

DENON

SERVICE MANUAL

ELECTRONIC PIANO

MODEL
EP-5000

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NIPPON COLUMBIA CO., LTD.

IMPORTANT TO SAFETY

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION:

1. Handle the power supply cord carefully

Do not damage or deform the power supply cord. If it is damaged or deformed, it may cause electric shock or malfunction when used. When removing from wall outlet, be sure to remove by holding the play attachment and not by pulling the cord.

2. Do not open the top cover

In order to prevent electric shock, do not open the cover. If problems occur, contact your WURLITZER dealer.

3. Do not place anything inside

Do not place metal objects or spill liquid inside INSTRUMENTS. Electric shock or malfunction may result.

Please, record and retain the Model name and serial number of your INSTRUMENTS shown on the rating label.

Model No. EP-913R

NOTE: To allow you to enjoy music at a stable operation, it is recommended to use this in a room 10°C~35°C.

SAFETY INSTRUCTIONS FOR ELECTRONIC PIANO

■ INSTALLATION

1. Operate the INSTRUMENTS only from a power source which is indicated on the rating label (indication) at the back of the INSTRUMENTS.

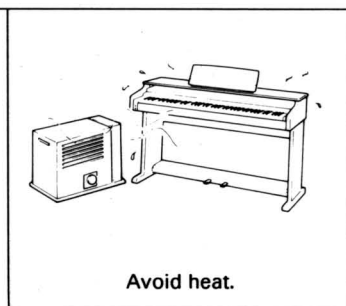
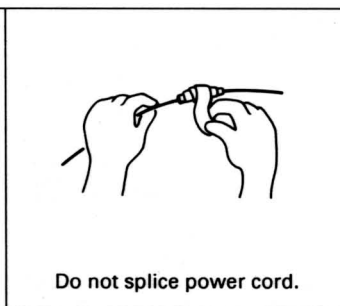
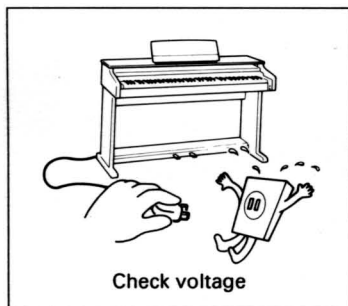
2. Prayed cords and broken plugs may cause a fire or shock hazard.

Do not damage the power cord.

- Do not cut and splice the power cord.
- When removing the power cord from wall outlet, be sure to unplug by holding the play attachment and not by pulling the cord. Do not hold the plug with wet hands.
- Call your service technician for replacement of damaged cords and plugs.

3. Select a place so that the location or position does not interfere with the proper ventilation of the INSTRUMENTS for releasing heat generated during operation.

- Select a flat and level surface allowing enough space for setting up and operation.
- Never block the bottom ventilation holes placing the INSTRUMENTS on a bed, sofa, rug etc.
- Never place the INSTRUMENTS in a "built-in" enclosure unless proper ventilation is provided.
- Never place the INSTRUMENTS near a radiator, heat register or stove.
- Avoid locations where the INSTRUMENTS is exposed directly to the sun light.



■ USE

1. Do not expose the INSTRUMENTS to rain or water (liquid). Do not spill liquid or insert metal objects inside the set. Rain, water or liquid such as cosmetics as well as metal may cause electric shorts which can result in fire or shock hazard. If anything gets inside, unplug the power cord and have a WURLITZER service technician check your set before further use.

2. Never leave your INSTRUMENTS switched on when leaving the house. For added protection of your audio system during lightning storm or when the INSTRUMENTS is to be left unused for a long period of time, be sure to unplug the power cord from the wall outlet.

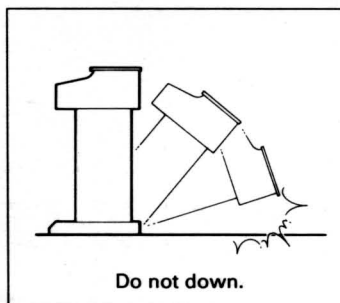
3. Take care so that the INSTRUMENTS is not dropped to avoid damaging the cabinet which defeats safeguards or injuring yourself. If the INSTRUMENTS has been dropped or the cabinet has been damaged, unplug the INSTRUMENTS and have it checked by a WURLITZER service technician to restore the safeguards.



■ SERVICING

1. The servicing of the INSTRUMENTS must not be attempted by yourself beyond that described in the operating instructions. In case of problems that cannot be settled by referring to your operating instructions, unplug the power cord and contact your WURLITZER dealer. No user serviceable parts are inside the INSTRUMENTS. Only qualified service technician can service inside your INSTRUMENTS.

2. Refer to the operating instructions for maintenance and cleaning.



DISASSEMBLY

Fig. 1

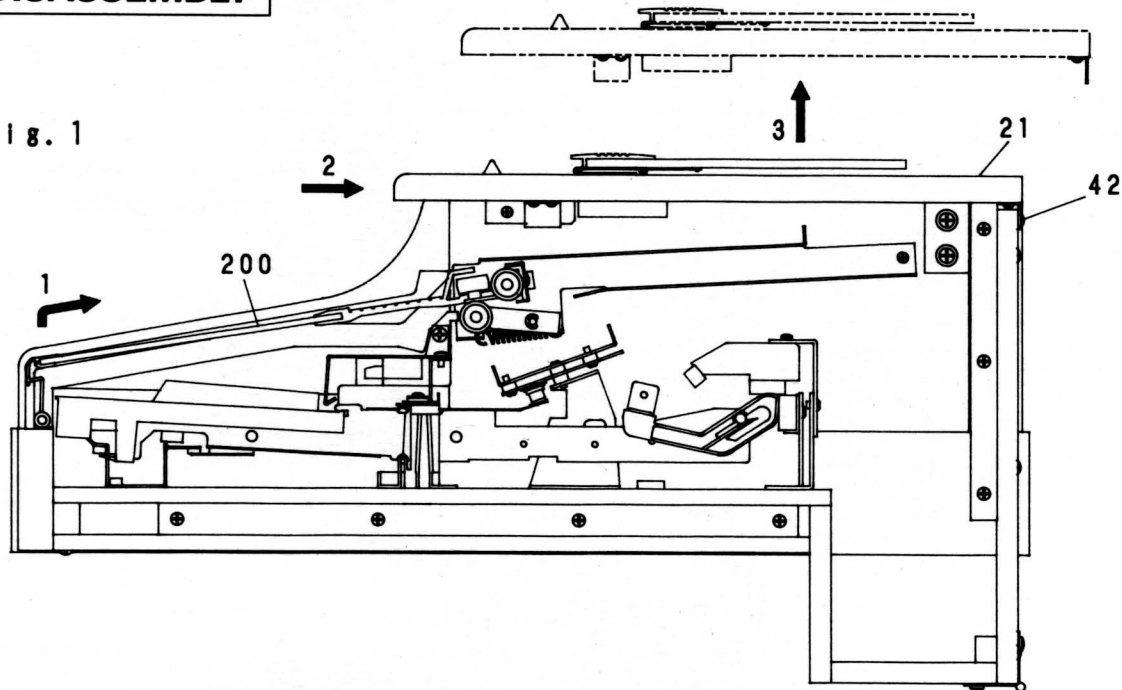


Fig. 2

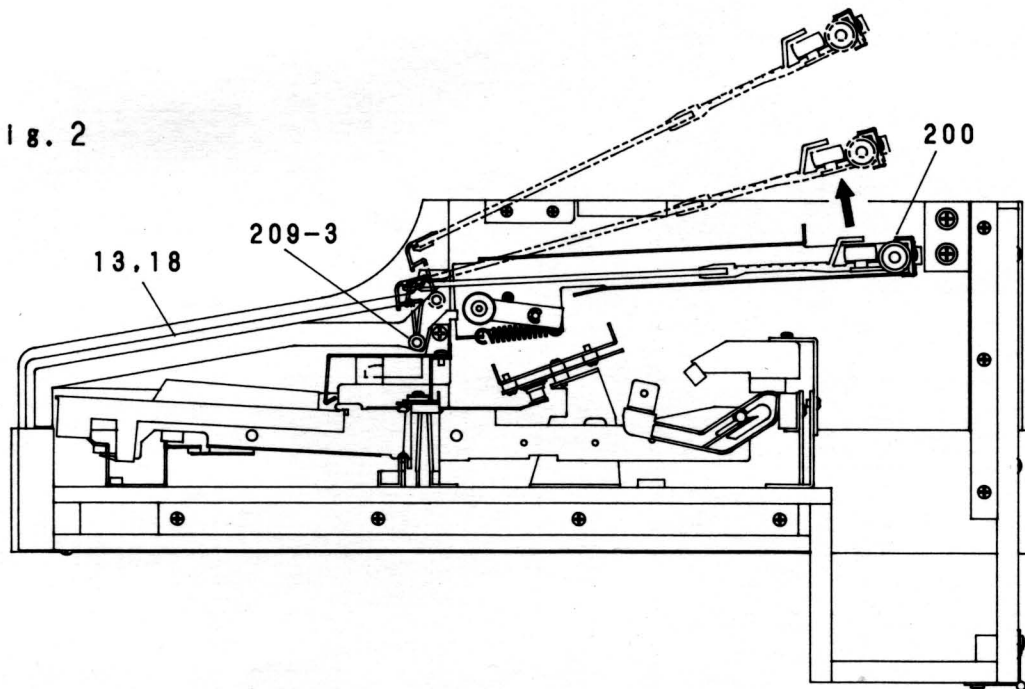


Fig. 3

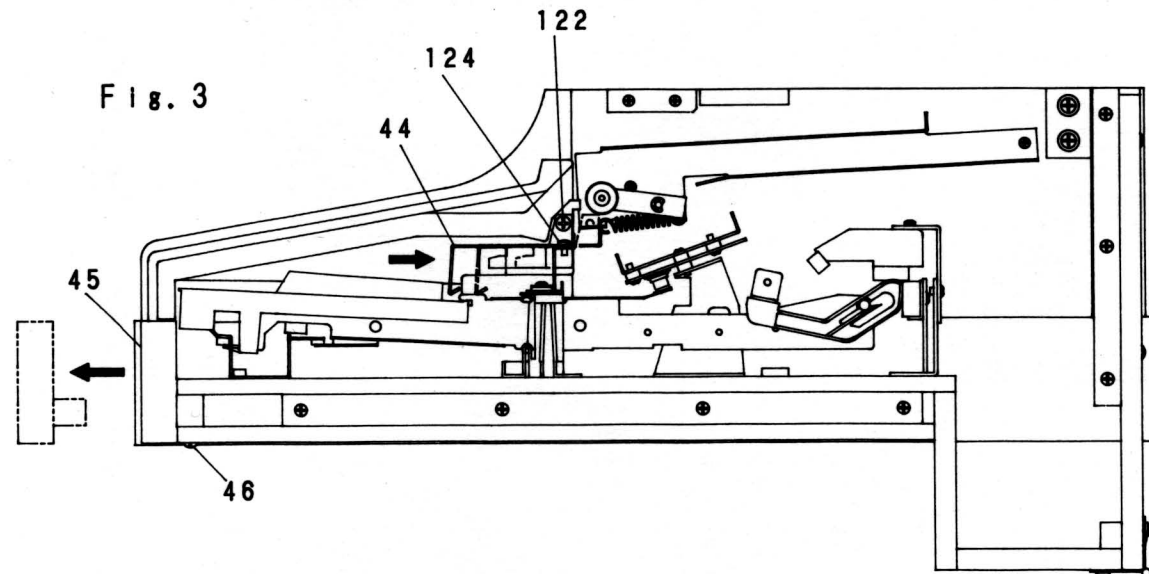
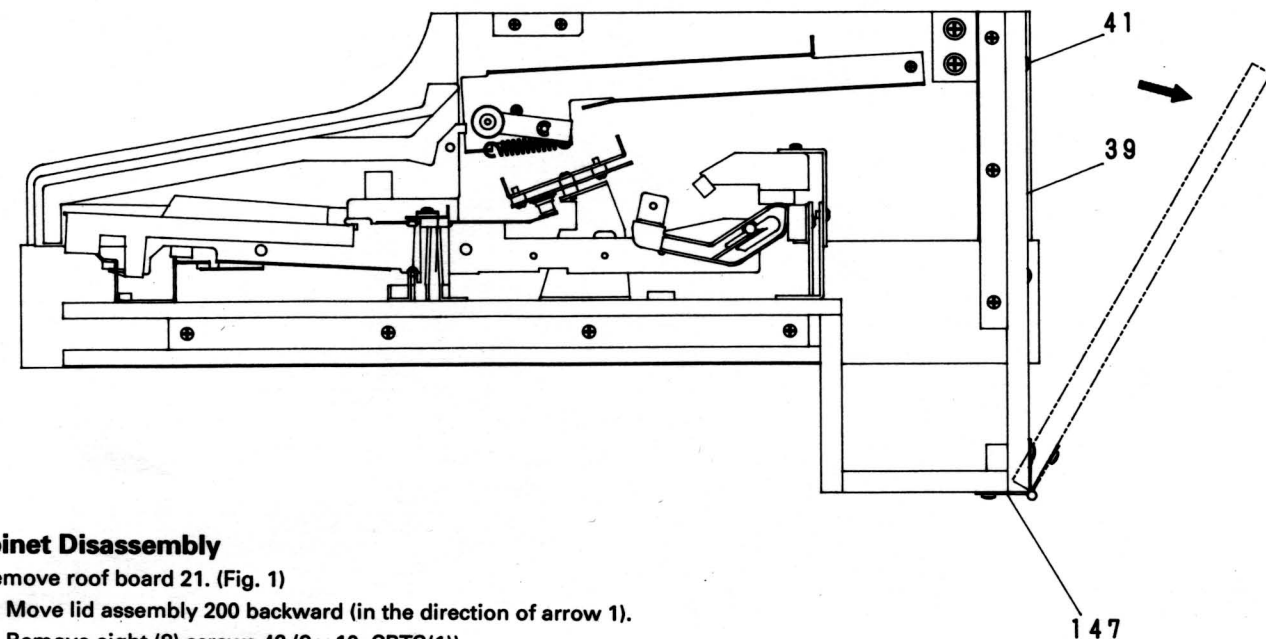


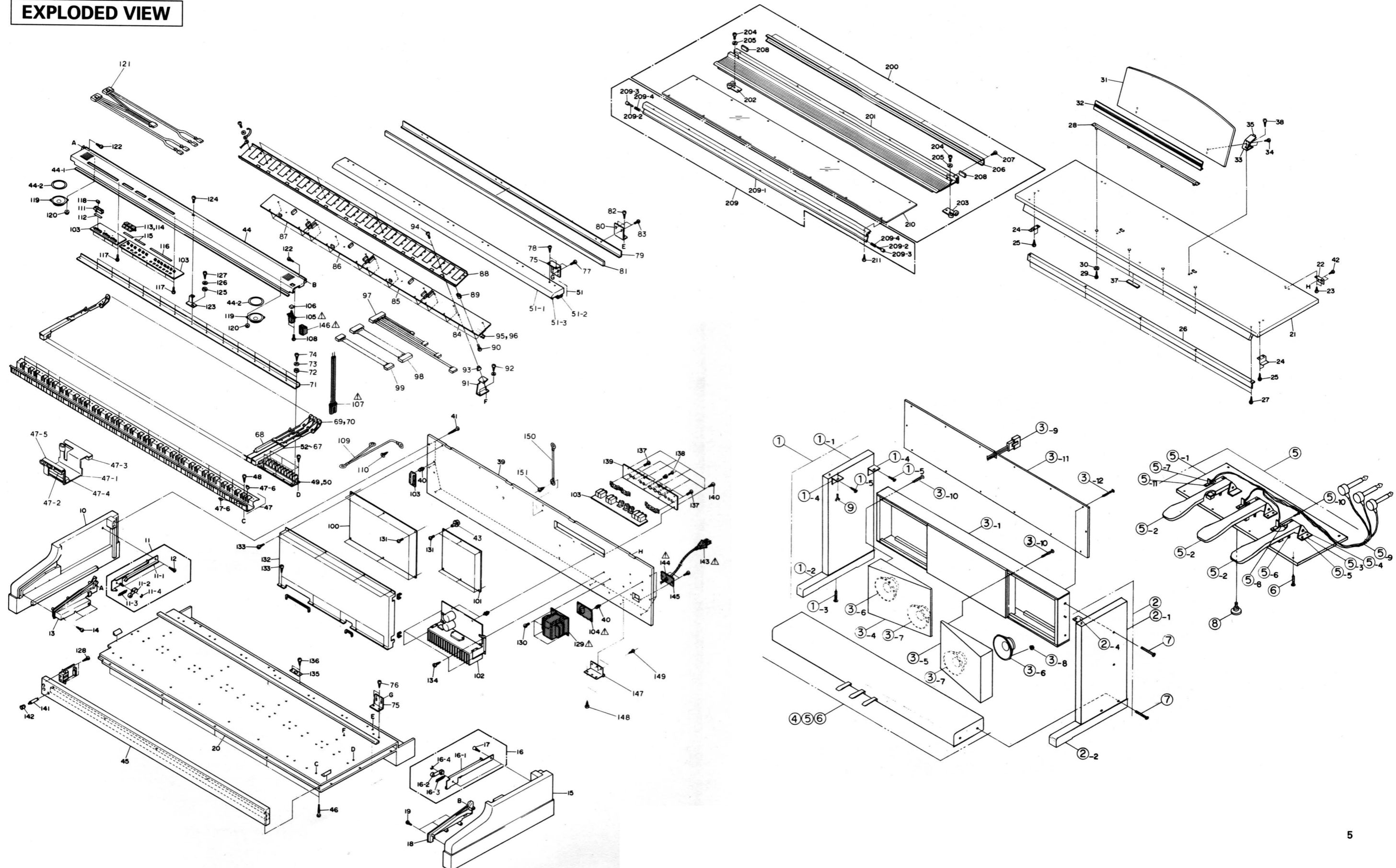
Fig. 4



Cabinet Disassembly

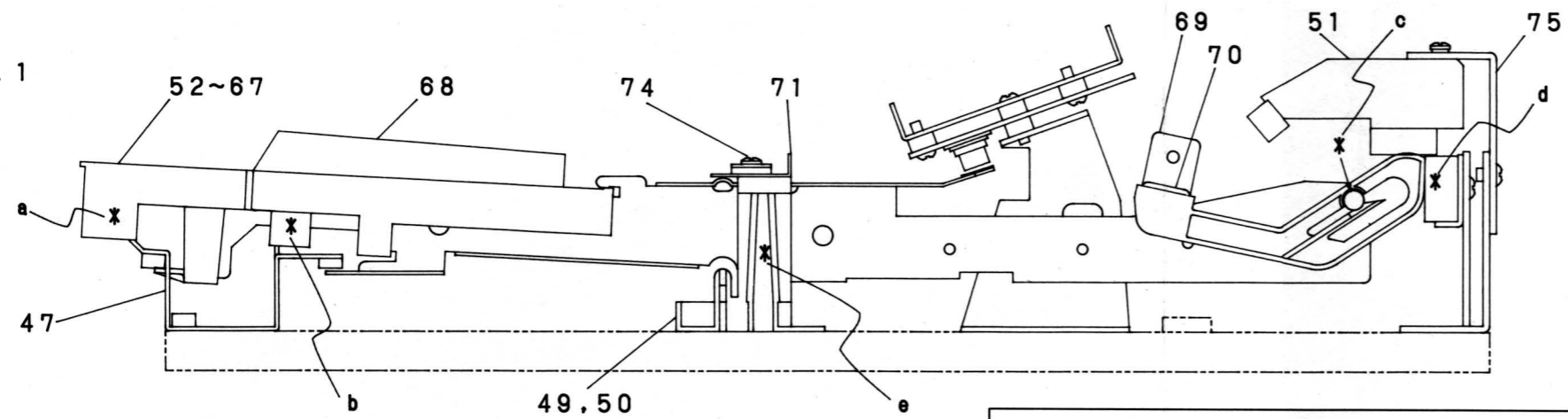
1. Remove roof board 21. (Fig. 1)
 - 1) Move lid assembly 200 backward (in the direction of arrow 1).
 - 2) Remove eight (8) screws 42 (3 × 10, CBTS(1)).
 - 3) Move roof board 21 in the direction of arrow 2 and remove it in the direction of arrow 2,
2. Remove lid assembly 200. (Fig. 2)
 - 1) Move lid assembly 200 backward and lift its rear in the direction of the arrow.
 - 2) Lift guide roller (B) 209-3 at the front obliquely along the grooves in cover guides (L) 13 and (R) 18 to remove it.
3. Remove top panel semi-assembly 44 and front board assembly 45. (Fig. 3)
 - 1) Remove two (2) screws 122 (3.5 × 30, CTTS(1)) each on the left and right and screw 124 (3 × 6, CBTS(S)), then move top panel semi-assembly 44 in the direction of the arrow to remove it.
 - 2) Remove five (5) screws 46 (4 × 40, CTTS(1)) and then front board assembly 45 in the direction of the arrow.
4. Open rear board 49. (Fig. 4)
 - 1) Remove nine (9) screws 41 (3.5 × 20, CTTS(1)) and turn rear board 39 to open it using rear hinge 147 as a fulcrum.

EXPLODED VIEW



DISASSEMBLY OF KEYS

Fig. 1



Coat sections marked * with grease.

- a. Contact between the inside of natural key and key guide
- b. Contact between the inside of chromatic key and key guide
- c. Engagement between hammers and hammer shaft
- d. Contact between the hammers and cushion rail felt
- e. Contact between the key assembly and center rail

Grease	Silicone grease SB-1 (white)	a, b, c, d	→ Mixing ratio: 1:1
	Shinetsu silicone grease G30M		
	Shinetsu silicone oil KF96H 100,000CS		
	PLASTILUBE EP(brown)	e	

Fig. 4

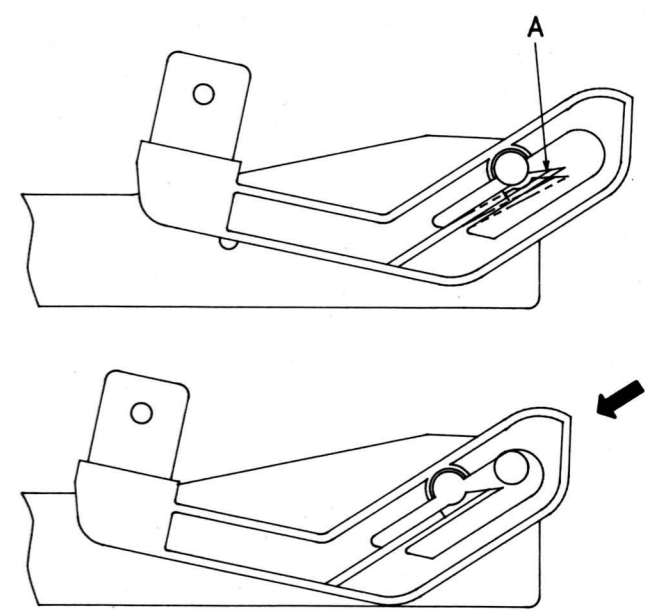


Fig. 2

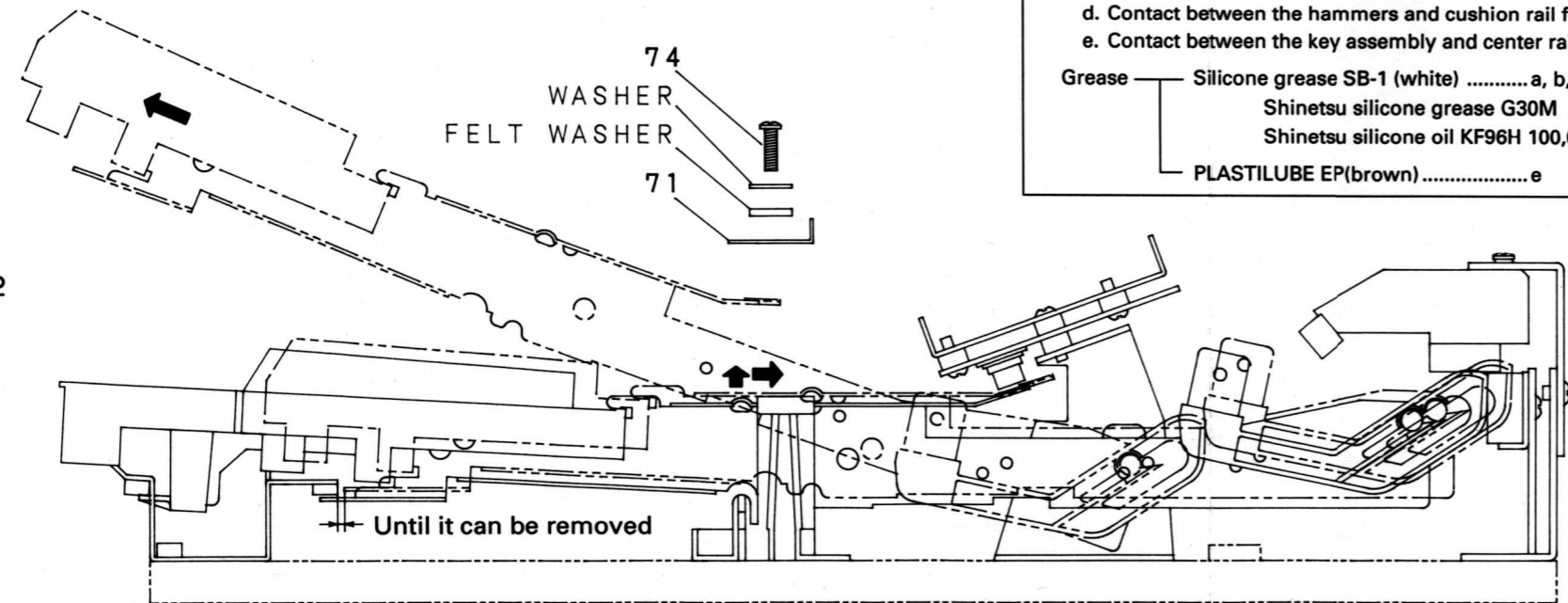
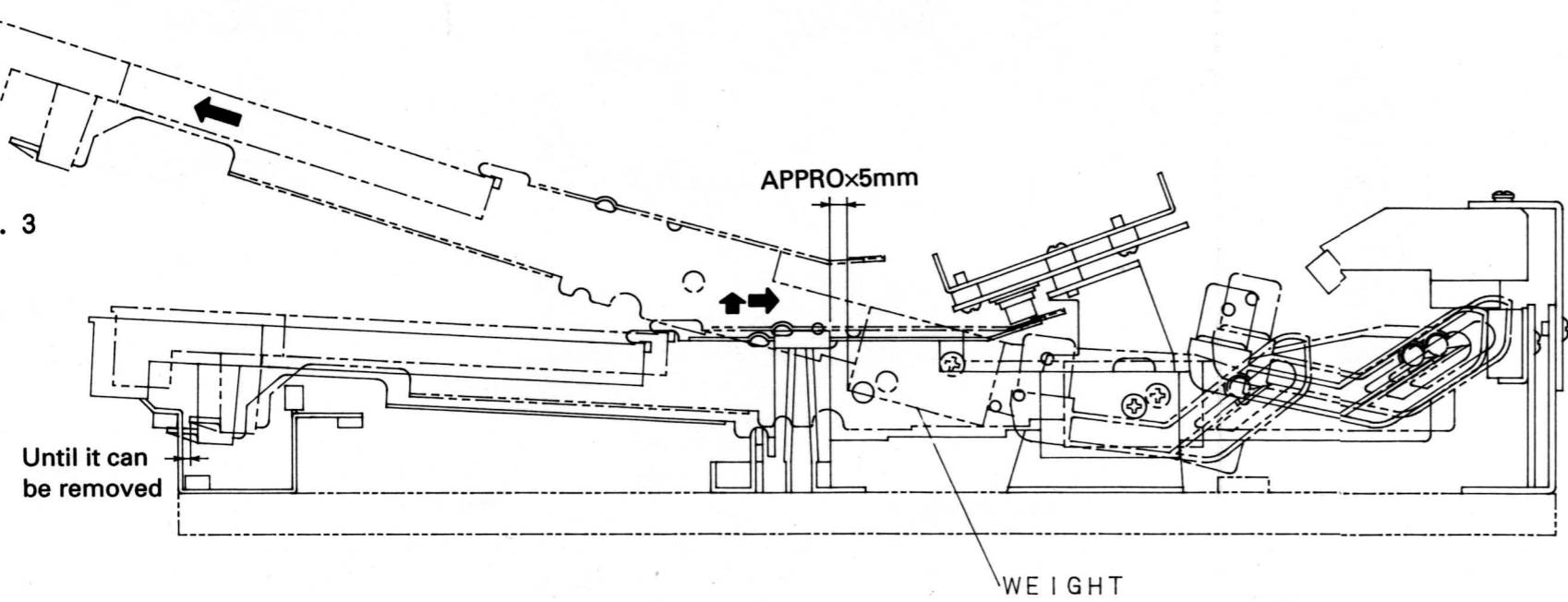


Fig. 3



Keyboard Disassembly – Cross-sectional view (Fig. 1)

*Remove chromatic keys first, and install natural keys first.

1. Chromatic key removal (Fig. 2)
 - 1) Remove fifteen (15) screws 74 (3.5 × 12, CBTS(2)) and then top rail 71.
 - 2) Lift key assembly (B) 68 and move it backward to release the upper limit stopper section at the front bottom from front guide rail assembly 47.
 - 3) Lift the front of the chromatic key block and pull out the block forward obliquely. Since hammers 69 and 70 rotate freely at this time, hold them so the block can easily be pulled out.
2. Natural key removal (Fig. 3)
 - 1) Lift key assemblies (W) 52-67 and move them backward to release the upper limit stopper section from front guide rail assembly 47.
 - 2) Lift the front of the natural key and the key forward obliquely up to about 5 mm where the weight nearly touched center rails 49 and 50 and then turn it to the left or right by 45° to pull it out. Since hammer 69 rotates freely at this time, hold it so the key can easily be pulled out.
3. Hammer removal (Fig. 4)
 - 1) Depress sections A of hammers 69 and 70 and push the hammers in the direction of the arrow to remove them.

ADJUSTMENT OF KEYS

Fig. 1

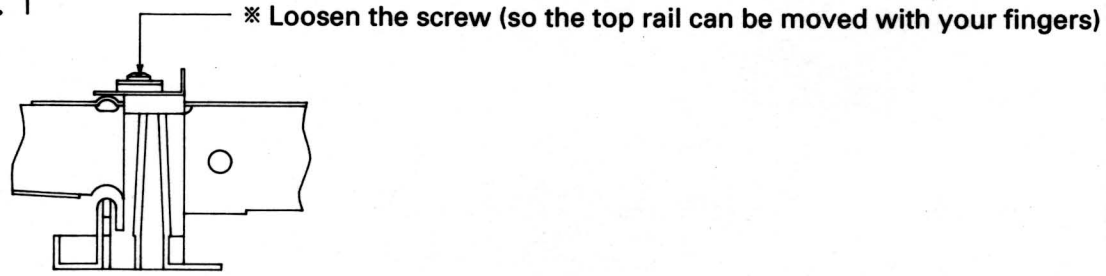


Fig. 2

Loosen screw A holding back rail bracket 75 (so that it moves when it is hit by the handle of screwdriver) and lower the back rail so that the keyboard sinks 10.5 ± 0.5 mm, then tighten the screw. (The keyboard sinks more when back rail 51 is lowered and sinks less when it is raised.)

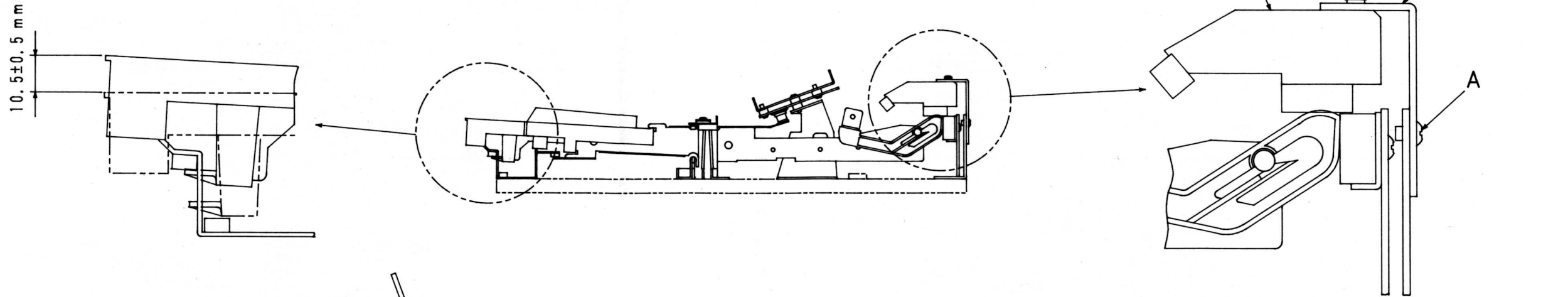


Fig. 3

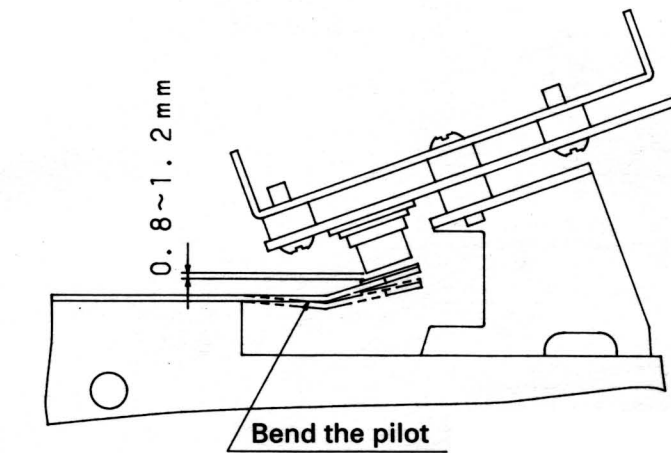
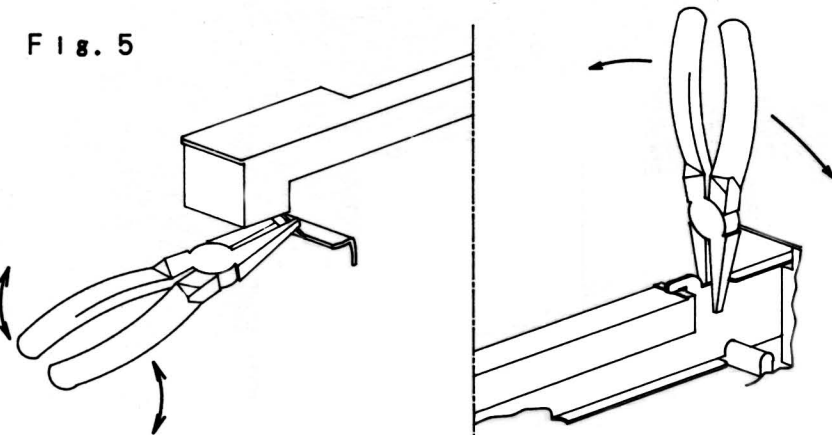


Fig. 4

Fig. 5



Causes of Defect, Remedies and Adjustments

1. Key does not return

- a) The key arm comes into contact with the switch base bracket Bend the key arm to eliminate the contact.
- b) Since the screws holding the top rail are too tight, the cabinet is warped, swelled or shrunk, causing the gap of the center rail to be narrower Loosen the screws holding the top rail. (Fig. 1)
- c) No grease at the key guide Coat with grease (Silicone grease SB-1 *White)
- d) No grease at the center rail Coat with grease (Plastilube EP *Brown)
- e) The rotation of hammers is not smooth Coat with grease (Silicone grease SB-1 *white)
(no grease at the shaft, defective engagement) * Replace the hammers if engagement is defective.

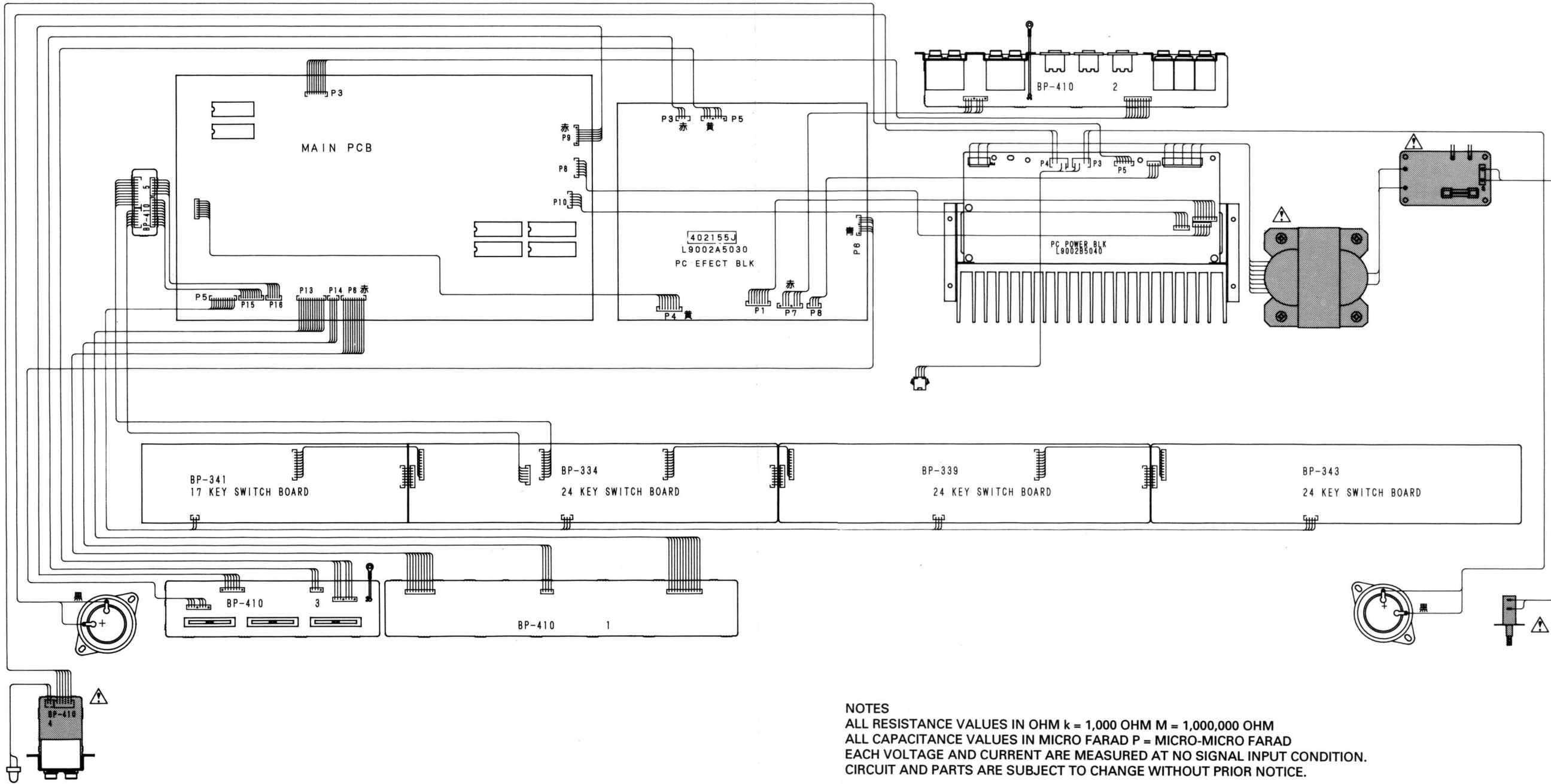
2. Key noise

- a) No grease between the center rail and key arm Coat with grease (Plastilube EP *Brown)
- b) The key arm comes into contact with the switch base bracket Bend the key arm to eliminate the contact.
- c) Lifting of the center rail and fulcrum at which the key arm rotates Defective adjustment of keyboard height (when a key is pressed, the keyboard hits the key cushion first) (refer to keyboard height adjustment)
- d) Touching of keys Adjust the tilt of keyboard (refer to keyboard tilt adjustment)

3. Adjustment This action is feasible to adjust the keyboard height and the gap at the actuators of the rubber switch and key arm as well as the keyboard tilt and horizontal alignment.

- a) Adjusting the tilt of keyboard (Fig. 4)
- b) Adjusting the alignment of keyboard (horizontal) (Fig. 5)
- c) Adjusting the height of keyboard (Fig. 2)
- d) Adjusting the gap at the actuators of the rubber switch and key arm (Fig. 3)

BLOCK DIAGRAM



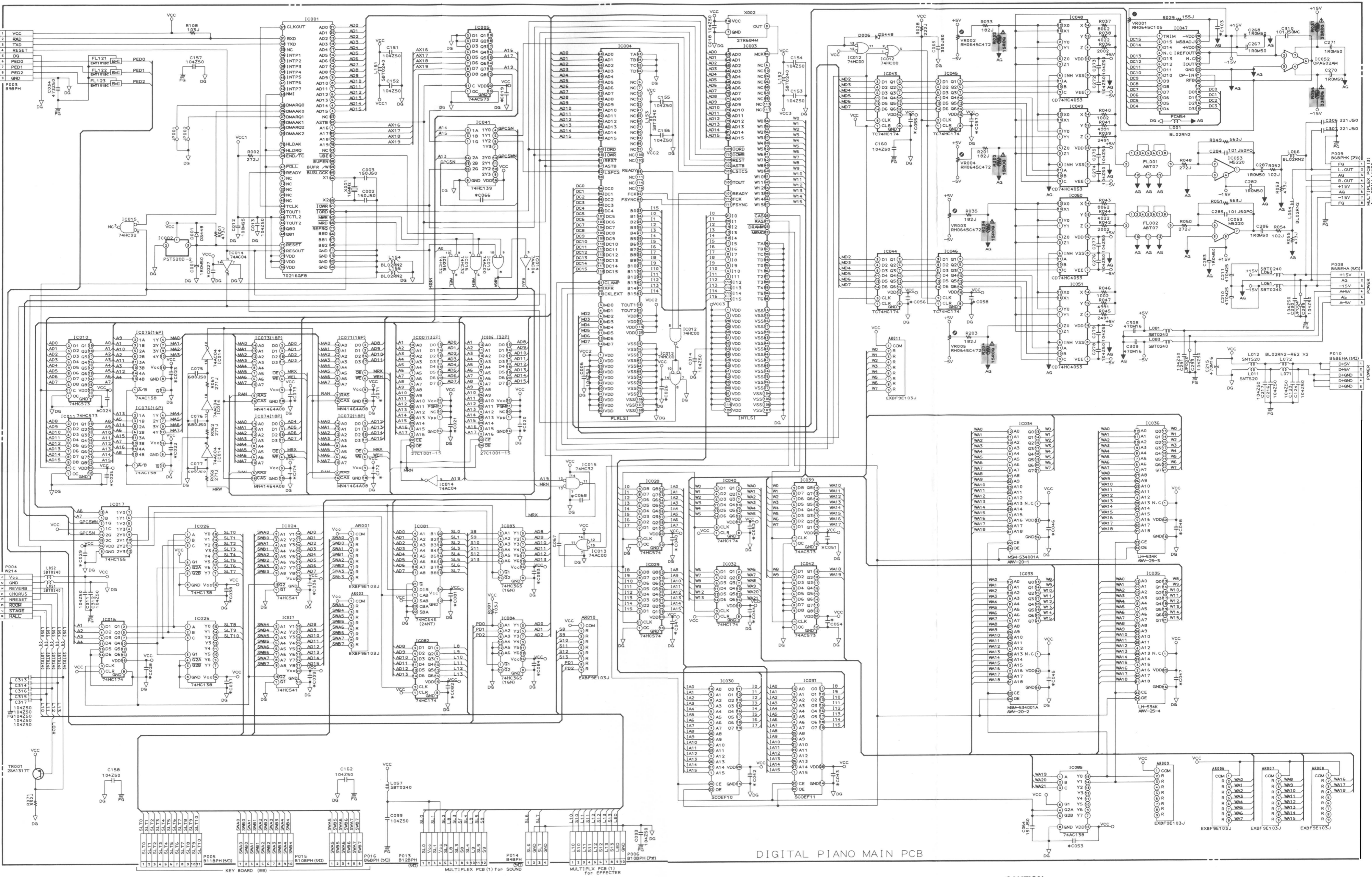
NOTES
 ALL RESISTANCE VALUES IN OHM k = 1,000 OHM M = 1,000,000 OHM
 ALL CAPACITANCE VALUES IN MICRO FARAD P = MICRO-MICRO FARAD
 EACH VOLTAGE AND CURRENT ARE MEASURED AT NO SIGNAL INPUT CONDITION.
 CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

WARNING:
 Parts marked with this symbol  have critical characteristics.
 Use ONLY replacement parts recommended by the manufacturer.

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 k ohm, the unit is defective.

WARNING:
 DO NOT return the unit to the customer until the problem is located and corrected.

3997011015 MAIN BOARD CIRCUIT DIAGRAM



DIGITAL PIANO MAIN PCB

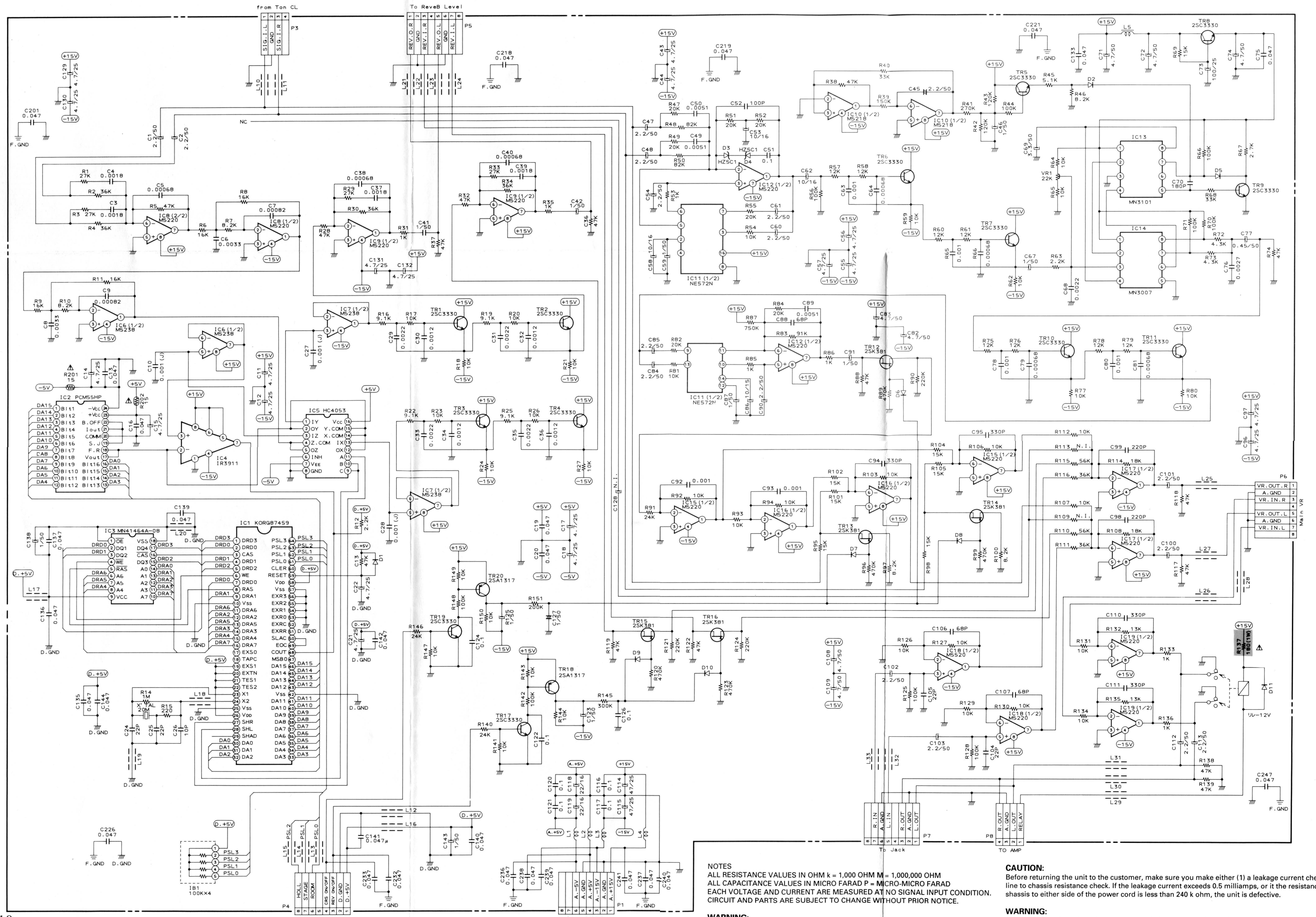
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3997008002 CONTROL BOARD CIRCUIT DIAGRAM



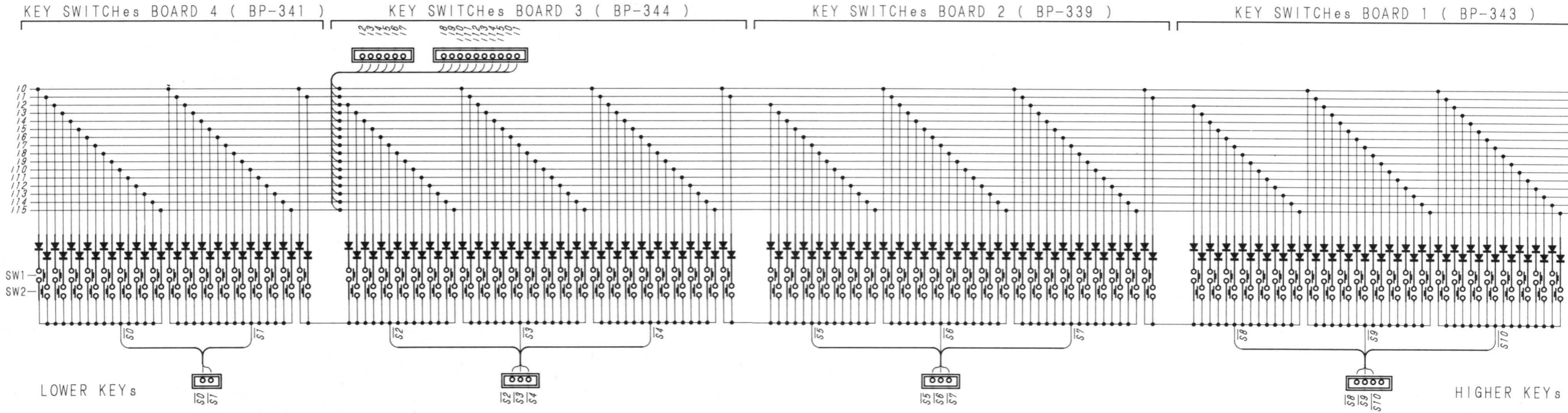
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BP-343, 339, 334, 341 SWITCH BOARD CIRCUIT DIAGRAM



KEY SWITCHES BOARDs (88 KEYS MATRIX)

KEY SWITCH :

NOTES

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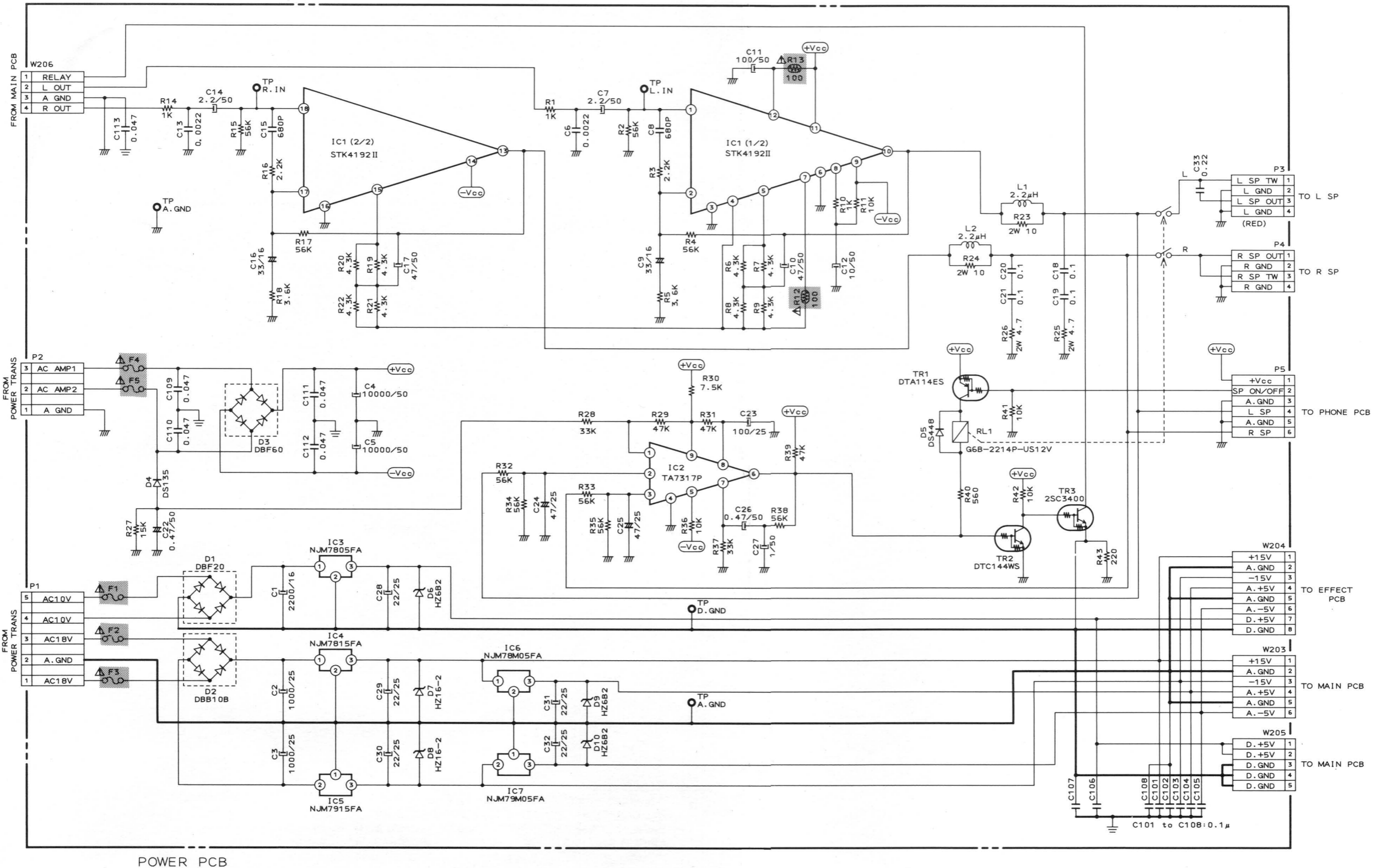
CAUTION:

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WARNING:

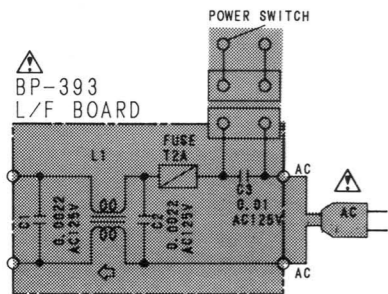
DO NOT return the unit to the customer until the problem is located and corrected.

3997009027 POWER BOARD CIRCUIT DIAGRAM



POWER PCB

BP-393-2 L/FILTER BOARD CIRCUIT DIAGRAM



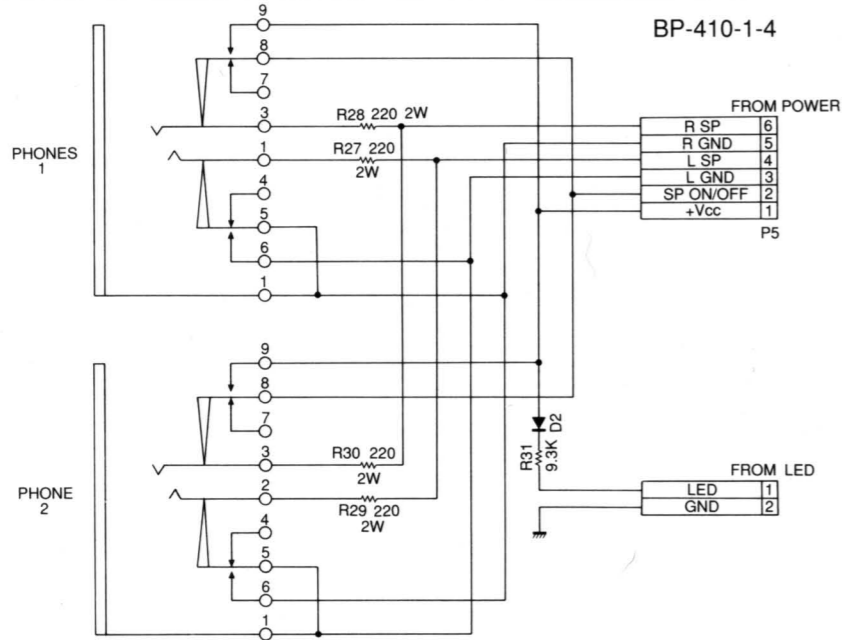
NOTES
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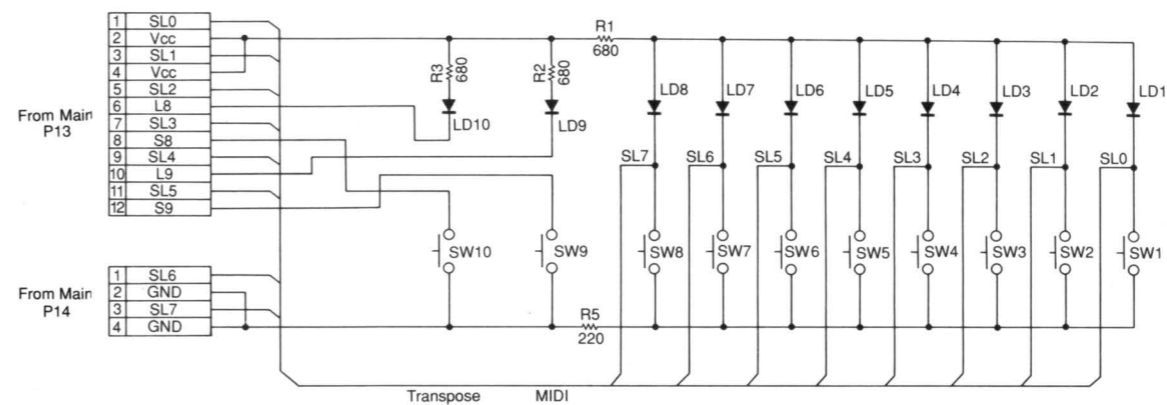
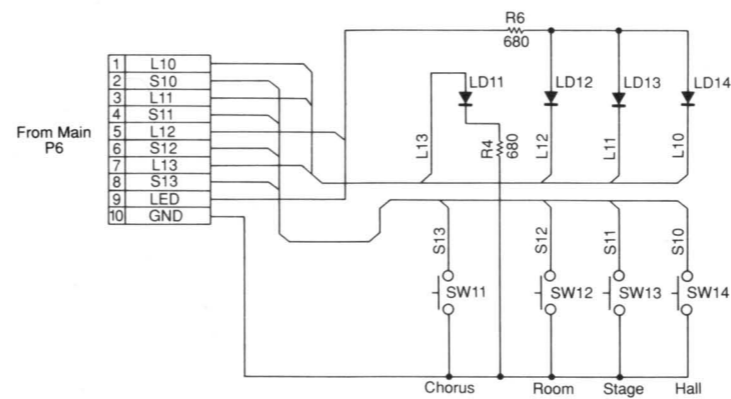
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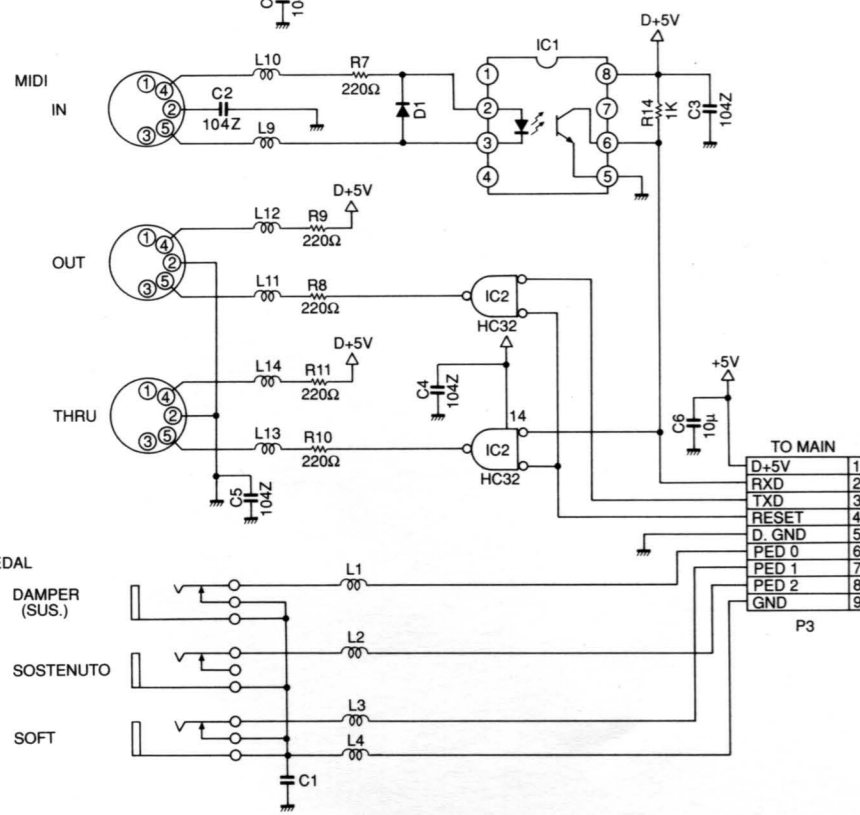
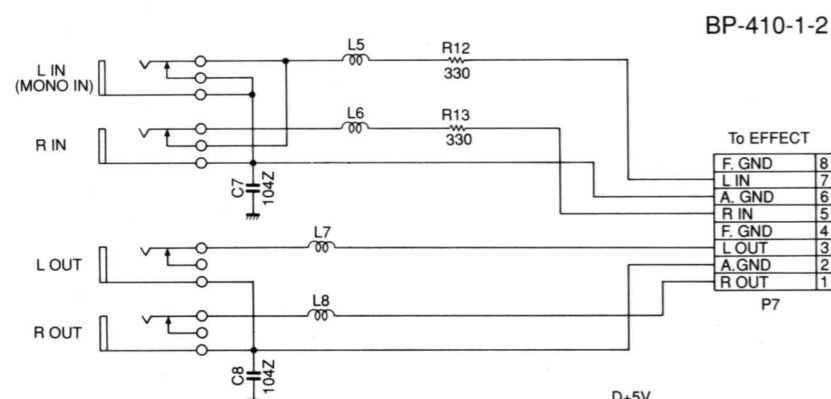
BP-410 MULTIPLE BOARD CIRCUIT DIAGRAM



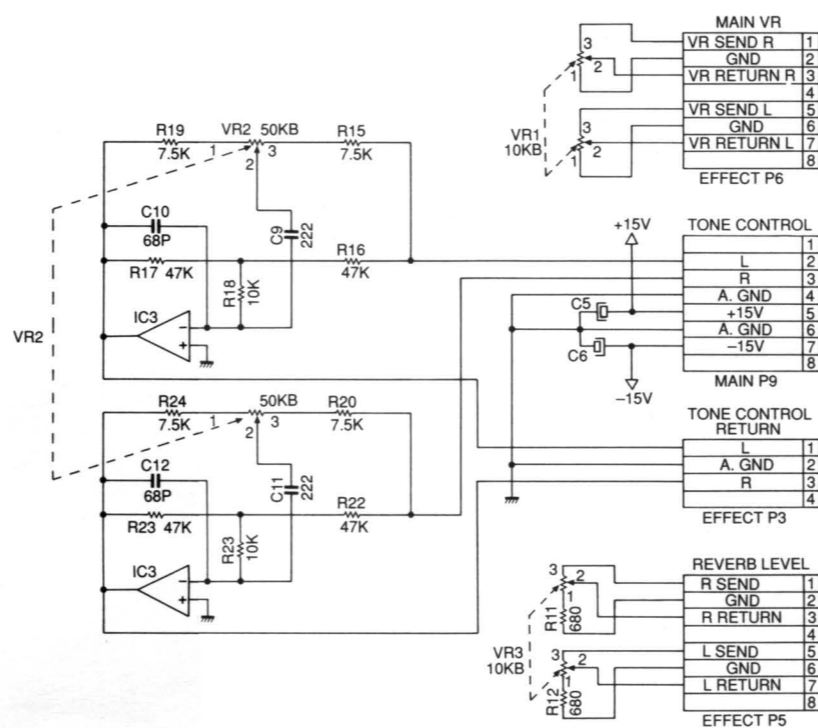
BP-410-1-1



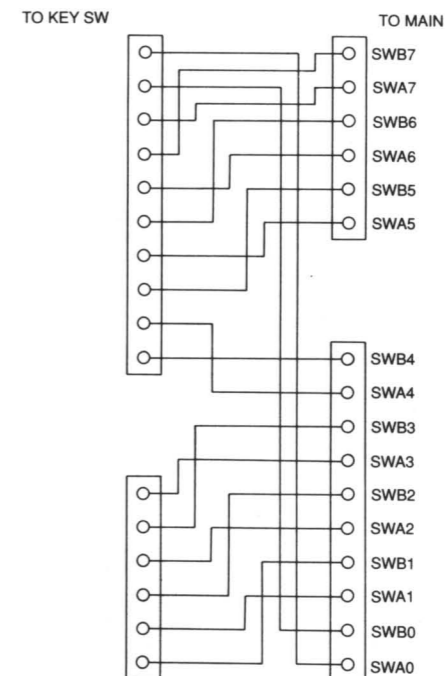
SL7 : Piano1
 SL6 : Piano2
 SL5 : E. Piano
 SL4 : Harpsichord
 SL3 : Vibraphone
 SL2 : Organ
 SL1 : Strings
 SL0 : Choir



BP-410-1-3



BP-410-1-5



NOTES

ALL RESISTANCE VALUES IN OHM k = 1,000 OHM M = 1,000,000 OHM
 ALL CAPACITANCE VALUES IN MICRO FARAD P = MICRO-MICRO FARAD
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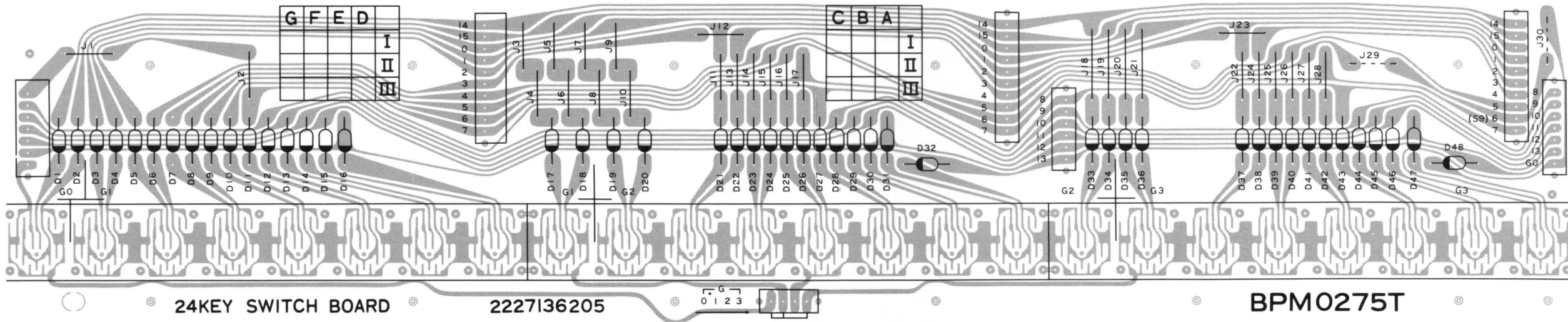
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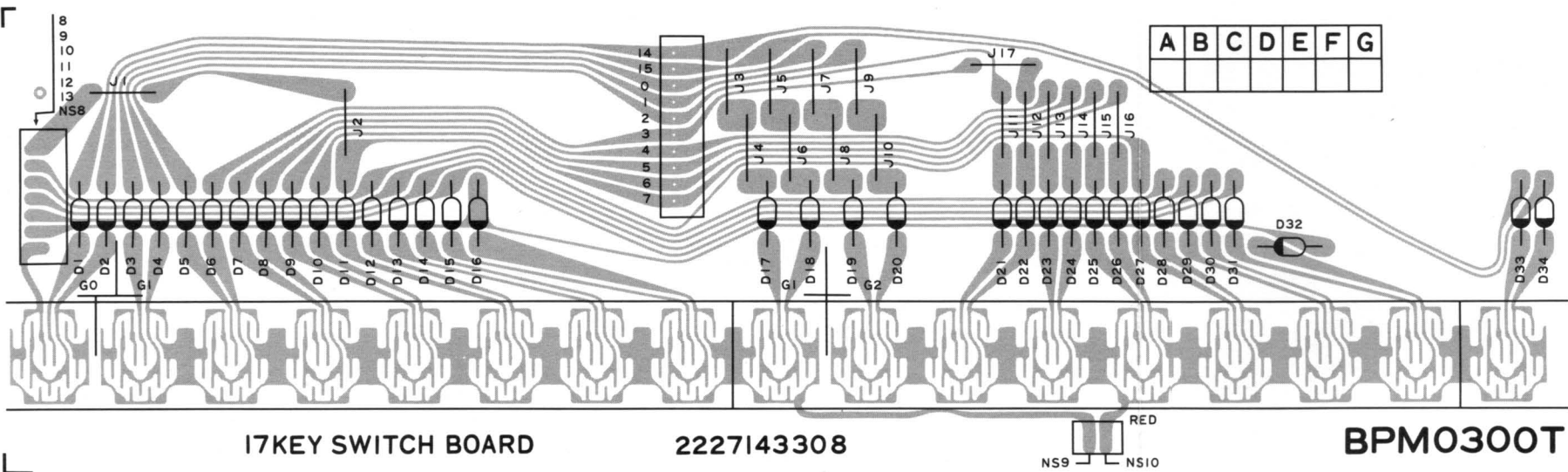
WARNING:

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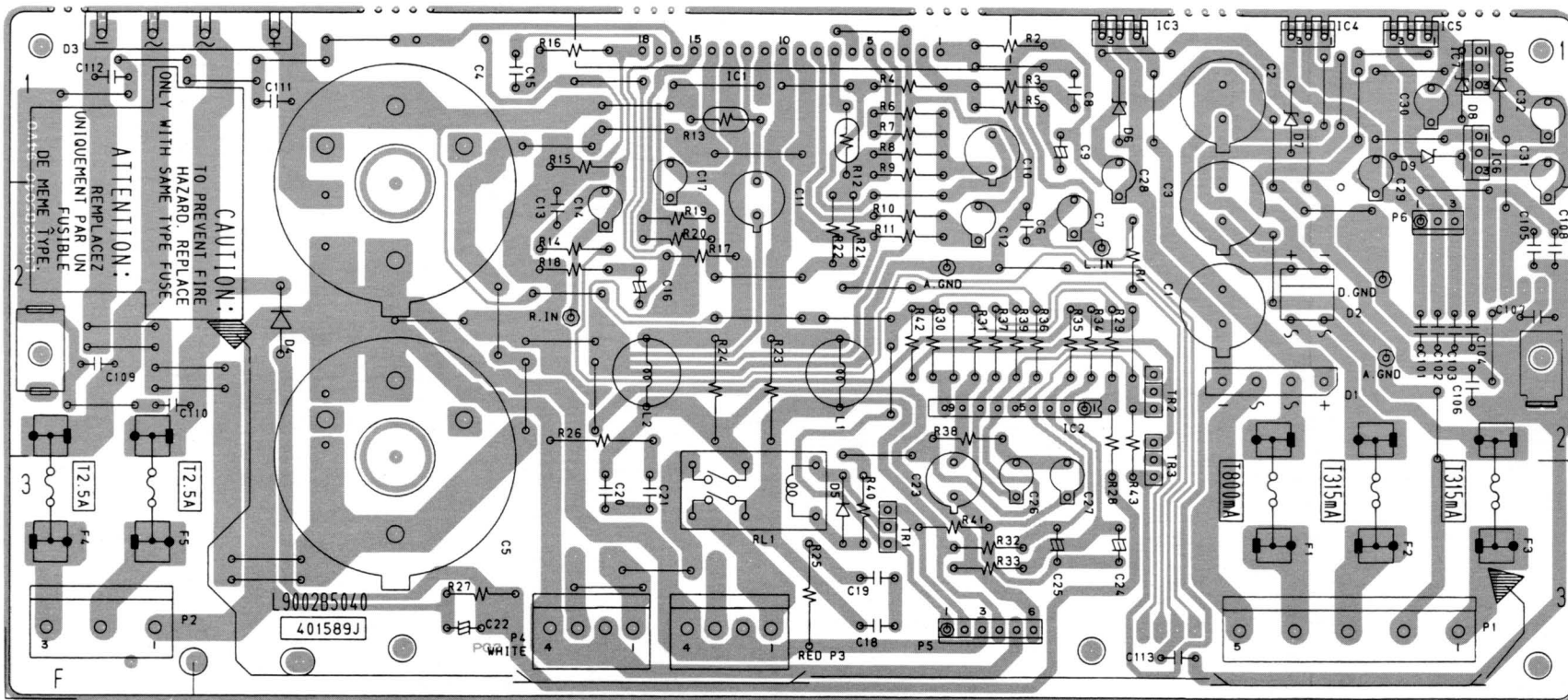
BP-343, 339, 344 SWITCH BOARD UNIT



BP-341 SWITCH BOARD UNIT

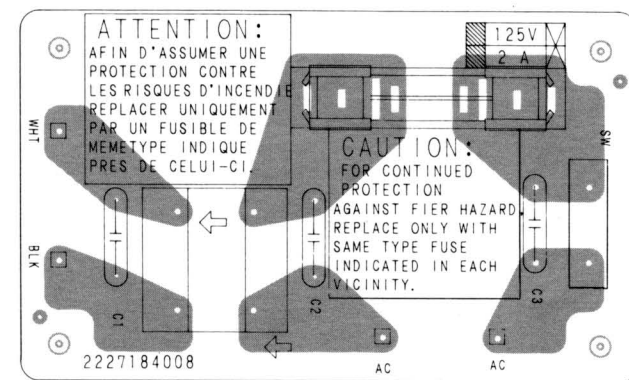


3997009027 POWER BOARD UNIT

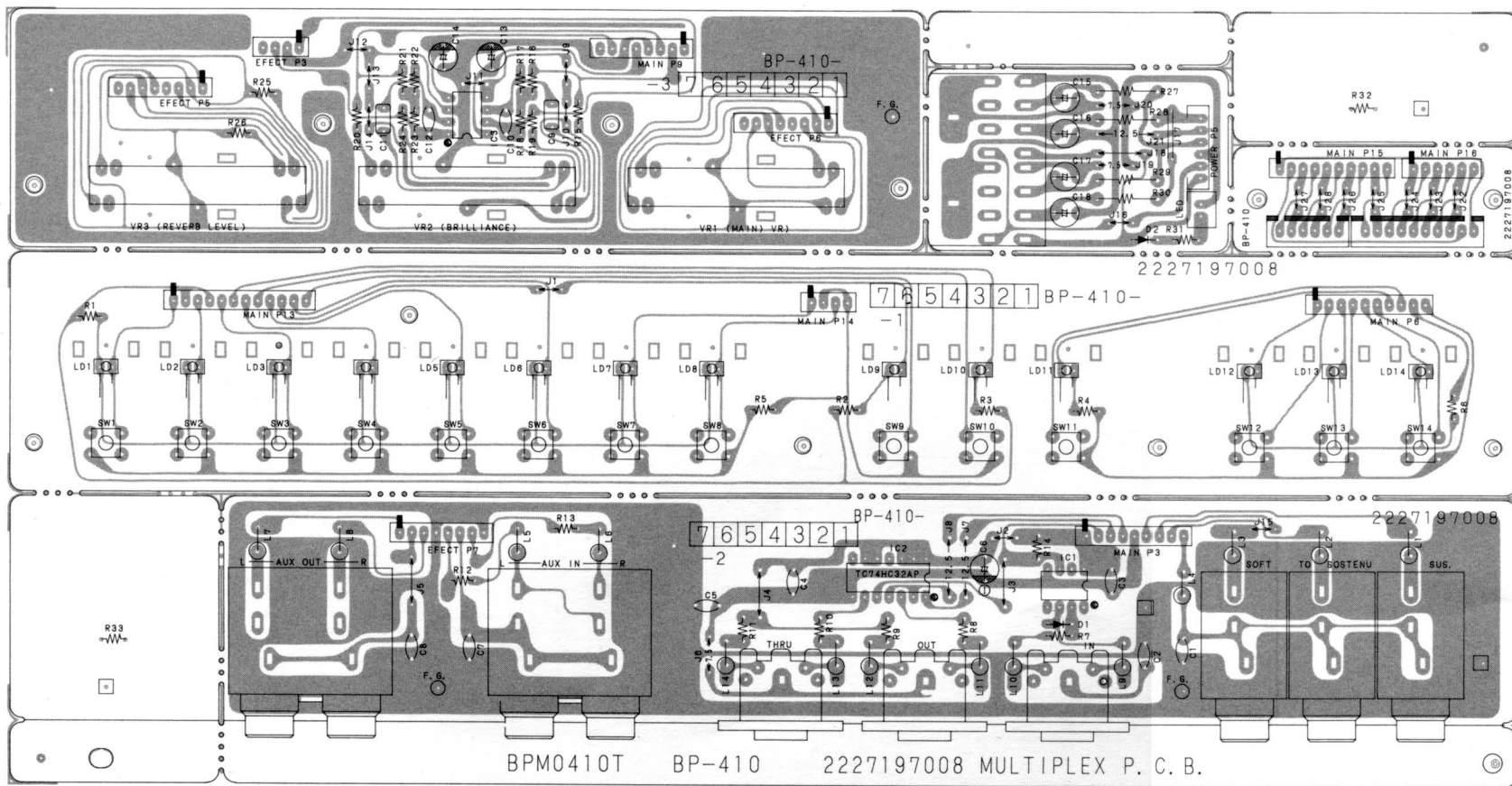


POWER PCB L9002B5040

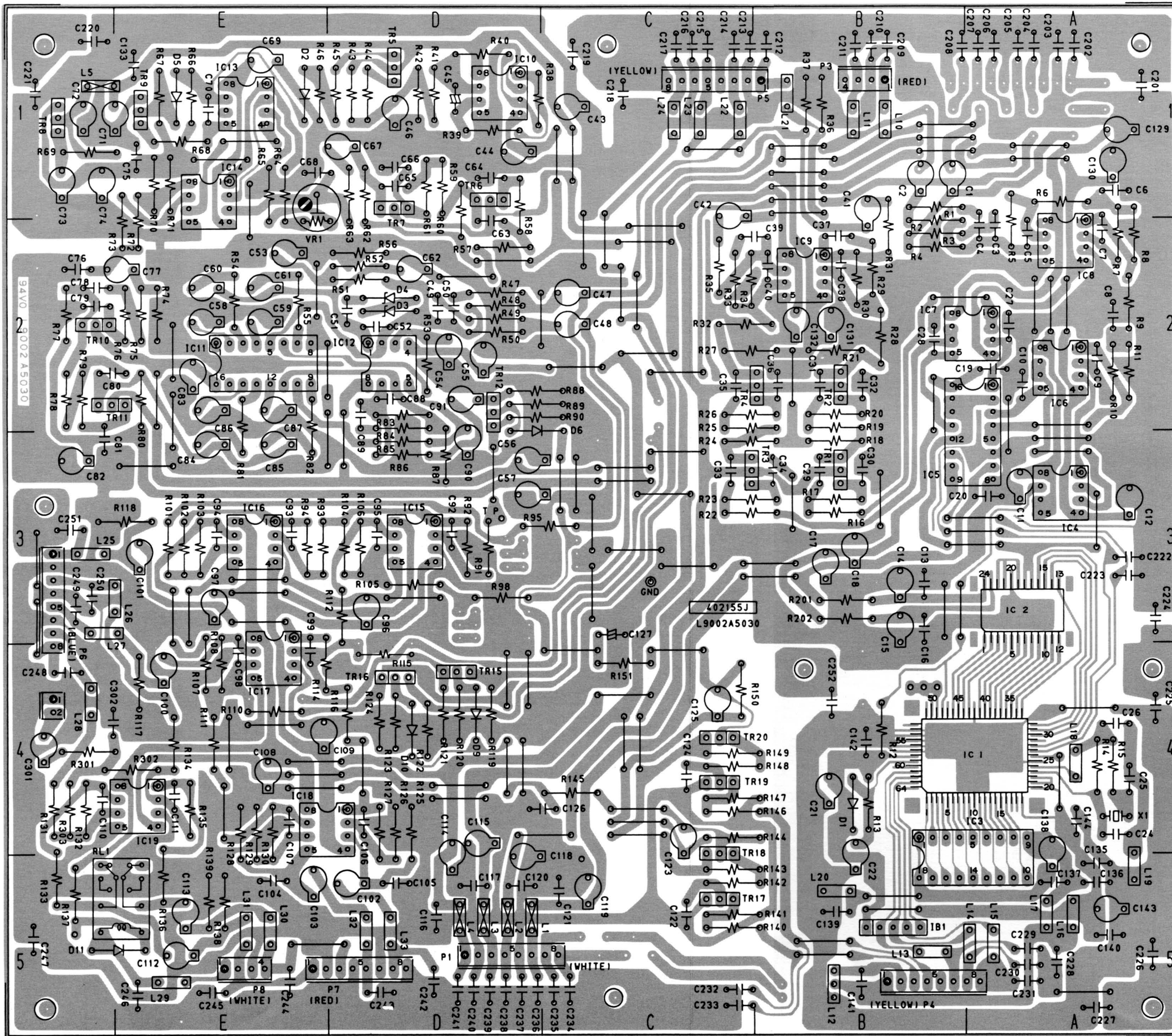
BP-393-2 L/FILTER BOARD UNIT



BP-410 MULTIPLEX BOARD UNIT



BPM0410T BP-410 2227197008 MULTIPLEX P. C. B.



PRINCIPAL PARTS LOCATION

ICs

IC1	A,B4
IC2	A3
IC3	A,B5
IC4	A3
IC5	A,B2
IC6	A2
IC7	A,B2
IC8	A2
IC9	B2
IC10	D1
IC11	E2
IC12	D2
IC13	E1
IC14	E1
IC15	D3
IC16	E3
IC17	E4
IC18	D,E4
IC19	E4

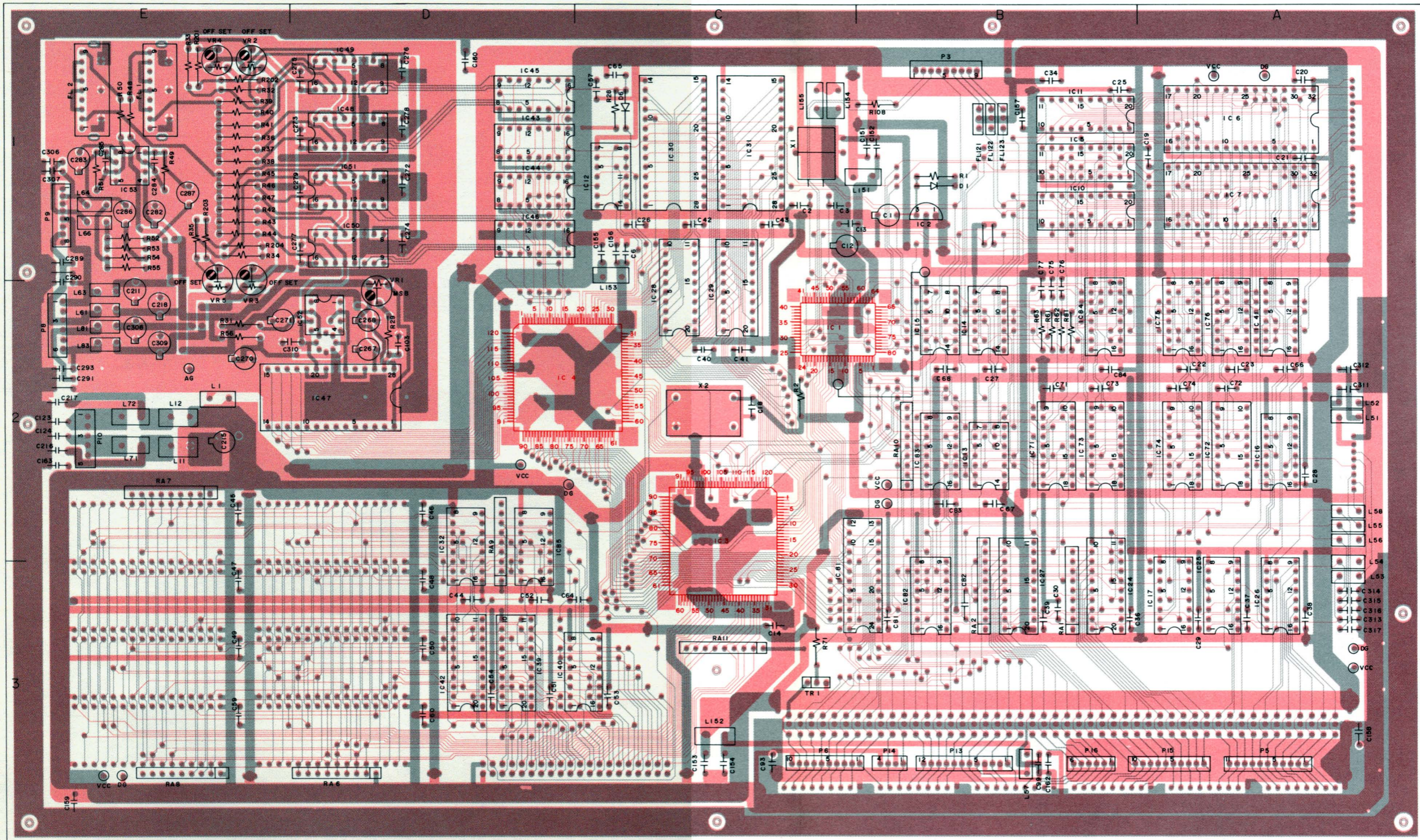
CONNECTORS

P1	D5
P3	B1
P4	B5
P5	C1
P6	F3
P7	D5
P8	E5

TRANSISTORS

TR1	B3
TR2	B2
TR3	C3
TR4	B,C2
TR5	D1
TR6	D1
TR7	D1
TR8	F1
TR9	E1
TR10	F2
TR11	E,F2
TR12	D2
TR15	D4
TR16	D4
TR17	C5
TR18	C5
TR19	C4
TR20	C4

3997011015 MAIN BOARD UNIT



PRINCIPAL PARTS LOCATION

- | ICs | |
|------------|------|
| IC1 | B,C2 |
| IC2 | B1 |
| IC3 | C2,3 |
| IC4 | C,D2 |
| IC5 | B1 |
| IC6 | A1 |
| IC7 | A1 |
| IC10 | B1 |
| IC11 | B1 |
| IC12 | C1 |
| IC13 | B2 |
| IC14 | B2 |
| IC15 | B2 |
| IC16 | A2 |
| IC17 | A3 |
| IC24 | B2,3 |
| IC25 | A3 |
| IC26 | A3 |
| IC27 | B2,3 |
| IC28 | C1,2 |
| IC29 | C1,2 |
| IC30 | C1 |
| IC31 | C1 |
| IC32 | D2,3 |
| IC39 | D3 |
| IC40 | C,D3 |
| IC41 | A2 |
| IC42 | D3 |
| IC43 | D1 |
| IC44 | D1 |
| IC45 | D1 |
| IC46 | D1 |
| IC47 | D,E2 |
| IC48 | D1 |
| IC49 | D1 |
| IC50 | D1 |
| IC51 | D1 |
| IC52 | D2 |
| IC53 | E1 |
| IC57 | E3 |
| IC58 | D,E3 |
| IC71 | B2 |
| IC72 | A2 |
| IC73 | B2 |
| IC74 | A2 |
| IC75 | A2 |
| IC76 | A2 |
| IC81 | B2,3 |
| IC82 | B3 |
| IC83 | B2 |
| IC84 | B2 |
| IC85 | D2,3 |
| CONNECTORS | |
| P3 | B1 |
| P5 | A3 |
| P6 | C3 |
| P8 | E2 |
| P9 | E1 |
| P10 | E2 |
| P13 | B3 |
| P14 | B3 |
| P15 | A3 |
| P16 | B3 |
| TRANSISTOR | |
| TR1 | C3 |

VOLUME ADJUSTMENT

Test Mode and Adjustment EP-5000 MAIN PCB

Test mode

How to set to the test mode:

- Press the CHOIR button and hold it, then turn the power switch on.
- Only the PIANO 1 indicator lights.

How to release the test mode:

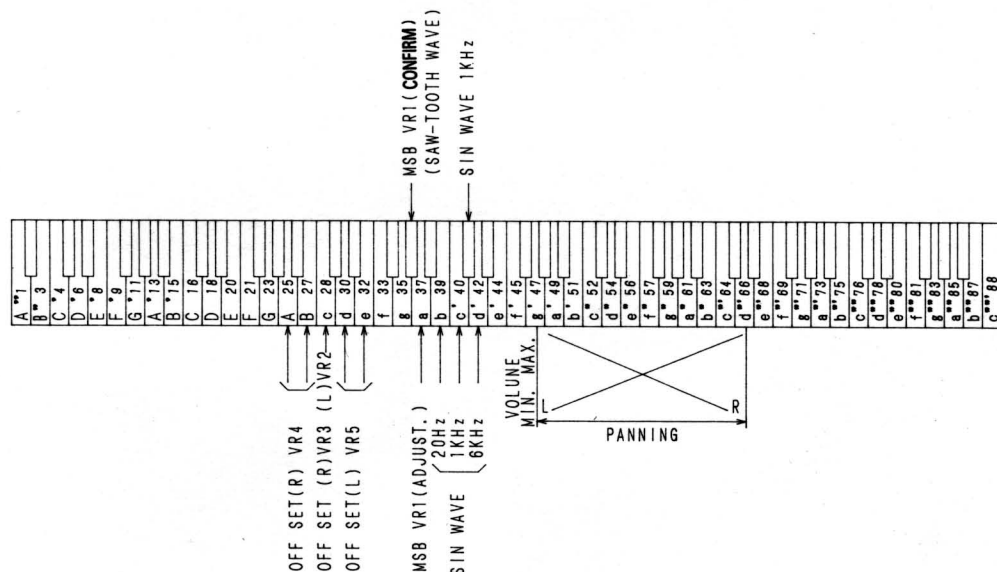
- Press the tone select button or turn the power switch off and then on again.

Details of test mode:

- Offset adjustment
- MSB adjustment
- Sine-wave output (20Hz, 1kHz, 6kHz, 20kHz)
- Sine-wave output (1kHz, output higher than above)
- Panning

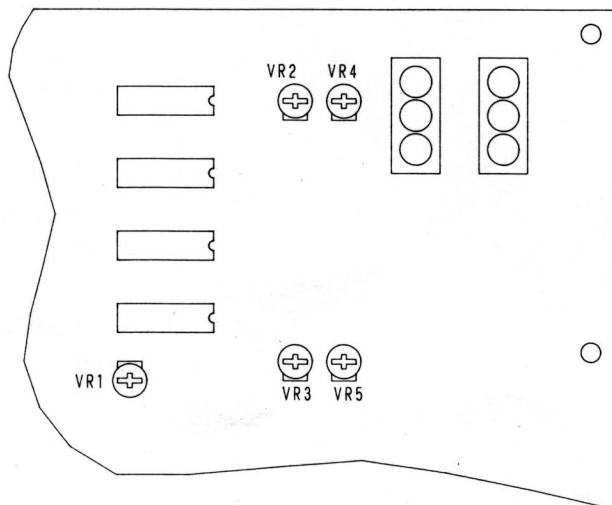
Relationship between the test mode and keyboard

See below.



Adjustment

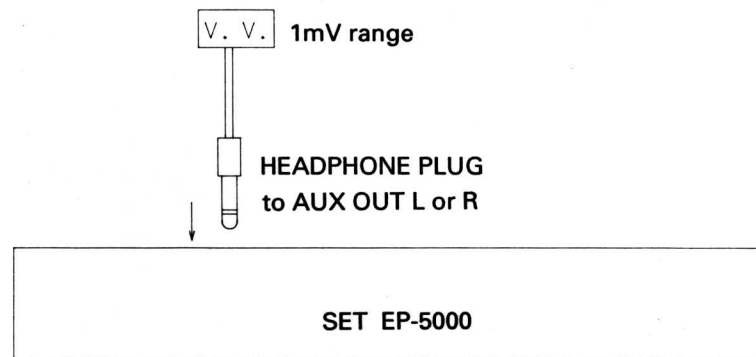
- Test equipment necessary for adjustment
Millivoltmeter
- Warm up the instrument for more than 5 minutes and set it to the test mode, then start adjustments.
- Locations of adjustment components



(4) Order of adjustments

1. Warm up	more than 5 minutes
2. Teat mode	
3. Offset adjustment	1 VR2 (R Side)
	2 VR3 (L Side)
	3 VR4 (R Side)
	4 VR5 (L Side)
4. MSB adjustment	VR1

Adjustment



Setting of variable resistors on panel

Variable resistor	VOLUME	BRILLIANCE
Setting	MAX.	BRIGHT

Adjustment

Adjust the variable resistors so the reading of the V.V. is minimum.

	Adjustment	Plug Position (AUX OUT)	KEY No.	Opration
1	VR2	R	28 (C)	VR2 Turn C on repeatedly.
2	VR3	L	28 (C)	VR3 Turn C on repeatedly.
3	VR4	R	30, 32 (D, E)	VR4 Turn D and E on alternately and repeatedly.
4	VR5	L	25, 27 (A,B)	VR5 Turn A and B on alternately and repeatedly.
5	VR1	L	37 (A)	VR1 Turn A on. (Adjust so the volume is minimum when hearing.)

SPECIFICATIONS

Model EP-5000

Keyboards	88 Keys (A ₂ ~c ⁵)		
Sound range	7 octaves 1/4		
Voices	Piano 1•2, E.Piano, Harpsichord Vibraphone, Organ, Strings, Choir		
Effects	Reverb Chorus		
Controls	Volume, Tuning, Transpose		
Connecting Jacks	AUX IN (monaural, stereo)		
	AUX OUT (stereo)		
	Headphone terminal × 2		
	Sustain pedal, Soft pedal		
	MIDI IN, MIDI OUT, MIDI THRU		
Speakers	16 cm × 4, Tweeter × 2		
Output	30 W+30 W		
Dimensions	Width	Height	Depth
	1370 mm	860 mm	574 mm
Weight	74 Kg		

Note: The specifications and appearance are subject to changes with out notice.

LIST OF P.W.BOARD No.

Name of P.W.BOARD	P.W.BOARD No.
SWITCH BOARD I	BP-343
SWITCH BOARD II	BP-339
SWITCH BOARD III	BP-344
SWITCH BOARD IV	BP-341
MAIN BOARD	3997011015
CONTROL BOARD	3997008002
POWER BOARD	3997009027
MULTIPLEX BOARD	BP-410
L/FILTER BOARD	BP-393-2