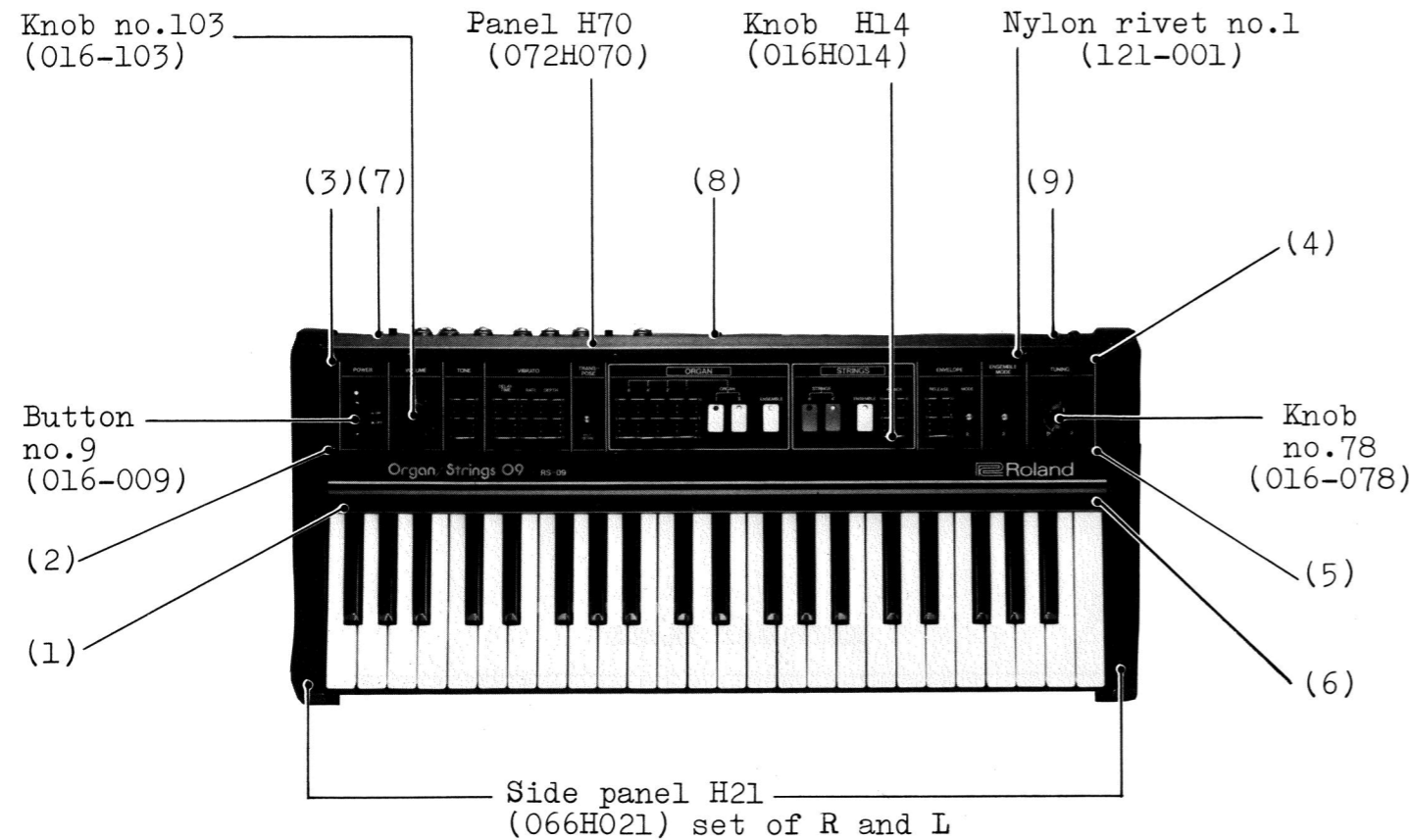


# RS-09 SERVICE NOTES

Second Edition

**APPLICABLE TO SERIAL NUMBERS with 947450 and SUBSEQUENT**  
(Guide on design change, pages 2, 3.)



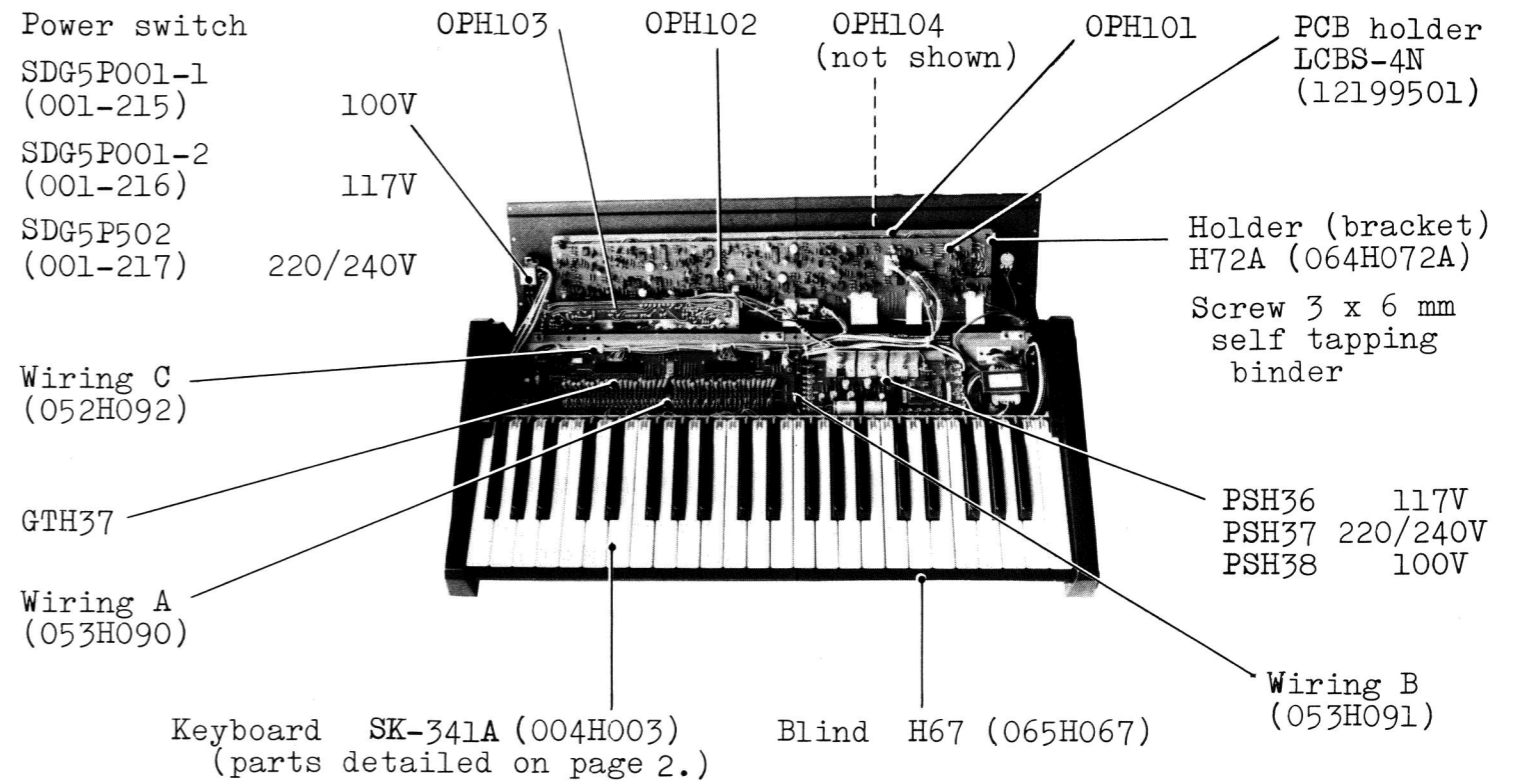
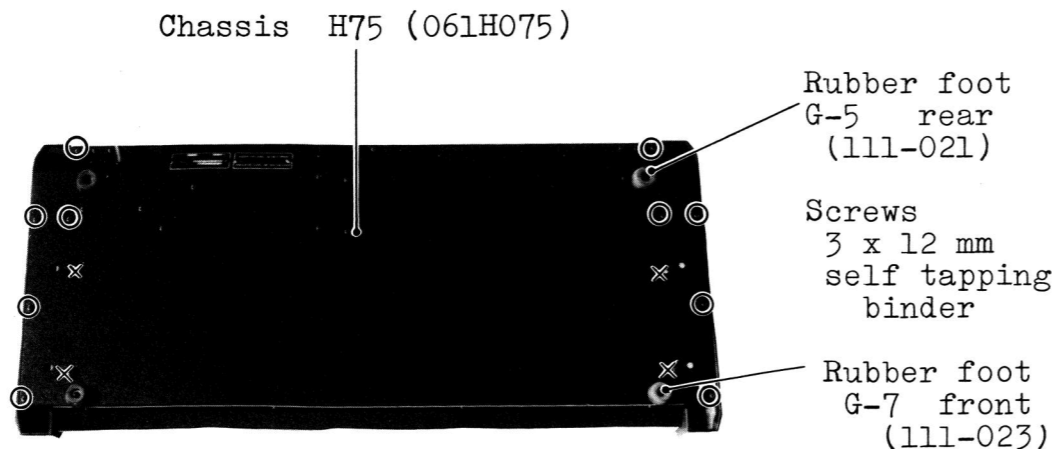
Top cover removal screws

- (1) through (6) 3 x 10 mm tap-tight binder Br
- (7) through (9) 3 x 6 mm self tapping binder Br

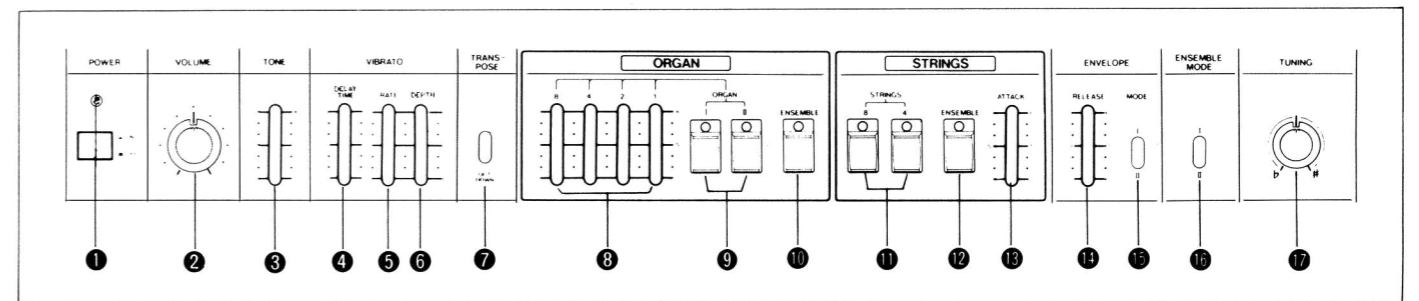
Side panel removal screws

(encircled)  
3 x 10 mm tap-tight B binder Br

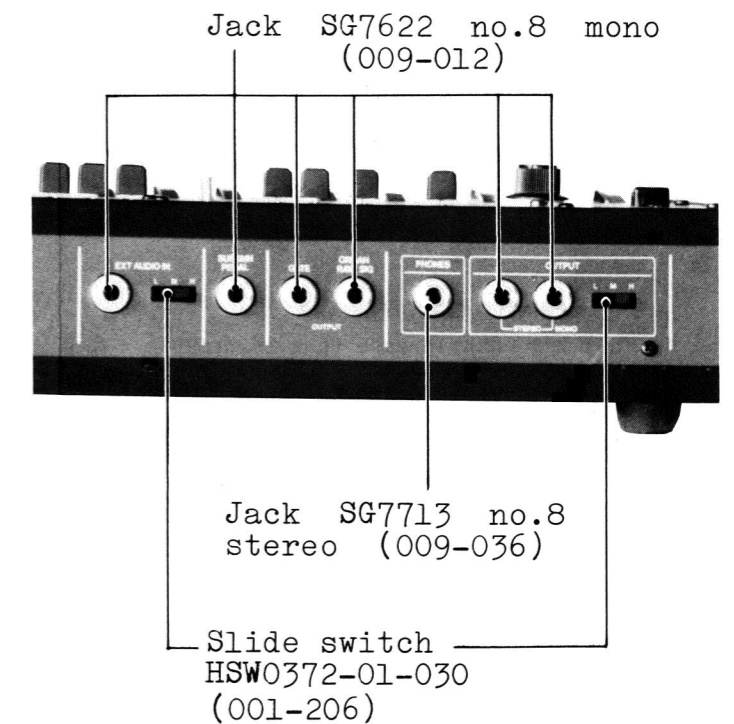
Keyboard removal screws (crossed)  
5 x 16 mm self tapping binder Br



WHEN ORDERING CIRCUIT BOARD, SUFFIX alphabet to the part name, if any.



- |        |                        |           |            |
|--------|------------------------|-----------|------------|
| 1      | TLR-124                |           | (019-028)  |
| 2      | GM70RK20A14P           | 10KA x 2  | (026-010)  |
| 3      | MFE9R-C16A15           | 100KA x 2 | (029-416)  |
| 4,5    | LFE9R-C16A15           | 100KA     | (029-306)  |
| 6      | LFE9R-C16B14           | 10KB      | (029-314)  |
| 7      | SLE-622-18PS           |           | (001-268)  |
| 8      | LFE9R-C16B14           | 10KB      | (029-314)  |
| Tablet |                        |           |            |
| 9      | H17                    | yellow    | (016H017)  |
| 10     | H10                    | white     | (016H010)  |
| 11     | H13                    | blue      | (016H013)  |
| 12     | H10                    | white     | (016H010)  |
|        | Switch KHC11901        |           | (13129712) |
|        | (includes LED AR3432S) |           |            |
| 13     | LFE9R-C16A16           | 1MA       | (029-309)  |
| 14     | LFE9R-C16B15           | 100KB     | (029-317)  |
| 15     | SLE-622-18PS           |           | (001-268)  |
| 16     |                        |           |            |
| 17     | EVHCOAK15B15           | 100KB     | (026-005)  |



PARTS LIST

GUIDE on DESIGN CHANGE

Major differences in circuit configuration, and components and their arrangements between versions.

NOTES:

"\*" : indicates parts first introduced into RS09 from serial number 947450, or parts different from those on the parts list of 13219 previously issued (DEC. 15, 1978) Service Notes. 78/ Of above, followed by "\*\*\*" can replace predecessors.

PANEL. CASING

- \*072H070 Panel (top) H70
- 066H021 Sidepanel H21 set of R and L
- 061H075 Chassis H75 (main)
- 111-021 Rubber foot G-5 rear
- 111-023 Rubber foot G-7 front

- \*004H003 Keyboard SK341A

SWITCH. BUTTON. KNOB

- 001-215 Power switch SDG5P001-1 100V
- 001-216 SDG5P001-2 117V
- 001-217 SDG5P502 220/240V
- \*016-009 Button no.9 black, power sw.
- 001-268 Lever switch SLE-622-18PS
- 001-206 Slide switch HSW0372-01-030
- \*13129712 Tablet switch KHCl1901
- \*016H010 Tablet H10 white
- \*016H013 Tablet H13 blue
- \*016H017 Tablet H17 yellow
- \*016-078 Knob no.78 TUNING
- \*016-103 Knob no.103 VOL
- \*016H004 Knob H4 slider

TRANSFORMER (WINDING)

- \*022H021J \*\* PT-H21J 100V
- \*022H021C-B\*\* PT-H21C-B 117V
- \*022H021D-A\*\* PT-H21D-A 220/240V
- 022-135 Coil 40M-067-018 10pH

JACK

- 009-012 SG7622 no.8 mono
- 009-036 SG7713 no.8 stereo
- 068-005 Bushing no.5
- 121-005 Washer no.5

FUSE

- 008-040 MGP 0.5000 (CSA) prim. 117V
- \*008-063 SEMKO T500mA sec. (also 220/240V prim.)
- 012-003 Fuse clip TF758 or F-6

PRINTED CIRCUIT BOARD

- \*147H037B\*\* GTH37B gate (pcb 052H149B)
- \*147H101A OPH101A control (pcb 052H246A-1)
- \*149H102A OPH102A control (pcb 052H246A-2)
- \*149H103 OPH103 output (pcb 052H248)
- \*149H104B OPH104B select (pcb 052H247B)
- \*146H036C \*\* PSH36C pwr supply (pcb 052H146C) 117V
- \*146H037C \*\* PSH37C (052H146C) 220/240V
- \*146H038C \*\* PSH38C (052H146C) 100V

CAPACITOR

- 035-320 ECQS1101K 100pF 125V polystyrene
- 035-279 ECQS1102K 1000pF 125V
- 032-270 1pF/50V electro. M type
- 032-275 0.47pF/50V electro. M type

POTENTIOMETER

- 026-005 EVHCOAK15B15 100KB TUNING
- 026-010 GM70RK20A14P(L) 10KA x 2 ganged, VOL
- 029-314 LFB9RC16B14 10KB slide
- 029-306 LFB9RC16A15 100KA slide
- 029-317 LFB9RC16B15 100KB slide
- 029-309 LFB9RC16A16 1MA slide
- 029-416 MFB9RC16A15 100KA x 2 slide, TONE
- \*030-465 SR19R 10KB trimmer
- \*030-471 SR19R 100KB trimmer

- 045-024 Resistor 3.3K-ohm carbon 1/2w

SEMICONDUCTOR

Transistor

- \*15119805 2SB834-0
- \*017-105 2SA1015-Y
- \*017-139 2SD880-0
- \*017-012 2SA733- Q or P
- \*017-013 2SC945- Q or P
- 017-016 2SK30A- GR or Y

Diode

- \*018-075 05Z5.1L zener
- 018-035 05Z5.6U zener
- 018-014 1S2473
- 018-094 1S2473FV vertical mount
- 018-089 1B4B41 rectifier bridge

- \*019-028 TLR124 LED

IC

- 020-191 S10430 divider keyer
- 020-156 AY-3-0214 chromatic divider
- 020-041 TC4013BP
- 020-097 uPC4558
- 020-160 BA662A
- 020-080 HA1457
- \*15159124TO TC4093BP
- \*020-063 MN3004 BBD
- \*020-224 MN3101 BBD driver
- \*020-083 TC4016BP

CONNECTOR. TERMINAL. CABLE

- Wafer Terminal
- \*010-188 5045-08A 010-185 5045-07A
- 010-183 5045-03A 010-193 5046-03A
- 010-186 5045-05A \*010-194 5046-04A

Wiring Assembly

- \*053H090 A \*053H092 C
- \*053H091 B \*053H093 D, E
- 053H030 Flat cable H30 PCB-PCB
- 053H031 Flat cable H31
- \*053H083 Flat cable H83 PCB-MWP
- \*13439509 Connector MWP 5P-1B flat cable

OTHERS

- 065H050 Dust cover H50 slide sw/pots. jack
- 048-001 Heat sink no.1
- 120-014 Long nut(spacer or stand off) no.14 3 x 6 mm
- 120-009 Long nut no.9 3 x 13 mm
- \*120-042 Long nut no.42 3 x 8 mm
- 064H072A Holder H72A bracket-OPH101
- 064H076 Holder H76 LED
- 121-001 Nylon river no.1
- \*12199501 Pcb holder LCBS-4N

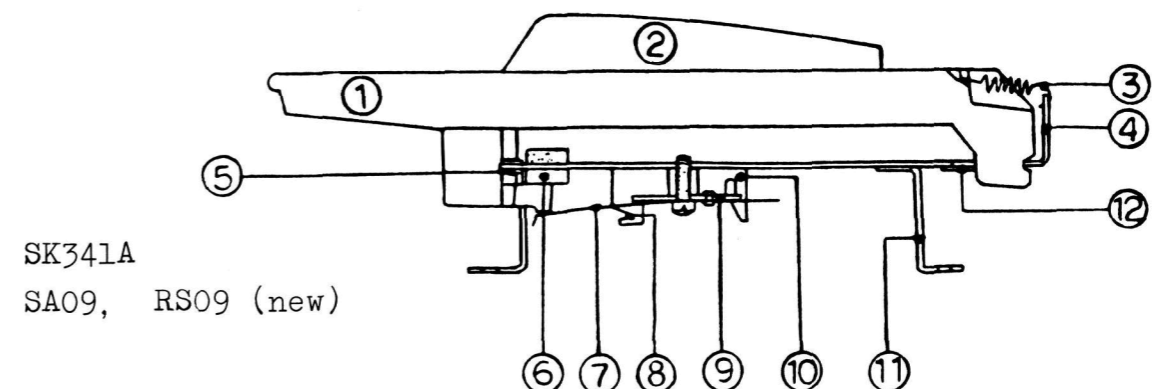
\*Some components are called out in new numbering.

SELECT SWITCH (ORGAN I, II)	Rocker (Changeover switch)	S/N with 947450 Key with LED (Independent)(OPH104)
KEYBOARD	SK-141A	SK-341A
MODULATION (Bias Adjust)	BBD SAD512 (Common to four)	BBD MN3004 (Individual)
SUSTAIN PEDAL CLICK NOISE	. . .	Q317, Q318 (OPH102) Reduction circuit
STRINGS VCA BALANCE	. . .	PM301 (DC adj.)
MUTING CIRCUIT	. . .	Q331-333 (OPH101)
PHONE AMP	OPH45, OUTPUT BRD.	OPH101, CONTROL BOARD

Prior to above, power transformers have been changed to those which deliver 2 volts lower secondary output at full load for less heat dissipation. - 23V to 21V DC -

KEYBOARD PARTS

NO	PART NO	DESCRIPTION	NO	PART NO	DESCRIPTION
1	106H026	Natural key C, F	5	068H004	Guide bushing H4
1	106H027	Natural key D	6	101H141	Level felt H141
1	106H028	Natural key E, B	7	071H044	Contact leaf H44
1	106H029	Natural key G	8	071H047	Bus bar 44p H47
1	106H030	Natural key A	9	043H007	Switch unit 12p H7
1	106H031	Natural key C', F'	9	043H006	Switch unit 8p H6
2	106H032	Sharp key black	10	104H029	Busbar holder H29
3	070H029	Key spring H29	11	062H024	Chassis bracket H24
4	061H084	Chassis H84	12	098H006	Key stopper H6





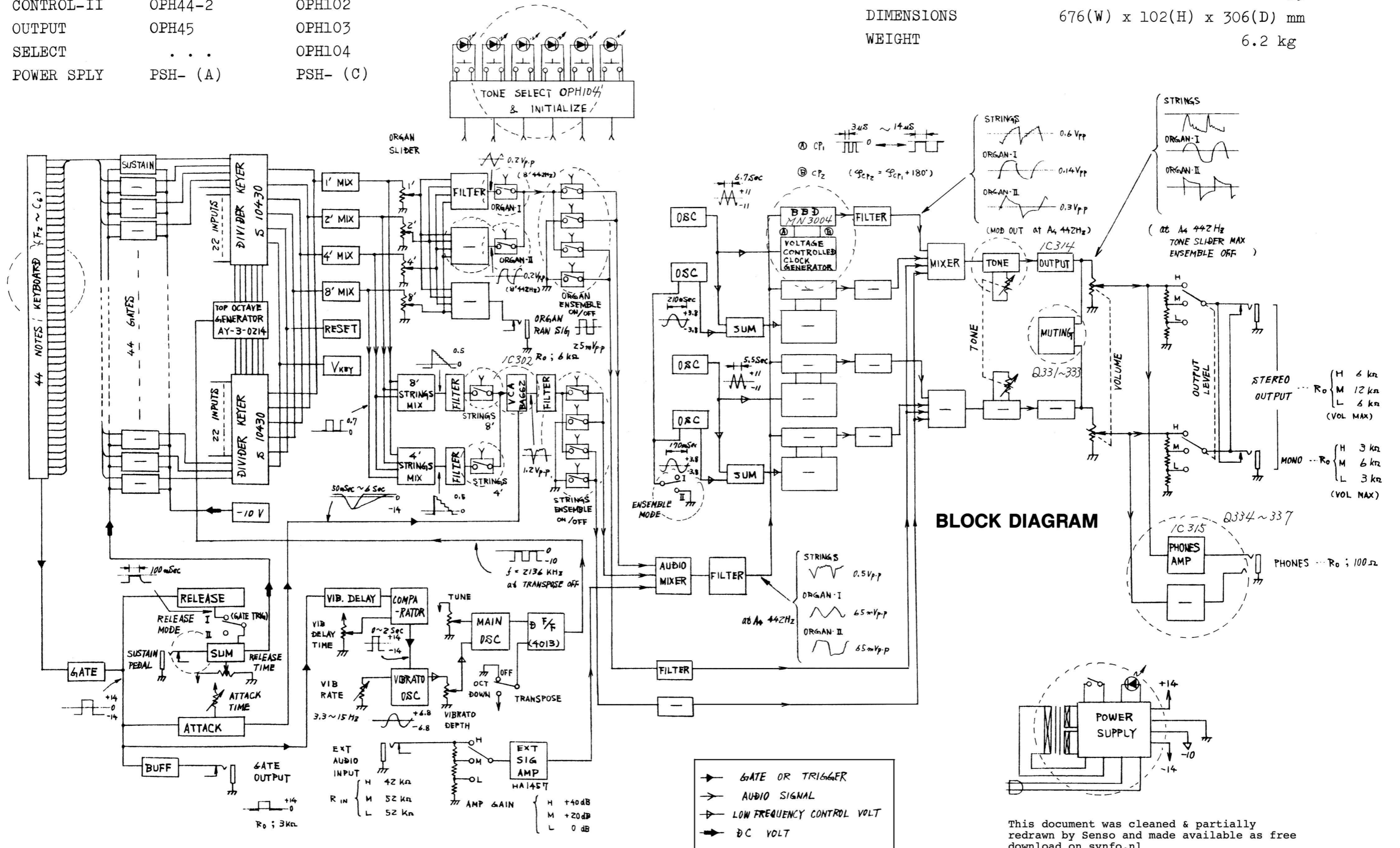
PRINTED CIRCUIT BOARDS

	S/N up to 937449	S/N with 947450
GATE	GTH37(A)	GTH37(B)
CONTROL-I	OPH44-1	OPH101
CONTROL-II	OPH44-2	OPH102
OUTPUT	OPH45	OPH103
SELECT	...	OPH104
POWER SPLY	PSH- (A)	PSH- (C)

DOTTED CIRCLES show circuits and parts different from those in previously issued Service Notes, not mentioned in Guide, inclusive.

SPECIFICATIONS

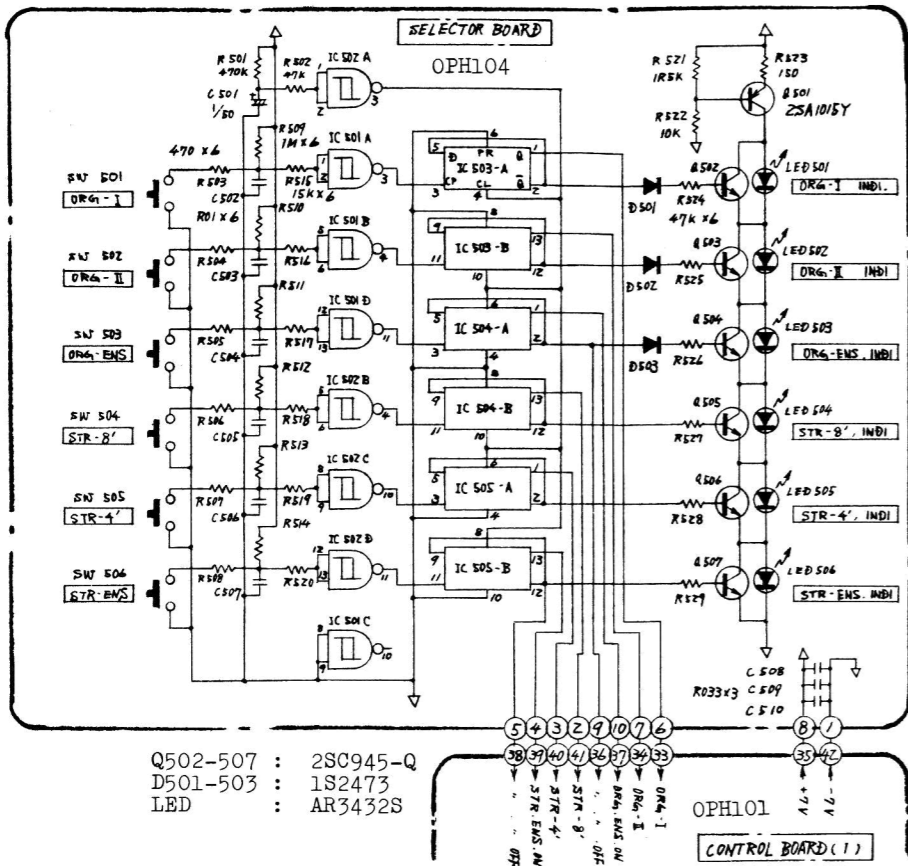
ENVELOPE RELEASE TIME	3.5s max.
PITCH CONTROLLABLE RANGE	± 50 cents
POWER CONSUMPTION	15W
DIMENSIONS	676(W) x 102(H) x 306(D) mm
WEIGHT	6.2 kg



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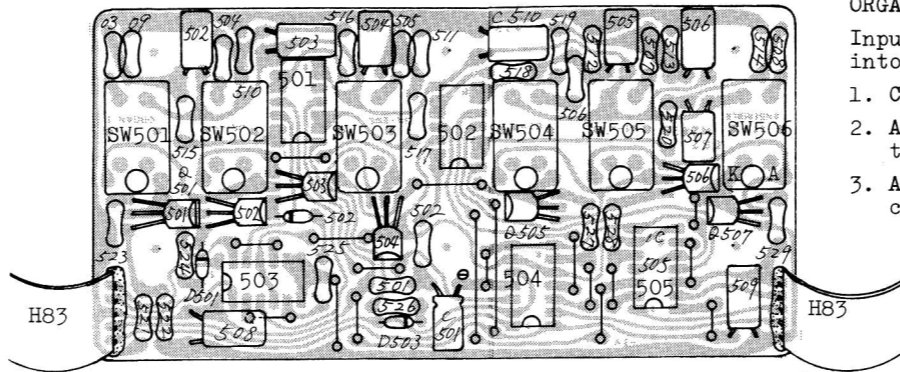
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V

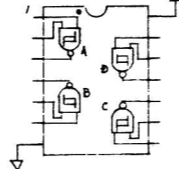


**OPH104B (149H104B) (pcb 052H247B)**

View from the foil side

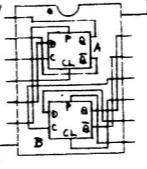


TC4093BP  
(top view)



IC501, 502

TC4013BP  
(top view)



IC503,  
504, 505

**OPH101A (149H101A) (pcb 052H246A-1)**

View from the foil side

**ADJUSTMENT**

BBD BIAS - OPH102 -

VCA DC BALANCE - OPH101 -  
(Strings)

SETUP

ORGAN/STRINGS ENSEMBLE : off

Input signal : Sine wave, 442Hz, -26dBm  
into EXT AUDIO IN (level switch, H)

1. Connect oscilloscope to TP5 on OPH102.
2. Adjust PM302 for centering waveform on the screen.
3. Apply similar steps to the other MOD channels:

TP6 - PM303 TP7 - PM304

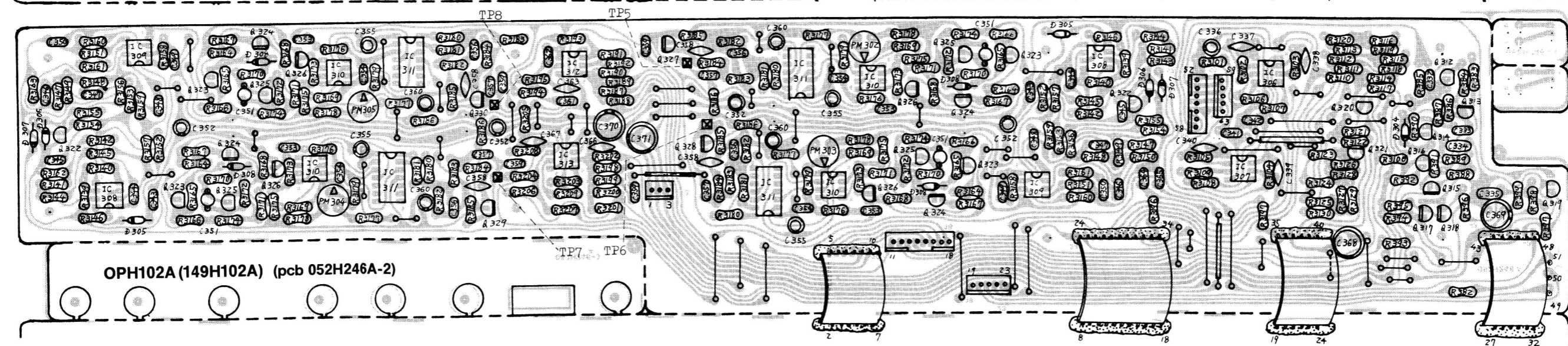
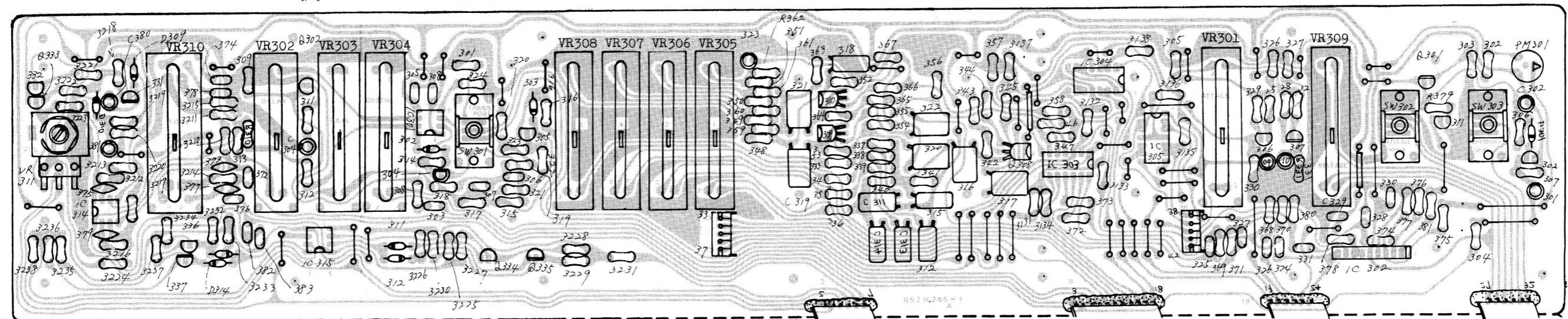
TP8 - PM305

4. Verify the following:

- a) Output level stays constant as the Input signal and the Input Level are set for, the following combinations.

INPUT SIGNAL	EXT AUDIO IN
-40dB	H
-20dB	M
0dB	L

- b) Distortion is not appreciable when four keys (in chord) are played simultaneously with the following control setting: ORGAN sliders 8', 4', 2', 1' - "10". ORGAN tab - I. TONE - "10". ORGAN ENSEMBLE - "on"



**OPH102A (149H102A) (pcb 052H246A-2)**



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

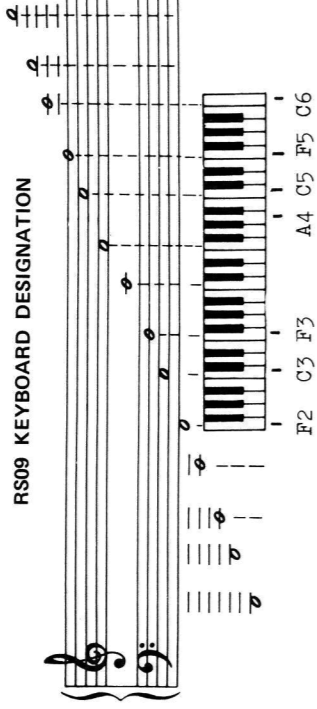
V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9 - = ~

### MASTER GENERATOR & TONE GATE GTH37B (147H037B) (pcb 052H149B)

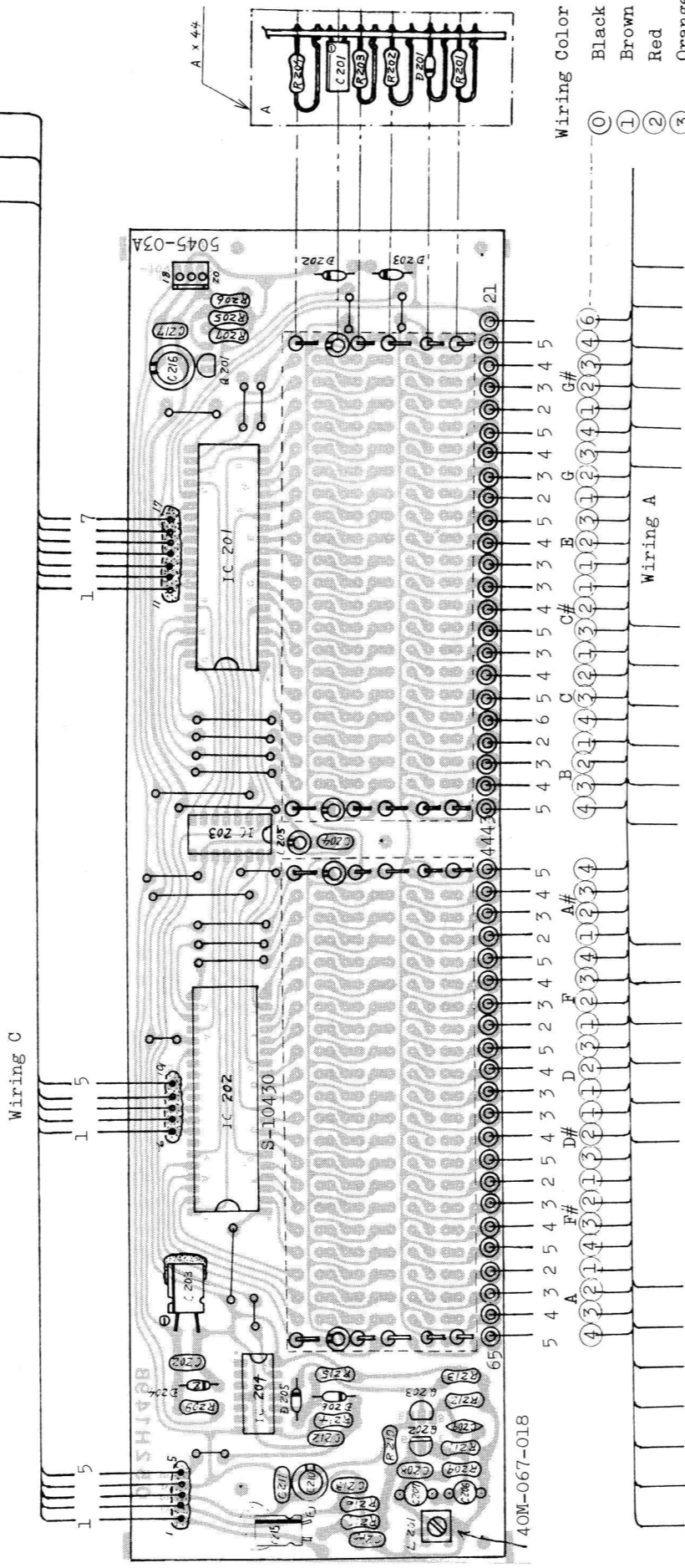
TUNING  
Tune L201 for 442Hz with the following settings.

- VOLUME, TONE : 10
- TRANSPOSE : NORMAL
- ORGAN 8' : 10
- ORGAN 4', 2', 1' : 0
- ORGAN II : on
- STRINGS 8', 4' : off
- ENSEMBLE : off
- TUNING : midpoint
- OUTPUT : MONO, H
- KEY : A4

#### RS09 KEYBOARD DESIGNATION

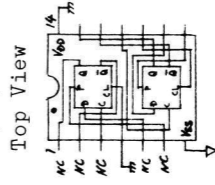


- C Bottom view
- 280945-Q
- 2SA733-Q
- 1S2473
- 0525.1-L
- R-25J
- Ceramic
- Electrolytic
- Mylar
- Polystyrene
- ELR-25J
- 1S2473FV
- Jumper

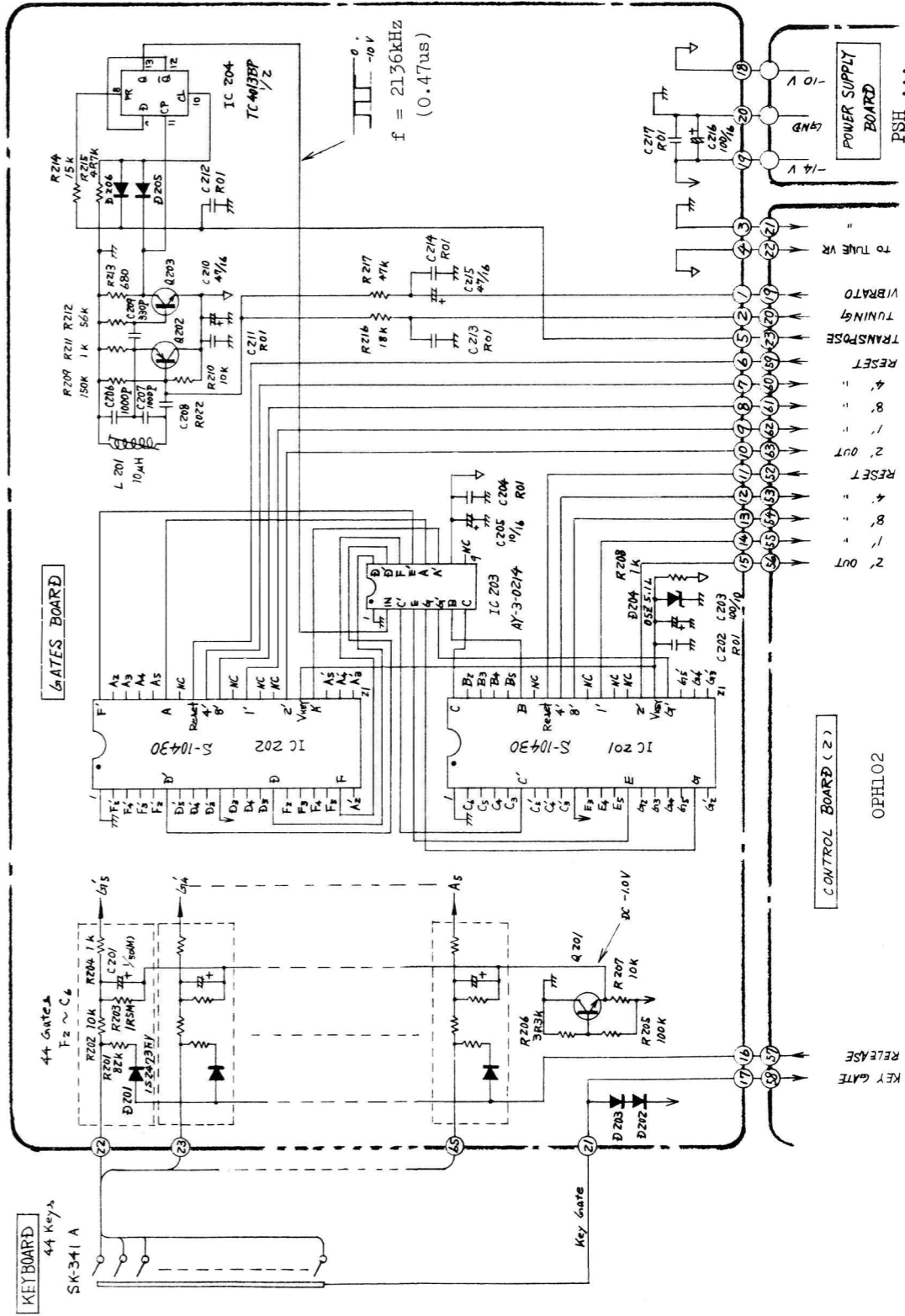


- Wiring Color
- 0 Black
  - 1 Brown
  - 2 Red
  - 3 Orange
  - 4 Yellow
  - 5 Green
  - 6 Blue
  - 7 Violet

TC4013BP Top View



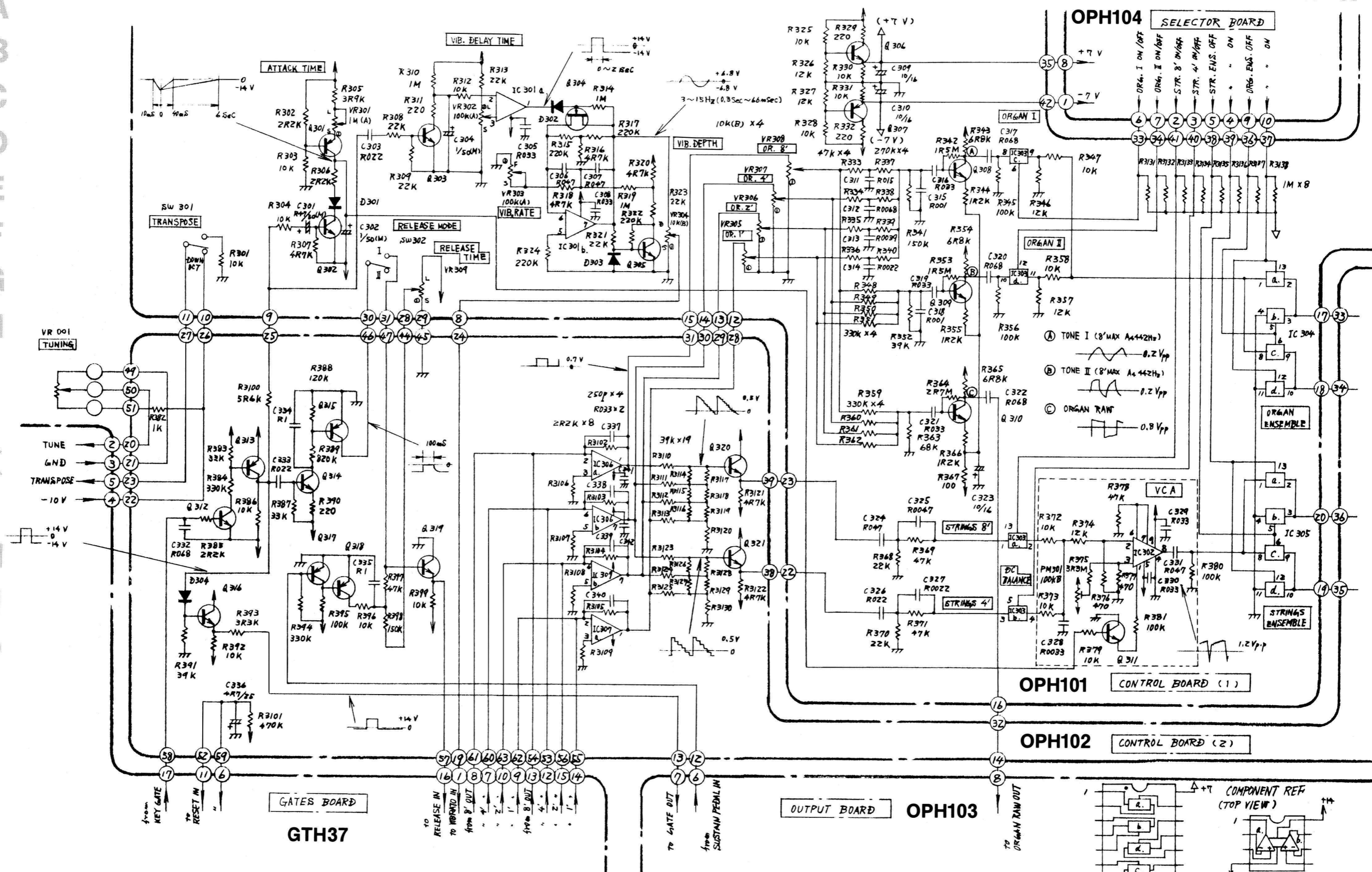
Unless otherwise noted:  
 PNP transistor: 2SA733-Q  
 NPN transistor: 280945-Q  
 Diode: 1S2473  
 C201: M type electro.  
 C206, 207: Polystyrene  
 Other Cs: Mylar  
 Resistor: 1/4W, 5%





1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

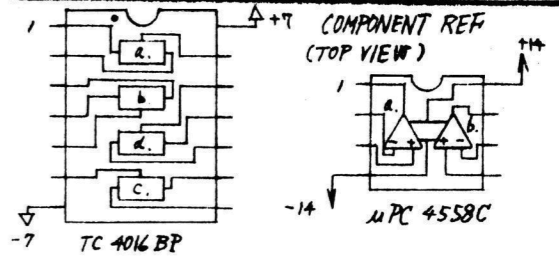


IC301, 306, 307:  $\mu$ PC4558C  
 IC303, 304, 305: TC4016BP

IC302: BA662  
 FET: 2SK30A- GR or Y

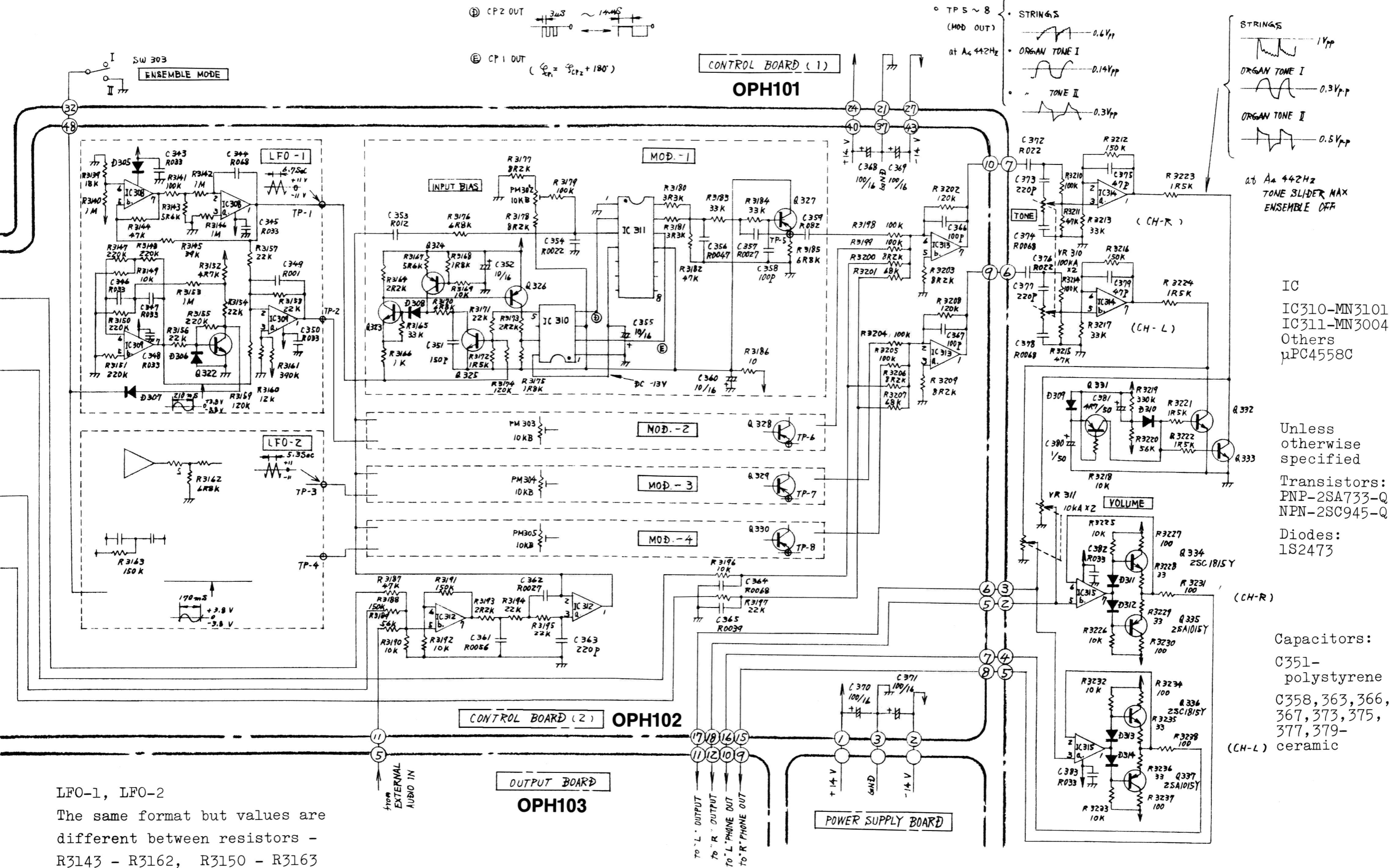
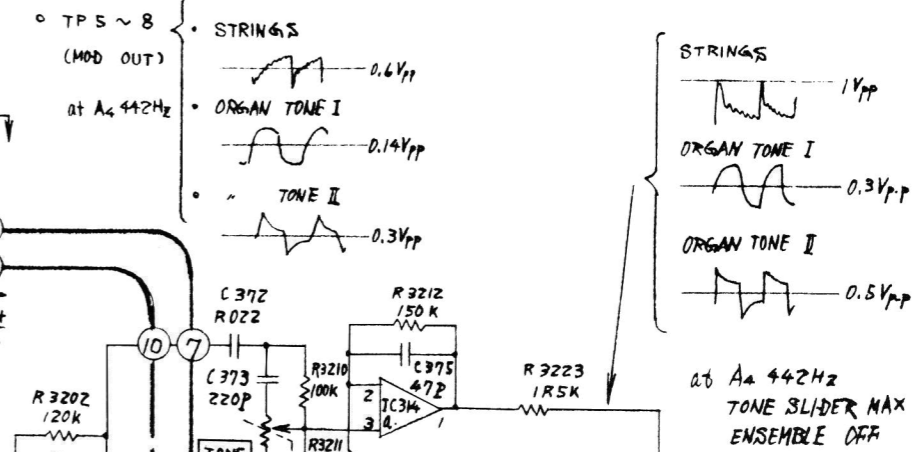
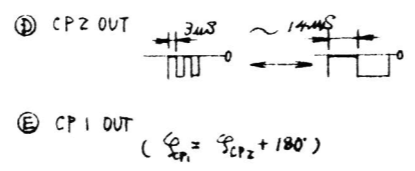
C301, 302, 304 : M type electrolytic  
 C337, 338, 339, 340: Ceramic

Unless otherwise specified: PNP transistors - 2SA733-Q; NPN - 2SC945-Q  
 Diodes - 1S2473



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V



IC  
IC310-MN3101  
IC311-MN3004  
Others  
 $\mu$ PC4558C

Unless otherwise specified

Transistors:  
PNP-2SA733-Q  
NPN-2SC945-Q

Diodes:  
1S2473

Capacitors:  
C351-  
polystyrene  
C358, 363, 366,  
367, 373, 375,  
377, 379-  
ceramic

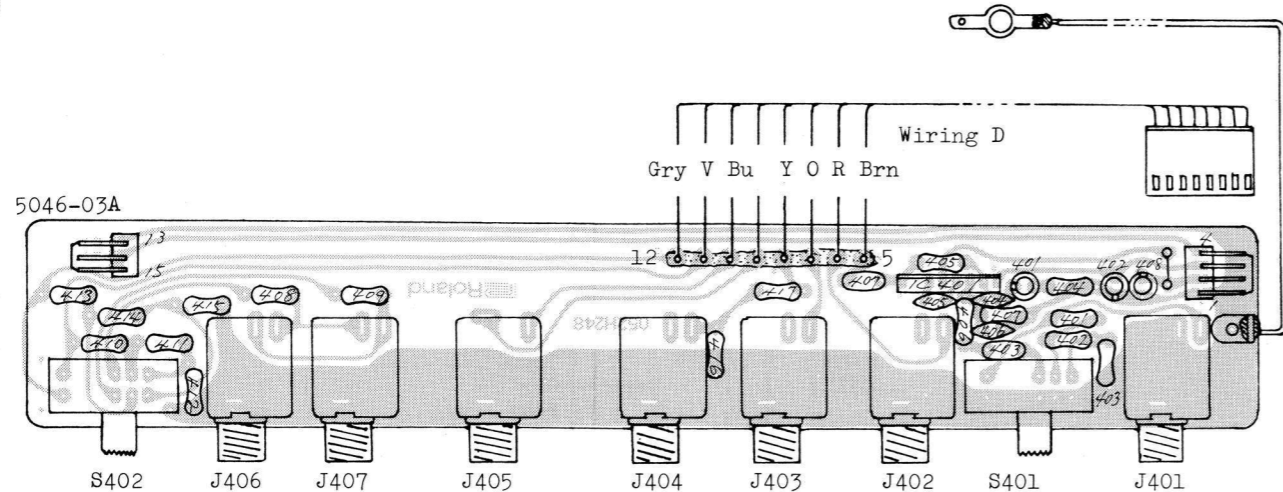
LFO-1, LFO-2  
The same format but values are different between resistors - R3143 - R3162, R3150 - R3163

Unused numbers for terminal designation: 1, 25, 26 - OPH101, 4, 41, 42 - OPH102

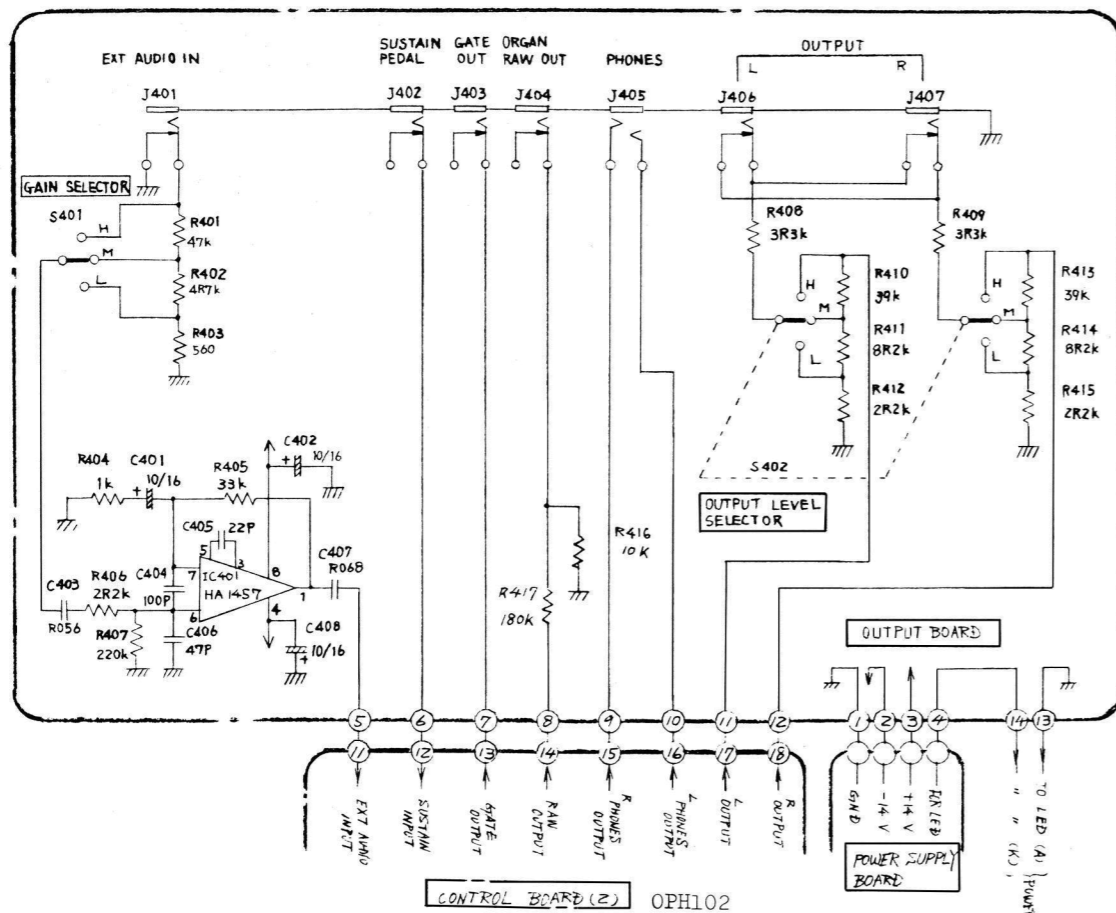
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OPH103 (149H103) (pcb 052H248)

View from the foil side



HSW0372-01-030 SG7622 no.08 SG7713 no.08 S G 7 6 2 2 n o . 0 8 HSW SG7622 no.08 0372-01-030

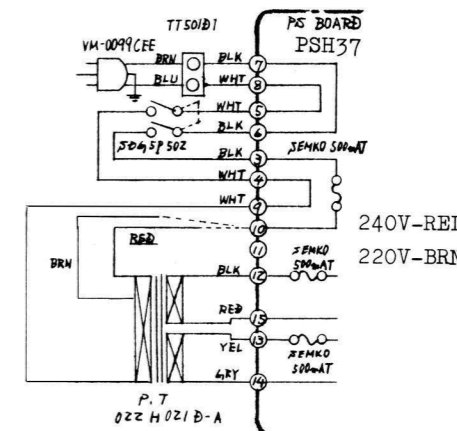
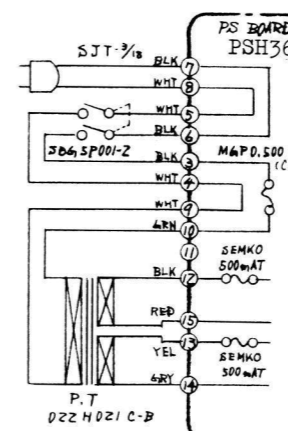
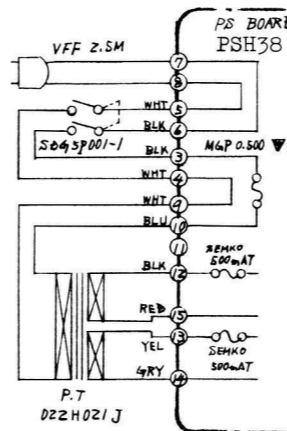


CONTROL BOARD (2) OPH102

100V

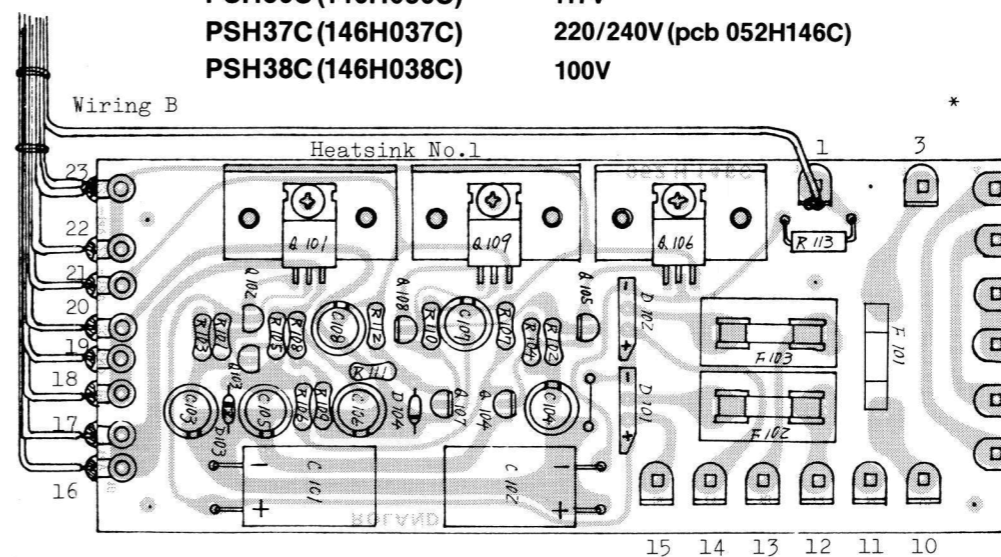
117V

220/240V



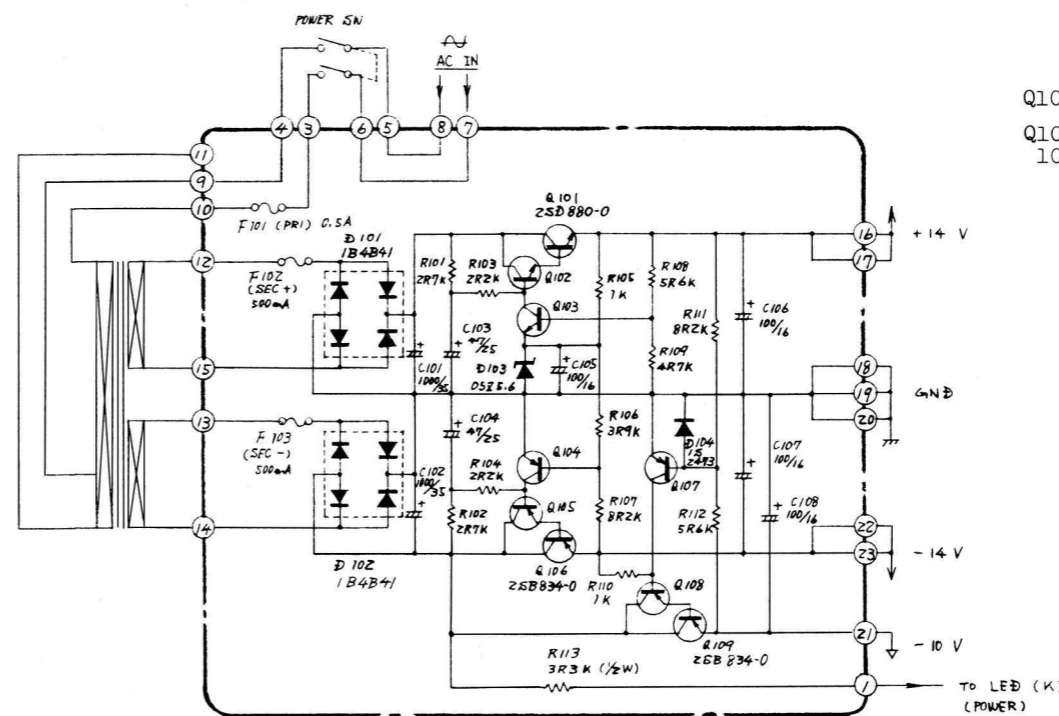
PSH36C (146H036C)  
PSH37C (146H037C)  
PSH38C (146H038C)

117V  
220/240V (pcb 052H146C)  
100V



DIFFERENCE AMONG VERSIONS:  
Type of F101  
PSH38 - MGP 0.5A  
PSH36 - MGP 0.5A (CSA)  
PSH37 - SEMKO T500mA

Q102, 103 - 2SC945-Q  
Q104, 105 - 2SA733-Q  
107, 108







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**20049**

UPC 20049



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