SH-2 SERVICE NOTES

**SPECIFICATIONS**

- **KEYBOARD**
  - 57 keys, 3 octaves
- **VCO**
  - **MODE**
    - AUTO BEND
    - MODULATION DEPTH
    - PW MODE
    - PW MODE SWITCH (ENV/ENV, MAN/ENV, FOLR)
    - TOTAL TUNE
  - **VCO-1**
    - RANGE (2, 16, 8, 4, 2)
    - WAVEFORM (SIN, SQR, TRI)
    - BINDER ON/OFF SWITCH
  - **VCO-2**
    - RANGE (2, 16, 8, 4, 2)
    - WAVEFORM IN/OUT, (SIN, SQR, TRI)
    - VCO-2 TUNE
    - TUNE RANGE (WIDE/NARROW)
- **AUDIO MIXER**
  - VCO-1 SUB
  - VCO-1
  - VCO-2

- **VCF**
  - CUT-OFF FREQUENCY (400Hz - 20kHz)
  - RESONANCE (0 - 15)
  - ENVELOPE SWITCH (ENV, FOLR, ENV, MAN, ENV)
  - £NVELOPE INHIBITOR
- **VCA**
  - MODULATION SW (HOLD, ENV, TRG, ENV, MAN, ENV, MAN, ENV, MAN, ENV)
- **POWER SWITCH** (with LED indicator)
- **VOLUME CONTROL**
- **PORTAMENTO** (0 - 30)
- **BENDER LEVER**
- **INPUTS/OUTPUTS**
  - OUTPUT Jack (1000m)
  - HEADPHONE Jack (stereo, 8Ω)
  - CV INPUT Jack (1V/10m)
  - GATE INPUT Jack (+7.5V)
  - CV OUTPUT Jack (1V/10m)
  - GATE OUTPUT Jack (+10V, 0.1µA)
  - EXT AUDIO INPUT Jack (0.9V p-p, max)
- **POWER CONSUMPTION**
  - 11W
- **DIMENSIONS**
  - 670W x 306D x 100H (mm)
- **WEIGHT**
  - 8.9kg
- **ACCESSORIES**
  - 2.5m patch cord

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When ordering PCBs, suffix letter to PCB name referring to the Parts List and PCB layout.

- **Power Transformer**
  - H200: 100/117V (022H200) or H200: 100V only
  - Power switch: 220/240V (022H200)
- **End block (panel)**
  - H22 (066H022)
- **Bender unit**
  - PB-4 (029-022)
- **Power switch**
  - SD5P 001-1 100V (001-215)
  - SD5P 001-2 117V (001-216)
  - SD5P 502 220/240V (022H200)
- **Jack Washer (red)**
- **Jack B-07713/08 stereo**
  - 0-5 (111-021) rear
  - 0-7 (111-023) front

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Panel removal screws
- Tap-tight B (self tapping)
- 3 x 10mm Br BH (keyboard)
- 4 x 8mm Br BH (keyboard)

Knob No. 33
- 066-053

Knob No. 57
- 066-057

Button No. 8
- 066-008

Endblock H22 removal screws
- Tap-tight B (self tapping)
- 3 x 6mm Br BH (keyboard)
- (front 3 x 6mm)

Panel H48
- 072H048

Jacks
- B-07622 #08
- (009-012)

**Keyboard**
- SK132-H
- (004-013)

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Roland

Printed in Japan B-2 1
## Parts List

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Quantity</th>
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<tr>
<td>072H048</td>
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<td>068-020</td>
<td>Bushing no. 20</td>
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<td>061H079</td>
<td>Chassis H 79</td>
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<td>111-021</td>
<td>Foot G-5 rear</td>
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<td>111-023</td>
<td>Foot G-7 front</td>
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<tr>
<td>064H073A</td>
<td>Holder H73A</td>
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<tr>
<td>066H032</td>
<td>Endblock H 22 (panel1), Bender</td>
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<tr>
<td>066H021</td>
<td>Endblock H 21 R/L set</td>
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<td>004-013</td>
<td>Keyboard SK132-H</td>
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<tr>
<td>016-057</td>
<td>Knob no. 57 rotary</td>
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<td>016-053</td>
<td>Knob no. 33 slider</td>
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<td>063-012</td>
<td>Strip no. 12</td>
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<td>009-011</td>
<td>Jack B97622 no. 8 FC type</td>
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<tr>
<td>009-008</td>
<td>Button no. 8 grey power switch</td>
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<tr>
<td>022H020</td>
<td>Power transformer 100/117Y or H2OJ 100V only</td>
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<tr>
<td>022H020-B</td>
<td>H2OJ-B 117Y only</td>
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<tr>
<td>022H020-D</td>
<td>H2OJ 220/240V</td>
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<td>009-012</td>
<td>Jack B97713 no. 6 stereo</td>
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<td>009-029</td>
<td>Fuse KGF 0.25A CSA prim.</td>
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<td>008-060</td>
<td>Fuse SERKO T250mA sec.</td>
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<td>Fuse SERKO T200mA sec.</td>
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<td>001-215</td>
<td>SD05P001-1 100V</td>
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<td>001-216</td>
<td>SD05P001-2 117V</td>
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<td>001-217</td>
<td>SD05P 502 220/240V</td>
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<td>001-234</td>
<td>SRK1036-K15 rotary 5p-4t</td>
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<td>001-214</td>
<td>SRK1035-K15 rotary 2p-5t</td>
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<td>SSB022-12PW slide 2p-2t</td>
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<td>SSB023-12PW slide 2p-3t</td>
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### Potentiometer

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<tr>
<td>149HO61A</td>
<td>OPC61A VCO VR board (PCB O52H176A-2)</td>
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<tr>
<td>149HO62A</td>
<td>OPC62A VCO (O52H176A-1)</td>
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<td>149HO63A</td>
<td>OPC63A VCF VR board (PCB O52H177A-2)</td>
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<td>149HO64A</td>
<td>OPC64A VCF (O52H177A-1)</td>
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<tr>
<td>149HO45B</td>
<td>OPC45B OUTPUT (O52H150B)</td>
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<td>149HO65B</td>
<td>OPC65B Bender (O52H140B)</td>
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<td>146HO31A</td>
<td>PHS31A Power supply 100V (PCB O52HR39A)</td>
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<td>146HO32A</td>
<td>PHS32A Power supply 117V</td>
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<td>146HO33A</td>
<td>PHS33A Power Supply 220/240V</td>
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### Capacitor

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<tr>
<td>029-306</td>
<td>LFDR016A15 105K</td>
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<td>029-517</td>
<td>LFDR016B15 100K</td>
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<td>029-519</td>
<td>LFDR016B6 500K</td>
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<td>029-508</td>
<td>LFDR016A5 500K</td>
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<td>029-509</td>
<td>LFDR016A6 1MA</td>
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<td>029-575</td>
<td>EVAL015B16 100K 20mm stroke</td>
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<td>029-577</td>
<td>EVAL015A26 2MA 20mm stroke</td>
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### Transistor

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<td>017-118</td>
<td>2SC1740-Q or 2SC945-P</td>
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<td>017-046</td>
<td>2SC0287 NZ for noise</td>
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<td>017-022</td>
<td>2SB344-0 or 2SB396-0</td>
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<td>017-010</td>
<td>2SB234-0 or 2SB526-0</td>
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<td>017-014</td>
<td>2SK300A-Y FBT</td>
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<td>017-016</td>
<td>2SK30A-4R FBT</td>
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<td>018-015</td>
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<td>018-017</td>
<td>182453 or 18258 zener</td>
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<td>019-009</td>
<td>LR0601R LED red</td>
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### Switch

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<td>001-234</td>
<td>SRK1034-K15 rotary 5p-4t</td>
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<td>001-214</td>
<td>SRK1035-K15 rotary 2p-5t</td>
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<td>001-182</td>
<td>SSB022-12PW slide 2p-2t</td>
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<td>SSB023-12PW slide 2p-3t</td>
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## semiconductor

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<td>020-100</td>
<td>T0820CF</td>
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<td>020-039</td>
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<td>020-160</td>
<td>BA662</td>
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<td>020-189</td>
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<td>020-103</td>
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## Wafers Terminal

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<td>1702B</td>
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<td>010-183</td>
<td>5045-03A w/friction lock</td>
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<td>010-186</td>
<td>5045-05A</td>
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<td>010-185</td>
<td>5045-07A</td>
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## Others

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<tr>
<td>068-005</td>
<td>Bushing no. 5 jack black</td>
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<td>121-005</td>
<td>Washer no. 5 jack</td>
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<td>121-018</td>
<td>Washer no. 18 jack red</td>
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<td>048H001</td>
<td>Heat sink no. H</td>
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<tr>
<td>012-003</td>
<td>Fuse clip TP758 or P-6</td>
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<tr>
<td>059H031</td>
<td>Flat cable H31</td>
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<tr>
<td>064H073A</td>
<td>Holder H73A</td>
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<tr>
<td>064H074A</td>
<td>Holder H73A</td>
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</tr>
</tbody>
</table>
**OPH61A 149H061A** View from the foil side

**OPH62A 149H062A** (Etch mask 052H176A-1)

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- 28K30A - GR or Y
- 28A826Q or 28A733P
- 28C1740Q or 28C945P
- 1S2473 or 1S1555

---

- SR19R
- R46 Metal film
- R-25J Carbon
- CRB4FX Metal oxide film

---

- R260-R263
- R257-R259

Each group of four is factory selected as nearly as possible for the same value.
**SH-2**

**OPH65A 149H065A** View from the foil side

**OPH66A 149H066A** (Etch mask 052H140B)

**OCT. 15, 1979**

**OPH65B 149H065B** (Etch mask 052H140B)

**Wiring Diagram**

- LED LR0601R
- Holder H77
- VR116
- VMLOR-K20
- A15 100KA
- VR115-VH113
- EVA-LOPC015 type

**Components**

- 28K30A GR or Y
- 28A826-Q or 28A733-P
- 28C1740-Q or 28C945-P

**Miscellaneous**

- R-25J Carbon resistor
- Metal oxide film resistor

**Notes**

- I08 ------ BA662A
- I04-I07 --- BA662 factory selected
- When replacing I04-I7, use BA662 of the same color.
PSH31A 100V, PSH32A 117V, PSH33A 220/240V
146H-31/32/33-A (Etch mask 052H139A)
Serial No. 830600 and higher

Terminals, nos.10-12 are different from preceder in location.
The rest remains unchanged.
ADJUSTMENT

BENDAR

Connect a digital voltmeter to the TP on OFH65 shown in the figure left.
1. While pushing BENDAR lever to the extreme left, note the reading on the meter.
2. While holding the lever at the extreme right, adjust VR3 for the reading equal to that of step 1.
Permissive voltage difference between the readings is ±30mV.

KCV

Shift the meter to the TP on OFH64 shown below.
1. While depressing F1 key, read the value of KCV on the meter. (For key designation, refer to page 1.)
2. While depressing F4 key, adjust VR6 for the reading 3V higher than that of step 1.
Make sure that F1, P2, P3 and F4 deliver 1V/1 oct voltages. Also voltage differences between every couple of octave keys must be within the range of 1V ±2mV.

VCO-1

For the following tuning, use a completely tuned electronic tuning or a Tuning Meter. Adjustment can be made either by beat sound method or by displaying Lissajous on an oscilloscope screen with a reference pitch being applied to EXT TR10 of the scope. For the latter, connect scope V IN to the TP on OFH64 shown in figure right.

WIDTH

1. While holding down F1 key, adjust VR11 (FRBQ) for the pitch.
2. Tune other P's in the order P2, P3 and F4 by turning VR11 with corresponding key being held down.

Fine
1. With F1 key held down, turn VR12 (WIDTH) in the direction causing F1 further out of tuned. (Do not attempt tuning F1 to the correct pitch at this step). Reverse rotation degree of VR12 should be proportional to F1 deviation from the reference pitch.
2. With F4 key down, tune F4 to the pitch with VR11.
3. Repeat steps 1 and 2 until all P's are correctly tuned. TOTAL TUNE knob can be the substitution for VR11.

IMPORTANT: Do not turn VR12 during subsequent adjustments. Turning VR12 will invalidate the entire VCO-1 adjustments.

LINEARITY

Set VCO-1 RANGE at 2'.
1. While depressing F1 key, tune F1 to pitch with TOTAL TUNE.
2. While depressing P3 key, adjust VR5 on OFH62 for the pitch.
3. Check all P keys for out of tune, if there any, repeat steps 2 and 3.
RANGE WIDTH

Set VCO-1 RANGE at 32'.
1. While holding down F1 key, adjust F1 for the pitch with TOTAL TUNE.
2. Place the RANGE at 2' and tune F1 to the pitch with VR10 (RANGE WIDTH).

FREQUENCY

Set VCO-1 RANGE at 8' and TOTAL TUNE at center of its travel range.
1. While depressing F1 key, adjust VR11 for F1 in tune.

VCO-2

WIDTH (Being analogous to VCO-1 WIDTH Adjustment, refer to it for the detail.)

Coarse
1. With F1 key held down, adjust VR7 (FREQ) for pitch.
2. Tune F2, F3, F4 in sequence with VR7.

Fine
1. With F1 key down, turn VR8 (WIDTH) to cause F1 further out of tuned.
2. With F4 key down, tune F4 to the pitch with VR7.
   (VCO-2 TUNE, VR117 may be used instead of VR7.)
3. Repeat steps 1 and 2.
   Do not turn VR8 after WIDTH adj. Inadvertent turn of VR8 at the last minute of the VCO-2 adjustments will reduce VCO-2 circuit to non-adjusted condition.

LINEARITY

Reset VCO-2 RANGE at 2'.
1. While depressing F1 key, tune F1 to the pitch with VCO-2 TUNE.
Set VCO-1 RANGE at 2' and raise VCO-1 knob on the panel (AUDIO MIXER) for a proper beat note volume.
2. While listening to the VCO -1 -2 beat sound, adjust VR4 (LINEARITY) on OPH62 for minimum beat repetition at F3 and F4 keys.(repeat steps 1 and 2)

SH-2

RANGE WIDTH

Reset VCO-2 RANGE at 32'. (AUDIO MIXER VCO-1 knob: at bottom)
1. Tune F1 to the pitch with VCO-2 TUNE knob.
Reset VCO-2 RANGE at 2'. Slide up VCO-1 knob for a beat note.
2. While holding down F1 key, adjust VR9 (RANGE WIDTH) for minimum beat repetition.
3. Repeat steps 2 and 3.

FREQUENCY

1. While switching TUNE RANGE on the panel -WIDE-NARROW-WIDE- repeatedly, set VCO-2 TUNE at the point assuring the least pitch difference between the switch positions.
2. While depressing a key with TUNE RANGE set at NARROW, adjust VR7 to tune the note to the pitch.

VCF

Make sure that VCF starts and sustains oscillation at 7-9 RESONANCE scale.

WIDTH

1. While depressing A2 key, tune the note to approx. 1kHz with CUTOFF
FREQ knob. (T=1ms)
2. Adjust VR2 (WIDTH) on OPH64 so that C1 and C2 keys develope VCF-generated notes having one octave relation with each other.

FREQUENCY

Slide up CUTOFF knob to the top.
1. While holding down F1 key, adjust WR1 for 20kHz.
Make it certain that low end key provides note less than 50Hz. Typically it is on 50Hz when C2 key is played with CUTOFF set at 0 (zero).