Service Information

Model: Nakamichi OMS-7/7E/70 (Compact Disc Player)
Serial No.: from –

Subject: Improvement of Trackability

Nakamichi

No. OOD-M-0309 (1/16)
Date 22 January 1988

Contents

1. General

1.1. Purpose

We determined to make some alteration in circuits and adjustment method of the OMS-7 in order to improve its trackability.

Points of alteration are as follows:

1. Uprating focus gain by 10 dB
2. Uprating tracking gain by 6 dB
3. Countermeasures for black dots
4. Countermeasures for track jump on an eccentric compact disc
5. Further stabilization of thermal drift of FETs
6. Uprating gain of the Disc Motor Driver by 6 dB
7. Disuse of the Mute P.C.B. Ass'y

Alterations in adjustment method are as follows: For new adjustment method, see section 3 "Adjustments".

1. Addition of offset adjustment in the RF Amp. Circuit
2. Alteration of focus offset voltage (from +40 mV ±10 mV to 0 V ±50 mV)
3. Alteration of pickup movement adjustment

As you know, Nakamichi's OMS-7 is designed to reject defective compact discs. Namely, if a compact disc does not meet the CD's own specifications, it is rejected. The reason we determined to alter this function is that we consider it impossible to expect more of a compact disc itself as well as it is difficult for you to make your customers recognize non-conformance of compact discs. What we expect you to recognize is that compact discs obtainable on the market now have any of or combination of defects in molding (defective pit shape, excessive deviation on disc surface, excessive eccentricity, etc.), defects in spattering (pin holes or uneven spatters, etc.), a lot of flaws and stains, etc. as well as that the 1-beam system adopted in the OMS-7 is completely different from the 3-beam system adopted in other models. In particular, the 1-beam system shows worse trackability if shape of pits on a compact disc is defective.

This alteration offers remarkably improved trackability and widened range of adjustment. We hope that it considerably reduces your effort in adjustment.

We recommend you to make this alteration in service work of the OMS-7 in the case of non-conforming tracking (caused by black dots, flaws, deviation on disc surface, eccentricity, etc.). Prior to making alteration, however, make sure that the OMS-7 can play back a compact disc which meets the specifications. Otherwise, it is difficult to judge whether any defect in the OMS-7 is caused by erroneous alteration or by another potential trouble.

We estimate that it will take approx. 40 minutes for alteration.

O 880102 Printed in Japan

1.2. Modification

The following parts have been modified. According to this modification, part No. of the Main P.C.B. Ass'y has been changed as follows:

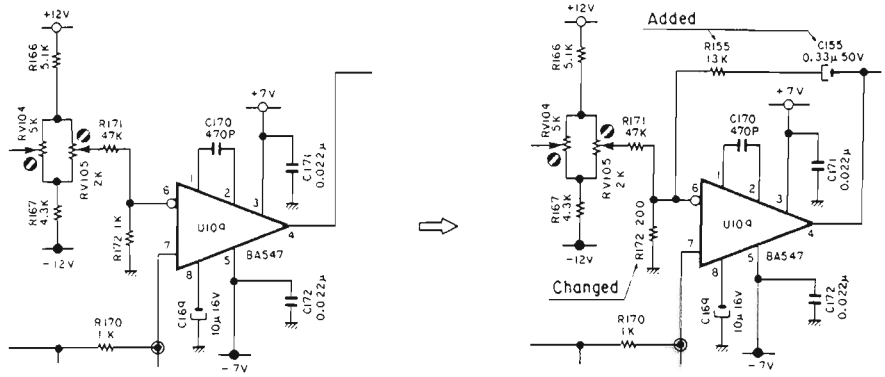
Current Part No.	New Part No.	Description
CA80246A	CA80246B	Main P.C.B. Ass'y

(1) Parts Modified (on Main P.C.B. Ass'y)

Ref. No.	Current Part No.	Current Description	New Part No.	New Description
(Focus Gain Improvement)				
C155	—	None Use	0B40209A	CE 0.33μF 50V
R155	—	None Use	0B09704A	RK 13K 1/6W J
R172	0B01857A	RK 1K 1/4W J	0B09660A	RK 200 1/6W J
(Tracking Gain Improvement)				
C145	0B41094A	CML 0.01μF 100V J	0B05582A	CML 0.022μF 50V J
C156	—	None Use	0B05796A	CML 0.047μF 50V J
R156	—	None Use	0B09723A	RK 82K 1/6W J
R163	0B09369A	RK 62K 1/4W J	0B05626A	RK 150K 1/4W J
R174	0B05626A	RK 150K 1/4W J	0B09835A	RK 300K 1/4W J
(Countermeasures for Black Dot)				
C126	0C81186A	CC 220P 50V J	0B09285A	CC 330P 50V K
R130	0B01846A	RK 4.7K 1/4W J	0B09271A	RK 6.2K 1/4W J
R132	0B05576A	RK 470 1/4W J	0B09565A	RK 1.6K 1/4W J
R133	0B05576A	RK 470 1/4W J	0B09565A	RK 1.6K 1/4W J
U104	0C80880A	IC SN74LS04N	0B11470A	IC SN74HC04N
(Countermeasures for Eccentricity)				
C150	0C81188A	CC 3300P 50V M	0B05681A	CML 0.01μF 50V J
C161	0C80930A	CC 1000P 50V M	0B05893A	CC 680P 50V K
C162	0C81193A	CC 680P 50V K	0B05880A	CC 470P 50V K
D116	0C80877A	SiD MA150	—	None Use
R187	0B09392A	RK 200K 1/4W J	0B09835A	RK 300K 1/4W J
R188	0B09392A	RK 200K 1/4W J	0B09835A	RK 300K 1/4W J
R245	0B09509A	RK 20K 1/4W J	0B01888A	RK 10K 1/4W J
(Countermeasures for Thermal Drift)				
R157	—	None Use	0B05575A	RK 560 1/4W J
R158	—	None Use	0B05575A	RK 560 1/4W J
R145	0B05622A	RK 2.2K 1/4W J	0B20507A	RK 1.1K 1/4W J
R146	0B01857A	RK 1K 1/4W J	0B05575A	RK 560 1/4W J
RV102	0C80888A	Semi VR 2K	0B07178A	Semi VR 1K

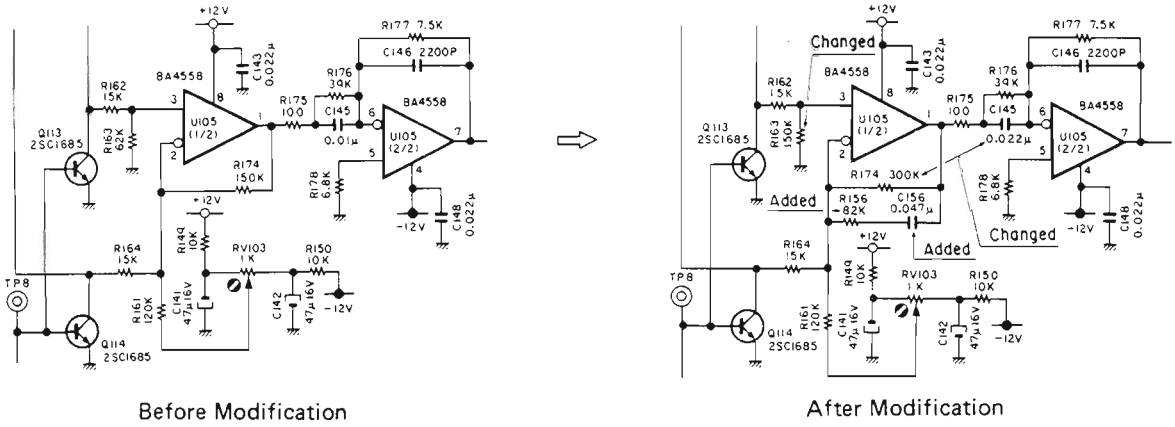
Note: SiD — Silicon Diode, RK — Carbon Resistor, CE — Electrolytic Capacitor,
CML — Mylar Capacitor, CC — Ceramic Capacitor

(2) Circuit Modification (on Main P.C.B. Ass'y)



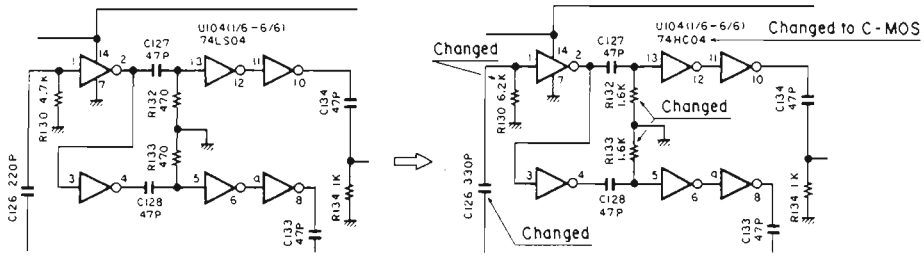
Before Modification　　After Modification

Fig. 1　Focus Gain Improvement (Approx. 10 dB Up)



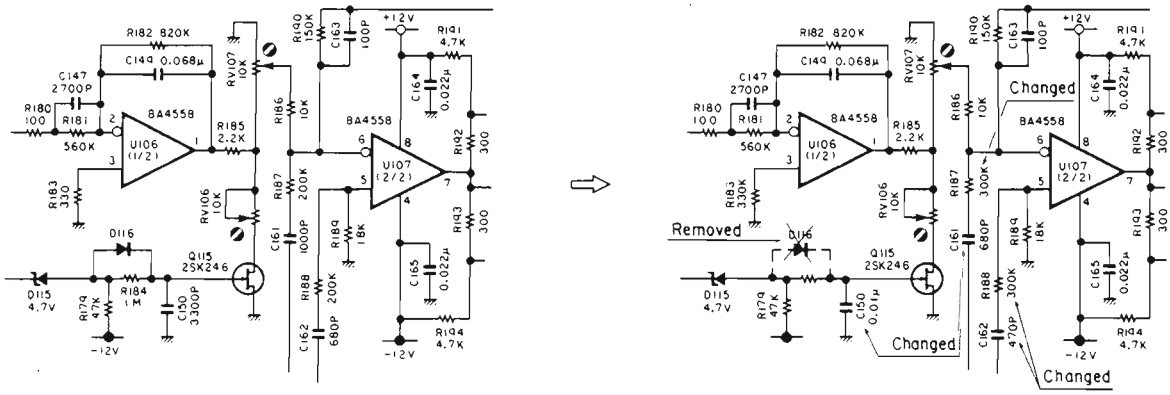
Before Modification　　After Modification

Fig. 2　Tracking Gain Improvement (Approx. 6 dB Up)



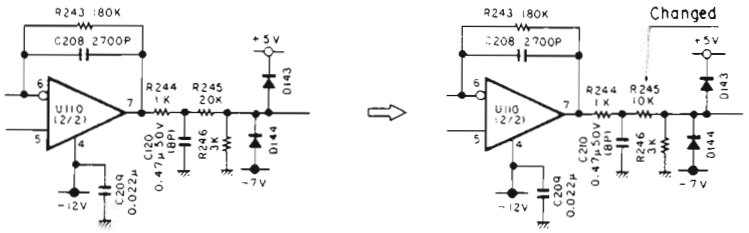
Before Modification　　After Modification

Fig. 3　Countermeasures for Black Dot



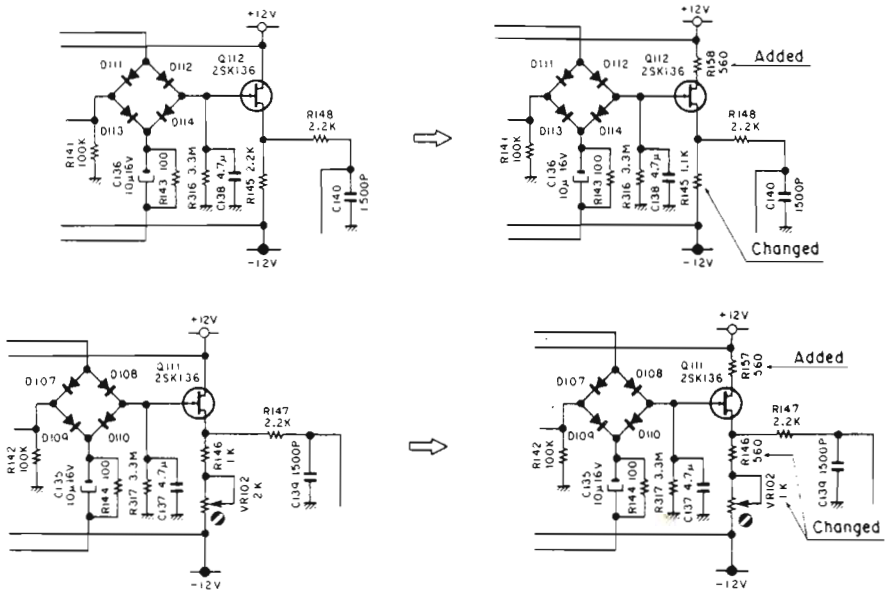
Before Modification　　After Modification

Fig. 4　Countermeasures for Eccentricity (1/2)



Before Modification After Modification

Fig. 4 Countermeasures for Eccentricity (2/2)



Before Modification After Modification

Fig. 5 Countermeasures for Thermal Drift

1.3. Compatibility (of new Main P.C.B. Ass'y with current one)

Possible. However, re-adjustment as per "3. Adjustments" is required after replacement.

2. Procedures for Modifying Current Models

2.1. Parts Required

Ref. No.	Part No.	Description		
(Focus Gain Improvement)				
C155	0B40209A	CE	0.33μF	50V
R155	0B09704A	RK	13K	1/6W J
R172	0B09660A	RK	200	1/6W J
(Tracking Gain Improvement)				
C145	0B05582A	CML	0.022μF	50V J
C156	0B05796A	CML	0.047μF	50V J
R156	0B09723A	RK	82K	1/6W J
R163	0B05626A	RK	150K	1/4W J
R174	0B09835A	RK	300K	1/4W J
(Countermeasures for Black Dot)				
C126	0B09285A	CC	330P	50V K
R130	0B09271A	RK	6.2K	1/4W J
R132	0B09565A	RK	1.6K	1/4W J
R133	0B09565A	RK	1.6K	1/4W J
U104	0B11470A	IC	SN74HC04N	
(Countermeasures for Eccentricity)				
C150	0B05681A	CML	0.01μF	50V J
C161	0B05893A	CC	680P	50V K
C162	0B05880A	CC	470P	50V K
R187	0B09835A	RK	300K	1/4W J
R188	0B09835A	RK	300K	1/4W J
R245	0B01888A	RK	10K	1/4W J
(Countermeasures for Thermal Drift)				
R157	0B05575A	RK	560	1/4W J
R158	0B05575A	RK	560	1/4W J
R145	0B20507A	RK	1.1K	1/4W J
R146	0B05575A	RK	560	1/4W J
RV102	0B07178A	Semi VR	1K	

2.2. Modification Procedures

Modify the Main P.C.B. Ass'y as follows:

Refer to REMOVAL OF CURRENT PARTS AND PATTERN CUT (Fig. 6) and MOUNTING OF NEW PARTS (Fig. 7).

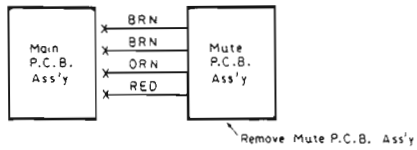
(1) Prior to modification, play back a compact disc which meets the specifications (i.e., less eccentricity, etc.) and make sure that the compact disc is played back properly.

(2) Remove the Top and Bottom Covers.

(3) Loosen the four screws that assemble the Main P.C.B. Ass'y and raise the Main P.C.B. Ass'y.

(4) Remove the Mute P.C.B. Ass'y on the Main P.C.B.

Note: Some units may not have this board installed.



(5) Remove the current parts and cut patterns referring to Fig. 6 "REMOVAL OF CURRENT PARTS AND PATTERN CUT".

Numbers of parts to be removed . . . . . 19 pcs.

Numbers of patterns to be cut . . . . . 2 places

(6) Mount new parts referring to Fig. 7 "MOUNTING OF NEW PARTS".

Numbers of parts to be mounted . . . . . 24 pcs.

(7) Visually check the modification.

(8) Make sure that the compact disc used in (1) is played back properly. If not, re-check the modification.

(9) Perform adjustment referring to "3. Adjustments".

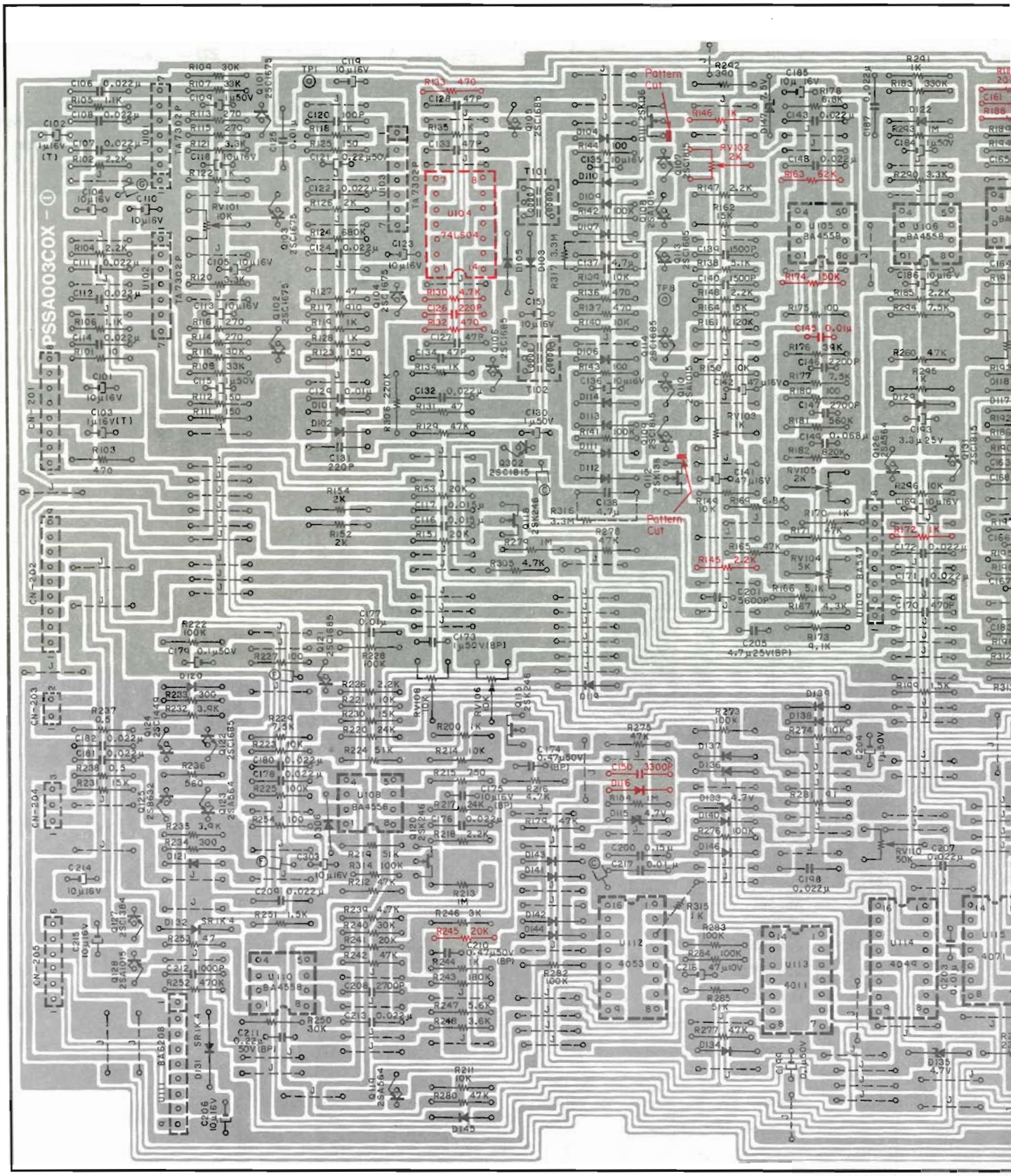
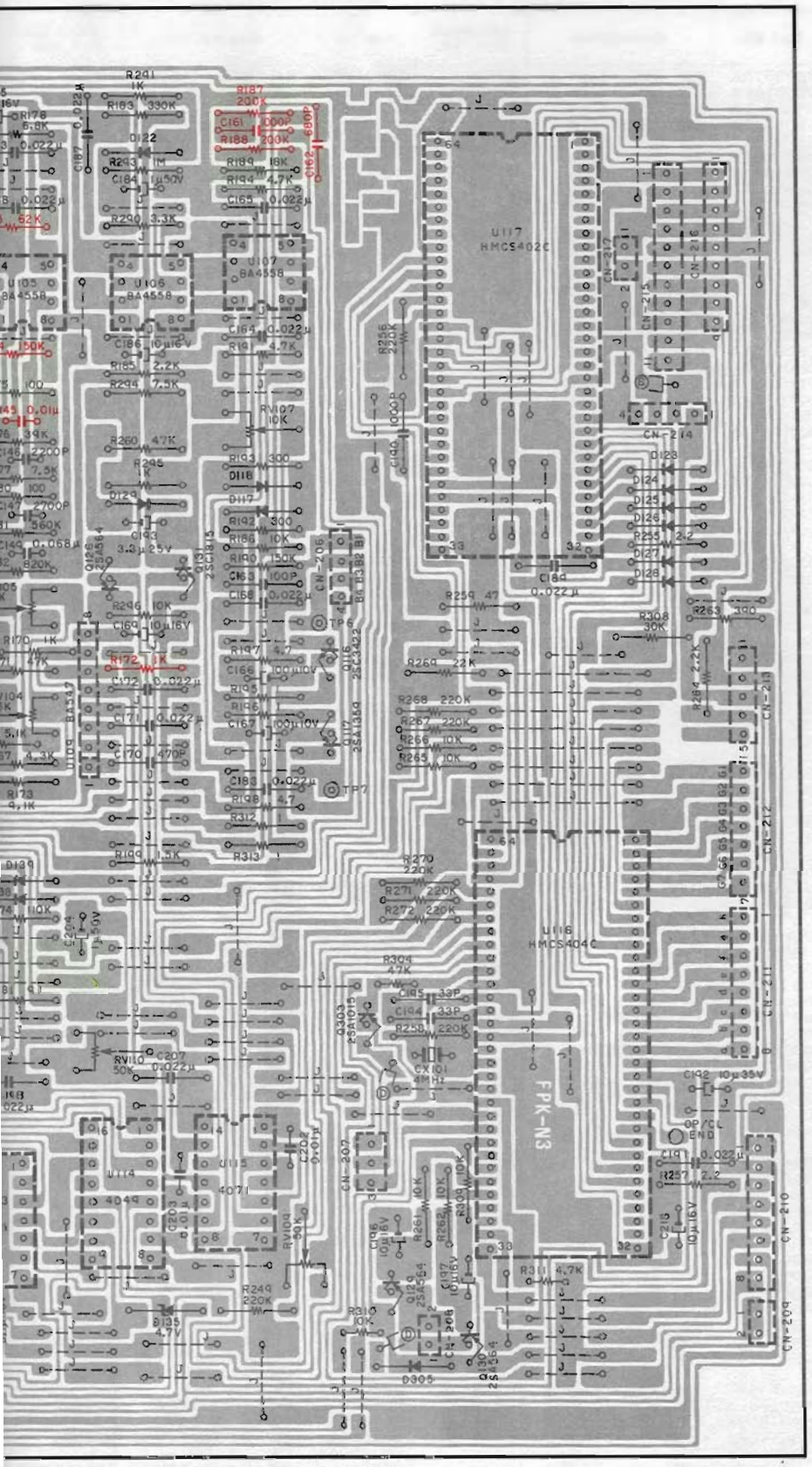


Fig. 6 (Main P.C.B. Ass'y)



.B. Ass'y)

Remove the following parts:

1. C162 (680P)
2. C161 (1000P)
3. R187 (200K)
4. R188 (200K)
5. R163 (62K)
6. R174 (150K)
7. C145 (0.01μ)
8. R172 (1K)
9. R146 (1K)
10. RV102 (2K)
11. R145 (2.2K)
12. C150 (3300P)
13. D116 (MA150)
14. R245 (20K)
15. R133 (470)
16. R132 (470)
17. R130 (4.7K)
18. C126 (220P)
19. U104 (74LS04)

Cut the following patterns:

1. Pattern between Q111 (drain) and Q107 (collector).
2. Pattern between Q112 (drain) and Q109 (collector).

Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
7.5K 1/4W J	C130	0B40112A	CE 1μ 50V	CN213	0C81413A	5P Connector Terminal
15K 1/4W J	C131	0C81186A	CC 220P 50V K			
3.9K 1/4W J	C132	0C80805A	CC 0.022μ 50V M	CN214	0C80858A	4P Connector Terminal
300 1/4W J	C133,134	0C81192A	CC 47P 50V J			
3.9K 1/4W J	C135,136	0B40009A	CE 10μ 16V	CN215	0C81133A	11P Connector Terminal
560 1/4W J	C137,138	0C81190A	CC 4.7μ 50V K			
0.5 1/4W J	C139,140	0C81185A	CC 1500P 50V M	CN216	0C81173A	9P Connector Terminal
4.7K 1/4W J	C141,142	0B40165A	CE 47μ 16V			
30K 1/4W J	C143	0C80805A	CC 0.022μ 50V M	CN217	0C81161A	2P Connector Terminal
20K 1/4W J	C145	0B05582A	CML 0.022μ 50V J			
47K 1/4W J	C146	0B04060A	CML 2200P 50V K			
180K 1/4W J	C147	0B09189A	CML 2700P 50V J			
1K 1/4W J	C148	0C80805A	CC 0.022μ 50V M			
10K 1/4W J	C149	0B41373A	CML 0.068μ 100V J			
3K 1/4W J	C150	0B05681A	CML 0.01μ 50V J			
5.6K 1/4W J	C151	0B40009A	CE 10μ 16V			
3.6K 1/4W J	C155	0B40209A	CE 0.33μ 50V			
220K 1/4W J	C156	0B05796A	CML 0.047μ 50V J			
30K 1/4W J	C161	0B05893A	CC 680P 50V K			
1.5K 1/4W J	C162	0B05880A	CC 470P 50V K			
470K 1/4W J	C163	0C81184A	CC 100P 50V J			
47 1/4W J	C164,165	0C80805A	CC 0.022μ 50V M			
100 1/4W J	C166,167	0B40063A	CE 100μ 10V			
2.2 1/4W J	C168	0C80805A	CC 0.022μ 50V M			
220K 1/4W J	C169	0B40009A	CE 10μ 16V			
2.2 1/4W J	C170	0C81191A	CC 470P 50V K			
220K 1/4W J	C171,172	0C80805A	CC 0.022μ 50V M			
47 1/4W J	C173	0B40199A	CE 1μ 50V (BP)			
47K 1/4W J	C174	0B40240A	CE 0.47μ 50V (BP)			
10K 1/4W J	C175	0B40246A	CE 10μ 16V (BP)			
390 1/4W J	C176	0C80805A	CC 0.022μ 50V M			
2.2K 1/4W J	C177	0C81183A	CC 0.01μ 50V M			
10K 1/4W J	C178	0C80805A	CC 0.022μ 50V M			
220K 1/4W J	C179	0C81205A	CE 0.1μ 50V (LN)			
22K 1/4W J	C180,181	0C80805A	CC 0.022μ 50V M			
220K 1/4W J	C182,183	0C80805A	CC 0.022μ 50V M			
220K 1/4W J	C184	0B40112A	CE 1μ 50V			
100K 1/4W J	C185,186	0B40009A	CE 10μ 16V			
110K 1/4W J	C187	0C80805A	CC 0.022μ 50V M			
47K 1/4W J	C189	0C80805A	CC 0.022μ 50V M			
100K 1/4W J	C190	0C80930A	CC 1000P 50V M			
47K 1/4W J	C191	0C80805A	CC 0.022μ 50V M			
1M 1/4W J	C192	0B40020A	CE 10μ 35V			
47K 1/4W J	C193	0B40013A	CE 3.3μ 25V			
91 1/4W J	C194,195	0C81189A	CC 33P 50V J			
100K 1/4W J	C196,197	0B40009A	CE 10μ 16V			
100K 1/4W J	C198	0C80805A	CC 0.022μ 50V M			
51K 1/4W J	C199	0C81205A	CE 0.1μ 50V (LN)			
3.3K 1/4W J	C200	0B41175A	CML 0.15μ 63V			
1K 1/4W J	C201	0B05659A	CML 5600P 100V			
390 1/4W J	C202,203	0B41094A	CML 0.01μ 100V J			
1M 1/4W J	C204	0B40112A	CE 1μ 50V			
7.5K 1/4W J	C205	0B40243A	CE 4.7μ 25V (BP)			
1K 1/4W J	C206	0B40009A	CE 10μ 16V			
10K 1/4W J	C207	0C80805A	CC 0.022μ 50V M			
10K 1/4W J	C208	0B81187A	CC 2700P 50V M			
4.7K 1/4W J	C209	0C80805A	CC 0.022μ 50V M			
10K 1/4W J	C210	0B40240A	CE 0.47μ 50V (BP)			
47K 1/4W J	C211	0B40238A	CE 0.22μ 50V (BP)			
4.7K 1/4W J	C212	0C80930A	CC 1000P 50V M			
220K 1/4W J	C213	0C80805A	CC 0.022μ 50V M			
30K 1/4W J	C214,215	0B40009A	CE 10μ 16V			
10K 1/4W J	C216	0B40008A	CE 47μ 16V			
4.7K 1/4W J	C217	0C81183A	CC 0.01μ 50V M			
1 1/4W J	C218	0B40009A	CE 10μ 16V			
100K 1/4W J	C301	0B05898A	CE 0.15μ 50V			
1K 1/4W J	C302	0B40115A	CE 4.7μ 50V			
3.3M 1/4W J	C303	0B40009A	CE 10μ 16V			
10μ 16V 1μ 16V	CN201	0C80837A	8P Connector Terminal			
10μ 16V 0.022μ 50V M	CN202	0C81173A	9P Connector Terminal			
0.022μ 50V M 1μ 50V	CN203	0C80856A	2P Connector Terminal			
10μ 16V 0.022μ 50V M	CN204	0C80857A	3P Connector Terminal			
10μ 16V 0.022μ 50V M	CN205	0C80836A	6P Connector Terminal			
1μ 50V 0.015μ 50V M	CN206	0C80858A	4P Connector Terminal			
10μ 16V 10μ 16V	CN207	0C80857A	3P Connector Terminal			
100P 50V J 0.22μ 50V	CN208	0C80856A	2P Connector Terminal			
0.022μ 50V M 10μ 16V	CN209	0C80856A	2P Connector Terminal			
0.022μ 50V M 0.01μ 50V M	CN210,211	0C80837A	8P Connector Terminal			
330P 50V K 47P 50V J 0.01μ 50V M	CN212	0C81172A	7P Connector Terminal			

Note:

TR — Transistor
ZD — Zener Diode
SiD — Silicon Diode
RK — Carbon Resistor
CE — Electrolytic Capacitor
CT — Tantalum Capacitor
CML — Mylar Capacitor
CC — Ceramic Capacitor

PARTS LIST OF MODIFIED MAIN P.C.B. ASS'Y

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.
	CA80246B	Main P.C.B. Ass'y	R109,110	0B09075A	RK 30K 1/4W J	R229	0B09183A	RK 7.5K 1/4W J	C130
			R111,112	0B05795A	RK 150 1/4W J	R230,231	0B01683A	RK 15K 1/4W J	C131
	0C81196A	Main P.C.B.	R113,114	0B05645A	RK 270 1/4W J	R232	0B05675A	RK 3.9K 1/4W J	C132
U101,102	0C80740A	IC TA7302P	R115,116	0B05645A	RK 270 1/4W J	R233,234	0B05967A	RK 300 1/4W J	C133,134
U103	0C80740A	IC TA7302P	R117	0B09272A	RK 910 1/4W J	R235	0B05675A	RK 3.9K 1/4W J	C135,136
U104	0B11470A	IC SN74HC04N	R118,119	0B01857A	RK 1K 1/4W J	R236	0B05575A	RK 560 1/4W J	C137,138
U105,106	0C80923A	IC BA4558	R120,121	0B01681A	RK 3.3K 1/4W J	R237,238	0C81131A	RK 0.5 1/4W J	C139,140
U107,108	0C80923A	IC BA4558	R122	0B01857A	RK 1K 1/4W J	R239	0B01846A	RK 4.7K 1/4W J	C141,142
U109	0C80732A	IC BA547	R123	0B05795A	RK 150 1/4W J	R240	0B09075A	RK 30K 1/4W J	C143
U110	0C80923A	IC BA4558	R124	0B05868A	RK 680K 1/4W J	R241	0B09509A	RK 20K 1/4W J	C145
U111	0C80733A	IC BA6208	R125	0B05795A	RK 150 1/4W J	R242	0B05641A	RK 47K 1/4W J	C146
U112	0C80734A	IC HD4053BP	R126	0B09301A	RK 2K 1/4W J	R243	0B05640A	RK 180K 1/4W J	C147
U113	0B06178A	IC μPD4011BC	R127	0B01706A	RK 47 1/4W J	R244	0B01857A	RK 1K 1/4W J	C148
U114	0B06215A	IC TC4049BP	R128	0B01857A	RK 1K 1/4W J	R245	0B01888A	RK 10K 1/4W J	C149
U115	0B06214A	IC μPD4071BC	R129	0B05641A	RK 47K 1/4W J	R246	0B09826A	RK 3K 1/4W J	C150
U116	0C80736A	IC HMCS404C	R130	0B09271A	RK 6.2K 1/4W J	R247	0B01887A	RK 5.6K 1/4W J	C151
U117	0C80735A	IC HMCS402C	R131	0B01706A	RK 47 1/4W J	R248	0B09556A	RK 3.6K 1/4W J	C155
Q101,102	0C80741A	TR 2SC1675	R132,133	0B09565A	RK 1.6K 1/4W J	R249	0B05625A	RK 220K 1/4W J	C156
Q103,104	0C80741A	TR 2SC1675	R134,135	0B01857A	RK 1K 1/4W J	R250	0B09075A	RK 30K 1/4W J	C161
Q105,106	0C80739A	TR 2SC1685	R136	0B05576A	RK 470 1/4W J	R251	0B05698A	RK 1.5K 1/4W J	C162
Q107	0C80742A	TR 2SC1815	R137	0B05576A	RK 470 1/4W J	R252	0B01684A	RK 470K 1/4W J	C163
Q108	0C80743A	TR 2SA1015	R138	0B09388A	RK 5.1K 1/4W J	R253	0B01706A	RK 47 1/4W J	C164,165
Q109	0C80742A	TR 2SC1815	R139,140	0B01888A	RK 10K 1/4W J	R254	0B01679A	RK 100 1/4W J	C166,167
Q110	0C80743A	TR 2SA1015	R141,142	0B01889A	RK 100K 1/4W J	R255	0B09925A	RK 2.2 1/4W J	C168
Q111,112	0C80744A	FET 2SK136	R143,144	0B01679A	RK 100 1/4W J	R256	0B05625A	RK 220K 1/4W J	C169
Q113,114	0C80739A	TR 2SC1685	R145	0B20507A	RK 1.1K 1/4W J	R257	0B09925A	RK 2.2 1/4W J	C170
Q115	0C80745A	FET 2SK246	R146	0B05575A	RK 560 1/4W J	R258	0B05625A	RK 220K 1/4W J	C171,172
Q116	0C80750A	TR 2SC3422	R147	0B05622A	RK 2.2K 1/4W J	R259	0B01706A	RK 47 1/4W J	C173
Q117	0C80751A	TR 2SA1359	R148	0B05622A	RK 2.2K 1/4W J	R260	0B05641A	RK 47K 1/4W J	C174
Q118	0C80745A	FET 2SK246	R149,150	0B01888A	RK 10K 1/4W J	R261,262	0B01888A	RK 10K 1/4W J	C175
Q119	0C80747A	TR 2SA564	R151	0B09509A	RK 20K 1/4W J	R263	0B05688A	RK 390 1/4W J	C176
Q120	0C80745A	FET 2SK246	R152	0B09301A	RK 2K 1/4W J	R264	0B05622A	RK 2.2K 1/4W J	C177
Q121,122	0C80739A	TR 2SC1685	R153	0B09509A	RK 20K 1/4W J	R265,266	0B01888A	RK 10K 1/4W J	C178
Q123	0C80747A	TR 2SA564	R154	0B09301A	RK 2K 1/4W J	R267,268	0B05625A	RK 220K 1/4W J	C179
Q124	0C80746A	TR 2SC1449	R155	0B09704A	RK 13K 1/6W J	R269	0B05615A	RK 22K 1/4W J	C180,181
Q125	0C80738A	TR 2SB632	R156	0B09723A	RK 82K 1/6W J	R270,271	0B05625A	RK 220K 1/4W J	C182,183
Q126	0C80747A	TR 2SA564	R157,158	0B05575A	RK 560 1/4W J	R272	0B05625A	RK 220K 1/4W J	C184
Q127	0C80748A	TR 2SC1384	R161	0B05621A	RK 120K 1/4W J	R273	0B01889A	RK 100K 1/4W J	C185,186
Q128	0C80743A	TR 2SA1015	R162	0B01683A	RK 15K 1/4W J	R274	0B09072A	RK 110K 1/4W J	C187
Q129,130	0C80747A	TR 2SA564	R163	0B05626A	RK 150K 1/4W J	R275	0B05641A	RK 47K 1/4W J	C189
Q131	0C80742A	TR 2SC1815	R164	0B01683A	RK 15K 1/4W J	R276	0B01889A	RK 100K 1/4W J	C190
Q301	0C80743A	TR 2SA1015	R165	0B05641A	RK 47K 1/4W J	R277,278	0B05641A	RK 47K 1/4W J	C191
Q302	0C80742A	TR 2SC1815	R166	0B09388A	RK 5.1K 1/4W J	R279	0B05776A	RK 1M 1/4W J	C192
Q303	0C80743A	TR 2SA1015	R167	0B09307A	RK 4.3K 1/4W J	R280	0B05641A	RK 47K 1/4W J	C193
Q304	0C80739A	TR 2SC1685	R169	0B01682A	RK 6.8K 1/4W J	R281	0C81132A	RK 91 1/4W J	C194,195
D101,102	0C80877A	SiD MA150	R170	0B01857A	RK 1K 1/4W J	R282,283	0B01889A	RK 100K 1/4W J	C196,197
D103,104	0C80877A	SiD MA150	R171	0B05641A	RK 47K 1/4W J	R284	0B01889A	RK 100K 1/4W J	C198
D105,106	0C80877A	SiD MA150	R172	0B09660A	RK 200 1/6W J	R285	0B05876A	RK 51K 1/4W J	C199
D107,108	0C80877A	SiD MA150	R173	0B05694A	RK 9.1K 1/4W J	R290	0B01681A	RK 3.3K 1/4W J	C200
D109,110	0C80877A	SiD MA150	R174	0B09835A	RK 300K 1/4W J	R291	0B01857A	RK 1K 1/4W J	C201
D111,112	0C80877A	SiD MA150	R175	0B01679A	RK 100 1/4W J	R292	0B05688A	RK 390 1/4W J	C202,203
D113,114	0C80877A	SiD MA150	R176	0B01854A	RK 39K 1/4W J	R293	0B05776A	RK 1M 1/4W J	C204
D115	0C80902A	ZD 4.7V MA1047	R177	0B09183A	RK 7.5K 1/4W J	R294	0B09183A	RK 7.5K 1/4W J	C205
D117	0C80877A	SiD MA150	R178	0B01682A	RK 6.8K 1/4W J	R295	0B01857A	RK 1K 1/4W J	C206
D118,119	0C80877A	SiD MA150	R179	0B05641A	RK 47K 1/4W J	R296	0B01888A	RK 10K 1/4W J	C207
D120,121	0C80877A	SiD MA150	R180	0B01679A	RK 100 1/4W J	R301	0B01888A	RK 10K 1/4W J	C208
D122,123	0C80877A	SiD MA150	R181	0B05784A	RK 560K 1/4W J	R302	0B01846A	RK 4.7K 1/4W J	C209
D124,125	0C80877A	SiD MA150	R182	0B09320A	RK 820K 1/4W J	R303	0B01888A	RK 10K 1/4W J	C210
D126,127	0C80877A	SiD MA150	R183	0B05627A	RK 330K 1/4W J	R304	0B05641A	RK 47K 1/4W J	C211
D128,129	0C80877A	SiD MA150	R184	0B05776A	RK 1M 1/4W J	R305	0B01846A	RK 4.7K 1/4W J	C212
D131,132	0C80824A	SiD SR1K4	R185	0B05622A	RK 2.2K 1/4W J	R306	0B05625A	RK 220K 1/4W J	C213
D133	0C80902A	ZD 4.7V MA1047	R186	0B01888A	RK 10K 1/4W J	R308	0B09075A	RK 30K 1/4W J	C214,215
D134	0C80877A	SiD MA150	R187,188	0B09835A	RK 300K 1/4W J	R309,310	0B01888A	RK 10K 1/4W J	C216
D135	0C80902A	ZD 4.7V MA1047	R189	0B05560A	RK 18K 1/4W J	R311	0B01846A	RK 4.7K 1/4W J	C217
D136,137	0C80877A	SiD MA150	R190	0B05626A	RK 150K 1/4W J	R312,313	0B05795A	RK 1 1/4W J	C218
D138,139	0C80877A	SiD MA150	R191	0B01846A	RK 4.7K 1/4W J	R314	0B01889A	RK 100K 1/4W J	C301
D140,141	0C80877A	SiD MA150	R192,193	0B05967A	RK 300 1/4W J	R315	0B01857A	RK 1K 1/4W J	C302
D142,143	0C80877A	SiD MA150	R194	0B01846A	RK 4.7K 1/4W J	R316,317	0B09784A	RK 3.3M 1/4W J	C303
D144,145	0C80877A	SiD MA150	R195,196	0B05695A	RK 1 1/4W J	C101	0B40009A	CE 10μ 16V	CN201
D146	0C80877A	SiD MA150	R197,198	0B09753A	RK 4.7 1/4W J	C102,103	0B40278A	CT 1μ 16V	
D147	0C80863A	ZD 7.5V MA1075	R199	0B05698A	RK 1.5K 1/4W J	C104,105	0B40009A	CE 10μ 16V	CN202
D301	0C80877A	SiD MA150	R200	0B01857A	RK 1K 1/4W J	C106,107	0C80805A	CC 0.022μ 50V M	
D305,306	0C80877A	SiD MA150	R211	0B01888A	RK 10K 1/4W J	C108	0C80805A	CC 0.022μ 50V M	CN203
CX101	0C81179A	Crystal 4MHz	R212	0B05641A	RK 47K 1/4W J	C109	0B40112A	CE 1μ 50V	
T101,102	0C80876A	Pulse Transformer	R213	0B05776A	RK 1M 1/4W J	C110	0B40009A	CE 10μ 16V	CN204
RV101	0C80887A	Potentiometer 10K	R214	0B01888A	RK 10K 1/4W J	C111,112	0C80805A	CC 0.022μ 50V M	
RV102	0B07178A	Potentiometer 1K	R215	0B09924A	RK 750 1/4W J	C113	0B40009A	CE 10μ 16V	CN205
RV103	0B07178A	Potentiometer 1K	R216	0B01846A	RK 4.7K 1/4W J	C114	0C80805A	CC 0.022μ 50V M	
RV104	0C80889A	Potentiometer 5K	R217	0B09548A	RK 24K 1/4W J	C115	0B40112A	CE 1μ 50V	CN206
RV105	0C80888A	Potentiometer 2K	R218	0B05622A	RK 2.2K 1/4W J	C116,117	0C81182A	CC 0.015μ 50V M	
RV106,107	0C80887A	Potentiometer 10K	R219	0B05876A	RK 51K 1/4W J	C118	0B40009A	CE 10μ 16V	CN207
RV108	0C80887A	Potentiometer 10K	R220	0B09548A	RK 24K 1/4W J	C119	0B40009A	CE 10μ 16V	
RV109,110	0C80890A	Potentiometer 50K	R221	0B01888A	RK 10K 1/4W J	C120	0C81184A	CC 100P 50V J	CN208
R101	0B05936A	RK 10 1/4W J	R222	0B01889A	RK 100K 1/4W J	C121	0B40023A	CE 0.22μ 50V	
R102	0B05622A	RK 2.2K 1/4W J	R223	0B01888A	RK 10K 1/4W J	C122	0C80805A	CC 0.022μ 50V M	CN209
R103	0B05576A	RK 470 1/4W J	R224	0B05876A	RK 51K 1/4W J	C123	0B40009A	CE 10μ 16V	
R104	0B05622A	RK 2.2K 1/4W J	R225	0B01889A	RK 100K 1/4W J	C124	0C80805A	CC 0.022μ 50V M	CN210,211
R105,106	0C81130A	RK 1.1K 1/4W J	R226	0B05622A	RK 2.2K 1/4W J	C125	0C81183A	CC 0.01μ 50V M	
R107,108	0B05509A	RK 33K 1/4W J	R227	0B01679A	RK 100 1/4W J	C126	0B09285A	CC 330P 50V K	CN212
			R228	0B01889A	RK 100K 1/4W J	C127,128	0C81192A	CC 47P 50V J	
						C129	0C81183A	CC 0.01μ 50V M	

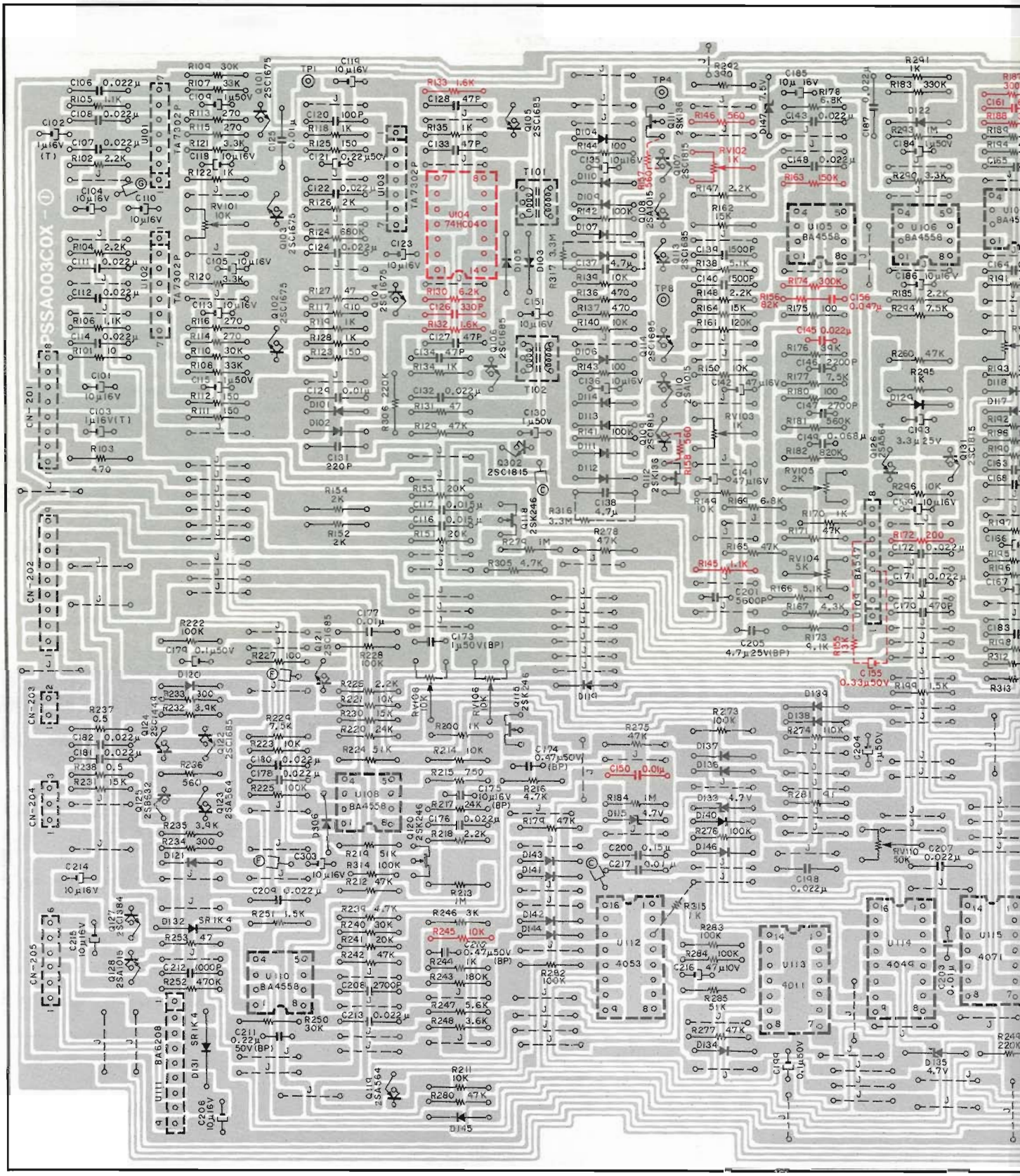
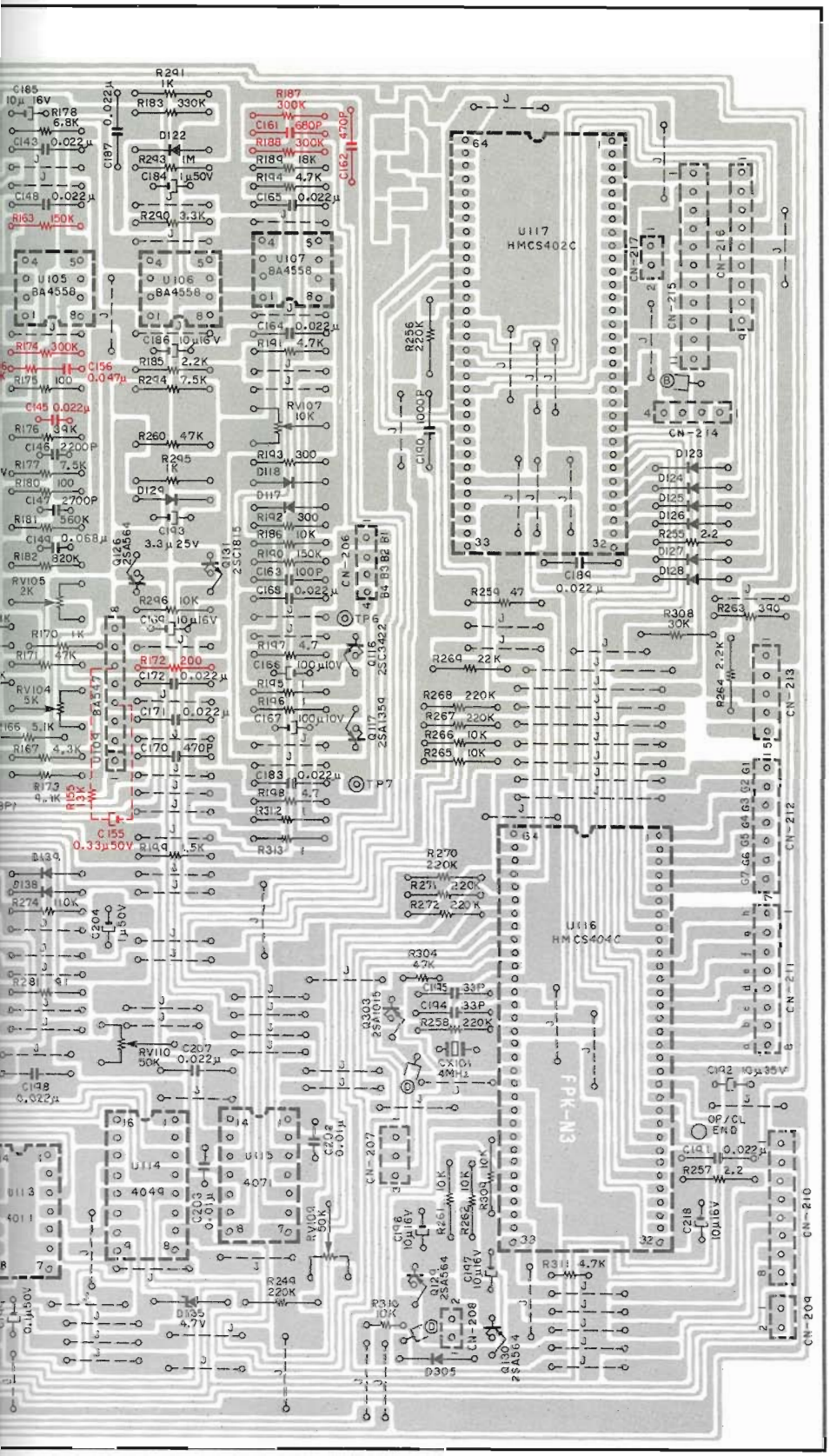


Fig. 7 (Main P.C.B. Ass'y)



B. Ass'y)

Mount the following parts:

1. C162 (470P)
2. C161 (680P)
3. R187 (300K)
4. R188 (300K)
5. R163 (150K)
6. R174 (300K)
7. (R156 (82K) + C156 (0.047μ)) across R174 (on the dip side of P.C.B.)
8. C145 (0.022μ)
9. R172 (200)
10. (R155 (13K) + C155 (0.33μ 50V)) between pins 4 and 6 of U109 (connect positive side of 0.33μ 50V to pin 4)
11. R146 (560)
12. RV102 (1K)
13. R145 (1.1K)
14. C150 (0.01μ)
15. R245 (10K)
16. R133 (1.6K)
17. R132 (1.6K)
18. R130 (6.2K)
19. C126 (330P)
20. U104 (74HC04, C-MOS)
21. R157 (560) between Q111 (drain) and Q107 (collector)
22. R158 (560) between Q112 (drain) and Q109 (collector)

3.3. Adjustment Instructions

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
1	Laser Power Adjustment	None	Optical Power Meter to Pickup Lens or DC Voltmeter across RM09 on Auto Power Control P.C.B.	Auto Power Control P.C.B. RVM01	**1. Using Optical Power Meter** a. Unsolder one of the leads of diode D135 on the Main P.C.B. Ass'y. b. See Fig. 9. Remove the Feed Motor Belt and, with rotating the Pulley, position the Pickup so that an optical power meter can be put onto the lens of the Pickup. Position the optical power meter at such a position and angle that provide maximum power meter reading. c. Check that RVM01 is at full counterclockwise position, and then turn ON the power. d. Rotate RVM01 slowly clockwise until the power meter reads 0.27 mW. (The value of 0.27 mW was determined just to provide a margin for the maximum laser power value when a new Pickup is attached. It does not mean that the laser diode is broken down at once by a laser power in excess of 0.27 mW (but below 0.30 mW). When you adjust the laser power, however, pay enough attention to the following caution.) **Caution:** When you rotate RVM01, the laser power is slow in responding to the RVM01 rotation. So adjust RVM01 gradually to prevent the laser power exceeding 0.30 mW. If 0.30 mW is exceeded even for an instance, the laser diode can be degraded or, in the worst case, broken down. e. Turn OFF the power and then solder the lead of D135 and put the belt on the feed motor. **2. Without using Optical Power Meter** Note: This adjustment is ineffective if laser diode is broken. a. Unsolder one of the leads of diode D135 on the Main P.C.B. Ass'y. b. Connect a DC voltmeter across RM09 (180-ohm 1 W) on the Auto Power Control P.C.B. Ass'y. c. Check that RVM01 is at full counterclockwise position, and then turn ON the power. d. Rotate RVM01 slowly clockwise until the reading on the DC voltmeter reaches 90% of the operating current Io. Io is marked on the label on the Pickup. Example: If Io is 37 mA, the voltmeter reading which corresponds to 90% of Io is 0.037 (A) x 0.9 x 180 (ohms) = 5.99 (V). **Caution:** Use care not to exceed Io at any moment, otherwise the Pickup will be damaged. In this example (Io = 37 mA), the limit is 6.66 V. e. Turn OFF the power and then solder the lead of D135.

3. Adjustments

3.1. Parts Location for Adjustment

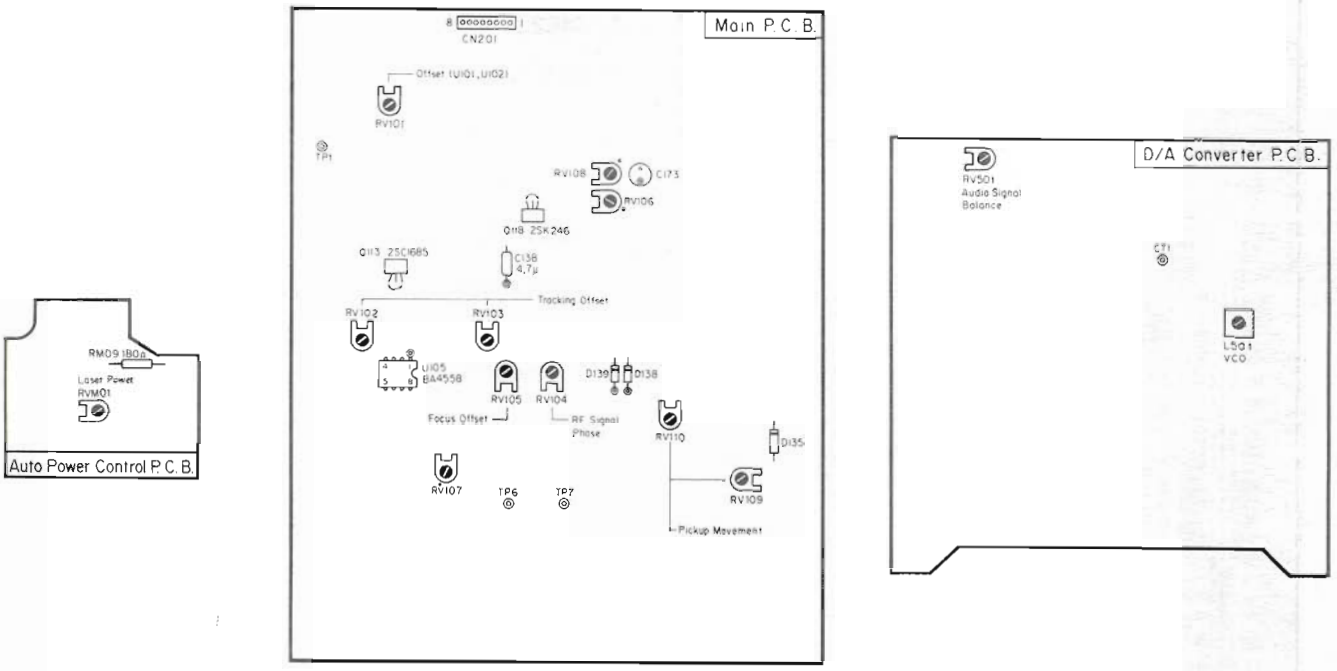


Fig. 8

3.2. Note

Pay attention to the following before adjustment.

(1) Keep the Compact Disc Player horizontal during adjustment.

(2) Before starting adjustment, allow 20 minutes in Stop mode after the power is turned ON. Offset voltage will be stabilized in this period of time.

(3) When a test disc (Philips 5 or 5A) is used, perform the adjustment while listening to the playback sound.

(4) Connect a low pass filter (pass band: 4 Hz to 20 kHz) in series to the distortion meter to be used.

(5) When the Main P.C.B. Ass'y is replaced with new one, set each of the trimming potentiometers as follows:

RV106, RV107: 1 o'clock direction (marked on the P.C.B.)

RV108: 10 o'clock direction (marked on the P.C.B.)

Others: Mechanical center positions

(6) Trimming potentiometers that are not stated in the adjustment instructions must be set to the preset positions stated in (5).

(7) When the Auto Power Control P.C.B. Ass'y or Pickup is replaced with new one, turn the trimming potentiometer RVM01 full counterclockwise to prevent damage to the Pickup.

(8) Keep the Pickup Lens clean. Carefully clean it with lens cleaner or similar tools.

Danger: Invisible laser radiation when opened and interlock failed or defeated. Avoid direct exposure to beam.

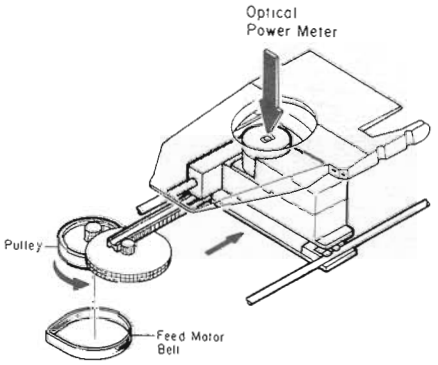


Fig. 9

3.3. Adjustment In

STEP	ITEM
1	Laser Powe Adjustment

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
2	Focus Offset Adjustment		Oscilloscope to TP7 on Main P.C.B.	Main P.C.B. RV105	1. Set an oscilloscope to DC mode and 50 mV/div., and connect it to TP7. 2. Short between the source and the drain of Q118. 3. Adjust RV105 to obtain 0 ±50 mV on the oscilloscope. 4. Remove the short of Q118.
3	Tracking Offset Adjustment		Oscilloscope to TP6 on Main P.C.B.	Main P.C.B. RV102 RV103	1. Set an oscilloscope to DC mode and 50 mV/div., and connect it to TP6. 2. Adjust RV103 to obtain 0 ±20 mV on the oscilloscope. Note: Before adjustment, allow 2 minutes after power is turned ON. 3. Short between pins 4 (A+C signal) and 5 (GND) of CN201 and between pins 6 (GND) and 7 (B+D signal) of CN201 on the Main P.C.B. Ass'y. Short between the emitter and the base of Q113 on the Main P.C.B. Ass'y. 4. Adjust RV102 to obtain 0 ±20 mV on the oscilloscope. Note: If not within 0 ±20 mV, paired FETs Q111 and Q112 (2SK136) must be changed to a new pair (rank R) as the characteristics of FETs currently mounted may be unbalanced. 5. Remove the short of CN201 and Q113.
4	Focus Screw Adjustment	Test Disc Philips Test Sample 5A	Oscilloscope to TP7 on Main P.C.B.	Focus Adjustment Screw	1. Loosen the four Lock screws A and B. Refer to Fig. 10 (read the Note). 2. Set an oscilloscope to DC mode and 50 mV/div., and connect it to TP7. 3. Play back the 10th music on the test disc. 4. Adjust the Focus Adjustment screw of the Pickup to obtain 0 ±50 mV on the oscilloscope.

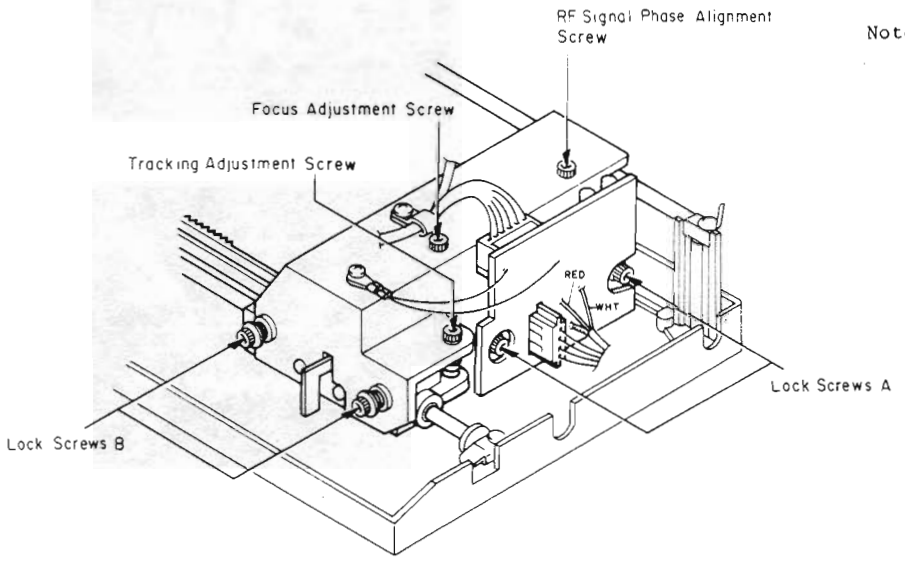
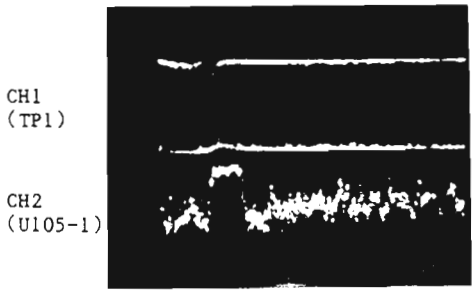
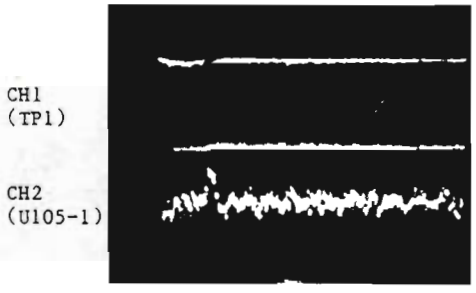


Fig. 10

Note: Check whether lock-tight paint has flowed inside the Lock screws. If so, adjustment of the Lock screws is impossible as the flowed paint fixes adjustment spring inside. In this case, loosen the Lock screws and remove the paint. After that, fasten the screws and then loosen them by one turn.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
5	RF Signal Phase Alignment	Test Disc Philips Test Sample 5A	Oscilloscope to TP1, TP7 on Main P.C.B.	Main P.C.B. RV104 RF Signal Phase Alignment Screw	1. Connect an oscilloscope to TP1 and play back the 10th music on the test disc. 2. Adjust RV104 so that the EFM signal waveform at TP1 becomes clear and maximized, and that its horizontal waving is minimized. 3. Adjust the RF Signal Phase Alignment Screw of the Pickup so that the EFM signal waveform at TP1 becomes clear and maximized and that its horizontal waving is minimized. (See Fig. 11) 4. Connect the oscilloscope to TP7, play back the 10th music on the test disc, and check that the level on the oscilloscope is 0 ±50 mV, i.e., the value adjusted in Step 4 is not shifted.
6	Tracking Screw Adjustment	Test Disc Philips Test Sample 5A	Connect Oscilloscope as follows: CH1: to TP1 CH2: to Pin 1 of U105/ TP7	Tracking Adjustment Screw Main P.C.B. RV104	1. Set the oscilloscope as follows: CH1 0.1 V/div, AC Mode CH2 0.1 V/div, AC Mode Time 0.5 msec Mode Normal Coupling: HF REJ Trigger CH1 2. Connect the CH1 of the oscilloscope to TP1 and CH2 to the pin 1 of U105. 3. Play back the 9th (900 µm) interruption music on the test disc and adjust the Trigger Level control of the oscilloscope so that the EFM signal waveform appears on CH1 as shown in the photograph below: 4. Observe the EFM signal waveform at TP1 and the tacking error signal at pin 1 of U105. Adjust the Tracking Adjustment screw of the Pickup so that the overshoot on CH2 (generated at recovery point of scratch) is minimized and the EFM signal waveform on CH1 becomes good.  CH1 (TP1) CH2 (U105-1) NG Waveform  CH1 (TP1) CH2 (U105-1) Good Waveform 5. Play back the 17th (800 µm) black dot music on the test disc and adjust the Trigger Level control of the oscilloscope so that the EFM signal waveform appears on CH1 as shown in the photograph below. 6. Connect the CH2 of the oscilloscope to TP7. (to be continued)

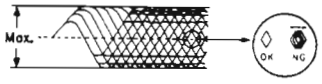
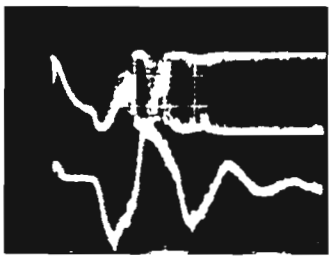
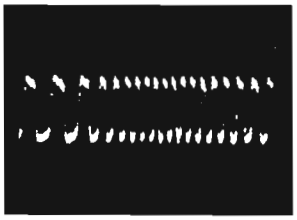
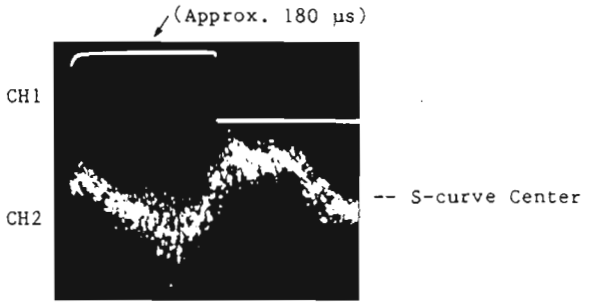
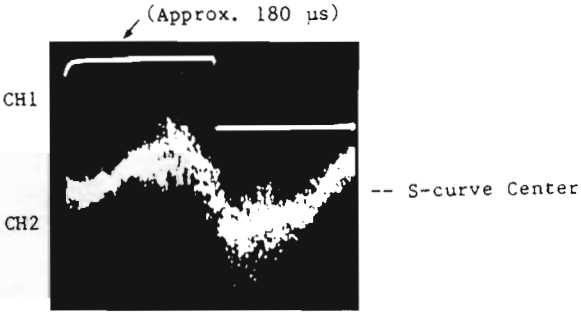


Fig. 11 EFM Signal at TP1

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
					7. Observe the EFM signal waveform on CH1 and the focus error signal on CH2. Adjust RV104 so that the overshoot on CH2 (generated at recovery point of black dot) is minimized and the EFM signal waveform on CH1 becomes good. CH1 (TP1) CH2 (TP7)  NG Waveform CH1 (TP1) CH2 (TP7)  Good Waveform 8. After completion of adjustment, securely tighten the Lock screws A and B alternately.
7	Offset Adjustment of U101, U102		Oscilloscope to pin 1 of U105	Main P.C.B. RV101	1. Set the oscilloscope as follows: CH1 0.1 V/div, DC Mode Time 2 msec Mode Auto Coupling: AC 2. Play back an eccentric disc and turn RV107 fully counterclockwise to turn OFF the tracking gain. 3. Adjust RV101 so that the GND line is located at exactly half the waveform peak-to-peak value on the oscilloscope.  --- GND Line NG Waveform  --- GND Line Good Waveform 4. Return RV107 to the original position (1 o'clock direction as shown in Fig. 8). Note: If good waveform is not obtained, the following may be required. a. Replacement of U101 and/or U102 b. Exchange of U101 and U102

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
8	Pickup Movement Adjustment	Test Disc Philips Test Sample 5	Connect Oscilloscope as follows: CH1: to anode of D138 (or pin 3 of U115)/anode of D139 (or pin 11 of U115) CH2: to C138 (Gate of Q112) on Main P.C.B.	Main P.C.B. RV109 RV110	1. Set the oscilloscope as follows: CH1 0.2 V/div, AC Mode CH2 20 mV/div, AC Mode Time 50 µs/div Mode Normal Coupling: HF REJ Trigger CH1 2. Connect the CH1 of oscilloscope to the anode of D138 and CH2 to C138 (gate of Q112). 3. Play back the test disc and then press the F. Fwd button to set the Compact Disc Player in Cue mode, and adjust the Trigger Level control of the oscilloscope so that the pulse waveform appears on CH1 as shown in the photograph below. 4. Adjust RV109 so that the pulse falling edge on CH1 locates at the S-curve center on CH2.  5. Press the F. Fwd button further several times, and check whether the time indication on the Time Indicator regularly increases. If not, repeat 4. 6. Connect the CH1 of oscilloscope to the anode of D139. 7. Play back the test disc and then press the Rev. button to set the Compact Disc Player in Cue mode, and adjust the Trigger Level control of the oscilloscope so that the pulse waveform appears on CH1 as shown in the photograph below. 8. Adjust RV110 so that the pulse falling edge on CH1 locates at the S-curve center on CH2.  9. Press the Rev. button further several times, and check whether the Time Indicator regularly changes its time indication.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
9	VCO Adjustment	Test Disc Philips Test Sample 5A	Oscilloscope to test point CT1 on D/A Converter P.C.B.	D/A Converter P.C.B. L501	1. Connect an oscilloscope to the test point CT1 on the D/A Converter P.C.B. Ass'y, then set it to DC mode and 1 V/div. 2. Play back the 17th (800 µm) black dot music on the test disc. 3. Turn the core of L501 counterclockwise and clockwise to find out the upper and the lower limits of VCO voltage, i.e., the limits at which the playback sound is about to cut off. Then adjust the core of L501 so that the VCO level is in the mid-point between the upper and lower limit voltages.
10	Audio Signal Balance Adjustment	Test Disc Sony YEDS-7	AC Voltmeter to Output Pin Jacks	D/A Converter P.C.B. RV501	1. Play back the first music on the test disc to play back 1 kHz 0 dB level signals. 2. Measure both L and R channel output levels and adjust RV501 so that the difference between both channels is less than 0.1 V.
11	Check for Scratch and Dot on Disc	Test Disc Philips Test Sample 5A			**1. Scratch 900 µm** Play back the 9th music with a 900 µm scratch on the test disc and listen to the playback sound. If playback is not properly made, conduct items 1 to 4 in Step 6 "Tracking Screw Adjustment". **2. Black Dot 800 µm** Play back the 17th music with a 800 µm black dot on the test disc and listen to the playback sound. If playback is not made properly, conduct items 5 to 7 in Step 6 "Tracking Screw Adjustment". If still proper playback is not made yet, conduct step 9 "VCO Adjustment".

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
12	Tracking Check with Eccentric Disc	Approx. ±0.1mm Eccentric Disc	Positive side of C173 on Main P.C.B.		Perform this adjustment only if a disc with eccentricity is not played back properly. Precisely re-adjust Step 3 "Tracking Offset Adjustment" and Step 6 "Tracking Screw Adjustment", and check whether playback is made properly. If not, perform the following to insure correct tracking for a ±0.1 mm Eccentric Disc. 1. Preparation for ±0.1 mm Eccentric Disc Find a disc with approx. ±0.1 mm eccentricity in the following manner: a. Set an oscilloscope to DC mode and connect it to the positive side of C173 on the Main P.C.B. Ass'y. b. Play back the first music on eccentric discs and press the Pause button to set the Compact Disc Player in Pause mode. Then observe the peak-to-peak level (Vpp) on the oscilloscope. The amount of eccentricity, X (mm), is given in the following formula: $X = 1/2 \times (1.3 \times (Vpp/(5.8 + 4.7))$ where, 1.3 mm/A: sensitivity of Tracking Servo 5.8 ohms: DC resistance value of Tracking Coil 4.7 ohms: value of resistor R197 If amount of eccentricity (X) is assumed to be 0.1 mm, $Vpp = 2 \times (5.8 + 4.7)/1.3 \times 0.1 = 1.6$ (V) That is, the disc which shows approx. 1.6 V on the oscilloscope should be selected. 2. Load the disc found in 1 above and play back the first music of the disc. Check whether it takes much time to enter Standby mode or whether the time indication of the Time Indicator begins with 00:00. 3. During playback, press the F. Fwd button several times and check that the time indication of the Time Indicator regularly increases. 4. Next, during playback, press the Rev. button several times to see whether the time indication of the Time Indicator regularly decreases. If satisfactory results are not obtained in 2 to 4 above, re-adjust Step 8 "Pickup Movement Adjustment".

Warning:

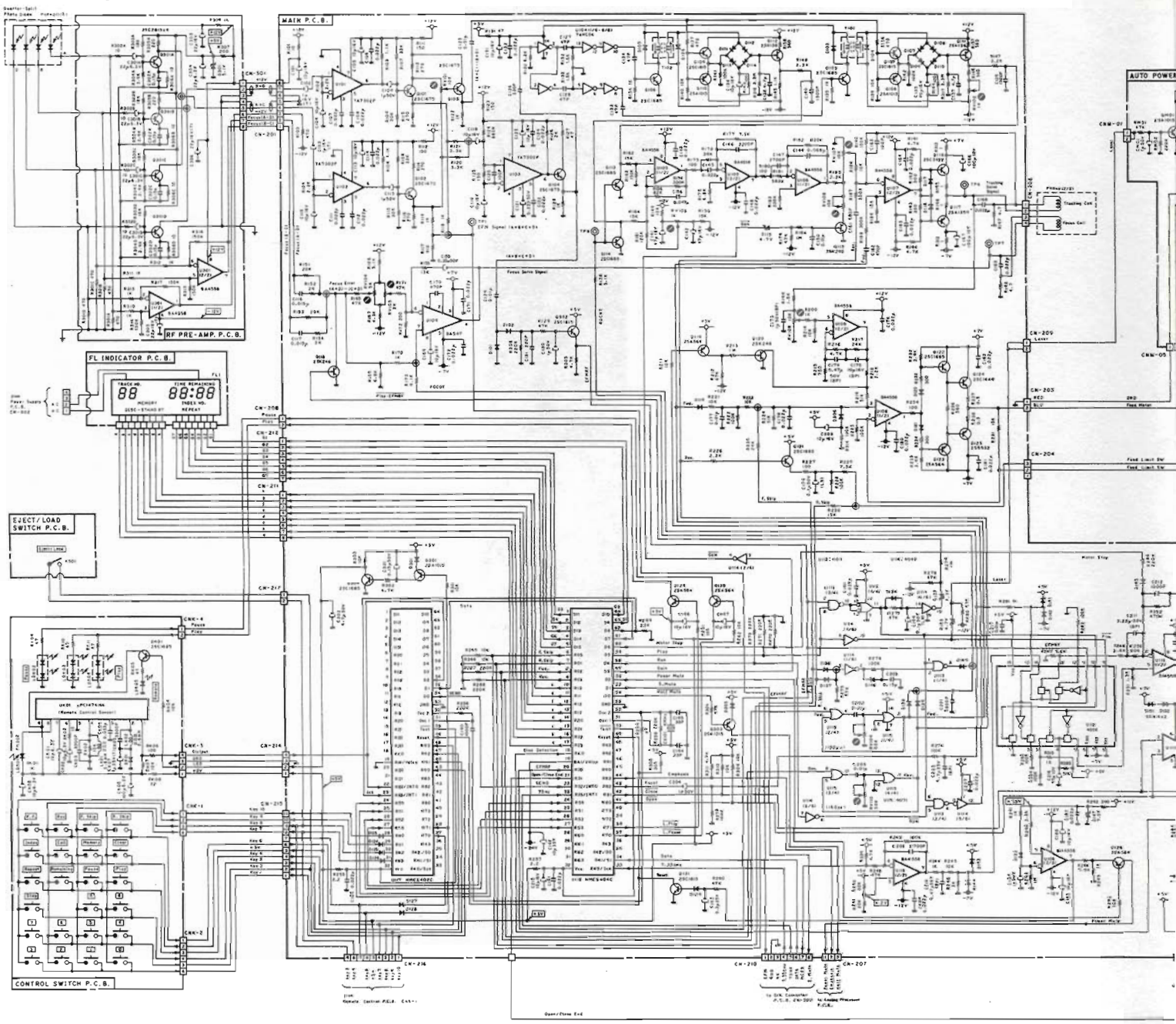
Parts marked with the symbol ⚠ have critical characteristics.

Use ONLY replacement parts recommended by the manufacturer. It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedure.

Caution:

Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective. WARNING — DO NOT return the unit to the customer until the problem is located and corrected.

4. Schematic Diagram



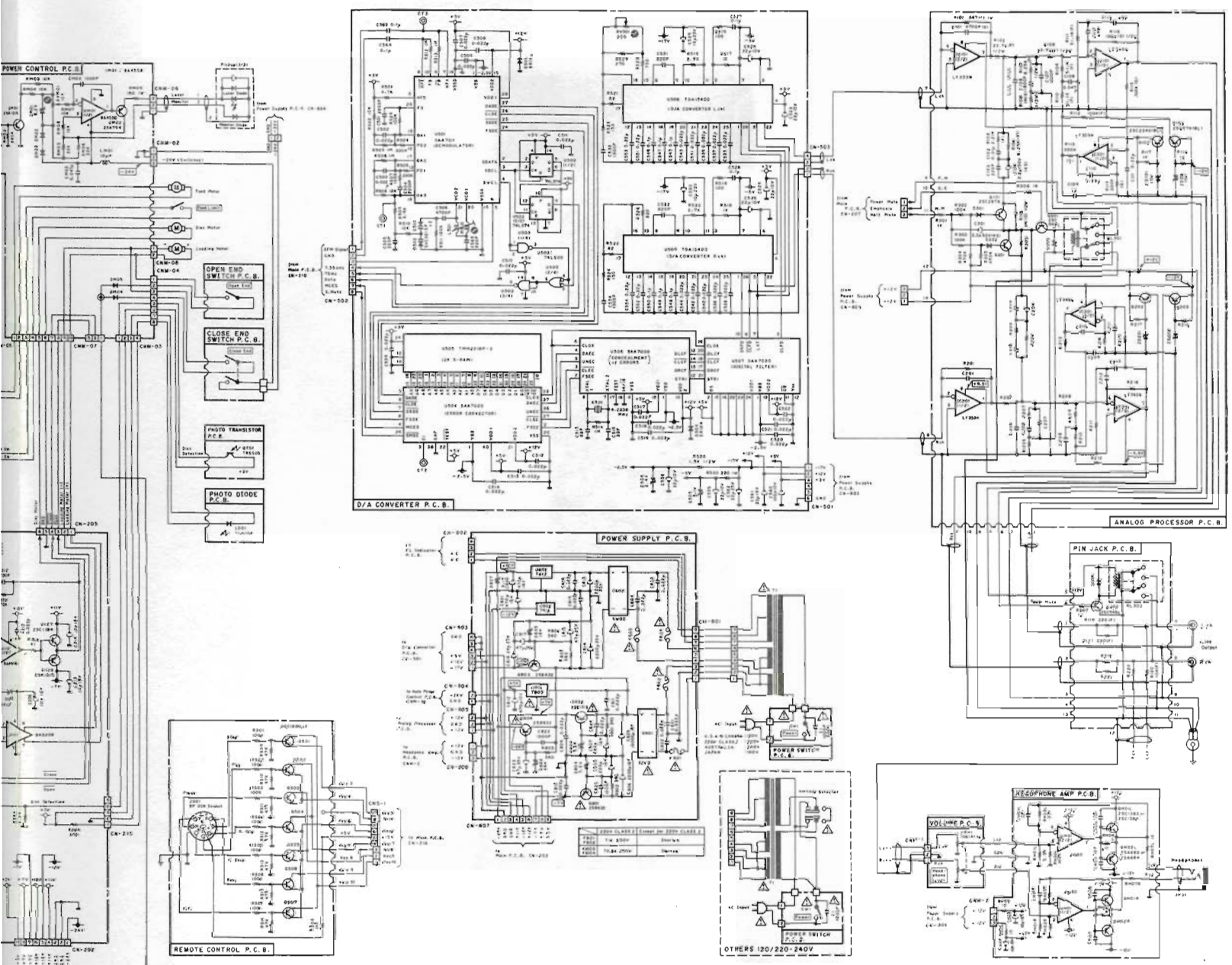


Fig. 12

Note: Diode is MA150, 1SS53, 1S1555, or 1SS176 unless otherwise specified.