

SH09 SERVICE NOTES

SPECIFICATIONS

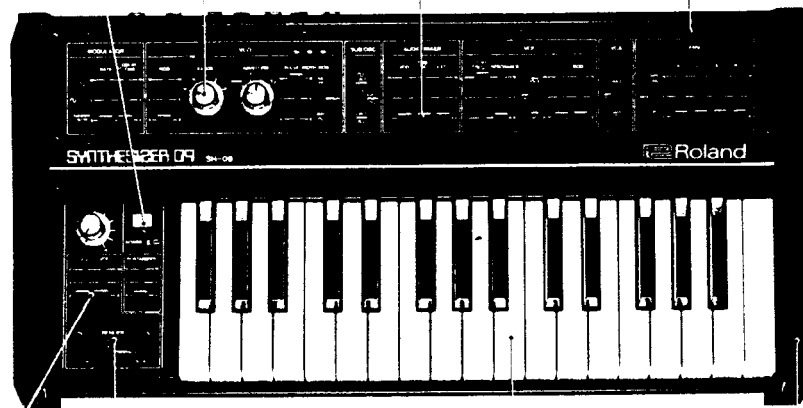
Keyboard -----	32-key, F3-C6(8')	Jacks	
Portamento -----	0-5 s	Signal output --	-10 dBm
Tune range -----	±65-cent	Phones -----	Stereo 8-ohm
VCF		cv output -----	1 v/oct
Cutoff frequency --	10 Hz-20 kHz	Gate output ----	Off:0 v: On: +14 v
Resonance -----	0-oscillation	CV input -----	1 v/oct
Envelope generator		Gate input ----	Threshold: +7.5 v
Attack time -----	1 x3-2.5 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		

Button no.8
gray
(016-008)

Knob no.57
(016-057)

Knob no.33
(016-033)

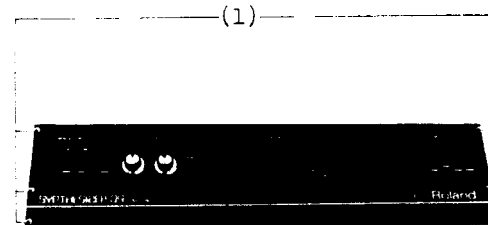
Panel H44
(072H044)



Endblock Bender unit Keyboard X132-F Side panel H21
H22(066H022) PS-4 (029-022) (004-014) R-L set (066H21)

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

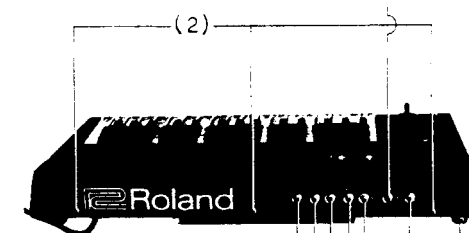
'Tap tight binding head
3 x 10 mm Fe, Br



Suffix letter to part number
when ordering pc board.

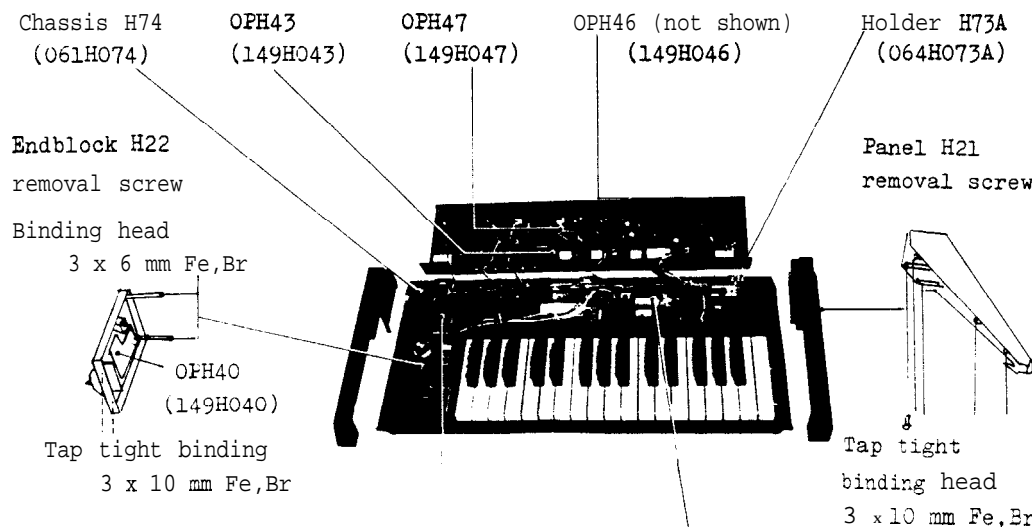
Jack SG7713 no.4 stereo
(009-036)

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



Jack SG7622 no.8
(009-012)

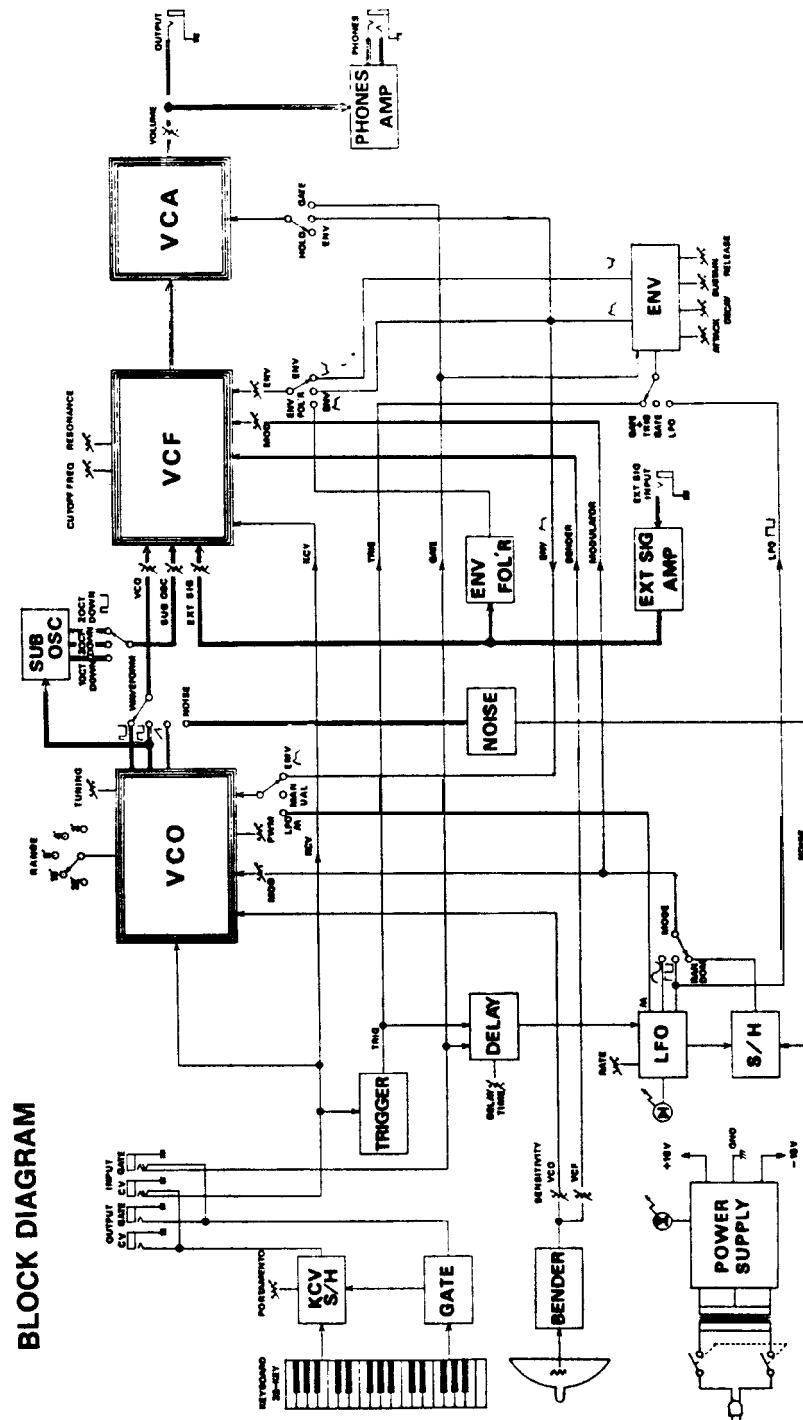
Rubber foot
G-5 (111-021)
G-7 front, not shown
(111-023)



Power transformer		Power supply board	
H20J (022H020J)	100 v	PSH31 (146H031)	100 v
H20C-B (022H020C-B)	117 v	PSH32 (146H032)	117 v
H20D (022H020D)	220/240 v	PSH33 (146H033)	220/240 v



VM10RK20A15 (028-706)		Power switch	
		SDG5P001-1 (001-215)	100 v
		SDG5P001-2 (001-216)	117 v
		SDG5P502 (001-217)	220/240 v
EVA-LOPC15B15 (029-575)		EVA-LOPC15A26 (029-577)	



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 μ PC4558C
 020-100 TLO82CP
 020-039 DN819
 020-032 μ 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 132473
 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 VM10RK20A15 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

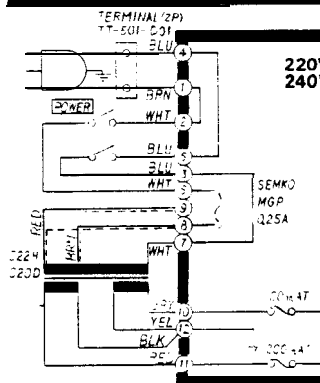
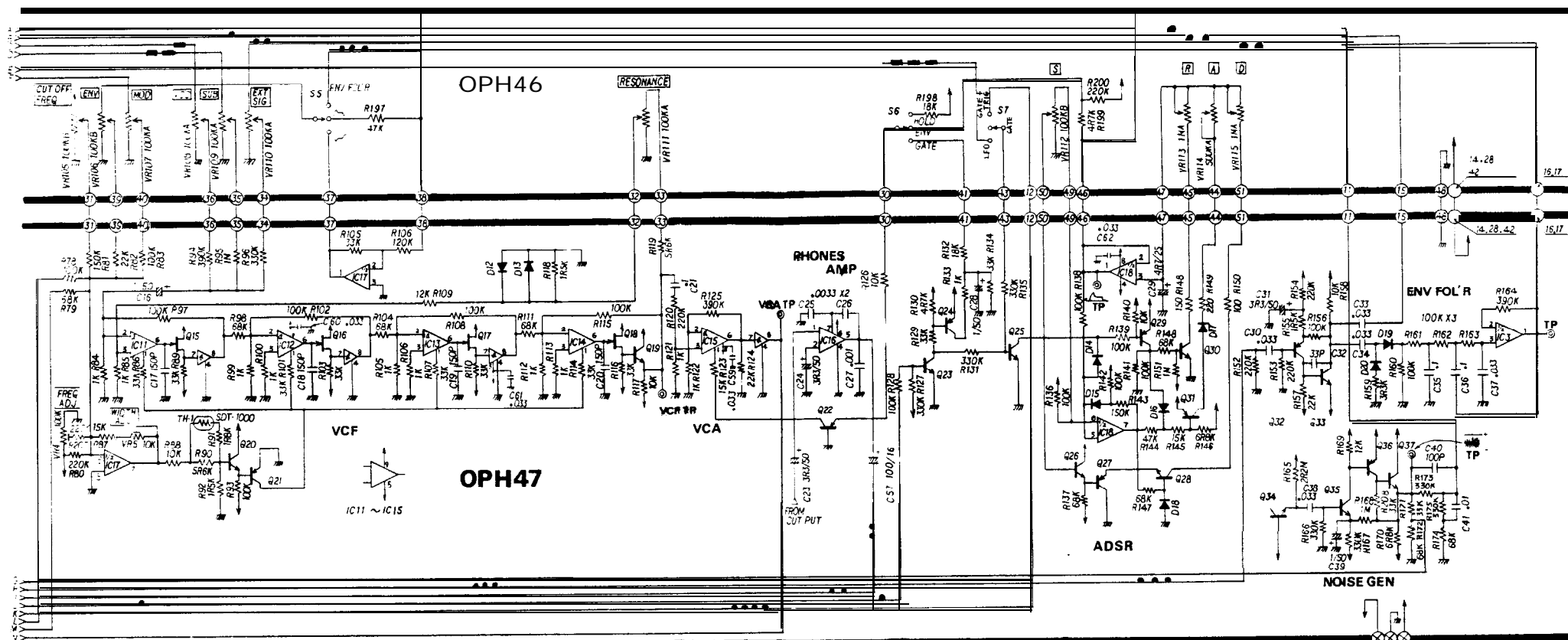
WAFER TERMINAL. WIRING ASSEMBLY

010-183 5045-03A Terminal 010-186 5045-05A
 010-218 EMCS 0750 010-220 EMCS 0950
 Wiring assy
 053H034 A
 053H035 B 010-226 EMCB 0730851 7p-30 cm
 053H036 C 010-228 EMCB 0920851 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





PSH33

Resistor	: in ohm (MF-- metal oxide film. 1%)
Capacitor	: in microfarad (P-- picofarad)
Diode	: 1S2473 or 1S1555 (D11-- 1S2453)
IC1, 3-4, 10,	: nPC4558C
IC11-19	: 1F13741H
IC2	: 1A700HC
IC6, -	: 1L082
IC7	: BA662A
IC11-14	: BA662 A B factory selected
IC15	: 1A700 HC
ENV transistor	: 1SAB26-Q or 1SAB33-Q
VCR transistor	: 1S0170-Q or 1S0944-Q
Q1, 2	: 2SK30A-BR FET
Q11, 13-15	: 15A 6A-F 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 d/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.

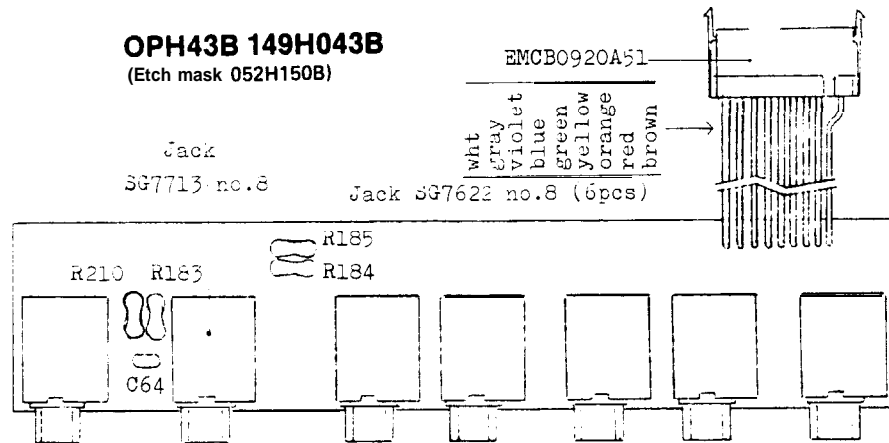
Solder BA662 tentatively after defective one is removed.

Press C2 key with CUT OFF set at "0" and RESONANCE at "10" -- no input signal.

Approximate 50Hz oscillation at VCF stage proves the IC adequate.

OPH43B 149H043B

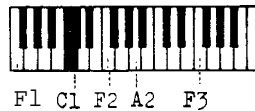
(Etch mask 052H150B)



View from the foil side

ADJUSTMENT

KEY DESIGNATION
only for the adjustments

**BENDER**

Panel setting and connection:
Digital voltmeter! at 10

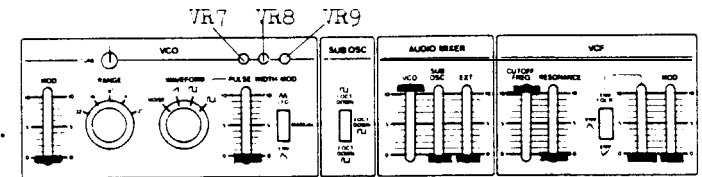
1. Flip and hold Bender lever at the left(-). Note the reading.
2. Turn and hold the lever at the right (+). Adjust VR-6 on OPH40 for the same reading, but opposite polarity, as in step 1. (Difference between two readings must be within 30 mV.)

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.

C) RANGE

--refer to A)WIDTH for details--

Set RANGE at 8'.

Obtain stable Lissajous figures.

1. F1 key --- VR-8.

Place RANGE at 2'.

Obtain motionless figures.

1. F1 key --- W-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.

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.

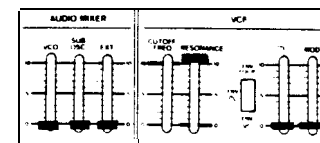
2. F3 key --- VR-3.

3. Repeat steps 1 and 2.

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

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".

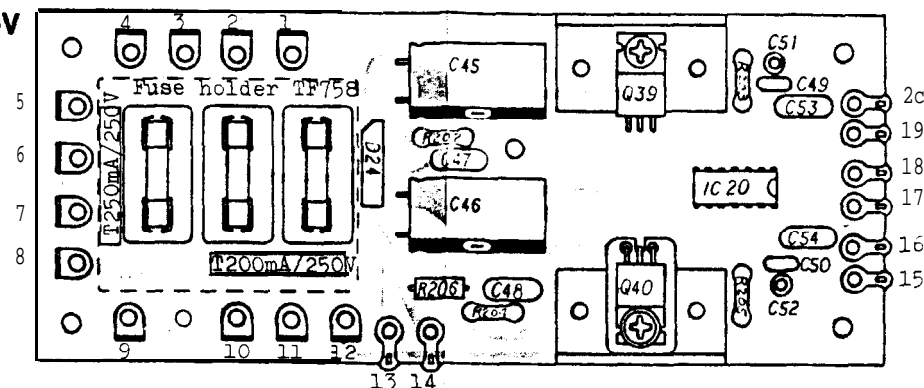
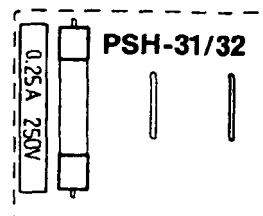
1. With F1 key held down, set VR-4 for 20 kHz.

OPH46 OPH47

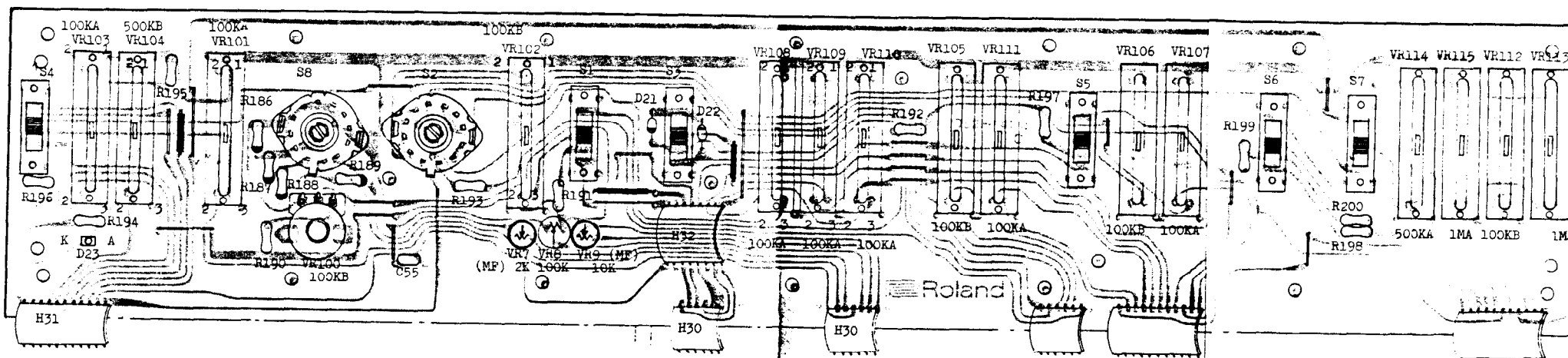
PSH31A 100V, PSH32A 117V, PSH33A 220/240V
146H-31/32/33-A (Etch mask 052H139A)

D 2SK30A
D 2SC1740-Q or 2X945-4
D 2SA826-Q or 2SA733-Q
D 152473 or 1S1555
D Metal oxide film
D CRB+FX
OPH46-- R186-189 :
tailored for nearly
equal resistance

	ECEA 146H-3
	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.

