

RS 09 SERVICE NOTES

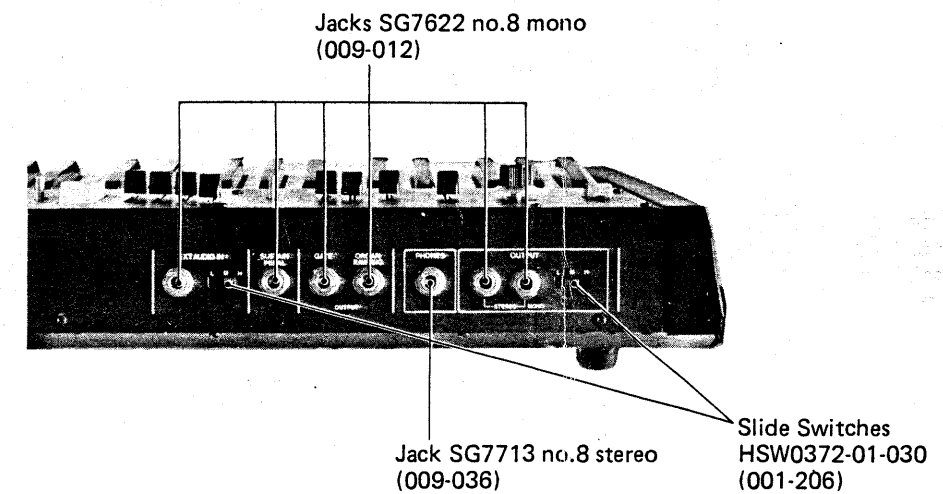
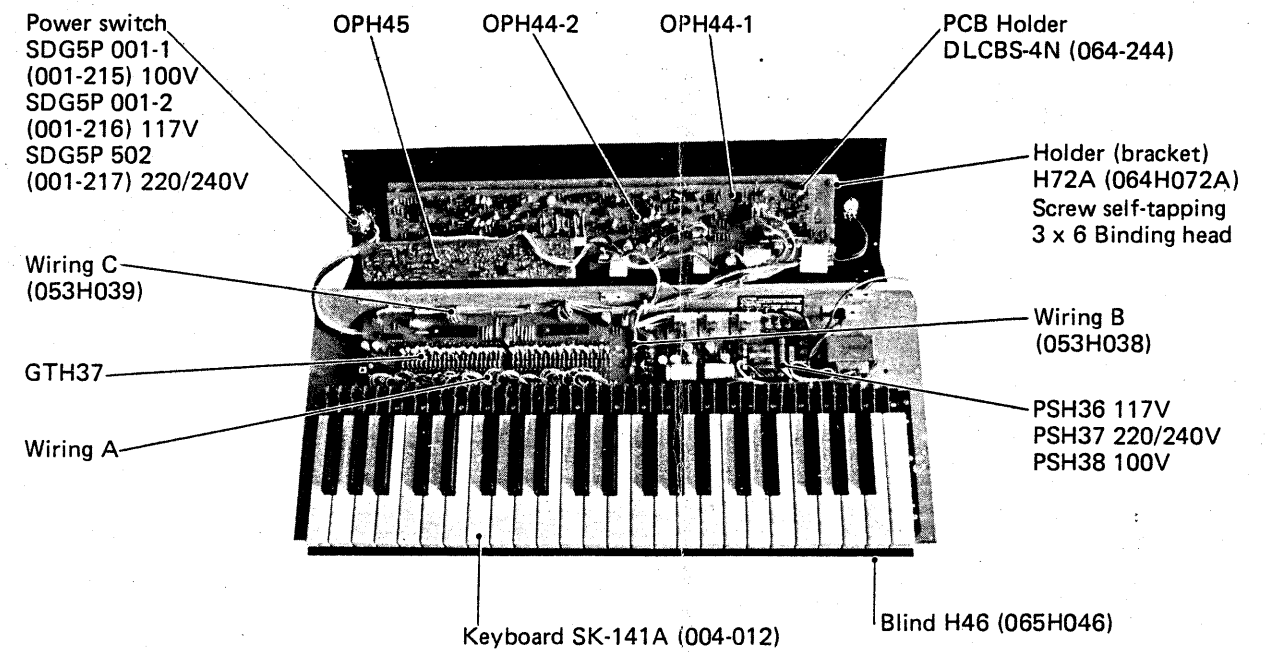
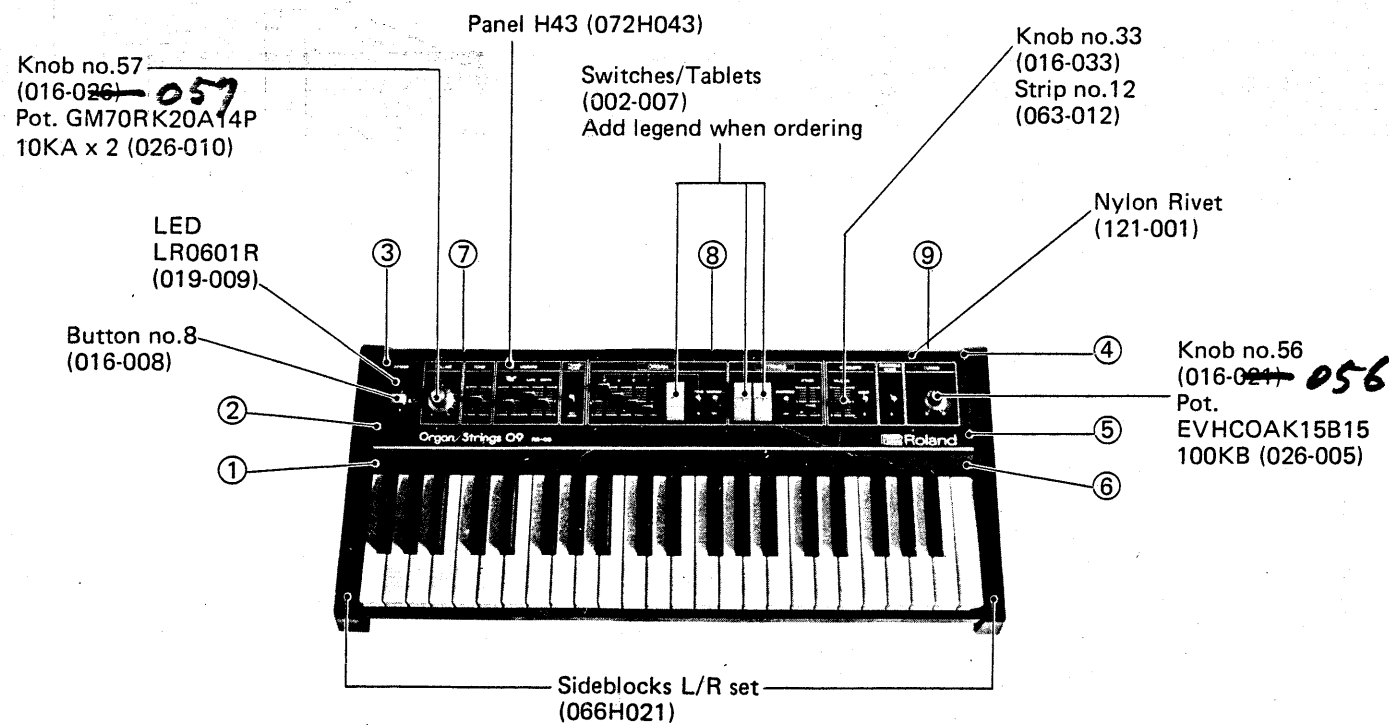
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DISASSEMBLY & PARTS LAYOUT

TOPCOVER REMOVAL SCREWS:

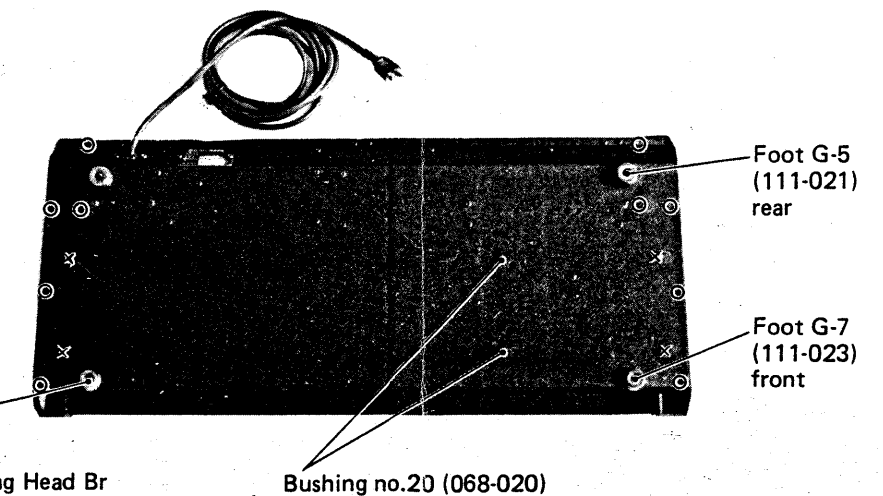
- ① through ⑥ 3 x 10mm Tap-tight Binding Head Br
- ⑦ through ⑨ 3 x 6mm Self-tapping Binding Head Br



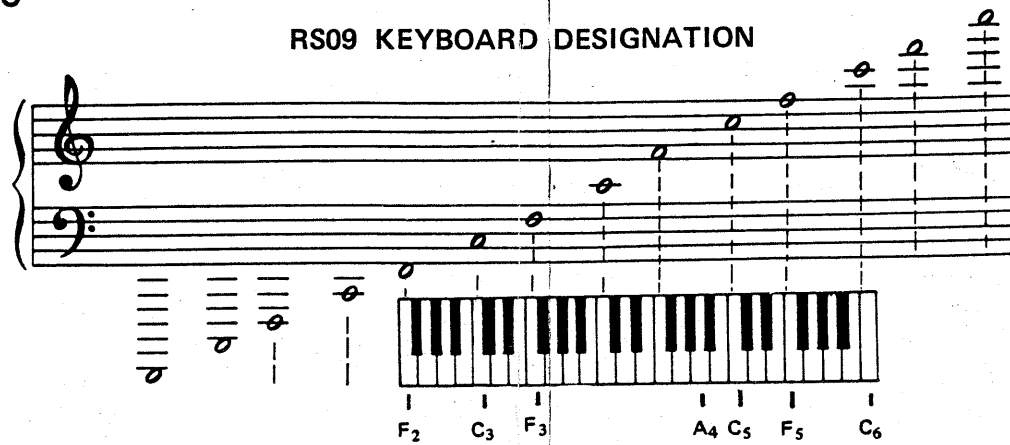
Sideblock removal screws: encircled
3 x 10mm Tap-tight B Binding Head Br

Keyboard removal screws: crossed
4 x 8mm Binding Head Br

Screws:
3 x 10mm Tap tight B binding Head Br



RS09 KEYBOARD DESIGNATION

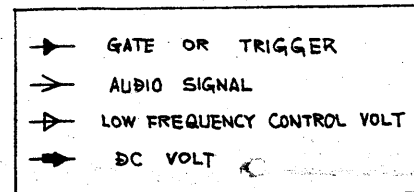
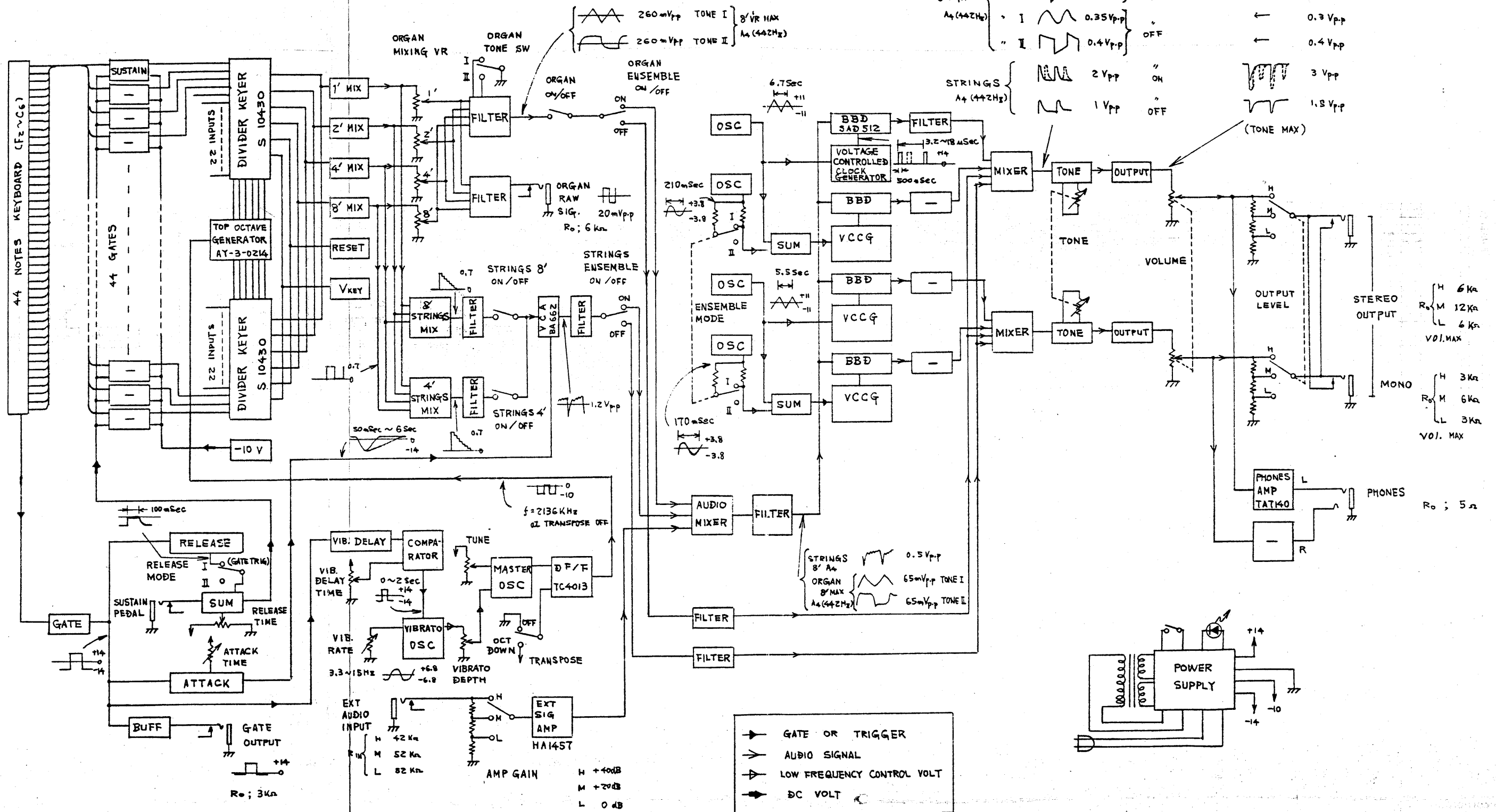


BLOCK DIAGRAM & SPECIFICATIONS

SPECIFICATIONS

ENVELOPE RELEASE TIME	3.5sec max.
TUNABLE RANGE	± 50 -cent
POWER CONSUMPTION	15W
DIMENSIONS	676(W)x102(H)x306(D)mm
WEIGHT	7.3Kg

* Refer to the Block Diagram for other specifications.



PCB & CIRCUIT DESCRIPTION

1 GATE PCB: GTH37

The PCB consists of the followings: Master Oscillator (Q202), Top Octave Generator (IC203), Flip-Flop (IC204), Divider-Keyer (IC201 IC202), and Gate Circuits corresponding to 44 keys.

1-1 MASTER OSCILLATOR: Q202 L201

This is a Colpitts type oscillator, the frequency of which is controlled within a range of ± 50 cents with a change in bias value using the TUNING Control on the Control Panel.

1-2 FLIP-FLOP: IC204

Flip-Flop here serves as a frequency divider. When TRANSPOSE (SW301 - OCT DOWN) is OFF, the signal coming from the Master Oscillator will just pass through unchanged and is divided into half when the TRANSPOSE is in ON position.

1-3 TOP OCTAVE GENERATOR: IC203

The signal coming from Flip-Flop is divided here to provide 12 Top Octave Tones of temperament.

1-4 GATE CIRCUITS

Forty-four of each independent gate circuits comprise this section. Each release time can be varied with a change of the time constant on its RC network. Attack time is held constant, for not such variation.

1-5 DIVIDER-KEYERS: IC201 IC202

Each incorporates 22 Key Inputs, 88 DC Keyer Circuits, 34 Binary Dividers and provides four Pitch Outputs. (8, 4, 2, 1 foot) Thus making a sum of 44 key inputs and 176 tone outputs on 2 ICs.

When any one of the 44 keys is played, the gate circuit corresponding to the key generates a signal of particular envelop to be sent to the Divider-Keyer through its key-input terminal. As a result, four outputs of the Divider-Keyer are to have the signals of 8, 4, 2, and 1 foot corresponding to the key played and to the envelop generated.

2 CONTROL PCBs: OPH44-1 OPH44-2

These are comprised of: Gate Signal Generator (Q309, Q310), release Control (Q314), Mixing Networks, Strings & Organ Filters, String Attack Control, and Modulators.

2-1 RELEASE CONTROL: Q314 (OPH44-2)

When a key is depressed, the capacitor C201 on the corresponding gate circuit is charged through R202 to -13V approx. To release the key makes the capacitor discharge to become 0V again. (The process is same on all 44 gates.) Details are as follows: D201 anode may beforehand be set at a certain level, at -5V for instance, by VR309, RELEASE, on the panel and through Q314. If set at -5V, the discharge is conducted through two ways, C201 - R202 - R201, and C201 - R203. (T = 87 msec) When C201's negative terminal reaches approx. -5V, it makes D201 cut off, limiting the pass to C201 - R203 alone. (T = 1.5 sec) The D201 anode voltage can either be set by the RELEASE at any point in a range from -14V to 0V. By the setting here, then, it is permitted to have a control on the Release Time. Q314's base is connected to SW302 for Release Mode and is led to the collector of Q312 when the Release Mode SW is at I. When played on non-legato, each keying causes at Q312 a pulse of approx. 100 msec width, to make the emitter of Q314 raise instantaneously to 0V, causing a quick discharge of C201. Because of this, each keying will also cause a cancellation of the tone of the preceding keying when having the Release Time set for long enough. If, on the other hand, the Release mode is at II, it is just to maintain the mode of an ordinary organ sustain. Q314's base is also connected to the SUSTAIN PEDAL Jack through R372 and R374 placed in series. When a pedal switch of "normally-closed" is plugged into this jack, - Roland DP-1 for example, it is to hold the Q314 base at 0V whenever a foot off and the pedal is in a released state, shortening release time in no concern to RELEASE setting. When the pedal is depressed, the release time turns to what the RELEASE has been set.

2-2 GATE SIGNAL GENERATOR: Q309 Q310 (OPH44-2)

The Keyboard bus bar is connected to -14V via D202 and D203 in series, when a key is depressed, a voltage drop of 1.2V develops across the two diodes. The gate signal is made by detecting this voltage drop. (Q309, Q310) They are then to be used for triggering the Delay Vibrato or Strings Attack, etc. It is also connected to the GATE OUTPUT jack via Q313 (buffer) for a synthesizer control.

2-3 MIXING NETWORKS: R385 - R3103 (OPH44-2)

Square waves (8, 4, 2, 1 foot) generated at the Divider-Keyer are sent to the Resistor Ladder Networks in order to get through mixing and be shaped to the stair-stepped waveforms for strings. (R385 thru R395 for Strings 8 foot, R396 thru R3103 for 4 foot)

2-4 FILTER CIRCUITS: OPH44-1

The high pass filter for Strings. (C316 - C319 and R348 - R353)
The low pass filter for Organ. (R324 - R331 and C307 - C310)

2-5 STRINGS ATTACK CONTROL: Q301 Q302 D301 (OPH44-1)

When a key is depressed, C302 will discharge rapidly through R305, D301 then to Q302. It is then recharged by constant current through Q301. The value of this current can be determined by the ATTACK time (VR301). Since C302 voltage is applied to the control input of IC302 (BA662/VCA) via Q308, it can be said that the rise time of the strings is determined by VR301, ATTACK.

2-6 MODULATOR: IC310 x 4 (OPH44-2)

With ENSEMBLE on, signals passing through the filters are fed to the Modulator Circuits having BBDs. In order to provide stereo outputs, four BBDs are used. (IC310 - two each for one channel) To the Clock input (pin no.1) of the BBD, a VCCG is connected which is to serve as a V-T converter to make period T in proportion to the control voltage V.

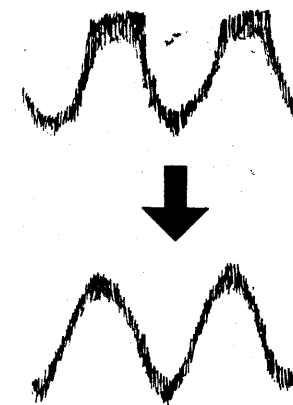
Delay Time of each BBD is determined by the frequency of the VCCG, which in turn is frequency modulated by the LFO output voltage. Two VCCGs are provided against each of the stereo channels, of which one is for modulation by a triangle waveform while the other is by a mixed waveform of opposite-phase triangle and lower level sine.

BBD BIAS ADJUSTMENT

The purpose of this adjustment is to set the operating points of BBDs (IC310) to their center.

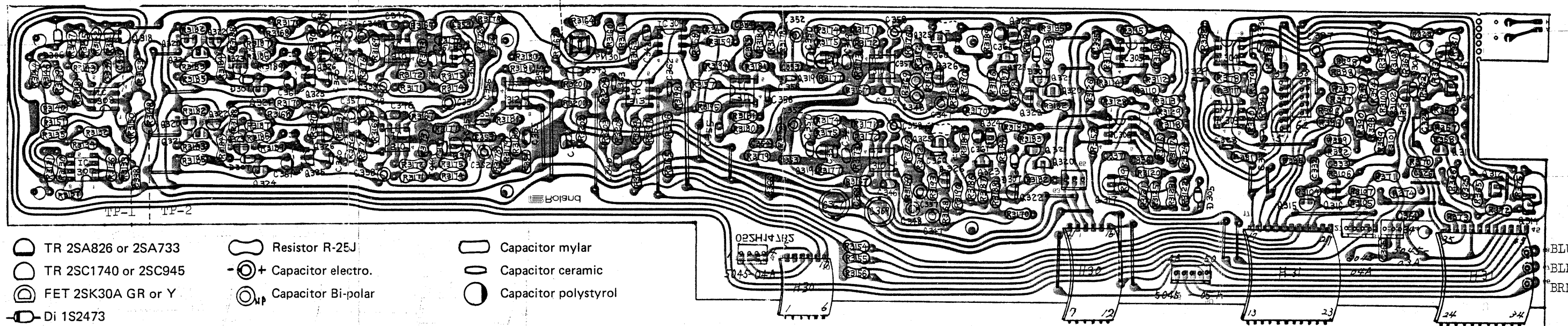
1. Feed a 1kHz sine wave through EXT IN jack.
2. Connect an oscilloscope vertical input lead to an IC310 pin no.4.

3. If the peak of half wave is only clipped with the input signal level adjusted, turn trimmer PM301 so that both positive and negative peaks are symmetrically distorted. Make sure that both tops become distortion free simultaneously as the signal being decreased.



CONTROL OPH44B-2 (149HO44B-2)

BBD Bias Adj.

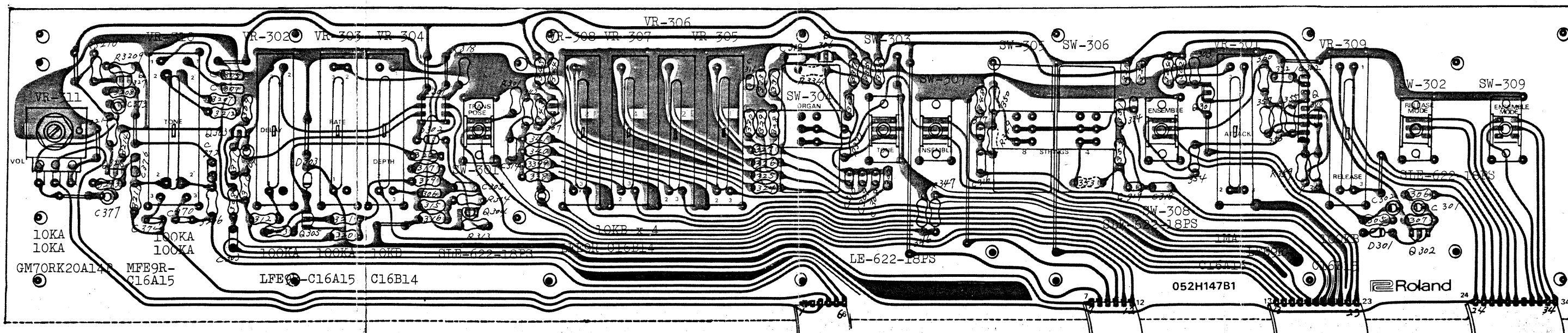


- TR 2SA826 or 2SA733
- TR 2SC1740 or 2SC945
- FET 2SK30A GR or Y
- Di 1S2473
- Resistor R-25J
- Capacitor electro.
- Capacitor Bi-polar
- Capacitor mylar
- Capacitor ceramic
- Capacitor polystyrol

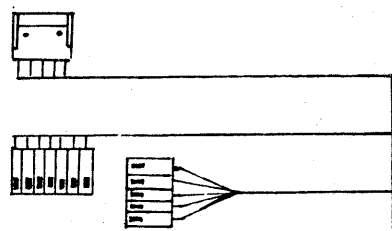
CONTROL OPH44B-1 (149HO44B-1)

VIEW FROM PATTERN SIDE

54.3k
R3158
18k → 10k



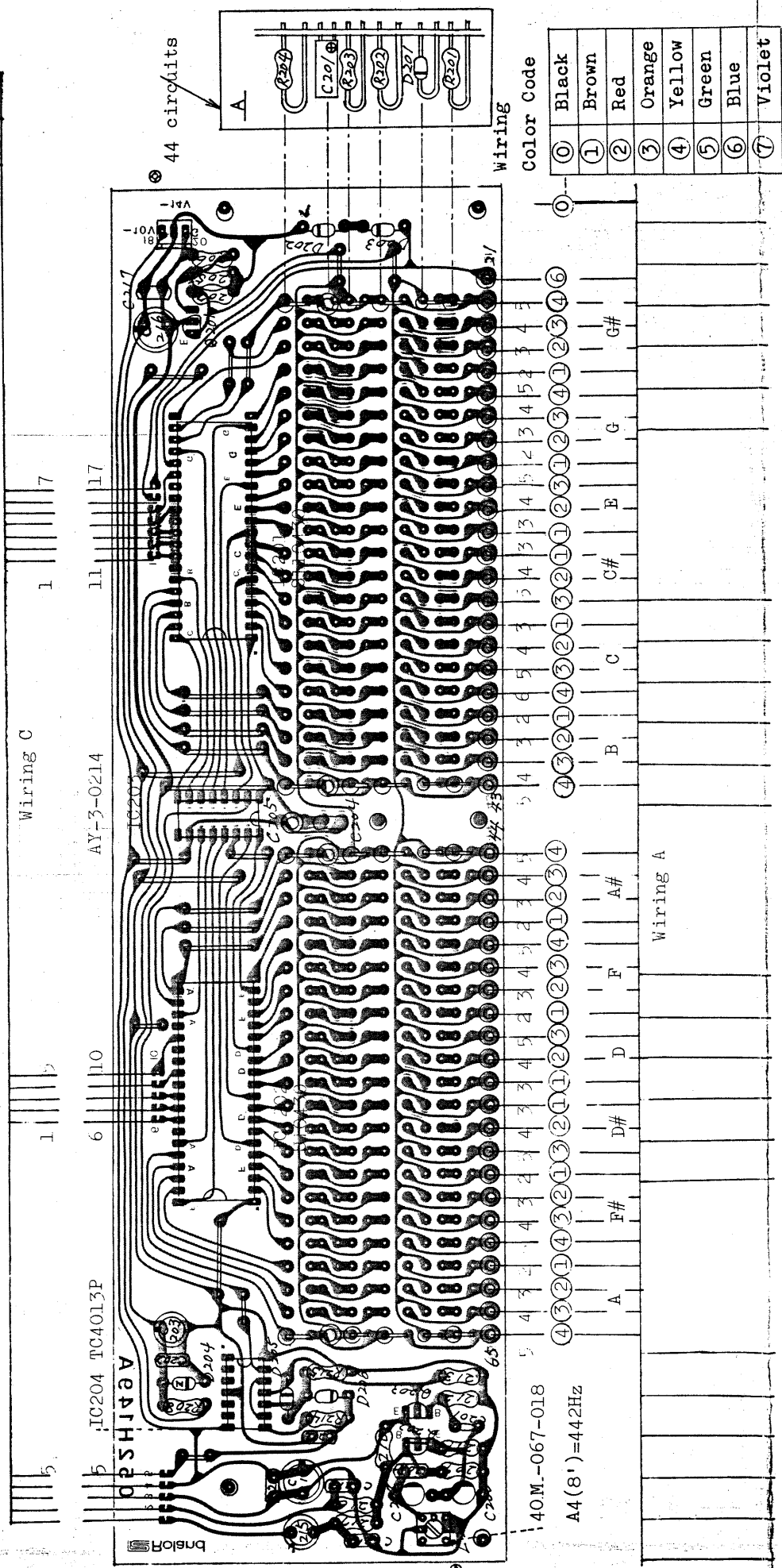
GATE GTH37(147HO37) A



2SA826 or 2SA733

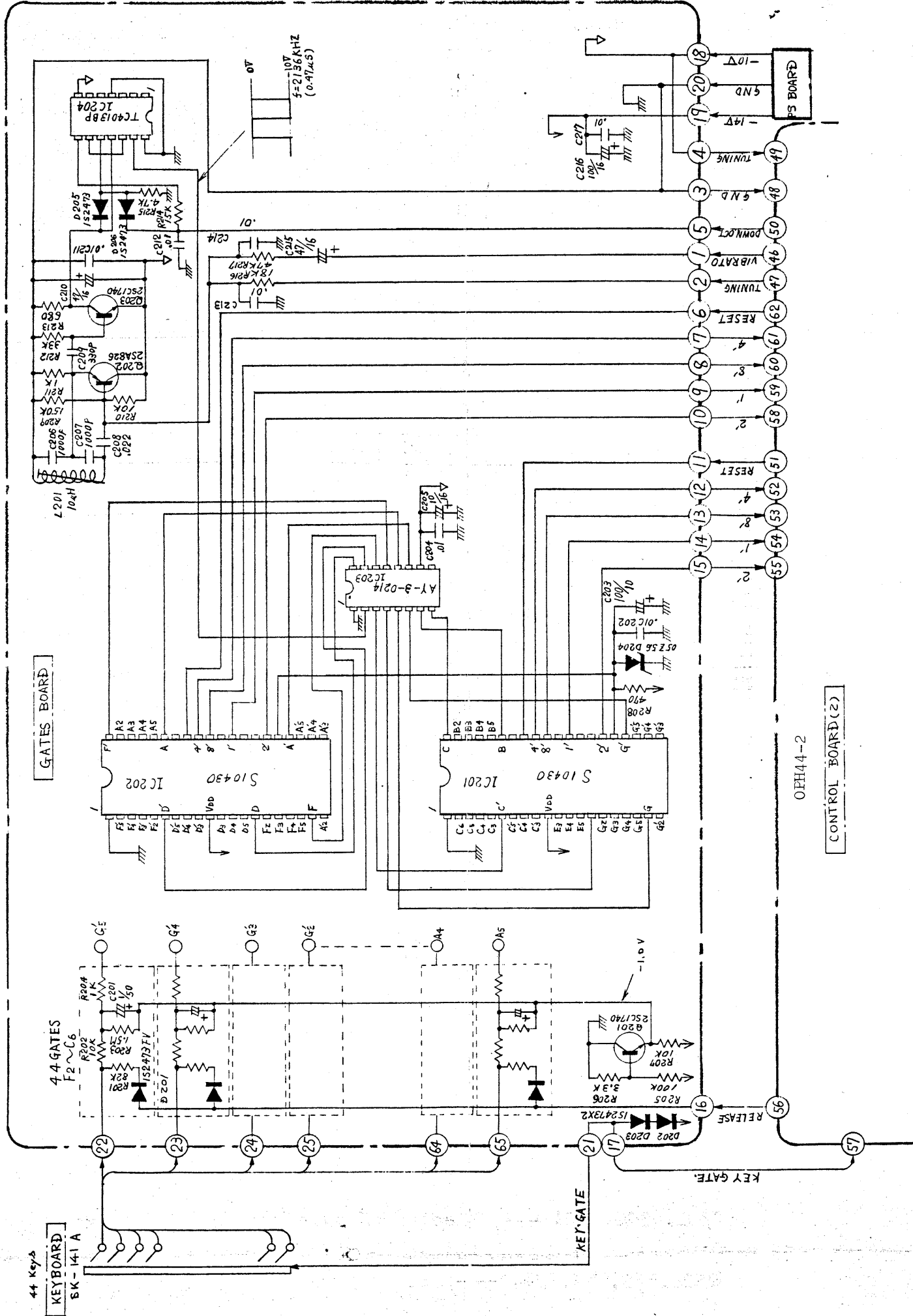
2SC1740 or 2SC945

Polystyrene film cap. 125V-K



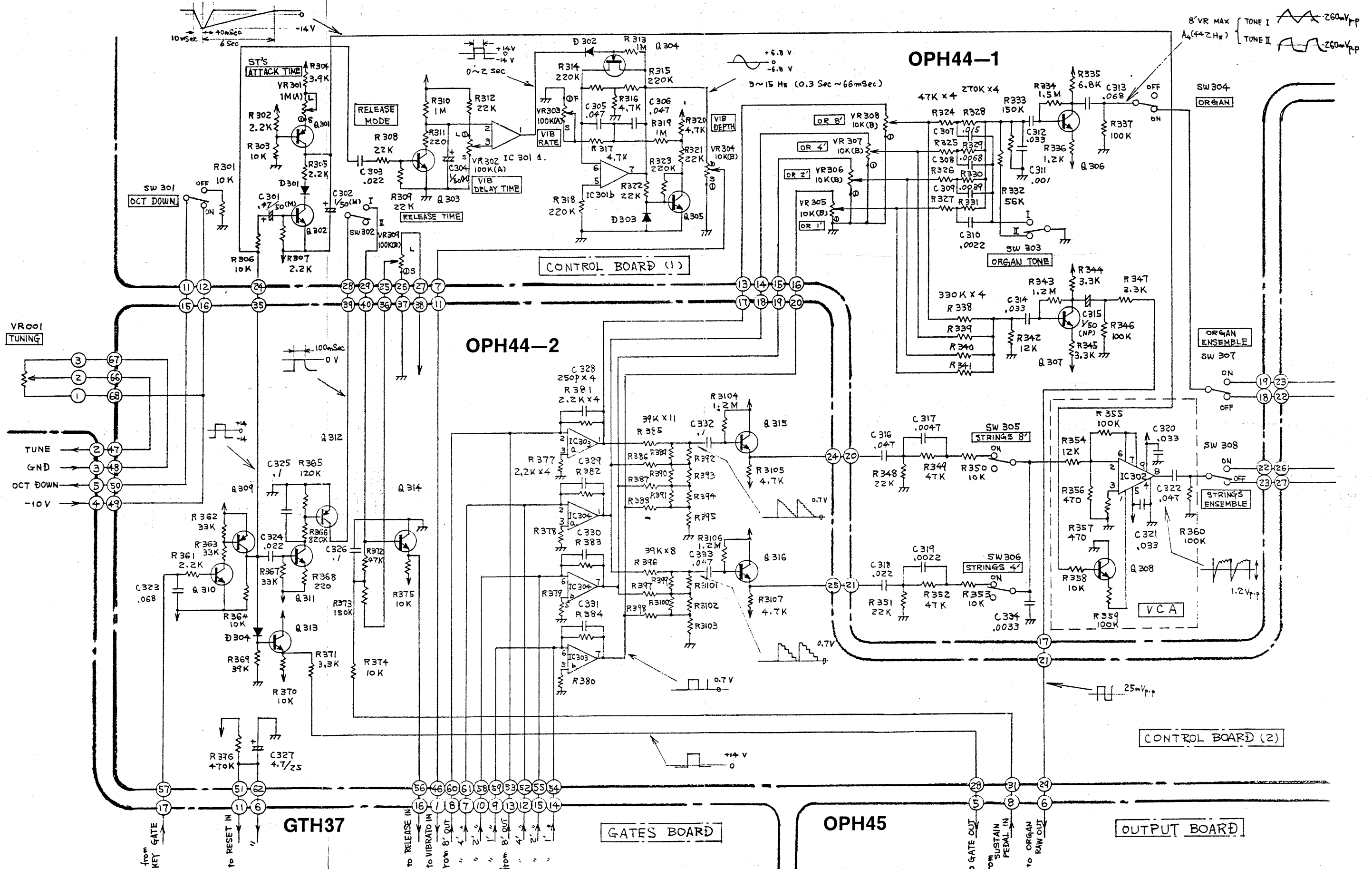
Wiring Color Code

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



OFH4-2

CONTROL BOARD(2)



C301, 302, 304 --- Electro (M type)
 C315 ----- Electro Bi-polar
 C328,329,330,331, --- Polystyrene

IC 301, 303, 304 --- μ PC4558C
 IC 362 ----- BA662

FETs --- 2SK30A GR or Y
 Transistors: PNP --- 2SA826 Q
 NPN --- 2SC1740 Q

OPH44-1

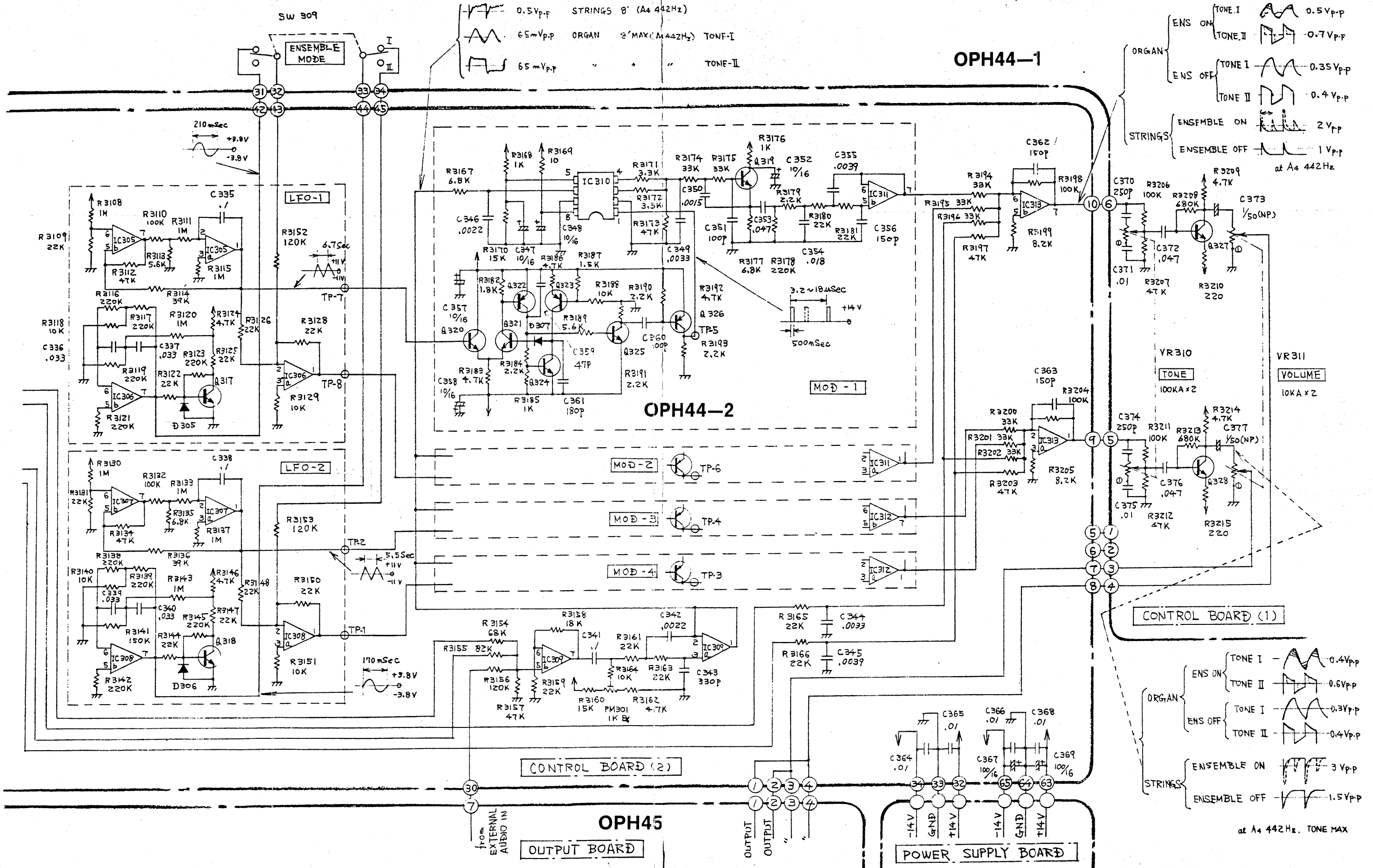
OPH44-2

OPH45

POWER SUPPLY BOARD

OUTPUT BOARD

CONTROL BOARD (1)



IC305, 306, 307, 308,
309, 311, 312, 313, --- uPC4558C

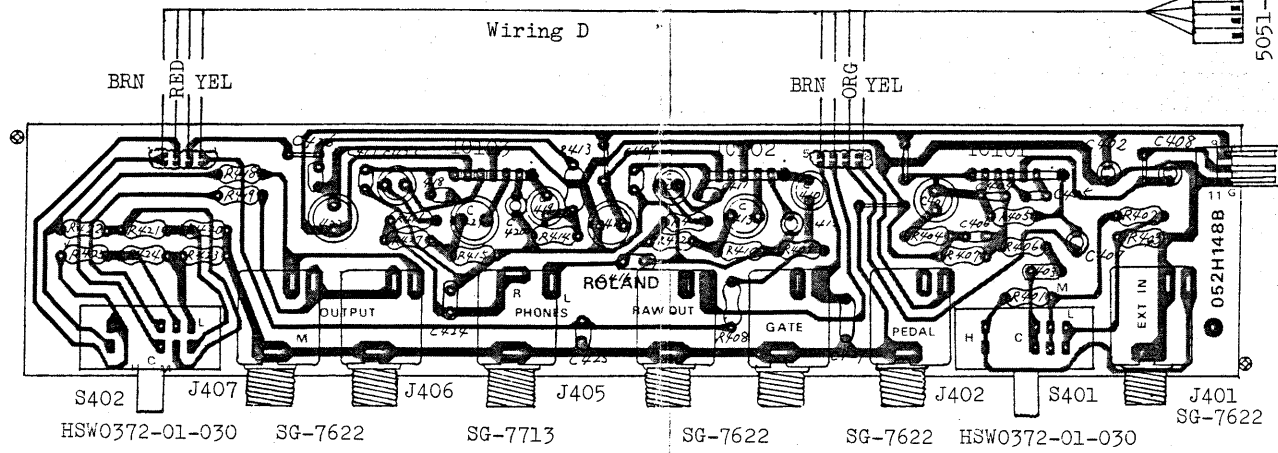
Diodes --- 1S2473

Transistors: NPN --- 2SC1740 Q
PNP --- 2SA826 Q

C361 --- Polystyrene
C373, 377 --- Electro Bi-polar

OUTPUT OPH45 (149HO45) B

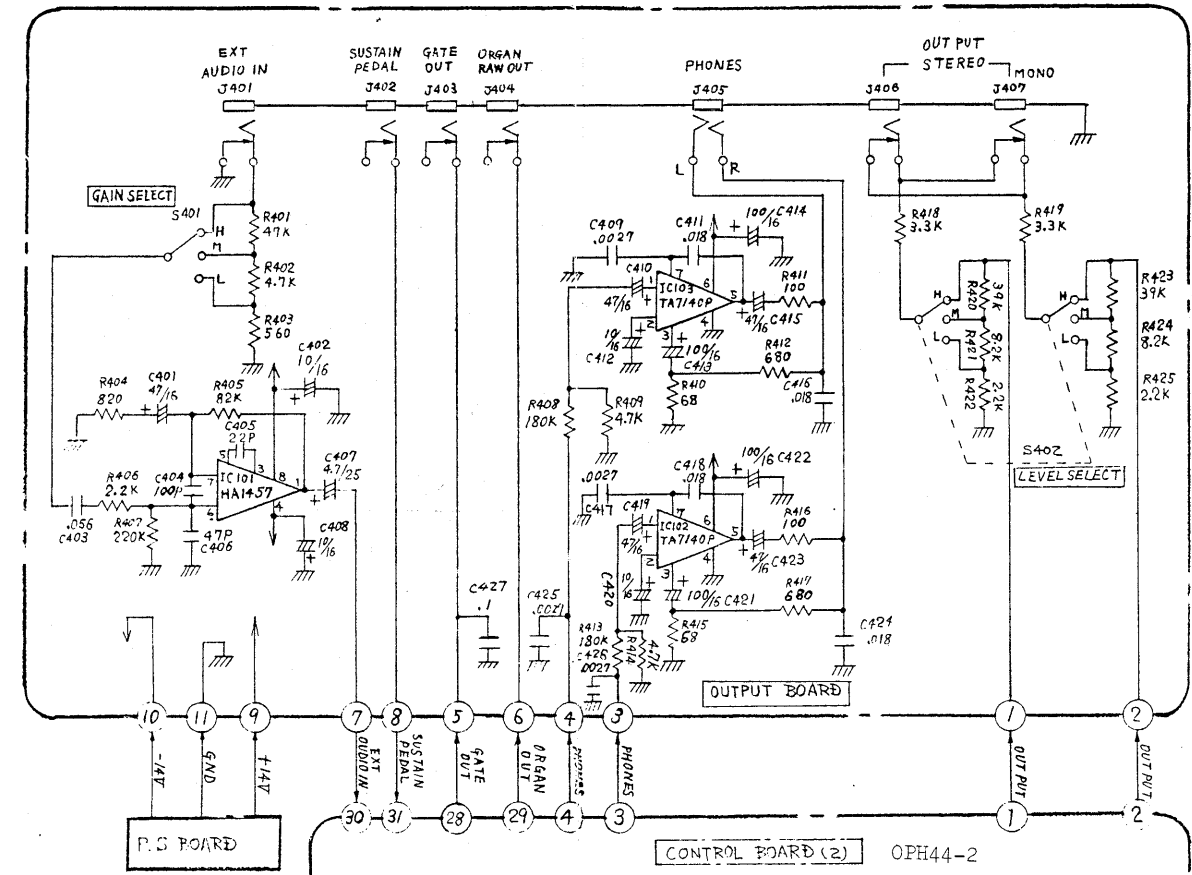
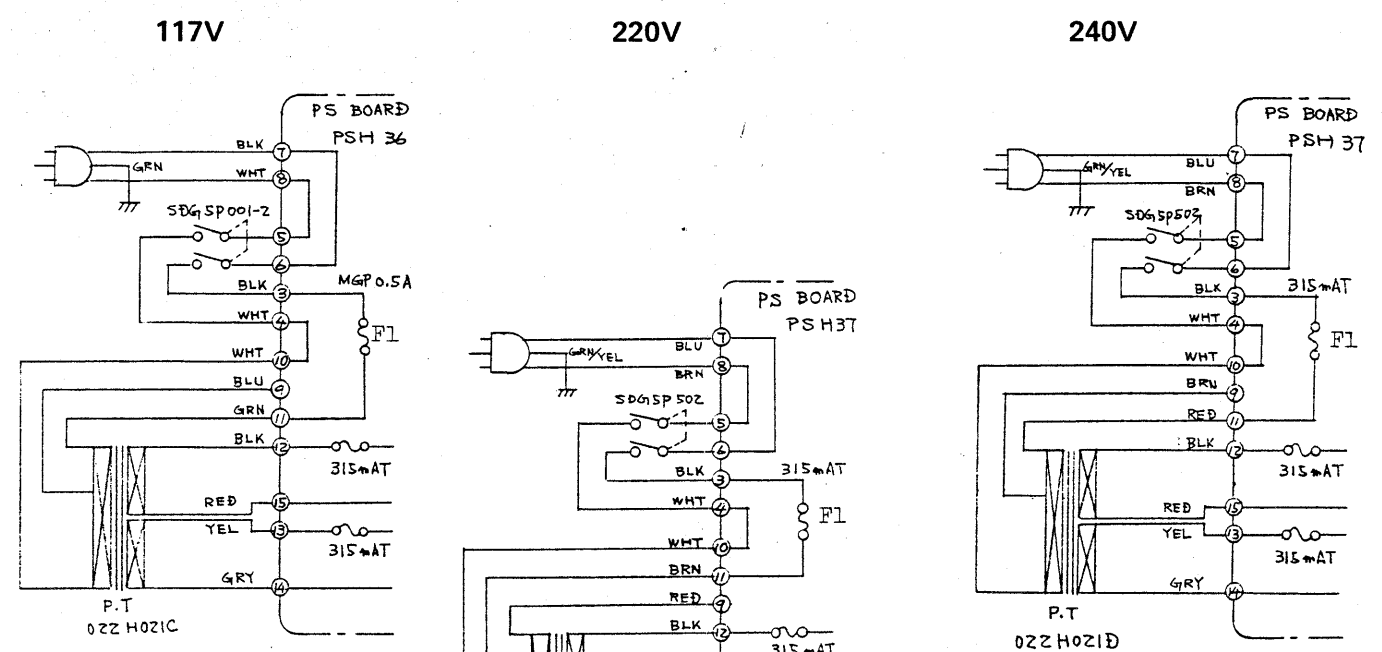
VIEW FROM PATTERN SIDE



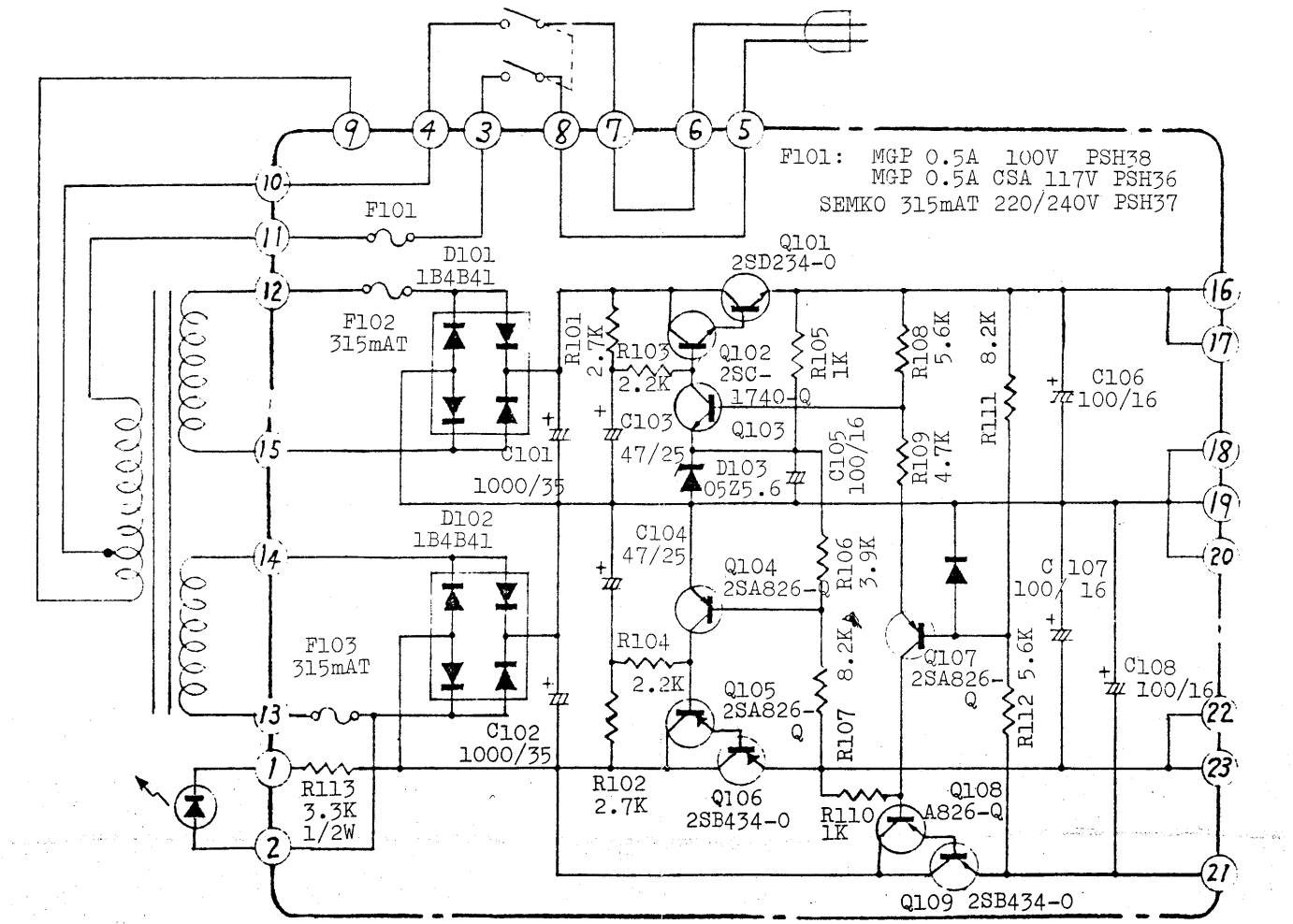
5046-03A

100V HO2IC-A → HO2IC
 CSA仕様 HO2IC-A → HO2IC-B
 UL仕様 HO2IC-A → HO2IC-B

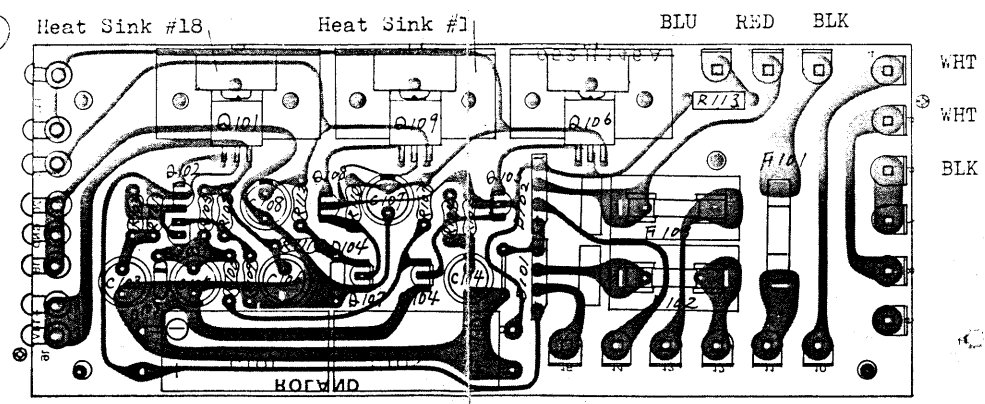
AC CONNECTIONS & FUSES



36 (146HO36) 117V
 PS BOARD FSH 37 (146HO37)A 220/240V
 38 (146HO38) 100V



5046-03A
 5046-03A (T1 501D1)
 ビン・117V ケーブルの色は BLU
 3020731



PARTS LIST

072H043 Panel
 066H021 Sideblocks R/L set
 061H075 Chassis H75 main
 068-020 Bushing no.20 bottom
 111-021 Foot G-5 rear
 111-023 Foot G-7 front
 004H012 Keyboard SK-141A
 016-008 Button no.8 grey power switch
 016W021 Knob no.56 TUNING
 016-026 Knob no.57 VOL
 016-033 Knob no.33 slide
 063-012 Strip no.12 knob no.33
 022H021C Power transformer H21C 100/117V
 022H021D Power transformer H21D 220/240V
 022-135 Coil 40M-067-018 10µH OSC
 009-012 Jack SG7622 no.8 mono
 009-036 Jack SG7713 no.8 stereo
 008-040 Fuse MGP 0.5COO(CSA) prim 117V
 008-061 Fuse SEMKO 315mA midget sec
 (also 220/240V prim)
 SWITCHES
 001-215 SDG 5P 001-1 power 100V
 001-216 SDG 5P 001-2 power 117V
 001-217 SDG 5P 502 power 220/240V
 001-268 SLE-622-18PS lever 13139137
 001-206 HSW0372-01-030 slide
 002-007 Rocker with tablet
 (add legend when ordering)
 PCBs
 147H037A GTH37A gate (052H149A)
 149H044B1 OPH44B1 control (052H147B1)
 149H044B2 OPH44B2 control (052H147B2)
 149H045B OPH45B output (052H148B)
 146H036A PSH36A power 117V (052H146A)
 146H037A PSH37A power 220/240V (052H146A)
 146H038A PSH38A power 100V (052H146A)
 POTENTIOMETERS
 026-005 EVHCOAK15B15 100KB TUNING
 026-010 GM70RK20A14P 10KA x 2 VOL
 029-314 LFE9RC16 B14 10KB slide
 029-306 LFE9RC16A15 100KA slide
 029-317 LFE9RC16B15 100KB slide
 029-309 LFE9RC16A16 1MA slide 1337427
 029-416 MFE9RC16A15 100KA x2 slide
 030-459 SR19R 1KB trimmer
 045-024 Resistor 3.3K-ohm carbon 1/4w
 CAPACITORS
 035-32C ECQS1101K 100pF 125V polystyrene
 035-279 ECQS1102K 1000pF 125V polystyrene
 032-270 1µF 50V electro. M type
 032-275 0.47µF 50V electro. M type
 032-190 1µF 50V Bi-polar

SEMICONDUCTORS
 017-097 2SA826-Q transistor
 017-118 2SC1740-Q transistor
 017-022 2SB434-0 transistor
 017-010 2SD234-0 transistor
 017-016 2SK30A-GR or Y FET
 018-035 05Z 5.6AU zener
 018-014 1S2473 diode
 018-094 1S2473FV diode
 018-089 1B4B41 diode stack
 019-009 LRO601R LED
 020-191 S10430 divider keyer
 020-156 AY-3-0214 chromatic divider
 020-041 TC4013BP IC
 020-097 µPC4558C IC
 020-162 SAD512D BBD
 020-160 BA662A IC
 020-080 HA1457 IC
 020-189 TA7140P IC

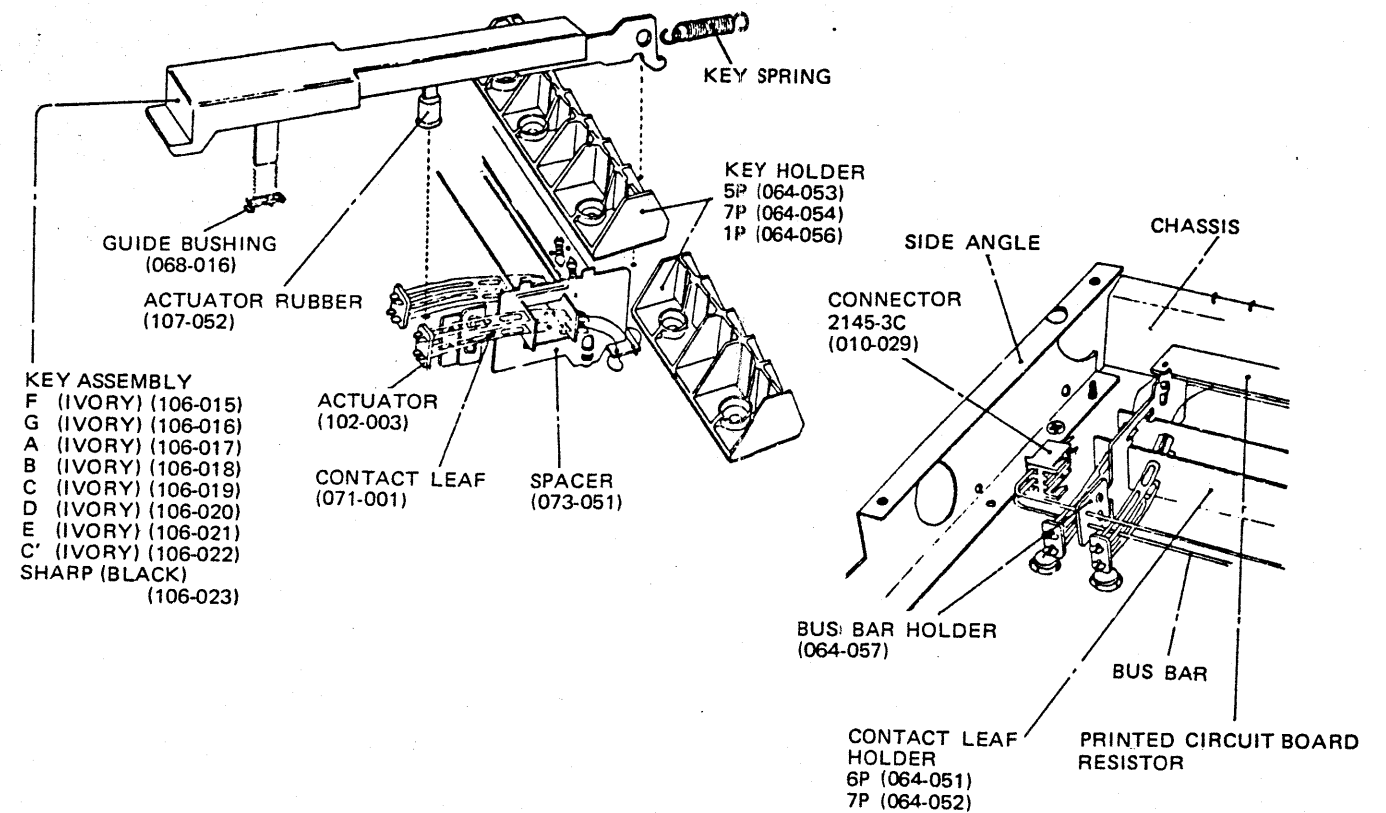
WAFER TERMINAL, WIRING ASSY
 010-183 Wafer terminal 5045-03A
 010-187 Wafer terminal 5045-04A
 010-186 Wafer terminal 5045-05A
 010-185 Wafer terminal 5045-07A
 010-193 Wafer terminal 5046-03A

Wiring Assy A
 053H037
 Wiring Assy B
 053H038
 Wiring Assy C
 053H039
 Wiring Assy D
 053H040

OTHERS
 065H050 Dust cover H50 slide pots/sw.
 jacks (set)
 068-005 Bushing no.5 jacks
 121-005 Washer no.5 jacks
 048-001 Heat sink no.1
 048-018 Heat sink no.18 SB-7
 012-003 Fuseholder TF758 or F-6
 053H030 Flat cable H30 PCB-PCB
 053H031 Flat cable H31
 120-014 Long nut(spacer)no.14 6mm
 120-009 Long nut(stand-off) no.9 13mm
 064H072A Holder H72A bracket OPH44
 064H076 Holder H76 LED
 064-244 Holder DLCBS-4N PCB
 121-001 Nylon rivet

No attempt has been made in this Parts List to cover all the necessary parts required for repairing RS09. When ordering, following description will help factory to fill order with ease and promptitude.
 1. Model and Serial number.
 2. Description of part and where it is used.
 3. In the case there is difficulty of description with words, xerox the page of Service Notes and mark the part in red.

KEYBOARD PARTS



INSTRUMENT MODEL	NO. OF KEYS	KEYBOARD MODEL	KEY SPRING	BUS BAR	PCB		RESISTOR
					6P	7P	
SH-1	32	SK-132-D	070-052	071H034	052-066	052-067	100 1/4W ±1% CRB1/4FX
SH-3A	44	SK-142-A	070-052	071-008	052-066	052-067	100 1/4W ±1% CRB1/4FX
SH-5	44	SK-142-B	070-052	071-008	052-066	052-067	100 1/4W ±1% CRB1/4FX
SH-7	44	SK-142-C	070-052	071-008	052-066	052-067	100 1/4W ±1% CRB1/4FX
SH-1000	37	SK-132-A	070-052	071-006	052-066	052-067	1K 1/4W ±2%
SH-2000	37	SK-132-B	070-052	071-006	052-066	052-067	1K 1/4W ±2% SELECTED
SYSTEM-100	37	SK-132-C	070-052	071-006	052-066	052-067	100 1/4W ±1% CRB1/4FX
SYSTEM-700	61	SK-162-C	070-058	071-007	052-066	052-067	100 1/4W ±1% CRA1/4FX
RS-09	44	SK-141-A	070-058	071-007	052-081	052-082	
RS-101	61	SK-161-A	070-058	071-007	052-081	052-082	
RS-202	61	SK-161-A	070-058	071-007	052-081	052-082	
RS-505	49	SK-192-A	070-058	071H043	052-081	052-082	
EP-10	61	SK-162-A	070-058	071-007			
EP-20	61	SK-162-A	070-058	071-007			
EP-30	61	SK-162B	070-058	071-007	052-081	052-082	

変更連絡書

No. RS-09

時期	SERIAL No.	名	料	部 品 名	仕 様	旧	新	変更理由	
S54. 5/11	832550	PSH 37	220V 240V	Fuse #5 2-7	315mA	3	0	DNS規格要求の為	
				#190					
				#400	T315mA/250V	0	2		
S54. 6/2	27Lot 842750	電源1枚側LEDの 配線変更 303組 220V 240V	9-ミナル2P	TT501D1		0	1	ヨーロッパ規格取得の為 電源基板を変更した	
				φ=-1L42-75φ	No.3AWG X 30mm	0	1		
				" 5φ	No.3AWG X 140mm	0	1		
				" 10φ	5/16in X 620mm	0	1		
				9.7L ² 7"ネジ	1X1X3X15BIFe	2	4		
				303組240V3P	9-ミナル2P	TT501D1	0		1
				φ=-1L42-7"5φ	No.3AWG X 30mm X 140mm	0	1		
				" 10φ	5/16in X 620mm	0	1		
				9.7L ² 7"ネジ	1X1X3X15BIFe	2	4		
				220V 240V	#5 2-7 #251	220V (220Vout)	0		1
	" #252	240V (240Vout)	0	1					
S54. 6/29	30Lot 843000	φ=-1L42-7"の追加 220VJ-240VJ 240V3P	φ=-1L42-7"5φ	No.3AWG X 100mm	0	1	SEMKO規格要求の為		
			φ=-1L42-7"5φ	No.3AWG X 100mm	0	1			
S54. 9/21		ト32ス変更	022H021C-A	→022H021J	100V				
			022H021C-A	→022H021C-B	CSA仕様				
			022H021C-A	→022H021C-B	UL仕様				
S5 1/17	65Lot 906500	Bushing #20 廃止 11件	Chassis 共通に 12.5mmの Bush #20	25 使用 11件					