

DENON

SERVICE MANUAL

ELECTRONIC PIANO

MODEL
EP-3300

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NIPPON COLUMBIA CO., LTD.

CAUTIONS

CAUTION:

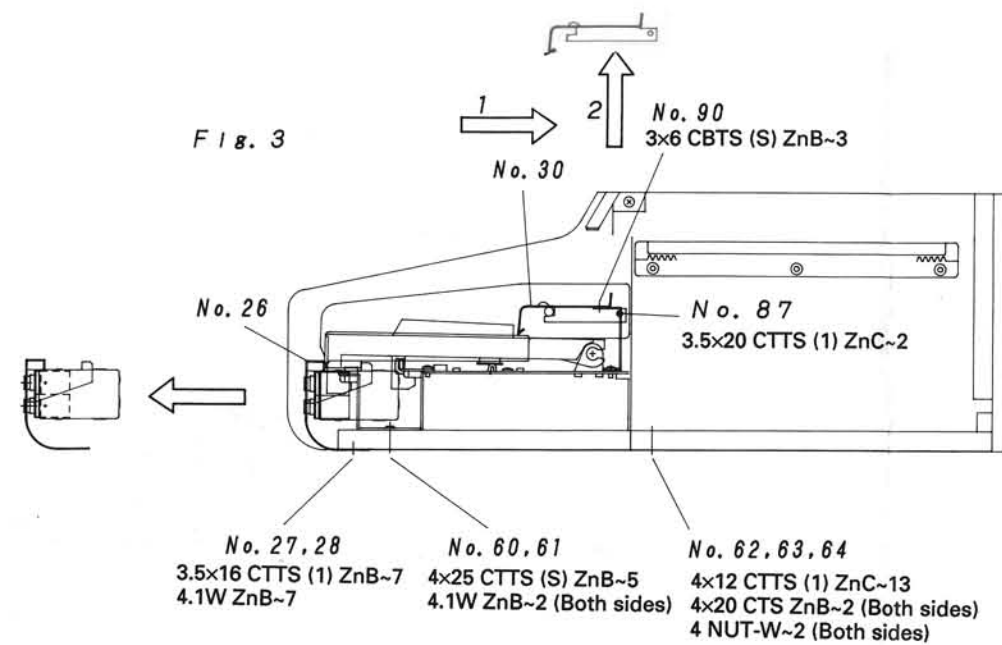
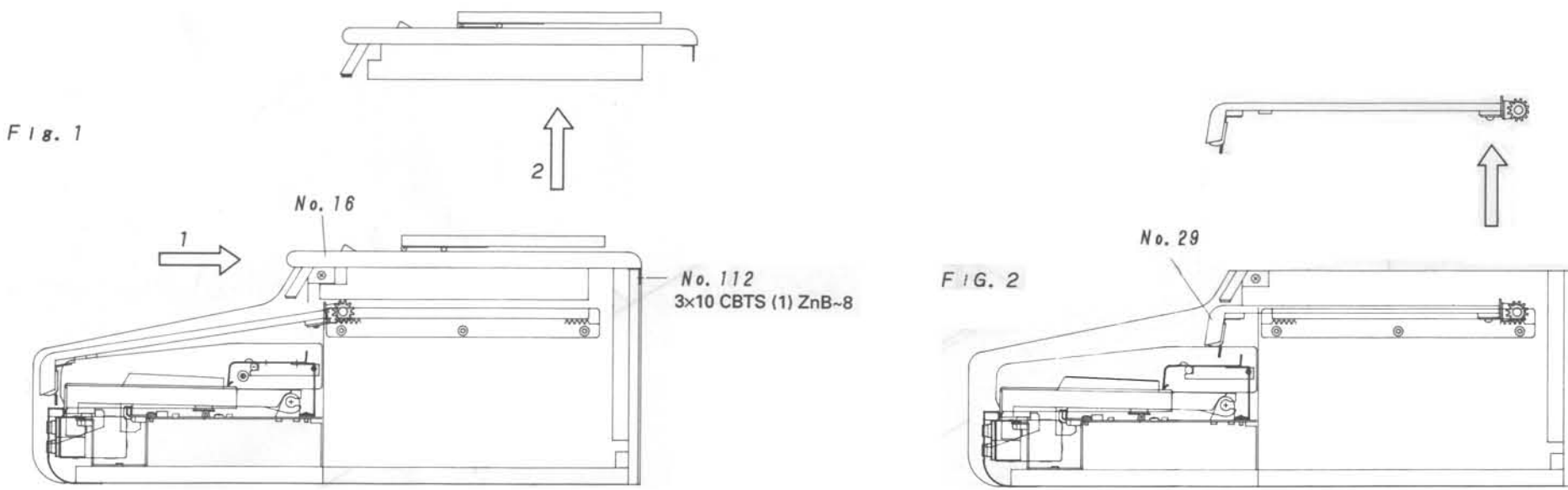
- Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamps, or if the resistance from chassis to either side of the power cord is less than 240 Kohms, the unit is defective.

WARNING:

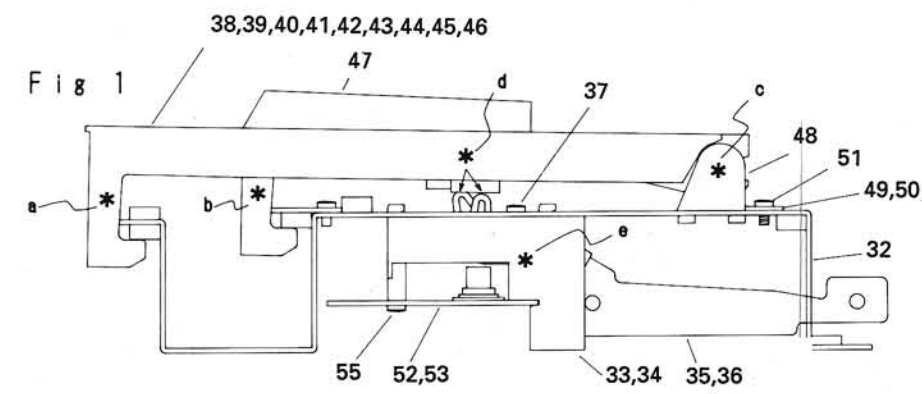
- Parts marked with  this symbol have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.
- DO NOT return the unit to the customer until the problem is located and corrected.

LIST OF P.C. Board UNIT

Name of P.C. Board	UNIT No.	Remarks
24 KEYS SWITCH BOARD	BP-380-2	
16 KEYS SWITCH BOARD	BP-383-2	
MAIN PCB	BP-421-2	
EFFECT BOARD	BP-422-1	
POWER BOARD	BP-419-1	
PANEL BOARD	BP-420-3	
L/FILTER BOARD	BP-393-2	U.S.A., Canada Models
	BP-393-3	Europe, U.K., Asia Models



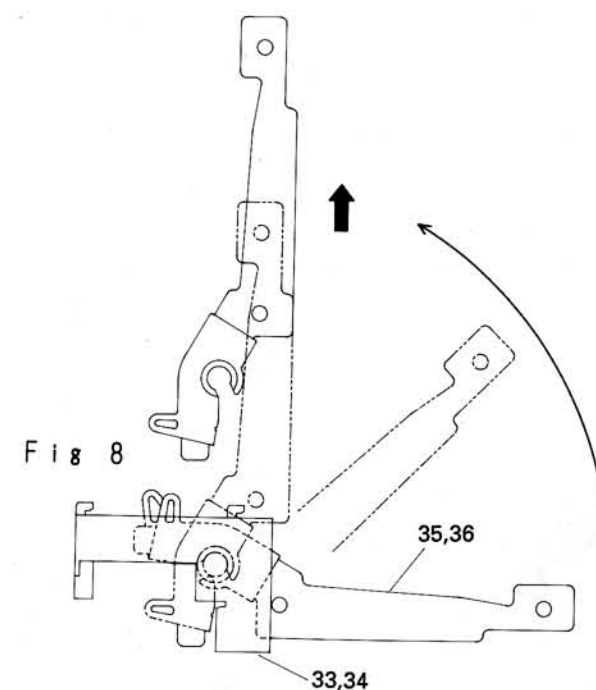
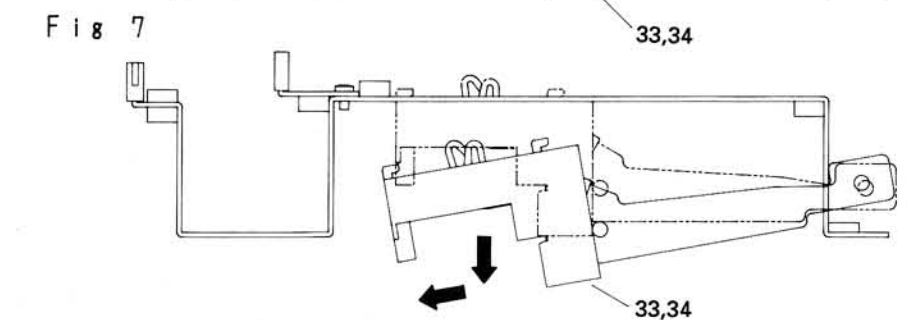
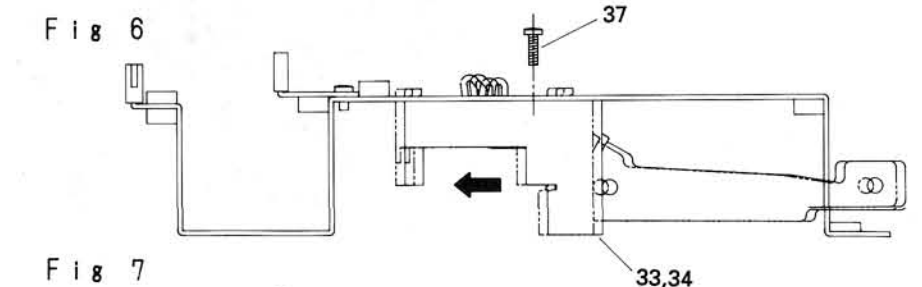
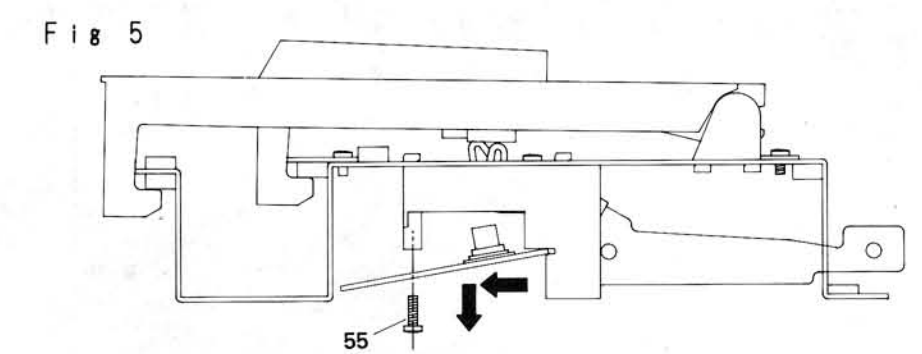
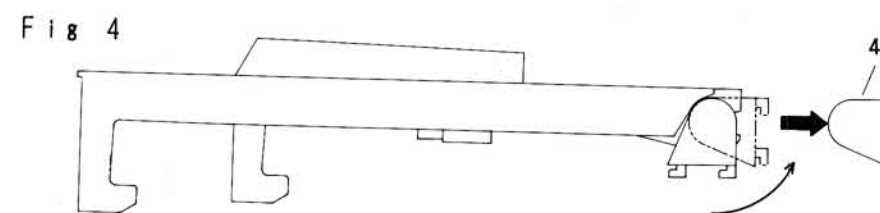
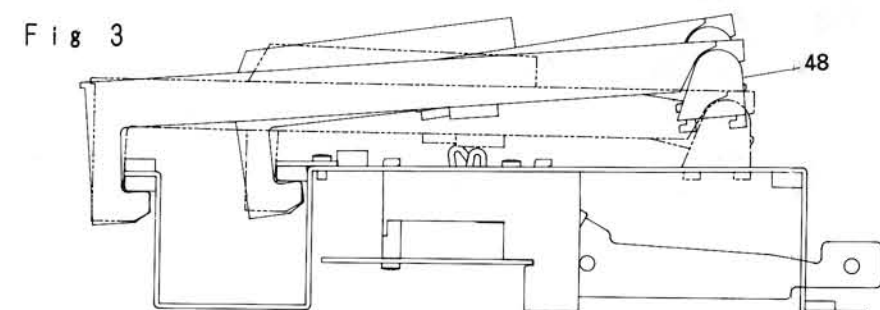
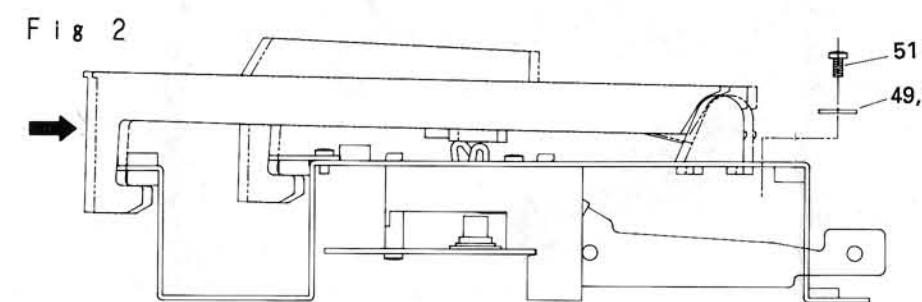
- Remove roof board semi-assembly 16. (Fig. 1)
 - Remove eight (8) screws 112 (3 x 10 CBTS(1)).
 - Move roof board semi-assembly 16 in the direction of arrow 1 and lift it in the direction of arrow 2.
- Remove key cover assembly 29. (Fig. 2)
 - Lift key cover assembly 29 to remove it.
- Remove top panel semi-assembly 30 and front panel 26. (Fig. 3)
 - Remove two (2) screws 87 (3.5 x 20 CTTS(1)) and three (3) screws 90 (3 x 6 CBTS(1)) and move top panel semi-assembly 30 in the direction of arrow 1 and then in the direction of arrow 2 to remove it.
 - Remove seven (7) screws 27 (3.5 x 16 CTTS(1)) and four (4) washers 28 (4.1 W), then remove front panel 26 in the direction of the arrow.
- Remove the keyboard unit. (Fig. 3)
 - Remove five (5) screws 60 (4 x 25 CTTS(S)) and two (2) washers 61 (4.1W) from both ends.
 - Remove two (2) screws 63 (4 x 20 CTS) and two (2) nuts 61 (4NUT-W) and then thirteen (13) screws 62 (4 x 12 CTTS(1)).



Apply a coat of grease to the portions marked with (*).

- Slide way inside the white key and key guide (w)
- Slide way inside the black key and key guide (B)
- Fit portion of key shaft and key
- Slide way of hammer and slide cushion
- Fit portion of hammer and hammer flange

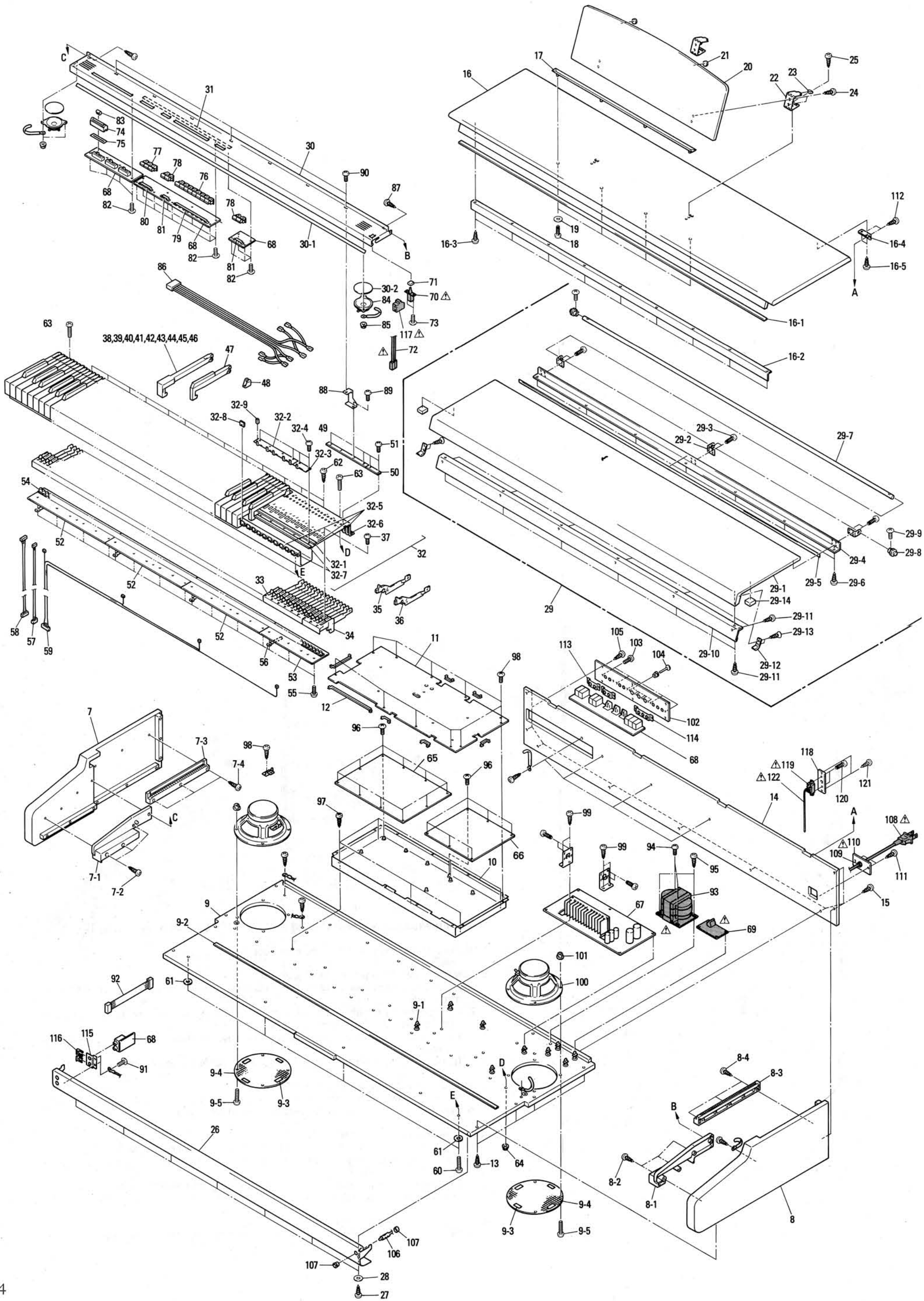
Lubricate them with silicon grease SB-1. — Shinetsu silicone grease G30M — Shinetsu silicone oil KF96H 100,000CS — Mixing ratio: 1:1




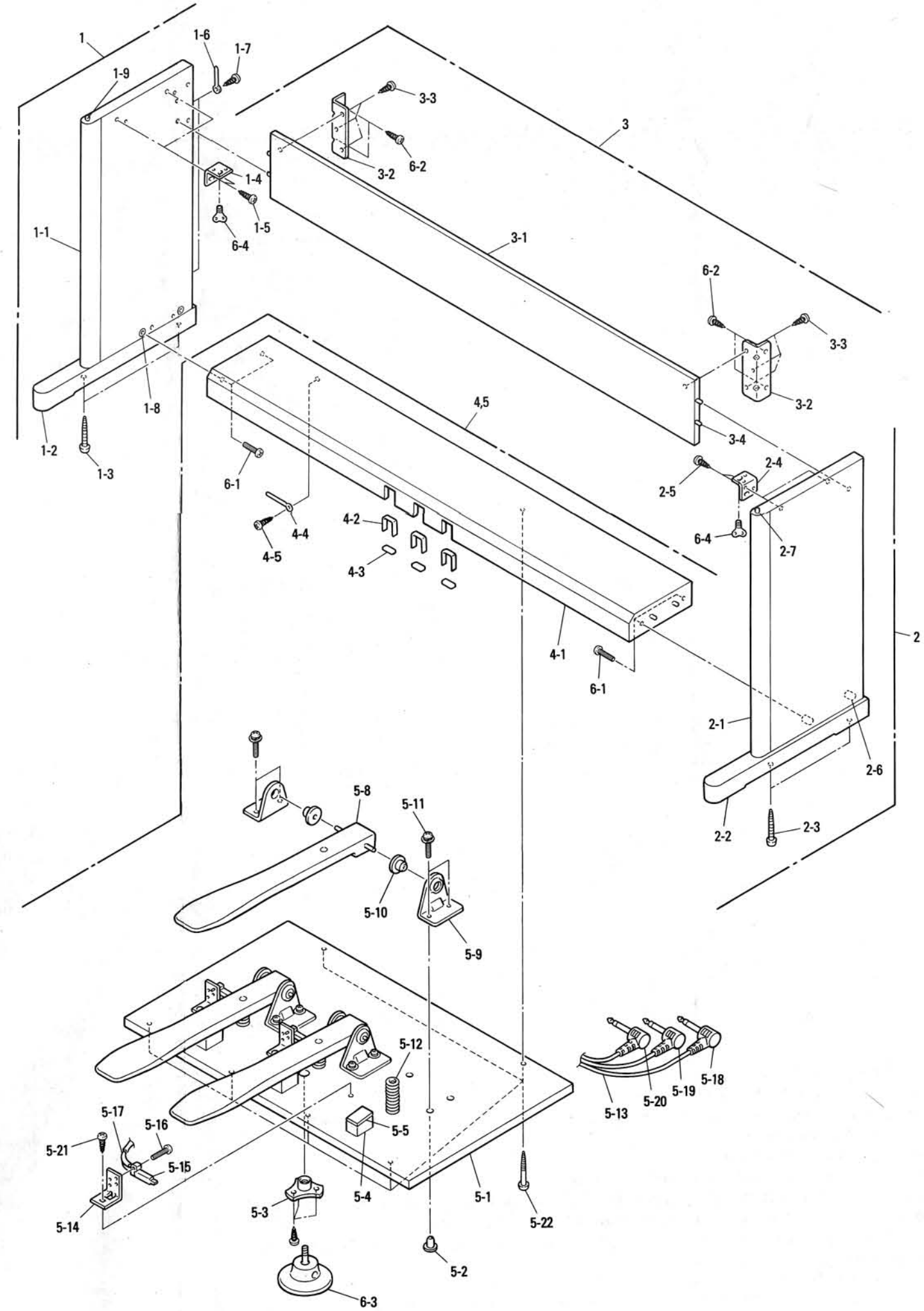
How to disassemble the keyboard unit KEY-148 Sectional view (Fig.1)

- Remove the keyboard unit from the piano body.
- How to remove the keyboard (Fig.2,3, and 4)
 - After removing screws 51, remove K/S stoppers 49,50. Push the keyboard toward the arrow. (Fig.2)
 - Remove the key together with key shaft 48 from the chassis ass'y by lifting the rear part of the key in the arrow direction. (Fig.3)
 - Remove the white key first, and then, the black key. For mounting them, mount the black key first.
 - Remove the key shaft 48 backward by turning it 90° in the arrow direction. (Fig.4)
- How to remove the switch board. (Fig.5)
 - Remove screw 55, and then, remove the switch board by moving it toward the arrow.
 - Removal of the keyboard is not necessary when removing the switch board only.
- How to remove the hammer (Fig.6,7)
 - Remove screws 37, and move the hammer flanges in the arrow direction. (Fig.6)
 - Remove hammer flanges 33,34 (together with each hammer) by moving them in the arrow directions. (Fig.7)
 - For removing the hammer flanges, all screws 37 can be removed by removing five white/black keys of octave G-B and four white/black keys on the high-pitched sound side.
- How to remove the hammers
 - Remove hammer 35,36 in the arrow direction by turning them upward by 90°.

EXPLODED VIEW



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Troubleshooting of Key-148

1. A keyboard does not return normally.

- a) The keyboard itself does not move normally.
- b) Its hammer does not function normally.
- c) Both keyboard and hammers function normally when they are not combined with each other, but they don't function normally together when they are combined with each other.

△ How to locate its cause

Lift the hammer tip. If the keyboard lowers due to its own weight, the trouble is not caused by (a).
 If the keyboard does not lower, the trouble is caused by (a).
 After fixing the keyboard under its lifted condition, lift the hammer up and down to check if a feeling of resistance of the hammer exists. If yes, the trouble is caused by (b).
 If the keyboard lowers due to its own weight without any feeling of resistance of the hammer, the trouble is caused by (c)

Causes of (a)

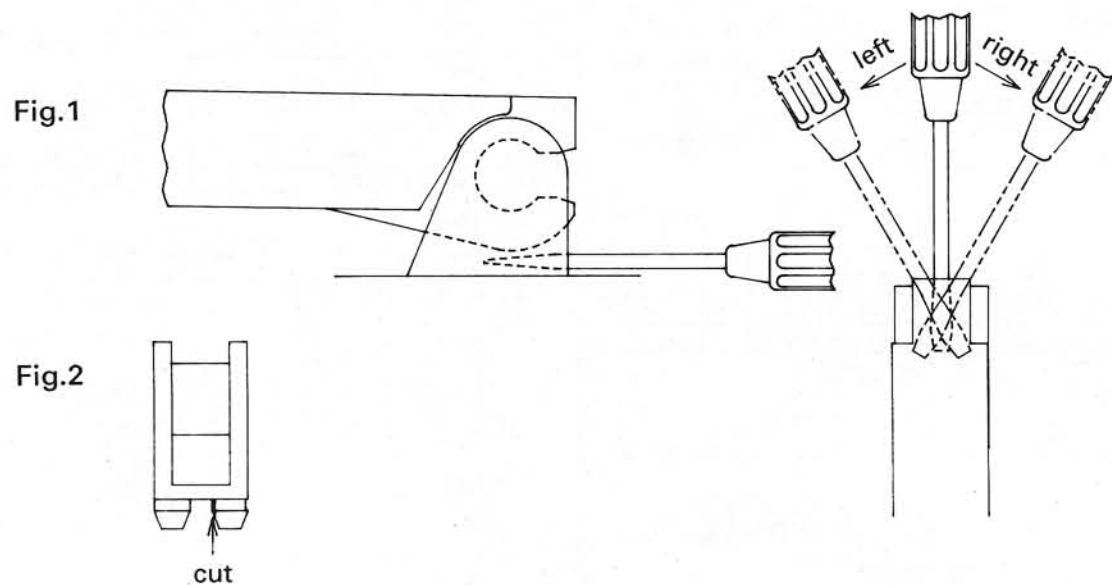
- 1) Malfunction due to the friction force between the key guide and the keyboard.

Repair method

Insert a small minus screwdriver into the key shaft rear part as shown in Fig.1, and position the key for normal movement while tilting it left ward or right ward.

If the key shaft can fully adjusted right ward, but it cannot fully be adjusted left ward, cut the inside of the rear lead of the key shaft by using a cutter knife as shown in Fig.2.

Fig.1 Left Fig.2 Cut



- 2) The fit portion of the key and the key shaft is not lubricated with grease. Apply a coat of grease SB-1.
- 3) The portion between the key and the key guide is not lubricated with grease. Apply a coat of a grease SB-1.
- 4) Tilting of key guide (in case of a black key, in particular). Repair the tilted condition.

Causes of (b)

- 1) Malfunction with the hammer flange due to the bending of hammer. Replace the hammer.
- 2) A contact to the chassis due to the bending of hammer. Replace the hammer.
- 3) A contact to the chassis due to the exfoliation of the hammer cushion. Replace the hammer cushion.
- 4) The fit portion of the hammer and hammer flange is not lubricated with grease. Apply a coat of grease. (SB-1)

Causes of (c)

- 1) Deformation of hammer (key contact part). Replace the hammer.
- 2) Wrinkle of slide cushion. Replace the slide cushion.

2. Action noises

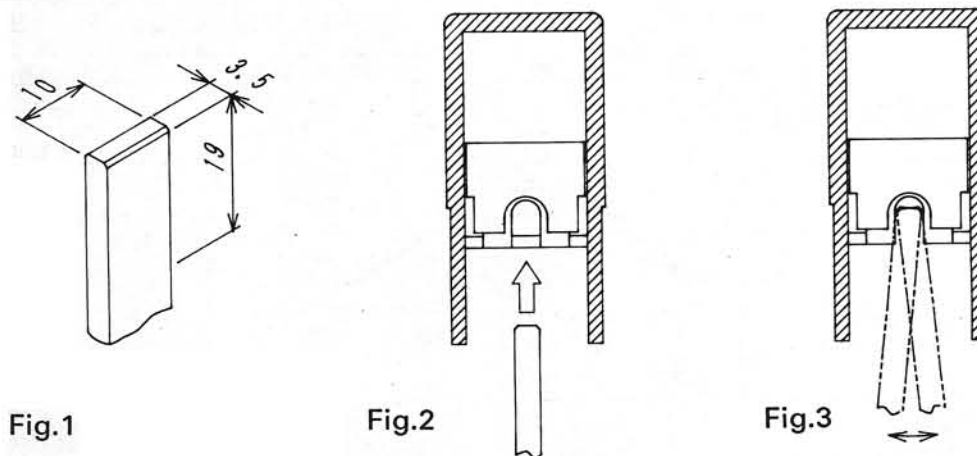
- 1) The fit portion of the key shaft and key is out lubricated with grease.
- 2) The fit portion SB-1 of the hammer and hammer flange is not lubricated with grease. SB-1
- 3) No slide cushion exists. (Either hammer or key lowers.)
- 4) A tightening failure of key guide rail screw (key touches the screw head when pressing it, or noises are produced when key returns).

3. Others

- 1) Key arrangement adjustment failure
- 2) Key fluctuates Key shaft is broken Replace the key shaft.
- 3) Key shaft is unstable longitudinally.
- 4) Slide cushion is worn. Neither slide cushion nor hammer slide portion is lubricated with grease, or they are lubricated insufficiently. Apply a coat of grease (SB-1)

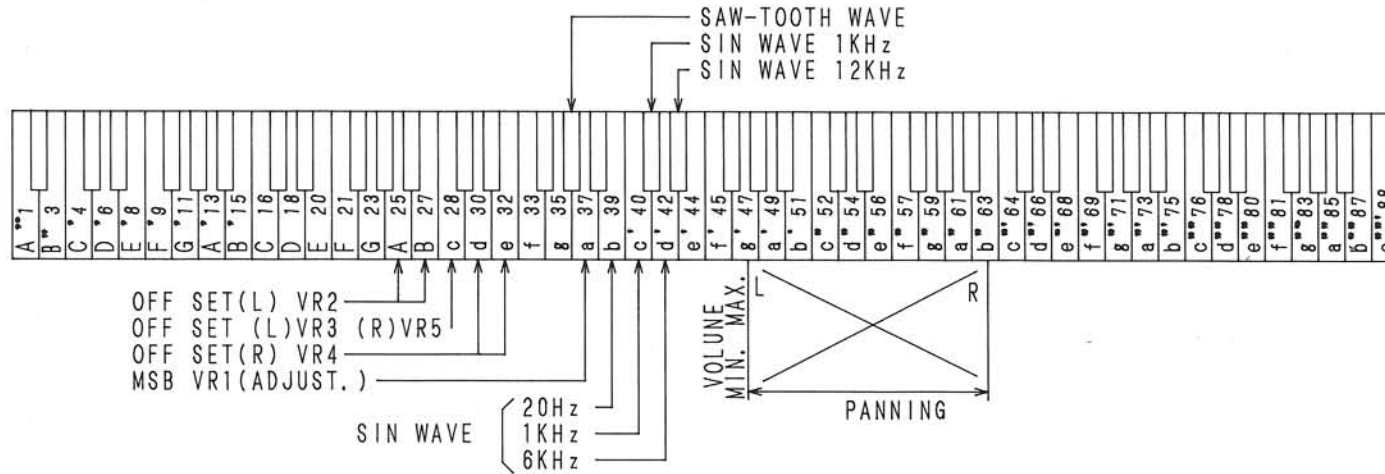
Adjusting method

- 1) This action is not adjustable basically, except for the horizontal key arrangement.
- 2) For adjusting the key arrangement, insert the tool shown in Fig.1 into the groove key guide as shown in Fig.2 and 3, and wrench the groove toward the desired moving direction. (After this adjustment lift each, and check if key moves normally.)



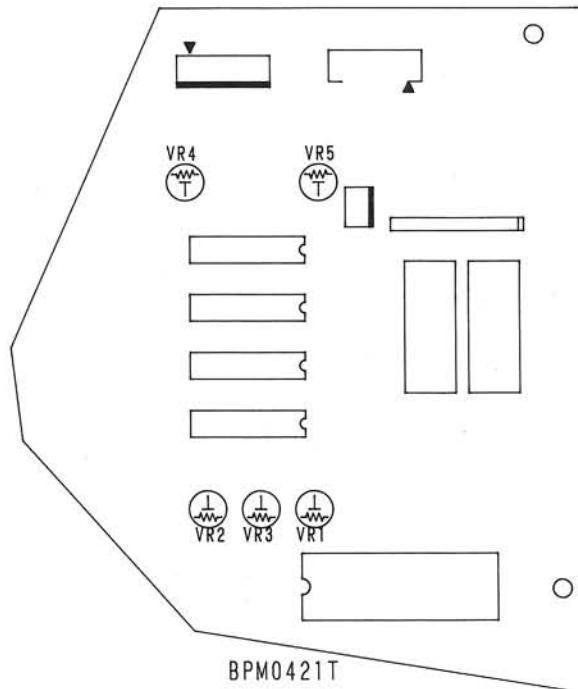
Test Mode

- (1) How to set to the test mode:
Press the BASS button and hold it, then set the POWER switch to ON. Only the PIANO 1 indicator lights.
- (2) How to clear the test mode:
Press the timbre select button once or set the POWER switch to OFF and then ON again.
- (3) Details of test mode
OFFSET adjustment
MSB adjustment
Sine-wave outputs (20Hz, 1kHz, 6kHz, 12kHz)
Sine-wave outputs (higher than the above at 1kHz)
Panning
- (4) Relationship between test mode and keyboard
See the diagram below.



Adjustment

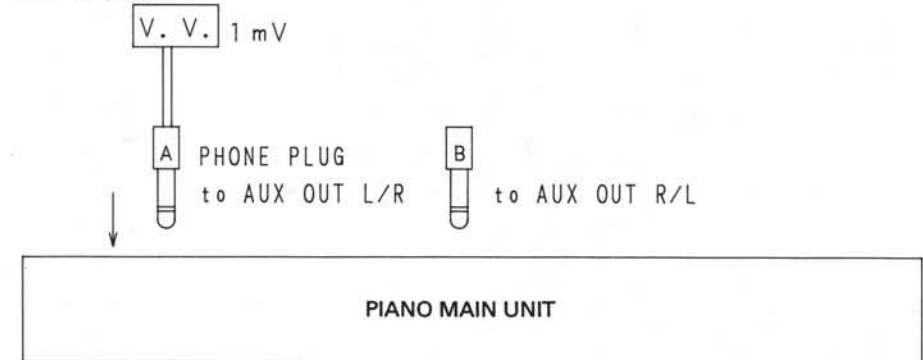
- (1) Test equipment necessary for adjustment
Millivoltmeter
- (2) Before starting
Warm up for 5 minutes and set to the test mode before starting adjustment.
- (3) Adjustment point locations
See the diagram on the right.
- (4) Order of adjustments



1	Warm up	More than 5 minutes
2	Test mode	
3	MSB adjustment	VR1
4	OFFSET adjustment	1 VR5 (R Side)
		2 VR4 (R Side)
		3 VR3 (L Side)
		4 VR2 (L Side)

(5) Settings of VRs on panel		
Name of VR	VOLUME	BRILLIANCE
Setting	MAX.	BRIGHT

(6) How to connect



(7) Adjustment procedure

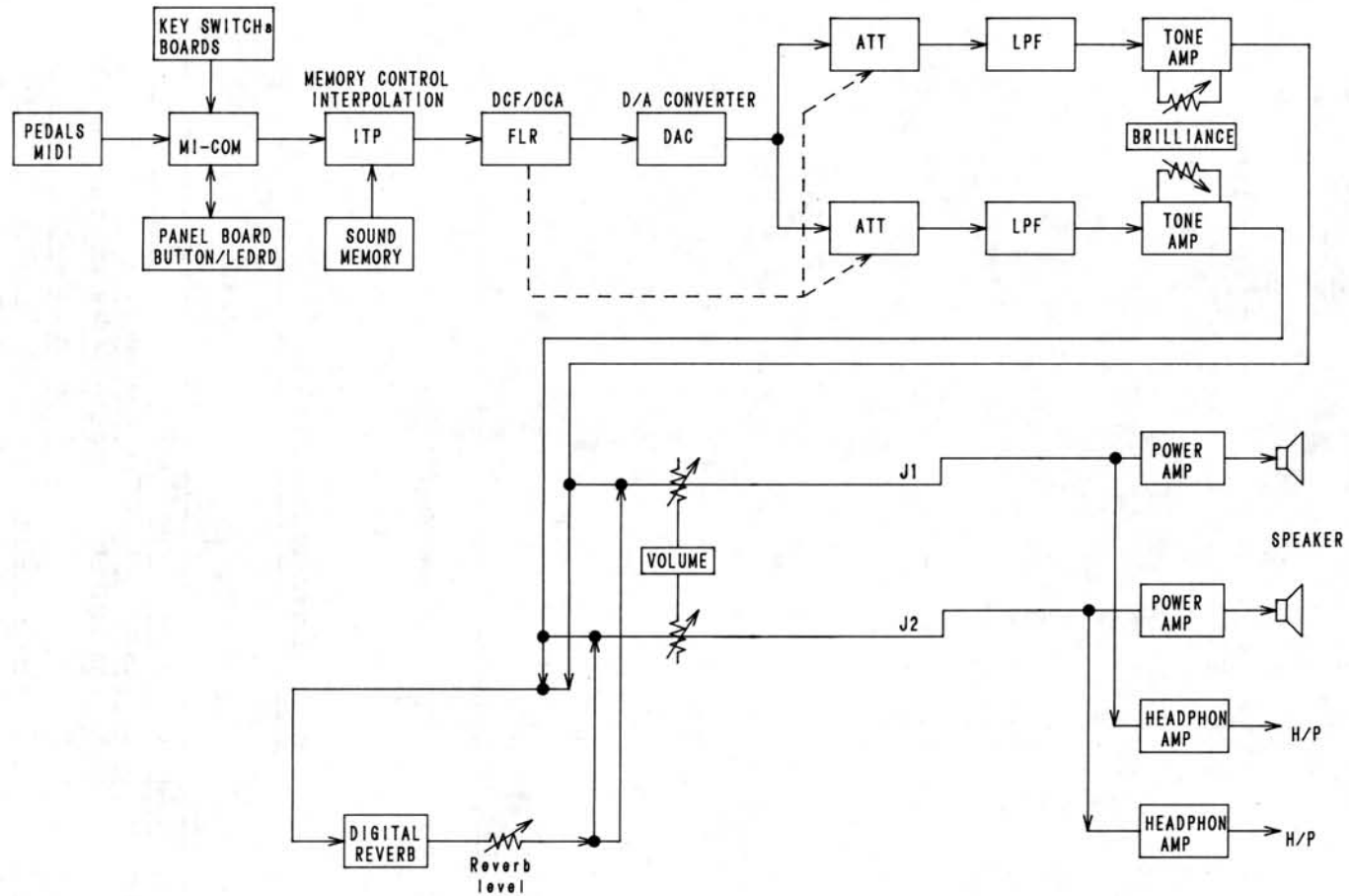
Adjust the VRs so the millivoltmeter reading is minimum.

	VR No.	Plug positions (AUX OUT)		No. of keys	Operation
		A	B		
1	VR1	R	L	37 (A)	Set A to ON.
2	VR5	R	L	28 (C)	Set C to ON repeatedly.
3	VR4	R	L	30, 32 (D, E)	Set D and E to ON alternately and repeatedly.
4	VR3	L	R	28 (C)	Set C to ON repeatedly.
5	VR2	L	R	25, 27 (A, B)	Set A and B to ON alternately and repeatedly.

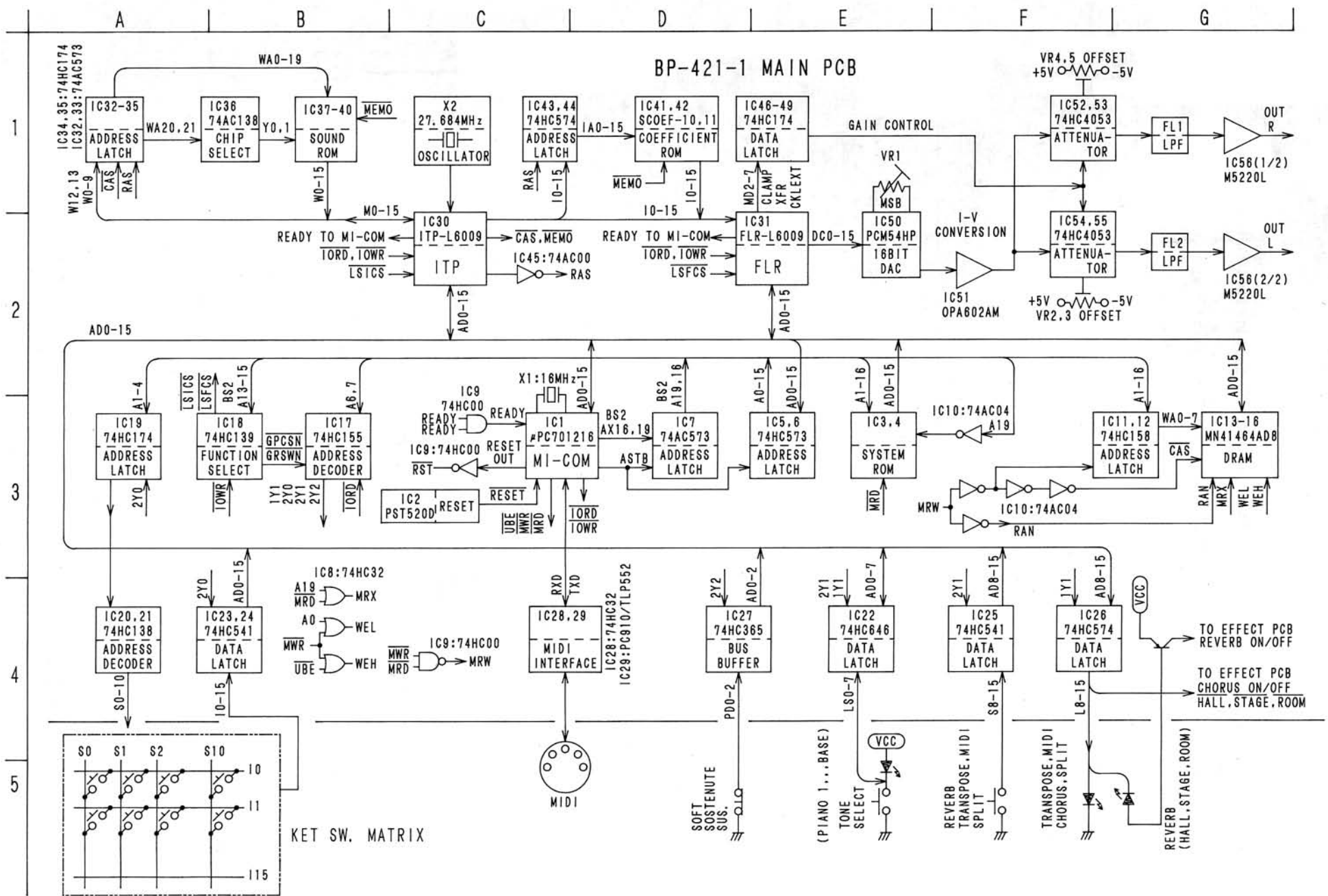
Note: For item 1 adjust to the volume is minimum when listening.

BLOCK DIAGRAM

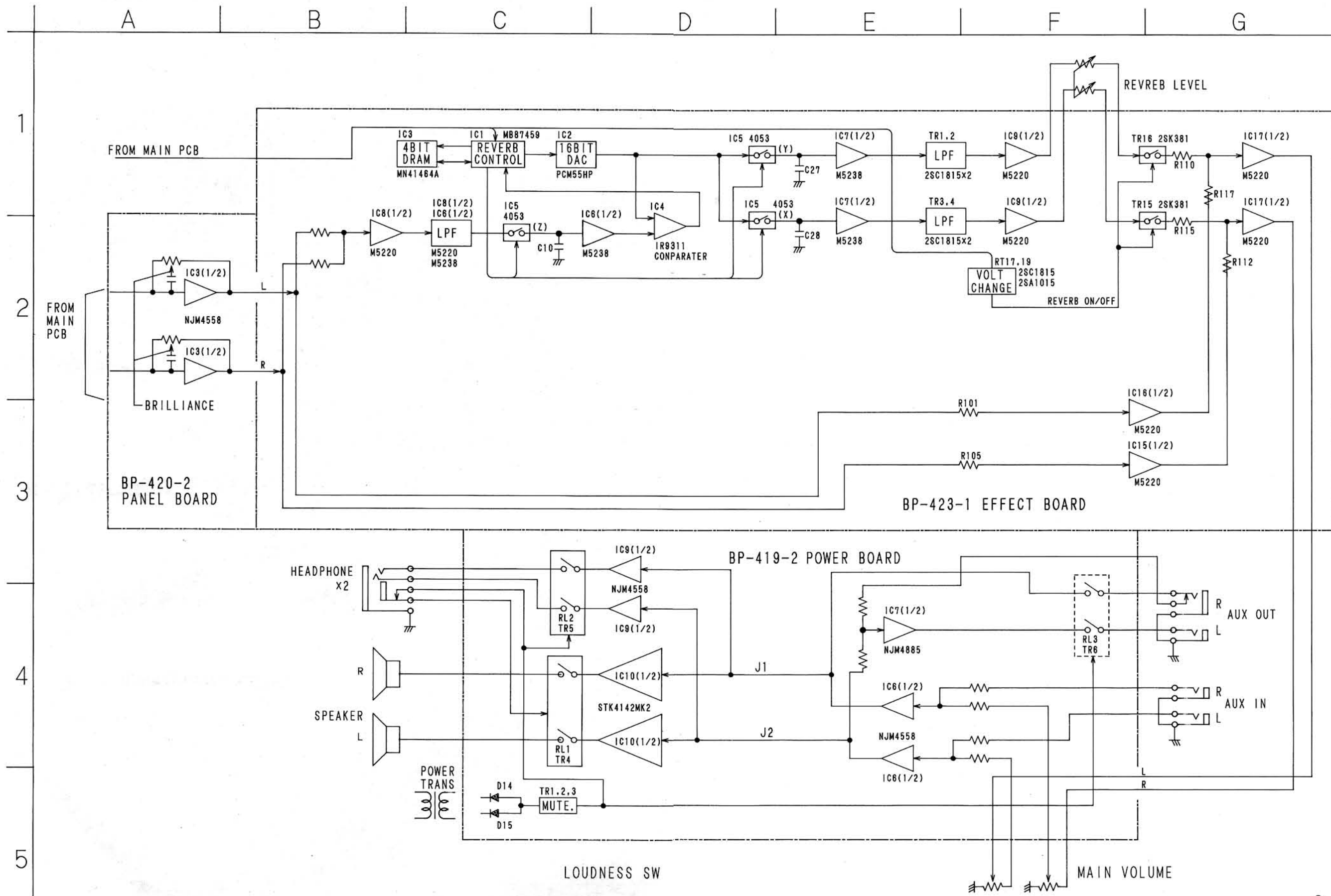
SYSTEM BLOCK DIAGRAM



CONTROL SYSTEM & D/A CONVERTER BLOCK DIAGRAM

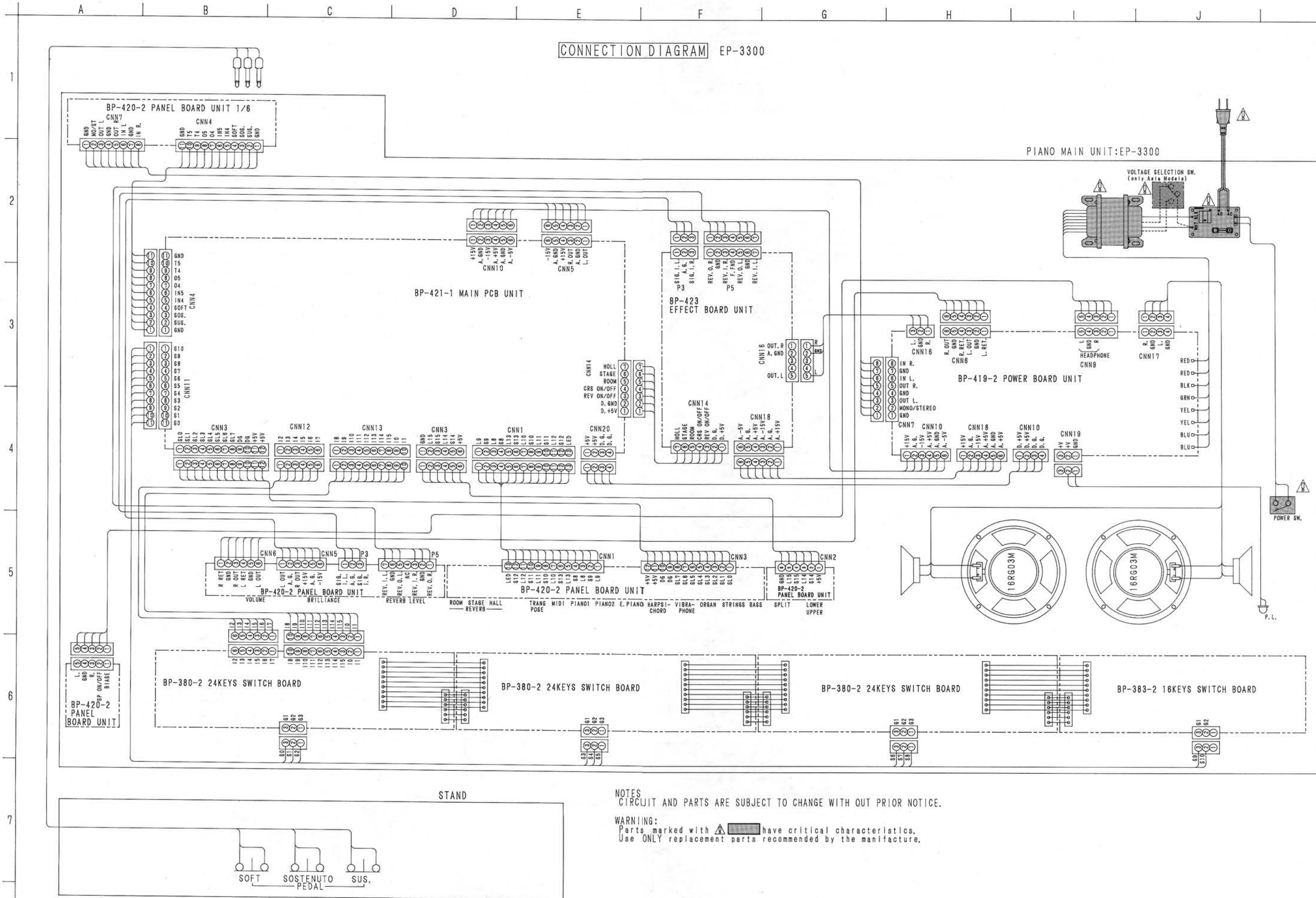



BLOCK DIAGRAM SOUND SYSTEM



CONNECTION

CONNECTION DIAGRAM EP-3300



NOTES
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LIST OF P.C. BOARD

PARTS LIST Printed Circuit Board:EP-3300

BP-421-1 MAIN PCB

Ref. No.	Part No.	Part Name	Remarks
IC1	2621535004	#PD702166F-8-3B8	
IC2	2630803002	PST520D-2	
IC3	2621726062	27C512-3300-2.0-L	
IC4	2621727061	27C512-3300-2.0-M	
IC5,6	2621313006	TC74HC573AP	
IC7,32,33	2621538001	CD74AC573E	
IC8,28	2621321001	TC74HC32AP	
IC9	2621318001	TC74HC00AP	
IC10	2621542000	HD74AC04P	
IC11,12	2621552003	HD74AC158P	
IC13-16	2621551004	MN4164A-08	
IC17	2621544008	TC74HC155AP	
IC18	2621159008	TC74HC139AP	
IC19,34, 35,46-49	2621543002	TC74HC174AP	
IC20,21	2621160000	TC74HC138AP	
IC22	2621077009	TC74HC646AP	
IC23-25	2621315004	TC74HC541AP	
IC26,43,44	2621314005	TC74HC574AP	
IC27	2621553002	TC74HC365AP	
IC29	3939330000	TLP552/PC910	
IC30	2621536003	ITP-L6009	
IC31	2621537002	FLR-L6009	
IC36	2621592005	TC74AC138P	
IC37	2621730003	LH538K13 AWW-100-3	
IC38	2621731002	LH538K14 AWW-100-4	
IC39	2621728002	LH538K11 AWW-100-1	
IC40	2621729001	LH538K12 AWW-100-2	
IC41	2621545007	SC0EF10-512 9743-081	
IC42	2621546006	SC0EF11-512 9743-081	
IC45	2621541001	HD74AC00P	
IC50	2620672007	PCM54HP	
IC51	2630804001	OPA602AM	
IC52-55	2621550005	CD74HC4053E	
IC56	2630226003	M5220L	
FL1,2	2610123003	LP YC258BLR-5589N	
△ R20,21	2412315035	RD14B2E330GFRF	33Ω
△ R38-41	2412371011	RD14B2E150GFRF	15Ω
X1		HC-49/U-S 16.000MHz	
X2	3997002008	COX-042C 27.684MHz	
RA1-3	2462045038	RK99=1H103JP8	10KΩx8
RA4	2462085001	RK99=1H103JP3	10KΩx3
VR1	2116089010	K07PB105	B-1MKΩ
VR2-5	2116089007	K07PB502	B-5KΩ

BP-423-1 EFFECT BOARD

Ref. No.	Part No.	Part Name	Remarks
D1,9,10	2760432000	1SS270A	
TR1-4,17	2730198028	2SC1815(GR)	
TR15,16	2750048006	2CK381(D/E)	
TR18	2710102021	2SA1015(GR)	
IC1	2631486001	MB87459PF-001	
IC2	2621561007	PCM55HP	
IC3	2621551004	MN41464A-08	
IC4	2630806009	1R9311	
IC5	2621562006	TC74HC4053AP	
IC6,7	2630679000	M5238P	
IC8,9,15 16,17	2630317006	M5220P	
X1	3997002024	HC-49/U-S 20.000MHz	
△ R201,202	2412371011	RD14B2E150GFRF	15Ω
RA1	2462077006	RK99=1H104JP4	100KΩx4
L10-16,19 21-25,27	2350023007	BL02RN2-R62	
L1-4	2350090001	SBT-0240	

BP-420-2 PANEL BOARD

Ref. No.	Part No.	Part Name	Remarks
IC3	2630081002	NJM4558D	
SW1-10 12-16	2124388004	TACT SWITCH	
LD1-10, 12-16,	3939490005	LN221RP	
VR1,3	2117050006	J3020VBB103	B-10KΩ
VR2	2117050019	J3020VBB503	B-50KΩ
L1-12	2350050009	BEAD INDUCTOR	
△ R29-32	2412314007	RD14B2E101JNBF	100Ω
MID1	2049431007	DIN SOCKET	
AUX IN	2049437001	PHONE JACK	
AUX OUT	2049436002	PHONE JACK	
PEDAL	2049444007	PHONE JACK	
HEADPHONE	2049443008	PHONE JACK	

EP-419-2 POWER BOARD

Ref. No.	Part No.	Part Name	Remarks
IC1	2360053006	NJM7805FA	
IC2	2630561001	NJM7915FA	
IC3	2630560002	NJM7815FA	
IC4	2630567005	NJM78M05FA	
IC5	2630501003	NJM79M05FA	
IC6,7	2630405002	NJM4558S	
IC9	2630485006	NJM4556S	
IC10	2650074002	STK4142MK2	
△ D1	2760505005	DBA208	
D2,3,5-12 14-19	2760432000	1SS270A	
△ D4	2760504006	DBA10C	
△ D13	2760576005	DBA40C	
ZD1	2760468003	HZS9B-(1)	
TR1,4-6	2730198028	2SC1815(GR)	
TR2,3	2710102021	2SA1015(GR)	
RL1	2140146000	G6B2214P-US DC12V	
RL2,3	2140148008	G5A-234P DA12	
△ F1,2	2081039092	FUSE 4A 125V	U.S.A.,Canada
△ F1,2	2081015087	FUSE 4A 125V	Europe,U.K.
△ F1,2	2081035070	FUSE 4A 125V	Asia
△ F3,4	2081039021	FUSE 500mA 125V	U.S.A.,Canada
△ F3,4	2081015003	FUSE 500mA 250V	Europe,U.K.
△ F3,4	2081035083	FUSE 630mA 125V	Asia
△ F5	2081039034	FUSE 1A 125V	U.S.A.,Canada
△ F5	2081015029	FUSE 1A 250V	Europe,U.K.
△ F5	2081053007	FUSE 1A 125V	Asia
△ R69,78	2412314007	RD14B2E101JNBF	100Ω
△ R76,77	2452381003	RN14B3D4R7JNBF	4.7Ω
△ R80	2412321029	RD14B2E152JNBF	1.5KΩ
△ R92	2412314081	RD14B2E561JNBF	560Ω
△ R95,98	2412321087	RD14B2E121JNBF	120Ω
L1-5	2350050009	BEAD INDUCTOR	

BP-380-2 24KEYS SWITCH BOARD

Ref. No.	Part No.	Part Name	Remarks
D0-47	2760049008	1S2706	
	2128598104	RUBBER SWITCH-II	

BP-383-2 16KEYS SWITCH BOARD

Ref. No.	Part No.	Part Name	Remarks
D0-31	2760049008	1S2706	
	2128598104	RUBBER SWITCH-II	

BP-393-2 L/FILTER BOARD(U.S.A./Canada)

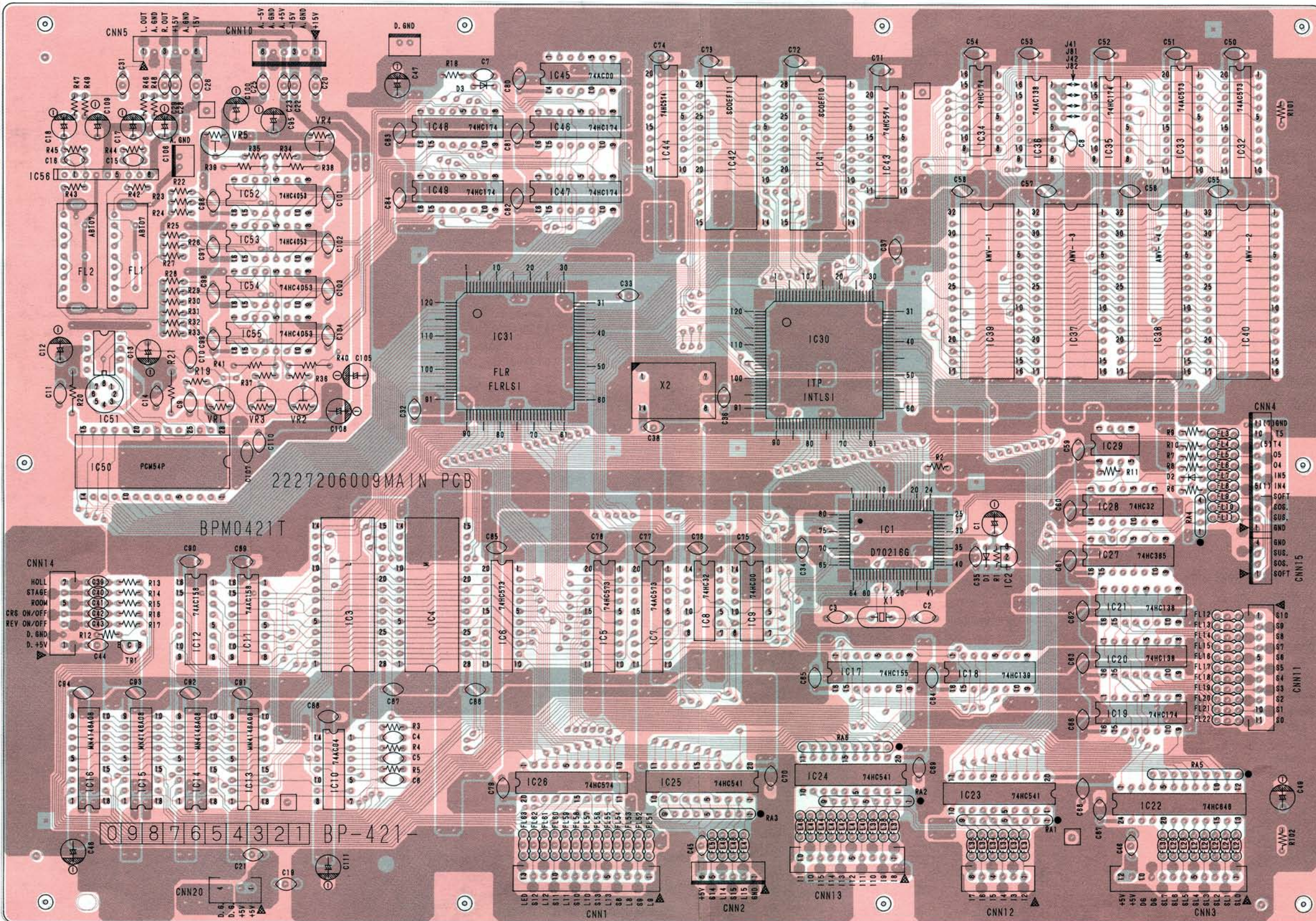
Ref. No.	Part No.	Part Name	Remarks
△ F	2081056004	FUSE 2A 125V	
△	2397001008	LINE FILTER	
△ C1,2	2538012005	CK45F2GAC222M	
△ C3	2538015002	CK45F2GAC103P	
△ SW	2033518004	2P CONNECTOR BASE	

BP-393-3 L/FILTER BOARD(Europe,U.K.,Asia)

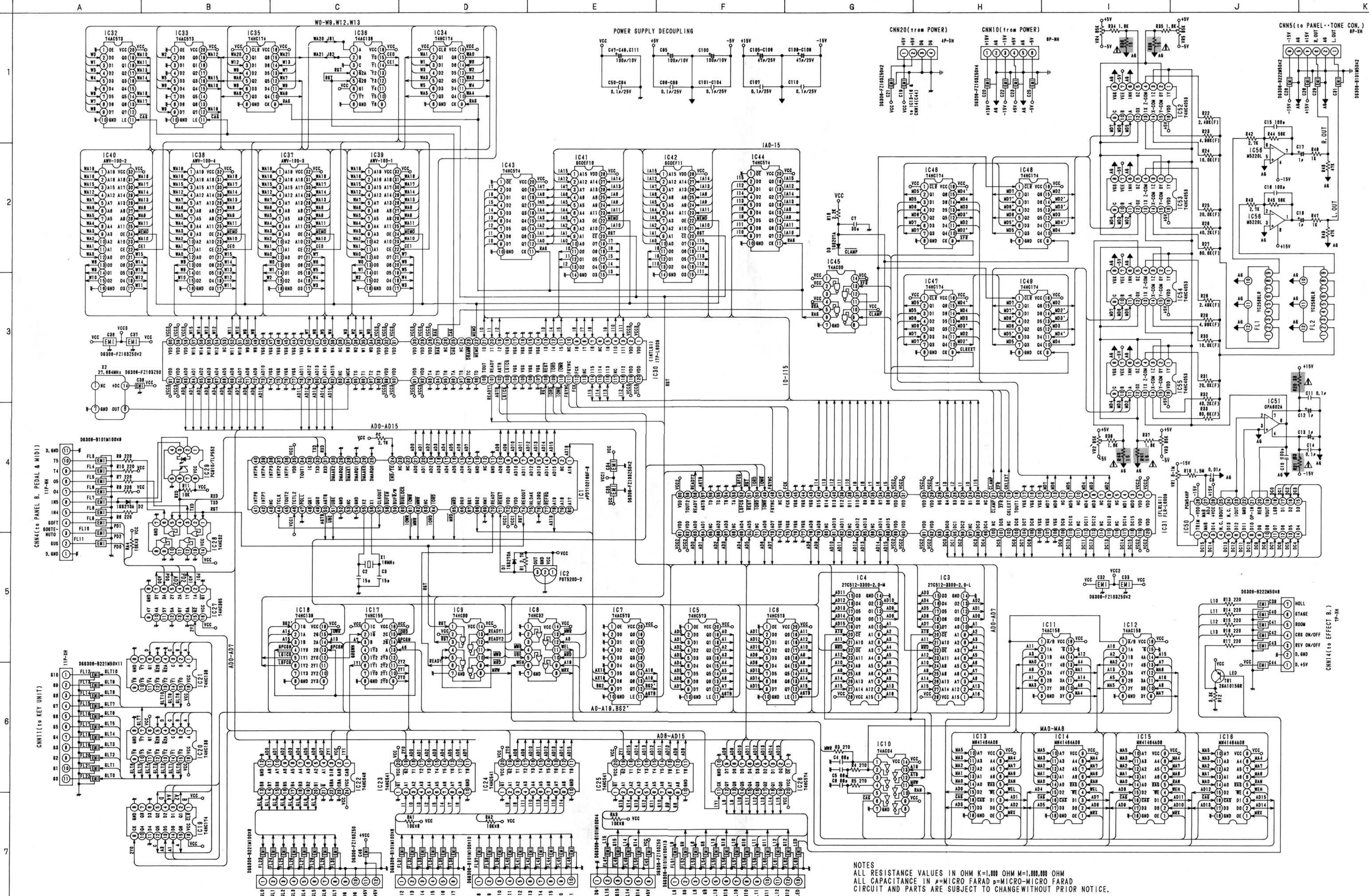
Ref. No.	Part No.	Part Name	Remarks
△ F	2081015081	FUSE 2A 250V	
△	2020014003	FUSE CLIP	
△	2397001008	LINE FILTER	
△ C1,2	2538012005	CK45F2GAC222M	
△ C3	2538015002	CK45F2GAC103P	
△ SW	2033518004	2P CONNECTOR BASE	

WARNING:

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SCHEMATIC DIAGRAM BP-421-1 MAIN PCB



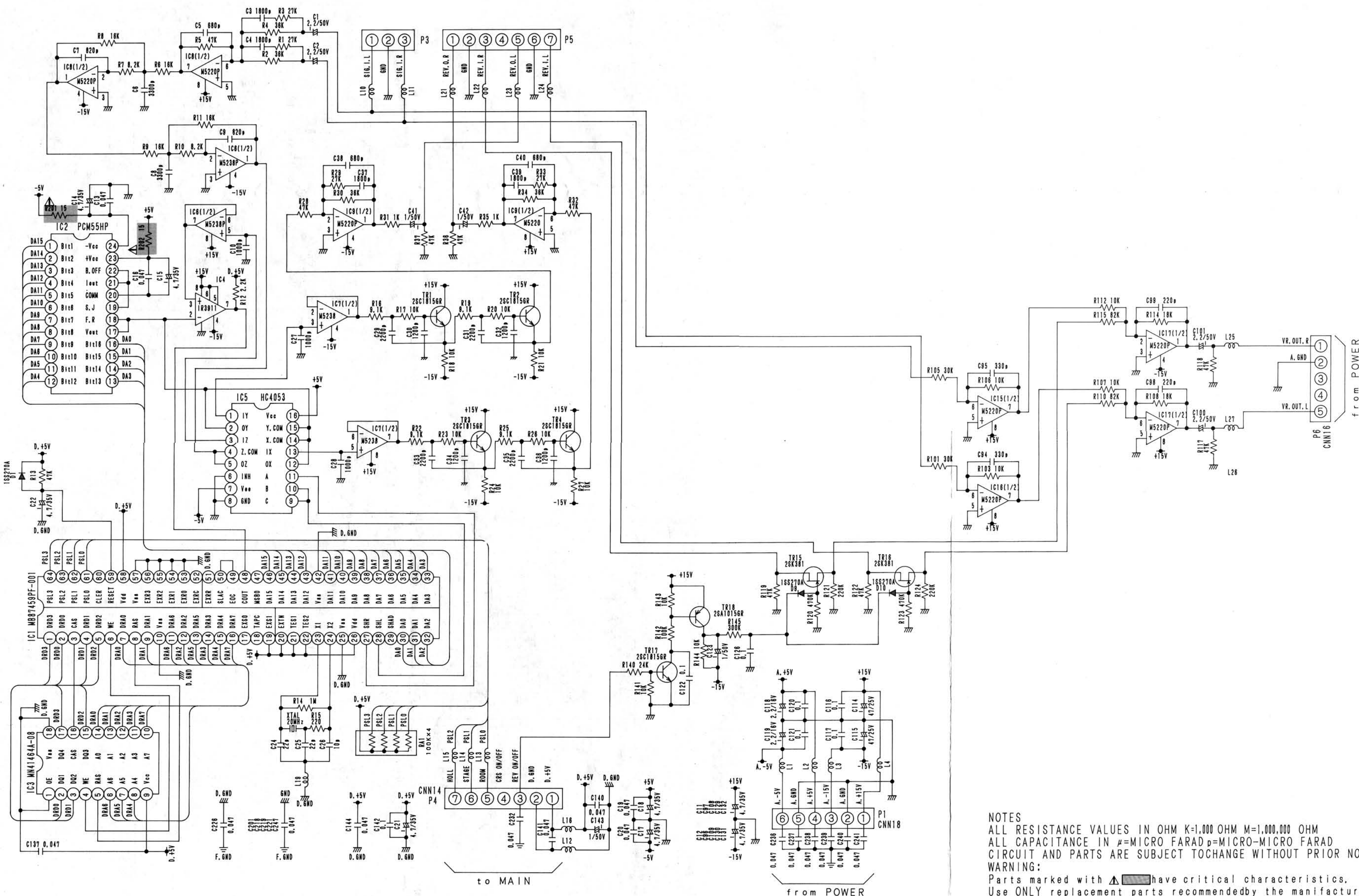
NOTES
 ALL RESISTANCE VALUES IN OHM K=1,000 OHM M=1,000,000 OHM
 ALL CAPACITANCE IN μ=MICRO FARAD p=MICRO-MICRO FARAD
 CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

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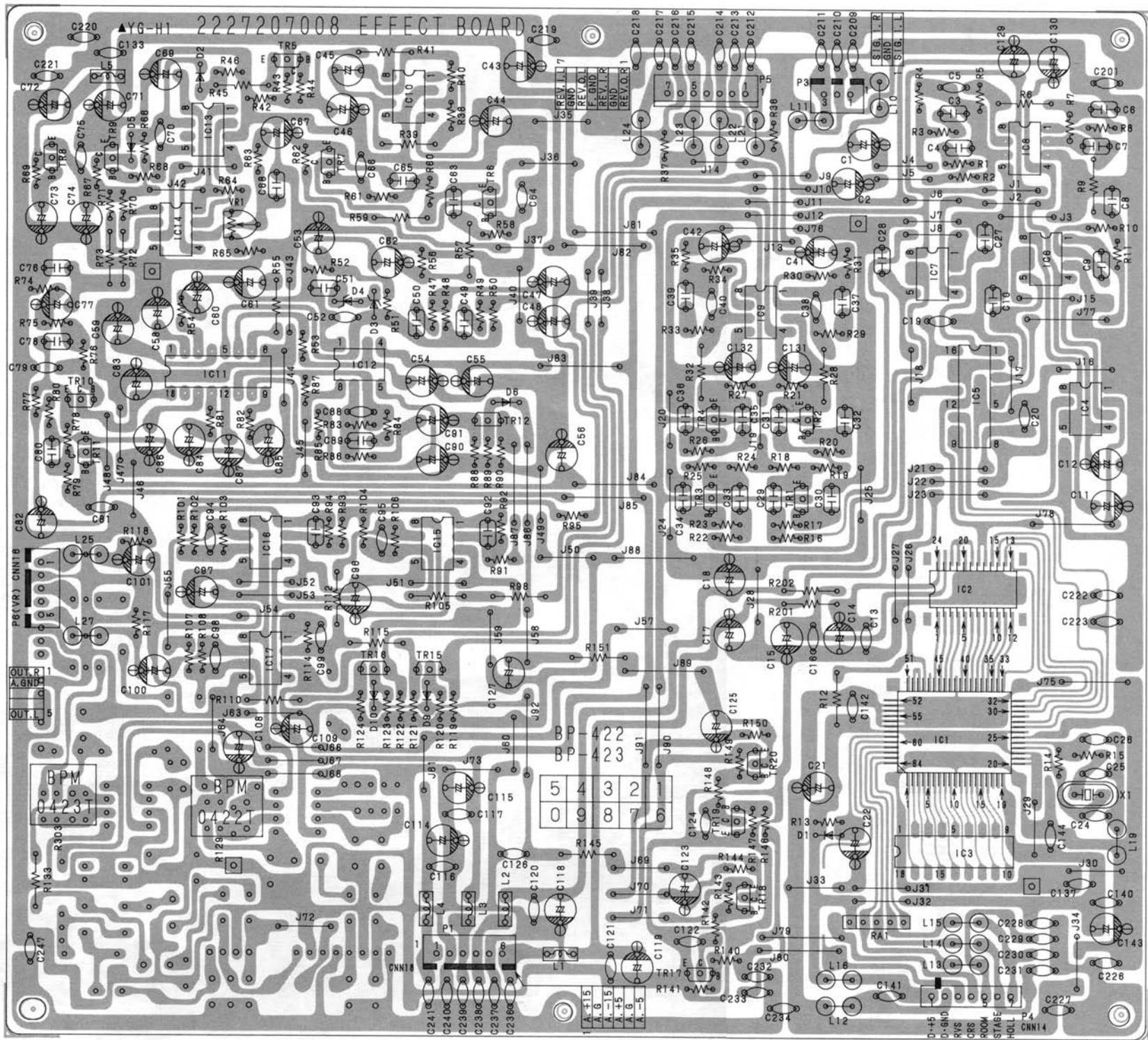
BP-423-1 EFFECT BOARD

SCHEMATIC DIAGRAM

from PANEL

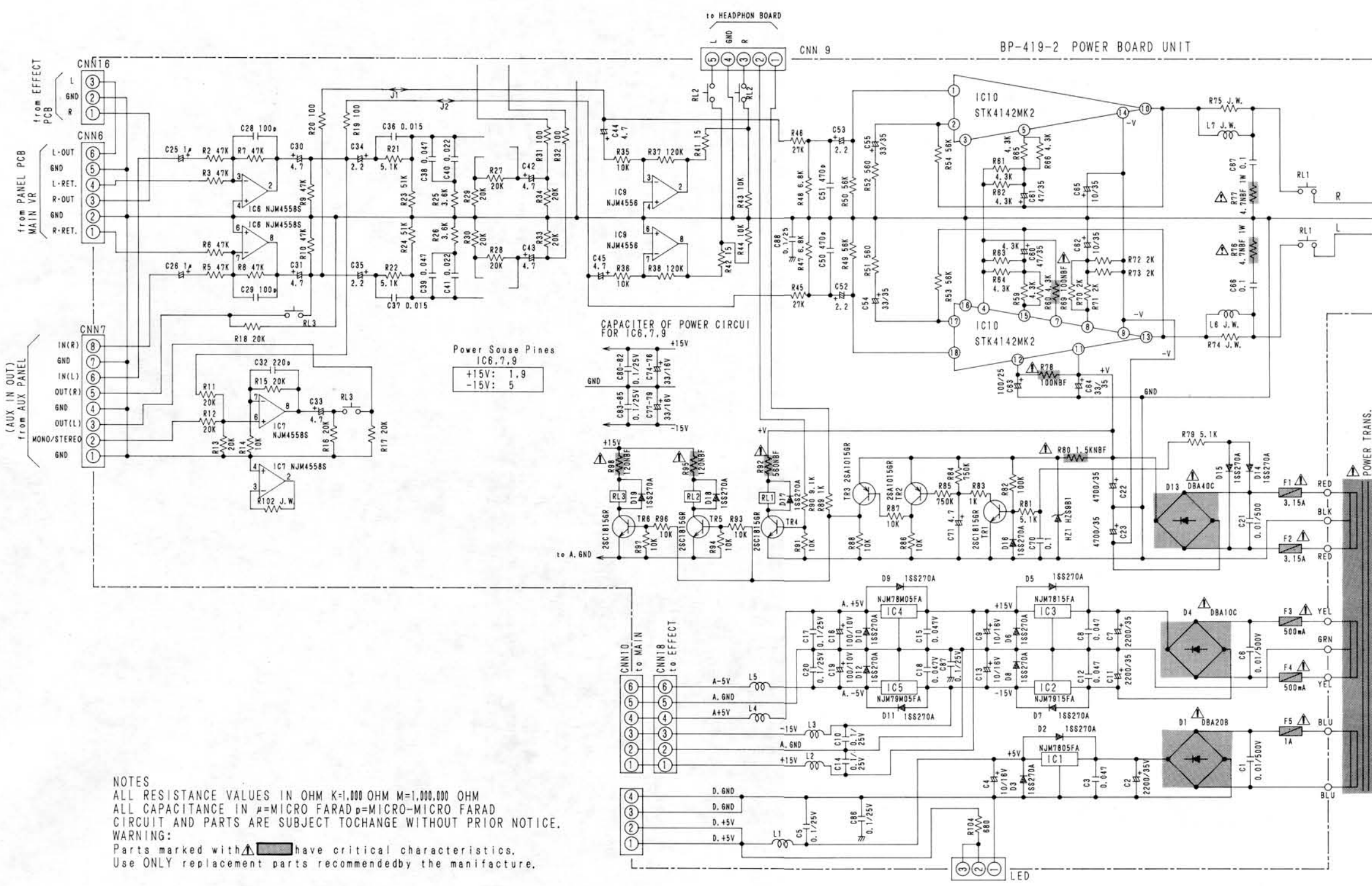


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BP-422, BP-423 EFFECT BOARD UNIT Pattern side

SCHEMATIC DIAGRAM BP-419-2 POWER BOARD & BP-393 L/FILTER

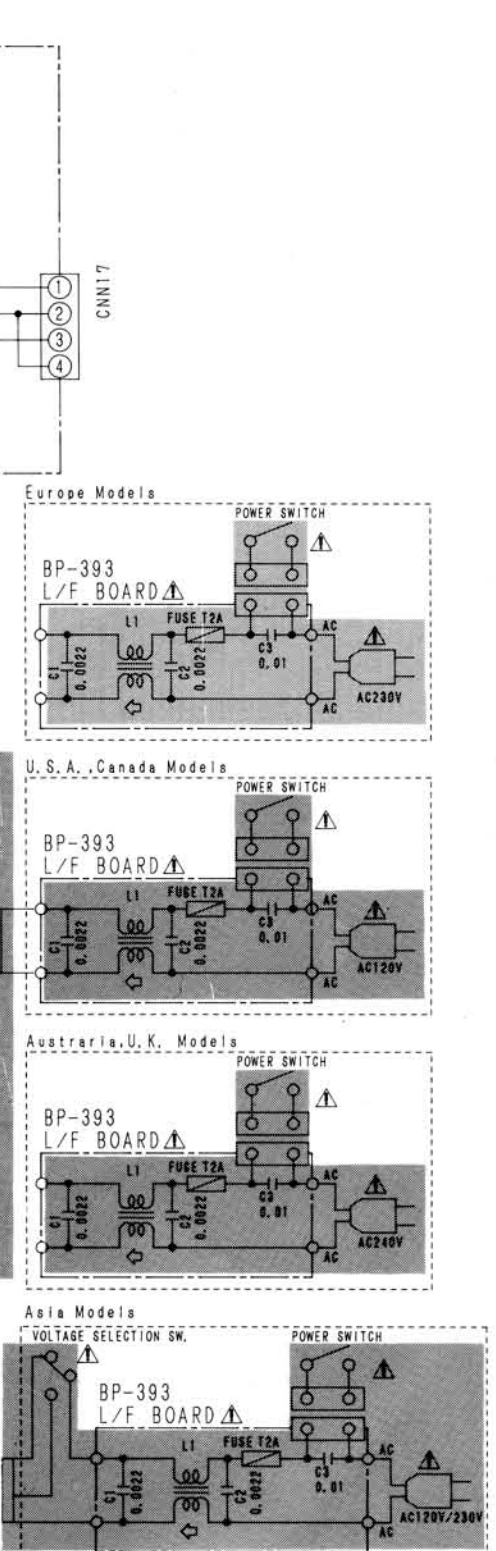
A
B
C
D
E



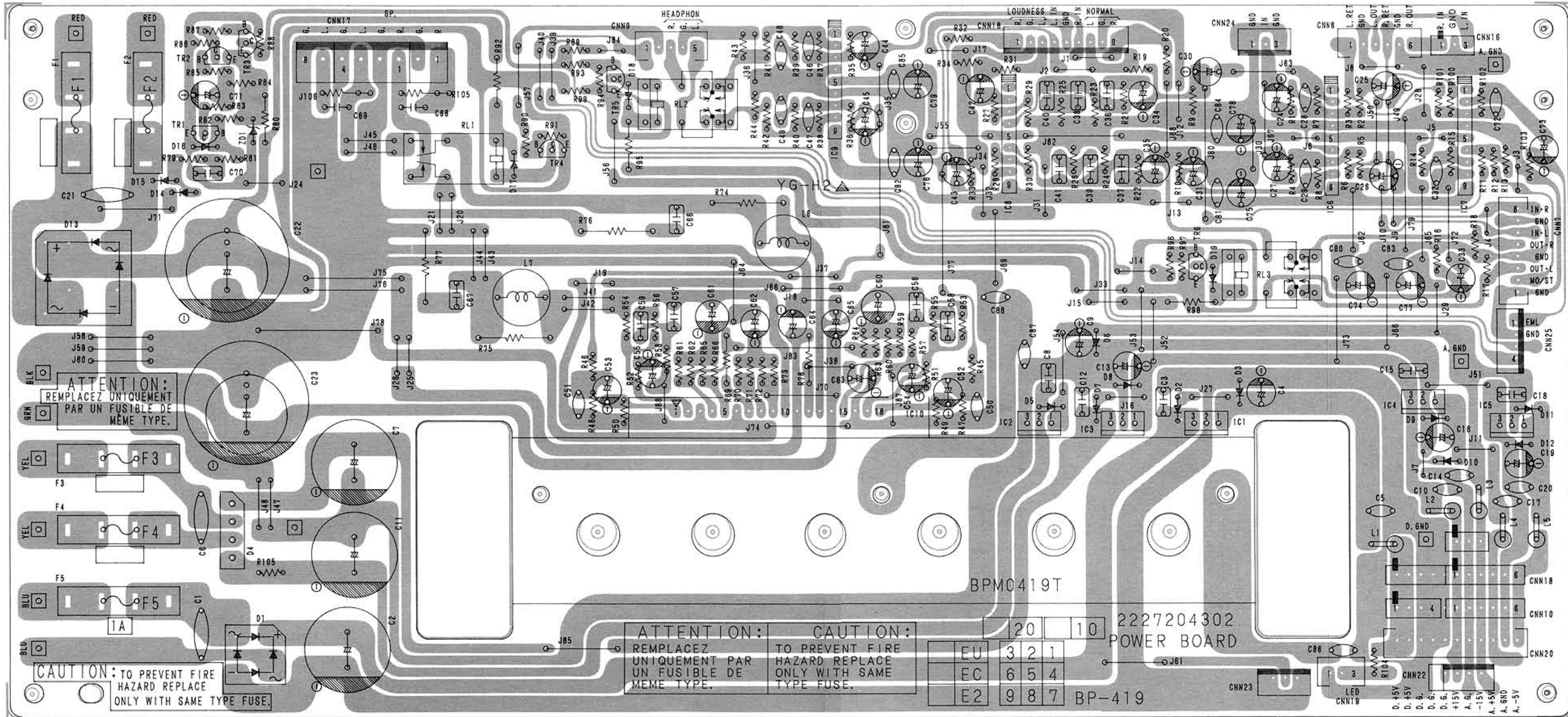
Power Souse Pines
IC6,7,9
+15V: 1.9
-15V: 5

CAPACITER OF POWER CIRCUI
FOR IC6,7,9

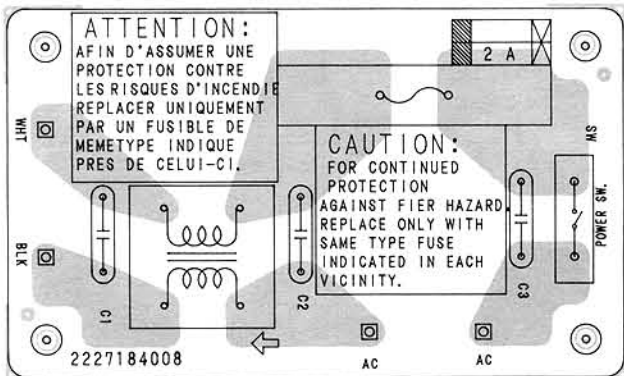
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ALL CAPACITANCE IN μ =MICRO FARAD μ =MICRO-MICRO FARAD
CIRCUIT AND PARTS ARE SUBJECT TOCHANGE WITHOUT PRIOR NOTICE.
WARNING:
Parts marked with Δ have critical characteristics.
Use ONLY replacement parts recommended by the manufacture.



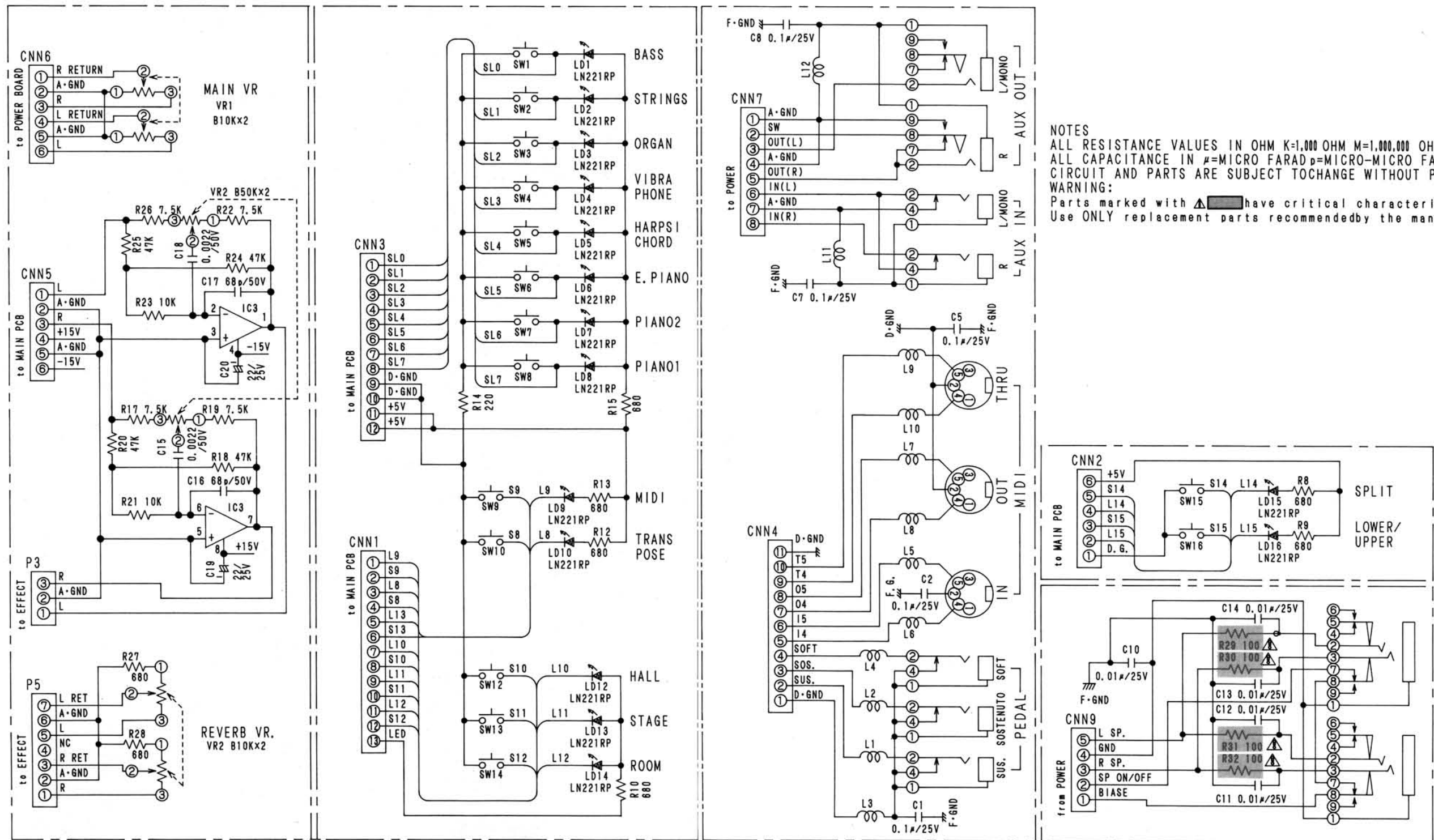
BP-419 POWER BOARD UNIT Pattern side



BP-393 L/FILTER BOARD Pattern side

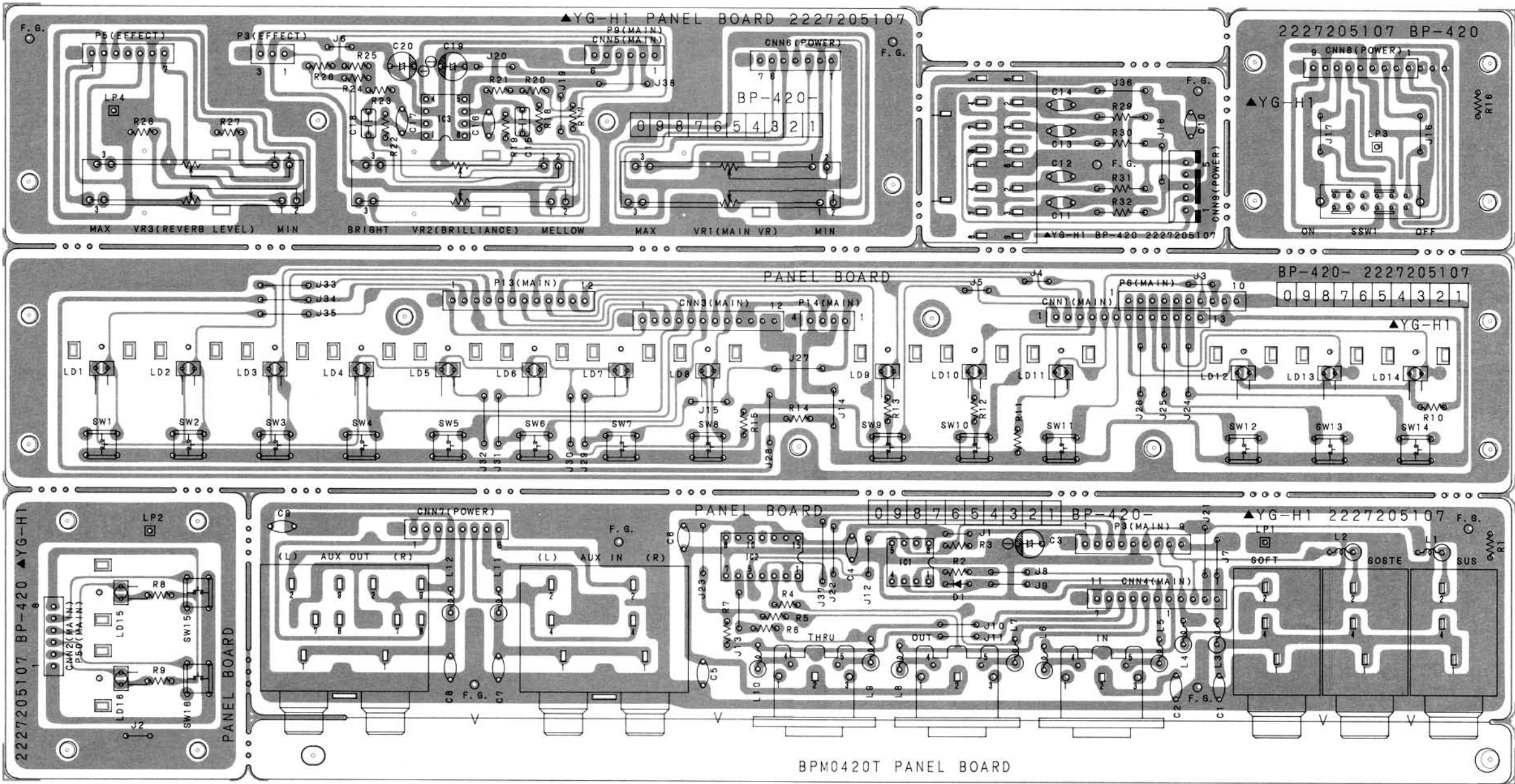


SCHEMATIC DIAGRAM BP-420-2 PANEL BOARD



NOTES
 ALL RESISTANCE VALUES IN OHM K=1,000 OHM M=1,000,000 OHM
 ALL CAPACITANCE IN μ =MICRO FARAD μ =MICRO-MICRO FARAD
 CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.
WARNING:
 Parts marked with Δ have critical characteristics.
 Use ONLY replacement parts recommended by the manufacture.

BP-420 PANEL BOARD UNIT Pattern side



BPM0420T PANEL BOARD

SCHEMATIC DIAGRAM

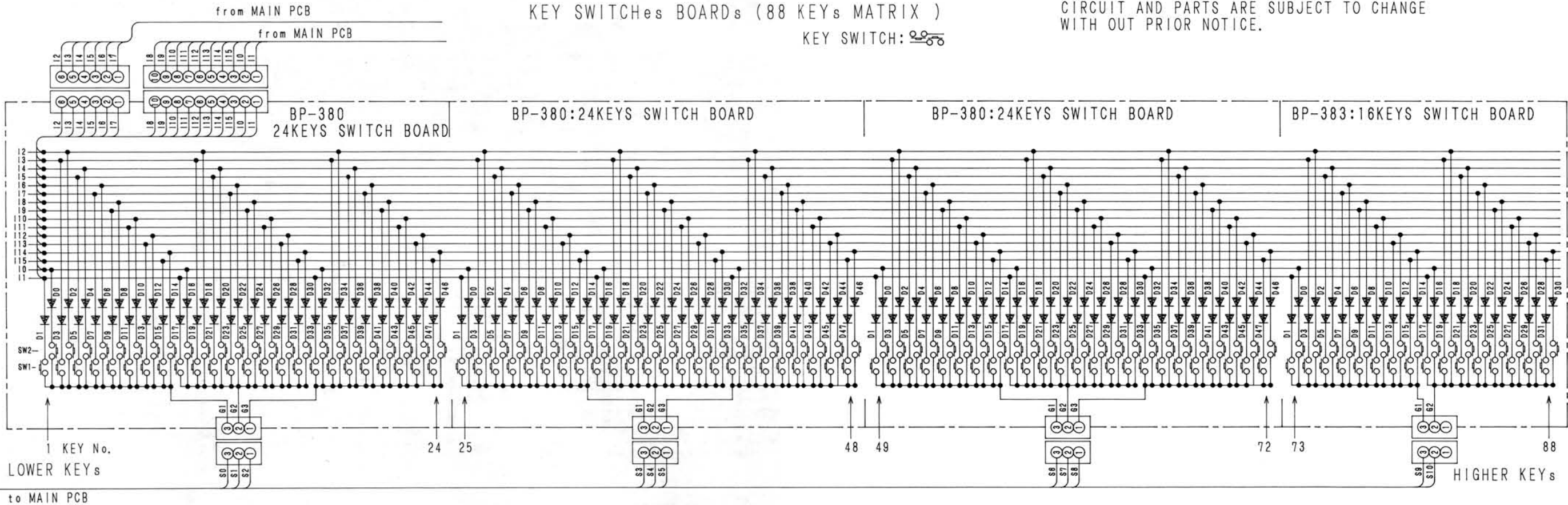
REAL HAMMER ACTION TYPE

KEY SWITCHES BOARDs (88 KEYS MATRIX)

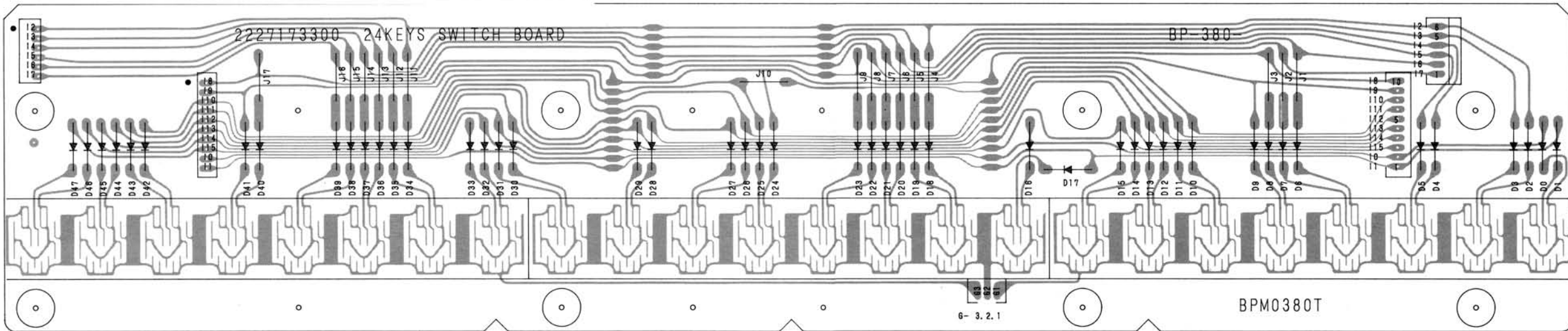
KEY SWITCH: 

NOTES

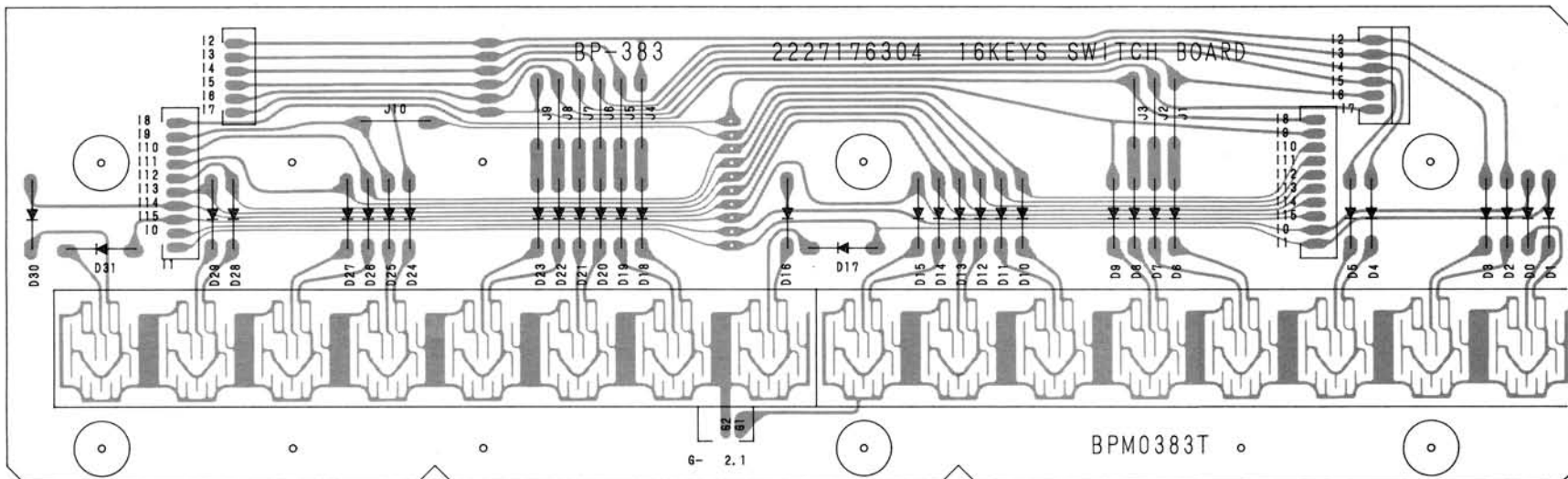
CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITH OUT PRIOR NOTICE.



BP-344, BP-339, BP-343 SWITCH BOARD Soldering side

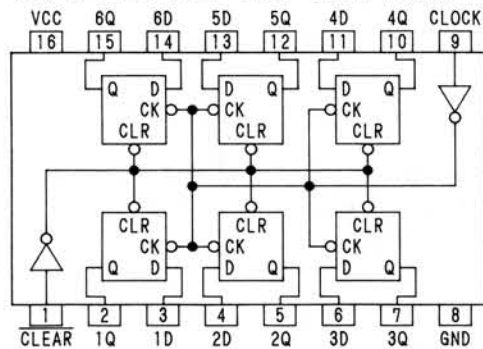


BP-341 SW BOARD IV Soldering side



SEMICONDUCTORS

74HC174
HEX D-TYPE FLIP FLOP WITH CLEAR

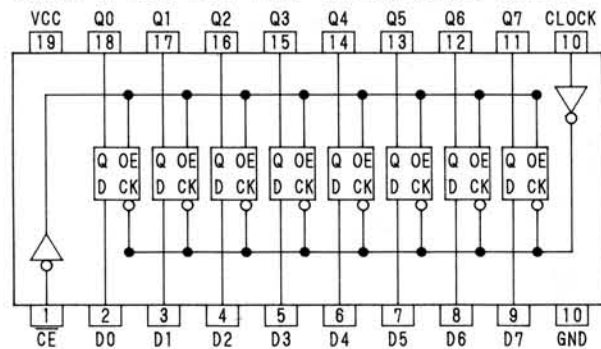


FUNCTION TABLE

INPUT			OUTPUT	FUNCTION
CLEAR	D	CLOCK	Q	
L	X	X	L	CLEAR
H	L	\downarrow	L	—
H	H	\downarrow	H	—
H	X	\downarrow	Q _o	NO CHANGE

X: Don't care

74HC574
OCTAL D-TYPE FLIP FLOP WITH 3-STAGE OUTPUT

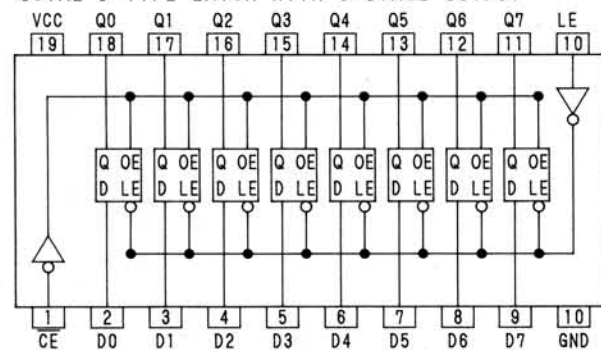


FUNCTION TABLE

INPUT		OUTPUT
\overline{OE}	CK	Q
H	X	X
L	\downarrow	X
L	\downarrow	L
L	\downarrow	H

X: Don't care
Z: HIGH-IMPEDANCE
Q_o: NO CHANGE

74HC573:74AC573
OCTAL D-TYPE LATCH WITH 3-STAGE OUTPUT

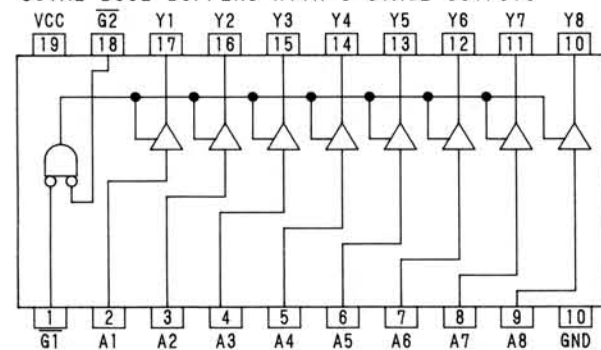


FUNCTION TABLE

INPUT		OUTPUT
\overline{OE}	CK	Q
H	X	X
L	L	X
L	H	L
L	H	H

X: Don't care

74HC541
OCTAL BUFE BUFFERS WITH 3-STAGE OUTPUTS

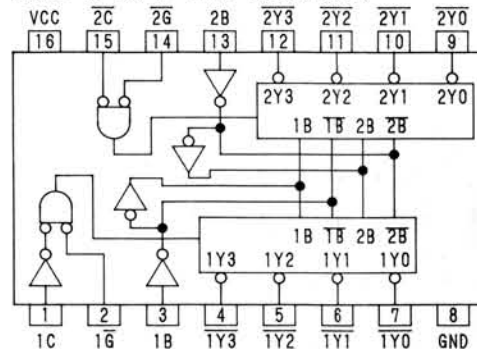


FUNCTION TABLE

INPUT		OUTPUT
G1	G2	Y
L	L	L
L	L	H
H	X	X
X	H	X

X: Don't care
Z: HIGH-IMPEDANCE

74HC155
DUAL 2-TO-4 LINE DECODER

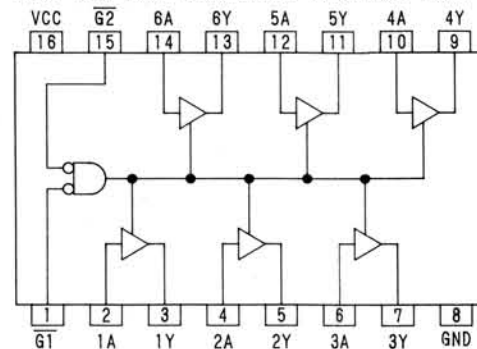


FUNCTION TABLE

INPUT				OUTPUT			
1B	2B	1C	1Y	1Y0	1Y1	1Y2	1Y3
X	X	H	X	H	H	H	H
L	L	L	H	L	L	L	L
L	L	L	H	L	L	L	L
L	L	L	H	L	L	L	L
H	L	L	H	H	H	L	H
H	L	L	H	H	H	L	H
H	L	L	H	H	H	L	H
X	X	X	L	H	H	H	H

X: Don't care

74HC365
HEX BUS DRIVERS WITH 3-STAGE OUTPUTS

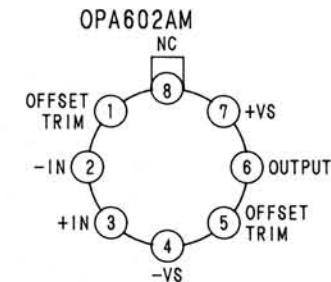
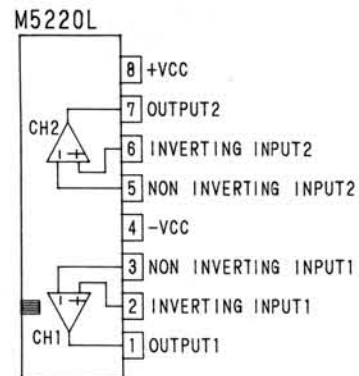
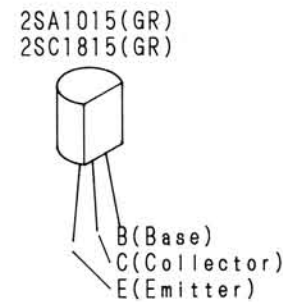
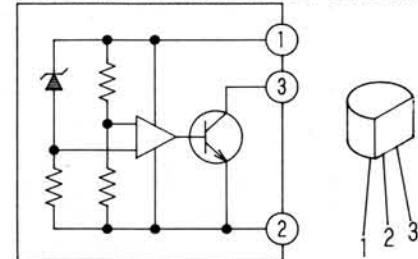


FUNCTION TABLE

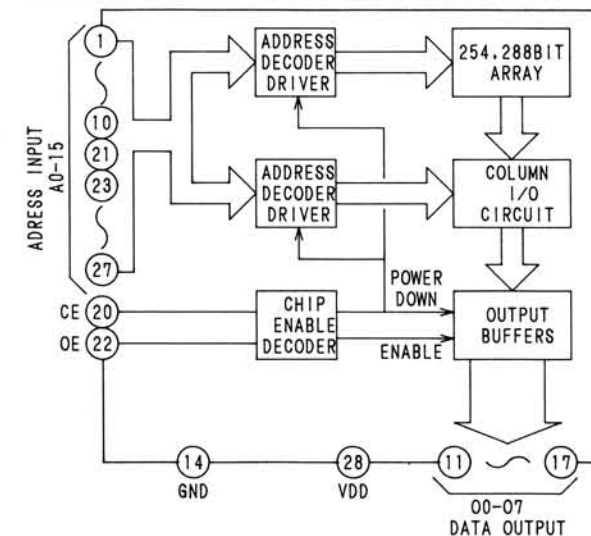
INPUT			OUTPUT
G1	G2	A _n	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

X: Don't care
Z: HIGH-IMPEDANCE

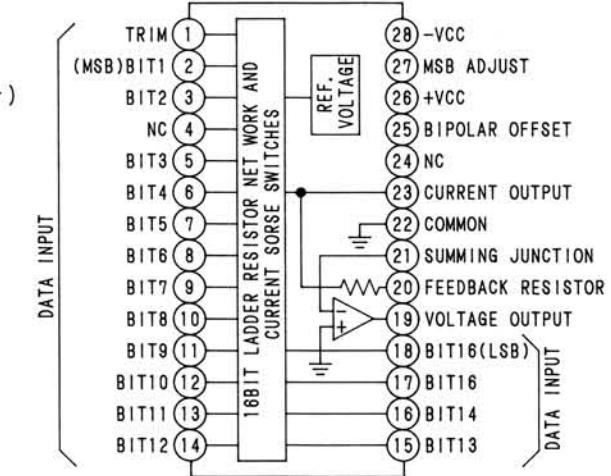
PST520D-2 (RESET PULSE GENERATOR)



SCOEF10-512/SCOEF11-512
(512K BIT C-MOS MASK PROGRAMMABLE ROM)

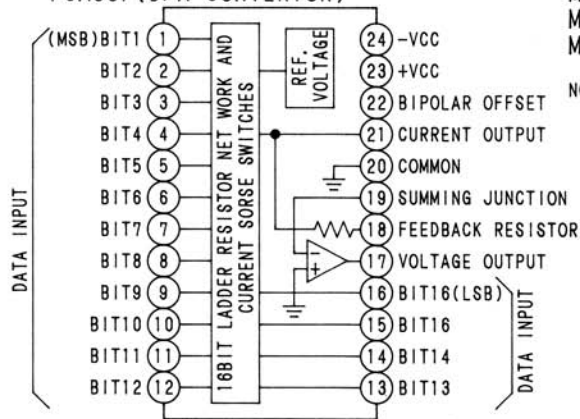


PCM54P (D/A CONVERTOR)

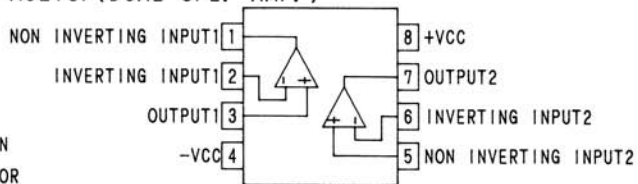


SEMICONDUCTORS

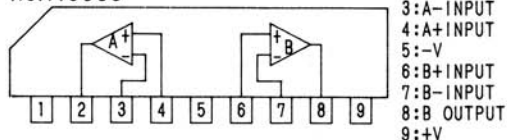
PCM55P(D/A CONVERTOR)



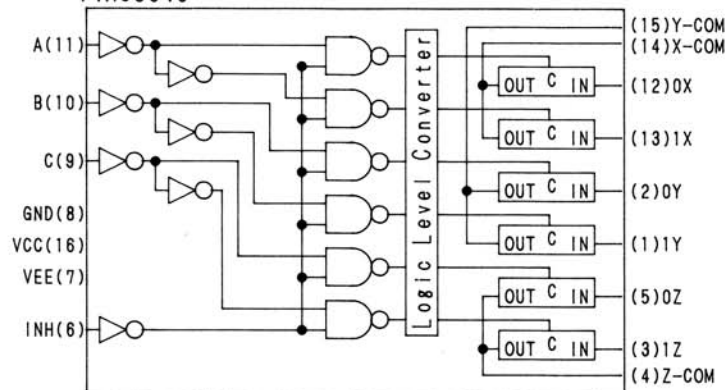
M5220P(LOW NOISE DUAL OPERATIONAL AMP.
M5238P(J-FET INPUT DUAL OPE. AMP.)
M5218P(DUAL OPE. AMP.)



NJM4556S
NJM4558S



74HC5043



FUNCTION TABLE

INHIBIT	C	B	A	*ON*CHANNEL
L	L	L	L	0X,0Y,0Z
L	L	L	H	1X,0Y,0Z
L	L	H	L	0X,1Y,0Z
L	L	H	H	1X,1Y,0Z
L	H	L	L	0X,0Y,1Z
L	H	L	H	1X,0Y,1Z
L	H	H	L	0X,1Y,1Z
L	H	H	H	1X,1Y,1Z
H	X	X	X	NONE

X: DON'T CARE