

Service
Service
Service



44 722 A11

Service Manual



Electrically: CD210/00R $\equiv$ CD210/60R
CD210/05R $\equiv$ CD210/65R $\equiv$ CD210/70R
CD210/61R = CD210/60R with voltage selector

CONTENTS

- 1 Contents and operation buttons
- 2 Technical specifications
servicing hints, loading and cabinet parts
- 3 Electrical measurements and adjustments
- 4 Blockdiagram, panel data and partslist of the main panel
- 5 Control and display, wiring diagram and electrical partslist
- 6 Changes

(GB)

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

(NL)

Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde worden toegepast.

(F)

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.

(D)

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

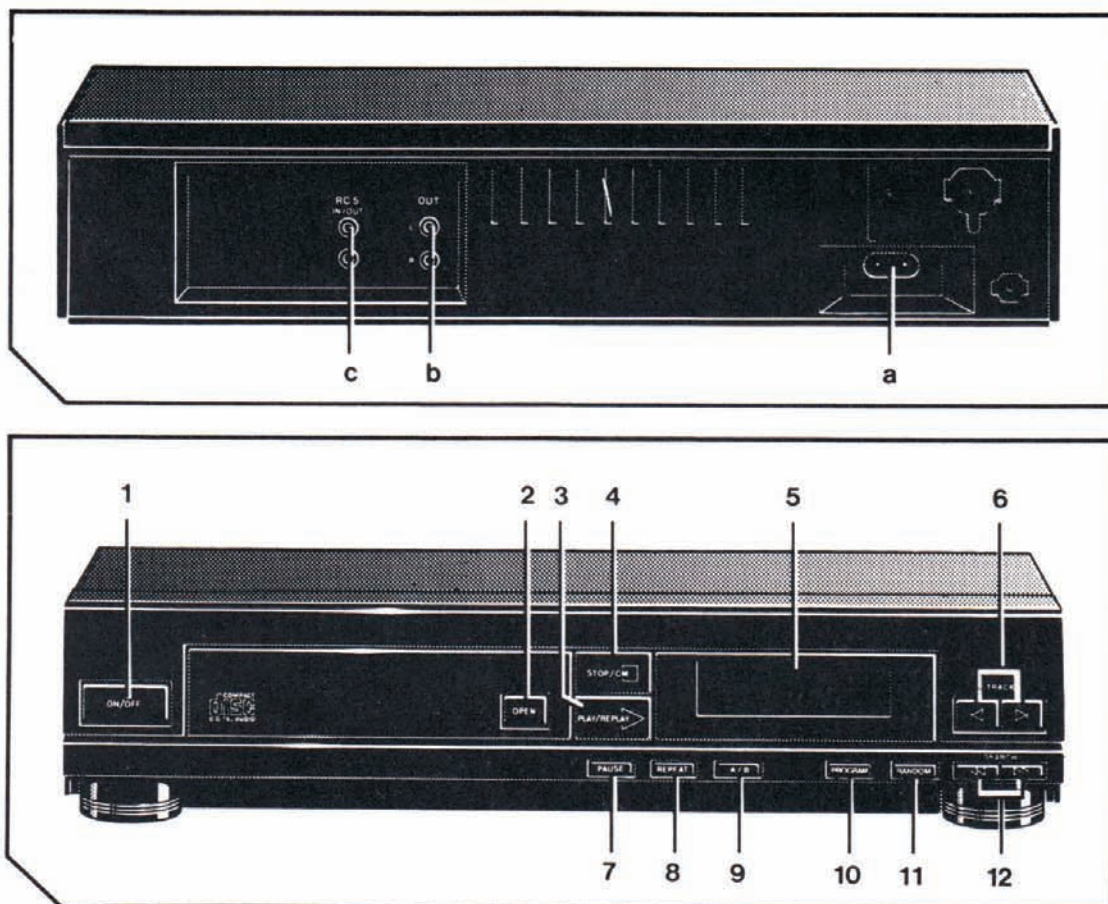
(I)

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati pezzi di ricambio identici a quelli specificati.

**CLASS 1
LASER PRODUCT**

3122 110 03420





44 723 A11

OPERATION

- 1 ON/OFF
- 2 OPEN
- 3 PLAY/REPLAY
- 4 STOP/CM
- 5 DISPLAY
- 6 ◀ TRACK ▶
- 7 PAUSE
- 8 REPEAT
- 9 A/B
- 10 PROGRAM
- 11 RANDOM
- 12 ◀◀SEARCH▶▶

- a CONNECTIONS FOR THE MAINS LEAD
- b OUT LEFT/RIGHT
- c RC5 IN/OUT

TECHNICAL DATA**Typical Audio Performance**

- Number of Channels: 2
- Frequency Range: 2-20 000 Hz
- Output resistance: 1 K Ω
- Nominal load impedance: 100 k Ω /100 pF
- Amplitude Linearity: ± 1 dB max. (20-20 000 Hz)
- Phase Linearity: $\pm 1.0^\circ$ (20-20 000 Hz)
- Dynamic Range: 65 dB min. (20-20 000 Hz)
- Signal-to-Noise Ratio: 75 dB min. (20-20 000 Hz)
- Channel Separation: 60 dB (20-20 000 Hz)
- Total Harmonic Distortion: 65 dB/0.05% (20-20 000 Hz)
- Wow and Flutter: quartz crystal precision
- D/A Conversion: quadruple oversampling (176.4 kHz) with digital filter and two 16 bit D/A converters
- Error Correction System: Cross Interleaved Reed Solomon Code (CIRC)
- Audio Output Level: 2 V_{rms}.

Power Supply

- Mains Voltage: see type plate at rear of player
- Mains Frequencies: 50 and 60 Hz
- Power Consumption: 15 W approx.
- Safety Requirements: IEC

Cabinet, general

- Dimensions (wxhxd)
cabinet with tray closed: 360 x 80/86 x 300 mm approx.
cabinet with tray opened: 360 x 80/86 x 445 mm approx.

(GB) WARNING

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.

ESD**(NL) WAARSCHUWING**

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).

Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.

Houd componenten en hulpmiddelen ook op hetzelfde potentiaal.

(F) ATTENTION

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD).

Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation.

Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfilier le bracelet muni d'une résistance de sécurité.

Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

(D) WARNUNG

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).

Unvorsichtige Behandlung im Reparaturfall kann die Lebensdauer drastisch reduzieren.

Veranlassen Sie, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand verbunden sind mit dem gleichen Potential wie die Masse des Gerätes.

Bauteile und Hilfsmittel auch auf dieses gleiche Potential halten.

(I) AVVERTIMENTO

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).

La loro longevità potrebbe essere fortemente ridotta in caso di non osservazione della più grande cauzione alla loro manipolazione.

Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.

Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

SERVICING HINTS

In the set chip components have been applied.
For disassembly and assembly of chip components see the figure below.

The disc should always rest properly on the turntable.
To achieve this a disc hold-down has been mounted in a bracket of the tray mechanism.

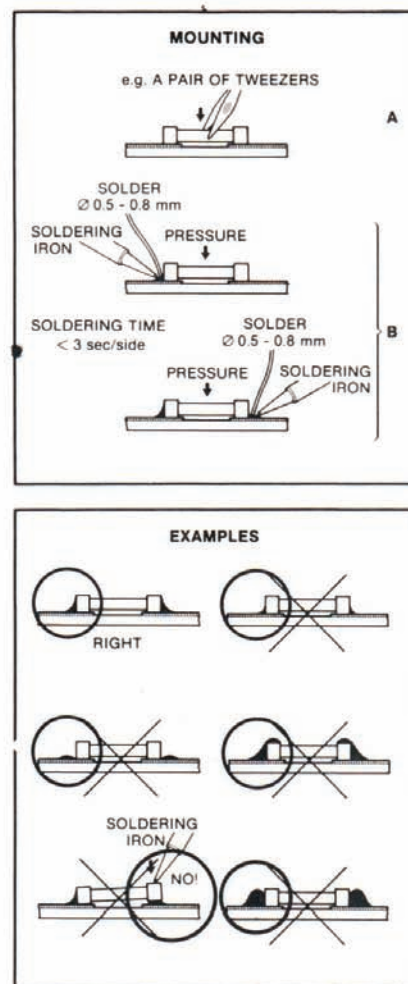
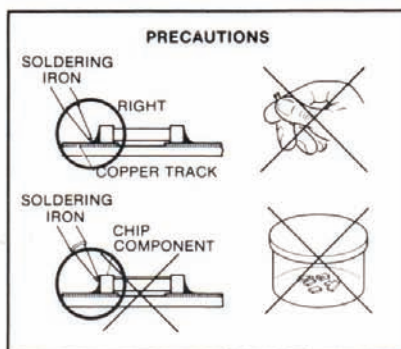
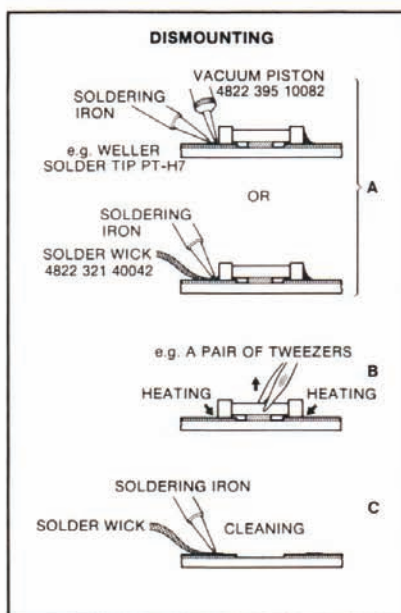
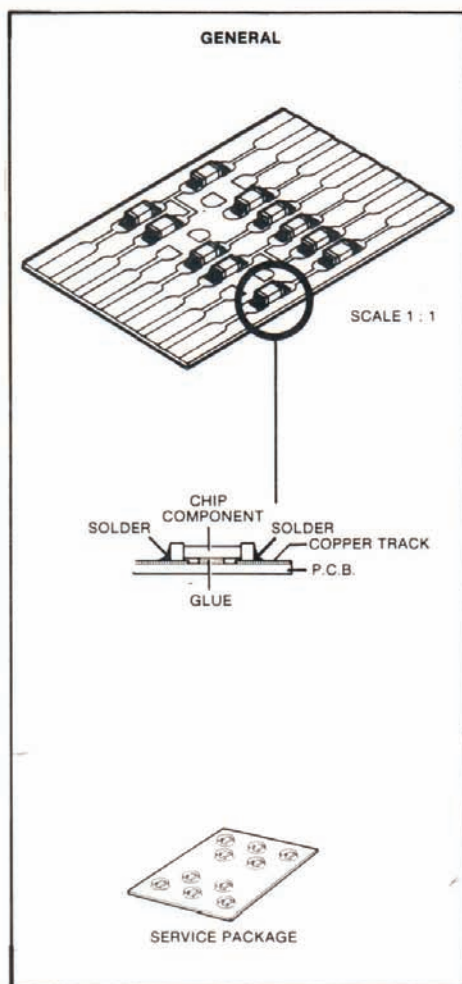
If the tray mechanism has to be disassembled for servicing, a separate disc hold-down should be used. For a service disc hold-down see drawing 42565 A12.
Page 2-3

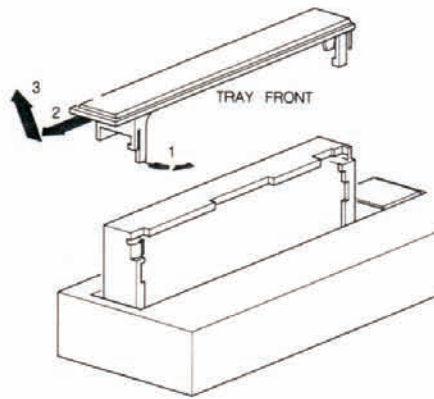
Test discs

It is important to treat the test discs with great care. The disorders on the discs (black spots, fingerprints, etc.) are exclusive and unambiguously positioned. Damage may cause additional drop-outs etc. rendering the intentional errors no longer exclusive. In that case it will no longer be possible to check e.g. the good working of the track detectors.

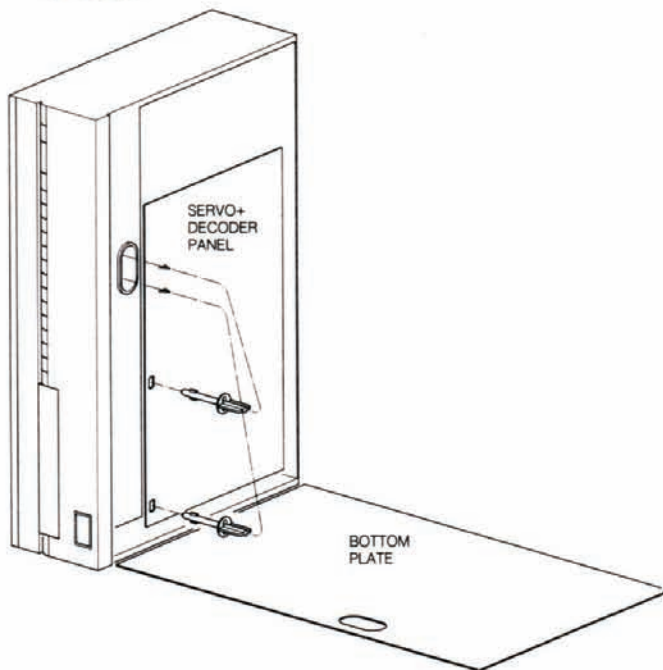
SERVICE TOOLS

Audio signal disc (1)	4822 397 30184
Disc without errors (5)+ disc with DO errors, black spots and fingerprints (5A)	4822 397 30096
Disc 65 min 1kHz without pause	4822 397 30155
Max diameter disc	4822 397 60141
Torx screwdrivers	
Set (straight)	4822 395 50145
Set (square)	4822 395 50132
13th order filter	4822 395 30204
Service cable (5p)	4822 321 21273
Service cable (14p)	4822 321 21598
Service flexfoil (14p)	4822 322 40066
Service connector (14p)	4822 267 50676
Glass disc	4822 395 90204



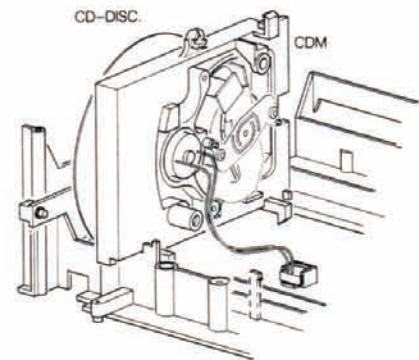


MEASURING AND ADJUSTMENT POSITION OF THE SET



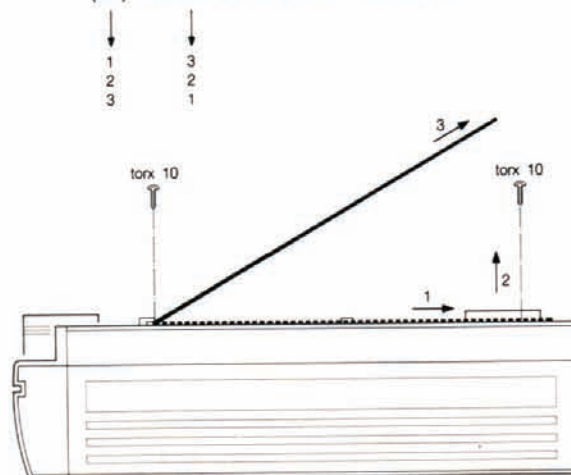
MDA.02138
916/T19

SERVICE POSITION PLAY



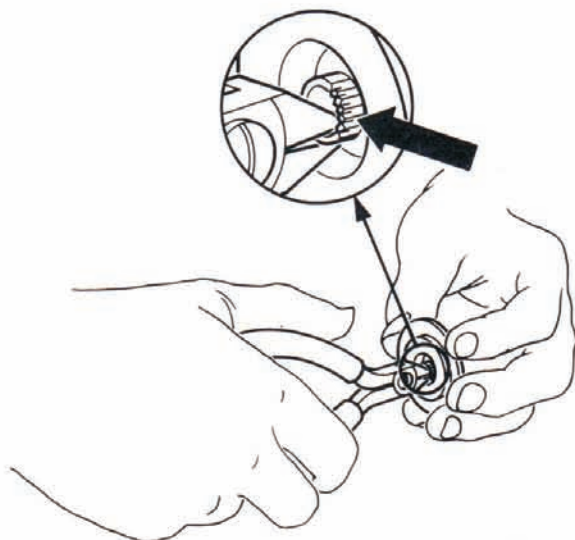
EVA.00849
916/T19

(DE)-MOUNTING THE BOTTOM PLATE



MDA.02161
T20-918

SERVICE DISC-HOLDDOWN

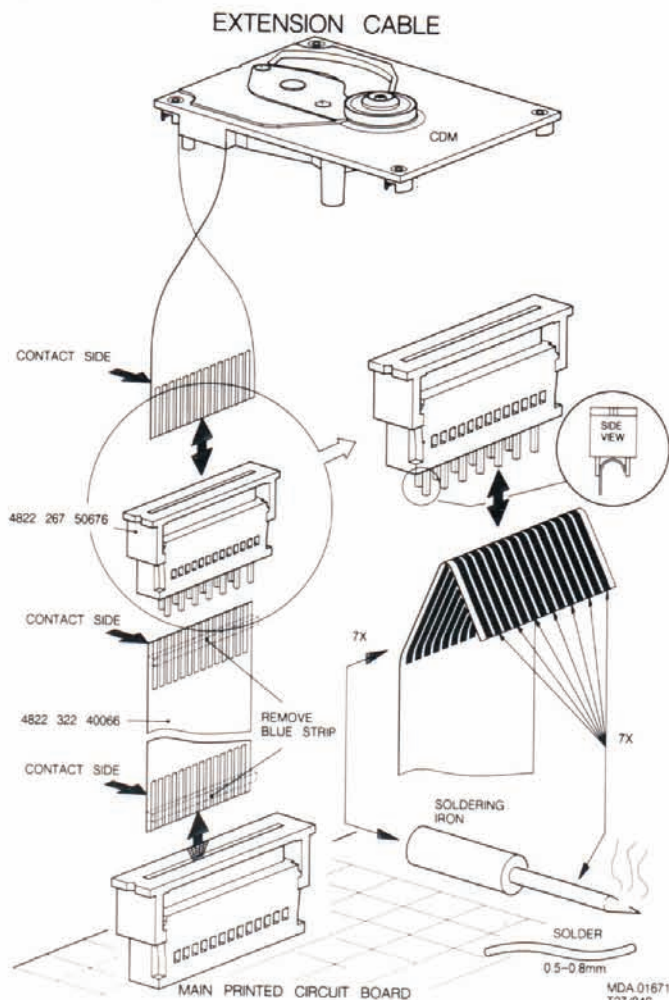


42 565 A12

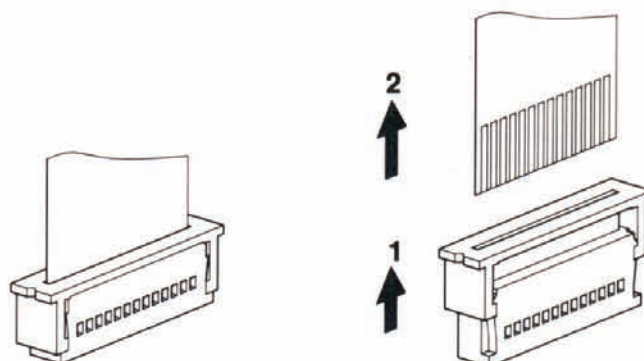
Compose a service Disc hold-down in the following way

- Cut in the most inner ring of a disc hold-down (4822 462 50383) with small and sharp nippers, see fig. above
- Enlarge the diameter of the innermost ring slightly with the hind part of a pencil or ballpoint, so that it jams onto the turntable with sufficient force.
- If the jamming force decreases after certain time of use, the diameter has to be enlarged with a pencil or ballpoint again.

SERVICE CDM FOIL

MDA.01671
T27/846

DEMOUNTING FOIL CDM

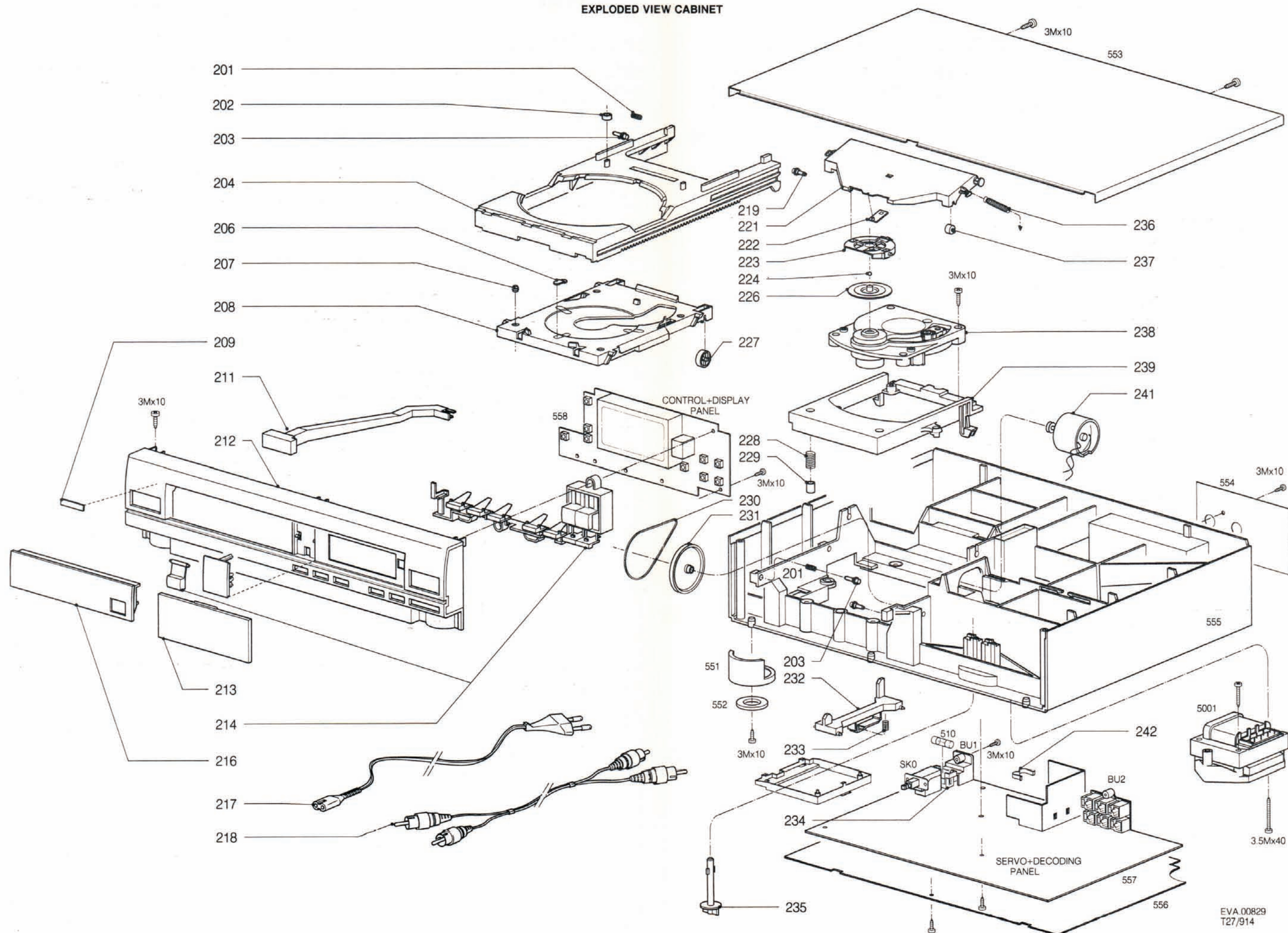
MDA.01408
T28/822

CABINET PARTS

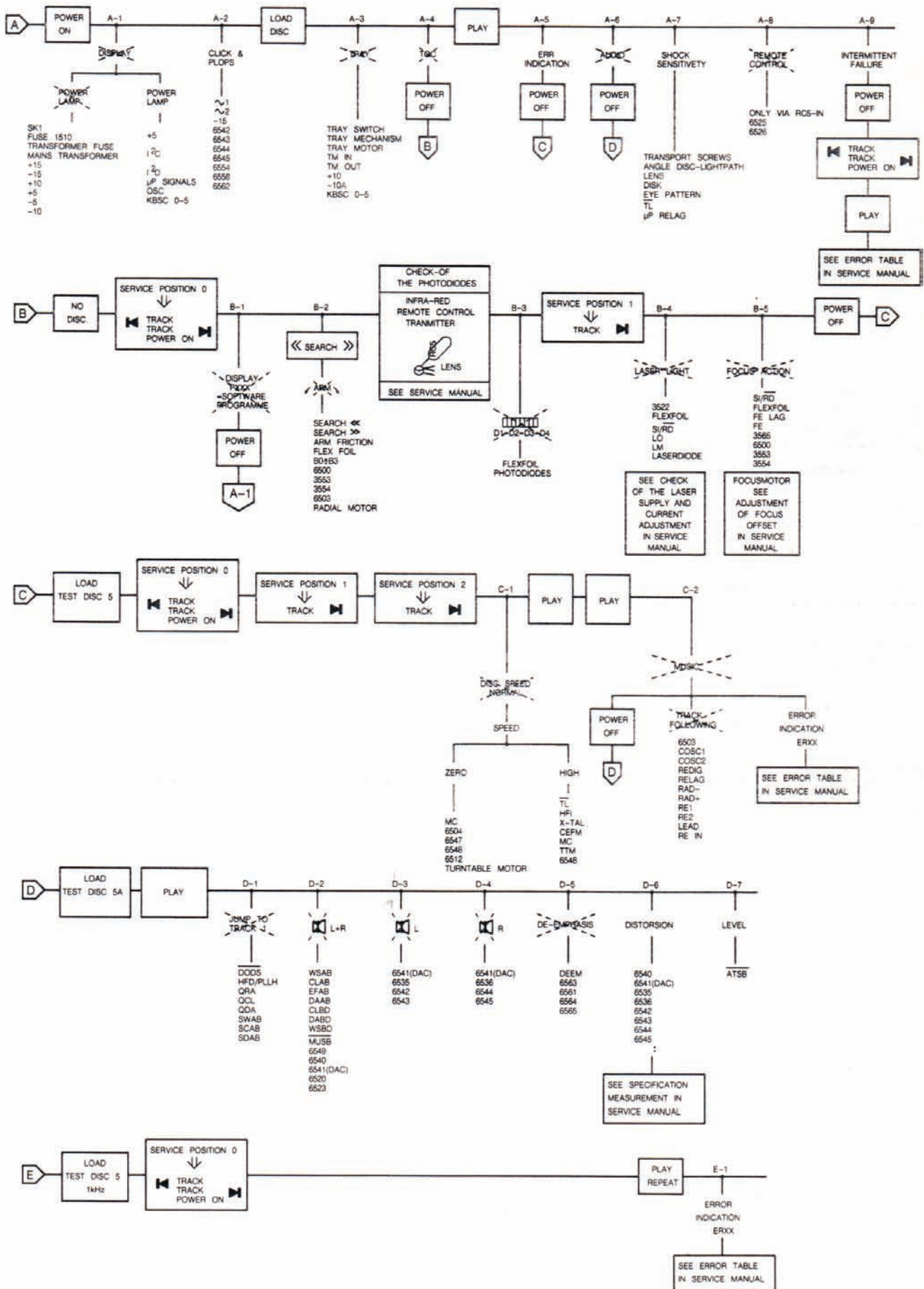
201	4822 492 52094	
202	4822 532 51756	
203	4822 402 61252	
204	4822 444 50603	
206	4822 325 50176	
207	4822 325 50177	
208	4822 466 92251	(+ pos. 206, 207, 227)
209	4822 459 10806	
211	4822 410 60107	/00R/05R
211	4822 410 60438	/60R/65R/70R
212	4822 444 40306	/00R/05R
212	4822 444 40337	/60R/65R/70R
213	4822 381 11053	/00R/05R
213	4822 450 61479	/60R/65R/70R
214	4822 410 60106	/00R/05R
214	4822 410 60437	/60R/65R/70R
216	4822 444 40307	/00R/05R
216	4822 444 40338	/60R/65R/70R
217	4822 321 10457	/00R/60R
217	4822 321 10522	/05R/65R
217	4822 321 10523	/70R
218	4822 321 22832	
219	4822 402 61253	
221	4822 444 60568	
222	4822 466 92257	
223	4822 401 61207	
224	4822 520 40177	
226	4822 530 80503	
227	4822 528 90638	
228	4822 492 51902	
229	4822 466 61587	
230	4822 358 10115	
231	4822 528 81329	
232	4822 402 50276	
233	4822 492 52123	
234	4822 256 30274	
235	4822 535 71262	
236	4822 492 32883	
237	4822 528 90639	
238	4822 691 30209	
239	4822 402 61196	
241	4822 361 20998	
242	4822 492 63076	

Spring under item 231 4822 492 70332

EXPLODED VIEW CABINET

EVA 00829
T27/914

ELECTRICAL MEASUREMENTS AND ADJUSTMENTS



A-1 μ P - SIGNALS

Signal	Mode				Remarks
Reset	Power on	14		Pulse "high"	
X-TAL	Stand-by	13		4 MHz	See frequency on x-tal
TRAY IN	Push tray	83		"high"	"high" when tray is closing
TRAY OUT	Open/close	83		"low"	"low" when tray is opening
ATSB	DISC, SEARCH	89		"high"	"low" during search
I ² C	Power on, play	31		Activity	"high" when starting up

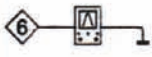
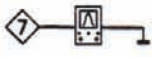
T-22382A

B-2 B0, B1, B2, B3 SIGNALS

Signal	Mode				Remarks
B0	Service position 0 or 1; search >>	36		"low"	
	Service position 0 or 1; search <<	36		"low"	
B1	Service position 0 or 1; search >>	34		"high"	
	Service position 0 or 1; search <<	34		"high"	
B2	Service position 0 or 1; search >>	33		"low"	
	Service position 0 or 1; search <<	33		"high"	
B3	Service position 0 or 1; search >>	32		"high"	
	Service position 0 or 1; search <<	32		"high"	

T-22382B

B-3 CHECK OF THE PHOTODIODES

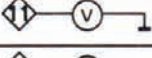
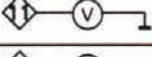
Step	Signal	Mode					Remarks
1	-	power on	   	-	-	See drawing 38314A12	Signal depends on Distance lens $\leftrightarrow$ IR LED of remote control

T-22382C

B-4 CHECK OF LASER SUPPLY

The laser, the lasersupply plus the monitor diode form a feedback system.

A defect in the lasersupply may result in the destruction of the laser. If, in that case, the laser is replaced, (= complete C.D.M.-unit) the new laser will also become defective. However, it is impossible to check and repair a feedback system if a link is missing. For this reason the laser supply can be checked with the replacement circuit for laser assembly.

Step	Signal	Mode					Remarks
1	LO	serv. pos. 2 SK 		-	1.8<V<2.3	-	PRS05539
	LM			-	170<mV<220	-	
2	LO	serv. pos. 2 SK 		-	1.8<V<2.3	-	PRS05540
	LM			-	170<mV<220	-	
3	LO	Power on		-	0V $\pm$ 0.2V	-	No light

T-22382D

B-4 LASER CURRENT ADJUSTMENT

Step	Signal	Mode					Remarks
1	-	Power off		R3520	1k Ω	-	Pre-adjustment Ohmic value
2	Eye-pattern HF	Power on Test disc 5 play	pin 32 decoder A (SAA7310) 	-	-	See drawing 37017B8	If no signal see "start up procedure"
3	laser current = voltage across R3508	Test disc 5 play track 1		R3520	50 mV DC	-	Use a high ohmic voltage meter

T-22382E

B-5 ADJUSTMENT OF FOCUS-OFFSET

Step	Signal	Mode					Remarks
1	-	Power on	-	R3568	-	-	adjust for optical mid-position of the focus motor
2	FE LAG	Play Test disc 5 Track 1	27	R3568	400mV $\pm$ 40 mV DC	-	fine adjustment

T-22382F

B-5 FOCUS ACTION

Signal	Mode				Remarks
SI/RD	Service position 1 when repeating start up procedure	21			See drawing MDA.01403
FE	Service position 1, no disc	26			See drawing MDA.01413
FE-LAG	Test disc 5A, play	27		pulse "high"	See adjustment of focus-offset

T-22382G

C-1 HIGH SPEED DISC ROTATION

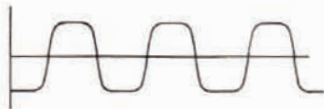
Signal	Mode				Remarks
HFI	Test disc 5, play or service position 2	65			See drawing: 37017B8
X-tal	Test disc 5A, play or service position 2	70		11.28 MHz	
MC	Test disc 5, play or service position 2	12			See drawing: 38849A12

T-22382H

C-2 TRACK FOLLOWING

Signal	Mode				Remarks
RE dig	Test disc 5, play or service position 3	37			Square wave
RE lag		41			DC level $\pm$ 2,5 Volt
RAD+	Test disc 5A, service position 1 $\ll \gg$	40			Arm inside: 1V Arm outside: -1V
C osc1	Test disc 5, play or service position 3	30		650 Hz	
C osc2	Test disc 5, play or service position 3	31		650 Hz	
LEAD	Position stop	35		650 Hz	Sinus
LEAD	Position play	35			See drawing 30743B
IDAC	Position play	48			Pulses low and high when bumped against the CDM

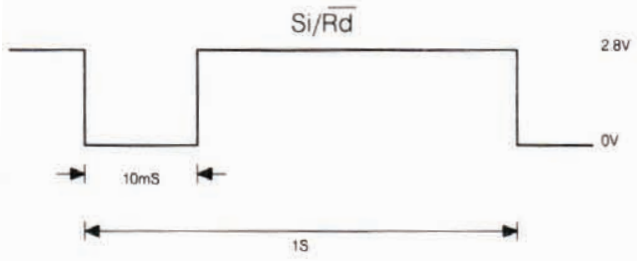
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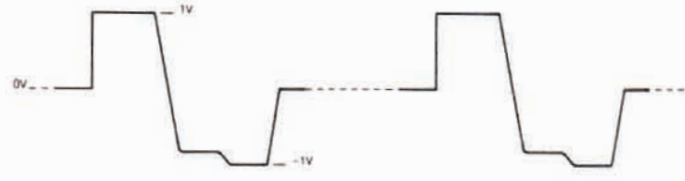
38 314 A12



37 017 B8



MDA 01403
T33/B21



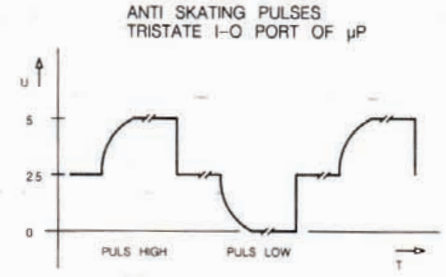
MDA 01413
T33/B23



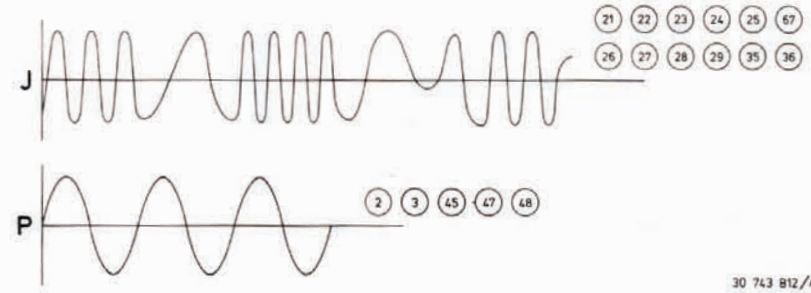
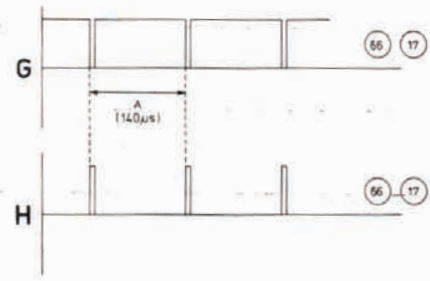
38 849 A12

POSITION PLAYER	POWER ON	SERVICE POSITION 3	PLAY	SEARCH PAUSE
DOOS SIGNAL	LOW	HIGH	HIGH	

MDA 01143
T12 -651



MDA 02158
T-04 917



30 743 B12/A

D1 JUMP TO TRACK 1

Signal	Mode				Remarks
DODS	Test disc 5A search >> or search <<	19			See drawing MDA.01143
QRA	Test disc 5A, play	75			} See drawing MDA.00453
QDA	Test disc 5A, play	77			
QCL	Test disc 5A, play	76			
SWAB/SSM	Test disc 5A, play	78			See drawing MDA.00239
SCAB	Test disc 5A, play	79			See drawing MDA.00239
SDAB	Test disc 5A, play	80			See drawing MDA.00239

T-22382J

D-2 NO AUDIO OUTPUT LEFT+RIGHT

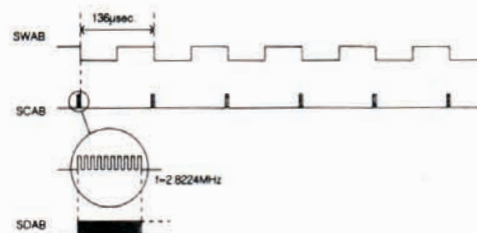
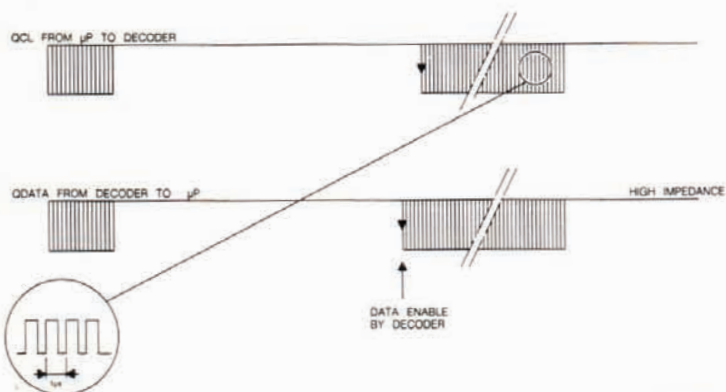
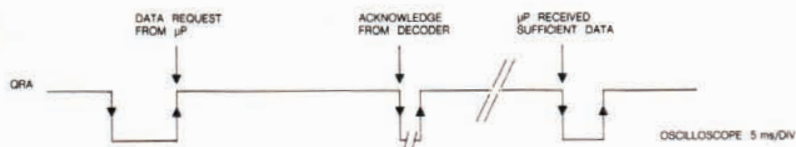
Signal	Mode				Remarks
CLAB	Disc, play	72			See drawing 38847C12
DAAB	Disc, play	73		activity	
EFAB	Testdisc 5A	74		pulses "high"	When the disc is slowly braked by hand
CLBD	Disc, play	87			See drawing 38848C12
DABD	Disc, play	86		activity	
WSBD	Disc, play	85			See drawing 38848C12
MUSB	Disc, play	90		"high"	Pulse low when track <</>

T-22382K

D-5 DEEM CIRCUIT

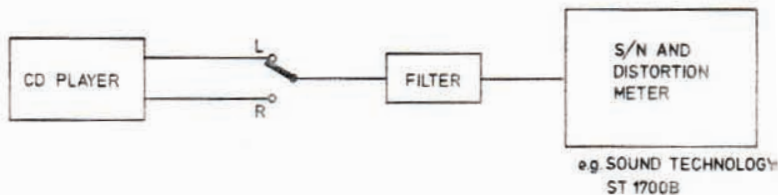
Signal	Mode				Remarks
DEEM	Test disc 5A: track 14 PLAY track 15 PLAY	84		"low" "high"	See testpoint 92 and 91 on DEEM circuit
Testpoint 92	Test disc 5A track 14	92		LF signal	
Testpoint 92	Test disc 5A track 15	92		No signal	
Testpoint 91	Test disc 5A track 14	91		LF signal	
Testpoint 91	Test disc 5A track 15	91		No signal	

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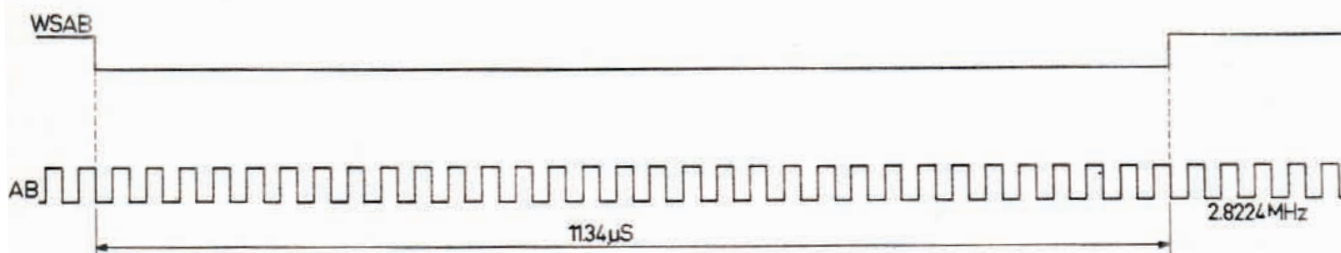


MDA 00453
T27/840

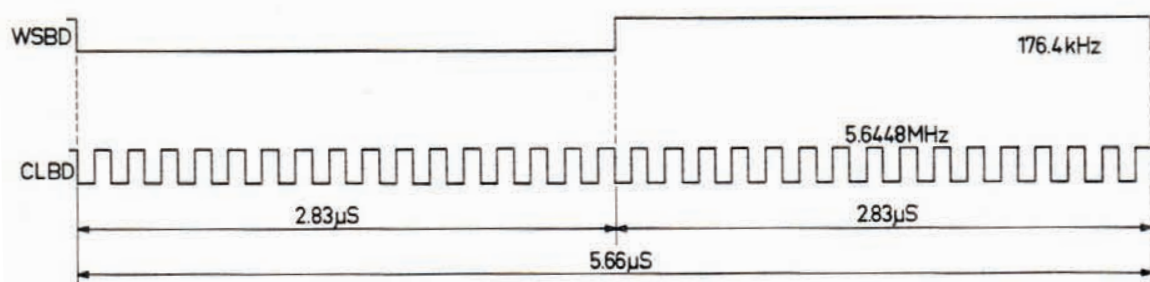
MDA 00239
T12/638
CD450



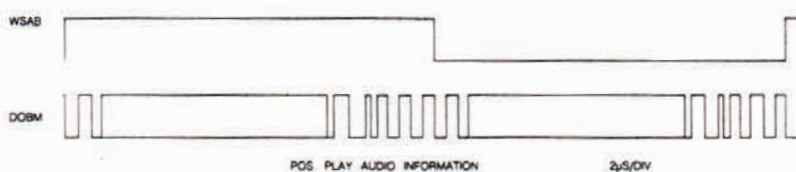
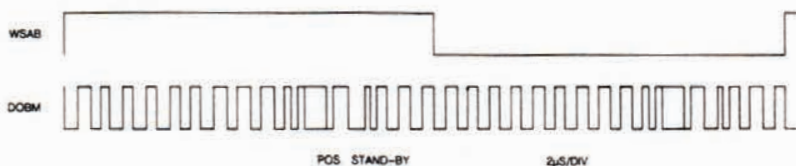
30 459 A12



38 847 C12



38 848 C12



MDA 00239
T12/730

D-6 SPECIFICATIONS MEASUREMENT

Signal	Mode				Remarks
BU2-L	Test disc 3, play, total harmonic distortion	filter output	See technical data		See drawing 30459A12
BU2-R	Test disc 3, play, total harmonic distortion	filter output	See technical data		See drawing 30459A12
BU2-L	Test disc 3, play signal-to-noise ratio	filter output	See technical data		See drawing 30459A12
BU2-R	Test disc 3, play signal-to-noise ratio	filter output	See technical data		See drawing 30459A12

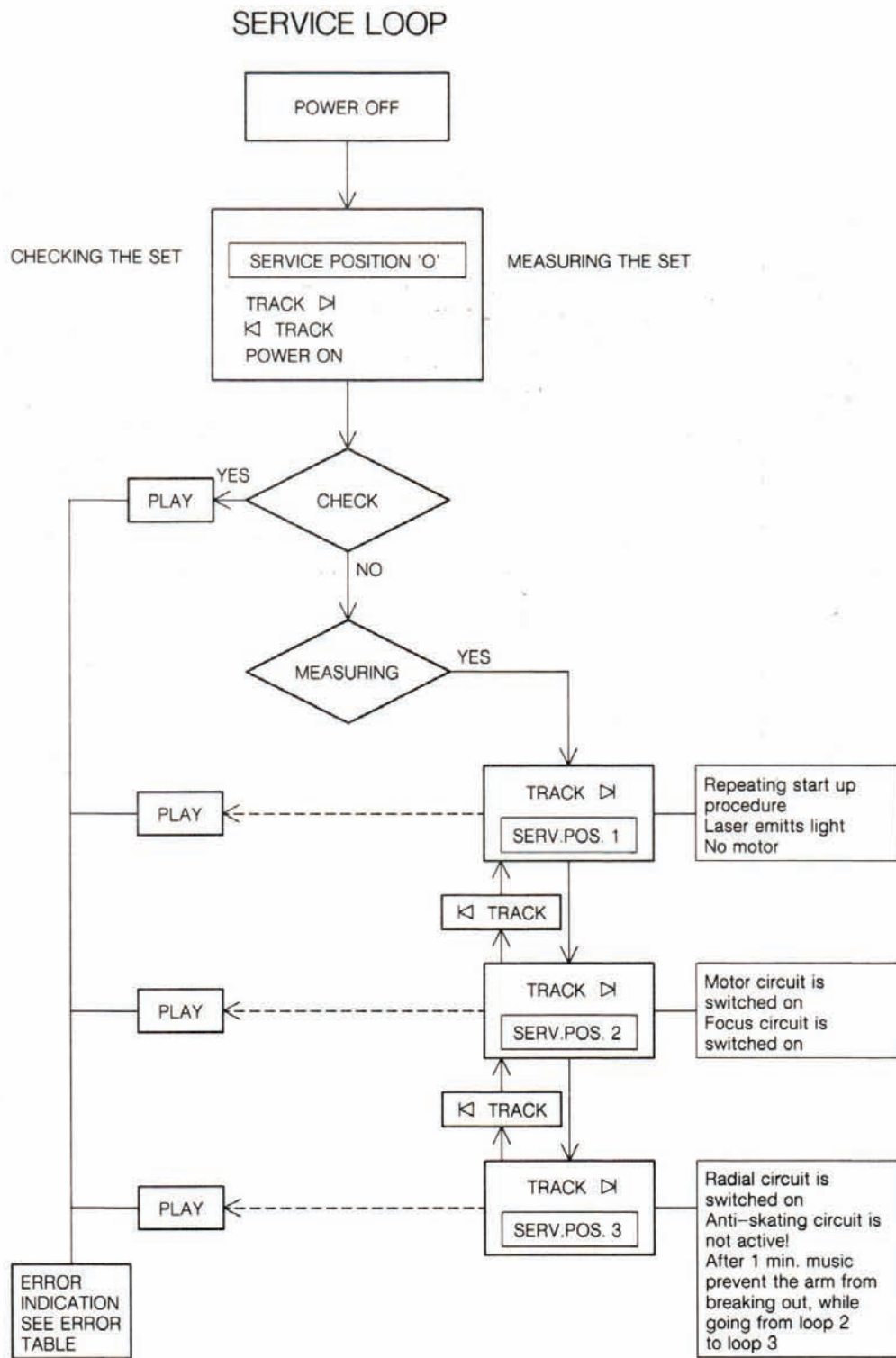
T-22382M

System errors

- 2 Focus error: no track loss
- 3 Radial start error: min excentricity point not found
- 6 TL error during jump: no positive TL or Rp edge during 60x8 milliseconds.
- 7 Subcode error: no valid subcode within 3 seconds.
- 8 TOC error: out of lead-in while reading TOC.

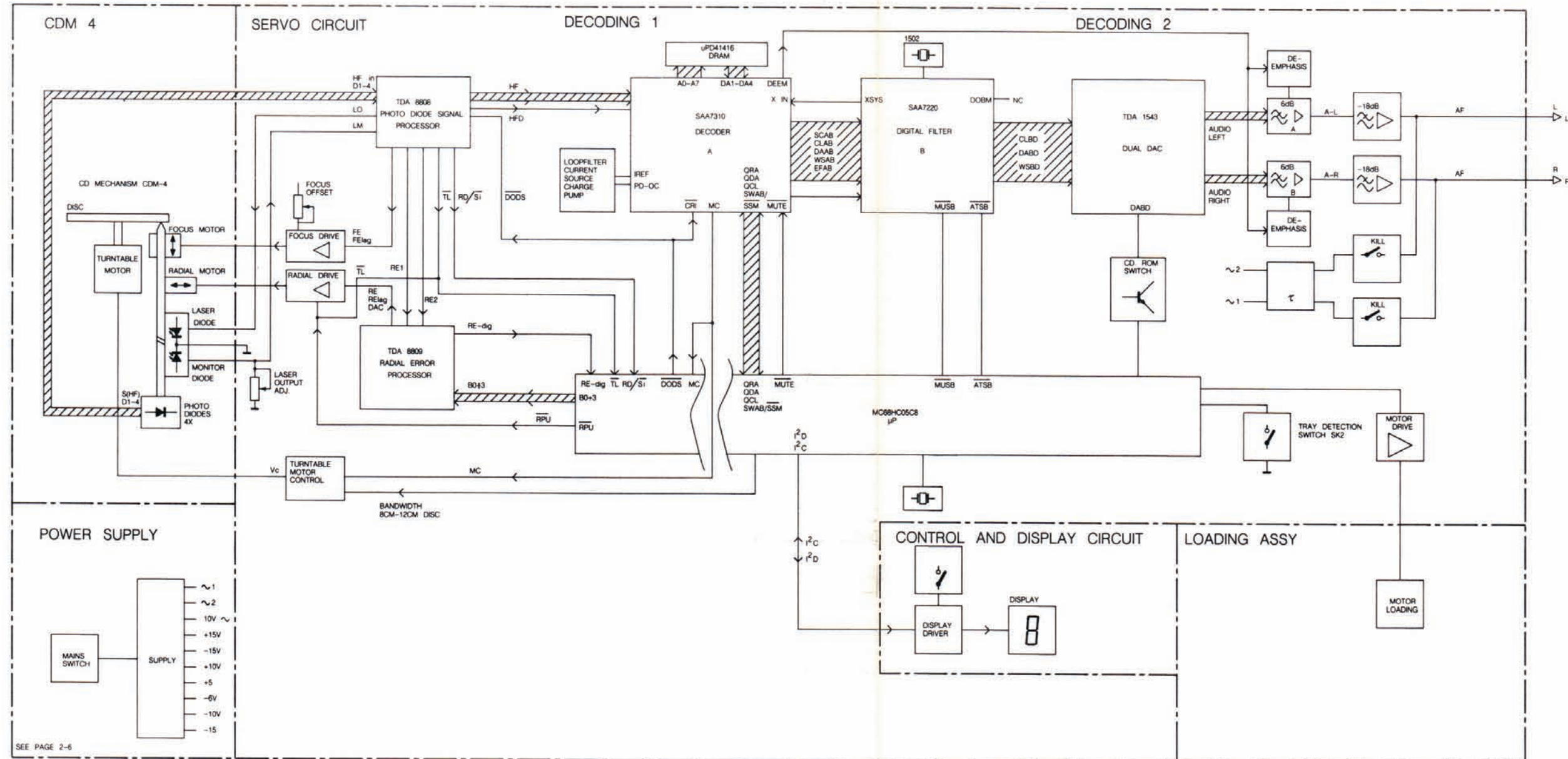
Operating errors

- 30 Next at a boarder when repeat is off.
- 31 Previous at a boarder when repeat is off.
- 34 No program.
- 35 Program memory full.
- 36 Programmed track is non existing on this CD.
- 37 Selected track is non existing on this CD.
- 40 Track key pressed when program of no valid track selection.
- 41 Track selected while program off.
- 56 AB key pressed while not in play mode.
- 60 Fast forward bound.
- 61 Fast reverse bound.



MDA.02157
T27/918

4-1
BLOCK DIAGRAM



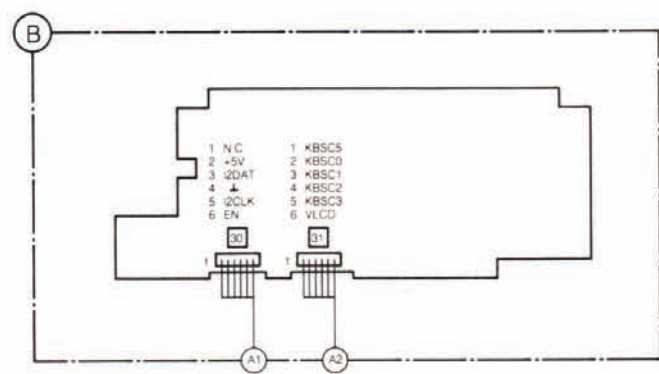
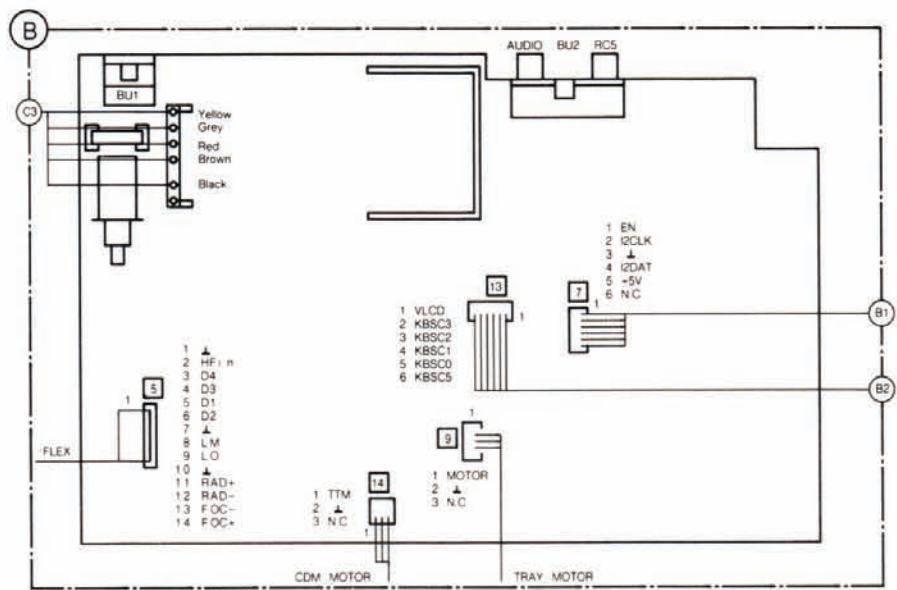
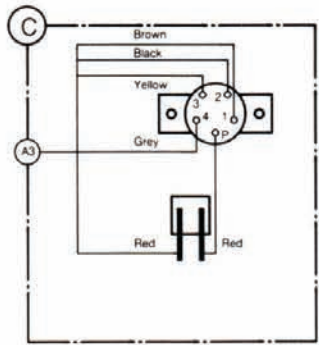
AGC - Automatic Gain Control
 B0-B3 - Control bits for radial circuit
 BEQ - Equalizer reference current input
 BGC - DC and LF gain control reference input
 Cosc1 - Capacitor wobble oscillator
 Cosc2 - Capacitor wobble oscillator
 DEC - Decoupling input internal bypass
 DET - HF detector voltage input
 DIV4 - Divide by 4 input
 DODS - Drop out detector suppression
 D1+4 - Photodiode currents
 FE - Focus error signal
 FE lag - Focus error signal for LAG network
 HF - HF output for DEMOD
 HFD - HF detector output for DEMOD
 HF-in - HF current input to HF amplifier
 HF-out - HF amplifier and equalizer voltage output
 LM - Laser monitor diode input
 LO - Laser amplifier current output
 MC - Motor control signal
 offset IN - Offset control input
 offset OUT - Offset control output
 PLLH - PLL on hold output
 RADout - output of RE2-RE1 input
 RE - Radial error signal (Amplified RE₂-RE₁ currents)

Rosc - Resistor wobble oscillator
 Rwob - Wobble generator input
 RE1 - Radial error signal 1 (summation of amplified currents D₃ and D₄)
 RE2 - Radial error signal 2 (summation of amplified currents D₁ and D₂)
 RE dig - Radial error digital
 RE lag - Radial error signal for LAG network
 Sc - Starting up capacitor input
 Si/RD - On/off control for laser supply and focus circuit. Ready signal, Starting up procedure succesful.
 TL - Track loss output signal
 TTM- - Control voltage for turntable motor
 TTM+ - Control voltage for turntable motor
 Vext- - Supply connection
 Vext+ - Supply connection

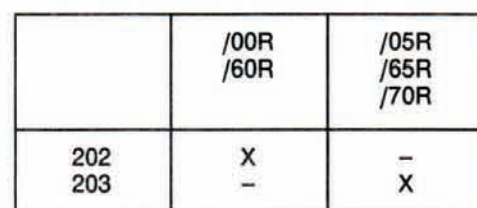
ATSB - Attenuation of Audio level in Search position (Cueing)
 CD ROM Switch - Digital Data information on disc signal
 CEFM - Clock Eight-to-Fourteen Modulator
 CLAB - Clock signal Decoder-A to Filter-B
 CLBD - Clock signal Filter-B to DAC
 CREF - Reference Current
 CRI - Counter Reset Inhibit
 DAAB - Data signal Decoder-A to Filter-B
 DABD - Data signal Filter-B to DAC
 DEEM - Deemphasis
 DOBM - Digital out signal
 EFAB - Error flag Decoder-A to Filter-B
 MUTE - Mute signal

MUSB - Soft Mute signal
 PD/OC - Phase detector - oscillator control
 KBSC.. - Key board scan
 VLCD - Voltage liquid cristal display
 QCL - Q-channel Clock signal
 QDA - Q-channel Data signal
 QRA - Q-channel Request Acknowledge
 SCAB - Subcode clock Decoder-A to Filter-B
 SDAB - Subcode data Decoder-A to Filter-B
 SWAB/SSM - Subcode Word/Start-stop motor signal
 WSAB - Word select Decoder-A to Filter-B
 WSBD - Word Select Filter-B to DAC
 XIN - Oscillator signal in Decoder-A
 XSYS - Oscillator signal out Filter-B

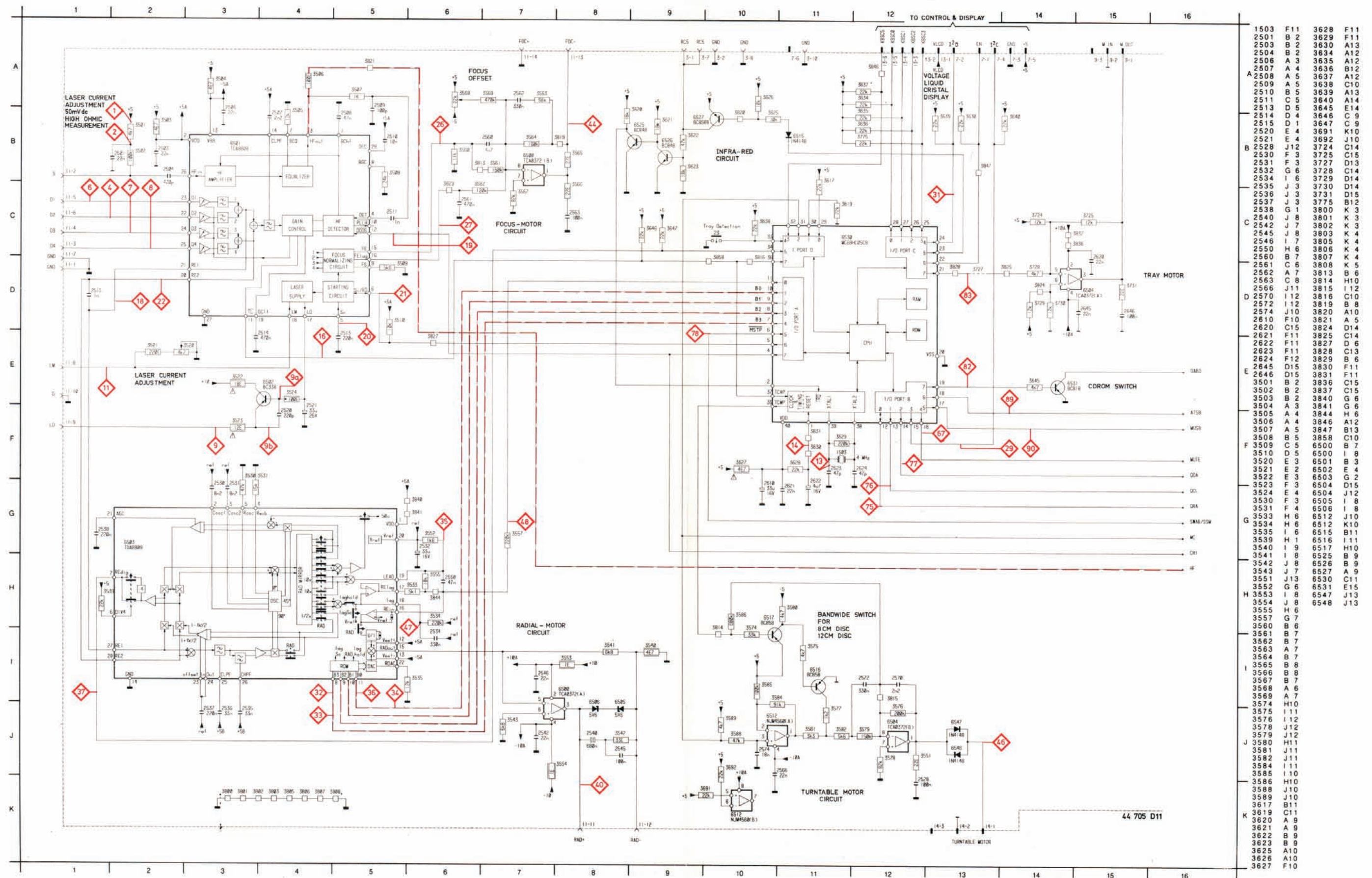
WIRING DIAGRAM



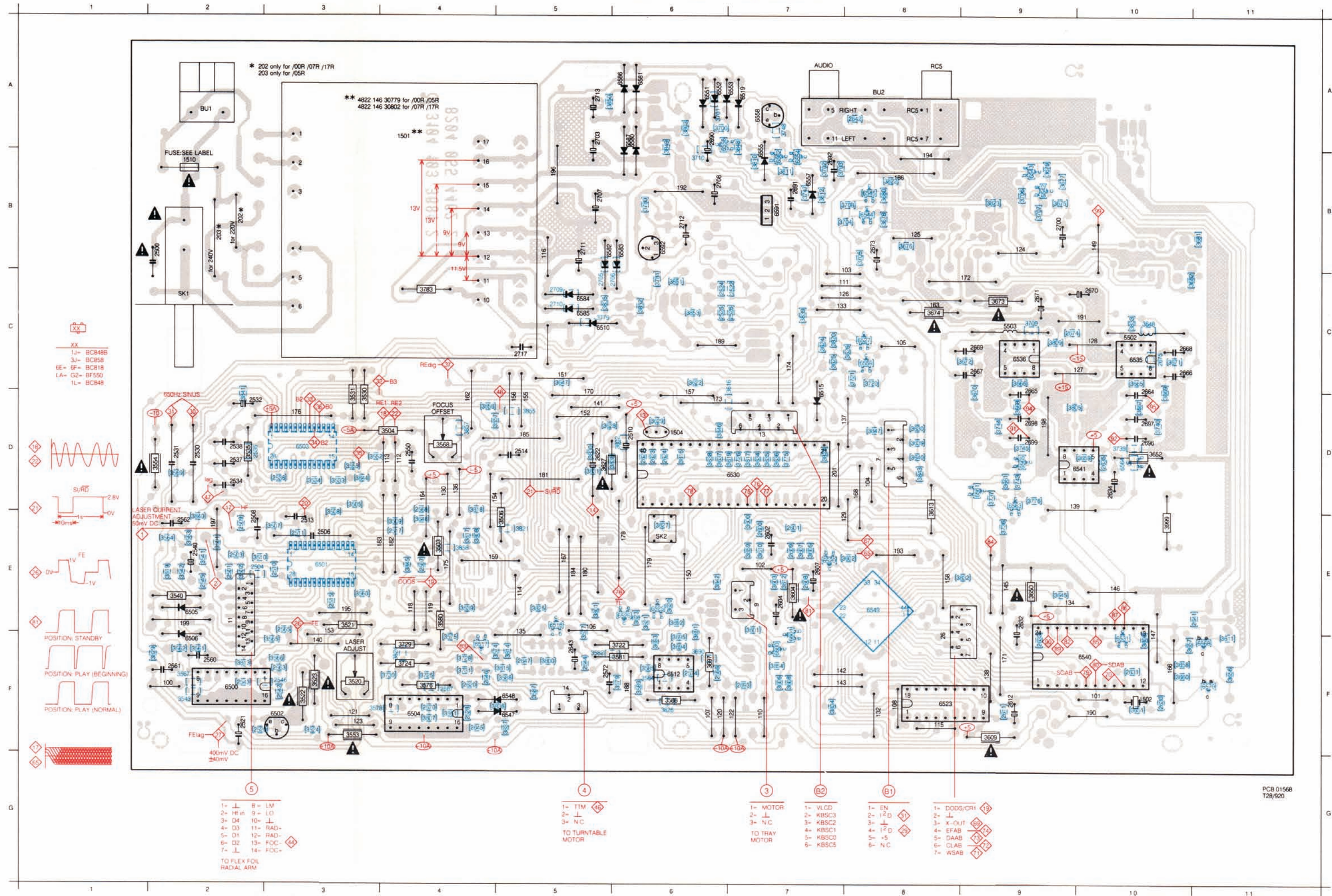
MOA 02380
T02/945

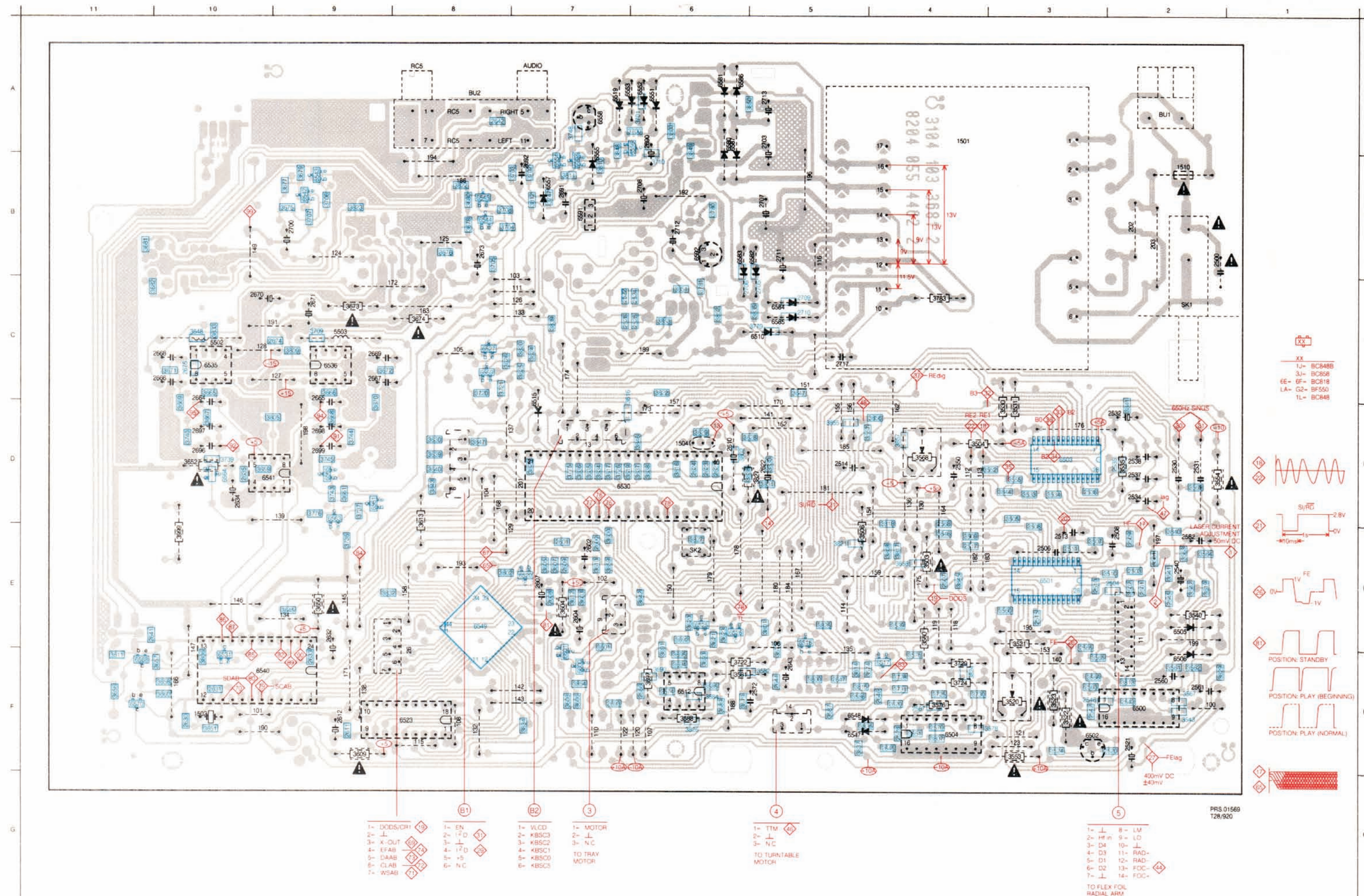


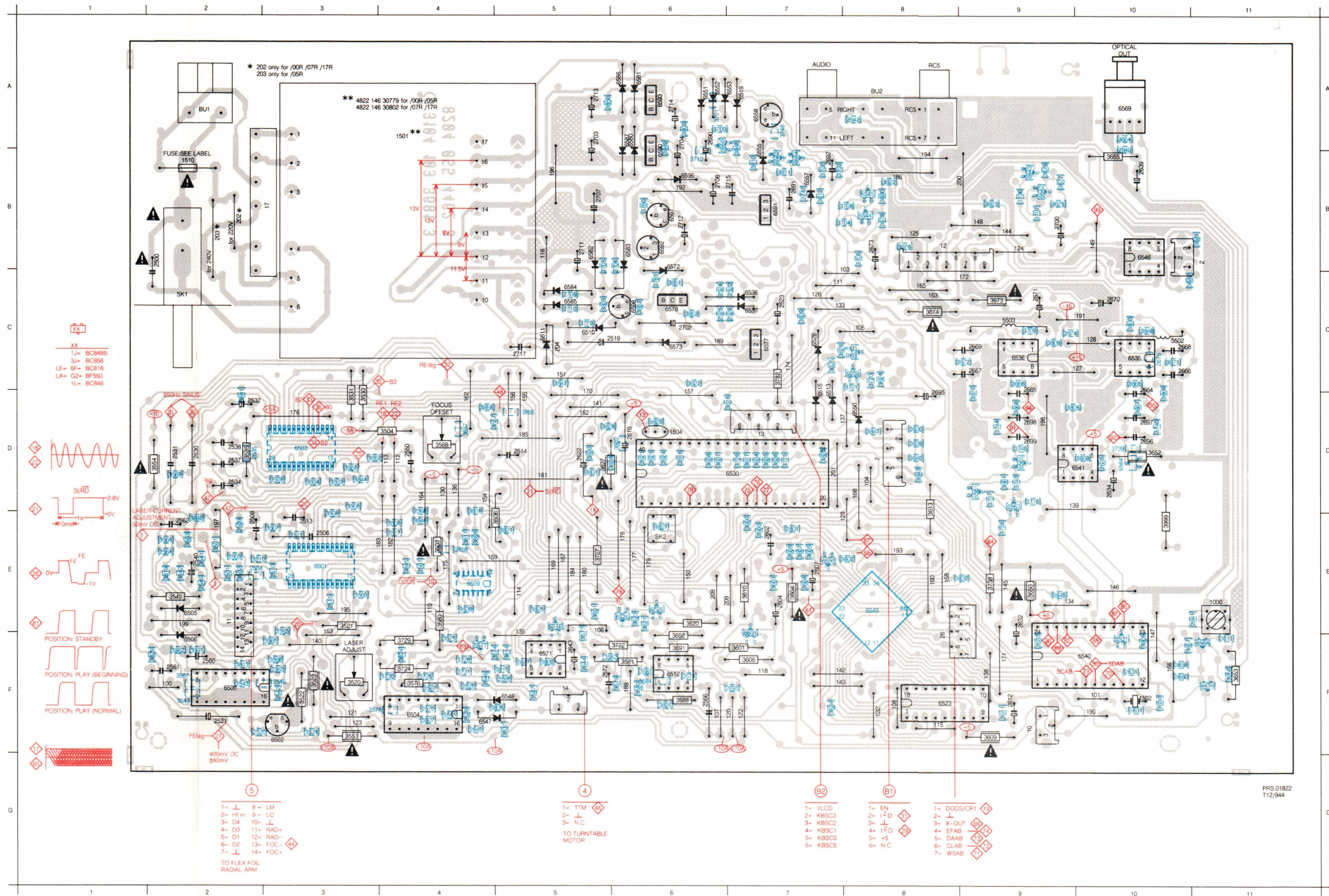
Resistor 3999 is an identification resistor for automatic measuring program selection.



PRS.04297
T12/933
BEH. BU 44705D

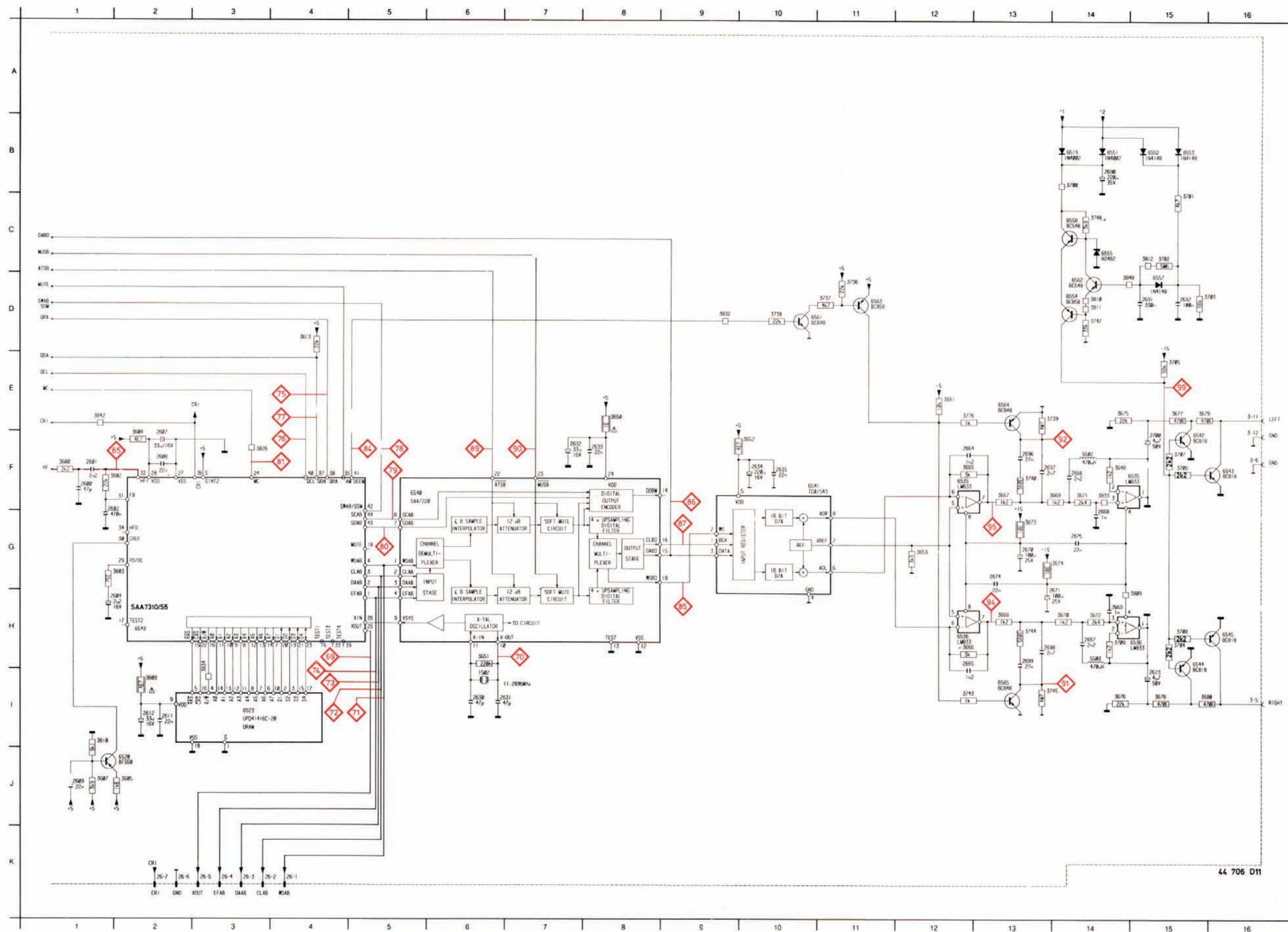


PRS 01569
128/920



100	F 2	2531	D 2	3567	F 2	3779	C 5	6592	B 6	100	F 2	2515	E 3	3534	D 3	3728	F 4	6558	A 7
101	F10	2532	D 2	3568	D 4	3780	B 6	6600	F 7	101	F10	2517	E 4	3535	D 2	3729	F 4	6559	C 8
102	E 7	2534	D 2	3569	D 2	3781	C 6	6601	F 7	103	B 8	2519	C 6	3539	E 4	3730	F 4	6561	D 9
103	B 8	2535	D 2	3574	F 4	3783	C 4	7	D 8	104	D 8	2520	F 2	3540	E 2	3731	F 4	6562	B 7
104	D 8	2536	D 3	3575	F 4	3800	F 5	9	E 7	105	C 8	2521	F 2	3541	E 2	3736	E 9	6563	D 9
105	C 8	2537	D 2	3576	F 4	3801	E 5	BU1	A 2	106	E 5	2522	C 7	3542	E 2	3737	D 9	6564	D10
106	E 5	2538	D 2	3577	E 5	3802	D 6	BU2	A 8	107	F 6	2523	C 7	3543	F 2	3738	E 9	6565	D 9
107	F 6	2540	E 2	3578	F 3	3803	A 6	SK1	C 2	108	F 8	2524	C 6	3551	F 4	3739	D10	6566	F11
108	F 8	2542	F 3	3579	F 6	3805	D10	SK2	E 6	111	C 7	2525	C 6	3552	D 3	3740	D10	6569	A10
110	F 7	2543	F 2	3580	E 4	3806	F10			112	D 4	2526	C 7	3553	F 3	3743	D 9	6570	F11
111	C 7	2545	E 2	3581	F 6	3807	F 4			113	D 4	2528	F 4	3554	D 2	3744	D 9	6571	F 5
112	D 4	2546	F 3	3582	F 5	3808	E 4			114	E 5	2530	D 2	3555	D 3	3745	D 9	6572	B 6
113	D 4	2550	D 4	3584	F 6	3809	C 9			115	F 8	2531	D 2	3557	D 4	3747	B 7	6573	C 6
114	E 5	2560	F 2	3585	F 6	3810	B 7			116	B 5	2532	D 2	3560	E 3	3748	A 7	6577	C 7
115	F 8	2561	F 2	3586	F 5	3811	B 7			119	E 4	2534	D 2	3561	F 2	3775	D 7	6578	C 6
116	B 5	2562	E 2	3587	F 5	3812	B 7			120	F 7	2535	D 2	3562	F 2	3776	D 9	6580	A 6
118	E 4	2563	F 3	3588	F 6	3813	F 2			121	F 3	2536	D 3	3563	E 2	3779	C 5	6581	A 6
119	E 4	2565	E 3	3589	F 6	3814	F 5			122	F 7	2537	D 2	3564	E 2	3780	B 6	6582	B 5
120	F 6	2566	F 6	3600	E 7	3815	F 5			123	F 3	2538	D 2	3565	F 3	3781	C 6	6583	B 6
121	F 3	2567	F 4	3601	E 7	3816	D 6			124	B 9	2540	E 2	3566	F 3	3782	C 7	6584	C 5
122	F 7	2568	D 4	3602	E 8	3817	E 4			125	B 8	2542	F 3	3567	F 2	3800	F 5	6585	C 6
123	F 3	2570	F 4	3603	E 7	3818	D 4			126	C 7	2543	F 2	3568	D 4	3801	E 5	6586	A 5
124	B 9	2572	F 5	3604	E 7	3819	E 2			127	C10	2545	E 2	3569	D 2	3802	D 6	6587	A 6
125	B 8	2574	F 6	3605	E 7	3820	C 7			128	C10	2546	F 3	3574	F 4	3803	A 6	6590	A 6
126	C 7	26	E 8	3606	F 7	3821	E 5			129	E 7	2550	D 4	3575	F 4	3805	D10	6591	B 7
127	C10	2600	E 7	3607	E 7	3822	B 8			130	D 4	2560	F 2	3576	F 4	3806	F10	6592	B 6
128	C10	2601	E 7	3608	F 7	3823	B 9			132	F 8	2561	F 2	3577	E 5	3807	F 4	6593	A 6
129	E 7	2602	E 7	3609	F 9	3824	F 4			133	C 7	2562	E 2	3578	F 3	3808	E 4	6593	A 6
130	D 4	2604	E 7	3610	E 7	3825	E 5			134	E 9	2563	F 3	3579	F 5	3809	C 9	6596	B 6
132	F 8	2607	E 7	3611	F11	3826	F 6			135	E 5	2564	E 2	3580	E 4	3810	B 7	6597	B 6
133	C 7	2608	E 7	3612	E 7	3827	E 6			136	D 4	2565	E 3	3581	F 6	3811	B 7	6598	C 6
134	E 9	2609	E 7	3613	D 8	3828	D 7			137	D 7	2566	F 6	3582	F 6	3812	B 7	6601	F 7
135	E 5	2610	D 6	3616	C 7	3829	F 2			138	F 9	2567	F 4	3584	F 6	3813	F 2	7	D 8
136	D 4	2611	F 9	3617	D 7	3830	D 5			139	D 9	2568	D 4	3585	F 6	3814	F 5	BU1	A 2
137	D 7	2612	F 9	3619	D 7	3831	D 5			140	F 3	2570	F 4	3586	F 5	3815	F 5	BU2	A 8
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151	C 5	2641	E11	3634	D 7	3843	D 8			152	D 5	2611	F 9	3609	F 9	3828	D 7		
152	D 5	2642	A 8	3635	D 7	3844	D 3			153	E 3	2612	F 9	3610	E 7	3829	F 2		
153	E 3	2643	F 5	3636	D 7	3845	E 4			154	D 4	2620	F 4	3611	F11	3830	D 5		
154	D 4	2644	F 5	3637	D 6	3846	D 6			155	D 5	2621	D 6	3613	D 8	3831	D 5		
155	D 5	2645	F 4	3638	D 6	3847	D 8			156	D 5	2622	D 6	3616	D 7	3832	E 9		
156	D 5	2646	F 4	3639	D 8	3848	A 7			157	D 6	2623	D 6	3617	D 7	3833	C10		
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159	E 4	2665	C 9	3646	E 4	3851	C 6			160	E 8	2631	F10	3622	C 6	3836	F 5		
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170	D 5	2673	B 8	3657	F10	3858	E 4			168	D 8	2641	E11	3630	D 8	3844	D 3		
171	F 9	2674	C 9	3658	F10	3859	E 7			169	E 5	2642	A 8	3634	D 7	3845	E 4		
172	C 9	2675	C10	3659	D10	3999	E10			170	D 5	2643	F 5	3635	D 7	3847	D 8		
173	D 6	2690	A 6	3660	F10	5502	C10			171	F 9	2644	F 5	3636	D 7	3848	A 7		
174	C 7	2691	B 7	3661	D 9	5503	C 9			172	C 9	2645	F 4	3637	D 6	3849	A 6		
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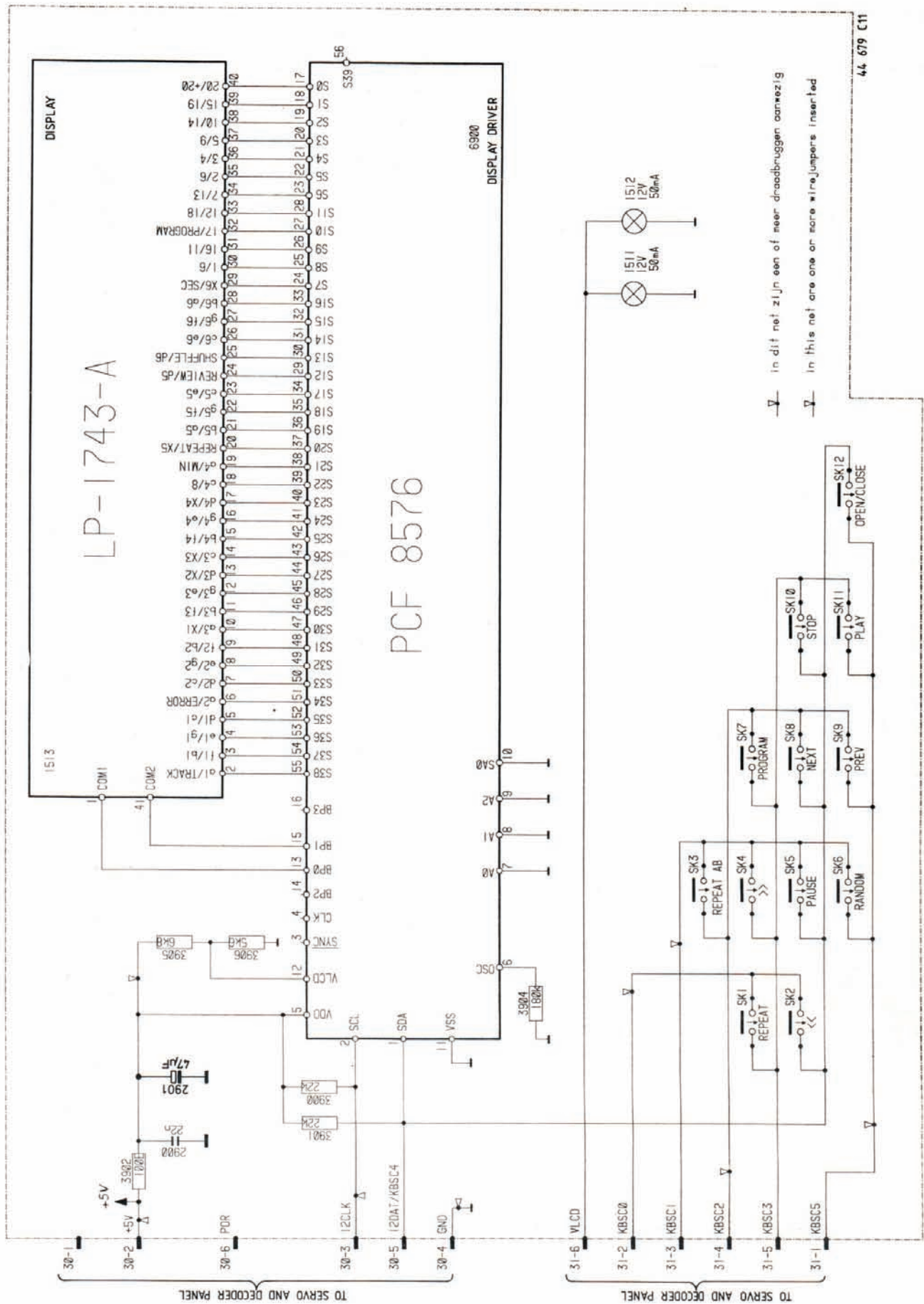
DECODING



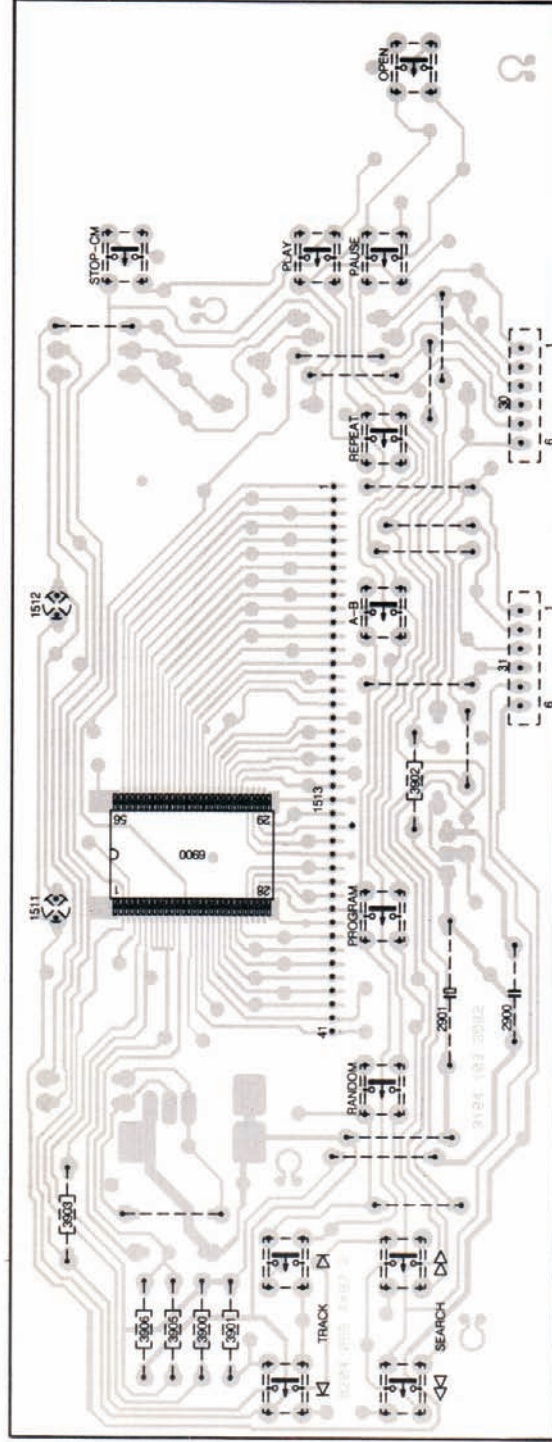
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2607	E 2	6551	B14
2608	F 2	6552	B15
2609	J 1	6553	B15
2611	I 2	6554	D14
2612	I 2	6555	C14
2630	I 6	6557	C15
2631	I 7	6558	C14
2632	F 7	6561	D11
2633	F 8	6562	D14
2634	F10	6563	D11
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2666	F14		
2667	H14		
2668	F14		
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2670	G13		
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2698	H14		
2699	H13		
2700	E15		
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3603	G 2		
3604	F 2		
3605	J 2		
3607	J 1		
3609	I 2		
3610	I 1		
3613	D 4		
3648	F14		
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3738	D10		
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3743	I12		
3744	H13		
3745	I14		
3747	D14		
3748	C14		
3776	E12		
3809	H15		
3810	D14		
3811	D14		
3812	C15		
3824	E 1		
3826	F 3		
3832	D 9		
3833	F14		
3834	H 3		
3848	C14		
5502	F14		
5503	H14		
6519	B14		
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6535	F15		
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 PRS: 04298
 T12/933

CONTROL AND DISPLAY CIRCUIT



CONTROL AND DISPLAY PANEL



PCB 01555
127/833

CONTROL & DISPLAY PARTS

ICPCF8576T	5322 209 11129
Tactl switch	4822 276 12465
Lamp 12V-50mA	4822 134 40944
Display	4822 130 90662
47µF 25V	4822 124 22027
22nF 16V	4822 122 10166
22K	4822 116 52463
100E	4822 116 52389
180K	4822 116 52502
6k8	4822 116 52441
5k6	4822 116 53027

ELECTRICAL PARTSLIST SERVO + DECODER PANEL

For non active chip components see separate list

		Bipolair elco	
MN4264-15	4822 209 70422	0.68µF 16V	4822 124 41583
MC79L09AC	4822 209 73233	10µF 25V	4822 124 41558
MC79M15CT	5322 209 86361	100µF 16V	4822 124 22339
MC7905CT	4822 209 73233		
TY40408 (+5V)	4822 209 71579	BZV85-C6V2	5322 130 32962
MC78M15	4822 209 80808	BZX55-C3V9	4822 130 31981
TDA8808T	4822 209 73234	BZX55-C12	4822 130 34197
TDA8809T/C2	4822 209 73235	BZX79-B5V6	4822 130 34173
SAA7310GP/S5	4822 209 61759	1N4002	5322 130 30684
µPD41416C-20	4822 209 50582	1N4148	4822 130 30621
SAA7220	4822 209 11157	HZ7C2/7V2	4822 130 32862
TDA1543	4822 209 73236	BA314	4822 130 30879
LM833N	4822 209 83163	HZ3B2	4822 130 32831
NJM4560D	4822 209 83274	HZ7A3	4822 130 33523
TCA0372DP2	4822 209 72587	BAT85	4822 130 31983
MC68HC05C8P	4822 209 61011		
		CSA4.000 mHz	4822 242 70831
BC858	5322 130 41983	11289.6 kHz	4822 242 71349
BC848C	5322 130 42136		
BC848	4822 130 61207	Coil 4.7 mH	4822 157 53141
BC328-16	4822 130 41023		
BC328	4822 130 44104	1/3 Watt	
BC338	4822 130 44121	4,7Ω	4822 116 52858
BC558B	4822 130 44197	12Ω	4822 111 30511
BC858 (C)	5322 130 42012	18Ω	4822 111 31515
BC848	5322 130 41981	100Ω	4822 116 52389
BC818	4822 130 42675	120Ω	4822 116 52394
BF550	4822 130 42131	220Ω	4822 116 52407
BC548	4822 130 40938	330Ω	4822 116 52416
Miscellaneous		750Ω	4822 116 52432
Spring clip	4822 255 40179	1kΩ	4822 116 52391
Cinch socket	4822 267 40766	1,2kΩ	4822 116 52395
Switch (tray)	4822 276 12523	1,8kΩ	4822 116 53109
Mains switch	4822 276 11309	2,2kΩ	4822 116 52408
Mains inlet	4822 265 20291	4,7kΩ	4822 116 52426
Phone socket	4822 267 30743	5,6kΩ	4822 116 52438
Fuse holder	4822 256 30274	6,8kΩ	4822 116 52925
Mains transformer	4822 146 30701	10kΩ	4822 116 52452
Fuse T160mA	4822 253 30009	22kΩ	4822 116 52463
Voltage selector	4822 277 21366	47kΩ	4822 116 52472
Safety cover	4822 462 41505	100kΩ	4822 116 52973
Fuse carrier	4822 255 41023	180kΩ	4822 116 52505
Mains transformer/61R	4822 146 21489	5,6MΩ	4822 116 52533
		680kΩ	4822 116 52536
3,3nF 400 V △	4822 122 40327	Non flammable safety resistors △	
3,3nF	4822 126 10005	12Ω	4822 111 30511
22nF	4822 122 10166	1Ω	4822 111 30483
1nF	4822 122 31746	4,7Ω	4822 111 30499
220nF 63V	4822 121 42245	10Ω	4822 111 30508
470nF 100V	4822 121 51252	33Ω	4822 111 30522
8,2µF 63V	4822 121 51321	1,8kΩ	4822 116 53109
3,3nF 63V	5322 122 31848	18Ω	4822 111 30515
4,7nF	4822 121 51314		
1,2nF	4822 121 51309	4,7kΩ	4822 101 10685
330nF	5322 121 42661	22kΩ	4822 100 20522
4,7µF 50V	4822 124 41577		
6,8µF 50V	4822 124 41578		
33µF 16V	4822 124 40272		
47µF 25V	4822 124 41527		
100µF 25V	4822 124 41528		
220µF 16V	4822 124 40196		
220µF 35V	4822 124 41572		
470µF 35V	4822 124 41573		
4700µF 16V	4822 124 41458		
1000µF 16V	4822 124 41571		
6800µF 16V	4822 124 41591		

SYMBOL	DESCRIPTION
	Capacitor, general
	Electrolytic capacitor (+ and - may be omitted)
	Bipolar electrolytic capacitor (+ may be omitted)
	Resistor, general
	N.T.C. resistor
	P.T.C. resistor
	Voltage divider with preset adjustment
	Chip jumper
	Pin contact
	Bus contact
	Coil, self-induction
	Transformer with electrically poor conducting core and adjustable pre-magnetization
	Diode
	Zener diode
	Stabistor
	Double variable capacity diode (in one envelope)
	Photo conductive diode
	L.E.D.

SYMBOL	DESCRIPTION
	Transistor (N.P.N.)
	Transistor (P.N.P.)
	Direct current (DC)
	Alternating current (AC)
	Earth (functional)
	Frame or chassis connection
	Direction in which AC voltages are passed on (optional present)
	Interrupted line
	Not-connected crossing lines
	Connected lines
	Cable tree with lead-outs
	Changer, general (arrow is optional)
	Voltage Controlled Oscillator
	Band-pass filter
	Phase changing network
	Delay element
	Amplifier, general

SYMBOL	DESCRIPTION
	Operational amplifier
	Differential amplifier
	Splitter
	Operational amplifier with open output
	Exclusive OR gate
	True/complement amplifier with high input
	Flip Flop
	AND gate
	OR gate
	Inverter with high input

	0.2W (CR 16)	$\leq 220k$ $> 270k$	5% 10%
	0.33W (CR 25)	$\leq 1M$ $> 1M$	5% 10%
	0.33W (SFR25)		5%
	0.25W (VR 25)	$\leq 10M$ $> 10M$	5% 10%
	0.5W (CR 37)	$\leq 1M$ $> 1M$	5% 10%
	0.67W (CR 52)		5%
	1.15W (CR 68)		5%

	Ceramic plate
	Polyester flat foil
	Polyester mepolesco
	Mylar (Polyester flat foil small sized)
	Micropoco
	Tubular ceramic (body colour pink or yellow/green)
	Miniature single elco
	Subminiature tantalum

* a=2.5V
b=4V
c=6.3V
d=10V
e=16V
f=25V
g=40V
h=63V
i=100V
j=125V
l=125V
m=150V
n=160V
q=200V
r=250V
s=300V
t=350V
u=400V
v=500V
w=630V
x=1000V
A=1.6V
B=6V
C=12V
D=15V
E=20V
F=35V
G=50V
H=75V
I=80V

MDA.00084
T32-735

⑥  Chips 50 V NP0 S1206				⑥  Chips 0,125 W S1206				⑥  Chips 0,125 W S1206				1U
1 pF	5%	4822 122 32479		4,7 E	5%	5322 111 90376		6,8 k	2%	4822 111 90544		
1,2 pF	5%	4822 122 33013		5,1 E	5%	4822 111 90393		7,5 k	2%	4822 111 90276		
1,5 pF	5%	4822 122 31792		5,6 E	5%	4822 111 90394		8,2 k	2%	5322 111 90118		
1,8 pF	5%	4822 122 32087		6,2 E	5%	4822 111 90395		9,1 k	2%	4822 111 90373		
2,2 pF	5%	4822 122 32425		6,8 E	5%	4822 111 90254		10 k	2%	4822 111 90249		
3,3 pF	5%	4822 122 32079		7,5 E	5%	4822 111 90396		11 k	2%	4822 111 90337		
3,9 pF	5%	4822 122 32081		8,2 E	5%	4822 111 90397		12 k	2%	4822 111 90253		
4,7 pF	5%	4822 122 32082		9,1 E	5%	4822 111 90398		13 k	2%	4822 111 90509		
5,6 pF	5%	4822 122 32506		10 E	2%	5322 111 90095		15 k	2%	4822 111 90196		
6,8 pF	5%	4822 122 32507		11 E	2%	4822 111 90338		16 k	2%	4822 111 90346		
8,2 pF	5%	4822 122 32083		12 E	2%	4822 111 90341		18 k	2%	4822 111 90238		
10 pF	5%	4822 122 31971		13 E	2%	4822 111 90343		20 k	2%	4822 111 90349		
12 pF	5%	4822 122 32139		15 E	2%	4822 111 90344		22 k	2%	4822 111 90251		
15 pF	5%	4822 122 32504		16 E	2%	4822 111 90347		24 k	2%	4822 111 90512		
18 pF	5%	4822 122 31769		18 E	2%	5322 111 90139		27 k	2%	4822 111 90542		
22 pF	10%	4822 122 31837		20 E	2%	4822 111 90352		30 k	2%	4822 111 90216		
27 pF	5%	4822 122 31966		22 E	2%	4822 111 90186		33 k	2%	5322 111 90267		
33 pF	5%	4822 122 31756		24 E	2%	4822 111 90355		36 k	2%	4822 111 90514		
39 pF	5%	4822 122 31972		27 E	2%	5322 111 90105		39 k	2%	5322 111 90108		
47 pF	5%	4822 122 31772		30 E	2%	4822 111 90356		43 k	2%	4822 111 90363		
56 pF	5%	4822 122 31774		33 E	2%	4822 111 90357		47 k	2%	4822 111 90543		
68 pF	5%	4822 122 31961		36 E	2%	4822 111 90359		51 k	2%	5322 111 90274		
82 pF	10%	4822 122 31839		39 E	2%	4822 111 90361		56 k	2%	4822 111 90573		
100 pF	5%	4822 122 31765		43 E	2%	5322 116 90125		62 k	2%	5322 111 90275		
120 pF	5%	4822 122 31766		47 E	2%	4822 111 90217		68 k	2%	4822 111 90202		
150 pF	5%	4822 122 31767		51 E	2%	4822 111 90365		75 k	2%	4822 111 90574		
180 pF	2%	4822 122 31794		56 E	2%	4822 111 90239		82 k	2%	4822 111 90575		
220 pF	5%	4822 122 31965		62 E	2%	4822 111 90367		91 k	2%	5322 111 90277		
270 pF	5%	4822 122 32142		68 E	2%	4822 111 90203		100 k	2%	4822 111 90214		
330 pF	10%	4822 122 31642		75 E	2%	4822 111 90371		110 k	2%	5322 111 90269		
390 pF	5%	4822 122 31771		82 E	2%	4822 111 90124		120 k	2%	4822 111 90568		
470 pF	5%	4822 122 31727		91 E	2%	4822 111 90375		130 k	2%	4822 111 90511		
560 pF	5%	4822 122 31773		100 E	2%	5322 111 90091		150 k	2%	5322 111 90099		
680 pF	5%	4822 122 31775		110 E	2%	4822 111 90335		160 k	2%	5322 111 90264		
820 pF	5%	4822 122 31974		120 E	2%	4822 111 90339		180 k	2%	4822 111 90565		
1 nF	10%	5322 122 31647		130 E	2%	4822 111 90164		200 k	2%	4822 111 90351		
1,2 nF	5%	4822 122 31807		150 E	2%	5322 111 90098		220 k	2%	4822 111 90197		
1,5 nF	10%	4822 122 31781		160 E	2%	4822 111 90345		240 k	2%	4822 111 90215		
1,8 nF	10%	4822 122 32153		180 E	2%	5322 111 90242		270 k	2%	4822 111 90302		
2,2 nF	10%	4822 122 31644		200 E	2%	4822 111 90348		300 k	2%	5322 111 90266		
2,7 nF	10%	4822 122 31783		220 E	2%	4822 111 90178		330 k	2%	4822 111 90513		
3,3 nF	10%	4822 122 31969		240 E	2%	4822 111 90353		360 k	2%	4822 111 90515		
3,9 nF	10%	4822 122 32566		270 E	2%	4822 111 90154		390 k	2%	4822 111 90182		
4,7 nF	10%	4822 122 31784		300 E	2%	4822 111 90156		430 k	2%	4822 111 90168		
5,6 nF	10%	4822 122 31916		330 E	2%	5322 111 90106		470 k	2%	4822 111 90161		
6,8 nF	10%	4822 122 31976		360 E	1%	4822 111 90288		510 k	2%	4822 111 90364		
10 nF	10%	4822 122 31728		360 E	2%	4822 111 90358		560 k	2%	4822 111 90169		
12 nF	10%	5322 122 31648		390 E	2%	5322 111 90138		620 k	2%	4822 111 90213		
15 nF	10%	4822 122 31782		430 E	2%	4822 111 90362		680 k	2%	4822 111 90368		
18 nF	10%	4822 122 31759		470 E	2%	5322 111 90109		750 k	2%	4822 111 90369		
22 nF	10%	4822 122 31797		510 E	2%	4822 111 90245		820 k	2%	4822 111 90205		
27 nF	10%	4822 122 32541		560 E	2%	5322 111 90113		910 k	2%	4822 111 90374		
33 nF	10%	4822 122 31981		620 E	2%	4822 111 90366		1 M	2%	4822 111 90252		
47 nF	10%	4822 122 32542		680 E	2%	4822 111 90162		1,1 M	5%	4822 111 90408		
56 nF	10%	4822 122 32183		750 E	2%	5322 111 90306		1,2 M	5%	4822 111 90409		
100 nF	10%	4822 122 31947		820 E	2%	4822 111 90171		1,3 M	5%	4822 111 90411		
180 nF	10%	4822 122 32915		910 E	2%	4822 111 90372		1,5 M	5%	4822 111 90412		
220 nF	20%	4822 122 32715		1 k	2%	5322 111 90092		1,6 M	5%	4822 111 90413		
⑥  Chips 0,125 W S1206 NP0				1,1 k	2%	4822 111 90336		1,8 M	5%	4822 111 90414		
0 E	jumper	4822 111 90163		1,2 k	2%	5322 111 90096		2 M	5%	4822 111 90415		
1 E	5%	4822 111 90184		1,3 k	2%	4822 111 90244		2,2 M	5%	4822 111 90185		
1,1 E	5%	4822 111 90377		1,5 k	2%	4822 111 90151		2,4 M	5%	4822 111 90416		
1,2 E	5%	4822 111 90378		1,6 k	2%	5322 111 90265		2,7 M	5%	4822 111 90417		
1,3 E	5%	4822 111 90379		1,8 k	2%	5322 111 90101		3 M	5%	4822 111 90418		
1,5 E	5%	4822 111 90381		2 k	2%	4822 111 90165		3,3 M	5%	4822 111 90191		
1,6 E	5%	4822 111 90382		2,2 k	2%	4822 111 90248		3,6 M	5%	4822 111 90419		
1,8 E	5%	4822 111 90383		2,4 k	2%	4822 111 90289		3,9 M	5%	4822 111 90421		
2 E	5%	4822 111 90384		2,7 k	2%	4822 111 90569		4,3 M	5%	4822 111 90422		
2,2 E	5%	5322 111 90104		3 k	2%	4822 111 90198		4,7 M	5%	4822 111 90423		
2,4 E	5%	4822 111 90385		3,3 k	2%	4822 111 90157		5,1 M	5%	4822 111 90424		
2,7 E	5%	4822 111 90386		3,6 k	2%	5322 111 90107		5,6 M	5%	4822 111 90425		
3 E	5%	4822 111 90387		3,9 k	2%	4822 111 90571		6,2 M	5%	4822 111 90426		
3,3 E	5%	4822 111 90388		4,3 k	2%	4822 111 90167		6,8 M	5%	4822 111 90235		
3,6 E	5%	4822 111 90389		4,7 k	2%	5322 111 90111		7,5 M	5%	4822 111 90427		
3,9 E	5%	4822 111 90391		5,1 k	2%	5322 111 90268		8,2 M	5%	4822 111 90237		
4,3 E	5%	4822 111 90392		5,6 k	2%	4822 111 90572		9,1 M	5%	4822 111 90428		
				6,2 k	2%	4822 111 90545		10M	5%	5322 111 91141		

CHANGES

Changed pages
Introductions with A89-119

Page	Reason
Frontpage	/60R/65R and /70R added
2-1-a	Max. diameter added
2-3-a	Partslist adapted for /60R, /65R and /70R
4-2-a	Drawing corrected
4-3-a	Table adapted for /60R, /65R and /70R
4-6-a	Mapping added
5-1-a	Mapping added
	Circuit diagram corrected
	Correct printed circuit board given

CHANGES

Changed pages
Introductions with A89-121

Page	Reason
Frontpage	/61R added
2-3b	Partslist adapted
4-1-1	Wiring diagram added
4-4a	Due to change of main panel
4-5a	Due to change of main panel
4-5-1	Due to change of main panel
4-5-2	Due to change of main panel
4-6b	Schematic diagram adapted
5-2a	Partslist adapted