

QRS Music Technologies, Inc.

Upright Stop Rail

Installation Manual

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Introduction

The QRS hammer blocking system has been designed to be extremely adaptable with plenty of adjustability allowing installation into many different piano models. The parts and materials provide a sturdy mechanism that when installed properly works very well and is reliable.

A successful system requires much care be taken during the installation. Any skilled piano technician should find the system easy to install and adjust.

This installation guide provides details about how to install the hammer stop system into common type vertical pianos. As with all retrofit type hardware you will most likely find situations that require some "out of the box" thinking to fit the system into your particular piano.

It is strongly recommended that you read the instructions before starting the installation. It is important to understand the small details and nuances of installation as a precise and neat installation will guarantee a properly working system.

Specifically defined bumper material is used where the hammer shank contacts the blocking rail which allows the rail to be set precisely at the point escapement. The material does not deform with use yet allows a reasonably low impact noise level. This design also provides minimal effect on the touch of the piano when in silent mode and has virtually no effect when disengaged.

It is important to realize the purpose of this silent system is prevent the hammers from striking the strings at normal practice forces. If the piano keys are played at high velocities there will be a point where you can expect to get note bleed through. The hammers are being stopped in a very tight window right before the hammer strikes the string and this is how piano touch is maintained, consequently with the very precise blocking window any significant deflection of the blocking rail will allow notes to sound which is what happens when playing at high velocity.

Please refer to the PNOscanII and QRS Sound Module manuals for relevant information.

Tools And Materials

- | | |
|--|--|
| #2 Phillips screw driver | Clean rags |
| #2 Flat blade screwdriver | Measuring tools |
| Power drill and screw bits | Center punch |
| Drill Bits | Needle-nose pliers |
| Ignition wrenches | Jig saw or band saw with metal cutting blade |
| 1/4" socket set, ratchet and 12" extension | Vacuum cleaner |
| Side cutters | Various wood stock |
| Small hammer | Glues |



Parts List

QTY	PART #	DESCRIPTION
<input type="checkbox"/>	1	560661 VSR (VERTICAL STOP RAIL) HAMMER BLOCKING RAIL (ALUMINUM)
<input type="checkbox"/>	1	5606605 UP STOP RAIL WITH DOVETAIL GROVE
<input type="checkbox"/>	1	5606620 VSR LEVER ASSEMBLY
<input type="checkbox"/>	1	5606490 GSR (GRAND STOP RAIL) LEVER ASSEMBLY
<input type="checkbox"/>	1	5606623 VSR SMALL PARTS BAG 1-A/B
<input type="checkbox"/>	1	5606615 BAR EXTENSION ADAPTER
<input type="checkbox"/>	1	5609401 STOP BAR EXTENSION/VERT STOP RAIL
<input type="checkbox"/>	1	560642 SILCON RUBBER STRIP 3/16" TK
<input type="checkbox"/>	1	56084 FELT STRIP - ADHESIVE BACKED BROWN FELT
<input type="checkbox"/>	2	5606629 SPRING - VSR L EXTENSION - 6"
<input type="checkbox"/>	2	56052 SCREW - 4 X 3/8" (SPRING)
<input type="checkbox"/>	3	5606631 SCREW - 1-40 X 3/8" - HEX HEAD
<input type="checkbox"/>	1	5606625 VSR SMALL PARTS BAG 2-A
<input type="checkbox"/>	5	5609403 MOUNTING B RACKET
<input type="checkbox"/>	3	5606607 BEARINGS - VSR WIDE
<input type="checkbox"/>	2	5606609 BEARINGS - VSR NARROW
<input type="checkbox"/>	10	5606613 SCREW - 4-40 X 3/4" HEX
<input type="checkbox"/>	20	2007017 WASHER - FLAT #4
<input type="checkbox"/>	5	2007042 WASHER - 8-25 1/4" HEX
<input type="checkbox"/>	10	2007049 WASHER - #4 SPLIT
<input type="checkbox"/>	10	35356 NUT - 4-40 X 1/4" HEX
<input type="checkbox"/>	1	5606627 VSR SMALL PARTS BAG 3-B
<input type="checkbox"/>	5	5609603 BEARING - OFFSET
<input type="checkbox"/>	5	2007017 WASHER - #4 FLAT
<input type="checkbox"/>	4	5606603 TABS- KEYBED - PLASTIC
<input type="checkbox"/>	4	2007119 SCREW - 4-40 X 4/16"
<input type="checkbox"/>	4	2007017 WASHER - #4 FLAT
<input type="checkbox"/>	9	2007049 WASHER - #4 SPLIT
<input type="checkbox"/>	9	35356 NUT - 4-40 X 1/4" HEX
<input type="checkbox"/>	5	5606633 SCREW - 4-40 X 5/16" HEX

Identify System Type

There are two types of actions this system was designed to fit specifically. They are referred to as Type "A" and Type "B". The two types are illustrated below. Once you identify the type you are installing you can refer to that specific section in this installation guide.

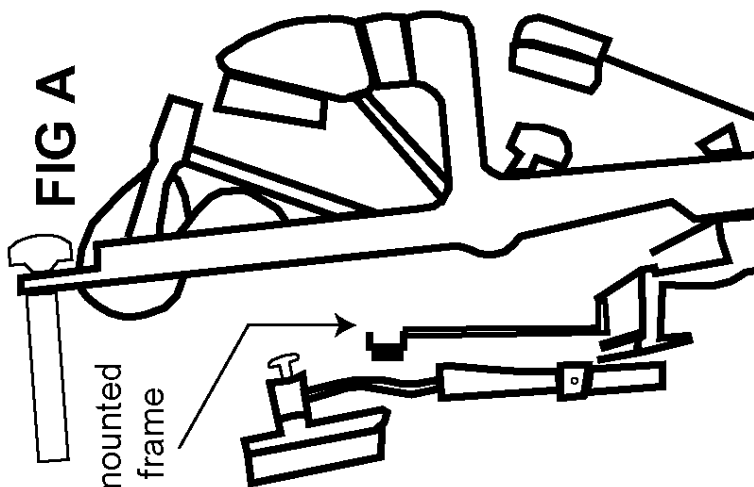


FIG A

Damper bar mounted to lower main frame

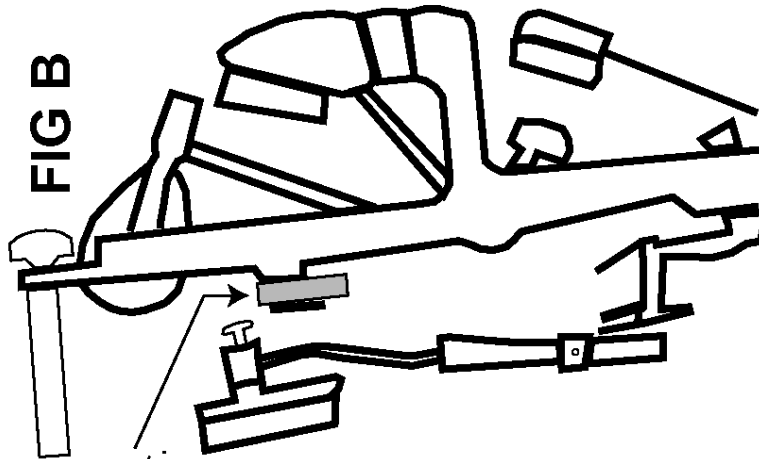


FIG B

Wood or metal felt damper bar.

Damper felt rail attached to "L" brackets which are mounted to the main lower action frame.

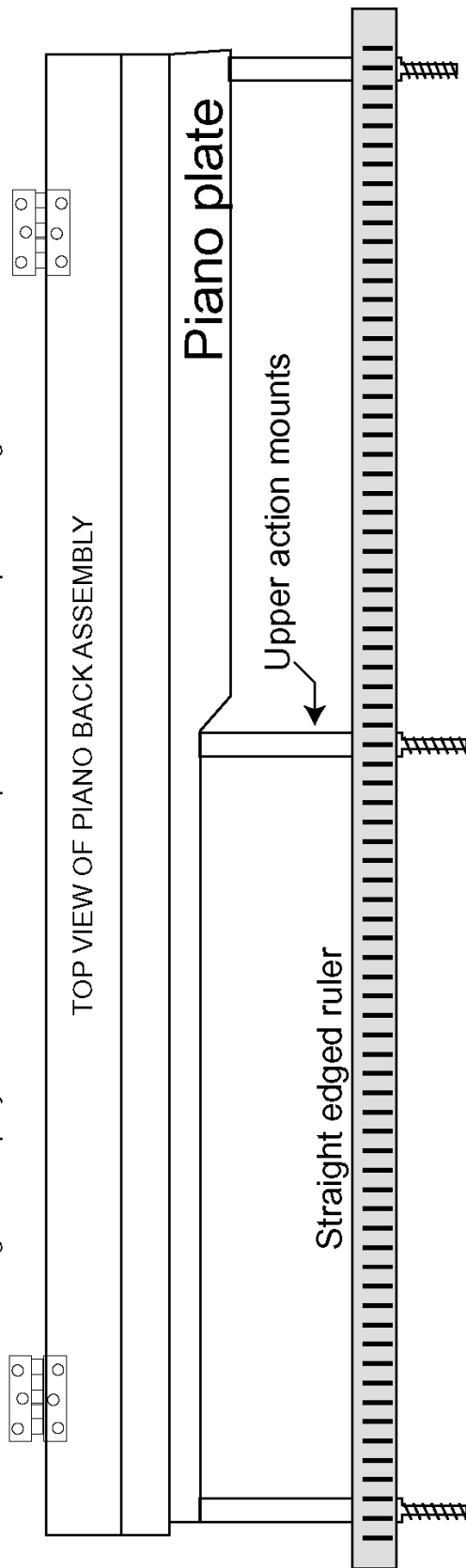
Damper felt rail attached to directly to cast action mounts.

Piano Action Preparation

Before beginning the installation of the silent system take time to thoroughly inspect the condition of the action components and regulation. Knowing the mechanical condition of the action will allow you to gage the final outcome of the installation.

If the action is in poor, loose condition you may want to chose to rework the action or recommend not installing the system in the particular piano. Loose pins and bushings should be noted.

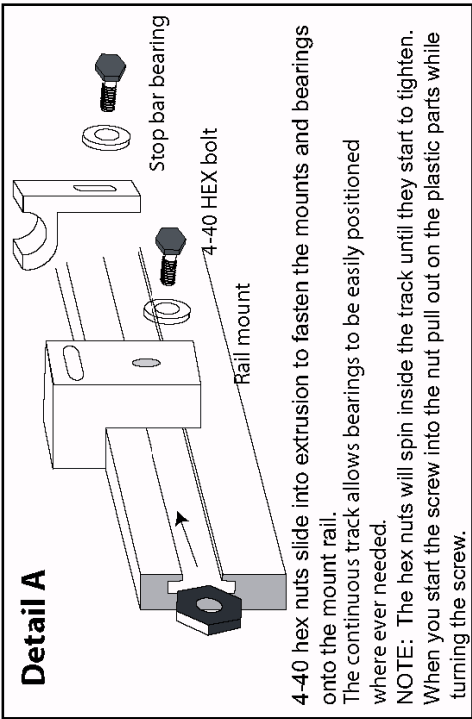
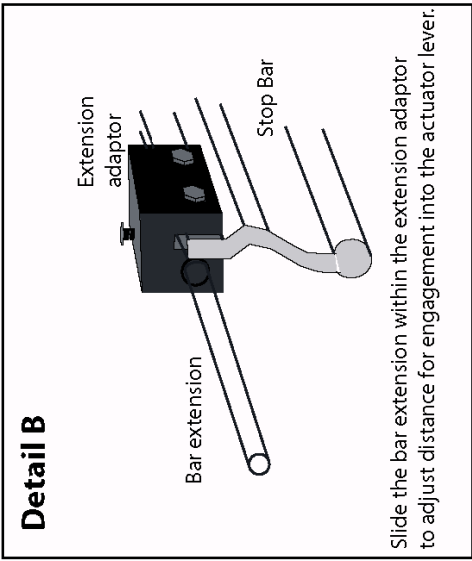
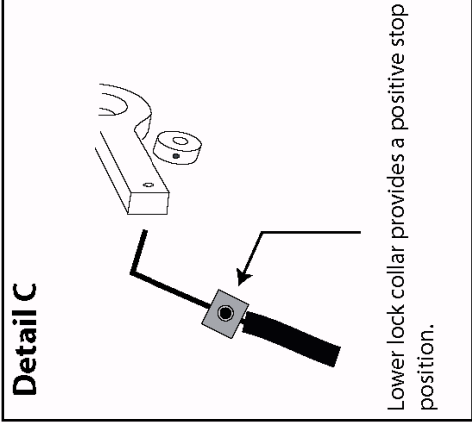
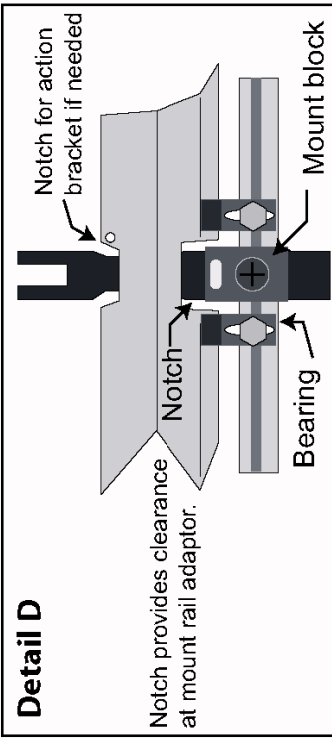
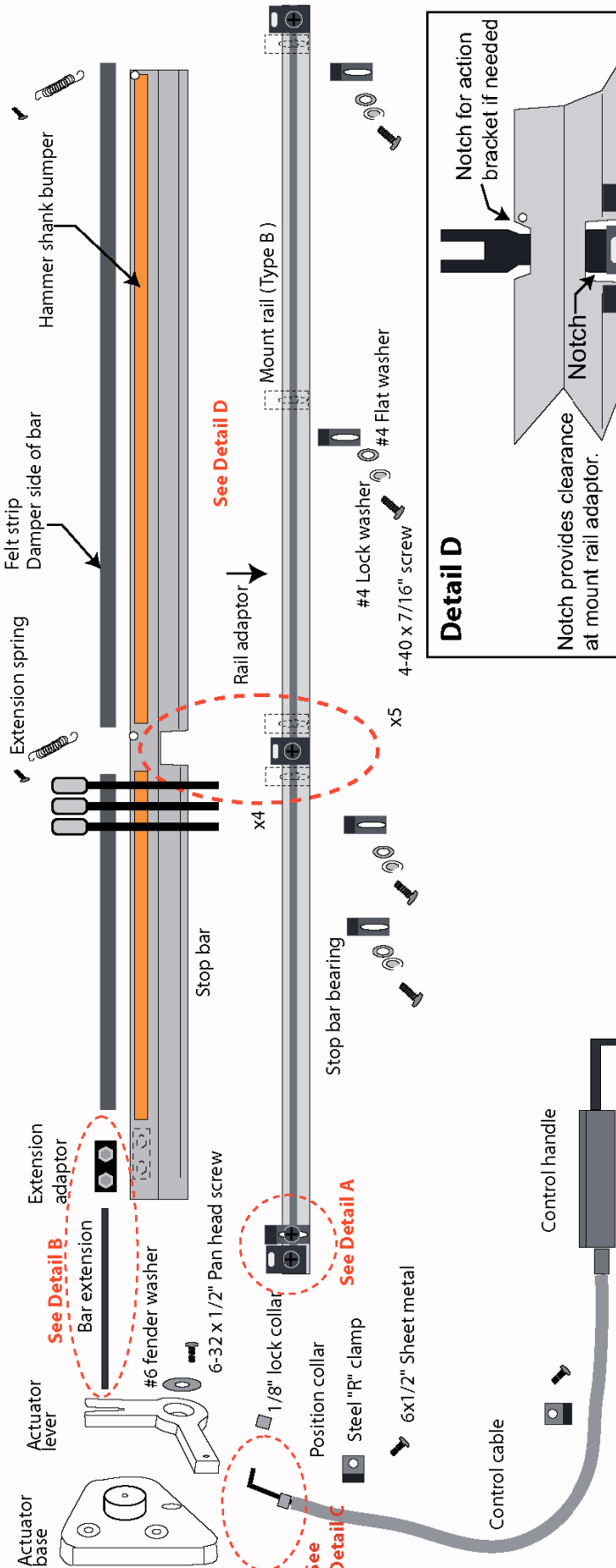
It is critical for a successful installation that the upper action mounting pins are all at the same depth. (See below) At this point if the piano is determine to be in good shape you should set the action pins to uniform depth and regulate the action.



Measure and record key dip, let off damper lift. If the action is grossly out of adjustment it is suggested that you regulate prior to stop rail installation and touch up once installation is completed.

	Notes,
Key dip (white bass) _____	Let off (bass) _____
Key dip (black bass) _____	Let off (mid) _____
Key dip (white mid) _____	Let off (treb) _____
Key dip (black mid) _____	Damper lift (bass) _____
Key dip (white treb) _____	Damper lift (mid) _____
Key dip (black treb) _____	Damper lift (treb) _____

Type "B" Exploded View



Type "B" Installation

Refer to exploded system view on page 4 for an overview of how system components are assembled. The exploded view alone will answer many questions about how the system is installed into the piano.

- 1 - Remove action from piano case. Remove the damper felt rail and discard. The rail will be replaced with the aluminum extruded bar. If the wooden strip had a shim block between the strip and the action set it aside for possible use later. You may or may not need it. Once you have the stop system installation roughed in you can easily determine if the shims are needed. You will reuse the original screws from the wooden felt rail.
- 2 - Slide the required 4-40 hex nuts into the T Slot in the mount rail. Position the three or four mounts along the length of the mount rail in the required positions. Be sure that the nuts in the track are grouped into their respective locations. There should be two loose nuts between each end of the mount rail and the mid positioned mount blocks to avoid trapping nuts between mount block nuts. Depending on the action type you will need either three for four mount block. Some actions have three action brackets while others have four. Actions with three bracket many times include a metal brace in place of the bracket in the tenor section. If your action is a three bracket type with a separate brace it is advised that you drill a hole in the QRS mount rail and attach the mount rail to the bracket. In this case you will use eight 4-40 nuts in the track instead of nine.
- 3 - Attach the three or four mount blocks onto the extruded mount rail, position the rail into the piano action, align the mount blocks with the action bracket threaded holes and fasten in place using the existing damper felt rail screws.
- 4 - Attach the five flanged bearings onto the extruded Stop Bar by sliding them in from the end. It is not recommended that you try snapping the bearing over the stop bar radius as this causes bearing distortion. The offset bearings will set on top of the mount rail. Refer to detail A of page 4 for proper bearing orientation.

NOTE: The hex nuts will try to spin inside the track until they start to tighten. When you start the screw into the nut pull out on the plastic parts while turning the screw.

- 5 - Position the assembled Stop Bar onto the mount rail. Position the bearing on the stop bar as shown in page 4, detail A and D. Position the stop bar so that the bass end is just inside the mount block with about 1/16" gap between bearing and mount block.
- At the treble end cut the excess stop bar length so as to fit between the bass and treble mount blocks. The stop bar should be cut so that it fits just inside the mount block with a 1/16" gap just like the bass end. Proceed to cut the length of the stop bar extrusion.

With the stop bar cut to proper length you can now place the stop bar into position over the mount rail. With the stop bar in position you will need to cut a notch at the bottom of the stop bar to provide clearance between the middle mount block and stop bar. Cut the notch just large enough to provide the clearance between bar and mount block. See page 4, Detail "D".

The stop bar will need to rotate between 8 and 15 degrees. It may be necessary to cut an additional notch at the top of the stop bar to allow clearance between the stop bar and the action bracket when the stop bar swings forward toward the hammer shanks. Most installations do not require this notch. Should you need to make the cut make as small a notch as possible. Reference Detail D, Page 4.

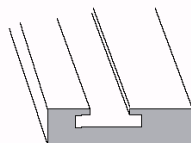
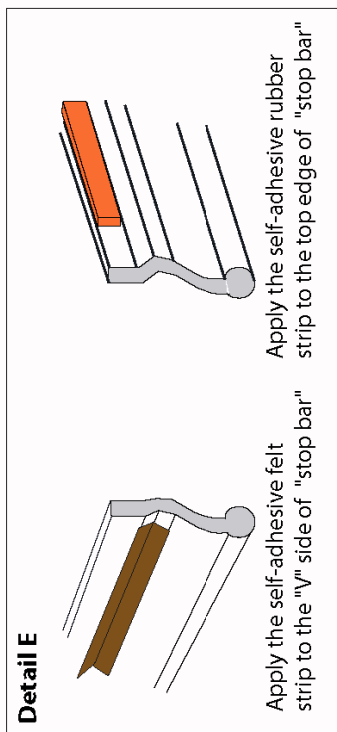
While the "stop bar" is in place in the action make some pencil marks on the aluminum stop bar where the brass damper screw heads would contact the bar. This area is somewhere around the "V" of the extrusion profile. Most actions will have a few dampers that rise in height near the tenor break. These screws will need removed so that extra length can be cut off. When cut properly the head of the screw will come close to the damper but not bottom out. The damper will then remain secure on the damper wire while providing clearance for the stop bar.

Type "B" Installation (Cont)

Type "B" Installation (Cont)

6 - With the extruded "stop bar" cut to length and notched proceed to apply the rubber bumper. The bumper strip has a urethane adhesive backing. This adhesive is very aggressive but does require a clean surface for good bonding. Use lacquer thinner or denatured alcohol to thoroughly clean the top of the aluminum stop bar prior to applying the rubber strip.

On the opposite side apply the felt strip to the "V" area of the stop bar extrusion. See Detail E



7 - At this point you should have the "stop bar mount" fastened to the action and the "stop bar" cut to fit the action. With the bearing installed onto the stop bar you can proceed to attach the "stop bar" to the "stop bar mount" using the included 4-40 x 7/16 screws. There are split ring lock washers included as well as #4 flat washers for fastening the bearings to "stop bar mount". Be sure to use all the washers.

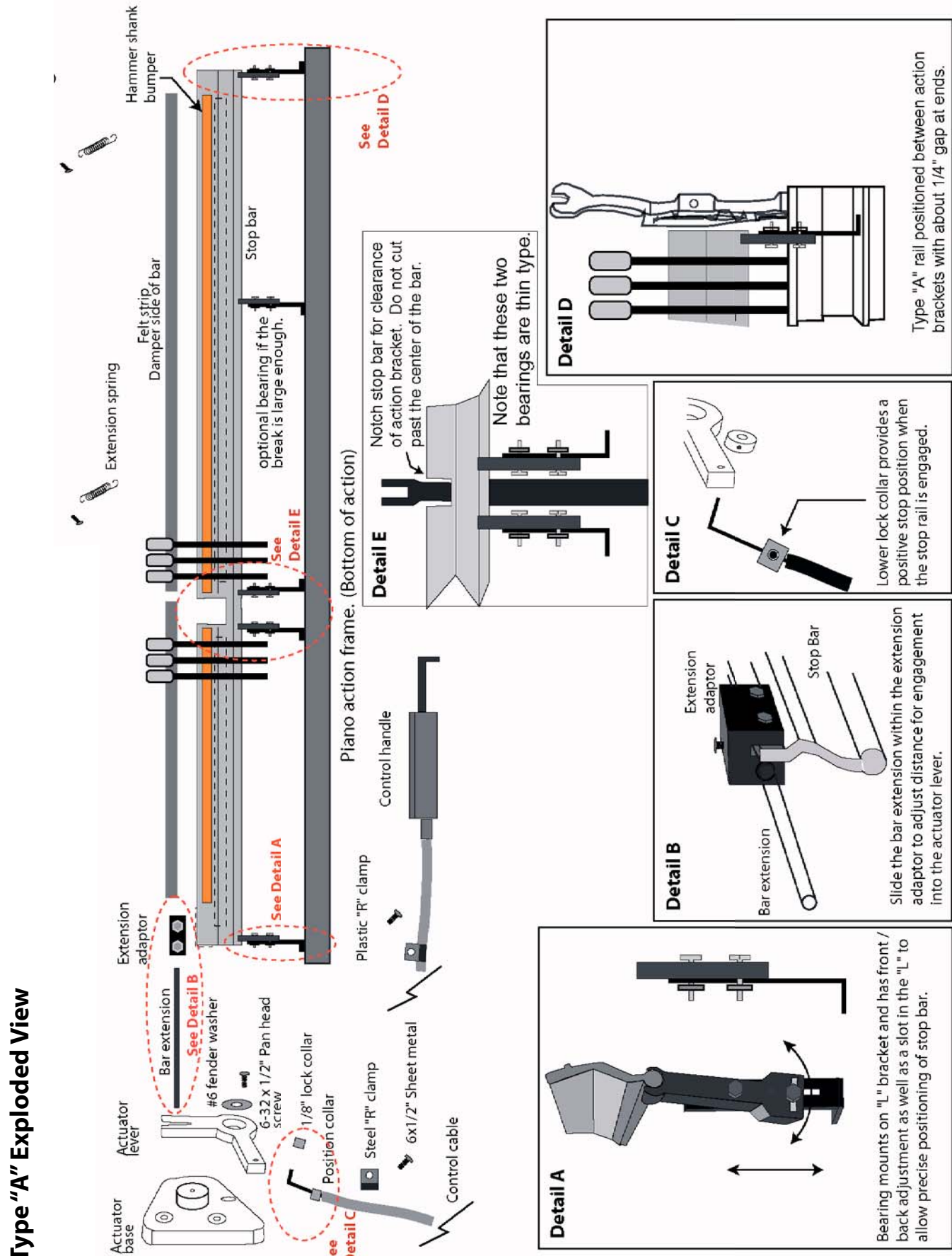
Because the #4 fasteners are fairly small you want to be sure not to over tighten them. The washers will allow a secure hold when they are just snugged tight. Over tightening could cause the threads to strip or the hex nut to slip inside the extruded "mount bar". Use Care!

8 - At this point you should be able to pivot the stop bar toward the hammers. Moving the bar to just the right spot will allow you to block the hammers right at escapement when moving the action wippen with your fingers. Moving the stop bar away from the hammers, far enough to allow escapement to happen without the damper screws hitting the back of the stop bar, will indicate that the stop system is roughly in the correct place.

9 - Place the second felt strip on the "mount rail" where damper wires could contact the rail. As with the wood felt rail, the dampers should never contact the rail if the action and pedal is adjusted properly. In the event that the sustain pedal exceeds normal travel the felt will help prevent clicking noise.

Refer to page 10 for final portion of installation for both type "A" and "B" system.

Type "A" Exploded View



Type "A" Installation

Refer to exploded system view on **page 5** for an overview of how system components are assembled. The exploded view alone will answer many questions about how the system is installed into the piano.

- 1 - Remove action from piano case. Remove the damper felt rail and discard. The damper felt rail will be eliminated in this particular style of stop system. The damper felt rail should under normal conditions, never make contact with the damper wires. In this type of action there is no structural purpose for the original damper felt rail. However, the action is not being compromised with this installation however the action rigidity could be increased from it's original design if you convert this "Type A" system to a "Type B" mounting type. There may or may not be space within this action to do this conversion. This section will focus on the standard "Type A" system. See the last page of this guide for notes on converting to a "Type A" silent system to a "Type B".
- 2 - Prepare the "stop bar" by cutting to length so that it fits inside the action brackets. When the stop bar is placed inside the action there should be about 1/4" of clearance between the stop bar and the action brackets at both the bass and treble ends. **See page 5, Detail D**
- 3 - Locate the five bearing positions on the piano action's main frame. This is the large bar that runs the length of the action that all action components attach. Usually made from aluminum but sometimes wood, this is the structure that the "L" brackets will mount to. See page 5. The stop system will require one bearing assembly at each extreme end of the stop bar, two at the bass / tenor break and if possible one in the middle of the treble section. You will notice two of the bearings are thin and three are thick. The two thin bearing must be placed at the bass/ tenor break. The thinner bearings accommodate the limited space at the break where two bearing assemblies are used close together. The thicker bearings are used everywhere else as they provide additional strength and stability. Reference page 5. Bearing thickness not shown in illustrations.

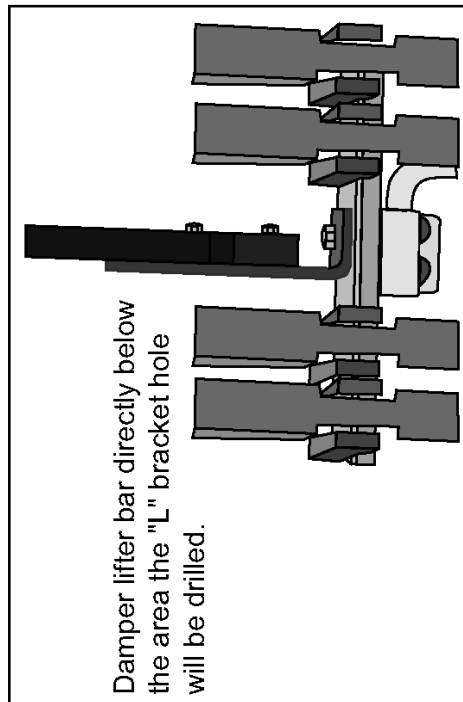
4 - Position the "L" bracket onto the action main frame at the proper position and orientation and mark the frame where a hole can be drilled. The bearing needs to be centered in the hammer shank break. The "L" bracket you are working with will need to be positioned off center of the break. The bass and treble bearings will need to be positioned just past the first and last hammers. See Page 5

5 - Use a center punch for precise positioning and drill a 1/8" hole for the "L" bracket. Repeat for the other locations.

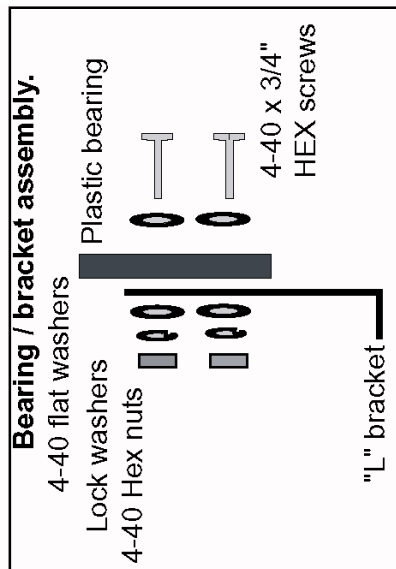
IMPORTANT! After drilling the holes, drive the hex bolts into the holes then remove the screws and chanfer the hole entrance with a larger drill bit or countersink.

This will remove the bulge around the hole caused by the self tapping bolts. Failure to do this can cause the "L" brackets to loosen during use!

As you mark the locations for the holes take notice of the damper lifter bar on the bottom side of the action main frame. It is possible that you may hit the lift bar when drilling the holes. Depending on the material thickness of the main frame you may need to add a flat washer on top of the "L" bracket to prevent the included self-threading bolt from hitting the lifter bar.



Type "A" Installation (Cont)



6 - Assemble the bearing to the "L" brackets. The bearings will need adjustment later. Snugging the screws just tight enough to hold them in position. Adjustment is easier when you can move the bearings on the "L" bracket without needing to loosen the screws each time.

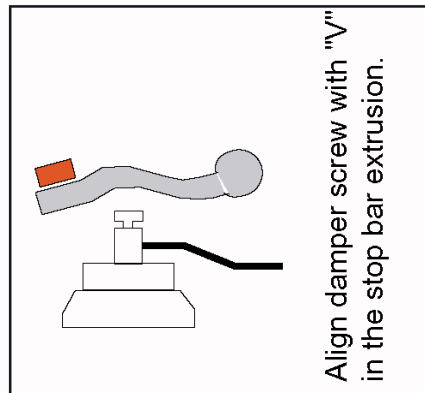
7 - Slide the bearing assemblies over the end of the "stop bar" extrusion and slide the bearings to their respective positions. Remember that the two thin bearings are placed at the bass / treble break. The feet of the "L" brackets face away from one another **See Detail E on page 5**

8 - At this point the stop bar is cut to length, notched and the bearing assemblies attached. Proceed to screw the "L" brackets onto the action main frame using the included hex bolts. Because you pre-threaded the holes you drilled earlier you will want to be sure and rotate the hex bolts counter clockwise until you feel the bolt lift and then drop down. This will ensure you have the bolt threads aligned with the threads in the holes to avoid cross thread damage. Use a socket and long extension to tighten the bolts. Snug the bolts firmly being careful not to strip the threads from the holes. It would be very difficult to repair a hole once stripped and there is no option to drill and thread a new hole because the bearing needs to be in the specific location. Hold the "L" brackets firmly to prevent the bracket from rotating during tightening. The bearings must remain squarely aligned to the stop bar to function properly.

9 - With the stop bar assembly installed into the action you should be able to rotate the rail toward the hammers while operating the wippen and stop the hammer just at the point of escapement. At this point you can find the optimum position for the stop bar. You should be able to block the hammer at point of escapement without interface with the action brackets. Now rotate the stop bar away from the hammers far enough to allow escapement with some clearance between hammer shanks and stop bar bumper.

Now check that you have clearance between the damper screw heads and the extrusion. By moving the bearings up and down you want to provide maximum clearance between the damper screws and extrusion by aligning the screw heads with the deepest part of the "V" shape in the stop bar. There will most likely be a few screw heads that step up away from the otherwise straight line of the other dampers. If necessary remove these screws and cut the length of the screw so that head of the screw is close to the damper block.

Use the rotational adjustment to optimize the front / back position of the stop bar. When adjustments are complete all the bearings should be on the same plane and height. Once the best position is found you can finish tightening the bearing screws. Use small box end wrench or ignition wrench to tighten the two hex screws on each bearing.



Type "A" and "B" Final Assembly

Type "A" and "B" Final Assembly

At this point the stop bar should now be mounted and working in the piano action. You can now install the cable control system.

The control cable consists of a push / pull handle, six foot solid core control cable, actuator, screws and clamps. The control system may or may not be preassembled depending on model. If you need to assemble the control system please reference exploded view page.

1 - Find the adaptor block and extension rod. Insert the extension rod into the corresponding hole in the plastic block. The amount of rod you need protruding out of the block will vary with installation. For now leave about 3" of rod projecting out of the block to the left.

See page 5, Detail B. Note that the rod fits very tight in the plastic block. You will need to use some force to position the rod in the block. This is necessary to ensure the link is stable as this rod holds the stop bar in the proper position when in use.

2 - With the extension rod inserted into the adaptor block set the assembly onto the bass end of the stop bar extrusion as shown on **page 5, Detail B.** Adjust the extension rod so that it comes within about 3/4" of touching the side of the piano case. This will provide you with a target to locate the cable control actuator. **DO NOT ATTEMPT TO SLIDE THE ROD IN THE PLASTIC BLOCK WHILE THE BLOCK IS ATTACHED TO THE STOP BAR!** Again the rod is very tight in the block and requires force to slide it within the block and the stop rail assembly cannot tolerate that type of stress. Note: Trim the rubber bumper material from the area where the adaptor block will set.

3 - Fish the actuator lever assembly up from under the key bed and through the gap between the key bed and the piano case.

4 - Pull the control handle out two or three clicks.

5 - Position the stop bar into the "OFF" position. The stop bar will need to be moved away from the hammers far enough that the hammer shanks do not touch the stop bar bumper when playing the keys.

6 - Position the actuator assembly onto the side of the piano with the slot of the actuator lever aligned with the extension rod. The actuator slot needs to be straight up and down and the extension rod should be at about half way down into the actuator slot. With the actuator assembly held in this position, mark the two hole locations through the plastic actuator base onto the side of the piano.

7 - Remove the action from the piano and pilot drill the two marks on the side of the piano. Place the actuator assembly into position and fasten in place with two #6 x 1/2" sheet metal screws.

8 - Remove the extension rod from the stop bar and replace the action back into the piano. With the action installed, place the extension rod adaptor assembly onto the extrusion with the extension rod fully engaged into the actuator slot. Lightly tighten the hex bolts to clamp the adaptor assembly onto the stop bar. **DO NOT OVER TIGHTEN THE HEX SCREWS!** Snug the screws enough that the extension assembly stays securely in place. Lightly snug the top hex screw to secure the extension rod in the plastic block.

9 - Install the control lever to the underside of the key bed in the desired location. When you route the control cable it is critical to proper function not to put sharp bends in the cable. Route in a way to allow large gradual bends. Fasten the control handle with the provided #8 sheet metal screws.

Use the included plastic "R" clamps to hold the cable along its length under the key bed. Allow the cable to follow its natural path as you secure it.

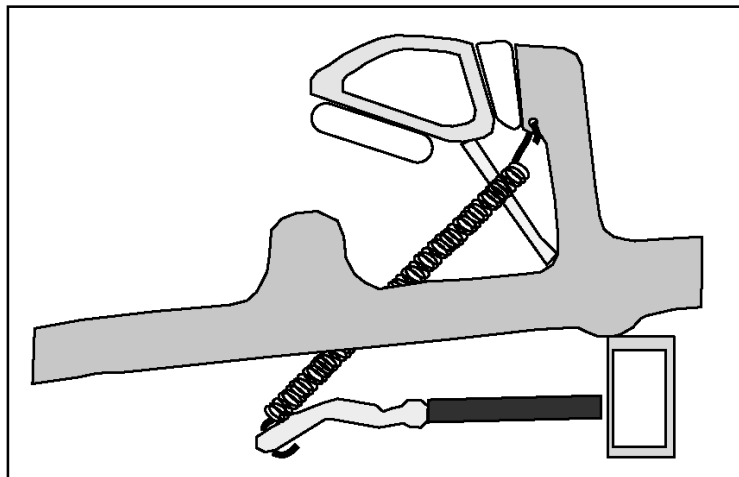
Type A & B Final Assembly (Cont)

Type A & B Final Assembly (Cont)

10 - With the stop system completely installed you can now install the two tension springs. One spring should be installed at the of the treble end and one at the bass / tenor break.

The kit includes two 6" sections of extension spring. Drill a small hole in the top edge of the stop bar and drill a second small hole at a location low on the action bracket as seen in the illustration at the right. You can use the included #4 x 1/4" sheet metal screw for an anchor in the action bracket or you can bend the spring end to form a hook that passes through the action bracket. Once installed the spring should have moderate to medium tension. If the tension is too heavy the stop bar may drift toward the on position over time. If it is too weak you may get note bleed through when playing the keyboard at higher velocities.

However you decide to install the springs they must pull the stop bar toward the hammers.



11 - Earlier in the installation you extended the control handle out three clicks prior to installing the actuator assembly. The stop bar was positioned in the "off" position and the actuator was positioned with the slot straight up and down. This represents the correct off position. You will find a long screw at the rear of the control lever which you will now adjust in until it just contacts the push/pull handle. This sets the off position of the silent system.

Type A & B Final Assembly (Cont)

Type A & B Final Assembly (Cont)

12 - If you begin pulling the control handle outward the stop bar will move toward the hammers. You will need to move the control handle to a position where the stop bar blocks the hammers from hitting the strings at the exact point let-off or jack escapement happens. If the stop system is installed with proper placement you should find the large majority of the piano keys can be played while the piano remains silent. You should also find that the keys can be played through jack let-off with ease.

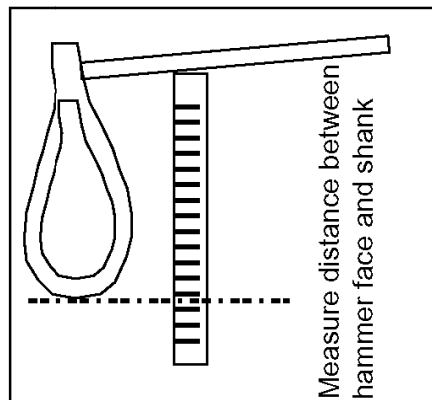
13 - Once the optimum position of the control handle is found the position lock collar can be tightened to lock in the adjustment.
See Page 5, Detail "C"

As you work on finding the perfect position for the control handle you may find a small number notes that do not easily play through left-off while some other keys still make the hammer strike the string. Generally speaking if the action is well regulated, the action is not installed in a arc due to miss aligned action mounting pins and the stop rail system is aligned properly in the action this problem should be minimal.

There is another problem we see in low cost piano actions that you need to consider if you are having trouble finding a perfect block point. There could be an inconsistent distance between the hammer face and the front of the hammer shank. By measuring this distance on hammers that either don't get through left-off or hammers that hit the strings and compare the distance with notes that are working well you can identify this issue. For distances that are greater than the majority you can add a piece of self adhesive felt to the front of the hammer shank or reshape the hammer to reduce the distance.

In the case of measurements that are less than the majority you can shave a small amount of wood from the front of the hammer shank. If all parameters are ideal you can simply make minor adjustments to let-off to ease the hammers that don't easily play through let-off.

If an entire section of hammers seem to bleed through during normal play force, it indicates that the rail position is not correct. Use the bearing tilt adjustment to reposition the stop bar. This is also true if an entire section is allowing notes to sound.





Type A / B Conversion

Type A / B Conversion

Depending on the particular action you are working with it may be possible to install a Type "B" stop rail mounting system into a Type "A" action. The benefit is that the Type "B" mounting is a more solid system. With the shorter bearing stems and the secondary aluminum bar the overall resistance to impact is better.

To install the system this way requires that you drill and tap mounting holes into the action brackets. Check that you have the space in height to allow this type of mount system. You will also need to make sure the action brackets are of adequate size to allow the holes to be drilled. If the action brackets are fairly narrow you can chose a smaller bolt than normally used in a action that already has the damper felt rail mounted this way. We do not recommend anything smaller than #6-32 screws.

The kit does not include extra hardware to do this conversion so you will need to prepare ahead of time.

General Notes:

You will generally find larger better quality pianos to install and adjust easier. In all cases taking the time to fine tune the position of the stop bar will make all the difference in terms of final performance.

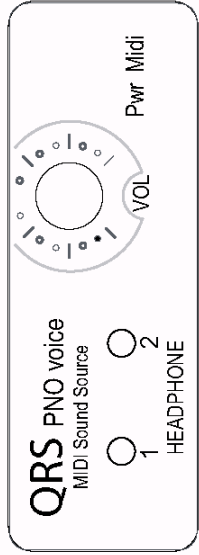
When the system is installed as intended and well adjusted you will find the keyboard easy to play even when playing softly. You should not have to force the key through let off. Small, cheap pianos may require more let off adjustment to get soft play to work well.

Working with the resistance spring tension also makes a big difference in performance. Taking time to fine tune the spring tension by will minimize note bleed in most cases. Just remember too much spring tension will prevent bleed through but may cause the system to drift into partial mute mode over a period of time.

It is important to make sure all screws are secured before finishing up the installation. Loose screws will surely be a service call in short order! These rails take a beaten over time and rely on a secure, tight installation.

QRS Sound Module

Front Panel



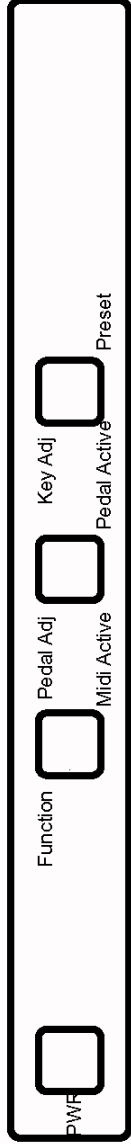
Headphone ports can drive any type of headphones. Lower impedance phones will be louder than high impedance phones. Always start with a low volume setting to prevent hearing damage!

Pwr - Indicates power is on

Midi - Flicker as MIDI signal flows to the sound module.

This device contains 128 MIDI sounds. Four can be directly accessed through the PNOscan II system and the others can be change using a MIDI controller that sends program changes.

QRS Silent practice sound module

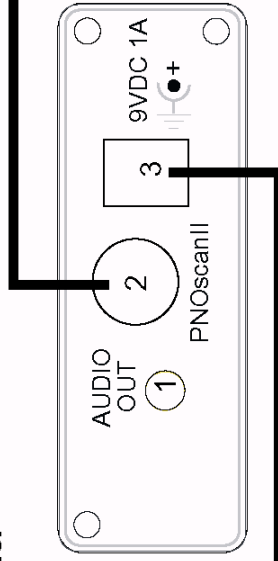


The sound module has four readily assessable sounds built in. To change sounds press the right most button on the PNOscanII controller. Each time the button is pushed the sound will change.

- 1 - Grand Piano (default sound)
- 2 - Electric Piano
- 3 - Church Organ
- 4 - Strings

If you experience a stuck MIDI sound press the PWR button several times until notes release.

Rear Panel



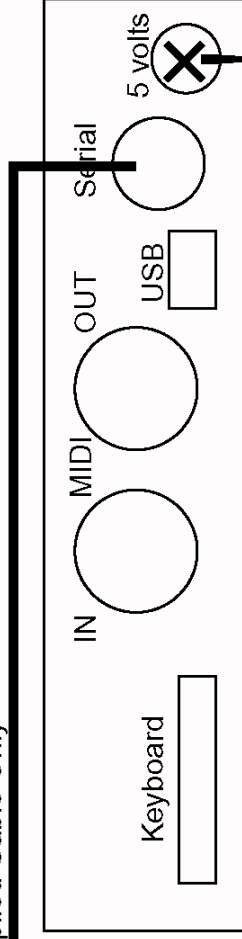
Supplied AC Adaptor 9 VDC

1 - Audio line output - Connect to a powered speaker. Is muted when headphones are plugged into front head - phone ports.

2 - PNOscan II Port

3 - 9 Volt DC power. (USE ONLY SUPPLIED ADAPTOR!)

Supplied Cable Only



There are only two connections required between the PNOscanII and the sound module. A special cable is supplied to connect the MIDI and power between the two boxes.

DO NOT PLUG AN AC ADAPTOR INTO PNOscan II system when used with the sound module!! Damage can occur!!