The PNO³ Processor MUST be within 30” of the Driver Boards

New Rev 7 Driver Board # 83122

83129 30” Ribbon Cable
83128 14” Ribbon Cable
83127 4” Ribbon Cable

PNO³ Processor
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Parts List</td>
<td>4</td>
</tr>
<tr>
<td>Grand Kit - PNO³ (825002) Without Record</td>
<td></td>
</tr>
<tr>
<td>Upright Kit - PNO³ (825022) Without Record</td>
<td>5</td>
</tr>
<tr>
<td>Preparation</td>
<td>6</td>
</tr>
<tr>
<td>Make Certain that the Kit will Fit!</td>
<td></td>
</tr>
<tr>
<td>Tools Needed</td>
<td></td>
</tr>
<tr>
<td>Regulation</td>
<td>7</td>
</tr>
<tr>
<td>Piano Action Regulation</td>
<td></td>
</tr>
<tr>
<td>Installation Procedures</td>
<td>8</td>
</tr>
<tr>
<td>Upright Piano Installation - Recommendations</td>
<td></td>
</tr>
<tr>
<td>Upright Slot Diagram &amp; Images</td>
<td></td>
</tr>
<tr>
<td>Vertical Pedal Solenoid Lifter Assembly [Includes Pedal Solenoid 701305]</td>
<td>9-10</td>
</tr>
<tr>
<td>Twin Speakers for Upright Installation - Special Order Part # 76047</td>
<td>11</td>
</tr>
<tr>
<td>Preparing the Key Solenoid Rail</td>
<td>12</td>
</tr>
<tr>
<td>Key Solenoid Plunger Throw</td>
<td>13</td>
</tr>
<tr>
<td>Key Solenoid Rail Assembly - Solenoid to Key Alignment</td>
<td>14</td>
</tr>
<tr>
<td>Modifying the Keyframe - Grand [Perform a PNOscan III Record Installation Here]</td>
<td>15-17</td>
</tr>
<tr>
<td>Cutting the Keybed Slot</td>
<td>18-19</td>
</tr>
<tr>
<td>Installing the Soft-Shift Lever</td>
<td>20</td>
</tr>
<tr>
<td>Installing the Sustain Pedal Trapwork</td>
<td>21-22</td>
</tr>
<tr>
<td>Installing the Sustain Pedal Solenoid - Grand</td>
<td>2324</td>
</tr>
<tr>
<td>Installing the Universal Sostenuto Assembly</td>
<td>25-27</td>
</tr>
<tr>
<td>Installing the Steinway Sostenuto Assembly [Special Order Part # 70897]</td>
<td>28-29</td>
</tr>
<tr>
<td>Mounting and Connecting the Electronic Components</td>
<td></td>
</tr>
<tr>
<td>Electronic Components - Description</td>
<td>30-31</td>
</tr>
<tr>
<td>Power Supply / Driver Board</td>
<td></td>
</tr>
<tr>
<td>PNO3 Processor / Pin-Light Extension (PLx) / Wi-Fi Device / Powered Speaker</td>
<td></td>
</tr>
<tr>
<td>Component Location - Grand and Upright</td>
<td>32</td>
</tr>
<tr>
<td>Mount &amp; Connect: Power Supply / Processor / Wi-Fi / Speaker / PNOscan III (Record)</td>
<td>33</td>
</tr>
<tr>
<td>Mount &amp; Connect the PLx</td>
<td>34</td>
</tr>
<tr>
<td>Mount the Key Solenoid Rail / Mount &amp; Connect the Driver Boards</td>
<td>35</td>
</tr>
<tr>
<td>Adjustment Procedures</td>
<td>36</td>
</tr>
<tr>
<td>Lost Motion Adjustment: Plunger-Plunger Tip to Keytail Height</td>
<td></td>
</tr>
<tr>
<td>Power ON and Test PNO³</td>
<td>37</td>
</tr>
<tr>
<td>Network Mode Setup</td>
<td>38</td>
</tr>
<tr>
<td>Mount and Connect the Netgear Wi-Fi Range Extender</td>
<td></td>
</tr>
<tr>
<td>Connect to PNO³</td>
<td></td>
</tr>
<tr>
<td>Stand Alone &amp; Network Modes</td>
<td></td>
</tr>
<tr>
<td>Menu Basics</td>
<td>39</td>
</tr>
<tr>
<td>Test Files</td>
<td></td>
</tr>
<tr>
<td>PNO³ Setup</td>
<td>40</td>
</tr>
<tr>
<td>Playback Parameters</td>
<td></td>
</tr>
<tr>
<td>Key Adjust</td>
<td></td>
</tr>
<tr>
<td>Pedal Adjust</td>
<td></td>
</tr>
<tr>
<td>Master Volume Curves</td>
<td>41</td>
</tr>
<tr>
<td>Completing the Installation</td>
<td>42</td>
</tr>
<tr>
<td>Install Rail Cover, Lyre Braces and Dress Cables</td>
<td></td>
</tr>
<tr>
<td>Attach the Lyre Braces, Dress the Cables / Installation is Complete</td>
<td>43</td>
</tr>
<tr>
<td>PNOscan Record Setup</td>
<td></td>
</tr>
<tr>
<td>Key Adjust</td>
<td>44</td>
</tr>
<tr>
<td>Pedal Adjust</td>
<td>45</td>
</tr>
<tr>
<td>Wi-Fi Setup</td>
<td>46</td>
</tr>
<tr>
<td>Configuring the Netgear for Netowrk - WPA Security</td>
<td></td>
</tr>
<tr>
<td>Configuring the Netgear for Netowrk - WEP Security</td>
<td>47</td>
</tr>
<tr>
<td>Warranty Information</td>
<td>49</td>
</tr>
</tbody>
</table>
QRS is pleased that you have chosen the QRS PNOmation II™ Retrofit Kit, the superb retrofit kit for automating acoustic pianos. This product brings a level of excellence in reproducing live performances on the piano. It is made possible by many remarkable technical innovations. However, in spite of its high level of sophistication, this retrofit kit is easy to install and service.

Before beginning the installation, take time to read “Make Certain the Kit Fits,” to ensure that the piano will indeed accept the kit. This kit will NOT fit into a spinet piano. Familiarize yourself with the parts in the kit before proceeding and then let the instructions guide you.

All piano keys have a tendency to react differently. The key solenoids provide three adjustments: the first adjusts the amount of plunger throw to match that of the key-tail lift, the second sets the lost motion between the key tail and the plunger tip and the third adjusts the force of each key solenoid.

Although the kit has been provided with enough solenoids to play 80 notes, the instrument has been designed to support the entire 88-note range of the modern piano. The additional parts required may be purchased separately if an 88-note installation is desired.

The standard Pianomation kit comes with a pedal solenoid but will also run in magic pedal mode if the Pedal Solenoid is not present. The pedal solenoid is connected to the power supply by a 4 position plug. The Pedal Solenoid will activate the trapwork, therefore lifting the dampers off of the strings as a real pianist would. In “Magic Pedal Mode” the key solenoids control the sustain events by extending note durations to the corresponding pedal ON event.

The instrument uses relatively low voltages supplied by an isolation transformer. Low voltages eliminate the danger of electrical shock to the installer (Below UL limit of 41V). The electronics are fully shielded to prevent electromagnetic interference.

You will need some materials not provided with the kit to complete the installation.

Steinway grand pianos require special Sostenuto trapwork not supplied with the standard kit. Order QRS part number 70897.
# Parts List

**Grand Kit - Item #825002 [Without Record Option]**

<table>
<thead>
<tr>
<th>Item #2</th>
<th>Item #3</th>
<th>Item #4</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>76040</td>
<td>76140</td>
<td>1</td>
<td>QRS “Q35” Amplified Speaker</td>
<td></td>
</tr>
<tr>
<td>81500</td>
<td>1</td>
<td>PNO3 Kit - Grand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80124</td>
<td>8012406</td>
<td>1</td>
<td>PNO3 PLX Pin Light Extension (PLx)</td>
<td></td>
</tr>
<tr>
<td>50128</td>
<td>2</td>
<td>Cable: 1/8” Male to 1/8” Male - 6.5’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50126</td>
<td>2</td>
<td>Cable: USB A Male to 5-Pin USB Mini B Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50141</td>
<td>1</td>
<td>Cable: USB A Male to USB B Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>790185B</td>
<td>1</td>
<td>Cable: PNOscan extension ribbon, black - 72”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5606433</td>
<td>4</td>
<td>Screw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80208</td>
<td>1</td>
<td>PNO3 Processor Assembly [2 Brackets -80109 / Screws - 37322]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80308</td>
<td>1</td>
<td>PNO3 Processor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80309</td>
<td>1</td>
<td>Magnetic Mounting Bracket w/Screws and Straps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>990026</td>
<td>1</td>
<td>Cable: 1/8” Male to Twin RCA - 8’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83122</td>
<td>5</td>
<td>16-Note Driver Board w/Built-In Buffer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82124</td>
<td>2</td>
<td>Aluminum Extrusion - <em>Driver Board Mounting</em> [70585 Screws x 6]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75210</td>
<td></td>
<td>Power Supply Rev 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79211</td>
<td>1</td>
<td>Wi-Fi Device and Ethernet Cable (Netgear EX6100 Range Extender)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82797</td>
<td>1</td>
<td>Owners Pack Out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70388</td>
<td>4</td>
<td>AAA Batteries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73398</td>
<td>1</td>
<td>PNO3 Big Button Remote</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71009</td>
<td>1</td>
<td>Split Loom Tubing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71010</td>
<td>3</td>
<td>Clamp, R Cable (7/8” Black)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70253</td>
<td>1</td>
<td>Owners Warranty Registration Card</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60205</td>
<td>1</td>
<td>Cable Package:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83127</td>
<td>3</td>
<td>Driver Board Interconnecting Ribbon Cable - 4”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83128</td>
<td>1</td>
<td>Driver Board Interconnecting Ribbon Cable - 14”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83129</td>
<td>1</td>
<td>Processor to In-Line Buffer Board Ribbon Cable - 30”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>811437</td>
<td>1</td>
<td>Power Supply to Note Driver Power Cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>811439</td>
<td>1</td>
<td>Processor to Power Supply Ribbon Cable 48”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70263</td>
<td>1</td>
<td>Power Cord 3’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70348</td>
<td>1</td>
<td>Extension Cord 8’ Black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71500B</td>
<td>1</td>
<td>Rail &amp; Components Assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70050A</td>
<td>1</td>
<td>Note Rail Assembly-Grand (2 Rails &amp; 80 Solenoids)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70065</td>
<td>1</td>
<td>Solenoid Rail Cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70130S</td>
<td>1</td>
<td>Pedal Solenoid Assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70743</td>
<td>1</td>
<td>Universal Sostenuto Assembly (Steinway Sostenuto 70897 - Special Order)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74270D</td>
<td>1</td>
<td>Sustain Trapwork Assembly REV D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70083F</td>
<td>80</td>
<td>Key Solenoid Plungers 4.5” [Felt Tip] “No key-tail felt required”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70400A</td>
<td>1</td>
<td>Small Parts Bag:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70058</td>
<td>2</td>
<td>Dual Solenoid Mounting Plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70054</td>
<td>4</td>
<td>Rail Mounting Plate Bolt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70056</td>
<td>4</td>
<td>Rail Mounting Plate Nut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70062</td>
<td>8</td>
<td>Rail Mounting Bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70078</td>
<td>8</td>
<td>Rail Bracket Mounting Screw 10/32 x5/16”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70079</td>
<td>8</td>
<td>#10 Flat Washer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70075</td>
<td>8</td>
<td>#10 External Star Lock Washer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70080</td>
<td>38</td>
<td>#10 x 1” Screw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70222</td>
<td>1</td>
<td>Left Soft Shift Bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70224</td>
<td>1</td>
<td>Right Soft Shift Bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70226</td>
<td>1</td>
<td>Axel Rod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70228</td>
<td>1</td>
<td>Axel Rod lock Nut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70236</td>
<td>2</td>
<td>Nylon Washer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70204</td>
<td>10</td>
<td>Cable Tie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70208</td>
<td>4</td>
<td>Ribbon Cable Clamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70218</td>
<td>8</td>
<td>Power Cord Clamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70129</td>
<td>16</td>
<td>1” Cable Clamp Screw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70076</td>
<td>8</td>
<td>8/32 x 1/4” Bolt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70190</td>
<td>4</td>
<td>Fender Washer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70178</td>
<td>2</td>
<td>10/32 x 1/2” Screw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Parts List

**Upright Kit - Item #825022** [Without Record Option]

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item #3</th>
<th>Item #4</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>76040</td>
<td>70051</td>
<td>70052</td>
<td>1</td>
<td>QRS Amplified Speaker [Twin Speakers can be ordered for smaller pianos - # 76047]</td>
</tr>
<tr>
<td>81502</td>
<td>81204</td>
<td>50128</td>
<td>1</td>
<td>PNO3 Kit - Upright</td>
</tr>
<tr>
<td></td>
<td>8012040</td>
<td>50126</td>
<td>2</td>
<td>PNO3 PLP x Pin Light Extension (PLx)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50141</td>
<td>1</td>
<td>Cable: USB A Male to USB B Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>790185B</td>
<td>1</td>
<td>Cable: PNOscan extension ribbon, black - 72”</td>
</tr>
<tr>
<td></td>
<td>5606433</td>
<td></td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td></td>
<td>80208</td>
<td></td>
<td>1</td>
<td>PNO3 Processor Assembly [2 Brackets -80109 / Screws - 37322]</td>
</tr>
<tr>
<td></td>
<td>80308</td>
<td></td>
<td>1</td>
<td>PNO3 Processor</td>
</tr>
<tr>
<td></td>
<td>80309</td>
<td></td>
<td>1</td>
<td>Magnetic Mounting Bracket w/Screws and Straps</td>
</tr>
<tr>
<td></td>
<td>990026</td>
<td></td>
<td>1</td>
<td>Cable: 1/8” Male to Twin RCA - 8”</td>
</tr>
<tr>
<td></td>
<td>83122</td>
<td></td>
<td>5</td>
<td>16-Note Driver Board w/Built-In Buffer</td>
</tr>
<tr>
<td></td>
<td>82124</td>
<td></td>
<td>2</td>
<td>Aluminum Extrusion - Driver Board Mounting [70585 Screws x 6]</td>
</tr>
<tr>
<td></td>
<td>75210</td>
<td></td>
<td></td>
<td>Power Supply Rev 2</td>
</tr>
<tr>
<td></td>
<td>79211</td>
<td></td>
<td>1</td>
<td>Wi-Fi Device and Ethernet Cable (Netgear EX6100 Range Extender)</td>
</tr>
<tr>
<td></td>
<td>82797</td>
<td></td>
<td>1</td>
<td>Owners Pack Out</td>
</tr>
<tr>
<td></td>
<td>70388</td>
<td></td>
<td>4</td>
<td>AAA Batteries</td>
</tr>
<tr>
<td></td>
<td>73398</td>
<td></td>
<td>1</td>
<td>PNO3 Big Button Remote</td>
</tr>
<tr>
<td></td>
<td>71009</td>
<td></td>
<td>1</td>
<td>Split Loom Tubing</td>
</tr>
<tr>
<td></td>
<td>71010</td>
<td></td>
<td>3</td>
<td>Clamp, R Cable (7/8” Black)</td>
</tr>
<tr>
<td></td>
<td>70253</td>
<td></td>
<td>1</td>
<td>Owners Warranty Registration Card</td>
</tr>
<tr>
<td></td>
<td>60205</td>
<td></td>
<td>1</td>
<td>Cable Package:</td>
</tr>
<tr>
<td></td>
<td>83127</td>
<td></td>
<td>3</td>
<td>Driver Board Interconnecting Ribbon Cable - 4”</td>
</tr>
<tr>
<td></td>
<td>83128</td>
<td></td>
<td>1</td>
<td>Driver Board Interconnecting Ribbon Cable - 14”</td>
</tr>
<tr>
<td></td>
<td>83129</td>
<td></td>
<td>1</td>
<td>Processor to In-Line Buffer Board Ribbon Cable - 30”</td>
</tr>
<tr>
<td></td>
<td>811437</td>
<td></td>
<td>1</td>
<td>Power Supply to Note Driver Power Cable</td>
</tr>
<tr>
<td></td>
<td>811439</td>
<td></td>
<td>1</td>
<td>Processor to Power Supply Ribbon Cable 48”</td>
</tr>
<tr>
<td></td>
<td>70263</td>
<td></td>
<td>1</td>
<td>Power Cord 3’</td>
</tr>
<tr>
<td></td>
<td>70348</td>
<td></td>
<td>1</td>
<td>Extension Cord 8’ Black</td>
</tr>
<tr>
<td>70051</td>
<td>70050A</td>
<td></td>
<td>1</td>
<td>Rail &amp; Components Assembly - Upright</td>
</tr>
<tr>
<td></td>
<td>70074</td>
<td></td>
<td>80</td>
<td>Foam - Lost Motion</td>
</tr>
<tr>
<td></td>
<td>51045</td>
<td></td>
<td>1</td>
<td>Vertical Pedal Solenoid Lifter Assembly [Includes Pedal Solenoid 701305]</td>
</tr>
<tr>
<td></td>
<td>70083R</td>
<td></td>
<td>80</td>
<td>Key Solenoid Plungers 4.5” [Rubber Tip]</td>
</tr>
<tr>
<td></td>
<td>70084</td>
<td></td>
<td>1</td>
<td>Key Tail Felt 1’-1/16”</td>
</tr>
<tr>
<td></td>
<td>70400A</td>
<td></td>
<td>1</td>
<td>Small Parts Bag:</td>
</tr>
<tr>
<td></td>
<td>70061</td>
<td></td>
<td>80</td>
<td>Felt - Lost Motion - Upright</td>
</tr>
<tr>
<td></td>
<td>70058</td>
<td></td>
<td>2</td>
<td>Dual Solenoid Mounting Plate</td>
</tr>
<tr>
<td></td>
<td>70054</td>
<td></td>
<td>4</td>
<td>Rail Mounting Plate Bolt</td>
</tr>
<tr>
<td></td>
<td>70056</td>
<td></td>
<td>4</td>
<td>Rail Mounting Plate Nut</td>
</tr>
<tr>
<td></td>
<td>70123</td>
<td></td>
<td>8</td>
<td>Rail Mounting Bracket - Upright</td>
</tr>
<tr>
<td></td>
<td>70078</td>
<td></td>
<td>8</td>
<td>Rail Bracket Mounting Screw 10/32 x5/16”</td>
</tr>
<tr>
<td></td>
<td>70079</td>
<td></td>
<td>8</td>
<td>#10 Flat Washer</td>
</tr>
<tr>
<td></td>
<td>70075</td>
<td></td>
<td>8</td>
<td>#10 External Star Lock Washer</td>
</tr>
<tr>
<td></td>
<td>70080</td>
<td></td>
<td>38</td>
<td>#10 x 1” Screw</td>
</tr>
<tr>
<td></td>
<td>70222</td>
<td></td>
<td>1</td>
<td>Left Soft Shift Bracket</td>
</tr>
<tr>
<td></td>
<td>70224</td>
<td></td>
<td>1</td>
<td>Right Soft Shift Bracket</td>
</tr>
<tr>
<td></td>
<td>70226</td>
<td></td>
<td>1</td>
<td>Axel Rod</td>
</tr>
<tr>
<td></td>
<td>70228</td>
<td></td>
<td>1</td>
<td>Axel Rod Lock Nut</td>
</tr>
<tr>
<td></td>
<td>70236</td>
<td></td>
<td>2</td>
<td>Nylon Washer</td>
</tr>
<tr>
<td></td>
<td>70204</td>
<td></td>
<td>10</td>
<td>Cable Tie</td>
</tr>
<tr>
<td></td>
<td>70208</td>
<td></td>
<td>4</td>
<td>Ribbon Cable Clamp</td>
</tr>
<tr>
<td></td>
<td>70218</td>
<td></td>
<td>8</td>
<td>Power Cord Clamp</td>
</tr>
<tr>
<td></td>
<td>70129</td>
<td></td>
<td>16</td>
<td>1” Cable Clamp Screw</td>
</tr>
<tr>
<td></td>
<td>70076</td>
<td></td>
<td>8</td>
<td>8/32 x 1/4” Bolt</td>
</tr>
<tr>
<td></td>
<td>70190</td>
<td></td>
<td>4</td>
<td>Fender Washer</td>
</tr>
<tr>
<td></td>
<td>70178</td>
<td></td>
<td>2</td>
<td>10/32 x 1/2” Screw</td>
</tr>
</tbody>
</table>
Introduction

Make Certain that the Kit will Fit!

All kits play 80 notes, excluding the first and last 4 keys of the standard piano keyboard. The following questions should be asked before beginning an installation:

1. Is it a grand or upright piano? The kit will not fit into a spinet piano.

2. Is the keybed made of wood or a wood-veneered laminate?

3. Does the piano have a range of 88 notes, extending from low A to high C?

4. Is the keyframe made of wood?

5. Is the piano well-regulated and in good mechanical condition?

6. Does the piano have sufficient space beneath the soundboard or inside an upright to mount the pedal solenoid & power supply (5.25” x 5.25” x 12.5”)?

7. Can the back of the key frame be cut away 1 3/16”?

Tools Needed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td></td>
</tr>
<tr>
<td>Pencil</td>
<td>Wood Chisel</td>
</tr>
<tr>
<td>Measuring Tape</td>
<td>Awl</td>
</tr>
<tr>
<td>Long Straightedge</td>
<td>Wood Glue</td>
</tr>
<tr>
<td>Adjustable Frame Square</td>
<td>Spray Paint (Black)</td>
</tr>
<tr>
<td>Screwdriver (Assortment)</td>
<td>Sandpaper (Assortment)</td>
</tr>
<tr>
<td>Power Screwdriver (Optional)</td>
<td>Palm Sander (Optional)</td>
</tr>
<tr>
<td>Socket (Assortment)</td>
<td>Jig Saw</td>
</tr>
<tr>
<td>11/32” Nut Driver</td>
<td>Jig Saw Blades (Assortment)</td>
</tr>
<tr>
<td>5/16” Nut Driver</td>
<td>Power Drill (Right Angle Optional)</td>
</tr>
<tr>
<td>Hammer</td>
<td>Drill Bits (Assortment)</td>
</tr>
<tr>
<td>Hacksaw</td>
<td>1-3/4” Forstner Bit or Flat (paddle) Bit</td>
</tr>
<tr>
<td>Metal File</td>
<td>Center Punch</td>
</tr>
<tr>
<td>Rasp</td>
<td>Circular Saw - 7 1/2” blade (Optional)</td>
</tr>
<tr>
<td>Utility Knife</td>
<td>Router (Optional)</td>
</tr>
<tr>
<td>Plastic Cutting Board</td>
<td>Vacuum Cleaner</td>
</tr>
</tbody>
</table>
Introduction

Piano Action Regulation

This discussion is not intended to be a complete course on grand action regulation, but rather may prove helpful in restoring the action to proper performance. Proper alignment of action parts, and key easing are all very important steps in the regulation procedure. The following procedure assumes that this preliminary work has been checked and performed as necessary. Before removing the action from the action cavity, evaluate action regulation. If the action is not well regulated, proper performance of the system cannot be expected.

During the installation process of the PNOmation II Player System, it is quite possible that action regulation will be directly affected. A portion of the keyframe and back rail cloth will be removed so that the note solenoid plungers can contact the keytails. This operation may cause the keytails to be lower than their original position. The result of lower key tails is an increase in both key height, and hammer strike distance. Restoring the strike distance to specifications by turning out the capstan screws is not the proper remedy. Always re-work the back rail height so that the key height is at its original position.

- Are the keys level?
- Do the hammers let off 1/8 in the bass, tapering to 1/16 in the high treble?
- Is the drop 1/16 below the point of let-off?
- Is the hammer line straight?
- Are the hammer shanks approximately one shank thickness above the hammer rest rail?
- Is there adequate after-touch?

With the action on a flat, clean workbench, measure and record the following:

Natural key height at bass and treble ends.
Sharp height above naturals.
Key dip; both naturals and sharps.
The height of the first and last hammers in each section of the action.

Replace the keys and action stack on the action frame. Refer to the regulation measurements recorded earlier to see if regulation has been affected by the modifications to the action frame. If key height, key level, or strike distance are different than previously recorded, steps must be taken to restore proper regulation.

To restore key height, replace the back rail cloth with one of a thicker dimension. Remove the action stack and keys. After removing the old back rail cloth, be sure that all traces of glue have been removed from the back rail. Replace a few of the end keys and try various thickness of back rail cloth, without glue, to balance the correct key height. Light finger pressure on the capstan screw will approximate the force that is normally on the capstan. Set key height with the back rail cloth at, or slightly below the desired key height.

When you are satisfied that you have the best choice of back rail cloth, glue the material to the back rail, leaving the rear edge unglued. Name board felt is available in a few different thicknesses, and can be used for fine adjustments when glued under the back rail cloth.

Although key height can be reestablished quite accurately using the above procedure, some key leveling is to be expected when replacing back rail cloth.

Remember that subsequent action regulation adjustments will affect those already performed. To prepare the action for final regulation, do the following quickly:

Check or set repetition lever height so it is slightly higher than the jack. During your final regulation, trip the jack tender with your finger and release it slowly. If regulated properly, you will be able to feel the jack brushing the knuckle as it is released. The jack must return completely under the knuckle.

Set strike distance to 1 3/4. Be sure that hammer shanks are above the rest rail.

Check or set jack position so that the back edge of the jack is aligned with the back edge of the knuckle core.

Set let-off 1/8 from string in the bass, tapering to 1/16 in the high treble. Make sure that you have some drop after escapement.

Set drop to 1/16 below let-off.

With the above preliminary steps completed, level keys as necessary to their final specification. Note that with key height at the same specification as it was before action frame modification, key dip should be correct (assuming that the dip was correct prior to the installation procedure). Also, damper lift timing is reestablished.

Check or set repetition spring. The spring should carry the hammer upward with a steady motion, without kicking.

With the preliminary action regulation done, you are ready to establish the strike distance and key dip measurements that will result in proper after-touch. Since the key height/key dip relationship has been reestablished, consider varying only the strike distance to get the proper after-touch. If you are working on an older instrument, consider varying both strike distance and dip to arrive at an acceptable compromise. Select sample keys with which to work, like the first and last two keys in each section.

Depress your first sample key very slowly, stopping its movement just after let off. Look to see if there is additional key travel left. If there is no additional key travel after the let off point, there is no after-touch. Key dip will have to be increased, or strike distance will have to be decreased. If there is too much additional key travel after the let off point, the hammer may block against the strings when the key is played fully into its dip. Key dip will have to be decreased, or strike distance will have to be increased. Be sure that the sharps have the same after touch as the naturals. As a second check, see that with the key fully depressed, there is still some travel left at the jack tender.

When you have the key dip/strike distance established on your samples, set your key dip to your established specification uniformly throughout the action. You are now ready for the final regulation.

Using your new strike distance measurements, carefully repeat the above outlined steps for the final time.
Installation Procedure

Upright Piano Installation - Recommendations...

This section outlines the differences between the installation of the QRS kit in an upright piano versus a grand. The differences are relatively small, and an installer familiar with the installation procedure for a grand piano should have no difficulty installing the system in an upright. The differences are as follows:

On a grand piano the slot cut into the keybed is determined by the location of the keytails. The position of the action determines where to cut the slot and you mount the rail to the bottom of the keybed accordingly. On an upright piano, with limited space for the components, the slot location is determined the position of the key solenoid rail assembly. Begin by determining how close can you mount the rail to the plate and still have the plungers strike the bottom of the keys. And remember, you want the plungers as close to the back-end of the keys as possible.

On a grand piano we usually cut one long slot in the keybed for the key solenoid rail. We want to cut three slots in the upright to keep the wood at the break-points to support the action bracket studs. We suggest adding a piece of angle-iron to support the keybed. This is mounted at the back side of the balance rail.

Since the mechanism is hidden from view, a key solenoid rail cover is not necessary.

Sostenuto and Sustain Pedal Trapwork aren’t used on the upright. We recommend installing the pedal solenoid for better playback. The sustain pedal mechanism on an upright is very different from that of a grand piano and requires the installer to fabricate a mounting system specific to the individual piano.

As of August, 2013 QRS includes the Vertical Pedal Solenoid Lifter assembly in the upright kit.

In most cases, the back rail and back rail cloth must be relocated toward the back edge of the piano keys.

**IMPORTANT:** Care must be taken to first measure the key dip at the back end of the keys before any work begins. Secondly, after the back rail has been relocated, you must ensure that the key dip is exactly the same as it was before starting. If it is not, you must either trim the back rail or shim it up to its original measurement.

Special upright driver board mounting brackets are required for mounting the driver boards to the solenoid rail. These brackets are longer which allow the driver boards to hang below the solenoid rail to save space. Since the upright keybed is thinner than a grand, longer key solenoid rail mounting brackets are supplied with the upright kit.

**SPECIAL NOTE:** The driver boards are usually oriented differently on an upright which will change the order that the keys play. You can reverse the key order by selecting “Invert Keybed” in the “Playback Parameters” section of PNO3.

All of the electronic components are mounted inside the piano in a place convenient for the installer. Smaller speakers are supplied with the upright kit.

You may need to cut a 1” hole directly through the soundboard of the piano towards the bottom of the piano at the end where the power supply is usually mounted. This will allow the main power plug to easily be plugged into a wall outlet. This hole will not affect the sound of the piano in any way.

Alignment of the solenoid rail is made by laying a wooden stick at the top back edge of the keys and carefully transferring the centerline of each key onto the wooden stick. This stick will become your guide to position the key solenoids on the rail. Remember that a standard installation is 80 notes. Start with note #5 and end with note #84 and slide each pair of solenoids in direct alignment with your marks on the alignment stick and tighten the 11/32” nuts.

We’ve included some pictures on the next few pages to help you with the upright piano installation.
Installation Procedure

...Upright Piano Installation - Recommendations...

- Extend slot 9.52mm [3/8"] beyond keys at break points.
  Corner radius = 6.35mm [1/4”]
- Keys 1-4 and 85-88 are not used by the player.

- Angle-iron to support keybed
- Three keybed slots
- Re-positioned back rails
- PNOScan III Record
Installation Procedure

...Upright Piano Installation - Recommendations...
Installation Procedure

...Upright Piano Installation - Recommendations

Vertical Pedal Solenoid Lifter # 51045

Includes the Pedal Solenoid

This twin speaker set is a special order item.

Twin Speakers for smaller piano upright pianos # 76047
Mount two brackets. One on each side of each speaker. Use two screws per bracket. Attach brackets to piano.
Installation Procedure

Preparing the Key Solenoid Rail

In this chapter, we determine the throw of the key solenoid plunger in relation to the piano action’s key-tail travel. We also walk through the process of key solenoid alignment with respect to the piano actions keytails. When this chapter’s work has been done, the solenoid rail will have the proper rail height and plunger throw. The mounting brackets will be in place and ready for mounting to the piano.

Tools needed include the 2 optional rail support brackets a 11/32” nut driver, two rail bracket mounting screws, screwdriver, hacksaw, metal file, ruler and a pencil. The piano action is on your workbench and the keys are facing away from you.

The Pianomatation Key Solenoid Rail is shipped assembled. Its component parts are as follows:

Key Solenoid Plunger Throw...

Step 1. To take advantage of PNmatation’s best reproducing capabilities, it is essential that the plunger throw is slightly greater than the keytail lift.

Note the following measurements:
B. Measure the bottom of the keytail to the keybed at the KEYTAIL UP position.
A. Measure the bottom of the keytail to the keybed at the KEYTAIL DOWN position.

$$B = \text{____________}$$
$$A = \text{____________}$$
$$B - A(C) = \text{__________}$$

Step 2. Take the key lift measurement “C” above and add 1/16” to compensate for the felt plunger tip. This is the measurement used to find the rest position of the plunger.

Plunger Throw = C + 1/16” ______________
Installation Procedure

...Key Solenoid Plunger Throw

**Step 3.** Hold the plunger in its "ON-HOLD" position.
*This On-Hold position is where the TOP of the Plunger Body is flush with the top of the solenoid.*
Position a gauge, a piece of wood or cardboard, and mark the location of top of the Plunger Tip.
Release the plunger.

**Step 4.** From the position marked in step 3, use a ruler to measure the Plunger Throw distance (step 2) and mark your gauge.

**Step 5.** Turn the Key Solenoid Cap to move the Plunger Tip to your mark.

NOTE: If the cap won’t raise the plunger high enough because it is tight against the solenoid housing, no more threads, remove the plungers and insert Lost-Motion felt washers.

**Step - Final.** Adjust all lost motion caps to the same position.
Installation Procedure

Key Solenoid Rail Assembly - Solenoid to Key Alignment

With the piano action on your workbench and the fronts of the keys facing away from you. Place the solenoid rail on the workbench in front of the keytails and put the plungers inside the solenoids. Turn the solenoid rail assembly on its side, so that the plungers are now parallel to the workbench surface and the felt plunger tips are touching the back ends of the piano keys. The first plunger should start all the way to the left side of the rail. Secure the rail and action with the two clamps so they will not move during the alignment process. Mark which side is bass and treble. Make sure all the solenoid plates are free moving. If they are not, use an 11/32” nut driver to loosen them.

The spacing between sections has been held in check by the introduction of solenoid assembly pairs adjacent to the breaks. Because not all sections on a piano will have an even number of notes played in them, those which have an odd number will require a modified solenoid assembly to provide the additional note required, and this modified note will be placed adjacent to a section break or at either end.

Count the number of keys to be played in each section. If there is an even number, align the solenoids with plungers already on the rail with the centers of their respective key tails. If the number of keys to be played is odd, simply remove one of the solenoids from the double mounting bracket and continue to the alignment of the next section.

If necessary, cut away the unused portion of the rail ends with a hack saw and file off all burrs with a metal file. Be careful not to cut away the rail bracket mounting holes, or cut any solenoid wires.

Mount all 8 rail support brackets to the rail with the 10-32 X 7/16” screws and #10 external star washers.

Note: The distance from the bottom of the keybed to the bottom of the keytail felt should be equal to the distance from the top of the solenoid plunger to the top of the rail mounting brackets.

At this stage, the key solenoids have been matched up with their corresponding keytails. The rail has been cut to length, and the rail brackets attached in place. Put the rail aside for future installation in the piano.
Installation Procedure

Modifying the Keyframe - Grand...

If you are installing a QRS PNOscan III record system you should incorporate it’s installation while modifying the piano action. The PNOscan III has it’s own installation manual.

The Keyframe will probably require modification to accommodate the Key Solenoid Rail Assembly. The key tails must protrude over the back of the action frame, so the rear of the key frame must be cut away.

Tools needed for this chapter: pencil, paper, wood chisel, straightedge, jig saw, palm sander & sand paper, utility knife, wood glue and an assortment of screwdrivers.

At this point in the installation, the piano is on its legs, the fall board, keyslip, and cheek blocks have been removed, and the lyre is still in place. The piano has been measured to verify that the Note Rail Assembly will fit.

Measure the distance the action shifts when the left (una corda) pedal is pressed. (If a hammer lift rail is installed, measure the distance the hammers lift for a given movement of the soft pedal lyre lift rod.) Measure the distance the soft shift (una corda) pedal lift rod travels when the pedal is depressed. Write these measurements down for later trapwork installation.

Remove the entire grand or upright piano action from the piano and place it on a clean, level workbench. Do not depress the keys while sliding the action in or out of the piano, or broken hammers will result.

Examine the relationships of the key tails to the rear edge of the keyframe. Each key tail must have at least 1-1/4" exposed beyond the rear edge of the key frame. If this is not the case, then the key frame must be modified. If modifications are required, follow these steps:

**IMPORTANT:** Before removing the hammer action from the key frame action you must first measure the distance from the bottom of the key frame action to the bottom of the piano key. Next, depress the key and measure once again, from the bottom of the key frame action to the bottom of the key. Write these measurements down for later use.

With a screwdriver remove the wooden key stop rail from the key frame. With a screwdriver remove the hammer action from the keyframe, being certain to note any screw length differences in the 8 or 10 wood screws used to secure the action to the keyframe. It is always advisable to put the same screw into the same hole. Verify that the keys are properly numbered before removing them. Remove all keys except key numbers 5, 84, and the break keys. With a pencil, mark 1-1/4" in from the ends of the key tails onto the keyframe. Allow an additional 1/4" at either end of each section. With a straightedge to guide you, connect the marks in each section. Removal of the back rail felt may be required before this step. (Figure 1)

The back rail felt rests beneath the key tails, and can be removed by using a sharp utility knife or in some cases a wood chisel. Place the removed back rail felt to the side for future use when relocating and re-gluing in its new position.
Installation Procedure

...Modifying the Keyframe - Grand...

The key frame must now be cut. Remove all keys. With a jig saw, follow the pencil line and cut away the frame in each section between the breaks.
With the palm sander, clean up all the rough edges.

The action is now ready to be used to locate the positions of the slots through the piano's keybed.

Place the keyframe into the grand piano case and secure it with the right and left cheek blocks. With a short, sharp pencil, reach into the keyboard compartment and mark the notched rear most limits of the keyframe, including the right and left extremes of each notch. These lines will be used to identify the exact locations of the keybed slots on the underside of the keybed, so be certain to make well-defined pencil lines.

Remove the keyframe and reglue the keytail felt flush with the back of the keyframe. Measuring the key dip before and after repositioning the felt is recommended. If it is the same, less regulation will be required. If it has changed, simply shim the back edge with a thin piece of cardboard to maintain the original key dip.

Newer kits include key solenoid plungers with felt tips. Therefore we no longer provide the felt strip below.

Note: This is a good time to install the optional 88 note record strip (70014). See the PNOScan record strip installation manual.

Place all of the keys back on the key frame.

Re-install the hammer action on the key frame, using the same 8-10 screws you removed earlier.

Re-install the Key Stop Rail.

At this point, the grand action modifications are complete.
For best player performance it is important that the action be regulated properly.
Installation Procedure

...Modifying the Keyframe - Grand

- Keyframe:
  - 1-3/4” to 2” slot
  - 1/4”
  - Back edge of the keyframe drawn on the top of the keybed.

- Keybed:
  - Ends of the slot
  - Lines transferred from the top of the keybed.

- Diagram:
  - DO NOT CUT ACTION SUPPORT FEET
  - KEYS AT BREAK
  - CUT-AWAY AREA
  - BACKRAIL FELT
Installation Procedure

Cutting the Keybed Slot...

Tools needed for this chapter include a circular saw (sabre saw with a sufficiently long blade/ router may be used), a power drill with a sharp 1-3/4" Forstner bit (or wood boring bit), various screwdrivers, a frame square, a pencil, a tape measure, and paint that matches the underside of the piano.

At this point the piano is on its legs, the action is outside of the piano case and has been modified to allow the key tails to protrude over the rear of the key frame by 1-1/4". Felts are attached to the undersides of each key tail, and the original trapwork is still in place.

Next, have an assistant press the sustain pedal. While he depresses it, measure the distance the pedal lyre lift rod moves and write it down. Likewise, measure the distance the damper lift rail rises when the pedal is pressed. This measurement can be taken from inside the case. Next, mark the exact location of the upward extension of the pedal lyre's vertical rods onto the keybed bottom. Set these measurements aside for later trapwork installation.

Repeat the above step with the Sostenuto pedal (if it exists).

There may be two or more action stop blocks inside the case. These blocks stop the insertion of the grand piano keyboard at the proper location and prevent it from lifting up off the keybed. In the event that these interfere with the slot to be cut, remove by force applied by a sharp chisel and hammer.

Remove the lyre from the piano.

Turn the piano on its flat or bass side and secure it. Make a visible pencil mark outlining the bass and the treble legs. Next, remove each leg marking them accordingly (bass, treble, tail) and place in a safe area to prevent damage.

Use a pencil and mark the lyre rod strike points (where the lyre rods hit the original trap work) on the bottom of the keybed. Remove all trapwork, and other parts that may interfere with the keybed modifications from the underside of the piano.

Using a tape measure, record the distance from the front of the piano case to the marks you previously made inside the case. Do this on both the bass and treble end. Call this the depth measurement.
Transfer the slot marks made on the inside of the piano case to the underside of the keybed.

For Upright installations, See Page 9.
Installation Procedure

...Cutting the Keybed Slot

Taking into account any variations in the contour of the front of the piano and using the frame square aligned with the mark just made on the front underside of the keybed, measure and mark the depth measurement on the underside of the keybed. Next, measure 1/4" toward the front of the piano scribing a straight line between the bass and treble notes. Then measure 1-3/4" toward the rear of the piano from the newly scribed line. Whenever possible we recommend keeping in the breaks.

Each slot should be at least 1-3/4" wide (2" Maximum). The longitudinal center of each slot must correspond to the center line of the felt padded key tails, which is 1/2" in from the end of each key.

Verify the marks just made. Drill a small exploratory hole within each slot and compare the position of the slot with the marks made inside the case. Correct each slot position as required.

Using a 1-3/4" Forstner bit, drill holes centered at the ends of each slot.

Cut the lengths of each slot with a sabre saw, circular saw or router (being extremely careful with all power tools), connecting the end holes just made. Avoid cutting away the breaks between the slots if possible.

Rasp or sand the slots smooth and square with the surface of the keybed. Bevel the top most slot edges with coarse sand paper. The slots should be sealed with paint matching the bottom of the piano, or a clear sealant to retard drying of the wood.

At this point the slots have been positioned and cut. Now is the time to remount the Soft Shift Lever.

Side View of Modified Keyframe and Keybed
Installing the Soft-Shift Lever

The Soft Shift (una corda) pedal mechanism usually includes a long, cast-iron bell crank lever whose short arm protrudes though the keybed to engage a groove cut in the bottom of the keyframe somewhere beneath the treble section. The shift pedal in this configuration does not have to pass through the solenoid rail and, therefore, may often be left untouched. However, on some pianos you may have to move the soft shift toward the front of the piano to accommodate for the width of the rail. For the pianos that need modification, brackets have been included in the kit for easy readjustment. It is a good idea to leave one of the original wooden blocks attaching the soft shift lever to the keybed, and only use one of the brackets supplied. This will make adjusting the Soft Shift lever much easier. The brackets can be attached to the keybed with four #10 x 1” mounting screws. The pedal must shift the action the same distance as before with the same pedal movement. Refer to the measurements taken when the trapwork was removed to verify that this behavior has been retained (See “Modify the Piano Action” section).

Measuring from the front edge of the slot there should be 2-1/4 inches to the front edge of the soft-shift hole.
Installation Procedure

Installing the Sustain Pedal Trapwork...

General Recommendations

When you are at the point where you are ready to start removing the original trapwork system from the piano we recommend that you trace around the trap components before you actually remove them. This is just a good reference should you have questions about leverage, stroke or placement after you have removed everything. You should also trace around anything else you will be removing such as the piano legs.

It is normally a good idea to install the new trap components (except for the Sostenuto) after you install the solenoid rail because there is only one correct place the rail can be installed, where as the trap components are somewhat flexible in their placement. The first is deciding if you need to mill any areas of the keybed besides the rail slot itself. The most likely places that would require special milling would be to mill a recess for the Sostenuto actuator assembly so it can be mounted above the solenoid rail. Another case would be to mill a pocket in the keybed to accommodate the up most position of the soft shift lever such as on a Steinway. You might be milling a slot perpendicular to the solenoid slot to fit a bridge support if you can’t leave one when you cut the main slot. Depending on the situation you may need to drill a new hole for the sustain dowel. It is important to realize these possibilities before you cut the slot. You don’t want to cut the slot, clean up the mess and install the solenoid rail just to find out you need to cut more material to accommodate a piece of the trap hardware!

Once you have the slot laid out on the bottom of the keybed (we recommend using a soap stone or med tip grease pencil), it will be much easier to conceptualize how you will configure the trap system. With the lines drawn exactly where the slot will be cut, you will be able to tell what obstacles will need to be moves, modified or worked around. For instance if you are installing a 88 note rail, you will immediately see what needs to be done to the piano legs. (you should have traced around the legs before you remove them.) You can measure the total width of the solenoid rail and soft shift lever assembly, reference this measurement off the front of the slot line you drew and decide if you need to move the lyre assembly forwards.

The chapters that follow this overview will provide explanations and graphic details that will help you realize the ideas behind the hardware design. For the most part, you will find that the hardware we supply will adapt easily to a typical installation bit keep in mind that the hardware we have designed can be easily modified to adapt to unique applications. If bending a lever to fit your particular installation fits the bill, then bend as needed. It’s your ingenuity that finalizes the hardware’s conformity.
Installation Procedure

...Installing the Sustain Pedal Trapwork

1. Draw a Straight line between the sustain hole in the keybed, lyre sustain push rod and the Pedal Solenoid.
2. Place the trapwork on the keybed so that it follows that line.
3. Fasten the trapwork to the keybed with the 4, 3 1/2” screws provided.
4. Screw the locking nylon nuts onto the #8 Damper Tray Push Rod so that it supports the damper tray. Screw the 2 #8 nuts with a washer on the other end.
5. Insert the #8 Damper Tray Push rod onto the Damper Tray.
6. Align the #8 Damper Tray Push Rod with the predrilled hole in the Trapwork Straight Bar. Put the Nylon Collar in that hole.
7. Place felt or leather on the Adjustable Lyre Rod Lever where the sustain push rod makes contact with the Adjustable Lyre Rod Lever.
8. Adjust the Lyre Rod Lever until it reaches over the lyres sustain push rod.
9. Adjust the 2 #8 Nuts so that the dampers fall to a full rest on the strings.
10. Tighten the nuts after all the lost motion is out.
11. Notch the Solenoid Rail cover where the Trapwork Straight Bar enters.
12. Adjust the Pedal so that there is 1/4” lift on the damper tray.

14. Trapwork Straight Bar
Installation Procedure

Installing the Sustain Pedal Solenoid - Grand...

You can now turn your attention to the installation of the sustain pedal solenoid assembly. This procedure is not required when sustain pedal is not installed.

Because there is a certain amount of variation in the architecture of grand pianos, you will probably have to custom-tailor the following directions to suit the mechanical dimensions of the particular instrument you are working on.

The key elements to focus on here include the sustain pedal lyre rod’s upward projection onto the keybed immediately above it, the location of the large hole through which the original sustain pedal pitman dowel projected to reach its corresponding hole in the wooden or aluminum damper tray (which lifts all of the piano’s dampers simultaneously), and the rearmost OUTSIDE vertical wall of the keyboard compartment, called “the belly rail.” The proper installation of the sustain pedal solenoid assembly takes into account the dimensional relationships of these three elements.

In addition to providing for both the manual and automatic operation of the piano’s dampers, you want to give the sustain pedal solenoid as much mechanical advantage as possible in order to minimize the power required to activate it. Despite the excellent design of the sustain pedal solenoid assembly, its long term operation depends upon your skill in locating the various leverage-points which enable it to function both manually and automatically.

Optimally, the sustain pedal solenoid assembly will be mounted on the belly-rail immediately behind the sustain pitman dowel which formerly connected the old trapwork lever’s far end to the damper tray in the keyboard compartment. This arrangement provides the shortest distance between the sustain pedal solenoid assembly’s lever-arm and the load imposed by the damper tray through the pitman dowel. Where such a situation exists, you will use the four mounting holes to locate the four #10 x 1” panhead screws used to secure the pedal solenoid to the belly-rail. If the belly rail is too close to the pitman dowel, locate the solenoid on a frame member or on an extension attached to the frame member.

Now, measure the distance from the center of the pedal solenoid’s pusher tip to the exact center of the damper tray’s pitman rod location. Sixty percent (60%) of this distance FROM THE PEDAL SOLENOID’S CENTER (that is, the lion’s share of this distance) is the location of the fulcrum of the trapwork assembly’s straight bar. The remaining 40% of this distance becomes the minor portion from the fulcrum to the pitman dowel.
Installation Procedure

...Installing the Sustain Pedal Solenoid - Grand

NOTE:
* It is important that the lift rod ends do not enter into the damper tray hole or top lever hole more than 1/4" or 6mm. This is determined by the position of the lift rod stop nuts. If length of lift rod needs changed be sure to cut excess rod length off.

NOTE: Adjusting damper lift height and solenoid throw.
When solenoid is fully activated (closed) the dampers should rise no more than 2.5mm or 1/8" above the string plane.

* For 2 and 3 string notes the dampers will not lift above the strings but only enough to avoid contact when vibrating.

* At rest the gap between the top plate of the solenoid and the felt washer in the solenoid case equals the distance the solenoid will move the lever.

QRS Music Technologies, Inc.
Sustain trap adjustment
Sheet 2 of 2
Install the Universal Sostenuto Assembly...

Identify the piano’s Sostenuto type.

**Push** - The Sostenuto is engaged when the actuator rises toward the strings.

**Pull** - The Sostenuto is engaged when the actuator descends away from the strings.

**Steinway** - Part of the assembly is built into the action.
You will need to order the Steinway Sostenuto Assembly from QRS.
Part # 70897

These instructions explain a Pull Type Sostenuto installation.

Remove the existing actuator attached to the Sostenuto blade.

Drill a hole in the new actuator for the staple.

Connect the actuator to the staple on the Sostenuto bar. Clamp the actuator over the bar so the staple is pinched by the hole just drilled and the large hole clamps around the rod. Tighten the actuator screw.

Push the “L” shaped thread rod through one of the three holes in the actuator and secure with the lock-nut.
Installation Procedure

...Installing the Universal Sostenuto Assembly...

**Install the push lever** which consists of the Push Block, the Main Shaft, the Shaft Bearings and the Swing Arm.

Determine placement of the push lever by first installing the pedal lyre on the piano. Place the push lever so that the end of the lyre’s Sostenuto rod is on the outer edge of the push block when the pedal is not depressed. Make sure that there is clearance as the push block travels through its arc as the pedal is depressed. The push block position is adjustable by loosening the set-screw. There are several indents in the shaft for positioning. Also note the position of the shaft bearing and bushing has been placed as close to the bend in the shaft as possible to prevent the bushing from working its way out during operation. Only this shaft bearing should be fastened in place at this time. It is OK for the shaft bearings to slightly overhang the slot.

The assembly may need inset into the keybed to accommodate the key solenoid rail and rail cover.

---

Insert the second Shaft Bearing and the Swing Arm to the Main Shaft. Screw the first lock-nut onto the thread-rod and then a washer. Push the thread-rod through the oval hole in the Swing Arm and then add the second washer and lock-nut. Do not tighten the lock nuts.

Center the thread rod/Swing Lever assembly in the slot being mindful of where the piano keys and solenoid rail will be located. The Sostenuto parts can touch neither when the installation is completed. Once the activator assembly is centered properly you can screw the second shaft bearing in place.
Installation Procedure

...Installing the Universal Sostenuto Assembly

Attach the small return spring to the thread-rod so it pulls up on the actuator. You’ll have to find a convenient place above the actuator to attach the other end of the spring.

Adjust the Sostenuto by loosening the locking screw on the swing arm to allow the main shaft to spin freely without activating the Sostenuto. Swing the main shaft so that the brass insert on top of the push block is centered on the spring with the pedal in the rest position. Rotate the swing arm so that the piano’s Sostenuto tab lifter bar is about 1/16” away from damper Sostenuto tabs. Tighten the swing arm locking screw. Push the Sostenuto pedal on the lyre and inspect the operation of the mechanism. When the pedal is depressed the tab lifter bar should be nearly parallel with the key bed.

Install the solenoid rail so that it goes over the Sostenuto shaft.
Installing the Steinway Sostenuto Assembly (Order 70897)...

**Installation Procedure**

This system allows for a custom length lever. Once the lever system is installed excess length can be cut off the lever ends to prevent interference.

It is important that the link is positioned directly under the actuator. Avoid pulling the link cable from severe angles.

Generally, it is recommended that the lever be removed from the front of the piano by 1/2" to provide space for player handware. Ultimately, the installer must decide what modifications are necessary for a given piano.

Find the optimum position for the pivotal point of the lever and flip the bearing mount at this point with the #1 x 1/4" screws. To access the #10 screws remove the screws from the nut. Again, do not overtighten the screws.

To prevent the nut from inadvertently slipping, again, do not overtighten the screws.

This sostenuto system is inherently adjustable. It is suggested that you maintain a near 50% pivot ratio. This will keep pedal stroke matched to the actuator.

Please follow these guide lines for installation and adjustment. The suggested guide lines apply to all Steinway models as well as other piano brands.

---

Universal / Steinway Sostenuto System

ORS Music Technologies, Inc.
Installation Procedure

...Installing the Steinway Sostenuto Assembly  (Order 70897)

Route out the Sostenuto actuator pocket, centered on the original dowel hole, 2” x 2”.

The depth is dependent on the key bed thickness but, the monkey must be able to slid over the actuator guide.
## Mounting & Connecting the Electronic Components

### Electronic Components - Description...

#### Power Supply Description

1. **ON/OFF Main Power Switch**
   - The UNSW OUT socket is “hot” when switch is ON
2. **FUSE:** 7amp 250 volt
3. **Processor - Ribbon Power Cable to PNO3**
4. **AC INPUT - From home’s AC Outlet**
5. **SUST PEDAL - To Sustain Pedal Solenoid**
6. **Mounting Bracket**
   - Can be also be mounted to the short side of the chassis
7. **RAIL PWR - DC Power Harness cable to Driver boards**
8. **UNSW OUT - Un-switched AC Out (To Wi-Fi device)**
9. **FOR FUTURE USE**
10. **SW OUT - To Speaker**
    - “Hot” only when HI light is ON
11. **LO/HIGH volt LEDs. Both LEDs must be out before connecting or disconnecting cables**

#### Board Description

There are five Key Note Driver Boards used in the Pianomation System. They are all identical and can be interchanged, if necessary. Notice Input and Output connectors! Input is near the “Logic LED” “Input” must be connected to PNO3’s PWM Control Port or previous driver board.

![Diagram of power supply and board connections]

Go bottom left to top right, from board to board...

---

**Do Not connect or disconnect any cables when the lights are on!**

- **Four pin male connector / Connect Note Driver Power cable 811437 - From Power Supply Rail Power**
- **Connect Key Solenoids to these sixteen 2-pin connectors**
- **Ribbon Cable Connectors / Connect Note Driver Ribbon cables 83126, 83127 & 83128**
  - From PNO3 PWM Control Port to bass end board and then chain other boards together.
Mounting & Connecting the Electronic Components

Electronic Components - Description

PNO3 Processor Description

The new PNOmation II processor replaces both the traditional QRS processor and the QRS user controller. The entire QRS Music library can be put on an SD memory card and inserted into the PNO3 unit. Control of the system is best achieved when connected via a standard wireless access point and an iPad or Android device.

PNOmation II Processor with the SD Card Music Library, Mounting brackets and screws

Pin-Light Extension (PLx) Description

The PLx box is used to extend two of the USB ports and two of the audio ports from the PNO3 processor to an easily accessible location under the keyboard. This box is also used to show the status of the system.

Pin-Light Port Extender [PLx] [Six Lights; IR Sensor; Stereo & USB Ports; Microphone; Reset Button]

Wi-Fi Device Description

The Wi-Fi device is the wireless link between the PNO3 processor and the iPad control device.

Netgear EX6100 (AC750) Range Extender

Powered Speaker Description

Verify that the red line voltage switch is set to 115 Volts

Mounting Bracket

Audio Line IN

AC Power

45 Watts RMS. Actual power!
5.25" Polypropylene woofer for clean bass response.
1.25" Polydome tweeter provides smooth even high frequency response without harshness.
Small milled cast fits better under piano and has superior sound due to resin type and heavy wall thickness.
Simple user interface
120 / 240 Volt AC input switch for world wide compatibility.
Green power indicator.
Detachable power cord.
Standard 1/8" Audio port accepts both mono and stereo plug types.
No volume control needed. Gain is matched to the QRS PNO systems. No need to crawl under the piano to set a volume level.
Sturdy integrated mounting bracket allows for angular adjustability to help get the sound out of the piano.
Bracket installs easily under the piano prior to mounting speaker. Easier installation.
Large modular heat sink chassis for allows for good heat dissipation without bulging fins on rear of speaker.
Mounting & Connecting the Electronic Components

Component Location - Grand
At this point the piano is still on its side. The optional sustain pedal solenoid is in place. All the trapwork modifications have been completed and a clear passage has been made for installation of the solenoid rail. The following is the SUGGESTED method of mounting the electronics. Keep in mind every piano will be unique, and may require some parts mounted differently.

Component Location - Upright

---

---
Mounting & Connecting the Electronic Components

Mount the Power Supply

Having located the sustain pedal solenoid assembly, you can now locate the Power Supply chassis on the side of an adjacent wooden beam beneath the piano’s soundboard. You should attempt to locate the Power Supply chassis as close to the belly-rail as possible so as to avoid exceeding the length of the related cables. The mounting can be placed on either the wide or narrow side of the power supply.

Mount and Connect the PNO3 Processor and the Optional PNOscan (Record)

Mounting the new PNO³ processor to the piano and connect these cables.

The PWM Control PORT MUST within 30” of the INPUT of the first Driver Board.

- “PWM Control” [This is the new flat black cable going to the driver boards]
- “POWER SUPPLY” [This is the 3/4” flat gray cable going to the power supply]
- “KEYSCAN PRIMARY” - QRS PNOscan Record Systems Only - Black flat cable coming from the record system’s Soft-Shift circuit board.

Mounting Brackets

Mount and Connect the Wi-Fi Adapter and Speaker

Plug the wireless power adapter into an AC outlet. There are two possible locations:

- The un-switched outlet [UNSW OUT] on the type A power supply, if it’s not being used.
- The extension cord from the wall outlet that runs inside or under the piano.

Connect the Ethernet cable from the wireless to the Ethernet port on the PNO3 processor.

Using the Velcro strip supplied, attach the wireless unit to the piano.

Connect your powered speaker to the PNO3’s Audio #3 jack. Use the 1/8” stereo-to-RCA cable provided.

Mounting Brackets

EX6100

Amplified Speaker

PNOscan
Silver contact side down

Power Supply
**Mounting & Connecting the Electronic Components**

*Mount and Connect the PLX “Pin-Light Extension” Box*

The PLX “Pin-Light Extension” box serves several functions:

- Six lights will display valuable information about your system.
- The built-in IR Sensor will allow you to use your existing QRS Remote with PNO3.
- Extends several of the PNO³ processor ports to an accessible position on the piano.
- The button can be used to start and stop playback.

**Connect cables first**, then mount the PLX unit under the keybed at the treble side of the piano. [Check cable length to the treble side of piano]

![Diagram showing cable connections]

**USB HOST**

- Use a 50126 “USB A Male to USB Mini B” cable to connect PNO³’s USB HOST port to the USB Mini B port on the PLX box.
- Use to update PNO³’s “File System Version” software.
- Insert a USB Drive containing the PNO³ update file...the update is automatic.
- Use to play MIDI files from a USB Drive.
- Insert USB Drive with MIDI files and select Play Piano / USB Drive.

**USB CLIENT**

- Use the 50141 “USB Male A to USB Male B” cable to connect PNO³’s USB CLIENT port to the “USB A” port on the PLX box.
- MIDI file playback and record via a computer connection and music software.
- Select Play Piano / External Input / MIDI USB Client to play MIDI files from the computer.

**Audio #1 AUX INPUT**

- Insert a 50145 1/8” adapter into the end 1/8” jack on the back of the PLX box.
- Connect a 50128 “1/8” Male to 1/8” Male” cable from the adapter to Audio port #1 on PNO³.
- Connect to an iPad’s audio out jack to the play piano from QRS YouTube Videos. [Play Piano / Video - Enable Aux Input]
- Connect to AMI OUT on a Qsync to play piano from the QRS SyncAlong DVDs. [Play Piano / External Input / Auxiliary Line In]

**Audio #2 OUTPUT**

- Mixed Output to home stereo system.
- Use to send separate audio signal “synth piano with the background” to a home stereo system.
- Go to System Setup / Performance & Delay Settings / Mixed Out / Turn ON “Mixed Out (Upper Right).”

**Audio #3 OUTPUT Speaker**

- Use the 990026-“1/8” stereo to two RCA” and the 70213-“6” RCA “Y” cables to connect the speaker to the PNO³ processor.
- Mixed Output - Use to send synth piano with the background audio to the speaker connected to Audio #3.
- Go to System Setup / Performance & Delay Settings / Mixed Out / Turn ON “Mixed Out (Lower Left).”

**Audio #4 OUTPUT Headphones**

- Mixed Out
- Insert a 50145 1/8” adapter into the end 1/8” jack on the PLX box.
- Connect a 50128 “1/8” Male to 1/8” Male” cable from the adapter to Audio port #1 on PNO³.
- Mixed Output - Use to send synth piano with the background audio to the speaker connected to Audio #4.
- Go to System Setup / Performance & Delay Settings / Mixed Out / Turn ON “Mixed Out (Lower Right).”

**PLX**

- Connect the 790185B 72” 6-pin ribbon cable from the PLX port on the PNO³ unit to the back of the PLX box.
- The silver side of the ribbon cable faces the floor at the PLX box and away from the PLX label at the PNO³ processor.
Mounting & Connecting the Electronic Components

Mount the Key Solenoid Rail

At this point, the rail has solenoid assembly pairs corresponding to active keys at either end of each action section and the rail has been previously cut to length. The piano is on its side; all of the electronics, mounting hardware and trapwork are in place and functioning.

Since the piano is resting on its left side, you can install the key solenoid rail easily by resting the bass-most (that is, the lowest) portion of the rail on the lowest end of the lowest slot and then bringing the treble-most part of the solenoid rail into the higher slots. The external parts of the rail assembly will take the brunt of the weight of the key solenoid rail and spare the more fragile internal structures. You can use a heavy-duty screwdriver inserted between the bass-most aspect of the lowest slot and the lowest part of the rail assembly as a simple wedge-lever to fine-tune the rail’s precise alignment within the slot-system. Look inside the keyboard compartment to observe the alignment of the solenoid plungers alignment with their respective key-tails. If these are not satisfactory, you will have to remove the key solenoid rail assembly and place it back on the workbench in front of the keyframe-with-keys to correct any misalignment.

Once you are satisfied with these adjustments and the rail is properly aligned within the keybed slots, take a spring-loaded center punch or a sharp awl and carefully mark the centers of the four corner brackets, in the larger of the two holes in each bracket.

Next, fasten the four alignment screws with the large washers. This will allow you to move the solenoid rail 1/4” in all directions for fine alignment.

**NOTE:** The solenoid rail can be installed easily and more accurately when the piano is on its legs and the action is in place. However, an assistant may be required to hold the rail while it is being fastened to the keybed for this step.

In the case of uneven keytails, a lost motion adjustment can be made for each individual key. Each solenoid has a 5/8” nylon cap at the bottom of the solenoid. With the 5/8” socket wrench turn the nylon cap clockwise to raise the plunger tip or counter clockwise to lower the plunger tip.

Mount and Connect the Rev 7 Driver Boards

There are 5 Note Driver Boards, 2 Aluminum Extrusions and 6 Black Ribbon Cables [30” x 1, 14” x 1 & 4” x 3] in the kit. You will slide the driver boards into the grooves of the extrusions and then mount the extrusions to the keybed. Before mounting, you will want to find locations for the two extrusions so that all of the cables will reach.

1] Connect the 30” ribbon cable from PNO3 PWM Control Port to the INPUT end of the first Driver Board.
2] Connect the other four Driver boards, Bass or Treble end of the piano.
3] Connect the other boards with the cables provided. The 14” cable is used to connect between the two extrusions.

Each 16-note driver board has 16 pairs of header pins, one header pair for every note. Start with the lowest key solenoid plug and plug it onto the lowest (that is, the left most) header pair. The next key solenoid plug should be the opposite wire color and it goes onto the next higher header pair. Continue this process for all 16 pair-positions on each board (Note: if there is a single solenoid at a break, there may be a wire color change.).

At this point, all boards have been mounted and connected to their respective key solenoid. Also, all electronic components, solenoid rail, and trap work have been mounted to the piano.
Adjustment Procedures

Lost Motion Adjustment: Plunger-Tip to Keytail Height

Don’t confuse Lost Motion with the Plunger Throw adjustment!
The Lost Motion is the space between the tips of the plungers and the bottoms of the keytails.
Raise or lower the Key Solenoid Rail Assembly so that the plunger tips are as close as possible to the keytails without touching.

- **Lost Motion**
  Adjust the solenoid rail assembly

- **Solenoids**
  Fully encased solenoids with a unique metal alloy inner sleeve specially designed for PN0mation. Built to hold tolerances of commercial applications and environments.

- **Teflon Impregnated Plungers**
  Won’t Corrode / Non-Sticking / Self-Lubricating
  Don’t lubricate, just wipe with a dry cloth.
Adjustment Procedures
Power ON and Test PNO³

Before connecting the Netgear Wi-Fi Range Extender, let’s power ON the system and play the piano using the PLX button.

Reconnect the piano to the AC power outlet and then turn the power supply switch ON.

The PLX lights should begin to scan as the operating system is loaded.

Within ten (10) seconds at least one of these PNO³ button lights should illuminate.

If these lights don’t turn on, turn OFF the power supply and remove the following two screws from the PNO³ chassis.

Turn ON the power supply and start again.

PLX light sequence:

Within ninety (90) seconds

#1 “Power” light turns green
#2 “System” = green
#3 “Network” = red and green [The Network light is flashing red because the Ethernet cable is disconnected.]

Within two (2) minutes

Voice-Prompt announcements should be heard from the speaker.
#6 “Prompt” light flashes yellow with audio.

Tap the button on the PLX box.

The piano should play and the “Power” light will flash.

If the piano did not play:

Check the cable and AC power connections.
Check that the power supply switch is on.
Check that the HI and LO lights are illuminated on the power supply.
Call QRS Technical Support @ 800-247-6557

Stand Alone or Network Mode?

All PNO³ processors and Netgear Wi-Fi Range Extenders are shipped to operate in Stand Alone mode. So, you could go to the “Mount and Connect the Netgear Range Extender” section on the next page and follow the Stand Alone Mode instructions below to connect to the system. But...

We suggest that you use Network Mode.

Stand Alone Mode

No connection to the Internet. The third PLX light is green.
Use your device, iPad, to wirelessly connection to QRSNO####2GEXT, which is what the Netgear will broadcast.
Enter 192.168.1.1 in your web browser. [Apple Safari / Android Browser / Google Chrome]

Network Mode - Go to “Network Mode Setup” on the next page.

You MUST be in network mode to receive songs once a purchased Music Subscription expires! The Netgear Range Extender is bridged to the home network. The third PLX light is yellow.
Your device stays connected to your home network to surf the internet OR to play the piano.
Your home router assigns the IP Address that is used to connect to the PNO³ system.
Enter the IP address in the Apple Safari / Android / Google Chrome browser OR use the QRSFinder app.
PNO³ receives operating system and music updates over the Internet.
Purchased music is released over the Internet...no unlock keys to enter.
Adjustment Procedures

Network Mode Setup

Put PNO³ in Network Mode [Home router will assign an IP address to PNO³]

QRS Remote Control: Press and release the “SHIFT” button and then press and release “B”. [SHIFT B]

If you don’t have the remote...Press and Hold button number three (3) for just four (4) seconds and then release.

Voice prompts will announce the change and the PLX Network light will flash yellow and red. [Red because cable isn’t connected]

Program the Netgear Wi-Fi Range Extender

You will need the home router’s password, and security type, to access the home router when you program the Netgear.

Go to Page 46  WPA Security - A made-up name for the password.

Go to Page 47  WEP Security - The password consists of the numbers 0-9 and the capital letters A-F only.

Return to this page and continue below after programming the Netgear.

Mount and Connect the Netgear Wi-Fi Range Extender

Find an AC outlet under the piano and plug in the Netgear. The diagram below may help locate an outlet.

The Netgear should begin to power ON.

Secure the Netgear to the piano using a Velcro strip or wire ties.

Connect the Ethernet cable from the Wi-Fi device to the Ethernet port on the PNO³ processor.

The “Network” light on the PLX should turn solid yellow.

Voice prompts should announce the IP Address that the home router has assigned to PNO³.
Adjustment Procedures

Connect to PNO³

Stand Alone Mode - The third PLX light is green.

Use your device [Settings / Wi-Fi] to wirelessly connect to the stand alone Netgear - QRSPNO####2GEXT

Use the QRSFinder App or enter 192.168.1.1 in your browser.

Network Mode - The third PLX light is yellow.

Use your device [Settings / Wi-Fi] to wirelessly connect to your home network.

Use the QRSFinder App or enter the IP Address assigned to PNO³ in your browser.

QRSFinder App - Finds and connects to PNO3 matter what IP address is used.
   Download from the Apple App Store to use with the Apple iPad, iPhone or iPod.
   Download from Google Play store to use with the Android Phone or Tablet.

Voice Prompts - Use the IP Address announced over the speaker.
   Press and Release “SHIFT” then Press and Release 3.
   You can also tap button #1 on the side of the PNO³ processor to hear the address.

Menu Basics

Test Files

First, check that the processor’s Playback Parameters are set to play the keys in the proper order.

Go to: System Setup / Performance Setup / Test Files

Play the Middle_c.cmp3 test file
   Confirm that the middle “C” key plays.

Play Test-Chromatic-Velocity-001.MID file.
   The keys should play from bass to treble; 5-84 on 80 note & 1-88 on an 88 note system.
Adjustment Procedures
PNO³ Setup

Playback Parameters

Notes Inverted [Invert Keyboard on PMII]

If the Test-Chromatic test file played the keys from treble to bass then, change the Notes Inverted switch.

If the keys play from bass to treble but, middle “C” does not play with the PedalKeySync.MID test file then, check the Number of Notes and the Lowest Note settings below.

Number of Notes
80 note system - Number of notes = 80
88 note system - Number of Notes = 88

Lowest Note [MIDI Reference]
80 note system - Lowest Note = 25
88 note system - Lowest Note = 21

Transpose = 0
Note Delay (ms) = 500

Key Adjust

Go to: System Setup / Performance Setup / Key Adjust.

Min. Attack [Sets the level that the key will play when the Master Volume is 1 and Piano Volume is 0.]

Press Start.
Press the Min. Attack’s “-” or “+” button...
...adjust so that the note plays as softly as possible.
Press the “>” button to move to the next note.
Repeat Min. Attack adjustment for each note.

Press “Stop” when all notes have been adjusted.

Global - Red when ON - Any changes made will effect ALL keys!
Press “<” or “->” to play chromatically up and down keyboard.
The “->” buttons set the current value to all keys upscale.

Regular/Heavy Action - Heavy applies a little more force.

Pedal Adjust

Go to: System Setup / Performance Setup / Pedal Adjust.

The Pedal Hold preset should not be turned up to help lift the dampers...
...only to hold them at maximum lift.

Use the “-” button to set all values to “0”.
Press Start.

Press the Pedal Attack Preset’s “+” button until the dampers jump up off of the strings.
Numbers increase by 100. You can enter numbers directly to fine tune the adjustment.

Press the Pedal Hold Preset’s “+” button so that the dampers hold for about one second before falling.

The Pedal Retro Preset pulses the pedal solenoid to slow it down as it falls.
This adjustment is used to eliminate some of the noise.
Press the “+” button to eliminate any noise as the dampers fall.

If the Pedal Retro is set too high it will not cushion the dampers.

Press the Stop button when finished.
Adjustment Procedures
Master Volume Curves

Master Volume Curves allow you to set the Piano, Audio, Synth and Voice Prompt levels at three different positions along Master Volume scale. [Soft Play: Master Volume =1] [Full Expression: Master Volume = 50] [Maximum is a Master Volume = 100]

Go to: System Setup / Performance Setup / Master Volume Curves

Curve/Volume Wizard - Tap the “Curve/Volume Wizard” button.

Midi Velocity Maps to File Types

For each of the file types, select a curve that matches your piano.

Play a sample of each type and choose the curve that sounds best, dynamically.

Tap “Next”

Volume Curves

For each of the Volume Curve Configurations in the Wizard:

- **Soft Playback**
  - ALWAYS set the Piano slider to 0, lowest setting, and then press Next.

- **Full Expression Playback**
  - Set the piano slider to level wanted for “Full Expression” and press Next.

- **Loud Playback**
  - Set piano slider to the level wanted for “Loud Playback” and press Next.

MIDI File Setup [*.MID files / Piano & Synth Curves]

Tap the “Play Sample” button to play piano at **Soft Play** level.

Always set the Piano level to 0, or lowest setting at Soft Play!

Mute the Piano, un-Mute Synth and adjust the level of the synth piano heard from the speakers.

Tap “Next” to go to **Full Expression**.

- Adjust the Piano and the Synth levels for Full Expression.

Tap “Next” to go to **Loud Playback**.

- Make adjustments.

Tap “Next” to go to next Setup.

Repeat the steps above for each configuration in the Wizard.

QRS Solo File Setup [*.QRS files / Piano & Synth Curves]

QRS Audio File Setup [*.QRS with *.MID files / Audio, Piano & Synth Curves]

Practice Setup [Synth files when triggered by the PNOscan record sensor strip]

Voice Prompt Setup [PNO³ audio announcements]

Tap the “Finish” button at the end of the Wizard.

External AMI Setup

This configuration is a curve adjustment for devices streaming music from the External Input - PNO³ Audio Port #1.
Completing the Installation

Install the Rail Covers

Shutdown the system and unplug the unit from AC power.

Install the two key solenoid rail covers using “L” brackets

Cut notches in the cover for the sustain lever and cables.

Attach the eight “L” brackets to the two rail cover sections using bolts and nuts. Attach the two sections to the keybed. The cover sections overlap.
Completing the Installation

Attach the Lyre and Braces

Locate the points on the keybed where the original braces were seated. Because the cover might be in the path of the braces to these two points, bend each brace in a gentle arc such that when the braces are placed into their seats on the lyre, their opposite ends come up just under their original mounting positions.

Measure the distance from the keybed to the brace bracket. Fill the distance with a block of the appropriate thickness, painted the color of the piano's keybed finish. Attach the blocks to the underside of the keybed with wood screws. Attach the lyre braces to the blocks.

If necessary, insert a spacer block between the keybed and the brace so that the lyre clears the rail cover.

Dress the Cables

Secure the cables using wire-ties and clamps.

Installation is Complete

At this point the installation is completed. Power on and Play the instrument to test for pinched or disconnected cables.
Adjustment Procedures
PNOscan Record Setup

If you did **NOT** connected a ribbon cable to the PNOscan 10 port on the PNO3 processor then skip this page.

**Key Adjust**

This procedure calibrates the PNOscan’s key sensors and saves the data to the PNO3 processor.

Go to: System Setup / Record Setup / PNOscan Adjust / PNOscan Keys Basic / Press the “Reset Calibration” button.

The “PNOscan Key Adjustment” dialog box appears.
Press and hold the first bass key.
When you hear the sound of the note from the speaker, release the key.
*The fifth light on the PLx box should blink.*
Repeat for all 88 keys.
Press “OK” when finished.

**Pedal Adjust**

Go to: System Setup / Record Setup / PNOscan Adjust / PNOscan Pedals

*The pedal sensors will not work if the Pedal Trigger number is not between the Rest and Down numbers. Use the Trigger Position’s “-” & “+” buttons to change the Trigger number.*

**Sustain Pedal**

Tap the “Rest” button.
Wait for the “Rest” number to change value.
Depress the Sustain Pedal to the floor.
Tap the “Down” button.
Wait for the “Down” number to change value.
Release the Sustain Pedal.
Slowly depress the Sustain Pedal while tapping a piano key.
When the tone rings, indicating that the dampers have lifted off of the strings
Tap the “Trigger” button.
Wait for the Trigger number to change value before releasing the pedal.
Release the sustain pedal.

**Soft Pedal**

Tap the “Rest” button.
Wait for the “Rest” number to change value.
Depress the Soft Pedal to the floor.
Tap the “Down” button.
Wait for the “Down” number to change value.
Tap the “Trigger” button.
Wait for the “Trigger” number to change value.
Release the pedal.

*Sostenuto Pedal - No adjustment necessary.*
Flip the switch on the Netgear to the “Access Point/Extender” position. 

Plug the Netgear into an AC outlet near the home Wi-Fi router.  

*Do not connect the Ethernet cable.*  

*If the Netgear does not power on , press the “Power On/Off” button.  
Wait, about 40 seconds, for the Power LED to turn green.*

Use a paper clip to Press and Hold the “Factory Reset” button for about for 12 seconds.  

*Wait for the amber “Power LED” to blink at least 3 times before releasing the reset button.*

Go to your device’s Wi-Fi settings page and Select the “EX6100_Netgear_2GEXT”.  
You may want to turn the Wi-Fi OFF and then ON to refresh the Wi-Fi list.  
The reset EX6100 broadcasts two SSIDs: EX6100_Netgear...2GEXT & 5GEXT

The Netgear “genie” should appear within one minute.  

Enter “www.mywifiext.net” into your web browser if the genie doesn’t appear.  
If requested, enter username = “admin” and password = “password and then Select “Log In”.

Select your home Wi-Fi network from the 2G list. 
Select “Continue”.  
Enter your home Wi-Fi password.  
Select “Continue”.  

Skip the 5G network  
Select “Private Network”.  
Select “Continue”.  

Summary Page:  
Move to the bottom of the page and select “Continue”.  
Select “OK”.  

Wait for the Net gear to apply changes and reboot.  

Verify that the Netgear is “Bridged” to your home network:  

*The reprogrammed Net gear will be renamed to incorporate you home Wi-Fi name.*  

Go to your device’s Wi-Fi settings and Select “homerroutername_2GEXT”.  
You be required to enter your home router’s password again.  

Use your browser to see if you can surf the internet.  
If you can’t surf the internet you must repeat this process to reprogram the Netgear.  
If you CAN surf the internet then the Netgear is “Bridged” and you can continue with the installation.

*Return to Page 38*
Wi-Fi Setup

Configuring the Netgear Range Extender For “Network” Mode

Home Wi-Fi using WPA Security

Flip the switch on the Netgear to the “Access Point/Extender” position.
Plug the Netgear into an AC outlet near the home Wi-Fi router.
   *Do not connect the Ethernet cable.*
   *If the Net gear does not power on, press the “Power On/Off” button.*
   *Wait, about 40 seconds, for the Power LED to turn green.*
Use a paper clip to Press and Hold the “Factory Reset” button for about for 12 seconds.
   *Wait for the amber “Power LED” to blink at least 3 times before releasing the reset button.*
Go to your device’s Wi-Fi settings page and Select the “EX6100_Netgear_2GEXT”.
   *You may want to turn the Wi-Fi OFF and then ON to refresh the Wi-Fi list.*
   *The reset EX6100 broadcasts two SSIDs: EX6100_Netgear...2GEXT & 5GEXT*
The Netgear “genie” should appear within one minute.
   *Enter “www.mywifiext.net” into your web browser if the genie doesn’t appear.*
If requested, enter username = “admin” and password = “password and then Select “Log In”.
Select your home Wi-Fi network from the 2G list.
Select “Continue”.
Enter your home Wi-Fi password.
Select “Continue”.
Skip the 5G network
Select “Private Network”.
Select “Continue”.
Summary Page:
Move to the bottom of the page and select “Continue”.
Select “OK”.
Wait for the Net gear to apply changes and reboot.
Verify that the Netgear is “Bridged” to your home network:
   *The reprogrammed Net gear will be renamed to incorporate you home Wi-Fi name.*
Go to your device’s Wi-Fi settings and Select “homeroutername_2GEXT”.
   *You be required to enter your home router’s password again.*
Use your browser to see if you can surf the internet.
   *If you can’t surf the internet you must repeat this process to reprogram the Netgear.*
   *If you CAN surf the internet then the Netgear is “Bridged” and you can continue with the installation.*
QRS Music Technologies, Inc. ("QRS") warrants to you for the Warranty Period that there are no defects in the materials of this Product (as identified at the end of this warranty certificate). The "Warranty Period" expires (except as explained below) One (1) year from the date of your purchase of the Product. In order to determine the date of your purchase of the Product, you will need to provide to us a credit card receipt, a purchase agreement, a sales slip, a warranty registration or some other form of proof that you are the original purchaser and the date of your purchase of the Product.

If you are not able to provide us with some form of proof of purchase date, the Warranty Period will be a shorter period (the "Shorter Warranty Period") which is one year from the date that your dealer purchased the Product from QRS. If you cannot provide a proof of purchase date, you may contact us in the manner described below and we will assist you in determining the date that your dealer purchased the Product from us and determining the Shorter Warranty Period. This is a warranty for parts only and does not include shipping or labor.

This warranty does not apply to any accessories you may have purchased with the product and does not apply to any piano or components of the piano with which the product is used or any piano in which the product is installed. In addition, this warranty does not cover scratches, dents or other defects in the cosmetic finish of the product. Accessories used in connection with the system and sold through QRS are covered by the original manufacturers warranty. The warranty does not cover connectivity issues with your existing network.

The warranty is issued solely to the original purchaser of the product. THIS WARRANTY IS NOT TRANSFERABLE. If, during the Warranty Period, parts incorporated in this product are found to be defective in material or workmanship, and the original purchaser provides Purchase Documents to QRS, then QRS or its authorized dealer will provide replacement parts without charge. We may, at our discretion, provide reconditioned parts or assemblies as warranty replacements. You as the original purchaser will be responsible to pay labor costs incurred in connection with any repair.

EXTENDED WARRANTY
As long as the customer has their piano networked and part of a QRS Music Access Plan, their warranty will remain in effect.

LIMITATION IN CONNECTION WITH OBSOLETE PRODUCTS
If at the time you make a claim pursuant to this warranty, we no longer manufacture or sell the same model of Product, we may, at our discretion, rather than repair or replace defective parts in the Product, offer to sell you a more current version of a similar Product. If we offer to sell you a more current model of the Product, you will be responsible to pay the difference between the Manufacturer's Suggested Retail Price ("MSRP") of the more current version of a similar Product and the price you paid for the Product you purchased. If you choose not to accept such offer, we will have no further obligations pursuant to this warranty.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, MADE BY THE MANUFACTURER IN CONNECTION WITH THIS PRODUCT. INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT ALLOWED BY THE LAW, QRS SHALL NOT BE RESPONSIBLE FOR LOSS OF THE PRODUCT, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, SPECIAL OR CONSEQUENTIAL DAMAGES, EVEN IF THE MANUFACTURER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This warranty gives you specific legal rights. Some states provide other rights, and some states do not allow excluding or limiting liability for incidental or consequential damage. Consequently, the limitations and exclusions in this warranty may not apply to you. In addition, some jurisdictions have consumer protection rules, regulations and statutes that may apply to you.