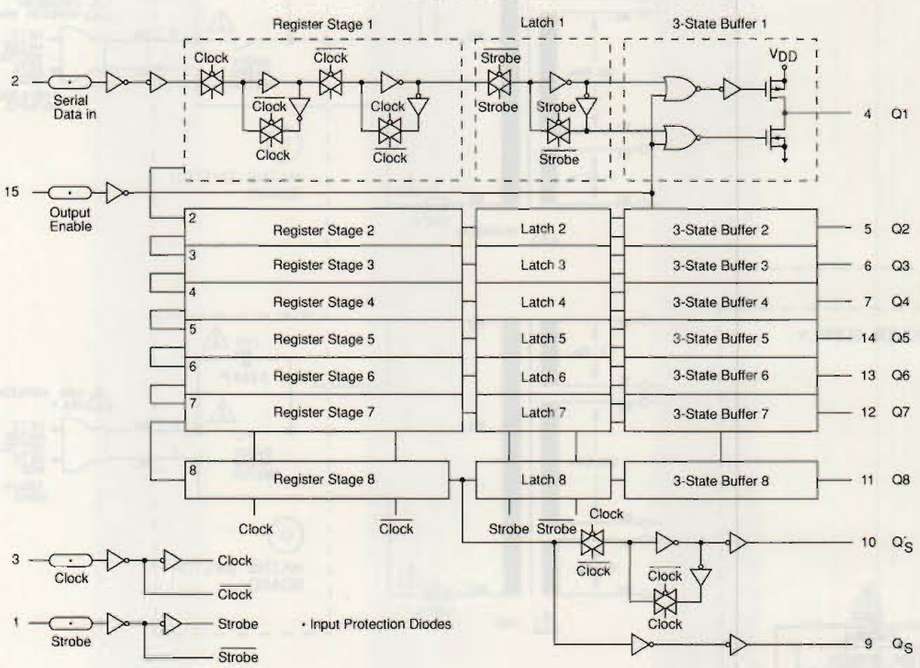


CIRCUIT DIAGRAM AUTOBIAS BOARD

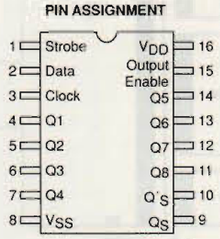


4094 B

BLOCK DIAGRAM

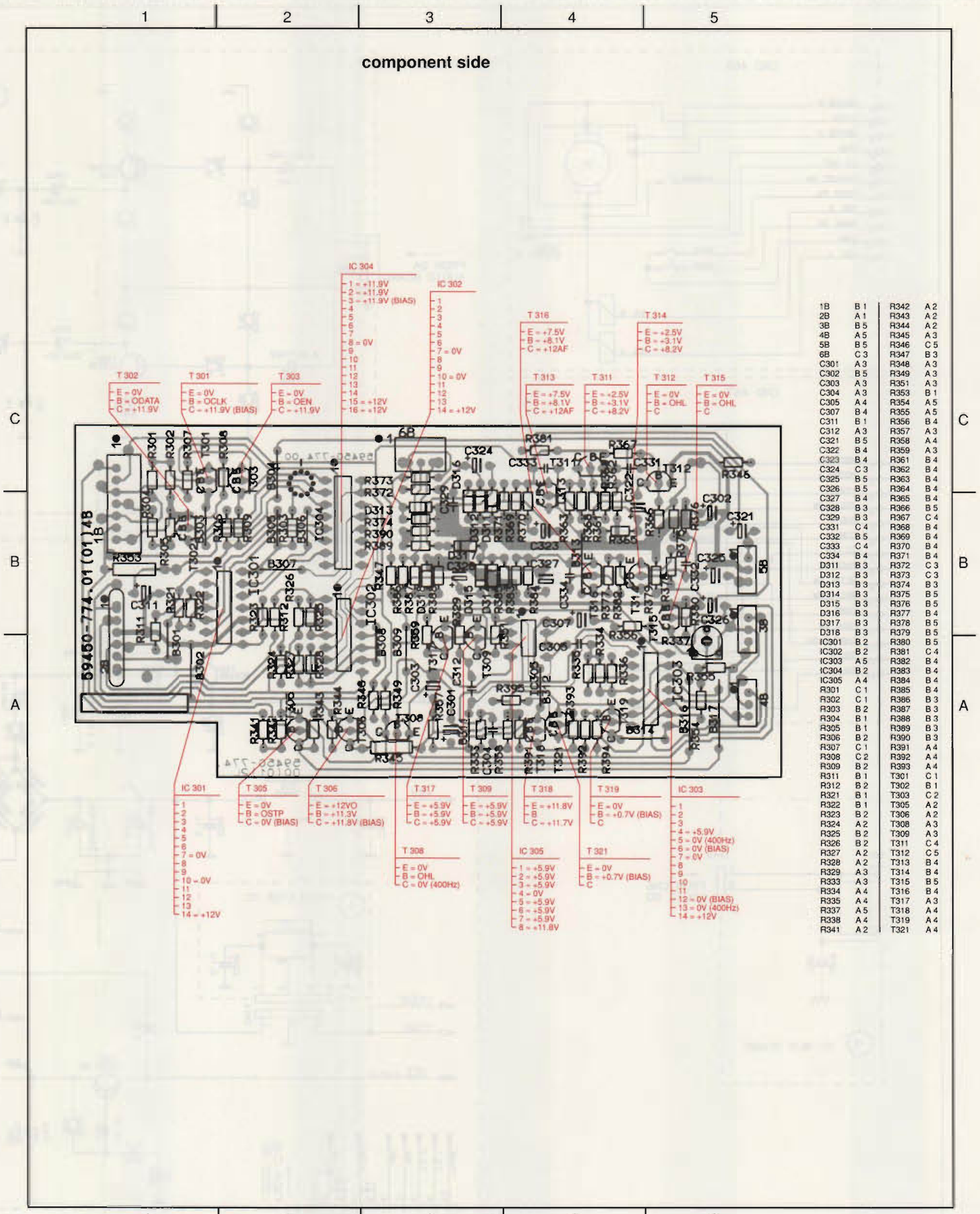


PIN ASSIGNMENT



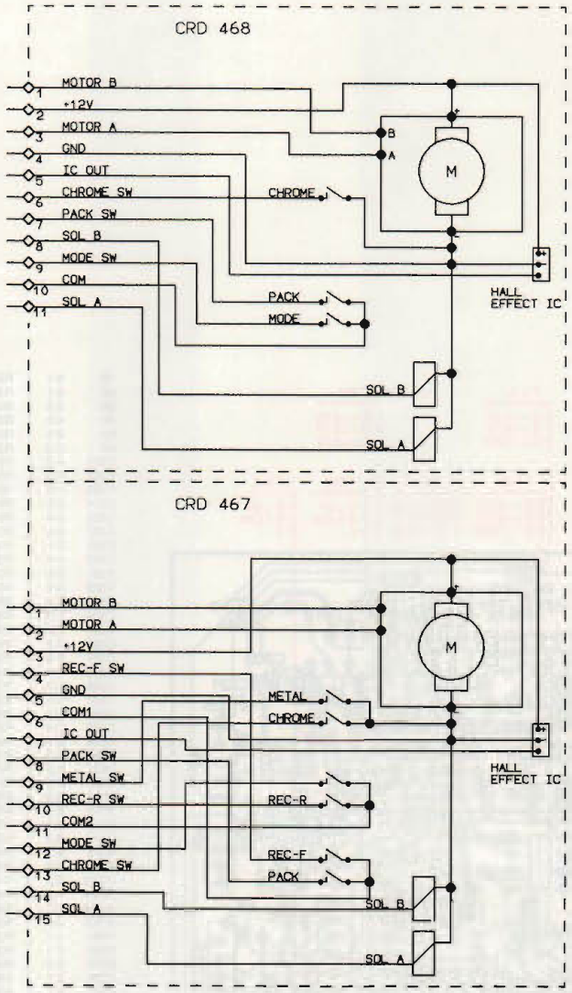
AUTOBIAS PCB

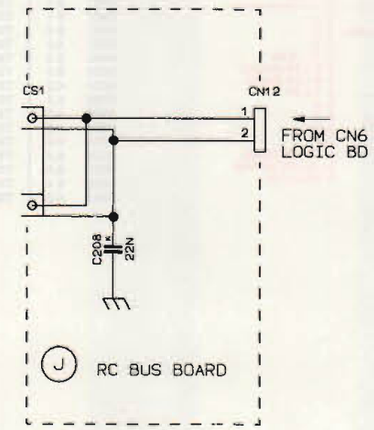
component side

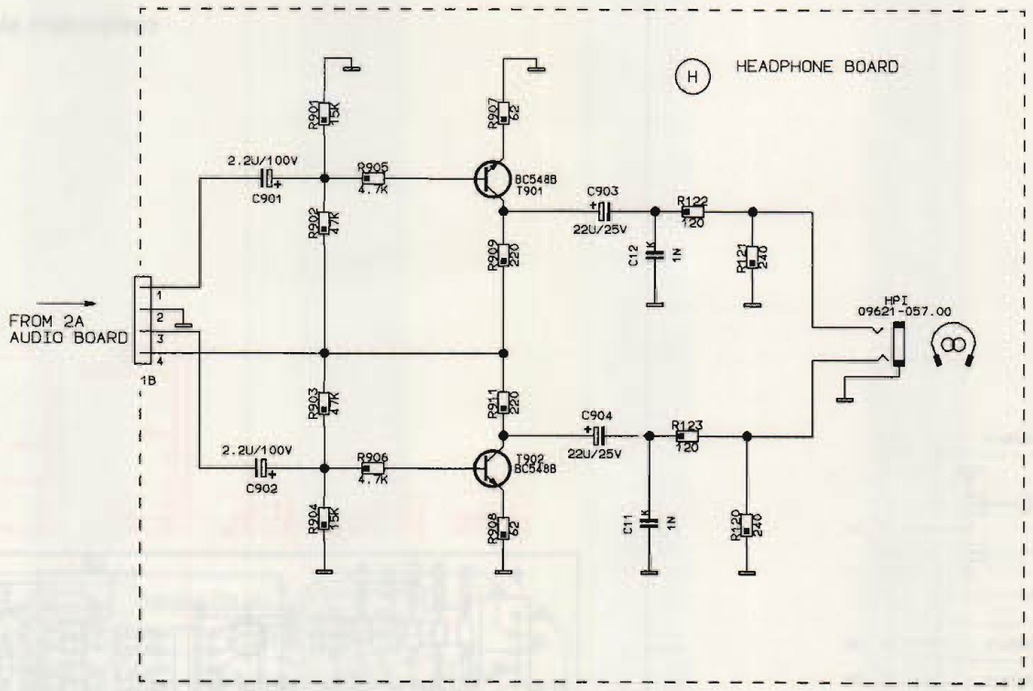


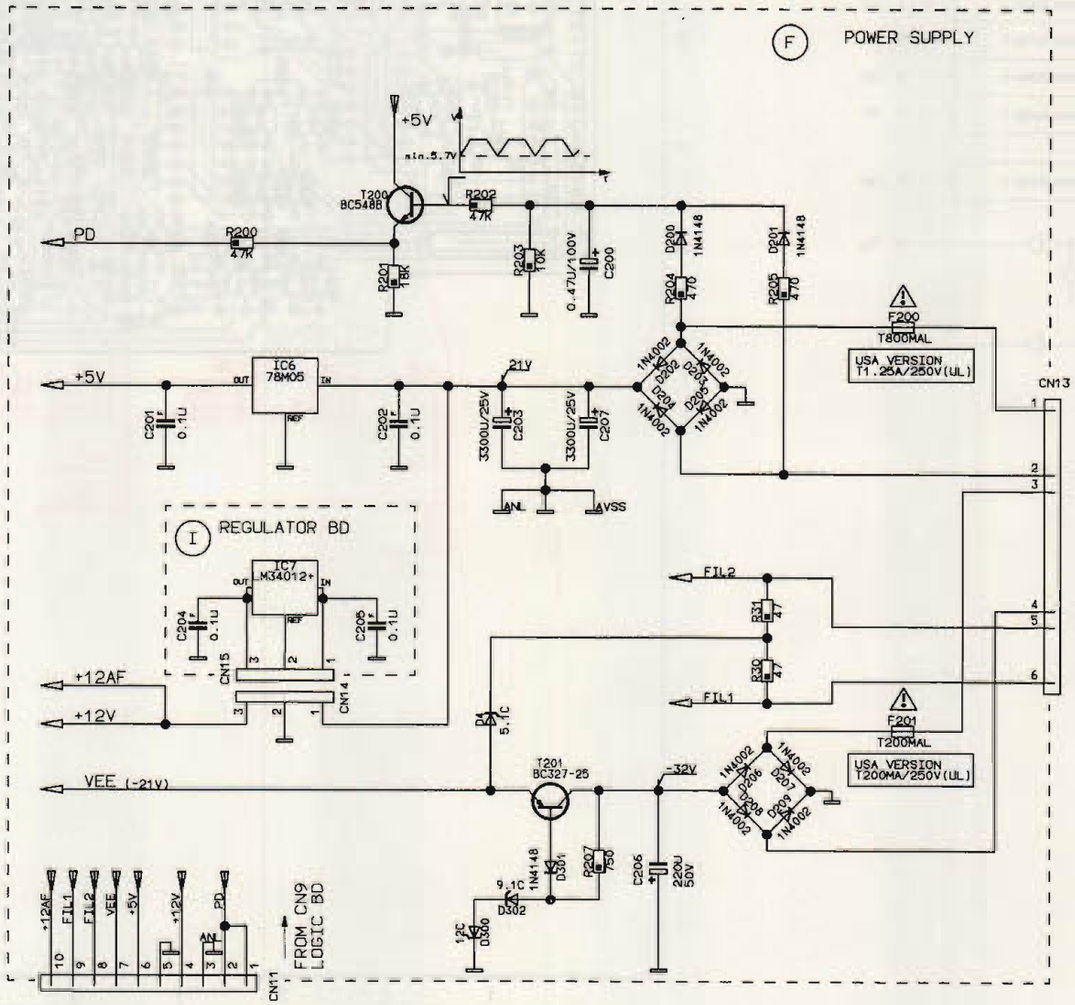
1B	B 1	R342	A 2
2B	A 1	R343	A 2
3B	B 5	R344	A 2
4B	A 5	R345	A 3
5B	B 5	R346	C 5
6B	C 3	R347	B 3
C301	A 3	R348	A 3
C302	B 5	R349	A 3
C303	A 3	R351	A 3
C304	A 3	R353	B 1
C305	A 4	R354	A 5
C307	B 4	R355	A 5
C311	B 1	R356	B 4
C312	A 3	R357	A 3
C321	B 5	R358	A 4
C322	B 4	R359	A 3
C323	B 4	R361	B 4
C324	C 3	R362	B 4
C325	B 5	R363	B 4
C326	B 5	R364	B 4
C327	B 4	R365	B 4
C328	B 3	R366	B 5
C329	B 3	R367	C 4
C331	C 4	R368	B 4
C332	B 5	R369	B 4
C333	C 4	R370	B 4
C334	B 4	R371	B 4
D311	B 3	R372	C 3
D312	B 3	R373	C 3
D313	B 3	R374	B 3
D314	B 3	R375	B 5
D315	B 3	R376	B 5
D316	B 3	R377	B 4
D317	B 3	R378	B 5
D318	B 3	R379	B 5
IC301	B 2	R380	B 5
IC302	B 2	R381	C 4
IC303	A 5	R382	B 4
IC304	B 2	R383	B 4
IC305	A 4	R384	B 4
R301	C 1	R385	B 4
R302	C 1	R386	B 3
R303	B 2	R387	B 3
R304	B 1	R388	B 3
R305	B 1	R389	B 3
R306	B 2	R390	B 3
R307	C 1	R391	A 4
R308	C 2	R392	A 4
R309	B 2	R393	A 4
R311	B 1	T301	C 1
R312	B 2	T302	B 1
R321	B 1	T303	C 2
R322	B 1	T305	A 2
R323	B 2	T306	A 2
R324	A 2	T308	A 3
R325	B 2	T309	A 3
R326	B 2	T311	C 4
R327	A 2	T312	C 5
R328	A 2	T313	B 4
R329	A 3	T314	B 4
R333	A 3	T315	B 5
R334	A 4	T316	B 4
R335	A 4	T317	A 3
R337	A 5	T318	A 4
R338	A 4	T319	A 4
R341	A 2	T321	A 4

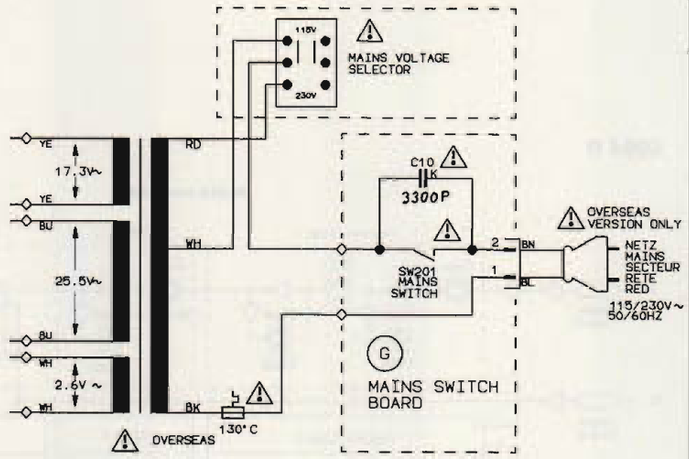
CIRCUIT DIAGRAM: MAINS SWITCH BOARD, POWER SUPPLY BOARD, HEADPHONE BOARD, RC BUS BOARD, DRIVE MECHANISM CRD 467 AND CRD 468

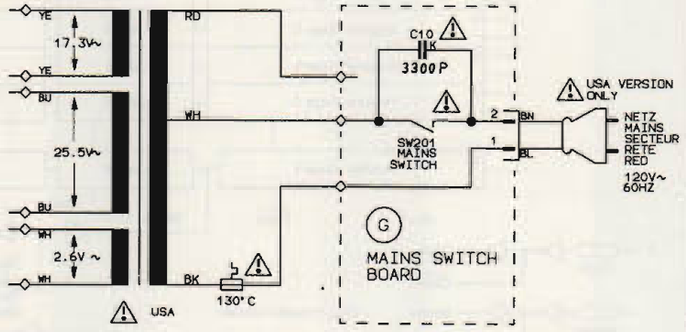


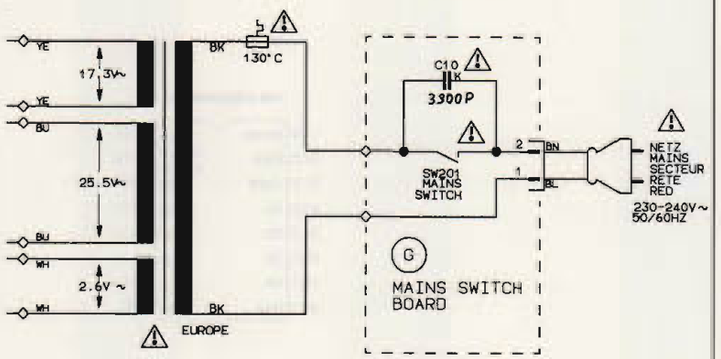








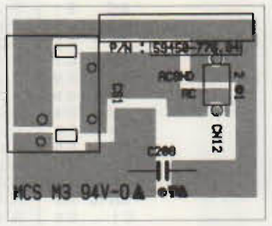




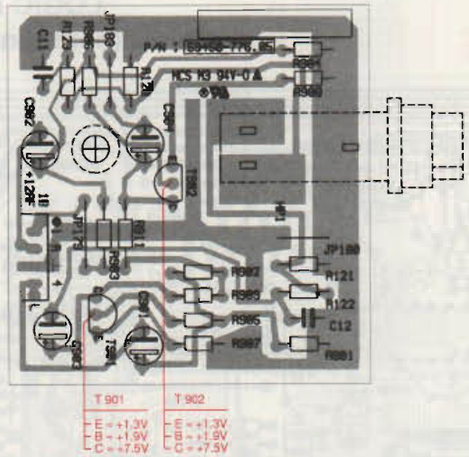
FC931

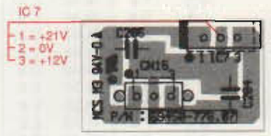
MAINS SWITCH PCB, POWER SUPPLY PCB, HEADPHONE PCB, RC BUS PCB, DRIVE MECHANISM CRD 467 PCB AND CRD 468 PCB

RC BUS BOARD
(component side)



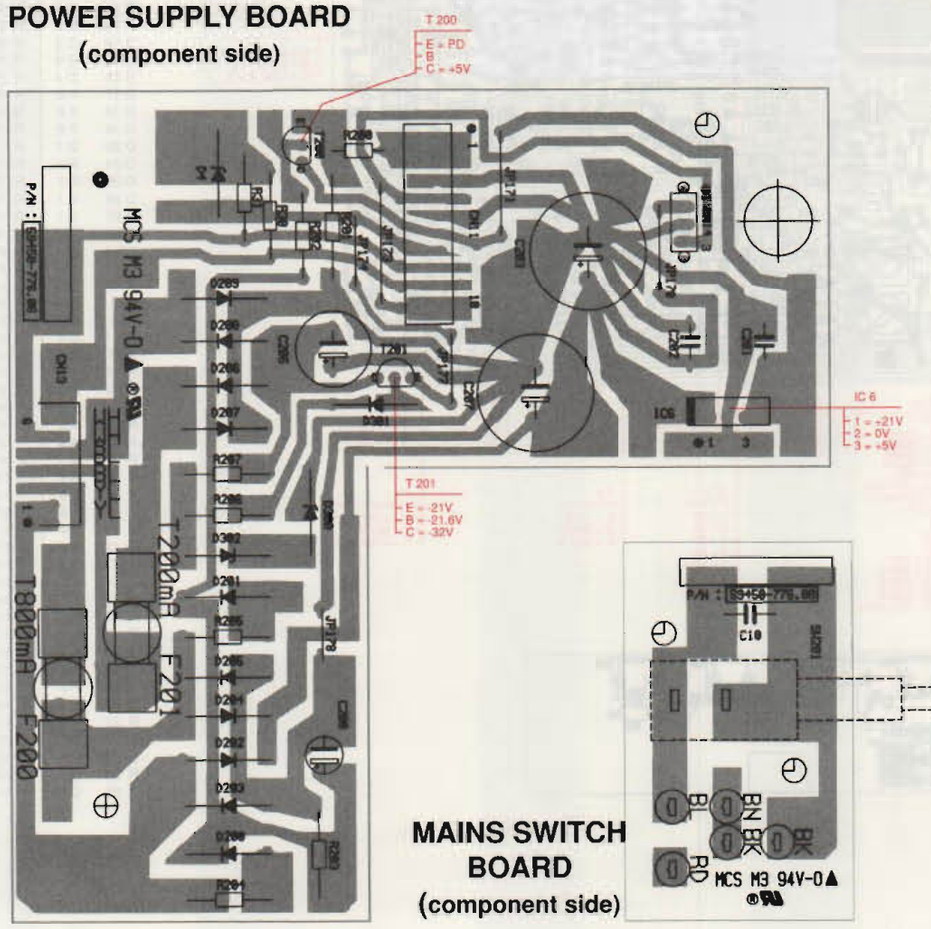
HEADPHONE BOARD
(component side)





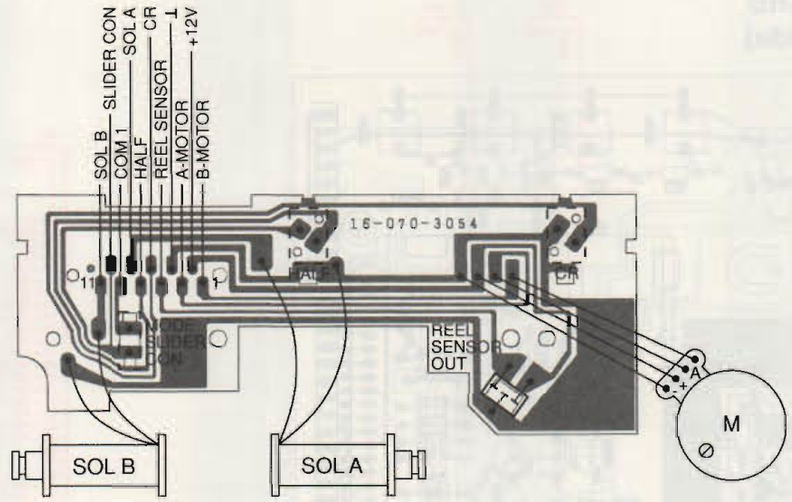
REGULATOR BOARD
(component side)

POWER SUPPLY BOARD
(component side)

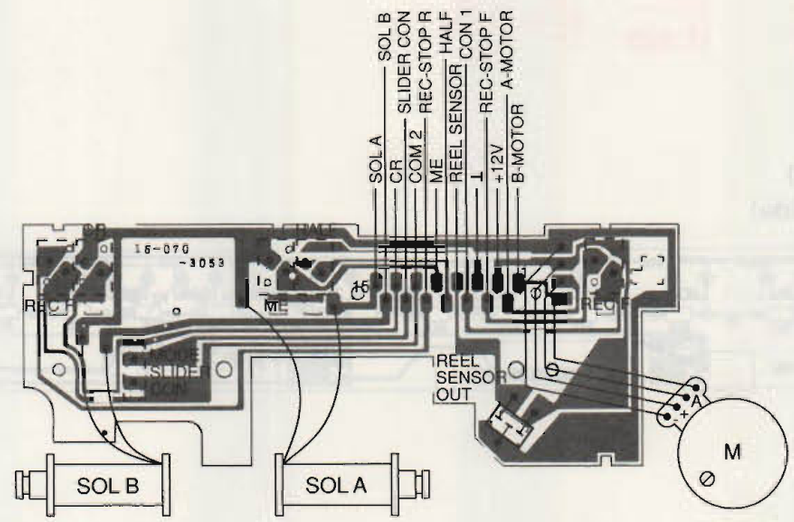


MAINS SWITCH BOARD
(component side)

DRIVE MECHANISM A CRD 468
(solder side)



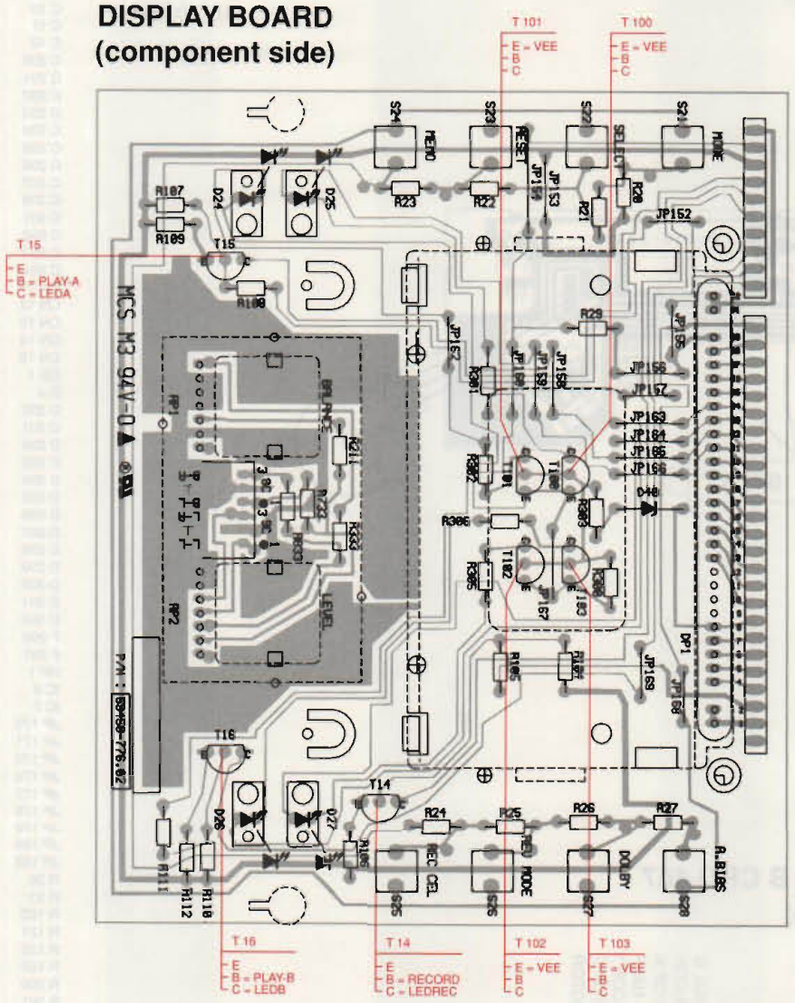
DRIVE MECHANISM B CRD 467
(solder side)



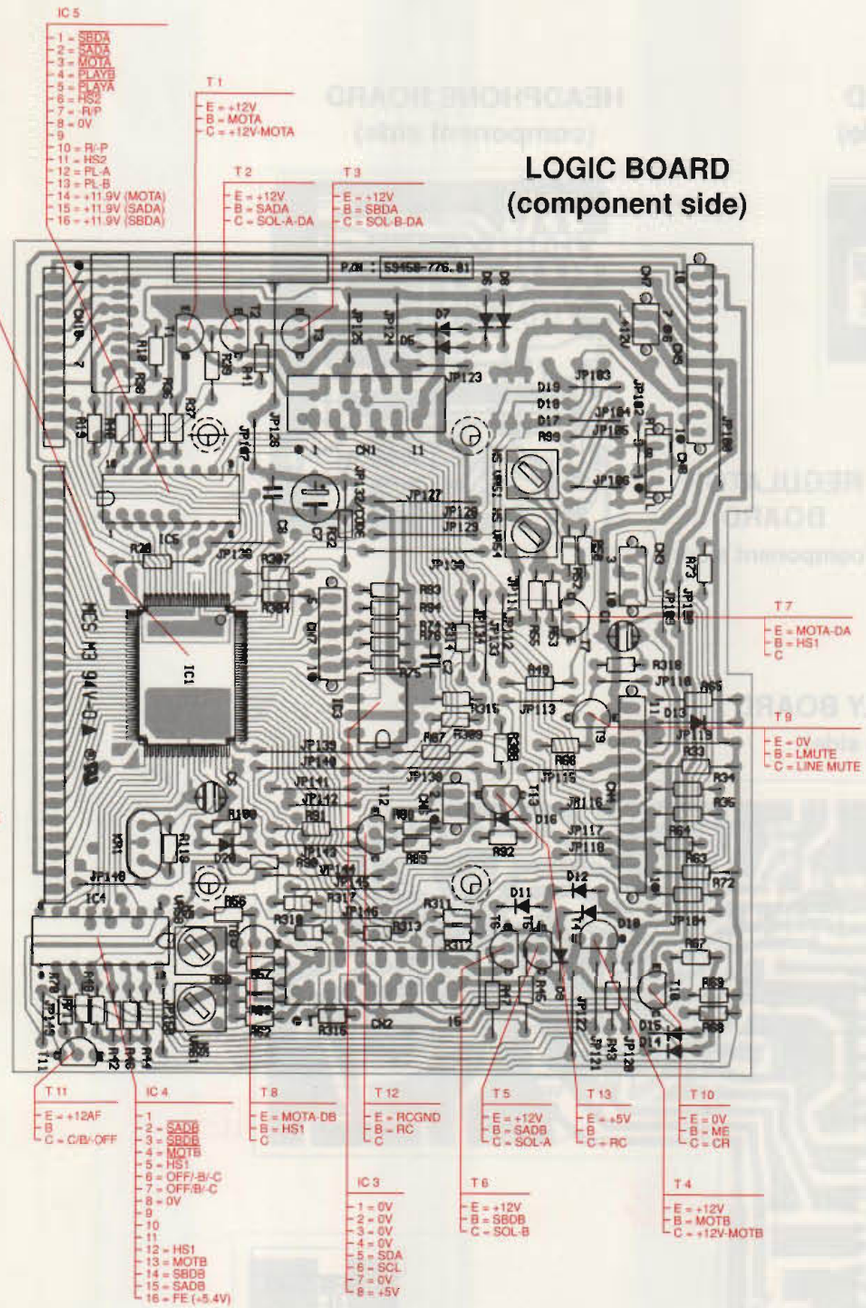
1 B	F 3
C 10	B 4
C 11	G 3
C 12	F 4
C 200	A 2
C 201	C 4
C 202	C 4
C 203	D 3
C 204	F 1
C 205	F 1
C 206	C 2
C 207	C 3
C 208	G 1
C 901	F 3
C 902	G 3
C 903	F 3
C 904	G 3
CN 11	D 3
CN 12	G 2
CN 13	C 1
CN 14	D 4
CN 15	F 1
CS 1	G 1
D 4	D 2
D 200	A 2
D 201	B 2
D 202	A 2
D 203	A 2
D 204	B 2
D 205	B 2
D 206	C 2
D 207	C 2
D 208	C 2
D 209	D 2
D 300	B 2
D 301	C 2
D 302	B 2
F 200	B 1
F 201	B 1
HP 1	G 4
IC 6	C 4
IC 7	F 1
JP 170	D 4
JP 171	D 3
JP 173	D 2
JP 174	D 2
JP 177	C 3
JP 178	B 2
JP 179	F 3
JP 180	F 4
JP 183	G 3
R 30	D 2
R 31	D 2
R 120	G 3
R 121	F 4
R 122	F 4
R 123	G 3
R 200	D 2
R 201	D 2
R 202	D 2
R 203	A 2
R 204	A 2
R 205	B 2
R 206	B 2
R 207	C 2
R 901	F 4
R 902	F 4
R 903	F 3
R 904	G 4
R 905	F 4
R 906	G 3
R 907	F 4
R 908	G 4
R 909	F 4
R 911	F 3
SW 201	B 4
T 200	D 2
T 201	C 2
T 901	F 3
T 902	G 4

DISPLAY PCB, KEYBOARD PCB, LOGIC PCB

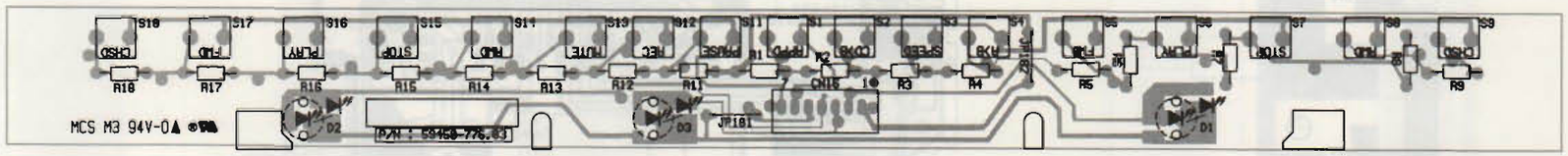
DISPLAY BOARD (component side)



LOGIC BOARD (component side)

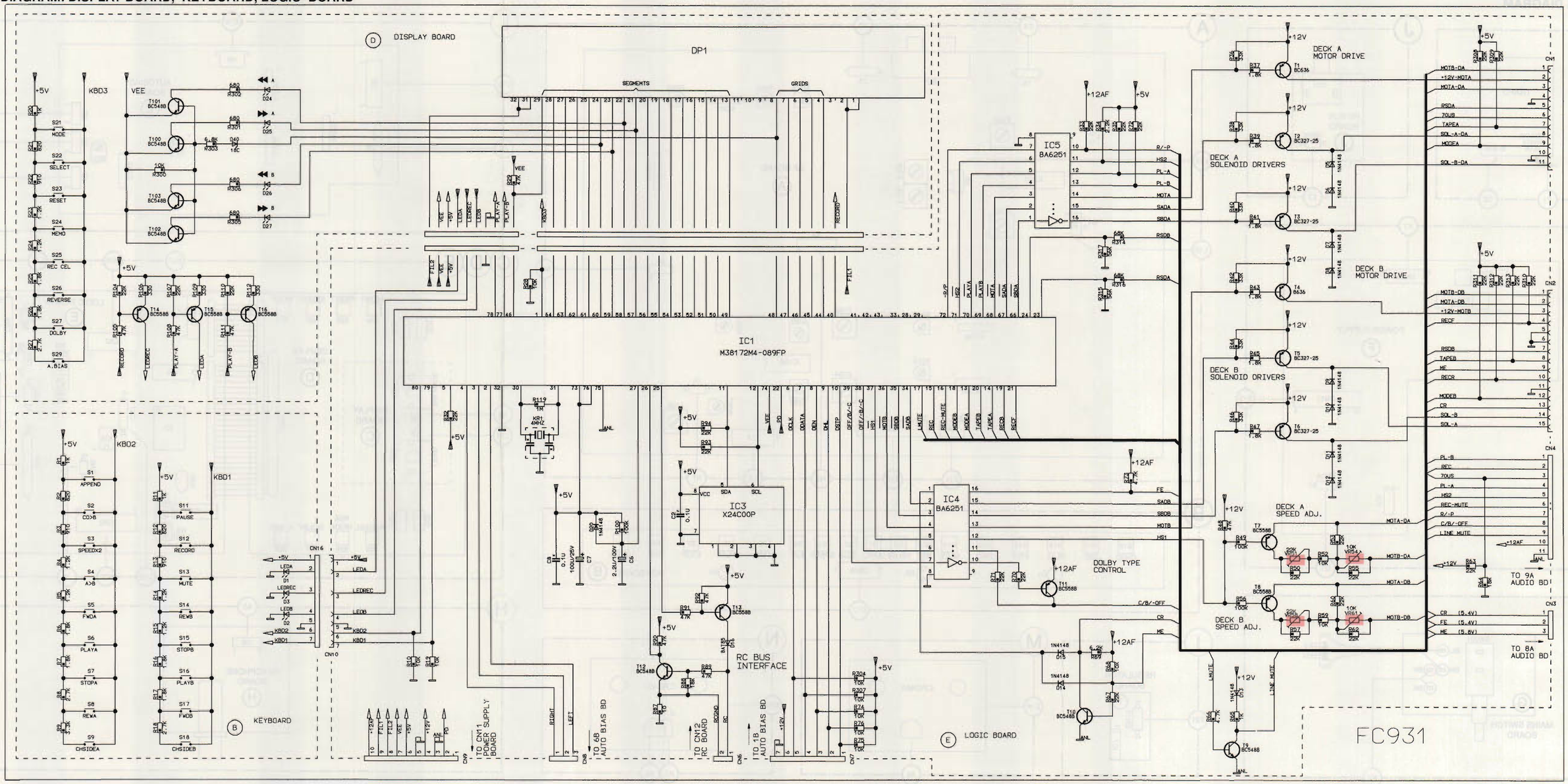


KEYBOARD (component side)

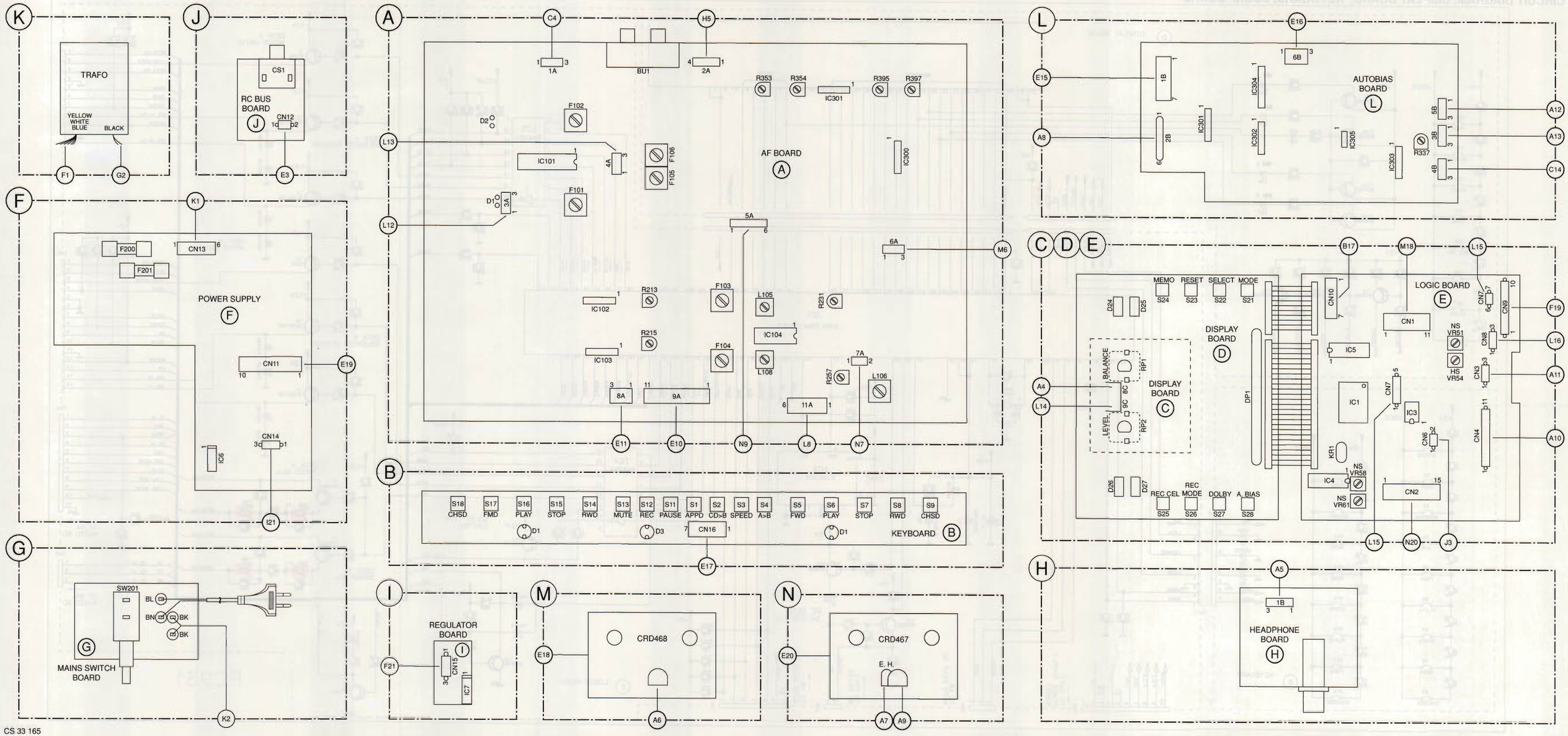


8 C	E 1	R 27	C 3	R 211	E 2
9 C	D 1	R 28	E 6	R 300	D 3
CN 1	F 7	R 29	E 3	R 301	E 2
CN 2	C 7	R 32	E 7	R 302	E 2
CN 3	E 9	R 33	D 9	R 303	D 3
CN 4	D 9	R 34	D 9	R 304	E 7
CN 6	D 8	R 35	D 9	R 305	D 2
CN 7	E 7	R 36	F 6	R 306	D 2
CN 8	E 9	R 37	F 6	R 307	E 7
CN 9	F 9	R 38	F 6	R 308	D 8
CN 10	F 6	R 39	F 6	R 309	D 8
CN 16	A 5	R 40	F 6	R 310	C 7
C 1	E 8	R 41	F 7	R 311	C 8
C 2	D 8	R 42	C 6	R 312	C 8
C 3	F 8	R 43	C 8	R 313	C 7
C 4	F 8	R 44	C 6	R 314	E 8
C 5	F 8	R 45	C 8	R 315	D 8
C 6	D 6	R 46	C 6	R 316	C 7
C 7	E 7	R 47	C 8	R 317	C 7
C 8	E 7	R 48	C 6	R 318	D 8
D 1	A 6	R 49	D 8	R 333	D 2
D 2	A 2	R 50	E 8	R 733	D 1
D 3	A 4	R 52	E 8	R 833	D 1
D 5	F 8	R 53	E 8	RP 1	E 1
D 6	F 8	R 55	E 8	RP 2	D 1
D 7	F 8	R 56	C 7	VR 51	E 8
D 8	F 8	R 57	C 7	VR 54	E 8
D 9	C 8	R 58	C 7	VR 58	C 6
D 10	C 8	R 60	C 7	VR 61	C 6
D 11	C 8	R 62	C 7	S 1	A 4
D 12	C 8	R 63	C 9	S 2	A 5
D 13	D 9	R 64	D 9	S 3	A 5
D 14	C 9	R 65	D 9	S 4	A 5
D 15	C 9	R 66	D 8	S 5	A 6
D 16	D 8	R 67	C 9	S 6	A 6
D 17	F 8	R 68	C 9	S 7	A 7
D 18	F 8	R 69	C 9	S 8	A 7
D 19	F 8	R 70	C 6	S 9	A 8
D 20	D 7	R 71	C 6	S 11	A 4
D 24	F 1	R 72	C 9	S 12	A 4
D 25	F 1	R 73	E 9	S 13	A 3
D 26	C 1	R 74	E 7	S 14	A 3
D 27	C 1	R 75	D 7	S 15	A 2
D 40	D 3	R 76	E 7	S 16	A 2
DP 1	D 3	R 87	D 8	S 17	A 1
IC 1	D 6	R 88	D 7	S 18	A 1
IC 3	D 7	R 89	D 7	S 21	F 3
IC 4	C 6	R 90	C 7	S 22	F 3
IC 5	E 6	R 91	D 7	S 23	F 2
KR 1	D 6	R 92	D 8	S 24	F 2
R 1	A 4	R 93	E 7	S 25	C 2
R 2	A 5	R 94	E 7	S 26	C 2
R 3	A 5	R 95	E 8	S 27	C 3
R 4	A 5	R 96	E 8	S 28	C 3
R 5	A 6	R 97	E 8	T 1	F 6
R 6	A 6	R 98	E 8	T 2	F 7
R 7	A 7	R 99	F 8	T 3	F 7
R 8	A 7	R 100	D 7	T 4	C 8
R 9	A 8	R 101	E 8	T 5	C 8
R 10	F 6	R 102	E 8	T 6	C 8
R 11	A 4	R 103	E 8	T 7	E 8
R 12	A 3	R 105	D 2	T 8	C 7
R 13	A 3	R 106	C 2	T 9	D 8
R 14	A 3	R 107	F 1	T 10	C 9
R 15	A 2	R 108	F 1	T 11	C 6
R 16	A 2	R 109	F 1	T 12	D 7
R 17	A 1	R 110	C 1	T 13	D 8
R 18	A 1	R 111	C 1	T 14	C 2
R 19	F 6	R 112	C 1	T 15	F 1
R 20	F 3	R 112	E 8	T 16	C 1
R 21	F 3	R 113	F 8	T 100	E 3
R 22	F 2	R 114	F 8	T 101	E 3
R 23	F 2	R 115	F 8	T 102	D 3
R 24	C 2	R 119	D 6	T 103	D 3
R 25	C 2	R 133	E 8		
R 26	C 3	R 134	E 8		

CIRCUIT DIAGRAM: DISPLAY BOARD, KEYBOARD, LOGIC BOARD

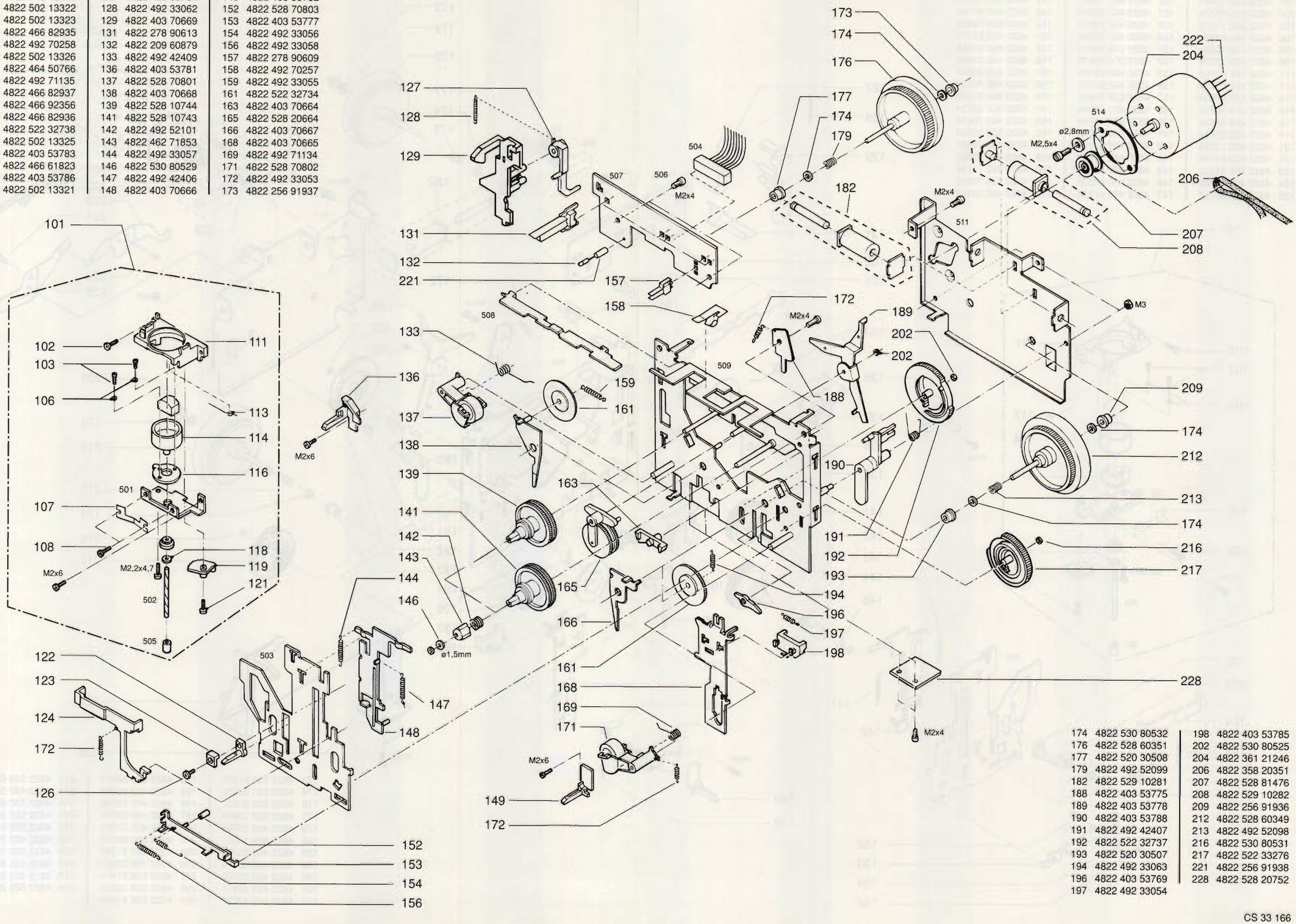


WIRING DIAGRAM



EXPLODED VIEW: LIST OF MECHANICAL PARTS DRIVE MECHANISM A (CRD 468)

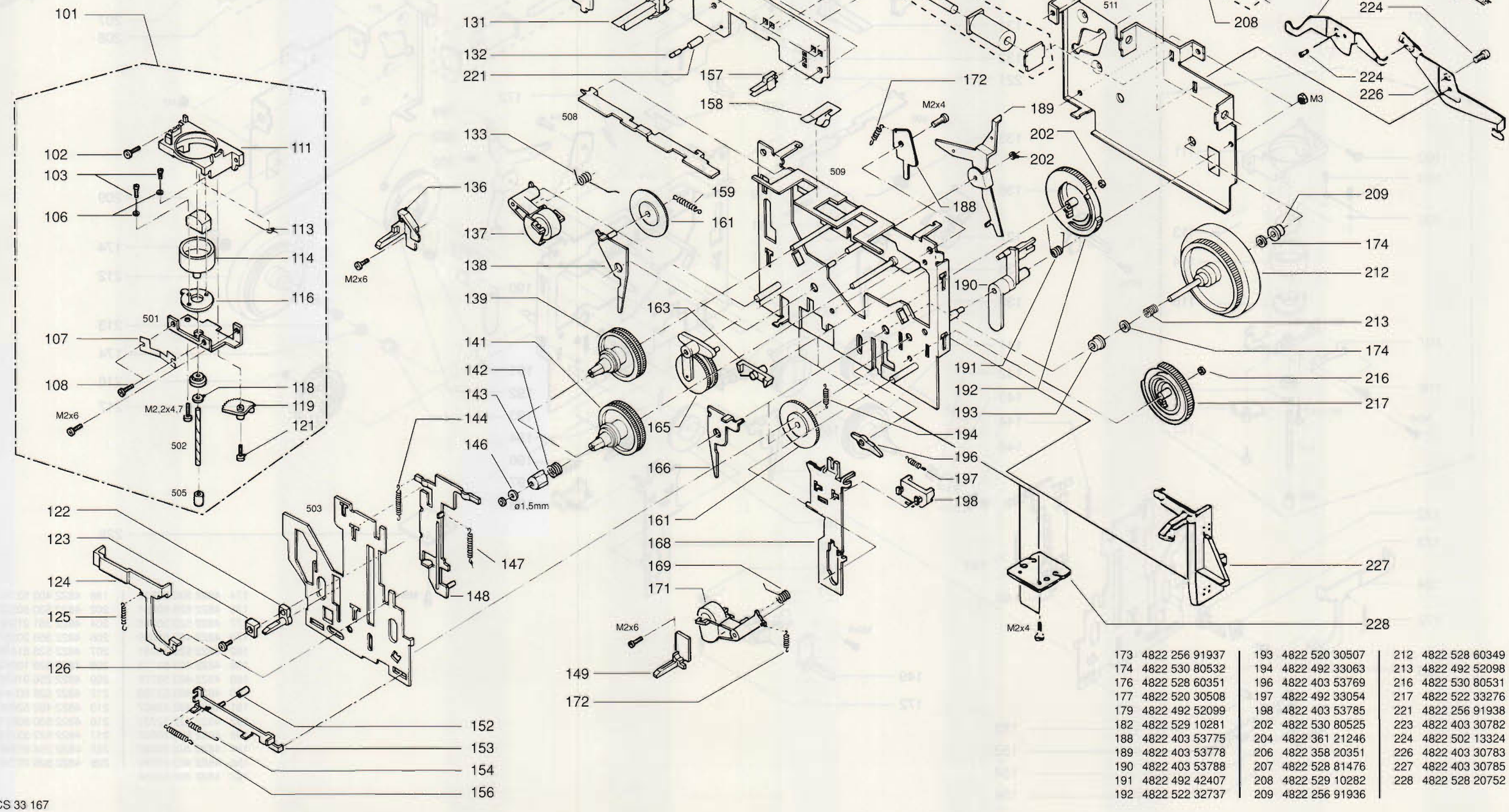
101	4822 249 10466	127	4822 403 53784	149	4822 403 53782
102	4822 502 13322	128	4822 492 33062	152	4822 528 70803
103	4822 502 13323	129	4822 403 70669	153	4822 403 53777
106	4822 466 82935	131	4822 278 90613	154	4822 492 33056
107	4822 492 70258	132	4822 209 60879	156	4822 492 33058
108	4822 502 13326	133	4822 492 42409	157	4822 278 90609
111	4822 464 50766	136	4822 403 53781	158	4822 492 70257
113	4822 492 71135	137	4822 528 70801	159	4822 492 33055
114	4822 466 82937	138	4822 403 70668	161	4822 522 32734
116	4822 466 92356	139	4822 528 10744	163	4822 403 70664
118	4822 466 82936	141	4822 528 10743	165	4822 528 20664
119	4822 522 32738	142	4822 492 52101	166	4822 403 70667
121	4822 502 13325	143	4822 462 71853	168	4822 403 70665
122	4822 403 53783	144	4822 492 33057	169	4822 492 71134
123	4822 466 61823	146	4822 530 80529	171	4822 528 70802
124	4822 403 53786	147	4822 492 42406	172	4822 492 33053
126	4822 502 13321	148	4822 403 70666	173	4822 256 91937



174	4822 530 80532	198	4822 403 53785
176	4822 528 60351	202	4822 530 80525
177	4822 520 30508	204	4822 361 21246
179	4822 492 52099	206	4822 358 20351
182	4822 529 10281	207	4822 528 81476
188	4822 403 53775	208	4822 529 10282
189	4822 403 53778	209	4822 256 91936
190	4822 403 53788	212	4822 528 60349
191	4822 492 42407	213	4822 492 52098
192	4822 522 32737	216	4822 530 80531
193	4822 520 30507	217	4822 522 33276
194	4822 492 33063	221	4822 256 91938
196	4822 403 53769	228	4822 528 20752
197	4822 492 33054		

EXPLODED VIEW: LIST OF MECHANICAL PARTS DRIVE MECHANISM B (CRD 467)

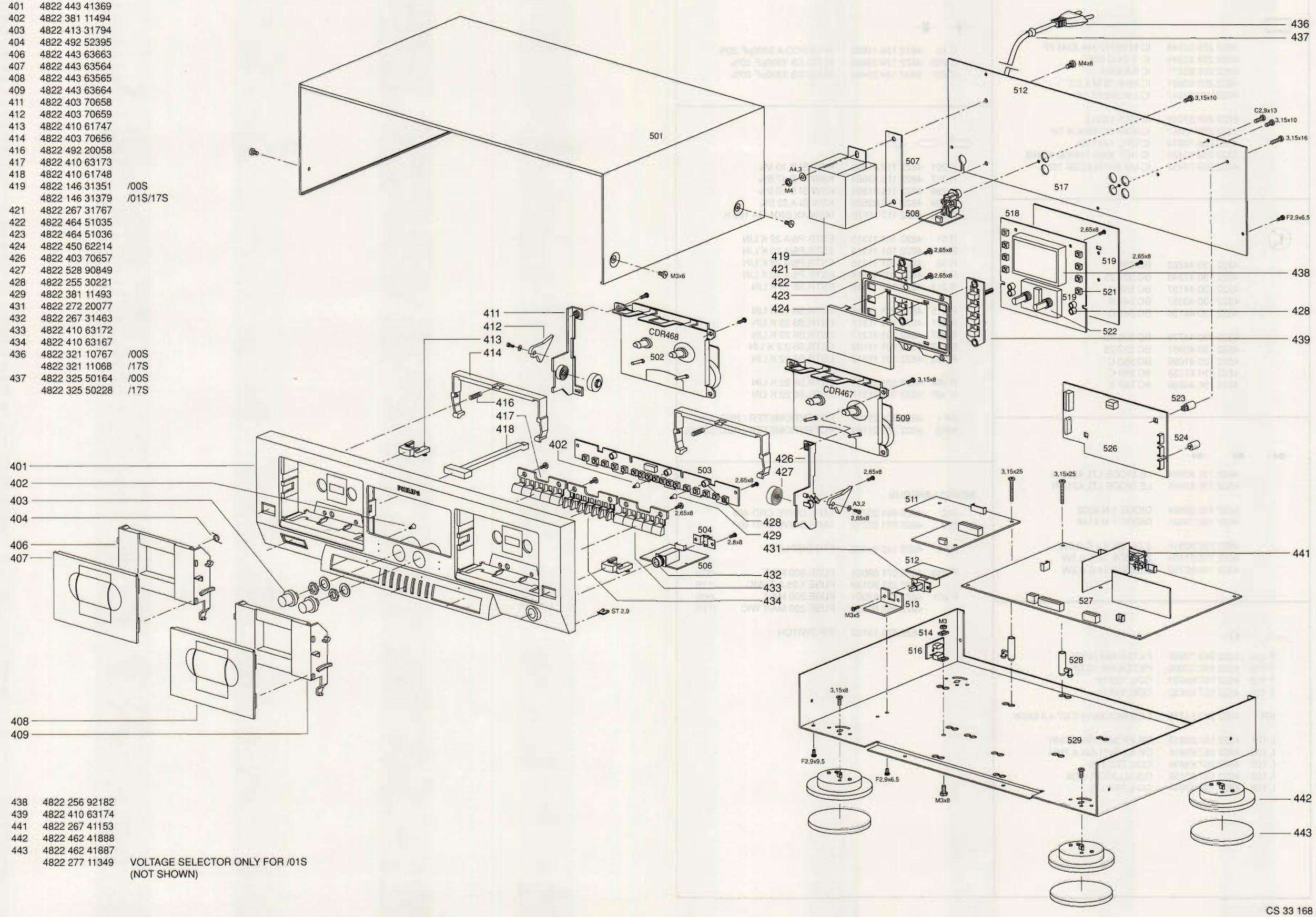
101	4822 249 10467	126	4822 502 13321	148	4822 403 70666
102	4822 502 13322	127	4822 403 53784	149	4822 403 53782
103	4822 502 13323	128	4822 492 33062	152	4822 528 70803
106	4822 466 82935	129	4822 403 30784	153	4822 403 53777
107	4822 492 70258	131	4822 278 90613	154	4822 492 33056
108	4822 502 13326	132	4822 209 60879	156	4822 492 33058
111	4822 464 50766	133	4822 492 42409	157	4822 278 90609
113	4822 492 71135	136	4822 403 53781	158	4822 492 70257
114	4822 466 82934	137	4822 528 70801	159	4822 492 33055
116	4822 466 92356	138	4822 403 70668	161	4822 522 32734
118	4822 466 82936	139	4822 528 10744	163	4822 403 70664
119	4822 522 32738	141	4822 528 10743	165	4822 528 20664
121	4822 502 13325	142	4822 492 52101	166	4822 403 70667
122	4822 403 53783	143	4822 462 71853	168	4822 403 70665
123	4822 466 61823	144	4822 492 33057	169	4822 492 71134
124	4822 403 53786	146	4822 530 80529	171	4822 528 70802
125	4822 492 33053	147	4822 492 42406	172	4822 492 33342



173	4822 256 91937	193	4822 520 30507	212	4822 528 60349
174	4822 530 80532	194	4822 492 33063	213	4822 492 52098
176	4822 528 60351	196	4822 403 53769	216	4822 530 80531
177	4822 520 30508	197	4822 492 33054	217	4822 522 33276
179	4822 492 52099	198	4822 403 53785	221	4822 256 91938
182	4822 529 10281	202	4822 530 80525	223	4822 403 30782
188	4822 403 53775	204	4822 361 21246	224	4822 502 13324
189	4822 403 53778	206	4822 358 20351	226	4822 403 30783
190	4822 403 53788	207	4822 528 81476	227	4822 403 30785
191	4822 492 42407	208	4822 529 10282	228	4822 528 20752
192	4822 522 32737	209	4822 256 91936		

EXPLODED VIEW: LIST OF MECHANICAL PARTS CASSETTE DECK

401	4822 443 41369	
402	4822 381 11494	
403	4822 413 31794	
404	4822 492 52395	
406	4822 443 63663	
407	4822 443 63564	
408	4822 443 63565	
409	4822 443 63664	
411	4822 403 70658	
412	4822 403 70659	
413	4822 410 61747	
414	4822 403 70656	
416	4822 492 20058	
417	4822 410 63173	
418	4822 410 61748	
419	4822 146 31351	/00S
	4822 146 31379	/01S/17S
421	4822 267 31767	
422	4822 464 51035	
423	4822 464 51036	
424	4822 450 62214	
426	4822 403 70657	
427	4822 528 90849	
428	4822 255 30221	
429	4822 381 11493	
431	4822 272 20077	
432	4822 267 31463	
433	4822 410 63172	
434	4822 410 63167	
436	4822 321 10767	/00S
	4822 321 11068	/17S
437	4822 325 50164	/00S
	4822 325 50228	/17S



438	4822 256 92182	
439	4822 410 63174	
441	4822 267 41153	
442	4822 462 41888	
443	4822 462 41887	
	4822 277 11349	VOLTAGE SELECTOR ONLY FOR /01S (NOT SHOWN)

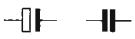
LIST OF ELECTRICAL PARTS

4822 209 33348	IC M 38172-M4-XXM FP
4822 209 33349	IC X 24 C 00P
4822 209 83077	IC BA 6251
4822 209 80891	IC MHz 78 M 5 CT
4822 209 33347	IC LM 340 AT-12
4822 209 31009	IC CXA 1330 S
5322 209 10357	IC 4066 B/14066 B CP
4822 209 72874	IC UPC 1297 CA
5322 209 10421	IC HEF 4094 PHI/CD 4094B
4822 209 73452	IC LM 833 N/ELDB 793

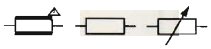
4822 130 44283	BC 636
4822 130 41246	BC 327-25
4822 130 44197	BC 558 B
4822 130 40937	BC 548 B
4822 130 44196	BC 548 C
5322 130 44779	BC 338-40
4822 130 40981	BC 337-25
4822 130 41096	BC 550 C
4822 130 61755	BC 560 C
4822 130 44568	BC 557 B

4822 130 82954	LE DIODE LTL 4232 N
4822 130 82955	LE DIODE LTL 4212 N
5322 130 30684	DIODE 1 N 4002
4822 130 30621	DIODE 1 N 4148
4822 130 80515	Z DIODE 5,1 C 0,5W
4822 130 31024	Z DIODE 18 C 0,5W
4822 130 82753	Z DIODE 24 C 0,5W

F 101	4822 242 72602	FILTER KM 10 DF
F 102	4822 242 72602	FILTER KM 10 DF
F 103	4822 157 63633	COIL 10X10
F 104	4822 157 63633	COIL 10X10
KR 1	4822 242 81735	CER.RES.86/13 CST 4.0 MGW
L 101	4822 157 63815	DR AX 0411-GA 4.7MH
L 102	4822 157 63815	DR AX 0411-GA 4.7MH
L 105	4822 157 63634	COIL 7X7 175
L 106	4822 157 60198	OSCILLATOR-COIL
L 108	4822 157 63634	COIL 7X7 175



C 10	4822 126 11805	SI-CERCO.A 3300pF 20%
C 203	4822 124 23498	ELCO CB 3300µF 20%
C 207	4822 124 23498	ELCO CB 3300µF 20%



R 201	4822 116 81858	KSW SI B 10 5%
R 297	4822 116 53664	KSW SI B 47 5%
R 298	4822 116 81858	KSW SI B 10 5%
R 299	4822 116 83526	KSW SI A 22 5%
R 305	4822 117 11132	MSW AX 0204-GA 100 K
R 51	4822 101 11315	ESTR.P6/A 22 K LIN
R 54	4822 101 11314	ESTR.P6/A 10 K LIN
R 58	4822 101 11315	ESTR.P6/A 22 K LIN
R 61	4822 101 11314	ESTR.P6/A 10 K LIN
R 213	4822 101 11316	ESTR.S6 10 K LIN
R 215	4822 101 11316	ESTR.S6 10 K LIN
R 231	4822 101 11317	ESTR.S6 22 K LIN
R 257	4822 101 11317	ESTR.S6 22 K LIN
R 337	5322 101 11109	ESTR.S6 2,2 K LIN
R 353	4822 101 11317	ESTR.S6 22 K LIN
R 354	4822 101 11317	ESTR.S6 22 K LIN
R 395	4822 101 11317	ESTR.S6 22 K LIN
RP 1	4822 101 21191	POTENTIOMETER / REC. BAL.
RP 2	4822 101 21189	POTENTIOMETER / REC. LEVEL

MISCELLANEOUS

502	4822 691 20734	TAPE DRIVE CRD 468	
509	4822 691 20735	TAPE DRIVE CRD 467	
DP 1	4822 130 91342	FTD DISPLAY	
F 200	4822 071 58001	FUSE 800 MA/T	/00S
	4822 253 50159	FUSE 1.25 A/T WIC	/17S
F 201	4822 071 52001	FUSE 200 MA/T	/00S
	4822 253 50158	FUSE 200 MA/T WIC	/17S
	4822 276 13152	TIP SWITCH	