SERVICE NOTES
First Edition

TABLE OF CONTENTS / 目次

SPECIFICATIONS

- Keyboard ............................................ 1
- Panel .............................................. 2
- Exploded View ...................................... 3
- Disassembly / Assembly ............................ 4
- Keyboards .......................................... 5
- Identifying Version Number ......................... 6
- Restoring the Factory Presets ...................... 7
- ADJUSTMENT ....................................... 8
- DATA SAVe AND LOAD .............................. 9
- Circuit Disconnection .............................. 10
- Parts List .......................................... 11
- Block Diagram ..................................... 12
- Circuit Board (MAIN) ............................. 13
- Circuit Diagram (MAIN) ......................... 14
- Circuit Board (VOLUME L and ENCODER) ....... 15
- Circuit Diagram (ENCODER) ....................... 16
- Circuit Diagram (VOLUME L) ...................... 17
- Circuit Board (VOLUME R) ....................... 18
- Circuit Board (JACK) ............................. 19
- Circuit Diagram (JACK) .......................... 20
- Circuit Boards ..................................... 21
- Circuit Diagrams .................................. 22
- Circuit Board (SWITCH A, B, C, LED and Bender) 23
- Test Mode .......................................... 24
- Troubleshooting .................................... 25
- IC DATA ........................................... 26

- SPECIFICATIONS / 仕様
  - Keyboard ........................................ 1
  - Panel .......................................... 2
  - EXPLODED VIEW ................................. 3
  - DISASSEMBLY / ASSEMBLY ....................... 4
  - KEYBOARD ....................................... 5
  - IDENTIFYING VERSION NUMBER .................. 6
  - RESTORING THE FACTORY PRESets .............. 7
  - ADJUSTMENT .................................... 8
  - DATA SAVE AND LOAD ............................ 9
  - CIRCUIT DISCRIPTION ........................... 10
  - PARTS LIST ...................................... 11
  - BLOCK DIAGRAM ................................ 12
  - CIRCUIT BOARD (MAIN) ......................... 13
  - CIRCUIT DIAGRAM (MAIN) ....................... 14
  - CIRCUIT BOARD (VOLUME L and ENCODER) ...... 15
  - CIRCUIT DIAGRAM (ENCODER) .................... 16
  - CIRCUIT DIAGRAM (VOLUME L) ................. 17
  - CIRCUIT BOARD (VOLUME R) ..................... 18
  - CIRCUIT BOARD (JACK) ........................ 19
  - CIRCUIT DIAGRAM (JACK) ....................... 20
  - CIRCUIT BOARDS ................................ 21
  - CIRCUIT DIAGRAMS ............................... 22
  - CIRCUIT BOARD (SWITCH A, B, C, LED and Bender) 23
  - TEST MODE ...................................... 24
  - TROUBLESHOOTING ............................... 25
  - IC DATA ........................................ 26

- 8 Knob CM ........................................ (22485251)
- Rotary Encoder .................................... (EVOW05F02040)
- Display Cover ..................................... (22050250)
- Front Panel A (2125496)
- Front Panel B ..................................... (2225439)
- Bender Unit ....................................... PB-1016 (23275009)
- Keyboard Assy .................................... SK-781-E (7025020000)
- LCD Display ....................................... LM40 x 212 (15029523)
- LED B seg ......................................... (15029585)
- Lower Panel R .................................... (21125497)
- Power Switch ...................................... WKZ4A4 6A/250V (13149108)
- Bottom Chassis .................................... (22815778)
- AC inlet ........................................... PA-116 (13429710: 100V/120V/230V)
- Jack (stereo)....................................... YKB21-5010 (13449145)
- Jack (mono) ........................................ YKB21-5012 (13449145)
- DIN Socket (triple) ............................... YKFS1-5046 (13429273)
- Card Escutcheon (WAVEFORM card) ............. (22253365)
- Card Escutcheon (DATA card) ............... (22253365)
- Lower Panel L .................................... (21125498)

- © 1991 by ROLAND CORPORATION

17059569 Printed in Japan AHE0 (DP) 1
<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 KNOB S</td>
<td>224155253</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 KNOB CS</td>
<td>224155252</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 POT ESCUTCHEON 1P</td>
<td>222255558</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 POT ESCUTCHEON 2P</td>
<td>222255559</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 POT ESCUTCHEON 3P</td>
<td>222255560</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 POT ESCUTCHEON 4P</td>
<td>222255561</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 KNOB HOLDER 1P</td>
<td>222255540</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 KNOB HOLDER 2P</td>
<td>222255541</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 KNOB HOLDER 3P</td>
<td>222255542</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 KNOB HOLDER 4P</td>
<td>222255543</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EWA-NPE × 05815</td>
<td>13334481</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EWA-NPK × A3815</td>
<td>13334833</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EWA-NAO × 05814</td>
<td>13359666</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RK11K113</td>
<td>13289133</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 With center click, EWA-NPK × A3815

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>B KEYTOP A 1P</td>
<td>22495251</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP A 2P</td>
<td>22495252</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP A 3P</td>
<td>22495253</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP A 4P</td>
<td>22495254</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP A 5P</td>
<td>22495255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP B</td>
<td>22495256</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B KEYTOP C</td>
<td>22495257</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B BUTTON</td>
<td>22455663</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED GJH58</td>
<td>15005299</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED SPACER LDS-120R</td>
<td>12169370</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED HOLDER 2P</td>
<td>22205533</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED HOLDER 3P</td>
<td>22205534</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKPDAC 250G</td>
<td>13169727</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKVHD 100G</td>
<td>13169597</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVG-GB913K</td>
<td>13169728</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EXPLODED VIEW / 分解図

No. | PARTS NAME | PARTS No. |
----|------------|-----------|
 1  | Volume_L Board | 7626619001 |
 2  | Volume_R Board | 7626631001 |
 3  | Encoder Board | 7626618001 |
 4  | Switch A Board | 7626634001 |
 5  | Bender Board | 7626637001 |
 6  | Switch B Board | 7626637001 |
 7  | LED Board | 7626637001 |
 8  | LCD Display LM40 x 212 | 15029523 |
 9  | Display Cover | 22045265 |
10  | Switch C Board | 7626637001 |
11  | B Knob CM | 22485251 |
12  | B Knob CS | 22485252 |
13  | Bender Unit PB-A0106 | 23276929 |
45  | Leaf Terminal | 23465322 |
47  | SW_A Preparing Lead | 23485879 |
48  | Coaching Clip CS-4 | 22200561 |
49  | Panel Holder | 22200561 |

SCREW -
B 3 x 8mm B.Tight Binding Fe.Cm
C 3 x 8mm P.Tight Pan Head Fe.BC
EXPLODED VIEW

No. | PARTS NAME | PARTS No.
---|------------|---------
14 | Lower Panel R | 21125499
15 | Side Holder R | 22205536
16 | LCD Holder | 22205539
17 | Side Panel Holder B | 22205563
18 | Side Holder L | 22205535
19 | Lower Panel L | 21125498
20 | Side Panel Holder A | 22205562
21 | Side Panel L | 21125496
22 | Side Panel R | 21125497
23 | Front Panel B | 22225440
24 | Front Panel A | 22225439
25 | B Pot Escutcheon 4P | 22225361
26 | B Pot Escutcheon 3P | 22225360
27 | B Pot Escutcheon 2P | 22225359
28 | B Pot Escutcheon 1P | 22225358
29 | Adhesive Tape | 23455322
30 | Leaf Terminal | 23466693
31 | Preparing Wire | 23466693
32 | Coaching Clip C5-4 | 

SCREW:
A 3 x 6mm P. Tight Pan Head Fe.BC
B 3 x 8mm B. Tight Binding Fe.CM
C 3 x 6mm P. Tight Pan Head Fe.BC
HOW TO REMOVE THE PANEL
パネルのはずし方

- Remove 8 screws A
- Aのネジ8本をはずします。
- Remove 6 screws B.
- Bのネジ6本をはずします。
- Remove 2 screws C.
- Cのネジ2本をはずします。
**KEY REMOVAL**

1. Remove the stopper.

2. Pulling the key in the direction of arrow 2, disengage the key fulcrum from the chassis. See Fig.3 and Fig.4 for disengage status.

3. Taking care not to distort the spring, lift the key in the direction of 3.

**KEY INSTALLATION**

1. Place the spring onto the chassis as shown in Fig.6.

2. Referring to Fig.8, press the key in the direction of 4.

**KEY の取り付け方**

1. Fig.6に示す様、スプリングをシャーシに設置します。

2. スプリングをKEYスプリング保持部に当て(Fig.8参照)、方向4にKEYを押し込みます。
【CONTACT BOARD INSTALLATION】
First align the 2.1mm hole between C3 and C#3 of the contact board with a half piece of the chassis. Next align the slot (2.1 x 4mm) of remaining octaves with half pieces, respectively. Make sure the joint of the CIC cable and the board end are on the left end of the lowest G of the chassis. The CIC cable cannot be detached as it is thermally sealed to the contact board.

【CONTACT RUBBER SHEET INSTALLATION】
Place the contact rubber sheet on the contact board. Align contact projections with holes in the board. Press the hole in top face of the projection with a small rod (like clip shown in Fig.12) so that the projection is held in a hole of the chassis. Note that the left end of a rubber contact should be placed over the right end of the left side rubber sheet (see M in Fig.12).

【基板の取り付け方】
まずC3とC#3の穴にあたる2.1mmの基板の穴をシャーシーのハーフピースに合わせ、次に1オクターブ1コずつある2.1 x 4mmの穴を合わせて行います。この時、CICケーブルと基板のつまき目がシャーシー下面部厚さ (G) と一致する事を確認してください。なお、CICケーブルと基板は、熱压着されているので、分解できません。

【INSTALLING THE AFTERTOUCH CIC TO THE CONNECTOR BOARD】
Fasten screws from the backside using the holes (1), at the D1 key chassis shank section on the connector board.

【接点ゴムの取り付け方】
接点ゴムの足を基板の穴に合わせて置き、先端のものがない側

【コネクターボードへのアフタータッチ、CICの取り付け方】
コネクターボードは、シャーシーA#2KEY軸部付近にある穴 (1) を用いて基盤からピースにて固定します。

A lock is provided on the CIC cable connector. The lock releases when both sides of the connector are gripped and pulled out in the direction of (2). The lock attaches when pushed in the direction of (3). Lock the CIC cable in position after plugging it in and release the lock before removing the cable.

Plug the AFTER TOUCH and the FUJI CARD directly into the connector. (Plug in to lock.) In order to remove, simply pull. (The lock will release when the right amount of force is exerted while pulling) After plugging the FUJI CARD into the connector, seal it to the chassis with double-sided tape. (FUJI CARD bends in a right angle at the A #2 KEY position)

CICケーブル用のコネクタにはロックがついています。コネクタの両端を持って (2) 方向に引くとロックが解除され、(3) 方向に押すとロックされます。CIC取り付けの際には、CICケーブルを差し込んだ後にロックを行い、取りはずす前にロックの解除を行って下さい。

アフタータッチ及びフジカードは、コネクタにそのまま差し込むで下さい。（差し込むとロックされます。）はずす時は、そのまま引き抜いて下さい。（ある程度、引く抜き方向に負荷がかかりとロックが解除される。）

フジカードはコネクタに差し込んだ後、シャーシーに貼付である面をフジカードで固定します。（A #2KEYの裏側でフジカードを直接に貼り付けます。）

CAUTION: When removing a contact rubber sheet, gently pull it off the board or sheet will break off.

注: 捕点ゴムを取りはずす時、無理に引っ張るとゴム足が切れることがないので慎重に扱ってください。
IDENTIFYING VERSION NUMBER

1. Press the [MULTI] button to set the JD-800 in Multimode.
2. Press the [EXIT] button while simultaneously pressing both the [CURSOR L] and [CURSOR R] buttons.
3. The version number is displayed on the screen at the right.

REMOVING THE FACTORY PRESETS

The original factory settings will be restored to the entire memory space when performing the following operation. Make sure to transfer user data to a DATA card (M-2675) before executing this operation. (Refer to “Data Save and Load” page 9.)

1. Turn on the power.
2. After pressing the [DATA TRANSFER] button, press the [PAGE A] button six times to call up the “Factory preset” screen.

3. Complete the procedure by pressing the [INC/YES] button.

ADJUSTMENT

【1】Adjusting D/A Conversion

- Use VR1 on the jack board for adjustment.

【2】Adjusting LCD Contrast

- Use VR1 on the main board for adjustment.
- The display becomes dark when turning the VR1 toward the right and becomes light when turning it toward the left.

【1】D/A調整

- 調整はジャックボード上のVR1に従って行います。
- 電子音のレベルを調節したい場合は、使用したいトーンの設定値を参照してください。

【2】LCDコントラスト調整

- 調整はメインボード上のVR1に従って行います。
- VR1を右へ回すと表示が暗くなり、左へ回すと薄くなります。

バージョン番号の確認方法

1. [MULTI]ボタンを押し、JD-800をマルチモードにします。
2. [CURSOR L]と[CURSOR R]を同時に押しながら、[EXIT]ボタンを押します。
3. 右側面にバージョン番号が表示されます。

[data save and load]

- Save and Load by using the DATA card.

【1】Saving

1. Insert the DATA card into the DATA slot, and turn off the memory protection function of the DATA card.
2. After pressing the [DATA TRANSFER] button, press [PAGE A] to read out the "INT → CRD" screen.
3. Select the data to be saved by moving the [∥] mark by using the [CURSOR ▼].
4. Press [INC/YES].

DATA card overwritten sure?[YN]?

This message means “Do you wish to overwrite all data on the DATA card with that from internal memory?” All internal data (ALL) are automatically transferred when pressing [INC/YES]. Data can be read from and written to the DATA card without initialization when the above operation is completed.

【2】Loading

1. Insert the DATA card into the DATA slot.
2. After pressing the [DATA TRANSFER] button, press [PAGE A] to call up the "CRD → INT" screen.
3. Select the data to be loaded by moving the [∥] mark by using the [CURSOR ▲].
4. Press [INC/YES].

データのセーブ/ロードの方法

【1】セーブの方法

1. DATAカードをDATAスロットへ差し込み、DATAカードのプロテクトをOFFにします。
2. [DATA TRANSFER]ボタンを押した後、[PAGE A]を押し、"INT → CRD"の画面を呼び出します。
3. [CURSOR ▲]を押して[∥]マークを動かし、セーブするデータを選択します。
4. [INC/YES]を押します。

【2】ロードの方法

1. DATAカードをDATAスロットに差し込みます。
2. [DATA TRANSFER]ボタンを押した後、[PAGE A]を押し、"CRD → INT"の画面を呼び出します。
3. [CURSOR ▼]を押して[∥]マークを動かし、ロードするデータを選択します。
4. [INC/YES]を押します。

※この操作を実行すると、バッファがデータの一部を削除する可能性があります。バッファがデータの一部を削除する場合、あらかじめ手のカートリッジをコピーして保存しておくことをおすすめします。
回路説明

【概説】

JD-800はIC36（CPU、メモリMB）をCPUとするシステムです。IC21はIC6（NB）をメモリ、IC5（MB）はバッテリーパックにインサート、IC11（MB）はキーボードとインタフェース用です。

【電源源選択】

- IC2（電源供給）は電圧3.5Vを分解し、電圧3.5V（電源）の電源を供給しています。IC2は電圧3.5Vの電源を供給しています。
- IC3（電源供給）は電圧4.5Vを分解し、電圧4.5Vの電源を供給しています。
- IC11（電源供給）は電圧5Vを分解し、電圧5V（電源）の電源を供給しています。

【電圧源選択】

- IC11（電源供給）は電圧5Vを分解し、電圧5V（電源）の電源を供給しています。
- IC2（電源供給）は電圧3.5Vを分解し、電圧3.5V（電源）の電源を供給しています。

【メモリー】

- IC31（メモリー）は2MB ROM chip with the system program written in.
- IC29とIC30（メモリー）はRAM circuits. The data memorized to IC29 is backed up even after the power is turned off, and it includes data related to the sound programs, including patches and special setups, etc. IC30 is a RAM circuit for working data and temporary memory storage, etc.
- The DATA card is used to save sound program data. The DATA card is interfaced by IC29.

About the backup circuit:

When the reset signal is switched to the Low level, IC29 is set to the standby condition, and at the same time Vcc is cut off from the +5V power supply by G7 and G8 (on the MB), activating the back-up condition (See Fig.3.)
【パネル操作系及びコントローラ】
LCDの表示はIC13（on MB）によって行われています。また、LCDのコントラストはVR1によって調整されます。VR1をかか
る電圧が0.5～0.6Vの時に、最も良いコントラストが得ら
れます。
LCDのバックライトに供給される電源はQ5及びQ6（on MB）に
よって制御され、適切な電流が流れないようにになっています。
LCD以外のパネル操作系とベンダー、モニターレス、アフ
ターネッサ及びEXT.PedalはIC5（on MB）によって読み込まれ
ています。
スライダーはつまみの位置に応じた電圧を0～5Vの範囲で出力
します。8本のスライダーが1本の4051に入力され、IC5
（on MB）からのマルチプレックス化信号によってマルチプレックス
された後、デジタル・フォロウェットを通してIC5のアナログ入力ポー
ートに入力されます。回路の概略を図4に、また、IC5からのマル
チプレックス化信号を図5に示します。

The waves of these pulses are reformed by the filter, which
consists of R7, C8, and C7 (on MB); and the shmidt
trigger IC6 (on MB), from which they are input to the
IRQ0 of IC5 and port B. (See Fig.7)

IC5 reads in port B at the trailing edge of IRQ0, then judges
the direction of the rotation.
Twenty-four clicks per one rotation is used for the rotary
encoder.

The A/D converter of IC5 converts the input analog voltage,
and when the value is changed, it interrupts IC36 (on the
MB).

The rotary encoder outputs two phased pulses whose
phases are staggered every single click rotation. (See Fig.
6 (a), (b).)

ロータリー・エンコーダーは1クリック回転させることに、位相の
ずれた2相のパルスを出力します。 (Fig.6 (a), (b))
スイッチは8X8のマトリクスに構成され、IC5のポート2によってスキャンされています。スキャンリング・バターンはアクティブLowであり、LEDのダイナミックドカンマスキャナと兼用しています。スイッチのデータはポート8から読み込まれます。（Fig.8、Fig.9）

The sense circuit of the WAVEFORM card is included in the switch matrix. (Fig.10.)

スイッチ・マトリクスにはWAVEFORMカードのセンサ回路が含まれています（Fig.10）。

from IC5

<table>
<thead>
<tr>
<th>CARDSENS</th>
<th>P.2-0</th>
<th>P.2-1</th>
<th>P.2-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.6-7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to IC5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.6-6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the WAVEFORM card is inserted and CARDSENS reaches the High level, the action of the gate effectively accomplishes the same thing as the switch being pressed down.

WAVEFORMカードが挿入されてCARDSENSがHighレベルになると、ゲートの働きによって、スイッチが押されたと同様の状態になります。

The LED consists of an 8 × 8 matrix just like the switch, and dynamic lighting is accomplished. The matrix is scanned by port 2 of IC5 and data for lighting are output from port 1. The LEDs are lit up by the power flow of the driver IC2 and IC3 (on the MB). (See Fig.8.)

The LED isスイッチと同様、8X8のマトリクス状に構成され、ダイナミック点灯が行われています。マトリクスはIC5のポート2によってスキャンが行われ、ポート1からは点灯データが出力されます。LEDはドライバIC2及びIC3 (on the MB)の電力出力で点灯します。（Fig.8）

The Bender unit is a type of rheostat and output voltage is taken from the moveable terminals. Voltage of +5V is on the positive terminal and polarity voltage through Q4 (on the MB) by IC5 is on the negative terminal. The fixed terminal of resistance mid point is connected to the ground.

The output of the bender is multiplied by IC4 (on the MB), then read in by IC5. (See Fig.11.)

ベンダー・ユニットは一種の抵抗器であり、可動端子から出力が取り出されます。+5Vは正極端子にあり、IC5はQ4 (on the MB)でポリタリティ電圧が出力されます。また、抵抗の中点の固定端子はGNDに接続されています。ベンダーの出力はIC4 (on the MB)でマルチプレックスされ、IC5に読み込まれます。（Fig.11）

IC5 sets the polarity voltage to +5V at first in order to read the bender, then it sets the polarity voltage to 0V, and re-reads the bender. The polarity is judged by the value which is read the second time.

IC5はまずポリタリティ電圧を+5Vにしてベンダーを読み込み、次にポリタリティ電圧を0Vにして同じベンダーを読み込みます。極性は2度目の読み込みの値によって判断されます。
**KEYBOARD**

- The keyboard has 61 keys, and each key has two contact points, "make" (MK) and "break" (BR). Velocity values are determined based on the time difference of MK on and BR on.
- A total of 122 contact points consist on an 8 x 16 matrix. They are scanned by TO~T7 of IC11 (on the MB). IC11 interrupts IC36 when reading the keyboard.
- The key matrix is shown in Fig.13 and the timing of the scanning pulse is shown in Fig.14.

**SOUND SOURCE**

- PCM data is memorized in IC25, IC26 (on the MB), and IC1 (on the Card Board). This memory and the PCM data read from the WAVEFORM Card are processed by IC21~IC24 (on the MB), and output as serial data. IC22 functions for the TVF. IC21 executes the effect processing.
- Serial data is converted from digital to analog by IC11 (on the JB), then is demultiplexed by IC13 (on the JB) before becoming voice waveforms.
- The signals for muting of the output are made from the reset signals. The circuit is shown in Fig.16. The interval, from which the reset signal reaches high until the mute is released, is determined depending on the capacity of C69. The mute signals continue to output by D6 and C67 for a while after the power is turned off.
<table>
<thead>
<tr>
<th>PARTS LIST/パーツリスト</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety Information</strong></td>
</tr>
<tr>
<td>The parts marked with a red cross indicate essential components. Do not remove or replace any parts marked with a red cross.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CARTON</th>
<th>20D00940</th>
<th>FRONT PANEL</th>
<th>20D008</th>
<th>N/A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20D00464</td>
<td>CENTER PANEL L</td>
<td>20D003</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D00465</td>
<td>CENTER PANEL R</td>
<td>20D002</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D00186</td>
<td>SIDE PANEL L</td>
<td>20D001</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01560</td>
<td>TOP PANEL L</td>
<td>20D014</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01561</td>
<td>TOP PANEL R</td>
<td>20D013</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01562</td>
<td>TOP PANEL M</td>
<td>20D012</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01563</td>
<td>BOTTOM PANEL R</td>
<td>20D011</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01564</td>
<td>BOTTOM PANEL L</td>
<td>20D010</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01565</td>
<td>FRONT PANEL</td>
<td>20D015</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01566</td>
<td>COVER L</td>
<td>20D016</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01567</td>
<td>COVER R</td>
<td>20D017</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20D01568</td>
<td>COVER M</td>
<td>20D018</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**DISPLAY UNIT**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200020940</td>
<td>LCD B</td>
<td>200020</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200021040</td>
<td>LCD T</td>
<td>200021</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**KEYBOARD UNIT**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200022010</td>
<td>KEYBOARD</td>
<td>200022</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**POWER SUPPLY BOARD**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200023010</td>
<td>POWER BOARD</td>
<td>200023</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**INVERTER**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200024010</td>
<td>INVERTER</td>
<td>200024</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**OTHER PARTS**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200025010</td>
<td>OTHER PARTS</td>
<td>200025</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**ACCESSORY INFORMATION**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>MODEL NUMBER</th>
<th>VENDOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200026010</td>
<td>ACCESSORY</td>
<td>200026</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
VOLUME L BOARD
ASSY 7626618001
(pcb 22925992)

NOTE: Volume L Board includes Encoder Board.

NOTE: Volume L Board には Encoder Board が含まれます。
JACK BOARD
ASSY 7626611000
 pcb 22925991

View from components side.
### TEST MODE

The TEST MODE is entered by pressing [EXIT] while simultaneously holding down the [CURSOR ▼] and [CURSOR ▶] in the MULTI MODE.

Executing the operations below in the TEST MODE calls up the following TEST MODE:

<table>
<thead>
<tr>
<th>EXIT</th>
<th>BANK1</th>
<th>Internal RAM test</th>
<th>Internal RAM test</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXIT</td>
<td>BANK2</td>
<td>DATA card test</td>
<td>DATA card test</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK3</td>
<td>Internal PCM ROM test</td>
<td>Internal PCM-ROMのテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK4</td>
<td>WAVEFORM card test</td>
<td>WAVEFORMカードのテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK5</td>
<td>Button test</td>
<td>ボタンテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK6</td>
<td>LED test</td>
<td>LEDテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK7</td>
<td>Slider test</td>
<td>サライダーテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>BANK8</td>
<td>Encoder test</td>
<td>エンコーダーテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER1</td>
<td>Bender &amp; Afturtouch test</td>
<td>ベンダー&amp;アフタートッチテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER2</td>
<td>Pedal test</td>
<td>ペダルテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER3</td>
<td>Keyboard test</td>
<td>キーボードテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER4</td>
<td>MIDI test</td>
<td>MIDIテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER5</td>
<td>Output test</td>
<td>出力テスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER6</td>
<td>Effect test</td>
<td>エフェクトテスト</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER7</td>
<td>D/A adjustment</td>
<td>D/A調整</td>
</tr>
<tr>
<td>EXIT</td>
<td>NUMER8</td>
<td>Exit test mode</td>
<td>テストモード終了</td>
</tr>
</tbody>
</table>

### 1 Internal RAM Test

1. Press [BANK 1] while holding down [EXIT].
2. The test has been successfully completed if "OK" is displayed in the right side of the screen.

When "NG" appears under R/W:
Refer to [2] 3 in the Troubleshooting section (p.34).

When "NG" appears under Batt:
Refer to [1] 3 in the Troubleshooting section (p.33).

### 2 DATA Card Test

1. Press [BANK 2] while holding down [EXIT].
2. Insert a memory card such as the M-256E into the DATA CARD slot on the rear panel. (Turn off the memory protect switch.)
3. The test has been successfully completed if "OK" is displayed in the right side of the screen.

When "NG" appears:
Refer to [2] 1 in the Troubleshooting section (p.34).

### 3 Internal PCM ROM Test

1. Press [BANK 3] while holding down [EXIT].
2. The test has been successfully completed if "OK" is displayed in the right side of the screen.

When "NG" appears:
Refer to [3] 1, 3, and 4 in the Troubleshooting section (p.38).

### 4 WAVEFORM card test

When "NG" appears:
Refer to [3] 1, 3, and 4 in the Troubleshooting section (p.38).

When "NG" appears under R/W:
Refer to [2] 3 in the Troubleshooting section (p.34).

When "NG" appears under Batt:
Refer to [1] 3 in the Troubleshooting section (p.33).

### Internal PCM ROMs

<table>
<thead>
<tr>
<th>ROM1</th>
<th>ROM2</th>
<th>ROM3</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>

### Internal PCM~ROMのテスト

1. [EXIT] を押ししながら [BANK3] を押します。
2. 右画面に "OK" が表示されれば合格です。

NGの場合は：トラブルシューティングの【3】の1, 3, 4を参照して下さい（P.38）。

### WAVEFORM card test

1. [EXIT] を押ししながら [BANK3] を押します。
2. メモリーパネルのWAVE CARDのスロットに、WAVEFORMカード（SO-JD60）を挿入します。
3. C2-E3の範囲で調整をします。
4. ウェーブの名前が正しく表示され、音が正しく鳴れば合格です。
5. F3-E5の範囲で調整をします。
6. ウェーブの名前が正しく表示され、音が正しく鳴れば合格です。
7. F5-C7の範囲で調整をします。
8. ウェーブの名前が正しく表示され、音が正しく鳴れば合格です。

### WAVENAME (TOP) C-0011 EP_HARD

When it is inoperative:
Refer to [3] 1, 3, and 4 in the Troubleshooting section (p.38).

NGの場合は：トラブルシューティングの【3】の1, 3, 4を参照して下さい（P.38）。

---

30
【5】ボタン・テスト
1. [EXIT] を押しながら [BANK5] を押します。
2. 各ボタンを順に押し、押したボタンの名前とON/OFFが、各ボタンについて正しく表示されなければ合格です。

When it is imperative:
Refer to [2] 4 in the Troubleshooting section (p.34).

【6】LEDテスト
1. [EXIT] を押しながら [BANK5] を押します。
2. 各LEDが順に点灯・消灯されています。全てのLEDが点灯・消灯すれば合格です。
3. LEDの点滅を停止させると、点灯・消灯のスピードは調節できます。

When it is imperative:
Refer to [2] 5 in the Troubleshooting section (p.35).

【7】スライダー・テスト
1. 全てのスライダーを下におろしておきます（ボリュームは除きます）。
2. [EXIT] を押しながら [BANK5] を押します。
3. 各スライダーを上に動かすと、スライダーの名前が表示されます。
4. スライダーの動きとともに音が出て、ピッチが上に変化します。
5. スライダーの名前が正確に表示され、値が“00”〜“127”まで変化し、かつピッチが順に変化すれば合格です。

When it is imperative:
Refer to [2] 6 in the Troubleshooting section (p.35).

【8】エンコーダー・テスト
1. [EXIT] を押しながら [BANK5] を押します。
2. [WAVEFORM] のツマミをまわし、クリックが合わさって数字が表示されます。
3. ツマミを回すと数字は大きくなり、左回しで少なくなります。
4. 1クリックにつき１つ、1方向に応じて数字が変化すれば合格です。

When it is imperative:
Refer to [2] 7 in the Troubleshooting section (p.35).

【9】ベンダー・アタッチ・テスト
1. [EXIT] を押しながら [NUM1] を押します。
2. ベンダー・アタッチを左右に動かし、BNDの数字が“-127”〜“00”〜“+127”と変化することを確認してください。
3. ベンダー・アタッチをモジュレーション側に押し込み、MODの数字が“00”〜“127”と変化することを確認してください。
4. 全ての確認が完了したら、AFTの数字が“-127”〜“+127”と変化することを確認してください。

When it is imperative:
Refer to [2] 8 in the Troubleshooting section (p.35).

【10】ペダル・テスト
1. [EXIT] を押しながら [NUM2] を押します。
2. 本体からのペダルのEXT CONTにボリューム・ペダル（EV-5またはEV-60）を接続します。
3. ボリューム・ペダルを踏んでいくと、EXTの値が“0”から“127”に変化することを確認してください。
4. ボリューム・ペダルのプラグを本体から抜き、EXTの値が“127”になることを確認してください。
5. 本体からのペダルのHOLD PEDALにダンバー・ペダル（DP-2またはDP-6）を接続します。
6. ダンバー・ペダルを踏むとHOLDが“ON”、離すとHOLDが“OFF”と表示されることを確認してください。

When it is imperative:
Refer to [2] 9 in the Troubleshooting section (p.35).
【11】キーボード・テスト

1. [EXIT] を押しながら [NUMBERS] を押します。
2. 鍵盤を押し、正しいキー名がペソテーキーが表示されれば合格です。

【11】Keyboard Test

1. Press [NUMBER 3] while holding down [EXIT].
2. If the correct key name and the velocity are displayed when the key is hit, the test has been successfully completed.

【12】MIDI Test

1. Press [NUMBER 4] while holding down [EXIT].
2. Connect a single cable to both the MIX IN and the MIDI OUT connectors on the rear panel.
3. Check that the "OK" message is displayed.
4. Disconnect the cable and check that the display changes from "OK" to "NG".

【12】MIDIテスト

1. [EXIT] を押しながら [NUMBERS] を押します。
2. 本体内蔵のMIDI INとMIDI OUTを一本のケーブルでつなげます。
3. "OK"の表示が出ることを確認してください。
4. ケーブルを抜き、表示がNGに変わることを確認してください。

【13】Output Test

1. Connect the cable to each MIX OUT L/R and DIR OUT L/R jacks on the rear panel, and observe each signal by an instrument such as an oscilloscope.
2. Press [NUMBER 5] while holding down [EXIT].
3. Confirm that the voice is output only through MIX OUT L.
4. Press [CURSOR R].
5. Check that the voice is output only through MIX OUT R.
6. Press [CURSOR R].
7. Check that the voice is output only through DIR OUT L.
8. Press [CURSOR R].
9. Check that the voice is output only through DIR OUT R.

【13】出力テスト

1. 本体内蔵のMIX OUT L/RとDIR OUT L/Rにそれぞれ音声ケーブルをつなぎ、それぞれの信号をオシロスコープなどで観察できるようにしてください。
2. [EXIT] を押しながら [NUMBERS] を押します。
3. MIX OUT だけから音声が出力されていることを確認してください。
4. [CURSOR R] を押します。
5. MIX OUT Rだけから音声が出力されていることを確認してください。
6. [CURSOR R] を押します。
7. DIR OUT Lだけから音声が出力されていることを確認してください。
8. [CURSOR R] を押します。
9. DIR OUT Rだけから音声が出力されていることを確認してください。

【14】Effect Test

1. Press [NUMBER 6] while holding down [EXIT].
2. Hold down any key on the keyboard for approximately one second.
3. If the sound comes out clearly, the test has been successfully completed. (Make sure that noise is not mixed with the sound.)

【14】エフェクト・テスト

1. [EXIT] を押しながら [NUMBERS] を押します。
2. 鍵盤の任意の鍵を一秒間押します。
3. 音がきれいに出れば合格です（ノイズが混ざっていないこと）。

【15】D/A Adjustment

1. Use an instrument such as an oscilloscope to observe the output waveform of MIX OUT L on the rear panel.
2. Press [NUMBER 7] while holding down [EXIT].
3. A sine wave with a relatively low sound volume should be output. Make it a smooth sine wave by adjusting VR1 on the Jack Board.

【15】D/A調整

1. 本体内蔵のMIX OUT Lの出力波形をオシロスコープなどで観察できるようにします。
2. [EXIT] を押しながら [NUMBERS] を押します。
3. 微小音程の正弦波が出力されるので、波形が滑らかな正弦波になるように、ジャックボードのVR1を調整して下さい。

【16】Exit Test Mode

1. Press [NUMBER 8] while holding down [EXIT].
2. Press [INC/YES] when the display below is shown.

【16】テ스트モードから抜ける

1. [EXIT] を押しながら [NUMBERS] を押します。
2. 下のように表示されたら、[INC/YES] を押します。
トラブルシューティング

不具の場合は、回路図を参照して下記の事を確認して下さい。

- IC等の取付電圧が正常か？
- クロックは正常か？
- 訊号は正常か？

注意：
本体が正常に動作している場合でも、パラメータの設定や周辺機器の状態により不具に見えることがあります。

【1】Power-related Malfunctions

1. Power is Interrupted
   - AC voltage is not being conducted on the (first order side ?) of the power transformer?

   If not:
   - Check the AC cord, power switch, line bypass condenser, etc.

2. Is the output voltage on the second order side sufficient?

   If not:
   - Check the power transformer, power switch, C1 — CB, C10, C12, C16, D1, D2, IC2-4 (on the PSB), etc.

3. +5V coming to the TP4 (on the MB)?

   If not:
   - Check IC1, IC2, CB, CB and D3 (on the PSB). Check that there is no short between the power supplies patterns on the Main Board, Jack Board and Card Board.

【1】電源関係の不良

1. 電源が入らない
   - 電源トランスの2次側のAC電圧が未入ったか

   NGの場合:
   - ACコード、パワースイッチ、ラインバイパスコンデンサ等チェックして下さい。

   - 電源トランスの2次側電圧は十分か。

   NGの場合:
   - 電源トランス、パワースイッチ、C1〜C6、C10、C12及びC16、D1、D2、IC2-4 (on PSB)等をチェックして下さい。

   - TP4 (on MB)に+5Vが入っている。

   NGの場合:
   - IC1、IC2、CB、CB及びD3 (on PSB)をチェックして下さい。
   - もう一つ、メインボード、ジャックボード、カードボードの各ボード上で電源パターン側にショートがないかチェックして下さい。

【1】電圧関係の不良

1. 電圧が入らない
   - 電源トランスの2次側AC電圧が未入ったか

   NGの場合:
   - ACコード、パワースイッチ、ラインバイパスコンデンサ等チェックして下さい。

   - 電源トランスの2次側電圧は十分か。

   NGの場合:
   - 電源トランス、パワースイッチ、C1〜C6、C10、C12及びC16、D1、D2、IC2-4 (on PSB)等をチェックして下さい。

   - TP4 (on MB)に+5Vが入っている。

   NGの場合:
   - IC1、IC2、CB、CB及びD3 (on PSB)をチェックして下さい。
   - もう一つ、メインボード、ジャックボード、カードボードの各ボード上で電源パターン側にショートがないかチェックして下さい。

HOW TO CHECK FOR SHORT CIRCUITS AMONG THE POWER SUPPLY PATTERNS
First, disconnect all of CN1-3 (on PSB). Make sure at this time that +5V is being conducted over pin three of IC2. Then, one by one reconnect the connectors that you just unplugged to find which connector decreases the voltage of pin three on IC2 to a point as low as 0V. If the voltage decreases when CN1 is reconnected, the power supply pattern on the jack board has a short circuit. If the voltage decreases when CN2 is reconnected, the power supply pattern on either the Main Board or Card Board has a short circuit. If the voltage decreases when CN3 is reconnected, the power supply pattern on the Main Board has a short circuit. Remember that CN2 and CN3 have separate power supplies on the Main Board.

BATTERY ERROR MESSAGE

The installed batteries and the batteries for the DATA card are monitored to see if they have sufficient voltage or not by the voltage which is conducted to pin number 72 (installed batteries) and pin number 53 (card batteries) on IC36 (on the MB). Battery power is sufficient if the voltage is more than +2.7V and less than +3.5V. Error messages are shown when the voltage is not within that range.

バッテリーのエラーメッセージについて

電源バッテリー及びDATAカードのバッテリーは、それぞれIC36 (on MB)の5番ビート及び53番ビートに入力される電圧によって、正常であるか否かのチェックがされています。電圧が+2.7V以上〜3.5V以下であれば正常と判断され、それ以外ならばエラーメッセージが表示されます。
【2】操作系の不良

1. DATA card is incorrect. (See [2] in the TEST MODE section, p.30)
   a. Patches of the card cannot be read or written correctly.
   - First confirm that all the switches of [INT/CARD], [WRITE] and [INC/YES] function properly. (See [5] in the TEST MODE section, p.31) If everything works properly, check IC28 (on the MB). Also check CN14 (on the MB). It is possible that the DATA card itself has some sort of malfunction.

b) Display shows "DATA card battery low".
   - The battery in the DATA card is worn out. Replace it with a new one.
   - Check CN14 (on the MB). Check R51, J34 (on the MB) and their peripheral patterns. Then check the patterns between pin number 7 on IC34 and pin number 52 on IC36. Also check that there is no short circuit between pin number 52 on IC36 and other pins. It is also possible that the batteries of the DATA cards themselves are low.
   - Refer to (1) 3. "Low Internal Battery Power."

2. WAVEFORM card is incorrect. (Refer to [4] in the TEST MODE section, p.30)
   a. Display shows "WAVEFORM card is not ready".
   - Does pin number 5 on CN12 (on the MB) reach high level when the WAVEFORM card is inserted?

   If so:
   - Check the wiring between the following: R1, C1N, C1S, CN3 (on the CB) and the Main Board Check also R56, D3, IC37 (on the MB) and the patterns which are connected to them. It is also possible that WAVEFORM card itself has some sort of malfunction.

   Does a pulse wave appear at pin number 11 on IC37 when the WAVEFORM card is inserted?

   When there is no pulse wave:
   - Check IC37, D4, R3A, CN3 and CN4 (on the MB). Confirm that pin number 11 is connected to IC5 (on the MB). Referring to the circuit diagrams, check all the switches and diodes which are connected to pin 28 on IC5, on the all the boards except the main board.

   b) The display of the WAVE NAME is incorrect.
   - Does the screen correct when the WAVE in the WAVE FORM card is selected?

   When it sounds correct:
   - Check IC13 (on the MB) and its peripheral. Check CN9 (on the MB) and the wirings which are connected to CN9. Also check the LCD unit.

   If not:
   - Check CN1 to CN3 (on the CB). Check the wiring which connects the card board to the main board. Check also IC24 (on the MB) and its peripheral. It is also possible that the WAVEFORM card itself has some sort of malfunction.

3. Patch is written but not memorized.
   - Confirm that the [WRITE] and [INC/YES] buttons function correctly, referring to [3] in the TEST MODE section, p.31.

   Check IC29, IC30 (on the MB) and their peripherals. Also check IC29, Q9 (on the MB) and their peripherals.

4. Button switch is out of order. (See [5] in the TEST MODE section, p.31)
   - Check the switches which are out of order and the diodes which are close to these switches. Referring to the circuit diagrams, check the pattern of the scan lines which are connected to these switches on all the boards.
   - Check CN3, CN4 (on the MB) and the wirings which are connected to CN3 and CN4. Check the wirings and connectors on all the boards attached to the panel.

   Is a pulse waveform coming from all the pins of pin numbers 48 to 55 on IC5 (on the MB)?

   When there are some pins from which a pulse waveform cannot be detected:
   - IC5 is defective.

When a pulse waveform is not coming from any of those pins:
   - IC5 is out of order. Check the following points.

   Is a pulse waveform coming from pin number 46 on IC5?

   If not:
   - IC5 is out of order. Check for short circuits among the pins on IC5, short circuits in the peripheral patterns, and the cut-off of the outputs. Then check the following matters.

   Is a clock signal coming to pin number 3 on IC5?

   When it is inoperative:
   - Check IC36, FL26, RS2 (on the MB) and their peripheral patterns.

   Is a clock signal coming to pin number 2 on IC5?

   When it is inoperative:
   - Check IC7 (on the MB) and its peripheral patterns.

Switches, encoders, sliders and LEDs are periodically scanned by IC5 (on the MB) and reading in and lighting up are executed. The pulse waveform which appears at pin number 46 on IC5 indicates that this scanning is accomplished correctly. When scanning is stopped because of an insufficient level of the clock signal is supplied to IC5, or because IC5 is defective, the pulse waveform is not output. In such cases, problem will appear in reading data from sliders and encoders, and lighting up of the LEDs.
5. LED is incorrect. (Refer to [6] in the TEST MODE section, p.31.)
   - Check the LEDs which are malfunctioning. Check all the patterns of scan lines which are connected to these LEDs on all the boards.
   - Check C3, C4, (on the MB) and the wirings which are connected to them. Also check the wirings and connectors on all the boards installed to the panel.
   - Check IC2, IC3 (on the MB) and their peripheral patterns.
   - Check IC5 (on the MB), as in "4. Button switch is out of order," above.

6. Slider is out of order. (Refer to [7] in the TEST MODE section, p.31.)
   a) Display does not change when slider is moved.
      - Check that the output voltage of the slider changes between 0～5V when the slider is moved.
      - Check the 4051 to which the slider with the problem is connected, referring to the circuit diagrams. Also check the op-amp (operational amplifier) which is connected to the output of the 4051.
      - Check C1 (on MB) and IC1 (on the MB). Also check the connected wirings.
      - Check the operation of IC5 (on the MB), as in "4. Button switch is out of order," above.
   b) Parameter value doesn't change continuously.
      - There is a possibility that the noise is produced in the slider. Replace the slider with a new one.

When the outputs of several sliders have short circuits, several parameters may simultaneously change moving a single slider. In such a case, the display is unstable and the value seems to change irregularly. Refer to the next item c) for this problem.

c) Display changes irregularly.
   - Referring to the circuit diagrams, check that there is no short circuit between output of the slider with the problem and the output of another slider.
   - Check C1, D1, C2, C3, R1, R5, R6 (on the MB) and their peripherals. Also check that there is no short circuit among the pins numbered 30～37 on IC5 (on the MB).
   - Check that there is more than ±7V power voltage for the 4051 which is connected to the slider with the problem. Check that the input pin of the 4051 is not open.

When the power voltage is less than ±7V:
   The power supply used for the 4051 is from the op-amp, which decreases the ±15V by half. Referring to the circuit diagrams, check the op-amp that supplies the power supply voltage and its peripheral elements and patterns.
   - Check that normal multiplex signals are input in pin numbers 9～11 of the 4051.

5. LED がおかしい（テストモードの [1] （P.31）を参照して下
   さい。）
   - LED のうち異常が見つかっているものはどのラインに接続されているかを調べてください。また、回路
     図を参照して、そのLED がつながるスキャット線のパターンを、全てのボードについてチェックしてください。の
   - C3 及び C4 (on MB) と、それぞれ接続されているウノサ
     リングをチェックしてください。また、パネルに取付けられ
     ている全てのボードについて、ウノサリングとコネクタの接続
     をチェックしてください。
   - IC2 及び IC3 (on MB) と、それぞれの周辺のパターンを
     チェックしてください。
   - 以下の「4. ボタンスイッチがおかしい」と同様に、IC5 (on MB) の動作をチェックしてください。

   下さい。）
   a) スライダーを動かしても表示が変わらない。
      - スライダーを動かした際に、スライダーの出力電圧が0～
        5V に変化することを確認してください。
      - 回路図を参照して、全ての接続されているスライダがつなが
        っている4051をチェックしてください。また、その4051の出力につな
        がっているオペアンプもチェックしてください。
   - C1 及び C4 (on MB) をチェックしてください。それらに、それ
     ぞれ接続されているフィードバックをチェックしてください。
   - P/S ボタンスイッチがおかしい」と同様に、IC5 (on MB) の
     動作をチェックしてください。
   b) パラメータ値が不規則に変化する。
      - スライダーが変化しているかどうかあります。スライダ
        エを新しいものに交換してください。

7. 電源电压が低い（テストモードの [1] （P.31）を参照して下
   さい。）
   - ドライプに短絡があるとスライダが変化することを
     あります。電源电压が低いとスライダが不規則に変化
     しているようなことがあります。
   - この場合、電源电压をチェックしてください。

   さい。）
   - ベルトモジュールの不良品が接続されていることを
     確認してください。
   - ベルトモジュールの不良品が接続されていることを
     確認してください。
   - C3 及び C4 (on MB) の不具合が見つかっている場合、デ
     ラフの不具合を検査してください。
   - 機械的な不良品が見つかっている場合、ベルトモジュ
     ルの不良品が接続されていることを確認してください。

The output of 8 sliders is input to one of 4051. The 4051 multiplexes them and outputs them. When the power supply voltage greatly decreases, crosstalk is caused among the inputs of the 8 sliders of the 4051, and one input can effect other inputs. Also when there are some open inputs among the inputs of the 4051, these inputs will be affected by other inputs.

d) パラメータ値が変わらないのフィードバックの変化を調査する。
   - C1 及び C4 (on MB) 及びそれらに接続されているフィード
     バックをチェックしてください。また、Volume_1およびVolume_2ボ
     ダーでのフィードバックの変化をチェックしてください。
   - C1, C2, C3, R1, R5及びR6 (on MB) と、それぞれの接続
     をチェックしてください。
   - IC5 (on MB) の30～37ピンをすべて、全てのパネル
     のスライダをスキャンしているのをチェックしてください。
     また、パネルスイッチに異常がないかチェックして
     ください。

7. エンコーダーがおかしい（テストモードの [1] （P.31）を参照して
   下さい。）
   - エンコーダーを確認して、エラーチェックしてください。
   - C1 及び C4 (on MB) の不具合が見つかっている場合、デ
     ラフの不具合を検査してください。
   - 電源电压が低いとスライダが変化しているようなことがある。
   - この場合、電源电压をチェックしてください。

8. ベルトモジュールの不良品の不具合（テストモードの [2] （P.31）を参照して下
   さい。）
   - ベルトモジュールの不良品が接続されていることを
     確認してください。
   - ベルトモジュールの不良品が接続されていることを
     確認してください。
   - C3 及び C4 (on MB) の不具合が見つかっている場合、デ
     ラフの不具合を検査してください。
   - 機械的な不良品が見つかっている場合、ベルトモジュ
     ルの不良品が接続されていることを確認してください。

The output of the encoder is sent through a low pass filter which consists of R7, C6 and C7 (on MB). This is to prevent jumps in value when the encoder is rotated slowly. When the values of C6, C7, R7 are greatly different from that of the circuit diagram because of errors or defects, jumps in value and operation defects can be caused.

d) スライダーを動かせないのフィードバックの変化を調査する。
   - C1 及び C4 (on MB) 及びそれらに接続されているフィード
     バックをチェックしてください。また、Volume_1およびVolume_2ボ
     ダーでのフィードバックの変化をチェックしてください。
   - C1, C2, C3, R1, R5及びR6 (on MB) と、それぞれの接続
     をチェックしてください。
   - IC5 (on MB) の30～37ピンをすべて、全てのパネル
     のスライダをスキャンしているのをチェックしてください。
     また、パネルスイッチに異常がないかチェックして
     ください。

The output of the encoder is sent through a low pass filter which consists of R7, C6 and C7 (on MB). This is to prevent jumps in value when the encoder is rotated slowly. When the values of C6, C7, R7 are greatly different from that of the circuit diagram because of errors or defects, jumps in value and operation defects can be caused.
a) Bender doesn't move up or down at all. Does the voltage on pin number 3 on C55 (on the JB) reach +5V when the bender is moved to the right?

If not:
- Check the pattern between CN2 and CN4 (on the JB). It is also possible that the bender unit is defective.

b) Bender doesn't go down.
- Is the +5V pulse waveform coming from pin number 4 on C55 (on the MB)?

If not:
- Check Q1, R1, R14, R22, and R23 (on the MB). When the gain of IC9 is not enough, or when the voltage decrease of emitter follower of Q3 is large, the bender voltage will not increase as high as +5V.

c) Bender is active even though the bender is set to the center position.
- Is the voltage of pin number 3 on C55 (on the MB) at 0V, when the bender is set to the center?

If not:
- Check the bender unit. Also check the connection from the bender unit to the Jack Board.

d) Modulation is either difficult to activate, or is never on.
- Does the voltage at pin number 2 on C55 on the Main Board reach +5V when the bender lever is pushed up?

If not:
- Check IC9 (on the JB) and its peripheral elements and patterns. It is also possible that the bender unit itself is defective.

e) モジュレーションがかからず放しになる。
- ベンダーが手放した状態では、C55 (on MB) の2番ピンに+5Vがでない。

NGの場合:
- ベンダー・ユニットをチェックして下さい。また、ベンダー・ユニットからジャックボードへの接続をチェックして下さい。

f) After touch is either difficult to activate, or is never on.
- Check Q7 (on the MB) and the cable which is connected to it. Also check the connections on the Keyboard and their peripherals.
- Does the voltage of pin number 14 on IC4 (on the MB) reach +5V when the keys are pressed down?

If not:
- Referring to the circuit diagrams, check IC10 (on the MB) and its peripheral elements and patterns. Also check R11, R12 and Q2 (on MB).

If so:
- IC5 (on the MB) may be defective.

OKの場合:
- Q1, Q5, Q7 (on MB) とその周辺に問題がありません。

NGの場合:
- ベンダー・ユニットをチェックして下さい。また、ベンダー・ユニットからジャックボードへの接続をチェックして下さい。

OKの場合:
- Q2 (on the MB) and its peripherals. When it is operating properly, releasing a key causes the voltage at pin number 1 on Q2 and pin number 14 on IC4 (on the MB) to become 0V.
9. Pedal Malfunctions (Refer to [10] in the TEST MODE section, p.31.)

- Check the following items for both a) and b):
  - Check the connection of CH5s (on the JB) and CN10 (on the MB).
  - Referring to the circuit diagrams, check that the standard voltage is 5V.

a) EXT. Pedal malfunctions.

- Does the voltage at pin number 2 on CN10 (on the MB) become 5V when the EXT. Pedal is pressed all the way down or when the Pedal is pulled out?

If not:
- Check IC3a, J6G (on the JB) and their peripheral elements and patterns. Also check D1, D2 and FL10 (on the JB). It is also possible that the EXT. Pedal itself is defective.

If so:
- Check I15, IC4, IC5, RA6, DA1, DA2, CA1 (on the MB) and their peripheral patterns. Also check pin number 30 on IC5 (on the MB) for a short circuit, loose pin or pattern cutoff. When nothing is found wrong, it is possible that IC5 itself is defective.

b) HOLD Pedal doesn't function.

- Is a pulse waveform coming from pin number 2 on IC12 (on the MB)?

When it is imperative:
- Check IC1 (on the MB) for short circuits among the pins, loose pin or pattern cutoff. It is also possible that IC1 or IC12 themselves are defective.

- Does the voltage at pin number 1 on CN10 (on the MB) become 0V when the HOLD Pedal is pressed down? Also, does the voltage at pin number 1 on CN10 become 5V when the HOLD Pedal is released?

If not:
- Referring to the circuit diagrams, check the patterns from JK7 to Q7 (on the JB) and the elements connected to these patterns. Also check FL11 (on the JB). It is also possible that the JK7 is not connected properly or the HOLD Pedal itself is defective.

If so:
- Check IC11, IC12, R29 (on the MB) and their peripheral patterns.

10. LCD Malfunctions

Check the following items for all cases from a) to f):

- Check CN8 and CN9 (on the MB) and the wirings which are connected to them.

If not:
- While referring to the circuit diagrams, check IC13 (on the MB) and its peripheral elements and patterns.

a) Display is blank.
- Do all functions excepting the LCD work properly?

If not:
- Main board is not started up. Check the socket connection when the socket is used for ROM. Check the clock signals, the level of reset signals, address bus and data bus. Also check the clock select signals and interrupts of each IC

If so:
- The LCD itself may be defective. Also, RA15-RA17 (on the MB) may be defective.

b) Display doesn't change.
- Do all the functions excepting the LCD work properly?

If not:
- It is possible that the program is runaway. Check the socket connection when the socket is used for ROM. Check the clock signals and the level of reset signals. Also check that there are no short circuits among the patterns or pattern cutoff.

If so:
- The LCD itself may be defective. Also, RA15-RA17 (on the MB) may be defective.

c) Display changes unexpectedly or contrary to panel control changes.
- It is likely that the slider, rather than the LCD, is defective. Refer to d) as "5. Slider is out of order."

d) Backlight doesn't light.
- Is there voltage of L+5V at pin number 1 on CN8 (on the MB)?

If not:
- Check R30-R32, Q5, Q6 (on the MB) and their peripheral patterns.

If so:
- It is possible that the backlight is burnt out.

e) Screen is too dark or light.
- Adjust the contrast by turning VR1 (on the MB).

When it cannot be adjusted:
- Check that there is a voltage of 0.5 to 0.6V on pin number 1 of VR1. Also check that pin number 3 of VR1 is grounded. It is also possible that the LCD itself is defective.

LCD contrast is adjusted by the voltage on pin number 3 on CN8 (on the MB). The display is at optimal contrast when this voltage is 0.5 to 0.6V.
[3] Problems in the sound

Check the following items in all cases 1—8, below.

1. No sound, or sound is distorted

When it’s inoperative:
   - Check the connection between CN1 (on the MB) and CN5 (on the JB).
   - Check the connection between CN1 (on the JB) and CN2 (on the BB).

1.1. No sound
   - Is the PCM ROM in working order? (Refer to [3] in the TEST MODE section, p.30.)

If not:
   - Check IC24, IC25, IC26 (on the MB) and their peripherals. Especially check that there is no short circuit or loose pin between the pins on IC24.
   - Check the busses connected to IC24, IC25 and IC26. Since the busses are connected to the card board, check after the writing.
   - Also check the same thing for IC1 (on the CB). It is possible that IC24, IC25 or IC26 themselves are defective.

[3] 音に関する不良

以下のうち、1—8の全ての場合はにおいて:

- CN1 (on MB) と CN5 (on JB) の間の接続をチェックして下さい。
- CN1 (on JB) と CN2 (on BB) の間の接続をチェックして下さい。

1. 音が出ない・音が変

1.1. 音が出ない - [3] “キーボード不具合” の a) を参照して、鍵盤の動作をチェックして下さい。

NGの場合:
   - CN7 (on MB) と鍵盤の間の接続をチェックして下さい。
   - IC11 (on MB) と鍵盤の間の接続をチェックして下さい。

If not:
   - PCM ROM が正常です。（テストモードの [3] (P.30) を参照して下さい。）

NGの場合:
   - IC24, IC25, IC26 (on MB) とその周辺をチェックして下さい。
     特に、IC24 のピン付近のショート電流子が陥らないかチェックして下さい。
     IC24 から IC25 と IC26 に接続されているパースについてはもチェックして下さい。

1.2. 音が出ている - IC24 の動作不良が考えられます。

IC24 の動作不良が考えられます。IC24 に接続されているパースにショートがあるかをチェックして下さい。
また、IC24 は大きなパースのブロックとして動作しているかどうかチェックして下さい。
また、IC24 の動作不備を確認して下さい。

【問題の解決】

問題を解決するために、IC23 (on MB) の 63—82 及び 88 ビット

- は高周波パルス波形が出力されます。

If not:
   - The operation of IC23 may be defective. Check that there are no short circuit or pattern cutoff for patterns which are connected to IC23. Also check that a clock signal of sufficient level is supplied to IC23.
   - Check the operation of IC23 on the MB.
   - Check that there are no anomalies of the reset signals and bus signals. It is also possible that IC23 is itself defective.

【問題の解決】

問題を解決するために、IC20 (on MB) の 63—82 及び 88 ビット

- は高周波パルス波形が出力されます。

1.3. 音が出ている - IC10 (on MB) の 4 ビット音が欠落するシンバル不具合を出します。

NGの場合:
   - FL5 (on MB) からチェックして下さい。
     FL5 が異常がない場合は、IC22 (on MB) の動作不良が考えられます。

1.4. 音が出ている - IC22 (on MB) の動作不良が考えられます。

If not:
   - First check FLS — FL11, FLS — R33 と R36 と C101 (on MB).
     If no anomalies are found, the operation of IC22 (on MB) may be defective.
     Check that there is no short circuit or pattern cutoff of patterns which are connected to IC22.

Silent data of voice and pulse signals for demultiplex are sent to the jack board after passing through FLS—FL11 on the Main Board. When the timing of data becomes incorrect due to an error or defect in the characteristics of FLS—FL11, noise or distortion in the sound will result. In the worst case, no sound will be output.

- は音のシールドプラグのデジタルプルス出力のパース信号は、
   メインボード上のF LS—FL11を通った後、ジャックボードに送
   り出されています。FL5—FL11の特性の不具合や不良等によっ
   てデータのタイミングが乱れ、レベルが低下するとき、
   損害として音にノイズがあり、音がカットされ、音の
   聴覚が感じることがあります。音

【問題の解決】

問題を解決するために、IC22 (on MB) の 50—60 ビット

- は高周波パルス波形が出力されます。

1.5. 音が出ている - IC11 (on MB) の 50—60 ビット音が欠落するシンバル不具合を出します。

NGの場合:
   - まず FL6 — FL11, R33 — R36, IC101 (on MB) をチェックして下さい。
     いずれも異常がない場合は、IC22 (on MB) の動作不良が考えられます。

- は音のシールドプラグのデジタルプルス出力のパース信号は、
   メインボード上のF LS—FL11を通った後、ジャックボードに送
   り出されています。FL5—FL11の特性の不具合や不良等によっ
   てデータのタイミングが乱れ、レベルが低下するとき、
   損害として音にノイズがあり、音がカットされ、音の
   聴覚が感じることがあります。音

【問題の解決】

問題を解決するために、IC22 (on MB) の 50—60 ビット

- は高周波パルス波形が出力されます。

1.6. 音が出ている - IC11 (on MB) の 50—60 ビット音が欠落するシンバル不具合を出します。

NGの場合:
   - IC11 または IC12 (on MB) の動作不良が考えられます。
     IC11 及び IC12 の動作不良が考えられます。IC11 及び IC12 の動作不良が考えら
   ます。
3. Noise elements in the sound.
   a) Noise only occurs along with the sound.
      - Adjust the D/A converter, referring to [15] in the TEST MODE section, to set 0.02%.
      - There is a possibility that the sound source operation is defective. Check IC21 ~ IC26 (on the MB) and their peripherals, referring to [33] "1. No sound, or sound is distorted." Also check IC1 (on the CB) and its peripherals.

   b) Pulse-like noise sounds intermittently.
      - This kind of problem can be caused when the level and timing of serial data become incorrect because of an error or defect of the characteristics of FLS~FL7 (on the MB). Check FLS~FL7 and their peripherals.

4. Effect malfunctions.
   - Check that a clock signal of sufficient level is supplied to pin number 2 on IC21 (on the MB). Check the level of the reset signal which is input to pin number 94 on IC12. Also check the serial data on pins numbered 59, 64 and 66 on IC21 (on the MB).
   - Check IC22 (on the MB) and its peripherals.
      - Check IC14 ~ IC19 (on the MB) and their peripherals. Also check the signals which are supplied from pins numbered 59, 64, 66 from IC21 (on the MB). Check IC22 (on the MB) and its peripherals.

5. Sound volume is low.
   - There may be a decrease of gain in the analog output circuits. Check the analog output circuits on the Jack Board, referring to the circuit diagrams. Also check VR1 (on the BB).
   - It is possible that the volume becomes low because the EXT. Pedal is out of order. Refer to a) and b) in [2] "Effect Malfunctions."

6. Scale or tuning is incorrect.
   - Check the frequency of the clock which is supplied to pin number 24 on IC24 (on the MB). The correct frequency is 26.195MHz.
   - Correct the frequency of the clock which is supplied to pin number 62 on IC22 (on the MB). The correct frequency is 26.264MHz.
   - It is possible that the pitch is affected by the defect of Bender, Modulation, after Touch or EXT. Pedal. Check while referring to [2] "Effect Malfunctions of the Bender, Modulation, and After Touch" and "Pedal Malfunctions."

7. There is a lot of noise even when the instrument should be silent.
   - Check the constant of IC5, IC7, IC11~IC13, CS3, CS4, CS6 and CS7 (on the MB) and their peripherals, using a wave and spectrum analyser. Also check IC21 ~ IC26 (on the MB), referring to the circuit diagrams.
   - The S/N ratio could worsen due to a ripple in the ±15V power supply. Check the voltage and power consumption of the ±15V power supply. The rated current of ±15V is 500mA and when the current increases becomes greater than that ripple. In such a case, check the ±15V power source pattern and all the elements which are connected to them.

8. The stereo output doesn’t function properly, or the balance of the right and left signals is incorrect.
   - It is the serial number 4 on CN10 (on the MB) when a key is pressed.

If not:
   - Check the source sound circuit may be defective. Check the source sound circuit and its peripherals by referring to [33] "1. No sound, or sound is distorted."

4. Pedal at fault.
   - IC21 (on the MB) is the pedal pin and the pedal switches the circuit which is supplied to IC21 (on the MB) and 94 pin is connected to the input pin of the pedal.
   - IC21 (on the MB) is the pedal at fault. Check IC21 (on the MB) and its peripherals.
   - IC22 (on the MB) is the pedal at fault. Check IC22 (on the MB) and its peripherals.

5. Volume is low.
   - Although the volume at the input pin of the line is connected to the input pin of the pedal.
   - Check IC21 (on the MB) and its peripherals. Also check the signals which are supplied from pins numbered 59, 64, 66 from IC21 (on the MB).
   - EXT. Pedal is out of order, Volume level is small (not being possible."

6. Volume is low.
   - IC24 (on the MB) is the pedal pin and the pedal switches the circuit which is supplied to IC24 (on the MB) and 94 pin is connected to the input pin of the pedal.
   - IC24 (on the MB) is the pedal at fault. Check IC24 (on the MB) and its peripherals.
   - EXT. Pedal is out of order, Volume level is small (not being possible."

7. Volume is low.
   - IC5, IC7, IC11~IC13, CS3, CS4, CS6 and CS7 (on the MB) are the pedal at fault. Also check IC21 ~ IC26 (on the MB), referring to the circuit diagrams.
   - The S/N ratio could worsen due to a ripple in the ±15V power supply. Check the voltage and power consumption of the ±15V power supply. The rated current of ±15V is 500mA and when the current increases becomes greater than that ripple. In such a case, check the ±15V power source pattern and all the elements which are connected to them.

8. Stereo output doesn’t function properly, or the balance of the right and left signals is incorrect.
   - It is the serial number 4 on CN10 (on the MB) when a key is pressed.

If not:
   - Check the source sound circuit may be defective. Check the source sound circuit and its peripherals by referring to [33] "1. No sound, or sound is distorted."
【4】MIDI Malfunctions

1. MIDI signals are not output

- Does the instrument sound when keys are pressed?

When it doesn't:

There is a possibility that the keys are not being read correctly. Check the operation of the keys by referring to [5] "Keyboard Malfunctions".

- Observe pin number 1 on CN15 (on the MB) and pin number 4 on IC10 (on the JB) with an oscilloscope, and check that active sensing is output.

When it's not output through CN15:

Check the patterns between CN15 and IC36 on the Main Board. Also check P33. If nothing wrong is found, the operation of IC36 may be defective.

When it's output through CN15 but not IC10:

Check the connection between CN15 (on the MB) and CN5 (on the JB). Check the patterns from CN5 (on the JB) to IC10 (on the JB), as well as IC6 and L7 (on the JB), referring to the circuit diagrams. Check also Q8, C11, R44, R45, R51 and L12–L14 (on the JB) and their peripherals. If nothing wrong is found, the operation of IC10 may be defective.

2. MIDI signals are not received.

- Does it sound when keys are pressed?

When it doesn't:

There is a possibility that the keys are not being read correctly. Check the operation of the keys by referring to [5] "Keyboard Malfunctions".

- Using an oscilloscope, observe the waveform at pin number 2 on IC9 (on the JB), pin 6 of IC9 (on the JB) and pin 3 on CN15 (on the MB) when MIDI is input.

When there is no pulse at any points:

Check L10, L11, R44, R45 and D5 (on the JB).

【5】Other Malfunctions

1. Keyboard Malfunctions

a) Sound isn't output when keys are pressed.


When there are no sounding keys within an octave:

The scan line of the keyboard matrix may be defective. Check if there is pulse waveform at pins numbered 8–16, 63–68, 70–75 and 77–80 on IC11 on the Main Board. Check the cable which connects the Main Board to the keys as well as it is also possible that the flexible plate on the keys is defective.

When sound isn't output from any of the keys:

There is a possibility that the keys are not being read correctly. Check IC11 and its peripherals on the Main Board. Also check the cable connection from the keys to IC11 on the Main Board. The keys themselves may also be defective.

【6】Other Malfunctions

1. MIDI signals are not output

- Did the instrument sound when keys are pressed?

When it doesn't:

There is a possibility that the keys are not being read correctly. Check the operation of the keys by referring to [5] "Keyboard Malfunctions".

- Using an oscilloscope, observe the waveform at pin number 2 on IC9 (on the JB), pin 6 of IC9 (on the JB) and pin 3 on CN15 (on the MB) when MIDI is input.

When there is no pulse at any points:

Check L10, L11, R44, R45 and D5 (on the JB).

When pulse appears only at pin number 2 of IC9:

Check Q46, IC9, IC10, L6, CN6 (on the JB) and their peripherals. Especially check that there is no short circuit in the patterns. If there is no bad connection between CN6 (on the JB) and CN15 (on the MB), IC9 (on the JB) may be defective.

Since a similar problem is caused when there is a short circuit in the peripheral patterns of CN15, check the same thing with the wirings being disconnected from CN15.

When a pulse appears at pin number 2 and pin number 6 on IC9:

Check L6 (on the JB). Check also the connection between CN6 (on the JB) and CN15 (on the MB).

When a pulse appears at all the pins:

Check that there are no loose pins or pattern output of IC36 (on the MB). If everything is normal, IC36 may be defective.

IC9の2番ピンのみが互いに落ちる場合：

R46, IC9, IC10, L6, CN6 (on the JB)とその周辺をチェックしてください。また、CN6 (on the JB)とCN15 (on the MB)の接続が悪い場合はIC9 (on the JB)の不良と考えられます。

なお、CN9 (on MB)の端子を外しておいてもIC9 (on the JB)の不良であることが確認できます。IC9の2番ピンとIC9の2番ピンに電流が流れている場合：L6 (on the JB)をチェックしてください。また、CN6 (on the JB)とCN15 (on MB)の周辺の接続をチェックしてください。

全てにパルスが出ている場合：IC36 (on MB)の抵抗やコンデンサーをチェックしてください。

IC9の2番ピンとIC9の2番ピンにパルスが出ている場合：L6 (on the JB)をチェックしてください。また、CN6 (on the JB)とCN15 (on MB)の周辺の接続をチェックしてください。

【4】MIDI Malfunctions

1. MIDI signals are not output

- Did the instrument sound when keys are pressed?

When it doesn't:

There is a possibility that the keys are not being read correctly. Check the operation of the keys by referring to [5] "Keyboard Malfunctions".

- Observe pin number 1 on CN15 (on the MB) and pin number 4 on IC10 (on the JB) with an oscilloscope, and check that active sensing is output.

When it's not output through CN15:

Check the patterns between CN15 and IC36 on the Main Board. Also check P33. If nothing wrong is found, the operation of IC36 may be defective.

When it's output through CN15 but not IC10:

Check the connection between CN15 (on the MB) and CN5 (on the JB). Check the patterns from CN5 (on the JB) to IC10 (on the JB), as well as IC6 and L7 (on the JB), referring to the circuit diagrams. Check also Q8, C11, R44, R45, R51 and L12–L14 (on the JB) and their peripherals. If nothing wrong is found, the operation of IC10 may be defective.

2. MIDI signals are not received.

- Does it sound when keys are pressed?

When it doesn't:

There is a possibility that the keys are not being read correctly. Check the operation of the keys by referring to [5] "Keyboard Malfunctions".

- Using an oscilloscope, observe the waveform at pin number 2 on IC9 (on the JB), pin 6 of IC9 (on the JB) and pin 3 on CN15 (on the MB) when MIDI is input.

When there is no pulse at any points:

Check L10, L11, R44, R45 and D5 (on the JB).

When pulse appears only at pin number 2 of IC9:

Check Q46, IC9, IC10, L6, CN6 (on the JB) and their peripherals. Especially check that there is no short circuit in the patterns. If there is no bad connection between CN6 (on the JB) and CN15 (on the MB), IC9 (on the JB) may be defective.

Since a similar problem is caused when there is a short circuit in the peripheral patterns of CN15, check the same thing with the wirings being disconnected from CN15.

When a pulse appears at pin number 2 and pin number 6 on IC9:

Check L6 (on the JB). Check also the connection between CN6 (on the JB) and CN15 (on the MB).

When a pulse appears at all the pins:

Check that there are no loose pins or pattern output of IC36 (on the MB). If everything is normal, IC36 may be defective.
b) 鍵盤を弾くとカクカクと音が出る
- 緩衝の板パネルが外れかかっているか、もしくは板パネルのグリースが不足している可能性があります。「キーの取り外し方」及び「キーの取り付け方」(P.7)を参照して修理して下さい。

When lubrication is needed, specify 'Froil C474-B' in the order form and send it to the service center.

c) The action of the keyboard is exceptionally hard
- The plate springs of the keys are not installed correctly. Repair them by referring to "How to remove the keys" and "How to replace the keys" (P.7).

d) Keys come off
- The stoppers of the keys are loose. Repair them by referring to "How to remove the keys" and "How to replace the keys" (P.7).

2. The buttons and switches are hard to operate
- Switches, sliders or volumes may be tilted or at an angle in the plate and are touching the holes. Check them by referring to the exploded view.
18bit D/A Converter (IC11 on JB)
PC1061
15209160

Analog Multiplexer
SOP
BU4051BF T-2 (IC4 on MB)
152591101

TOP VIEW

Reset IC (IC1 on PSB)
M61863AL
15219185

Block Diagram