**JUNO-106 SERVICE NOTES**

*First Edition*

**SPECIFICATIONS**

**KEYBOARD**
- 61 keys, 5 octaves, C scale

**DIO**
- TUNE: ±58 cents
- LFO MOD: ±400 cents
- BENDER: ±1200 cents

**VCF**
- CUTOFF FREQ.: 5Hz to 50kHz
- RESONANCE: 0 to self oscillation
- ENV MOD: ±14 octaves
- LFO MOD: ±5 6 octaves
- BENDER: ±3.5 octaves
- KEY FOLLOW: ±3.75 octaves

**ENV**
- ATTACK TIME: 1.5ms to 3s
- DECAY TIME: 1.5ms to 12s
- SUSTAIN LEVEL: 0 to 100%
- RELEASE TIME: 1.5ms to 12s

**LFO**
- RATE: 0.1Hz to 30Hz
- DELAY TIME: 3 to 3s
- OUTPUT: L: −30dBm, M: −15dBm, H: 0dBm

**DIMENSIONS**
- 992(W)x320(D)x120(H)mm
- 39 1/10(W)x12 5/8(D)x4 11/10(H) in.

**WEIGHT**
- 10kg/22 lb.

**POWER CONSUMPTION**
- 25W (20V-100V)

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**Diagram**: A diagram of the JUNO-106 keyboard with various components labeled, including side panels, LED display window, and top panel. There are also notes on the diagram regarding the keyboard and its specifications. The diagram includes a labeled diagram of the circuit board components, such as the CPU board, panel board, and power transformer. There is also a note about the AC inlet, G/N socket (triple), and rubber feet for the unit. The diagram indicates that four feet should be used to rest the unit level.
PARTS CHANGE NOTES

CPU IC1 CPU BOARD IC20 MODULE BOARD
Various CPUs used on both boards
1. µP078100... CPU Board, Module Board
   without internal ROM
2. µP07811G-033/037/036 CPU Board, Module Board
   with internal ROM that contains program for different model
3. µP07811G-101... with internal ROM that contains program dedicated to Module Board of JUNO-106
4. µP07811G-102... with internal ROM that contains program dedicated to CPU Board of JUNO-106

CPUs 1 and 2 need an external ROM:
- CPU Board IC2
- Module Board IC37

CPU of 3 or 4 can replace existing CPU regardless of presence or absence of ROM. Although both CPUs do not require external ROM, it is harmless for their performance.

WAVE GENERATOR

IC4, 8, 12 MODULE BOARD
Three versions used on the board
1. MC5534 incomplete 2 channel
2. MC5534-1 complete 1 channel
3. MC5534A incomplete 2 channel

When replacing existing MC5534 series, use only MC5534A for better performance and easier job.

NOTE: Two ICs of 5 or 2 are accommodated together in the same mounting holes which are originally designed for one IC.

VCF/VCAs ICs 3, 5, 7, 9 MODULE BOARD
Change from A10G8001170 to A10H800117A
Compatible with each other. However, to avoid timbre difference among voices, mixing use of two versions in a unit is not recommended.

ICs 16, 19, 20 MODULE BOARD
Both TL072CP and TL082CP can be used.

ICs 23, 24, 26 MODULE BOARD
TC45518 (Toshiba) cannot be used.

PORTAMENTO SWITCH/SLOT BENDER PANEL
SN 435500-up
Switch... from SLE-622-18P (SLE622-9C with an aluminum sleeve to SLE622-9C and synthetic knobs (22475038))
This change is to reduce the chance of RAM memory from being shifted by static charges entering through the switch.

Bender Panel... For accommodating above-mentioned square knobs, mounting slot in the Bender Panel is also squared.

RUBBER FEET CABINET
From G-5 to G-7:
G-5... H: 15mm (0.6 in.)
G-7... H: 10mm (0.4 in.)
Also diameter is different between the two.
To rest the unit level four of a size.

JAPANESE VERSION ONLY
SN 41B00-up
Transformer... change to 2245538000 100V only, SN 419000-up
Power Cable... change from detachable Cord Set (13439001) to Non-detachable cable (13439001) which requires Cord Holder (22195549) and Bushing instead of AC Inlet.

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Part No.

1. KNOB 22475324
13395445 EWA-NK5-D185B5 50kB
2. KNOB 22475324
13395439 S201B406-50KA 50kB
3. KNOB 22475324
13217586 EWN-EP202B8 10Kb2
4. KNOB 22475324
13217291 EWN-EP202B8 10Kb2
5. BENDER 22475324
13219241 EWN-EP202B8 10Kb2
6. LEVER SW 1339137 SLE622 1BP (SN 380100-425499)
6. LEVER SW 1339137 SLE622 1BP (SN 435500-)
7. KNOB 22475324
13217291 EWN-EP202B8 10Kb2
8. LEVER SW 13169147 SLE622 9C (SN 380100-425499)
9. LEVER SW 13169147 SLE622 9C (SN 435500-)
10. LED 15029195 TLG-124 (red)
11. LED 15029195 TLG-124 (green)
PARTS LIST

CASE
21135130 Cabinet
21125180 Side panel (right)
21125190 Side panel (left)
22125519 Bracket (R.L same)
22221508 Top panel
22215722 Bender panel (SN 380100-425499)
22215722A Bender panel (SN 435500-up)
22235320 Blind
22245211 LED Display window
12539104 Rubber foot G-5
h: 15mm (SN 380100-405699)
or
12359105 Rubber foot G-7
h: 10mm (SN 405700-up)
(0.4 in.)

KNOB, BUTTON
22475326 Knob VOLUME, PORTAMENTO
22475324 Knob slide Pot, SW
22475325 Knob slide SW
22475336 Knob PORTAMENTO (SN 435500-up)
22475593 Button (white) 1P
22475590 Button (white) 2P
22475590 Button (white) 3P
22475590 Button (blue) 1P
22475590 Button (blue) 2P
22475590 Button (blue) 3P
22475593 Button (orange) 1P
22475592 Button (orange) 2P
22475592 Button (orange) 3P

POWER SWITCH
13149108 WK2AA 3A
or 14149102 1801-0121

PUSH SWITCH
13169633 KBI10910

LEVER SWITCH
13139137 SLE622-18P (SN 380100-425499)
SLE622-9C with aluminum sleeve
PORTAMENTO
13139152 SLE622-9C (SN 435500-up)

SLIDE SWITCH
13159334 SP332-12N
MEMORY PROTECT, OUTPUT LEVEL, FUNCTION
13159147 SFO02-6N PM, VCF ENV, VCA
13159506 SW0026-4 HPF

PBC ASSY
76139140 CPU BOARD (pcb 22915901)
76139170 MODULE BOARD (pcb 22915902)
76139320 PANEL BOARD (pcb 22915911)
76139350 JACK BOARD (pcb 22915899)
76139410 BENDER BOARD (pcb 22915899)
76139380 MIDI BOARD (pcb 22915899)
76139121 POWER SUPPLY (pcb 22915900)
76139124 POWER SUPPLY (pcb 22915900)
76139111 FUSE BOARD (pcb 22915981)
76139114 FUSE BOARD (pcb 22915981)
220/240V

JACK
13449126 ELJ0320-01-010 stereo
13449125 ELJ0320-01-110 mono
13429168 MI121-3S DIN Triple

FUSE
13559355 GGS 1.0A pref. 100/117V
12559510 CEE T40mA pref. 220/240V
12559521 CEE T1.6A sec. 200/240V
12559511 CEE T50mA sec. 200/240V

BENDER UNIT
23275751 PB-9

POSISTOR
5229919 ERS-A333 561T 560

RESISTOR ARRAY
13193136 RM-8 103J 10K x 8
13193111 RM-8 223J 22K x 8
13193114 RG50 4x22K 2x2K 4x2K
13194146 RK141L503F R=2R 12 bit

POTENTIOMETER
[Slider]
13139443 EMA-NN015B5 50K 30mm stroke
13339339 S0218B405-50KB 50K 20mm stroke

[Rotary]
13279750 EVL-ELA102B5 50K TUNE
13219241 EVN-5XAP25B3 10K 30mm stroke
13219256 EMJ-EJAF20B1 10K x 2 PORTAMENTO

[Trimmer]
13299182 EVN-EAA008B5 5KB
13299191 EVN-C4A000B2 2KB PS BBD, V1
13299183 EVN-A4A008B1 10KB
13299188 EVN-A4A008B4 20KB
13299185 EVN-EAA008B1 10KB
13299186 EVN-EAA008B4 5KB
13299554 RV5077V101-3-502 (BUL) 5KB PS BBD, V2

COIL
12449229 FEB160M15 AC Line Filter
12449244 SC-02-15E AC Line Filter
13529105 DDS310-55D23S EMI Filter

POWER TRANSFORMER
22455371UD 100/117/220/240V
2245538DNO 100V only

DIODE
15019212 18S-133 rectifier bridge
15019245 18861 rectifier bridge
15019250 2818K1 zener
15019208 18S35-200 red
15019531 RD-6.8E5-3 green
15029103 TLG-124 (LED) display
15029175 LB-602VA2-1 (LED)

PHOTO COUPLER
15229709 TLP552

IC
IMPORTANT:
Refer to PARTS CHANGE NOTES and schematic diagram when replacing SELECTIVELY USED SEMICONDUCTORS

15179184 6P4-7610G CPU external ROM version for both CPU and MOJO Board
15179190 6P4-7611G-102-36 CPU internal mask-ROM version for MODULE BOARD
15179194 6P4-7611G-101-36 CPU internal mask-ROM version for CPU BOARD
15179649 2764-A649 EPM Board for external version CPU only
15179650 2764-B650 EPM Board for external version CPU only
15179317 TCG571AP RAM
15179309 MB814-20L RAM
15179185 MR8253 Triple Programmable Interval Timers
15159310HR ED1455BP 4 bit Counter
15159503 TC40000 Quad 2-input NAND Gate
15159505 TC40000 Hex Inverter
15159514 TC40032 Quad 2-input OR Gate
15159506 TC40138 3 to 8 Line Decoder/Demultiplexer
15159532 TC40161P 4 bit Counter
15159508 TC40373 Octal D-type Latch
1515912870 TC4030P 8IC Multiplexer/Demultiplexer (excludes TOSHIBA)
15159113 HD4150BP
15159114T0 TC5052BP Differential 4ch
15159114T0 TC6069UBF Multiplexer/
15159113 TC6017BP Demultiplexer
15159170 M54522P Hex Inverter
15159704T0 TD6208AP Hex D-Type Flip-Flop
15149110BM M54562P Transistor Array
15159117 M54564P
15169117H0 BD7407P Quad 2-Input NAND Gate
15169117H0 BD7407P Hex Buffers/Drivers
15189115 TL-0825P Low-Power OP Amp
15189146 IRF522 Low-Power OP Amp
15189119 TL-064 Low-Power JFET-Input OP Amp
15189154 TL-0725P Low-Power JFET-Input OP Amp
15189118 TL-0825P JFET-Input OP Amp
15189136 M521BL Low-Noise OP Amp
15189142 TA7555S8 Low-Noise OP Amp
15229802 HA66A Wave Generator Custom IC
15229816 MG5534A VCA Custom IC
15229817 AQ0800170 VCF, VCA Custom IC
15229870A DP1352J2 VCA
15219124 M3009 BBD
15319504 M3101 BBD DRIVER
1549106H0 MZ7005 Voltage regulator
1549113 MZ230L Voltage regulator
1549123 MZ231L Voltage regulator

**CAPACITOR**

13589465 ECO-02A473MN Line Capacitor
13529104 DE7150F172MA1 Line Capacitor
13659214MD BZT2558210W 6800µF/25V 3300µF/35V
13659223MD BCET353322W

**TRANSISTOR**

15119113 2SA1015-CR (or 15119112 2SA1015-Y)
15119106DR 2SA933-R (or 15119106DO 2SA933-Q)
15119124 2SA1115-T (or 15119129 2SA1115-E)
15119116 2SB1015-D
15129114 2SC1815-GR (or 15129115 2SC1815-Y)
15129113 2SC1740-R (or 15129141 2SC1740-Q)
15129135 2SC2063-P (or 15129140 2SC2063-E)
151291080A 2SC945 Selected For Noise Generator
15129136 2SC880A
15129827 2SD1406-O
15139103 2SK30A-GR (or 15139101 2SK30A-Y)

**AC CORD, AC CORD SET**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1349812P0</td>
<td>AC Cord Set</td>
<td>200V</td>
</tr>
<tr>
<td>1349813P0</td>
<td>AC Cord Set</td>
<td>240V</td>
</tr>
<tr>
<td>1349817P0</td>
<td>AC Cord Set</td>
<td>200V</td>
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<tr>
<td>1349814P0</td>
<td>AC Cord Set</td>
<td>240V</td>
</tr>
<tr>
<td>1349825F0</td>
<td>AC Cord Set DC-300-200V</td>
<td>100V</td>
</tr>
<tr>
<td>1349801</td>
<td>AC Cord VFF 2,5m</td>
<td>100V</td>
</tr>
<tr>
<td>1349710</td>
<td>AC Inlet</td>
<td>117/220V</td>
</tr>
<tr>
<td>1349709</td>
<td>AC Inlet</td>
<td>240V</td>
</tr>
</tbody>
</table>
| 15256040     | SS-4N-4              | Cord Bushing
|              |                      | 100V version without AC Inlet |
|              |                      | Cord Holder
|              |                      | 100V version without AC Inlet |

**OTHERS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12389728</td>
<td>KMFC1034T1 8MHz ceramic resonator</td>
</tr>
<tr>
<td></td>
<td>MASTER OSC MGB BOARD</td>
</tr>
<tr>
<td>12389719</td>
<td>KMFC1007T31 12MHz ceramic resonator</td>
</tr>
<tr>
<td></td>
<td>(CPU/MOD BOARD)</td>
</tr>
<tr>
<td>12569149</td>
<td>5R2325-1H6 Lithium Battery</td>
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</tbody>
</table>

**KEYBOARD**

76139200 SK361GR 61 Keys

**SK361GR Parts List**

1. 25206 Ceramic Key, C
2. 25205 Ceramic Key, D
3. 25204 Ceramic Key, E
4. 25203 Ceramic Key, F
5. 25202 Ceramic Key, G
6. 25201 Ceramic Key, A
7. 25200 Ceramic Key, C
8. 25204 Ceramic Key, D
9. 25203 Ceramic Key, E
10. 25202 Ceramic Key, F
11. 25201 Ceramic Key, G

12. 25200 Ceramic Key, A
13. 25201 Ceramic Key, C
14. 25202 Ceramic Key, D
15. 25203 Ceramic Key, E
16. 25204 Ceramic Key, F
17. 25205 Ceramic Key, G

**TRANSPORT**

15129113 2SA1015-CR (or 15119112 2SA1015-Y)
15119106DR 2SA933-R (or 15119106DO 2SA933-Q)
15119124 2SA1115-T (or 15119129 2SA1115-E)
15119116 2SB1015-D
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151291080A 2SC945 Selected For Noise Generator
15129136 2SC880A
15129827 2SD1406-O
15139103 2SK30A-GR (or 15139101 2SK30A-Y)
**CIRCUIT DESCRIPTIONS**

**GENERAL**

There are two CPUs on the JUNO-106: IC1 (master on CPU board) and IC29 (slave on Module board). Two CPUs share the tasks as shown below:

**CPU BOARD**

Master CPU /PD7810/7811

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>PIN NO.</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 AND A0</td>
<td>34</td>
<td>Analog Input</td>
</tr>
<tr>
<td>A1 (ANALOG INPUT)</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>38</td>
<td>BENDER CV</td>
</tr>
<tr>
<td>B3</td>
<td>39</td>
<td>LFO SENSE</td>
</tr>
<tr>
<td>B4</td>
<td>40</td>
<td>BENDER POLARITY</td>
</tr>
<tr>
<td>B5</td>
<td>41</td>
<td>LEG TRIGGER</td>
</tr>
</tbody>
</table>

**PORT A**

<table>
<thead>
<tr>
<th>PAD</th>
<th>PIN NO.</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>1</td>
<td>SWITCH READ</td>
</tr>
<tr>
<td>A1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>7</td>
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**PORT B**

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<tr>
<th>PBD</th>
<th>PIN NO.</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>8</td>
<td>DISPLAY LED DRIVE</td>
</tr>
<tr>
<td>A1</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>10</td>
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</tr>
<tr>
<td>A3</td>
<td>11</td>
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</tr>
<tr>
<td>A4</td>
<td>12</td>
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<tr>
<td>A5</td>
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<td>A6</td>
<td>14</td>
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<tr>
<td>A7</td>
<td>15</td>
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<tr>
<td>A8</td>
<td>16</td>
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**PORT C**

<table>
<thead>
<tr>
<th>PCD</th>
<th>PIN NO.</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>17</td>
<td>MIDI/SLAVE SERIAL OUTPUT</td>
</tr>
<tr>
<td>A1</td>
<td>18</td>
<td>MIDI/SLAVE SERIAL INPUT</td>
</tr>
<tr>
<td>A2</td>
<td>19</td>
<td>MIDI/SLAVE CPU SELECT SIGNAL</td>
</tr>
<tr>
<td>A3</td>
<td>20</td>
<td>PEDAL HOLD SWITCH INPUT</td>
</tr>
<tr>
<td>A4</td>
<td>21</td>
<td>PROTECT SWITCH INPUT</td>
</tr>
<tr>
<td>A5</td>
<td>22</td>
<td>CASSETTE INTERFACE INPUT</td>
</tr>
<tr>
<td>A6</td>
<td>23</td>
<td>CASSETTE INTERFACE OUTPUT</td>
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</tbody>
</table>

**PORT D**

<table>
<thead>
<tr>
<th>PAD (Data Bus)</th>
<th>PIN NO.</th>
<th>FUNCTION</th>
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<tbody>
<tr>
<td>A0</td>
<td>24</td>
<td>ROM DATA</td>
</tr>
<tr>
<td>A1</td>
<td>25</td>
<td>ROM DATA</td>
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<td>A2</td>
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<td>ROM DATA</td>
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<td>A3</td>
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<td>A7</td>
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<td>ROM DATA</td>
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<tr>
<td>A8</td>
<td>32</td>
<td>ROM DATA</td>
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</table>

**PORT F**

<table>
<thead>
<tr>
<th>HF</th>
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<tbody>
<tr>
<td>A0</td>
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<td>RAM ADDRESS</td>
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<tr>
<td>A1</td>
<td>34</td>
<td>RAM ADDRESS</td>
</tr>
<tr>
<td>A2</td>
<td>35</td>
<td>RAM ADDRESS</td>
</tr>
<tr>
<td>A3</td>
<td>36</td>
<td>RAM ADDRESS</td>
</tr>
<tr>
<td>A4</td>
<td>37</td>
<td>RAM ADDRESS</td>
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<td>A5</td>
<td>38</td>
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<td>A6</td>
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<td>RAM ADDRESS</td>
</tr>
<tr>
<td>A7</td>
<td>40</td>
<td>RAM ADDRESS</td>
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**KEYBOARD MATRIX**

<table>
<thead>
<tr>
<th>IC9</th>
<th>Port A</th>
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<tbody>
<tr>
<td>CBA</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>000</td>
<td>C2 G7 D7 F7 E7 F7 E7</td>
</tr>
<tr>
<td>001</td>
<td>G7 F7 A7 B7 C7 D7 E7</td>
</tr>
<tr>
<td>010</td>
<td>E7 F7 C7 G7 F7 G7 F7</td>
</tr>
<tr>
<td>011</td>
<td>F7 G7 A7 F7 D7 C7 D7</td>
</tr>
<tr>
<td>012</td>
<td>G7 F7 A7 E7 B7 C7 D7</td>
</tr>
<tr>
<td>013</td>
<td>F7 G7 A7 F7 C7 D7 F7</td>
</tr>
<tr>
<td>100</td>
<td>D7 E7 F7 G7 F7 E7 F7</td>
</tr>
<tr>
<td>101</td>
<td>E7 F7 D7 B7 G7 F7 E7</td>
</tr>
<tr>
<td>110</td>
<td>F7 G7 E7 F7 E7 D7 F7</td>
</tr>
<tr>
<td>111</td>
<td>G7 F7 D7 C7 B7 F7 D7</td>
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**SWITCH MATRIX**

<table>
<thead>
<tr>
<th>IC9</th>
<th>Port A</th>
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<tbody>
<tr>
<td>CBA</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>010</td>
<td>1 2 3 4 5 6 7 8</td>
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<td>011</td>
<td>1 2 3 4 5 6 7 8</td>
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<tr>
<td>100</td>
<td>1 2 3 4 5 6 7 8</td>
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<td>101</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>110</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>111</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>
**LED LIGHTING**

The LEDs in the table are lit sequentially in dynamic format.

<table>
<thead>
<tr>
<th>LED</th>
<th>PF7 of CPU (IC1)</th>
<th>PF6 of CPU (IC1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>0 1 2 3 4 5 6 7</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

**Bank number display**

- **00**: Display
- **01**: Patch number display

**Range Waveform Choices**

- **16**: 8' 4' A'
- **11**: Poly 1, Poly 2
- **14**: Save, Verify
- **16**: Group A, Group B

**POTENTIOMETER & BENDER READINGS**

Multiplexers ICl and ICo combine 16 pots VR1~VR16 into four channels and connect them to AN0~AN3 of CPU IC1 as shown below. To AN4~AN7 connect directly outputs from Bender Board Pots.

Two analog parameter groups - AN0~AN3 and AN4~AN7 are accommodated independently by two A/D converters in ICl.

**NOTE:** The master CPU does not transmit information through AN4~AN7 to the slave but to MIDI OUT. The bender outputs are also read by the slave CPU for use in control Juno-106 proper.

**KEY ASSIGNMENT**

The master CPU IC1 contains two key buffers in internal RAM: one for MIDI keys and one for built-in keyboard; each buffer maps stores the On/Off events of keys as they are played on the associated keyboard.

The master CPU performs logical exclusive OR of these two maps at an interval and takes necessary steps whenever the OR output of a particular note shows a difference from that of the preceding cycle.

- **a)** When Off to On (a new key pressed), transition, the master CPU informs the slave CPU (on the Module board) of the notes value, note On and a module to be assigned to the key.

- **b)** When On to Off (a key released), instructs the slave to free the voice with the key.

This OR system allows MIDI and keyboard to be played simultaneously. However, the system does not generate retrigger pulse, that is, when a key is already held down, pressing the same key on the other keyboard has no effects to the voice.

The master transmits data including the above to the slave in serial format and lets the slave works accordingly.

**RAM & PARAMETER BUFFER**

IC13 of CPU board is a 2048-byte RAM which is capable of storing 128 voices (128 presets). The address map below illustrates how 16-bit parameters and 12-switch status (on the front panel) for a particular preset voice are stored in the RAM.

**DATA TRANSFERRING FROM RAM TO BUFFER**

On power-up the CPU reads a set of panel settings (16 pot and 12 switch) from the RAM memory addressed by default Group, PATCH and BANK buttons.

The CPU then writes this data into an internal buffer called Parameter Buffer.

Whenever a new Group, BANK or PATCH button is selected, the CPU replaces contents in the buffer with the new ones that are read from the RAM; the CPU also sends the information to the slave CPU on the Module board to make new setting effective on the voice(s).

**EDIT**

The master CPU updates the parameter buffer upon receiving outputs from editable controls and switches (on the panel) or upon recognizing messages (MIDI FUNCTION set in EII).

**WRITING INTO RAM**

When a writing procedure is performed on the panel, the master CPU writes the contents in the buffer into the RAM, renewing RAM data to the edited values.

**RAM ADDRESS, RAM SELECTION**

To gain access to 2048-byte memories in the RAM, 11 address lines are required (2^11=2048). In addition to lower 8 bits provided by address latch IC6, higher 3 bits are supplied from CPU port F (PF3-PF2). Selection between RAM and ROM is established by PFS.

**TAPE INTERFACE**

The data transferring between JUNO-106 tape interface and the tape are to be configured as follows:

**LOAD**

The audio waveform from the tape coming into Jack board is first differentiated and smoothed through ICl3a and ICl3b and converted to a rectangular pulse at ICl3a output. The pulse is then applied through PFS to the master CPU which measures the period of the pulse by detecting level changes (edges). The CPU recognizes the waveform as a useful data when the period is:

- **a)** less than 416µs as 0 and
- **b)** within 416~806µs as 1.

The CPU will cease Load routine when it correctly reads entire 1024-byte data group. The following conditions will cause the CPU to issue an error indication:

- **SAVE**

  During the SAVE runtime data of 1024 bytes (data group) are sent out twice from PCB and PCl7 of the master CPU. Each data is represented in 2-bit code that is selected between two available codes depending on values of the adjacent data. This selectable code arrangement makes every data distinct from the neighbors when converted into analog form at R22 and R24.

- **VERIFY**

  Verify circuitry and program work in similar way as in LOAD except that the 1024-byte data is checked against data in the RAM. In case discrepancy between RAM and the tape is added to error conditions mentioned in the above LOAD routine.

A byte is constructed in incorrect format.

Pass word recorded on the tape before the actual data is not found.

Checksum indicates unequal answer.

Length of the half-period is more than 960µs.
The oscillator consists of a master oscillator (BMIC) and a divider IC25. The IC25 divides BMIC by two, four, or eight according to a position of RANGE (4', 8', 16') on the panel and feeds it to DCOs IC33 and IC34 which are 18-bit Programmable Interval Timers.

Each of three counters in one Timer divides OSC frequency by a number defined by a divide data represented on the data bus of the slave CPU IC20. The divide data is the sum of a key number and the outputs from LFO, Bender, Portamento and Tune for a particular note. The resultant at the output of each counter will be a rectangular audio frequency.

D/A CONVERTER

In controlling voices the slave CPU does not output each parameter independently, rather, it integrates some of parameters that are needed for a particular destination (DCO, VCF or VCA) and represents them as a 12-bit data (upper 6 bits at PB0-PB5 and lower 6 bits at PC2-PC7). The data is converted into an analog voltage which is conditioned and routed to the destination module from the multiplexer IC23, 24 or 26 as shown below.

D/A & S/H TIMING CHART

Note that the select code and INH for IC26 are level shifted at IC25 output. This is because that IC26 operates from ±15V.

This document was cleansed. Service schemes added and macros available as free download by synfc.nl
MC6534 (IC 8, 9 and 12) is, with a given rectangular at CLK IN, capable of generating three different waveforms, divided by two rectangular, sawtooth and variable-width rectangular (Pulse Width Modulated). There are three versions in MC6534 series, of these MC6534A is the latest version containing complete two identical circuits. See Parts Change Notes in the Parts List section for detail.

SUB OSCILLATOR

This is self-explaining from the figure. The output amplitude being variable to a change of collector supply voltage (SUB LEVEL).

Sawtooth

For sawtooth and PWM waveforms, DCO CV is applied from the slave CPU in addition to DCO output.

The DCO CV will keep the sawtooth and pulse amplitude nearly constant (approx. 12Vp-p) over the frequency range (detailed later). Therefore, DCO CV includes LFO, BENDER, PORTAMENTHO and TUNE data as well as key value, but it does not contain RANGE data; the DCO CV sets RANGE at the output of 4062 (IC2, 6 or 10) which selects among R85, 86 and 87 in accordance with RANGE code (PF6 and 7 of the slave CPU). The DCO CV changes CS4 through R85 (if 16') and discharges through transistor E on the positive going edges of DCO. If the RC time constant (CS4 and R85, 86 or 87) remains unchanged, sawtooth amplitude becomes low at 4'. The same principle applies to key range over the keyboard; the output amplitude decreases as the note rises high. Therefore, DCO CV is made to become higher in proportion to key number.

Pulse Modulated Wave

At ICB input, sawtooth wave is compared with PWM CV that determines the pulse duration of ICB output; duty ratio is 50% at +6V PWM CV and 96% at -0.6V. With PWM OFF, PWM CV is -0.6V, this can swing and keep ICB output to High, disabling the rectangular.

VCF, VCA

A10H800170, A10H80017A

A10H80017A is a one-chip VCF and VCA. Both VCF and VCA are individually controlled by the several parameters integrated into one voltage: VCF CV contains CUT OFF (VCF) frequency, ENV, LFO, Key follow and Bender; VCA CV includes ENV and GATE.
↑ PANEL BOARD
76139320
(pcb 22915911)
View from foil side

CPU BOARD ➪
76139140
(pcb 22915901)

NOTE: BACKUP CIRCUITRY/BATTERY (CPU BOARD)

GROUNDING IC4 OPEN TERMINALS

- Mandatory On Units with Serial Numbers Up To 439000.
- To insure a longer battery life, short together IC4's pins 4, 5 and 7 (or a DG terminal) of the CPU board.
- In practice, first connect a jumper wire to a digital GROUND and then to pins 4 and 5 to protect IC4 against static charges.

REPLACING BATTERY

- Also replace the battery that cannot supply more than 2.8V under installed condition.
- In replacing, be sure to observe polarity of the battery.
- After mounting, check the voltage; it must be more than 3V.
### ADJUSTMENT

Adjustment must be performed in the order listed below:

- POWER SUPPLY BOARD
- ENTERING TEST MODE
- MODULE BOARD
- JACK BOARD
- CHECKING MIDI FUNCTION

### CAUTION

Allow at least 10 minutes for warm-up period; mandatory upon VCF adjustments.

#### 1. DC SUPPLY VOLTAGES (POWER SUPPLY BOARD)

**CAUTION**

Any slight adjustment on this board must be followed by a complete adjustment of the rest. Do not touch the trimmers inadvertently before checking the test points for voltage.

Test instrument: Digital volt meter with 10mV resolution.

1. Adjust VR1 for -15V ± 10mV at [2].
2. Adjust VR2 for 45V ± 10mV at [3].
3. Verify +15V ± 0.8V at [2].
4. Verify +5V ± 0.5V at [4].

#### PRESSING BANK button

Pressing BANK buttons also activates Test Program and sets the front panel controls as below. PATCH buttons have no effects in the test mode.

<table>
<thead>
<tr>
<th>BANKNO</th>
<th>TEST FUNCTION</th>
<th>LFO</th>
<th>DCO</th>
<th>HF</th>
<th>VCF</th>
<th>VCA</th>
<th>ENV</th>
<th>CHORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCA OFFSET</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>SUB OSC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>VCA GAIN VCF</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>PWM 50%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>NOISE LEVEL</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>VCF HIGH LOW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>RE-TRIGGER</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Not all TEST FUNCTIONS are involved in the adjustment.

---

### 2. DCO CV OFFSET (MODULE BOARD)

- **Test instrument:** Voltmeter (1mV resolution)
- **Test point:** TP3
- **Key assignment:** POLY 1 (UNISON during test mode).

1. Press MIDI CH button; D/A converter turns its output to 0V.

**CAUTION**

Pressing any key on the keyboard releases MIDI CH, letting the D/A to develop voltage according to that key. Press MIDI CH again to defeat the key voltage.

2. Adjust VR33 for 0V reading.
3. Leave MIDI CH ON for the next adjustment 3.

---

### 3. VCA BIAS (MODULE BOARD)

- **Test instrument:** Voltmeter (1mV resolution)
- **Test point:** TP7
- **Key assignment:** POLY 1 (UNISON during test mode).

1. Press MIDI CH. Refer to "CAUTION in 2.1."
2. Adjust VR34 for a reading within ±0.25V to ±0.27V.

---

### 4. VCA OFFSET (MODULE BOARD)

- **Test instrument:** Oscilloscope
- **Test point:** TP8 (CH1) to TP13 (CH6)
- **BANK:** 1
- **Key assignment:** POLY 1 (UNISON during test mode).

1. Adjust the following trimmers, respectively, for the minimum thumps:

<table>
<thead>
<tr>
<th>VR NO.</th>
<th>30</th>
<th>25</th>
<th>20</th>
<th>15</th>
<th>10</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH NO.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

---

### TEST PROGRAM

The following adjustments can be performed with the aid of Test Program stored in the CPU on the CPU Board. To enter the test mode, hold KEY TRANSPOSE down and turn the JUNO-106 ON, the display window will read indicating that the unit is in the test mode. During the test mode, each switch serves as follows:

- POLY 1: UNISON:
  - All six modules are assigned simultaneously to a key being pressed.
  - The display window indicates currently assigned channel number.

- POLY 2:
  - ROTARY: The voices are assigned to the keys played in any sequence.
  - The display window indicates currently assigned channel number.

- POLY 1 & POLY 2:
  - ROTARY: The voices are assigned in cyclic manner; 7th key steers the voice from the 1st key.
  - The display window indicates currently assigned channel number.

- BANK GROUP:
  - GROUP A: HOLD OFF
  - GROUP B: HOLD ON

- MIDI CH:
  - Turns D/A output to 0V

Pressing BANK buttons also activates Test Program and sets the front panel controls as below. PATCH buttons have no effects in the test mode.
5. VCF RESONANCE
(MODULE BOARD)

**CAUTION**
This adjustment must be done after 10 minutes has passed.

- **Test instrument:** Oscilloscope
- **Test point:** TP10 (CH1) to TP14 (CH6)
- **Key assignment:** POLY 1 (UNISON during test mode)
- **Bank:** 3

5-1. While holding down C4 key, adjust the trimmers listed below, respectively, for 4.8Vpp sine wave.

<table>
<thead>
<tr>
<th>VR NO.</th>
<th>10</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>29</th>
<th>13</th>
<th>13</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH NO.</td>
<td>21</td>
<td>22</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

6. VCA GAIN
(MODULE BOARD)

**CAUTION**
This adjustment must follow 5. VCF RESONANCE.

- **Test instrument:** Oscilloscope
- **Test point:** TP8 (CH1) to TP13 (CH6)
- **Key assignment:** POLY 1 (UNISON during test mode)
- **Bank:** 3

6-1. While holding down C4 key, adjust the following trimmers, respectively, for 6Vpp sine wave.

7. VCF FREQUENCY
(MODULE BOARD)

**CAUTION**
This adjustment must be performed after 10-minute warmup has passed.

- **Test instrument:** Frequency counter or Tuner
- **Test point:** TP8 (CH1) to TP13 (CH6), or OUTPUT
- **Key assignment:** POLY 1 (UNISON during test mode) or POLY 1 + POLY 2 (ROTARY during test mode) when checking at OUTPUT
- **Bank:** 3

7-1. While holding C4 key down, adjust the trimmers listed below, respectively, for 248Hz (B3 pitch).

<table>
<thead>
<tr>
<th>VR NO.</th>
<th>22</th>
<th>27</th>
<th>27</th>
<th>13</th>
<th>13</th>
<th>13</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH NO.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

8. VCF WIDTH
(MODULE BOARD)

**CAUTION**
Perform this adjustment after at least 10-minute warm-up.

- **Test instrument:** Frequency counter or Tuner
- **Test point:** TP8 (CH1) to TP13 (CH6), or OUTPUT (tuner method)
- **Key assignment:** POLY 1 or POLY 1 + POLY 2 (OUTPUT)
- **Bank:** 3

8-1. Holding OS key down, adjust each trimmer listed below respectively for 992Hz (equal to B5 note).

<table>
<thead>
<tr>
<th>VR NO.</th>
<th>25</th>
<th>28</th>
<th>23</th>
<th>18</th>
<th>16</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH NO.</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

9. NOISE LEVEL
(MODULE BOARD)

**CAUTION**
6. VCA GAIN must have been finished before this adjustment is performed.

- **Test instrument:** Oscilloscope
- **Test point:** TP8
- **Key assignment:** POLY 1
- **Bank:** 0

9-1. Holding any key on the keyboard down, adjust VR32 for 4Vpp on the scope.

10. PWM
(MODULE BOARD)

**CAUTION**
2. DCU CV OFFSET must have been finished.

- **50%**
  - **Test instrument:** Oscilloscope
  - **Test point:** TP8 (CH1) to TP13 (CH6)
  - **Key assignment:** POLY 1
  - **Bank:** 5

10-1. While holding C4 key down, adjust VR31 for a 50% duty cycle.

10-2. Confirm that the duty cycles of the rest channels (TP8 – TP13) are within 48 – 52%.

10-3. Holding C4 key down, confirm that duty cycle of all channels are within 89 – 97% with PWM set at 10.

**NOTE:** If, incidentally, the PWM knob has been set at 10, lower it then raise to 10 again.

11. CHORUS BIAS
(JACK BOARD)

- **Test instrument:** Oscilloscope, Audio generator
- **Test point:** TP1 (CH1), TP2 (CH2)
- **VCA LEVEL:** 0
- **Chorus:** 1

11-1. Feed 10Vpp, 1kHz sine wave into TP2 of the MODULE BOARD.

11-2. Adjust VR1 (CH1) and VR2 (CH2) on the JACK Board respectively so that positive and negative halves are symmetrical with respect to the center horizontal line.

12. LOAD OFFSET
(JACK BOARD)

- **Test instrument:** Voltmeter with 1mV resolution
- **Test point:** TP5

12-1. Adjust VR3 for 0mV reading.

13. MIDI FUNCTION SWITCH CHECK

- I: only VERIFY LED lights
- II: only SAVE LED lights
- III: no LEDs light

13-1. Verify the following with FUNCTION set at respective position.

- I: VR3 = 0
- II: VR3 = 1
- III: VR3 = 2
MIDI NOTES

GENERAL PRECAUTIONS ON MIDI CONNECTION

Although all MIDI instruments function to MIDI specification, some precautions must be taken for satisfactory operation.

This is mainly due to MIDI readers. One of primary procedures to be correctly followed is setting of "Channel Mode" otherwise MIDI function fails from the beginning. Also remember that MIDI information is effective only when receiving device can recognize a given message and has software and hardware that duplicate function defined by the message.

On power-up most Roland products complying with MIDI specification 1.0 default to OMNI OFF, POLY. On the contrary, they transmit OMNI OFF and POLY mode messages from MIDI OUT jack. The reason is as follows.

MODE | RECEIVER
----- |---------
1 OMNI ON POLY | Voice messages are received from all Voice Channels and assigned to voices polyphonically.
2 OMNI ON MONO | Voice messages are received from all Voice Channels, and assigned only to one voice, monophonically.
3 OMNI OFF POLY | Voice messages are received in Voice Channel N thru 1 thru M, and assigned monophonically to voices 1 thru M, respectively.
4 OMNI OFF MONO | Voice messages are received in Voice Channel N thru 1 thru M, and assigned monophonically to voices 1 thru M, respectively.

N: Basic Channel

This is a inherent channel of an instrument, which cannot be changed by MIDI messages but may be changed by the panel function on the instrument.

The JUNO-106 has channel selections on the front panel.

Receiving instrument must be set to OMNI OFF mode when it is to accommodate voice messages sent over the channel to which it is currently assigned while other voice messages are present in other channels. (Example: a system consists of one master and more than one slave, each assigned to different channel.) However, some instruments are incapable of changing modes on the front panel and need external OMNI OFF mode message.

To cure this problem a system including such instruments as slaves should be configured as below.

MASTER (1st slave)

*capable of producing OMNI OFF message (or POLY, see NOTES)
1. on panel or other means at desired time
2. on power-up

SLAVE(s)

*incapable of turning to OMNI OFF mode by itself

In the above combination:

1. Slave must be powered ON before the master is turned ON. (When the second slave connects to MIDI OUT of the first slave, it is the first to be turned ON)
2. Master and Slave(s) must be set in the same channel since mode messages will be recognized by the same only when set in the channel to which the slave's receiver has been assigned.

NOTES:

1. Roland products with preliminary MIDI turn to OMNI OFF upon receiving POLY mode ON.
2. JUNO-106 transmits OMNI OFF and POLY messages on power-up.

MIDI IMPLEMENTATION

1. TRANSMITTED DATA

1.1. TRANSMITTED DATA

Note events, Hold on/off and Channel Mode messages are sent.

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 xnn nnnn 00kk bbb hhh 0000 0000 0000</td>
<td>Note on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1001 xnn nnnn 00kk bbb hhh 0000 0000 0000</td>
<td>Note off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1011 xnn nnnn 0100 0000 0111 1111</td>
<td>Hold on from rear panel jack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1011 xnn nnnn 0100 0000 0000 0000</td>
<td>Hold off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1011 xnn nnnn 0111 1111 0000 0000</td>
<td>ALL NOTE OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1011 xnn nnnn 0111 1111 0000 0000 | POLY *

NOTE: xnnn: MIDI channel number - 1. (If ch-1, xnnn = 0000)

*1: On power up or when MIDI channel number is set.
*2: When all Notes are turned off.

1.2. WHEN MIDI FUNCTION IS AT 2.

Messages to be sent with FUNCTION set at 1, Program Change, Bender and LFO Modulation are sent.

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1106 xnn 00pp 00pp</td>
<td>Program Change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>Pitch Bender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>LSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>CENTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MAX (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (high)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.3. WHEN MIDI FUNCTION IS AT 3.

Messages to be sent with FUNCTION set at 1, Bender, LFO Modulation and Exclusive Messages are sent.

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100 xnn 00pp 00pp</td>
<td>Program Change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>Pitch Bender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>LSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>CENTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MAX (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (high)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. RECOGNIZED RECEIVE DATA

2.1. WHEN MIDI FUNCTION IS AT 1.

When power is first applied, receiver's mode is set to OMNI ON, POLY. Note events, Hold on/off and Channel Mode Messages are recognized.

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 xnn 00kk bbb hhh</td>
<td>Note ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1001 xnn 00kk bbb hhh</td>
<td>Note OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1111 xnn 0111 1111 0000 0000</td>
<td>Note OFF, velocity ignored</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1111 xnn 0011 1111 0000 0000</td>
<td>Note OFF, hold ON, velocity ignored</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2. WHEN MIDI FUNCTION IS AT 2.

Messages to be recognized with FUNCTION set at 1, Program Change, Bender and LFO Modulation are recognized.

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1106 xnn 0000 0000 0000</td>
<td>Program Change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>Pitch Bender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>LSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>SS (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>CENTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (low)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MAX (high)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110 xnn 00bb 0000 0bb bbb hhh</td>
<td>MIN (high)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. EXCLUSIVE MESSAGES

3.1. When Group, Bank or Patch number is changed.

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1111 0000</td>
</tr>
<tr>
<td>b</td>
<td>0100 0000</td>
</tr>
<tr>
<td>c</td>
<td>0011 0000</td>
</tr>
<tr>
<td>d</td>
<td>0000 nnNN</td>
</tr>
<tr>
<td>e</td>
<td>0000 nn00</td>
</tr>
<tr>
<td>f</td>
<td>Oxx xxxx</td>
</tr>
<tr>
<td>g</td>
<td>1111 0111</td>
</tr>
</tbody>
</table>

*** Example ***

```
   a b c d e f g
  7F 45 00 00 2F 00 00 2A 19 1F
```

3.2. When Manual Button is pressed.

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1111 0000</td>
</tr>
<tr>
<td>b</td>
<td>0000 0000</td>
</tr>
<tr>
<td>c</td>
<td>0011 0001</td>
</tr>
<tr>
<td>d</td>
<td>0000 nn00</td>
</tr>
<tr>
<td>e</td>
<td>0000 0000</td>
</tr>
<tr>
<td>f</td>
<td>Oxx xxxx</td>
</tr>
<tr>
<td>g</td>
<td>1111 0111</td>
</tr>
</tbody>
</table>

*** Example ***

```
   a b c d e f g
  7F 45 00 00 2F 00 00 2A 19 1F
```

3.3. When pos.1 or switch in the upper half of the front panel is manipulated.

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1111 0000</td>
</tr>
<tr>
<td>b</td>
<td>0000 0000</td>
</tr>
<tr>
<td>c</td>
<td>0011 0001</td>
</tr>
<tr>
<td>d</td>
<td>0000 nn00</td>
</tr>
<tr>
<td>e</td>
<td>0000 0000</td>
</tr>
<tr>
<td>f</td>
<td>Oxx xxxx</td>
</tr>
<tr>
<td>g</td>
<td>1111 0111</td>
</tr>
</tbody>
</table>

*** Example ***

```
   a b c d e f g
  7F 45 00 00 2F 00 00 2A 19 1F
```

3.4. Parameter number table.

* Potentiometers

<table>
<thead>
<tr>
<th>#/</th>
<th>Function</th>
<th>#/</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>LFO rate</td>
<td>8</td>
<td>VCF LPf</td>
</tr>
<tr>
<td>1</td>
<td>LFO delay</td>
<td>9</td>
<td>VCF KYBD</td>
</tr>
<tr>
<td>2</td>
<td>110 LFO</td>
<td>10</td>
<td>VCF level</td>
</tr>
<tr>
<td>3</td>
<td>110 LFO</td>
<td>11</td>
<td>attack</td>
</tr>
<tr>
<td>4</td>
<td>noise level</td>
<td>12</td>
<td>decay</td>
</tr>
<tr>
<td>5</td>
<td>VCF cutoff</td>
<td>13</td>
<td>sustain</td>
</tr>
<tr>
<td>6</td>
<td>resonance</td>
<td>14</td>
<td>release</td>
</tr>
<tr>
<td>7</td>
<td>VCF ENV</td>
<td>15</td>
<td>sub level</td>
</tr>
</tbody>
</table>

* Switches

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>chorus</td>
</tr>
<tr>
<td>1</td>
<td>chorus</td>
</tr>
<tr>
<td>2</td>
<td>sustain</td>
</tr>
<tr>
<td>3</td>
<td>pulse</td>
</tr>
<tr>
<td>4</td>
<td>range</td>
</tr>
<tr>
<td>5</td>
<td>1: off</td>
</tr>
<tr>
<td>6</td>
<td>1: on</td>
</tr>
<tr>
<td>7</td>
<td>1: gate</td>
</tr>
<tr>
<td>8</td>
<td>1: RAN</td>
</tr>
<tr>
<td>9</td>
<td>0: on</td>
</tr>
<tr>
<td>10</td>
<td>0: ENV</td>
</tr>
<tr>
<td>11</td>
<td>0: 15</td>
</tr>
</tbody>
</table>

3.4. Parameter number table.

* Potentiometers

<table>
<thead>
<tr>
<th>#/</th>
<th>Function</th>
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</thead>
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</tr>
<tr>
<td>1</td>
<td>LFO delay</td>
<td>9</td>
<td>VCF KYBD</td>
</tr>
<tr>
<td>2</td>
<td>110 LFO</td>
<td>10</td>
<td>VCF level</td>
</tr>
<tr>
<td>3</td>
<td>110 LFO</td>
<td>11</td>
<td>attack</td>
</tr>
<tr>
<td>4</td>
<td>noise level</td>
<td>12</td>
<td>decay</td>
</tr>
<tr>
<td>5</td>
<td>VCF cutoff</td>
<td>13</td>
<td>sustain</td>
</tr>
<tr>
<td>6</td>
<td>resonance</td>
<td>14</td>
<td>release</td>
</tr>
<tr>
<td>7</td>
<td>VCF ENV</td>
<td>15</td>
<td>sub level</td>
</tr>
</tbody>
</table>

* Switches

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
<td>1</td>
<td>chorus</td>
</tr>
<tr>
<td>2</td>
<td>sustain</td>
</tr>
<tr>
<td>3</td>
<td>pulse</td>
</tr>
<tr>
<td>4</td>
<td>range</td>
</tr>
<tr>
<td>5</td>
<td>1: off</td>
</tr>
<tr>
<td>6</td>
<td>1: on</td>
</tr>
<tr>
<td>7</td>
<td>1: gate</td>
</tr>
<tr>
<td>8</td>
<td>1: RAN</td>
</tr>
<tr>
<td>9</td>
<td>0: on</td>
</tr>
<tr>
<td>10</td>
<td>0: ENV</td>
</tr>
<tr>
<td>11</td>
<td>0: 15</td>
</tr>
</tbody>
</table>
TO SERVICE ENGINEERS:

SUBJECT
COUNTERMEASURE TO MEMORY BACK UP BATTERY

We inform you that we have taken a modification to JUNO-106 to set longer battery life than now from the serial number 437300 (last June production). This information is issued for solution you can apply to JUNO-106 with the serial numbers 437299 and before when you have a chance to repair it.

PROBLEM

It was found that JUNO-106 is likely to break memory data in a short period as IC-4 40H000P on CPU BOARD draws a variance current ranging 250 micro ampere to zero.

CAUSE & SOLUTION

The “floating” inputs (pins 4 and 5) of the unused section of IC-4 40H000P are the cause of this problem. The solution is that they should be connected to ground point by using a jumper wire. Please refer to the attached drawing.

NOTE: If you have a chance to repair JUNO-106 on any problem, please take the following steps, certainly.

STEP-1: Check whether the battery voltage is more than 2.8V or not.

STEP-2: If the battery voltage is less than 2.8V, please replace the battery with new one and then take above modification to CPU BOARD.

STEP-3: If the battery voltage is more than 2.8V, you do not need to replace the battery but need to take the modification.

NOTE: Before proceeding above steps, please save DATA (group A and B) into an external cassette tape to keep a memorized DATA.

NOTE: Firstly, connect a jumper wire to above ground point to prevent breaking IC from happening on, and then, connect the jumper wire to pins 4 and 5 of IC-4.

Pins 4 and 5 must be connected to grounding point by using a jumper wire.

This document was cleaned, Service Bulletins added and made available as free download by synfo.nl
Recently there are many IC(AIQ-80017) faults on JUNO-106. So we checked this IC and found the following trouble points.

1) Obfected IC Lot: 41C and 42B lots

2) Problem: Leakage between jump wire and $-15\text{V}$ line on IC. Poor soldering. Surface leakage etc....

3) Countermeasure: Must be replaced with the new one (the other lot).

So when you meet to repair the above model, please check this and replace it with the new one if necessary.

80017A
Roland □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ Indicated IC Lot no.