

# SH09 SERVICE NOTES

## SPECIFICATIONS

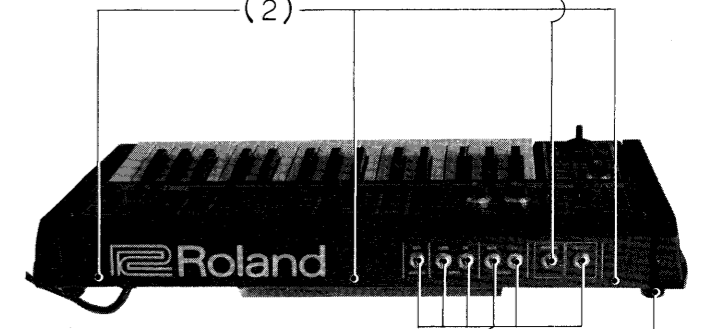
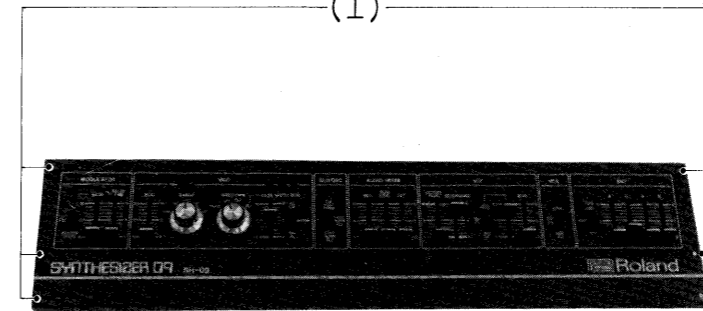
|                                  |                                    |
|----------------------------------|------------------------------------|
| Keyboard ----- 32-key, F3-C6(8') | Jacks                              |
| Portamento ----- 0-5 s           | Signal output -- -10 dBm           |
| Tune range ----- ±65-cent        | Phones ----- Stereo 8-ohm          |
| VCF                              | CV output ----- 1 v/oct            |
| Cutoff frequency -- 10 Hz-20 kHz | Gate output ---- Off:0 v: On:+14 v |
| Resonance ----- 0-oscillation    | CV input ----- 1 v/oct             |
| Envelope generator               | Gate input ---- Threshold: +7.5 v  |
| Attack time ----- 1 ms-2.5 s     | Ext. sig. input- 0.5 vpp or less   |
| Decay time ----- 2 ms-10 s       | Power consumption -- 8-watt        |
| Sustain level ----- 0-100 %      | Weight ----- 6.1 kg                |
| Release time ----- 2 ms-10 s     | Dimensions                         |
| Modulator                        | 605 (w) x 305 (d) x 100 (h) mm     |
| Rate ----- 0.2 Hz-25 Hz          |                                    |
| Delay time ----- 0-1.5 s         |                                    |

Panel H44 removal screws: (1). (2)

Jack SG7713 no.4 stereo  
(009-036)

Tap tight binding head  
3 x 10 mm Fe, Br

Self tapping binding head  
3 x 6 mm Bl, Fe, Br



Jack SG7622 no.8  
(009-012)

Rubber foot  
G-5 (111-021)  
G-7 front, not shown  
(111-023)

Suffix letter to part number  
when ordering pc board.

Button no.8  
gray  
(016-008)

Knob no.57  
(016-057)

Knob no.33  
(016-033)

Panel H44  
(072H044)



Endblock  
H22(066H022)

Bender unit  
PB-4 (029-022)

Keyboard SK132-F  
(004-014)

Side panel H21  
R-L set (066H21)

Chassis H74  
(061H074)

OPH43  
(149H043)

OPH47  
(149H047)

OPH46 (not shown)  
(149H046)

Holder H73A  
(064H073A)

Endblock H22  
removal screw

Binding head  
3 x 6 mm Fe, Br

OPH40  
(149H040)

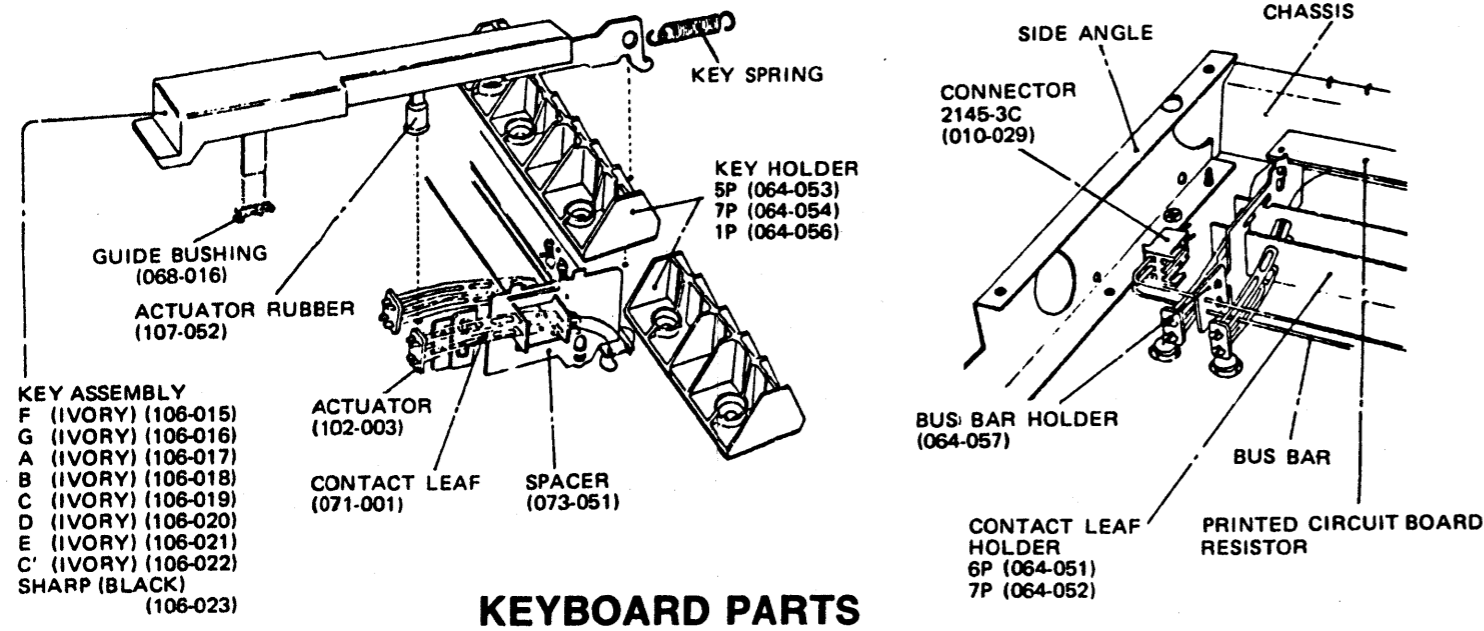
Tap tight binding  
3 x 10 mm Fe, Br

Panel H21  
removal screw

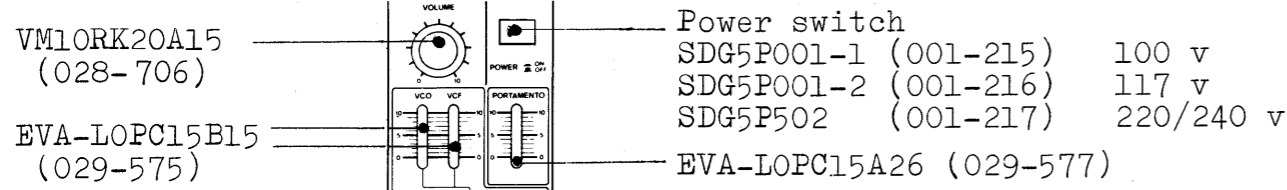
Tap tight  
binding head  
3 x 10 mm Fe, Br

Power transformer  
H20J (022H020J) 100 v  
H20C-B (022H020C-B) 117 v  
H20D (022H020D) 220/240 v

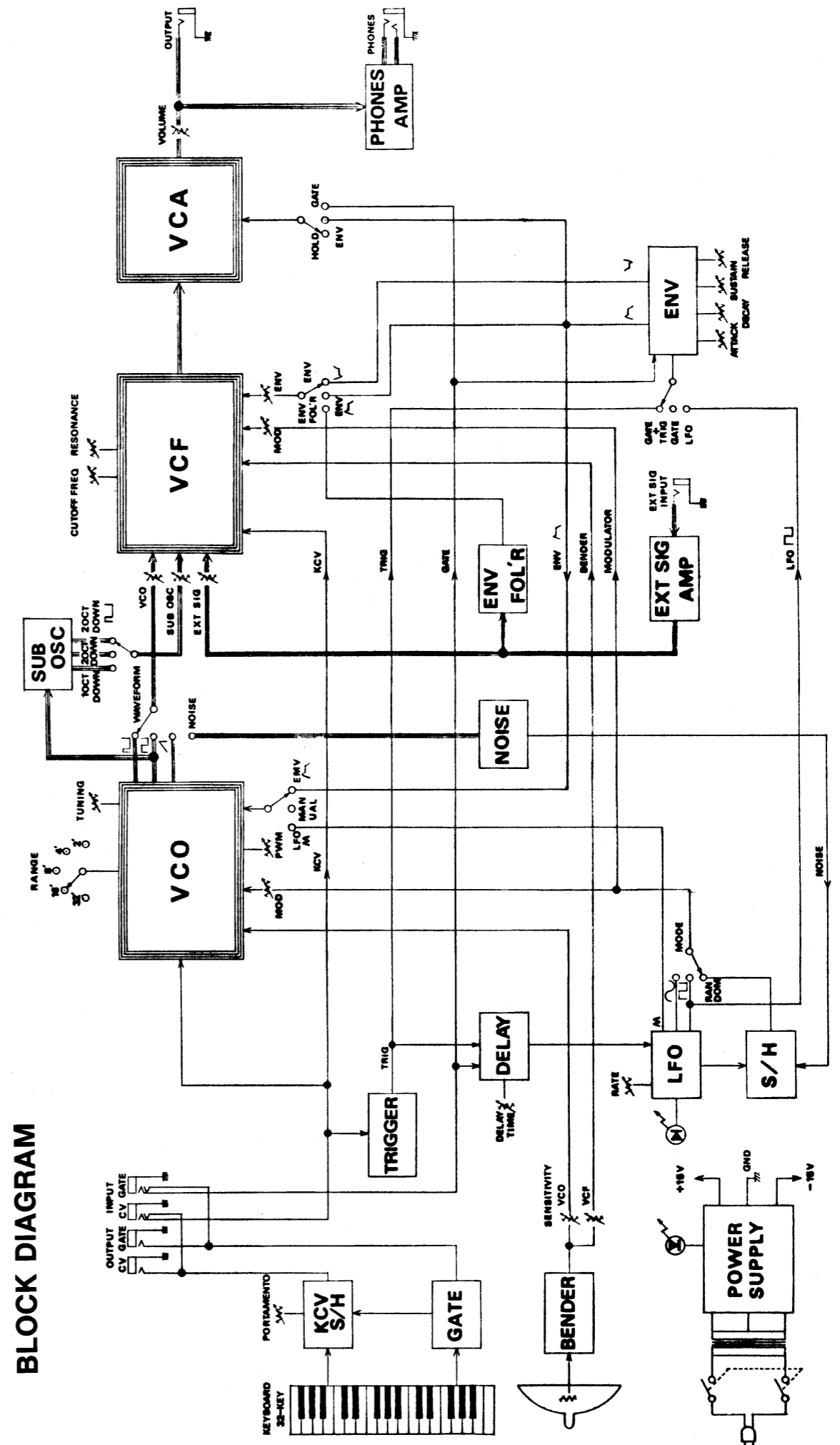
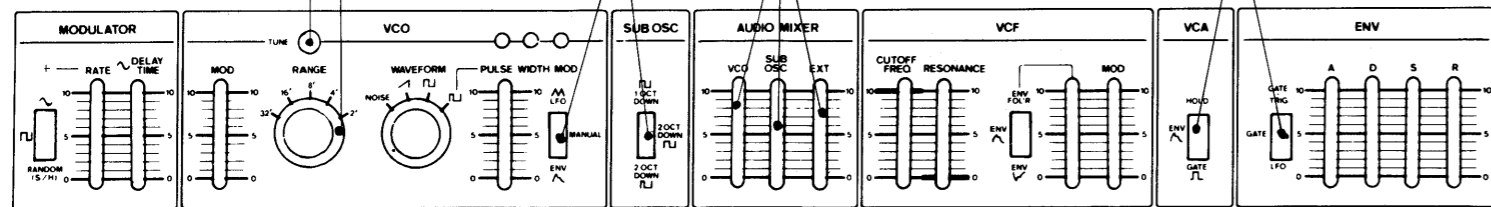
Power supply board  
PSH31 (146H031) 100 v  
PSH32 (146H032) 117 v  
PSH33 (146H033) 220/240 v



| INSTRUMENT MODEL | 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-09            | 32   | SK-132-F       | identical to SK-132D except for blind |         |         |         |                       |



- SSB023-1.2PN (001-183)
- LFE9R-C16A15 (029-306)
- LFE9R-C16B55 (029-319)
- LFE9R-C16A15 (029-306)
- EVH-LWAD25B15 (030-951)
- SRM1025-K15 (001-214)
- SRM1034-K15 (001-234)
- LFE9R-C16B15 (029-317)
- SSB023-1.2PN (001-183)
- LFE9R-C16A15 (029-306)
- LFE9R-C16B15 (029-317)
- LFE9R-C16A15 (029-306)
- SSB023-1.2PN (001-183)
- LFE9R-C16A55 (029-308)
- LFE9R-C16A16 (029-309)
- LFE9R-C16B15 (029-317)
- LFE9R-C16A16 (029-309)



## PARTS LIST

072H044 Panel (top) H44  
 066H022 Endblock (bender) H22  
 066H021 Side panel H21 a pair of R and L  
 061H074 Chassis H74  
 111-021 Foot G-5 rear  
 111-023 Foot G-7 front  
 068-020 Bushing no.20 panel

004-014 Keyboard SK132-F  
 029-022 Bender assy PB-4  
 016-057 Knob no.57 rotary  
 016-033 Knob no.33 slider  
 063-012 Strip no.12 knob no.33  
 016-008 Button no.8 gray,power switch

009-012 Jack SG7622 no.8 mono  
 009-036 Jack SG7713 no.4 stereo  
 068-005 Bushing no.5 jack  
 068-018 Bushing no.18 red,jack

022H020J Power transformer H20J 100 V  
 022H020C-B Power transformer H20C-B 117 V  
 022H020D Power transformer H20D 220/240 V

**SWITCH**

001-215 SDG5P001-1 power 100 V  
 001-216 SDG5P001-2 power 117 V  
 001-217 SDG5P502 power 220/240 V  
 001-234 SRM1034-K15 rotary 3p-4t WAVEFORM  
 001-214 SRM1025-K15 rotary 2p-5t RANGE  
 001-183 SSB023-12PN slide 2p-3t

**CAPACITOR**

035-156 ECQS1151KZ 150 pF polystyrene  
 035-188 ECQS1102KZ 1000 pF polystyrene  
 035-091 ECQF-2334M 0.33 mfd polypropylene

## PCB ASSEMBLY

149H046C OPH46C (pcb 052H141-2-C)  
 149H047C OPH47C (pcb 052H141-1-C)  
 149H040B OPH40B (pcb 052H140B)  
 149H043B OPH43B (pcb 052H150B)  
 146H031A PSH31A (pcb 052H139A) 100 V  
 146H032A PSH32A (pcb 052H139A) 117 V  
 146H033A PSH33A (pcb 052H139A) 220/240V

## SEMICONDUCTOR

IC

020-097  $\mu$ PC4558C  
 020-100 TL082CP  
 020-039 DN819  
 020-032  $\mu$ A726HC  
 020-160 BA662A

020-189 TA7140P  
 020-102 LF13741H  
 020-103 TA7179P

## TRANSISTOR

017-097 2SA826-Q  
 017-118 2SC1740-Q  
 017-046 2SC828 NZ (noise generator)  
 017-022 2SB434-0  
 017-010 2SD234-0  
 017-014 2SK30A-Y FET  
 017-016 2SK30A-GR FET

## DIODE

018-014 1S2473  
 018-078 1S2353 zener  
 018-089 1B4B41 rectifier stack  
 019-009 LR0601R LED

## FUSE. FUSE HOLDER

008-029 MGP 0.25 A prim. 100/117 V  
 008-060 SEMKO T250 mA prim. 220/240 V  
 008-059 SEMKO T200 mA sec. 220/240 V  
 012-003 TF758 fuse clip

## POTENTIOMETER

029-306 LFE9RC16A15 100 KA slide  
 029-317 LFE9RC16B15 100 KB slide  
 029-308 LFE9RC16A55 500 KA slide  
 029-319 LFE9RC16B55 500 KB slide  
 029-309 LFE9RC16A16 1 MA slide  
 029-575 EVALOPC15B15 100 KB slide  
 029-577 EVALOPC15A26 2 MA slide  
 028-706 VM1ORK20A15 100 KA rotary  
 030-951 EVHLWAD25B15 100 KB rotary  
 030-641 RJ6-202 2 KB trimmer, metal film  
 030-643 RJ6-103 10 KB trimmer, metal film  
 030-463 SR19R 4.7 KB trimmer  
 030-465 SR19R 10 KB trimmer  
 030-469 SR19R 47 KB trimmer  
 030-471 SR19R 100 KB trimmer

## WAFER TERMINAL. WIRING ASSEMBLY

Terminal

010-183 5045-03A 010-186 5045-05A  
 010-218 EMCS 0750 010-220 EMCS 0950

Wiring assy

053H034 A  
 053H035 B 010-226 EMCB 0730A51 7p-30 cm  
 053H036 C 010-228 EMCB 0920A51 9p-20 cm

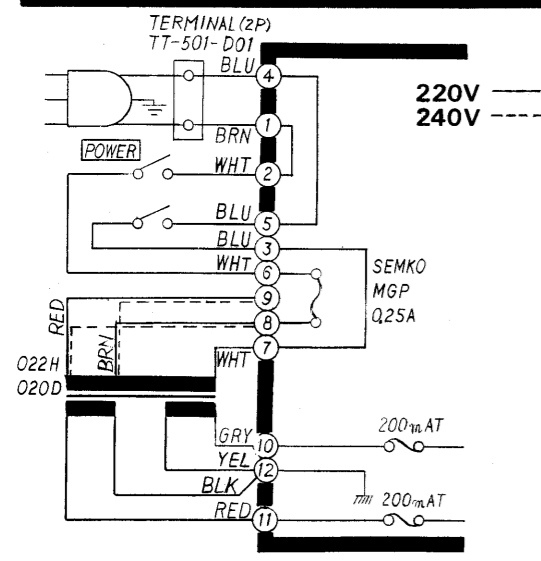
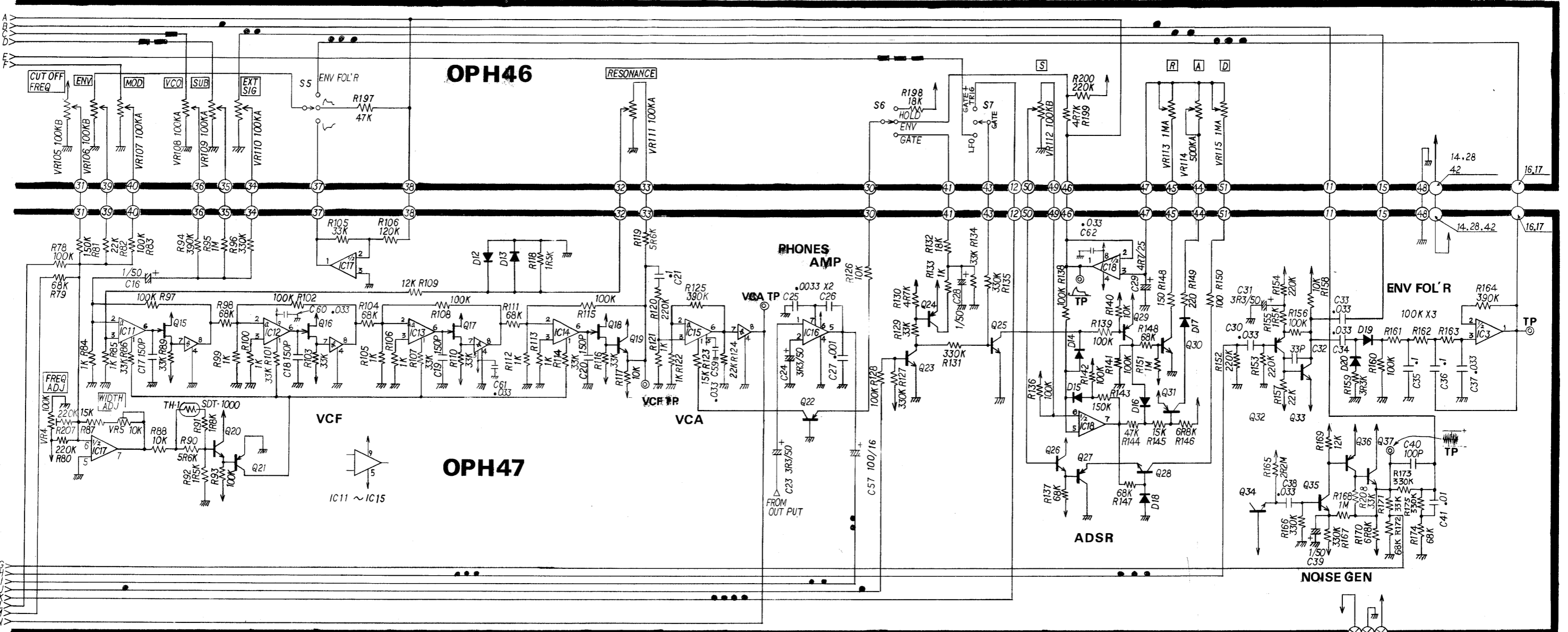
## OTHERS

064H055A Holder H55A(pot.VOL.bracket)  
 064H073A Holder H73A(chassis-top panel)  
 064-264 PCB holder DLCBS-4N  
 053H030 Flat cable H30  
 053H031 Flat cable H31  
 053H032 Flat cable H32  
 048H001 Heat sink H1



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



**PSH33**

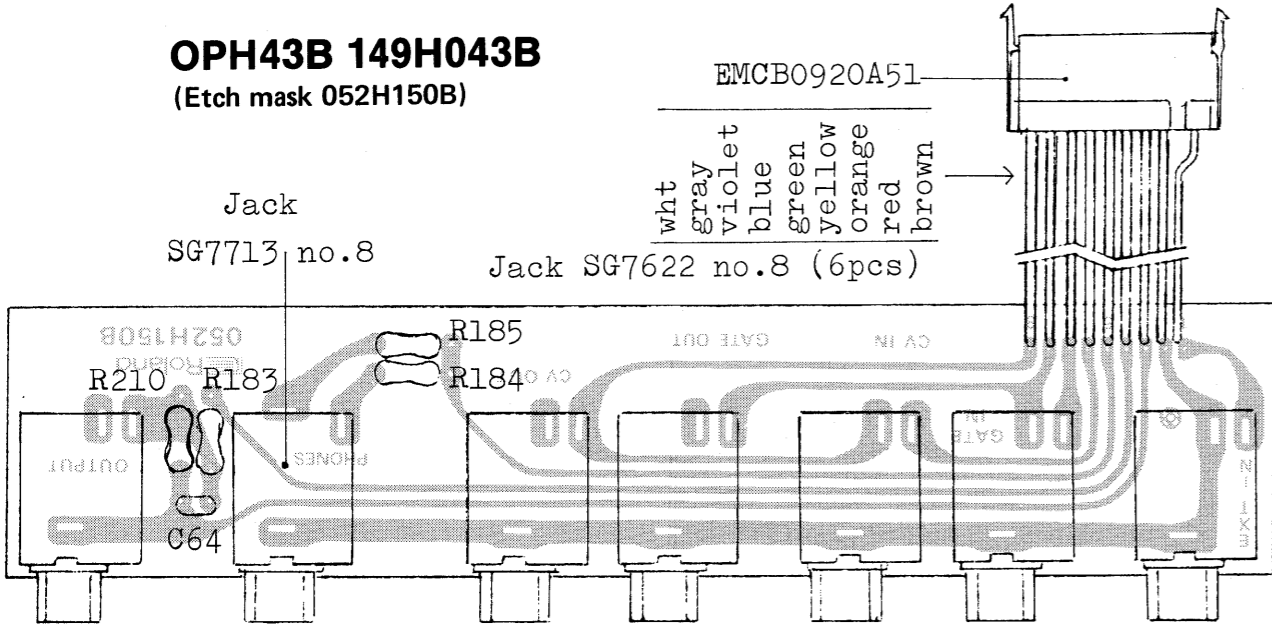
- Resistor : in ohm (MF-- metal oxide film, 1%)
- Capacitor : in microfarad (P-- picofarad)
- Diode : 1S2473 or 1S1555 (D11-- 1S2453)
- IC1, 3-4, 10, IC17-19 :  $\mu$ PC4558C
- IC2 : 1F13741H
- IC5 :  $\mu$ A726HC
- IC6, 7 : TL082
- IC15 : BA662A
- IC11-14 : BA662 A/B factory selected
- IC16 : TA7140C
- PNP transistor : 2SA826-Q or 2SA733-Q
- NPN transistor : 2SC1740-Q or 2SC945-Q
- Q2, 7, 13 : 2SK30A-GR FET
- Q12, 15-18 : 2SK30A-Y FET

NOTES -- Replacing Selected IC, Transistor --  
 When replacing Q12, IC11-14, take the following procedures.

Q12  
 Choose 2SK30A-Y for minimum leakage.  
 Check new Q12 for leakage with VCO being LFO modulated under the following settings:  
 MOD--"10" RATE--"0"  
 MODULATOR--RANDOM  
 VCO should not drift before the next S/H pulse generates.

IC11-14  
 The VCF, being a set of four BA662's of much the same characteristics in transconductance, requires a test of BA662 A/B in stock as a replacement.  
 Solder BA662 tentatively after defective one is removed.  
 Press C2 key with CUTOFF set at "0" and RESONANCE at "10" -- no input signal.  
 Approximate 50Hz oscillation at VCF stage proves the IC adequate.

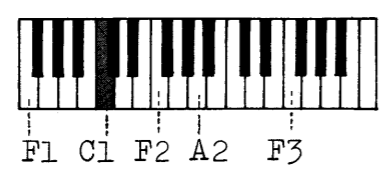
**OPH43B 149H043B**  
(Etch mask 052H150B)



View from the foil side

- EMCB0920A51
- wht
  - gray
  - violet
  - blue
  - green
  - yellow
  - orange
  - red
  - brwn

**ADJUSTMENT**



KEY DESIGNATION  
only for the adjustments

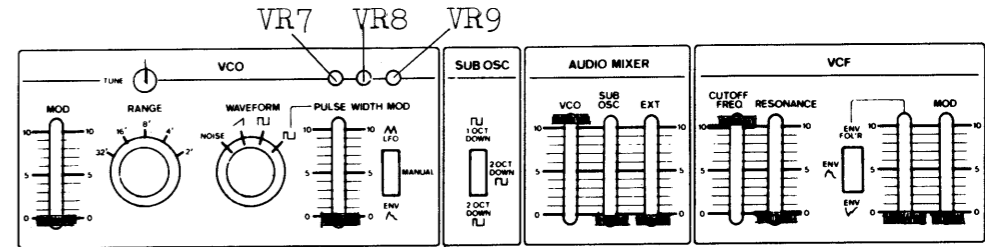
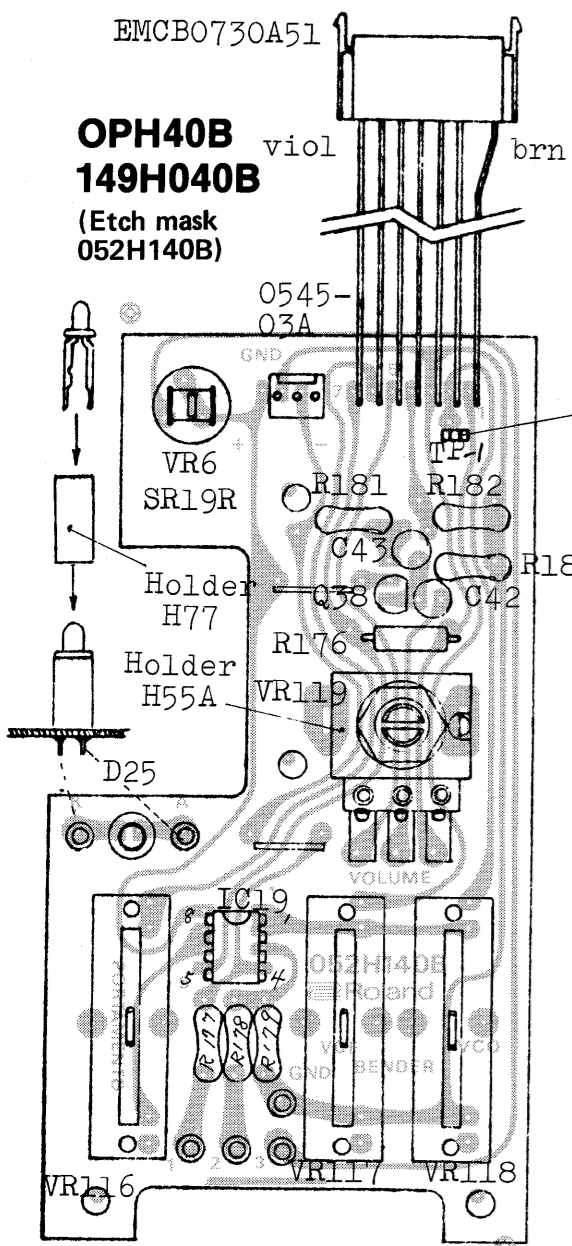
**BENDER**

Panel setting and connection:  
Digital voltmeter at 10

1. Flip and hold Bender lever at the left (-). Note the reading.
2. Turn and hold the lever at the right (+). Adjust VR-6 on OPH40 for the same reading, but opposite polarity, as in step 1. (Difference between two readings must be within 30 mV.)

**KCV**

- Connect digital voltmeter to TP-2 on OPH47.
1. Press F1 key and note the reading, (F1-V).
  2. While pressing F3 key, adjust VR-1 on OPH-47 for F1-V + 2.000 V reading.
  3. Since turning VR-1 has an effect on F1-V, repeat steps 1 and 2 until F3-V becomes F1-V + 2.000 V ± 1 mV.



VCO  
Set panel controls as illustrated right.

Connect an oscilloscope to TP-3 on OPH47. Apply reference F note to the scope EXT. IN for Lissajous figures.

A) WIDTH

- Set RANGE at 8'.
1. With F3 key held down, adjust VR-8 for motionless figures.
  2. While pressing down F1 key, adjust VR-9 for motionless figures. F3 pitch will vary as VR-9 turned.
  3. Repeat steps 1 and 2 until F3 and F1 figures stand still.

B) LINEARITY

- details follow A) WIDTH --
- Set RANGE at 2'.
- Adjust the pots.
1. F1 key --- VR-8.
  2. F3 key --- VR-3.
  3. Repeat steps 1 and 2.

Adjustments A and B must be repeated because of cross interference between them.

C) RANGE

- refer to A)WIDTH for details--
- Set RANGE at 32'.
- Obtain stable Lissajous figures.
1. F1 key --- VR-8. Place RANGE at 2'.
- Obtain motionless figures.
1. F1 key --- VR-7.

D) FREQUENCY

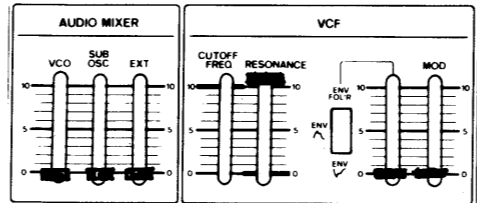
- Set RANGE at 8'.
- Set TUNE at its midpoint.
1. While playing A2 key, adjust VR-8 for 440 Hz.

E) DUTY CYCLE

- Set WAVEFORM at  $\square$ .
1. Adjust VR-2 for 1:1 mark/space.

**VCF**

Set Controls as shown below.



Connect oscilloscope to TP-3 on OPH47.

A) WIDTH

1. While pressing A2 key, set CUTOFF FREQ. for approximate 1 kHz.
2. While playing F2 and F3 keys alternately, turn VR-5 until F3 figure doubles F2 in cycle.

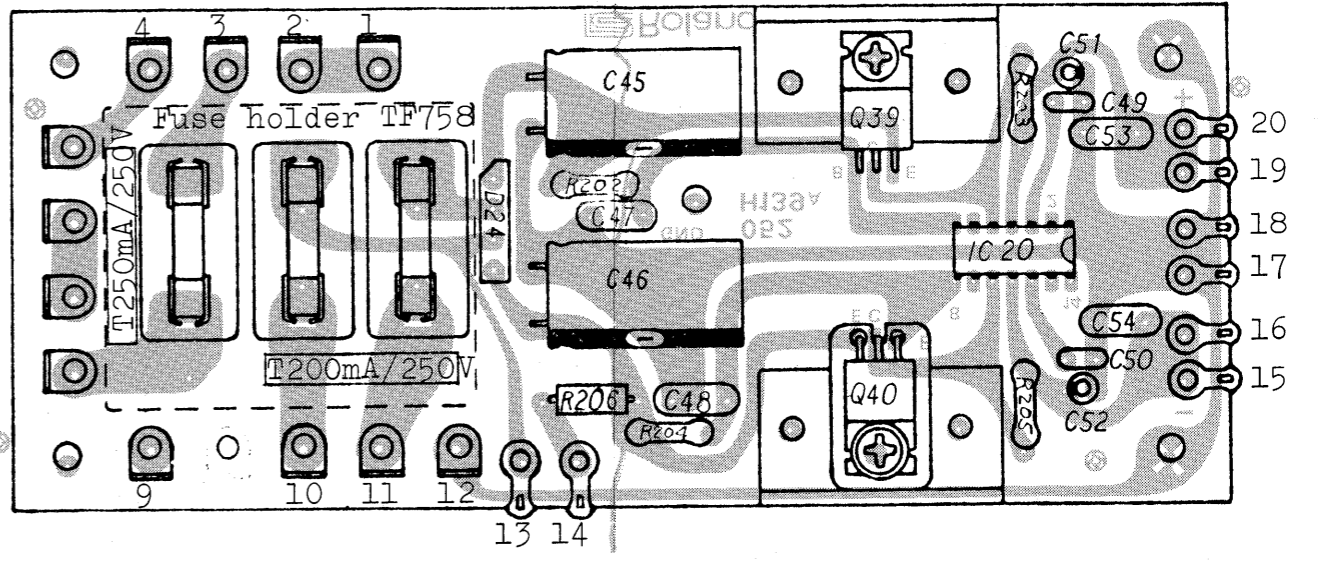
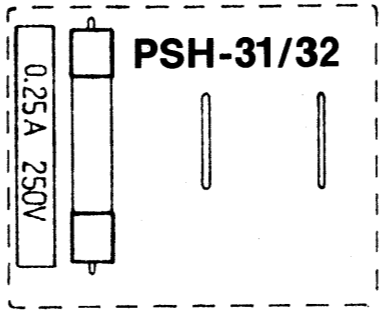
B) FREQUENCY

- Slide up CUTOFF knob to "10".
1. With F1 key held down, set VR-4 for 20 kHz.

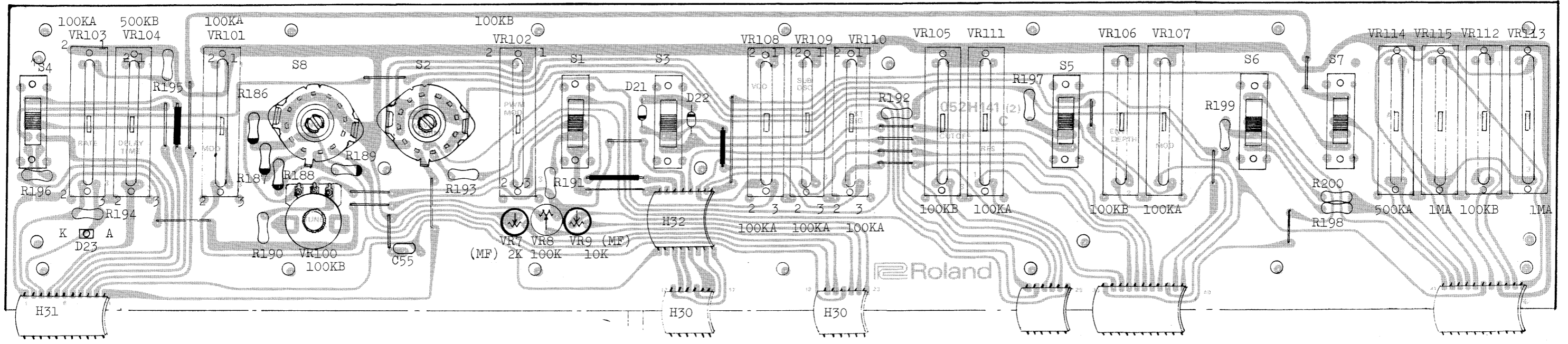
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

- OPH46 OPH47
- 2SK30A
- 2SC1740-Q or 2SC945-Q
- 2SA826-Q or 2SA733-Q
- 1S2473 or 1S1555
- Metal oxide film CRB4FX
- OPH46-- R186-189: tailored for nearly equal resistance

- ECEA 146H-31/32/33-A (Etch mask 052H139A)
- Mylar 50V K
- Ceramic 50V K
- Check point 59BS8806
- SR19R
- Metal film RJ6



OPH46C(149H046C) View from foil side



OPH47C(149H047C) (PCB 052H141(1)C)

For selected semiconductors, see NOTES on page 5.

IC11-14: BA662 selected.

