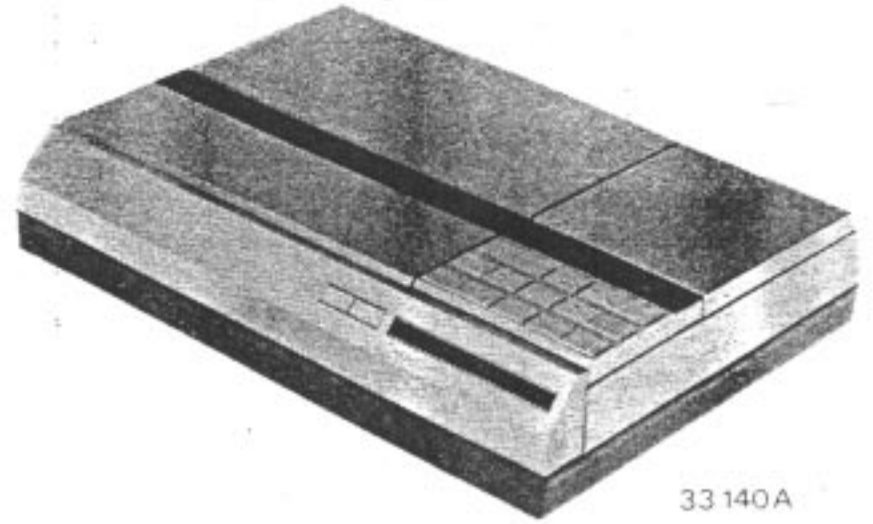


Service
Service
Service



33140A

Service Manual

22VP932 is a Video Disc Player suitable for play back of pre-recorded optical video discs, according Laser Vision system.

Part I Service Manual
Part II Repair Method
Part III Descriptions

Deck 22VP420 Service Manual

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

TECHNICAL DATA

Player

Mains voltage	: 110 V \pm 10%
Mains frequency	: 50/60 Hz
Power consumption	: 45 W (max.)
Fuse	: 2.5 A delayed
Mains cord	: 2.5 m
Dimensions	: 532 x 412 x 123 mm
Weight	: 10 kg
Operation position	: Horizontal max. 20° inclined
Allowed ambient temperature	: 15°C < t < 35°C acc. spec 5°C < t < 15°C working 35°C < t < 40°C
T.V. system	: PAL G
Intercarrier distance	: 5.5 MHz
Audio/Video connector	: SCART connector
Video output	: acc. to SCART norm
Output signal	: EMF = 2 V _{pp} , R _i = 75 Ω
Frequency range	: 5 MHz (-6 dB)
Signal to noise ratio	: >37 dB unweighted
Amplitude ratio picture/sound carrier during sync. level	: 10...15 dB
Colour subcarrier frequency	: 4433619 Hz \pm 50 Hz
Audio outputs (2) (only during play forward)	: Dual cinch : 1 V _{rms} max, R _i =1500 Ω
Frequency range	: 40 Hz...20 kHz (3 dB)
Signal-noise ratio	: \geq 60 dB
Channel crosstalk	: \leq -55 dB (1 kHz-100% mod.)
Distortion	: <1% (1 kHz-100% mod.)
Muting during other mode functions than play forward	: >70 dB
Subcarriers	: audio 1 683 kHz audio 2 1066 kHz

Optical reading system

Appearance of stable picture on T.V. set after start	: See deck : \leq 12 sec (disc depending)
Time base instability	: <10 nsec (except during search)
Disc systems	: C.A.V. (constant angular velocity) C.L.V. (constant linear velocity)
Playing time (max.)	: C.A.V. 36 min. per side C.L.V. 54 min. per side
Lid open after shut off	: \leq 10 sec

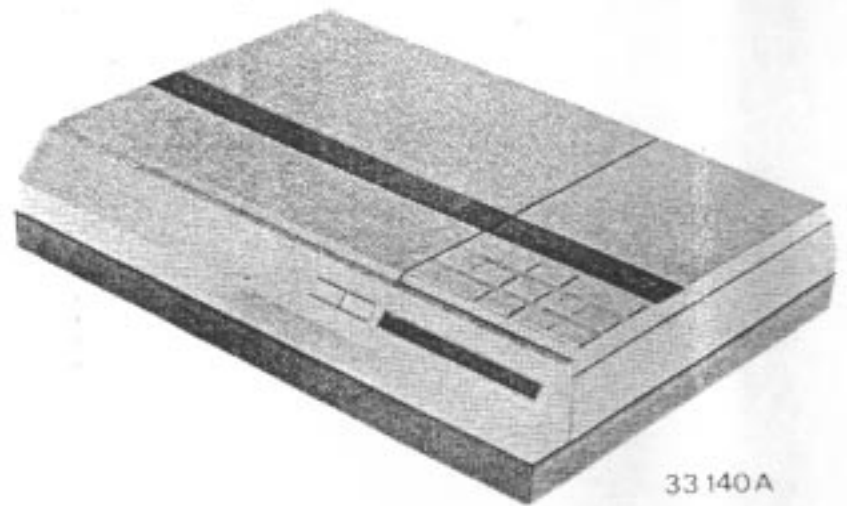
FEATURES: (see also directions for use)

- Picture and chapter search
- Repeat and automatic stop
- Automatic start after lid closure
- Automatic return to start position after lid opening or end of program

CONTROL:

The player is equipped with an external control bus, in accordance with the RS232-C standard.
Transmission speed of data is 9600 Baud

Service
Service
Service



33 140A

PART I

Service Manual

Contents:



- Remarks
- Warnings
- Block diagram
- Demounting housing
- Location of parts
- Wiring diagram
- Adjustments
- Circuit diagrams and printed boards:
 - A Supply panel
 - B Video Servo 1 panel
 - C Video Servo 2 panel
 - D Control panel

Remark:

- Exploded view
- List of mechanical parts
- List of electrical parts
- Abbreviations in the diagrams
- Survey of symbols
- Connections of semiconductors
- For the deck see Service Manual of 22VP420

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

1. Circuit diagrams

- a. The voltages indicated in the diagrams have been measured in the "play" mode of the set. The voltages under deviating circumstances are indicated between brackets ().
- b. The oscillograms have been measured in the "still" mode, with the colour bar pattern of the test disc as video signal.
- c. The signals going to the control panel (diagram D) are indicated with . Signals coming from the control panel are indicated with . Also see the corresponding indications in the block-diagram.

2. Printed Circuit Boards

The drawings of the PCBs are accompanied by a component search system, by means of which it is possible to quickly determine the location of the components.

A quadrantal division has been drawn around the PCB and a Table with all the occurring components is given next to the PCB.

For example:

2018 B5 means that capacitor 2018 is located in quadrant B-5.

3. Optical adjustments

The light path in the player consists of very critically adjusted components.

If a deviation has been observed, one should first convince oneself of the fact that the deviation is located in the optical part and not in the electronic circuits in the rest of the set, before making a beginning with the optical adjustments in the deck.

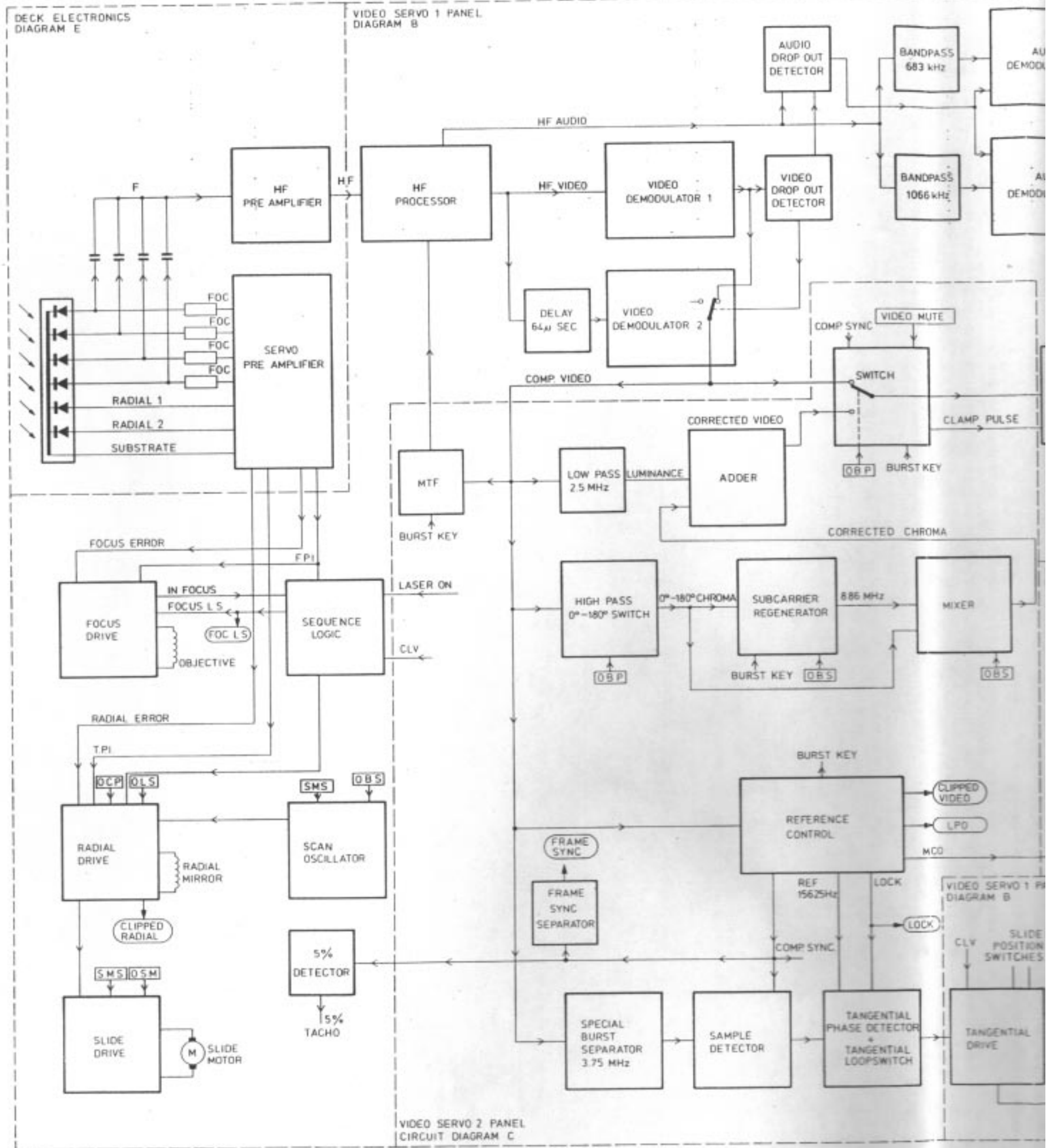
If necessary, replace the complete deck to locate the deviation.

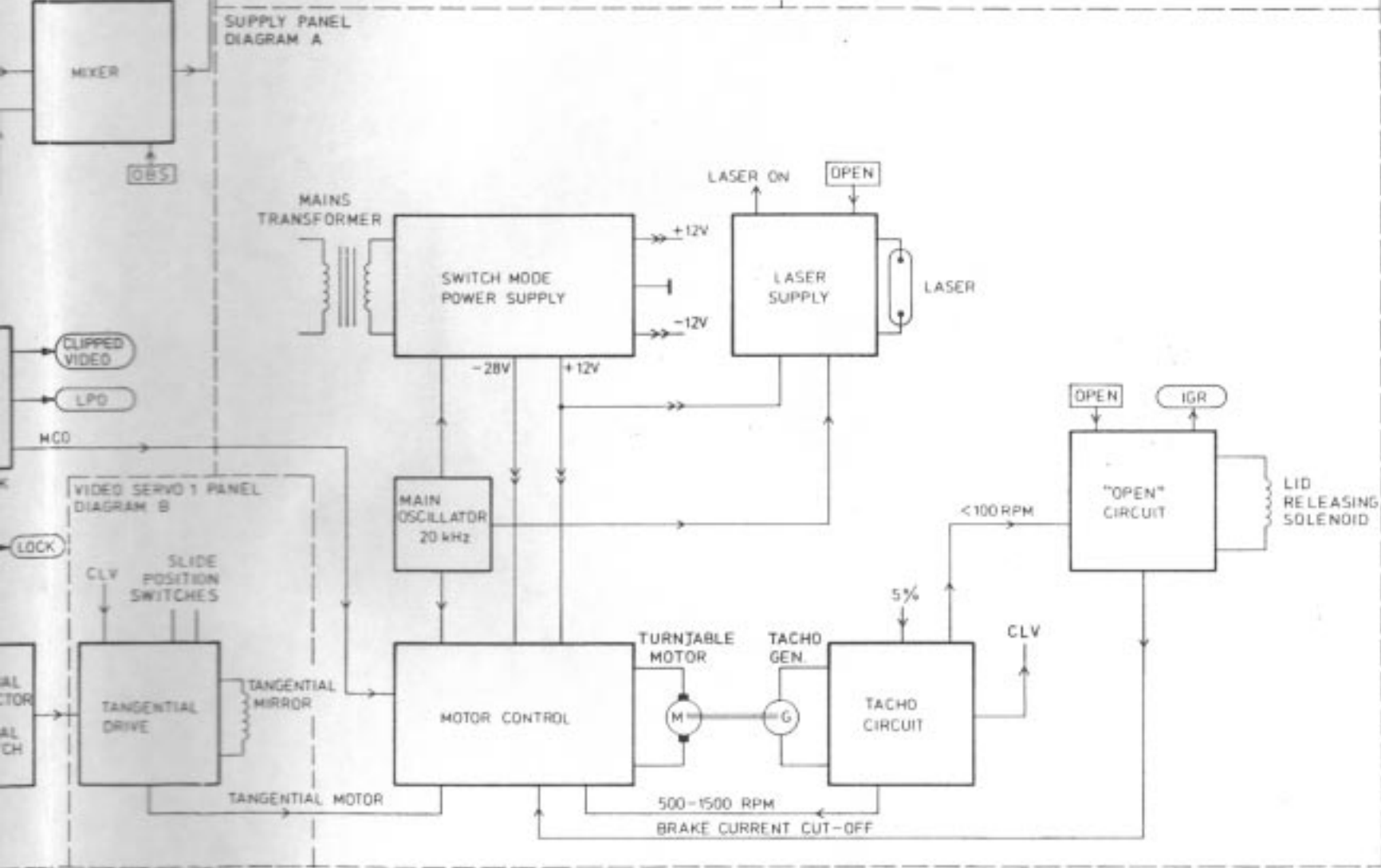
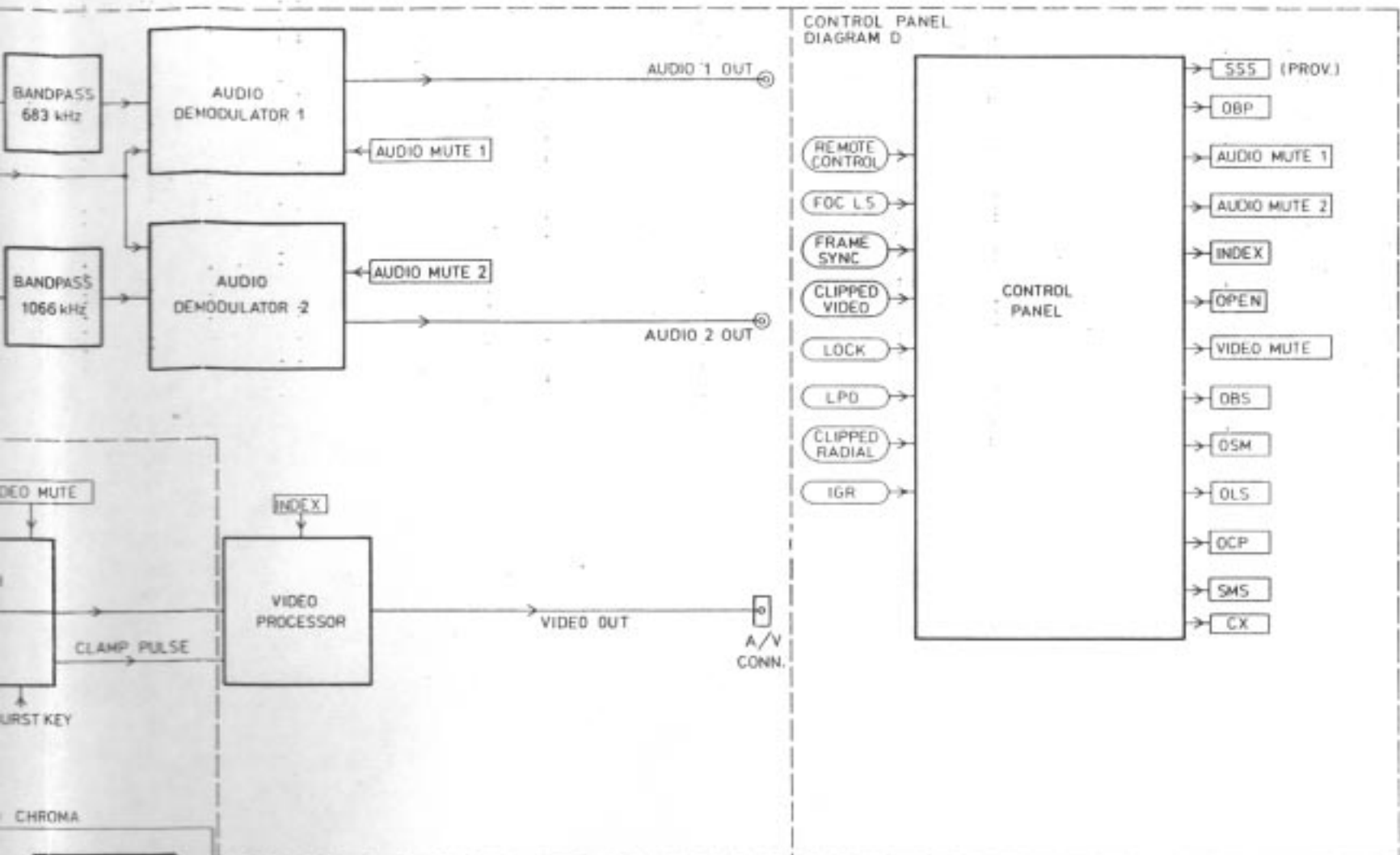
Warnings

1. While repairing and measuring in the electric circuits, one should keep in mind that part of the circuit on the supply panel remains under voltage when the set has been switched off with the ON/OFF switch. Therefore be sure to always remove the mains plug from the socket outlet before replacing any components.
2. The laser used in this set is a HeNe laser which emits visible light with a power of 1 mW and which is classified in the category "class 3B" laser. If, during repair in the deck, the objective unit is removed, a parallel laser beam emerges from the objective hole.

Avoid looking directly into the laser beam as this might cause permanent injury to the eye.

BLOCK DIAGRAM

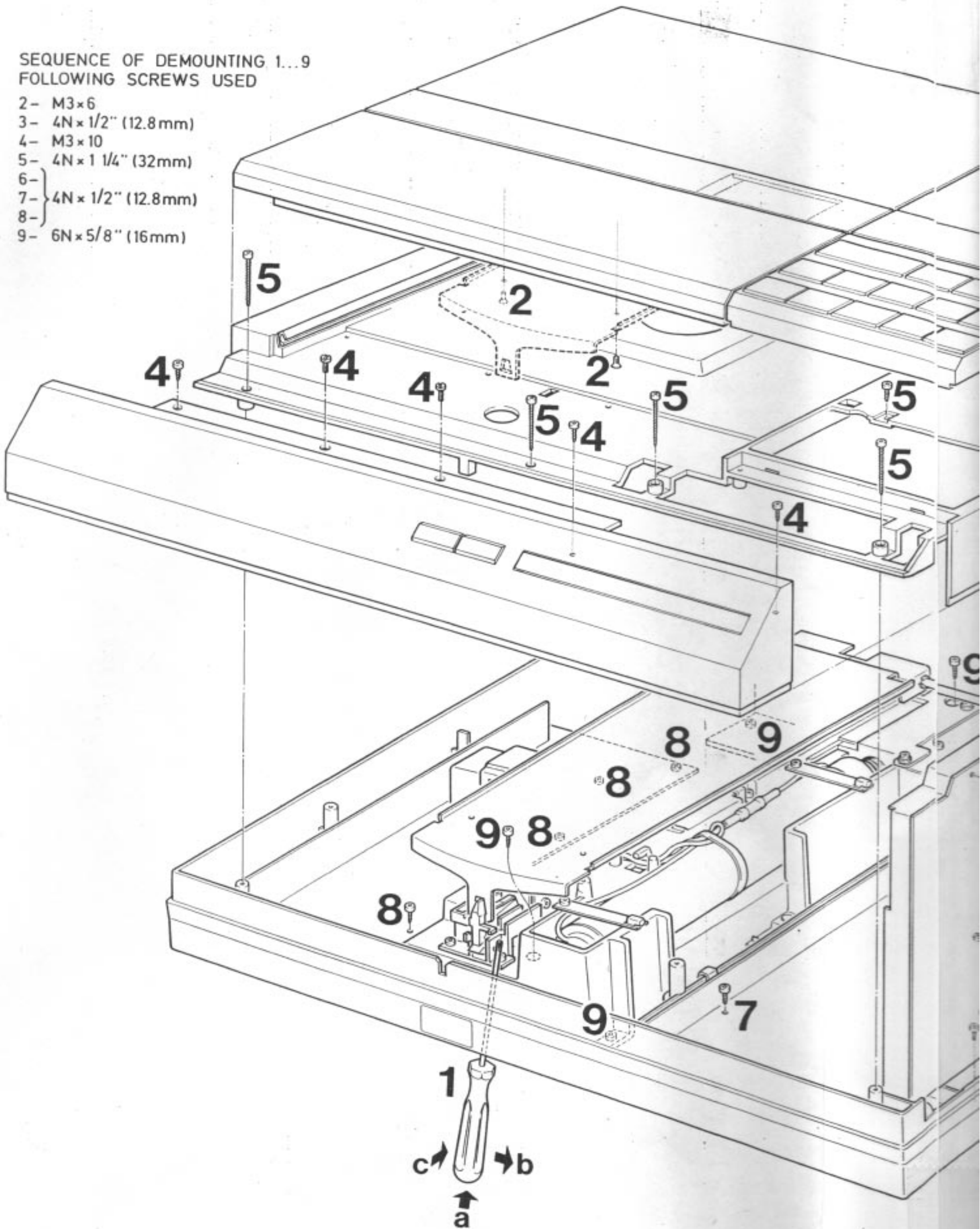


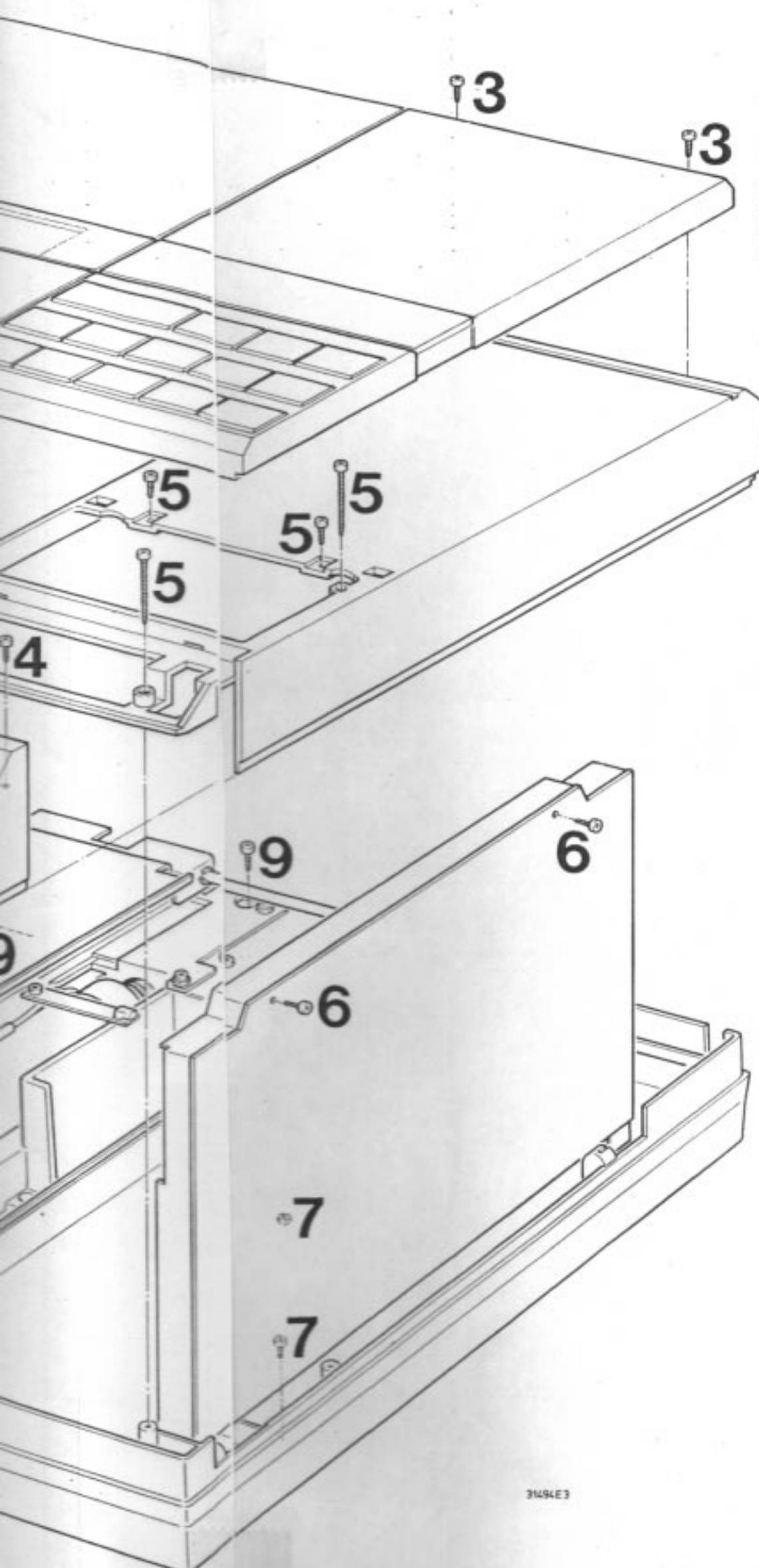


DEMOUNTING HOUSING

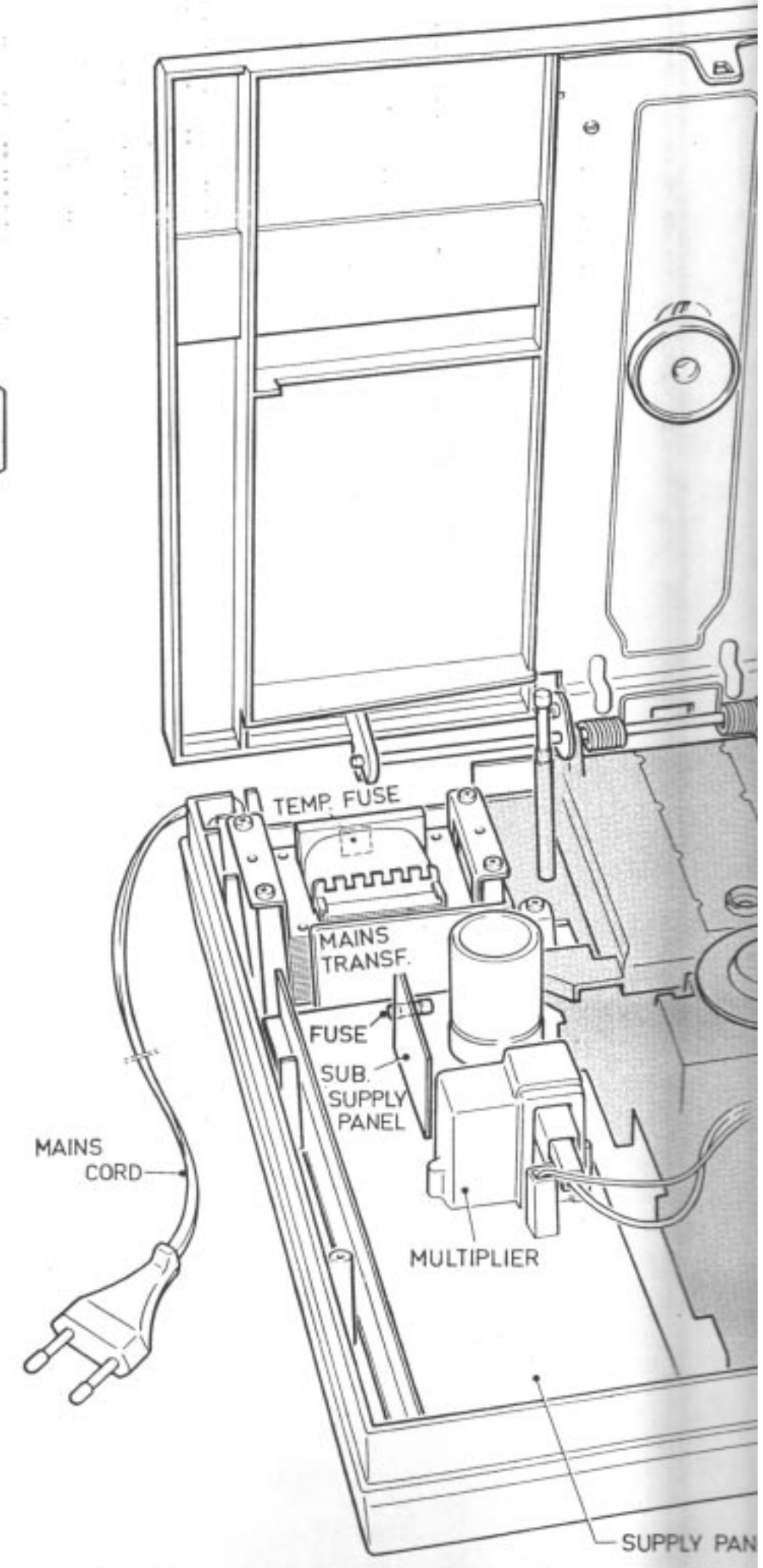
SEQUENCE OF DEMOUNTING 1...9
FOLLOWING SCREWS USED

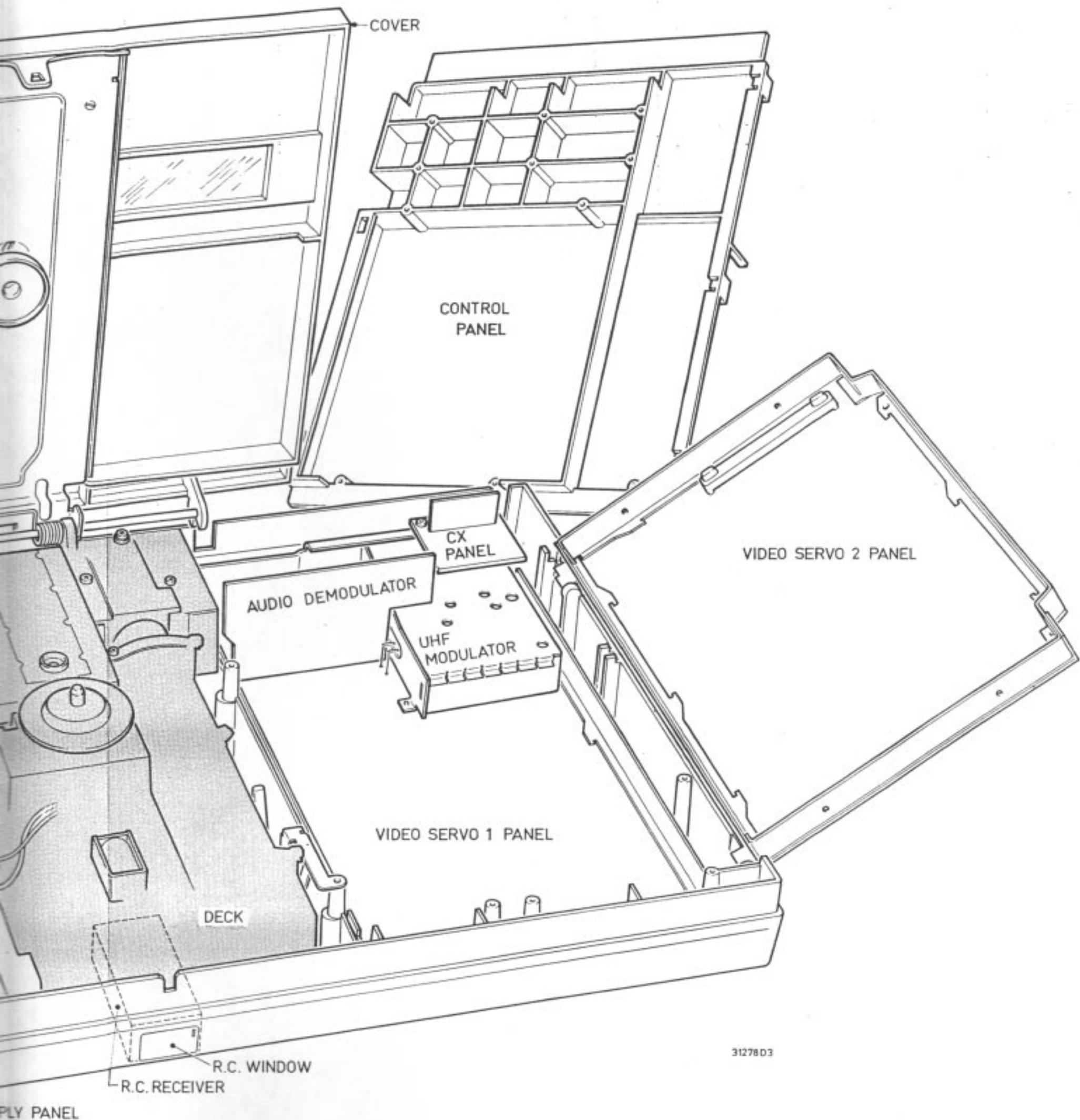
- 2- M3x6
- 3- 4N x 1/2" (12.8mm)
- 4- M3x10
- 5- 4N x 1 1/4" (32mm)
- 6- }
- 7- } 4N x 1/2" (12.8mm)
- 8- }
- 9- 6N x 5/8" (16mm)





LOCATION OF PARTS





31278D3

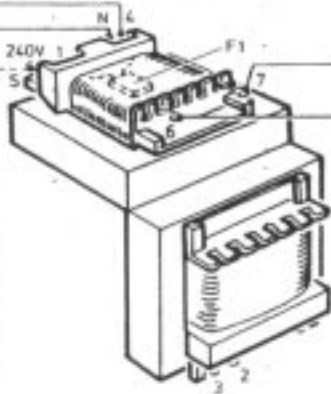
WIRING DIAGRAM

DECK
DIAGRAM E

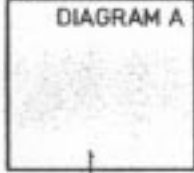
U _{PRIM} (V)	WINDING	INTER-CONNECT
110	N-2	2-4 1-3
127	N-5	2-4 1-3
220	N-4	2-3
240	N-5	2-3

MAINS CONNECTOR

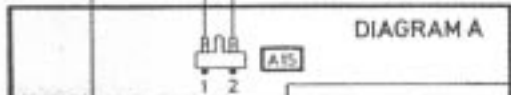
MAINS TRANSFORMER
T1



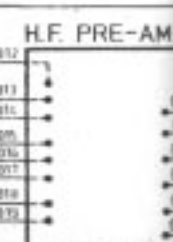
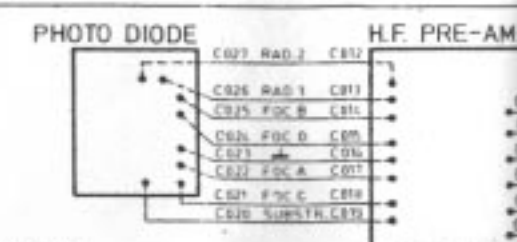
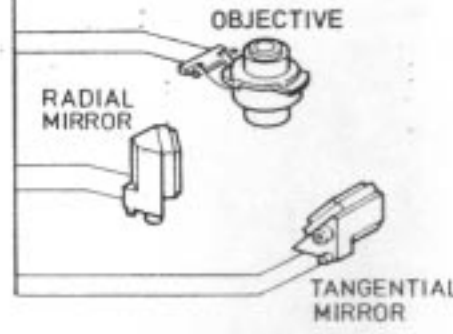
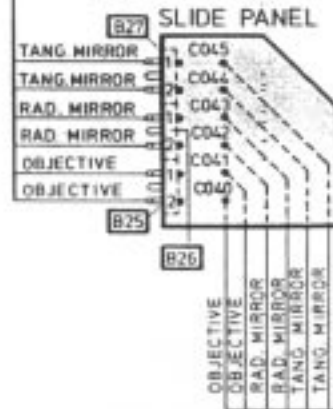
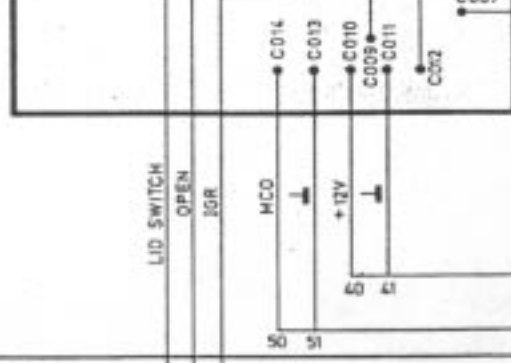
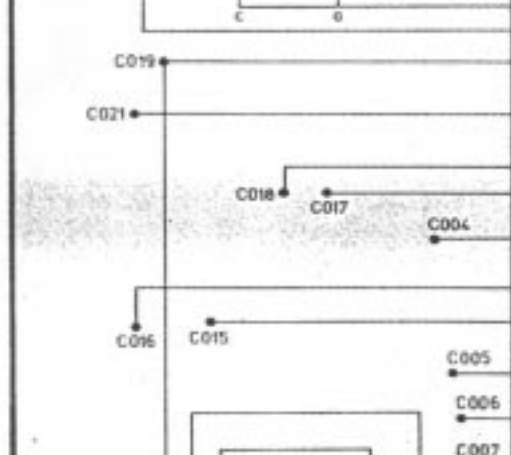
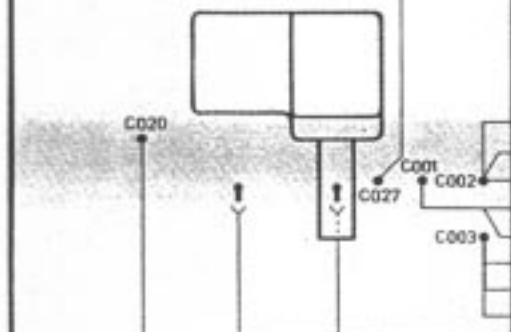
SUB SUPPLY PANEL
DIAGRAM A



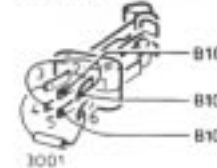
SUPPLY PANEL
DIAGRAM A



ON/OFF SWITCH
C024 C026



SLIDE POSITION SWITCHES

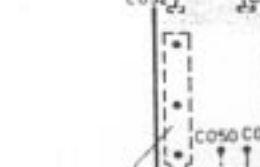


TURNTABLE MOTOR + TACHO GEN.



SLIDE MOTOR

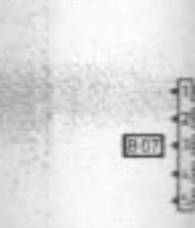
SLIDE MOTOR PANEL



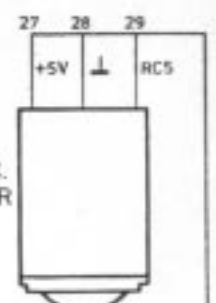
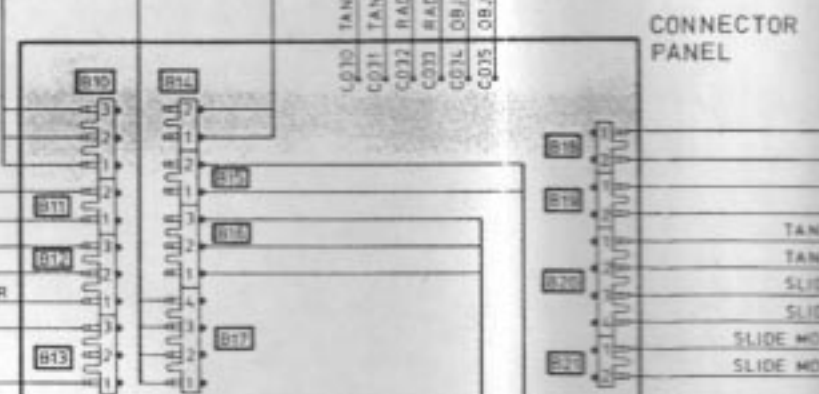
SLIDE END STOP SWITCH



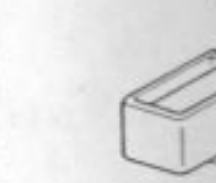
SERVO PRE-AMPLIFIER



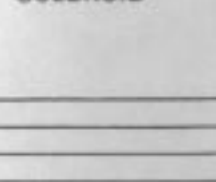
CONNECTOR PANEL



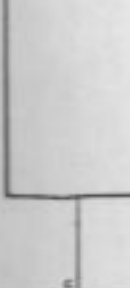
LID SWITCH



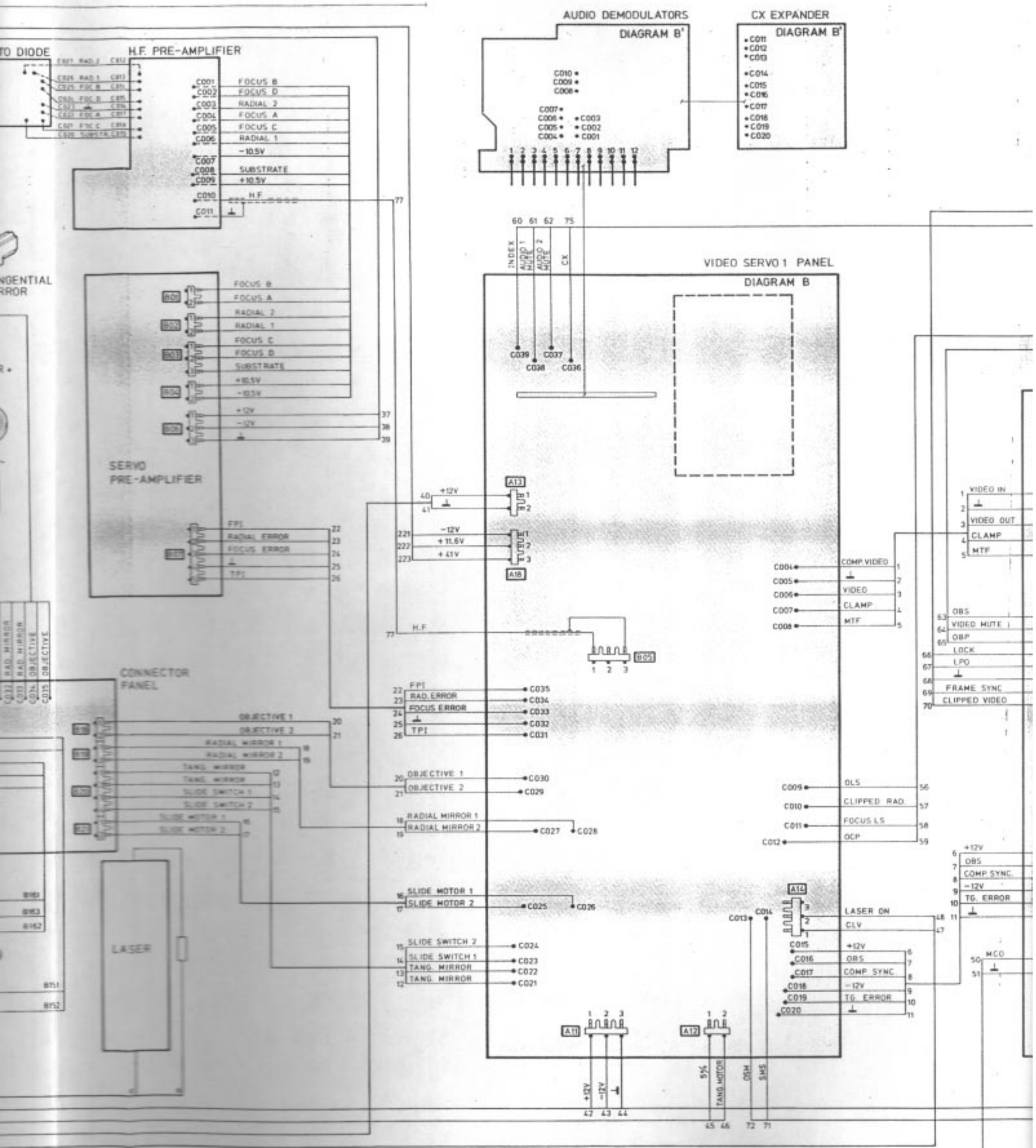
LID RELEASING SOLENOID



LASER



32 53 55



TO DIODE

H.F. PRE-AMPLIFIER

- C001 FOCUS B
- C002 FOCUS D
- C003 RADIAL 2
- C004 FOCUS A
- C005 FOCUS C
- C006 RADIAL 1
- C007 -10.5V
- C008 SUBSTRATE
- C009 +10.5V
- C010 H.F.
- C011

AUDIO DEMODULATORS

DIAGRAM B'

- C010
- C009
- C008
- C007
- C006
- C005
- C004
- C003
- C002
- C001

CX EXPANDER

DIAGRAM B'

- C011
- C012
- C013
- C014
- C015
- C016
- C017
- C018
- C019
- C020

VIDEO SERVO 1 PANEL

DIAGRAM B

- 60 INDEX
- 61 AUDIO 1 MUTE
- 62 AUDIO 2 MUTE
- 75 CX

- C039
- C038
- C037
- C036

SERVO PRE-AMPLIFIER

- B01 FOCUS B
- B02 FOCUS A
- B03 RADIAL 2
- B04 RADIAL 1
- B05 FOCUS C
- B06 FOCUS D
- B07 SUBSTRATE
- B08 +10.5V
- B09 -10.5V
- B10 +12V
- B11 -12V

- FPI
- RAD. ERROR
- FOCUS ERROR
- TPI

CONNECTOR PANEL

- OBJECTIVE 1
- OBJECTIVE 2
- RADIAL MIRROR 1
- RADIAL MIRROR 2
- TANG MIRROR
- SLIDE SWITCH 1
- SLIDE SWITCH 2
- SLIDE MOTOR 1
- SLIDE MOTOR 2

LASER

- C035 FPI
- C034 RAD. ERROR
- C033 FOCUS ERROR
- C032
- C031 TPI

- C030 OBJECTIVE 1
- C029 OBJECTIVE 2
- C028 RADIAL MIRROR 1
- C027 RADIAL MIRROR 2
- C026 SLIDE MOTOR 1
- C025 SLIDE MOTOR 2
- C024 SLIDE SWITCH 2
- C023 SLIDE SWITCH 1
- C022 TANG MIRROR
- C021 TANG MIRROR

- C004 COMP VIDEO
- C005 VIDEO
- C006 CLAMP
- C007
- C008 MTF

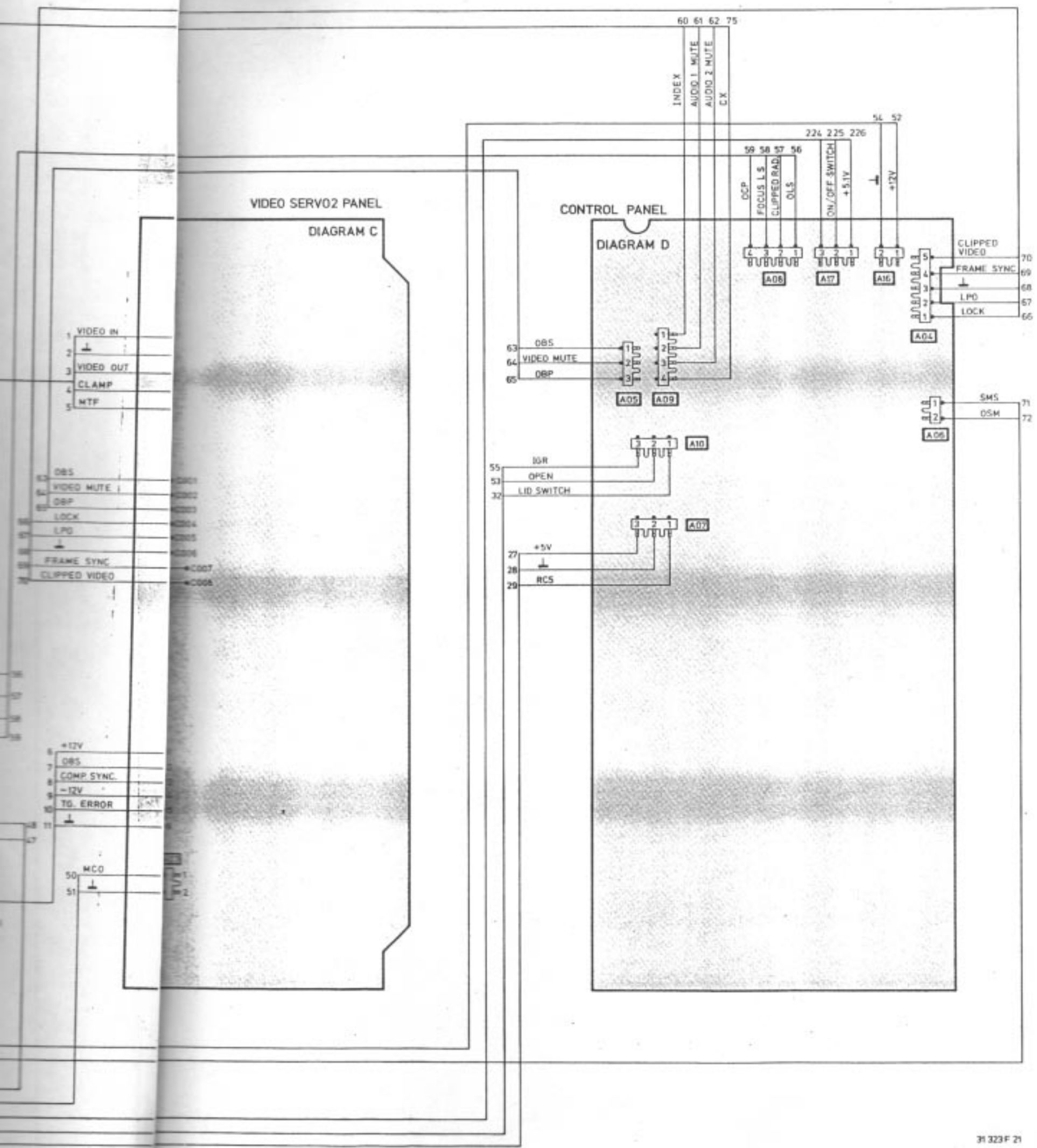
- C009 DLS
- C010 CLIPPED RAD.
- C011 FOCUS L.S.
- C012 OCP

- C013
- C014
- C015 +12V
- C016 OBS
- C017 COMP SYNC
- C018 -12V
- C019 TG. ERROR
- C020

- 1 VIDEO IN
- 2
- 3 VIDEO OUT
- 4 CLAMP
- 5 MTF

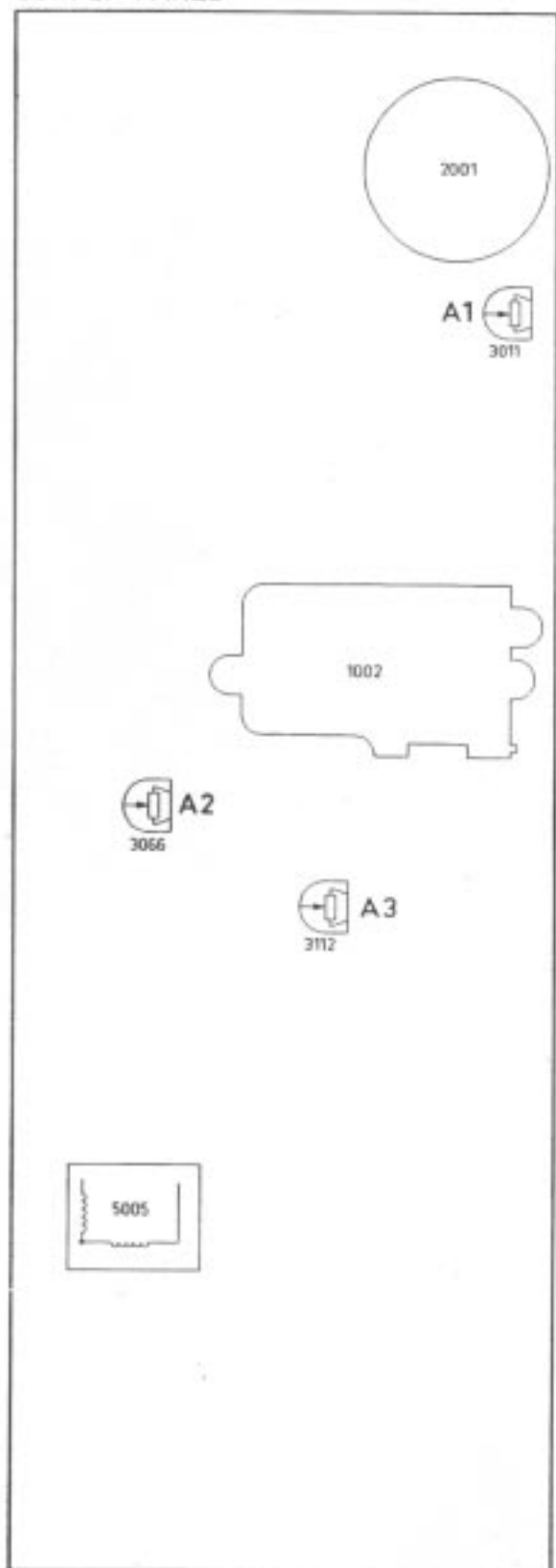
- 63 OBS
- 64 VIDEO MUTE 1
- 65 OBP
- 66 LOCK
- 67 LPO
- 68 FRAME SYNC
- 69 CLIPPED VIDEO
- 70

- 6 +12V
- 7 OBS
- 8 COMP SYNC
- 9 -12V
- 10 TG. ERROR
- 11
- 50 MCO
- 51

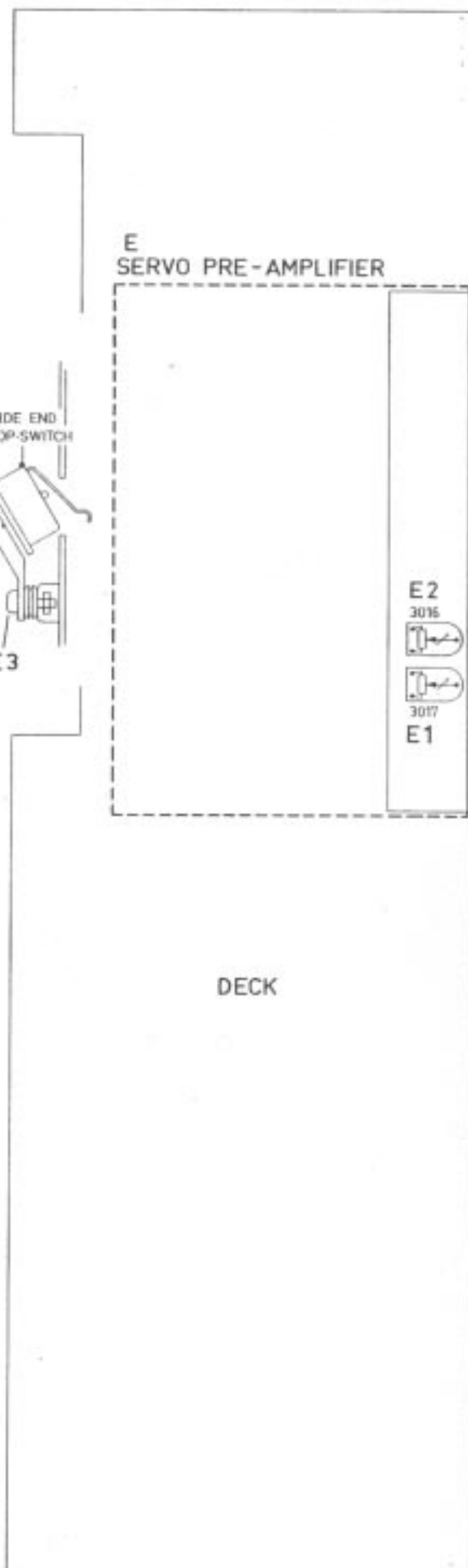


ELECTRICAL ADJUSTMENTS

A SUPPLY PANEL

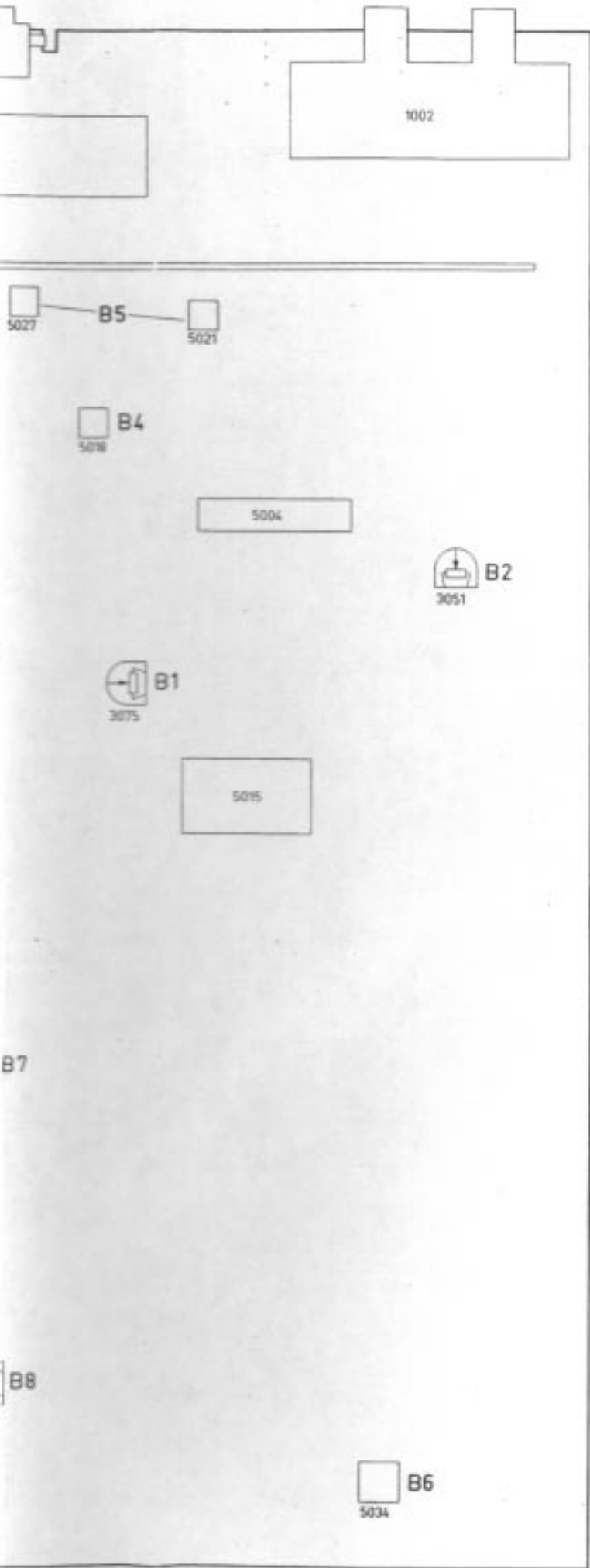


E SERVO PRE-AMPLIFIER

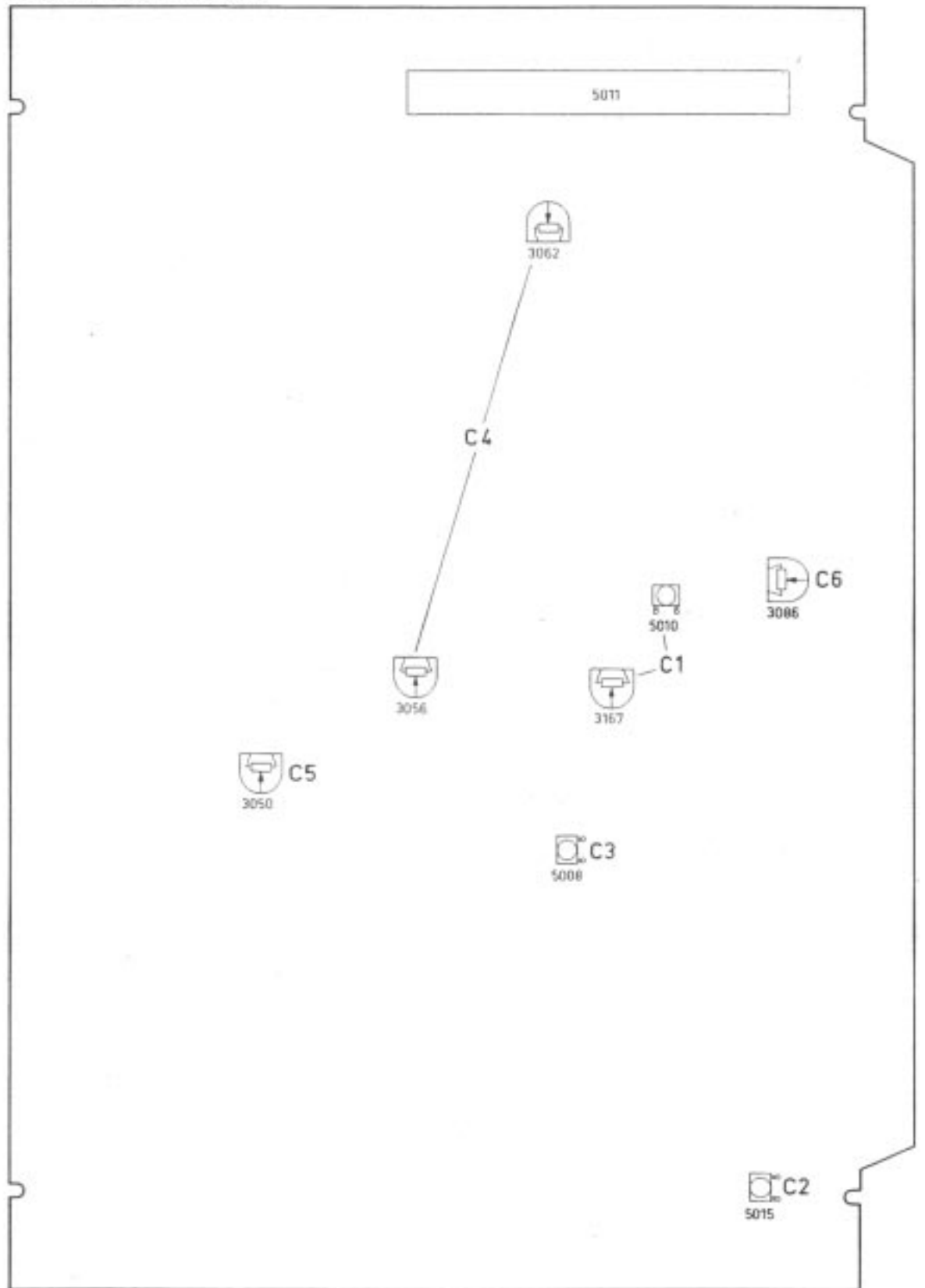


B VIDEO-SERVO 1 PANEL



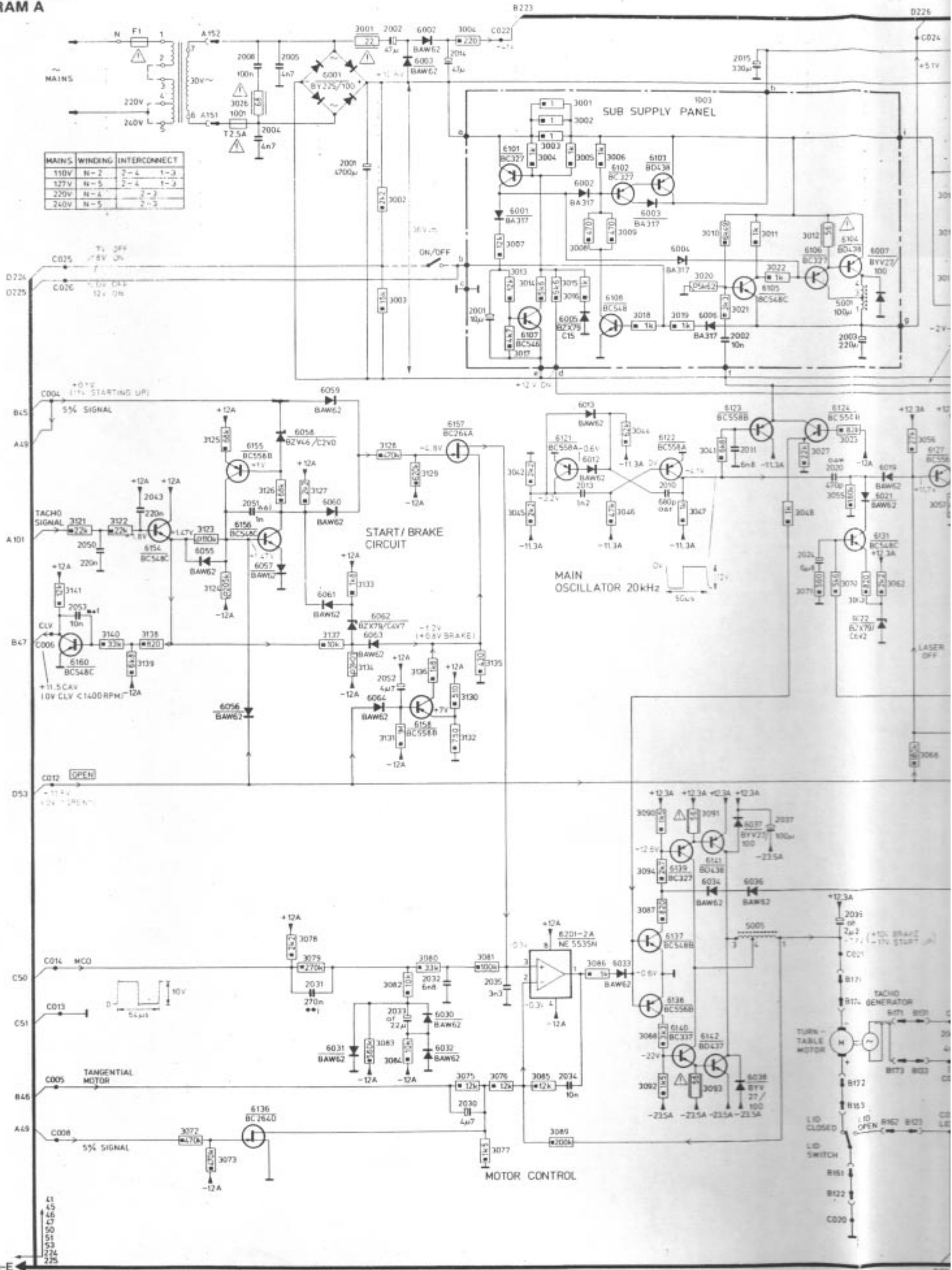


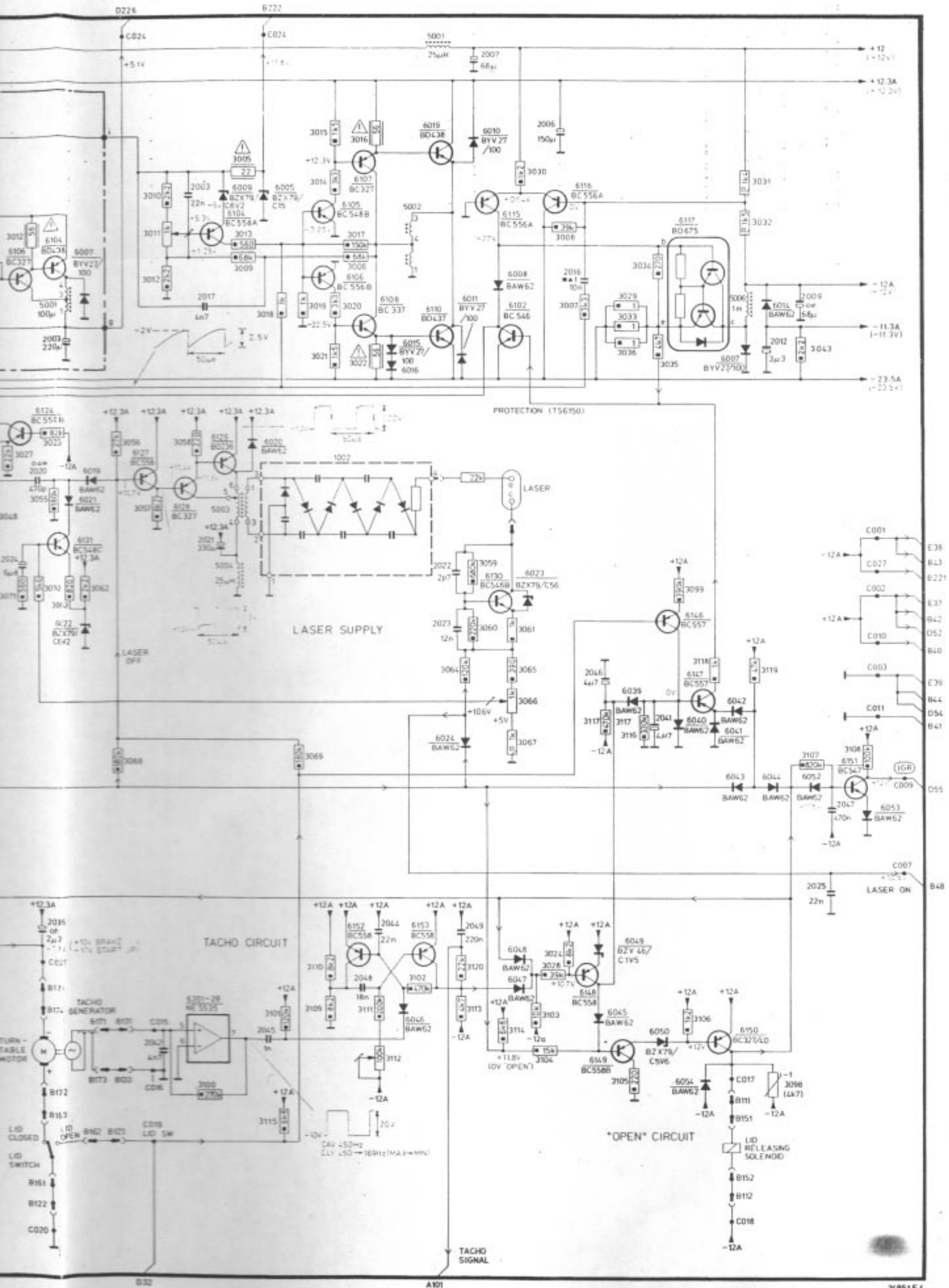
C
VIDEO SERVO 2 PANEL



31452F3

SUPPLY PANEL DIAGRAM A





0226 B722

C024 C024

5001 2007

+12 (+12V)

+12.3A (+12.3V)

-12A

-11.3A (-11.3V)

-23.5A (-23.5V)

PROTECTION (TS6150)

LASER

LASER SUPPLY

LASER OFF

E36

B43

B221

E37

B42

O52

B40

C003

E39

B44

O54

B41

+12A

C009

O55

C007

-12.1V

B48

LASER ON

TACHO CIRCUIT

TURN-TABLE MOTOR

LID SWITCH

LID OPEN

LID CLOSED

B151

B122

C020

OPEN CIRCUIT

LID RELEASING SOLENOID

TACHO SIGNAL

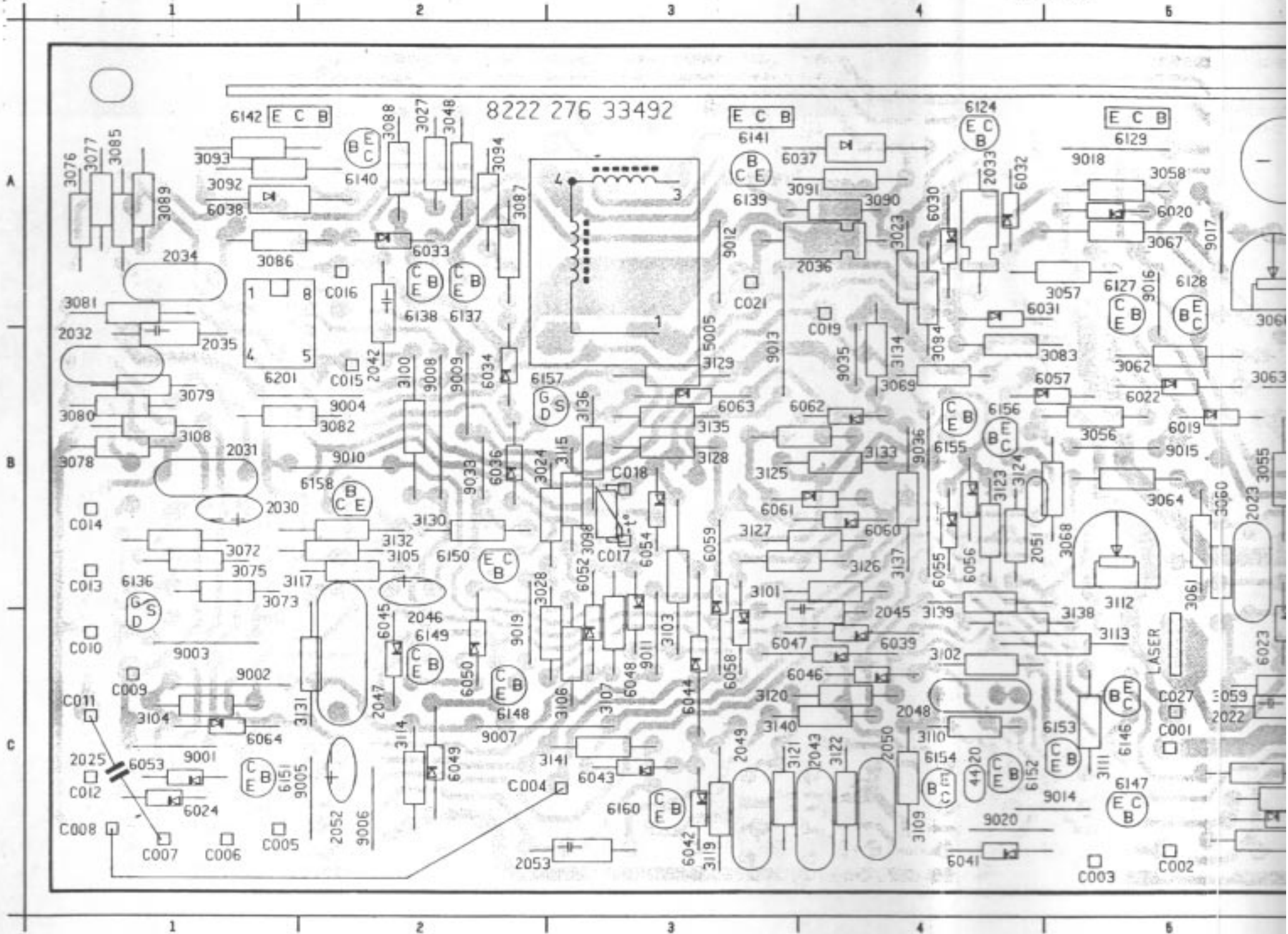
032

A101

34951E4

SUPPLY PANEL

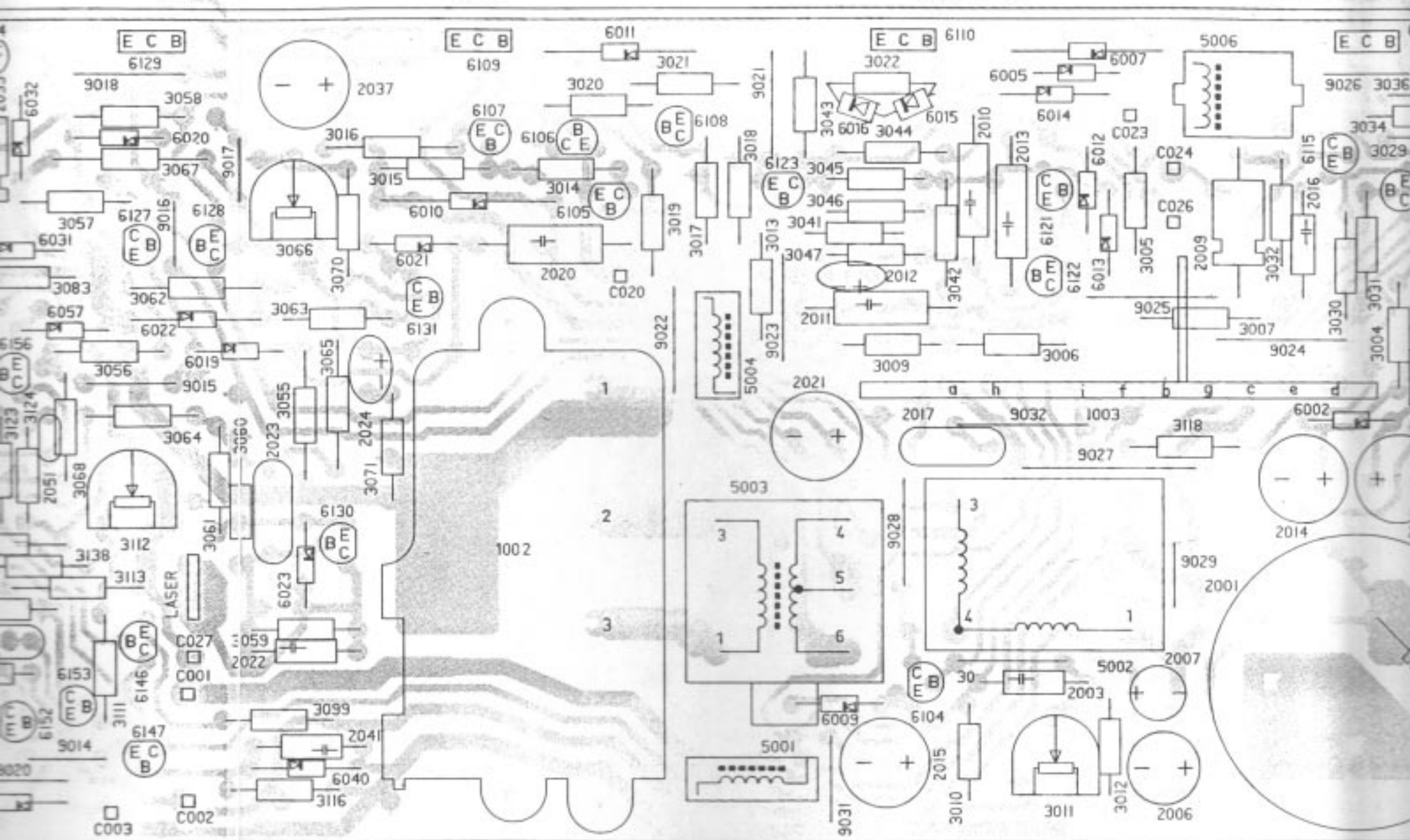
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1003	B 9	2011	B 7	2024	B 6	2042	B 2	3001	B10	3012	C 9	3023	A 4	3035	A10	3056	B 5	3067	A 5	3078	B 1	3089	A 1	3104	C 3
2001	C 9	2012	B 8	2025	C 1	2043	C 4	3002	B10	3013	A 7	3024	B 2	3036	A10	3057	A 5	3068	B 5	3079	B 1	3090	A 4	3105	B 3
2002	B10	2013	A 8	2030	B 1	2045	C 4	3003	A10	3014	A 6	3026	B10	3041	A 7	3058	A 5	3069	B 4	3080	B 1	3091	A 4	3106	C 3
2003	C 8	2014	B 9	2031	B 1	2046	C 2	3004	B10	3015	A 6	3027	A 2	3042	B 8	3059	C 5	3070	B 6	3081	A 1	3092	A 1	3107	C 3
2004	C10	2015	C 8	2032	B 1	2047	C 2	3005	A 9	3016	A 6	3028	B 2	3043	A 7	3060	B 5	3071	B 6	3082	B 2	3093	A 1	3108	B 1
2005	C10	2016	A 9	2033	A 4	2048	C 4	3006	B 8	3017	A 7	3029	A10	3044	A 8	3061	B 5	3072	B 1	3083	B 5	3094	A 2	3109	C 4
2006	C 9	2017	B 8	2034	A 1	2049	C 3	3007	B 9	3018	A 7	3030	B 9	3045	A 7	3062	B 5	3073	B 1	3084	B 4	3099	C 6	3110	C 4
2007	C 9	2020	B 6	2035	B 1	2050	C 4	3008	A10	3019	A 7	3031	B10	3046	A 7	3063	B 5	3074	C 1	3085	A 1	3100	B 2	3111	C 3
2008	B10	2021	B 7	2036	A 4	2051	B 4	3009	B 8	3020	A 7	3032	B 9	3047	A 7	3064	B 5	3075	B 1	3086	A 1	3101	B 3	3112	B 3
2009	A 9	2022	C 5	2037	A 6	2052	C 2	3010	C 8	3021	A 7	3033	A10	3048	A 2	3065	B 6	3076	A 1	3087	A 2	3102	C 4	3113	C 5
																					3098	B 3			



SUPPLY PANEL + SUB-SUPPLY PANEL

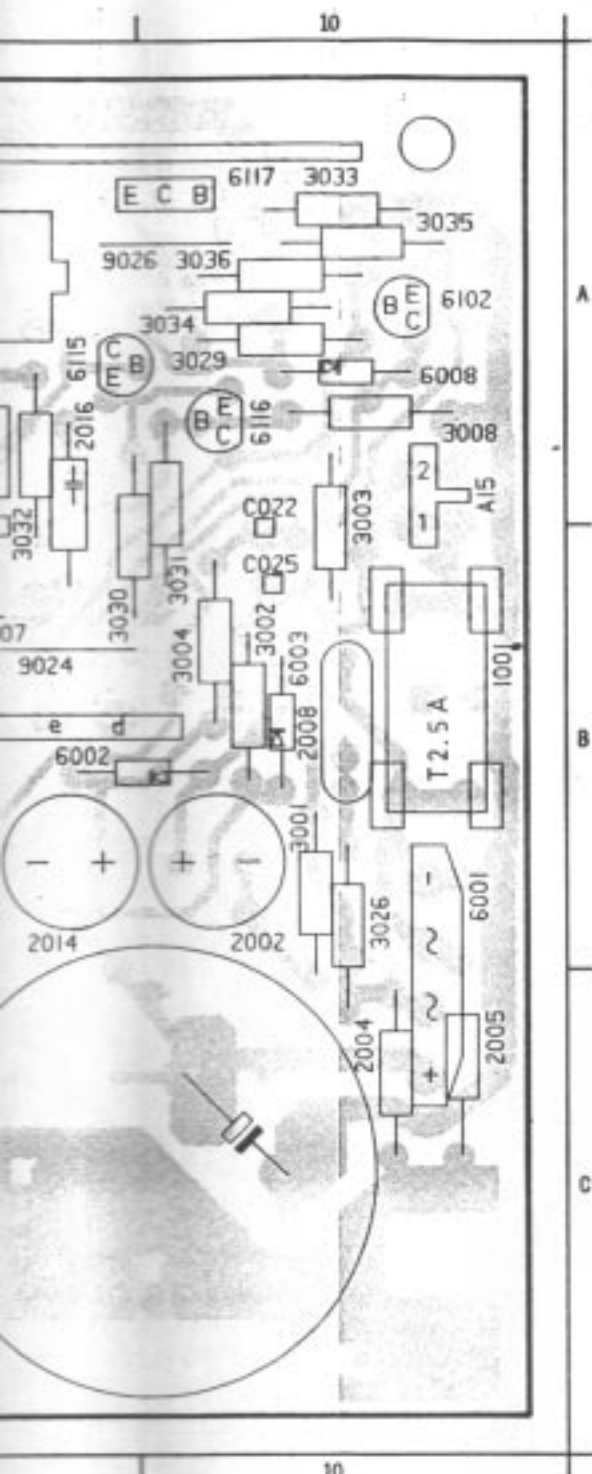
1002	Multiplier	4822 214 50231		NFR25	
				3001,3005	22 Ω
				3016,3022,	56 Ω
				3091,3093	
				3026	68 Ω
5001,5004	Coil 25 μH	4822 158 10573			
5002,5005	Transformer	4822 158 20371			
5003	Transformer	4822 146 20694			
5006,5010	Coil 1 mH	4822 157 51589			
3011,3066	1 kΩ	4822 100 10037		2001	4700 μF 63 V
3112	100 kΩ	4822 100 10052		2002	47 μF 63 V
				2003	22 nF 30%
				2004	4.7 nF 30%
				2005	4.7 nF 30%
				2006	150 μF 16 V
				2007	68 μF 16 V

3077	A 1	3088	A 2	3103	C 3	3114	C 2	3125	B 3	3136	B 3	5006	A 9	6014	A 8	6033	A 2	6045	C 2	6057	B 5	6106	A 6	6124	A 4	6141		
3078	B 1	3089	A 1	3104	C 1	3115	B 3	3126	B 4	3137	B 4	6001	B 10	6015	A 8	6034	B 2	6046	C 4	6058	C 3	6107	A 6	6127	A 5	6142		
3079	B 1	3090	A 4	3105	B 2	3116	C 6	3127	B 3	3138	C 5	6002	B 9	6016	A 8	6036	B 2	6047	C 3	6059	B 3	6108	A 7	6128	A 5	6146		
3080	B 1	3091	A 4	3106	C 3	3117	B 2	3128	B 3	3139	C 4	6003	B 10	6019	B 5	6037	A 4	6048	C 3	6060	B 4	6109	A 6	6129	A 5	6147		
3081	A 1	3092	A 1	3107	C 3	3118	B 9	3129	B 3	3140	C 3	6005	A 8	6020	A 5	6038	A 1	6049	C 2	6061	B 3	6110	A 8	6130	B 6	6148		
3082	B 2	3093	A 1	3108	B 1	3119	C 3	3130	B 2	3141	C 3	6007	A 9	6021	B 6	6039	C 4	6050	C 2	6062	B 4	6115	A 9	6131	B 6	6149		
3083	B 5	3094	A 2	3109	C 4	3120	C 3	3131	C 2	5001	C 7	6008	A 10	6022	B 5	6040	C 6	6052	B 3	6063	B 3	6116	A 10	6136	B 1	6150		
3084	B 4	3099	C 6	3110	C 4	3121	C 3	3132	B 2	5002	C 9	6009	C 8	6023	C 5	6041	C 4	6053	C 1	6064	C 1	6117	A 10	6137	A 2	6151		
3085	A 1	3100	B 2	3111	C 5	3122	C 4	3133	B 4	5003	B 7	6010	A 6	6024	C 1	6042	C 3	6054	B 3	6102	A 10	6121	A 8	6138	A 2	6152		
3086	A 1	3101	B 3	3112	B 5	3123	B 4	3134	B 4	5004	B 7	6011	A 7	6030	A 4	6043	C 3	6055	B 4	6104	C 8	6122	B 8	6139	A 3	6153		
3087	A 2	3102	C 4	3113	C 5	3124	B 4	3135	B 3	5005	B 3	6012	A 9	6031	A 5	6044	C 3	6056	B 4	6105	A 7	6123	A 7	6140	A 2	6154		
3098	B 3											6013	B 9	6032	A 4													

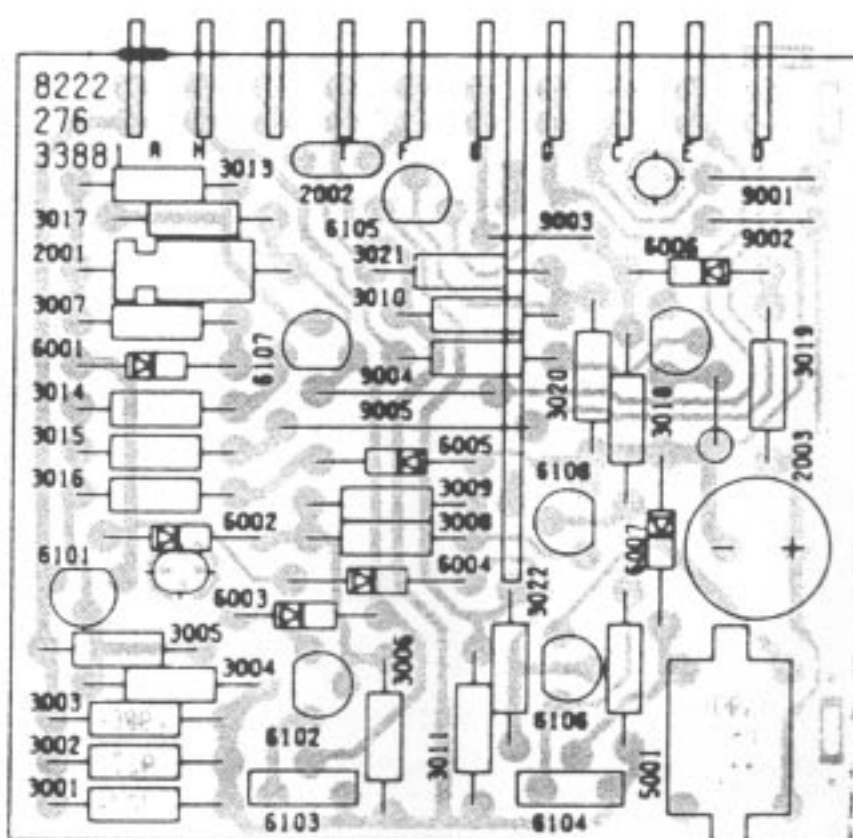


2 Ω	4822 111 30517	2008	100 nF 10% 250 V	4822 121 41672	2037	100 μF 63 V
6 Ω	4822 111 30528	2011	6.8 nF 2% 63 V	4822 121 50538	2041	4.7 μF 25 V
8 Ω	4822 111 30531	2012	3.3 μF 16 V	4822 124 20947	2042	4.7 nF 30%
		2013	1.2 nF 2% 250 V	5322 121 54135	2043	220 nF 10% 100 V
		2014	47 μF 63 V	4822 124 40253	2044	22 nF 30%
		2015	330 μF 16 V	4822 124 40197	2045	1 nF 10%
		2017	4.7 nF 10% 400 V	4822 121 41459	2046	4.7 μF 25 V
		2021	330 μF 16 V	4822 124 40197	2047	470 nF 10% 100 V
		2022	2.7 pF 5%	4822 122 10221	2048	18 nF 10% 400 V
		2023	12 nF 10% 400 V	4822 121 41401	2049	220 nF 10% 100 V
		2024	6.8 μF 16 V	4822 124 21315	2050	220 nF 10% 100 V
		2030	4.7 μF 25 V	4822 124 10367	2052	4.7 μF 25 V
		2032	6.8 nF 10% 400 V	4822 121 41377	2075	22 nF 30%
		2034	10 nF 10% 400 V	4822 121 41677	2076	3.3 μF 25 V
		2035	3.3 nF 10%	4822 122 10165		

6124	A 4	6141	A 3	6155	B 4
6127	A 5	6142	A 1	6156	B 4
6128	A 5	6146	C 5	6157	B 3
6129	A 5	6147	C 5	6158	B 2
6130	B 6	6148	C 2	6160	C 3
6131	B 6	6149	C 2	6201	B 1
6136	B 1	6150	B 2		
6137	A 2	6151	C 1		
6138	A 2	6152	C 4		
6139	A 3	6153	C 5		
6140	A 2	6154	C 4		



SUB SUPPLY PANEL



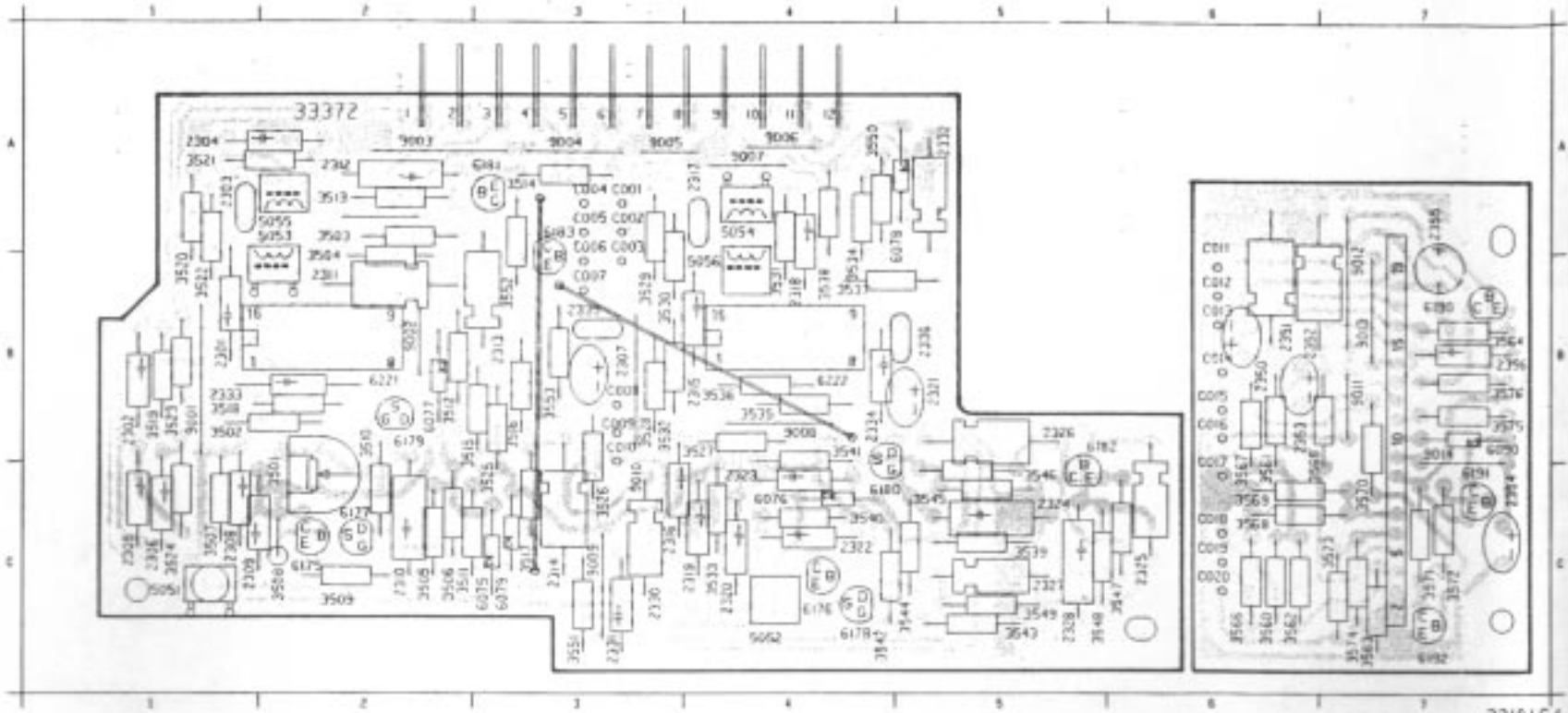
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μF 63 V	4822 124 40255
μF 25 V	4822 124 10367
nF 30%	4822 122 10227
nF 10% 100 V	4822 121 41673
nF 30%	4822 122 10188
nF 10%	4822 122 10162
μF 25 V	4822 124 10367
nF 10% 100 V	4822 121 41674
nF 10% 400 V	4822 121 41706
nF 10% 100 V	4822 121 41673
nF 10% 100 V	4822 121 41673
μF 25 V	4822 124 10367
nF 30%	4822 122 10188
μF 25 V	4822 124 21316

AUDIO DEMODULATOR PANEL

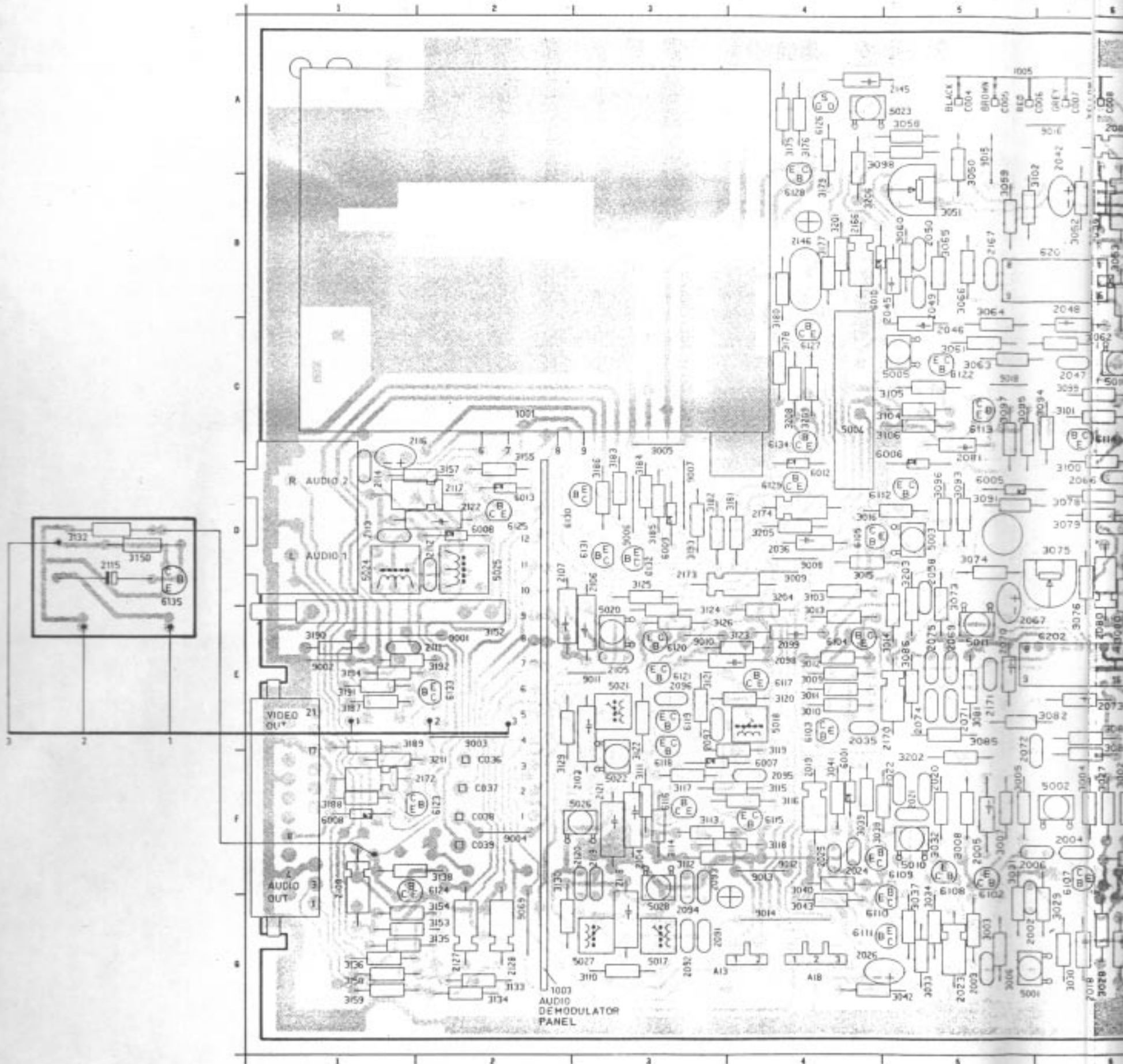
CX EXPANDER

2301	B	1	2310	C	2	2319	C	4	2328	C	5	2353	B	6	3504	B		3513	B	2	3522	B	1	3531	B	4	3540	C	4	3549	C	5	3564	B	1	3573	C	7	5056	B	4	6177	C	2	6192	C	7
2302	B	1	2311	B	2	2320	C	4	2329	C	3	2352	B	6	3505	B		3514	B	2	3523	B	1	3532	B	3	3541	B	4	3550	B	4	3565	C	8	3574	C	7	6075	C	3	6178	C	4	6221	B	2
2303	B	1	2312	B	2	2321	B	5	2330	C	3	2353	B	6	3506	C	1	3515	B	3	3524	C	1	3533	C	4	3542	C	4	3551	C	3	3566	C	4	3575	B	7	6076	C	4	6179	B	2	6222	B	4
2304	B	1	2313	B	3	2322	C	4	2331	B	5	2354	C	7	3507	C	1	3516	B	3	3525	C	1	3534	B	4	3543	C	5	3552	B	3	3567	C	8	3576	B	7	6077	B	2	6180	C	4			
2305	C	1	2314	C	3	2323	C	4	2332	B	5	2355	B	7	3508	C	2	3517	B	3	3526	C	2	3535	B	4	3544	C	5	3553	B	3	3568	C	4	3577	C	1	6078	B	5	6181	B	3			
2306	C	1	2315	B	4	2324	C	4	2333	B	4	2356	B	7	3509	C	2	3518	B	3	3527	C	2	3536	B	4	3545	C	5	3554	C	8	3569	C	4	3578	C	1	6079	C	3	6182	B	5			
2307	B	3	2316	C	3	2325	C	5	2334	B	5	2357	B	7	3510	C	2	3519	B	3	3528	B	3	3537	B	4	3546	C	5	3555	C	4	3570	C	7	3579	C	1	6080	B	7	6183	B	3			
2308	C	1	2317	B	4	2326	B	5	2335	B	5	2358	B	7	3511	C	2	3520	B	3	3529	B	3	3538	B	4	3547	C	5	3556	C	4	3571	C	7	3580	C	1	6081	B	7	6184	B	3			
2309	C	1	2318	B	4	2327	C	5	2336	B	5	2359	B	7	3512	B	7	3521	B	3	3530	B	3	3539	C	5	3548	C	5	3557	C	7	3572	C	7	3581	B	2	6082	C	4	6185	C	7			



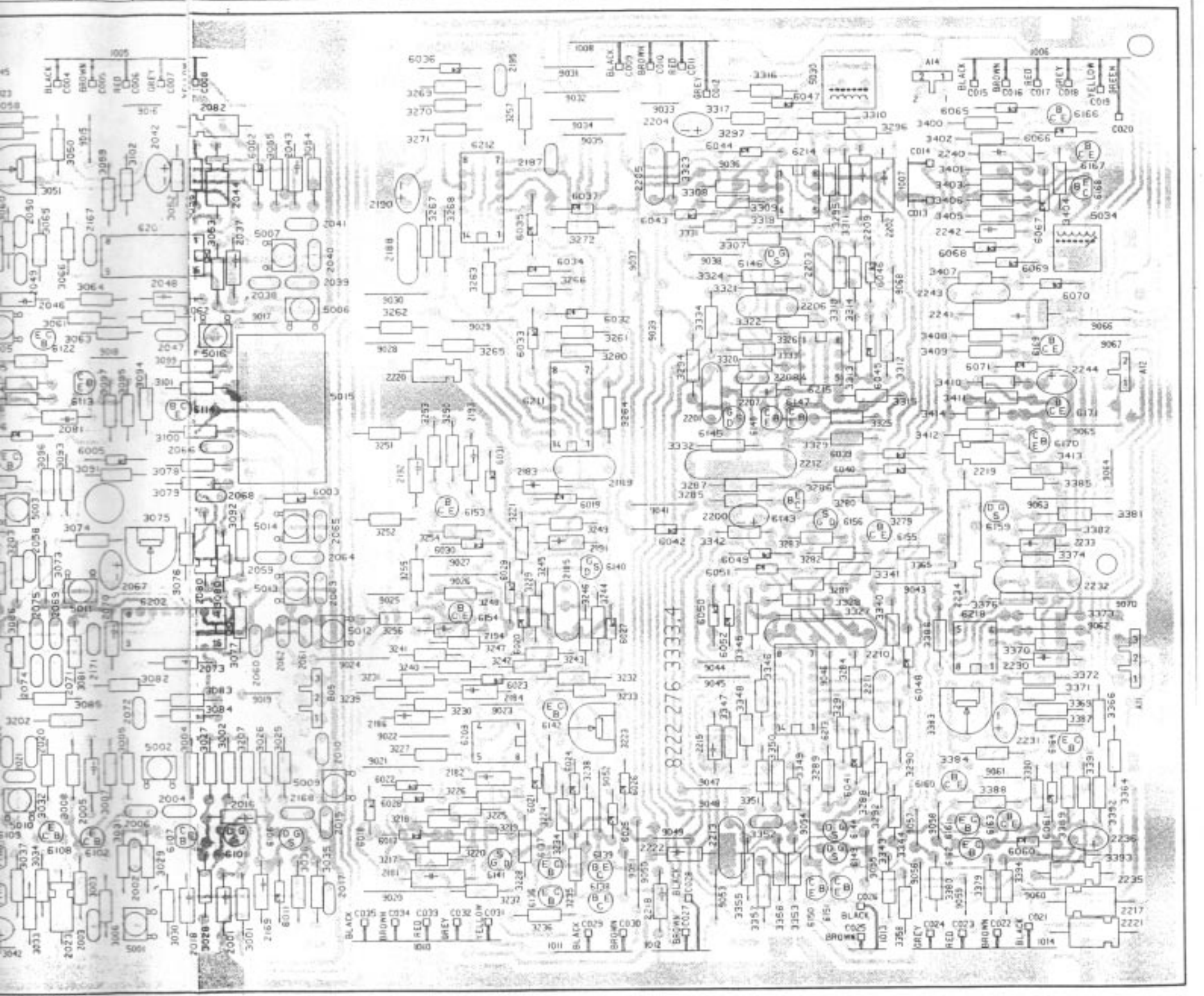
VIDEO SERVO 1 PANEL

1005	R 5	2019	F 4	2047	C 8	2074	E 5	2111	E 2	2169	G 6	2195	R 8	2221	G 12	3007	F 5	3035	G 7	3062	D 6	3092	D 6	3115	F 4	3138	F 4
1006	R 12	2020	F 5	2048	B 6	2075	E 5	2112	D 2	2170	G 5	2200	B 9	2222	F 9	3008	F 5	3036	G 7	3063	D 6	3093	D 5	3116	F 4	3139	F 4
1007	R 11	2021	F 5	2049	B 5	2080	C 5	2113	D 1	2171	F 5	2201	C 9	2223	E 11	3009	F 4	3037	F 5	3064	C 6	3094	C 6	3117	F 4	3140	F 4
1008	R 9	2022	F 5	2050	B 5	2081	C 5	2114	D 1	2172	F 5	2202	B 11	2224	F 11	3010	F 4	3038	F 4	3065	C 5	3095	C 5	3118	F 4	3141	F 4
1010	G 7	2023	G 5	2058	D 5	2082	R 6	2115	E 1	2173	D 3	2203	B 10	2225	E 12	3011	F 4	3039	F 4	3066	C 5	3096	C 5	3119	F 4	3142	F 4
1011	G 8	2024	F 4	2059	D 6	2091	G 3	2116	C 2	2174	D 4	2204	A 9	2226	D 12	3012	F 4	3040	F 4	3067	C 5	3097	C 5	3120	F 4	3143	F 4
1012	G 9	2025	F 4	2060	E 8	2092	G 3	2117	D 2	2181	G 7	2205	B 9	2227	E 11	3013	F 4	3041	F 4	3068	C 5	3098	C 4	3121	F 4	3144	F 4
1013	G 10	2026	G 4	2061	E 7	2093	F 3	2118	F 3	2182	F 8	2206	C 10	2228	G 12	3014	F 4	3042	G 5	3069	C 5	3099	C 6	3122	F 4	3145	F 4
1014	G 12	2025	E 4	2062	E 6	2094	G 3	2119	F 3	2183	D 8	2207	C 10	2229	F 12	3015	D 4	3043	D 4	3070	C 6	3100	D 6	3123	F 4	3146	F 4
2001	G 6	2038	D 4	2063	E 7	2095	F 4	2120	F 3	2184	C 8	2208	C 10	2240	B 11	3016	D 4	3050	H 5	3077	F 6	3101	C 6	3124	F 4	3147	F 4
2002	G 5	2037	B 6	2064	D 7	2096	E 3	2121	F 3	2185	D 8	2209	B 10	2241	C 11	3025	F 6	3051	H 5	3078	D 8	3102	H 5	3125	F 4	3148	F 4
2003	G 5	2038	C 6	2065	D 7	2097	E 3	2122	D 2	2186	F 7	2210	E 10	2242	B 11	3026	F 6	3052	H 8	3079	D 8	3103	D 4	3126	F 4	3149	F 4
2004	F 6	2039	B 7	2066	D 8	2098	E 4	2127	G 2	2187	B 8	2211	E 10	2243	C 11	3027	F 6	3053	H 6	3080	D 8	3104	C 5	3127	F 4	3150	F 4
2005	F 5	2040	B 7	2067	E 5	2099	E 4	2128	G 2	2188	B 7	2212	E 10	2244	C 12	3028	G 6	3054	H 7	3081	D 8	3105	C 5	3128	F 4	3151	F 4
2006	F 5	2041	B 7	2068	D 6	2103	F 3	2145	H 5	2189	D 9	2213	F 9	3001	G 6	3029	G 6	3055	H 8	3082	F 6	3106	C 5	3129	F 4	3152	F 4
2010	F 7	2042	R 6	2069	E 5	2104	F 3	2146	B 4	2190	B 7	2215	F 9	3002	F 6	3030	G 6	3056	H 8	3083	F 6	3107	D 3	3130	F 4	3153	F 4
2015	F 7	2043	R 7	2070	E 5	2105	E 3	2165	F 2	2191	D 9	2217	G 12	3003	G 5	3031	F 5	3058	H 5	3084	F 6	3111	F 3	3131	F 4	3154	F 4
2016	F 6	2044	B 8	2071	E 5	2106	B 3	2166	B 4	2192	D 7	2218	G 9	3004	F 6	3032	F 5	3059	H 5	3085	F 5	3112	F 3	3132	F 4	3155	F 4
2017	G 7	2045	B 5	2072	E 5	2107	D 2	2167	B 5	2193	C 8	2219	D 11	3005	F 5	3033	G 5	3060	H 5	3086	F 5	3113	F 3	3133	F 4	3156	F 4
2018	D 6	2046	C 5	2073	B 6	2108	F 1	2168	F 7	2194	E 8	2220	C 7	3006	G 5	3034	G 5	3061	C 5	3087	D 5	3114	F 3	3134	F 4	3157	F 4



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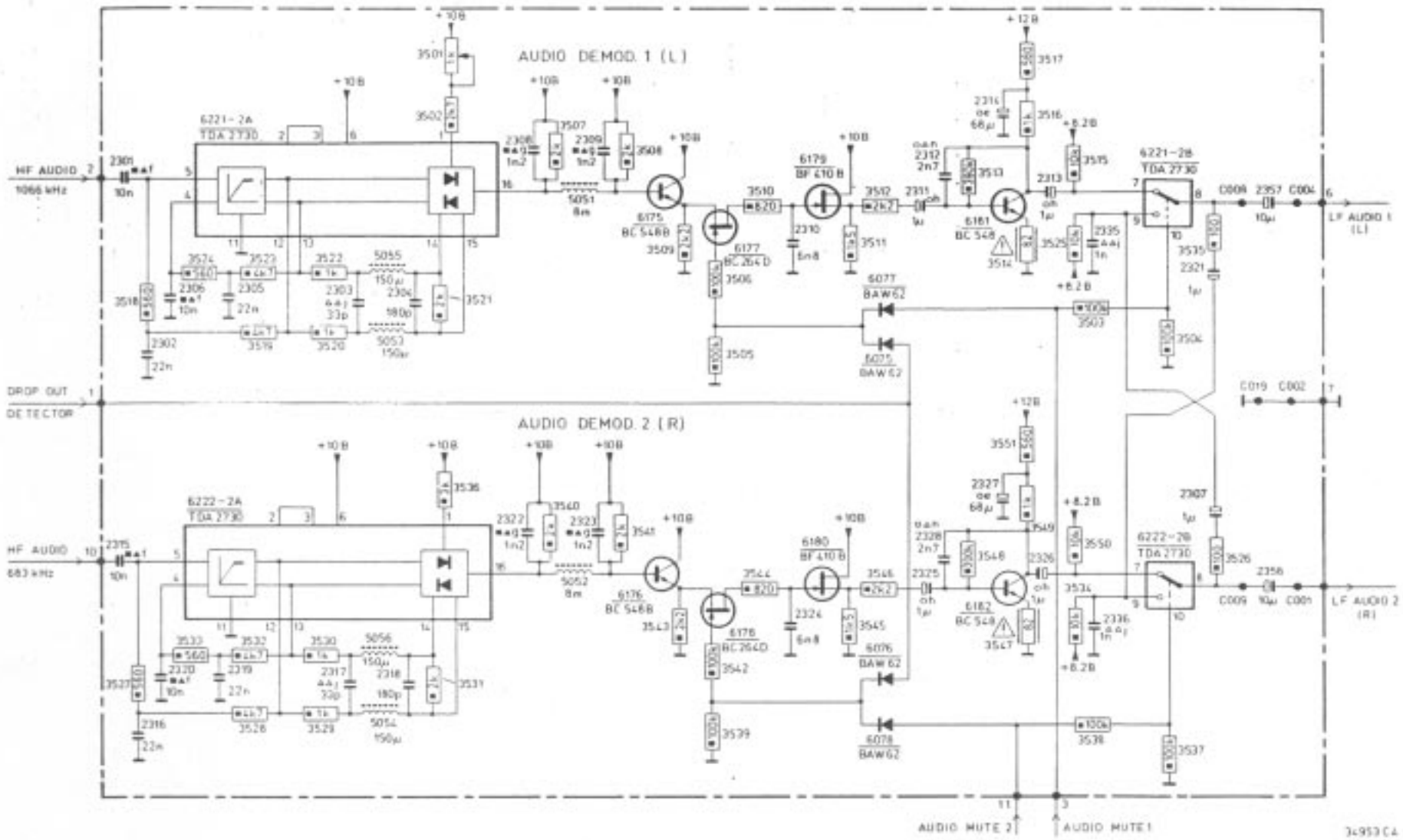
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**VIDEO SERVO 1 PANEL + SOUND DEMODULATORS
+ CX EXPANDER**

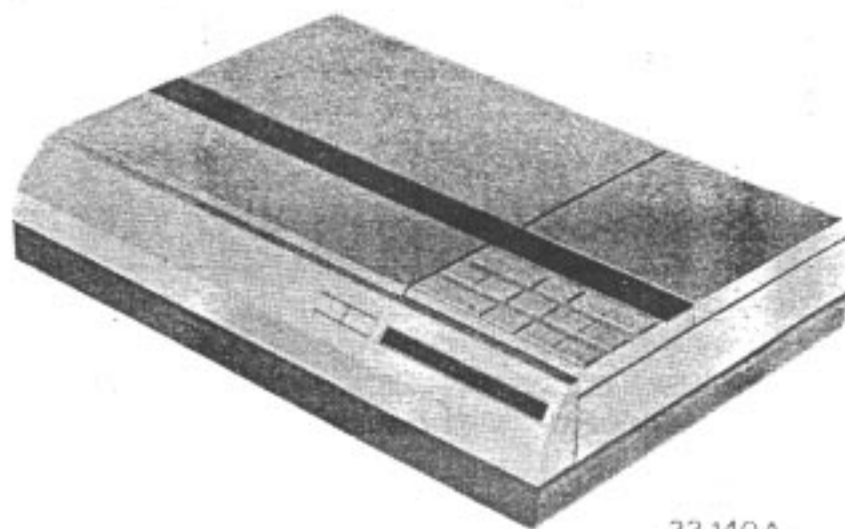
6225	CX Expander (DiFi)	4822 214 50306		2046	22	nF 30%	4822 122 10188
				2048	18	pF 5%	4822 122 31553
5004	Delay line DL680	4822 218 20193		2062	56	pF 2%	4822 122 31521
5015	Delay line 470 nsec	4822 320 40081		2064	56	pF 2%	4822 122 31521
				2067	15	μ F 16 V	4822 124 20977
5001,5009	7.2 μ H	4822 156 21047		2070	22	pF 5%	4822 122 31385
5002,5010	87 μ H	4822 156 21054		2073	18	pF 5%	4822 122 31553
5003,5005	2 μ H	4822 156 21048		2081	22	nF 30%	4822 122 10188
5006,5020,5022	51 μ H	4822 157 51412		2091	270	pF 2%	4822 122 31335
5007	37 μ H	4822 156 21052		2092	56	pF 2%	4822 122 31521
5011	4.6 μ H	4822 156 21051		2094	150	pF 2%	4822 122 31413
5012,5016	34 μ H	4822 157 51166		2098	2.2	nF 10%	4822 122 10164
5013,5014	25 μ H	4822 157 51167		2099	22	nF 30%	4822 122 10188
5017,5021	570 μ H	4822 156 21056		2111	330	pF 2%	4822 122 31353
5018,5027	210 μ H	4822 156 21055		2112	330	pF 2%	4822 122 31353
5023	100 μ H	4822 156 21049		2113	2	nF 2%	4822 121 50773
5024,5025	12 μ H	4822 157 51591		2114	2	nF 2%	4822 121 50773
5026,5028	44 μ H	4822 156 21053		2115	150	μ F 16 V	4822 124 20691
5030,5034	4.7 mH	4822 156 20917		2116	0.68	μ F 40 V	4822 124 21317
5051,5052	8 mH	4822 156 20928		2118	1.2	nF 5%	4822 121 50842
5053,5054,5055,5056	150 μ H	4822 156 10535		2119	150	pF 2%	4822 122 31413
				2121	1.2	nF 5%	4822 121 50842
3051,3075,3501	1 k Ω	5322 100 10112		2145	22	nF 30%	4822 122 10188
3152	100 k Ω	4822 101 90115		2181	2.2	nF 5%	4822 121 50753
3223	220 k Ω	4822 100 10088		2182	22	nF 30%	4822 122 10188
3383	4.7 k Ω	4822 100 10036		2185	47	nF 10% 250 V	4822 121 41676
				2186	1	nF 10%	4822 122 10162
3352	150 k Ω	4822 116 30198		2188	150	nF 10% 100 V	4822 121 41682
				2190	1.5	μ F 25 V	4822 124 20942
3012,3205,3211	68 Ω	4822 111 30531		2191	330	pF 10%	4822 122 10163
3201,3203	22 Ω	4822 111 30517		2193	1	nF 10%	4822 122 10162
3187,3191,3332	47 Ω	4822 111 30526		2200	4.7	μ F 25 V	4822 124 10367
3357,3358	10 Ω	4822 111 30508		2201	220	nF 10% 100 V	4822 121 41673
3365	33 Ω	4822 111 30522		2202	6.8	nF 5% 63 V	4822 121 50538
3390	6.8 Ω	4822 111 30504		2204	2.2	μ F 25 V	4822 124 21255
3514,3547	82 Ω	4822 111 30533		2205	47	nF 10% 250 V	4822 121 41676
				2206	10	nF 10% 400 V	4822 121 41677
2003	56	pF 2%	4822 122 31521	2207	100	pF 5%	4822 122 10223
2006	82	pF 2%	4822 122 31243	2208	150	pF 2%	4822 122 31413
2016	1	nF 10%	4822 122 10162	2210	1	μ F 10% 100 V	4822 121 41719
2020	220	pF 2%	4822 122 31506	2212	1	μ F 10% 100 V	4822 121 41719
2022	220	pF 2%	4822 122 31506	2213	27	nF 10% 250 V	4822 121 41705
2026	2.2	μ F 25 V	4822 124 21255	2218	22	nF 30%	4822 122 10188
2036	22	nF 30%	4822 122 10188	2222	22	nF 30%	4822 122 10188
2037	22	nF 30%	4822 122 10188	2230	100	pF 5%	4822 122 10223
2042	15	μ F 16 V	4822 124 20977	2231	15	μ F 16 V	4822 124 20977
2043	27	pF 5%	4822 122 10215	2233	22	nF 10% 400 V	4822 121 41664
				2236	3.3	μ F 25 V	4822 124 21316
				2243	100	nF 10% 250 V	4822 121 41672
				2244	4.7	μ F 25 V	4822 124 10367
				2302	22	nF 30%	4822 122 10166
				2304	180	pF 10%	4822 122 31474
				2305	22	nF 30%	4822 122 10166
				2307	1	μ F 25 V	4822 124 20944
				2310	6.8	nF 2% 63 V	4822 121 50538
				2316	22	nF 30%	4822 122 10166
				2318	180	pF 10%	4822 122 31474
				2319	22	nF 30%	4822 122 10166
				2321	1	μ F 25 V	4822 124 20944
				2324	6.8	nF 2% 63 V	4822 121 50538
				2331	22	nF 30%	4822 122 10166
				2333	22	nF 30%	4822 122 10166
				2334	22	nF 30%	4822 122 10166
				2350	1	μ F 25 V	4822 124 20944
				2353	1	μ F 25 V	4822 124 20944
				2354	10	μ F 16 V	4822 124 21314
				2355	68	μ F 16 V	4822 124 40193
				2356	22	nF 30%	4822 122 10188

**AUDIO DEMODULATOR PANEL
DIAGRAM B'**



3-953 C4

Service
Service
Service



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

33 140A

PART II

Repair Method

Introduction

This repair method enables quick location of faults.

The VLP should be tested in the sequence given in this repair method.

If a fault is established, reference is made to the number of the repair procedure. In some cases direct reference is made to the defective circuit.

Explanation of the symbols and instructions used in this repair method

V _{7-IC6218(1)}	Measure the voltage on pin 7 of IC6218 on panel 1.
Osc. cTS6160(2)	Check the oscillogram on the collector of TS6160 on panel 2.
7-IC6218(1) + cTS6160(2)	Check the circuit or the connection between the indicated points.

The letters or digits between brackets which follow the components or circuits indicate on which panel they can be found. The abbreviations or digits used for this purpose are:

Supply panel (SP)	HF pre-amplifier (HF)
Control panel (CP)	Video servo 1 panel (1)
Servo pre-amplifier (Servo)	Video servo 2 panel (2)

General remarks

- In the event of a brief short-circuit or overload the power supply will be switched off by the protection circuit.
In that case it will be necessary to switch on the VLP again by means of the ON switch.
- The cooling strip on the supply panel has not been earthed. Therefore this strip cannot be used as an earth point during measurements.
- In number 15 of the repair procedure the self-test programmes of the μ -processors have been described.

Warnings

While repairing and measuring in the electric circuits, one should keep in mind that part of the circuit on the supply panel remains under voltage when the set has been switched off with the ON/OFF switch. Therefore be sure to always remove the mains plug from the socket outlet before replacing any components.

Avoid looking directly into the laser beam as this might cause permanent injury to the eye.

REPAIR METHOD

- . Use a CAV disc
- . Check the video disc for dirt and damage
- . Clean objective

CONTROL PROCEDURE

- . Connect VLP to CTV
- . Remove the video disc
- . Switch CTV on and select VLP channel (37)
- . Switch VLP on with the ON switch (lid remains open)

Does ON LED light up ? NO 1

YES

Is slide back to initial position ? NO 2

YES

Has lid release solenoid been attracted ? * YES TS6149 ... TS6151(SP), TS6111(CP)
Plug A103(CP) + TS6151(SP)

NO

Has objective risen ? YES D6017(1), IC6209(1)
8-IC6209(1) + + 11.8B

NO

Noise still on screen ?

NO

YES

- . Check tuning of CTV

Noise still on screen ? YES 4U1001(UHF mod) + + 11B(1)
9U1001 + + 41
Plug A052(CP) + C002(2)

NO

- . Insert video disc and close lid

Picture correct within 30 s ? YES Sound correct ? YES 3a

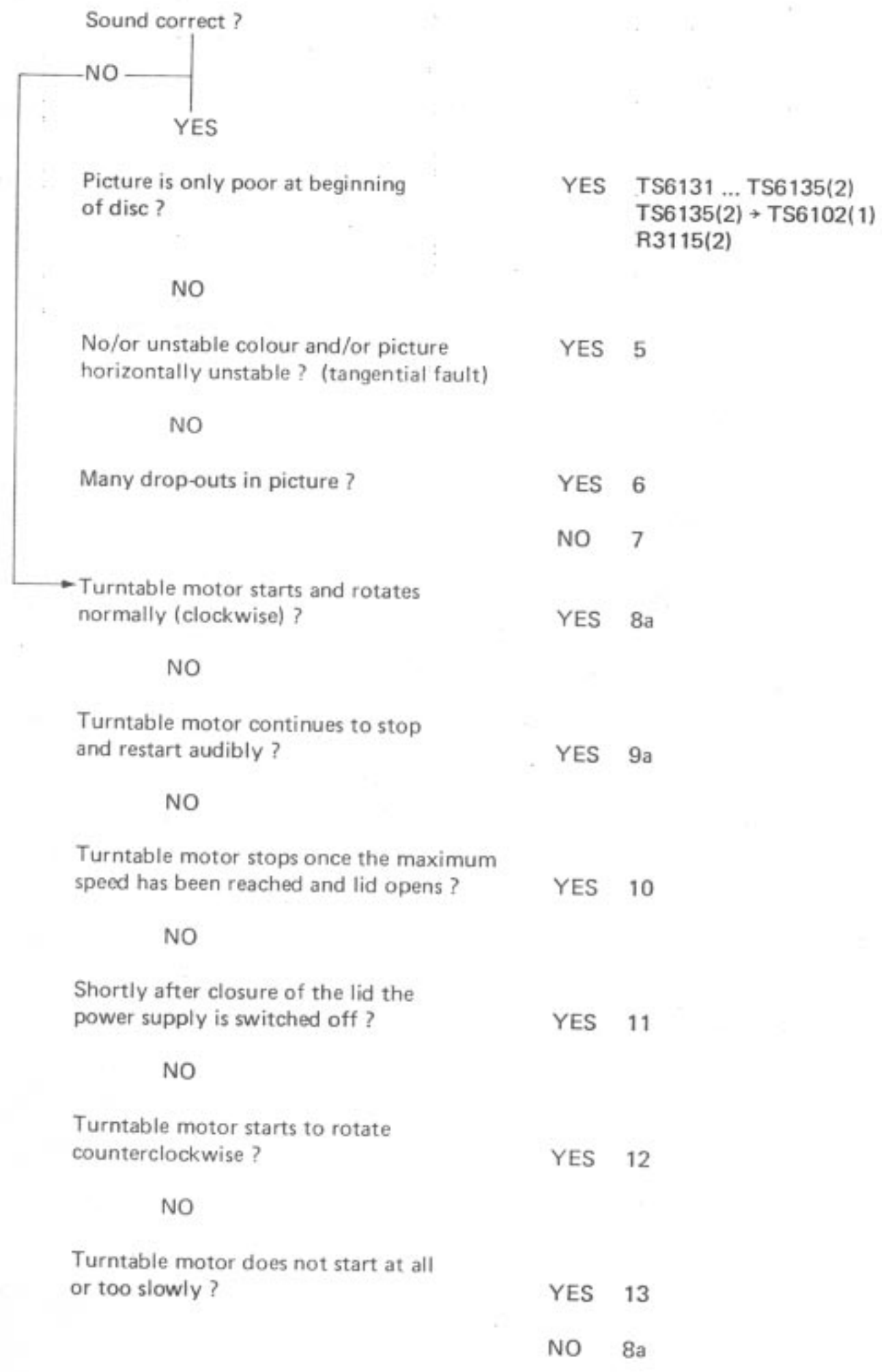
NO 4

NO

See page 3

* **Remark:**

If the lid release solenoid has been attracted, the VLP must be switched OFF to avoid damaging the coil.



REPAIR PROCEDURE

1. ON LED DOES NOT GLOW

Switch the VLP on again *

ON LED is glowing ?

YES Follow control procedure
on page 2

NO

- a. Check especially the following power transistors on the metal edge of the power supply panel:
TS6109, TS6110, TS6117 (power supply) **
TS6129 (laser)
TS6141, TS6142 (turntable motor)
- b. Check TS6150 and TS6149(SP) if the lid switch is activated for a moment when switching on.
- c. Check the following circuits for interruption:
cTS6150(SP) → solenoid → -12A
Lid switch (SP) → J, ON switch
Lid switch → plug B123 → TS6146(SP),
TS6146, R3099(SP)
- d. Check TS6121 ... TS6123(SP)

Remarks:

- * If, due to a brief overload or short-circuit, the power supply is switched off by the protection circuit, it will be necessary to switch the VLP ON again with the ON switch.
- ** In case of short-circuiting on the +12A or -12A power supply, disconnection of plug A11 will make it possible to establish whether the short-circuit is outside the power supply PCB. If so, disconnecting plugs B18 ... B21 one by one will make it possible to check the output circuit for objective, radial and tangential mirrors and slide motor respectively. These plugs are situated at the right of the laser on the connector panel.

2. SLIDE DOES NOT RETURN TO INITIAL POSITION

VLP switched on and lid open
V = -12A (C001 on SP) -12 V ?

NO TS6115 ... TS6117 (SP)

YES

V = plug B211 on connector panel
(see diagram E) + 11 V

YES Slide motor
E-TS6150 → R3356(1)

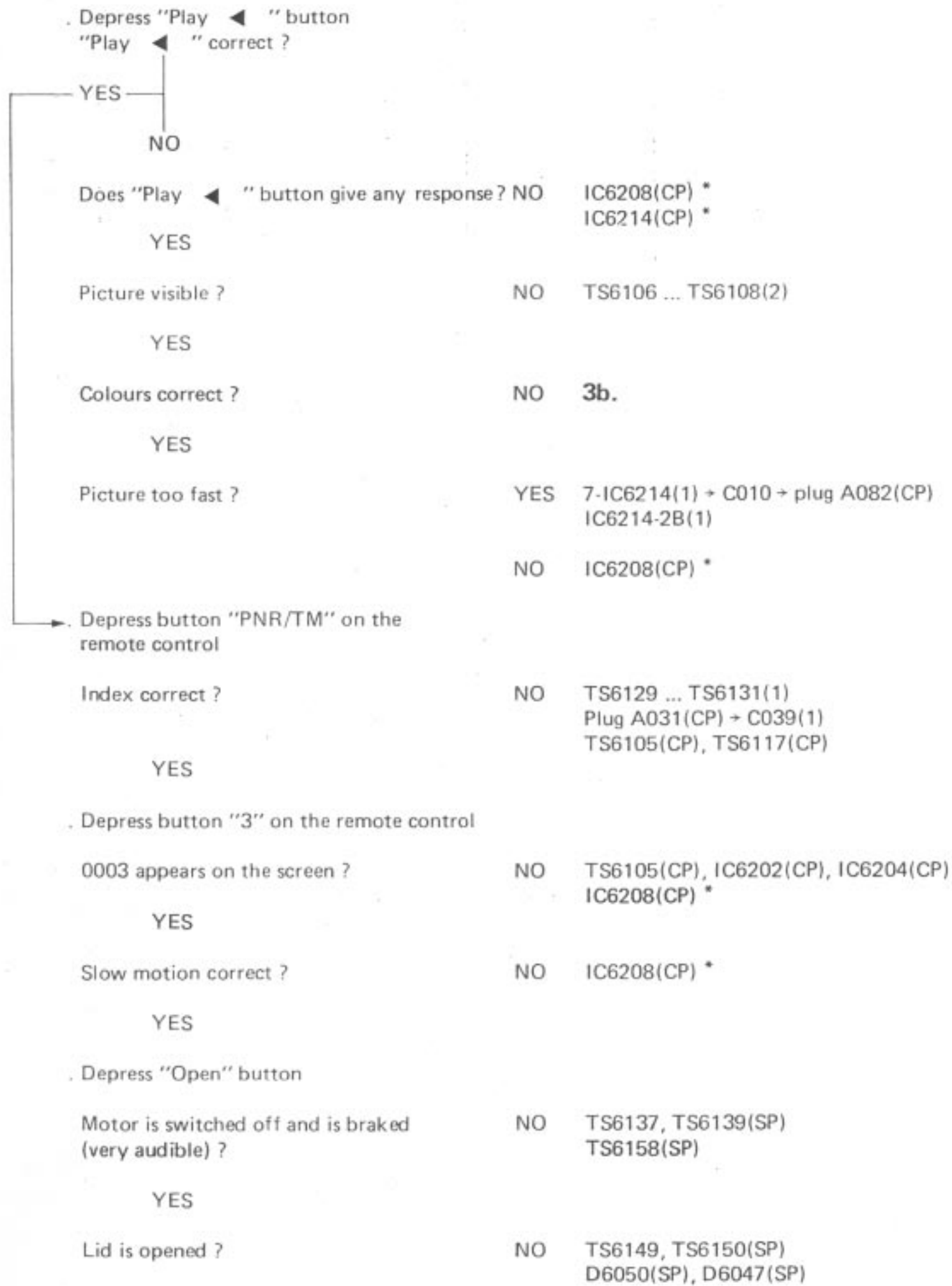
NO

V = 13-IC6213(1) 1.8 V ?

YES TS6150(1), TS6151(1)
IC6213-4C and 4D(1)

NO c-TS6150(1) → +11.8B(R3364)
11-IC6213(1) → -12B(R3366)
13-IC6213 → D6049/50 → 22-IC6214(CP)

3a. "PLAY ▶ " PICTURE AND SOUND CORRECT



Remarks: * Also see no. 14 of the repair procedure.

3b. "PLAY ◀ " NO/OR UNSTABLE COLOURS

a. If no colours

. Osc. 2-IC6201/C2010(2) Chrom. signal with a burst-amplitude of 0.5 V _{pp} ?	NO	TS6101 ... TS6104(2)
YES		
. Osc. cTS6109/R3047(2) Chrom. signal with a burst-amplitude of 0.6 V _{pp} ?	NO	TS6109(2), IC6201(2)
YES		TS6110(2), Plug A051(CP) + C001(2)

b. If colours unstable

. Osc. 7-IC6203/C2052(2) Burst-amplitude ≥ 200 mV _{pp} ?	NO	TS6112 ... TS6117(2)
YES		
. Osc. 15-IC6203/R3196(2) correct ?	NO	TS6136(2), IC6206(2)
YES		
. Osc. 4-IC6201/R3030(2) correct (in "Play ◀ " 40 ms pulse width) ?	NO	TS6118, TS6119(2) IC6203(2)
YES		TS6104(2), TS6116(2) IC6201(2), Plug A053(CP) + C003(2)

4. NO OR WEAK SOUND - PICTURE CORRECT

. V → E-TS6110(1) 5 V ?	NO	TS6108 ... TS6110(1)
YES		
. V → 1-U1003 (sound demod) 8.5 V ?	NO	E-TS6120(1) + +10,7B(R3204) TS6120(1)
YES		
. V → C-TS6124(1) 4.5 V ?	NO	TS6124(1)
YES		U1003, U1001(1)

5. TANGENTIAL FAULT

Select "Play ▶" mode
 Osc. 4-IC6207-2A(2) correct ?

NO TS6147 ... TS6149(2)

YES

Osc. 7-IC6207-2A(2) correct ?

NO TS6150, IC6207(2)

YES

Osc. c-TS6160(2) as Fig. 5-a ?

NO TS6156 ... TS6160(2)

YES (possibly unstable)

Depress "Open" button (lid open)
 V → E-TS6163(1) approx 0 V ?

NO TS6160 ... TS6164(1)

YES

V → 7-IC6218(1) approx 0 V ?

NO IC6218 (1)

YES

Switch off VLP
 Unsolder one lead of C2162(2)
 from the PCB
 Select "Play ▶" mode
 Osc. c-TS6164(2) as Fig. 5-b ?

NO TS6159 ... TS6164(2)

YES

Osc. c-TS6165(2) as Fig. 5-c ?

NO TS6167, TS6141, TS6142(2)

YES E-TS6163(1) + Tang. mirror (9 Ω) + ⊥
 7-IC6218(1) + R3075(SP)
 TS6151(2)

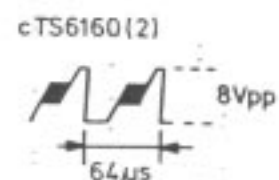


Fig. 5-a

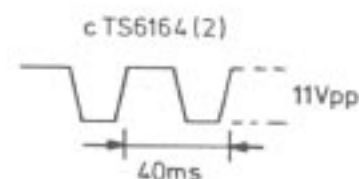


Fig. 5-b

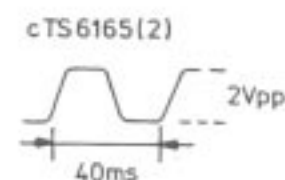


Fig. 5-c

6. MANY DROP-OUTS IN PICTURE

Osc. 9-IC6201(1)
 Video signal approx 2.5 V_{pp} ?

YES TS6112(1), TS6113(1)
 Check setting of R3051(1)

NO 1-IC6201(1) + + 10,9B(R3201)
 9-IC6201(1) + + 8B(R3206)
 TS6105(1), IC6201(1)

7. NO OR WEAK PICTURE - CORRECT SOUND

Picture quality only poor at
 beginning of disc ?

YES TS6131 ... TS6135(2)

NO

Osc. 14-IC6202(2) on plug A013(2)
 video signal approx 2 V_{pp} ?

NO TS6121 ... TS6123(2)
 IC6202(2)

YES

V → on plug A013(2) 5 V ?

NO D6014(2)

YES c-TS6127(1) + +10,2B(R3205)
 2U1001(1) + +6B(TS6134)
 TS6127, TS6128, TS6132(1)

8a. NO PICTURE AND NO SOUND

Depress "Open" button
Motor stops and lid opens ?

NO 4-IC6218(1) + -12B
TS6151(SP), IC6218(1)

YES

Switch VLP off
Switch VLP on again after 5 s
Close lid and depress "Scan ►►" button before the maximum disc speed has been reached

Picture visible during scan ?

NO 8b.

YES

Correct picture after scan (possibly for short period of time) ?

YES

NO

Slide continues to run fast after button "Scan" is released ?

YES Plug A042(CP) + 14-IC6206(2)
7-IC6213(1), IC6208(CP) *

NO

Unstable picture without colour ?

NO Plug A041(CP) + 13-IC6206(2)

YES C034/E23(1) + plug B072 (Servo)
7-IC6201(1) + +8B(R3206)
TS6146, TS6147(1)
IC6215(1), TS6157(SP)
Servo pre-amplifier

While picture is correct, depress "Play ◀" button

Picture continues to move forward or stops (possibly unstable or without colour) ?

YES TS6147(1), IC6214(1), IC6215(1)
IC6208(CP) *

NO

"Play ◀" correct picture ? (possibly for a short period of time)

YES 8c.

NO

Slide returns rapidly after the button is released ?

YES TS6148(1)

NO Plug A042(CP) + 14-IC6202(2)

Remark: * If necessary, refer to no. 14 of the repair procedure.

8b. NO PICTURE DURING "SCAN ►► "

V → 40-IC6208(CP) 5 V ?	NO	40-IC6208(CP) + + 5D
YES		
V → 4-IC6213(CP) 5 V ?	NO	TS6103, TS6104(CP)
YES		
V → 23-IC6214(CP) 6 V ?	NO	TS6101, TS6102(CP)
YES		
V → 39-IC6208(CP) approx 0.4 V ?	NO	39-IC6208(CP) + 11-IC6212(1)
YES		
Osc. plug A044(CP) correct ?	NO	TS6109(CP), IC6208(2)
YES		
Osc. 6-IC6214(CP) correct ?	NO	Plug A042(CP) + 14-IC6206(2), IC6206(CP)
YES		
Switch OFF the VLP		
Unlock the slide drive mechanism by pressing bracket 106 downwards		
Move the slide a little bit backwards		
Switch ON the VLP		
Depress button "Scan ►► "		
Picture visible ?	NO	TS6108(CP), TS6114(CP), TS6120(CP) 10-IC6212(CP), IC6208(CP) *
	YES	Plug A081(CP) + 2-IC6214-2A(1) Plug A084(CP) + 2-IC6215-2A(1) eTS6151(1) + slide motor + ⊥ TS6151(1), IC6213(1), IC6212(CP)

8c. "PLAY ◀ " CORRECT AFTER "SCAN ►► "

Slide runs fast during "Scan ►► " ?	NO	eTS6151(1) + slide motor + ⊥ Plug A062(CP) + C013(1) + 13-IC6213(1) TS6150, TS6151, IC6213(1)
YES		
V → plug A041(CP) 11 V ?	NO	Plug A041(CP) + 13-IC6206(2)
YES		
Osc. 15-IC6202(CP) frame pulse 5 Vpp ?	NO	TS6110(CP), IC6202(CP), IC6201(CP)
YES		
Osc. 4-IC6201(CP) frame pulse 5 Vpp ?	NO	TS6120(CP), IC6204(CP), IC6218(CP)
YES		
Osc. 6-IC6205(CP) frame pulse 5 Vpp ?	NO	IC6205(CP), IC6203(CP)
YES		
LED's "Active play" are glowing ?	NO	IC6201(CP), IC6217(CP), IC6208(CP) *
	YES	IC6207(CP), IC6205(CP), IC6208(CP) * Check setting of slide stop switch

* Remark: If necessary refer to nr. 14 of the repair procedure.

9a. TURNTABLE MOTOR CONTINUES TO SWITCH ON AND OFF *

- . Remove video disc
- . Depress lid switch by hand

Laser is glowing ? NO Laser circuit
TS6127 ... TS6131(SP)

YES

Objective is jumping ? NO 9b.

YES

- . Insert video disc
- . Close lid and before disc has reached maximum speed, depress "Scan ►►" button for a few seconds
- . Picture and sound correct ?

YES Check setting of slide stop switch

NO

- . Objective continues to jump audibly ?

YES TS6140, TS6142(1)

NO

- . Osc. 5-IC6206(2) on plug A023(2) correct (sync pulses at maximum speed approx $64 \mu\text{s}$ -11 V_{pp}) ?

YES 9c.

NO

- . Osc. B-TS6120(2) on plug A011(2) correct (approx 2 V_{pp} video signal or approx 1 V_{pp} sync.) ?

YES TS6120(2), TS6139, TS6140(2)
5-IC6206(2)

NO

- . Osc. 5-IC6202(1) correct (HF signal $\geq 150 \text{ mV}$) ?

YES IC6202-2A and 2B(1)
IC6201-3C, TS6114(1)

NO

- . Osc. on plug B051 (in centre of panel 1) correct ?

YES TS6107(1)
TS6102 ... TS6104(1)

NO

- . Osc. R3332/C028(1) correct ? (radial mirror)

NO TS6147, TS6148(1)
IC6215-2A(1)

YES

- . V $\overline{\text{E}}$ E-TS6163/64(1) approx 0 V ?

NO TS6160 ... TS6164(1)

YES HF pre-amplifier

Remark: * In order to simplify measuring, it is possible, if necessary, to prevent the motor from constantly switching off in the following way:
Connect B-TS6155(SP) via a resistance of 22 k to chassis.
Connect 3-IC6201/C2035 via an electrolytic capacitor of 47 μF to chassis (+ to chassis). Remove these components after repair!

9b. OBJECTIVE DOES NOT JUMP

- Leave lid open
- V \rightarrow plug A083/D6026(CP) approx. 11 V ? NO 14-IC6212 + +11,8B(1)
IC6212(1)
- YES
- Insert video disc
- Close lid
- V \rightarrow plug A083(CP) becomes approx. 0 V when disc has reached maximum speed ? NO
 - a. Remains 11 V
5-IC6211(1) + cTS6160(SP)
IC6211, IC6209, IC6212
 - b. Becomes unstable
TS6137, TS6139, TS6153
- YES Check connections:
C035(1) + plug B071 (Servo)
C034(1) + plug B072 (Servo)
Plug B061 (Servo) + +12A
Plug B062 (Servo) + -12A
- Servo pre-amplifier

9c. CHECK OF 5 % DETECTOR (sync. pulses correct)

- V \rightarrow c-TS6171(1) on connector C004(SP) approx. 0 V ? YES (possibly unstable)
TS6157(SP), D6031, D6032(SP)
3-IC6201(SP) + connector
C014(SP) + plug A031(2) + 12-IC6206(2)
- NO
- Osc. c-TS6168 (at maximum speed approx. 64 μ s - 20 V_{pp}) ? YES TS6169 ... TS6171(1)
- NO TS6166 ... TS6168(1)

10. TURNTABLE MOTOR STOPS AND LID OPENS

- . Remove video disc
- . Leave lid open and mains switched on
- . Depress lid switch by hand

Objective is jumping? NO TS6141, TS6153(1)
c-TS6138(1) → OBJ (approx 10 Ω) → ⊥

YES

. Release lid switch
. V → c-TS6138/C030(1) 0.4 V? NO TS6138, TS6136(1)

YES

. Insert video disc
. Close lid
. Osc. C033/R3217(1) focus signal ≥ 2 V? * NO C033(1) → servo pre-amplifier
IC6215(1), Servo pre-amplifier

YES TS6140, TS6154(1)

Remark: * Check oscillogram before video disc has reached maximum speed.

11. IMMEDIATELY OR SHORTLY AFTER CLOSING THE LID, POWER SUPPLY IS SWITCHED OFF

- . Open lid and remove video disc
- . Switch VLP on again (lid remains open)
- . Check tachogenerator signal on c-TS6153(SP) while the turntable is being rotated by hand

Negative pulses approx. 22 V_{pp}?

YES
NO

. Osc. 7-IC6201-2B(SP)

Square-wave voltage approx. 22 V_{pp}? YES TS6152, TS6153(SP)

NO

. Osc. 5-IC6201-2B(SP)

Sine-wave voltage approx. 0.5 V_{pp}? YES IC6201(SP)
NO 5-IC6201(SP) → tachogenerator

. V → 3-IC6201/C2035(SP) -1 V? NO TS6154, TS6156, TS6158(SP)
IC6201-2A(SP)

YES

. V → turntable motor (on plug B121) left in front of motor) -15 V? NO TS6138, TS6140, TS6124(SP)
TS6142, IC6201-2A(SP)

YES TS6105, TS6107, TS6109(SP)
c-TS6142(SP) → T5005 → motor → lid switch interrupted?
TS6148, D6049(SP)

12. MOTOR STARTS COUNTERCLOCKWISE

. Remove video disc

. Leave lid open

. V $\xrightarrow{\quad}$ -12A(C001 on SP) -12 V ? NO TS6116(SP)

YES

. V $\xrightarrow{\quad}$ 7-IC6218(1) approx 0 V ? NO 8-IC6218(1) + + 11,8B(R3364)
IC6218(1)

YES

. V $\xrightarrow{\quad}$ c-TS6171(1) 11 V ? NO b-TS6170(1) + +11,4B(R3365)
TS6169 ... TS6171(1)YES c-TS6171(1) + TS6157(SP)
TS6157(SP), IC6201-2A(SP)

13. TURNTABLE MOTOR IS NOT ROTATING AT ALL OR TOO SLOWLY

. Motor rotates counterclockwise ? YES See 12

NO

. Remove video disc and leave lid open

. V $\xrightarrow{\quad}$ connector C005(SP) approx. 0 V ? NO 4-IC6218(1) + -12B(R3366)
IC6218(1)

YES

. V $\xrightarrow{\quad}$ 2-IC6201-2A(SP) -1 V ? NO TS6153 ... TS6155(SP)
TS6158, IC6201-2A(SP)YES TS6138, TS6140,
TS6142, IC6201-2A(SP)

14. CONTROL PANEL IS NOT FUNCTIONING AT ALL OR NOT CORRECTLY

Proceed as follows:

a. Quick check of the μ -processors 8048 and 8049 on the control panel

Pin 5 power supply 5 V

Pin 3 oscillogram clock oscillator (6 MHz)

Pin 4 $\overline{\text{reset}}$ input (5 V)

Pin 39 (8048) frame impulses

Pin 30 (8049) frame impulses

If necessary, see no. 15 for an extensive check of the μ -processors.

b. Check of SAA1083 - IC6214

Pin 24 power supply voltage 12 V

Pin 23 oscillogram clock oscillator (4 MHz)

Pin 4 oscillogram clipped video signal

Now the various functions can be checked by applying the correct interconnections between outputs 9, 10 and 11 of IC6214 and inputs 4, 5 and 12 of IC6211.

The VLP should become operative according to the table below:

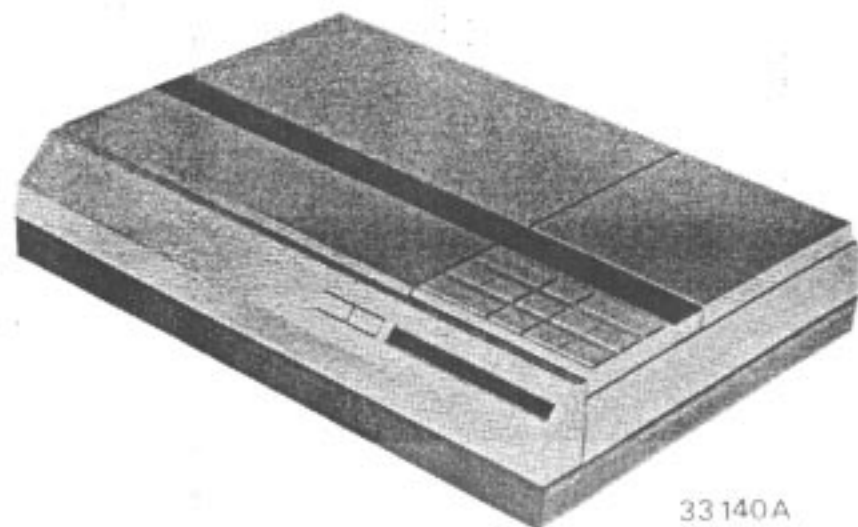
Play	▶	pin 11 SAA1083	↔	pin 12	IC6211
Play	◀	pin 11 SAA1083	↔	pin 4	IC6211
Slow		pin 10 SAA1083	↔	pin 12	IC6211
Still	▶	pin 9 SAA1083	↔	pin 12	IC6211
Still	◀	pin 9 SAA1083	↔	pin 4	IC6211
Scan	▶	pin 9 SAA1083	↔	pin 5+4	IC6211
Scan	◀	pin 10 SAA1083	↔	pin 5+4	IC6211
Fast	▶▶	pin 9 SAA1083	↔	pin 5+12	IC6211
Audio 1		pin 10 SAA1083	↔	pin 5+12	IC6211
Audio 2		pin 11 SAA1083	↔	pin 5+12	IC6211
Index		pin 11 SAA1083	↔	pin 5+4	IC6211

If the VLP is functioning correctly now, check IC6209 and IC6210. *

If the VLP is not functioning correctly, IC6214 or IC6211 is possibly defective.

Remark: * If necessary, see no. 15 for an extensive check of the μ -processors.

Service
Service
Service



33140A

PART III

Circuit Description

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The Laser Vision System

In the Laser Vision system the video and audio information are stored on a disc in encoded form.

The information on the disc is scanned optically on a Laser Vision player and then converted into an RF TV signal suitable for a standard colour television receiver. The information is stored on the disc along a spiral track in the form of pits; the disc is scanned from the centre to the outside. The length of the pits and their spacing are determined by the stored information.

The pits are $0.4 \mu\text{m}$ wide and approximately $0.1 \mu\text{m}$ deep. The track-to-track spacing is 1.6 to $1.8 \mu\text{m}$ (refer to Fig. 1). The overall length of the track on a 30 cm disc is about 34 kilometres!

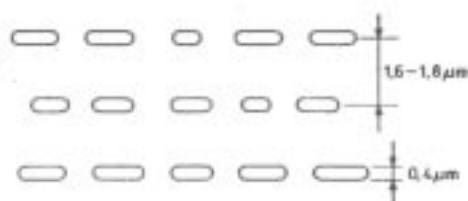


Fig. 1

The disc is made of a transparent plastic into which the pits are pressed. An extremely thin reflective layer of aluminium is added on top, followed by a protective coating that covers the whole. Two of these discs are glued together to form a double-sided disc. A cross section of the disc is shown in Fig. 2.

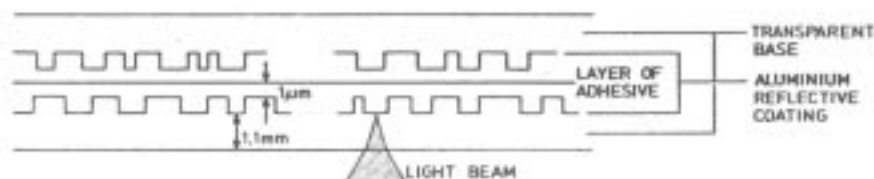
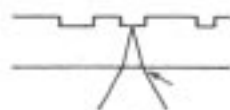


Fig. 2

A great advantage of the optical system is the contactless read-out of the information on the disc, as a result of which wear of disc and read-out device is non-existent. A second advantage is the effective protection of the information on the disc against dust, fingerprints, etc. When taking a closer look at the beam path from the objective to the disc (refer to Fig. 3), we notice that at the place where the light cone enters the transparent base section the light cone's diameter is still fairly large.

Dust particles, etc. at this place exert very little influence; the light passes, as it were, around the dust particle. This highly effective protection of the information enables normal handling of the disc.



27627A19

Fig. 3

Optical read-out of the information on the disc takes place as follows:

The light beam from a HeNe laser is focused on the disc by a lens (objective). In the absence of a pit practically the full amount of light is reflected. The reflected light passes through the objective and is then separated from the light beam going to the disc. The reflected light now falls on a photodiode; the amount of current that starts flowing through the diode is proportional to the amount of light falling on it.

When the light beam hits a pit, practically no light will be reflected due to the properties of the laser light and the depth of the pit; consequently, the current passing through the photodiode will be reduced.

In this way it is possible to convert the information on the disc into an electrical signal that is suitable for further processing to a normal TV signal in the player.

Encoding of the signals on the disc

The video signal is frequency modulated on a carrier (refer to Fig. 4a). Top sync level is situated at a frequency of 6.76 MHz, black level at a frequency of 7.1 MHz and white level at a frequency of 7.9 MHz. This results in a total frequency swing of $7.9 - 6.76 = 1.14$ MHz.

Including the side bands the video FM signal encompasses a frequency range up to approximately 2.5 MHz at the lower side.

The two audio signals are equally frequency modulated on carriers of 683 kHz and 1066 kHz respectively. The frequency swing of the two channels is ± 100 kHz (refer to Fig. 4b).

Summing these three signals and next limiting them results in a pulse-width modulated signal (refer to Fig. 4c). The negative half periods of this signal determine the length of the pits, the positive half periods determine the spacing of the pits (refer to Fig. 4d).

Fig. 5 shows the entire frequency spectrum with associated recording levels of the video and audio RF signals.

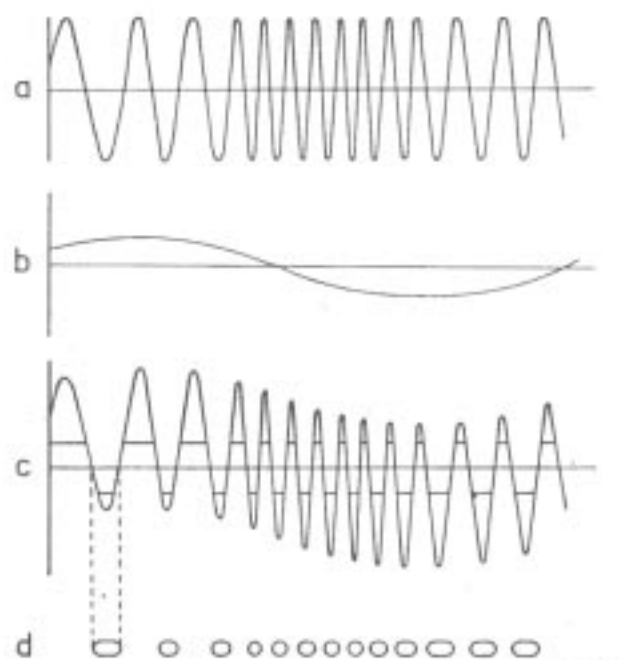


Fig. 4

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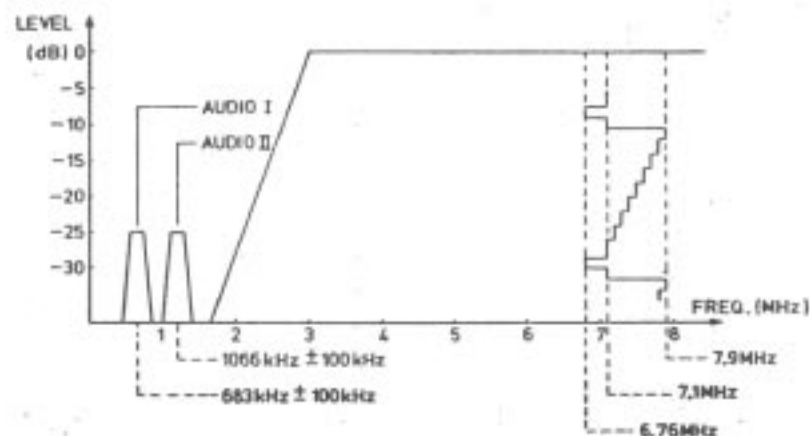


Fig. 5

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The encoded RF signals may be stored on the disc in two different ways:

1. The disc rotates at a constant speed (1500 rpm = 25 rps). At each revolution of the disc a complete TV picture is reproduced. This implies that the length of the track corresponding to one picture gradually increases from the centre of the disc to the outside. The frame sync pulses are situated on a diagonal. This type of disc is referred to as CAV disc (Constant Angular Velocity disc). Special playing modes like 'still picture', 'slow motion', 'fast forward' and 'reverse' are feasible with this type of disc only, since the frame sync pulses and, consequently, the frame blanking are situated on a diagonal. This allows jumping from one track to the next one or to the preceding one.

The maximum playing time of a CAV disc is 36 minutes/side.

2. The track length of each frame on the disc is constant.

This implies that the rotational speed of the disc decreases when scanning the disc from the inside to the outside, and that from 1500 rpm at the inside to 565 rpm at the outside of the disc. This type of disc is referred to as CLV disc (Constant Linear Velocity disc). No special playing modes can be realised with this type of disc, because the frame sync pulses and frame blanking are no longer situated on a diagonal, thus putting jumping from one track to the other out of the question.

The maximum playing time of a CLV disc is 54 minutes per side. The player is suited for both types of discs.

In addition to the video and audio information, the disc contains a number of special codes, inserted in the frame blanking periods.

Test signals have been inserted during the lines 19, 20, 332, 333. Digital codes for various purposes have been inserted during the lines 16, 17, 18, 329, 330, 331.

These signals have the following functions:

Lead-in tracks

A minimum of 900 tracks prior to the start of the actual programme contain a start code which sends the read-out objective to the beginning of the programme at nine times the normal speed.

Lead-out tracks

A minimum of 600 tracks immediately after the end of the programme contain an end code which sends the read-out objective back to the beginning at 75 times normal speed. Video and audio signals are muted during the return period.

Programme area

Here a distinction has to be made between CAV and CLV types of discs.

CAV discs

1. Picture code consisting of a picture number by means of which each individual picture of a programme can be identified.

The number may be displayed on the TV screen, if desired.

The picture number code is always present in the first field of each complete television frame. The second field may contain a stop code to switch the player to STILL PICTURE mode.

2. Chapter code consisting of a chapter number by means of which a search action can be automatically stopped as soon as the start of the relevant chapter is reached.

The chapter number may also be displayed on the TV screen, if desired.

The presence of stop code and chapter code is optional and depends on the programme content.

CLV discs

1. A normal play code is always present in CLV discs. This code disables the special modes of operation of the player.
2. Instead of a picture number code a time code is present in CLV discs. It contains a time coding with hour and minutes indication showing the time elapsed since the start of the programme. This time may be displayed on the TV screen, if desired.

Focusing

The objective used to read the information on the disc has a very small depth of focus, that is, maximum $2 \mu\text{m}$. In view of tolerances in disc and in player construction this accuracy can only be realised by means of a servo-control system that continuously verifies and corrects the focusing of the objective.

For this purpose the objective is mounted in a magnet so as to allow vertical motion. Around the objective and firmly attached to it, a coil has been mounted. By feeding a current through the coil, the objective will move more or less upwards, depending on the current intensity. Fig. 6 shows a cross-sectional view of the objective plus coil and magnet.

The system is very much similar to a loudspeaker system.

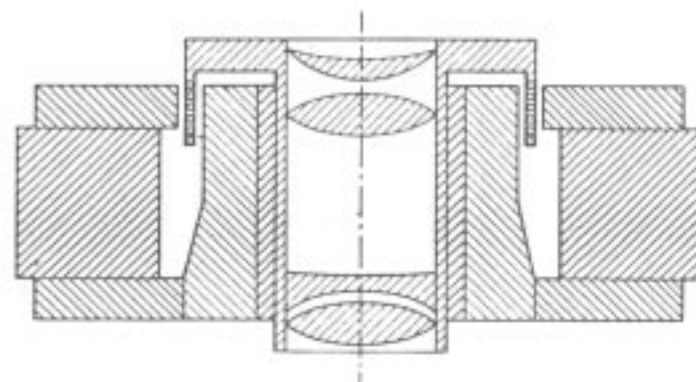


Fig. 6

27623A19

The objective is driven in the following way:

The light reflected by the disc is focused on the photodiodes by the objective. On its way to the diodes the reflected beam passes a cylindrical lens. In conjunction with the objective, this lens constitutes an astigmatic lens.

Unlike a spherical lens, an astigmatic lens does not have one single focal point, but two focal lines at some distance from each other and at right angles to each other. Between the focal lines a plane exists where a circular picture is formed. When the disc is out of focus with respect to the objective, that is, too far from or too close to the objective, the cylinder lens will modify the shape of the picture from the focused state (circular picture) to an elliptical picture. The direction of the ellipsis' axes is determined by the fact whether the disc is too far from or too close to the objective. The photodiode that converts the light variations into an RF signal is composed of four quadrants A, B, C and D (refer to Fig. 7). When the objective is in focus, all four quadrants receive equal amounts of light.

When the objective is out of focus, either A and B or C and D receive more light. The quadrants are interconnected crosswise. The sum of the signals over A, B, C and D constitutes the RF signal. The difference signal $(A+B) - (C+D)$ is the drive signal for the objective.

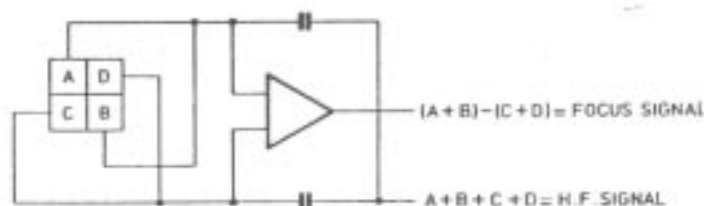
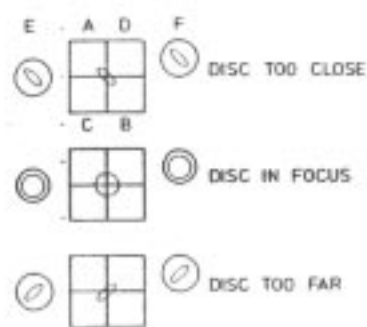
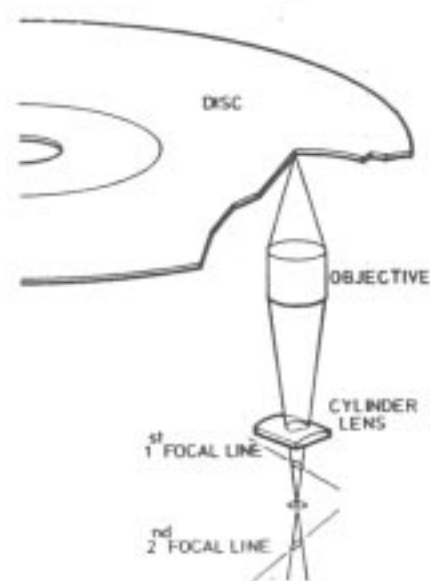


Fig. 7

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Radial tracking

The information on the disc is contained in a spiral track that is read from the inside to the outside. This implies that the objective - in order to be capable of following the track - has also to move from the centre of the disc to the outside.

For this purpose the objective and all associated components which constitute the optical system are mounted on a slide, driven by a motor and moving radially under the disc.

The light spot has to follow the track on the disc with an accuracy of approximately 0.1 μm .

Tolerances in player and disc may cause a track wobble of 100 μm . It will be clear that the slide is incapable of following this wobble at a rotational speed of 25 rps.

To obtain the required accuracy a movable mirror has been inserted in the light path under the objective; this mirror allows to move the light spot radially over the disc.

A magnet is attached to the mirror. Around the mirror a coil is mounted. When a current flows through the coil, the intensity and the direction of this current determine to what extent the mirror will pivot to the left or to the right (refer to Fig. 8).

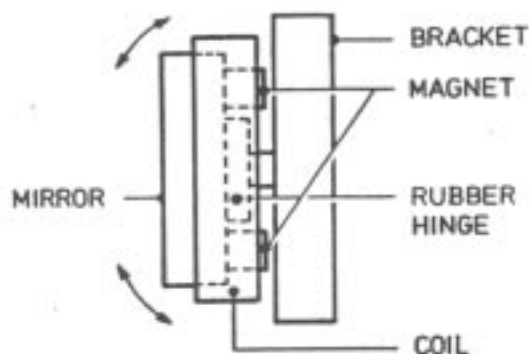


Fig. 8

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Driving of the mirror is obtained as follows:

In the optical system, apart from the main beam for track scanning, two further auxiliary light beams are formed whose impact is slightly displaced with respect to the track's centre line, in opposite directions.

The light spots formed on the disc by the two auxiliary light beams fall partly on the track and partly outside the left or right edge of the track. The objective focuses these light spots on two separate photodiodes situated at either side of the signal diodes (E and F in Fig. 7). When the track is followed correctly, the signals coming from each diode will be equal. When tracking is less optimal, it depends on the direction of deviation which diode output will exceed that of the other diode. (Refer to Fig. 9).

The difference between both signals is - after amplification - used to drive the mirror. When the average voltage across the mirror coil is positive or negative, the slide motor will be controlled until the average voltage is again 0 (zero).

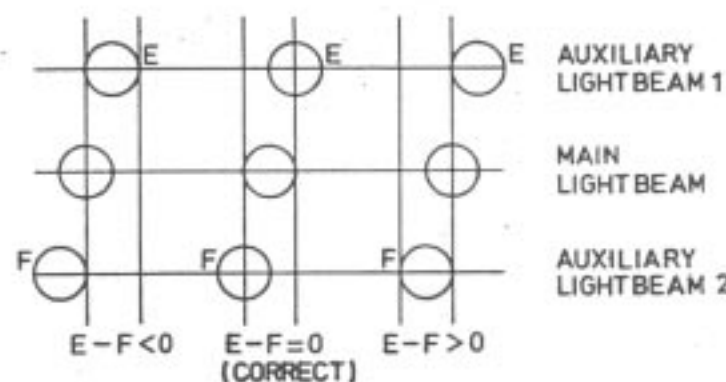


Fig. 9

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Time error compensation

A television picture consists, as we know, of lines that have to be written in an exactly defined time interval (64 μ secs for the PAL system).

Deviations result in a distorted picture and moreover in phase errors in the colour signal which might cause loss of colour. The player's signal should also meet this requirement as to constancy of the time base to be capable of reproducing an undisturbed picture with colour information.

As stated before, tolerances in disc and player construction may cause eccentricities up to 100 μ m. Eccentricity causes speed variations of the track with respect to the scanning beam at the frequency of the rotational speed (25 Hz). These variations give rise to timebase errors that may easily attain approx. 11.5 μ secs.

The maximum permissible deviation of the timebase that still ensures a stable picture on any TV receiver is 10 nsecs.

In order not to exceed this value a first requisite is to keep the motor speed as constant as possible. To ensure this, the phase of the line sync pulses in the video signal is compared with the phase of pulses having the line frequency coming from a crystal oscillator. The control voltage obtained from this comparison is used to control the turntable motor speed.

It will, however, be obvious that this control system is not capable of correcting speed variations having a frequency of 25 Hz or more.

For the correction of these errors use is made of a second movable mirror that allows tangential movement of the light beam across the disc surface. In this way the scanning speed can be increased or decreased.

The tangential mirror is driven by a signal obtained by comparing the phase of a crystal-controlled signal having the line frequency and line-frequency pulses of the video signal.

Since the line sync pulses are not suitable to perform a sufficiently accurate measurement of the time difference, use is made of a signal having a frequency of

3.75 MHz (240 times line frequency) and recorded on the disc at the level of the top sync pulses.

By using during each line sync pulse the same zero crossing of the 3.75 MHz signal, the real line duration can be measured with sufficient accuracy. With this timebase correction facility it is possible to connect the player to any type of TV receiver.

The light path (refer to Fig. 10)

The first component in the light path is the light source. It consists of a 1 mW Helium-Neon laser. The light produced is monochromatic and has a wavelength of 632,8 nm; it is coherent and linearly polarized (vertically). The next component in the light path is the grating. Through this grating the original light beam is divided into three light beams of which the intensities are in the ratio of 1 : 4 : 1. Further light beams are created, but their intensity is so low that they can be ignored.

Next the light passes through the spot lens. The spot lens focuses the three light beams on a plane approximately 10 mm behind the spot lens.

The light beams now encounter the prism that deflects the light through 90°. Subsequently, the light passes through the $1/4 \lambda$ plate that causes the polarization of the light to change from linear to circular.

The light beams now hit the folding mirror that deflects the light once more through 90°.

The following component is the collimator lens. This lens transforms the three diverging light beams into three parallel light beams.

These light beams then hit the radial mirror that is movable around a vertical axis and next the tangential mirror that is movable around a horizontal axis. The three light beams are focused by the objective into three light spots on the surface of the videodisc.

One light spot (the central one with the highest intensity) serves to scan the information on the disc; the remaining two light spots are used for radial tracking.

The radial and tangential mirrors are located together with the objective on a slide that moves from the centre to the outside underneath the disc.

After reflection from the disc, the light (modulated now) follows the same path in opposite direction.

In the $1/4 \lambda$ plate the light is converted from circularly polarized light into linearly polarized light. However, the direction of polarization is horizontal now.

Subsequently, the light falls on the prism where, due to the horizontal polarization of the light, no deflection occurs.

The light now hits the cylinder lens. The purpose of the cylinder lens has been explained in the Chapter: Focusing.

The three light beams finally form three light spots on the photodiodes; these diodes convert the modulated light into an RF signal (the actual information), a signal for focusing and a signal for radial tracking.

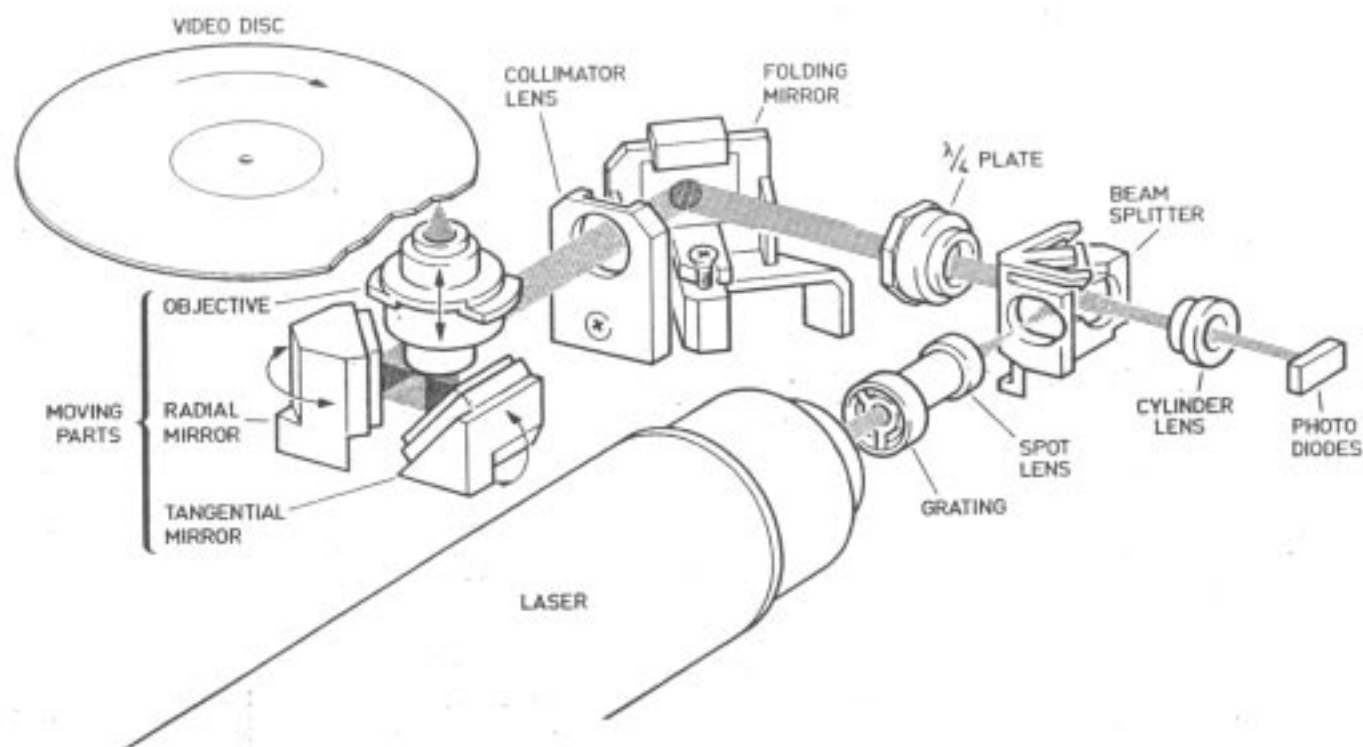


Fig. 10

Video signal path during special playing modes

For the special playing modes like still picture, slow motion, play reverse and fast motion, where it is necessary to jump one track back or forth, the PAL system causes problems for the following reasons:

In the first place the R-Y phase changes each line by 180° . Owing to the odd number of picture lines (625) the R-Y phase of any first picture line is shifted 180° relative to the first picture line of the preceding or following picture.

In the second place the subcarrier frequency in the PAL standard is 4433618.75 Hz. This implies per picture

$$\frac{4433618.75}{25} = 177344.75$$

periods of the subcarrier are available.

As a consequence, the phase of each successive track changes by 90° , which will become clear from the following lines (Fig. 11).

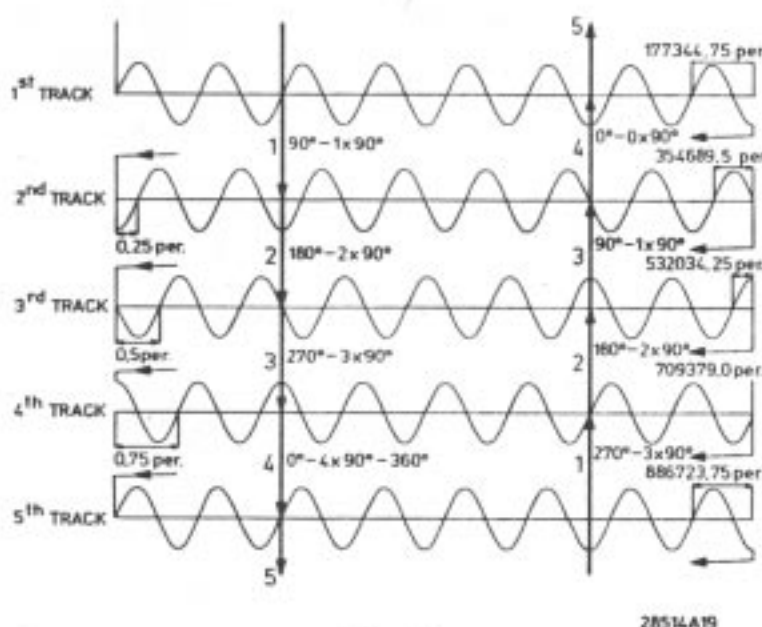


Fig. 11

Let us assume that for the first track the first positive-going zero crossing of the subcarrier coincides with the beginning of the track. At the end of track 1 177344.75 periods of the subcarrier will have passed.

The first positive-going zero crossing of track 2 will then occur 0.25 period after the beginning of track 2. At the end of track 2 354689.5 periods of the subcarrier will have passed. The first positive-going zero crossing of track 3 will occur 0.5 period after the beginning of track 3. At the end of track 3 532034.25 periods of the subcarrier have passed.

The first positive-going zero crossing of track 4 will thus occur 0.75 period after the beginning of track 4.

At the end of track 4 709379.0 periods have passed.

The first positive-going zero crossing of track 5 will again coincide with the beginning of the track.

Thus we have seen that there exists a difference of 0.25 period between two successive tracks. Since 1 period equals 360° , this implies that the phase shift between two successive tracks is $360 \times 0.25 = 90^\circ$. This means also that the phase shift between track 1 and track 3 is $360 \times 0.5 = 180^\circ$ and between track 1 and track 4 $360 \times 0.75 = 270^\circ$.

At successive jumps in outward direction (that is, in the normal play forward direction) the phase of the subcarrier signal successively changes by 90° , 180° , 270° , 0° , 90° , etc.

With the help of Fig. 11 it will be evident that at successive jumps inwards the phase of the chroma signal successively changes by 270° , 180° , 90° , 0° , 270° , etc.

In the PAL system the R-Y phase of the corresponding lines of each frame changes 180° .

When the R-Y phase of track 1 starts positive, the R-Y phase of track 2 starts negative, of track 3 positive again, and so on.

Recording the phase errors of the subcarrier signal and of the R-Y signal at successive jumps in a table, we find:

	Forward subcarrier phase	R-Y phase	Reverse subcarrier phase
1st jump	90°	180°	270°
2nd jump	180°	0°	180°
3rd jump	270°	180°	90°
4th jump	$360^\circ = 0^\circ$	0°	0°

If we split the subcarrier phase error in an error of 0° or 90° and an error of 0° or 180° , the following situation will present:

	Forward subcarrier phase	R-Y phase	Reverse subcarrier phase
1st jump	$0^\circ + 90^\circ$	180°	$90^\circ + 180^\circ$
2nd jump	$180^\circ + 0^\circ$	0°	$0^\circ + 180^\circ$
3rd jump	$180^\circ + 90^\circ$	180°	$90^\circ + 0^\circ$
4th jump	$0^\circ + 0^\circ$	0°	$0^\circ + 0^\circ$

It appears that the R-Y phase always shows a 180° error when the subcarrier phase shows an error of 90° .

When the subcarrier phase correction could be split up in a correction of 0° or 180° and a correction of 0° or 90° , whereby in the case of a 90° correction the R-Y phase could at the same time be corrected 180° , we would obtain a correct chroma signal.

The 0° or 180° phase correction is realised by feeding the chroma signal to a controllable phase-shifter which, dependent on a control signal, realises a 0° or 180° phase shift. The control signal in question is the burst PAL signal. This signal is provided by the control module.

The 0° or 90° phase correction combined with the 180° correction of the R-Y phase takes place as follows:

The chroma signal may be represented by $(B-Y) \cos \omega t \pm (R-Y) \sin \omega t$. It has been found that in case this signal is mixed with a signal having twice the subcarrier frequency (8.86 MHz) with a 90° phase shift, the mixer product assumes the following form:

$$(B-Y) \cos (\omega t + 90^\circ) \mp (R-Y) \sin (\omega t + 90^\circ) + (B-Y) \cos (3\omega t + 90^\circ) \pm (R-Y) \sin (3\omega t + 90^\circ)$$

When the unwanted component $3\omega t + 90^\circ$ is filtered out, the following form remains:

$$(B-Y) \cos (\omega t + 90^\circ) \mp (R-Y) \sin (\omega t + 90^\circ)$$

Thus we see that after mixing and filtering out of the unwanted component a chroma signal is left with 90° phase-shift and inverted R-Y phase relative to the original signal.

By mixing or not mixing we obtain a signal with a 90° phase-shift + inverted R-Y phase or 0° and initial R-Y phase.

The control signal for the mixer circuit is the burst switch signal that is also supplied by the control module.

The chroma correction described above is brought about in the following manner (see diagram C in service Manual): The video signal from the emitter of TS6120 is split up into a luminance signal and a chrominance signal by means of a low-pass filter and a high-pass filter.

The low-pass filter is composed of the coils L5004 and L5005 and the capacitors C2020-C2026. Via the wiper of preset pot R3062 the luminance signal is applied to the base of TS6106.

Via the group delay correction network C2029, L5006 and R3069 the luminance signal reaches the base of TS6107. The high-pass filter is formed by R3001 and C2001. The chrominance signal is via TS6101 presented to coil L5001. This coil is provided with a central tap which, via C2002, is connected to ground. The signals at the opposite ends of the coil are therefore in opposite phase.

These signals are applied to the bases of TS6102 and TS6103 which together form the 0° - 180° switch. The OBP signal coming from the control panel throws TS6104 into conduction or into cutoff. This transistor in its turn drives either TS6102 or TS6103 into conduction. On the common emitter resistor R3012 of these two transistors appears the 0° or 180° phase-shifted chroma signal.

The 0° - 180° phase-shifted chroma signal is via R3010 and C2010 applied to the mixer stage IC6201 where it is mixed or not with the 90° phase-shifted 8.86 MHz signal. Mixing or non-mixing is via TS6105 commanded by the OBS signal that is also originating from the control panel.

When leaving the mixer stage the 0° - 90° - 180° or 270° corrected chroma signal is via bandpass filter L5002-L5003-C2015 applied to the base of TS6109. Via the collector of this transistor the signal is applied to the base of TS6110 and via the emitter of this transistor to the emitter of TS6107. Here, the chroma signal is added to the luminance signal that enters at the base of this transistor. On the collector of TS6107 appears now the corrected video signal. Via emitter follower TS6108 the signal is passed on to pin 12 on IC6202. During the special playing modes pin 12 and pin 14 are interconnected. From here the video signal follows the normal path.

The mixer stage's output voltage is, in the case of non-mixing, twice as great as the voltage occurring in the event of mixing. To correct this, the resistors R3049 and R3050 are by means of TS6111 connected parallel to the collector resistor (R3047) of TS6109. Adjustment of R3050 allows to set the amplitude of the output signal during mixing or non-mixing to the same value.

The 8.86 MHz signal is generated in IC6203. This IC includes a crystal-controlled oscillator and a phase discriminator controlled by the burst key pulses.

This phase discriminator must be fed with a burst signal having a constant phase. During jumps across the tracks the phase is continuously changed by 90° . After the 0° - 180° correction there is still left a phase error of 0° or 90° . This error is corrected by means of TS6113, TS6114 and TS6115.

The signals appearing on the emitter and on the collector of TS6113 are in phase opposition. The network consisting of R3091 and C2049 yields a phase shift by 45° . The network C2047 and R3096 yields also a phase shift by 45° , however in opposite sense. The result is that the signals on the bases of TS6114 and TS6115 are shifted in phase by 90° relative to one another. By using the OBS signal to drive either TS6114 or TS6115, via TS6116, into conduction, we will find at the collectors of these transistors a chroma signal with constant burst phase. Via emitter follower TS6117 the signal is passed on to the phase discriminator in IC6203.

The transistor TS6112, in conjunction with the network R3086-R3087-C2047, ensures that the required 90° phase shift of the 8.86 MHz signal is brought about. R3086 serves to adjust this phase shift.

The Figures below once again explicitly show the chroma correction for the special playing modes. First of all the correction in case of fast motion (Figs. 13a and 13b).

Fig. 13a shows the jumps across the tracks. In Fig. 13b we successively find the normal chroma signal, the chroma signal after the jumps, the Burst PAL signal that drives the 0° or 180° correction, the chroma signal after the 0° or 180° correction, the Burst Switch signal that drives the 0° or 90° correction and the completely corrected chroma signal. In the lower part of Fig. 13b the R-Y phase correction is shown.

We see that after the first jump the signal of track 2b is scanned. This signal has a phase-shift of 90° relative to track 1b.

After the second jump track 4a is scanned; the phase shift is 180° with respect to track 2a. After the third jump track 5b is scanned; phase shift 270° relative to track 2b. After the fourth jump track 7a is scanned; phase shift $360^\circ = 0^\circ$ with respect to track 3a, etc...

After the 0° or 180° correction we see that there remains alternately a 0° or 90° phase error. After the 0° or 90° correction we have again a normal chroma signal.

In the lower part of Fig. 13b the R-Y phase correction is shown. The R-Y phase alternately shows an error of 0° and 180° . We find that the 180° error situation coincides with a 90° phase error of the subcarrier.

As we have seen before, in case of a 90° subcarrier correction the R-Y phase also shifts by 180° , thus giving a correct R-Y phase.

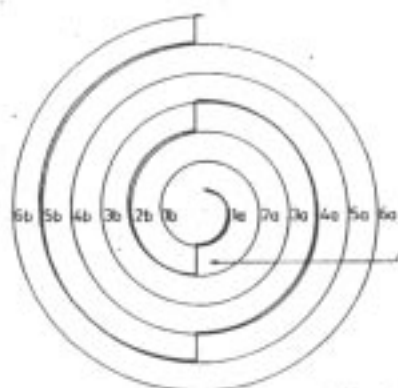


Fig. 13a

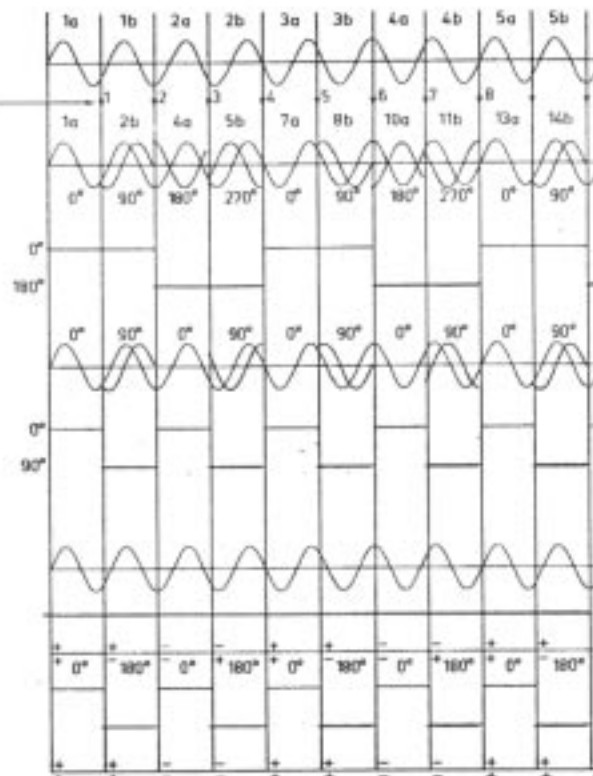


Fig. 13b

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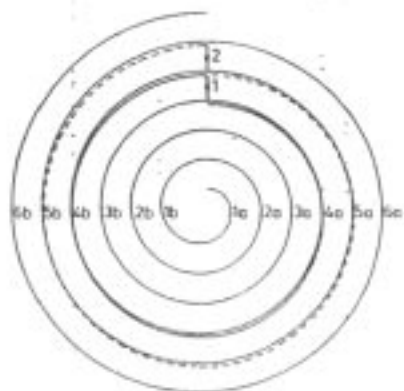


Fig. 14a

The Figs. 14a and 14b show the situation for still picture and slow motion. The successive jumps now take place from the outside to the centre, so that the phase change is now $270^\circ-180^\circ-90^\circ-0^\circ$.

While passing from track 4 to track 5 no jump occurs and consequently no change in the phase error present at that moment.

The Burst PAL and Burst Switch signals are adapted accordingly.

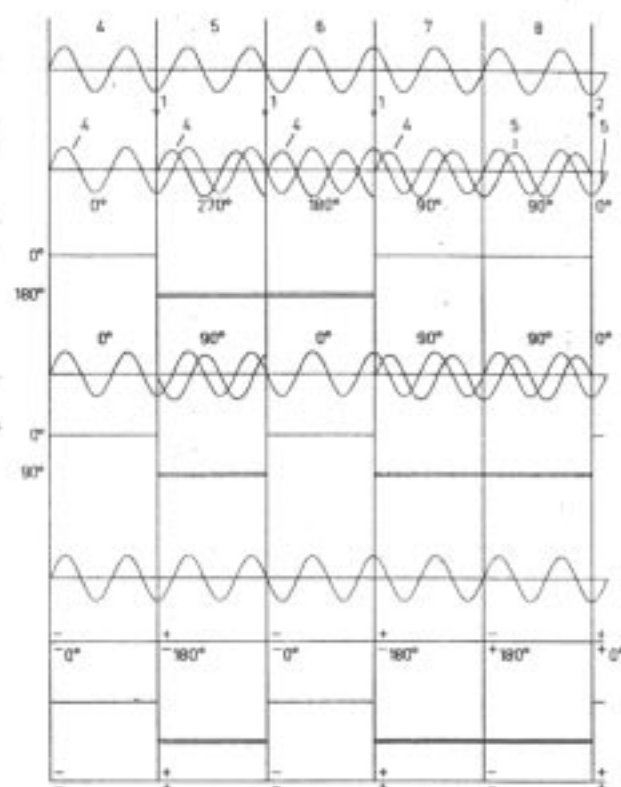


Fig. 14b

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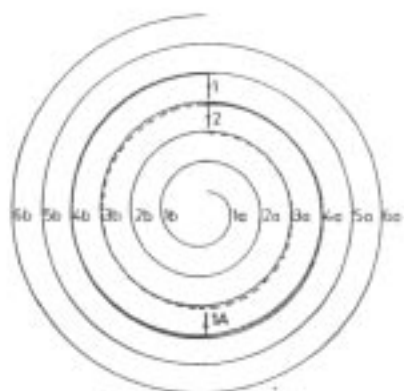


Fig. 15a

Figs. 15a and 15b show the situation for still picture and slow motion reverse.

The phase change at the successive jumps is now again $270^\circ, 180^\circ, 90^\circ, 0^\circ$, etc.

When passing from track 4 to track 3 there is an additional jump on a frame.

The Burst PAL and Burst Switch pulses are also adapted in this case.

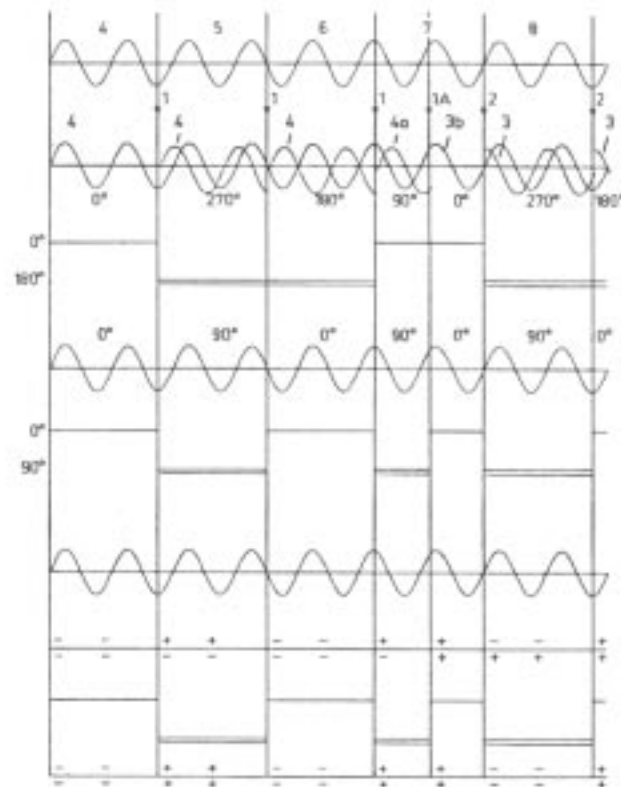


Fig. 15b

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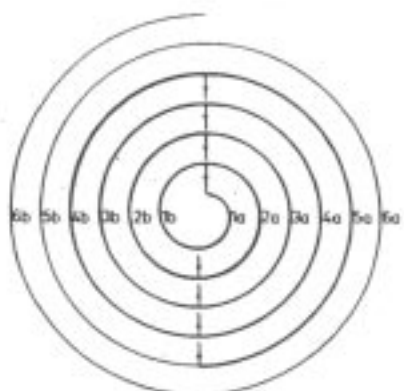


Fig. 16a

Figs. 16a and 16b show the situation for reverse play. The phase change after each jump is again $270^\circ-180^\circ-90^\circ-0^\circ$, etc.

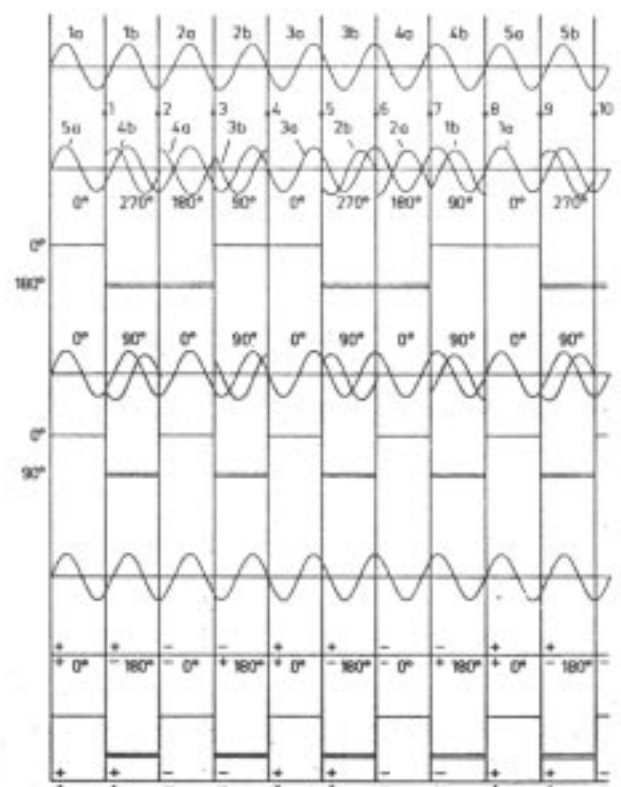


Fig. 16b

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H.F. and Servo Pre-Amplifiers

The H.F. and servo pre-amps are located on the deck as closely as possible to the photodiodes. The signals from the four central diodes are passed on via the capacitors C2001÷C2004 to the H.F. pre-amp composed of TS6001 and TS6002. Leaving the collector of TS6002, the H.F. signal flows via point C010 to the H.F. processor.

The signals from the four central diodes are at the same time fed via R3007÷3010 and via point C001-C002-C004 and C005 to the servo pre-amp.

The signals from the two radial diodes are flowing via point C003 and C006 to the servo pre-amp. A further interconnection that exists is between substrate and servo pre-amp via point C008.

All these signals are in the servo pre-amp presented to the normalizer IC6016. In this IC the focus and radial signals are processed so as to eliminate the influences of the disc's reflection coefficient (that is, the amount of light) and of the recorded signal's modulation depth.

At the outputs of the normalizer IC appear a radial signal and a focus signal which exclusively contain the information concerning the radial position and the focus of the spot.

The radial error signal on pin 11 of IC6016 is amplified in IC6017 and presented to pin B072 on the servo pre-amp. IC6016 also supplies a radial position signal (TPI).

This signal is high (+12 V) as long as the radial tracking is locked-in. As soon as radial tracking slips out of the lock-in range, the TPI signal becomes low (-5 V). The TPI signal appears on pin B073 of the servo pre-amp.

The focus signal on pin 4 of IC6016 is amplified in IC6018 and presented to pin B073 of the servo pre-amp.

The servo pre-amp delivers the focus position (FPI) signal at pin B071. The FPI signal is high (+10 V) during player start-up. When the objective becomes focused on the main reflection of the disc, the FPI signal becomes low (-12 V). Only when the FPI signal is low the focus servo can lock-in. In this way the objective is prevented from locking-in on the pre-reflection (outer surface of the disc).

The circuitry operates as follows:

When the substrate current is maximum (max. light, that is, reflection occurs at the Al layer), pin 2 on IC6016 becomes low. TS6010 is driven into conduction and the emitter becomes low. Diode D6002 cuts off. If now pin 1 on IC6018 becomes low (S-curve of the focus signal), pin 1 on IC6017 also becomes low. Diode D6003 is biased into conduction and keeps pin 3 on IC6017 low. The focus servo locks in. In order to prevent that too small a substrate current (as occurring in the event of a damage to the disc) immediately causes the FPI signal to swing high again, C2003 and C2004 have been connected parallel to R3007. These capacitors keep the emitter of TS6010 low for about 0,36 msec. This implies that the inner side of the disc is allowed to show a damage of a good 3 mm in diameter before the FPI signal becomes high and puts the focus control out of operation.

The H.F. signal of the pre-amp arrives via C2010 and a low-pass filter (< 15 MHz) on the base of TS6107. Leaving the collector of this transistor, the signal flows via a high-pass filter (> 2 MHz) to the base of TS6102).

The collector circuit of this transistor includes a circuit tuned to 8 MHz. This circuit serves to boost the high

frequencies of the signal at the inside of the videodisc. Connected parallel to this circuit is transistor TS6101. This FET acts as variable damping of the circuit.

The gate of TS6101 is driven by the MTF signal that is derived from the colour burst amplitude at some other place in the player. In this way the frequency response is adapted to the scanning diameter of the disc.

Via amplifier TS6103 and TS6104 and a 15-MHz low-pass filter the H.F. video signal is applied to video demodulator I (IC6202) and via amplifier TS6105 and a 64 μ s delay line to video demodulator II (IC6201).

The demodulated video signal appears on pin 16 of IC6202.

The amplitude is adjustable with R3075. From pin 16 the video signal flows via a 5-MHz low-pass filter to pin 3 on IC6202. The video signal is amplified and has an amplitude of 2 V_{pp} when appearing at the output (pin 2) of IC6202. Via a delay line of 470 nsecs and amplifier TS6114 the video signal flows to pin 7 on IC6201. Via a switch in IC6201 the video signal is presented to pin 8 on IC6201. The 64 μ s (= 1 line time) delayed H.F. video signal is demodulated in IC6201. The delayed video signal appears on pin 16 of IC6201. The amplitude is adjustable with R3051. Via a 2,5-MHz low-pass filter the video signal is applied to pin 3 on IC6201. The video signal is amplified and has an amplitude of 2 V_{pp} at the output (pin 2) of IC6201.

Via C2044 the video signal flows to pin 9 on IC6201, being the second point of the switch in this IC. Dependent upon the position of this switch, the direct video signal or the 1-line time delayed video signal is appearing on pin 8.

The switch is operated by the video dropout detector (TS6112 and TS6113). As long as the video signal at pin 2 of IC6202 is normal, TS6112 and TS6113 conduct. Pin 10 on IC6201 is low.

The signal on pin 7 of IC6201 is switched to pin 8 so that the undelayed video signal is reproduced.

When the signal on pin 2 of IC6202 drops out, a positive spike is applied to the base of TS6112.

The negative pulse on the collector cuts off TS6113.

On the collector of TS6113 appears a positive pulse that actuates the switch in IC6201. During the drop-out the 1-line time delayed video signal is reproduced, thus filling in the drop-out.

The video signal on pin 8 of video demodulator II is via connector A011 applied to the video servopanel 2. Via emitter follower TS6120, delay line 5011 and amplifier TS6121-TS6122 the signal appears on pin 13 of IC6202.

This IC is an electronic switch. In normal play mode pin 11 on IC6202 is high (Burst Pal Signal). Pin 13 on IC6202 is now interconnected with pin 14. From pin 14 on IC6202 the video signal flows via connector A013 to the video servopanel 1.

On this panel the video signal is presented to the base of emitter follower TS6127. Via coupling capacitor C2146 the signal is applied to the base of emitter follower TS6128. The base of TS6128 is during the back porch of the line sync pulse - clamped to the black level (approx. 6 V) by a positive clamp pulse applied via TS6126.

Via emitter follower TS6132 and group delay correction network L5024, L5025 and C2111÷C2114 the signal goes to pin 4 on the UHF modulator.

Via emitter follower TS6133 the video signal is applied to pin 19 of the audio-video connector (75 Ohms).

TS6129, TS6130, TS6131 and D6009, plus the associated resistors, ensure the insertion of the index signal. The index signal is supplied by the control panel.

It is a tri-state signal. When the index signal is low no index is inserted.

In the index signal is floating, TS6129 is conducting and will maintain the base of TS6132 clamped to black level (window).

If the signal is high, the emitter of TS6132 goes high (white level) because TS6130 and TS6131 are brought into conduction (digits).

The reference control supplies the following signals:

The MCO signal for turntable motor control, the motor lock signal, a reference signal with a frequency of 15625 Hz for the tangential servo, the composite sync signal, the burst key pulses, the clipped video signal for the control panel and line frequency pulses.

All of these signals are generated in IC6206. This IC comprises a crystal-controlled oscillator with a frequency of 4.5 MHz, followed by a 1:288 divider. The output of the divider is the 15625 Hz reference signal (pin 3 on IC6206). The video signal appears via a low-pass filter and an emitter follower on the points 7 and 11 of IC6206. The IC incorporates a sync separator; on pin 5 of IC6206 appears the composite sync signal.

The video signal is limited in IC6206; on pin 6 appears the clipped video signal for the control panel.

In the IC the frequency and phase of the line sync pulses are compared with the reference pulses. The resulting signal represents the MCO signal.

As long as the line frequency is lower than the reference frequency, the MCO signal is low. When the line frequency exceeds the reference frequency, the MCO signal is high. At equal frequency of the line sync pulses and reference pulses the MCO signal takes the form of a square-wave voltage.

The duty cycle is determined by the phase difference between line sync pulses and reference pulses; the frequency is equal to the line frequency.

As soon as line frequency and reference frequency are equal, that is, the motor is spinning at correct speed, pin 13 on IC6206 becomes high. This is the motor lock signal.

On pin 14 of IC6206 appear line sync pulses. These pulses are protected against drop-outs in the video signal.

When a drop-out occurs, the position is taken by a reference pulse.

Finally, pin 4, appears a negative going pulse on the back porch of the line sync pulse. This is the burst key pulse.

Motional Transfer Function (MTF)

The MTF voltage to control the frequency response of the RF processor is obtained in the following way:

Via R3160 and C2095 the composite video signal is presented to the base of TS6131. The collector circuit of this transistor incorporates circuit L5013-C2097 which is tuned to 4.43 MHz. The 4.43 MHz signal appears on the base of emitter follower TS6132. From the emitter of TS6132 the signal flows to the source of FET6133. The gate is driven by the burst key pulses originating from the reference control.

FET6133 is only conducting during the burst key pulses so only the colour burst is present on the drain.

The burst signal goes via C2100 to the base of TS6134. In case of increasing amplitude of the burst signal on the base this transistor will conduct less hard. The collector voltage rises with increasing burst amplitude. So the voltage across C2101 depends on the burst amplitude. Via emitter follower TS6135 this voltage will go to the RF processor (connector A015).

Sequence logic, focus drive, radial drive, slide drive

The sequence logic assures that the focus and radial servo are switched on at the right moment.

The following signals are applied to the sequence logic:

1. The "laser-on" signal from the laser supply;
2. The rpm > 1400 signal from the tacho circuit;
3. The FPI signal from the servo pre-amp;
4. The "in-focus" signal from the focus drive.

The FPI signal from the servo pre-amp is high as long as no reflection takes place from the Al coating on the disc.

The in-focus signal from the focus drive is low as long as the focus servo has not been locked-in.

When closing the lid, the laser is ignited and the "laser-on" signal becomes high. At reaching an rpm > 1400, pin 10 on IC6211 becomes high and pin 12 on IC6212 becomes high. Pin 13 on IC6211 is high (FPI signal) and pin 12 on IC6211 is low (in-focus signal) so that pin 11 on IC6211 is high. Initially, pin 11 on IC6212 is high. Pin 10 on IC6212 is low and pin 1 on IC6212 is low. Consequently, pin 3 is high. With a certain delay, caused by R3266, R3267 and C2188, pin 13 on IC6212 becomes high. Pin 11 becomes low and TS6142 (focus loop switch) cuts off.

Pin 10 on IC6212 will, however, be high now and after a delay caused by R3270 and C2190 pin 1 on IC6212 becomes high.

Pin 2 is via inverter IC6212-4B kept high as before and the output 3 on IC6212 becomes low.

Pin 13 on IC6212 becomes low, pin 11 on IC6212 becomes high and the focus loop switch TS6142 starts conducting. The drive is short circuited and the objective moves down. The complete cycle is restarted. The sequence logic oscillates; the frequency is about 2 Hz.

The FPI signal from the pre-amp is high during start-up. (+10 V).

This voltage is via diode D6018 and zener diode D6017 applied to the inverting input 6 on IC6209. Output 7 on IC6209 will become negative. In the case that the focus loop switch signal is low and, as a result, TS6142 is cut off, the output stage is driven via R3228. Since the drive signal is negative, TS6137 and TS6139 will be driven into conduction, pin C030 becomes negative and the objective moves up.

The FPI signal (+10 V) is the supply voltage for TS6153. This transistor forms together with TS6154 an astable multivibrator. The frequency of the generated signal is approx. 1 kHz.

This multivibrator is capable to operate when the focus loop switch signal is low. If the focus loop switch signal is high, the base of TS6153 is via zener diode D6031 connected to a fixed voltage and the multivibrator is turned off.

When the focus loop switch signal is low and the FPI signal is high, the multivibrator is operative and the signal on the collector of TS6153 drives FET TS6141 into and out of conduction and via D6029 FET TS6140 is also driven into and out of conduction. When TS6141 is conducting, the drive of the output stage is short circuited. TS6140 will also be conducting and the counter-e.m.f. of the objective charges capacitor C2185.

The result is that the objective is not driven with a constant current, but with a pulse-shaped current. This drive prevents the objective from remaining stuck due to mechanical resistance. The counter-e.m.f. across C2185 (-60 mV at normal ascent of the objective) and a reference voltage on the voltage divider R3239 and R3241 drive input 3 on IC6209.

If the counter-e.m.f. is great (high speed of the objective), output 1 on IC6209 becomes low and the drive on pin 6 of IC6209 is reduced via R3225, R3226 and D6021. When the counter-e.m.f. is small, the full drive is applied to pin 6 on IC6209.

When the focus loop switch signal becomes high again, input 2 on IC6209 becomes high and output 1 becomes negative.

Input 6 on IC6209 becomes negative and output 7 becomes positive.

Even though TS6142 is conducting, D6024 will ensure that sufficient positive voltage is left to bring the output stage around TS6136 and TS6138 into conduction. The objective is pulled downwards.

As soon as the focusing is correct, the FPI signal becomes negative. Diode D6018 cuts off, multivibrator TS6153-TS6154 is turned off, TS6141 and TS6140 cut off via D6028 and D6030, input 2 on IC6209 becomes negative via D6022 and output 1 on IC6209 becomes positive. This is the "in-focus"-signal that via D6020 is applied to the sequence logic.

It renders pin 2 on IC6212 low via inverter IC6212 (5-6 and 4). The oscillator is stopped and the objective remains locked-in.

The objective drive is performed now by the focus error signal on pin C033.

As soon as the radial loop switch signal becomes low (pin 2 on IC6212), pin 2 on IC6214 becomes low and pin 1 on IC6214 becomes high. The radial loop switch TS6146 is biased into conduction.

The radial error signal from the pre-amp flows via the phase correction network R3311-C2202 to input 6 on IC6215. The signal on output 7 of IC6215 is presented via loop switch TS6146 to input 3 on IC6215. The output signal on pin 1 of IC6215 serves to drive the radial mirror via output stage TS6147-TS6148. The voltage across R3334 is used as negative feedback for IC6215 (pin 2).

On pin 2 of IC6215 appear also the course pulses for the special modes of operation. During these pulses the radial loop switch TS6146 cuts off owing to a positive pulse on D6044.

During scan the objective moves at great speed under the disc. The radial mirror follows a number of tracks and a picture is displayed. When the light beam shows a tendency to move outside the picture field, the radial loop

switch is thrown out of conduction and the mirror springs back; through its speed it moves past the neutral position to almost the opposite extreme position. The radial loop switch starts conducting again and the mirror is capable of following again a number of tracks. This sequence is realised by the scan oscillator IC6213. This oscillator supplies a square-wave signal that is high for 10 ms and low for 70 ms.

The oscillator is switched on by TS6143. During the scan mode the Burst Switch signal is high, TS6143 cuts off and C2200 may be charged and discharged.

During the 10 ms that the search oscillator signal is high, the radial loop switch is via D6042 thrown out of conduction; at the same time TS6144 is conducting. This transistor discharges C2201.

If this did not occur, the charge on C2201 would make the mirror return slowly; this is unwanted.

In normal situations the TPI signal from the pre-amp is high. TS6145 is then conducting and D6043 is cut off.

If tracking is disturbed so that the spot lands on an adjacent track, the TPI signal becomes low. TS6145 cuts off and the radial loop switch is via D6043 thrown out of conduction. The charge on C2206 will see to it that the mirror again starts following the correct track and that the TPI signal becomes high again.

The radial error signal is also amplified and clipped (together with D6047) in IC6214 (5-7). The signal on pin 7 is the clipped radial signal for the control panel.

The absorption circuit C2209-L5030 is tuned at abt. 100 kHz and serves to filter out interference peaks which occur in the radial error signal due to tiny holes in the reflective layer of the videodisc.

These interference peaks might pass on an erroneous zero crossing indication to the control panel, as a result of which the course pulses would occur at the wrong moments.

Via filter R3329-C2211 the mirror signal arrives at the input 5 on IC6213. From output 7 on IC6213 the signal goes via R3345 and R3346 to input 13 on IC6213; output 14 drives input 9 on IC6213 and output 8 on IC6213 drives via output stage TS6150 and TS6151 the slide motor. As soon as a DC component is present in the mirror signal, the slide will be driven in the correct direction.

To input 13 is presented via diodes 6049-6052 the scan signal coming from the control panel.

TS6149 is connected between junction R3345-R3346 and ground.

Usually this transistor is cut off by a low level at input S.M.S. When actuating the pause key, the SMS signal becomes high and TS6149 starts conducting and shorts the slide motor drive. At the same time the radial loop switch is cut off via diode D6040.

Tangential servo

Tangential servo is required to compensate for timebase errors in the video signal from the disc. This compensation is achieved by moving the spot by means of a movable mirror in tangential direction across the surface of the disc.

The scanning speed may thus be increased or decreased to compensate for the timebase errors.

The control voltage for the tangential mirror is obtained by comparing the line time of the video signal from the disc with a reference signal delivered by a crystal oscillator.

The line sync pulses themselves are insufficiently accurate to measure the timebase errors. For this reason a special burst signal has been added to the video signal recorded on the disc. The frequency is 3.75 MHz (= 240 x f_H).

The signal has been inserted on the top level of the line sync pulses.

By taking - for every line sync pulse - the same zero crossing of the special burst signal, it is possible to measure the real line time accurately.

The circuit used operates as follows:

The video signal is presented via C2140 to the base of TS6147.

The collector circuit of this transistor comprises a circuit tuned to 3.75 MHz.

The special burst signal is then limited by TS6148 and TS6149 and applied to input 4 on IC6207.

IC6207 comprises two one-shot multivibrators. The first one-shot is triggered on pin 12 by the positive going edge of the video signal's line sync pulse.

On pin 10 appears now a positive pulse having a width determined by C2145 and R3251. The negative going edge of this pulse brings, via C2144, TS6150 out of conduction and pin 3 becomes high. The width of the pulse on pin 3 is determined by C2144 and R3255.

As soon as pin 3 is high, the second one-shot (in this configuration connected as set-reset flip-flop) is triggered by the next positive going zero crossing of the special burst signal on pin 4. Pin 7, and as a result pin 13 also, becomes low and pin 6 becomes high. The low level on pin 13 blocks one-shot 1.

As soon as pin 3 becomes low, the pins 7 and 13 become again high and pin 6 low. The next line sync pulse is again capable of triggering one-shot 1, etc.

The negative going edge of the pulse on pin 7 is differentiated by C2150 and R3260. On the collector of TS6156 appears now a positive pulse having a width determined by R3260 and C2150.

The time interval between two successive pulses on collector TS6156 is the real line time of the video signal on the disc.

During the time that pin 6 is low and pin 3 is high, TS6151 conducts. This transistor influences the time constant of one-shot 1 and, as a result, the width of the pulse on pin 10. In this way it is ensured that the same zero crossing of the special burst signal is used each time.

As long as the collector of TS6156 is low, TS6157 is conducting.

C2151 is charged with a constant current. During the positive pulse on the collector of TS6156, TS6157 is cut off. The charging of C2151 is interrupted and the voltage remains constant. After the pulse on collector TS6156, TS6157 is again biased into conduction and charging of C2151 is continued until a positive pulse from the reference oscillator and divider in IC6206, drives TS6158 into conduction.

C2151 is discharged now and the cycle is restarted.

It is obvious that the frequency of the sawtooth voltage is determined by the reference pulses. According as the

pulse on the collector of TS6156 is produced earlier or later, the point at which charging of C2151 is interrupted will occur lower or higher on the sawtooth. The plateau in the sawtooth is thus a measure for the timebase error of the video signal.

The signal on C2151 is applied via FET6159 and TS6160 to the source of FET TS6161. On the gate of this FET appears the pulse originating from the collector of TS6156, called sample pulse. During the sample pulse TS6161 is conducting and C2152 is being charged up to the value of the plateau in the sawtooth voltage. The signal on C2152 is then the tangential error signal. The tangential error signal is amplified by TS6162-6163 and 6164 and eventually appears on the collector of TS6165. This transistor is the tangential loop switch.

The various resistors and capacitors in the amplifier circuit are required to give the amplifier its correct frequency response.

The tangential loop switch is "actuated" by the motor lock signal from IC6206. As long as the motor speed is not yet correct, pin 13 on IC6206 is low. TS6141 is cut off and TS6165 is conducting. The tangential error signal is shorted and the tangential servo is switched off.

Via D6022, TS6142 is also conducting. C2129 has been charged and TS6166 is conducting.

As soon as the motor speed is correct, pin 13 on IC6206 becomes high. TS6141 is driven into conduction and TS6165 cuts off.

The tangential error signal appears on pin A025.

TS6142 and TS6166 remain in conduction until C2129 is discharged. TS6166 switches C2160 to ground; as a consequence, the gain of the tangential servo is lower by 20 dB for the time that TS6166 is conducting. This is required to prevent instability at switching-on. During scan the gain of the tangential servo is also lower by 20 dB. During scan the OBS (Output Burst Switch) signal is high. Via D6023, TS6142 and, as a result TS6166 also, are conducting and the gain is 20 dB lower.

The tangential error signal flows from pin A025 to pin C019 on video servo panel I.

On this board the signal is amplified in IC6218/2A and IC6218/2B.

From pin 7 on IC6218/2B the signal is via pin A122 applied to the motor control. This coupling of the tangential servo and the motor control is necessary to make sure that the mean value of the tangential error signal remains zero.

From pin 1 on IC6218/2A the signal is presented via C2231 and voltage divider R3383 and R3384 to the base of TS6160.

From the collector of this transistor the signal is via TS6162 and the complementary output stage TS6163 and TS6164 passed on to the mirror coil, pins C021 and C022.

Part of the output signal is via voltage divider R3388-C2234 and R3385 applied to the base of TS6161. The emitter of this transistor is connected with the emitter of TS6160.

The current flowing through TS6161 and the common emitter resistor R3387 constitutes a negative feedback and reduces the gain of TS6160.

When reading a CAV disc the tangential correction has to be increased while moving from inside of disc to outside of disc. The fact is that the light beam (spot) has to travel a farther distance at the outer edge of the disc to yield the same timebase error. Consequently, the mirror must be turned through a larger angle. This implies that the gain of the tangential servo should increase as the spot is approaching the outer edge of the disc.

This adaptation of the gain occurs in 4 steps by means of the slide position switches. These switches bring about

that, on the way from inside to outside, R3385 is shunted successively by: 1° no resistor, 2° R3380 in series with R3001, 3° R3379 and 4° the parallel circuit formed by R3379 and R3380, thus reducing the negative feedback and increasing the gain.

When reading a CLV disc the diameter correction should be switched off. With a CLV disc each line time on the disc is equally long. As soon as the rotational speed is < 1400 rpm, pin A141 becomes low, TS6159 cuts off and the diameter correction is switched off.

Control panel

The control panel supplies the index signal and the signals for control of the various servo circuits in the player.

The control signals depend on the commands given via the keyboard on the set, via the remote control unit or via signals on the disc.

The control signals are made in IC6214 (SAA1083P). This IC has been designed specially for the VLP player and supplies the following signals:

The **OBS** signal on pin 20. This is a 3-state signal. "1" during scan, "0" - 90° phase correction of the chroma signal and "3" - 0° phase correction of the chroma signal during tricks.

The **OBP** signal on pin 18. This is a 3-state signal. "1" during normal play forward, "0" - 180° phase correction of the chroma signal and "3" - 0° phase correction of the chroma signal during tricks.

The **OLS** signal on pin 1. This signal switches the radial servo during tricks. "1" radial servo switched off, "0" radial servo switched on.

The **OCP** signal on pin 3. This is a 3-state signal. "3" during normal play forward. "0" and "1" during tricks. The OCP signal drives the spot one track forward or backward during tricks by means of the radial mirror.

The **OSM** signal on pin 22. This is a 3-state signal. "0" during scan forward, "1" during scan reverse, "3" the slide motor is driven by the radial servo.

The **Index** signal on pin 7. This is a 3-state signal. "0" no index "3" black level (frame) and "1" white level (digits).

The **Audio Mute 1** signal on pin 16. "1" Audio 1 switched off, "0" audio 1 switched on.

The **Audio Mute 2** signal on pin 14. "1" Audio 2 switched off, "0" audio 2 switched on.

Both audio mute signals drive the audio 1 and audio 2 indication LEDs D6043 and D6044 via TS6115 and TS6116 respectively, and the audio indication LEDs D6045 and D6040 via TS6119.

The **Video Mute** signal on pin 5. This is a 3-state signal. "0" Video switched on, "3" video switched off and "1" video switched off and "open" command.

The video mute signal on pin A052 of the control panel is not driven directly by IC6214, but via TS6114 and flip-flop IC6216-2B.

Pulses of oscillator TS6101-TS6102 appear across the clock-input, pin 11, of IC6216-2B.

As long as the D input, pin 9 of IC6216-2B is low, the Q output, pin 12 is high and the video mute output of the control panel, plug A052, is high via D6017 and D6047 and the video signal is switched off.

The D input is low as long as the motor is not locked in and the motor lock signal is still low. The D input is also low if TS6114 is conducting. TS6114 is driven by the video mute signal at pin 5 on IC6214. TS6114 is conducting when pin 5 on IC6214 is "3" or "1".

The high level at junction D6017-D6047 switches off both audio channels via D6048-D6022 and D6023, and furthermore the index signal is shorted via R3069 and TS6117.

TS6113 starts conducting, both "Pause" LEDs illuminate. TS6121 and TS6124 cut off, causing the supply voltage for the audio active play, audio long play and CX indication LEDs to become switched off.

As soon as the turntable is locked in and the lock signal goes high, the video mute signal goes low when TS6114 is not conducting.

D6015 has been provided to ensure that the video mute signal remains low and the picture visible, when during scan of a CLV disc the motor lock signal goes low.

When the video mute signal on pin 5 of IC6214 becomes "1", this transition forms a clock pulse for D flip-flop IC6216-2A.

The D input, pin 5, is high and the Q output pin 2 on IC6216-2A goes low. This is the "open" command on pin A102.

The reset pulse on pin A103 resets IC6216-2A to RD input pin 4, via inverter TS6111.

The Q output, pin 1, resets IC6214 to pin 21 via inverter TS6108.

Operation of the "open" key results via C2024 in a positive pulse on the SD input, pin 6, on IC6216-2A; as a result of this the Q output becomes low and the "open" command is supplied to pin A102.

If a "Replay" command is given, TS6123 starts conducting through IC6208, causing the clock pulse for IC6216-2A to become shorted and the "open" command from IC6214 to become suppressed.

Operation of the "open" key remains possible at all times. IC6214 is supplied with the following signals:

Clock pulses to pin 23.

The clock pulses are generated by oscillator TS6101-TS6102. The clock oscillator is restarted after each line pulse.

Line pulses to pin 6.

Clipped video signal to pin 4.

The clipped video signal contains the data from the disc.

Slow motion pulses to pin 8.

The slow motion pulses are supplied by IC6208.

Frame pulses to pin 19.

A reset pulse to pin 21.

Clipped radial signal to pin 2.

The clipped radial signal supplies information on the position of the spot during forward or backward jumps (tricks).

The keyboard is scanned by IC6213. The keys are connected between pins 12, 13 and 14 (keyboard output) and pins 27, 28, 29, 30 and 31 (keyboard input) of IC6213. The RC5 signals arrive a pin 1 on IC6213 and are decoded in this IC.

The switching on and off of the CX decoder is driven by IC6213 via TS6118. This transistor also switches CX indication LED D6042.

Via the serial data output, pin 37, the remaining commands are supplied to the serial input, pin 38, of the direct access controller IC6208.

This μ C (MAB8049HP) drives ICs 6209 and 6210 on pins 21, 22, 23, 24 and 35. The switches in these ICs are located between keyboard output connections 9, 10 and 11 and the keyboard input connections 13, 15 and 17 on IC6214. The 5 V/12 V adapter IC6211 adapts the output level of the switches (5 V) to the input level of IC6214 (12 V).

The "Pause" function is driven directly by IC6208 when a CLV-disc is played, and via IC6214 when a CAV-disc is played. If the "Pause" command is given during playback of a CLV-disc, pin 14 of IC6208 will go high. The SMS output, pin A061, goes high via 5 V/12 V adapter IC6212. The slide motor is switched off. At the same time the video mute output, pin 12 on IC6208, goes high. The video mute output, pin A052, goes high via the 5 V/12 V adapter D6024 and D6047. Furthermore the "Pause" indication LEDs, D6039 and D6040, are switched on via TS6113.

At "Pause" during playback of a CAV-disc, IC6208 gives IC6214 the Still Picture command. Furthermore the video mute output will go high and the video signal will be switched off.

The information whether the player is switched in "Still Picture" enters IC6208 via pin 12.

To be able to execute a "search" command, the direct access controller, IC6208, must be supplied with both the desired picture number or chapter number **and** the picture and chapter numbers of the disc.

The picture numbers are encoded on the disc in lines 17 and 18 of each picture. The chapter numbers, if present, can be found in lines 18 and 331 of each picture.

The picture and chapter numbers consist of 24 bits and are coded in Manchester code; that is, the transitions in the middle of each bit cell determine the value of the bit concerned: a L-H transition is "1", a H-L transition is "0". Each bit cell is 2 μs wide (see Fig. 1).

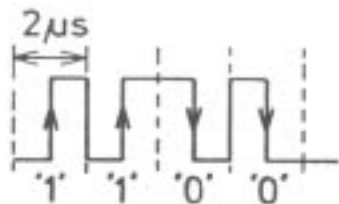


Fig. 1

32 749 A12.

The clipped video signal on pin A045 contains i.a. the data of the disc. To ensure that only the data (lines 17, 18 or 331) are read, the data read circuit has been applied. This circuit consists of three counters (IC6202, IC6203 and IC6204), a 64-bit shift register (IC6205), 4 switches (IC6207), 2D flip-flops (IC6215-2A and -2B), four exclusive OR-gates (IC6201-A-B-C-D) and 8 Nand-gates (IC6217-A-B-C-D and IC6218-A-B-C-D).

The circuit functions as follows:

Counter IC6202 selects which line is "read", line 17 or 18 (331).

Which of the lines is going to be read is determined by the level on pin 19 of IC6208 (line select). If this pin is low, line 18 will be read, if this pin is high, line 17 is read.

Counter IC6202 is reset by the frame pulse on the \overline{PL} input, pin 9. Consequently, when pin 19 of IC6208 is low, output Q0 (pin 14) goes high (P0 high) and output Q1 (pin 13) goes low (P1 low).

Outputs Q2 (pin 12) and Q3 (pin 11) go low because P2 and P3 are low. The CEP (count enable) input, pin 7, is high via D6004.

As soon as the \overline{PL} input goes high, the counter starts counting. The line pulses on pin 2 now form the clock pulses. The counter starts at 0001, (see table).

(P)D3	(P)D2	(P)D1	(P)D0			
Q3	Q2	Q1	Q0			
0	0	0	0			
0	0	0	1	line 18 } IC6202		
0	0	1	0		line 17 }	
0	0	1	1			
0	1	0	0			
0	1	0	1			
0	1	1	0	data in shift register } IC6203		
0	1	1	1			
1	0	0	0			
1	0	0	1			
1	0	1	0	5 divider }		
1	0	1	1			
1	1	0	0			
1	1	0	1			
1	1	1	0			
1	1	1	1			

After 14 line pulses (clock pulses) the TC output, pin 15, goes high.

The position of the frame pulse relative to the line pulses is such that this takes place at line 18.

If pin 19 on IC6208 is high, the counter will start counting at 0010 and the TC output will go high after 13 line pulses. This corresponds with line 17 (see Fig. 2).

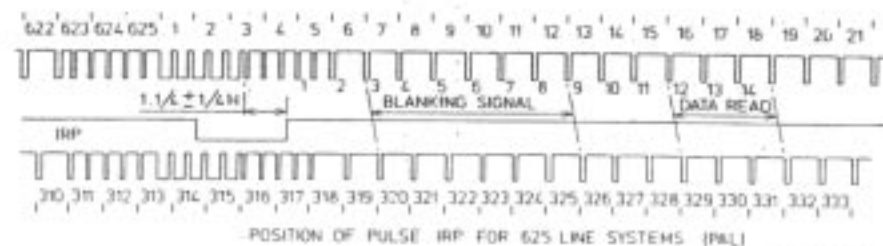


Fig. 2

32 749 A12.

As soon as pin 15 on IC6202 goes high, pin 10 on IC6205, the input select input, goes high as well. Input B, pin 1, is now active and data from the disc can be put into the shift register.

When pin 15 on IC6202 is high, diode D6030 cuts off. During the time that IC6202 is active, a second counter, IC6204, is active as well. This counter is reset by each line pulse and starts at the positive-going edge of the line pulse. The clock pulses (freq. 6 MHz) are supplied by IC6208. From pin 3 on the IC the clock pulses are fed to the \overline{CP} input, pin 1, on IC6204 via emitter follower TS6120 and nand-gate IC6218-4B.

Output Q3, pin 6, of the first counter in IC6204 supplies the clock pulses for the second counter in IC6204. After 32 clock pulses (= 5.33 μs) output 10 goes high. Pin 11 on IC6218-4C becomes low and input 10 on IC6218-4B becomes low. Output 8 on IC6218-4B goes high and the clock pulses for IC6204 are cut off: the counter stops.

As soon as pin 10 on IC6204 goes high, pin 4 on IC6201-4A, via IC6218-4C, goes high as well and D6005 cuts off.

Pin 16 on IC6208 is low and hence pin 9 on IC6203 is low as well.

Pin 10 on IC6203 is high via inverter IC6217-4B, just as pin 4 on IC6215-2B, pin 4 on IC6218-4D and pin 4 on IC6217-4A.

Pin 5 on IC6217-4A is low and hence pin 6 is high and D6031 is cut off.

So, first pin 15 on IC6202 goes high during the selected line and D6030 cuts off; 5,33 μs later D6005 cuts off. D6031 was already cut off and now pin 10 of inverter IC6201-4B goes low, causing the MR (Master Reset) input, pin 14, on IC6203 to go low. The delay of 5,33 μs has been applied to avoid that the colour burst would be read as data. Counter IC6203, however, cannot start yet because the \overline{PL} input, pin 11, is still low.

The clipped video signal on pin A045 first passes a buffer stage, IC6201-4C, and then goes to pin 1, input B, of the shift register IC6205 and to pin 10 on IC6207. Provided that the switch between pins 10 and 11 on IC6207 is closed, the clipped video signal will go from pin 11 to the clipped video input of IC6214 via the 5 V/12 V converter IC6212.

From pin 11 of IC6201-4C the clipped video signal also goes to pin 2 on IC6201-4D. The other input, pin 1, is connected to the Q output, pin 9, of D flip-flop IC6215-2A. The \overline{Q} output, pin 8, is connected to the D input, pin 12. The circuit is such that a positive pulse is generated on pin 3 of IC6201-4D at each change in the level of the clipped video signal.

This positive pulse is the clock pulse for D flip-flop IC6215-2B. The D input, pin 2, has been connected to the +5 V, so the Q output, pin 5, goes high. Consequently output 6 on IC6218-4D will go low and output 8 on IC6217-4D will go high.

The \overline{PL} input, pin 11, of IC6203 goes high and the counter starts at 0110 (see Table). After two clock pulses the Q3 output goes high.

Via pin 1-2 on IC6207, this high level causes a positive jump on the clock input, pin 2, of the shift register IC6205. The level of the clipped video signal (Manchester code) present at that moment, will be put in the shift register.

The counter continues counting, 7 clock pulses = $1\frac{1}{6} \mu\text{s}$. The TC output, pin 12, goes low.

This low level resets the D flip-flop IC6215-2B to pin 1. The $\overline{\text{PL}}$ input, pin 11, on IC6203 goes low and the counter waits for the next level change in the clipped video signal.

As a result of this, the level changes between the bit cells are not put in the shift register. The data on the disc are demodulated (see Fig. 3).

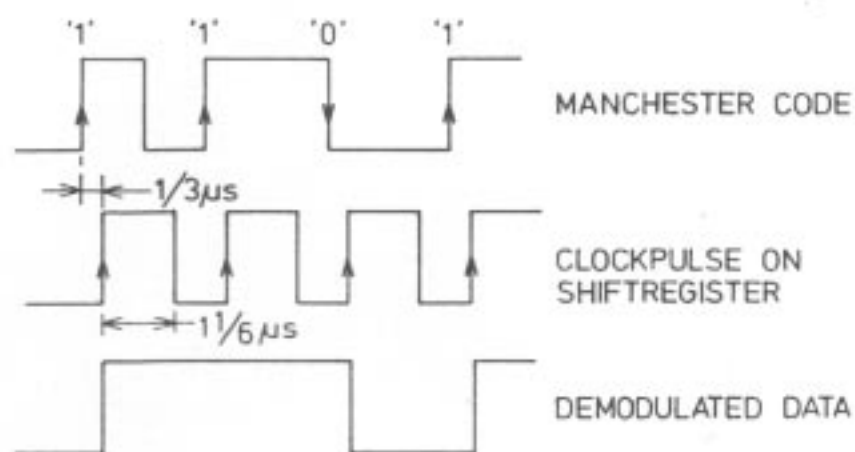


Fig. 3

32 748 A12.

When 24 bits have been "read", the output, pin 6, on IC6205 goes high because the direct access controller had put 24×0 and 40×1 in the shift register **before** the data on the disc were read.

The high level on pin 6 of IC6205 makes diode D6031 conductive through IC6217-4A. The MR input, pin 14, of counter IC6203 goes high, the counter is reset and all outputs go low.

At the end of the selected line, so at the 15th and 14th line pulse after the frame pulse respectively, all outputs of IC6202 go low. The CEP input, pin 7, goes low and the counter stops.

The low level on pin 7 makes input 2 of IC6218-4A low via TS6122.

Hence output 3 on IC6218-4A goes high and the counters in IC6204 are reset to pins 2 and 12. Output 10 on IC6204 goes low. The total circuit now waits for the next frame pulse.

Data from the shift register are read by direct access controller IC6208 in the following way:

When counter IC6203 has been reset, all outputs of this counter are low. By now closing and opening the switch between pins 1 and 2 of IC6207 by means of pulses from pin 17, clock pulses are formed on pin 2 of IC6205. First the information is shifted $40 \times$ and then the first information of the disc appears across output, pin 6, of IC6205 and can be read by IC6208 on pin 1.

Data from the direct access controller IC6208 are put into the shift register in Manchester code. This can take place when the input select input, pin 10, on IC6205 is low and this is the case after the desired line has been read; pin 15 of IC6202 is then low once again.

The necessary clock pulses for IC6205 are made in the way described above.

Data from the shift register are supplied to the SAA1083 in the following way.

Pin 16 of IC6208 goes high. Consequently the SD input, pin 4, of IC6215-2B goes low via IC6217-4B, making IC6215-2B inoperative. As soon as the MR input, pin 14, of IC6203 goes low, the counter starts counting. Pins 5 and 6 of IC6207 are high and the switches between pins 3 and 4 and between pins 8 and 9 are closed.

The pulses on output Q2, pin 6, of IC6203 now act as clock pulses for the shift register via pins 3 and 4 of IC6207. The data from the shift register are fed to SAA1083 via pins 8 and 9 of IC6207. The TC u pulse on pin 12 of IC6203 resets the counter to the $\overline{\text{PL}}$ input pin 11. The counter starts at 1010 and acts as a :5 divider and thus supplies clock pulses with a frequency of 1,2 MHz to the shift register (see table).

The data of the disc that are read by the direct access controller are checked for their correctness. They should be 24 bits and the data should meet the specification. By means of the data read, the direct access controller can determine whether the disc being played is a CAV or a CLV disc.

In the first case the picture numbers are read. The CAV LED-drive output, pin 34, goes high and the LEDs "Active Play" light up via TS6107.

In the second case the time code is read. The CLV LED-drive output, pin 33, goes high and the LEDs "Long Play" light up via TS6106.

If no disc data are read and the focus loop switch signal gives more than 10 pulses on pin 39, this means that there is no disc in the player. The direct access controller gives the "open" command to IC6214.

There are two different "search" possibilities. Picture number search and chapter number search.

In the first case the video mute output of IC6208, pin 12, goes high and the direct access controller compares the keyed-in picture number with the actual picture number. If the difference exceeds 399 pictures, the "scan forward" or "scan reverse" command is given, dependent on whether the difference is positive or negative.

When the difference is or becomes less than 400 pictures, the command "fast forward" or "play reverse" is given. Furthermore extra frame pulses are fed to the SAA1083 via output, pin 31, of IC6208 and TS6109.

Consequently the tracks are passed very quickly (extra course pulses).

As soon as the difference has become 6 pictures, the SAA1083 receives "still forward" or "still reverse" commands until the correct picture number has been reached. The video mute output, pin 12 of IC6208, becomes low.

When during search the lead-out tracks are reached - the keyed-in picture number is too high - the picture with the highest number is displayed and the index starts blinking.

Chapter number search is done in the following way:

The video mute signal on pin 12 becomes high. The "scan" command is given. The "scan reverse" command is given if the difference between the keyed-in chapter number and the actual chapter number is negative.

The "scan reverse" command is given until the difference is positive and then the command "scan forward" is given until the difference is 0. Because the slide cannot be stopped very quickly during "scan", the command "still picture reverse" is given when the difference = 0 point is passed. Extra frame pulses are fed to the SAA1083 until the difference is once again positive. After this, "still forward" commands are given and the video mute is switched off.

Chapter number search with CLV discs takes place in the same way. However, clipped video is not supplied to SAA1083 by opening the switch between pins 10 and 11 on IC6207. The switch is operated by the level on pin 18 of IC6208.

If now a picture number from the direct access controller is supplied to SAA1083, SAA1083 will accept still picture commands.

When the chapter number has been reached, clipped video is once more fed to the SAA1083 and the video mute is switched off.

When a top high chapter number has been keyed in, the highest existing chapter is searched and the index starts blinking.

Power supply VP720

The power supply must provide the following voltages and currents:

1. +12 V 1A regulated for the video and servo panels
2. -12 V 150mA regulated
3. 1600 V 5mA regulated for the laser
4. -28 V 1A unregulated for the turntable motor.

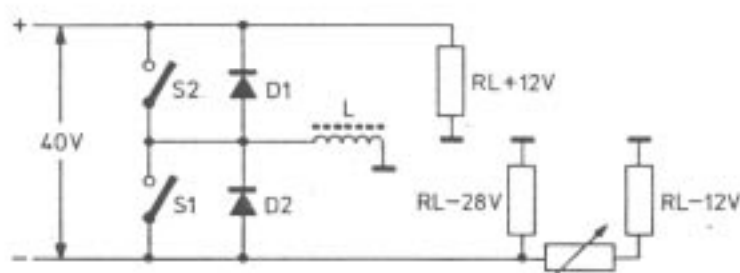
To keep the losses as small as possible use is made of a switched-mode power supply.

The voltage from the supply transformer's secondary winding is rectified by the bridge rectifier D6001. Across capacitor C2001 a DC voltage of 40 V appears.

In the next circuit this voltage is divided into a regulated voltage of +12 V relative to ground and an unregulated voltage of -28 V relative to ground.

From the -28 V the regulated -12 V is obtained by means of a series stabilizer.

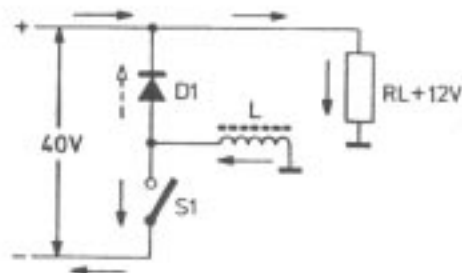
The principle of the circuit used is shown in Fig. 17.



30 854 A21

Fig. 17

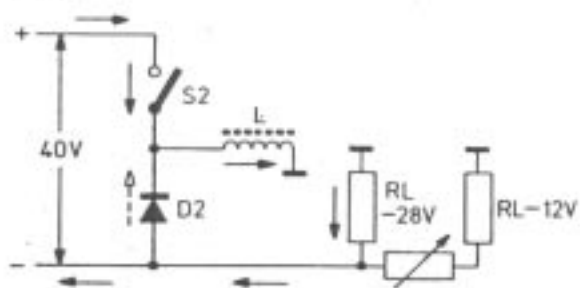
This circuit does in fact consist of the two following circuits (Fig. 18 and Fig. 19).



30 855 A21

Fig. 18

Fig. 18 shows the part of the circuit that provides the +12 V. When S1 is closed, the current will flow in the direction of the arrows. When S1 is opened, the energy stored in the magnetic field of coil L will maintain the current via D1 (dashed arrow).



30 856 A21

Fig. 19

The same reasoning is true for Fig. 19.

By alternately closing the two switches, whereby the time during which S1 is closed is determined by the voltage on +12 V output, a regulated +12 V and an unregulated -28 V are obtained.

Switch S1 is formed by the Darlington pair TS6108 and TS6110.

D1 is D6010. S1 is controlled by TS6106.

Switch S2 is formed by the Darlington pair TS6107 and TS6109.

D2 is D6011. S2 is controlled by TS6105.

On the bases of TS6105 and TS6106 appears a sawtooth-shaped signal, having a frequency of about 20 kHz, provided by the free-running multivibrator TS6121 and TS6122.

The square-wave signal of this multivibrator is transformed into a sawtooth signal by R3041 and C2011.

This signal is via emitter follower TS6123 applied to the bases of TS6105 and TS6106. TS6105 is biased into conduction by the positive peaks of the sawtooth voltage and TS6106 is biased into conduction by the negative peaks of the sawtooth voltage. Variation of the DC level on the bases allows to maintain either TS6105 or TS6106 conducting for a longer time.

This DC level is adjusted by TS6104. The voltage on the emitter of this transistor is via zener diode D6009 set 6 V below the +12 V output voltage. The base of TS6104 is connected with a tap of the voltage divider R3010, R3011 and R3012 between +12 V and ground. A decrease of the +12 V will reduce the current through TS6104, TS6106 remains longer in conduction and the +12 V will rise.

An increase of the +12 V will augment the current through TS6104 and TS6106 will conduct shorter. The +12 V drops. The correct output voltage is adjusted with R3011.

The regulated -12 V is derived by means of series transistor TS6117 from the -28 V. The +12 V serves as reference voltage.

By means of comparator TS6115 and TS6116 and the resistors R3031 and R3032 the +12 V and -12 V are kept in step.

When the +12 V rises, the -12 V drops proportionally. This is necessary because the radial and tangential mirrors are switched between +12 V and -12 V. Any offset between + and -12 V would result in a shift of the mirrors.

The power supply is protected against overload and overvoltage.

R3001 is the measuring resistor for the +12 V and the -28 V.

If the current through this resistor becomes too great, flip-flop TS6101-TS6102 is set. TS6112 and TS6111 cut off so that the +12 V is switched off.

The base of TS6117 becomes low via D6008 and the -12 V is switched off also. Via D6002 the oscillator TS6121-TS6122 is turned off and, as a result, the -28 V is also switched off.

R3029, R3033 and R3036 form the measuring resistor for the -12 V. Too great a current through this resistor triggers flip-flop TS6101-TS6102 on the base of TS6102, upon which action the +12 V, the -12 V and the -28 V are switched off.

An overvoltage on the +12 V and the -12 V drives TS6103 into conduction. As a result, flip-flop TS6101-TS6102 is set and the power supply is switched off.

Resetting of flip-flop TS6101-TS6102 can only be achieved by an interruption of the mains voltage (and by waiting until C2001 has discharged).

The laser supply consists of a DC-DC converter. The squarewave signal from multivibrator TS6121-TS6122 drives TS6127 via C2020, R3055 and D6019. This transistor drives TS6128 and TS6129 into saturation. The collector circuit of TS6129 includes high-voltage transformer T5003. An interruption of the current in the primary winding of this transformer caused by TS6129 induces in the secondary winding a high voltage that is rectified by the tripler 1002. As long as the laser has not yet been fired, this DC voltage is approx. 10000 V. Once the laser fires, this voltage drops as a result of the tripler's internal resistance to about 1100 V, being the operating voltage of the laser.

The current leaving the cathode of the laser flows via D6023, TS6130, R3061, R3065, R3066 and R3067 to ground.

The base of TS6131 is connected with the wiper of potentiometer R3066. The emitter of TS6131 is maintained at a constant voltage of 6 V by means of zener diode D6022. The voltage on the base determines the current through TS6131. This current determines with the help of R3056, D6019 and D6021 the voltage on the base of TS6127. This base voltage determines how long TS6127 is kept conducting and, consequently, via TS6128 and TS6129 the amount of energy that is applied to the tripler and, as a result, also the magnitude of the current through the laser. This current is adjusted to 5 mA with R3066, that is, to 5 V across R3067. TS6130 acts as current source for the laser.

Supply panel VP932

This supply panel deviates from the circuit used in the VP720 as to the following points:

- There is no mains switch. A supply voltage should be present at all times for the modified modulator/aerial amplifier.
The remaining supply voltages are switched on and off electronically.
- A 5 V switch mode power supply has been added for the control panel.
- The -12 V power supply has been changed from a series-controlled power supply to a switch-mode power supply (less loss).
- The protection circuit has been changed.
The components for switching on and off the +12 V, the current protection of the +12 V and the +5 V supply are housed on the sub panel 1003.

The switching on and off of the +12 V and hence also the +5 V and the -12 V takes place in the following way. As soon as the mains voltage is connected, a voltage of approx. 40 V appears across C2001. This voltage appears at pins a and e of sub panel 1003. TS6170 conducts through R3184, R3182 and R3177. The collector is positive relative to ground, TS6171 and TS6172 are cut off by this and the +12 V on pin h of sub panel 1003 is switched off. The voltage on pin b of sub panel 1003 is 0 V. Voltage divider R3002 and R3003 has been applied across C2001.

The voltage on junction R3002/R3003 is approx. 7 V relative to ground.

The on/off switch has been applied between this junction and pin b of sub panel 1003.

If the on/off switch is closed for a short while, a positive pulse is generated on the base of TS6170 via pin b-C2075 and R3177. Consequently TS6170 cuts off, causing TS6171 and TS6172 to start conducting. The +12 V is now on pin h of sub panel 1003. The collector of TS6171 is now positive and holds TS6170 cut off via R3182.

A 12 V voltage relative to ground appears now on pin b of sub panel 1003.

When the on/off switch is closed once again, the voltage on pin b of sub panel 1003 drops from +12 V to +7 V. This negative pulse arrives at the base of TS6170 via C2076 and makes this transistor conductive. As a result of this, TS6171 and TS6172 are cut off and the +12 V is switched off.

In case of overload of the +12 V, the voltage drop across the parallel circuit of R3175, R3190 and R3192 becomes so large that TS6170 starts conducting through D6075 and the +12 V is switched off.

The +5 V power supply consists of driver transistor TS6173 and switching transistor TS6174. The corresponding self induction is L5010 and D6078 is the corresponding diode.

The base of TS6173 gets a fixed voltage through the voltage divider R3185 and R3186. Via C2077 and R3187, the saw-tooth voltage on the emitter of TS6123, also arrives at the base of TS6173.

TS6173 drives TS6174 to conduction for a shorter or longer time, dependent upon the load.

If the +12 V is switched off, then the +5 V is also switched off because the base setting voltage of TS6173 has disappeared.

The -12 V power supply is also a switch mode power supply. The reference voltage is the +12 V.

The voltage divider R3031/R3032 has been applied between the +12 V and the -12 V. The base of TS6116 is connected to the junction of R3031 with R3032. The saw-tooth voltage of the emitter of TS6123 also arrives at the base of TS6116, via R3007 and C2006.

Dependent upon the load, TS6116, via TS6115, drives switching transistor TS6117 into conduction for a shorter or longer period. Coil L5006 and diode D6007 are the associated self-induction and diode.

The circuit of TS6116 and TS6115 takes care that the + and -12 V power supply keep in step.

In case of overload of the -12 V, the voltage drop across the parallel circuit of R3029, R3033 and R3036 becomes so large that TS6102 starts conducting. TS6117 is cut off via D6008 and the -12 V is switched off. Furthermore pin d of sub panel 1003 becomes negative.

Consequently TS6170 starts conducting and switches off the +12 and +5 V.

The voltage doubler C2002, D6002, D6003 and C2014 supplies the 41 V supply voltage for the modulator.

Motor drive

The motor drive performs the following functions:

1. During readout of a CAV disc the rotational speed has to be kept constant. During readout of a CLV disc it is the linear scanning speed that must be kept constant; this implies that the rotational speed must gradually drop from 1500 rpm at the inner side of the disc to 565 rpm at the outer edge of the disc.
2. At the end of the disc or when actuating the open key the disc must be braked. For this, the direction of current flow in the motor must be inverted.

The turntable motor has been placed for either of the current directions in a switched mode circuit.

The switches are formed by the Darlington pairs TS6140-TS6142 and TS6139-TS6141. The associated diodes are D6037 and D6038 respectively. The Darlington pairs are driven by TS6138 and TS6137 respectively. On the bases of these transistors appears the sawtooth voltage from multivibrator TS6121 and TS6122, that is, the same sawtooth voltage that is used for the power supply.

Via D6033 a DC voltage originating from pin 1 on op amp IC6201 is fed to these bases. When this voltage is low, TS6138 will conduct during the negative peaks of the sawtooth voltage. The direction of current flow is the normal direction for all playing modes.

When the voltage on the bases is high, TS6137 will conduct and the direction of current flow through the motor is inverted. The motor and, as a result, the disc are braked. During normal play the motor is driven by the MCO signal generated by the reference control by comparison of the frequency and phase of the line sync pulses in the video signal with the reference pulses supplied by a crystal oscillator. The MCO signal is a square-wave signal. The duty cycle is determined by the phase difference between the line sync pulses and reference pulses. The DC component of this signal after filter R3080, C2032, R3081 and C2035, drives via IC6201 the two transistors TS6137 and TS6138.

A tacho generator is coupled to the turntable motor. This generator supplies at 1500 rpm a signal with a frequency of 450 Hz. IC6201 (5-7) amplifies this signal and transforms it into a pulse-shaped signal. The negative edges of these pulses trigger the one-shot multivibrator TS6152-TS6153.

In the non-triggered state TS6153 is conducting. The collector is positive. As soon as the one-shot is triggered, TS6153 is cut off and the collector becomes negative via R3113. C2049 is then charged via R3120. When the one-

shot resumes its stable state, C2049 is discharged via R3120.

With an increasing frequency of the tacho pulses, the charging time of C2049 will exceed the discharging time. The voltage across C2049 drops. The base of TS6154 becomes less positive and so will the voltage on the emitter of TS6154.

Consequently, the voltage on the emitter of TS6154 depends on the rotational speed of the turntable motor. This voltage sets or resets the flip-flop TS6155-TS6156.

When the voltage is positive, the flip-flop is set.

When the rotational speed exceeds 1500 rpm, the voltage becomes low and the flip-flop is reset.

When TS6156 is conducting, the junction D6061-D6062-R3133 is low. The voltage across R3135 is low now.

When TS6156 is cut off, the junction D6061-D6062-R3133 is high. The voltage across R3135 rises.

So it is the turntable motor's rotational speed that determines the voltage level across R3135.

The voltage across R3135 determines the drive on pin 3 (input) of IC6201 when switch TS6157 is closed.

As long as the motor speed is still low, the 5% signal is high. TS6157 is via D6059 biased into conduction. The voltage across R3135 is low. Input 3 on IC6201 is low and the motor accelerates.

As soon as a video signal is picked up from the disc and the line frequency is within 5% of the nominal line frequency of 15625 Hz, the 5% signal becomes low.

TS6157 cuts off and the motor is driven by the MCO signal. D6058 sees to it that at 1500 rpm the flip-flop TS6155-TS6156 is kept reliably set.

If, however, no video signal is picked up from the disc, the rotational speed rises to > 1500 rpm, flip-flop TS6155-TS6156 becomes reset via D6055. The level on R3135 rises and no energy is applied any longer to the motor. The rotational speed drops below 500 rpm.

The flip-flop TS6155-TS6156 is set again, the level across R3135 is again low and the motor will accelerate again, etc. On actuation of the open key, pin C012 becomes low.

Flip-flop TS6155-TS6156 becomes reset via D6056. TS6157 is via D6060 biased into conduction. The level across R3135 ensures that no energy is applied any longer to the motor.

After about 2 seconds (delay caused by R3131 and C2052) TS6158 starts conducting.

The level across R3135 becomes positive and TS6137 starts conducting. The direction of current flow through the motor is inverted and the motor is braked.

As long as the rotational speed is still > 100 rpm, TS6148 is conducting; TS6149 and TS6150 are cut off. As soon as the speed drops below 100 rpm, TS6148 is via D6047 driven to cutoff. TS6149 and TS6150 are driven into conduction and the eject magnet becomes energized. At the same time TS6139 and TS6140 are via D6034 driven to cutoff so that the current supply to the motor becomes interrupted.

5%-detector

The 5%-detector supplies the 5%-signal for the motor control. This circuit works as follows:

The composite sync signal appears via D6055 on the base of TS6166.

From the collector of TS6166 the signal flows via R3402 and C2240 to the base of TS6167 and from the collector of this transistor the signal goes via R3404 to the base of TS6168. The collector circuit of this transistor incorporates circuit L5034 and C2241 which is tuned to 15625 Hz. D6067 gives a feedback to the collector of TS6166 and causes a decrease in damping and thus greater selectivity of the circuit. D6066 serves for correct adjustment of TS6166.

The signal on the collector of TS6168 flows via C2242 to voltage doubler D6068 and D6069. The voltage on the anode of D6069 becomes negative relative to ground. This negative voltage decreases the flow of current through

TS6169. The collector voltage becomes more positive. Via D6071 C2244 is charged. At a certain value of this voltage Schmitt-trigger TS6170-TS6171 is triggered and the collector voltage of TS6171 becomes low. This happens when the line frequency of the video signal of the disc is within 5% of the nominal frequency of 15625 Hz.

Via connector A121 the 5%-signal flows to the motor control.

Audio

The RF signal on the emitter of TS6107 appears via R3031 on the basis of TS6108. Between the collector of TS6108 and the base of TS6109 low-pass filter C2020-C2021-C2022 and L5010 has been incorporated (< 2 MHz).

Now only the RF audio signal is present on the basis of TS6109.

From the collector of TS6109 the audio RF signal goes via emitter follower TS6110 to both audio demodulators and to the audio drop-out detector.

Via C2024 the audio RF signal appears on the anode of D6001. The resulting DC voltage causes TS6111 to conduct more or less hard, dependent on the amplitude of the audio RF signal. The voltage across R3036 thus depends on the amplitude of the audio RF signal. This voltage will cause FET6106 to conduct more or less hard. Together with R3026 this FET forms a variable voltage divider. In this way the amplitude of the signal on the base of TS6107 is kept constant.

The RF audio signal is presented to two bandpass filters tuned to 683 kHz for audio channel 1 and to 1066 kHz for channel 2 respectively.

The RF signal for channel 1 (683 kHz) appears on pin 5 of IC6222-2A.

The demodulated signal appears on pin 16 of IC6222-2A. Via a low-pass filter (50 kHz) the AF signal is presented to pin 7 of IC6222-2B. As long as the audio mute signal, originating from the control panel, is low, pin 7 of IC6222-2B will be interconnected with pin 8 of this IC.

Next the AF signal is presented to the source of FET6176. This FET is conducting as a result of a positive voltage on the gate, via D6076 originating from the audio drop-out detector. Via R3510 the AF signal appears on the gate of source follower FET6178. Between the gate of FET6178 and ground C2306 has been applied. So the AF signal appears across this capacitor.

Now, when a drop-out should occur in the RF signal, the audio drop-out signal will become low. FET6176 will be cut-off via D6076. The voltage which is at that moment present on C2306 will appear on the gate of FET6178 thus filling in the drop-out.

From the source of FET6178 the AF signal will go to the base of TS6180.

From the collector of this transistor the signal will flow to audio output 1 and to pin 3 of the audio/video connector. Via R3154 the AF signal is presented to the base of TS6124 and from the collector of this transistor the AF signal will flow to UHF modulator U1001.

The audio demodulator for channel 2 equals audio demodulator 1.

If channel 1 is switched off, the audio mute signal on pin 10 of IC6222-2B will become high and pins 8 and 9 of IC6222-2B will be interconnected. On pin 9 appears via R3515 and C2309 the signal from audio demodulator 2, so now the AF signal from channel 2 is presented to both audio outputs. If channel 2 is switched off, the AF signal of channel 1 will be presented to both audio outputs.

The output signal of audio demodulator 2 appears on audio output 2 and on pin 1 of the audio/video connector. Via R3153 the AF signal from audio demodulator 2 goes to the base of TS6124. So the signals of both audio channels are presented to the UHF modulator.

Audio drop-out detector

Drop-outs in the RF signal result in annoying interferences in the sound. That is why, as described above, the audio demodulators have been provided with a drop-out compensation to eliminate these interferences. The switching pulses required for this compensation are supplied by the audio drop-out detector.

The drop-outs occur in the entire frequency spectrum of the RF audio signal. It appears to be sufficient to measure the drop-outs in a band around 400 kHz.

Drop-outs in the order of $10 \mu\text{s}$, however, are not detected reliably and should be measured separately both in positive and in negative direction.

The video drop-out pulses, finally, also give audio drop-out pulses.

The entire circuit functions as follows:

The RF audio signal passes a low-pass filter having a cut-off frequency of approx 450 kHz. This filter consists of coil L5017 and capacitors C2091-2092 and 2093. The signal which is limited up to 450 kHz appears on the base of TS6115. The collector circuit of this transistor incorporates circuit L5018-C2095 which is tuned to 400 kHz. From the collector of TS6115 the signal flows to the base of TS6118.

This transistor is cut-off by the positive voltage on the base. D6007 serves for correct adjustment of TS6118.

If a drop-out occurs TS6115 will conduct harder and TS6118 will also conduct during this period.

Normally TS6120 is conducting. Junction R3124-R3125 is high. As soon as TS6118 starts conducting, TS6120 will be cut-off. The collector of TS6120 will become low and junction R3124-R3125 will become low. This is the switching pulse for the drop-out compensation in the audio demodulators.

The signal which is limited up to 450 kHz also appears on the base of TS6116. The signal is amplified by this transistor and is via C2097 presented to the base of TS6117 and via C2096 to the base of TS6119.

TS6117 and TS6119 are both cut-off. If a drop-out occurs, either TS6117 and as a result TS6118 too will be biased into conduction or TS6119 is biased into conduction and in both cases the base of TS6120 will become positive and a drop-out pulse will be formed.

Detection both in negative and in positive direction is required to prevent the compensation from arriving too late (see Fig. 20).

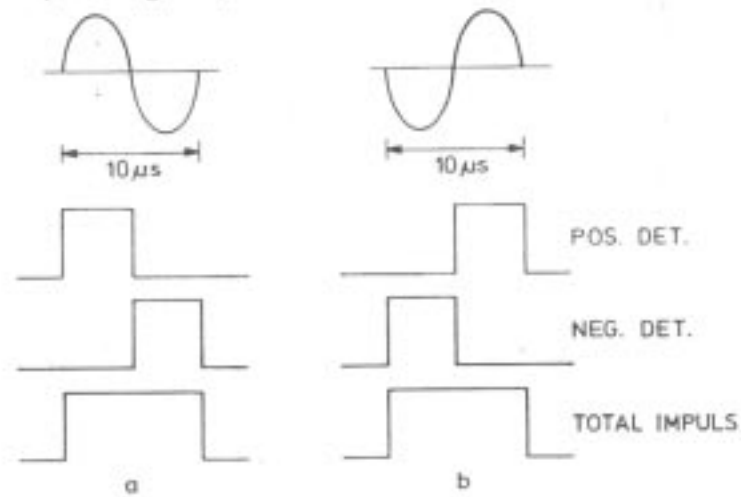


FIG. 23

30857A21

Fig. 20

Fig. 20a shows that when only negative detection would be applied, the drop-out pulse can arrive $5 \mu\text{s}$ late, while Fig. 20b shows that in case of just positive detection the drop-out pulse can also arrive $5 \mu\text{s}$ late.

The positive video drop-out pulse, finally, drives via inverter TS6112 TS6121 into conduction as a result of which TS6120 will be cut-off and an audio drop-out pulse will be formed.

ADJUSTMENTS

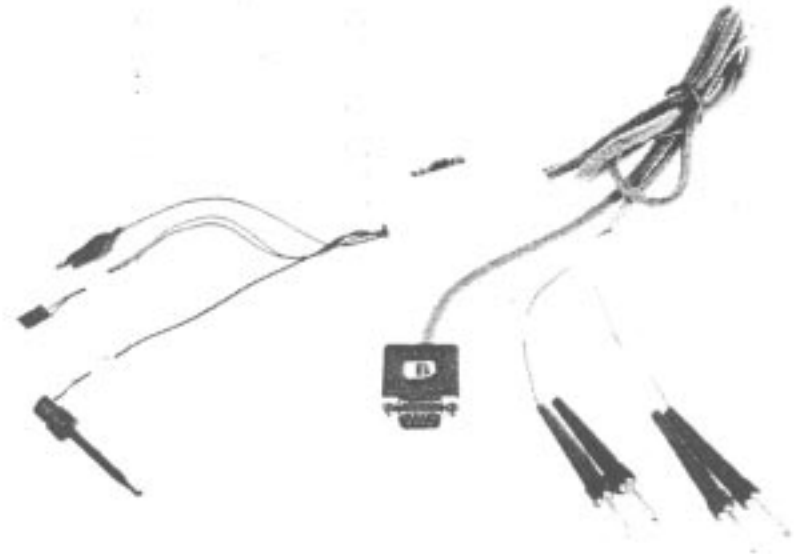
Optical adjustments

For the optical adjustments the following items are required:

1. Optical adjustments set (4822 395 30124) comprising:



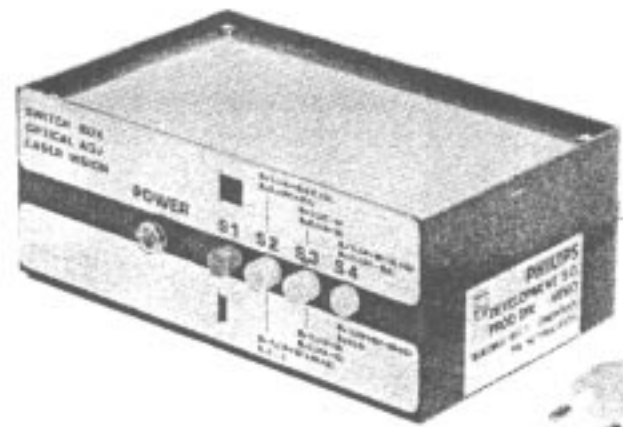
— mirror alignment turret;



— test lead;



— pupil-filling meter;



— switch box;



— test jig;



— target block;



— key for adjustment of $\frac{1}{4}\lambda$ plate;

2. Double-beam oscilloscope.
3. Signal generator, 10 Hz - 100 kHz.
4. Variable d.c. power supply.
5. Set of Torx screwdrivers (4822 395 50145).
6. Test disc 8" (approx. 20 cm dia.) 4822 397 30068.

Operations to be carried out prior to optical-path adjustments.

1. Remove the covers (items 143, 153 and 511) and the slide drive mechanism (item 129) as shown in Fig. 1. Remove the deck from the cabinet by undoing the four fixing screws. Place the deck with its rear side on the rear cabinet edge and place cover 143 underneath the front, as indicated in Fig. 2.

2. **Switching on the laser** (servo section of the player inoperative)

- Unplug connectors B16 and B17 on the connector panel of the deck.
- Unplug connectors B26 and B27 on the slide panel of the deck.
- Remove connector A10 from the control panel.
- Short-circuit C and E of TS6148 on the power supply panel by means of an insulated test clip.
- Switch on the laser by switching on the mains switch.

POSITION OF CONNECTORS

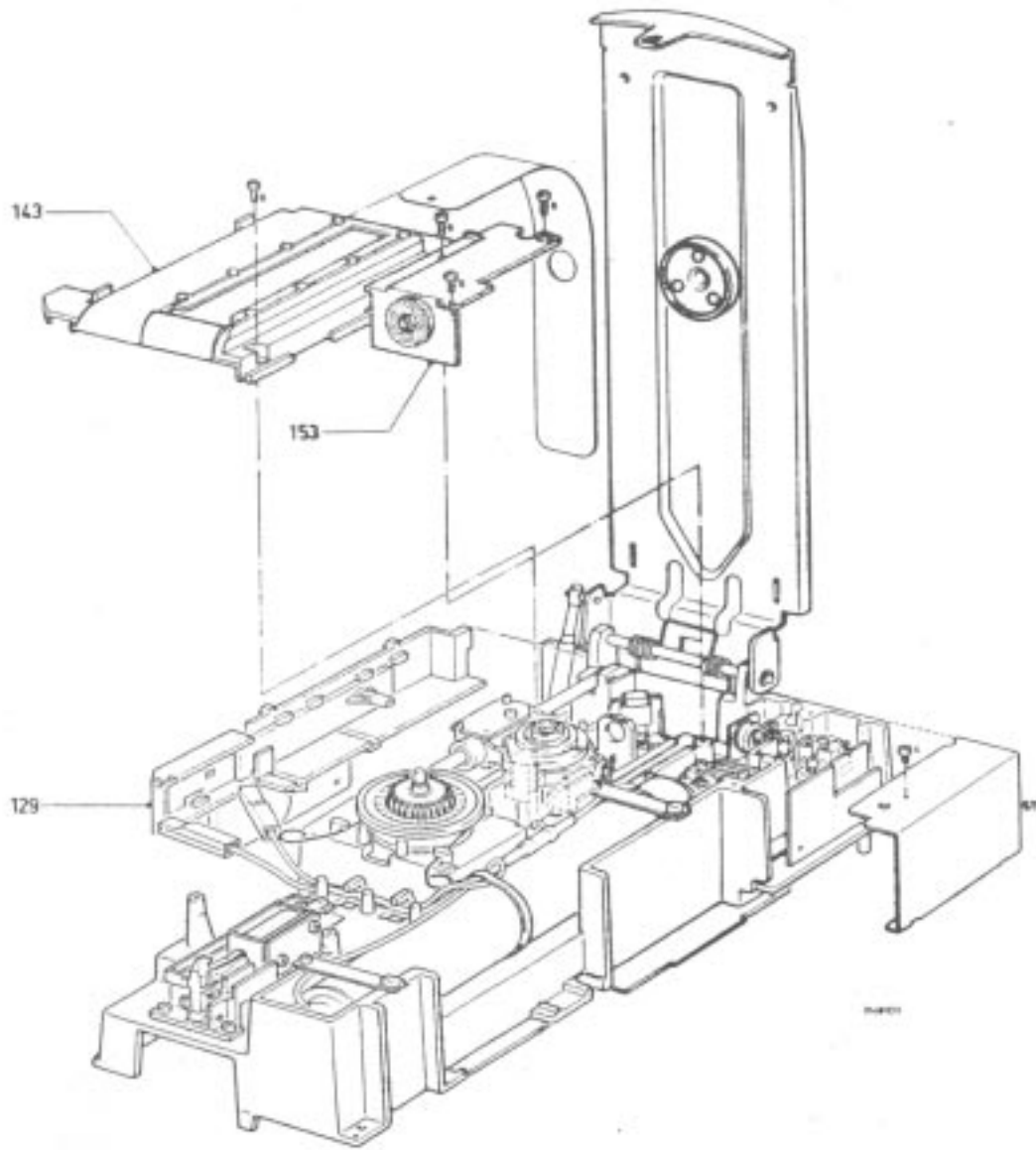
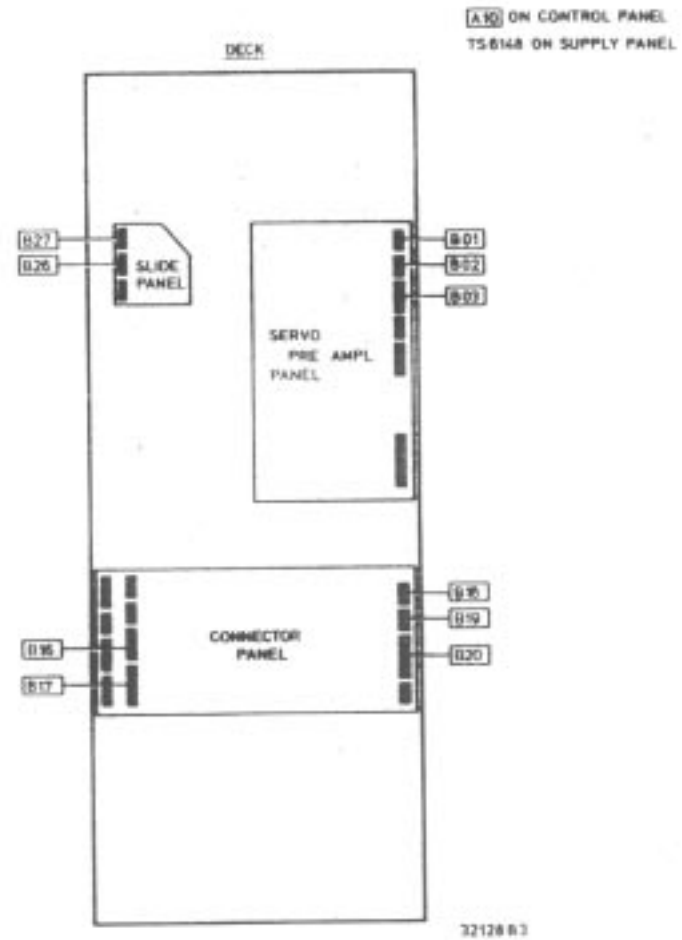


Fig. 1

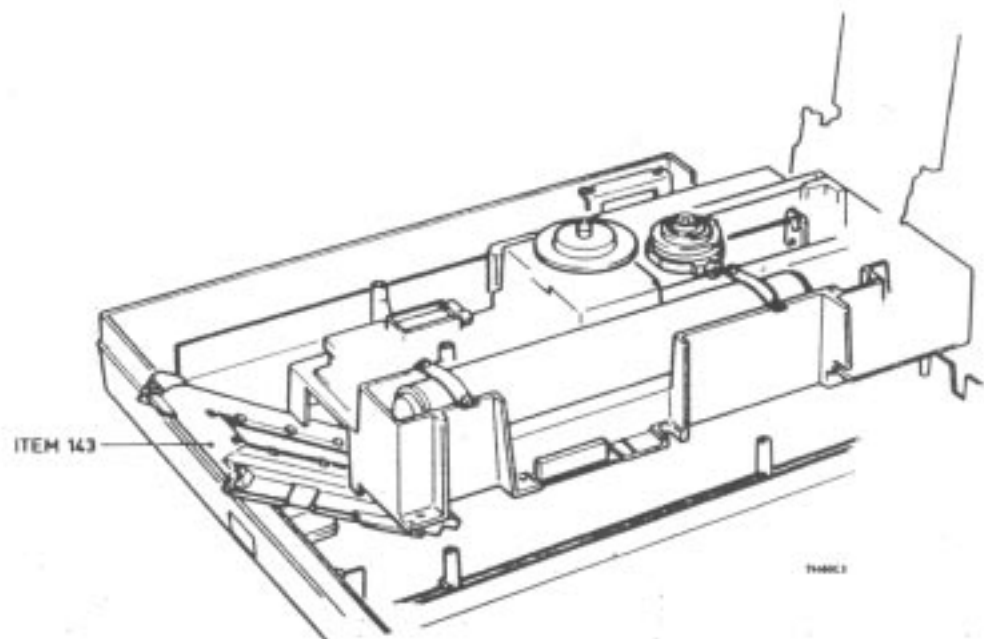


Fig. 2

3. Adjusting the manipulators

The manipulators for the spot lens, the radial and tangential mirrors and the photo-diode are constructed as shown in Fig. 3a. The pivots A and B are integrated in the manipulator material, so that their adjustment range is limited. If the adjustment is such that an upward movement is obtained (turn set-screw clockwise) this will present no problems.

However, if subsequently a downward adjustment is required (turn set-screw anti-clockwise) the pivot will no longer exert an adequate spring force on the manipulator after some turns. In that case it is necessary to re-energize the manipulator by turning the set-screw six turns further anti-clockwise and pressing the manipulator against its stop by means of the screwdriver. After this turn the set-screw clockwise until the manipulator has reached the desired position.

The same procedure must be adopted for the folding mirror, although a different construction is employed (see Fig. 3b).

The pivots A and B are energized by turning set-screw E four turns anti-clockwise and then urging the mirror holder upward against the set-screw.

Pivot C is actuated by turning set-screw D four turns anti-clockwise and pressing the manipulator towards set-screw D.

It is obvious that the range of the manipulator adjustments described above is not unlimited. If it is necessary to repeat the energization of the manipulators more than three times, the entire manipulator must be replaced.

4. Connecting the switch box

- Connect the oscilloscope to the rear of the switch box. Connect the A-channel to BU1 and the B-channel to BU2.
- Connect the pupil-filling meter to the receptacle marked A and the test lead to receptacle B.

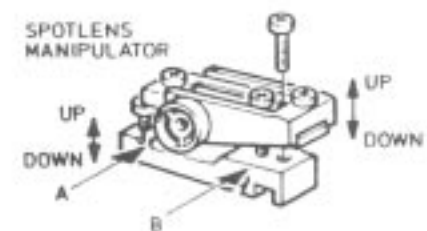
5. Removing and mounting the objective

The objective holder has been snapped onto the objective magnet and must be removed with care, as indicated in Fig. 4.

When remounting the objective, one of the three clamping lugs of the objective holder must snap onto the magnet with an audible click.

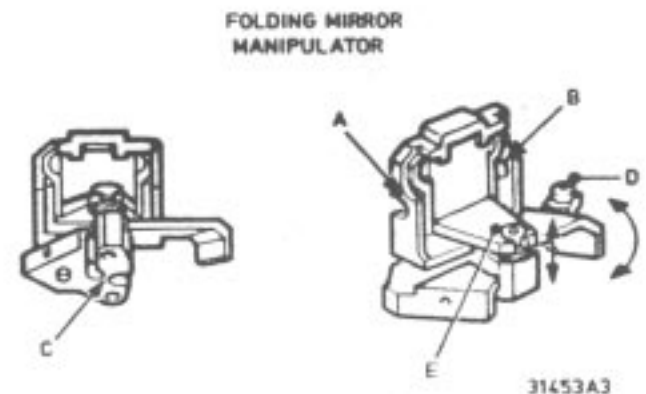
Caution:

Never look directly into the laser beam when the objective has been removed. The parallel beam may cause permanent eye damage.



31451A3

Fig. 3a

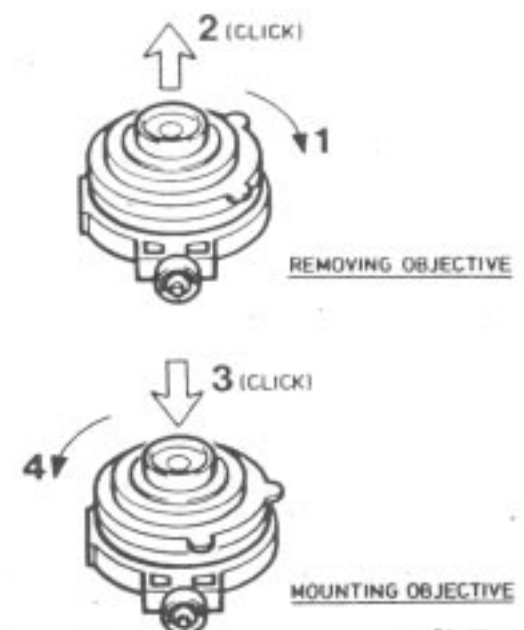


31453A3

Fig. 3b

CHECK MATRIX OPTICAL ADJUSTMENTS

Check and/or adjust \ Replaced part	Grating	Spotlens	$\frac{1}{4}\lambda$ plate	Fold. mir.	Rad. mir. + tang. mir.	Photo diode
Laser	x	x	x	x	x	x
Grating/spotlens	x	x				x
$\frac{1}{4}\lambda$ plate			x			
Folding mir.		x		x	x	
Radial mir.					x	
Tangential mir.					x	
Objective						
Cyl. lens/ph. diode						x



31452A3

Fig. 4

Adjusting the light path (see Fig. 5)

1. Coarse adjustment of the light path

- Place the target block into pos. 1 on the deck.
- Adjust the spot lens with screws A and B (in turn) until the laser beam fills target 1 completely.
- Place the target block into pos. 2.
- Adjust the folding mirror with screws D and E (in turn) until the laser beam fills target 2 completely.
- Remove the objective from the objective slide.
- Place the test jig onto the slide guide-points above the objective slide.
- Place the mirror alignment turret into the hole in the jig and adjust the radial and tangential mirrors in the slide by means of screws F and G until the shadow of the crossing of the lines lies within the circle on the frosted glass screen.
- Proceed with the fine adjustment of the light path as described in 2.

2. Fine adjustment of the light path

- Remove the objective from the slide and place the test jig on the slide guide-points above the objective slide.
- Place the pupil-filling meter into the objective holder through the hole in the test jig. The pins on the meter should engage the grooves in the jig.
- Set both channels of the oscilloscope to 0.5 V/cm (DC) and 0.5-ms time base. Adjust the lines on the oscilloscope to the zero line by means of the shift controls.
- Switch on the switch box with the "POWER" button and press S1 and S3.
- Switch on the laser.
- Move the test jig to the extreme position in the direction of the folding mirror and adjust the spot lens with screws A and B (in turn) until the horizontal lines on the oscilloscope coincide with the zero line in the best possible manner.
- Move the test jig to the extreme position in the direction of the turntable motor and adjust the folding mirror with screws D and E (in turn) until the lines coincide with the zero line of the oscilloscope in an optimum manner.
- Repeat adjustments f and g a few times until the deviation of the two lines relative to the zero line is not more than 50 mV when the test jig is moved to and fro.
- Remove the pupil-filling meter from the test jig and place the mirror-alignment turret on the test jig.
- Adjust the radial and tangential mirror in the slide by means of screws F and G so that the shadow of the crossing of the lines lies within the circle on the frosted glass screen.
- Optimize the adjustment of the spot lens with screws A and B, as described in f.
- Remount the objective.

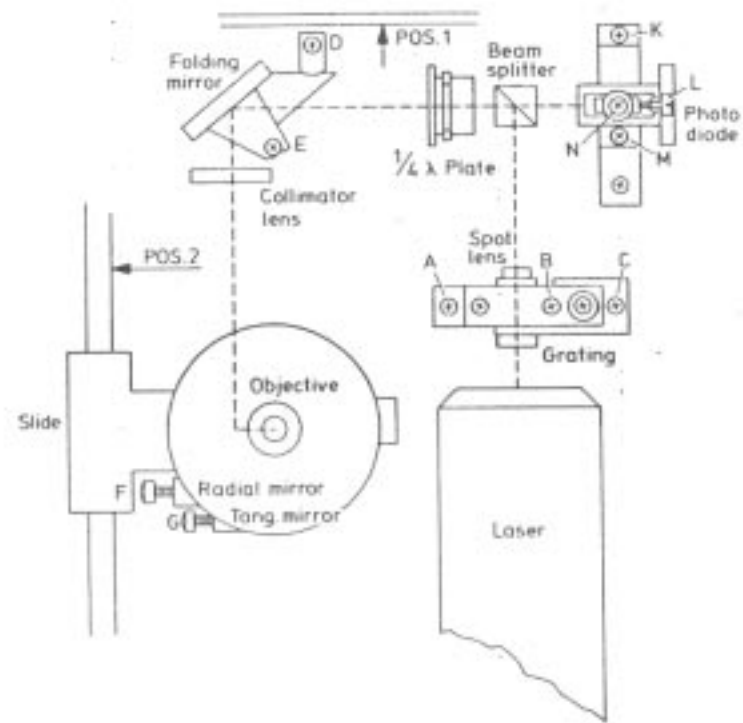


Fig. 5

3145783

3. Adjusting the photo-diode (X-Y direction)

- Insert connectors B01, B02 and B03 of the servo-preamp into the receptacles of the test lead. Insert connector B18 of the test lead into receptacle B18 on the connector panel. Connect the earth clip to the mass of the deck.
- Connect the signal generator, the oscilloscope and the d.c. power supply, as shown in Fig. 6.
- Place the 8" test disc with its unrecorded side on the turntable and bring the objective slide to a position about halfway the disc.
- Switch on the laser.
- Switch off S1 and switch on S4 of the switch box.
- Set the oscilloscope to 0.5 V/div. and a time base of 2 ms.
- Set the frequency of the signal generator to approx. 30 Hz and adjust the amplitude of the generator signal and the power supply so that the objective starts to oscillate freely and an S-curve is displayed on the oscilloscope screen (beam A). The $(R_1 - R_2)$ signal on beam B should be minimum (≈ 0 V). The amplitudes and waveform are shown in Fig. 7.
- Adjust screws K and M in turn so that the amplitude of the S-curve is a maximum. If the minimum value of the voltage (1 V) is not reached the components in the light path must be inspected for dust and other contaminants. If necessary, clean these components.
- Switch on S3 and adjust screws K and M in turn until the amplitude of the difference signals (A-B) and (C-D) is ≤ 60 mV.
- If no S-curve is found S2 must be switched on to display the sum signal $(A+B) + (C+D)$ from the photodiodes. Adjust screws K and M for a maximum sum signal and repeat adjustments g to i inclusive.

4. Adjusting the $\frac{1}{4}\lambda$ plate

- Connect the player as described under 3a and 3b (adjustment of the photo-diode by means of the S-curve).
- Switch off S1 and switch on S2 of the switch box.
- The sum signal $(A+B) + (C+D)$ is displayed on the A-channel of the oscilloscope (see Fig. 8).
- Adjust the $\frac{1}{4}\lambda$ plate, using the accessory key, so as to obtain a minimal ripple on the peak of the sum signal.
- Remove the connectors from the receptacles of the test lead, refit all the connectors in the player, remove the short circuit of TS6148 and mount the slide drive mechanism, so that the player is restored to the normal operating condition.

5. Adjusting the grating

- Put on the 8" test disc and switch on the player. Select picture number 17000 (still picture).
- Unlock the slide drive mechanism by pressing the bracket of the slide motor downwards.
- Unplug connectors B19 and B20 (rad. and tang. mirror) on the connector panel.
- Unplug connector B02 on the servo-preamplifier panel and insert this connector into receptacle B02 of the test lead. Connect the test lead to the switch box.
- Switch off S1 on the switch box and switch on S4, so that the radial difference signal $(R_1 - R_2)$ appears on the B-channel of the oscilloscope.
- Turn screw C clockwise until the grating lens has approximately reached the extreme position and the oscilloscope displays the radial difference signal for the 2.5 and 1.66 μm track pitch (see Fig. 9). If necessary, search for this signal by manually varying the position of the objective slide by rotating the gear wheel.

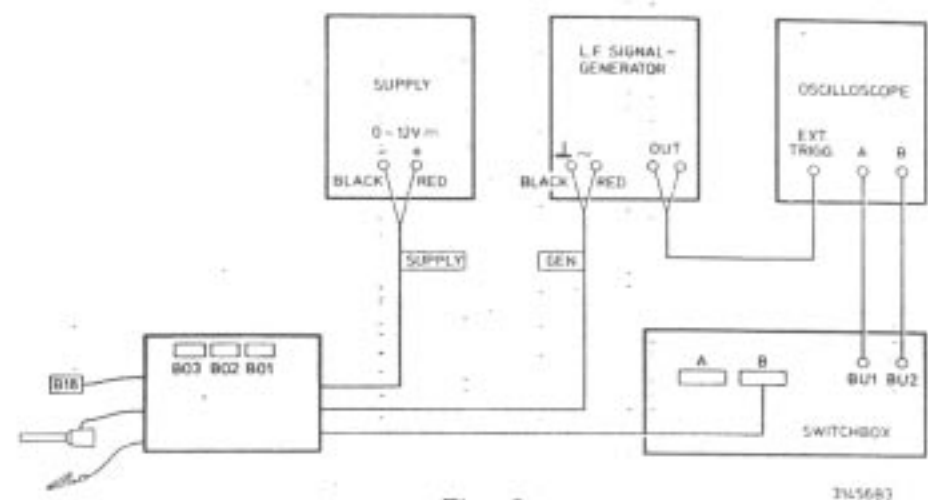


Fig. 6



Fig. 7

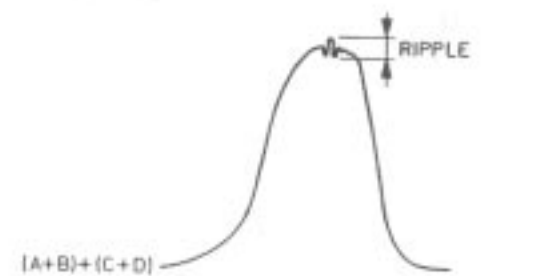


Fig. 8

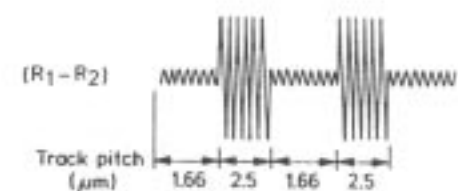


Fig. 9

- g. Turn screw C about 3 turns anti-clockwise until the radial difference signal is minimal for both track pitches. The position of the three spots is now exactly in line with the tracks.
- h. Move the objective slide until picture number 16000 is displayed (track pitch $1.4 \mu\text{m}$).
- i. Switch on S2 on the switch box. The radial sum signal (R1 + R2) is now displayed on the oscilloscope.
- j. Turn screw C anti-clockwise (about 1 turn) until the signal on the oscilloscope is minimal.
- k. Refit connectors B02, B19 and B20 and lock the slide drive mechanism.

6. Adjusting the photo-diode (Z-direction)

- a. Put the 8" test disc on the turntable and switch on the player. Set the player to the "still picture" mode.
- b. Apply a 1 KHz sinewave signal from the signal generator to point 6-IC6209-2A (focus drive) via $27 \text{ k}\Omega$. The accessory test lead may be used for this purpose. Connect the correspondingly marked terminals to earth and to point 6-IC6209-2A focus-drive. Connect the cable marked "GEN" to the output of the signal generator.
- c. Measure the HF signal on C-TS6104 by means of the oscilloscope (approx. 600 mV.).
- d. Connect the 1 kHz signal to the other input of the oscilloscope and trigger on this signal.
- e. Adjust the amplitude of the signal from the signal generator so that a 1 kHz whistle is just audible from the objective and the oscilloscope displays a HF signal modulated with a 1 KHz sinewave (see Fig. 10).
- f. Loosen screw N slightly and adjust the position of the photodiodes with screw L until the amplitudes A of the HF signal have the same values as the amplitudes B.
- g. Fasten screw N again.

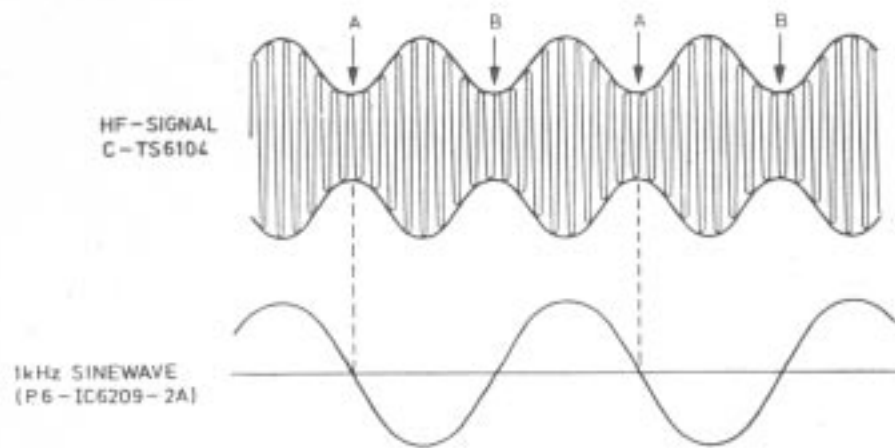


Fig. 10

31455A3

Electrical adjustments (see Fig. 11)

Equipment required for the electrical adjustments:

- Double-beam oscilloscope with delayed time base;
- HF generator PM 5326;
- LF generator;
- Voltmeter (preferably digital);
- Variable d.c. power supply;
- 8" test disc (approx. 20 cm dia.) 4822 397 30068.

A. Power supply panel (circuit diagram A)

1. Switched-mode power supply

- Measure the voltage on point C002 with the voltmeter.
- Adjust this voltage to +12 V ($\pm 120 \text{ mV}$) with R3011.

2. Laser supply

- Measure the voltage on junction point R3066-R3067.
- Adjust this voltage to +5 V (= 5 mA laser current) with R3066.

3. Tacho circuits

- Test disc on player; normal-play mode.
- Measure the voltage on the base of TS 6154.
- Adjust this voltage to +1.69 V with R3112.

B. Video Servo 1 panel (circuit diagram B)

1. Video demodulator 1

- Test disc on player, picture number 8600 (B/W bars), still picture.
- Measure the video signal on point C004 with the oscilloscope.
- Adjust for 1.5 Vp-p video signal with R3075.

2. Video demodulator 2

- Test disc in player, picture no. 8600 (B/W bars), still picture.
- Short-circuit the base of TS 6113 to earth.
- Measure the video signal on point C004 with the oscilloscope.
- Adjust R3051 for a 1.5 Vp-p video signal.
- Remove the short-circuit.

3. HF processor

- Mains switch on, cover open.
- Connect the HF generator to connectors B051 and B053 (earth) via a filter (Fig. 12).
- Set the generator to a frequency of 8 MHz and 20 mVp-p output voltage, unmodulated.
- Connect point C008 to earth.
- Measure the signal on point 5 of IC 6202 by means of the oscilloscope.
- Adjust L5001 for maximum signal amplitude.

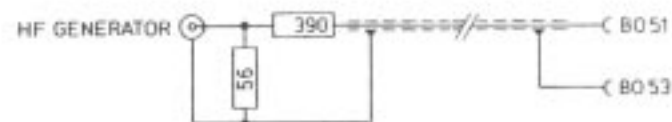


Fig. 12

4. Audio drop-out detector

- Mains switch on, cover open.
- Connect the HF generator to the connectors B051 and B053 (earth) via a filter as shown in Fig. 12.
- Set the generator to a frequency of 400 kHz, unmodulated, and set the RF attenuation to 40 dB.
- Apply a voltage of 8 V d.c. (negative to earth) to point C008.
- Measure the signal on the base of TS6118 by means of the oscilloscope.
- Adjust L5018 for maximum signal amplitude.

5. Audio band-pass filters

- Mains switch on, cover open.
- Connect the HF generator to connectors B051 and B053 (earth) via the filter shown in Fig. 12.
- Set the generator to a frequency of 1066 kHz, unmodulated and an output voltage of 30 mVp-p.
- Measure the signal on point 3 of the audio demodulator panel by means of the oscilloscope. Note down the amplitude of this signal as V_{max} .
- Adjust L5021 so that amplitude at 955 kHz and at 1177 kHz is $0.7 \times V_{max}$ (see Fig. 13).
- Set the frequency of the HF signal to 683 kHz.
- Measure the signal on point 7 of the audio demodulator panel (V_{max}).
- Adjust L5027 so that the amplitude at 550 kHz and at 815 kHz is $0.7 \times V_{max}$.

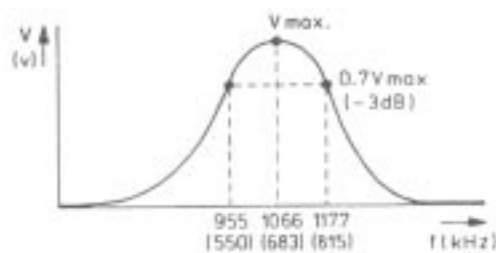


Fig. 13

6. 5% detector

- Test disc in the player, normal play mode.
- Measure the signal on the collector of TS6168 by means of the oscilloscope.
- Adjust L5034 for maximum signal amplitude.

7. Focus drive

- Test disc in player, picture number 20000, still picture.
- Via a 27-kohm resistor apply a sinewave-signal having a frequency of 2.1 kHz and an amplitude of 0.6 Vp-p to point 6 of IC6209-2A.
- Measure the signal on junction R3218-R3219 with channel A of the oscilloscope.
- Set the oscilloscope to X-deflection and apply the 2.1-kHz generator signal to X-input.
- Adjust R3223 so that the left-hand and right-hand side of the Lissajous figure are at the same level (see Fig. 14).

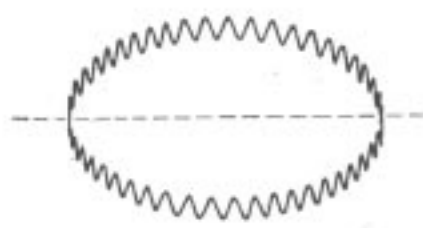


Fig. 14

8. Tangential serve

- Test disc in player, picture number 16500 (blue), still picture.
- Turn potentiometer R3383 fully clockwise. Hazy horizontal bars will now appear in the picture.
- Turn potentiometer R3383 anti-clockwise until these bars just disappear.

C. Video Servo 2 panel (circuit diagram C)

1. MTF circuit

- Connect the HF generator to connectors A011 and A012 (earth).
- Set the frequency to 4.43 MHz and the amplitude to 0.1 Vp-p.
- Measure the signal on the emitter of TS6132 by means of the oscilloscope.
- Adjust L5013 for maximum signal amplitude.
- Remove the generator signal.
- Test disc in the player, picture number 180, still picture.
- Connect the oscilloscope to point 19 of the audio-video connector (see circuit diagram B) and search for the multi-burst signals in the VITS (line 20) by means of the delayed time base.
- Adjust R3167 so that the amplitude of MB IV = MB I (see Fig. 15).

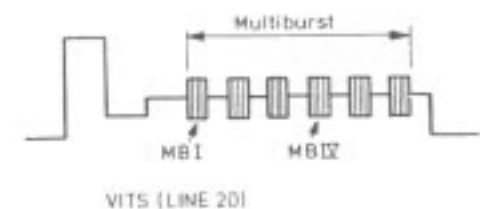


Fig. 15

2. Special burst separator

- Test disc in the player, normal play.
- Measure the signal on the collector of TS 6147 (3.75 MHz) by means of the oscilloscope.
- Adjust L 5015 for maximum signal amplitude.

3. Subcarrier regenerator

- Test disc in the player, still picture.
- Measure the signal on the emitter of the TS6119 by means of the oscilloscope.
- Adjust L5008 for maximum signal amplitude (8.86 MHz signal).

4. Adder

- Test disc in the player, picture number 8600 (B/W bars).
- Measure the signal on connector A013 by means of the oscilloscope.
- Make the amplitude of the video signal during the still picture mode equal to the amplitude during normal play by means of R3062.
- Locate picture number 9000 (colour bars).
- Make the chroma signal on connector A013 in the still picture mode and the chroma signal during normal play equal to each other by means of R3056.

5. Mixer

- Test disc in the player, picture number 9000 (colour bars), still picture mode.
- Measure the signal on connector A013 with the oscilloscope.
- Adjust R3050 for minimum amplitude variation in the chroma signal.

6. 90° adjustment

- Test disc in the player, picture number 150 (red), still picture.
- Adjust R3086 for minimum flicker in the picture.

E. Deck electronics (circuit diagram E)

1. Radial gain (Gain)

- Test disc in the player, still picture.
- Measure the signal on connector B075 by means of the oscilloscope.
- Display the TPI pulse by means of the delayed time base.
- Adjust the pulse width to approx. 95 μ secs. with R3017 (Gain).

2. Radial offset (balance)

- Test disc in the player, still picture.
- Unlock the slide drive mechanism by pressing the bracket of the slide motor downwards.
- Unplug connector B19 (rad. mirror) on the connector panel.
- Connect connector B033 (substrate) to earth via a 180-kohm resistor.
- Measure the "rad. error" signal on connector B072 by means of the oscilloscope (d.c.).
- Adjust R3016 (Balance) so that the signal is symmetrical relative to the zero level (see Fig. 16).
- Remove the 180 kohm resistor and refit connector B19.



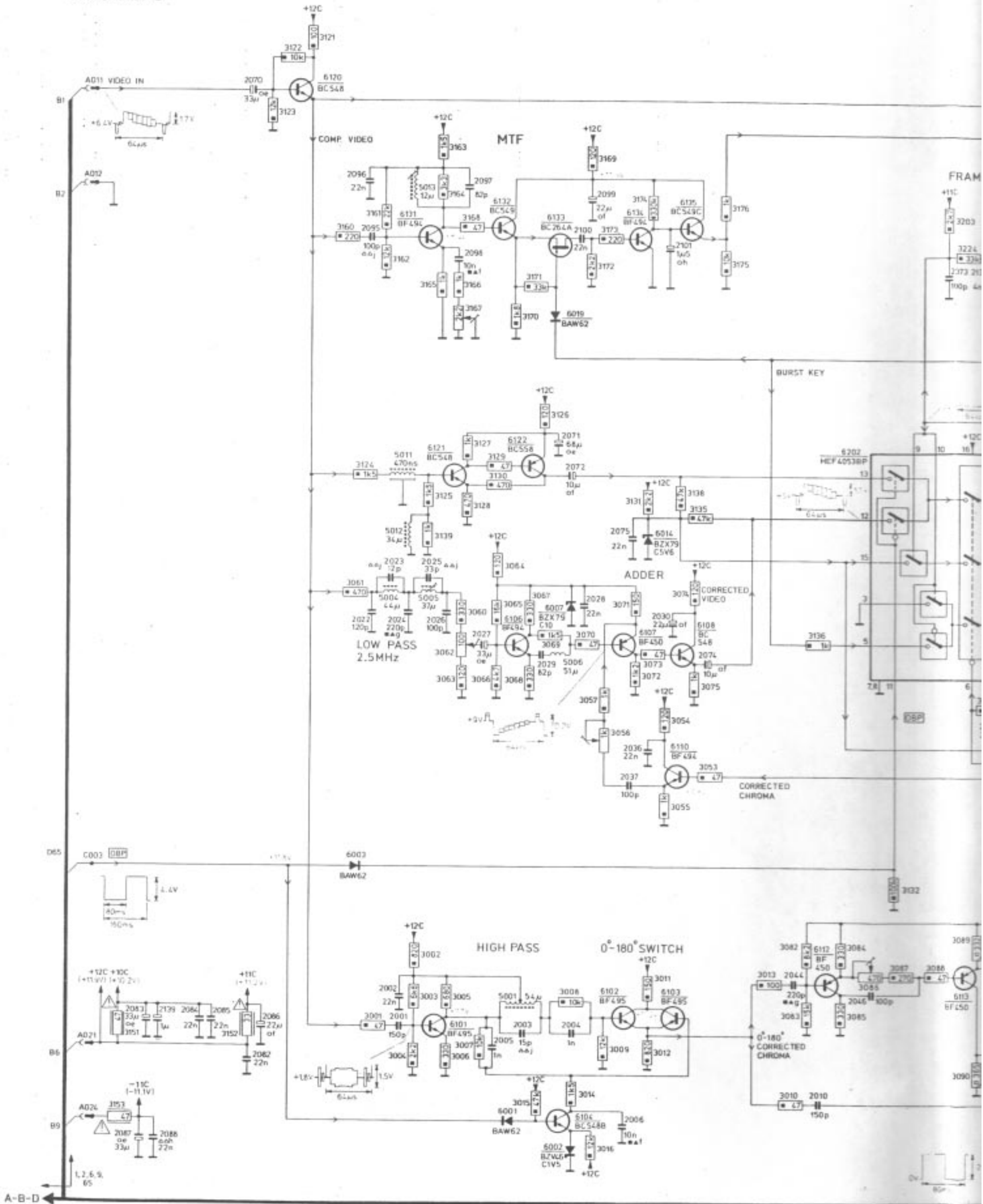
Fig. 16

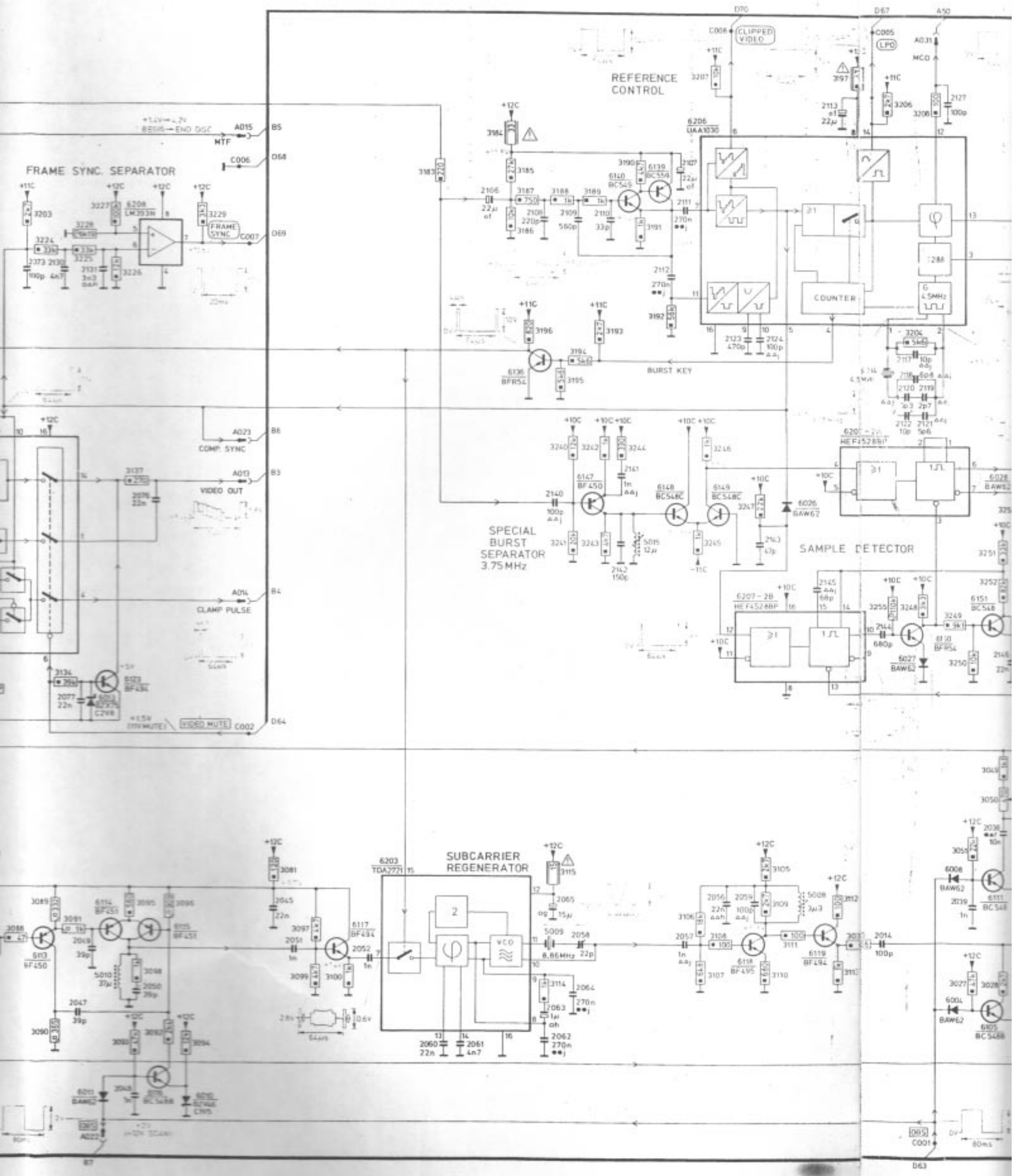
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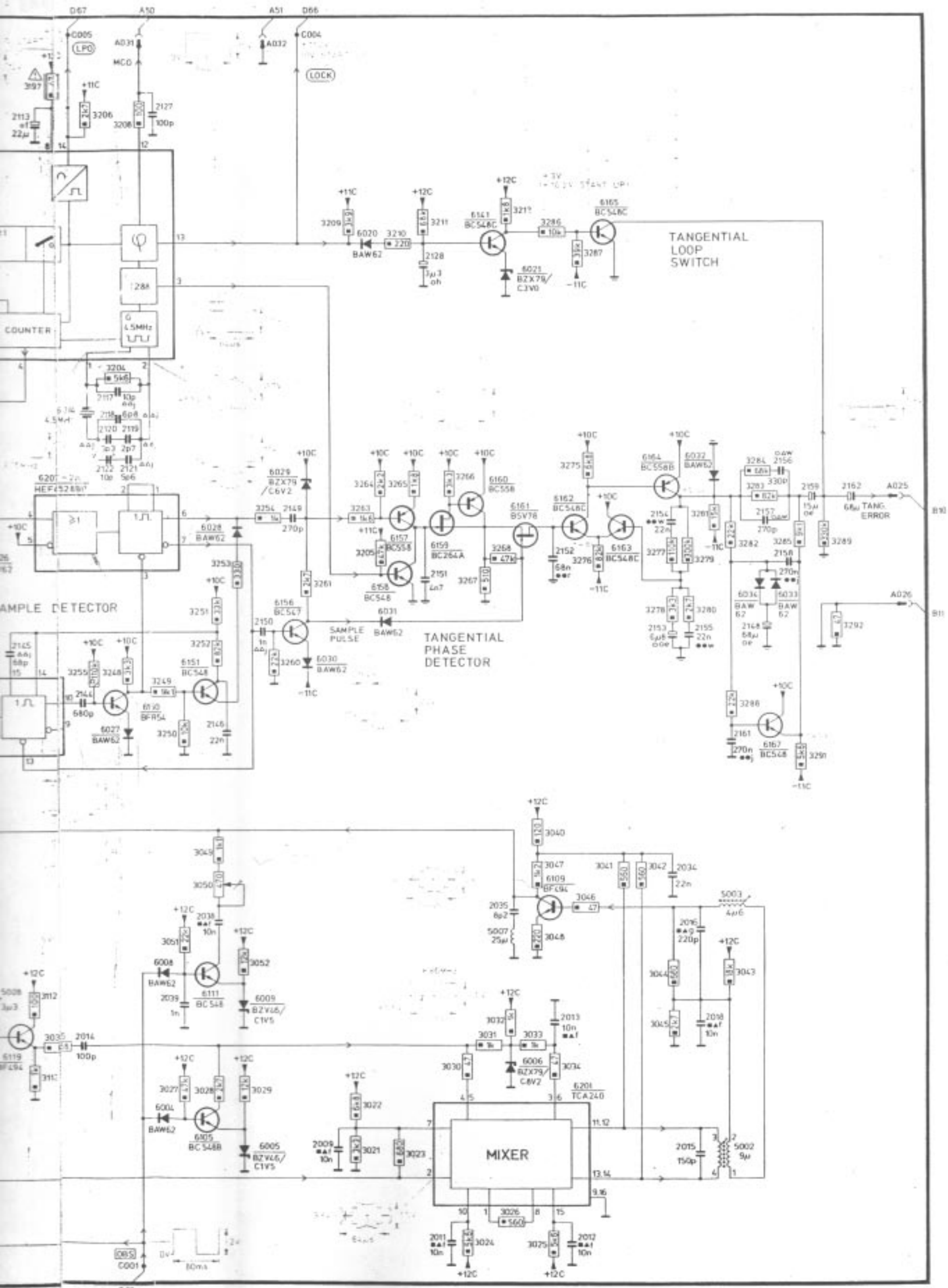
3. Adjusting the slide end-stop switch (item 122 in exploded view drawing of deck)

- Test disc in the player, picture number > 1000, still picture.
- Unplug connector B19 (rad. mirror) on the connector panel.
- Press button "scan reverse". The objective slide now travels to the centre of the disc until the beginning of the disc is reached.
- Release the "scan reverse" button. The player now starts with arbitrarily increasing picture numbers.
- Adjust the set-screw for the slide end-stop switch so that the starting point lies between picture number 60 and 90.
- If necessary, repeat the above operations.
- Refit connector B19.

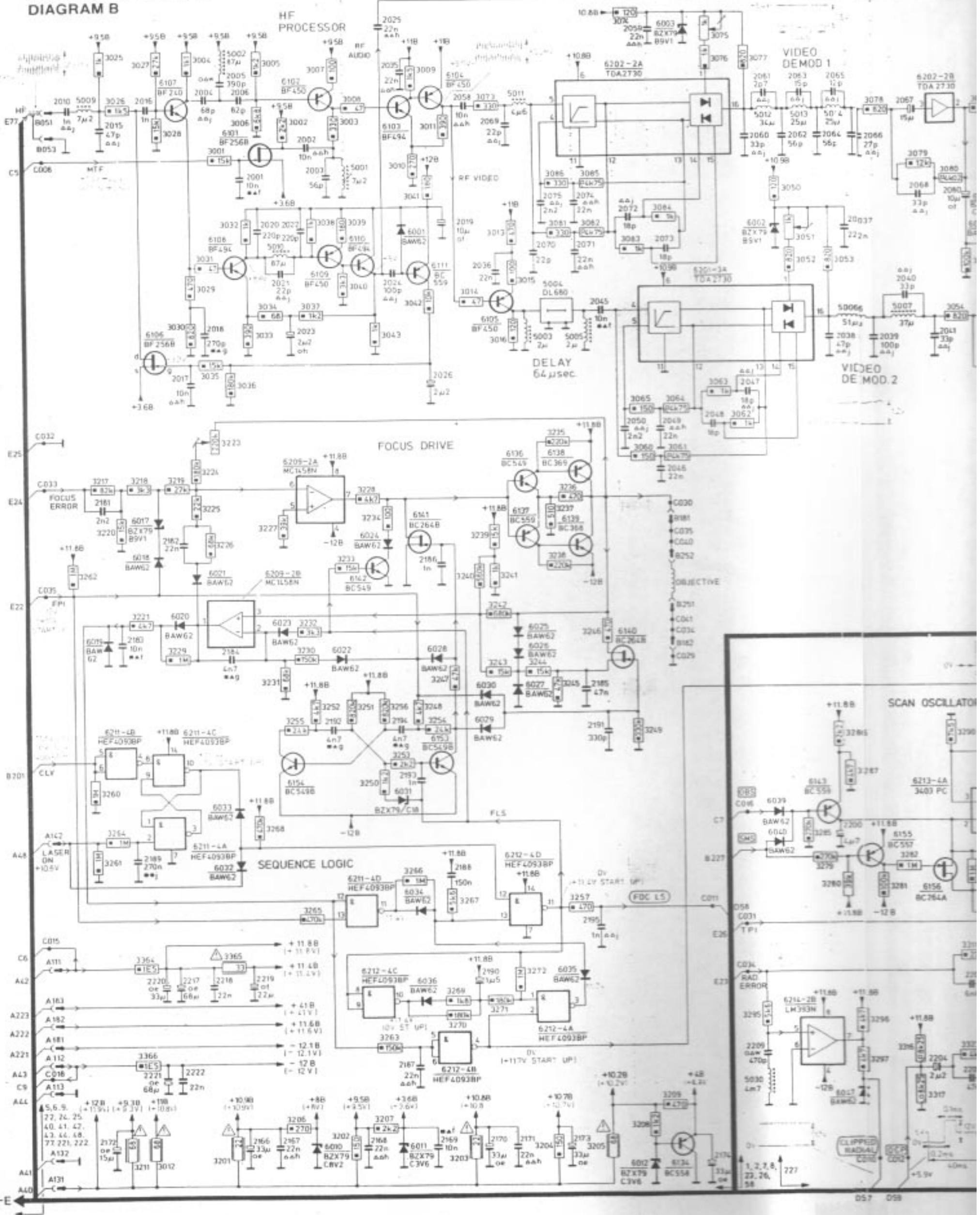
VIDEO SERVO 2 PANEL
DIAGRAM C

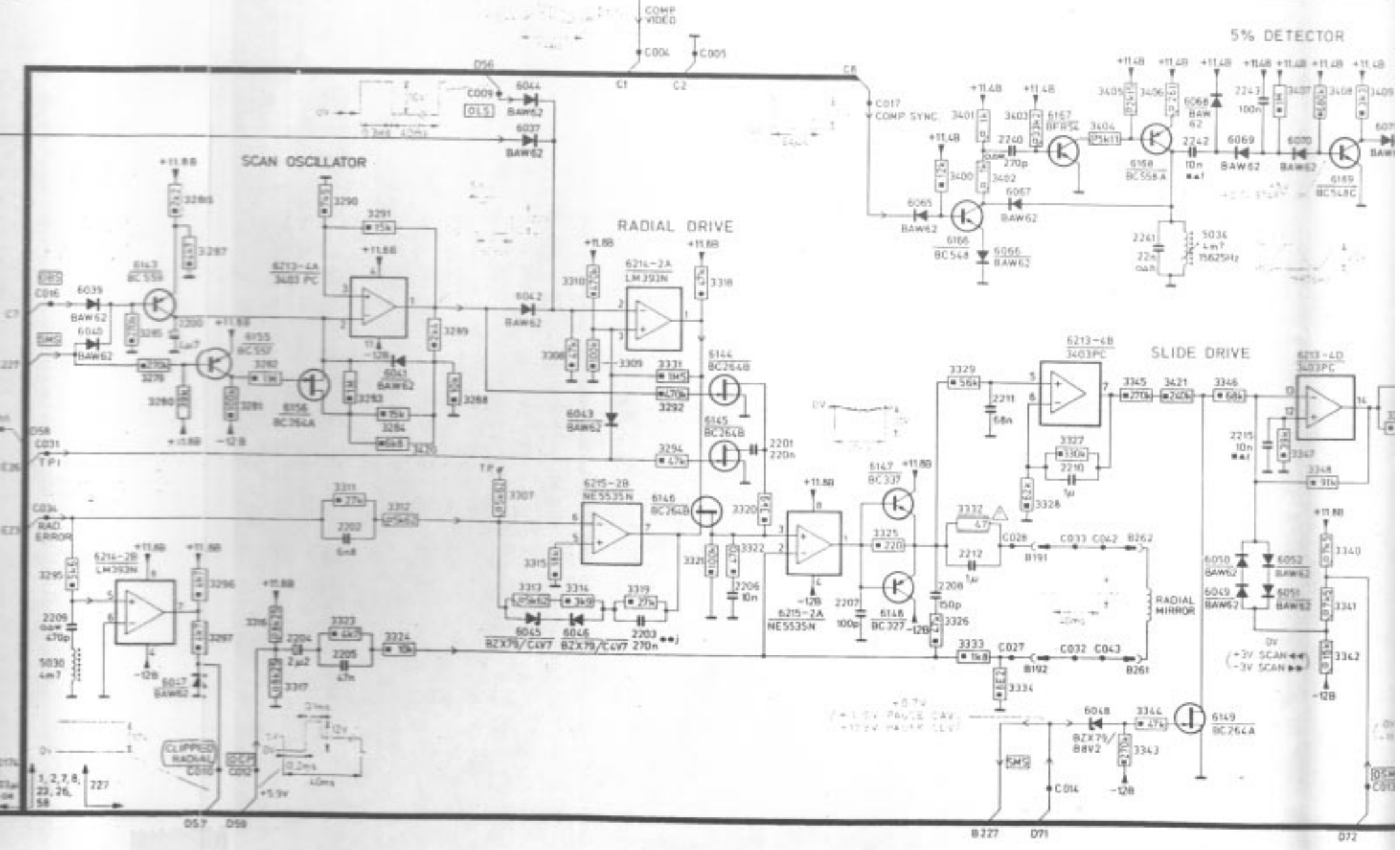
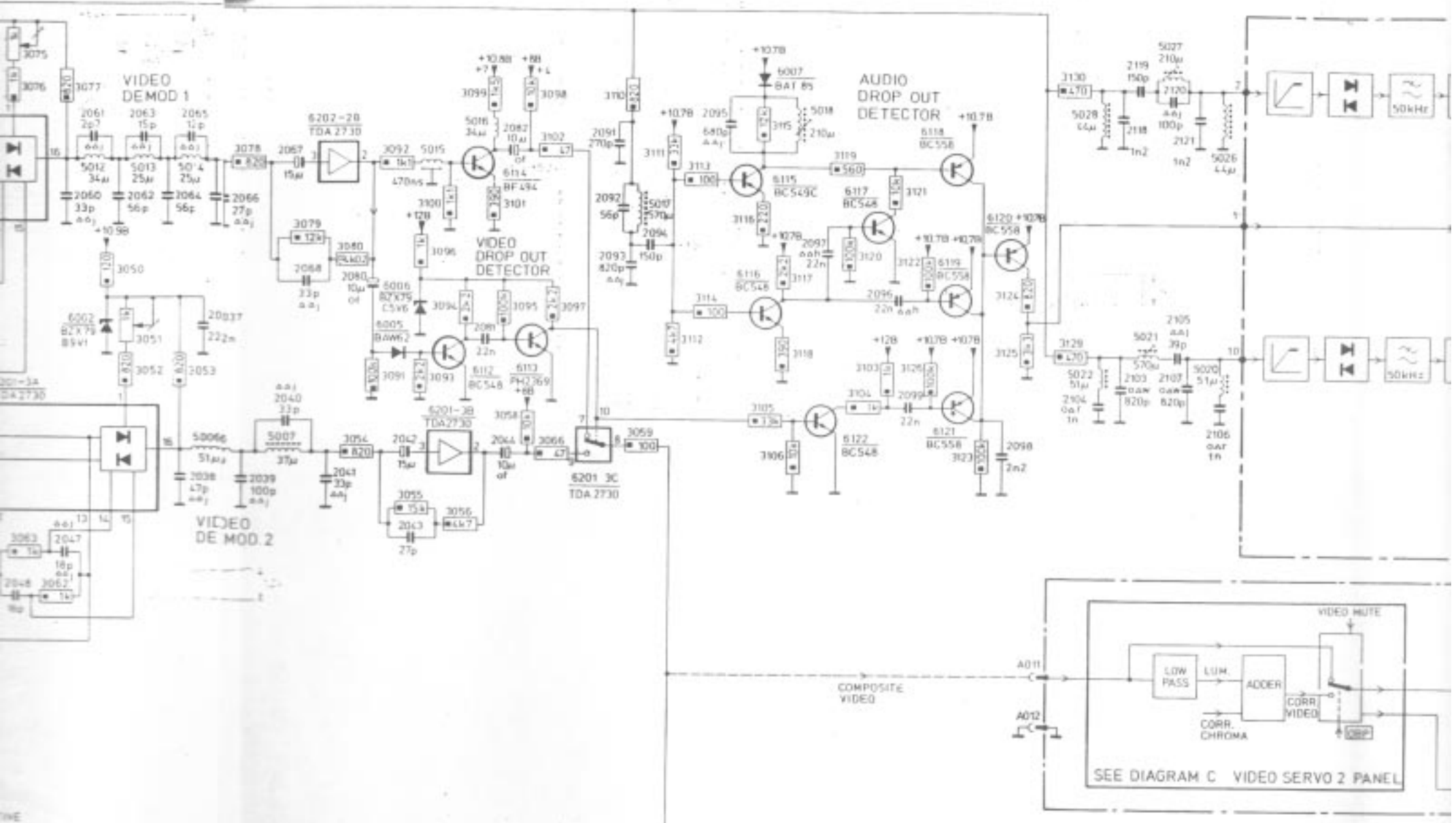






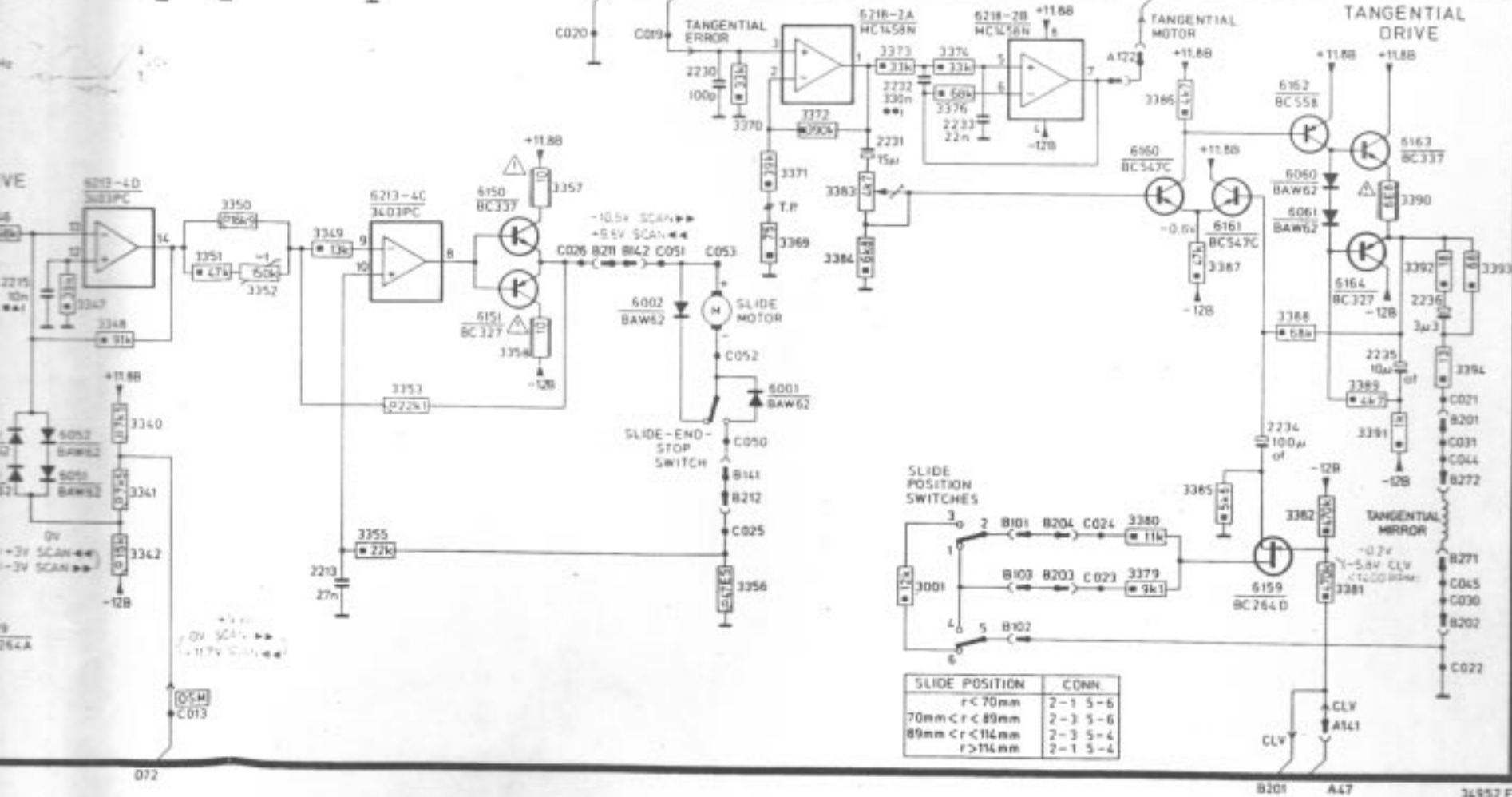
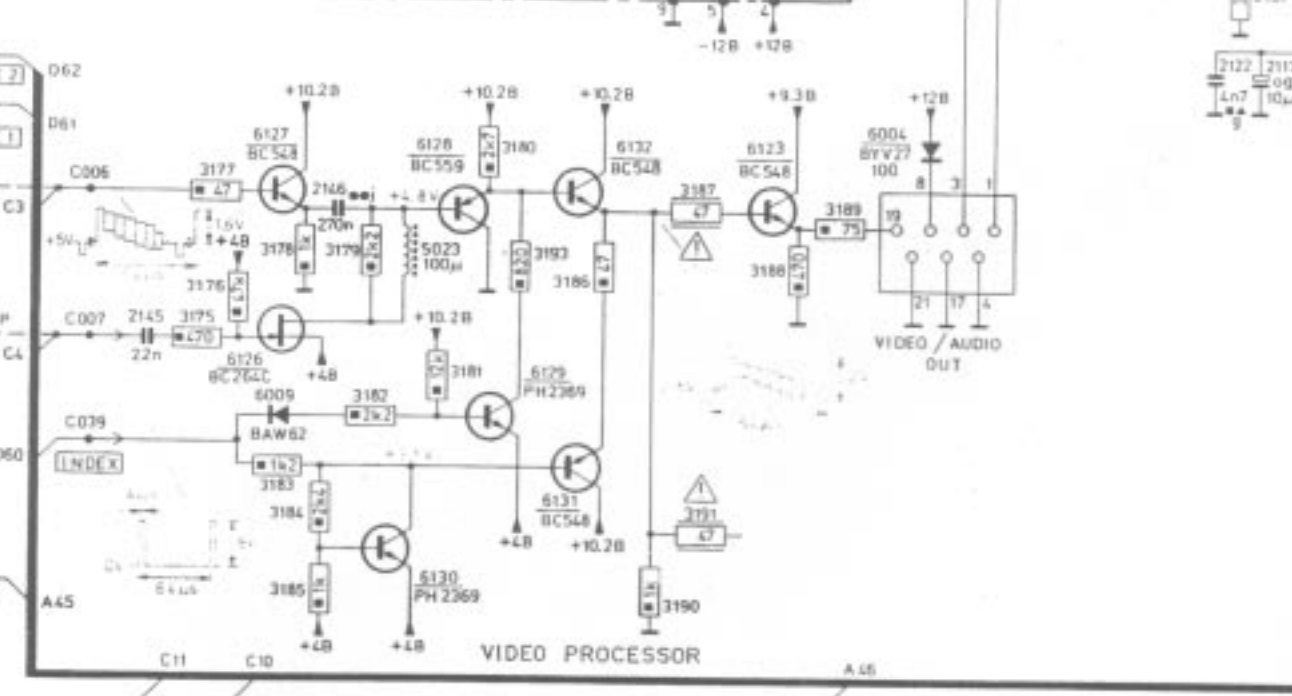
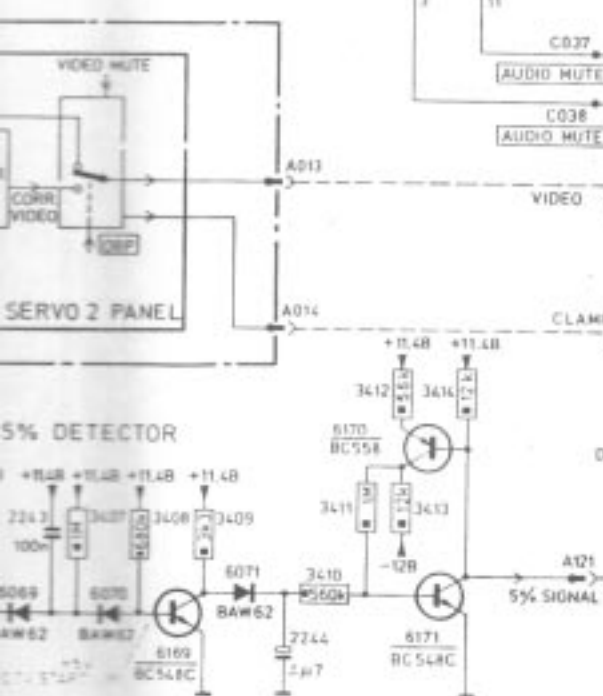
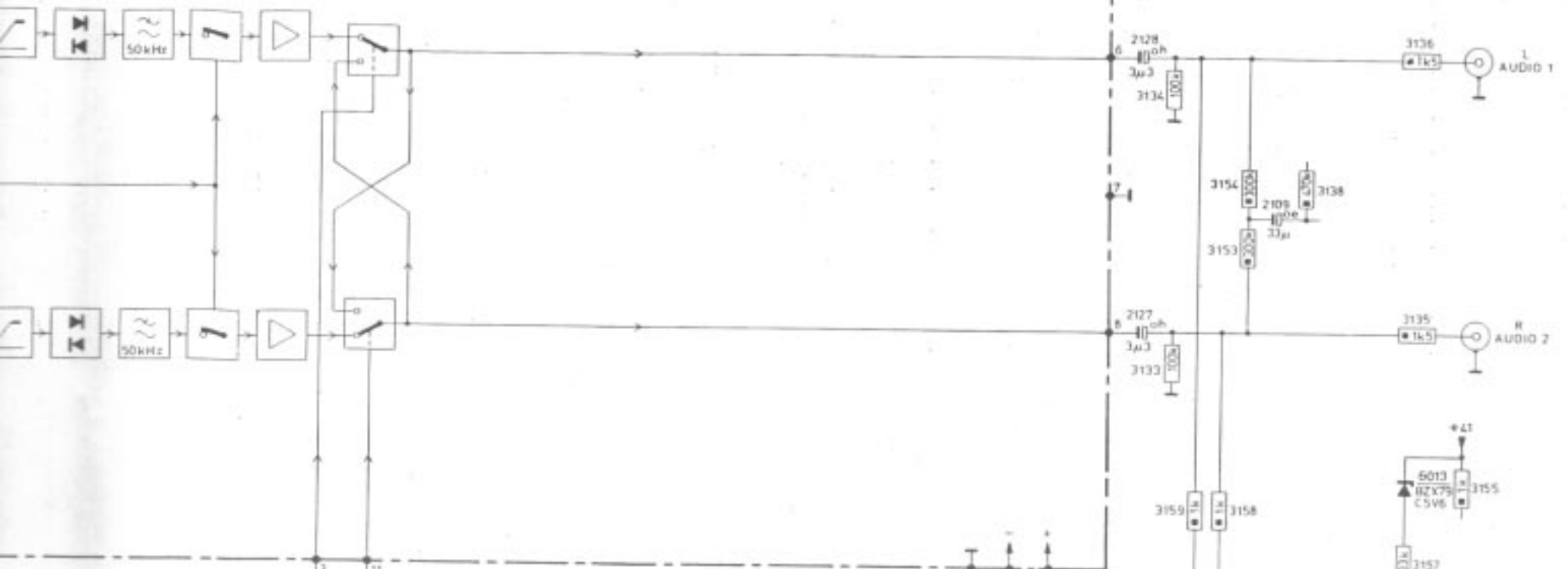
VIDEO SERVO 1 PANEL DIAGRAM B





AUDIO DEMODULATOR PANEL
SEE DIAGRAM B'

1003

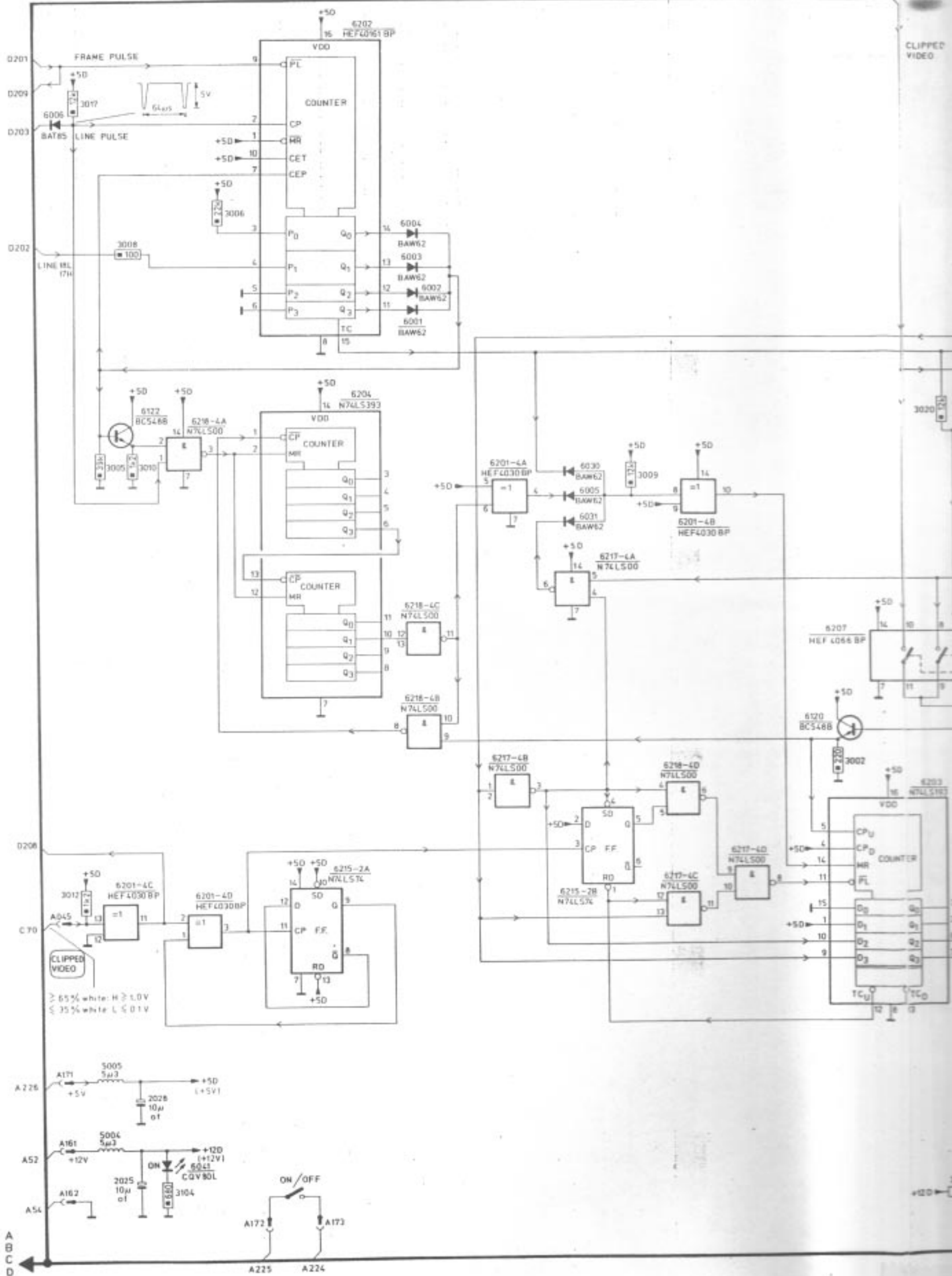


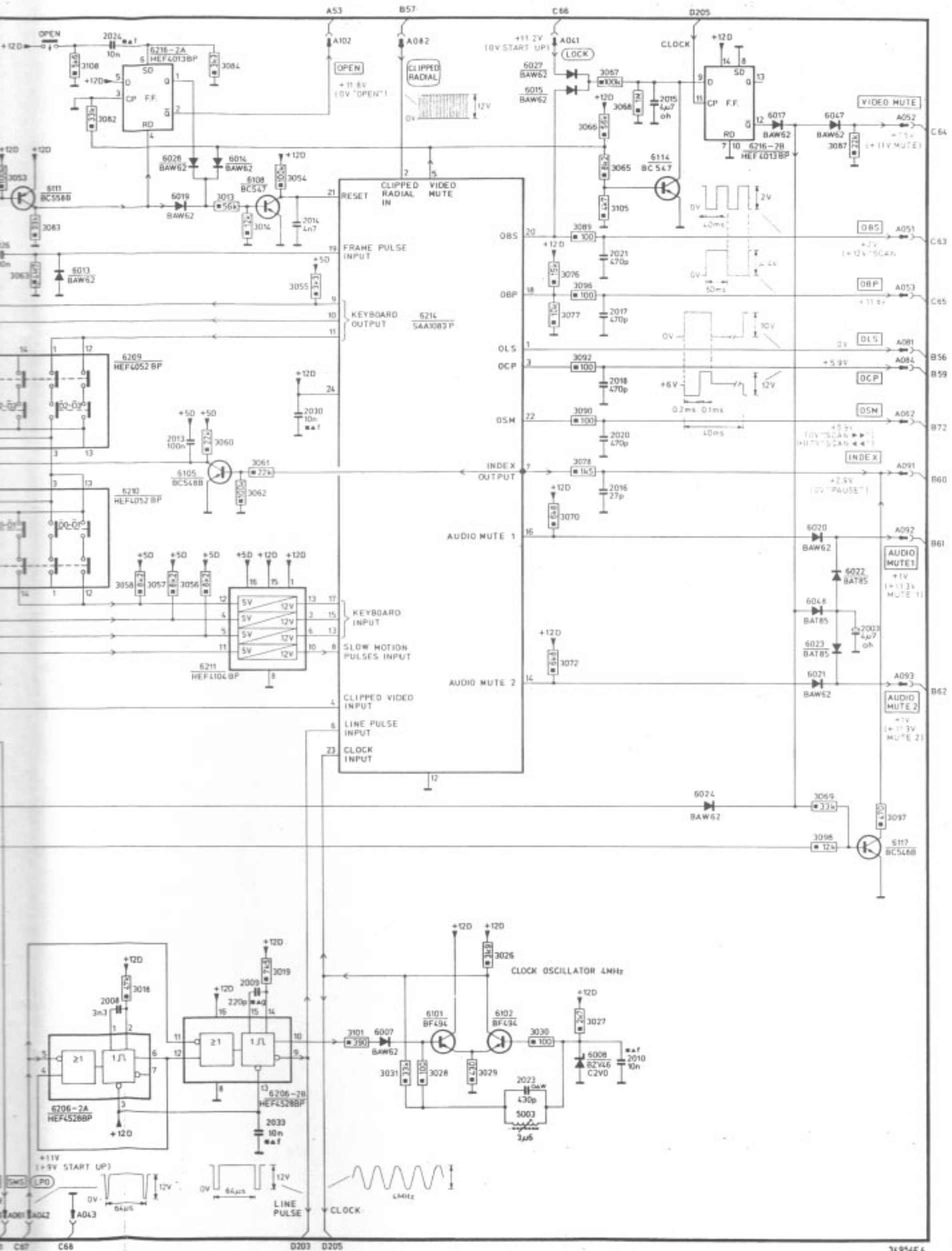
072

B201 A47

34952 F4

CONTROL PANEL DIAGRAM D





LIST OF MECHANICAL PARTS

1	Screw M3x6	4822 502 11064
2	Screw M3x10	4822 502 11573
3	Screw 4Nx $\frac{3}{8}$ "	4822 502 30188
4	Screw 4Nx $\frac{3}{8}$ "	4822 502 30209
5	Screw 4Nx $\frac{3}{8}$ "	4822 502 30219
6	Screw 4Nx $\frac{1}{2}$ "	4822 502 30091
7	Screw 4Nx $\frac{1}{4}$ "	4822 502 30248
8	Screw 6Nx $\frac{5}{8}$ "	4822 502 30189
10	Stopper	4822 462 40155
11	Stopper	4822 466 60922
101	Mains transformer	*
102	Connector laser cathode	4822 268 10134
103	Insulating plate	4822 255 40133
104	Spring clip	4822 255 40128
106	Lid cover	4822 444 60398
107	Grill	4822 458 30324
108	Profile	4822 466 60909
109	Sub cabinet	4822 444 30365
111	Front	4822 444 40112
112	Fuse holder	4822 492 60063
113	Sub supply panel	4822 214 50364
114	Multiplier	
117	Pin	
118	Cabinet	4822 444 50308
121	Foot	4822 462 40414
122	Window for R.C.	4822 459 20247
123	Guide roller	4822 528 90427
124	Button "on"	4822 410 22949
125	Button "open"	4822 410 22951
126	LED-window	4822 450 60286
127	Strip	4822 460 20463
128	Fuse	*
133	Frame	4822 464 50255
136	LED-frame	4822 464 50254
137	Key-frame	4822 444 60399
138	Window	4822 450 60378
139	Window	4822 450 60377
141	Audio demodulators	4822 214 50381
142	Audio Video connector	*
143	Audio connector	*
147	Ti-rap	4822 401 10632

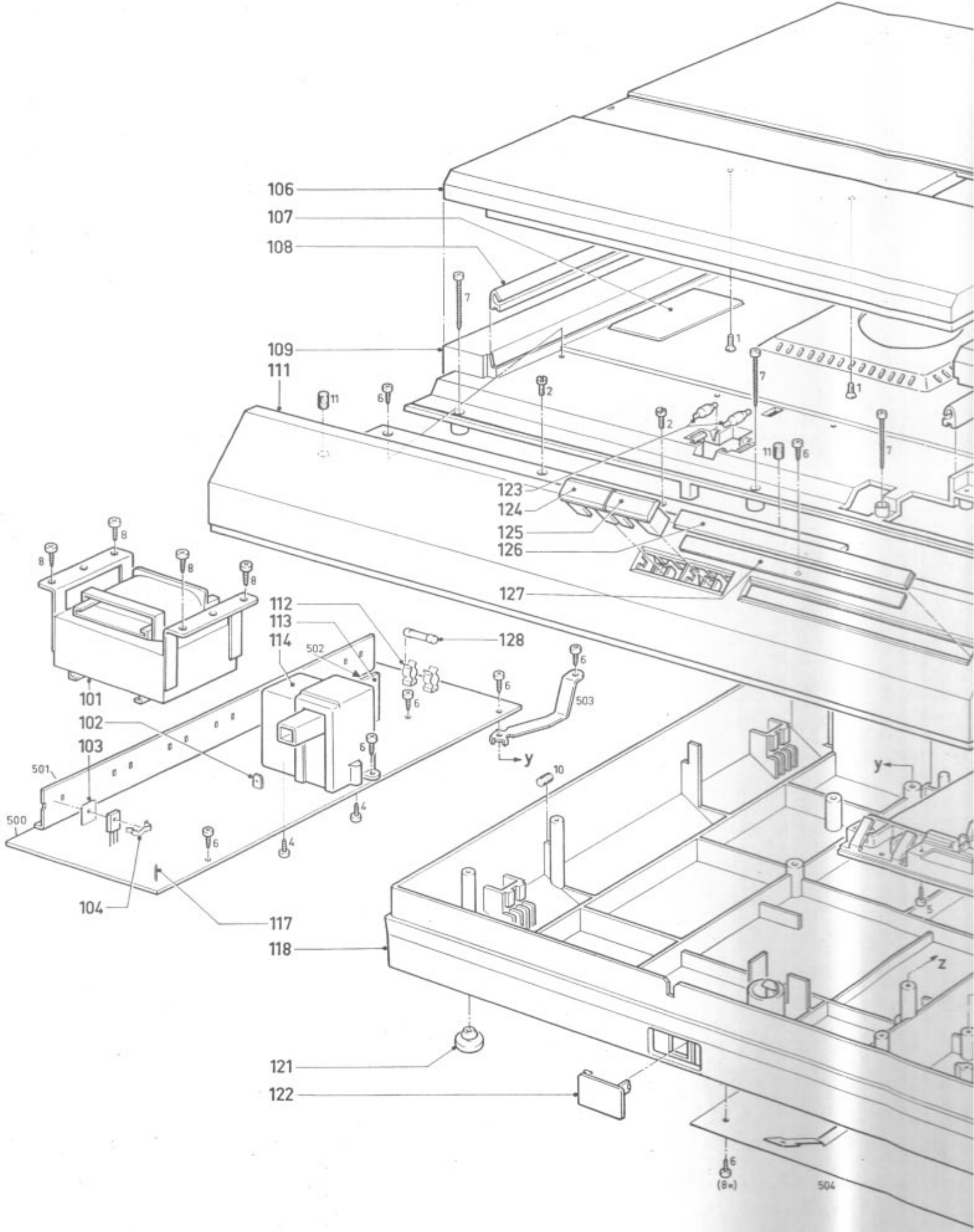
SERVICE AIDS

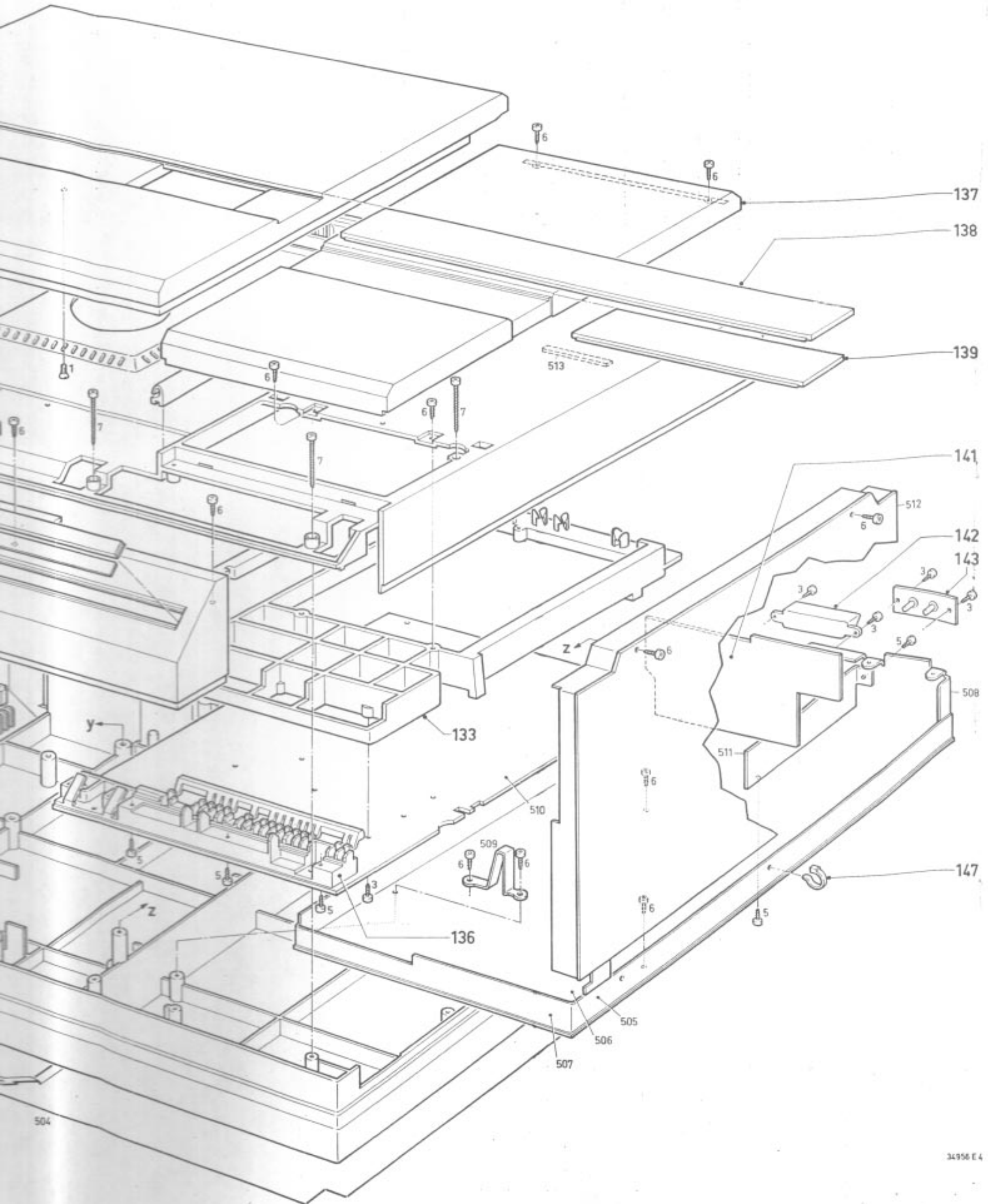
Test disc 12"	4822 397 30055
Test disc 8"	4822 397 30068
Set with torx-screw driving tools	4822 395 50145

* See list of electrical parts

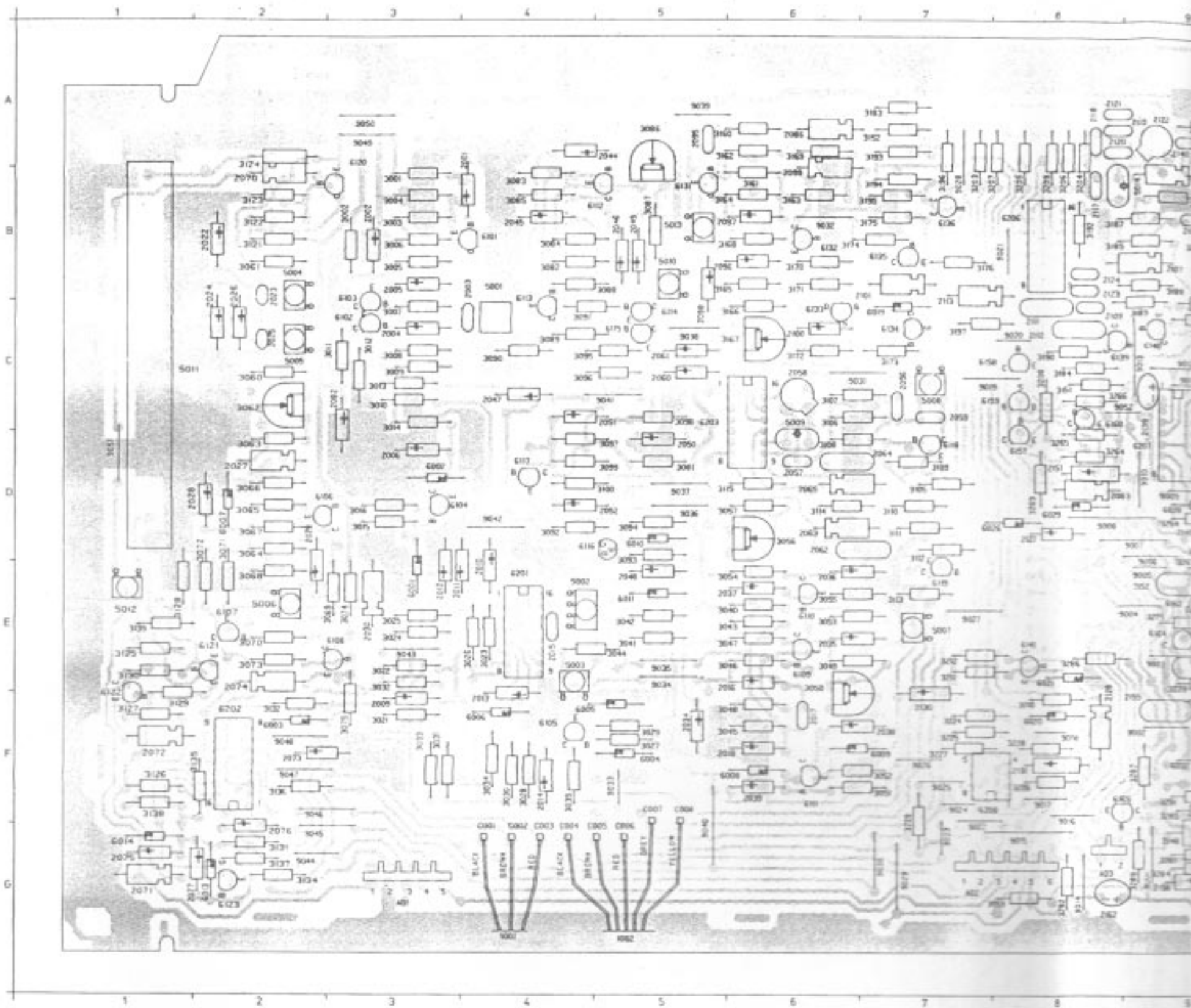
LIST OF ELECTRICAL PARTS

	Mains transformer	4822 146 20692
	Fuse 2.5A delayed Temp. fuse in mains transformer	4822 253 30026 4822 252 20017
	Audio Video connector	4822 267 10094
	Audio connector	4822 267 30469
	Remote control connector	4822 266 30072
	2f-black	5322 267 34085
	2f-grey	4822 267 30339
	3f-black	4822 268 10133
	3f-grey	4822 265 30144
	4f-black	4822 267 40258
	4f-grey	4822 267 40443
	5f-black	4822 267 40342
	6f-black	4822 267 40443
	3403PC	5322 209 85983
	MAB8748HP	4822 209 81943
	MAB8050HP	4822 209 10852
	HEF4013BP	5322 209 10002
	HEF40161BP	5322 209 10344
	HEF4030BP	5322 209 14124
	HEF4031BP	5322 209 81382
	HEF4052BP	5322 209 14233
	HEF4053BP	5322 209 14121
	HEF4066BP	5322 209 14104
	HEF4093BP	5322 209 14186
	HEF4104BP	4822 209 10273
	HEF4528BP	4822 209 10277
	LM393N	4822 209 80797
	MC1458N	5322 209 85512
	N74LS00	5322 209 84823
	N74LS74	4822 209 80782
	N74LS193	5322 209 85405
	N74LS393	4822 209 80447
	NE5535N	4822 209 81132
	SAA1083P	4822 209 80795
	TCA240	4822 209 80629
	TDA2721	4822 209 80568
	TDA2730	4822 209 80565
	UAA1030	4822 209 80794

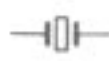
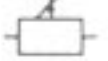

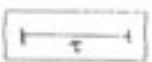





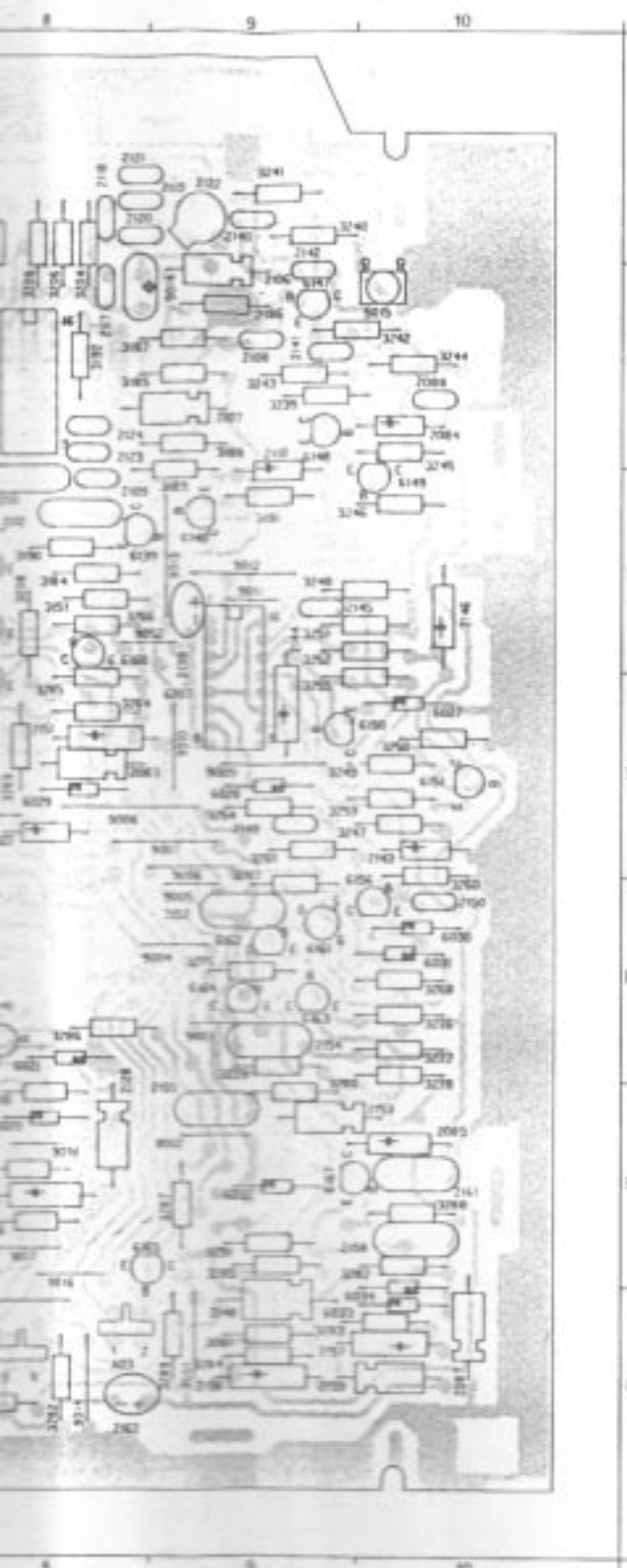


VIDEO-SERVO 2 PANEL



VIDEO SERVO 2 PANEL

					
5009	8.86 MHz	4822 242 70304	3050,3086	470 Ω	4822 100 10038
5014	4.5 MHz	4822 242 70361	3056	1 kΩ	4822 100 10037
			3062	100 Ω	4822 100 10075
			3167	2.2 kΩ	4822 100 10029
	470 nsec	4822 157 50887			
				NFR25	
5001	54 μH	4822 156 30843	3115	15 Ω	4822 111 30513
5002	9 μH	4822 156 40808	3151,3153,	} 47 Ω	4822 111 30526
5003	4.6 μH	4822 156 21051	3197		
5004	44 μH	4822 156 21053	3152,3184	33 Ω	4822 111 30522
5005,5010	37 μH	4822 156 21052			
5006	51 μH	4822 157 51412			
5007	25 μH	4822 157 51167			
5008	3.3 μH	4822 156 10518			
5012	34 μH	4822 157 51166			
5013,5015	12 μH	4822 156 20728			
					
			2001	150 pF 5%	4822 122 10224
			2002	22 nF 30%	4822 122 10188
			2004	1 nF 10%	4822 122 10162
			2005	1 nF 10%	4822 122 10162
			2010	150 pF 5%	4822 122 10224
			2014	100 pF 5%	4822 122 10223
			2015	150 pF 2%	4822 122 31413



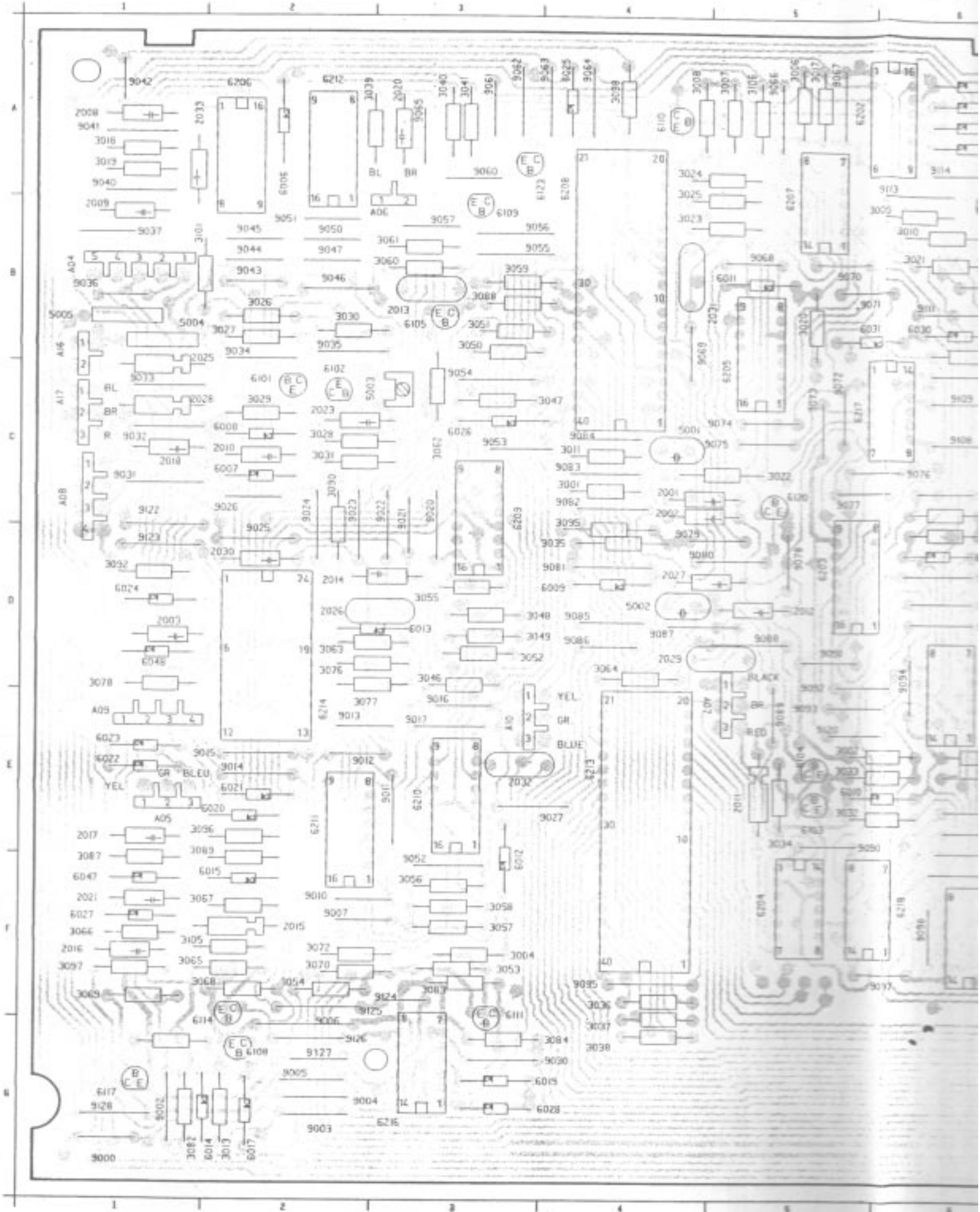
32488 D 4

1001	D 4	2121	A 8	3065	D 2	3189	C 9	5015	B 10
1002	D 5	2122	A 9	3066	D 2	3190	C 8	5001	E 3
2001	A 4	2123	B 8	3067	D 2	3191	C 9	5002	D 3
2002	B 3	2124	B 8	3068	E 2	3192	B 8	5003	F 2
2003	B 4	2127	D 8	3069	E 3	3193	A 7	5004	F 5
2004	C 3	2128	E 8	3070	E 2	3194	B 7	5005	F 4
2005	B 3	2129	E 8	3071	D 2	3195	B 7	5006	F 4
2006	D 3	2130	F 7	3072	D 2	3196	B 7	5007	D 2
2009	F 3	2131	F 8	3073	E 2	3197	C 7	5008	F 6
2010	E 4	2139	C 9	3074	E 3	3203	B 7	5009	F 7
2011	E 3	2140	A 9	3075	F 3	3204	B 8	5010	D 5
2012	E 3	2141	B 9	3081	D 5	3205	B 8	5011	E 5
2013	F 4	2142	A 9	3082	B 4	3206	B 8	5013	G 2
2014	F 4	2143	D 10	3083	B 4	3207	B 7	5014	G 1
2015	E 4	2144	C 9	3084	B 4	3208	C 8	5019	C 7
2016	E 6	2145	C 10	3085	B 4	3209	B 8	5020	F 8
2017	F 6	2146	C 10	3086	A 5	3210	F 8	5021	E 8
2018	F 6	2148	G 9	3087	B 5	3211	E 7	5022	E 8
2022	B 2	2149	D 9	3088	B 5	3212	E 7	5023	E 8
2023	B 2	2150	E 10	3089	C 4	3213	E 8	5026	D 8
2024	B 2	2151	D 8	3090	C 4	3214	E 8	5027	D 10
2025	C 2	2152	E 9	3091	C 4	3215	D 8	5028	D 9
2026	B 2	2153	F 10	3092	D 4	3216	E 7	5029	D 8
2027	D 2	2154	E 9	3093	D 5	3224	F 7	5030	E 10
2028	D 1	2155	F 9	3094	D 5	3225	F 7	5031	E 10
2029	D 2	2156	G 9	3095	C 4	3226	F 8	5032	F 9
2030	E 3	2157	G 9	3096	C 4	3227	F 7	5033	G 9
2034	F 5	2158	F 10	3097	D 5	3228	F 8	5034	G 10
2035	E 6	2159	G 9	3098	C 5	3229	F 7	5101	B 4
2036	E 6	2160	F 9	3099	D 5	3239	B 9	5102	C 3
2037	E 6	2161	F 10	3100	D 5	3240	A 9	5103	B 3
2038	F 7	2162	G 8	3105	D 7	3241	A 9	5104	D 3
2039	F 6	3001	B 3	3106	C 6	3242	B 10	5105	F 4
2044	A 5	3002	B 3	3107	C 6	3243	B 9	5106	D 2
2045	B 4	3003	B 3	3108	D 6	3244	B 10	5107	E 2
2046	B 5	3004	B 3	3109	D 7	3245	B 10	5108	E 3
2047	C 4	3005	B 3	3110	D 7	3246	C 9	5109	F 6
2048	E 5	3006	B 3	3111	D 7	3247	D 9	5110	F 6
2049	B 5	3007	C 3	3112	D 7	3248	C 9	5111	F 6
2050	D 5	3008	C 3	3113	E 7	3249	D 9	5112	B 5
2051	C 5	3009	C 3	3114	D 6	3250	D 10	5113	B 4
2052	D 5	3010	C 3	3115	D 6	3251	C 9	5114	C 5
2056	C 7	3011	C 3	3121	B 2	3252	C 9	5115	C 5
2057	D 6	3012	C 3	3122	B 2	3253	D 9	5116	D 4
2058	C 6	3013	C 3	3123	B 2	3254	D 9	5117	D 4
2059	C 7	3014	C 3	3124	A 2	3255	D 9	5118	D 7
2060	C 5	3015	D 3	3125	E 1	3260	E 10	5119	E 7
2061	C 5	3016	D 3	3126	F 1	3261	D 9	5120	A 3
2062	D 6	3021	F 3	3127	F 1	3263	D 8	5121	E 2
2063	D 6	3022	E 3	3128	E 1	3264	D 8	5122	F 1
2064	D 7	3023	E 4	3129	F 1	3265	D 8	5123	G 2
2065	D 6	3024	E 3	3130	E 1	3266	C 8	5131	B 5
2070	B 2	3025	E 3	3131	G 2	3267	D 9	5132	B 6
2071	G 1	3026	E 4	3132	F 2	3268	E 10	5133	C 6
2072	F 1	3027	F 5	3134	G 2	3275	E 9	5134	C 7
2073	F 2	3028	F 4	3135	F 2	3276	E 10	5135	B 7
2074	E 2	3029	F 5	3136	F 2	3277	E 10	5136	B 7
2075	G 1	3030	F 4	3137	G 2	3278	F 10	5139	C 8
2076	G 2	3031	F 3	3138	F 1	3279	E 9	5140	C 9
2077	G 1	3032	E 3	3139	E 1	3280	F 9	5141	E 8
2082	C 3	3033	F 3	3151	C 8	3281	G 9	5142	F 8
2083	D 8	3034	F 4	3152	A 7	3282	F 10	5147	B 9
2084	B 10	3035	F 4	3153	G 8	3283	G 9	5148	B 9
2085	F 10	3040	E 6	3160	A 5	3284	G 9	5149	C 10
2086	A 6	3041	E 5	3161	B 6	3285	F 9	5150	D 10
2087	G 10	3042	E 5	3162	A 5	3286	E 8	5151	D 10
2088	B 10	3043	E 6	3163	B 6	3287	F 9	5156	E 10
2095	A 5	3044	E 5	3164	B 5	3288	F 10	5157	D 8
2096	B 5	3045	F 6	3165	B 5	3289	G 9	5158	C 7
2097	B 6	3046	E 6	3166	C 6	3290	F 9	5159	C 8
2098	C 5	3047	E 6	3167	C 6	3291	F 9	5160	C 8
2099	B 6	3048	F 6	3168	B 6	3292	G 8	5161	E 9
2100	C 6	3049	E 6	3169	A 6	5001	B 4	5162	E 9
2101	B 7	3050	E 6	3170	B 6	5002	E 4	5163	L 9
2106	B 9	3051	F 7	3171	B 6	5003	E 4	5164	E 9
2107	B 9	3052	F 7	3172	C 6	5004	B 2	5165	F 9
2108	B 9	3053	E 6	3173	C 7	5005	C 2	5166	F 9
2109	C 8	3054	E 6	3174	B 6	5006	E 2	5167	F 9
2110	B 9	3055	E 6	3175	B 7	5007	E 7	5201	E 4
2111	C 8	3056	D 6	3176	B 7	5008	C 7	5202	F 2
2112	C 8	3057	D 6	3183	A 7	5009	C 6	5203	C 5
2113	C 7	3060	C 2	3184	C 8	5010	B 5	5206	B 8
2117	B 8	3061	B 2	3185	B 8	5011	C 1	5207	D 9
2118	A 8	3062	C 2	3186	B 9	5012	E 1	5208	F 7
2119	A 9	3063	D 2	3187	B 8	5013	B 5		
2120	A 8	3064	D 2	3188	B 9	5014	B 9		

10038	2022	120	pF 5%	4822 122 31555	2077	22	nF 30%	4822 122 10188
10037	2026	100	pF 5%	4822 122 10223	2078	22	nF 30%	4822 122 10188
10075	2028	22	nF 30%	4822 122 10188	2082	22	nF 30%	4822 122 10188
10029	2029	82	pF 5%	4822 122 10225	2084	22	nF 30%	4822 122 10188
	2034	22	nF 30%	4822 122 10188	2085	22	nF 30%	4822 122 10188
	2035	8.2	pF 10%	4822 122 10222	2096	22	nF 30%	4822 122 10188
	2036	22	nF 30%	4822 122 10188	2097	82	pF 5%	4822 122 10225
	2037	100	pF 5%	4822 122 10223	2100	22	nF 30%	4822 122 10188
30513	2039	1	nF 10%	4822 122 10162	2108	220	pF 2%	4822 122 31222
30526	2045	22	nF 30%	4822 122 10188	2109	560	pF 2%	4822 122 31425
30522	2046	100	pF 5%	4822 122 10223	2110	33	pF 5%	4822 122 10245
	2047	39	pF 5%	4822 122 31717	2122	10	pF trimmer	4822 125 50062
	2048	1	nF 10%	4822 122 10162	2123	470	pF 2%	5322 122 34159
	2049	39	pF 5%	4822 122 31717	2127	100	pF 5%	4822 122 10223
10224	2050	39	pF 5%	4822 122 31717	2130	4.7	nF 5% 63 V	4822 121 50539
10188	2051	1	nF 10%	4822 122 10162	2139	1	μF 25 V	4822 124 20944
10162	2052	1	nF 10%	4822 122 10162	2142	150	pF 2%	4822 122 31413
10162	2058	22	pF trimmer	4822 125 50045	2143	47	pF 5%	4822 122 31473
10224	2060	22	nF 30%	4822 122 10188	2144	680	pF 2% 630 V	5322 121 54061
10223	2061	4.7	nF 30%	4822 122 10226	2146	22	nF 30%	4822 122 10188
31413	2073	100	pF 5%	4822 122 10223	2149	270	pF 2%	4822 122 31335
	2075	22	nF 30%	4822 122 10188	2151	4.7	nF 5% 63 V	4822 121 50539
	2076	22	nF 30%	4822 122 10188				

CONTROL PANEL

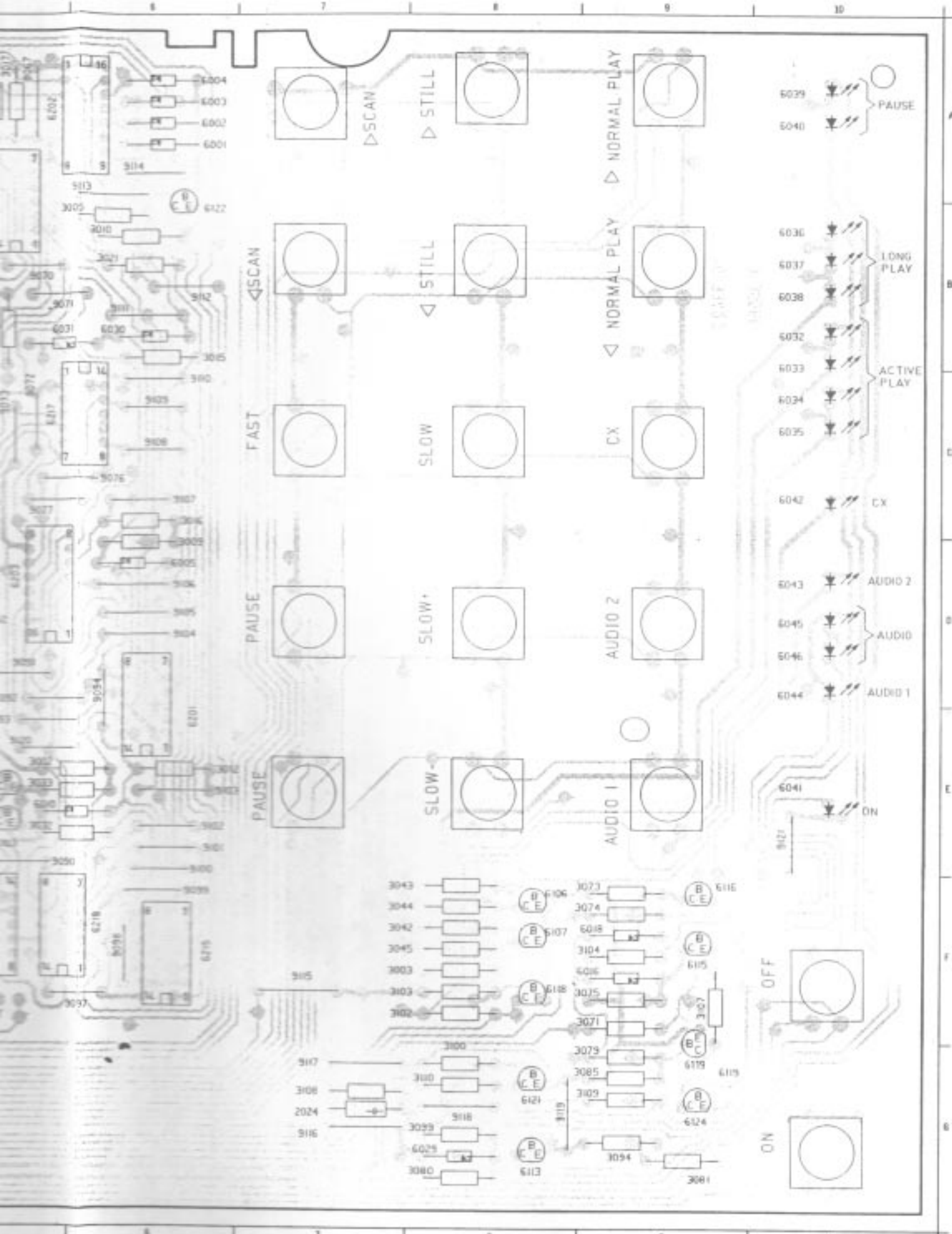
2001	C 4	2014	D 2	2025	C 2	3001	C 4	3010	B 6	3020	B 5	3029	C 2	3038	D 4	3047	C 4	3056	F 3	3065	F 2	3074	F 9	3083	F 3	3095	D 4	3104
2002	C 4	2015	F 2	2026	D 2	3002	E 5	3011	C 4	3021	B 6	3030	B 2	3039	H 2	3048	D 4	3057	F 3	3066	F 1	3075	F 9	3084	D 4	3096	E 2	3105
2003	D 1	2016	F 1	2027	D 4	3003	F 8	3012	E 7	3022	C 5	3031	C 2	3040	H 3	3049	D 4	3058	F 3	3067	F 2	3076	D 2	3085	D 8	3097	F 1	3106
2008	A 1	2017	E 1	2028	C 2	3004	F 3	3013	D 2	3023	B 4	3032	C 5	3041	H 3	3050	H 3	3059	H 3	3068	F 2	3077	T 3	3086	F 1	3098	H 4	3107
2009	B 1	2018	C 1	2029	D 4	3005	B 6	3014	B 6	3024	B 4	3033	C 5	3042	F 8	3051	B 3	3060	B 3	3069	F 1	3078	D 1	3087	B 3	3099	C 8	3108
2010	C 2	2020	H 3	2030	D 2	3006	H 5	3015	C 8	3025	H 4	3034	E 5	3043	F 8	3052	D 4	3061	H 3	3070	F 2	3079	D 8	3088	D 8	3100	C 8	3109
2011	E 5	2021	F 1	2031	B 5	3007	H 5	3016	H 5	3026	B 2	3035	D 4	3044	F 8	3053	F 3	3062	C 3	3071	F 8	3080	D 8	3089	F 2	3101	D 8	3109
2012	D 5	2022	C 2	2032	E 3	3008	H 4	3017	H 1	3027	B 2	3036	F 4	3045	F 8	3054	F 2	3063	D 2	3072	F 2	3081	D 9	3090	C 2	3102	F 8	3110
2013	B 3	2024	G 7	2033	H 1	3009	D 6	3018	H 1	3028	C 2	3037	G 4	3046	D 3	3055	D 3	3064	D 4	3073	F 8	3082	D 1	3091	D 8	3103	F 8	3101



CONTROL PANEL

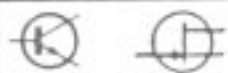
5001,5002 6 MHz	3080 390 Ω	2001 27 pF 5%
4822 242 70392	4822 116 51674	2002 27 pF 5%
5003 3.6 μH		
5004,5005 5.3 μH		
4822 156 10518		
4822 158 10101		

3083	F 3	2095	D 4	3104	F 3	5003	C 2	6007	C 2	8016	F 9	8025	H 4	8034	C 10	8043	D 10	8104	F 5	8114	G 2	8123	H 4	8208	H 4	8217	C 5
3084	F 3	3096	F 2	3105	F 2	5004	H 1	6008	C 2	8017	D 2	8026	C 3	8035	C 10	8044	D 10	8105	H 3	8115	F 3	8124	H 4	8209	D 3	8218	F 6
3085	F 3	3097	F 2	3106	H 5	5005	H 1	6009	D 4	8018	F 9	8027	F 3	8036	H 10	8045	D 10	8106	F 8	8116	F 9	8125	H 4	8210	E 3		
3086	F 3	3098	H 4	3107	F 3	6001	H 6	6010	E 5	8019	F 4	8028	D 4	8037	H 10	8046	D 10	8107	F 8	8117	G 1	8126	H 4	8211	E 2		
3087	F 3	3099	H 4	3108	C 7	6002	H 6	6011	B 5	8020	F 2	8029	D 6	8038	H 10	8047	F 3	8108	G 2	8118	F 8	8127	H 4	8212	H 2		
3088	F 3	3100	C 8	3109	C 7	6003	H 6	6012	F 3	8021	F 2	8030	H 6	8039	H 10	8048	D 10	8109	G 3	8119	G 9	8128	H 4	8213	E 4		
3089	F 3	3101	C 8	3110	C 8	6004	H 6	6013	D 3	8022	F 2	8031	H 6	8040	H 10	8101	C 4	8110	H 4	8120	C 5	8205	C 5	8214	F 2		
3090	F 3	3102	F 8	5001	C 4	6005	D 6	6014	C 2	8023	F 2	8032	H 10	8041	C 10	8102	C 4	8111	G 3	8121	G 8	8206	H 2	8215	F 6		
3091	F 3	3103	F 8	5002	D 4	6006	H 2	6015	F 2	8024	F 2	8033	C 10	8042	C 10	8103	C 5	8113	G 8	8122	D 6	8207	H 5	8216	D 3		



32486 D 4

674	2008	3.3 nF 10%	4822 122 10165	2020	470 pF 10%	4822 122 31435	
	2012	27 pF 5%	4822 122 10215		2021	470 pF 10%	4822 122 31435
	2013	100 nF 10% 250 V	4822 121 41672		2026	100 nF 10% 250 V	4822 121 41672
	2014	4.7 nF 30%	4822 122 10226		2027	27 pF 5%	4822 122 10215
	2016	27 pF 5%	4822 122 10215		2029	100 nF 10% 250 V	4822 121 41672
	2017	470 pF 10%	4822 122 31435		2031	100 nF 10% 250 V	4822 121 41672
	2018	470 pF 10%	4822 122 31435		2032	220 nF 10% 100 V	4822 121 41673



BC264A	5322 130 44476
BC264B	4822 130 41066
BC264C	5322 130 44476
BC264D	5322 130 44656
BC327	4822 130 40854
BC327/40	4822 130 41327
BC337	4822 130 40855
BC368	5322 130 44647
BC369	5322 130 44593
BC546	4822 130 41001
BC546B	4822 130 44461
BC547	4822 130 44257
BC547C	4822 130 44503
BC548	4822 130 40938
BC548A	4822 130 40948
BC548B	4822 130 40937
BC548C	4822 130 44196
BC549	4822 130 40964
BC549B	4822 130 40936
BC549C	4822 130 44246
BC556	4822 130 40989
BC556A	5322 130 44462
BC556B	4822 130 41691
BC557	4822 130 44256
BC558	4822 130 40941
BC558A	4822 130 40962
BC558B	4822 130 44197
BC559	4822 130 40963
BD235	4822 130 44235
BD236	4822 130 40917
BD437	4822 130 40982
BD438	4822 130 40995
BD675	5322 130 44786
BD676	5322 130 44695
BF240	4822 130 40902
BF256B	5322 130 44744
BF410B	4822 130 41908
BF450	4822 130 44237
BF451	4822 130 41395
BF494	4822 130 44195
BF495	4822 130 40947
BFR54	4822 130 41801
BSV78	5322 130 44093
PH2369	4822 130 41594



Red	CQV80L	4822 130 31984
Green	CQV81L	4822 130 31985
Yellow	CQV82L	4822 130 31986



BAT85	4822 130 31983
BAW62	4822 130 30613
BY225/100	4822 130 50312
BYV27/100	4822 130 31982
BZV46/C1V5	5322 130 34865
BZV46/C2V0	4822 130 31248
BZX75/C2V8	4822 130 34048
BZX79/B3V9	4822 130 31981
BZX79/B8V2	4822 130 34382
BZX79/B9V1	4822 130 30862
BZX79/C3V0	4822 130 31251
BZX79/C3V6	5322 130 34834
BZX79/C4V7	4822 130 34174
BZX79/C5V6	4822 130 34173
BZX79/C6V2	4822 130 31111
BZX79/C8V2	4822 130 34382
BZX79/C10	4822 130 34297
BZX79/C15	4822 130 34281
BZX79/C18	4822 130 31024
BZX79/C56	4822 130 34258
ZTK33A	4822 130 31148



1.5 M Ω	4822 110 72192
2.2 M Ω	4822 110 72196
4.7 M Ω	4822 110 72205



47.5 Ω	4822 116 51355
261 Ω	5322 116 54502
332 Ω	4822 116 51226
365 Ω	5322 116 54516
909 Ω	5322 116 55278
1 k Ω	4822 116 51235
1.4 k Ω	5322 116 54562
1.5 k Ω	4822 116 51239
2.15 k Ω	5322 116 50767
3.01 k Ω	4822 116 51246
3.65 k Ω	5322 116 54587
4.02 k Ω	5322 116 55448
4.75 k Ω	5322 116 54008
5.11 k Ω	4822 116 51115
5.62 k Ω	4822 116 51281
6.19 k Ω	5322 116 55426
6.49 k Ω	5322 116 54603
7.5 k Ω	5322 116 55324
8.25 k Ω	5322 116 54558
15 k Ω	4822 116 51255
16.9 k Ω	5322 116 54635
22.1 k Ω	4822 116 51257
33.2 k Ω	4822 116 51259
110 k Ω	5322 116 54701
205 k Ω	5322 116 55387

ABBREVIATIONS IN THE DIAGRAMS

CAV	= Constant angular velocity
CLV	= Constant linear velocity
COMP. SYNC.	= Composite synchronisation signal
CPU	= Central processing unit
FOC LS	= Focus loop switch
FPI	= Focus position indicator
HF	= High frequent
IGR	= Input general reset
LOCK	= Motor lock signal
LPO	= Line pulse out
LV	= Laser vision
MCO	= Motor control out
MTF	= Motional transfer function
OBP	= Output burst PAL
OBS	= Output burst switch (PAL/NTSC)
OCP	= Output course pulse
OLS	= Output radial loop switch
OSM	= Output slide motor
PAL	= Phase alternating line
POL	= Polarity
POR	= Power on reset
RAD	= Radial
RC	= Remote control
SCART	= Audio-Video connector
SMS	= Slide motor switch
SW	= Switch
TANG	= Tangential
TP	= Test point
TPI	= Track position indicator (radial)

SURVEY OF SYMBOLS:

	Adjustable resistor
	SFR 25
	VR 25
	MR 25
	NFR 25
	NTC
	Elco
	0 = miniature single elco
	00 = subminiature tantalum cap
	Micropoco
	Ceramic plate
	Tubular ceramic
	Ployester flat foil
	Crystal
	Coil
	Transformer

CONNECTIONS OF SEMICONDUCTORS

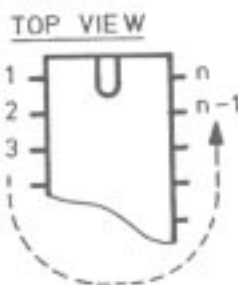
Transistors

Bottom view

BCE	EBC	BEC	DSG
BC368	BC327	BF240	BC264
BC369	BC328	BF450	BF256
	BC337	BF451	BF410
	BC546	BF494	
	BC547	BF495	
	BC548		
	BC549		
	BC556		
	BC557		
	BC558		
	BC559		
	BFR54		
	PH2369		

BCE	GDS
BD235	BSV78
BD236	
BD438	
BD675	
BD676	

IC's



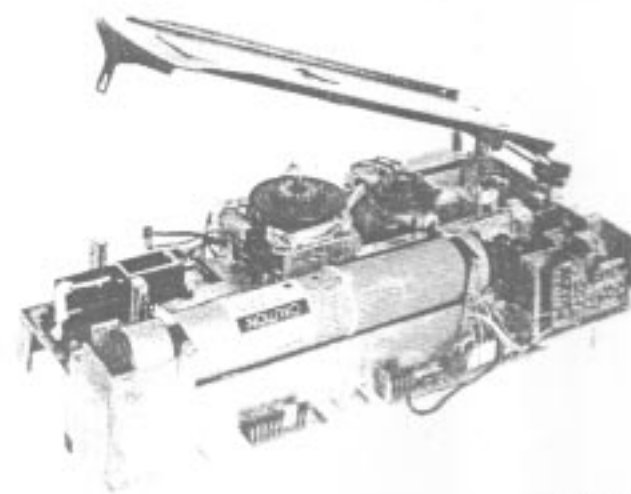
BOTTOM VIEW



DIODES

SLP155B40	CQV80	SFH206	
	CQV81		
	CQV82		

Service
Service
Service



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Service Manual

INTRODUCTION

The 22VP420 is a deck of a Laser Vision Player, suitable for play back of pre-recorded optical video discs, according Laser Vision system.

The deck includes :

- Laser with optical path
- Turntable motor with disc clamping
- Slide with moving optical parts
- Slide drive motor
- Lid releasing mechanism
- HF-pre-amplifier
- Servo-pre-amplifier
- Connector panel

Output signals :

- HF-signal
- Focus-signal
- Radial-signal
- Tacho-signal

Input signals :

- Supply voltages +12 V, -12V
- Laser supply
- Servo signals for:
 - objective
 - radial mirror
 - tangential mirror
 - turntable motor
 - slide drive motor
 - lid releasing

* Remark: For Service adjustments see Service Manual of the relevant Laser Vision player.

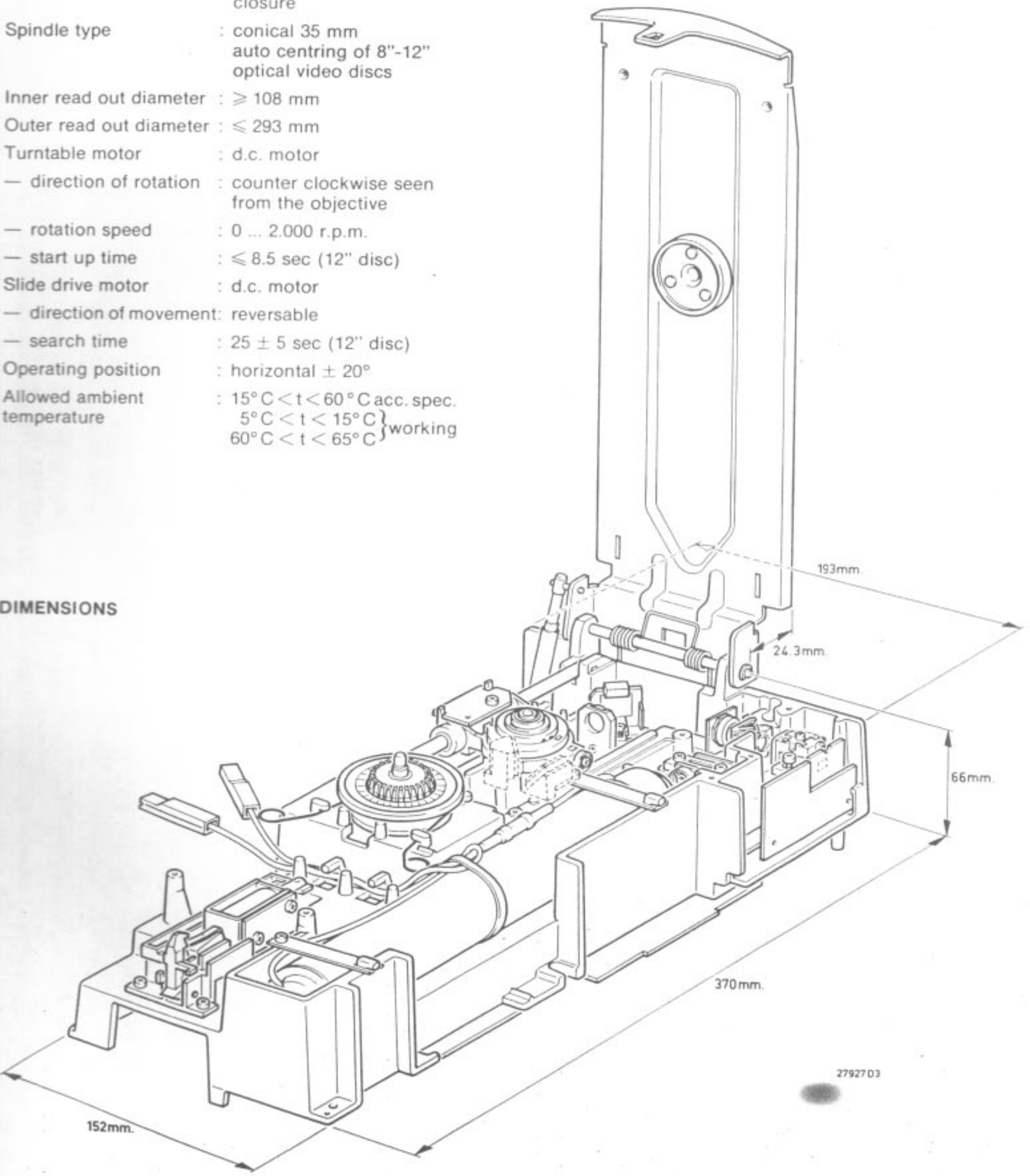
CONTENTS

: Introduction
 Technical data
 Dimensions
 Location of components
 Optical path
 Wiring diagram
 Circuit diagram
 Exploded view
 List of mechanical parts
 List of electrical parts

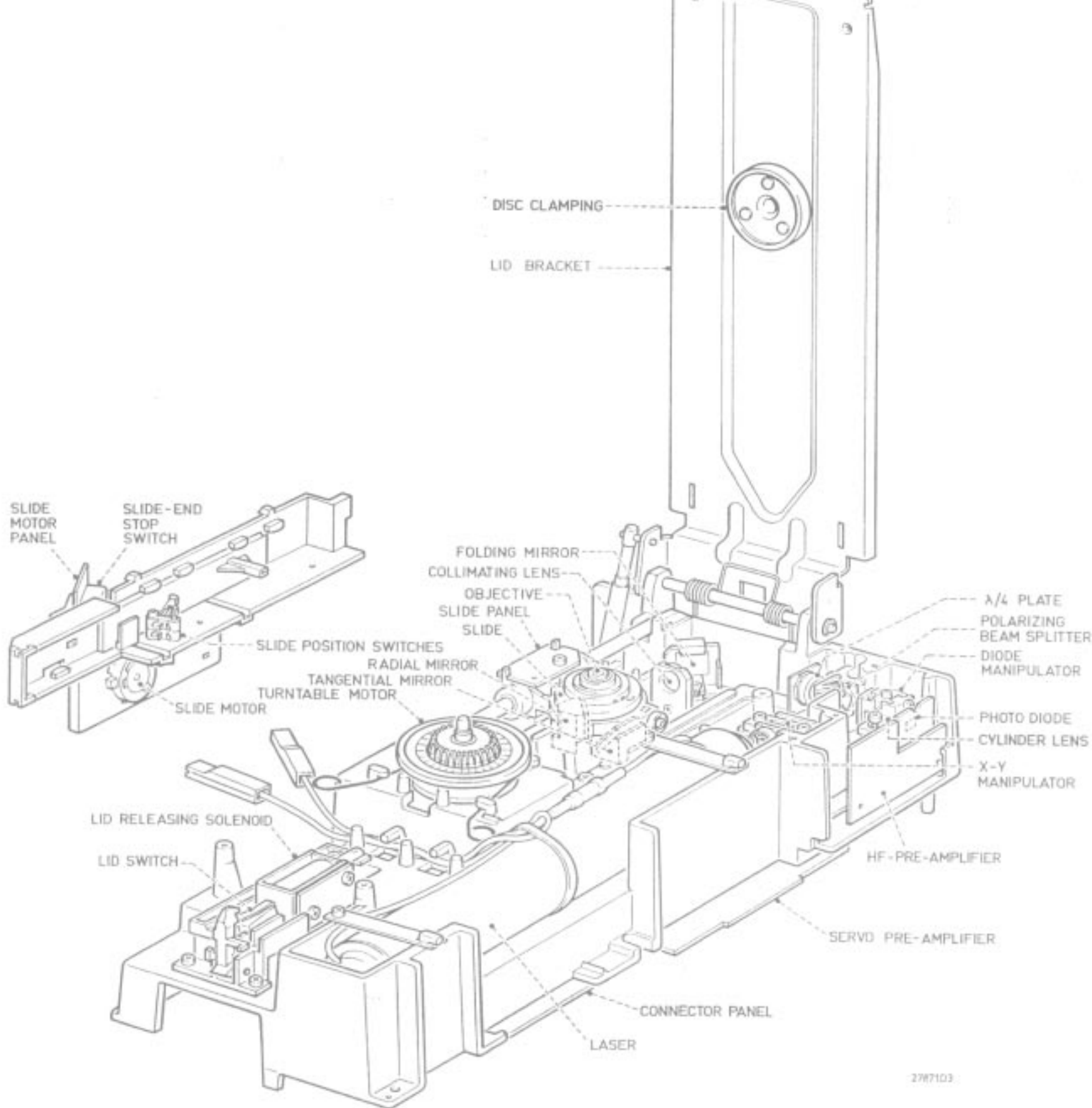
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used.

- Supply voltages : +12 V \pm 5%
-12 V \pm 5%
- Current consumption : < 30 mA
- Laser voltage : ignition \geq 8.000 V d.c.
operation 1150 \pm 100 V d.c.
- Laser current : operation 5 \pm 0.2 mA
- Laser type : He-Ne Laser
1.5 \pm 0.5 mW
632.8 nm
- Objective : 20 x 0.40 N.A.
- Disc clamping : automatically with lid closure
- Spindle type : conical 35 mm
auto centring of 8"-12"
optical video discs
- Inner read out diameter : \geq 108 mm
- Outer read out diameter : \leq 293 mm
- Turntable motor : d.c. motor
- direction of rotation : counter clockwise seen
from the objective
- rotation speed : 0 ... 2.000 r.p.m.
- start up time : \leq 8.5 sec (12" disc)
- Slide drive motor : d.c. motor
- direction of movement: reversable
- search time : 25 \pm 5 sec (12" disc)
- Operating position : horizontal \pm 20°
- Allowed ambient temperature : 15°C < t < 60°C acc. spec.
5°C < t < 15°C } working
60°C < t < 65°C }

DIMENSIONS

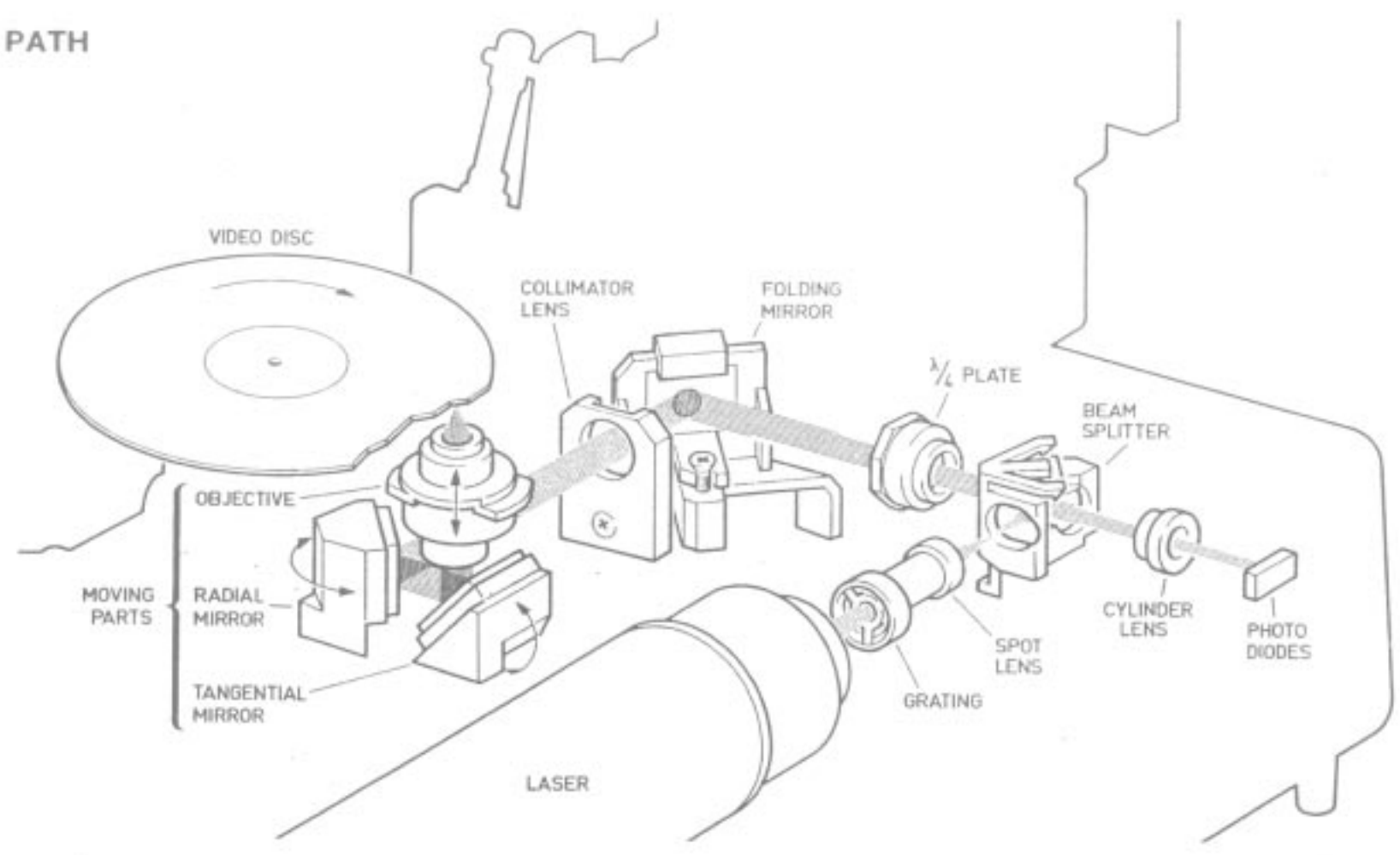


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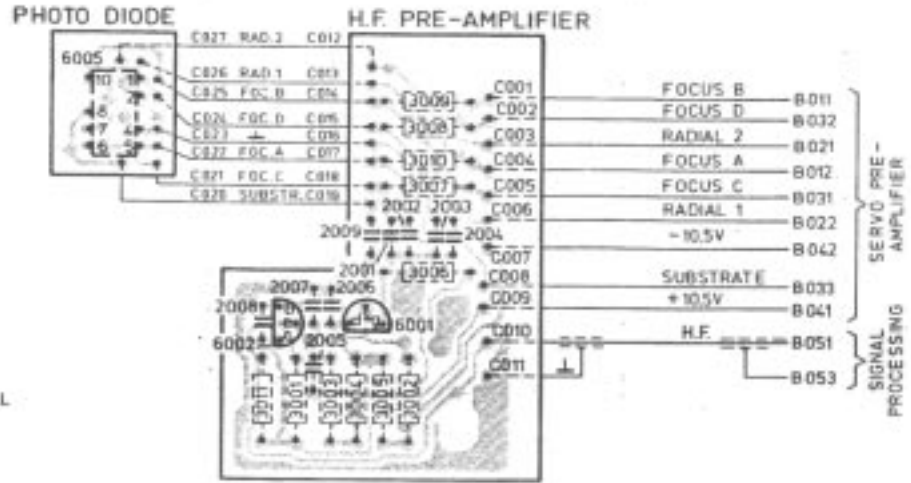
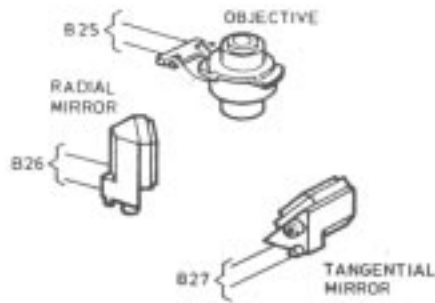
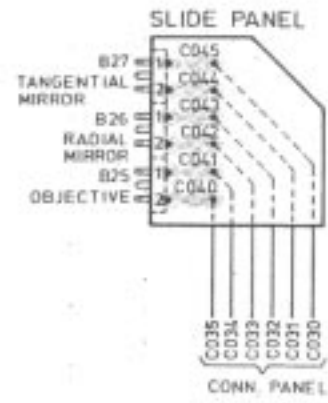
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OPTICAL PATH

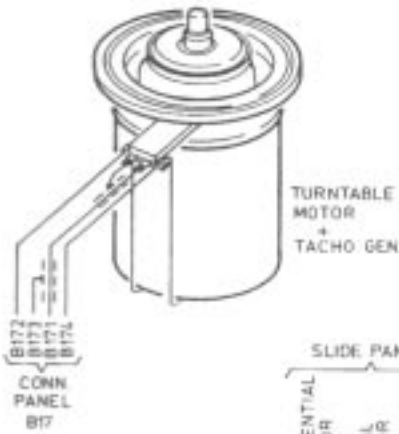
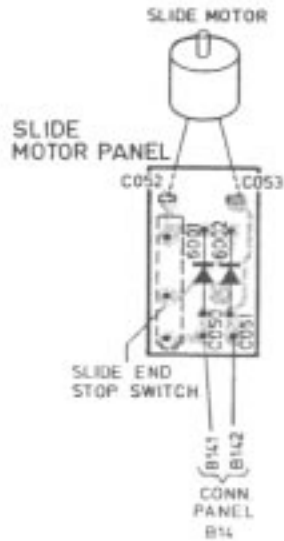
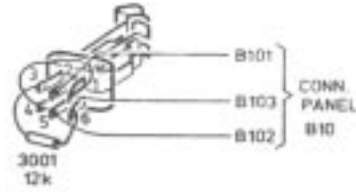


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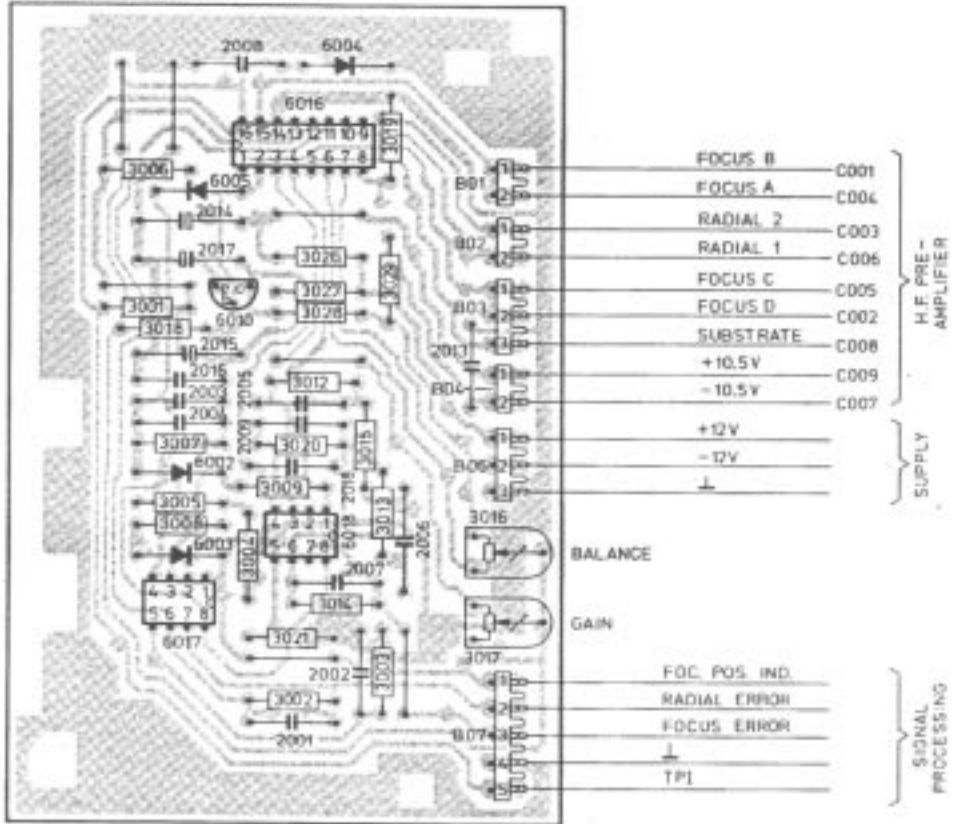
WIRING DIAGRAM



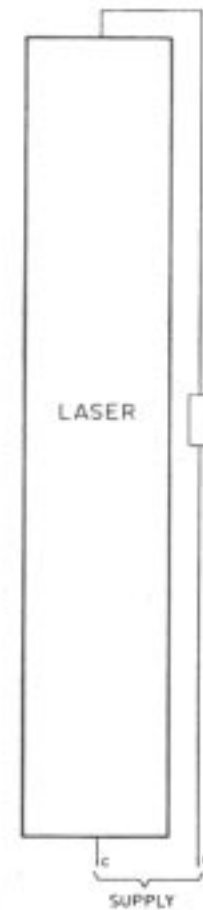
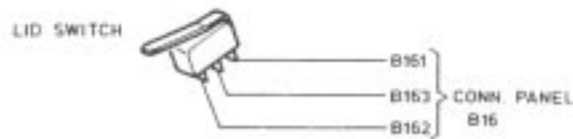
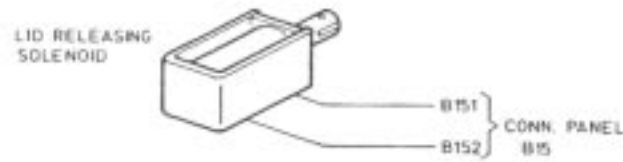
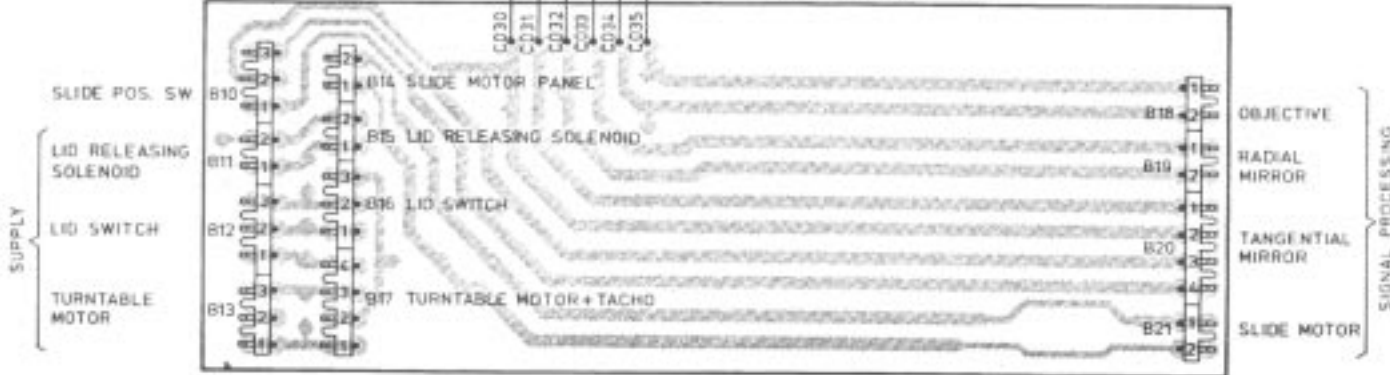
SLIDE POSITION SWITCHES



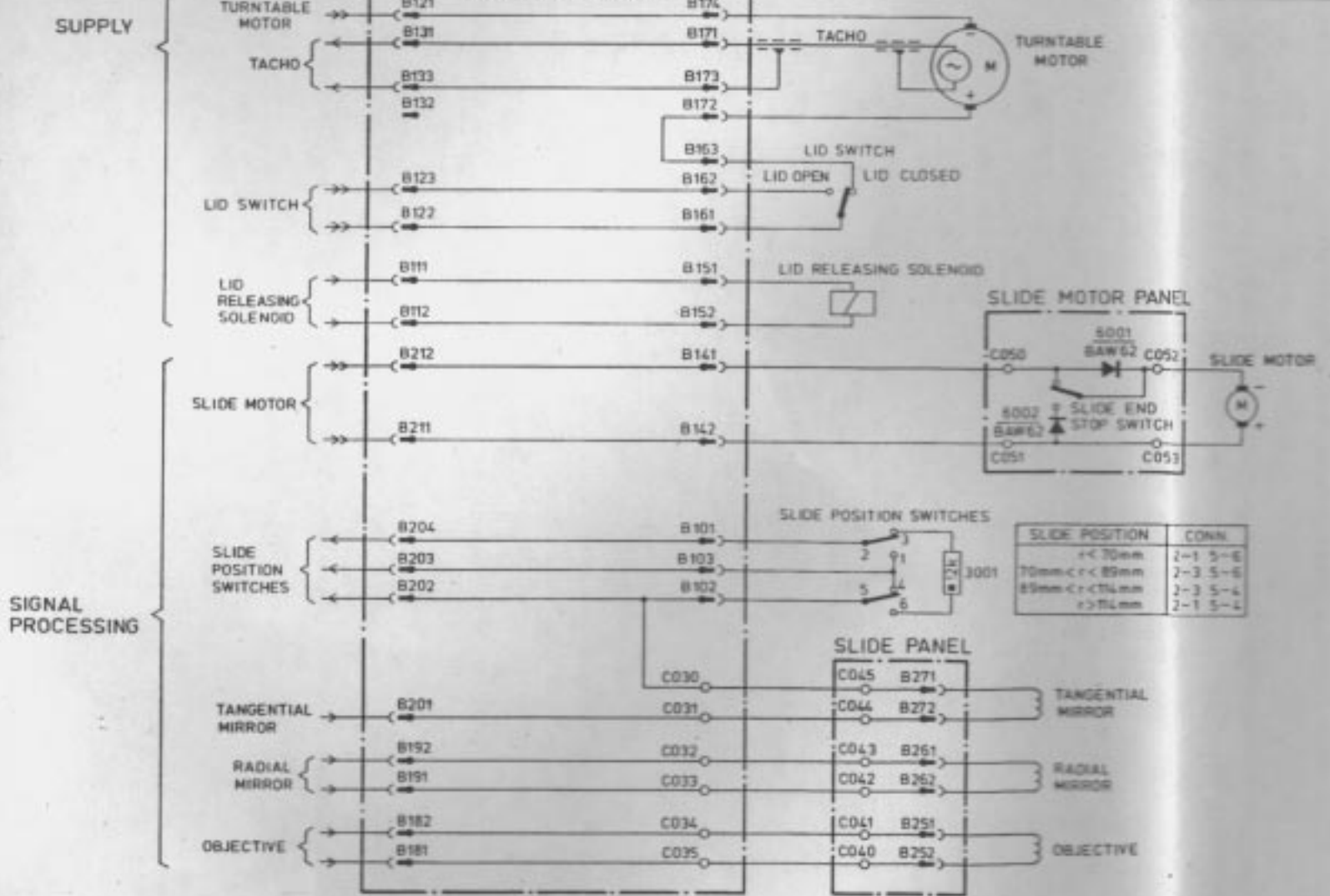
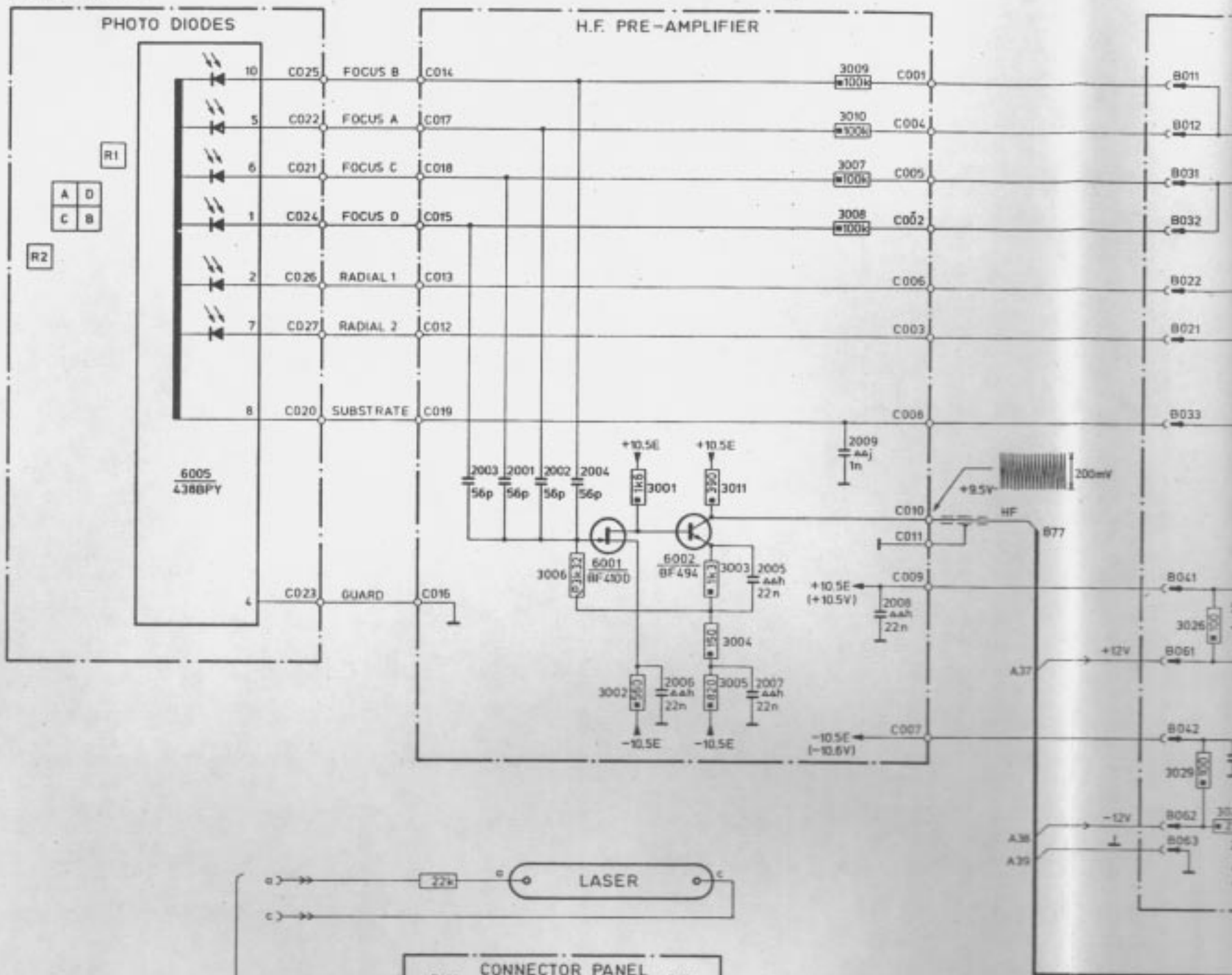
SERVO PRE-AMPLIFIER

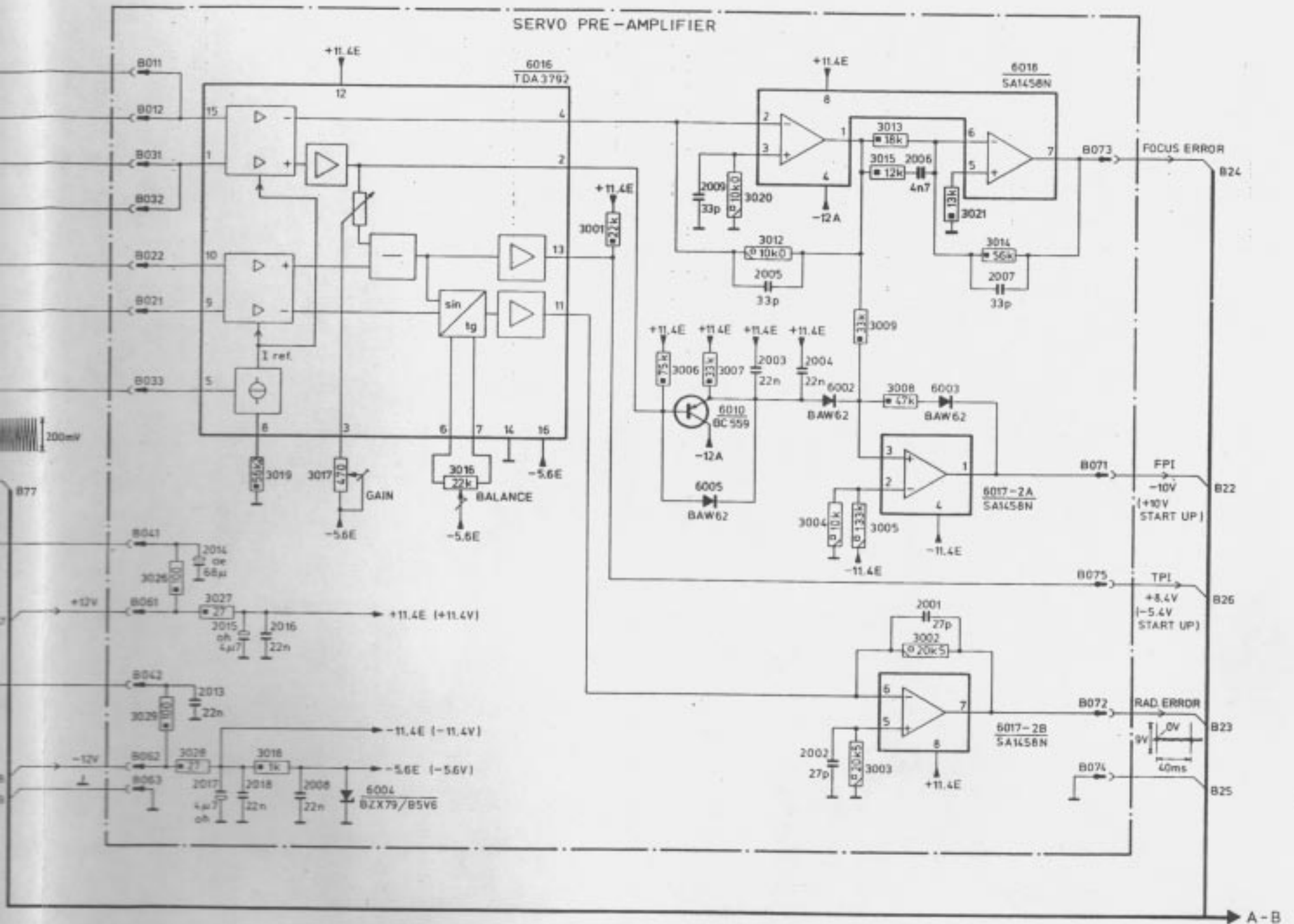


CONNECTOR PANEL

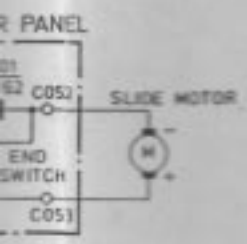


DECK ELECTRONICS DIAGRAM E





27383E6/C



ION	CONN
mm	1-1 5-6
mm	2-3 5-6
mm	2-3 5-6
mm	1-1 5-6

LIST OF MECHANICAL PARTS

Fixing material

1	4822 502 11469	Screw M2.5x5
2	4822 502 11549	Screw M2.5x10
3	4822 502 11552	Screw M2.5x16
4	4822 502 11472	Screw M3x5
5	4822 502 11526	Screw M3x5
6	4822 502 11473	Screw M3x8
7	4822 502 11574	Screw M3x8
8	4822 502 11474	Screw M3x10
9	4822 502 11573	Screw M3x10
11	4822 502 11553	Screw M3x15
12	4822 502 11475	Screw M3x16
13	4822 502 11554	Screw M3
14	4822 502 30048	4Nx16
16	5322 502 84013	Screw 2Nx13
17	4822 505 10471	Nut M2.5
18	4822 530 70043	Retaining ring 2.3
19	4822 532 10847	Ring 2.7x6.5
20	4822 530 70124	Retaining ring 4
21	5322 325 64029	Grommet
22	4822 502 11064	Screw M3x6
23	4822 532 10582	Ring 3.2x9





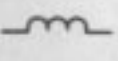





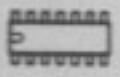
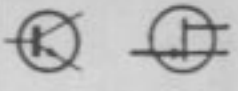
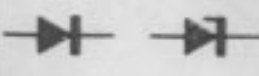
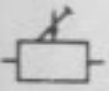
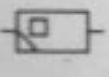
Chassis

101	4822 444 50289	Bracket	156	4822 691 30107	Spot lens/grating manipulator assy
102	4822 522 31747	Pulley	157	4822 535 20046	Wedge
103	4822 460 20337	Bracket	158	4822 381 20068	Folding mirror assy
104	4822 528 90447	Pulley	159	4822 380 10019	Folding mirror
106	4822 256 90573	Motor holder	161	4822 381 20069	Collimating lens
107	4822 492 62492	Leafspring	162	4822 214 50261*	Servo pre-amplifier
108	4822 361 20202*	Slide drive mirror	163	4822 214 50262*	Connector panel
109	4822 358 20126	Belt	164	4822 402 60859	Lid bracket
111	4822 214 50263*	Slide panel	166	4822 460 10518	Dust strip
112	4822 691 30109	Radial mirror	167	4822 532 60775	Clamping piece
113	4822 380 20118*	Radial mirror assy	169	4822 535 70644	Pin
114	4822 402 60815	Bracket	171	4822 360 40107	Plunger
116	4822 535 91261	Spindle	172	4822 535 91582	Spindle
117	4822 402 60817	Bracket	173	4822 381 20067	$\lambda/4$ plate assy
118	4822 281 30145*	Lid releasing solenoid	174	4822 535 91263	Spindle
119	4822 492 32073	Tension spring	176	4822 492 62493	Flat spring
121	4822 526 50058	Pawl	177	4822 130 31572*	Photo diode
122	4822 402 30125*	Slide motor panel	178	4822 402 60814	Diode manipulator
123	4822 271 30323*	Slide stop switch	179	4822 381 40045	Cylinder lens
124	4822 271 30255*	Slide position switch	181	4822 214 50273*	Photo diode with pre- ampli assy
126	4822 271 30255*	Slide position switch	182	4822 214 50259*	H.F. pre-amplifier
127	4822 462 30208	Rack	183	4822 268 20079*	Laser connector
128	5322 325 64029	Grommet	184	4822 268 40098	Anode connector housing
129	4822 691 20243	Slide drive assy	186	4822 492 62491	Leafspring
131	4822 691 30108	Slide assy	187	4822 268 40099	Cathode connector
132	4822 256 80046*	Objective assy	188	4822 492 41014	Tension spring
133	4822 528 90376	Wheel	189	4822 360 40108	Bush
134	4822 402 60815	Bracket	191	4822 492 62491	Leafspring
136	4822 380 20121	Tangential mirror	192	4822 131 41002*	Laser
137	4822 380 20119*	Tangential mirror assy		4822 390 20107	Grease for damper item 189
138	4822 417 50156	Lid blocking assy			
139	4822 271 30322*	Lid switch			
141	4822 464 50183	Bracket			
142	4822 535 91259	Spindle			
143	4822 462 71254	Dust cover			
144	4822 460 20336	Ornamental ring			
146	4822 532 60774	Centring ring			
147	4822 530 50592	"O"-ring			
148	4822 361 30152*	Turntable motor			
149	4822 492 62494	Spring			
151	4822 492 62489	Leafspring			
152	4822 532 51176	Ring			
153	4822 444 30318	Cover			
154	4822 492 62488	Leafspring			
155	4822 256 90414	Manipulator holder			

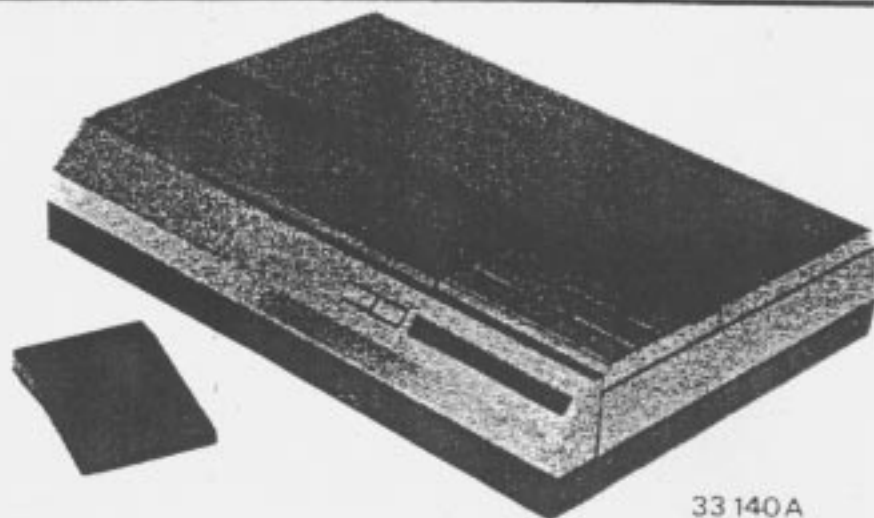
* See also list of electrical parts

Remarks:

For replacement of parts in light path see optical adjustments in the relevant Laser Vision Player - Service Manual.

Servo-pre-amplifier panel Connector panel Slide panel Slide motor panel	4822 214 50261 4822 214 50262 4822 214 50263 4822 402 30125		2014 2015,2017	68 μ F - 16 V 4.7 μ F - 63 V	4822 124 20689 4822 124 20726
Laser	4822 131 41002				
 Turntable motor Slide motor	4822 361 30152 4822 361 20202		2001,2002 2003,2004 } 2008,2018 } 2005,2007,2009 2006	27 pF - 50 V 22 nF 33 pF - 50 V 4.7 nF	4822 122 10215 4822 122 10188 4822 122 10179 4822 121 50539
 Lid switch Slide position switch Slide stop switch	4822 271 30322 4822 271 30255 4822 271 30323	HF-pre-amplifier			
 Objective assy Radial mirror assy Tangential mirror assy Lid-releasing solenoid	4822 256 80046 4822 380 20118 4822 380 20119 4822 281 30145		2001...2004	56 pF - 100 V	4822 122 31521
 Photo diode Photo diode with H.F.-pre-ampl.	4822 130 31572 4822 214 50273			1 nF 22 nF	100 V 63 V 4822 122 30027 4822 122 30103
 Photo diode Photo diode with H.F.-pre-ampl.	4822 130 31572 4822 214 50273		Print connectors		
 SA1458N TDA3792	4822 209 80793 4822 209 81029	B01,B11,B14,B19 B02,B04,B15, } B18,B21 } B03,B13,B16 B06,B10,B12 B07 B17,B20 B25,B27 B26	2f-top 2f-top 3f-top 3f-top 5f-top 4f-top 2f-bottom 2f-bottom	4822 267 30339 5322 267 34085 4822 265 30144 4822 268 10133 4822 267 40342 4822 267 40258 4822 267 30361 4822 267 30405	
 BC559 BF410D BF494	4822 130 40963 4822 130 41697 4822 130 44195				
 BAW62 BZX79/B5V6	4822 130 30613 4822 130 34173				
 470 Ω 22 k Ω	4822 100 10038 4822 100 10051				
 MR25 3.32 k Ω 10 k Ω 20.5 k Ω 56.2 k Ω 133 k Ω 100 k Ω	5322 116 54005 4822 116 51253 5322 116 55419 4822 116 51264 5322 116 54708 4822 116 51268				

Service
Service
Service



PROVISIONAL

Service Manual

22VP932/00 is derived from 22VP830/50 .

For Service-Manual see 22VP830/50 , codenumber 4822 726 13461 .

Following modifications have been made with respect to 22VP830
(see also adapted circuitry added to this sheet).

Control panel (diagram D)

1. Deleted resistor 3043 and diode 6027.
2. Deleted resistor 3007.
3. Deleted transistor 6123 and short circuit collector and emitter.
4. External lead and connector for RS232-drivers connected to μP -6213
(RS232 driver circuit see comm. spec. of 22VP932 , sheet 190-5).
Added resistor 10k on point 6- μP 6213
5. μP 's 6208 and 6213 replaced by IC-sockets and piggy-back IC

Video Servo 1 panel (diagram B)

1. In series with resistor 3345 , a 240k resistor mounted
(adapted Slide-Drive circuit).
2. Resistor 3284 changed from 15k to 4k7
(adapted Scan Oscillator circuit).

Supply (diagram A)

Mainsvoltage 110V . Transformer connection see diagram A in Service Manual.

Mechanics

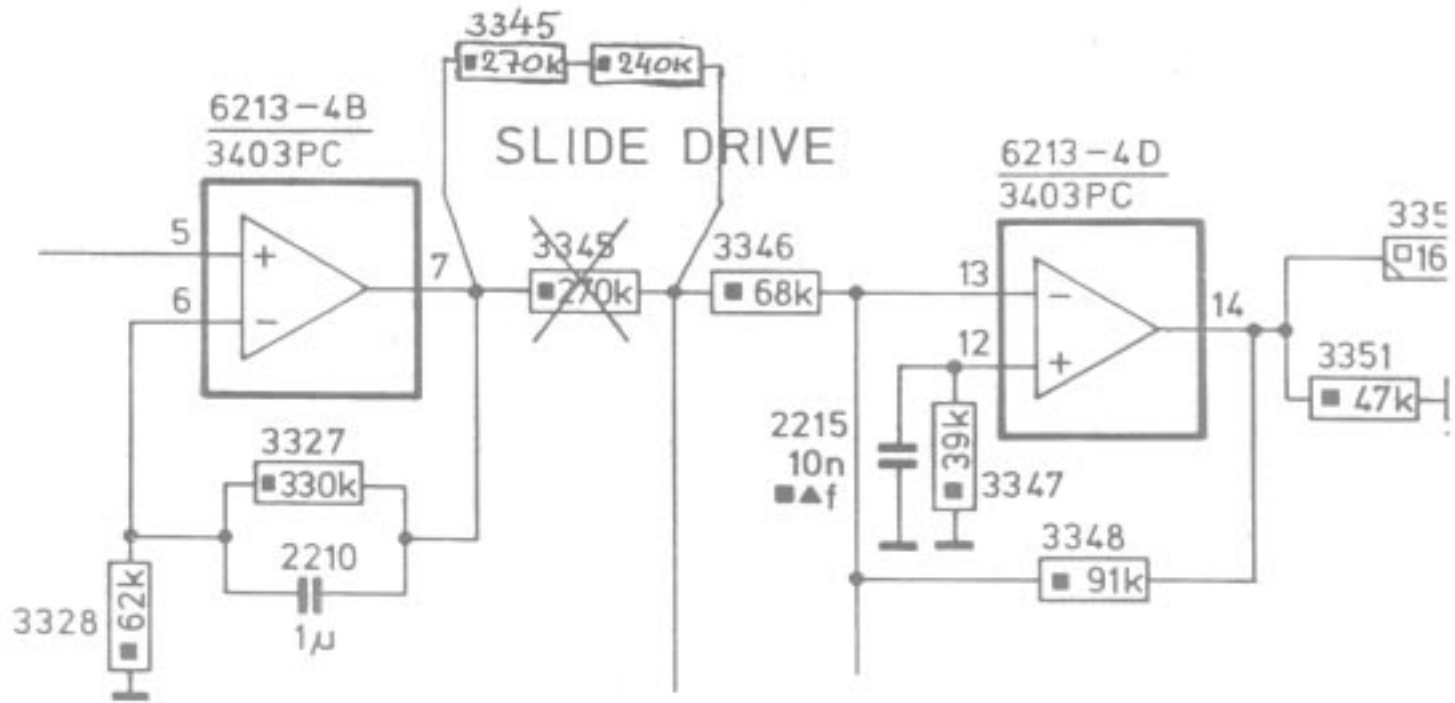
- Slide drive unit adapted (pos. 129 in 22VP420 Manual).
- Housing parts adapted.
- Mains cord changed.

Codenumbers for adapted mechanics will be published as soon as available.

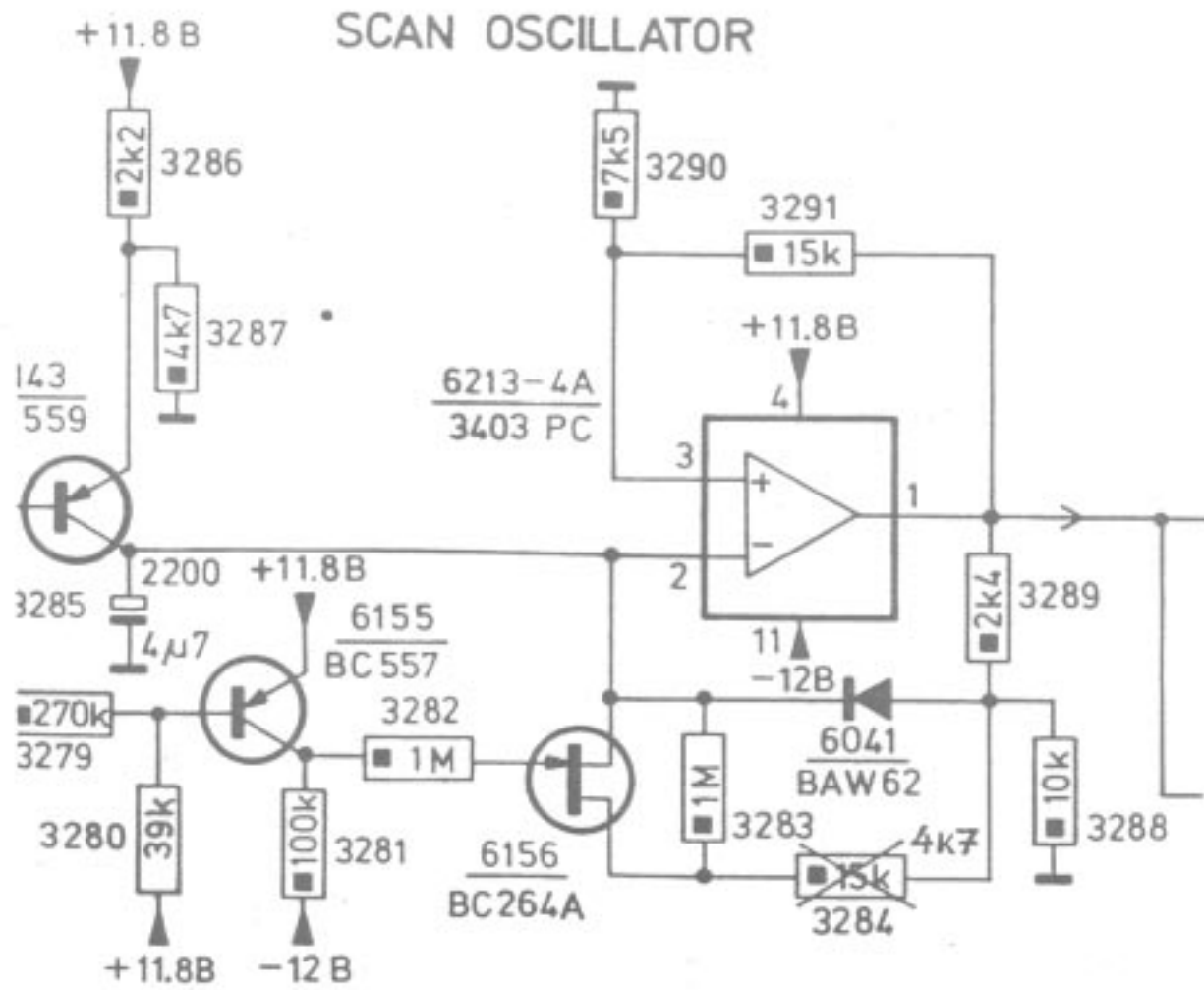
VIDEO SERVO 1 PANEL DIAGRAM B

VP932/00

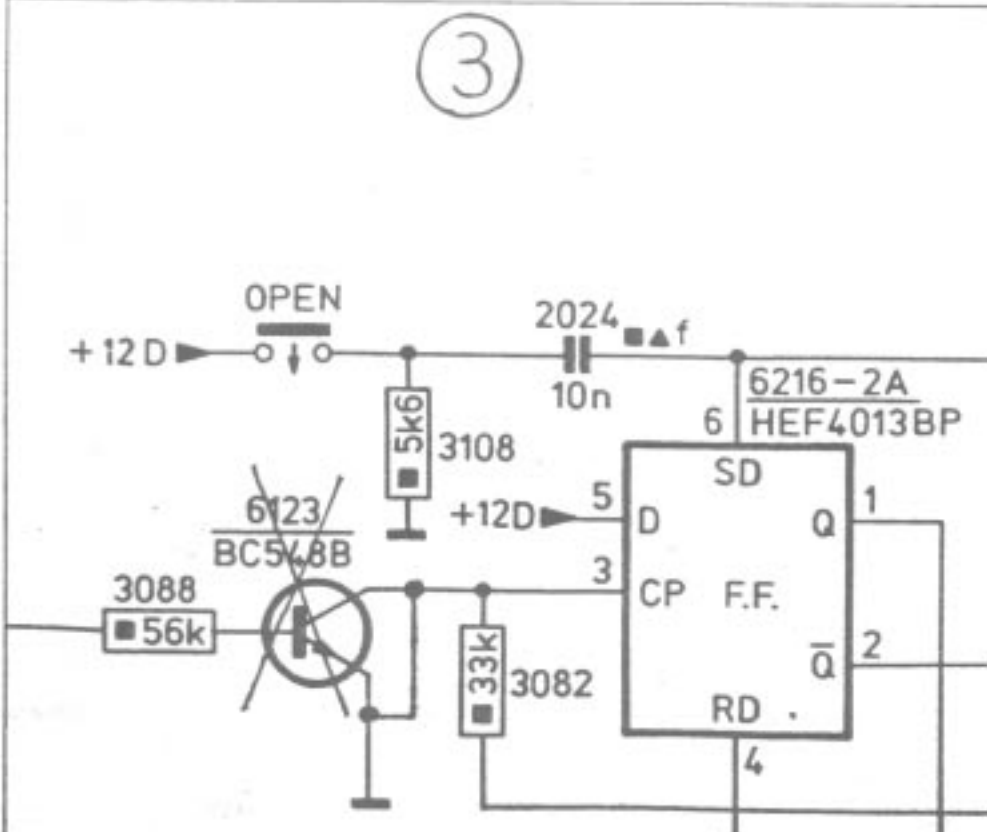
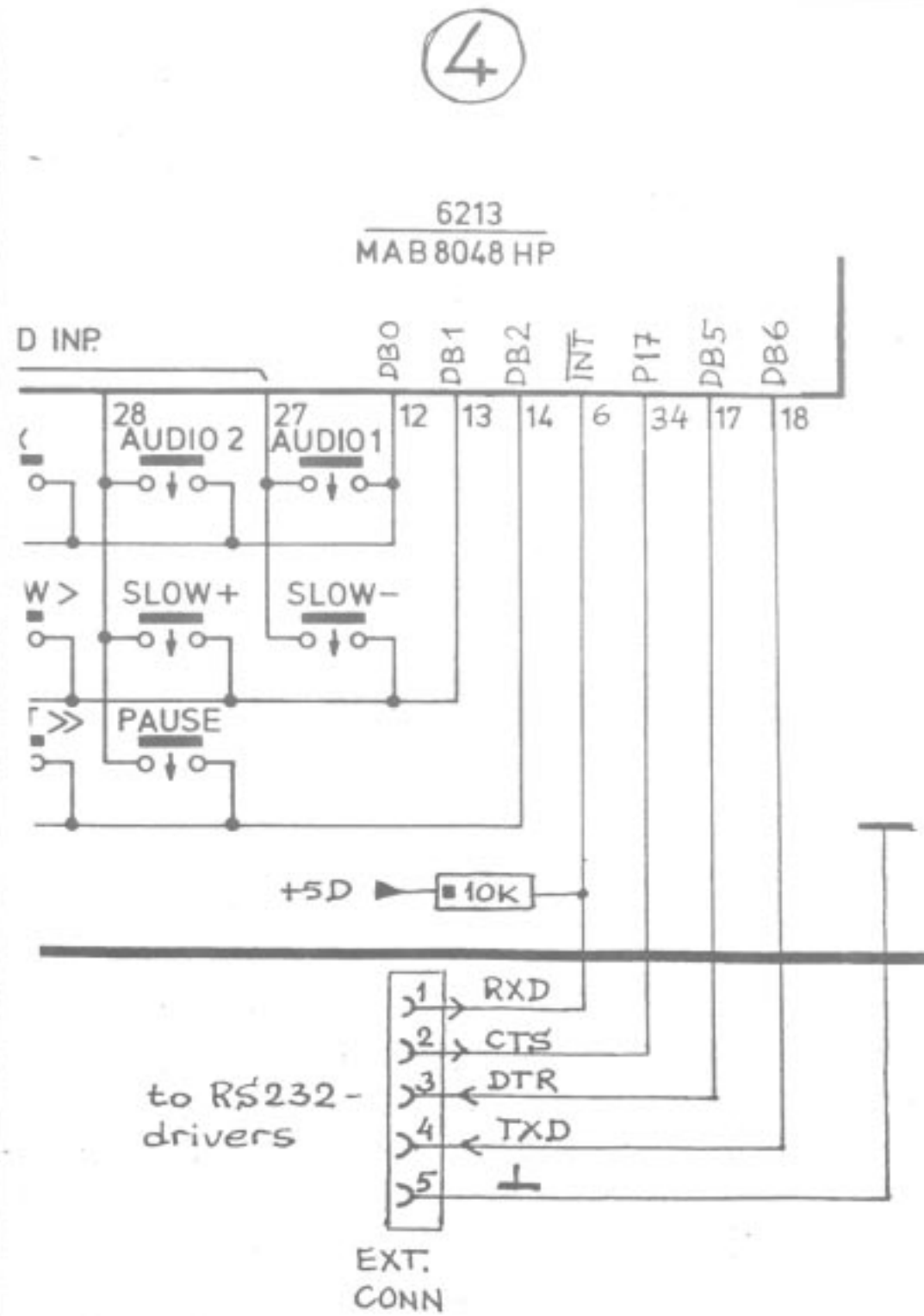
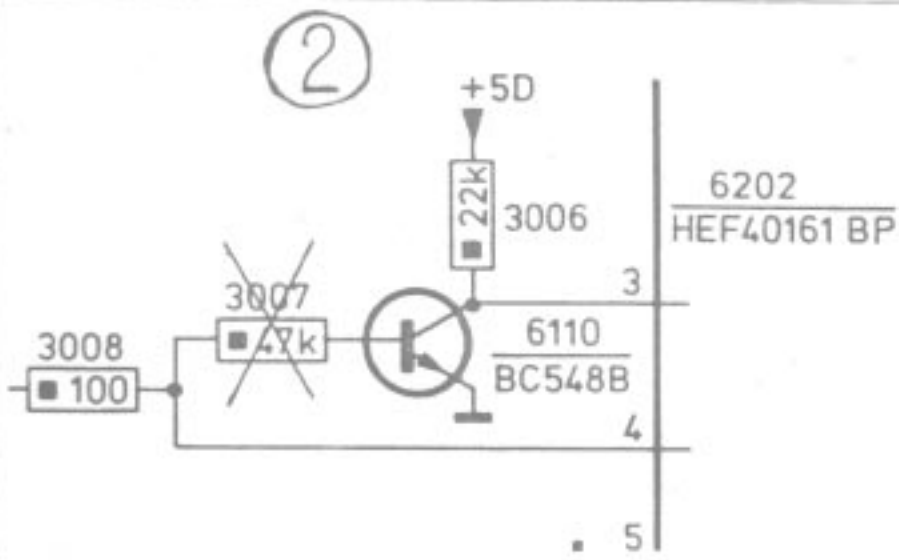
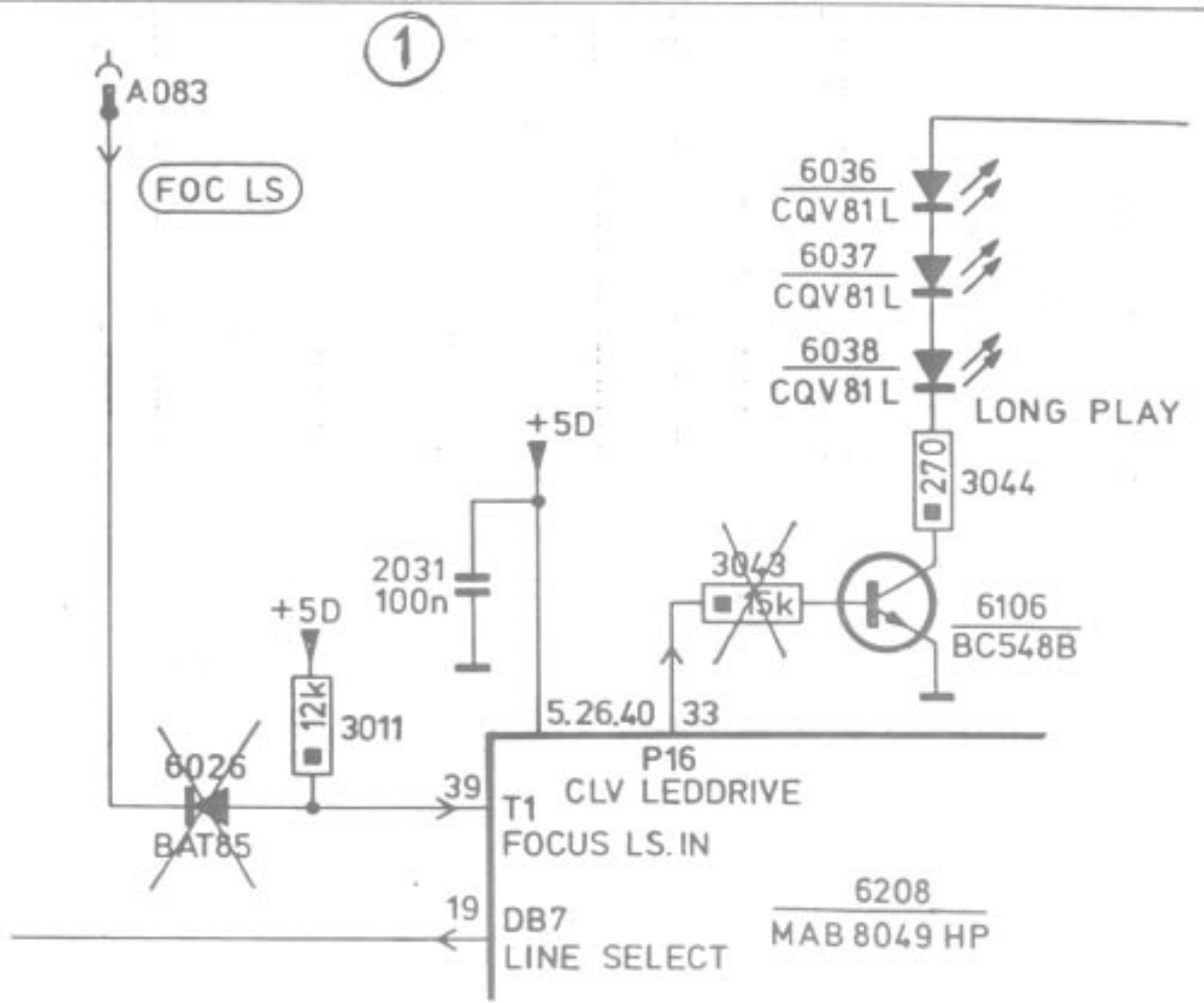
①



②



CONTROL PANEL DIAGRAM D VP932/00



GENERAL

The player is equipped with an external control Bus.
 The control bus will operate together with a driver circuit (see figure1)
 in accordance with the RS 232-C Standard.

The cable consists of :

1. Received data from external computer to LVS- player
2. Clear to send. Information from the external computer to the LVS-player that the computer is ready to accept data.
3. Data terminal ready. Information from the LVS-player to the external computer that the player is ready to accept data.
4. Transmitted data from LVS-player to external computer
5. Signal ground.

Transmission speed is 9600 baud.

Data format is one startbit, eight databits plus one stopbit. N° parity bit.

"DTR" function as always active and will provide correct timing.
 The "CTS" signal is software controlled because some computers dont make use of that signal.

A message to the LVS-player should consist of a single ascii-code plus carriage return "CR" or a string of characters plus "CR" no line feed.
 Action in player will start after "CR".
 The maximum length of a string including "CR" is XX characters.
 A longer string will be rejected.

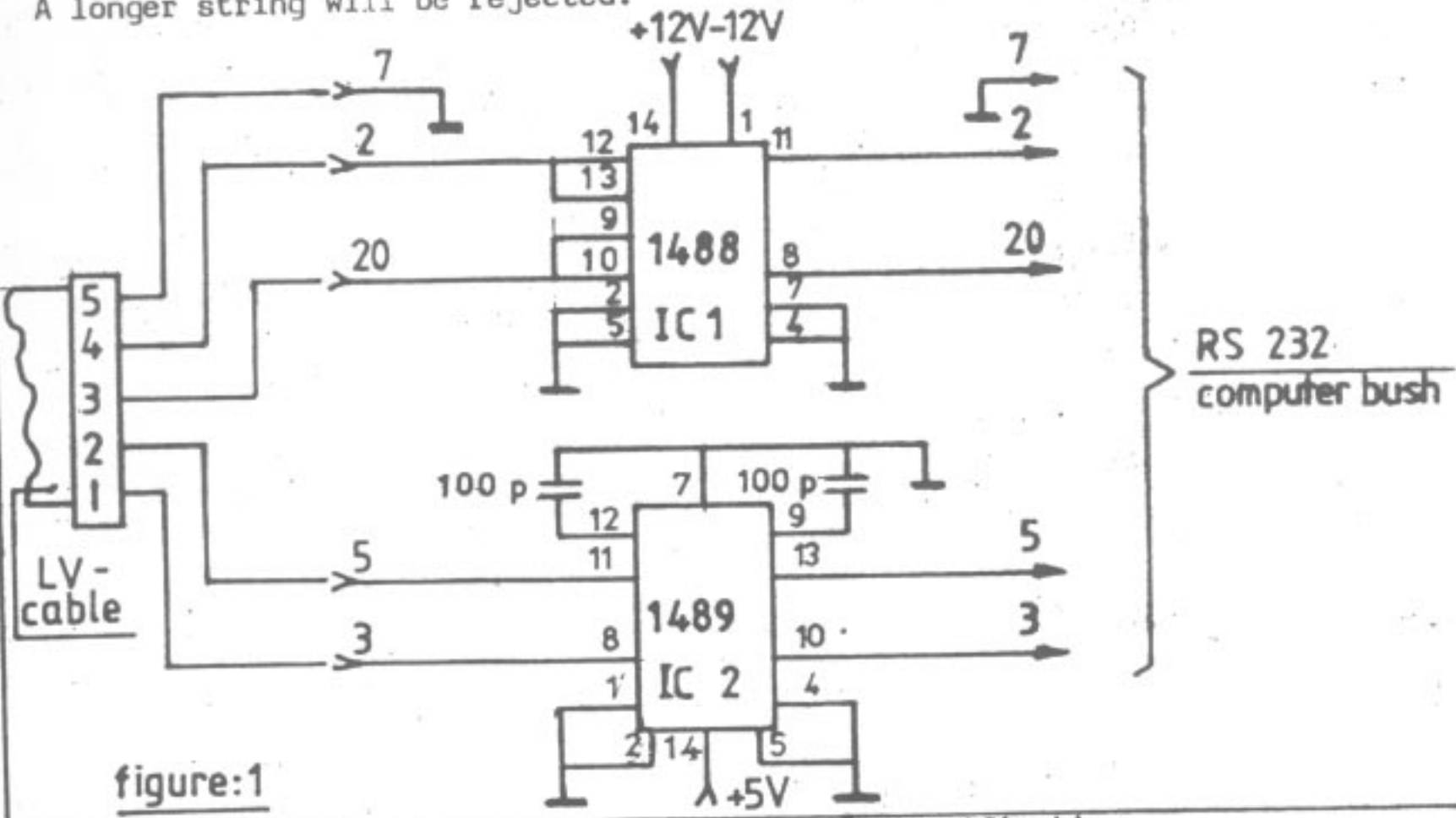


figure:1

L.V. -Player		Specification	
VP 932 /00		9022 809 32009	
83.09.29		21	10
J. Stevens	SUPERVISOR	190 - 5	
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