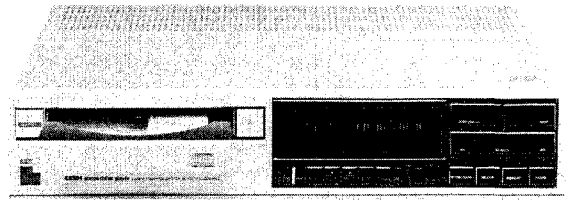


Service  
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Service



35493 A12.

For servicing hints for the CD mechanism see  
Service Manual C.D.M.-1. V13973

# Service Manual



## CONTENTS

1. Elucidation on the lay-out and table of contents per page.
2. Control buttons and technical specification.
3. Servicing hints.
4. Measurements and adjustments.
5. Exploded views and parts lists of mechanical parts.
6. Block diagram, circuit diagrams, data on PCBs, parts lists of electrical parts and wiring diagram.
7. Faultfinding method.
8. Remote control.

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



Documentation Technique Service Dokumentation Documentazione di Servizio Huolto-Ohje Manual de Servicio Manual de Servicio  
Subject to modification



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Consumer Electronics.

CS 5 118 GB

## 1. ELUCIDATION ON THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.

The number of the chapter is indicated by the first digit of the page number.

The second digit of the page number is the sequence numbering.

If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

A digit behind the page number indicates that it concerns a supplementary page.

A replacement page is indicated by a letter behind the page number.

### Example

3-6 is page 6 of chapter 3

3-6-1 is a supplementary page behind page 3-6

3-6-a is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

All pages are provided with a date of issue.

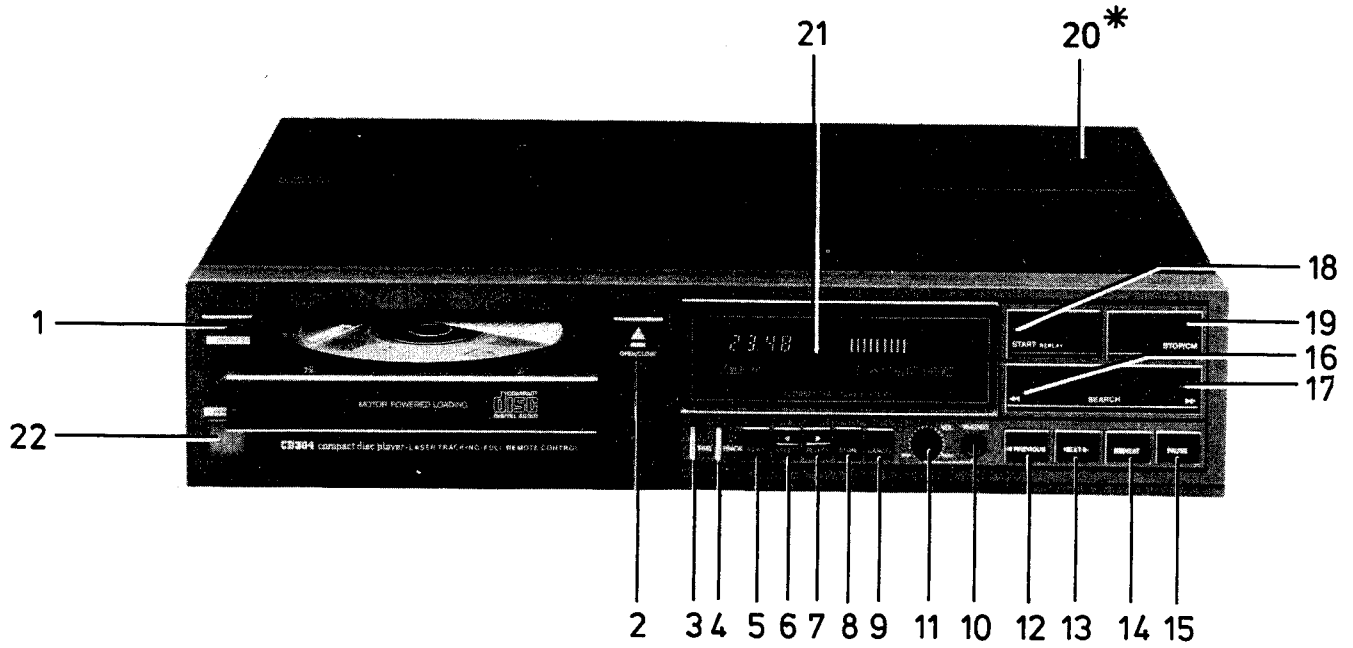
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2. CONTROLS



1	ON/OFF	SK1	12	PREVIOUS	SK4
2	OPEN/CLOSE	SK15	13	NEXT	SK10
3	TIME	SK12	14	REPEAT	SK18
4	TRACK	SK5	15	PAUSE	SK9
5	SCAN	SK13	16	SEARCH REVERSE	SK19
6	SELECT down	SK6	17	SEARCH FORWARD	SK8
7	SELECT up	SK14	18	START/REPLAY	SK17
8	STORE	SK7	19	STOP/Clear Memory	SK16
9	CANCEL	SK11	20	DIGITAL OUTPUT	BU3
10	Headphone socket	BU1	21	FTD DISPLAY	1051
11	Headphone level potentiometer	3751	22	INPUT IR REMOTE CONTROL	6851

**TECHNICAL SPECIFICATION**

System	: Compact Disc Digital Audio System	• Headphone	
Mains voltages	: 110 V, 127 V, 220 V, 240 V ± 10% (to be changed by changing the transformer connections)	– output voltage	: 0-max. 5.6 Vrms
Mains frequencies	: 50 Hz, 60 Hz (no conversion required)	– output impedance	: ≤ 150 Ω
Power consumption	: ≤ 25 W	• Channel separation	: ≥ 93 dB
Frequency range	: 2 Hz + 20 kHz ± 0.05 dB	• Channel difference	: < 0.6 dB
Output voltage	: 0-max. 2 Vrms	• Overall harmonic distortion	: ≤ 0.003%
Output impedance	: 200 Ω	• Intermodulation-distortion	: ≤ 0.003%
S/N ratio	: ≥ 96 dB	• De-emphasis	: 50 μs or 15 μs (switched by the subcode on the disc)
		• Dimensions (wxhxd)	: 420x92x300 mm (tray closed) : 420x92x450 mm (tray opened)
		• Weight	: approx. 7 kg

The above specifications apply within a frequency range of 20 Hz + 20 kHz

### 3. SERVICING HINTS

In order to prevent loose metal objects from getting in the CD mechanism it will be necessary to see to a clear repair station.

Before the player is being used or serviced, the transportation screws should be removed. These screws have to be reapplied after servicing.

The objective can be cleaned with a blow brush.

For servicing hints for the CD mechanism refer to Service Manual CDM-0 and CDM-1.

Do not loosen any screws other than those mentioned in the hints.

#### 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.

The disc should always bed down well on the turntable.

For this purpose a disc hold-down has been mounted in a bracket of the drawer mechanism.

When the drawer mechanism has to be demounted for repair, a loose hold-down should be employed.

The set can then function normally.

Code number of the disc hold-down is 4822 532 60906.

#### SERVICE AIDS

Service supports	4822 395 30202
Audio performance test disc	4822 397 30085
Disc without local defects,	
Disc with DO failures, black spots	
and finger-prints	4822 397 30096
Screwdriver set TORX	
Set straight	4822 395 50145
Set square	4822 395 50132
Disc hold down	4822 532 60906
7 th order filter	4822 395 30204
IR receiver	4822 212 21449

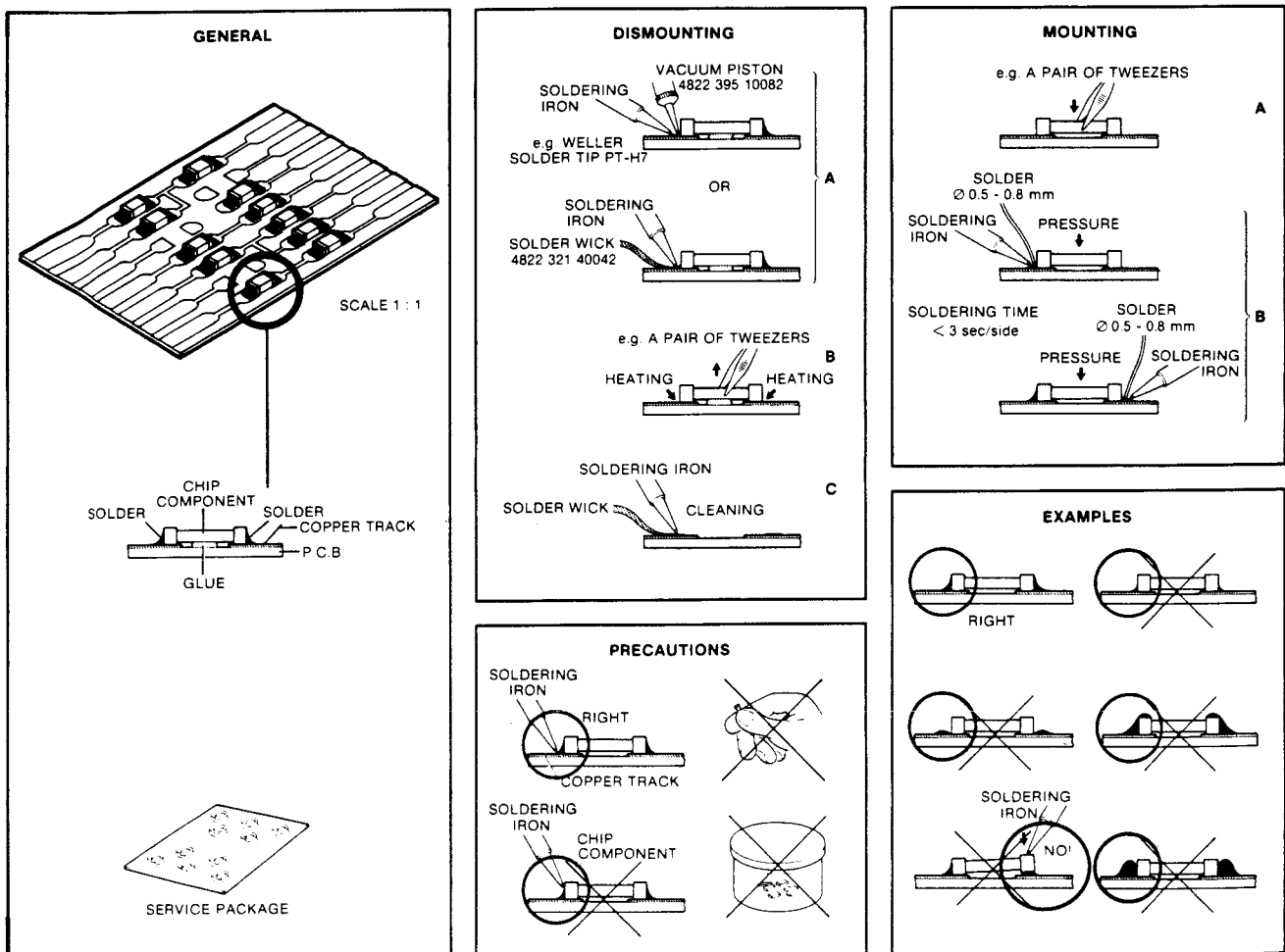


Fig. 2

27 012C12

The servo  $\mu$ P can be set to the servicing mode to check the switch and display PCB and to separately test the servo systems.

#### INITIATING SERVICE LOOP A

- Put a disc on the turntable.
- Simultaneously depress the CANCEL, PREVIOUS and STOP keys.  
Keep these three keys depressed while switching on the mains voltage. In this situation the laser and focus control are operative and the turntable motor is running.  
The light pen remains situated under the lead-in tracks. The radial servo system is switched off.  
In this service loop the display can be checked as follows:
- The display will indicate 01.02, then 02.04, 03.06 and continue in this way up to 20.40. 20.40 is followed again by 00.00, 01.02, etc.  
The indicators SCAN, PAUSE, REPEAT and DISC ERROR will light up and will remain switched on.  
At indication 01.02, bar 1 of the track bar is also driven and at 02.04 bar 2, etc.
- If now the CANCEL key is depressed, the TRACK indication will light up after 2 clock strokes of the display and the DISC ERROR indication will go off.  
The player stays in service loop A.

#### INITIATING SERVICE LOOP B

The player can be brought from service loop A into service loop B by depressing the STORE key. Now the radial servo system has been switched on independently of the P-bit and the sub-code.

The display makes clear that the set is in service loop B by means of **TIME** ABS, REL and TOT.

The player can be brought from service loop B in the PLAY mode by depressing the START/REPLAY key. For adjustments that have to be performed on the lower side for which the unit should be in the position of normal end use, servicing supports are supplied.  
Code number is 4822 395 30202.

These supports can be mounted in the four holes of the frame.

#### DEMOUNTING THE TOP COVER

- Remove the 4 screws in the sides.
- Remove the cover from the set by pulling it backwards.

#### Attention

When mounting the top cover, care should be taken that the top cover is placed correctly in the guidings of the front before mounting the four screws.

#### DEMOUNTING THE BOTTOM PLATE

- Remove the 4 screws in the bottom plate.
- Pick up the bottom plate at the rear of the set and pull it from the 3 fixing bosses at the front of the set.

#### REPLACING GLASS FUSE 1451

- Remove the top cover.
- The fuse on the mains filter PCB can now be reached at the left-hand side of the set via a hole in the mains filter housing.

#### REPLACING THE TRANSFORMER FUSE

- Remove the bottom plate.
- Remove the plastic cap covering the underside of the transformer.
- The transformer fuse is now accessible.
- Replace the screening cap once the fuse has been replaced.

#### SERVICING THE FRONT

##### Demounting the front.

- Remove the top cover.
- Remove the 3 fixing screws at the upper side and the 3 screws at the lower side of the front.
- The front can now be removed from the set by pulling it forwards.
- After loosening various connections and connectors, the front of the set can be removed.

##### Demounting the control and display PCB

- Remove the 9 screws on the control and display PCB.
- The PCB can now be taken away with the headphone PCB still in place.

##### Demounting the headphone PCB

Once the control and display PCB has been taken away, the headphone PCB can be removed.

### SERVICING THE SUPPLY PCB

- Remove the 2 screws B (see Fig. 3a).
- When the connectors have been loosened, the supply PCB can be taken out of the set from the rear.

#### Attention

The Audio cable is soldered to the decoder PCB.

When mounting the supply PCB care should be taken that the PCB falls in the guiding on the frame.

### SERVICING THE SERVO PCB AND THE DECODER PCB (see Fig. 3a)

- Remove the top cover.
- Remove the 2 screws A on the PCB holder.
- When the PCB holder is placed in the service position (see Fig. 4) measurement can be performed on both the servo PCB and the decoder PCB.

### SERVICING THE IR RECEIVER

For practical reasons, it is best to service the IR receiver by means of the trial and error method, with which defects, if any, are traced.

Code number of IR receiver: 4822 212 21449.

After removing the bottom plate, this receiver can be connected via plug 91.

#### Demounting the IR receiver:

- Remove the top cover.
- Remove the loading mechanism
- When clamping spring 555 has been removed, the receiver can be demounted.

Before mounting the new receiver, be sure to first adapt it according to the originally mounted version.

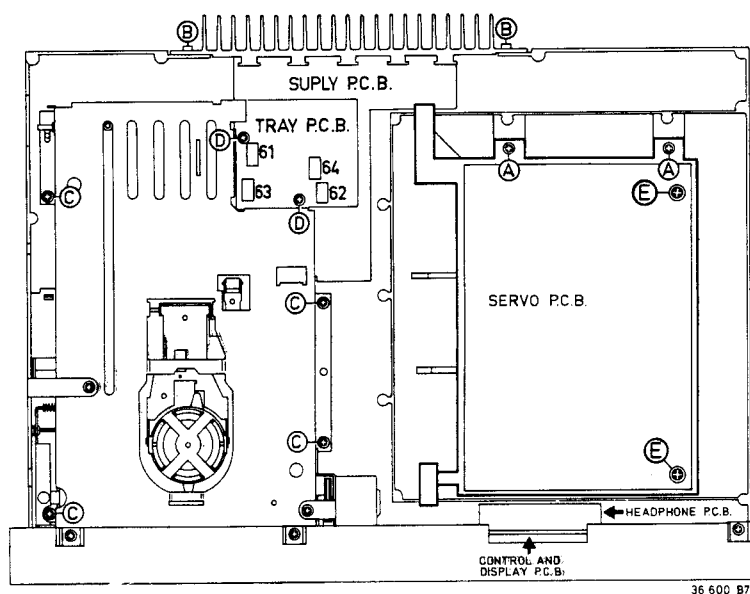


Fig. 3a

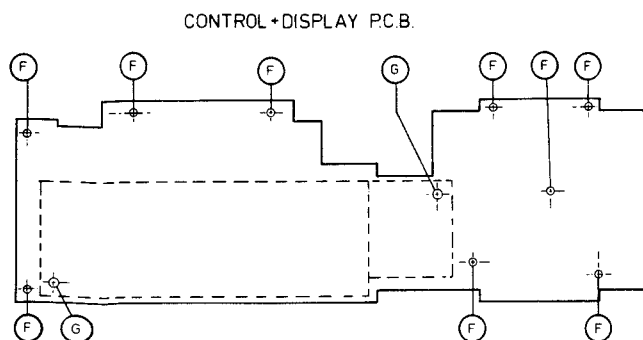


Fig. 3b

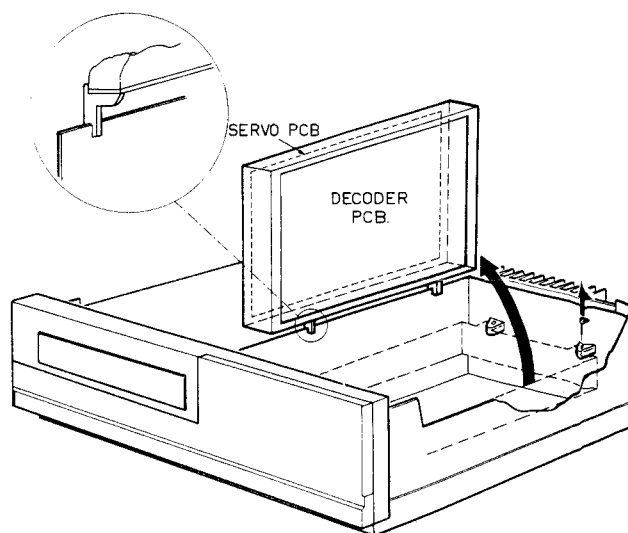


Fig. 4

## SERVICING THE TRAY MECHANISM

### Demounting the tray mechanism

- Remove the top cover.
- Remove the front.
- Remove the 4 screws C (see Fig. 3a).
- Loosen connectors 61 and 64 on the tray control PCB.
- The tray mechanism can now be taken out of the set.
- For repairs the tray mechanism can be made operative outside the set by fixing again connectors 61 and 64 on the drawer control PCB.
- In voltageless condition the drawer can be opened by moving the drawer forward by means of a non-scratching sharp device (for example finger nails) that is placed between front and drawer.

### Attention

If, during a repair, the tray mechanism or the tray control PCB has been demounted, the set will not function. To avoid this the contacts of the tray in-end switch SK2 on the tray control PCB should be interconnected.

### Replacing the disc hold-down

- See: Exploded View Tray.
- Place the disc hold-down (item 107) in its highest position (drawer opened as far as possible).
- The disc hold-down can be loosened by bending the 2 lugs on bracket item 508 apart and taking out the disc hold-down.

### Replacing the tray motor

- See: Exploded View Tray.
- Demount the tray mechanism.
- Remove the belt (item 129) from the motor pulley.
- Remove the 2 screws with item no. 119.
- The motor can now be loosened.

### Demounting the drawer (Item 127) and lifting plate (Item 513) assy

See: Exploded View Tray.

- Demount the tray mechanism.
- Remove motor bracket item 509 by undoing the 3 screws on bracket item 509.
- Remove roller item 108 by loosening the spring ring.
- Slide the tray forward and remove it.



#### 4. MECHANICAL MEASUREMENTS AND ADJUSTMENTS

##### MECHANICAL MEASUREMENTS AND ADJUSTMENTS TO BE PERFORMED ON THE CDM

##### — Height setting of the turntable

In case of adjustment of the height of the turntable by means of the set screw on the motor shaft, the voltage across resistor 3240 on the servo PCB should be set to 0 Volt.

##### — Checking and adjusting the angle setting

For checking and adjusting the angle setting see the Service Manual of C.D.M.

##### Note

For checking and adjusting the angle setting the drawer mechanism has to be demounted. See sub servicing hints.

##### MECHANICAL ADJUSTMENTS OF THE TRAY MECHANISM

##### Adjusting the clearance of the disc (see Fig. 5)

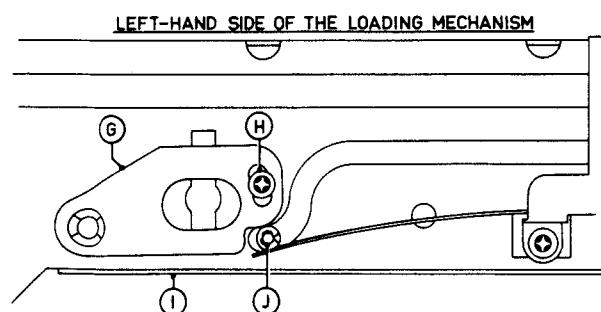


Fig. 5

36013A22

The disc may not rub against the black lifting plate (item 513 of the Exploded View Tray).

In case this should happen, the clearance can be adjusted with adjusting plate G and screw H.

With those the height of axis J of the lifting plate can be adjusted.

The adjustment should be performed with the drawer in position 'CLOSE'.

When screw H is loosened, adjusting plate G can be displaced in so far as this is allowed by the slotted hole of adjusting plate G.

If you can hear the disc rubbing, the adjusting plate should be adjusted.

In practice the disc will be adjusted parallel to edge I of the tray chassis.

##### Adjusting the play of the tray (see Fig. 6)

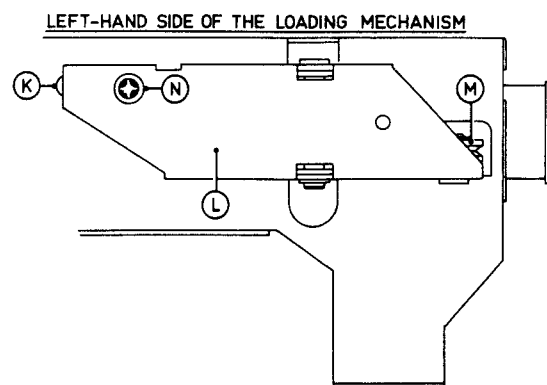


Fig. 6

36014A22

Spiral spring K ensures that bracket L, with wheel M on it, presses against the drawer so that the play of the drawer becomes minimum.

Optimum adjustment is obtained when the distance between screw N and the drawer chassis is adjusted for 0.35 mm.

##### Adjusting the ornamental front of the drawer (see Fig. 7)

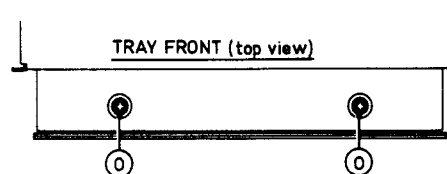


Fig. 7

36012A22

The position of the ornamental front of the drawer relative to the front of the set can be adjusted.

By means of screws O both the height and the position left-right can be adjusted.

**ELECTRICAL MEASUREMENTS AND ADJUSTMENTS**

**Specification measurement**

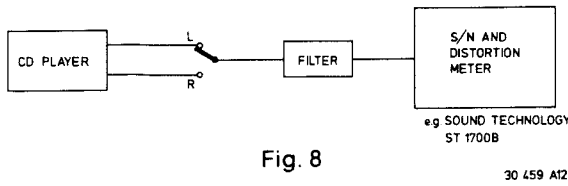


Fig. 8

To measure the specification use can be made of audio test disc 4822 397 30085.

Use a 7th order filter, e.g. 4822 395 30204 (see Fig. 8), to measure:

- Total harmonic distortion (THD).
- Intermodulation distortion.
- Signal-to-noise ratio (S/N).

**Changing the transformer connections**

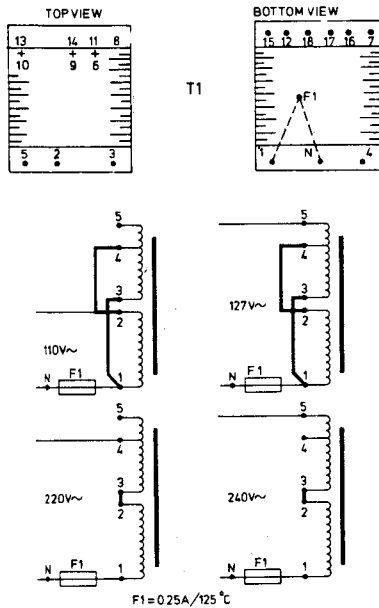


Fig. 9

If the unit has to be connected to a mains voltage deviating from that mentioned on the type plate, the transformer connections should be changed as indicated in the figure.

**Attention**

In case of adaptation to 110 V or 127 V the glass fuse on the mains filter PCB must be changed from 200 mA-T to 400 mA-T.

**Laser power supply (POS. VOLT. SH.)**

For check and preliminary adjustment of the laser supply see Service Manual C.D.M.

**Adjusting the laser supply**

Play track 1 of test disc 4822 397 30096 (disc without defects).

Connect a DC voltmeter across resistor 3308 on the servo PCB (= on emitter of transistor 6239 and ground).

Adjust the laser power supply with resistor 3180 until the voltage across resistor 3308 is  $575 \pm 75$  mV.

**Adjusting the focus bandwidth**

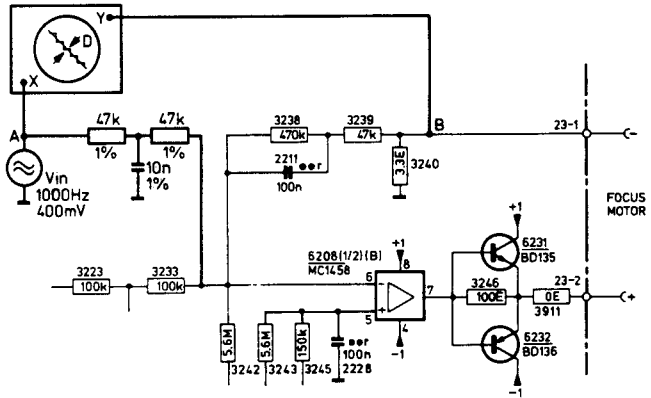


Fig. 10

36028 B12

Make a measuring arrangement according to the figure. Play track 1 of test disc 4822 397 30096 (disc without defects).

Adjust trimming resistor 3158 on PRE. AMPL. + LASER PCB for a 180° phase difference between signals A and B. This corresponds with a minimum distance D in the Lissajous pattern.

R = 47 kΩ - 1% 5322 116 54671

C = 10 nF - 1% 5322 121 54154

**Check of the AGC and offset circuits**

(See SERVO PCB)

Play track 1 of test disc 4822 397 30096 (Disc without defects).

The voltage between pin 1 of IC6212 and ⊥ should be  $-4 V \pm 2 V$ .

The voltage between pin 14 of IC6215 and ⊥ should be  $0 V \pm 2 V$ .



**TRAY**

101	4822 492 51628
102	4822 528 80977
103	4822 276 11277
104	4822 492 63071
105	4822 466 81483
106	4822 492 32396

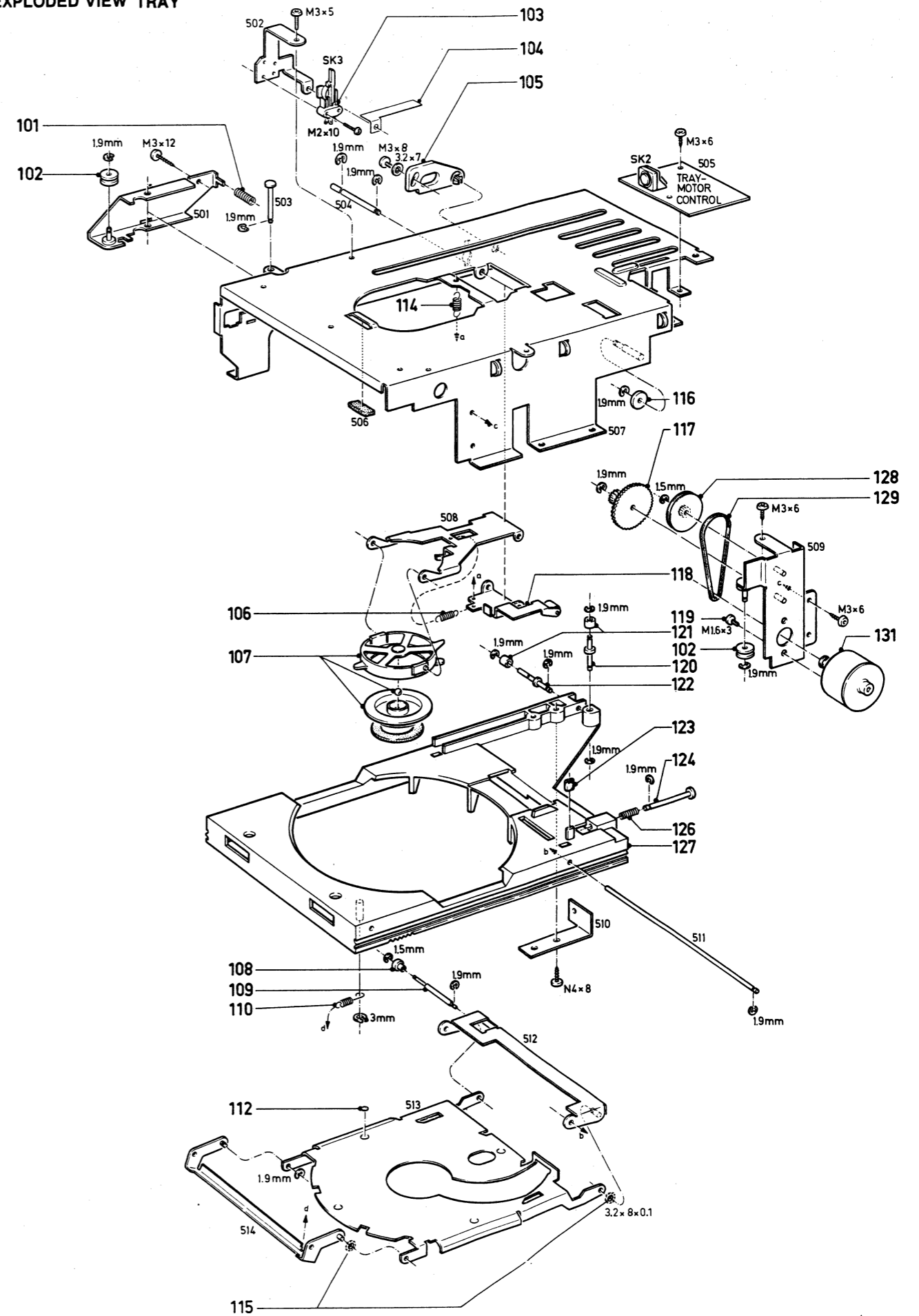
118	4822 402 60909
119	4822 502 11699
120	4822 535 91712
121	4822 532 51521
122	4822 535 91719
123	4822 532 51518
124	4822 535 91711
126	4822 492 51627
127	4822 444 40113
128	4822 528 50177
129	4822 358 30335
131	4822 361 20483

107	4822 528 10511 for C.D.M.-1
108	4822 532 11114
109	4822 535 91709
110	4822 492 32404
112	4822 466 60965
114	4822 492 32395
115	4822 530 80075
116	4822 532 51519
117	4822 522 31777

**Note**

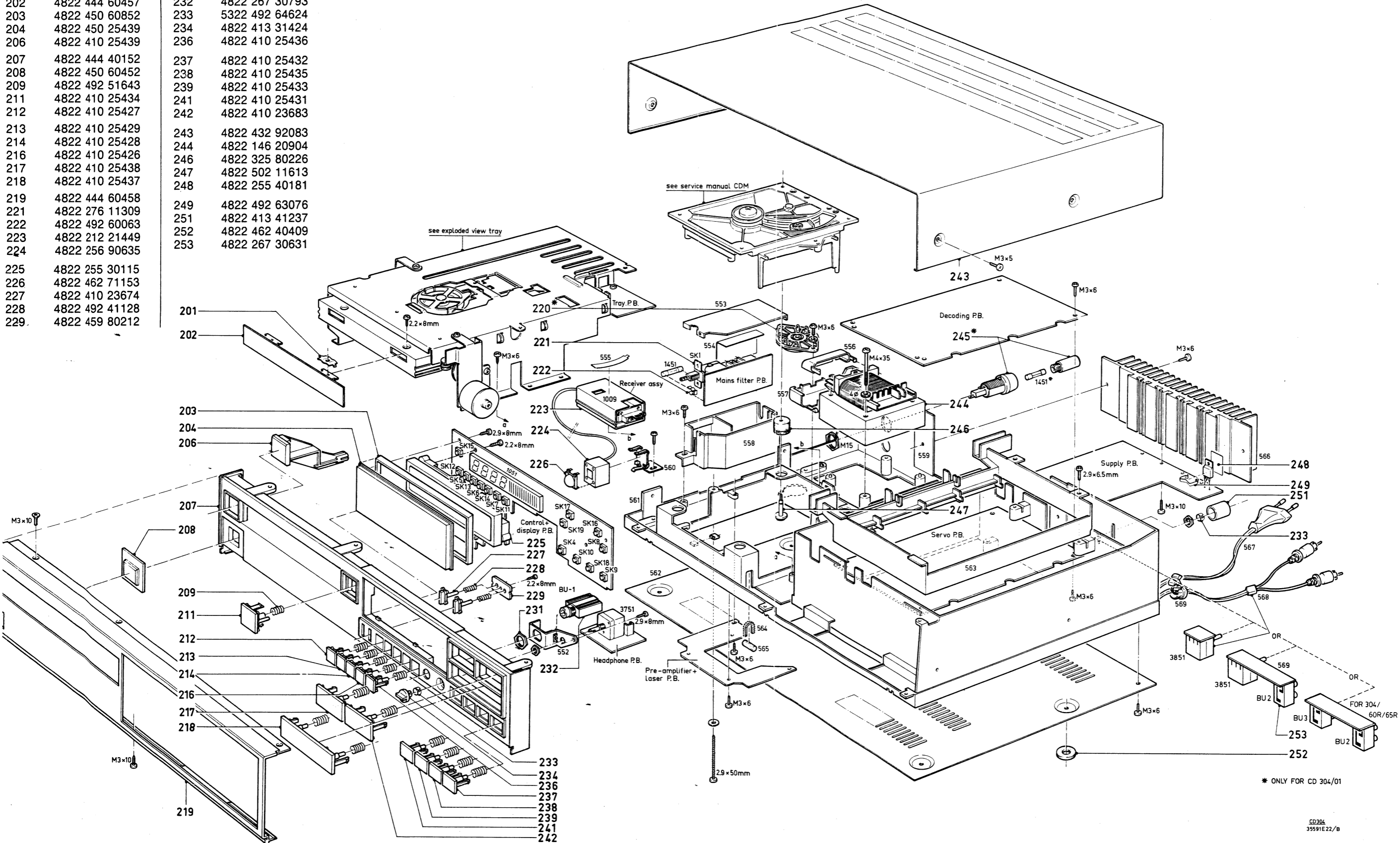
For mechanical parts of the C.D. mechanism see Service Manual C.D.M.-1.

**EXPLODED VIEW TRAY**

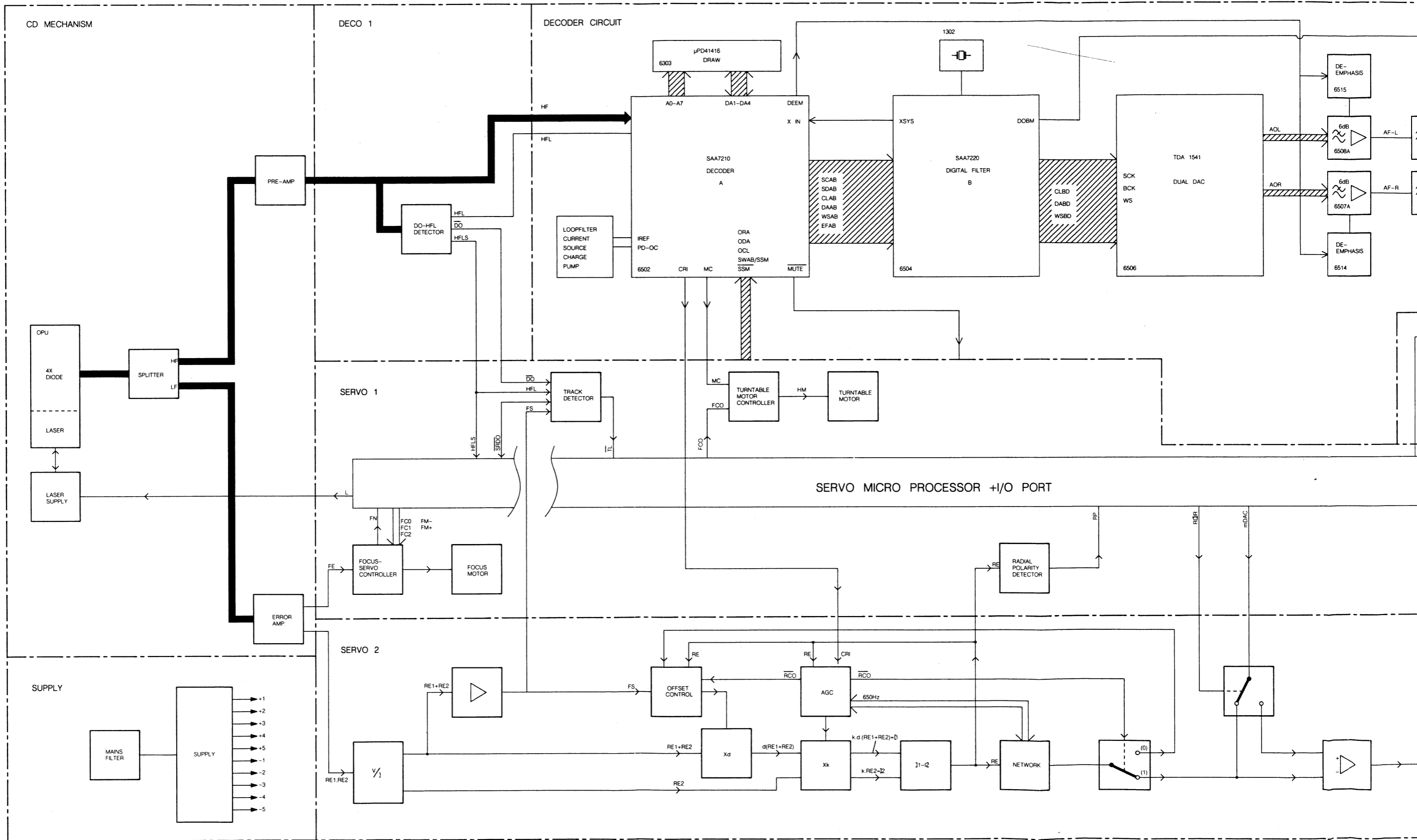


**EXPLODED VIEW CABINET**

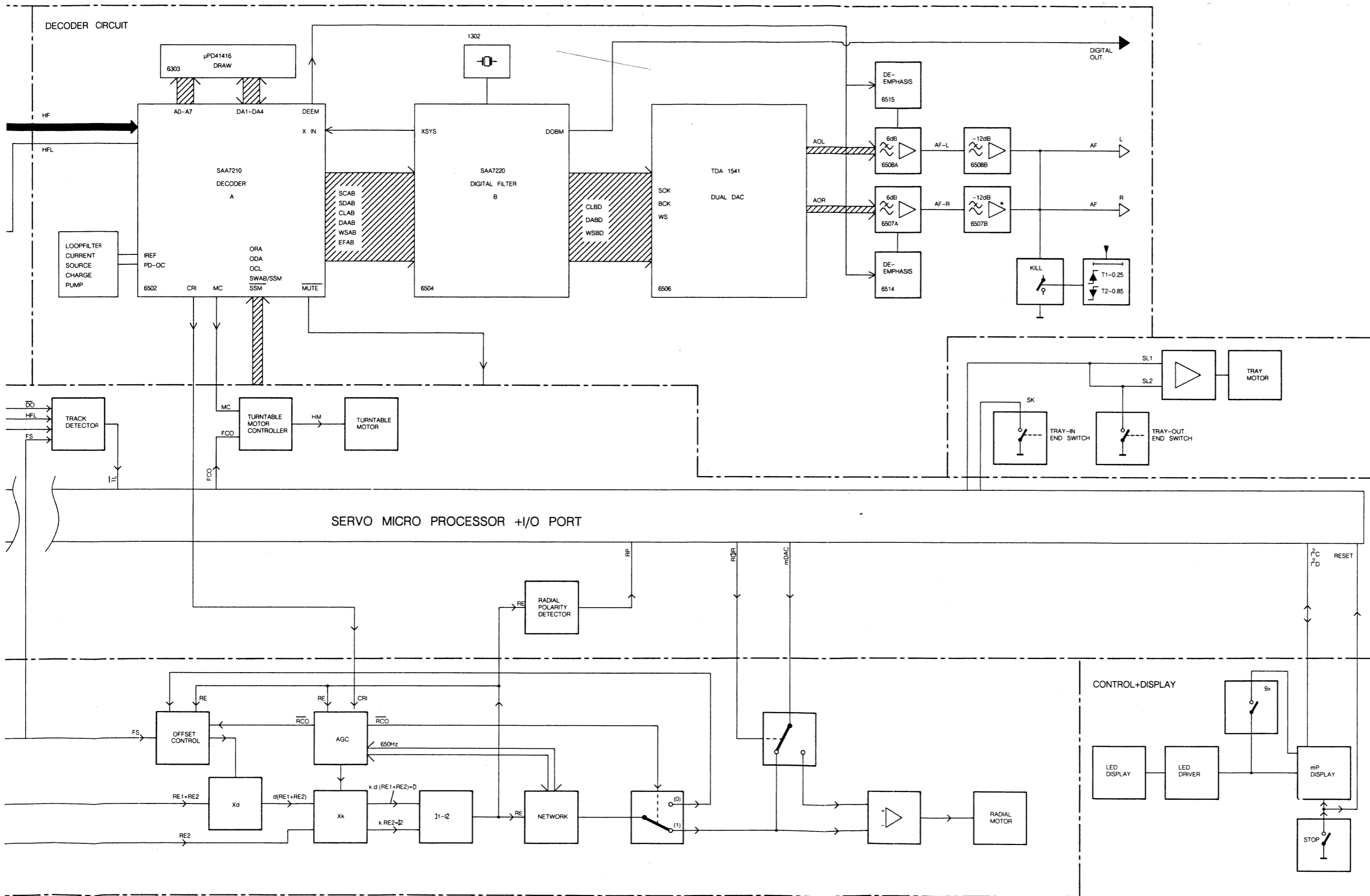
201	4822 492 63038	231	4822 505 10571
202	4822 444 60457	232	4822 267 30793
203	4822 450 60852	233	5322 492 64624
204	4822 450 25439	234	4822 413 31424
206	4822 410 25439	236	4822 410 25436
207	4822 444 40152	237	4822 410 25432
208	4822 450 60452	238	4822 410 25435
209	4822 492 51643	239	4822 410 25433
211	4822 410 25434	241	4822 410 25431
212	4822 410 25427	242	4822 410 23683
213	4822 410 25429	243	4822 432 92083
214	4822 410 25428	244	4822 146 20904
216	4822 410 25426	246	4822 325 80226
217	4822 410 25438	247	4822 502 11613
218	4822 410 25437	248	4822 255 40181
219	4822 444 60458	249	4822 492 63076
221	4822 276 11309	251	4822 413 41237
222	4822 492 60063	252	4822 462 40409
223	4822 212 21449	253	4822 267 30631
224	4822 256 90635		
225	4822 255 30115		
226	4822 462 71153		
227	4822 410 23674		
228	4822 492 41128		
229	4822 459 80212		



BLOCK DIAGRAM CD304/60R/65R



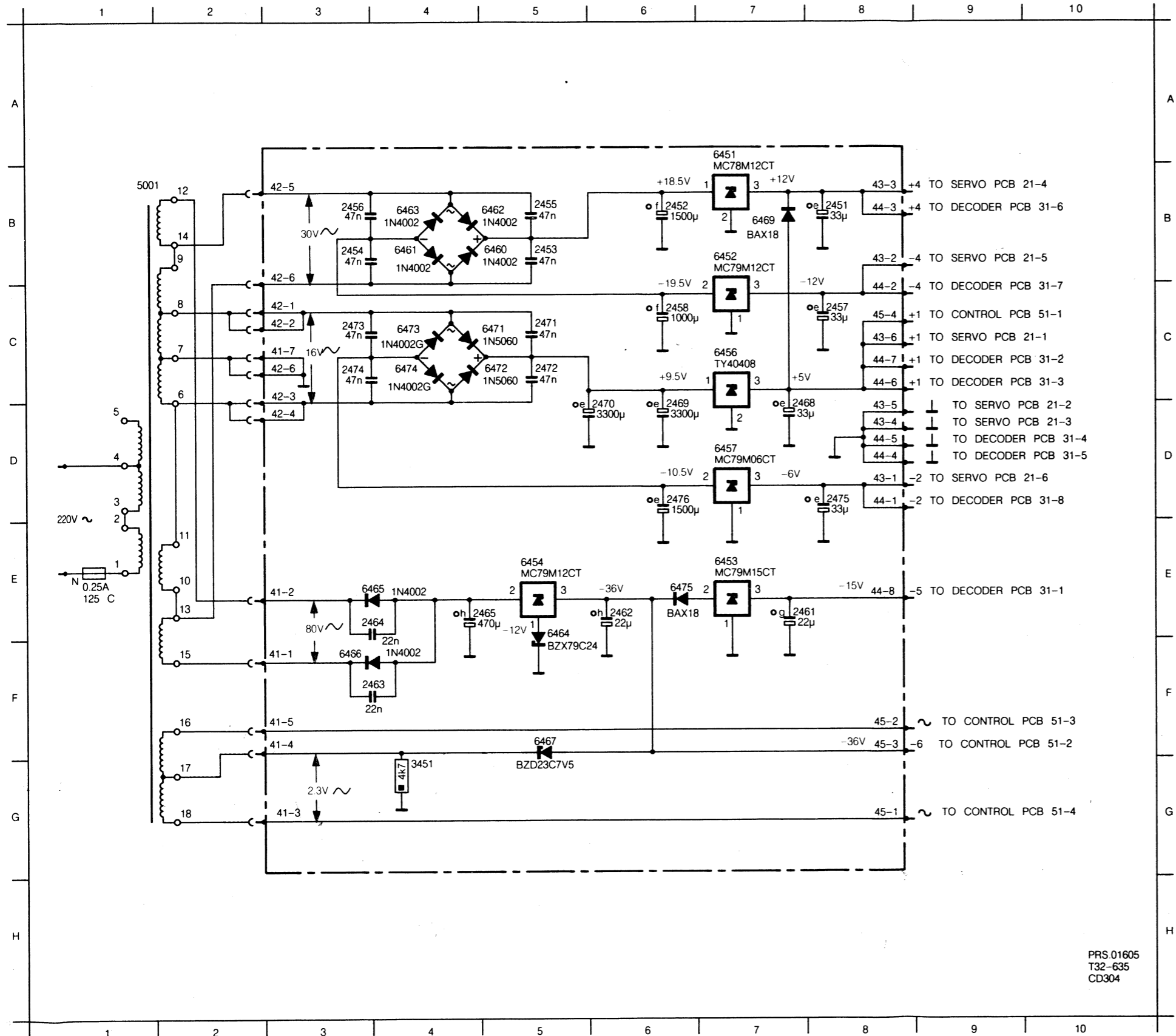
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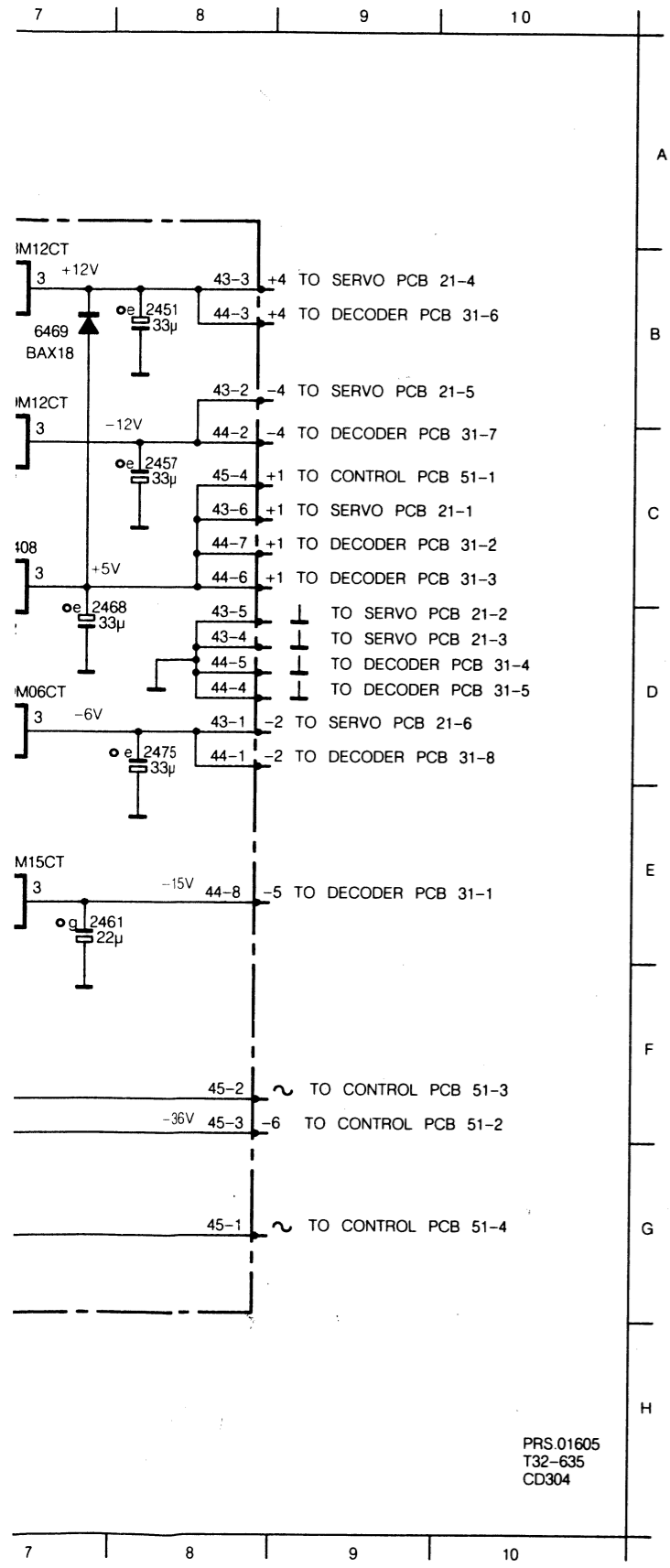
SUPPLY CIRCUIT

2451	B 8	2454	B 3	2457	C 8	2462	E 6	2465	E 5	2470	D 6	2473	C 3	2476	D 6	6461	B 4	6464	E 5	6467	F 5	6472	C 5	6475	E 6
2452	B 6	2455	B 5	2458	C 6	2463	F 4	2468	D 8	2471	C 5	2474	C 3	3451	G 4	6462	B 5	6465	E 4	6469	B 7	6473	C 4		
2453	B 5	2456	B 3	2461	E 8	2464	E 4	2469	D 6	2472	C 5	2475	D 8	6460	B 5	6463	B 4	6466	F 3	6471	C 5	6474	C 4		



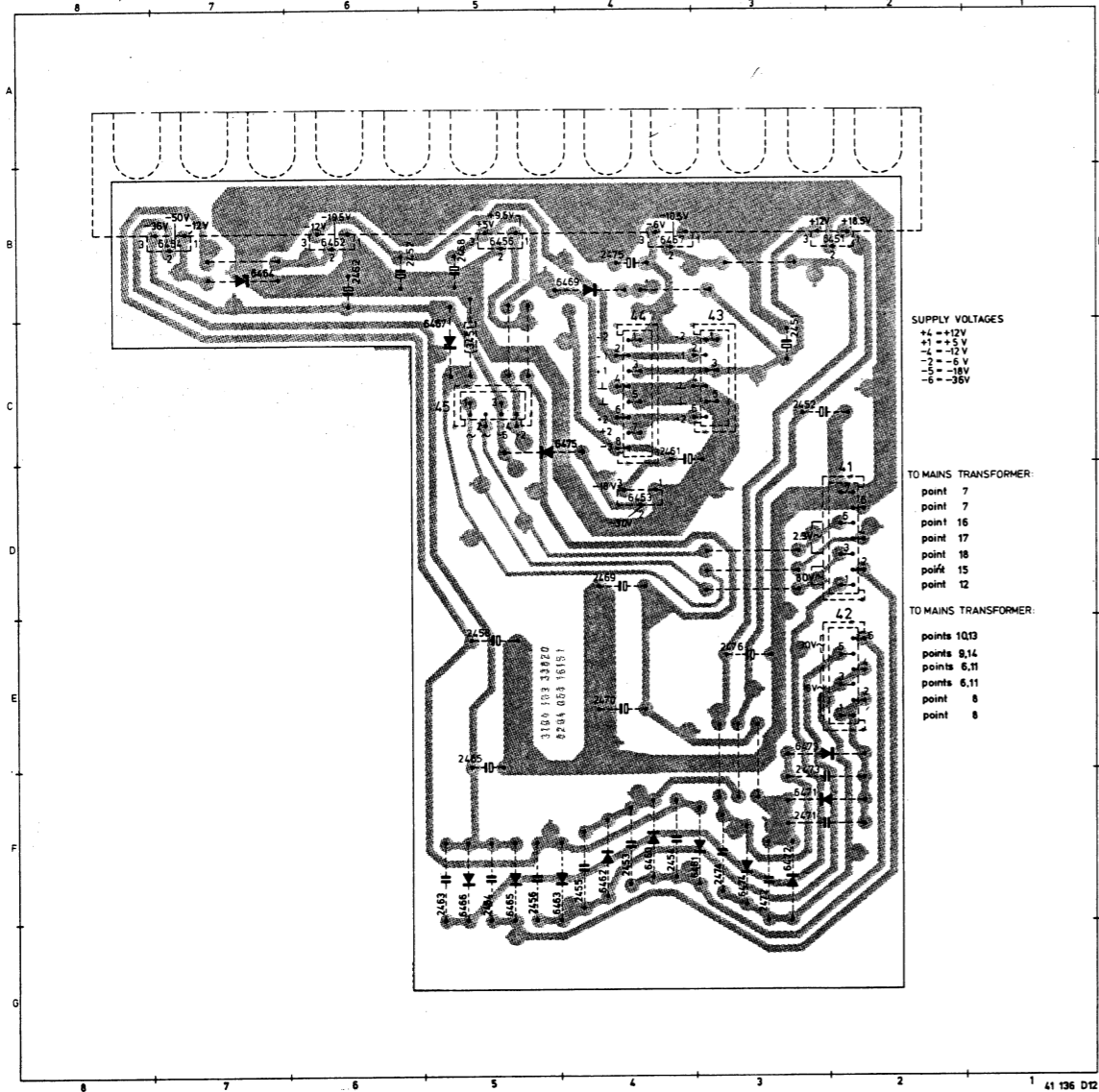
PRS 01605  
T32-635  
CD304

3461 B 4 6464 E 5 6467 F 5 6472 C 5 6475 E 6  
3462 B 5 6465 E 4 6469 B 7 6473 C 4  
3463 B 4 6466 F 3 6471 C 5 6474 C 4



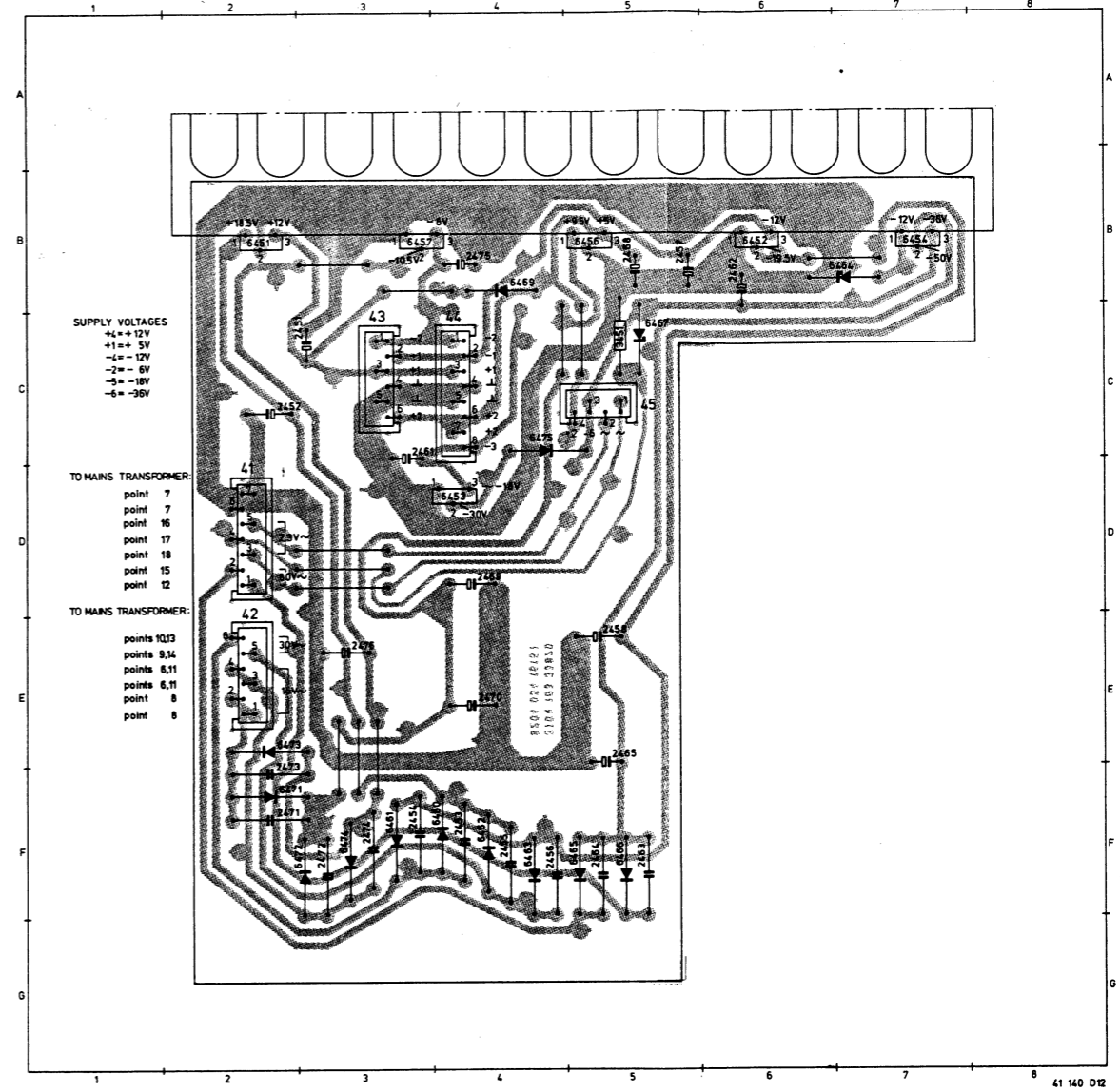
SUPPLY P.C.B.

MARKED B



SUPPLY P.C.B.

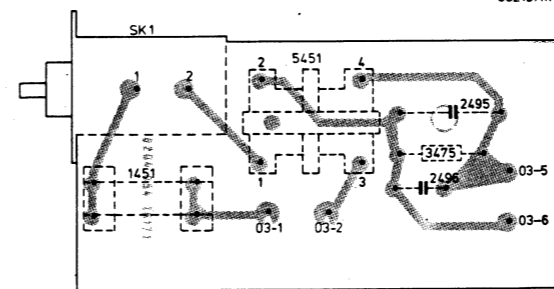
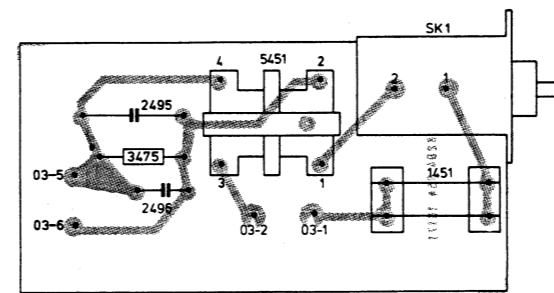
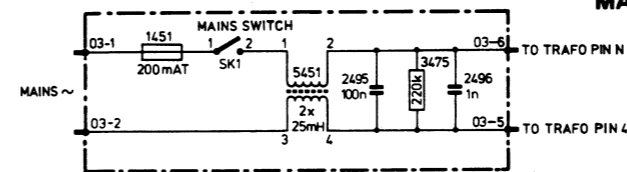
MARKED B



SUPPLY

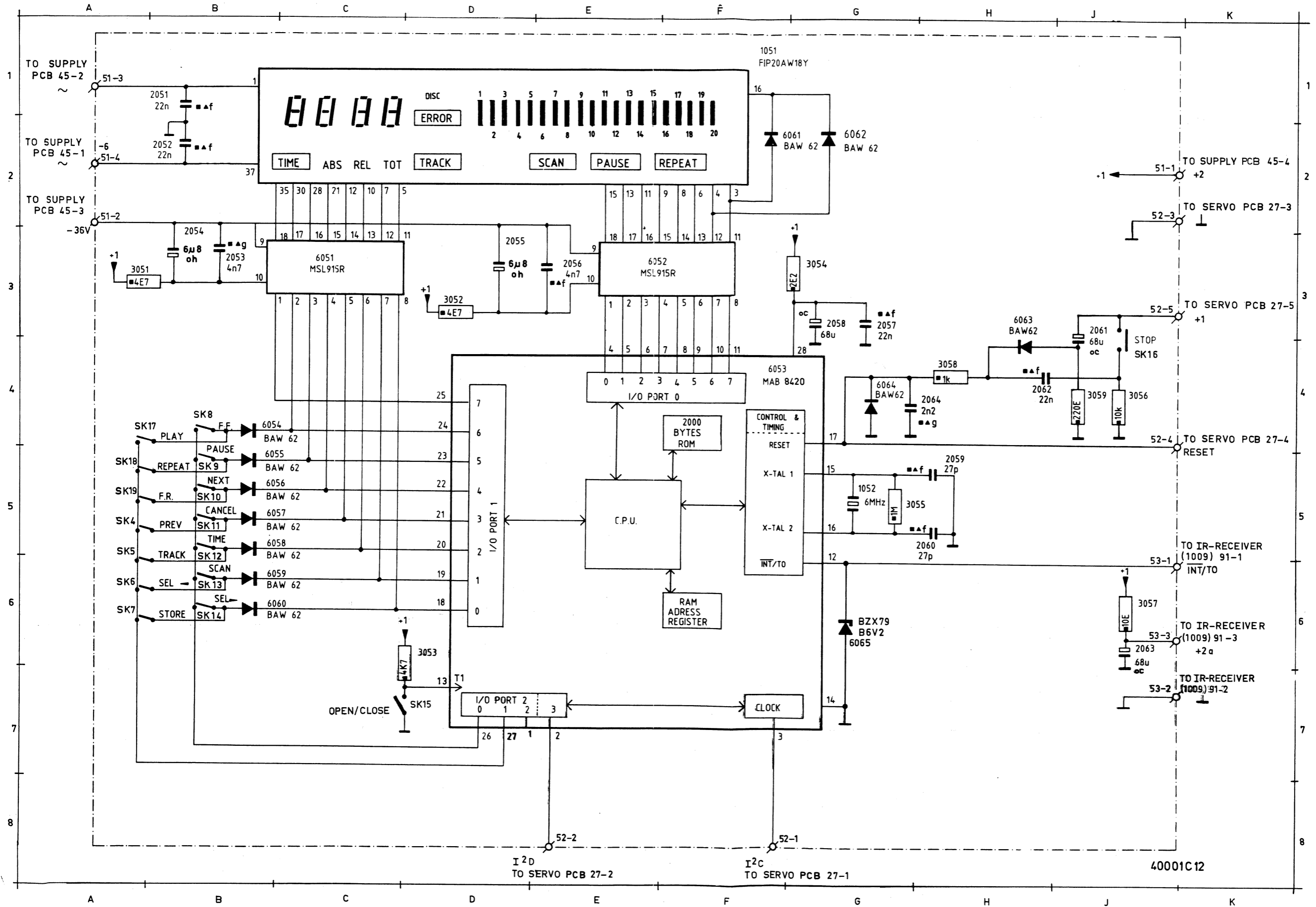
MC78M12CT	5322 209 86176	2453+2456 } 2471+2474 }	47 nF- 50 V 4822 122 10288
MC79M06CT	4822 209 82056	2463,2464	22 nF-100 V 4822 122 10289
MC79M12CT	4822 209 82065	2452	1500 μF- 25 V 4822 124 21471
MC79M15CT	5322 209 86361	2469,2470	3300 μF- 16 V 4822 124 21469
TY40408	MC7805CT selected 4822 209 70425	2458	1000 μF- 25 V 4822 124 40214
		2465,2476	470 μF- 63 V 4822 124 40751
		<b>Miscellaneous</b>	
BAX18	4822 130 34121	Mica washer	4822 255 40181
1N4002G	5322 130 30684	Spring clip	4822 492 63039
1N5060	4822 130 31164	Mains transformer	4822 146 20904
HZ24-2 (24Vo)	4822 130 60378	Transformer fuse 125°C/0.15 A	4822 252 20007
BZD23-C7V5	5322 130 33685		

MAINS FILTER



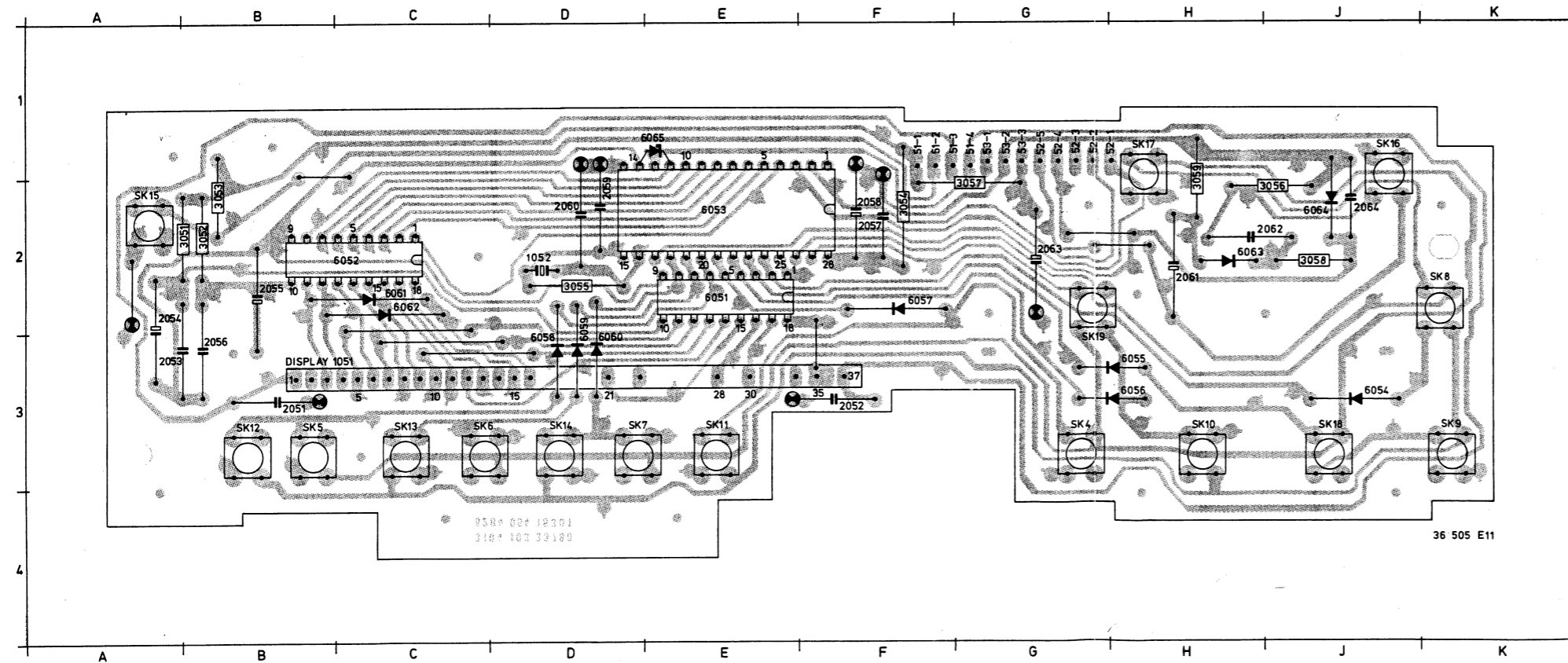
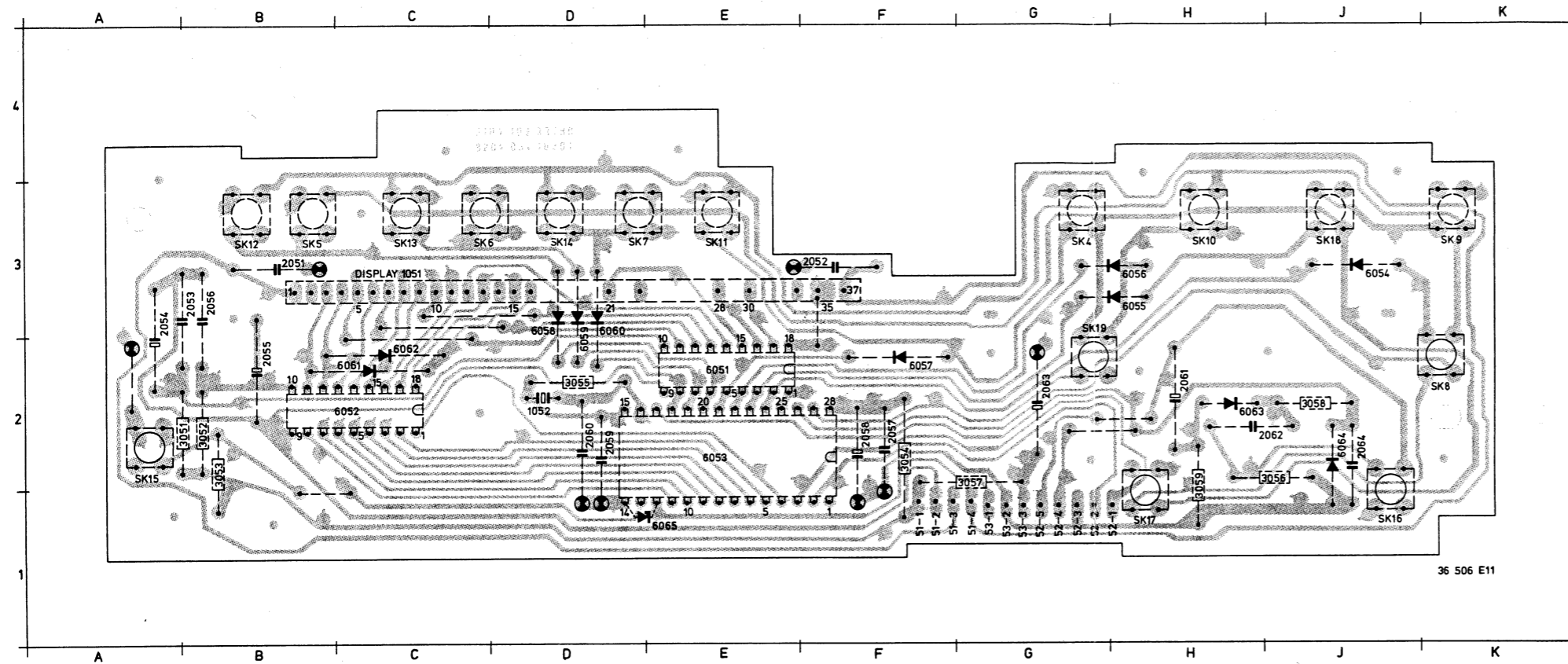
	5451	2x25 mH	4822 157 51576
	2495	100 nF-250 V	5322 121 44302
	2496	1 nF-400 V	4822 122 40368
	3475	220 kΩ-VR 25	5322 116 64114
	1451	220/240 V version: 200 mA 110/127 V version: 400 mA	4822 253 30012 4822 253 30016
<b>Miscellaneous</b>			
		Fuse holder springs	4822 492 60063
		Mains switch SK1	4822 276 11309

6-4  
CONTROL + DISPLAY CIRCUIT





CONTROL + DISPLAY P.C.B.

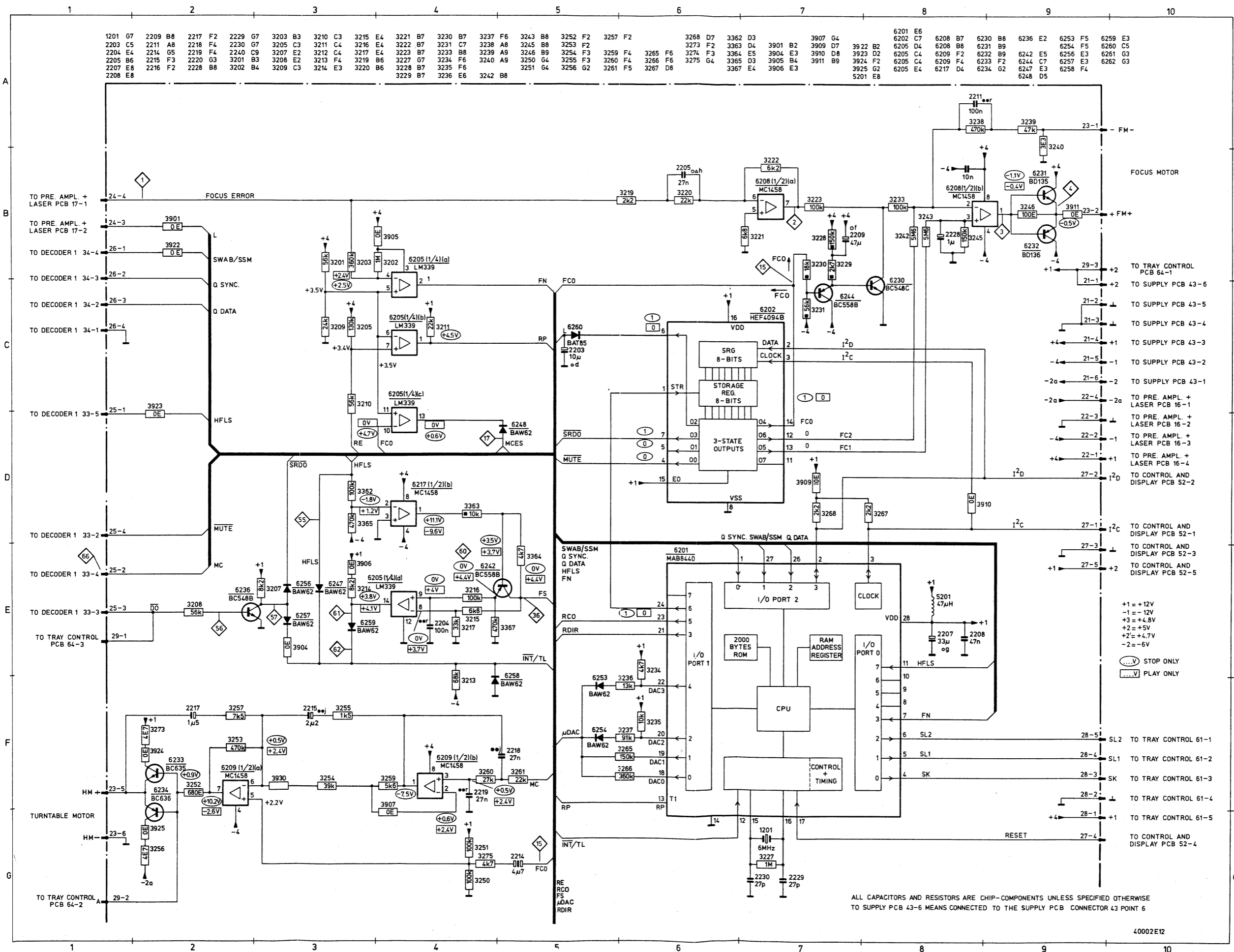


CONTROL AND DISPLAY

MSL915R MAB8420P/C033		5322 209 81493 4822 209 10919
BAW62		4822 130 30613
<b>Display</b>		
1051	FIP20AW18Y	4822 130 90203
1052	X-tal	4822 242 70392
SK3+19	Tact switch	4822 276 11276
BZX79	B6V2	4822 130 34167

SK4	G03	SK9	K03	2053	B03	2058	F02	2063	G02	3054	F02	3059	H02	6055	H03	6060	D03	SK10	H03	SK15	A02
SK5	B03	1051	C03	2054	A02	2059	D02	2064	J02	3055	D02	6051	E02	6056	H03	6061	C02	SK11	E03	SK16	J01
SK6	C03	1052	D02	2055	B02	2060	D02	3051	B02	3056	J02	6052	C02	6057	F02	6062	C02	SK12	B03	SK17	H01
SK7	D03	2051	B03	2056	B03	2061	H02	3052	B02	3057	G02	6053	E02	6058	D03	6063	H02	SK13	C03	SK18	J03
SK8	K02	2052	F03	2057	F02	2062	H02	3053	B02	3058	J02	6054	J03	6059	D03	6064	J02	SK14	D03	SK19	G02

SERVO I

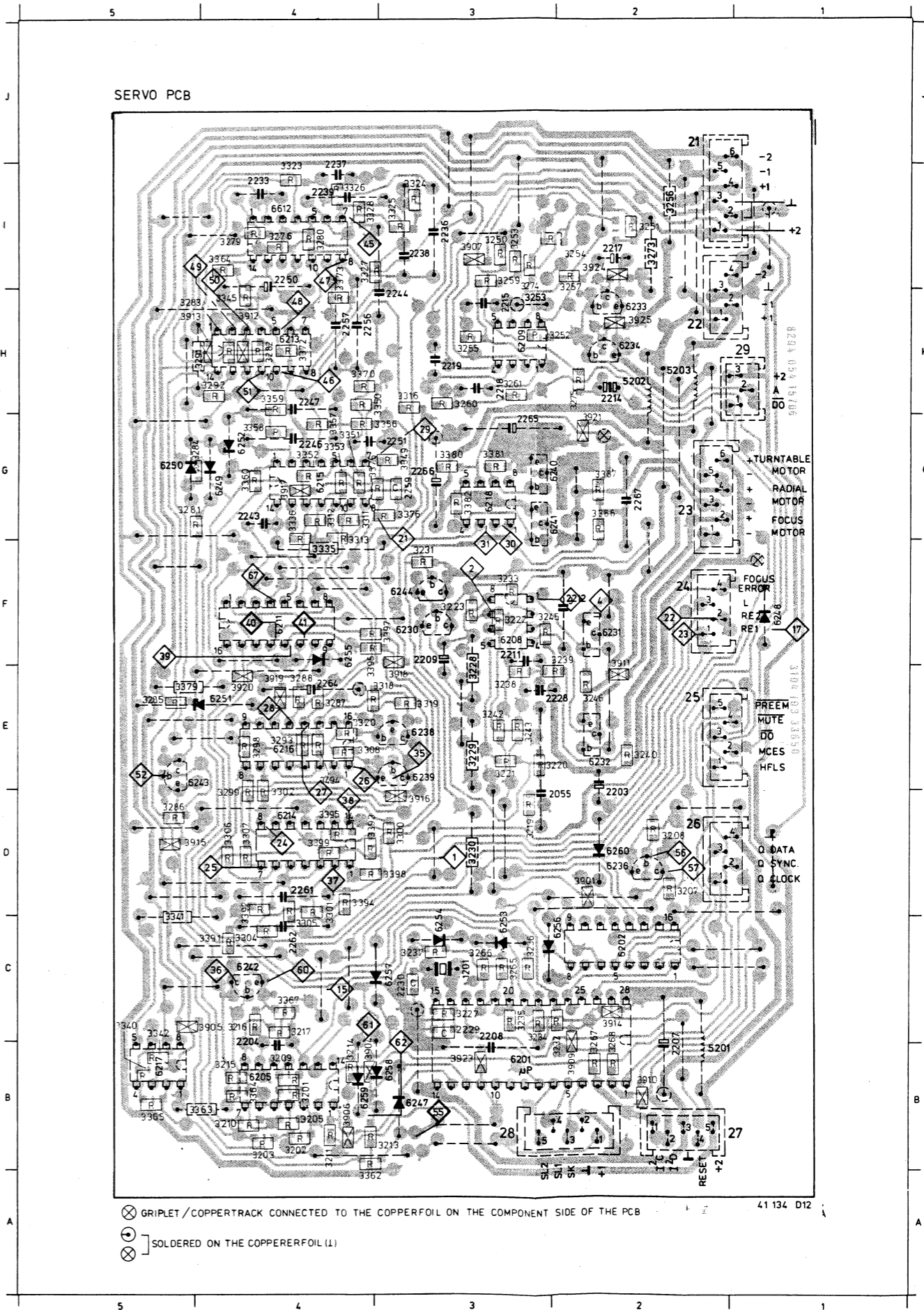


1201	C3	2208	B3	2216	H2	2228	E2	2237	I4	2246	G4	2257	H4	2265	G3	3203	B4	3210	B4
2203	E2	2209	F3	2217	I2	2229	B3	2238	I3	2247	H4	2259	G3	2266	G3	3205	B4	3211	B4
2204	B4	2211	F3	2218	H3	2230	C3	2239	I4	2250	I4	2261	D4	2267	G2	3207	D2	3212	B4
2205	E3	2214	H2	2219	H3	2233	I4	2243	G4	2251	G3	2262	C4	3201	B4	3208	D2	3213	B3
2207	B2	2215	H3	2220	I2	2236	I3	2244	H3	2256	H4	2264	E4	3202	B4	3209	B4	3214	B4
3215	B4	3221	E3	3229	E3	3234	C3	3239	E2	3246	E2	3254	I2	3259	I3	3267	B2	3276	I4
3216	C4	3222	F3	3230	D3	3235	C3	3240	E2	3250	I3	3255	H3	3260	H3	3268	B2	3279	I4
3217	C4	3223	F3	3231	F3	3236	C3	3242	E3	3251	I2	3256	I2	3261	H3	3273	I2	3280	I4
3219	D3	3227	C3	3232	B2	3237	C3	3243	E3	3252	H2	3257	I2	3265	C3	3274	I3	3281	G5
3220	E3	3228	E3	3233	F3	3238	E3	3245	F3	3253	I3	3258	I2	3266	C3	3275	H2	3282	H4
3283	H4	3288	E4	3300	D3	3306	D4	3313	F4	3323	I4	3328	I4	3342	C5	3351	G4	3358	G4
3284	G4	3291	H4	3301	D4	3307	D4	3316	H3	3324	I3	3335	F4	3345	H4	3352	G4	3359	H4
3285	E5	3292	H4	3302	D4	3308	E4	3318	E3	3325	I3	3336	G4	3346	I4	3353	G4	3360	G4
3286	D5	3298	E4	3304	C4	3311	G4	3319	E3	3326	I4	3340	C5	3349	G3	3356	G3	3362	A4
3287	E4	3299	E4	3305	D4	3312	G4	3320	E4	3327	I4	3341	C5	3350	H3	3357	G4	3363	B4
3364	B4	3373	I4	3381	G3	3387	G2	3395	D4	3901	D2	3909	B2	3914	C2	3919	E4	5201	B2
3365	B5	3375	G4	3382	G3	3391	C4	3396	F4	3904	B4	3910	B2	3915	D5	3920	E4	5202	H2
3367	C4	3376	G3	3384	G2	3392	D4	3397	F3	3905	C4	3911	E2	3916	D3	3921	G2	5203	H2
3370	H4	3379	E5	3385	G2	3393	E4	3398	D3	3906	B4	3912	H4	3917	G4	3923	B3	6201	B3
3372	H4	3380	G3	3386	G2	3394	D4	3399	D4	3907	I3	3913	H4	3918	E3	3924	I2	6202	C2
6205	B4	6213	H4	6218	G3	6234	H2	6241	G3	6248	F1	6253	C3	6258	B3				
6208	F3	6214	D4	6230	F3	6236	D2	6242	C4	6249	G4	6254	C3	6259	B4				
6209	H3	6215	G4	6231	F2	6238	E3	6243	E5	6250	G5	6255	F4	6260	D2				
6211	F4	6216	E4	6232	E2	6239	E3	6244	F3	6251	E4	6256	C2	6261	I2				
6212	I4	6217	B5	6233	H2	6240	G3	6247	B3	6252	G4	6257	C3	6262	I3				

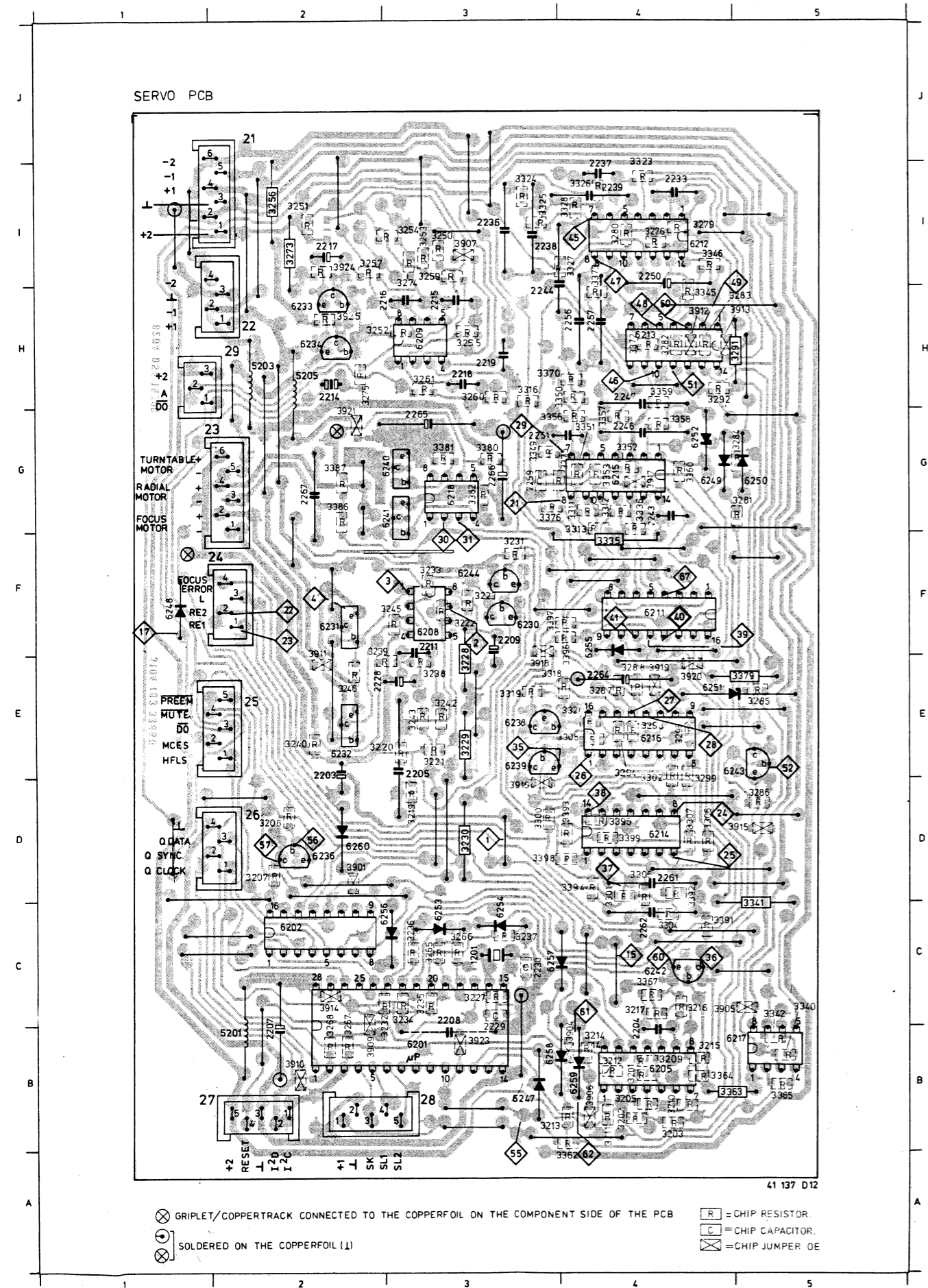
SERVO

HEF40538P	5322 209 14121	2203	10 μF-10 V	4822 124 21314	
HEF4070BP	4822 209 10265	2205	27 nF-63 V-2%	4822 121 50958	
HEF4094BP	5322 209 14485	2217	1.5 μF-25 V	4822 124 20942	
LM324N	4822 209 80587	2228	1 μF-25 V	4822 124 21457	
LM339N	4822 209 80631	2236	5.6 nF-63 V-2%	4822 121 50543	
MAB844P/T016	4822 209 11133	2238			
MC1458N	4822 209 81349	2239	390 pF-630 V-2%	5322 121 54128	
TCA240	4822 209 80629	2244	680 pF-250 V-2%	5322 121 54174	
μA741CN	4822 209 80617	2246			
		2247			
		2257	6.8 nF-63 V-2%	4822 121 50538	
		2261			
		2262			
		2256	1,8 nF-160 V-2%	5322 121 54087	
BC548B	4822 130 40947				
BC548C	4822 130 44196				
BC558B	4822 130 44197				
BC635	5322 130 44349				
BC636	4822 130 44283				
BD135	4822 130 40823				
BD136	4822 130 40824				
BF494	4822 130 44195				
		3256,3273	4E7	4822 111 30499	
		3402,3403	10E	4822 111 30508	
BAT85	4822 130 31983				
BAW62	4822 130 30613				
BZX79-C2V4	4822 130 31253				
BZX79-C5V1	4822 130 34233				
1201	6 Mhz	4822 242 70392			
5201	47 mH	4822 156 20966			

SERVO P.C.B.



SERVO P.C.B.



1201	C3	2208	B3	2216	H2	2228	E2	2237	I4	2246	G4	2257	H4	2265	G3	3203	B4	3210	B4
2203	E2	2209	F3	2217	I2	2229	B3	2238	I3	2247	H4	2259	G3	2266	G3	3205	B4	3211	B4
2204	B4	2211	F3	2218	H3	2230	C3	2239	I4	2250	I4	2261	D4	2267	G2	3207	D2	3212	B4
2205	E3	2214	H2	2219	H3	2233	I4	2243	G4	2251	G3	2262	C4	3201	B4	3208	D2	3213	B3
2207	B2	2215	H3	2220	I2	2236	I3	2244	H3	2256	H4	2264	E4	3202	B4	3209	B4	3214	B4
3215	B4	3221	E3	3229	E3	3234	C3	3239	E2	3246	E2	3254	I2	3259	I3	3267	B2	3276	I4
3216	C4	3222	F3	3230	D3	3235	C3	3240	E2	3250	I3	3255	H3	3260	H3	3268	B2	3279	I4
3217	C4	3223	F3	3231	F3	3236	C3	3242	E3	3251	I2	3256	I2	3261	H3	3273	I2	3280	I4
3219	D3	3227	C3	3232	B2	3237	C3	3243	E3	3252	H2	3257	I2	3265	C3	3274	I3	3281	G5
3220	E3	3228	E3	3233	F3	3238	E3	3245	F3	3253	I3	3258	I2	3266	C3	3275	H2	3282	H4
3283	H4	3288	E4	3300	D3	3306	D4	3313	F4	3323	I4	3328	I4	3342	C5	3351	G4	3358	G4
3284	G4	3291	H4	3301	D4	3307	D4	3316	H3	3324	I3	3335	F4	3345	H4	3352	G4	3359	H4
3285	E5	3292	H4	3302	D4	3308	B3	3318	E3	3325	I3	3336	G4	3346	I4	3353	G4	3360	G4
3286	D5	3298	E4	3304	C4	3311	G4	3319	E3	3326	I4	3340	C5	3349	G3	3356	G3	3362	A4
3287	E4	3299	D4	3305	D4	3312	G4	3320	E4	3327	I4	3341	C5	3350	H3	3357	G4	3363	B4
3364	B4	3373	I4	3381	G3	3387	G2	3395	D4	3901	D2	3909	B2	3914	C2	3919	E4	5201	B2
3365	B5	3375	G4	3382	G3	3391	C4	3396	F4	3904	B4	3910	B2	3915	D5	3920	E4	5202	H2
3367	C4	3376	G3	3384	G2	3392	D4	3397	F3	3905	C4	3911	E2	3916	D3	3921	G2	5203	H2
3370	H4	3379	E5	3385	G2	3393	E4	3398	D3	3906	B4	3912	H4	3917	G4	3923	B3	6201	B3
3372	H4	3380	G3	3386	G2	3394	D4	3399	D4	3907	I3	3913	H4	3918	E3	3924	I2	6202	C2
6205	B4	6213	H4	6218	G3	6234	H2	6241	G3	6248	F1	6253	C3	6258	B3				
6208	F3	6214	D4	6230	F3	6236	D2	6242	C4	6249	G4	6254	C3	6259	B4				
6209	H3	6215	G4	6231	F2	6238	E3	6243	E5	6250	G5	6255	F4	6260	D2				
6211	F4	6216	E4	6232	E2	6239	E3	6244	F3	6251	E4	6256	C2	6261	I2				
6212	I4	6217	B5	6233	H2	6240	G3	6247	B3	6252	G4	6257	C3	6262	I3				

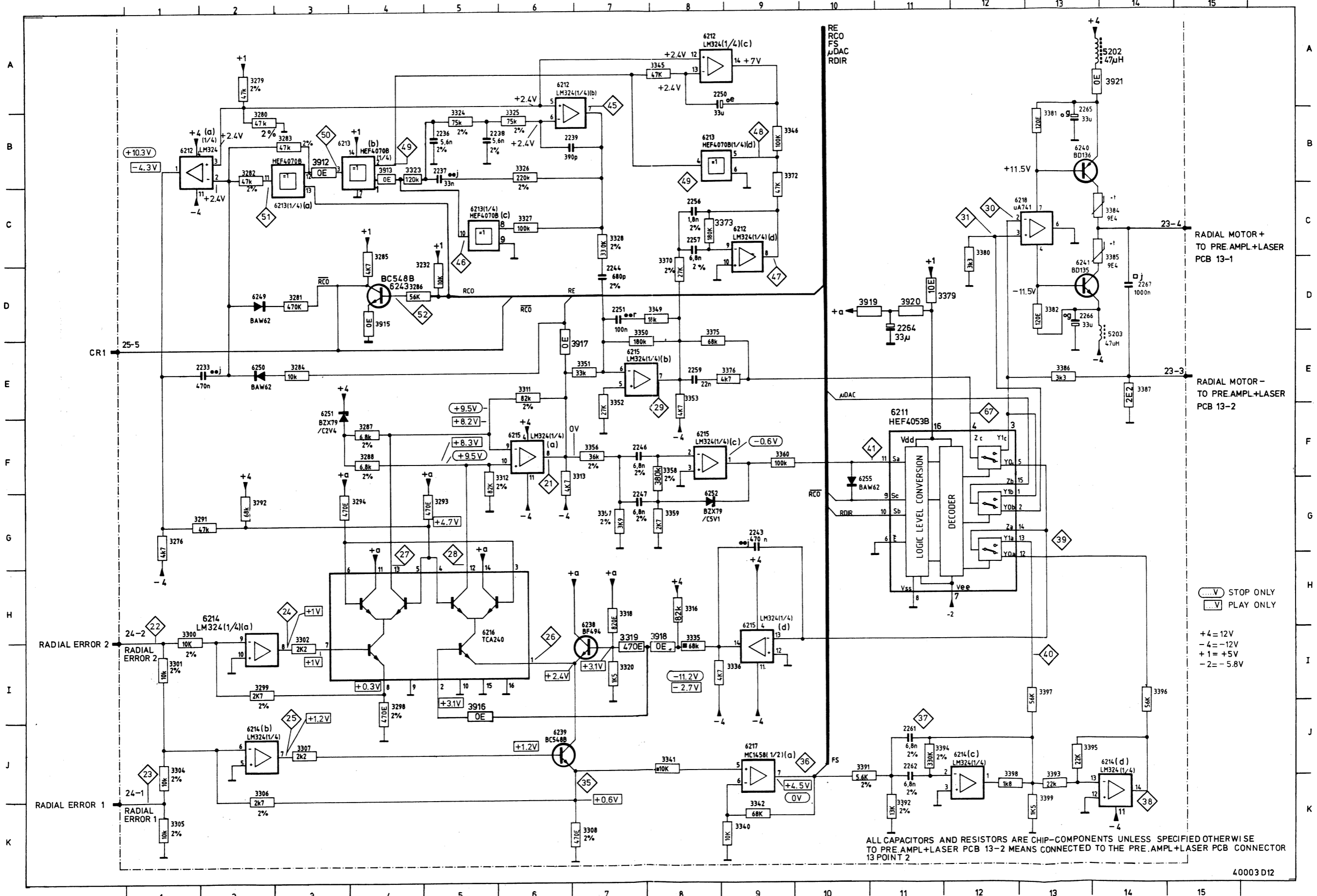
SERVO

	HEF40538P HEF4070BP HEF4094BP LM324N LM339N MAB844P/T016 MC1458N TCA240 μA741CN	5322 209 14121 4822 209 10265 5322 209 14485 4822 209 80587 4822 209 80631 4822 209 11133 4822 209 81349 4822 209 80629 4822 209 80617		2203 2205 2217 2228 2236 2238 2239 2244 2246 2247 2257 2261 2262 2266	10 μF-10 V 27 nF-63 V-2% 1.5 μF-25 V 1 μF-25 V 5.6 nF-63 V-2% 390 pF-630 V-2% 680 pF-250 V-2% 6.8 nF-63 V-2% 1.8 nF-160 V-2%	4822 124 21314 4822 121 50958 4822 124 20942 4822 124 21457 4822 121 50543 5322 121 54128 5322 121 54174 4822 121 50538 5322 121 54087
	BC548B BC548C BC558B BC635 BC636 BD135 BD136 BF494	4822 130 40947 4822 130 44196 4822 130 44197 5322 130 44349 4822 130 44283 4822 130 40823 4822 130 40824 4822 130 44195		3256,3273 3402,3403	4E7 10E	4822 111 30499 4822 111 30508
	BAT85 BAW62 BZX79-C2V4 BZX79-C5V1	4822 130 31983 4822 130 30613 4822 130 31253 4822 130 34233		For chip-components see page 6-18		
	1201	6 Mhz	4822 242 70392		IC	
	5201	47 mH	4822 156 20966		28p	4822 255 40156



SERVO 2

2233 E 2	2246 F 7	2261 J11	3276 G 1	3284 E 3	3293 G 5	3304 J 1	3313 F 6	3324 B 5	3340 K 9	3351 E 7	3360 F 9	3380 C 12	3391 J 10	3398 J 12	6212 C 9	6214 H 2	6216 H 5	6243 D 4	3912 B 3
2236 B 5	2247 G 7	2262 J11	3279 A 2	3285 D 4	3294 G 3	3305 K 1	3316 H 8	3325 B 6	3341 J 8	3352 E 7	3370 D 8	3381 B 13	3392 K 11	3399 K 13	6212 A 8	6214 J12	6217 J 9	6249 D 2	3913 C 4
2237 B 5	2250 A 8			3286 D 4	3298 I 4	3306 K 2	3318 H 7	3327 C 6	3342 K 9	3353 E 8	3372 B 9	3382 D 13	3393 J 13	5202 A 13	6213 B 3	6214 J14	6218 C 13	6250 E 2	
2238 B 5	2251 D 7			3287 F 4	3299 I 2	3307 J 3	3319 I 7	3328 C 7	3345 A 8	3356 F 7	3373 C 8	3384 C 13	3394 J 11	5203 E 13	6213 C 5	6215 H 9	6218 I 7	6251 E 3	3915 D 4
2239 B 6	2256 C 8			3288 F 4	3300 H 1	3308 K 6	3319 I 7	3328 C 7	3346 B 9	3357 G 7	3375 E 8	3385 C 13	3395 J 13	6211 F 11	6213 B 4	6215 F 8	6239 J 6	6252 G 8	3916 I 5
2243 G 9	2257 C 8			3289 B 2	3291 G 2	3301 I 1	3311 E 6	3320 I 7	3349 D 8	3358 F 8	3376 E 9	3386 E 13	3396 I 14	6212 A 6	6213 B 8	6215 F 6	6240 B 13	6255 F 10	3917 E 6
2244 D 7	2259 E 8	3232 D 5	3283 B 3	3292 G 2	3302 I 3	3312 F 5	3323 B 4	3336 I 8	3350 E 7	3359 G 8		3387 E 14	3397 I 13	6212 B 1	6214 J 2	6215 F 7	6241 D 13		3918 I 8

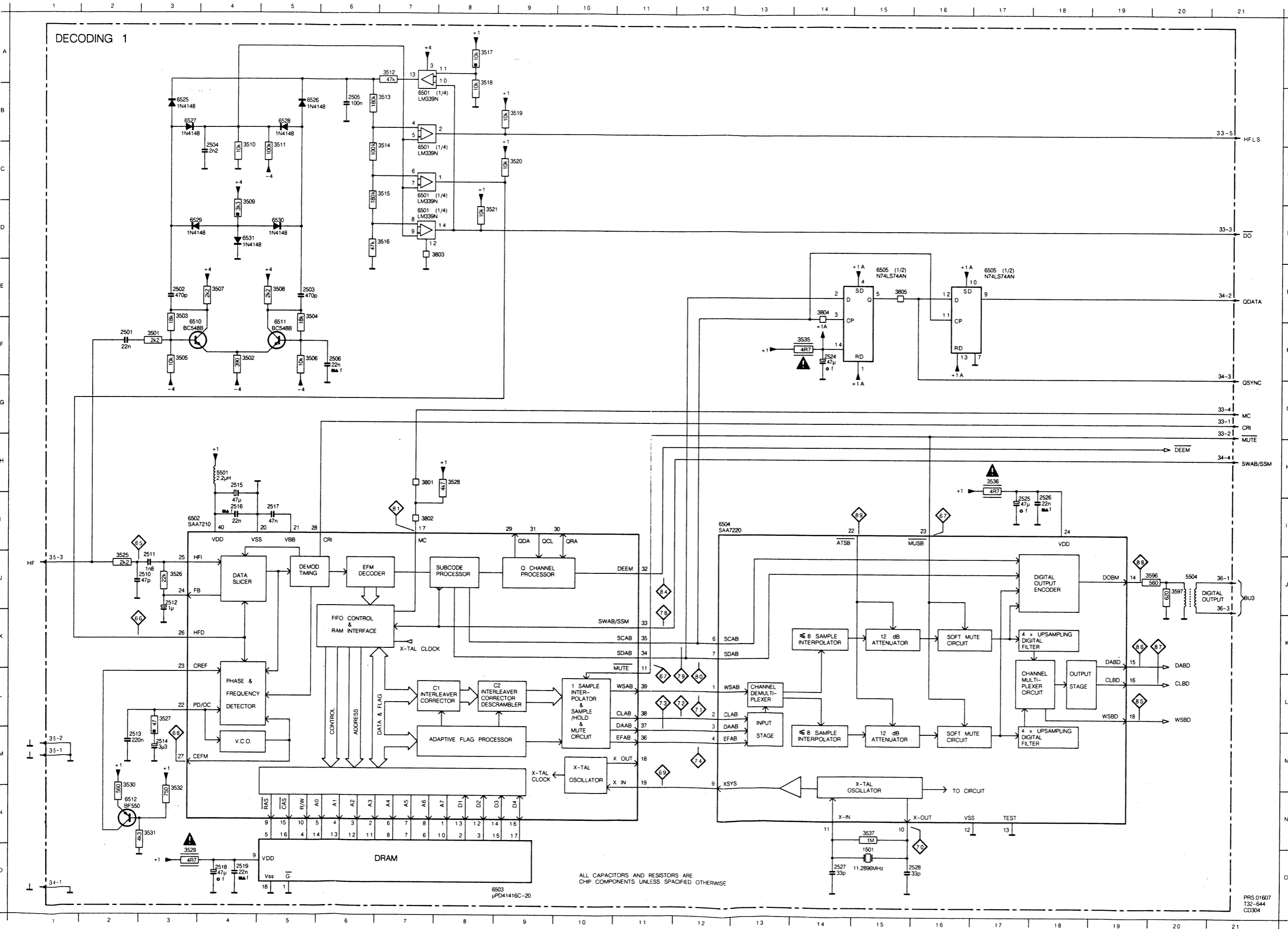


STOP ONLY  
 PLAY ONLY  
  
 +4 = 12V  
 -4 = -12V  
 +1 = +5V  
 -2 = -5.8V

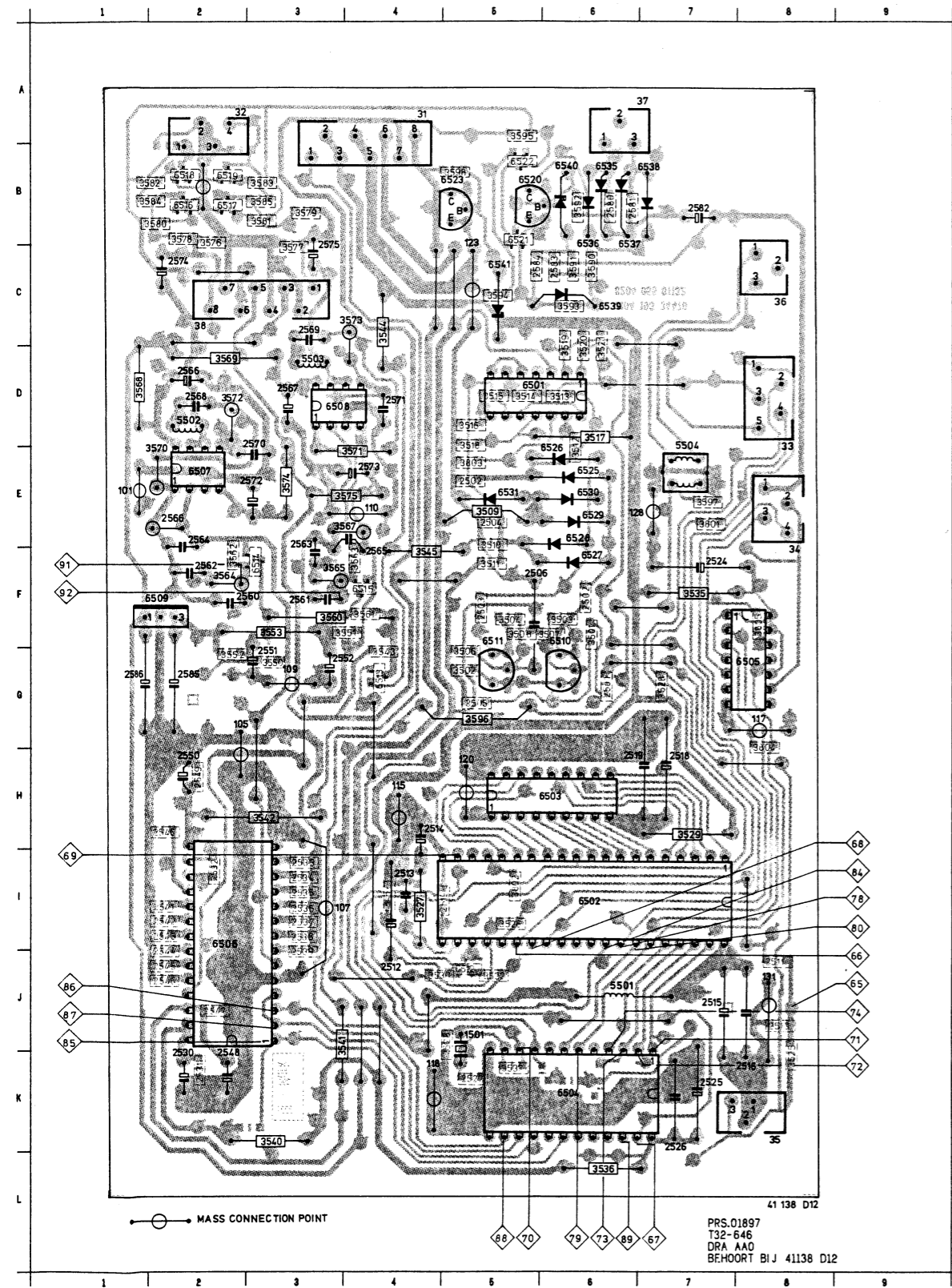
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS UNLESS SPECIFIED OTHERWISE TO PRE-AMPL+LASER PCB 13-2 MEANS CONNECTED TO THE PRE-AMPL+LASER PCB CONNECTOR 13 POINT 2

40003 D12

1501 O15 2503 E 5 2506 F 6 2512 J 3 2515 H 4 2518 O 4 2525 I 17 2528 O16 3503 E 3 3506 F 5 3509 D 4 3512 A 7 3515 C 7 3518 A 8 3521 D 8 3527 L 3 3530 M 2 3535 F14 3596 J20 3802 I 7 3805 E15 6501 B 7 6501 D 7 6504 I 12 6510 F 3 6525 B 3 6528 B 5 6531 D 4  
 2501 F 2 2504 C 4 2510 M 2 2516 I 4 2519 O 4 2526 I 18 3501 F 3 3504 F 5 3507 E 4 3510 C 4 3513 B 7 3516 D 7 3519 B 9 3525 J 2 3528 H 8 3531 N 3 3536 H17 3597 J20 3803 D 8 5501 H 4 6501 C 7 6502 I 3 6505 E15 6511 F 5 6526 B 5 6529 D 3  
 2502 E 3 2505 B 6 2511 J 3 2514 M 3 2517 I 5 2524 F14 2527 O14 3502 F 4 3505 F 5 3508 E 5 3511 C 5 3514 C 7 3517 A 8 3520 C 9 3526 J 3 3529 O 3 3532 N 3 3537 N15 3801 H 7 3804 E14 5504 J20 6501 C 7 6503 O 9 6505 E17 6512 N 2 6527 B 3 6530 D 5







- 1501 J 5
- 2501 G 6
- 2502 E 5
- 2503 F 6
- 2504 F 5
- 2505 E 5
- 2506 F 5
- 2507 J 8
- 2508 I 4
- 2509 H 4
- 2510 J 8
- 2511 J 8
- 2512 J 4
- 2513 I 4
- 2514 H 4
- 2515 J 7
- 2516 K 8
- 2517 I 5
- 2518 H 7
- 2519 H 6
- 2520 F 7
- 2521 K 7
- 2522 L 7
- 2523 K 5
- 2524 J 5
- 2525 K 2
- 2526 I 2
- 2527 I 3
- 2528 I 3
- 2529 J 3
- 2530 I 3
- 2531 I 3
- 2532 I 2
- 2533 I 3
- 2534 I 3
- 2535 I 3
- 2536 I 3
- 2537 I 3
- 2538 J 3
- 2539 J 3
- 2540 J 3
- 2541 I 2
- 2542 I 2
- 2543 I 2
- 2544 J 2
- 2545 J 2
- 2546 J 2
- 2547 H 2
- 2548 K 2
- 2549 H 2
- 2550 H 2
- 2551 G 3
- 2552 G 4
- 2553 F 3
- 2554 F 2
- 2555 F 2
- 2556 D 2
- 2557 D 3
- 2558 D 3
- 2559 C 3
- 2560 F 3
- 2561 F 2
- 2562 F 2
- 2563 F 3
- 2564 E 2
- 2565 E 2
- 2566 D 2
- 2567 D 3
- 2568 D 3
- 2569 C 3
- 2570 E 3
- 2571 D 4
- 2572 E 4
- 2573 E 4
- 2574 C 2
- 2575 C 3
- 2576 B 6
- 2577 B 7
- 2578 B 7
- 2579 B 7
- 2580 C 6
- 2581 C 6
- 2582 B 7
- 2583 C 6
- 2584 C 6
- 2585 D 2
- 2586 G 1
- 3501 F 6
- 3502 G 5
- 3503 F 6
- 3504 F 5
- 3505 G 5
- 3506 G 5
- 3507 F 6
- 3508 F 5
- 3509 E 5
- 3510 F 5
- 3511 F 5
- 3512 E 6
- 3513 D 6
- 3514 D 5
- 3515 D 5
- 3516 D 5
- 3517 D 6
- 3518 E 5
- 3519 D 6
- 3520 D 6
- 3521 D 6
- 3522 I 6
- 3523 I 6
- 3524 I 6
- 3525 H 7
- 3526 H 4
- 3527 J 4
- 3528 G 7
- 3529 H 7
- 3530 J 4
- 3531 I 4
- 3532 J 5
- 3533 F 7
- 3534 L 6
- 3535 K 5
- 3536 K 3
- 3537 K 3
- 3540 K 3
- 3541 J 4
- 3542 H 3
- 3543 G 4
- 3544 C 4
- 3545 F 4
- 3550 G 3
- 3551 F 4
- 3552 G 2
- 3553 F 3
- 3554 F 3
- 3555 F 4
- 3556 F 2
- 3557 F 4
- 3558 D 2
- 3559 D 2
- 3560 E 2
- 3561 F 3
- 3562 F 2
- 3563 F 2
- 3564 F 2
- 3565 F 3
- 3566 F 4
- 3567 E 4
- 3568 D 2
- 3569 D 2
- 3570 E 2
- 3571 E 4

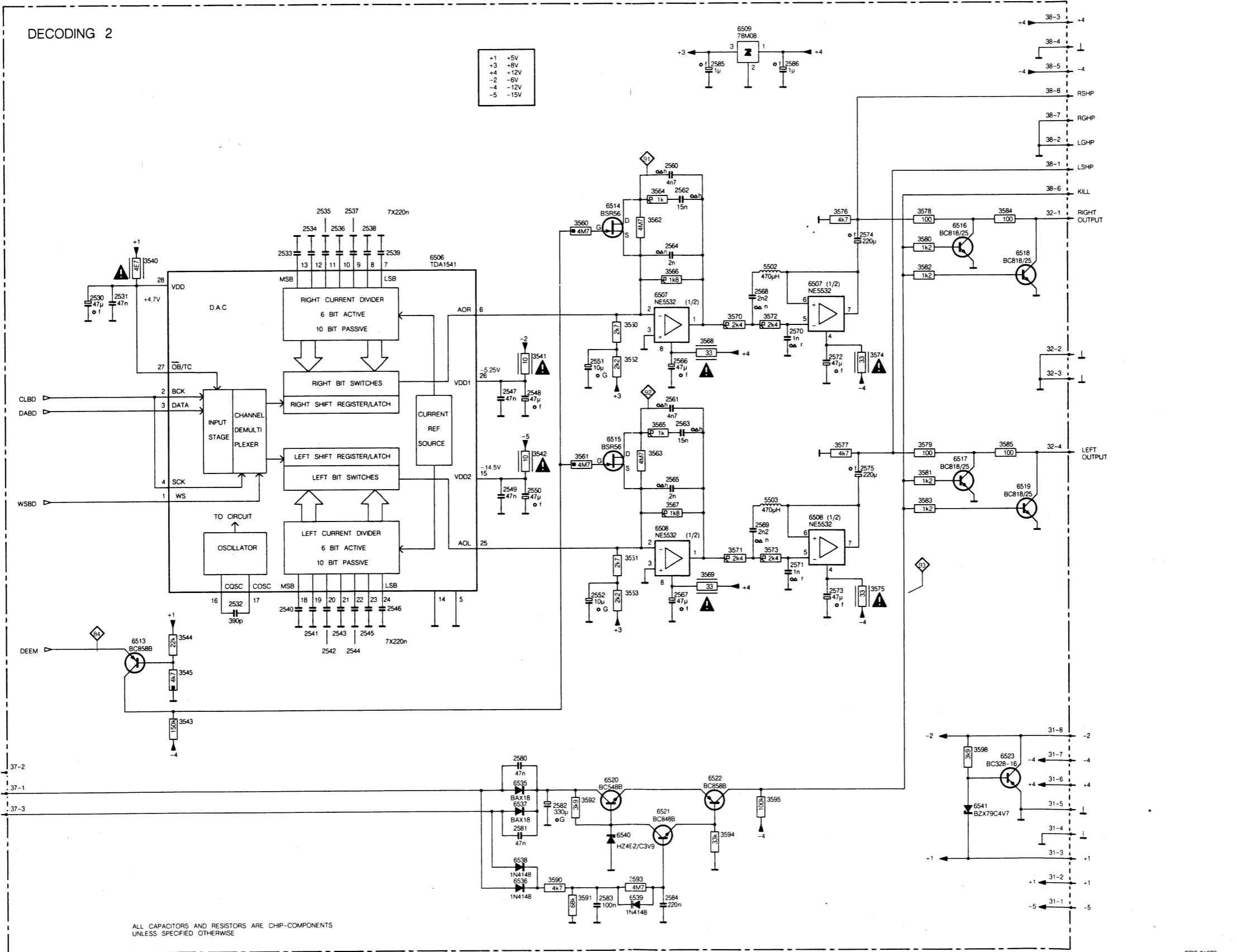
DECODER

SAA7210P/04 SAA7220 TDA1541/N5 μPD41416C N74LS74AN NE5532N MC78M08CT LM339N	4822 209 71001 4822 209 11157 4822 209 70295 4822 209 50582 4822 209 80782 5322 209 86234 4822 209 81713 4822 209 80631	1N4148 BAX18 HZ4B2 (3V9) HZ5B1 (4V1)	4822 130 30621 4822 130 34121 4822 130 32843 4822 130 32986
1501	X-tal 11289.6 kHz		4822 242 71644
BC548B BC858BR BC818-25 BC848B BF550 BSR56 BC858B BC328-16	4822 130 40937 4822 130 42134 4822 130 42696 5322 130 41982 4822 130 42131 4822 130 42633 5322 130 41983 4822 130 41023	5550 } 2.2 μH 5502 } 470 μH 5503 } 5504 } Trafo dig output	4822 157 50963 4822 157 51193 4822 148 80281
		For chip-components see page 6-18	



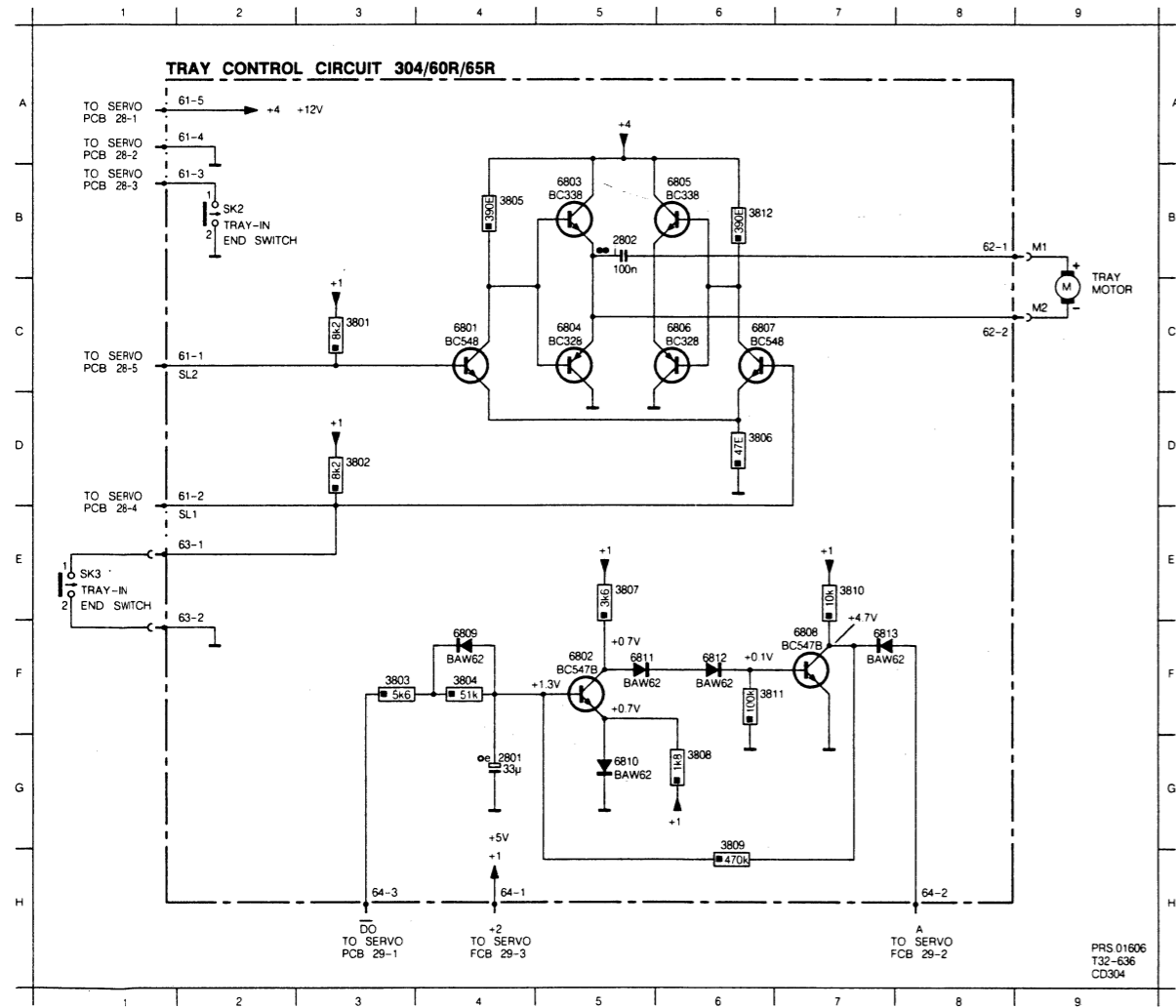
DECODING 2

+1	+5V
+3	+8V
+4	+12V
-2	-6V
-4	-12V
-5	-15V



- 2530 E 3
- 2531 E 3
- 2532 D 5
- 2533 D 5
- 2534 D 6
- 2535 D 6
- 2536 D 6
- 2537 D 7
- 2538 D 7
- 2539 D 7
- 2540 I 5
- 2541 J 6
- 2542 J 6
- 2543 J 6
- 2544 J 6
- 2545 J 7
- 2546 F 7
- 2547 F 9
- 2548 F 9
- 2549 H 9
- 2550 H 9
- 2551 F 10
- 2552 I 10
- 2553 C 11
- 2554 F 11
- 2555 D 11
- 2556 G 11
- 2557 D 11
- 2558 H 11
- 2559 F 11
- 2560 I 11
- 2561 E 12
- 2562 H 12
- 2563 I 12
- 2564 I 13
- 2565 D 14
- 2566 G 14
- 2567 K 9
- 2568 L 9
- 2569 M 10
- 2570 M 10
- 2571 M 11
- 2572 F 13
- 2573 I 13
- 2574 D 14
- 2575 G 14
- 2576 K 9
- 2577 L 9
- 2578 M 10
- 2579 M 10
- 2580 M 11
- 2581 B 11
- 2582 B 13
- 2583 D 4
- 2584 F 9
- 2585 G 9
- 2586 K 4
- 2587 J 4
- 2588 J 4
- 2589 E 10
- 2590 I 10
- 2591 F 10
- 2592 I 10
- 2593 D 10
- 2594 G 10
- 2595 D 11
- 2596 G 11
- 2597 H 11
- 2598 H 11
- 2599 F 11
- 2600 H 11
- 2601 I 12
- 2602 I 12
- 2603 I 12
- 2604 F 14
- 2605 I 14
- 2606 D 13
- 2607 G 13
- 2608 D 14
- 2609 G 14
- 2610 E 14
- 2611 H 14
- 2612 D 15
- 2613 G 15
- 2614 M 9
- 2615 M 10
- 2616 L 10
- 2617 M 10
- 2618 M 12
- 2619 K 15
- 2620 E 12
- 2621 H 12
- 2622 D 8
- 2623 E 13
- 2624 E 11
- 2625 H 13
- 2626 H 11
- 2627 A 12
- 2628 J 3
- 2629 D 10
- 2630 G 10
- 2631 D 15
- 2632 G 15
- 2633 D 16
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- 2635 L 10
- 2636 M 9
- 2637 L 9
- 2638 M 9
- 2639 M 10
- 2640 M 10
- 2641 L 15

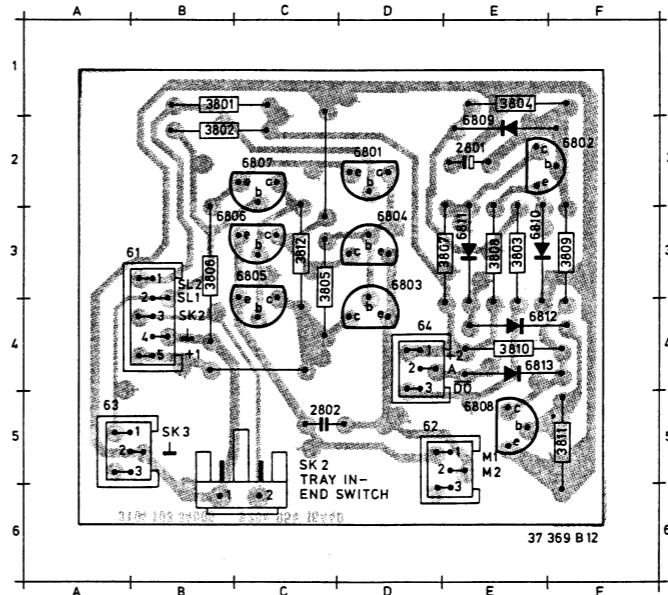
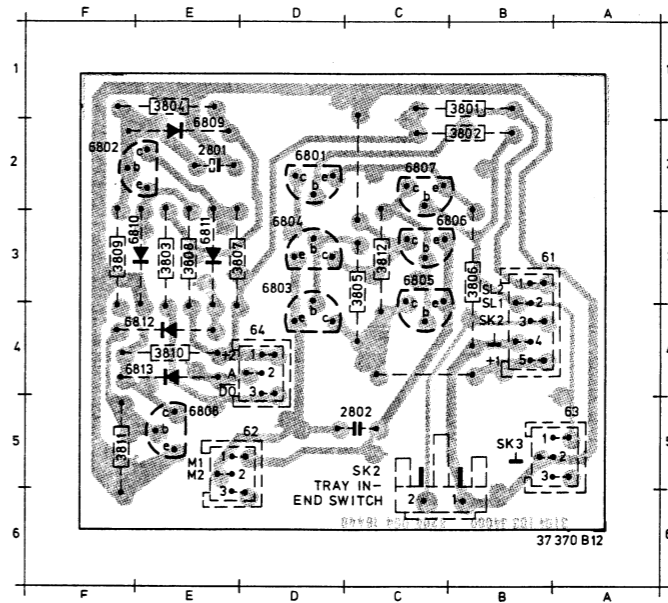
PRS 01608  
T32-644  
CD304



- 2801 G 4
- 2802 B 5
- 3801 C 3
- 3802 D 3
- 3803 F 3
- 3804 F 4
- 3805 F 4
- 3806 B 5
- 3807 E 5
- 3808 G 6
- 3809 G 6
- 3810 F 7
- 3811 F 7
- 3812 B 6
- 6801 C 4
- 6802 F 5
- 6803 B 5
- 6804 C 5
- 6805 B 6
- 6806 C 6
- 6807 C 6
- 6808 G 6
- 6809 G 6
- 6810 F 7
- 6811 F 7
- 6812 F 7
- 6813 F 7
- SK2 F 5
- SK3 F 7

PRS 01606  
T32-636  
CD304

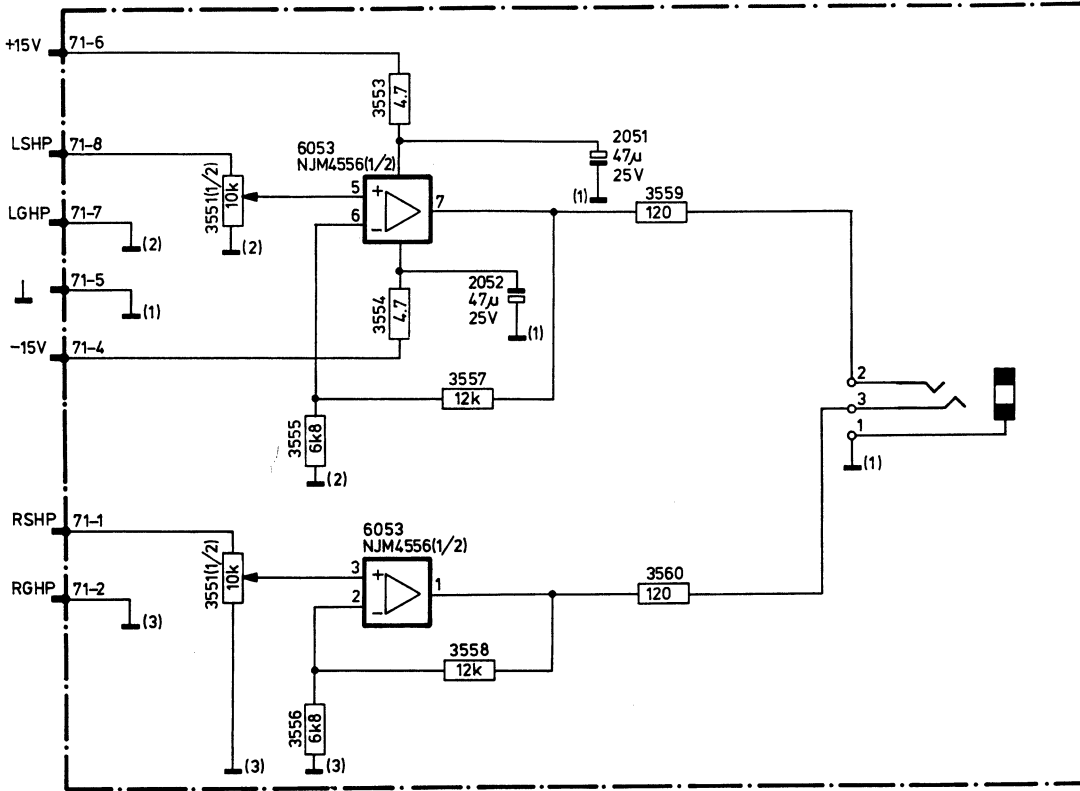
TRAY CONTROL P.C.B.



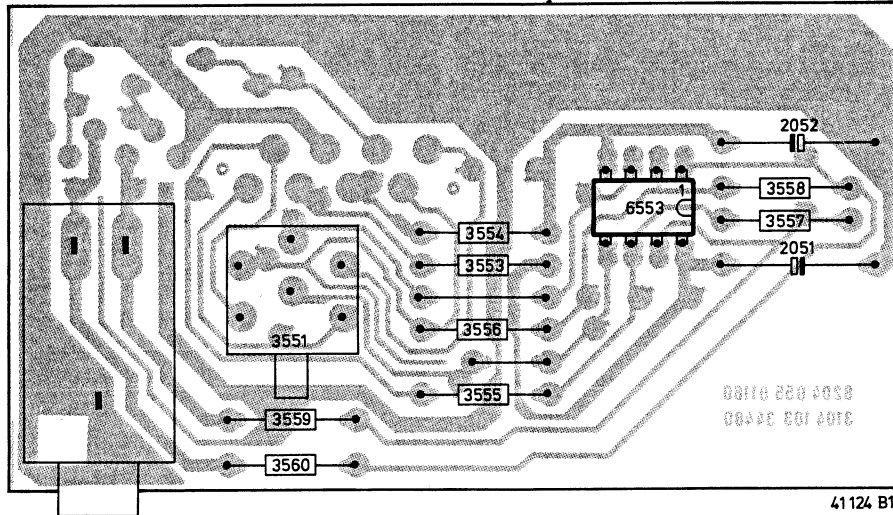
TRAY CONTROL

	BC548 BC338-40 BC328-40	4822 130 40938 5322 130 44779 4822 130 41715		SK2 Tact switch	4822 276 10863
				BAW62	4822 130 30613

HEADPHONE AMPLIFIER CIRCUIT



41 123 B12



41 124 B12

HEADPHONE AMPLIFIER

NJM4556D                      4822 209 82362	3571 47 k log                      4822 101 30527 3756,3757 47 Ω fuse res.      4822 111 30831
BU	
BU1                              4822 267 30346	

**Preface**

In course of the development of the troubleshooting guide for the Compact Disc it has become clear that a different approach from the one applied so far was required.

For, it is no longer possible to use the classic strategy, i.e. basing the troubleshooting method on a number of possible faults in the unit.

Practice has shown that a certain fault, with the associated symptom, can have a wide variety of causes.

The reason is that this player incorporates a number of feedback loop configurations — which, moreover, might affect each other — and this impedes the obvious measurements.

The method below divides the player from diagram point of view into nine clearly distinguishable sub-groups and by performing some measurements, the sub-group being in failure can be isolated. Later the defective circuit can be further examined according to the method given.

**PRACTICAL HINTS**

**Test discs**

It is important to handle the test discs with great care. For, the troubles (black dots, fingerprints, etc.) are exclusively and unambiguously positioned.

Damage can cause additional drop-outs etc. and as a result the conscious fault on this disc is no longer exclusive.

In that case it is no longer possible to check e.g. whether the track detector is working correctly.

**Measurements on op-amps**

In the electronic circuits of the servo systems op-amps are frequently being applied. These op-amps can be used as amplifiers, as filters, as invertors, as buffers, etc.

In those cases where feedback is applied in one way or the other, the voltage difference at the differential inputs inclines to zero. This applies both to DC and to AC.

The cause can be traced back to the properties of an ideal op-amp ( $Z_i = \infty$ ;  $G = \infty$ ;  $Z_o = 0$ ).

In practice this means that it is nearly impossible to perform measurements on the inverting and non-inverting inputs of op-amps if one input is directly connected to ground.

In those cases only the output signal will be measurable.

That is why in most cases no AC voltages can be given to the inputs.

The DC voltages at the inputs are equal.

**Simulating with „0” and „1”**

In the troubleshooting method certain pins should in a number of cases be connected to ground or be connected to the power supply voltage.

This way of acting offers the possibility to overrule certain circuits and to stimulate others.

In this way the diagnose time can be reduced.

In a number of cases the relevant pins appear to be **op-amp outputs**.

In this respect it should be mentioned that the outputs of the used op-amps are short-circuit protected.

This implies that the output of an op-amp can be made low (= usually ground potential) without consequences.

On the other hand should be pointed out that it is **not allowed** to connect the **output** of an op-amp directly to the **power supply voltage**.

I/Os of microprocessors should not be connected directly to power supply voltage.

These I/Os are allowed to be brought to „0” in case this is mentioned explicitly.

**Selection of ground point**

It is very important to select a ground point as close as possible to the test point.

**Conditions for injecting**

- It should be pointed out that injection of levels or signals from a strange source is **never** allowed to occur when the power supply voltage is lacking in the circuit in question.
- Naturally, the injected level is never allowed to exceed the power supply voltage of the circuit in question.

**Continuous burning of the laser**

- Disconnect plug 24 on the servo PCB and connect pin 24-3 (laser) of the cable connector to ground. Now the focus loop and the radial loop are interrupted as well:  
24-1 (RE1 = Radial Error 1), 24-2 (RE2 = Radial Error 2) and 24-4 (FE = Focus Error).  
The laser also burns continuously when the set is in service loop A.

**Irregular working of the display**

Irregular working of the display when the set is opened and playing, might have been caused by incidental body effect in the region of the crystal oscillators. Switching „off” and „on” of the mains voltage will eliminate this effect.

**Indication of checkpoint**

In the circuit diagram and PCB diagrams the checkpoints have been given a serial number (e.g. ②), to which the troubleshooting method will refer.

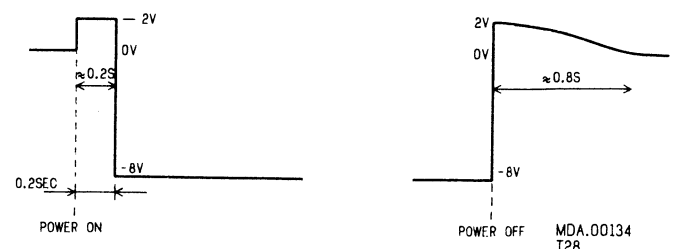
For oscillograms, amplitudes, time bases and position of set, see tables of checkpoints.

**GENERAL CHECKPOINTS**

In the detailed troubleshooting method following below a number of general conditions, required for proper functioning of the player, will **not** be repeated. Before starting the detailed troubleshooting method these general points should be checked.

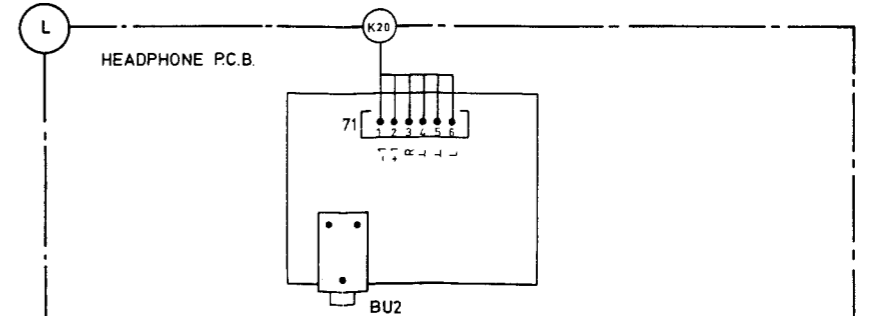
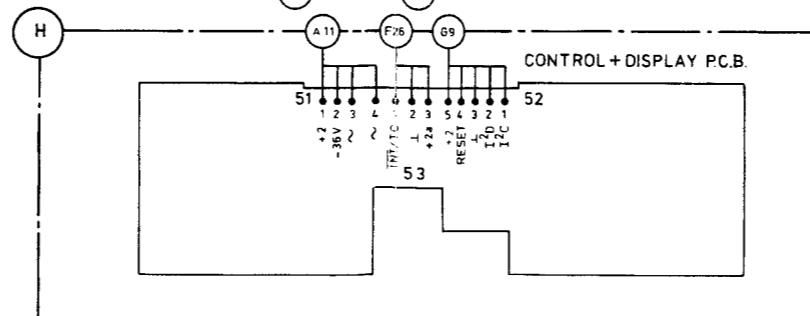
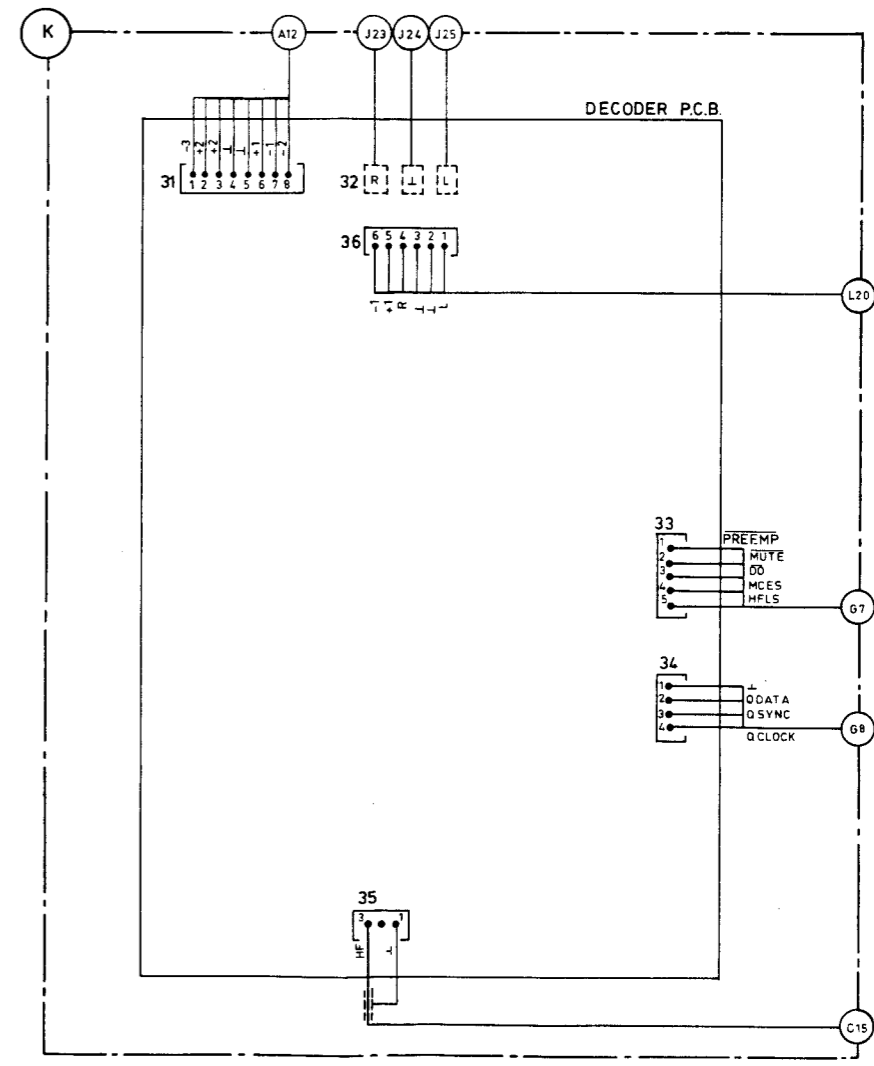
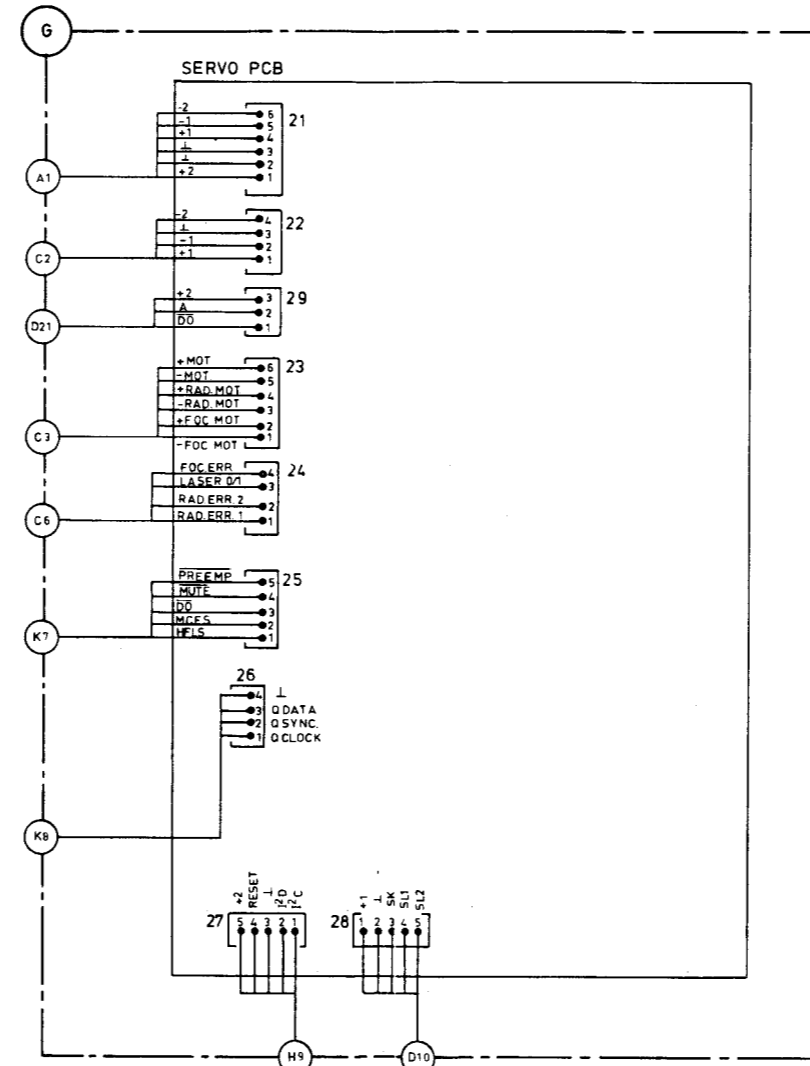
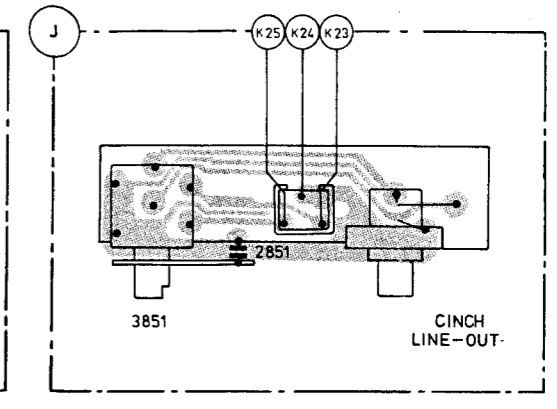
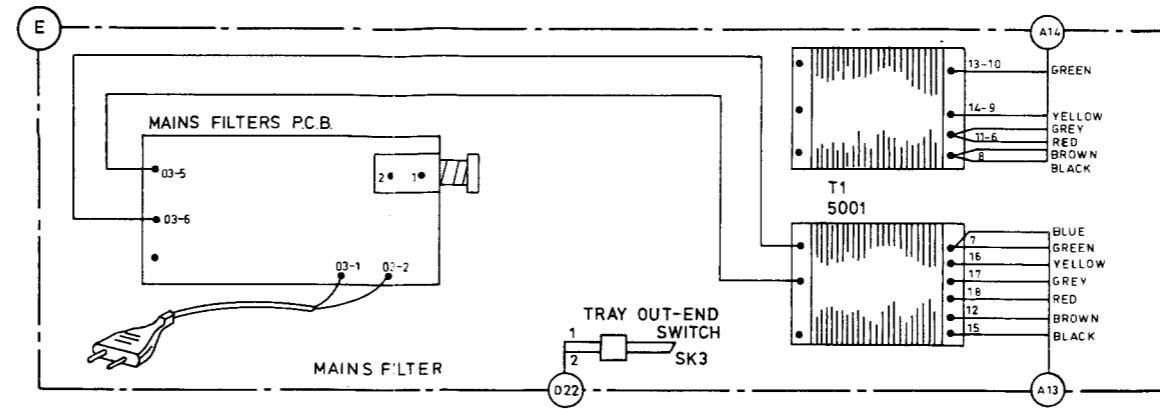
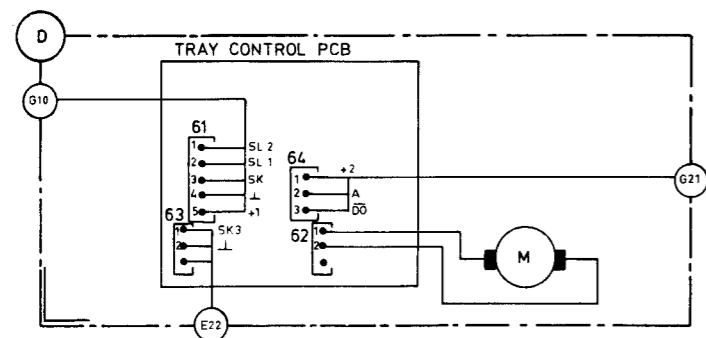
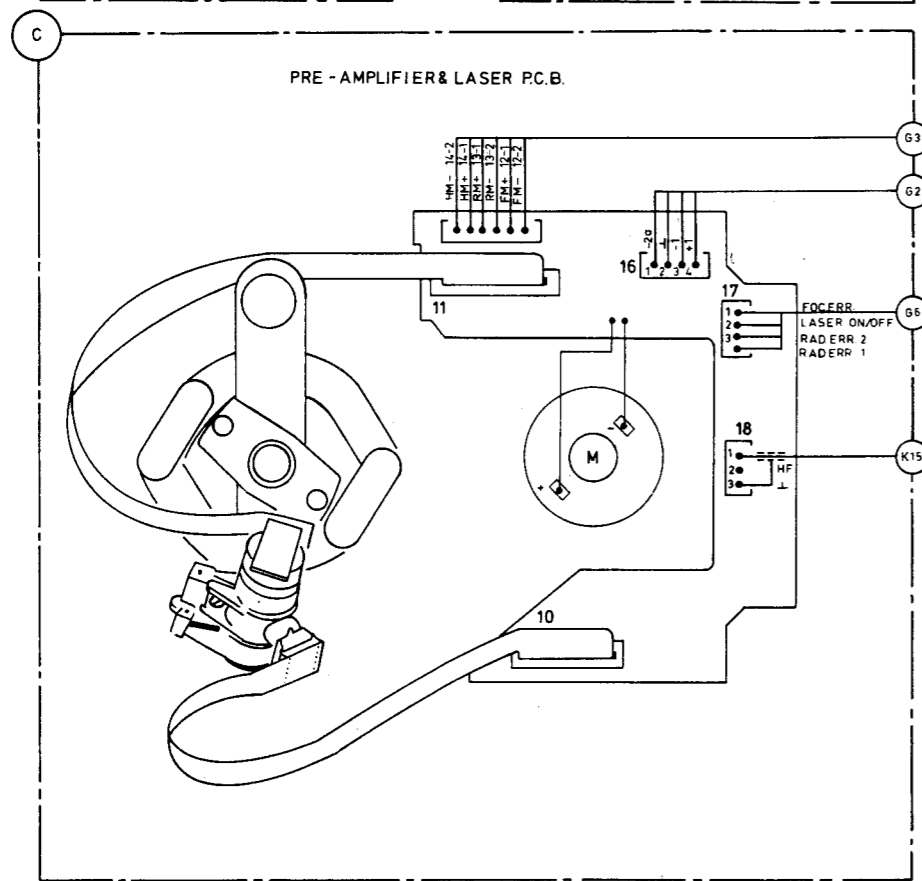
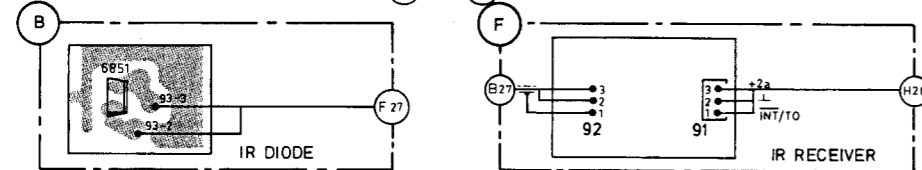
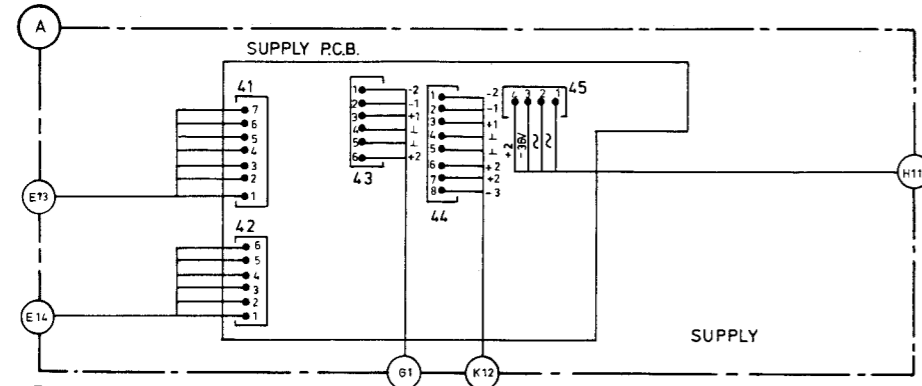
- a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and use undamaged discs.
- b. Convince yourself of the presence of the clock frequencies, viz.:
  - 6 MHz for  $\mu$ P servo (pin 16)
  - 6 MHz for control and display  $\mu$ P (pin 15)
- c. Check whether all power supply voltages are present and have the correct level. See PCB drawings.

**d. KILL CIRCUIT**



- During switching on and off the mains voltage the signal on the collector of 6327 (to be measured on a jumper, tp93) should be as indicated in the figure below.

WIRING DIAGRAM



41 139 D12

	Carbon film 0.2 W 70°C 5%		Ceramic plate Tuning ≤ 120 pF NP.0 2% Others -20/+80%
	Carbon film 0.33 W 70°C 5%		Polyester flat foil 10%
	Metal film 0.33 W 70°C 5%		Metalized polyester flat film 10%
	Carbon film 0.5 W 70°C 5%		Polyester flat foil small size (Mylar) 10%
	Carbon film 0.67 W 70°C 5%		Polysterene film/foil 1%
	Carbon film 1.15 W 70°C 5%		Tubular ceramic
	Chip component		Miniature single
			Subminiature tantalum ± 20%

27 037 A/C

- \*a = 2,5 V
- b = 4 V
- c = 6,3 V
- d = 10 V
- e = 16 V
- f = 25 V
- g = 40 V
- h = 63 V
- i = 100 V
- j = 125 V
- m = 150 V
- n = 160 V
- q = 200 V
- r = 250 V
- s = 300 V
- t = 350 V
- u = 400 V
- v = 500 V
- w = 630 V
- x = 1000 V
- A = 1,6 V
- B = 6 V
- C = 12 V
- D = 15 V
- E = 20 V
- F = 35 V
- G = 50 V
- H = 75 V
- I = 80 V

☒ Chips 50 V NP0 S1206			☒ Chips 0,125 W S1206			☒ Chips 0,125 W S1206			1R
1 pF	5%	4822 122 32479	5,6 E	5%	4822 111 90394	7,5 k	2%	4822 111 90276	
1,5 pF	5%	4822 122 31792	6,2 E	5%	4822 111 90395	8,2 k	2%	5322 111 90118	
1,8 pF	5%	4822 122 32087	6,8 E	5%	4822 111 90254	9,1 k	2%	4822 111 90373	
2,2 pF	5%	4822 122 32425	7,5 E	5%	4822 111 90396	10 k	2%	4822 111 90249	
3,3 pF	5%	4822 122 32079	8,2 E	5%	4822 111 90397	11 k	2%	4822 111 90337	
3,9 pF	5%	4822 122 32081	9,1 E	5%	4822 111 90398	12 k	2%	4822 111 90253	
4,7 pF	5%	4822 122 32082	10 E	2%	5322 111 90095	13 k	2%	4822 111 90509	
5,6 pF	5%	4822 122 32506	11 E	2%	4822 111 90338	15 k	2%	4822 111 90196	
8,2 pF	5%	4822 122 32083	12 E	2%	4822 111 90341	16 k	2%	4822 111 90346	
10 pF	5%	4822 122 31971	13 E	2%	4822 111 90343	18 k	2%	4822 111 90238	
12 pF	5%	4822 122 32139	15 E	2%	4822 111 90344	20 k	2%	4822 111 90349	
18 pF	5%	4822 122 31769	16 E	2%	4822 111 90347	22 k	2%	4822 111 90251	
22 pF	10%	4822 122 31837	18 E	2%	5322 111 90139	24 k	2%	4822 111 90512	
27 pF	5%	4822 122 31966	20 E	2%	4822 111 90352	27 k	2%	4822 111 90542	
33 pF	5%	4822 122 31756	22 E	2%	4822 111 90186	30 k	2%	4822 111 90216	
39 pF	5%	4822 122 31972	24 E	2%	4822 111 90355	33 k	2%	5322 111 90267	
47 pF	5%	4822 122 31772	27 E	2%	5322 111 90105	36 k	2%	4822 111 90514	
56 pF	5%	4822 122 31774	30 E	2%	4822 111 90356	39 k	2%	5322 111 90108	
68 pF	5%	4822 122 31961	33 E	2%	4822 111 90357	43 k	2%	4822 111 90363	
82 pF	10%	4822 122 31839	36 E	2%	4822 111 90359	47 k	2%	4822 111 90543	
100 pF	5%	4822 122 31765	39 E	2%	4822 111 90361	51 k	2%	5322 111 90274	
120 pF	5%	4822 122 31766	43 E	2%	5322 116 90125	56 k	2%	4822 111 90573	
150 pF	5%	4822 122 31767	47 E	2%	4822 111 90217	62 k	2%	5322 111 90275	
180 pF	2%	4822 122 31794	51 E	2%	4822 111 90365	68 k	2%	4822 111 90202	
220 pF	5%	4822 122 31965	56 E	2%	4822 111 90239	75 k	2%	4822 111 90574	
270 pF	5%	4822 122 32142	62 E	2%	4822 111 90367	82 k	2%	4822 111 90575	
330 pF	10%	4822 122 31642	68 E	2%	4822 111 90203	91 k	2%	5322 111 90277	
390 pF	5%	4822 122 31771	75 E	2%	4822 111 90371	100 k	2%	4822 111 90214	
470 pF	5%	4822 122 31727	82 E	2%	4822 111 90124	110 k	2%	5322 111 90269	
560 pF	5%	4822 122 31773	91 E	2%	4822 111 90375	120 k	2%	4822 111 90568	
680 pF	5%	4822 122 31775	100 E	2%	5322 111 90091	130 k	2%	4822 111 90511	
820 pF	5%	4822 122 31974	110 E	2%	4822 111 90335	150 k	2%	5322 111 90099	
1 nF	10%	5322 122 31647	120 E	2%	4822 111 90339	160 k	2%	5322 111 90264	
1,2 nF	5%	4822 122 31807	130 E	2%	4822 111 90164	180 k	2%	4822 111 90565	
1,5 nF	10%	4822 122 31781	150 E	2%	5322 111 90098	200 k	2%	4822 111 90351	
1,8 nF	10%	4822 122 32153	160 E	2%	4822 111 90345	220 k	2%	4822 111 90197	
2,2 nF	10%	4822 122 31644	180 E	2%	5322 111 90242	240 k	2%	4822 111 90215	
2,7 nF	10%	4822 122 31783	200 E	2%	4822 111 90348	270 k	2%	4822 111 90302	
3,3 nF	10%	4822 122 31969	220 E	2%	4822 111 90178	300 k	2%	5322 111 90266	
3,9 nF	10%	4822 122 32566	240 E	2%	4822 111 90353	330 k	2%	4822 111 90513	
4,7 nF	10%	4822 122 31784	270 E	2%	4822 111 90154	360 k	2%	4822 111 90515	
5,6 nF	10%	4822 122 31916	300 E	2%	4822 111 90156	390 k	2%	4822 111 90182	
6,8 nF	10%	4822 122 31976	330 E	2%	5322 111 90106	430 k	2%	4822 111 90168	
10 nF	10%	4822 122 31728	360 E	1%	4822 111 90288	470 k	2%	4822 111 90161	
12 nF	10%	5322 122 31648	360 E	2%	4822 111 90358	510 k	2%	4822 111 90364	
15 nF	10%	4822 122 31782	390 E	2%	5322 111 90138	560 k	2%	4822 111 90169	
18 nF	10%	4822 122 31759	430 E	2%	4822 111 90362	620 k	2%	4822 111 90213	
22 nF	10%	4822 122 31797	470 E	2%	5322 111 90109	680 k	2%	4822 111 90368	
27 nF	10%	4822 122 32541	510 E	2%	4822 111 90245	750 k	2%	4822 111 90369	
33 nF	10%	4822 122 31981	560 E	2%	5322 111 90113	820 k	2%	4822 111 90205	
47 nF	10%	4822 122 32542	620 E	2%	4822 111 90366	910 k	2%	4822 111 90374	
56 nF	10%	4822 122 32183	680 E	2%	4822 111 90162	1 M	2%	4822 111 90252	
100 nF	10%	4822 122 31947	750 E	2%	5322 111 90306	1,1 M	5%	4822 111 90408	
180 nF	10%	4822 122 32915	820 E	2%	4822 111 90171	1,2 M	5%	4822 111 90409	
			910 E	2%	4822 111 90372	1,3 M	5%	4822 111 90411	
			1 k	2%	5322 111 90092	1,5 M	5%	4822 111 90412	
☒ Chips 0,125 W S1206 NP0			1,1 k	2%	4822 111 90336	1,6 M	5%	4822 111 90413	
			1,2 k	2%	5322 111 90096	1,8 M	5%	4822 111 90414	
0 E	jumper	4822 111 90163	1,3 k	2%	4822 111 90244	2 M	5%	4822 111 90415	
1 E	5%	4822 111 90184	1,5 k	2%	4822 111 90151	2,2 M	5%	4822 111 90185	
1,1 E	5%	4822 111 90377	1,6 k	2%	5322 111 90265	2,4 M	5%	4822 111 90416	
1,2 E	5%	4822 111 90378	1,8 k	2%	5322 111 90101	2,7 M	5%	4822 111 90417	
1,3 E	5%	4822 111 90379	2 k	2%	4822 111 90165	3 M	5%	4822 111 90418	
1,5 E	5%	4822 111 90381	2,2 k	2%	4822 111 90248	3,3 M	5%	4822 111 90191	
1,6 E	5%	4822 111 90382	2,4 k	2%	4822 111 90289	3,6 M	5%	4822 111 90419	
1,8 E	5%	4822 111 90383	2,7 k	2%	4822 111 90569	3,9 M	5%	4822 111 90421	
2 E	5%	4822 111 90384	3 k	2%	4822 111 90198	4,3 M	5%	4822 111 90422	
2,2 E	5%	5322 111 90104	3,3 k	2%	4822 111 90157	4,7 M	5%	4822 111 90423	
2,4 E	5%	4822 111 90385	3,6 k	2%	5322 111 90107	5,1 M	5%	4822 111 90424	
2,7 E	5%	4822 111 90386	3,9 k	2%	4822 111 90571	5,6 M	5%	4822 111 90425	
3 E	5%	4822 111 90387	4,3 k	2%	4822 111 90167	6,2 M	5%	4822 111 90426	
3,3 E	5%	4822 111 90388	4,7 k	2%	5322 111 90111	6,8 M	5%	4822 111 90235	
3,6 E	5%	4822 111 90389	5,1 k	2%	5322 111 90268	7,5 M	5%	4822 111 90427	
3,9 E	5%	4822 111 90391	5,6 k	2%	4822 111 90572	8,2 M	5%	4822 111 90237	
4,3 E	5%	4822 111 90392	6,2 k	2%	4822 111 90545	9,1 M	5%	4822 111 90428	
4,7 E	5%	5322 111 90376	6,8 k	2%	4822 111 90544	10M	5%	5322 111 91141	
5,1 E	5%	4822 111 90393							

## Method

### Self-check of the servo $\mu$ P

- Disconnect points 2, 3 and 17 of the display  $\mu$ P.
- Interconnect pins 6, 14, 18 and 21 of the socket of the servo  $\mu$ P.
- If the  $\mu$ P functions properly, pin 22 should go from "0" to "1" within 1 second after switch-of on the mains voltage.

### Self-check of the display $\mu$ P

Take the servo  $\mu$ P out of its socket and ensure that points 2, 3 and 17 of the display  $\mu$ P are connected.

- Interconnect pins 6, 14, 18 and 21 of the display  $\mu$ P.
- If the  $\mu$ P is functioning properly, pin 22 should go from "1" to "0" within 1 second after switch-on of the mains voltage.

### Peripheral check

Place disc on turntable and switch off mains voltage.

### Initiating service loop A

See to it that the tray print is mounted or that, when the tray is closed, the tray-end switch (SK2) on that print is closed.

Keep the keys CANCEL, PREVIOUS and STOP depressed during switch-on of the mains voltage. Release the keys after approx. 2 seconds.

Now the set is in SERVICE LOOP A.

In this situation the laser and the focus control are operative and the turntable motor is running. The light pen remains situated against the innermost stop (i.e. the light pen remains situated under the lead-in tracks). The radial servo system is switched off.

In this service loop the display can be checked as follows:

- The display will indicate 01.02, then 02.04, next 03.06 and so on up to 20.40.  
20.40 is followed again by 00.00, 01.02, etc.  
The indicators SCAN, PAUSE, REPEAT and DISC ERROR will light up and will remain switched on.  
At indication 01.02, bar 1 of the track bar is driven as well. At 02.04, bar 2 is driven, etc.
- If now the CANCEL key is depressed, the TRACK indicator will light up after 2 clock strokes of the display and the DISC ERROR indicators will go off. The set remains in service loop A.

### Initiating service loop B

The set can be brought from service loop A into service loop B by depressing the STORE key.

The display shows that the set is in service loop B by means of TIME ABS, REL and TOT.

Now the radial servo system has been switched on independently of the P-bit and the sub-code.

After approx. 1 min. music will be audible.

This time depends on the length of the lead-in track. When the light pen is brought under the music track by hand, music is audible immediately.

The display remains in the service loop.

From service loop B the player can be brought in the PLAY mode by depressing the START/REPLAY key. If the START/REPLAY key is operated when the display shows a musical number that is not present on the disc, the set will stop.

### f. Eye pattern

Check on the oscilloscope whether the H.F.-signal — called eye pattern.

Set for this purpose the time basis of the oscilloscope to

0.5  $\mu$ s and check test point  $\diamond 65$  (on the decoder PCB).

This picture is fairly stable if PLL circuit is in lock and turntable loop is controlling correctly.

A vibrating or **unstable eye pattern** can be caused by a poor turntable motor, or by bringing the set in **service loop A**.

### DETAILED TROUBLESHOOTING METHOD

A number of quick and efficient checks immediately give a definite answer on poorly functioning sections of the player.

To check the servo systems two service loops have been built in  $\mu$ P 6201.

Before calling in service loop A or service loop B, it should be checked (position power on) whether the bus (clock, data; pin 3 and 2 of  $\mu$ P 6201 resp.) is free. In other words, checking whether these lines do not have a short circuit to ground or supply voltage (level low or „high“). In such a case the buttons cannot be operated.

For troubleshooting the step-by-step method below is followed.

#### First step (with disc on turntable)

##### Bring the player in service loop A.

If one of the conditions for service loop A is not met, the questions below should be answered positively in the sequence given.

Mostly this means that when one question has been answered positively, all the preceding circuits, to which the questions refer, are functioning well.

*Example:* if the eye pattern is present, we may conclude that the laser is working, the laser is in focus and that the turntable motor is running.

#### Note:

In some situations, certain faults in the radial servo circuit affect the focus servo circuit (e.g. if supply voltage +1 of IC6214 in the radial circuit fails, the focus coil starts oscillating).

To determine if this situation exists, connect point  $\diamond 36$  on the servo PCB to ground.

In this way, the influence of the radial servo circuit on the focus servo circuit can be eliminated.

- A. Is the laser giving light?  
(Test method: see sub A).
- B. Is the angle disc-light pin within the tolerance, i.e.  $90^\circ \pm 0.5^\circ$ ?  
(Test method: see description mentioned in chapter "Mechanical measurements and adjustments" of the C.D.M. manual).
- C. Is the laser giving sufficient light?  
(Test method: see sub C).
- D. Does the objective come in focus?  
(Test method: see sub D).
- E. Is the turntable motor running and, if so, is it running at the correct speed?  
(Test method: see sub E).

If the answers to questions A through E are positive, it should be possible to bring the player in service loop A.

#### Second step (with disc on turntable)

##### Bring the player in service loop B.

This means that the eye pattern on point  $\diamond 65$  (on the decoder PCB has to be stable, while MCES on point  $\diamond 17$  on the servo PCB has to be more stable too).

**Note that the set is not only tracking a song in loop B, but also playing the song, provided the digital circuit is working.**

If this does not work, return to service loop A and answer the questions below positively in the sequence given.

F. Are  $\overline{DO}$  and HFL detectors functioning?  
(test method: see sub F)

G. Is track detector functioning well?  
(test method: see sub G)

H. Is the radial control functioning properly?  
(test method: see sub H)

If the answers to questions F, G and H are positive, it should be possible to bring the player in service loop B.

### Third step (with disc on turntable)

Release the set from service loop B by pressing the START/REPLAY key on the display during playback of a musical number that is present on the disc.

**Note that the set is not only tracking a song in loop B, but also playing the song, provided the digital circuit is working.**

Sub. A. IS THE LASER GIVING LIGHT?

#### Test method

Bring the player in service loop A without placing a disc on the turntable. Now the laser is giving light for an unlimited period of time.

Another method for which the laser gives light during an unlimited period of time and the objective is **standing still**, is disconnecting plug 24 on the servo PCB and connecting point 24-3 of the cable connector to ground. In case of power-on the laser should burn. This is checked with the aid of a light-sensitive component which is slightly screened from ambient light.

Hereafter follow some examples:

- Connect photosensitive diode type BPW34, code number 4822 130 32108, with correct polarity to an **analogue** multimeter (e.g. PM2412) at range 10 k $\Omega$ . If the laser is burning, the meter will give virtually full scale deflection.
- Connect LDR, code number 4822 116 10002, to digital multimeter PM2517E. If the laser is burning, the resistance will drop to approx. 8 k $\Omega$ .

If the laser is **not** giving any light, proceed to Annex I.

Sub. C. IS THE LASER GIVING SUFFICIENT LIGHT?

#### Test method (Test points on Pre-amp PCB)

- Interrupt the collector of TS6230 on the servo PCB or ground the - side of electrolytic capacitor 2209. Disconnect

plug 24 on the servo PCB and connect pin 24-3 (laser) of the cable connector to ground.

Now the laser should continue to give light while FE, RE1 and RE2 are interrupted.

- Place disc on turntable and switch power on.
- Directly inject with AF generator ( $Z_i \leq 600$  Ohms) to test point  $\diamond 1$  FE a sine-wave signal between 25 and 60 Hz (exact frequency is player-dependent) and  $2 V_{pp}$ .
- Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points  $\diamond 5$ ,  $\diamond 6$ ,  $\diamond 7$  and  $\diamond 8$ . Amplitude 40 - 80 mV.
- If the amplitude is not sufficient, proceed to Annex I.

Sub. D. IS THE OBJECTIVE COMING INTO FOCUS?

#### Test method

##### • No disc on turntable

Switch power on and actuate Play button.

Now the arm should move inwards. Immediately after that the objective should move two times up-and downwards (this happens during searching of the focusing point).

After this the action will stop.

These actions are software-controlled from the servo  $\mu P$ . If this is not working, check  $\mu P$  servo, end stage focus circuit or focus coil.

##### • With disc on turntable

*Quick test procedure:*

For a rough check on the working of the focus circuit, proceed as follows:

- place disc on turntable.
- set player in service loop A.
- remove disc from turntable.
- now examine if the objective focuses by bringing a reflective object (e.g. mirror) above it.

*Detailed test procedure*

- Check TS6230 (on servo PCB) as follows: Check whether FN becomes, with each passage of the nominal focusing **low for a short period of time**. Only when focusing point FN has been found, FE will be released via TS6230 (base will become negative). Check whether base of TS6244 is driven low from servo  $\mu P$  (= FCO). If not, check servo  $\mu P$ . If so, proceed.
- Test focusing circuit as follows: Interrupt the collector of 6230 on the servo PCB and disconnect plug 24 on the servo PCB. Connect pin 24-3 (laser) of the cable connector to ground.



Now the laser is burning continuously, FE has been released and the focus loop has been interrupted at test point ① (= FE) on servo PCB, circuit diagram C.

#### Testing of circuit, between test point ① and focusing coil (Test points on servo PCB)

- Directly inject a sine-wave signal of 10 Hz,  $2V_{pp}$  to test point ① by means of an AF generator ( $Z_i \leq 600 \Omega$ ).
- Check visually whether focusing coil — and thus objective too — responds.
- Check whether this voltage is  $0.6 V_{pp}$  on test point ②.
- Check whether this voltage is  $6 V_{pp}$  on test point ③.
- Check whether this voltage is  $5 V_{pp}$  on test point ④.

#### Testing the subchassis (Test points on Pre Amp PCB, injection point on servo PCB)

- Place a disc on the turntable.
- Directly inject to test point ① a sine-wave signal between 25 Hz and 60 Hz at  $2 V_{pp}$  by means of an AF generator ( $Z_i \leq 600 \Omega$ ). The exact frequency is player-dependent.
- Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points ⑤, ⑥, ⑦ and ⑧.
- Check test points ⑨, ⑩, ⑪ and ⑫.
- Check test point ⑬.
- Check test point ⑭.

Is the same as signal on test point ⑬ but amplitude is dependent on position of potentiometer R3158.

If all the checks are positive, close focus loop (insert plug 24). Now the focusing circuit should be able to operate. Reconnect transistor 6230.

It should be noted here that the amplitudes on test points ⑤ through ⑬ are slightly dependent on the characteristic of the monitor diodes.

#### Sub. E. IS TURNTABLE MOTOR RUNNING AND, IF SO, IS IT RUNNING AT THE CORRECT SPEED?

##### Test method (Test points on servo PCB)

- Place disc on turntable and bring set in service loop A.
- If focusing point is found, check whether FCO is low on point ⑮.
- If not, check focus circuit sub D.  
If so, proceed.
- Now only power on, disconnect plug 25 on the servo PCB and check MC= point 2 of cable connector 25 or point ⑯ on the decoder PCB see figure F.  
If not, check DECODER CIRCUIT  
If so, proceed.
- Reconnect plug 25, disconnect plug 15 on the pre-amplifier PCB and inject a DC signal to the cable connector of the motor or directly to the turntable motor.  
The turntable motor should be running now.  
(A DC voltage of 2,5 V approximately corresponds with the rpm during scanning of the innermost tracks).  
In this condition the player should be brought in service loop A (depress Stop button while mains voltage is switched on).  
If  $DC < 2,5 V$  Figure G should be visible on test point ⑰ (servo PCB).

If  $DC > 2,5 V$  Figure H should be visible on test point

If so, check turntable control circuit (circuit from point ⑰ to turntable motor).

If not, check whether MCES is released by means of FCO at pin 13 of IC6205C.

This can be done by disconnecting plug 25 on the servo PCB and measure on point 2 of cable connector 25.

If MCES is working now, check circuit around IC 6205C.

- Reconnect plug 25.
- Take player out of service loop A, depress Power-on button and then Play button and check eye pattern on point ⑱ (on decoder PCB).  
To stabilize the eye pattern, bring light pin above tracks by hand, or by briefly (5 s) depressing Fast Forward button.  
If eye pattern on point ⑱ is not present or unstable, check RF pre-amplifier (see Annex V).
- If eye pattern is correct, proceed.
- Check whether point ⑲ (= HFLS) on the servo PCB is correct in service loop A (see Figure Y). If not, check HFLS detector circuit (is circuit between point ⑲ and ⑳). If so, proceed.

Take player out of service loop A by depressing the power button.

- Check locking-in of PLL circuit of decoder See Annex II. Checking locking-in of PLL circuit.  
If PLL is locking-in, proceed.
- If MC is still not functioning properly, replace the relevant specific digital IC.
- MC has to be present now.

#### Sub. F. ARE THE $\overline{DO}$ AND HFLS DETECTORS FUNCTIONING?

##### Test method (Test points on servo PCB)

- Starting point is:  
HFLS = 1 when spot is exactly on track  
HFLS = 0 between tracks (e.g. during track jumping)  
 $\overline{DO}$  = 0, or  $DO = 1$  in case of drop-out  
 $\overline{DO}$  = 1, or  $DO = 0$  when there is no drop-out.

##### Approximative method

(applicable in service loop A)

- Place disc on turntable.
- Bring player in service loop A.
- Check whether  $DO$  (test point ⑳) is not continuously „high”. Normally test point ⑳ is „low”; however small spikes of approximately 100mV are present in case of scratches on the disc.
- Check HFLS (test point ⑲).

**Precise method**

(can be checked in playing set only)

- Place test sample 5A (4822 397 30096) on turntable. Switch power on and depress Play button.
- Select track no. 10: Check point  $\diamond 55$ . HFLS pulses should be present.
- Select track no. 15: Check point  $\diamond 56$ .  $\overline{DO}$  pulses should be present. With this track the HFLS pulses on point  $\diamond 55$  should also be present.
- In case of track jumping HFLS pulses are always present on point  $\diamond 55$ .

**Sub. G. IS TRACK DETECTOR FUNCTIONING WELL?**

**Test method** (Test points on servo PCB)

**Switch off the offset circuit:**

Loosen resistor 3335 (at the side where it is in contact with pin 14 of IC6215).

Mount a 47 k $\Omega$  trimming potentiometer between +1 and -1 supply voltage (for example between pins 4 and 11 of IC6215). Connect the wiper of the trimming potentiometer to the loose side of resistor 3335.

- Place a disc on the turntable.
- Bring the set in service loop A.
- Adjust the signal on test point  $\diamond 21$  symmetrically round 0V by means of the external 47 k $\Omega$  trimming potentiometer. The amplitude of the signal may change during this adjustment.
- Measure F.S. on point  $\diamond 36$ .

Here too the frequency variation depends on the eccentricity of the disc.

- Check point  $\diamond 60$ .
- Check point  $\diamond 61$ . Signal cannot be triggered.
- Check point  $\diamond 62$ .
- Switch the offset circuit on again.

**Sub. H. IS THE RADIAL CONTROL FUNCTIONING PROPERLY?**

**Attention: The offset circuit (d-multiplier) and the AGC circuit (k-multiplier) are correction circuits. This means that under optimal conditions (new disc, minimum tolerances of components) the set may be working properly even if a fault is present in offset or AGC circuit.**

**Test method** (Testpoints on servo PCB)

- a. Place disc on turntable.
- b. Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier).

*Method:*

Switching off AGC circuit: interconnect points 5 and 6 of IC 6216.

**Switch off the offset circuit:**

Loosen resistor 3335 (at the side where it is in contact with pin 14 of IC6215).

Mount a 47 k $\Omega$  trimming potentiometer between +1 and -1 supply voltage (for example between pins 4 and 11 of IC6215). Connect the wiper of the trimming potentiometer to the loose side of resistor 3335.

- Place a disc on the turntable.
- Bring the set in service loop A.
- Adjust the signal on test point  $\diamond 21$  symmetrically round 0 V by means of the external 47 k $\Omega$  trimming pot. The amplitude of the signal may change during this adjustment.

- c. Bring set in service loop B. At this moment there is a high probability that the set is working. If so, check b and d factor (see Annexes IV and III). If not, proceed.

- d. Bring set in service loop A and check signal on point  $\diamond 21$ .

The AC-component has to be 12-14 V symmetrically, around a DC level of zero volt.

If this is correct, proceed to e).

If this is not correct check following testpoints

- $\diamond 22$ ,  $\diamond 23$  : value should be 0.7 V<sub>pp</sub>
- $\diamond 24$  : value should be 0.2 V<sub>pp</sub>
- $\diamond 25$  : value should be 0.25 V<sub>pp</sub>
- $\diamond 26$  : value should be 20 mV<sub>pp</sub>
- $\diamond 27$ ,  $\diamond 28$  : value should be 800 mV<sub>pp</sub>

*Note:*

The frequency variation strongly depends on the eccentricity of the disc.

If points  $\diamond 22 \div \diamond 28$  are OK, check point  $\diamond 21$  again.

If  $\diamond 21$  is OK, proceed.

- e. Check point  $\diamond 29$  (is RE +650 Hz).

Value should be 6 V<sub>pp</sub>. If so, proceed.

When the set is in the normal stand-by position 650 Hz at 300 mV is present on point  $\diamond 29$ .

- f. To check radial output stage, do not use a disc, only power on. Inject on points  $\diamond 30$  and  $\diamond 31$  respectively a sine-wave signal of 8 to 10 Hz 3 V<sub>pp</sub>. Then the radial motor will go back and forth.

At this moment radial tracking must be possible in service loop B.

- Switch the AGC circuit on again. If the original fault symptom is still present proceed to Annex IV: Check of the k-factor.
- Switch the offset circuit on again. If the original fault symptom is still present, proceed to Annex III: Check of the d-factor.

● **Check the SSM signal (test point 78; pin 33) = Start-Stop turntable motor**

- Motor start pulse when test point 78 is "high" for  $\geq 0.2$  sec.
- Motor stop pulse when test point 78 is "low" for  $\geq 0.2$  sec.

*Note:*

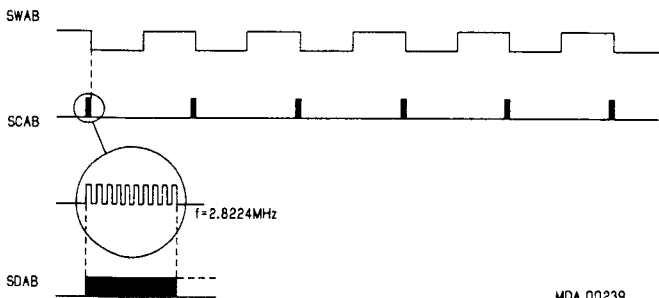
After the motor start pulse, SWAB information (Subcoding Word clock) will become visible at this point. The period time of that signal is 136  $\mu$ sec.

● **Check the subcode clock signals**

- Place a disc on the turntable.
- Select one of the following positions: SERVICE POSITION B or position PLAY.
- Trigger the oscilloscope with the SWAB signal at test point 78.
- Check the following signals:
  - SWAB at test point 78; pin 33
  - SCAB at test point 79; pin 35 (Subcode Clock from Decoder-A to Filter B)
  - SDAB at test point 80; pin 34 (Subcode Data from Decoder-A to Filter B)
 and their interrelations.

*Note:*

While the burst of 10 clock pulses, appear on SCAB the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows. The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



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● **Check the CRI signal**

The CRI signal is "low" in case of track jumping. Player in position SEARCH.

● **Check the DEEM signal (test point 84; pin 32)**

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS), the DEEM signal should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal should be "high".

III FILTER-B IC

● **Check the signals between Decoder-A IC and Filter-B IC**

- See sub. "II Decoder-A IC":
  - \* Check the X IN signal (test points 69 and 70)
  - \* Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
  - \* Check the EFAB signal (test point 74)
  - \* Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78, 79 and 80).

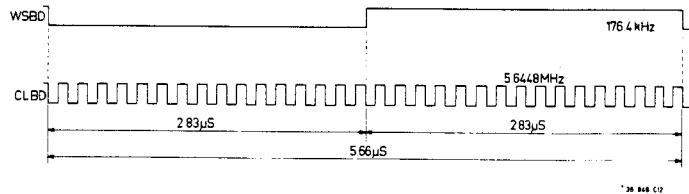
● **Check the timing signals between Filter-B IC and DAC IC**

- Place a disc on the turntable.
- Select the following position: position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

Check the following signals:

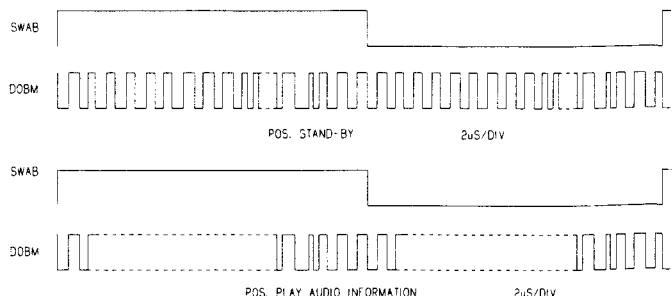
- WSBD at test point 85; pin 18
- CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC) and their interrelation.

If an Audio disc is used, there should be activity at test point 86 (pin 15) DABD signal (DATA from Filter B to DAC). If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor 6315. In that case the word "data" appears on the display.



● **Check the DOBM signal (Digital Output)**

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depressed).
- Trigger the oscilloscope with the SWAB signal (test point 78).
- Check the DOBM signal (test point 88; pin 14). An empty audio signal has a fixed pattern. See drawing, "Stand-by".
- Select the PLAY mode. Check the DOBM signal. See drawing "PLAY".



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● In position **SEARCH** the **ATSB** signal is "low" test point 89; pin 22 (**Attenuation Audio Signal**)

- When the "µP panel" is applied, (a sub-printed circuit board) that houses IC6451: MAB8441P/T012, test point 89 is not connected.

#### IV DAC IC (Dual Digital Analog Converter)

● Check the signals between Filter-B IC and DAC IC

- See sub. "III Filter-B IC":
  - \* Check the timing signals between Filter-B IC and DAC IC.

● Check the output of the OP-AMP after the DAC IC

- Place a disc on the turntable.
- In position **PLAY** or in **SERVICE POSITION B**, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

#### V DEEM CIRCUIT

● Check DEEM circuit

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS) the DEEM signal at test point 84 should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal at test point 84 should be "high".
- During playback of track no. 14 the analogue signal should be present at the source of 6514 (test point 91) and 6515 (test point 92).
- During playback of track no. 15 the analog signal at the source of 6514 (test point 91) and 6515 (test point 92) should be 0 V.

#### Annex I: LASER IS GIVING NO OR INSUFFICIENT LIGHT

Together with the laser supply and the monitor diode the laser forms a feedback system.

A defect in the laser supply might thus result in destruction of the laser. Replacement of the laser (= new light pin) will not solve anything. The new laser will also be destroyed since the original fault in the laser supply is still present.

On the other hand it is impossible to check and repair a feedback system when one link is missing.

For this reason the so-called laser simulator 3 is supplied. Code number 4822 395 30229.

This laser simulator consists of a PCB which contains the laser and monitor simulation, a switch to test the On/Off position and a number of sockets.

This PCB can be connected to the laser supply instead of the light pin so that the feedback system is closed.

#### Repair procedure:

**Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potentials of the aids and yourself equal the potential of the CD mechanism.**

Detach light pin and connect laser simulator as follows: (connections on pre-amp PCB).

Take the flex PCB out of socket 11 and connect the simulator PCB with the socket.

Remove plug 16 and insert it in the socket on the simulator PCB.

Connect the plug with 4 wires to socket 16. Take out plug 17 and insert the plug with 1 wire in socket 17.

- Switch on the mains switch and ensure that the drawer is closed or else that the tray-end-in switch on the tray PCB (Sk2) is depressed.

Now press the play key and check if the L-line of the servo µP, pin 17-2 on the pre-amplifier PCB, goes 'low'.

- In rest position the current through the laser diode should be  $\leq 1$  mA. For NEG. VOLT. lasers this can be checked as follows:

Set the switch on the simulator PCB in the OFF position and the mains switch in the ON position.

Turn trimming resistor 3180 counterclockwise (min. R) and measure the voltage across resistor 3194 on the pre-amp. PCB.

On pre-amplifier PCBs with discrete components turn resistor 3180 clockwise (min. R) and measure the voltage across resistor 3194.

The voltage should be  $\leq 15$  V.

#### Check of laser supply control

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and -V on the simulator PCB.

Resistor 3180 clockwise (max. R):  $U_{+v-v}=225 \text{ mV} \pm 45 \text{ mV}$ .

On preamplifier PCBs with discrete components resistor 3180 counterclockwise (max. R):  $U_{+v-v}=225 \text{ mV} \pm 45 \text{ mV}$ .

R3180 counterclockwise (min. R):  $U_{+v-v}=750 \text{ mV} \pm 150 \text{ mV}$ .

On preamplifier PCBs with discrete components resistor 3180 clockwise (min. R):  $U_{+v-v}=750 \text{ mV} \pm 150 \text{ mV}$

Set resistor 3180 in the mid-position.

This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted.

#### Fine adjustment of laser current

- Playback track 1 of test disc 4822 397 30096 (Disc without defects). Connect a DC voltmeter across resistor 3308 on the SERVO PCB circuit diagram. Adjust the laser power supply with resistor 3180 until the voltage across resistor 3308 is  $575 \text{ mV} \pm 50 \text{ mV}$ .

#### Remark:

It is recommended to use the laser simulator for any measurement in the laser supply, since incidental short-circuits with the test pin can have inconvenient consequences for the laser.

#### Annex II: CHECKING LOCKING-IN OF PLL CIRCUIT (Test points on decoding PCB)

First the free-running oscillator should be checked as follows:

- Switch power on, player in pos. play.
- Connect a frequency counter between pin 22 of IC6501 (DEMOD) and  $\perp$ .
- This frequency should be  $4.350 \text{ MHz} \pm 30 \text{ kHz}$ .

#### Attention

**This adjustment should be performed immediately after the unit is switched on.**

#### Checking locking-in:

- Insert disc, disconnect plug 14, inject  $2.5 \text{ V}_{dc}$  to the socket of plug 14 on pre-amp PCB and set player in service loop B.
- Variation of the DC round  $2.5 \text{ V}$  should be visible on the oscilloscope (point  $\diamond$ ) in the form of a frequency variation. This means that the PLL is locking in.

### Annex III: CHECKING d-FACTOR (Test points on servo PCB)

- Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier). See sub G and H.

Place disc on turntable and set player in service loop A.

- Check points  $\diamond 22$  and  $\diamond 23$ .  
Value should be  $0,7 V_{pp}$ .  
Frequency variation strongly depends on the eccentricity of the disc.
  - Check point  $\diamond 25$ .  
Value should be  $250 mV_{pp}$ .
  - Check point  $\diamond 35$ .  
Value should be  $200 mV_{pp}$ .
  - Check point  $\diamond 36$ .  
Value should be  $2 V_{pp}$ .
  - Check points  $\diamond 37$  and  $\diamond 38$ .  
Value should be  $10 V_{pp}$ .  
The signal is more sine-shaped now due to filtering out of 650 Hz.
  - Point  $\diamond 39$  is hard to measure since switch is in position  $Y_{oc}$  and thus connected with input of op-amp 6215. However, a signal of  $200 mV_{pp}$  is present.
  - Check point  $\diamond 40$ .  
Value should be  $9 V_{pp}$ .
- Bring the player in service loop B. With a disc on turntable and the AGC and offset-circuits are still switched off.
- Check point  $\diamond 41$ .
  - Check point  $\diamond 40$  on beam A of oscilloscope and check point  $\diamond 39$  on beam B of oscilloscope while oscilloscope is triggered with point  $\diamond 41$ .
  - Switch on the AGC-circuit and the offset circuit.

### Annex IV: CHECKING k-FACTOR (Test points on Servo PCB)

#### a. Static

Switch power on **without** depressing the Play button. I.e.  $RC0 = \text{high}$ ;  $\overline{RC0} = \text{low}$  so switch  $Y_a$  is in position 0 and switch  $Y_c$  is in position 0.

- Check point  $\diamond 45$ .  
Value should be  $9 V_{pp}$ .
- Check point  $\diamond 46$ .
- On point  $\diamond 29$  now appears a sine-wave signal of 650 Hz, 300 mV, and  $180 - 45 = 135^\circ$  shifted in phase relative to signal on point  $\diamond 45$ .
- Check point  $\diamond 47$ .  
Value should be  $1,5 V_{pp}$ .
- Check point  $\diamond 48$ .  
Value should be  $1 V_{pp}$ .
- Check points  $\diamond 49$ ,  $\diamond 50$ ,  $\diamond 51$  and  $\diamond 46$  relative to each other.  
Amplitudes are 5V.
- Check integrator IC 6212A.

**b. Dynamic**

Insert disc, select service loop A and check if the signal on point 21 equals to  $7 V_{pp}$ .

- Select service loop B.  
Now  $RC0 = \text{high}$  and  $RC1 = \text{low}$ .  
So switch  $Y_a$  is in position 1.  
Switch  $Y_c$  switches at  $f = 650 \text{ Hz}$ .  
Point 52 is low; so point 51 is in phase point 50.  
Now Fig. U should be present on point 51 with duty cycle jittering round 50%.

**Annex V: CHECKING RF PRE-AMPLIFIER**  
(measure points on pre-amp. PCB)

- a. Check DC-voltages on transistors 6103, 6104, 6105, 6109, 6110, 6111.
- b. For checking sensitivity, frequency and delay characteristic, proceed as follows:

- Take flex PCBs of sockets 10 and 11.
- Take plugs 18, 17, 12, 13, 14 and 15 out of sockets.

**Attention:** do not take of plug 16 (= supply!).

- Unscrew PCB to enable injection at the copper side of the PCB.

**Checking sensitivity**

- Inject  $V_{in} = 140 \text{ mV}_{\text{eff}}$ , 50 kHz on points 102, 101 via  $R = 100 \text{ k}\Omega$  and  $C = 39 \text{ pF}$  (see Fig. A).
- $V_{out}$  has to be  $245 \text{ mV} \pm 2 \text{ dB}$ .

**Note:**

Ensure that injection cord and test cord are identical.

**Checking frequency and delay characteristic**

- Adjust  $V_{in}$  in such a way that  $V_{out} = 245 \text{ mV} = 0 \text{ dB}$  at 50 kHz.
- Between the injected and the measured sine-wave signal the delay should be  $450 \text{ ns} \pm 50 \text{ ns}$  at 300 kHz. This can be measured on the dual beams oscilloscope with  $V_{in}$  on beam A and  $V_{out}$  on beam B according to Figure B.
- Check frequency and delay characteristic for frequencies given below:

Frequency (kHz)	$V_{out}$ (dB)	Delay (n sec.)	Delay, compared with delay at 300 kHz
1	$-15 \pm 3$	$450 \pm 50$	$-50 \pm 20$
6,3	$-2 \pm 1$		
16	$-0,5 \pm 1$		
50	0		
100	$0 \pm 1$		
200	$+1 \pm 1$		
300	$+1,5 \pm 1$		
500	$+3,5 \pm 1$		
700	$+5,5 \pm 2$		
1000	$+8 \pm 2$		
1600	$+8 \pm 2$	$0 \pm 20$	
2000	$+4,5 \pm 3$		

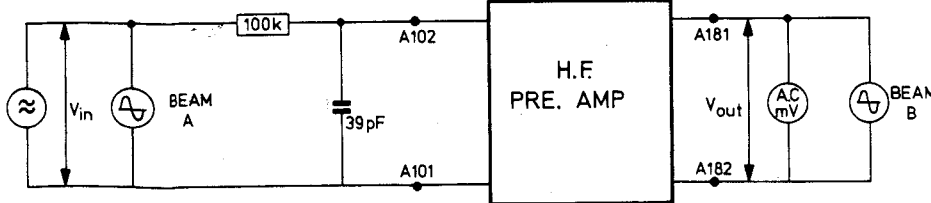


Fig. A

33 393A12

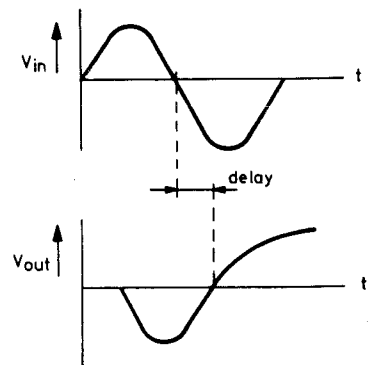


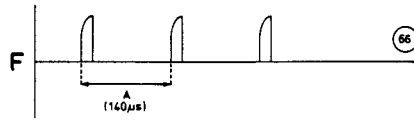
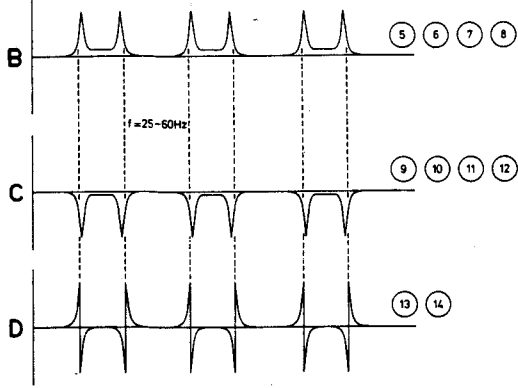
Fig. B

33 394A12

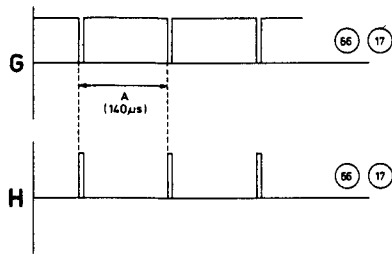
## SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	0,6 Vp-p	10 Hz	
3	P	see fault finding meth.	6 Vp-p	10 Hz	
4	P	see fault finding meth.	5 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	-2 V	25-60 Hz	
10	C	see fault finding meth.	-2 V	25-60 Hz	
11	C	see fault finding meth.	-2 V	25-60 Hz	
12	C	see fault finding meth.	-2 V	25-60 Hz	
13	D	see fault finding meth.	-8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 $\mu$ s
17	H	see fault finding meth.	0-5 V		A = 140 $\mu$ s
20		see fault finding meth.			
21	J	see fault finding meth.	12-14 Vp-p		
22	J	see fault-finding meth.	0,7 Vp-p		
23	J	see fault finding meth.	0,7 Vp-P		
24	J	see fault finding meth.	0,2 Vp-p		
25	J	see fault finding meth.	0,25 Vp-p		
26	J	see fault finding meth.	20 mVp-p		
27	J	see fault finding meth.	800 mVp-p		
28	J	see fault finding meth.	800 mVp-p		
29	J	see fault finding meth.	6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	see fault finding meth.	200 mVp-p		
36	J	see fault finding meth.	2 Vp-p		
37	K	see fault finding meth.	10 Vp-p		
38	K	see fault finding meth.	10 Vp-p		
39	L	see fault finding meth.	0-4 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
40	K	see fault finding meth.	9 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
40	M	see fault finding meth.	0-4 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
41	N	see fault finding meth.	6 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 $\mu$ s B = 769 $\mu$ s
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 $\mu$ s
66	G	see fault finding meth.	5-0 V		A = 140 $\mu$ s
66	H	see fault finding meth.	0-5 V		A = 140 $\mu$ s
67	J	see fault finding meth.			

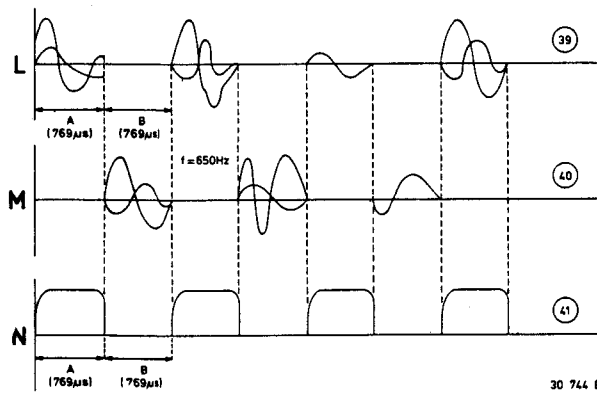
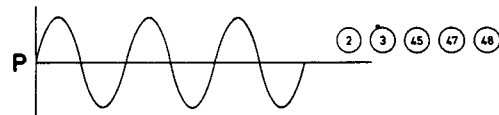
SERVO



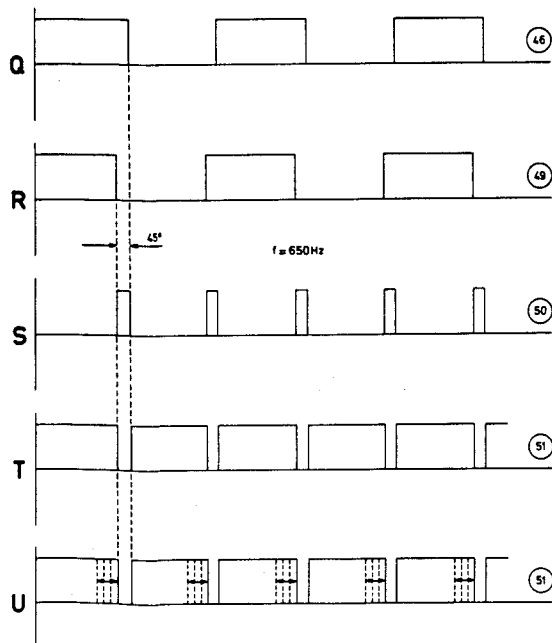
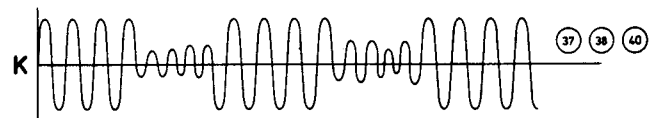
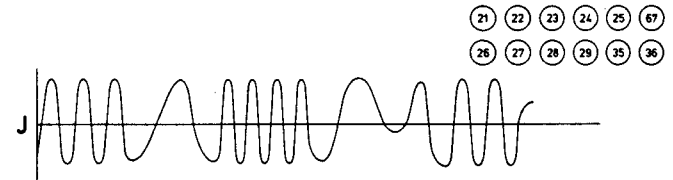
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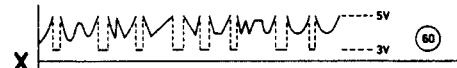
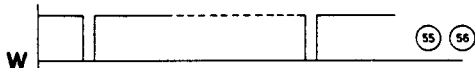
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30 744 B12/A



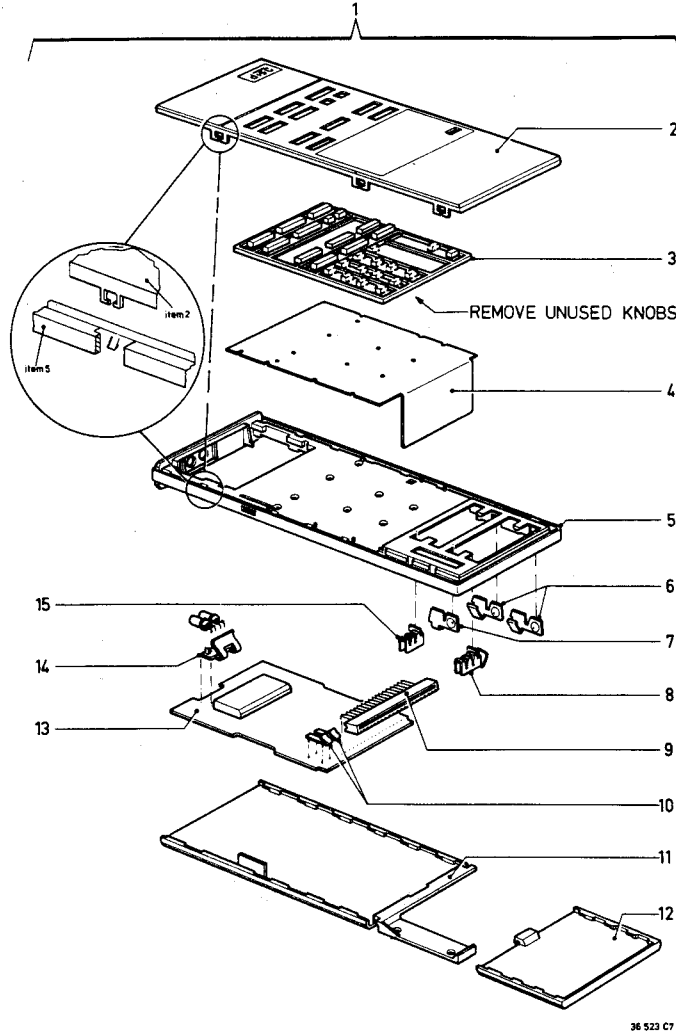
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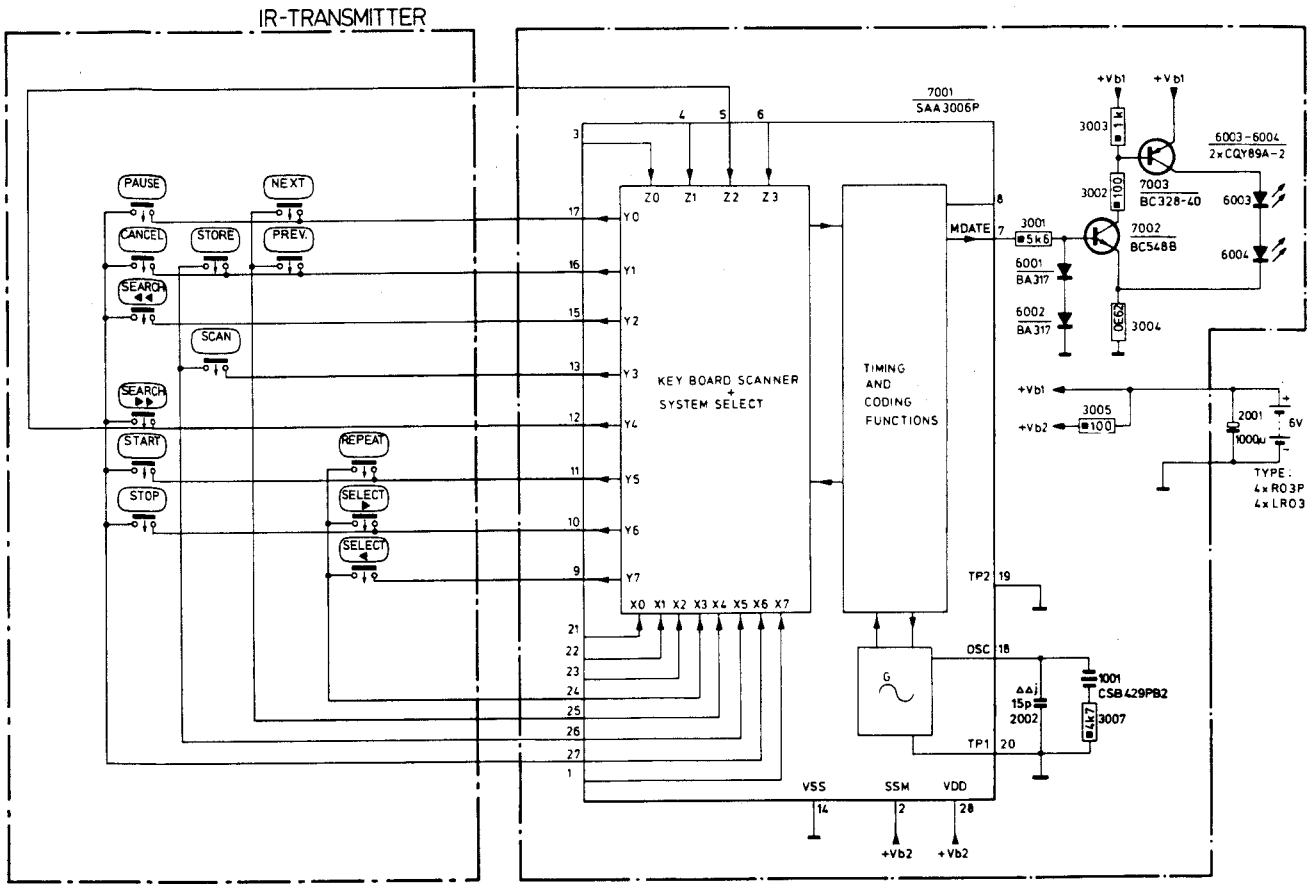


8. REMOTE CONTROL

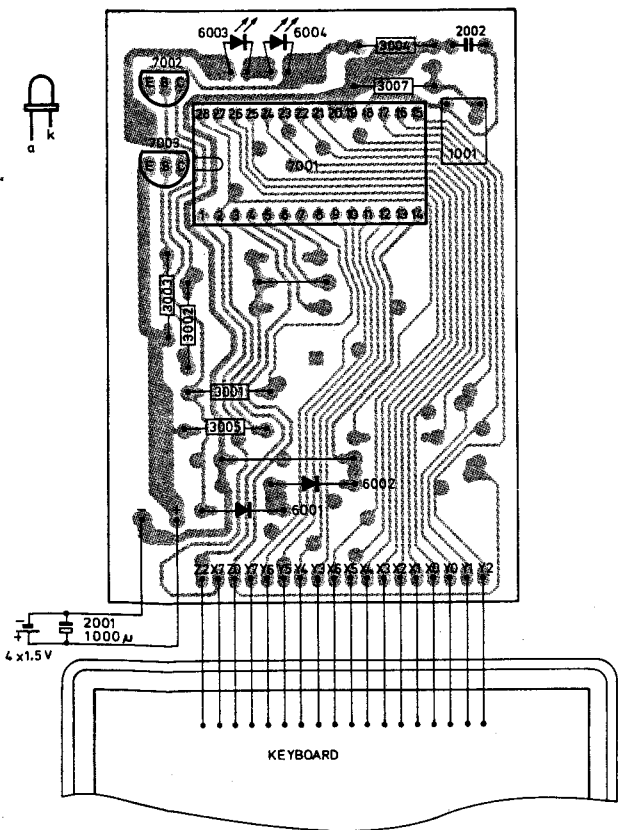


- 1 4822 218 10164
- 2 4822 443 30547
- 3 4822 410 24083
- 4 4822 218 20418
- 5 4822 432 30163
- 6 4822 492 62879
- 7 4822 492 62881
- 8 4822 492 62883
- 9 4822 267 50418
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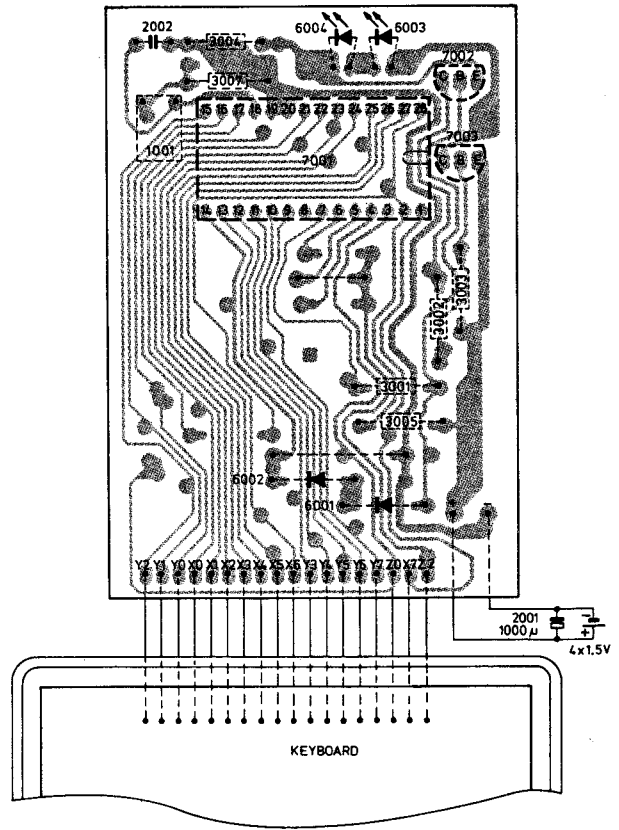
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	BC328-40 BC548B	4822 130 41715 4822 130 40937
	BA317 CQY89A/11	4822 130 30847 4822 130 31332
	2001	1000 $\mu$ F 8 V
	1001	CSB429PB2
		4822 242 70675



36571C22



36 500 B7



36 501 B7

### Annex III: CHECKING d-FACTOR (Test points on servo PCB)

- Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier). See sub G and H.

Place disc on turntable and set player in service loop A.

- Check points  $\diamond 22$  and  $\diamond 23$ .  
Value should be  $0,7 V_{pp}$ .  
Frequency variation strongly depends on the eccentricity of the disc.
- Check point  $\diamond 25$ .  
Value should be  $250 mV_{pp}$ .
- Check point  $\diamond 35$ .  
Value should be  $200 mV_{pp}$ .
- Check point  $\diamond 36$ .  
Value should be  $2 V_{pp}$ .
- Check points  $\diamond 37$  and  $\diamond 38$ .  
Value should be  $10 V_{pp}$ .  
The signal is more sine-shaped now due to filtering out of 650 Hz.
- Point  $\diamond 39$  is hard to measure since switch is in position  $Y_{oc}$  and thus connected with input of op-amp 6215. However, a signal of  $200 mV_{pp}$  is present.
- Check point  $\diamond 40$ .  
Value should be  $9 V_{pp}$ .

Bring the player in service loop B. With a disc on turntable and the AGC and offset-circuits are still switched off.

- Check point  $\diamond 41$ .
- Check point  $\diamond 40$  on beam A of oscilloscope and check point  $\diamond 39$  on beam B of oscilloscope while oscilloscope is triggered with point  $\diamond 41$ .
- Switch on the AGC-circuit and the offset circuit.

### Annex IV: CHECKING k-FACTOR (Test points on Servo PCB)

#### a. Static

Switch power on **without** depressing the Play button. I.e.  $RC0 = \text{high}$ ;  $\overline{RC0} = \text{low}$  so switch  $Y_a$  is in position 0 and switch  $Y_c$  is in position 0.

- Check point  $\diamond 45$ .  
Value should be  $9 V_{pp}$ .
- Check point  $\diamond 46$ .
- On point  $\diamond 29$  now appears a sine-wave signal of 650 Hz, 300 mV, and  $180 - 45 = 135^\circ$  shifted in phase relative to signal on point  $\diamond 45$ .
- Check point  $\diamond 47$ .  
Value should be  $1,5 V_{pp}$ .
- Check point  $\diamond 48$ .  
Value should be  $1 V_{pp}$ .
- Check points  $\diamond 49$ ,  $\diamond 50$ ,  $\diamond 51$  and  $\diamond 46$  relative to each other.  
Amplitudes are 5V.
- Check integrator IC 6212A.

**b. Dynamic**

Insert disc, select service loop A and check if the signal on point 21 equals to  $7 V_{pp}$ .

- Select service loop B.  
Now  $RC0 = \text{high}$  and  $RC0 = \text{low}$ .  
So switch  $Y_a$  is in position 1.  
Switch  $Y_c$  switches at  $f = 650 \text{ Hz}$ .  
Point 52 is low; so point 51 is in phase point 50.  
Now Fig. U should be present on point 51 with duty cycle jittering round 50%.

**Annex V: CHECKING RF PRE-AMPLIFIER**  
(measure points on pre-amp. PCB)

- a. Check DC-voltages on transistors 6103, 6104, 6105, 6109, 6110, 6111.
- b. For checking sensitivity, frequency and delay characteristic, proceed as follows:

- Take flex PCBs of sockets 10 and 11.
- Take plugs 18, 17, 12, 13, 14 and 15 out of sockets.

**Attention:** do not take of plug 16 (= supply!).

- Unscrew PCB to enable injection at the copper side of the PCB.

**Checking sensitivity**

- Inject  $V_{in} = 140 \text{ mV}_{eff}$ , 50 kHz on points 102, 101 via  $R = 100 \text{ k}\Omega$  and  $C = 39 \text{ pF}$  (see Fig. A).
- $V_{out}$  has to be  $245 \text{ mV} \pm 2 \text{ dB}$ .

**Note:**

Ensure that injection cord and test cord are identical.

**Checking frequency and delay characteristic**

- Adjust  $V_{in}$  in such a way that  $V_{out} = 245 \text{ mV} = 0 \text{ dB}$  at 50 kHz.
- Between the injected and the measured sine-wave signal the delay should be  $450 \text{ ns} \pm 50 \text{ ns}$  at 300 kHz. This can be measured on the dual beams oscilloscope with  $V_{in}$  on beam A and  $V_{out}$  on beam B according to Figure B.
- Check frequency and delay characteristic for frequencies given below:

Frequency (kHz)	$V_{out}$ (dB)	Delay (n sec.)	Delay, compared with delay at 300 kHz
1	$-15 \pm 3$	450 ± 50	-50 ± 20 0 ± 20 0 +20 ± 20 +30 ± 20 +30 ± 20
6,3	$- 2 \pm 1$		
16	$- 0,5 \pm 1$		
50	0		
100	$0 \pm 1$		
200	$+ 1 \pm 1$		
300	$+ 1,5 \pm 1$		
500	$+ 3,5 \pm 1$		
700	$+ 5,5 \pm 2$		
1000	$+ 8 \pm 2$		
1600	$+ 8 \pm 2$		
2000	$+ 4,5 \pm 3$		

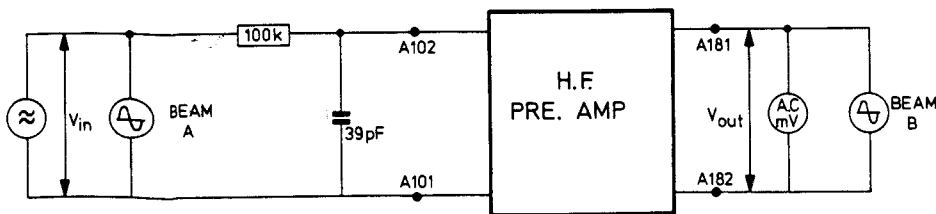


Fig. A

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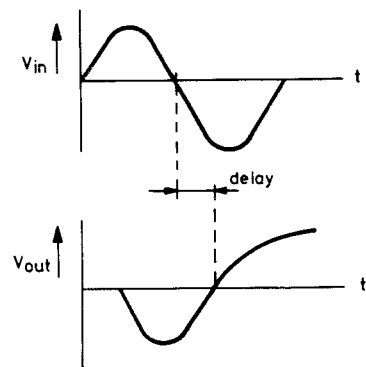
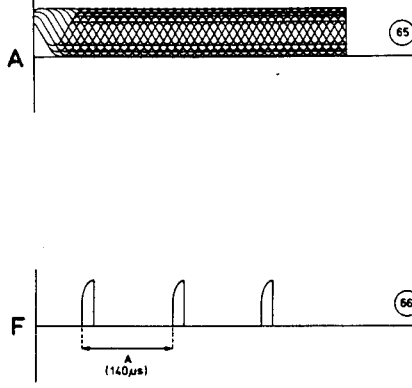
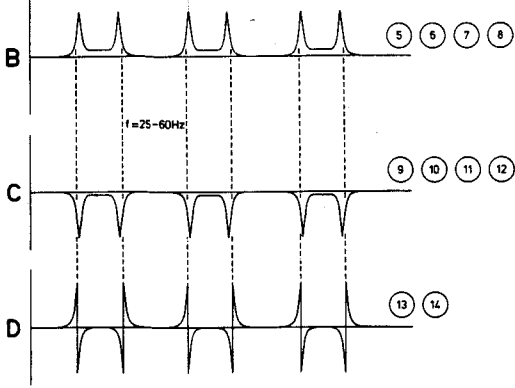


Fig. B 33 394A12

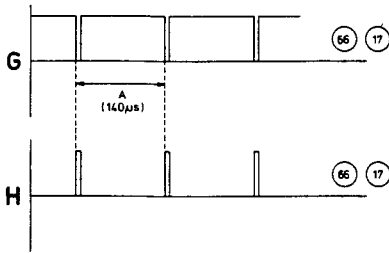
## SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	0,6 Vp-p	10 Hz	
3	P	see fault finding meth.	6 Vp-p	10 Hz	
4	P	see fault finding meth.	5 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	-2 V	25-60 Hz	
10	C	see fault finding meth.	-2 V	25-60 Hz	
11	C	see fault finding meth.	-2 V	25-60 Hz	
12	C	see fault finding meth.	-2 V	25-60 Hz	
13	D	see fault finding meth.	-8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 $\mu$ s
17	H	see fault finding meth.	0-5 V		A = 140 $\mu$ s
20		see fault finding meth.			
21	J	see fault finding meth.	12-14 Vp-p		
22	J	see fault finding meth.	0,7 Vp-p		
23	J	see fault finding meth.	0,7 Vp-P		
24	J	see fault finding meth.	0,2 Vp-p		
25	J	see fault finding meth.	0,25 Vp-p		
26	J	see fault finding meth.	20 mVp-p		
27	J	see fault finding meth.	800 mVp-p		
28	J	see fault finding meth.	800 mVp-p		
29	J	see fault finding meth.	6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	see fault finding meth.	200 mVp-p		
36	J	see fault finding meth.	2 Vp-p		
37	K	see fault finding meth.	10 Vp-p		
38	K	see fault finding meth.	10 Vp-p		
39	L	see fault finding meth.	0-4 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
40	K	see fault finding meth.	9 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
40	M	see fault finding meth.	0-4 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
41	N	see fault finding meth.	6 Vp-p		A = 769 $\mu$ s B = 769 $\mu$ s
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 $\mu$ s B = 769 $\mu$ s
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 $\mu$ s
66	G	see fault finding meth.	5-0 V		A = 140 $\mu$ s
66	H	see fault finding meth.	0-5 V		A = 140 $\mu$ s
67	J	see fault finding meth.			

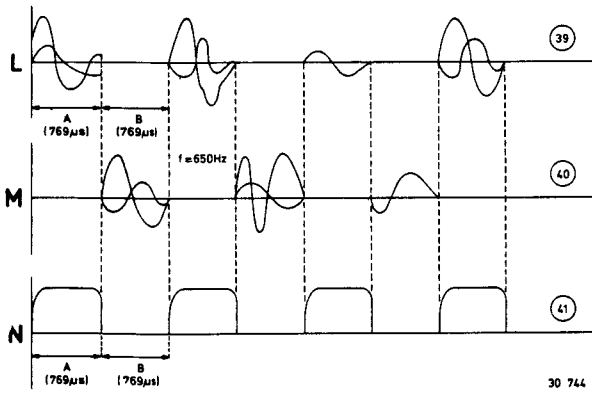
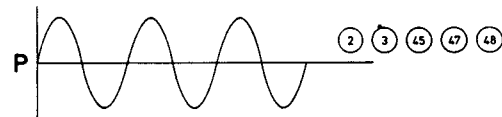
SERVO



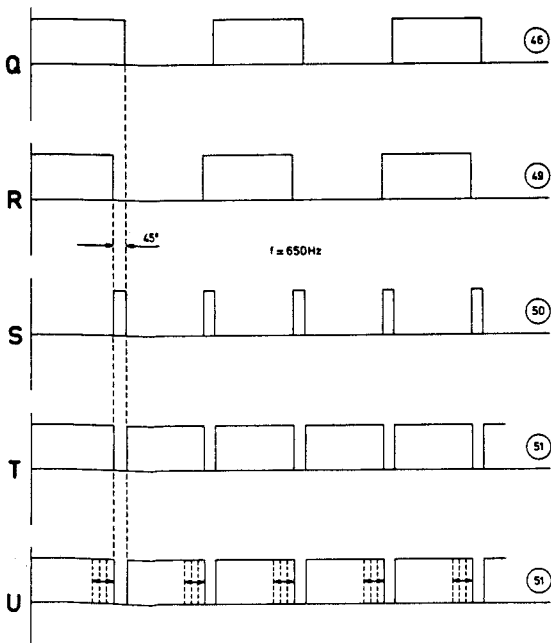
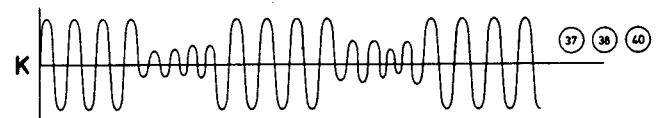
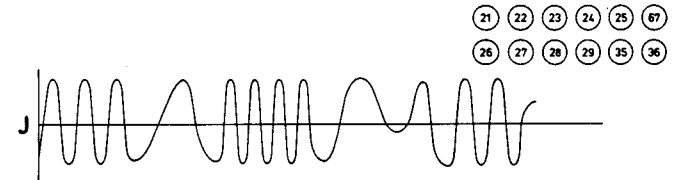
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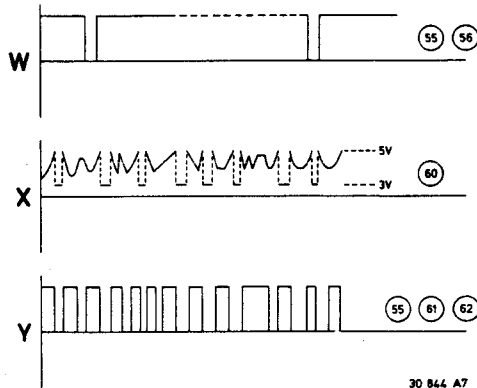
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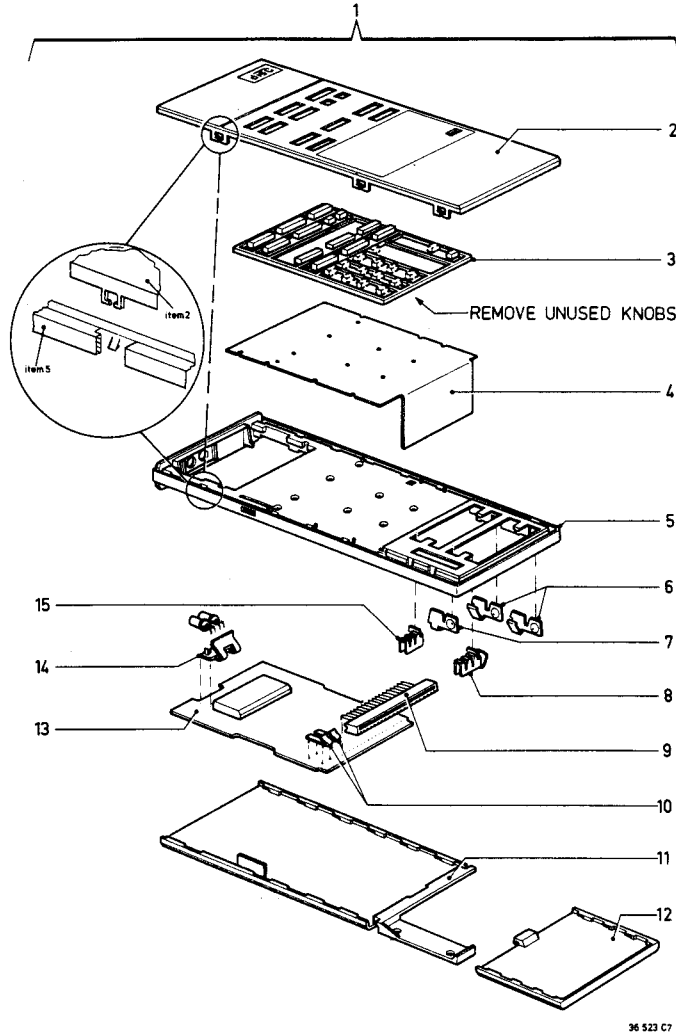


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8. REMOTE CONTROL

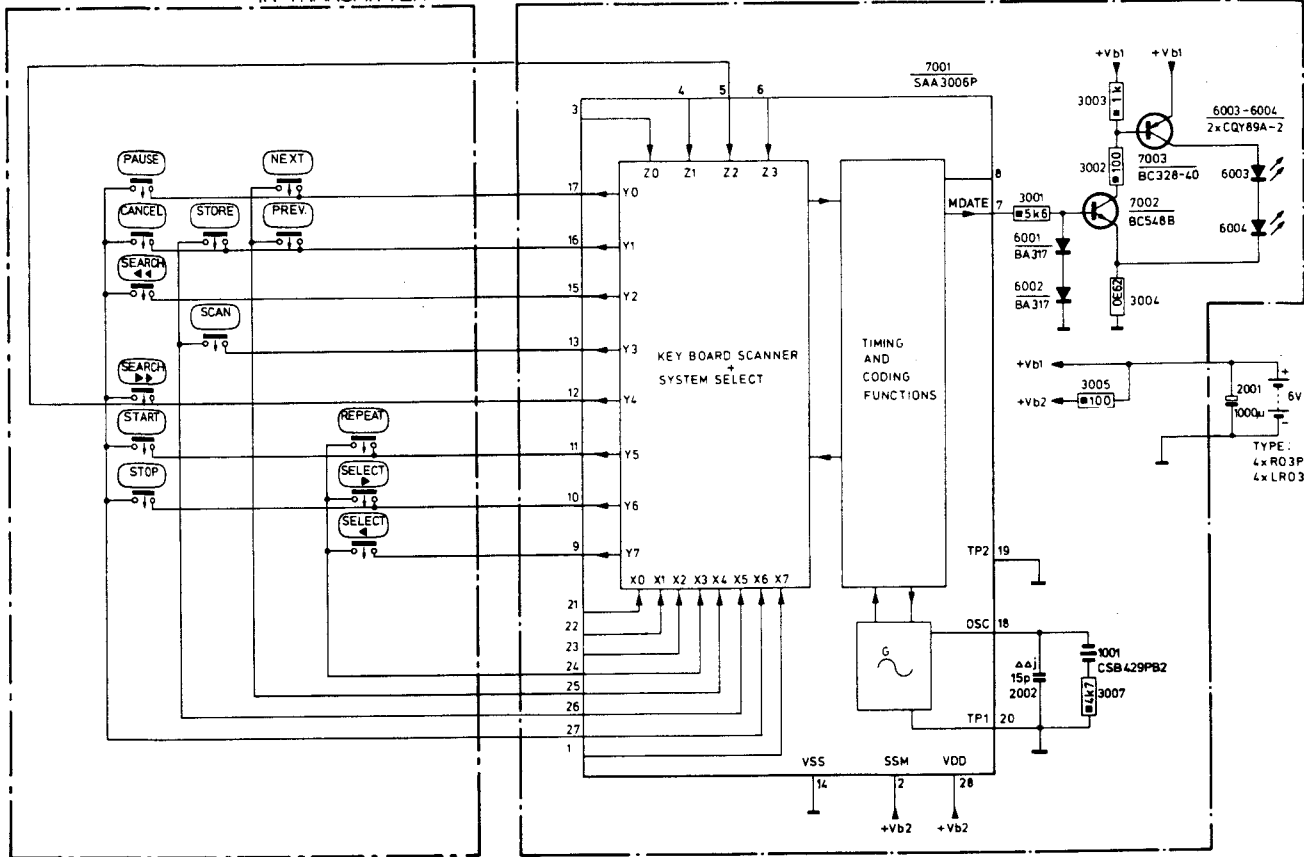


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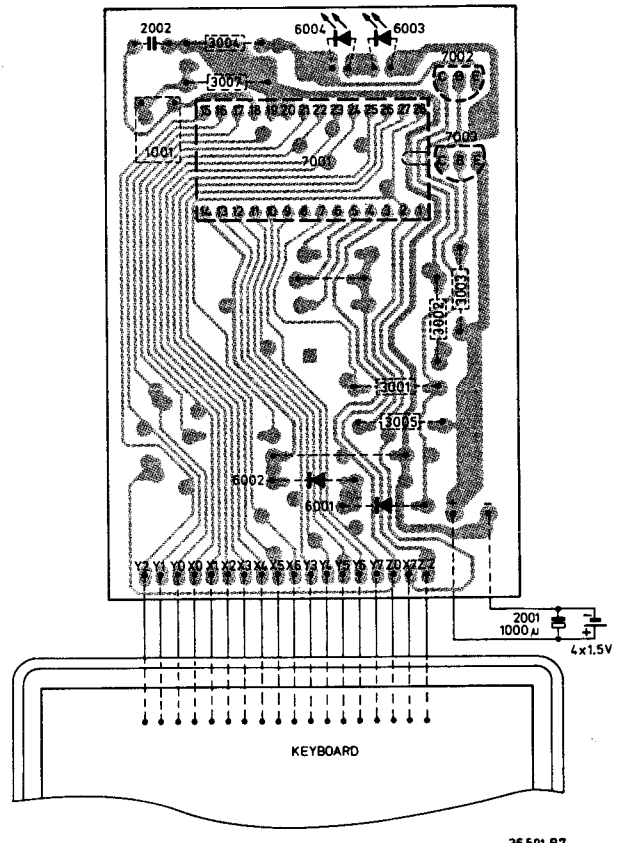
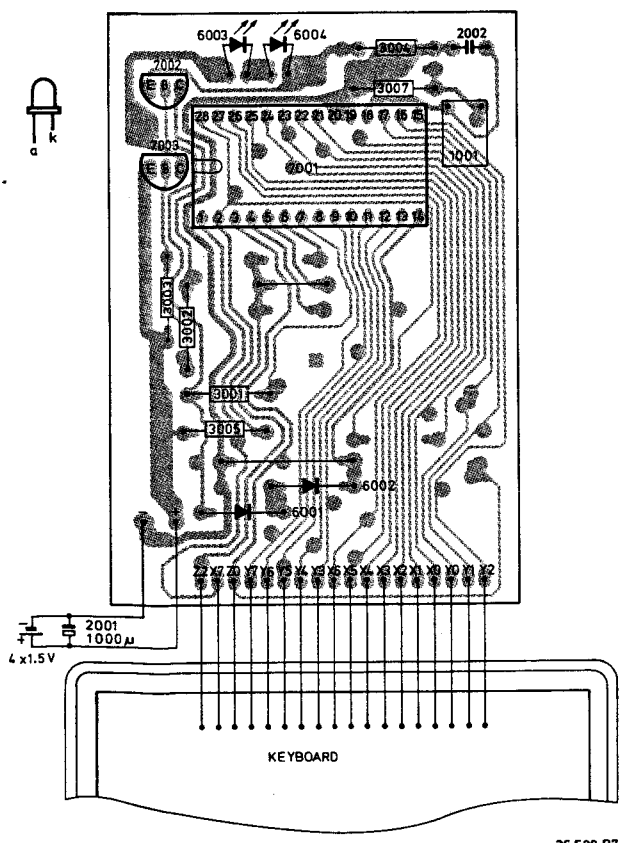
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- 8 4822 492 62883
- 9 4822 267 50418
- 10 4822 492 62904
- 11 4822 432 30232
- 12 4822 432 30233
- 13 4822 214 50418
- 14 4822 256 90506
- 15 4822 492 62882

SAA3006P		4822 209 81891
BC328-40		4822 130 41715
BC548B		4822 130 40937
BA317		4822 130 30847
CQY89A/11		4822 130 31332
2001	1000 $\mu$ F 8 V	4822 124 21341
1001	CSB429PB2	4822 242 70675

IR-TRANSMITTER



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C.D.M.-1

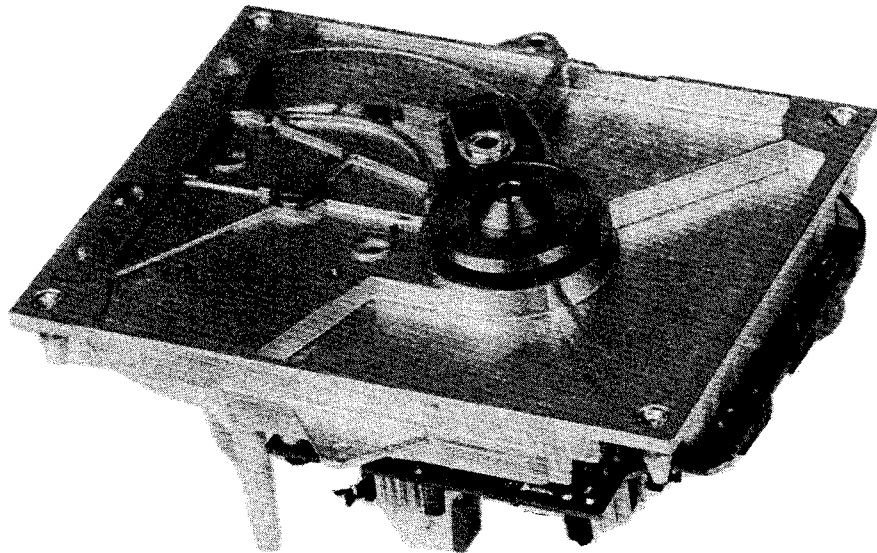
compact disc player

MECHANISM

Service  
Service  
Service

# Service Manual

COMPACT  
disc  
DIGITAL AUDIO



35 367 A

CLASS 1  
LASER PRODUCT

3122 110 03420

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Geräts darf nicht verändert werden; für Reparaturen sind Original-Ersatzteile zu verwenden.

Documentation Technique Service Dokumentation Documentazione di Servizio Huolto-Ohje Manual de Servicio Manual de Servicio

Subject to modification

4822 725 20129

Printed in The Netherlands

CS 94 556 D

REPARATURHINWEISE

Zur Verhütung dass lose Metallteile in den CD-Mechanismus gelangen, ist zu veranlassen, dass die Stellen an der repariert wird, sauber ist.

Das Objektiv lässt sich mit einem Blasepinsel reinigen.

**Der CD-Mechanismus ist mit selbstschmierenden Lagern versehen und darf daher NICHT geschmiert werden.**

**Es ist dafür zu sorgen, dass bei Reparaturen und Messungen auf der Unterseite des Gerätes das Gerät nicht auf der Achse des Plattentellermotors ruht.**

**Serviceleistungen an der RAFOC-Einheit (=Radial- und Fokussiereinheit pos. 61)**

Die von Service gelieferte RAFOC-Einheit (Radial- und Fokussiereinheit) ist die gleiche wie in CDM-0. Die Bodenplatte dieser RAFOC-Einheit ist in dem CDM-1 durch Rahmen Pos. 503 ersetzt worden. Beim Auswechseln der RAFOC-Einheit müssen **vorsichtig** und präzise folgende Handlungen verrichtet werden.

- Die beiden Flexprints den Steckverbindern am Vorverstärkerprint entnehmen.
- **Schadhafte** RAFOC-Einheit ausbauen, dadurch dass die vier Schrauben M3x18 mm gelöst und Achse Pos. 504 beseitigt werden.
- Bei der **neuen** RAFOC-Einheit die Achse Pos. 504 beseitigen. Es sind die drei Unterlegscheiben Pos. 502 und die Federscheibe Pos. 505 zu beachten; sie sollen beim Einbau an die gleiche Stelle gelangen.

Die vier Schrauben M3x18 mm so weit lösen, dass sich die Bodenplatte abnehmen lässt. Die Schrauben M3x18 mm nicht beseitigen (sie halten die neue RAFOC-Einheit zusammen).

- Die neue RAFOC-Einheit auf den Rahmen 503 einbauen. Es ist dann zu beachten, dass die 3 Unterlegscheiben 502 und die Federscheibe 505 sich an der richtigen Stelle befinden, bevor Achse Pos. 504 fixiert wird.
- Kontrollieren, ob der Arm freiläuft, sowie die Winklereinstellung prüfen (siehe Kontrolle und ggf. Regeln der Winklereinstellung).

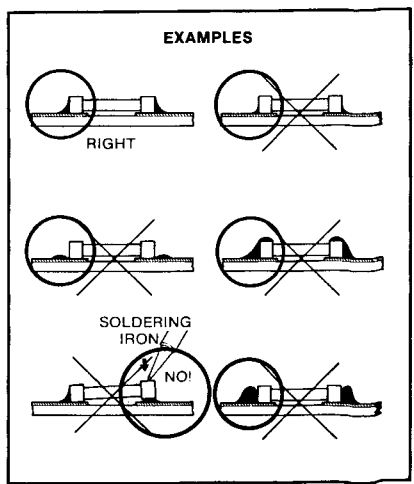
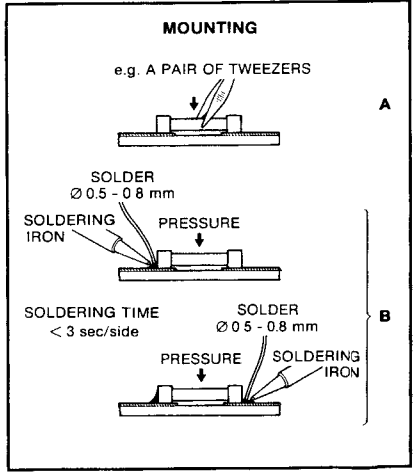
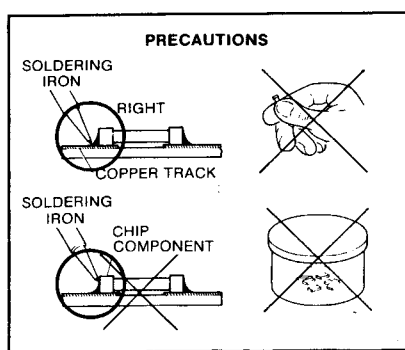
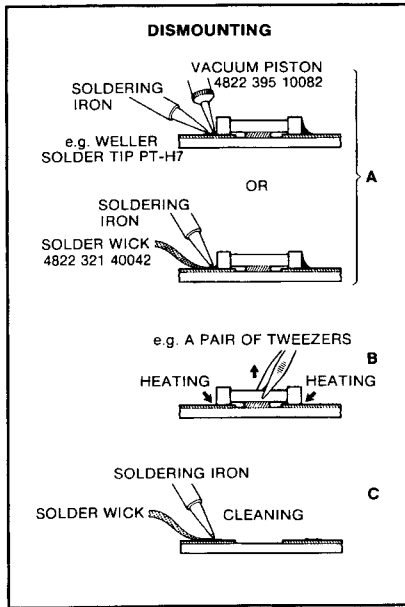
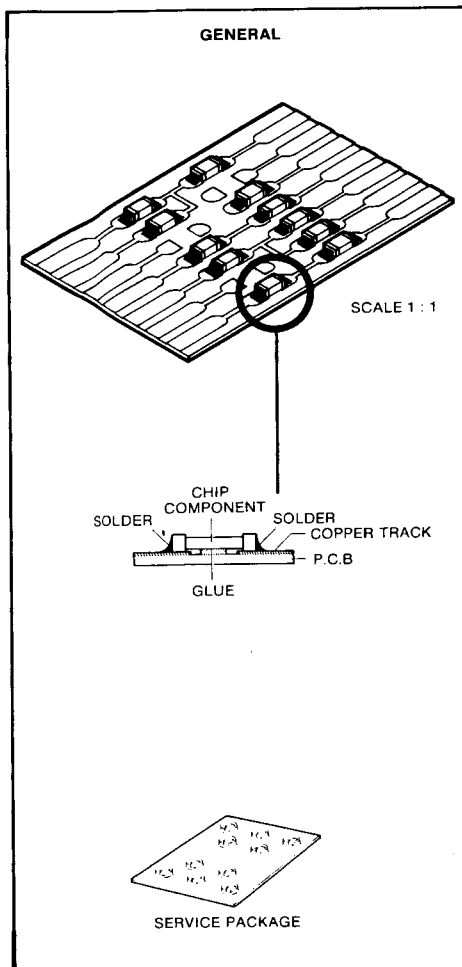
**Achtung!**

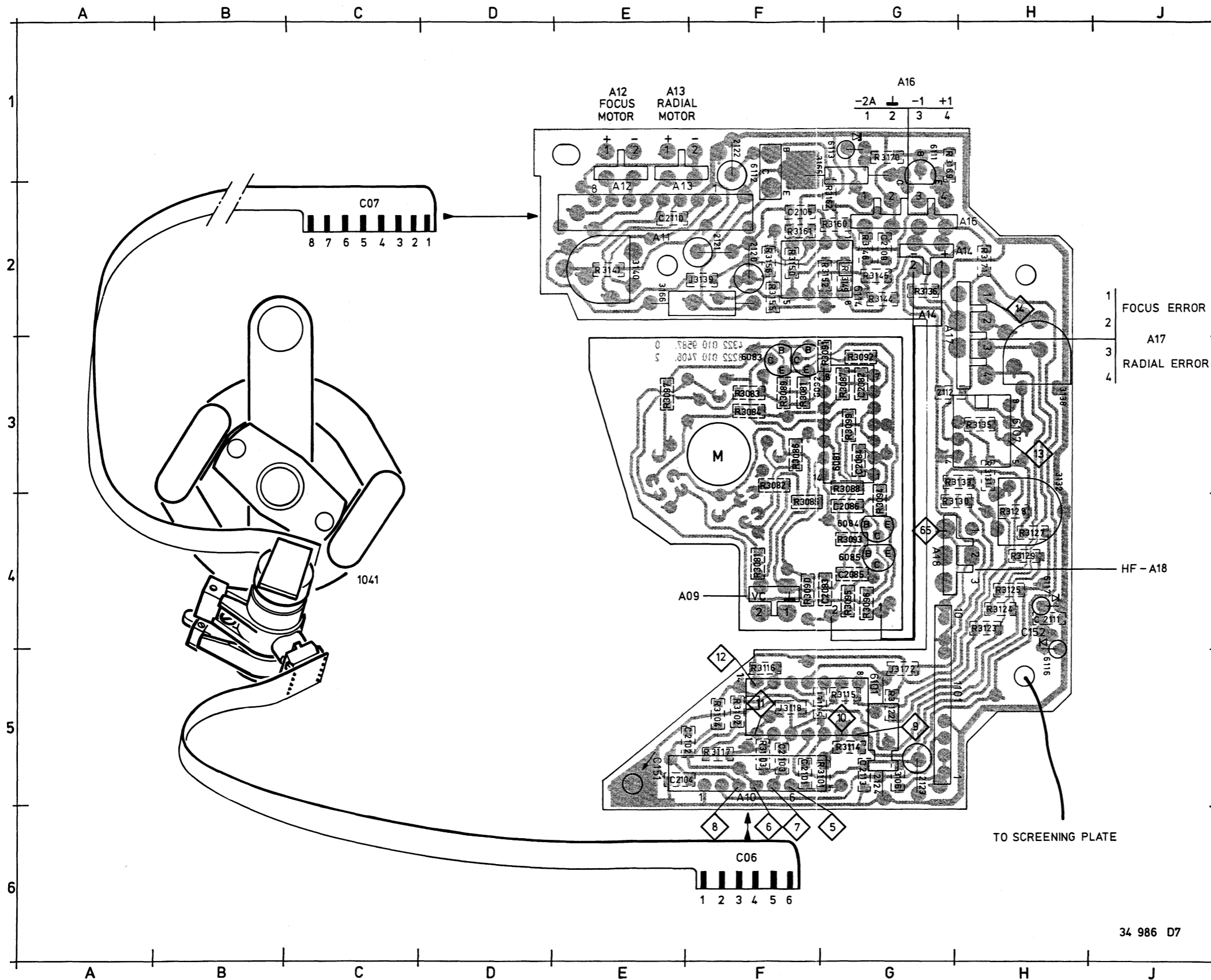
**Um zu verhindern, dass sich Einstellungen ändern, dürfen KEINE ANDEREN SCHRAUBEN als im vorhergehenden genannt losgedreht werden.**

**DIE OPTISCHE LESEVORRICHTUNG IST GEGENÜBER STATISCHER LADUNG WEIT EMPFINDLICHER ALS EIN MOS-IC.**

**UNSORGFÄLTIGES VORGEHEN WÄHREND SERVICEARBEITEN KANN DIE LEBENSDAUER DRASTISCH KURZEN.**

**DAHER IST ZU VERANLASSEN, DASS WAHREND DER SERVICEARBEITEN DIE HILFSMITTEL UND SIE SELBST DAS GLEICHE POTENTIAL WIE DER MECHANISMUS AUFWEISEN.**





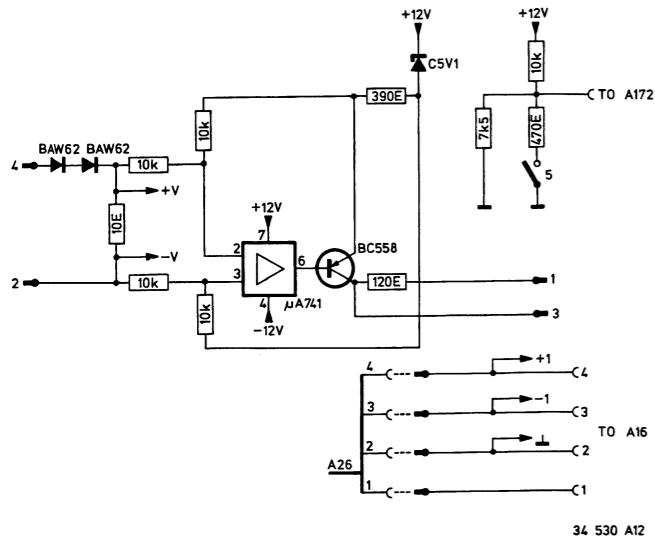
34 986 D7

UNIT		
1101	Thick film unit HF	4822 218 10157
NE532N		4822 209 80818
NE5514N		4822 209 81451
$\mu$ A714N		4822 209 80617
BC558		4822 130 40941
BD226		5322 130 44244
BZX79-C15		4822 130 34281
BAW62		4822 130 30613
3132	47k	4822 100 10583
3138	2k2	4822 100 20116
3140	1k	4822 100 20115
3165	15E MR30	5322 116 54914
3166	56E PR37	5322 116 54929
0E		4822 111 90163
47E		4822 111 90217
150E		5322 111 90098
270E		4822 111 90154
390E		5322 111 90138
2k2		4822 111 90249
3k3		4822 111 90157
6k8		5322 111 90117
10k		4822 111 90249
12k		5322 111 90097
22k		4822 111 90251
120k		4822 111 90149
680k		4822 111 90488
680 pF		4822 122 31809
10 nF		4822 122 31728

1101 G05	2133 G05	3102 F05	3133 R03	3169 G01
2082 G03	3081 F04	3103 F05	3135 R03	3170 G01
2083 F04	3082 F03	3104 F05	3136 G02	3171 H02
2084 G03	3083 F03	3105 F05	3138 R03	3172 G05
2085 G04	3084 F03	3106 G05	3139 F02	3081 G03
2086 G04	3085 F04	3114 G05	3140 E02	3083 F03
2101 F05	3086 F03	3115 G05	3141 E02	3084 G04
2102 F05	3087 G03	3116 F05	3144 G02	3085 G04
2103 F05	3088 G03	3117 F05	3145 G02	3092 F03
2104 E05	3089 F03	3118 F05	3146 G02	3101 G05
2105 F02	3090 F04	3122 G05	3149 G02	3107 R03
2109 G02	3091 F03	3123 H04	3150 F02	3111 G01
2110 E02	3092 G03	3124 H04	3152 G02	3112 F01
2111 H04	3093 G04	3125 H04	3155 F02	3113 G01
2112 G03	3094 G04	3127 H04	3156 F02	3116 H05
2113 G05	3095 G04	3128 H04	3160 G02	3117 H04
2120 F02	3096 G04	3129 H04	3161 F02	
2121 F02	3097 E03	3130 H04	3162 G02	
2122 F01	3099 G03	3131 H03	3165 G01	
2124 G05	3101 F05	3132 H04	3166 F02	

**Laserversorgung**

Da die Abtastoptik gegenüber statischen Ladungen äusserst empfindlich ist, müssen während der Messung und Einstellung der Laserversorgung die Hilfsmittel und Sie selbst das gleiche Potential wie der CD-Mechanismus haben.



34 530 A12

**Kontrolle**

Zu diesem Zweck muss die Lasersimulator-Printplatte nr. 3 (4822 395 30229) verwendet werden. Flexible Leiterplatte dem Steckverbinder A11 entnehmen und den Simulatorprint mit dem Steckverbinder verbinden.

Stecker A16 herausziehen und in den Steckverbinder am Simulatorprint einstecken. Den Stecker mit vier Drähten mit dem Steckverbinder A16 verbinden.

Stecker A17 lösen und den Stecker mit einem Draht in den Steckverbinder A17 einstecken.

**Kontrolle der Ruhestellung:**

Schalter am Simulatorprint in die "OFF"-Stellung und Netzschalter in die "ON"-Stellung bringen.

Einstellwiderstand 3140 rechtsherumdrehen (Höchst-Widerstand) und die Spannung zwischen den Punkten +v und -v am Simulatorprint messen. Die Spannung soll ≤ 15 mV sein.

**Kontrolle der Laserversorgungseinstellung:**

Schalter am Simulatorprint in die "ON"-Stellung bringen und die Spannungen zwischen den Punkten +v und -v am Simulatorprint messen.

Widerstand 3140 rechtsherumdrehen (Höchst-Widerstand):  $U_{+v -v} = 225 \text{ mV} \pm 45 \text{ mV}$ .

Widerstand 3140 linksherum-drehen (Mindest-Widerstand):

$U_{+v -v} = 750 \text{ mV} \pm 150 \text{ mV}$ .

Widerstand 3140 in die Mitte stellen.

Es handelt sich um eine Voreinstellung. Nachdem der Simulatorprint fortgenommen ist, muss der Laserstrom eingestellt werden.

(siehe service manual CD player).

**Regeln der Fokusbandbreite**

(siehe service manual CD player).

**Kontrolle der automatischen Verstärkungsregelung (AGC) und der Offsetschaltungen.**

(siehe service manual CD player).

**Kontrolle der Motorregelung (Hall).**

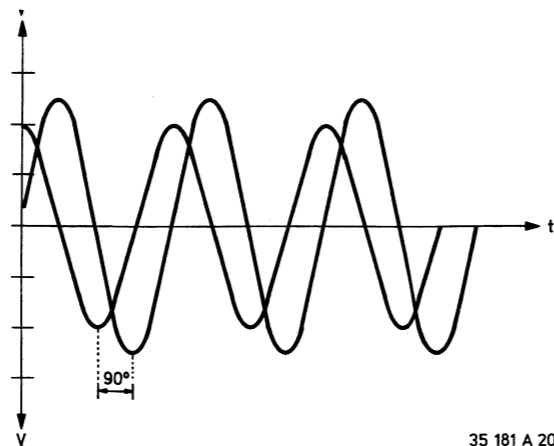
- 1 Stecker A09 vom Motorprint am CDM entfernen.
- 2 Kanal A eines Zweistrahloszilloskops an den Emitter der Transistoren 6082 und 6083 und Kanal B an den Emitter der Transistoren 6084 und 6085 schalten. Oszilloskopstellung: 2 V/Teilung — 10 ms/Teilung.
- 3 Anschluss 1 von Steckverbinder A09 am Motorprint mit der Masse des Gerätes verbinden.
- 4 Gerät einschalten.
- 5 Eine **negative** Spannung an Anschluss 2 von Steckverbinder A09 einspeisen. Das Einspeisen **sol** erst erfolgen, nachdem die Schaltung an die Versorgungsspannung angeschlossen worden ist. Es ist von 0 Volt auszugehen; diese Spannung nach und nach auf -5 V bringen. Der Motor soll nun laufen. Wenn der Motor läuft, kann die Spannung auf ca. -2,5 V gebracht werden. Der Motor soll dann immer noch laufen.
- 6 Am Oszilloskop sollen nun sinusförmige Signale erkennbar sein (siehe Bild A). Die Signale sollen nach etwa 2 Sekunden symmetrisch um die Nullachse liegen und um 90° zueinander verschoben sein. Die Amplituden dieser beiden Signale dürfen zuhöchst ein Verhältnis von 1 zu 2 aufweisen.
- 7 Die Amplitude wird durch die eingespeiste Spannung bedingt. Das Verhältnis  $U_{\text{in}} (V\text{-in}) / U_{\text{out}} (V\text{-out})$  soll zwischen 1:2 und 1:3 liegen.
- 8 Es ist zu ermitteln, bei welcher Eingangsspannung (V-in) der Motor 600 Umdrehungen in der Minute macht. Bei 600/min ist die Frequenz von V-out 30 Hz. V in soll bei dieser Motordrehzahl zwischen -1,5 V und -3,7 V liegen.

**Schlussfolgerung**

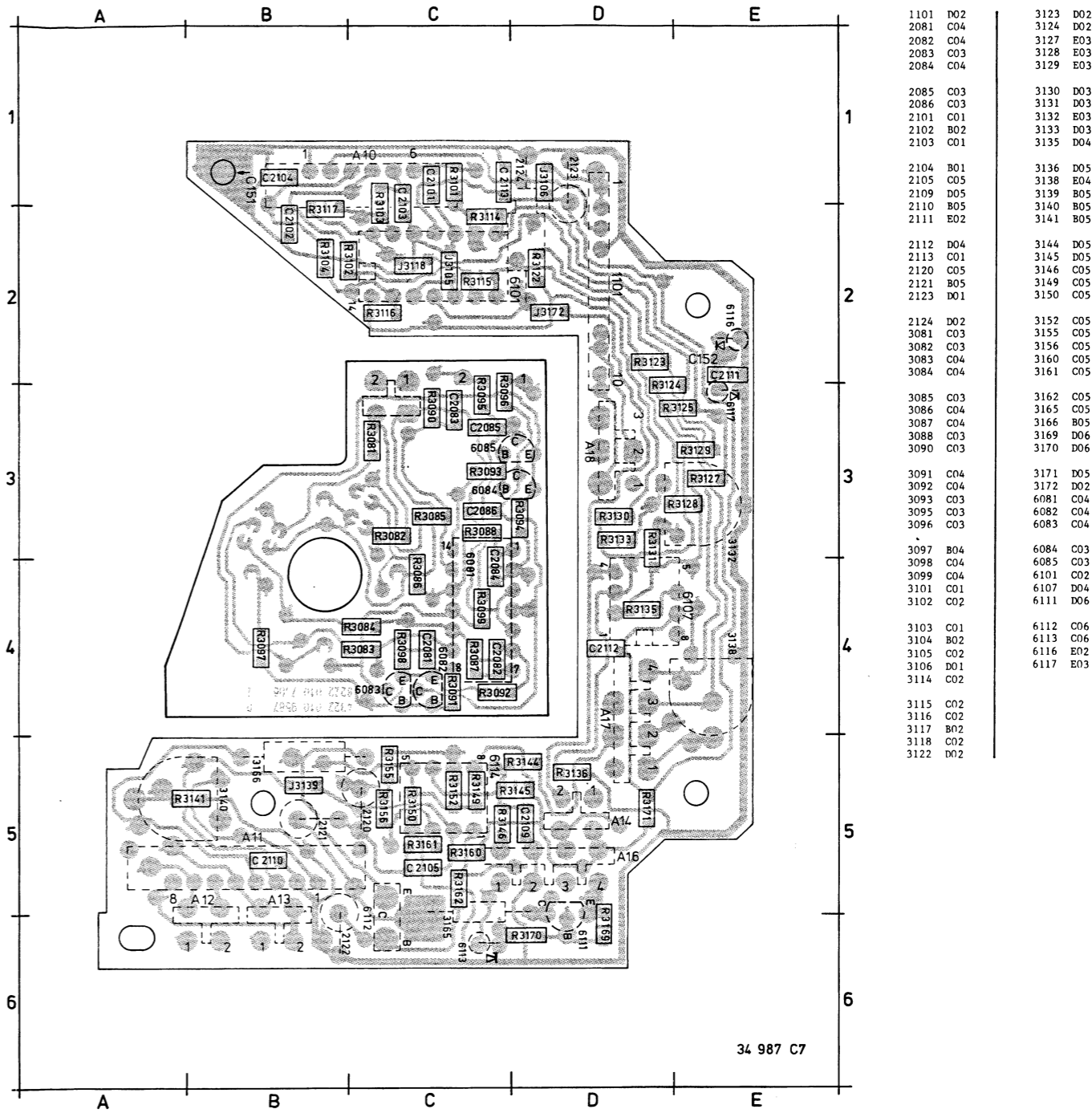
Wenn all diese Bedingungen erfüllt werden, lässt sich voraussetzen, dass der Motor und der Print in Ordnung sind.

Werden die Bedingungen in 5, 6 und 7 nicht erfüllt, dürfte allem Anschein nach der Fehler in der Elektronik gesucht werden.

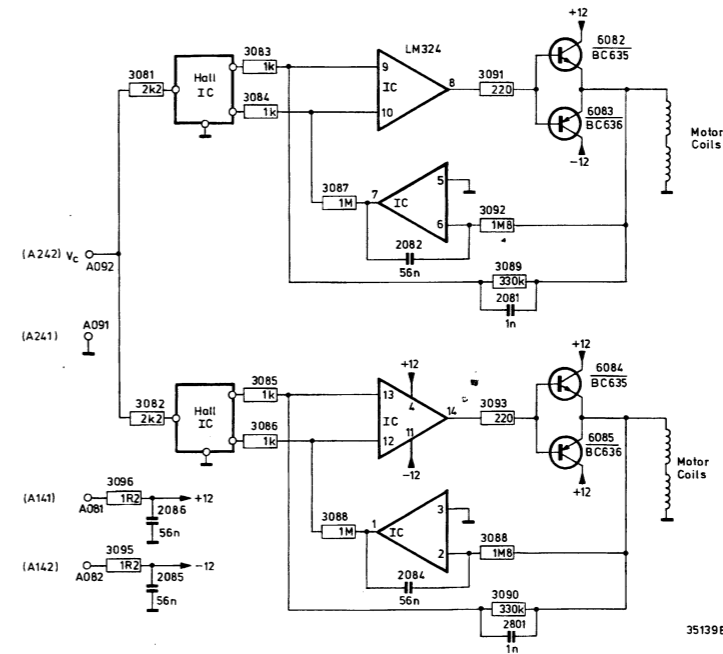
Werden die Bedingungen in 5, 6 und 7 erfüllt und sollte zu 8 eine Spannung von beispielsweise -4,5 V eingespielt werden müssen, damit eine Motordrehzahl von 600/min erreicht wird, dann wird allem Anschein nach in mechanischer Sicht einiges nicht in Ordnung sein, etwa eine zu hohe Lagerreibung.



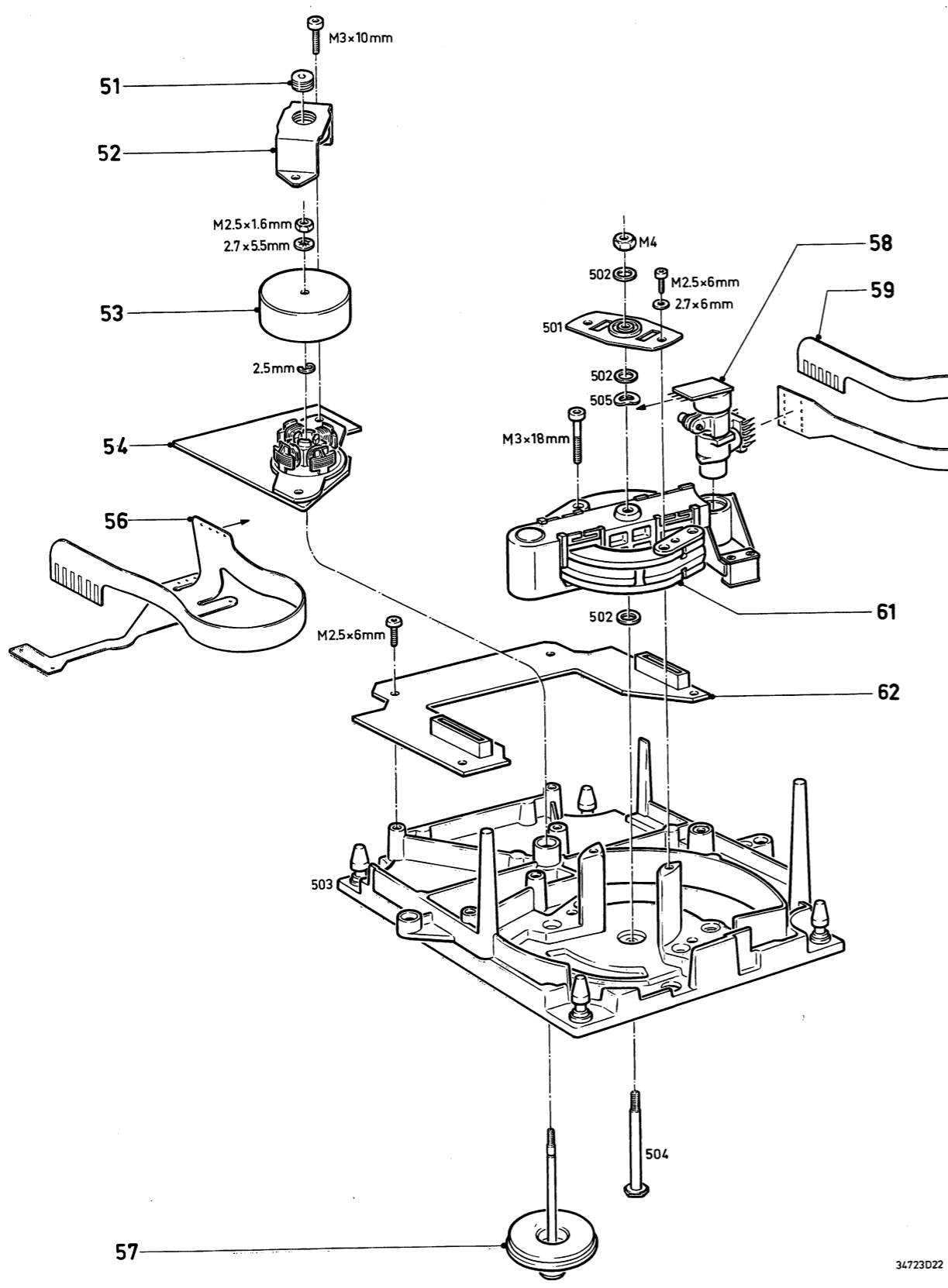
35 181 A 20



34 987 C7



35139B2

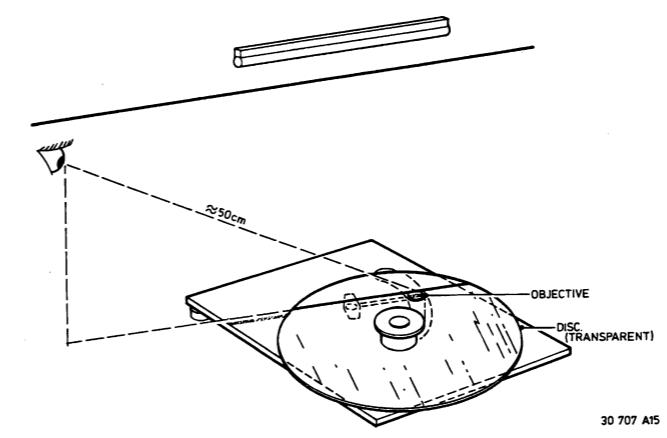


51	4822 502 11701
52	4822 520 10529
53	4822 362 20225
54	4822 214 50395
56	4822 322 40051
57	4822 528 10491
58+59	4822 691 30129
59	4822 322 40048
61	4822 691 30128
62	4822 214 50394

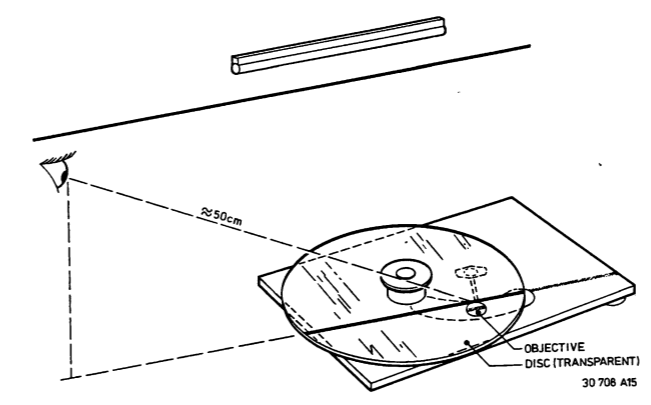
MECHANISCHE MESSUNGEN UND EINSTELLUNGEN

Höheneinstellung des Plattentellers (siehe service manual CD player)

Kontrolle der Winkeleinstellung



Spiegel 4822 395 90205 auf die Fokussiereinheit und Glasscheibe 4822 395 90204 (mit Andrücker 4822 532 60906) auf den Plattenteller legen.  
 Gerät unter eine Lichtquelle, unter der sich eine gerade Linie befindet, stellen, (z.B. TL mit Gitter).  
 Arm in Mittelstellung bringen. Gerät so drehen, dass der Arm parallel zu der Linie unter der Lichtquelle steht (siehe Bild).  
 In der Richtung und in der Fortsetzung der Linie die Reflexion auf Glasscheibe und Spiegel betrachten.  
 Die Linien dürfen nicht mehr als 4 mm voneinander getrennt sein.  
 Das Gerät derart stellen, dass eine Linie über der Mitte des Spiegels läuft.  
 Wenn die andere Linie innerhalb der Oberfläche des Spiegels bleibt, ist der Abstand  $\leq 4$  mm.

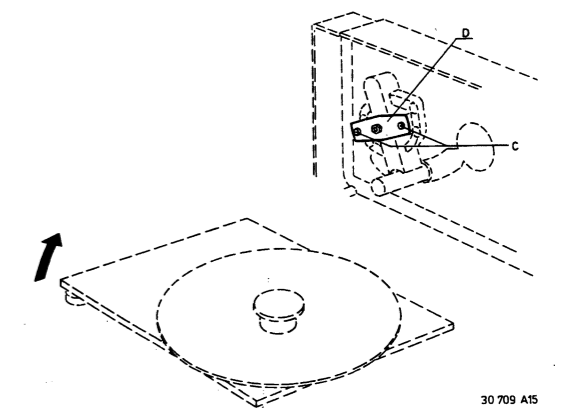


CD-Vorrichtung 90° gegenüber vorhergehende Stellung drehen.  
 Der Arm soll in der Mittelstellung verbleiben (siehe Bild).  
 Vorhergehende Messung wiederholen.

Winkeleinstellung

Beim fabrikmässigen Einstellen des durch Platte und Lichtweg gebildeten Winkels wurde ein Kompromiss zwischen Mindest-Winkelabweichung und Mindest-Armreibung angestrebt.  
 Wenn Messungen ergeben, dass der Winkel die gegebene Toleranz nicht einhält, muss der Winkel NICHT auf Mindestabweichung sondern gerade innerhalb der Toleranz eingestellt werden. Die neue Einstellung muss zwischen der alten und der günstigsten Einstellung liegen.

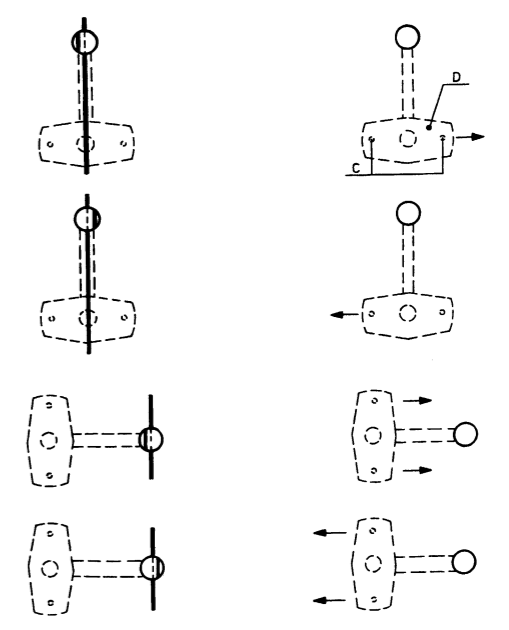
Nach der Einstellung muss die Armreibung geprüft werden. Die Prüfung der Armreibung wird mit Hilfe einer Federwaage vorgenommen, die an das Kontragewicht angelegt wird. Gemessen an dem Vollausschlag darf die Armreibung 30 mN nicht überschreiten. Wenn sich herausstellt, dass die Reibung zu hoch ist, muss die Einstellung auf den alten Wert zurückgebracht werden. Der Arm ist dann auszuwechseln und der Winkel ist erneut zu kontrollieren.



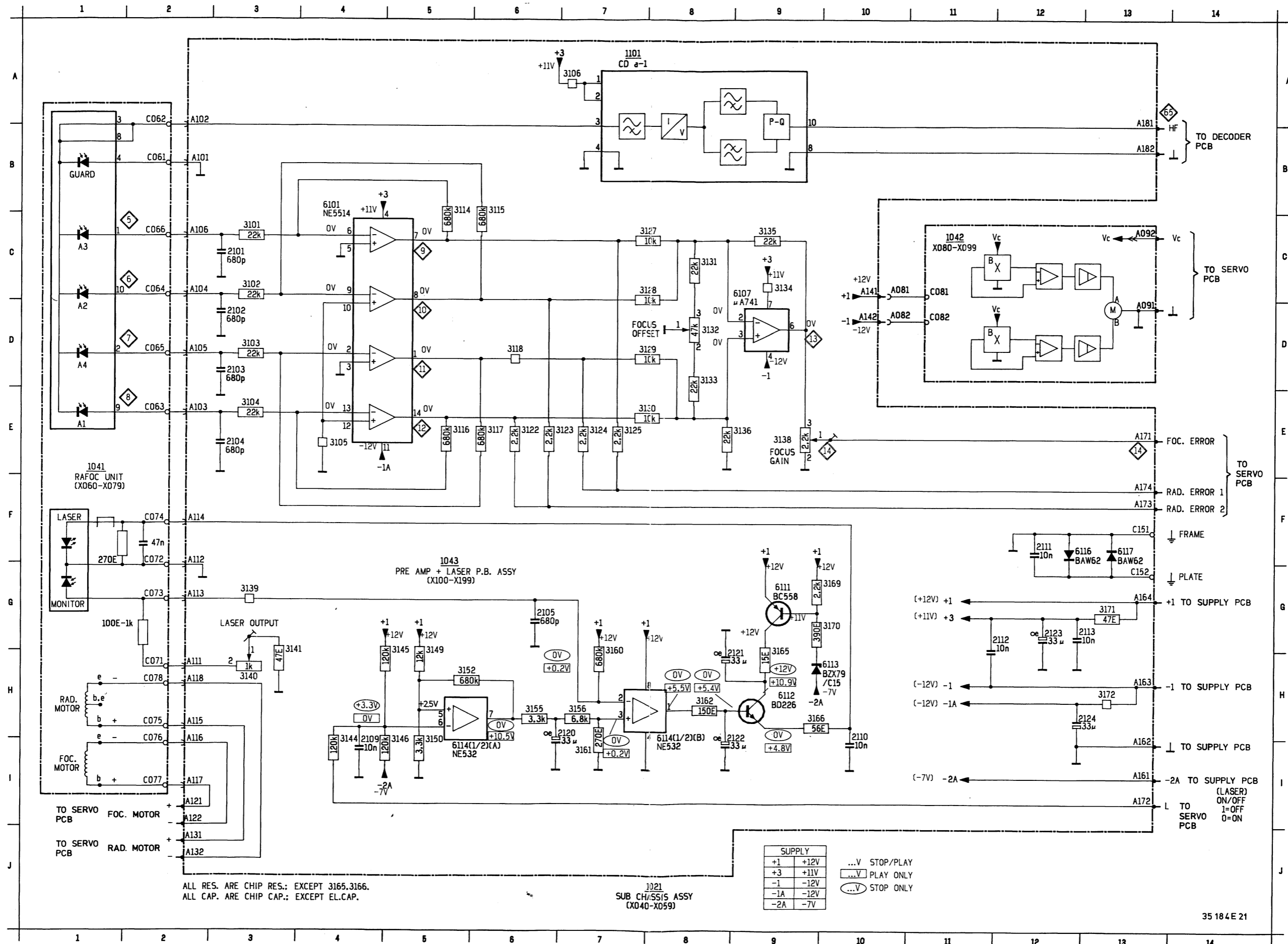
Der Winkel wird wie folgt eingestellt:  
 Gerät auf die Servicestützen 4822 395 30202 stellen.  
 Schrauben C (siehe Bild) soweit lösen, dass sich Lagerplatte D verschieben lässt.  
 Winkeleinstellung korrigieren, indem die Lagerplatte in die im Bild gekennzeichnete Richtung verschoben wird.  
 Schrauben C anziehen und beachten, dass sich die Einstellung nicht ändert.  
 Anschliessend nochmals die Winkeleinstellung in zwei Richtungen kontrollieren.

Achtung

Nach der Winkeleinstellung muss die Höheneinstellung des Plattentellers kontrolliert werden.



1101 A 7 2104 E 3 2111 F12 2121 H 9 3101 C 3 3105 E 4 3116 E 5 3123 E 7 3128 C 8 3132 D 8 3136 E 9 3141 G 3 3149 G 5 3156 H 7 3165 G 9 3171 G13 6111 G 9 6114(I 5  
 2101 C 3 2105 G 6 2112 G12 2122 H 9 3102 C 3 3106 A 7 3117 E 6 3124 E 7 3129 D 8 3133 D 8 3138 E 9 3144 I 4 3150 I 5 3160 G 7 3166 H 9 3172 H13 6112 H 9 6116 F13  
 2102 D 3 2109 I 4 2113 G13 2123 G12 3103 D 3 3114 B 5 3118 D 6 3125 E 7 3130 E 8 3134 C 9 3139 G 9 3145 G 5 3152 H 5 3161 I 7 3169 G10 6101 B 4 6113 H10 6117 F13  
 2103 D 3 2110 H10 2120 H 7 2124 H13 3104 E 3 3115 B 6 3122 E 6 3127 C 8 3131 C 8 3135 C 9 3140 H 3 3146 I 5 3155 H 6 3162 H 8 3170 G10 6107 C 9 6114(H 8



ALL RES. ARE CHIP RES.: EXCEPT 3165, 3166.  
 ALL CAP. ARE CHIP CAP.: EXCEPT EL. CAP.

1021  
 SUB CH/SS15 ASSY  
 (X040-X059)

SUPPLY		
+1	+12V	...V STOP/PLAY
+3	+11V	...V PLAY ONLY
-1	-12V	...V STOP ONLY
-1A	-12V	
-2A	-7V	



# SI

Wichtig für die Werkstatt!

Nr.: 24037

Sachgebiet: Compact Disc AC 24

Datum: 17.9.85

De/gs

## Service Information

Betrifft: Compact Disc-Laufwerk  
CDM 1

Verteiler: intern und extern

### 1. Abgleich Focus-Offset

Der Abgleich des Einstellers "Focus-Offset" auf dem Vorverstärker- und Laser-Print kann - falls erforderlich - wahlweise nach 2 verschiedenen Methoden durchgeführt werden:

- a.) mit Zuführung eines Meßsignals
  - Anschlüsse nach Fig. 1 herstellen.
  - Mit "Focus-Offset" Spannungen an Pin 6/IC 6107 auf Minimum ( $< 100$  mV) einstellen.Nach Abgleich soll der Schleifer des Einstellers in Mittelstellung ( $\pm 10^\circ$ ) stehen.
- b.) in Play-Funktion des Spielers
  - Fehlerfreie Platte - z. B. Testplatte 5 (Best.-Nr. 4822 397 300 96) - abspielen.
  - Mit "Focus-Offset" das HF-Signal am MP 65 ("Augenmuster") auf einen Wert  $\geq 500$  mV einstellen (messen mit AC-Millivoltmeter).

### 2. Ergänzung zur Ersatzteil-Aufstellung

Die Fassungen A 10 und A 11 auf dem Vorverstärker- und Laser-Print (Konnektoren für die Flexprints vom Lightpen) werden als Ersatzteile geführt:

A 10, 6polig	4822 267 504 12
A 11, 8polig	4822 267 504 13

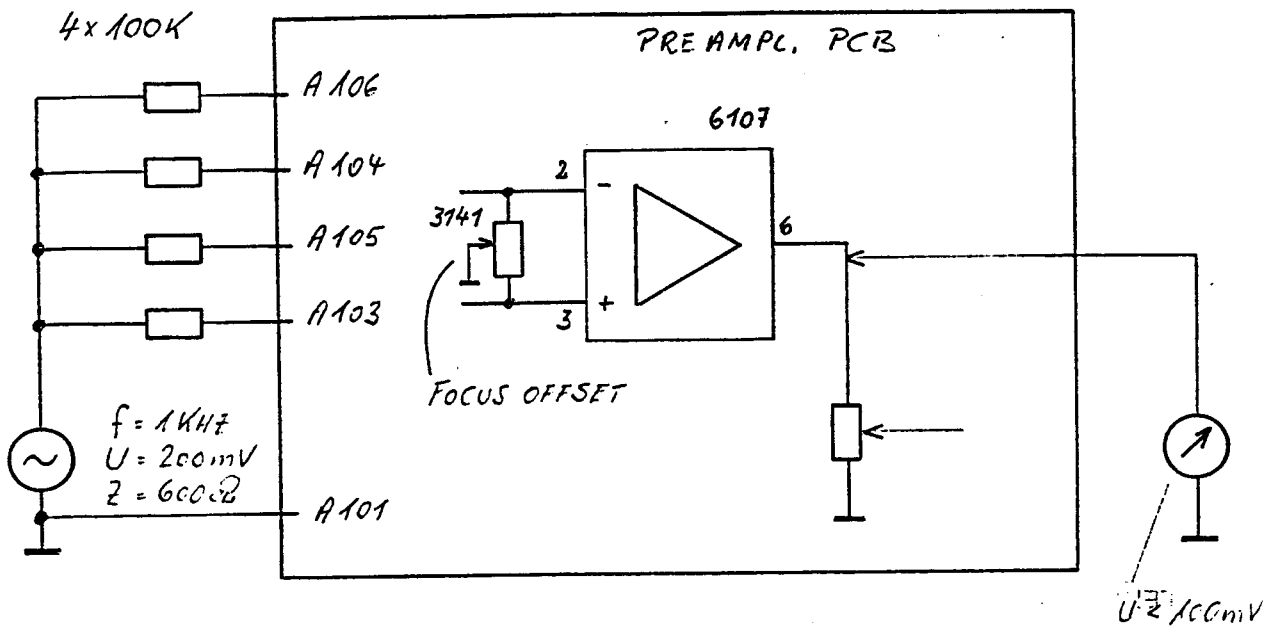


FIG. 1