ELECTRONIC MUSICAL INSTRUMENT

ROLAND SYNTHESIZER
SH-3A

SERVICE
NOTE

THE 5th EDITION
Printed in Japan. '76.Apr.
APPLIED FROM SERIAL No.270800

Roland Corporation
1. SPECIFICATIONS
* 44Keys(F Scale)
Note can be raised or lowered by one octave via Transpose switch.

* VCO Assembly (Voltage Controlled Oscillator)
  5 Octave Combination (32', 16', 8', 4', 2') ................. 5
  Waveform Selector ........................................... 5
  Modulation Waveform Selector (\H/\N/\N ) ....................... 1
  Modulation Depth Control (VIBRATO) ........................ 1
  Pitch Control ................................................. 1
  Glide Switch .................................................. 1
  Portamento Time (PORTAMENTO) ............................... 1
  Portamento OFF Switch (OFF) ................................ 1
  Transpose Changeover Switch (L/M/H) .......................... 1
  8' Chorus Speed Control/OFF (8' CHORUS) ....................... 1
  Sampler
    Sampled Waveform Selector (MODE - OFF//N//N/N//RANDOM) .... 1
    Sampling Time (SAMPLE TIME) ............................... 1
    Sampling Level Control (LEVEL) ............................ 1
* VCF Assembly (Voltage Controlled Filter)
  Filter Resonance Control
    CUTOFF FREQ ................................................ 1
    RESONANCE ................................................... 1
  Modulation Waveform Selector (\H/\N/\N ) ....................... 1
  Modulation Depth Control (GROWL) ............................ 1
  Envelope Selector (ADSR/\N/\N) ................................ 1
  Envelope Sensitivity Control (SENS) .......................... 1
* VCA Assembly (Voltage Controlled Amplifier)
  Modulation Waveform Selector (\H/\N/\N ) ....................... 1
  Modulation Depth Control (TREMOLO) .......................... 1
  Envelope Selector (ADSR/\N/\N/\N) ............................ 1
  Hold Control .................................................. 1
  OUTPUT Level Control (OUT LEVEL) ........................... 1
* Others
  Envelope Control ............................................... 4
    Attack Time/Decay Time/Sustain Level/Release Time
  Low Frequency Oscillator 1 Rate .............................. 1
  Low Frequency Oscillator 2 Rate .............................. 1
  Low Frequency Oscillator 2 Delay Time Control ............... 1
  Noise Generator Level Control ............................... 1
  White/Pink Noise Changer ..................................... 1
  Noise Input Selector ......................................... 1
  Phones Level Control ........................................ 1
  Tuning (on rear Panel) ....................................... 1
  OUTPUT Jack .................................................. 1
  OUTPUT VOLTAGE CHANGEOVER SWITCH (L/M/H) .................... 1
  PHONES Jack .................................................. 1
  Jack for VCO CONTROL ........................................ 1
  Jack for VCF CONTROL ......................................... 1
Voltage Changer (for changing AC voltage) .......................... 1

* Power Source
AC 100, 117, 220, 250V 50/60Hz

* Power Consumption
9VA

* Dimensions
W : 1005mm (40.2")
D : 320mm (12.8")
H : 150mm (6.0")

* Weight(Net)
14.5 Kg (32 Lbs.)

* Accessories
Music Rack
Connection Cord
(2.5m with Pin-Plug Adaptor)

** Accessories(optional)
Volume Control Pedal PV-1
(for controlling Sound Volume, VCO
GLIDE effect or VCF CUTOFF-FREQUENCY)

*******************************************************************************

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Note: Specifications changed from SH-3
VCF-VCA BOARD ASSEMBLY
Some Potentiometers
ADJUSTMENT
3-2 FILTER BOARD ASSEMBLY (F-5) (Serial number XX2549 and below)

A. Parts Layout

B. Circuit Diagram
3-2. FILTER BOARD ASSEMBLY (PL-5) (Serial number XX2550 and above)

A. Parts Layout

Tr.: 2SC945
D.: 1S2473
SW.: SLW-43-12
VR.: 5VR 10K A
EVA-QMA00A/14
3-2 FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2550 and above)

A. Parts Layout
3-3. PACK No.7B ASSEMBLY (Serial Number XX2549 and below)

A. Parts Layout

B. Circuit Diagram (Pack No.7B)
4. VCO CIRCUIT

4-1. VCO PULSE BOARD ASSEMBLY (OP-8A) (Serial Number XX2399 and below)
4. VCO CIRCUIT

4-1 VCO PULSE BOARD ASSEMBLY (Serial Numbers XX2400-XX2549 inclusive)

A. Parts Layout
4. VCO CIRCUIT

4-1. VCO PULSE BOARD ASSEMBLY (OP-9A) (Serial Number XX2550 and above)

A. Parts Layout
NOTE: UNLESS OTHERWISE SPECIFIED
ALL NPN TRANSISTORS 2SC545
ALL PNP TRANSISTORS 2SA133
ALL DIODES 1N2473
C. Rear side parts layout (OP-9A)

(Serial Number XX2549 and below)
4-2. PACK No. 6 ASSEMBLY

A. Parts Layout

B. Rear side (PACK No. 6)

4-3. PACK No. 4 ASSEMBLY

A. Parts Layout

B. Circuit Diagram (PACK No. 4)

C. Circuit Diagram (PACK No. 6)
5. VCP-VCA CIRCUIT

5-1. VCP-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX2549 and below)

A. Parts Layout
B. Rear parts layout (OP-10B) (Serial Number XX2549 and below)
5. VCF-VCA CIRCUIT

5-L VCF-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX2550-XX3049 inclusive)

A. Parts Layout
5. VCF-VCA CIRCUIT

5-1. VCF-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX3050 and above)

A. Parts Layout
6. POWER SUPPLY CIRCUIT
6-1. POWER SUPPLY BOARD ASSEMBLY (PS-12C)

A. Parts Layout

B. Power Supply Circuit Diagram (PS-12C)
7. ADJUSTMENT

7-1. Preparation (Operation Check and Pre-adjustment)

(1) Position the control and switches as follows

- VCO 8' .................................. 10
- VCF CUTOFF FREQ. .......................... 10
- VCA HOLD .................................. 10
- TRANSPOSE .................................. M
- Phones Level ................................. Optimum Audio
- Output Level ............................... }

(2) If any note does not come out, adjust VR258 (VCA CUTOFF) and VR254 (VCF FREQ.) so that the note is audible.

7-2. VCO TUNING

(1) Connect a frequency counter to the 71st terminal on OP-10B.

(2) Set the PITCH on the control panel at 0 position, and TUNING and WIDTH on the rear panel to the center position.

(3) Depress the F1 key and tune its frequency to 174.61Hz by VR102.

(4) Depress the F4 key and tune its frequency to 1396.9Hz by VR101.

(5) Repeat steps (3) and (4).

(6) Check the frequency of the F2(349.23Hz) and the F3(698.46Hz).

(7) Check the following (effects)
   a) PORTAMENTO ON/OFF
   b) GLIDE Button and GLIDE PEDAL
   c) PITCH, TUNING and WIDTH

7-3. VCA Adjustment

(1) Adjust the HOLD control to set the 87th terminal (OP-10B) voltage at 1 volt.

(2) Connect the oscilloscope to the 91st (OP-10B).
   Set all the waveform selector switches at \| \} position and VCO controls to maximum position.

(3) Adjust VR258 (CUTOFF) so as to get the no output waveform on the scope.

(4) Turn the HOLD full clockwise.

(5) Lower the VCO/\|\} knobs except 8' to minimum position, and confirm the output level of 2Vp-p. If not, adjust VR258 within the condition of step(3).

7-4. CLICK BIAS adjustment

(1) Setting
   VCO ........................................ all 0
   HOLD ........................................ 10
   VCA ENVELOPE ............................... \_

- 18 -
(2) Adjust VR257(CLICK BIAS) so that no pulse waveform is seen on the scope, repeating switch ON/OFF a key.

7-5. RESONANCE Adjustment
(1) Setting
   VCO ....................... all 0
   CUTOFF FREQ. ............... 5
   RESONANCE ................... 8

   Adjust VR256(RES SET) to get VCF oscillation, and then turn back the VR until the oscillation may just go off.

7-6. ADSR ZERO Adjustment
(1) Adjust VR104(ADSR 0 ADJ.) to set the 20th terminal(OP-9A) voltage at 0 volt.

7-7. VCF OCTAVE Adjustment
(1) Setting
   VCO ....................... all 0
   CUTOFF FREQ. ............... 5
   RESONANCE ................... 10
(2) While depress F2 key and F3 key alternately, adjust VR255(VCF WIDTH) to get one octave difference between F2 and F3.
(3) Setting
   CUTOFF FREQ. ............... 0

   Depressing the G4 key, adjust VR254(FREQ.ADJ.) to set its frequency at 348Hz.
(4) Stepping (2) affects one octave difference between F2 and F3, so repeat step (1) and (2).

7-8. CHORUS Adjustment
(1) Connect the scope to the 64th on OP-10B.
(2) Setting
   8' ....................... ON
   VCO 8' Control ............ 10

   While holding the F1 key down, adjust VR252(BIAS) so that the output waveform looks like the figure.

   While holding the G4 key down, adjust VR253(LINEARITY) as the same way as step (2).
(5) Connect the scope to the 66th on OP-10B.
   Setting
   CHORUS ..................... 2 - 3

   Adjust VR251(MOD DEPTH) so that the waveform seen on the scope may be sailling and shuttling as shown in the figure.

   However, the waveform height shouldn't be less than 1/2 of Max.
7-9. NOISE Adjustment

Connect the scope to the 91st on OP:10B.

Adjust VR259(NOISE) so as to get the NOISE output may reach 4Vp-p.
8. PARTS LIST

*GENERAL ASSEMBLY
  cabinet (Complete)
  Control Chassis Assembly
  Top Cover Assembly

162-002B Power Supply Assembly
004-002 Keyboard Assembly
       Connector Housing
064-030 Holder
064-024 "
101-016 Felt
091-997A Side Block

*CABINET ASSEMBLY
082-992 Cabinet
      (Lid)
081-993A "

  including the following parts
  Lock
  Hooking Hinge
  Handle
  Foot-Rubber

065-007 Lid (Rear, Cord Box)
074-025 Badge
047-018 Clamp

*CONTROL CHASSIS ASSEMBLY
145-005 Filter Board Assembly
149-009A VCO Pulse Board Assembly
149-010B VCP-VCA Board Assembly
140-007B VIB Pack No.7B
072-060A Panel
072-960A "
061-989 Chassis
064-996 Holder
064-993 "
065-996 Cover
065-994 "
065-049 "
065-034 "

  Output Transformer

016-028 Knob
016-003 "
063-001 Plate
001-018 Slide Switch
001-064 Lever Switch
001-065 "
001-049 Push Switch
009-001 Jack
009-002 "
121-005 Jack Washer
068-005 Insulation Bushing
042-009 Lug Terminal
120-007 Long Nut
      Connector Housing
066-019 Rubber Bushing
121-001 Aluminum Washer

PC-2B
SK-142A
2145-6C
No.30
No.24 (Common with EP-10)
No.18 30 x 610 x 1.5  Black
No.997A(Common to left and right)
P-11A(Cr)
T-32(Cr)
H-26(Black)
G-7
No.7
No.25
M2
No.18
FL-5A
OP-9A
OP-10B
BX-7B
No.60A(Rear Panel)
No.960A(Control Panel)
No.989 1.0t SPC-1
No.996 " (for width)
No.993 " (for PCB)
No.996 2.0t Black Sponge
No.994 "
No.49 2.0t Grey Sponge
No.34 " Black
ST-45 or ST-31 (on OP-10B)
TK-1114A or TK-1114 (Grub screw fixing)
No.3 (for Slide Potentiometer)
No.1
SW321
ESL-2412 (Double-Pole, Double-Throw)
ESL-2411 (On-Off)
No.44 Red
SG7615 No.5
LJ-039-1-6
BSP 1.6t N1
No.5 Black
21-6P
No.7 M3 x 52
2145-4C
2145-6C
2145-8C
No.19
8 φ (for Potentiometer)
SH-3A PARTS LIST

*TOP COVER ASSEMBLY
065-997  Top Cover  No.997
001-053  Power Switch  MS0664K  Black
          Light Emitting Diode  SLF-24B
062-004  Bracket  No.4
          Speed Nut  M8
068-011  Bushing(for Music Rack)  No.11
064-995  Holder  No.995
          Connector Housing  2145-3C

*POWER SUPPLY ASSEMBLY  PC-2B
146-012C  Power Supply Board Assembly  PS-12C
061-988B  Chassis  1t SPC-1
022-075  Power Transformer  No.75C (100-120V)  No.75D (220-250V)
053-021  AC Cord  (3M)
047-001  Cord Binder  No.11
047-019  Cord Bushing  R-5
121-031  Washer  No.31
042-004  Lug Terminal  2L-4P
008-037  Wired in Fuse(Pig tail)  1A
010-019  Connector Housing  2145-4C
064-033  P.C.B. Holder  LGBS-4N
          Heat Sink  No.18

*VCO PULSE BOARD ASSEMBLY  OP-9A
140-008  VCO Pack  No.8
140-004A  ADSR Pack  No.4
          Connector Wafer Pin  A2461-4C
          "  "  -6C
          "  "  -8C

*OTHERS
001-057  Slide Switch  SLW43-12P
001-054  Rotary Switch  ESR-B123K(R)20A
001-055  "  ESR-B114K(R)20B
001-056  "  ESR-B245K(R)20B
008-024  Midget Fuse  .5A
012-003  Fuse Holder  TF-758
020-014  IC  830C
          IC  741 or TA 7504M
          IC  uPC33C
          IC  uPA41C
          IC  CA3080
          IC  LM3216
          Silicon Transistor  2SC945 P or Q
          "  2SA733  "
          "  2SC828 (for Noise)
          "  2SC1000 GR
          "  2SC1000 (Selected)
          "  2SC373
          "  2SB434 0
          Pair Transistor  ITS1276
017-018  PUT  N13T1
017-019  PUT  N13T2
017-014  FET  2SK30A Y
          FET  2SK30A GR or Y (Selected)
          Thermister  SBT1000
          Diode  1N4002
          "  1S1555
018-014  "  1S2473
          "  02Z8.2A
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**SH-3A PARTS LIST**

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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Polystyrol Film Capacitor</th>
<th>Value</th>
<th>MFD</th>
<th>Rating</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>47</td>
<td>pfd</td>
<td>50V</td>
<td>Type (+ 10% or 20%)</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>pfd</td>
<td>50V</td>
<td>Type (+ 10% or 20%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ceramic Capacitor</th>
<th>Value</th>
<th>MFD</th>
<th>Rating</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>250</td>
<td>pfd</td>
<td>470</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dipped Tantalume Capacitor</th>
<th>Value</th>
<th>MFD</th>
<th>Rating</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.22</td>
<td>mfd</td>
<td>25V</td>
<td>Type (+ 20%)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>mfd</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>2.2</td>
<td>mfd</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.7</td>
<td>mfd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*MISCELLANEOUS PARTS*

| Part Number | Description        | Code
|-------------|--------------------|------|
| 130-999A    | Interior Packing Case | No.999A
| 132-087     | Pat                | No.87
| 132-088     | Pat                | No.88
| 092-999     | Music Rack         | 092-999

See next page.
NOTE: Be sure to confirm the serial number of them shown below before requirement.

<table>
<thead>
<tr>
<th>Potentiometer</th>
<th>Knob</th>
<th>Rotary Switch</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVCBOŠ...</td>
<td>TK-1114</td>
<td>ESR-E123Ř...</td>
<td>XXX800 - XX949</td>
</tr>
<tr>
<td>EVCBOŘ...</td>
<td>TK-1114A</td>
<td>ESR-E123Ř...</td>
<td>XXX950 - XX1599</td>
</tr>
<tr>
<td>EVCBOK...</td>
<td>TK-1114A</td>
<td></td>
<td>XX1600 - XX1829</td>
</tr>
<tr>
<td></td>
<td>TK-1114 (for Rotary SW.)</td>
<td>ESR-E123Ř...</td>
<td>XX1600 - XX1829</td>
</tr>
<tr>
<td>EVCBOK...</td>
<td>TK-1114A</td>
<td>ESR-E123Ř...</td>
<td>XX1830 -</td>
</tr>
</tbody>
</table>

* P.C.B. OP-10B (SH-3A) is not interchangeable with OP-10 (SH-3).