

RS 09 SERVICE NOTES

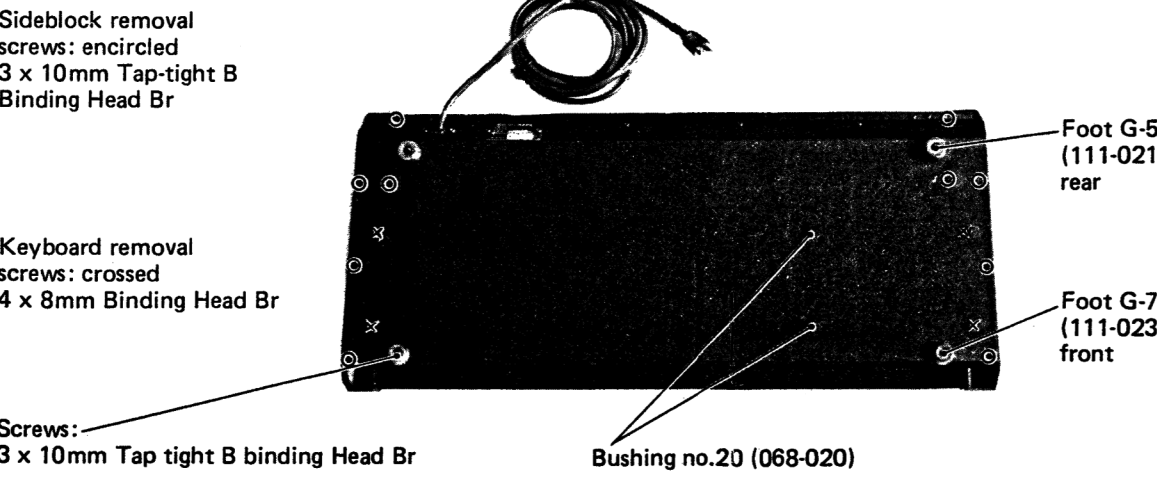
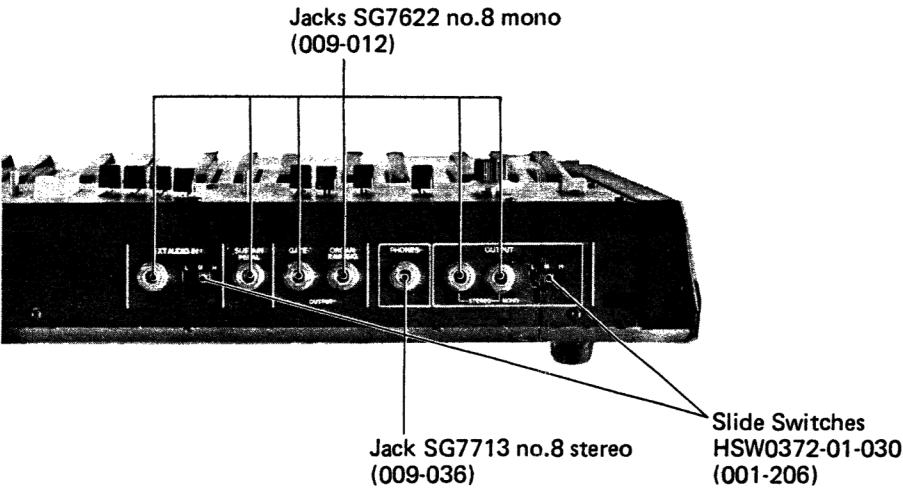
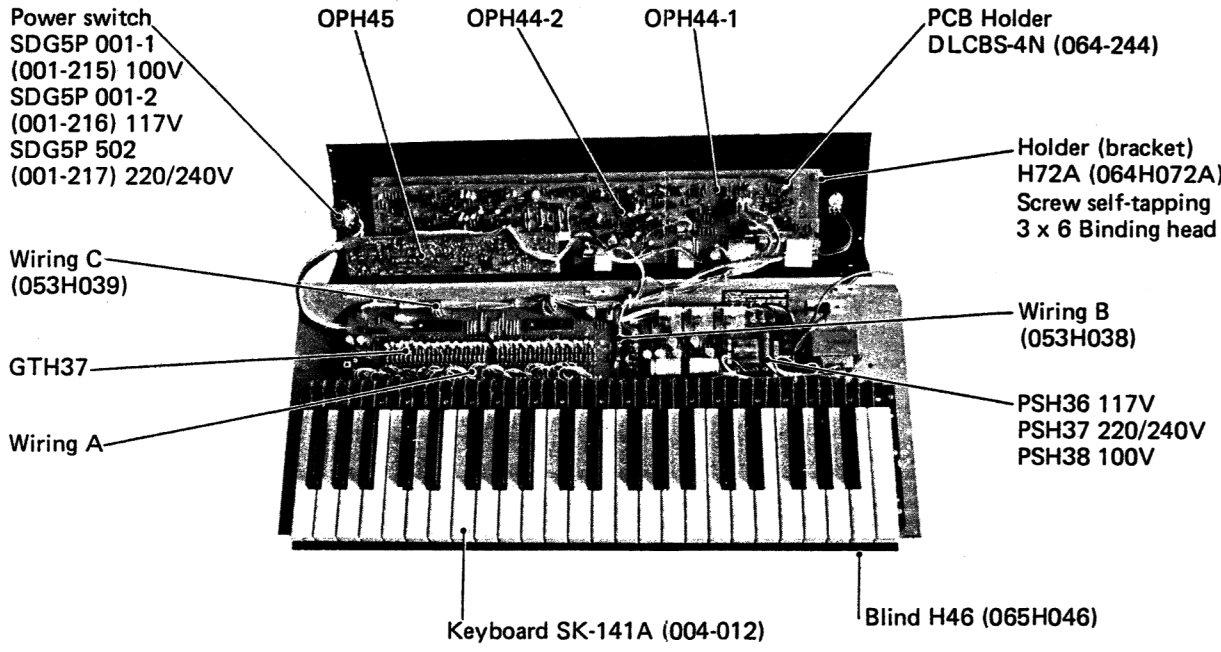
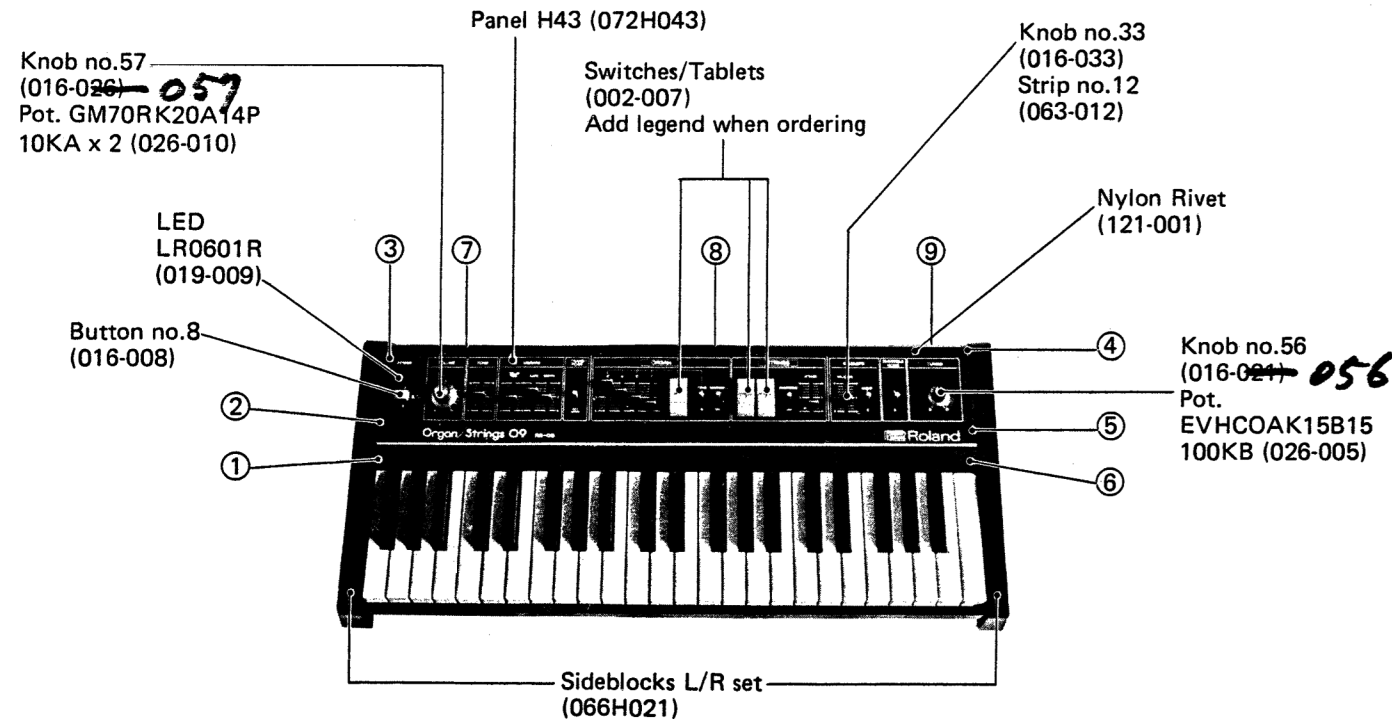
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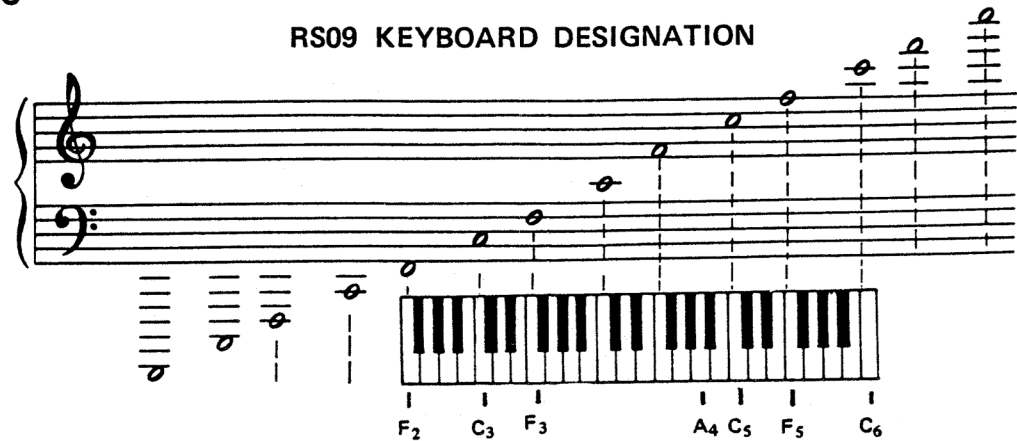
DISASSEMBLY & PARTS LAYOUT

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



RS09 KEYBOARD DESIGNATION

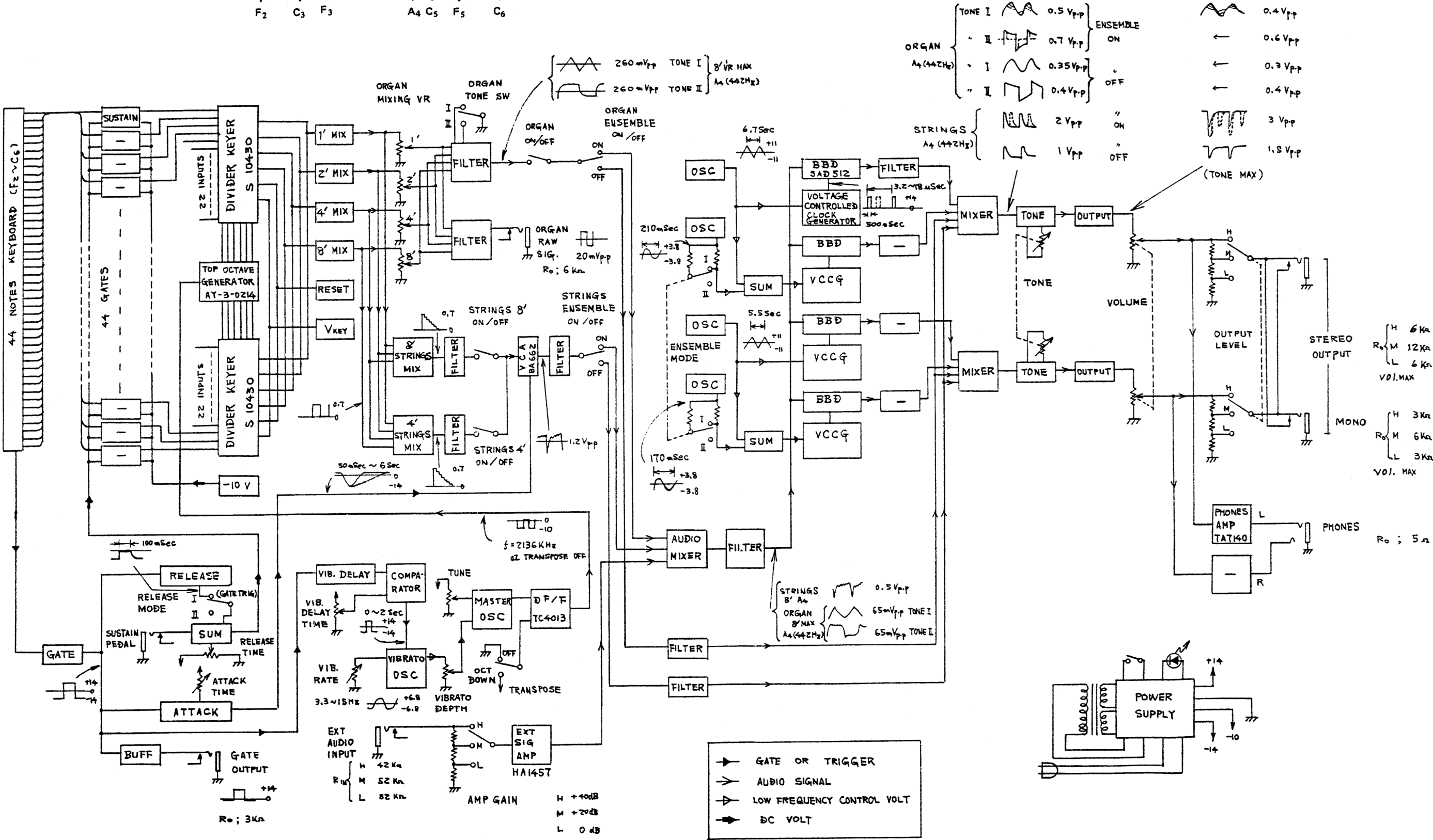


BLOCK DIAGRAM
&
SPECIFICATIONS

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), re-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 preceeding 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.

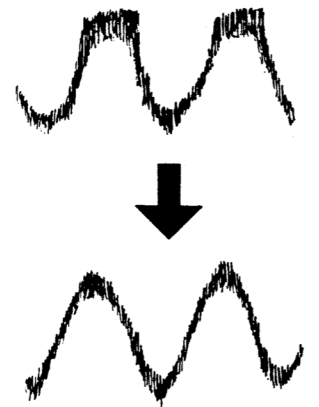
Delay Time of each BBD is determined by the frequency of the VCCG, which in turn is frequency modulated by the LFO output voltage. Two VCCGs are provided against each of the stereo channels, of which one is for modulation by a triangle waveform while the other is by a mixed waveform of opposite-phase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

BBD BIAS ADJUSTMENT

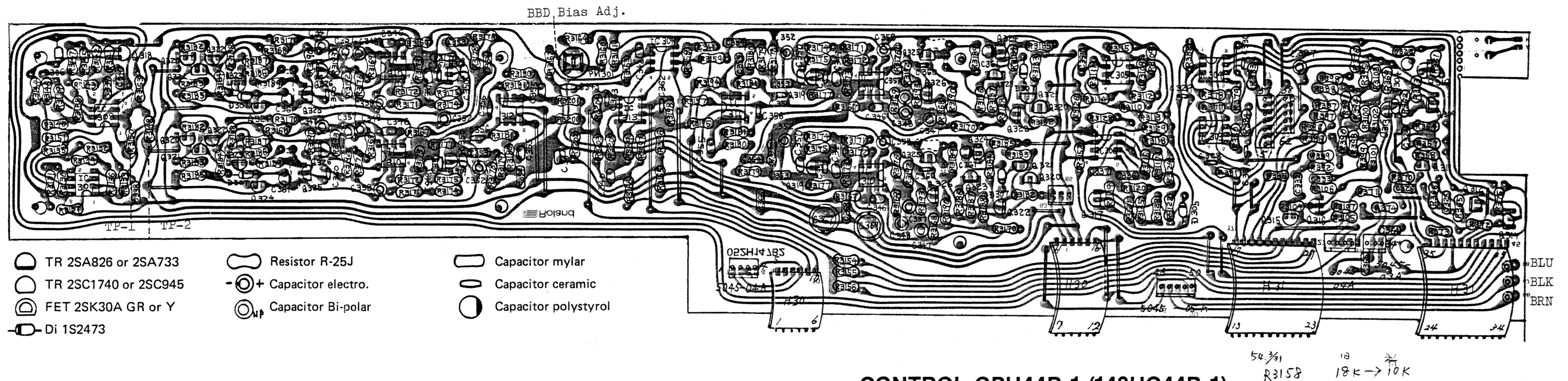
The purpose of this adjustment is to set the operating points of BBDs (IC310) to their center.

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.

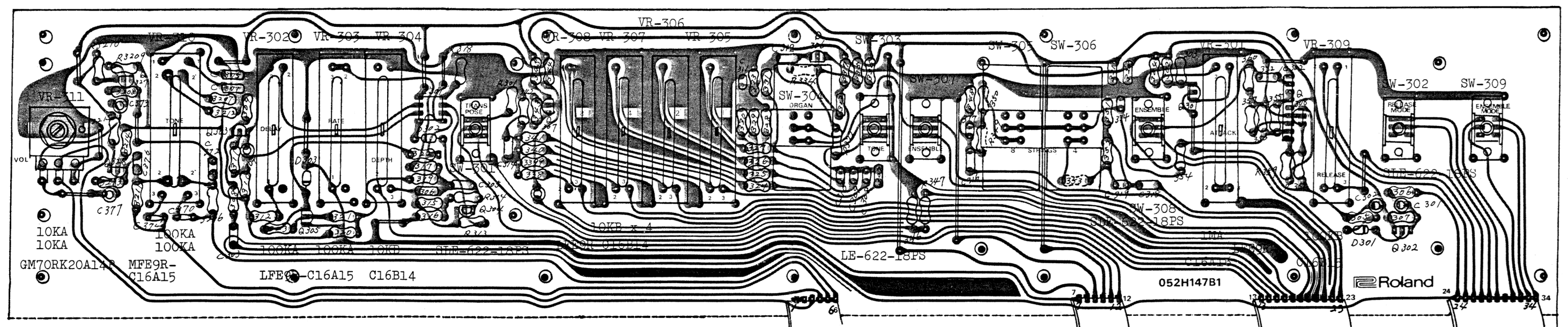


CONTROL OPH44B-2 (149HO44B-2)

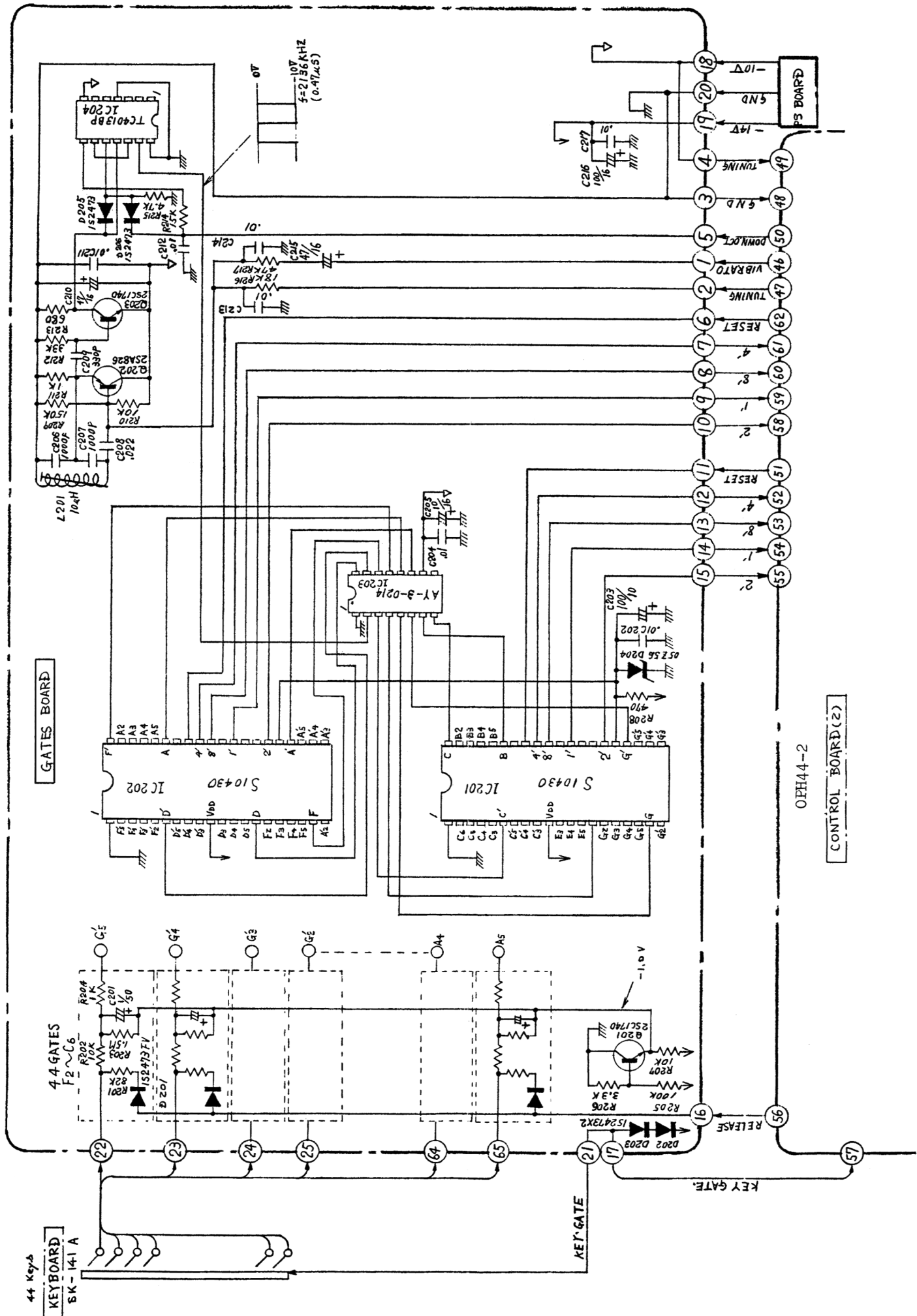
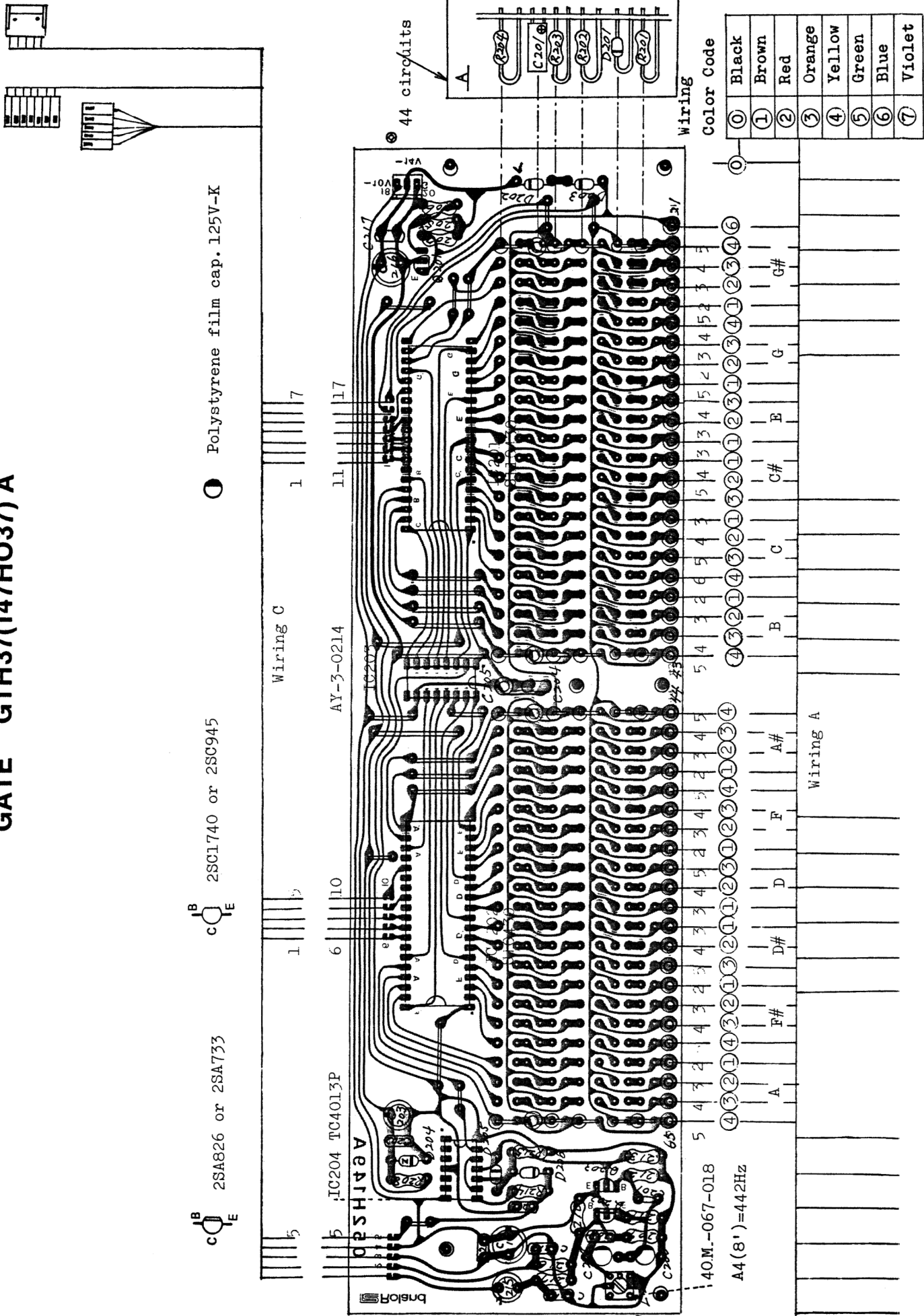


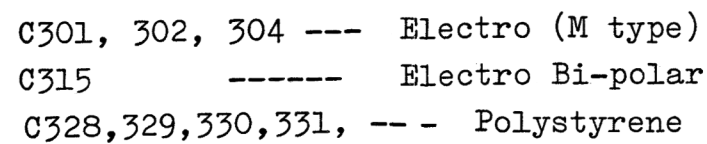
CONTROL OPH44B-1 (149HO44B-1)

VIEW FROM PATTERN SIDE



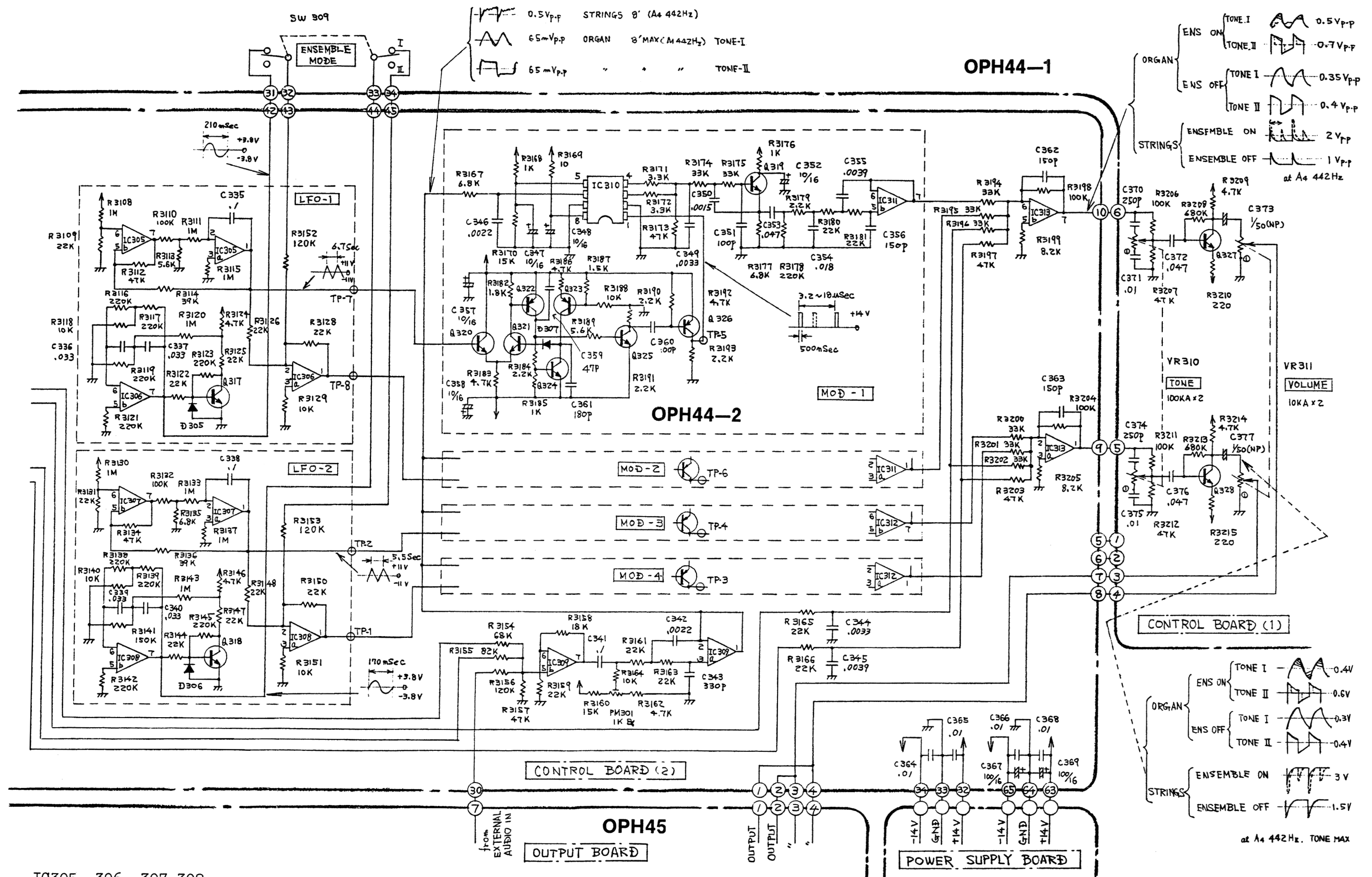
GATE GTH37(147HO37) A





FETs --- 2SK30A GR or Y

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



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

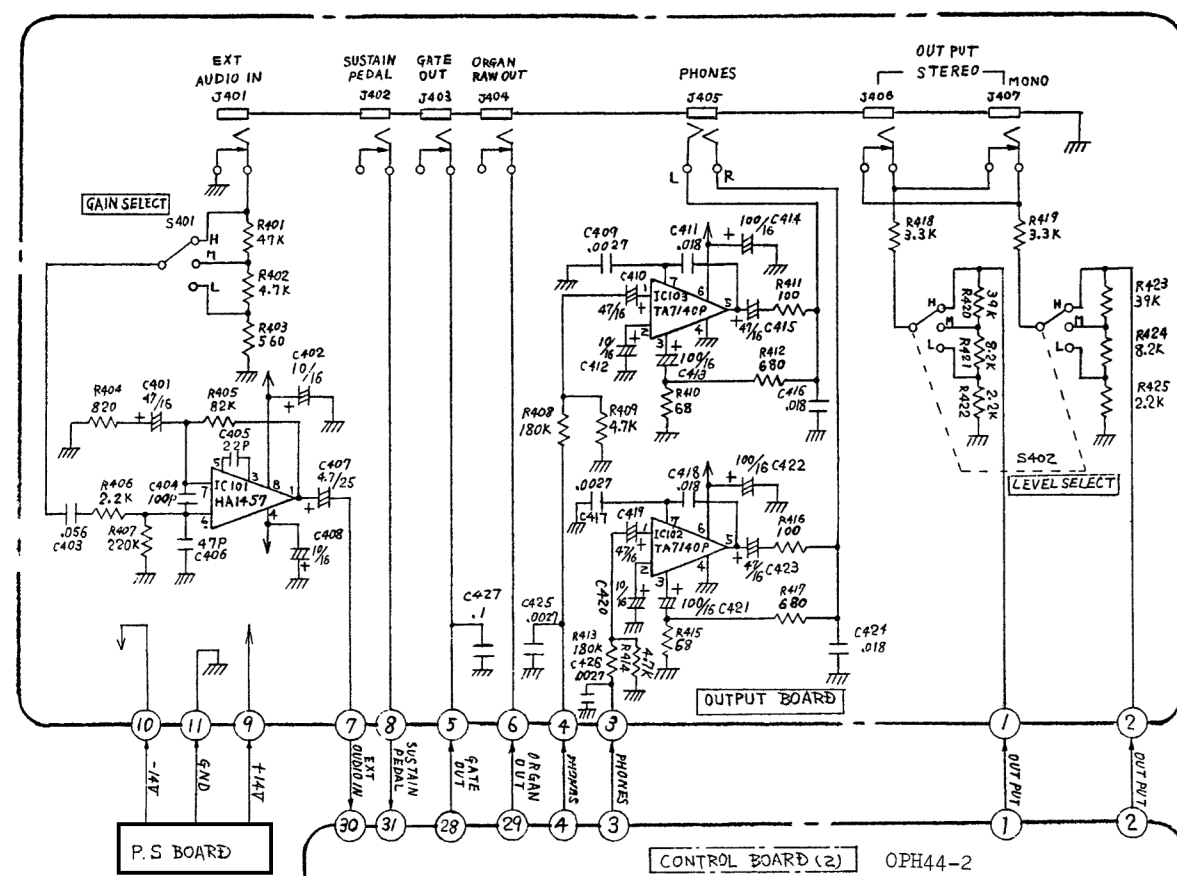
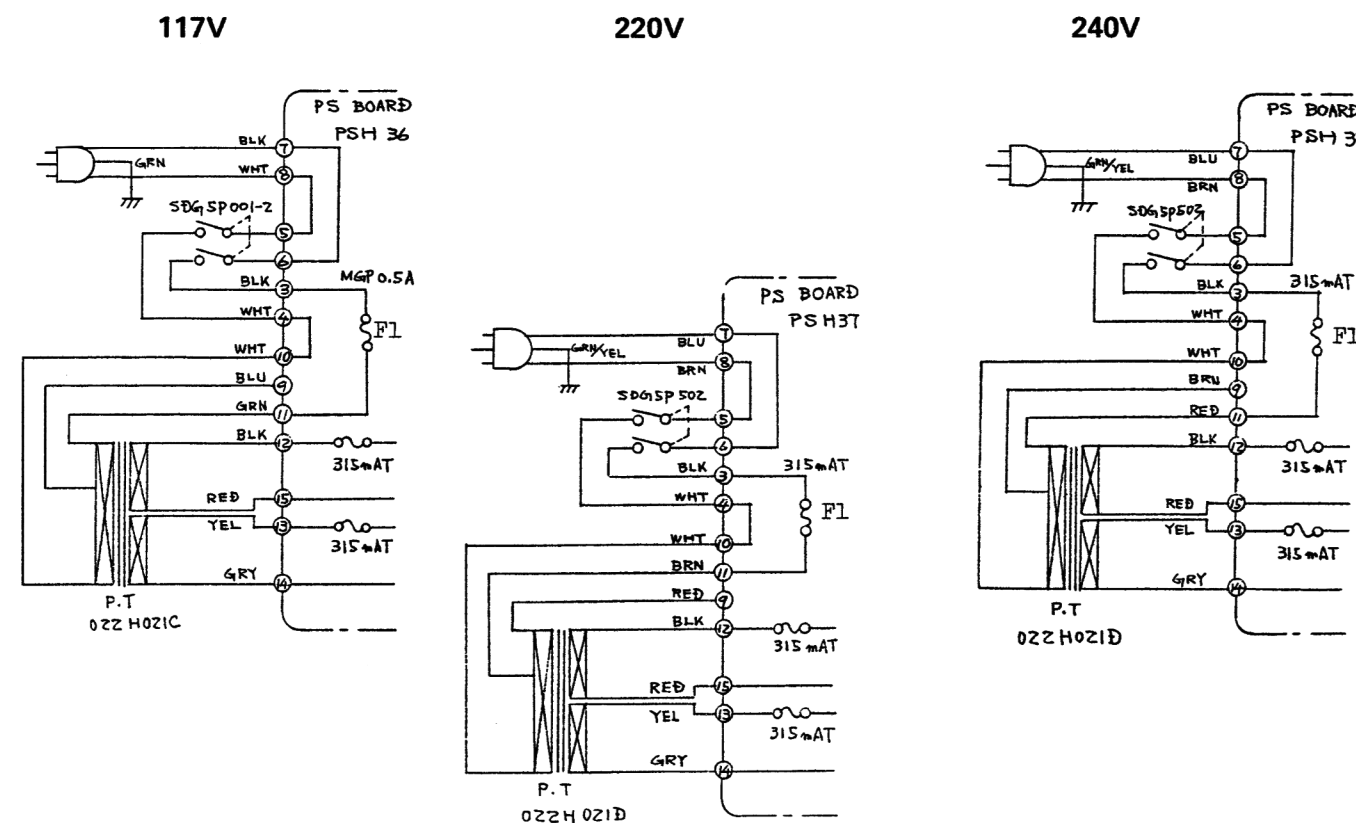
Diodes --- 1S2473

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

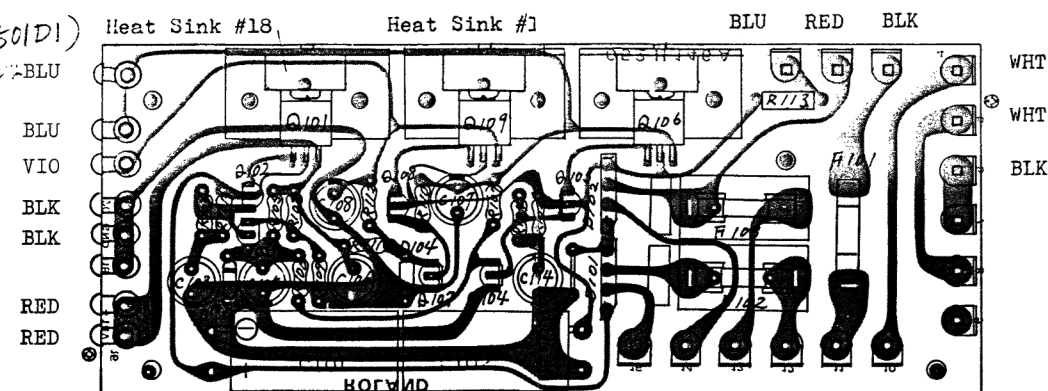
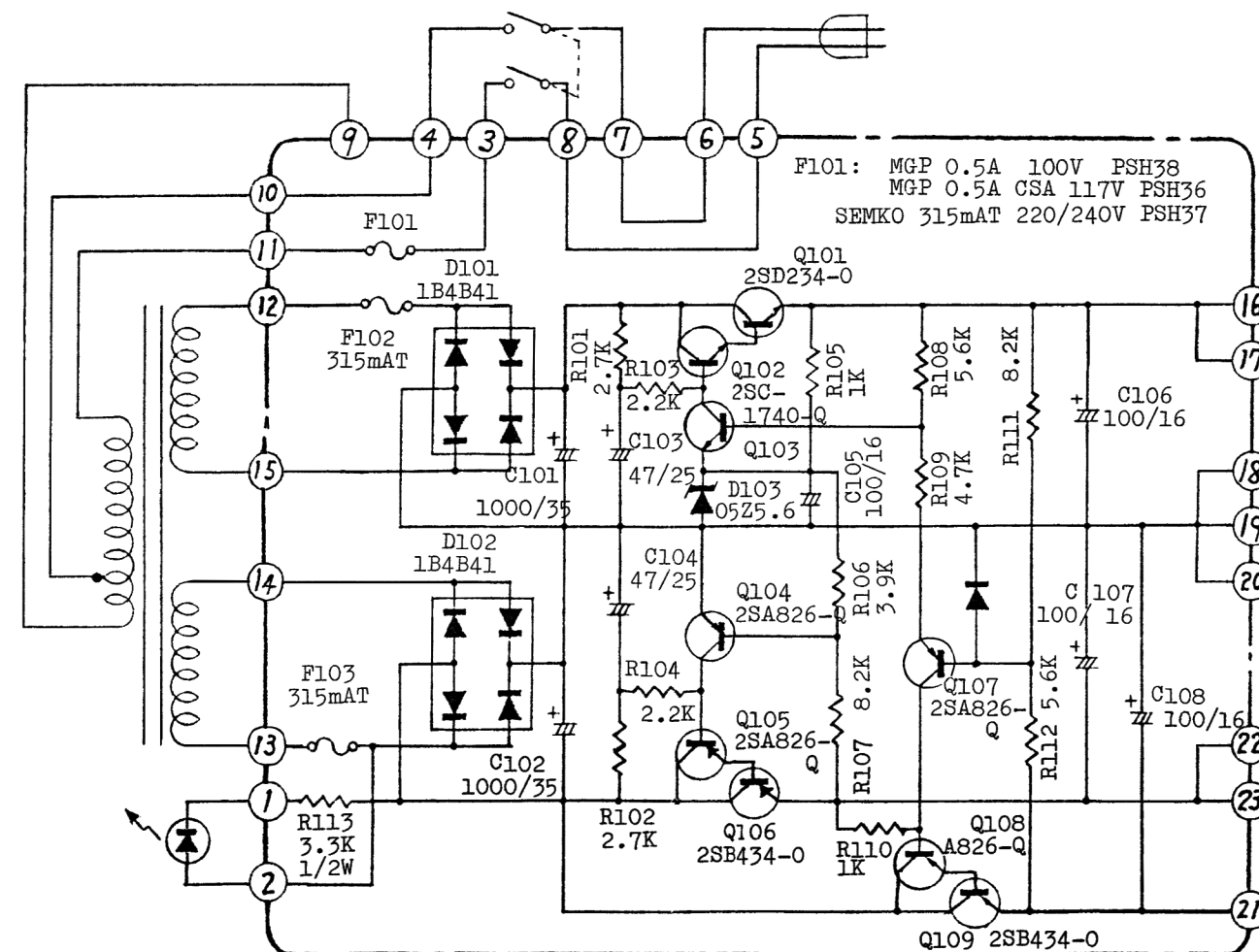
C361 --- Polystyrene
 C373, 377 -- Electro Bi-polar

AC CONNECTIONS & FUSES

100V H02IC-A → H02IJ **AC**
CSA仕様 H02IC-A → H02IC-B
UL仕様 H02IC-A → H02IC-B



POWER SUPPLY	36 (146HO36)	117V
	PSH 37 (146HO37) A	220/240V
	38 (146HO38)	100V



PARTS LIST

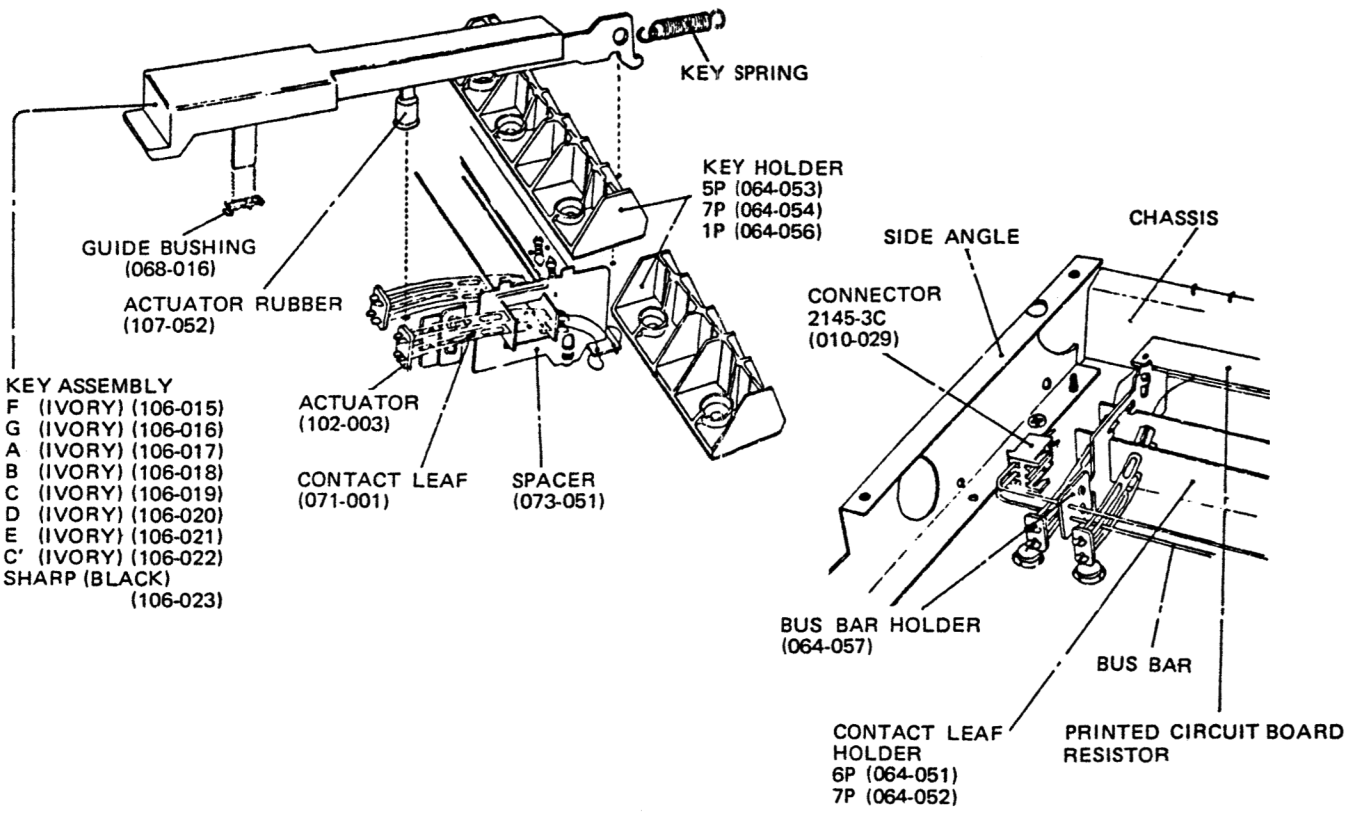
072H043	Panel
066H021	Sideblocks R/L set
061H075	Chassis H75 main
068-020	Bushing no.20 bottom
111-021	Foot G-5 rear
111-023	Foot G-7 front
004H012	Keyboard SK-141A
016-008	Button no.8 grey power switch
016-021	Knob no.56 TUNING
016-026	Knob no.57 VOL
016-033	Knob no.33 slide
063-012	Strip no.12 knob 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 0.5C00(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 13/39/37
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	GM7ORK20A14P 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 13339 427
029-416	MFE9RC16A15 100KA x2 slide
030-459	SR19R 1KB trimmer
045-024	Resistor 3.3K-ohm carbon 1/2w
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	LR0601R	LED
020-191	SL0430	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		
010-181	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
053H037	Wiring Assy	A
053H038	Wiring Assy	B
053H039	Wiring Assy	C
053H040	Wiring Assy	D
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	

No. RS-09

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