PIANODISC SYSTEMS

Installation Guide for Grand Pianos (Standard System)

Jan. 2019

Installation Guide

PianoDisc

Installation Guide for Grand Pianos

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Introduction

This installation manual will guide you through the process of fitting the PianoDisc High Definition SilentDrive reproducing piano system to virtually any grand piano. Along with the knowledge and experience gained from a PianoDisc Installation Seminar, this guide should be an invaluable resource.

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This guide is only to be used in the installation of the PianoDisc SilentDrive Reproducing System.

PianoDisc systems may ONLY be installed by technicians who have been certified by PianoDisc to perform such installations. If you have come into possession of this manual and/or a Retrofit Kit and you are NOT a PianoDisc Certified Technician, DO NOT ATTEMPT TO PERFORM THE INSTALLATION. Installations not performed by a certified PianoDisc technician WILL NOT meet the requirements for warranty protection, and such an installation will likely void the piano manufacturer's warranty for the instrument and the player system, and may also be a violation of FCC rules.

Technicians may only be certified by attending the PianoDisc installation Seminar at PianoDisc's Factory and World Headquarters in Sacramento, CA, or by on site training evaluation and certification by one of the PianoDisc Factory Installation Technicians duly authorized to certify technicians. A candidate for PianoDisc certification should be a Qualified Piano Technician understanding piano action regulation. A candidate who does not qualify under this rule will be evaluated on an individual basis, with an emphasis on total experience as a piano technician and possible previous experience in retrofitting pianos with other player piano mechanisms.

PianoDisc encourages PianoDisc technicians to comment on this installation manual by writing to: PianoDisc, 4111 North Freeway Boulevard, Sacramento, CA 95834, or by fax at (916) 567-1941. Please restrict telephone calls to technical questions and installation inquiries. Thank you.

Technical assistance for PianoDisc Certified Technicians is available Monday through Friday. The telephone number is: (916) 567-9999.

FCC Information

CAUTION: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

NOTE: This system, when in operation, can develop radio frequency energy which can cause harmful interference to radio communication unless the equipment is installed and used in strict accordance with manual instructions. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules, which provide reasonable protection against such interference.

If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a separate circuit from that of the receiver.

Consult PianoDisc, or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems.

This booklet is available from the US Government Printing Office, Washington, DC 20402

Table of Contents

Step 1 Disassemble the Piano

A. **Remove the music desk and the fallboard.** On many pianos, the fallboard can be easily removed by lifting it upward and outward. On others, it is attached to cheek blocks at the ends of the keyboard. These blocks must be removed first, usually by loosening the long screws beneath the keybed.

B. **Measure the key height.** An important measurement must be taken here – that of the key height for the particular piano on which you are working. Carefully measure the distance from the top of the keybed to the top of the (white) key covering. Record this measurement for later use. (Note: the height of a black key is measured from the top of an adjacent white key. This height is about ½" (13 mm). These measurements are also available from piano manufactures and the Piano Technicians Guild.

Mark the location of the Keyframe on the keybed.

D. **Remove the action.** Be especially careful that your fingers do not push the keys down while pulling out the action. The slightest pressure on a key will lift its hammer, thereby causing the hammer to catch on the pinblock and may cause damage when the action is pulled out of the piano. Place the action on a table. If the piano arrives at your workshop already on its side, you will need to tilt it in order to remove the action. New pianos shipped in a crate, usually have the hammers tied down. If this is the case, the action can be pulled out with the piano on its side.

E. **Removal of the lid is optional.** If left in place, secure it with a rubber inner tube. If it is removed, put it in a safe location. To guard against losing the hinge pins, tape each pin to its hinge.

F. **Place the piano on its bass side** on a carpeted piano board. With a soft lead pencil, draw the outline of the right and left legs on the bottom of the keybed. Remove the legs. With a permanent marker, number each leg and the keybed point from which it came. These marks will be indispensable later when some portions of the legs may need to be cut away.

G. **Remove the pedal lyre and all trapwork.** Remove the lyre and place it in a safe place. Remove all trapwork saving only the shift lever.

H. **Remove the hammer stack.** Remove the screws – 2 per bracket, for a total of 8 or 10. The screws may vary in size; consequently, mark each one in such a manner as to insure its return to the original position in the keyframe. Lift the action "stack" from the keyframe and place it somewhere safe.

Note: Pianos with leg bolts sometimes present a problem when attempting access to all 88 keys. It may be necessary to omit some key solenoids on both ends of the keyboard due to the interference of the leg bolt plate in the keybed.

To determine this key access –

1. Remove the action from the piano
2. Measure from the keyframe rest block (on the bass side) to the first leg bolt plate. Transfer the measurement to the keyframe. (see figure 1A and 1B - Measurment X)
3. Now measure from the keyframe rest block to the leg bolt plate in high treble. Transfer this measurement to the keyframe. See figure 1A and 1B – Measurment Y.

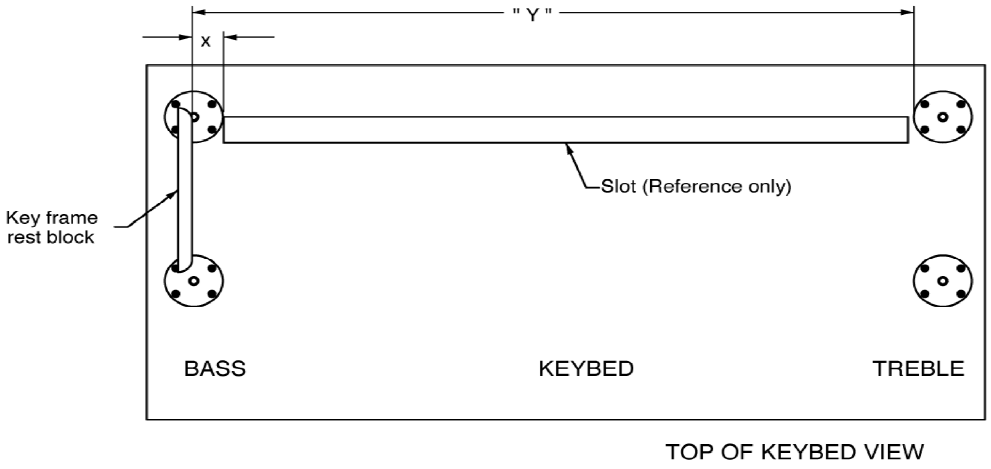


Figure 1A

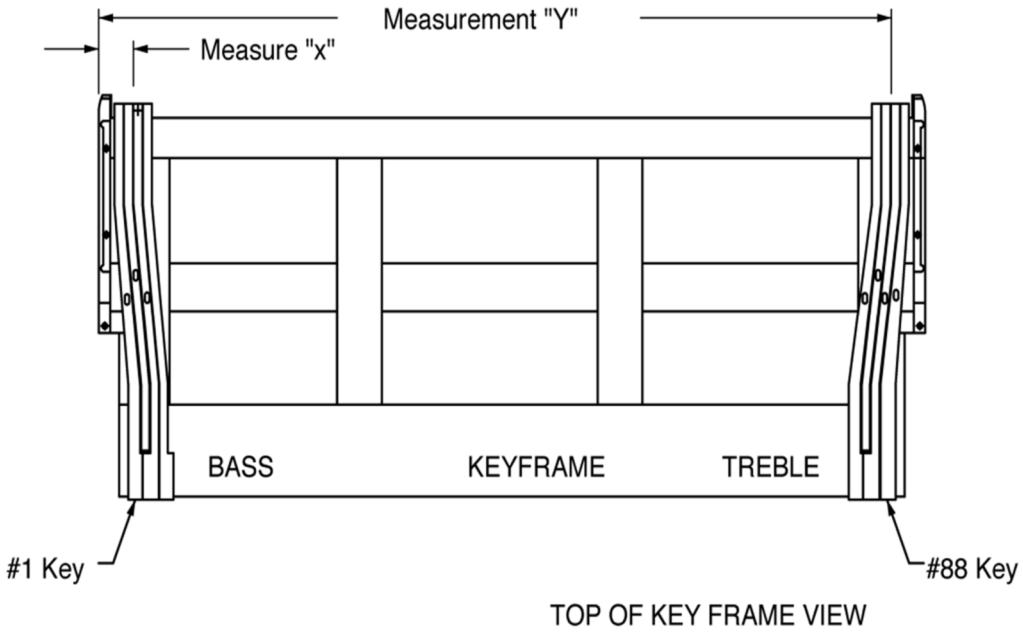


Figure 1B

Step 2 Measure the key groups

A. **Establish the key groups.** The front of the keys are evenly spaced in one continuous line: left to right, numbered 1 through 88. The stack is typically divided into four groups. The group at the left, the bass, has the largest hammers. This is Group 1. The mid-range group in the center of the keyboard is Group 2. Moving to the right is the low treble area, Group 3. Group 4 is the high treble area at the right end of the keyboard with the smallest hammers. The small open spaces between these groups are called “breaks”.

B. **Place and mark the rail blanks.** Position solenoid rail blank on damper lift felt centering rail bracket locations for best support. The mounting brackets should be supporting close to the ends of the section.(Figure 2B)

C. **Mark the starting** and ending point on the rail (first and last keys of that section with key solenoids) (Figure 2A)

D. **Always start with** short stem solenoid for the first key and mark ONLY the Short stem solenoid locations. When twisting the wire it works out better.

E. **Do the same** for the tenor and treble sections.

F. **Label each rail** (Bass, Tenor, Treble)

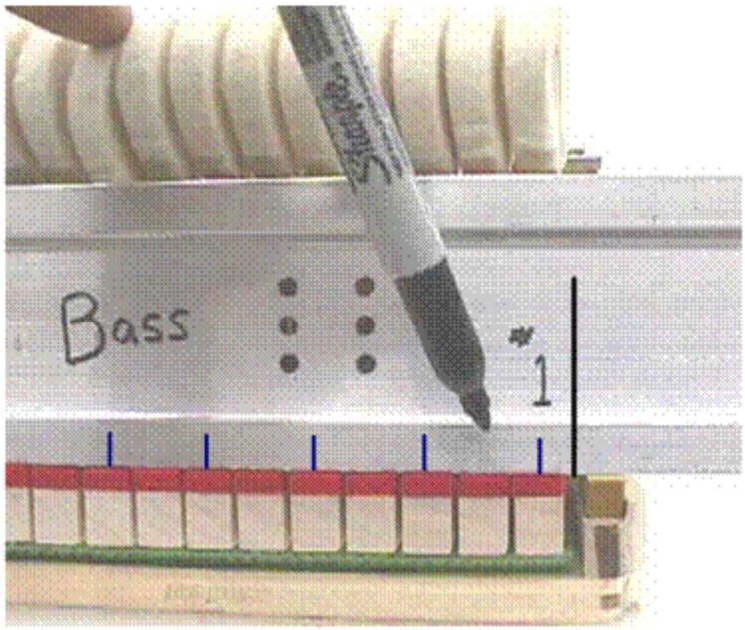


Figure 2A

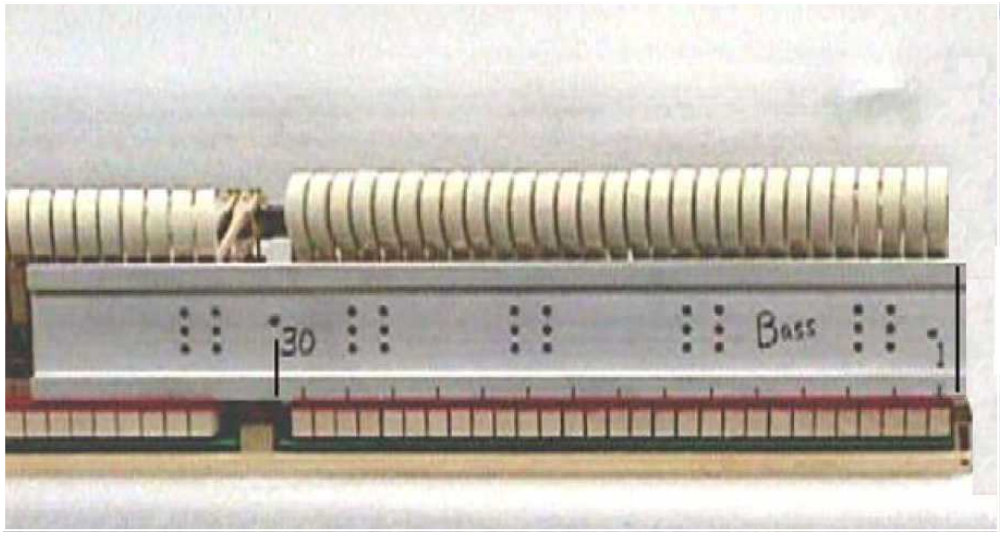


Figure 2B

Step 3 <u>Measure the keyframe cut</u>

A. Remove all keys from the keyframe, except end keys of each section.

Be careful to keep them in the correct order, 1 through 88.
If the numbers are not readily discernible on the key tops, re-number them with a ballpoint pen. Keys are not interchangeable.

B. **Measure from the back end of the first and last key in each section** (i.e. 1 and 28). Measure 3/4" (19 mm) toward the front of the key and mark the point on the keyframe felt. In some pianos you may not need to cut the felt.

NOTE: If more than half of the felt will be removed, it is better to remove the rest felt and move it forward to the keyframe cut line. This will require re-leveling the keys.

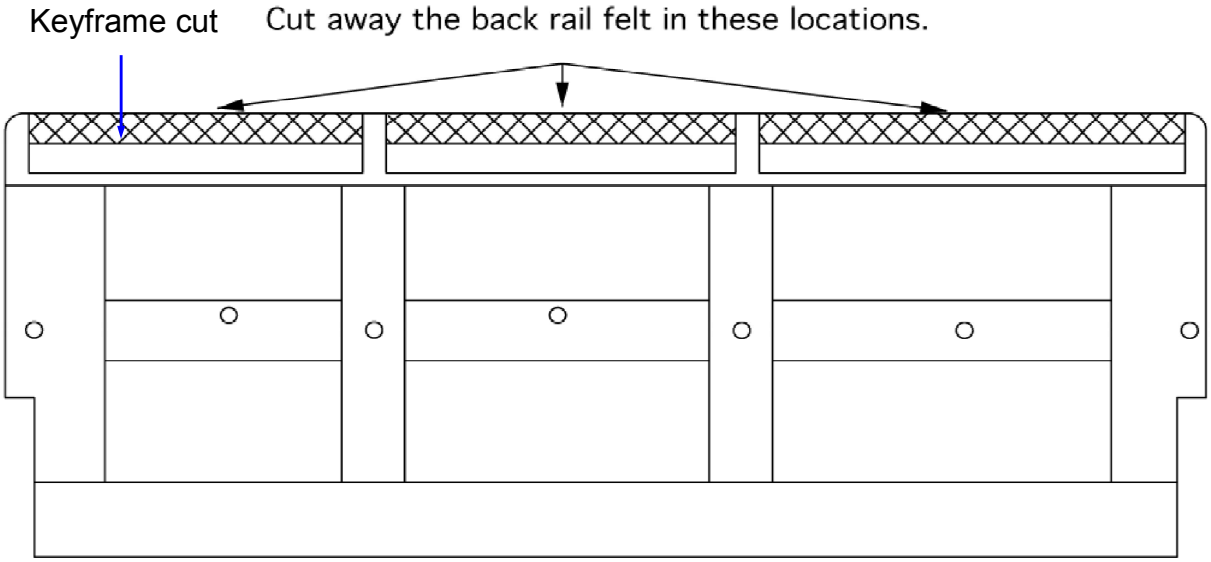


Figure 3

With a straight edge, draw a line in each section, connecting the points marked on the key felt in the above paragraph. A straight edge can be made from a piece of wood cut to the correct length of each section.

Cut away the back rail felt with a felt knife or razor blade, using pieces of wood to hold the felt while cutting.

Step 4 Bedding the Keyframe

Determine if additional support is necessary. Measure from the back edge of keyframe to the keyframe cut line. Tilt the keyframe vertically, looking at the bottom side and transfer measurement to the bottom side plus 1/4" (6 mm). (See Fig.4 below) If there is still 1/8" (3 mm) or more support left on the keyframe, then no additional support is necessary. (Continue to Step 5)

A. Shimming the keyframe. If shimming is necessary, you must locate where to place the shim and how thick the shim must be. Looking at Figure 4, you will see a view of the bottom of the keyframe. The dotted line represents the keyframe cut line that was transferred from the top. Notice the 5 shims are placed 1/4" (6 mm) from the dotted line. This is because the 1/4" (6 mm) portion is in the slot location.

1. Place a straight edge across the bottom of the keyframe. (front rail to rest rail)
2. Choose the appropriate thickness of shim stock to fill the void at the selected location. If the shim stock is thicker, that is ok; it can be sanded to the correct height.
3. Cut 5 pieces of shim stock 1" x 2" (25 mm x 50 mm).
4. Evenly space the shim on the bottom of the keyframe and glue the shims into place. (see Figure 4)
5. After the shims are dry, place the straight edge across the bottom of the keyframe and check the shim height. Sand the shims, if necessary, to the correct height.

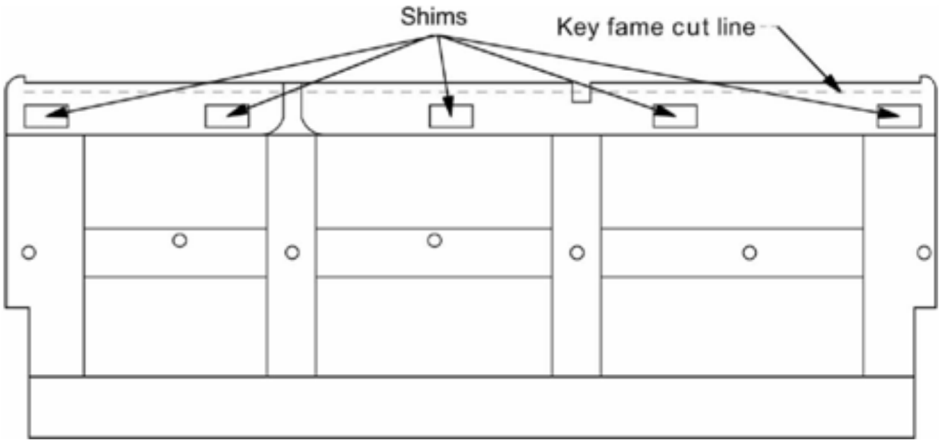


Figure 4

NOTE: On some piano, as in Kawai, there is a recess cutout on the keybed, this area may need to be filled to properly support the keyframe. The support of the keyframe is very important. This support should be placed in the same location the keyframe shims are placed, generally 1" (25mm) x 2" (50mm).

Step 5 Cut the keyframe

With a jig saw, cut away the keyframe in the marked area, conforming to the line drawn in the previous step.

CAUTION: Do not cut away the supports for the action brackets. That is, the small strips at the breaks on the keyframe.

File or block sand the cut area and vacuum or blow off saw dust.

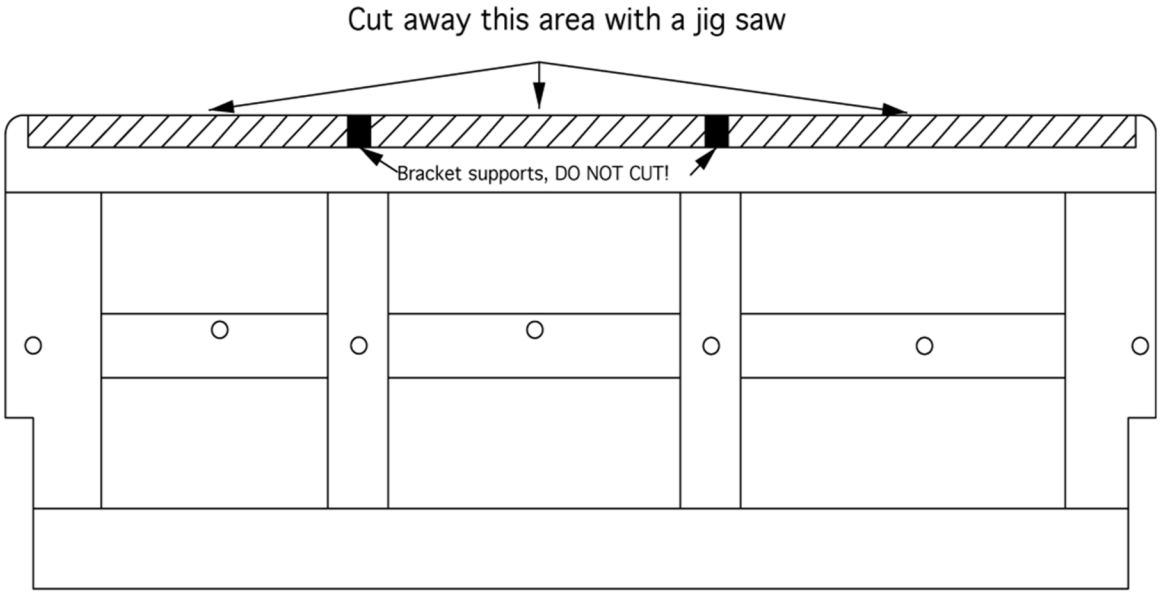


Figure 5

Step 6 Trace the keyframe

Steps 6-11 – a convenient time saving tip

On some pianos it is possible to remove the keybed, giving you easier access to the inside of the piano. Removal of the keybed often makes steps 6 through 11 much easier, since you would be able to perform these steps from the INSIDE of the keybed.

DO NOT attempt to remove the keybed until you have referred to Appendix A, since some keybeds are not removable. A list of piano makes with easily removable keybeds will be found in Appendix A at the end of this manual

B. With a pencil, outline on the keybed the cut just made in the back edge of the keyframe.

Step 7 Transfer your measurements

A. Remove the keyframe from the piano.

B. Transfer the keyframe cut outline from the top (inside) to the bottom (outside) of the keybed, where you will have access to it with a saw. Do this by measuring from each end of the line drawn in the previous step to the front top edge of the keybed, down the thickness of the keybed and then back the same distance on the bottom of the keybed.

CAUTION: On some pianos, the front edge of the keybed does not form a 90° angle.

MAKE SURE you account for this when you transfer your measurements from the inside of the keybed to the outside. (See Fig. 6)

C. Check the accuracy of the transfer by drilling a 1/8" (3 mm) hole at each end of the line, being sure to drill at a 90° angle with the keybed. Look inside to see if the holes hit the original line. Make adjustments if necessary.

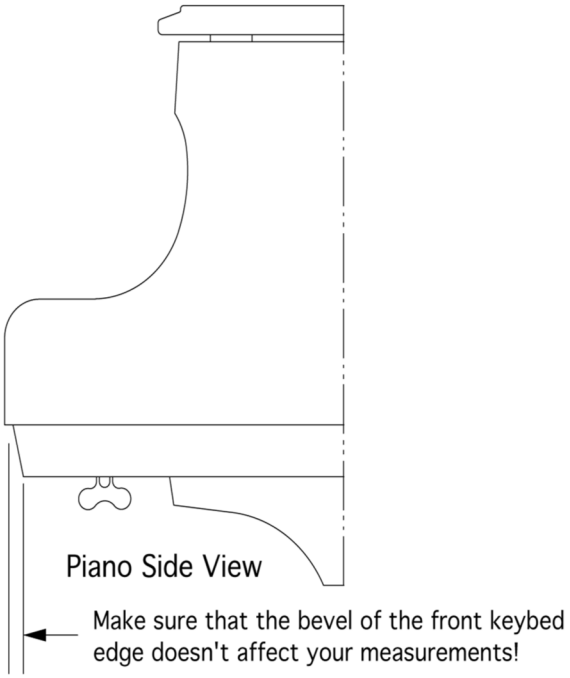


Figure 6

Step 8 Determine location for the solenoid rail slot

A. Using the 1/8" (3 mm) hole locations, see Fig. 7 line "A". From step 7, measure 1/4" (6 mm) to the left of each hole (toward the front of piano) and connect the 2 points with a 4' steel ruler. This establishes the front edge of the slot. – line "B"

B. Now measure 2” (51 mm) to the right of line “B” which establishes the back of the slot, - line “C”. (see figure 7A)

C. Using the 1/8” (3mm) holes drilled in step 7C, (looking inside the piano), measure from 1/8” (3 mm) hole to end of slot inside point. Transfer this measurement to the keybed bottom side (outside of piano). Do this at both ends, to establish ends of the solenoid slot.

Note: It is necessary at this time to determine if the keybed needs reinforcement. If so an additional 1/8" (3 mm) of keybed needs to be removed on the lyre side of the slot. This will accommodate the thickness of the angle iron support. If the keybed is sectional (as in some Steinways) or if the keybed is less then 1 1/2" (38 mm) thick, we strongly recommend reinforcing the keybed.

Confirm all Measurements!

“ Measure twice, cut once.”

The importance of being accurate on all measurements cannot be over stressed. Check everything carefully twice or even three times. Heed the carpenter’s old adage quoted above. Tolerances are very close and there is little room for error.

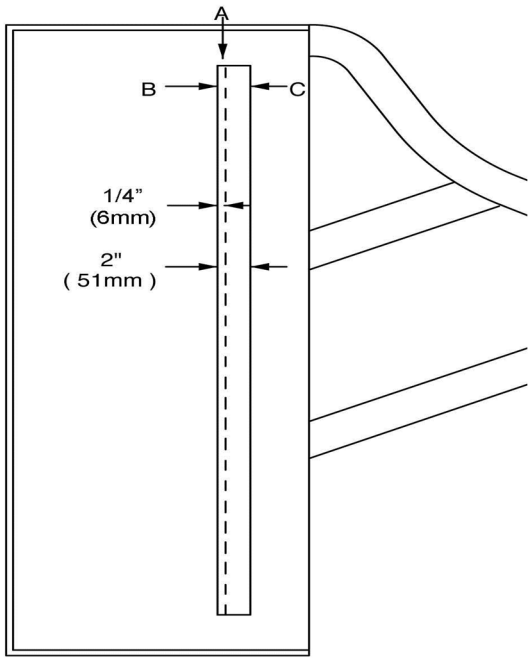


Figure 7A

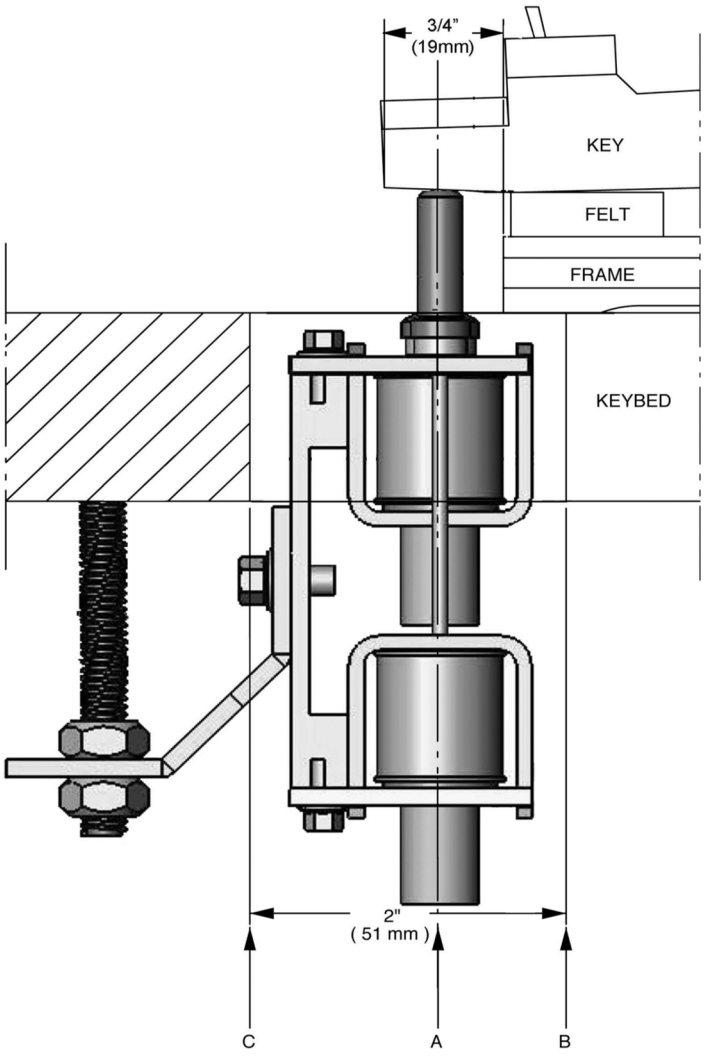


Figure 7B

Step 9 Drill the keybed

A. Measure the thickness of the keybed.

B. Mark the drill bit. Take a 3/8” (9.5 mm) bit and wrap masking tape around the bit at the depth of the keybed. This will indicate the point at which the bit will break through on the other side. This precaution will minimize the chance of suddenly bursting through the keybed and damaging the damper assembly.

C. Drill through the keybed. Drill out the holes at the corners of the slot outline to accommodate the jig saw blade. If a circular saw is used, the blade depth must be properly set.

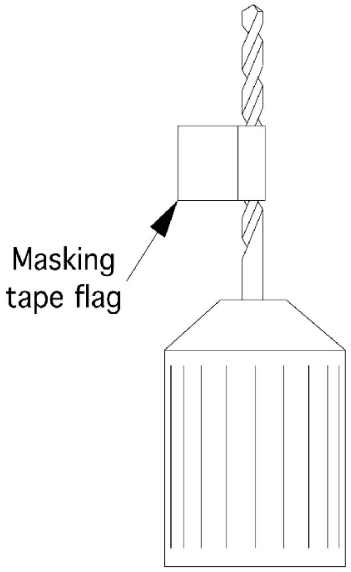


Figure 8

Step 10 Prepare to cut the slot

A. Wedge the damper tray in the "up" position to make sure that the saw blade has enough clearance.

B. Check the depth of the saw blade. Make sure not to cut accidentally into the damper tray.

C. Remove the "dags". It is very likely that the piano you are retrofitting is equipped with action stops (or "dags"). Because of their location, cutting the keybed will cut through them as well, unless they are removed before making the cut. Use of the dags is important for the PianoDisc system because they keep the action of the piano from impacting against the solenoid stems and possibly damaging them. Therefore, they should be removed and re-installed after the slot is cut. Due to the amount of frame material removed, the dags can only be placed at the far bass and treble ends of the slot. You should be able to knock the "dags" out fairly easily since the screws that attach them to the keybed are not in very deep. This will remove the screws as well.

Step 11 Cutting the slot

A. Cut lines B and C. Starting at the bottom of the keybed, cut along the length of line B with a circular saw. Then cut along the length of line C. Make sure that there is never more than 1/8" (3 mm) deviation on either side of the line being cut.

There should now be two long parallel cuts all the way through the keybed.

Note: A circular saw is highly recommended for making the long cuts along lines B and C. It is easier to cut long straight lines with a circular saw than with a jig saw.

B. Cut the ends of the slot. Make the two short end cuts along the lines that you drew in Step 8. Make these cuts with a jig saw, and connect them with the cuts along lines B and C. The long rectangle of keybed that you just outlined should fall out, leaving a rough cut of the solenoid slot.

C. File any rough spots. Usually the slot will be fairly smooth, but if there are any rough spots, take the time to file them down. Use a double cut file for this; and be sure to remove all slivers and rough spots. Sand with 220 grit sandpaper (or equivalent) if necessary.

Step 12 Re-inforce the keybed

Note: If the keybed is sectioned (as in some Steinways) or if the keybed is less than 1 1/2" (38 mm) thick, we strongly recommend reinforcing the keybed after cutting the slot. In weaker keybeds, this will greatly improve the stability of the action regulation.

Note: On the plank style keybeds, the connecting point of the planks will most likely be cut away when the slot is cut. It is advisible to locate and router out the area for the angle iron support before cutting the solenoid slot. (See Fig. 9)

A. **Prepare the reinforcement.** Use a piece of 1/8" (3 mm)thick by 1 1/2" (38 mm) wide angle iron and cut it to match the length of the slot.

- Drill screw holes in the angle iron at 6" (153 mm) intervals or into each plank so that it can be secured to the bottom of the keybed.
- Also, use a countersink bit on the holes drilled to flush mount flat head screws. (See Figure 9)

B. **Prepare the mounting location** for the angle iron by routing out the equivalent thickness and length along the bottom of the keybed. (See Fig. 9)

- This is so that the angle iron will not protrude from the bottom of the keybed, allowing the rail cover to fit properly. Use a wood router for this purpose. Also, after routing for flush fit of angle iron, round off the edge of keybed to match inside radius of angle iron. A router bit works well in making radius cut.

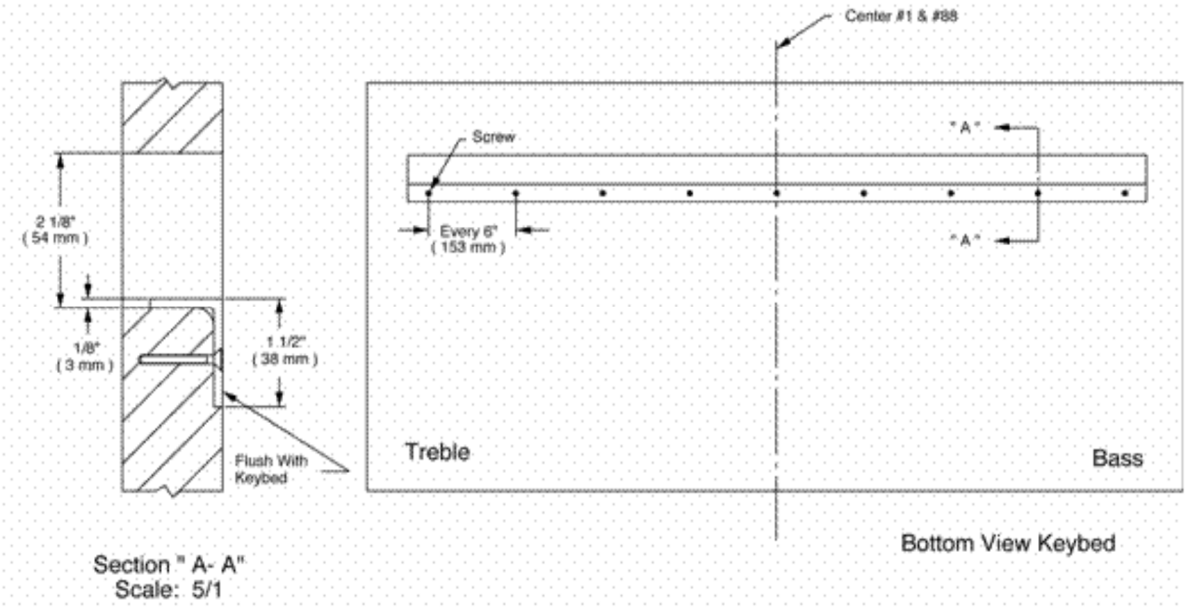


Figure 9

C. **Place the angle iron at the routed location.** Place a mark at each mounting screw location and drill a pilot hole for each screw.

D. **Paint the angle iron** black and mount the angle iron to the keybed at the pre-drilled hole locations. Make sure that the angle iron is flush with the keybed.

Step 13 Making, mounting, and marking rail cover

A. Assemble the solenoid rail cover halves with screws provide, so that the total length is equal to the rail slot plus 1/4” (6 mm). The screws should be at the

B. Position the rail cover onto the piano, leaving 1/8” (3 mm) spacing at each end of slot, at “A” and “B” (see Fig. 10). Position side “C” of rail cover to barely cover the front edge of the slot and then attach the cover with the screws supplied.

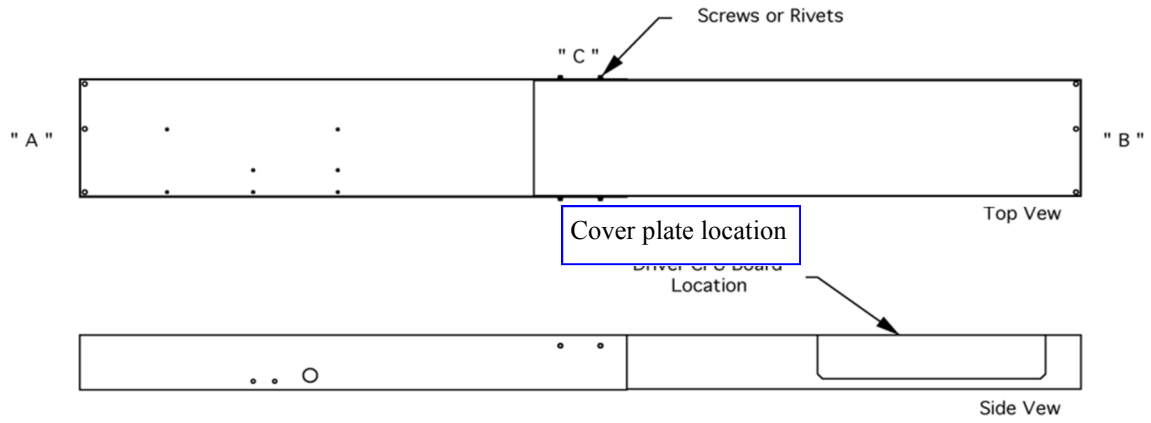
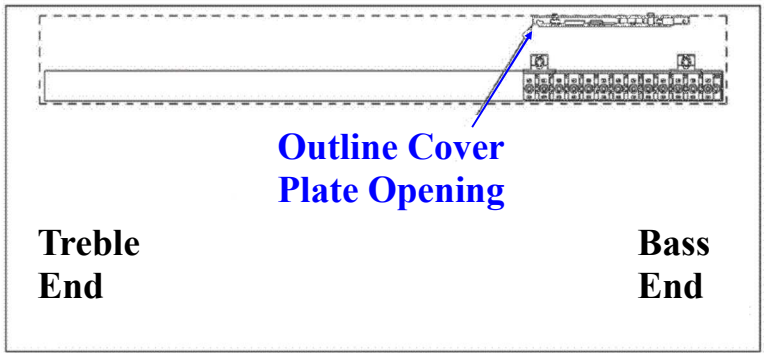


Figure 10

C. Using a pencil, out-line the complete perimeter of the rail cover. Also mark the cover plate opening. This will aid in locating position for the cover plate. (See Fig. 11)

Figure 11



D. Remove the rail cover from the keybed. Mount the cover plate to the keybed on the line drawn. The cover plate will overlap the rail cover opening lines drawn. (See fig. 11A)

E. The cover plate is on the outside of the rail cover for grounding purpose.

Figure 11A

Step 14 Leg alterations for placement of rail cover

NOTE: Some piano manufactures designate the legs for particular locations. Check for numbers or letters on the legs before proceeding.

A. Place the front legs (bass and treble locations) on the piano.

B. Place a mark on the legs where the rail cover intersects. Allow 1/8" (3 mm) clearance between the leg and rail cover. For pianos with an interlock leg, such as Young Chang, an extra 3/8" (9.5 mm) must be removed for access.

C. Mark the cutout on the top of the legs. Cut the legs with a jig saw. File or sand the area of the leg cut. Stain or paint exposed area to match the finish of the piano. (See Fig.12)

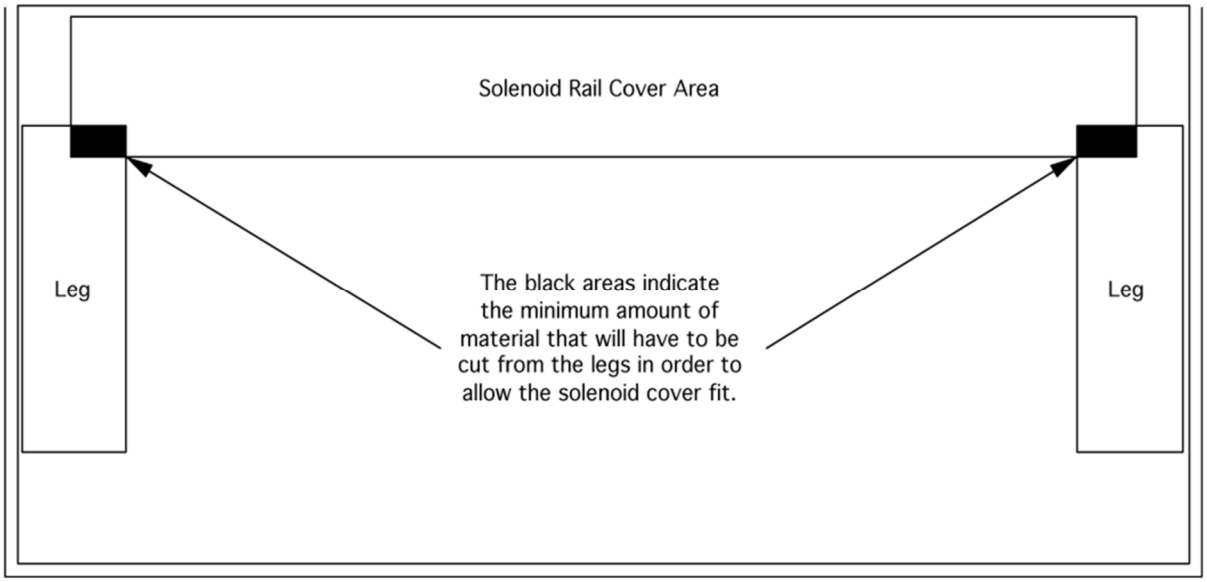


Figure 12

Step 15 Preparing to install the Trapwork

Before attempting to install the trapwork, it is necessary to determine whether there is enough room for the trapwork levers to operate without interference from the rail cover or the pedal lyre. To determine this you must do the following:

A. Install the pedal lyre. Mount the pedal lyre on the piano with the mounting screws, determining thereby how much room there will be for the sostenuto lever, and other trapwork. Re-install the *una corda* lever.

B. Measure the distance from the back edge of the *una corda* lever to the edge of the solenoid slot (See Figure 13). If this distance is 3/4" (19 mm) or more, there is adequate room to install the trapwork without additional modification. In that case, skip the next step and proceed to Step 17, "Prepare the pedal solenoid for mounting." However, if the distance from the back edge of the *una corda* lever to the edge of the solenoid slot is less than 3/4" (19 mm), there is insufficient room for the trapwork to be installed. This will require making certain changes to the position of the pedal lyre, and possibly the una corda (soft) pedal as well. Please continue on to Step 16, "Modifications for proper trapwork fit".

Step 16 Modifications for proper Trapwork fit

A. Determine the distance needed for the trapwork. There needs to be 3/4" (19 mm) of clearance between the shift lever and the rail cover. (See Figure 13) If there is not adequate room for the trapwork lever, then the lyre support must by moved forward.

B. Remove the lyre again, then outline the lyre support and then remove the keybed lyre support.
The keybed lyre support is a wood or metal support that is attached to the bottom of the keybed.

C. Reposition the keybed lyre support.
With a pencil, mark the new position of the mounting screws, and then drill the pilot holes for the lyre support screws. When drilling these holes be sure not to

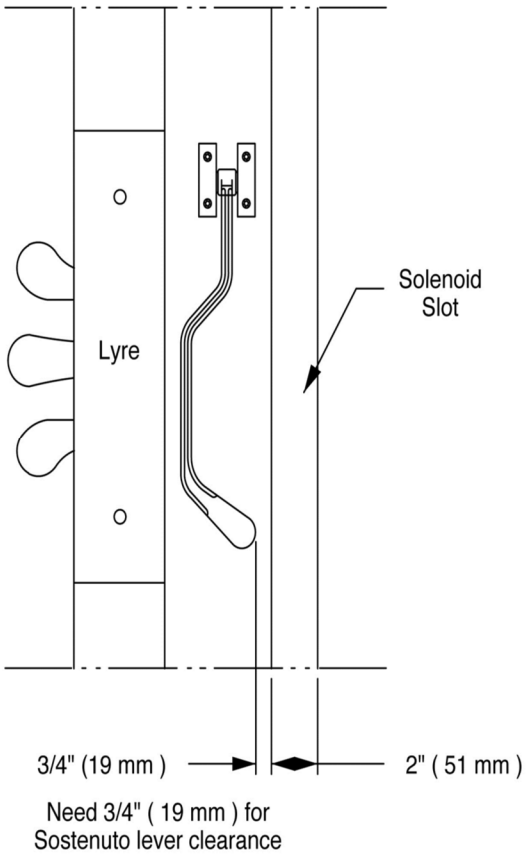


Figure 13

D. **Check the *una corda* lever position.** Because we have relocated the lyre sup port (and therefore the pedal lyre) it will be necessary to modify the position of the una corda (soft) pedal to accommodate this change. Re-attach the una corda lever to its original position on the keybed. Usually the una corda must be moved the same amount as the lyre Reposition the una corda lever as needed, drilling new holes in the keybed to mount it. Also check the una corda contact area of the keyframe. Sometimes hardwood needs to be added for proper con tact of the lever.

Step 17 Prepare the pedal solenoid for mounting

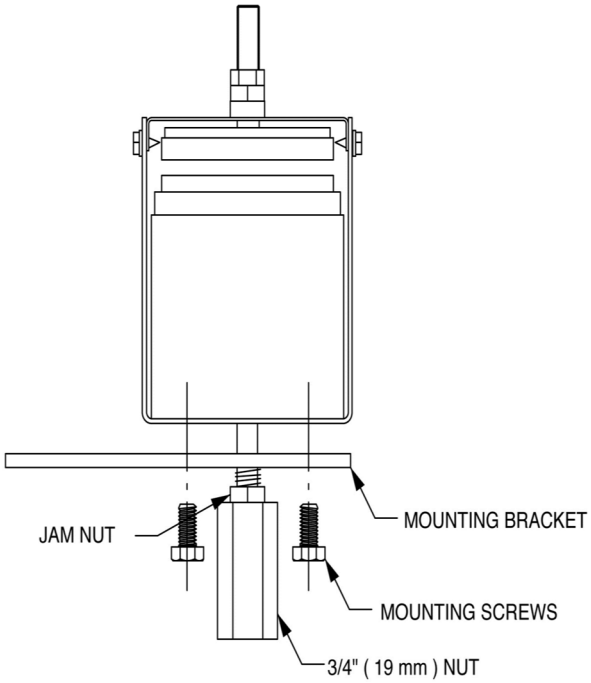


Figure 14

Note: When mounting the pedal solenoid to the beam it is best to have the cable facing towards the front of the piano so it may be necessary to change the mounting plate position.

A. **Changing the mounting plate position**

Remove the two bolts that attach the solenoid to the bracket (use a7/16” (12 mm) wrench for this). Now, rotate the mounting bracket 180 degrees and re-attach the plate to the solenoid.

Step 18 Mount the sustain lever and pedal solenoid

. . . a note about using the right equipment

When drilling the trapwork use a drill press to drill the holes accurately. Doing this by hand is strongly discouraged since the tolerances are very critical, sometimes less than a thousandth of an inch. There is very little room for error.

A. Place the lyre back into its position on the piano.

B. **Drill a hole through the sustain lever.** Using the diagram in figure 15, drill a #20 (4 mm) hole through the sustain lever as indicated. Locate the pivot pin in the kit, place a little grease on the pivot pin and tap it into the hole with a hammer. The grease helps with the press fit of the pin.

NOTE: It is best to check the size of the pin before drilling as they can vary in size. If the hole was drilled too large, epoxy can be used to secure the pin in the hole.

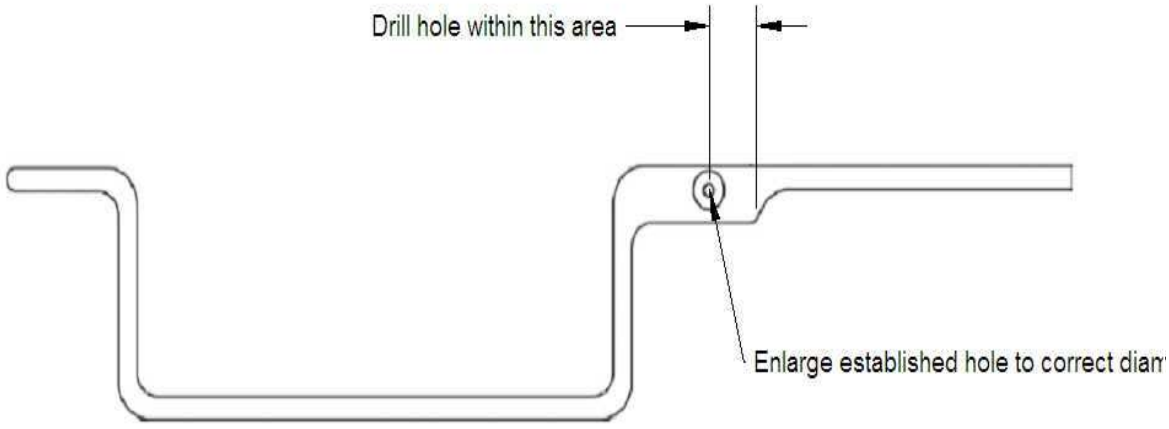
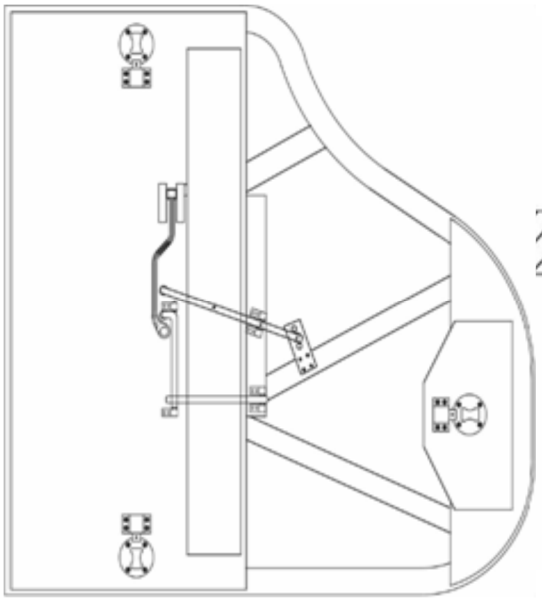


Figure 15

C. **Mark the solenoid contact point.** Measurement 6” (152 mm) from the pivot pin towards end of lever (See figure 16B).



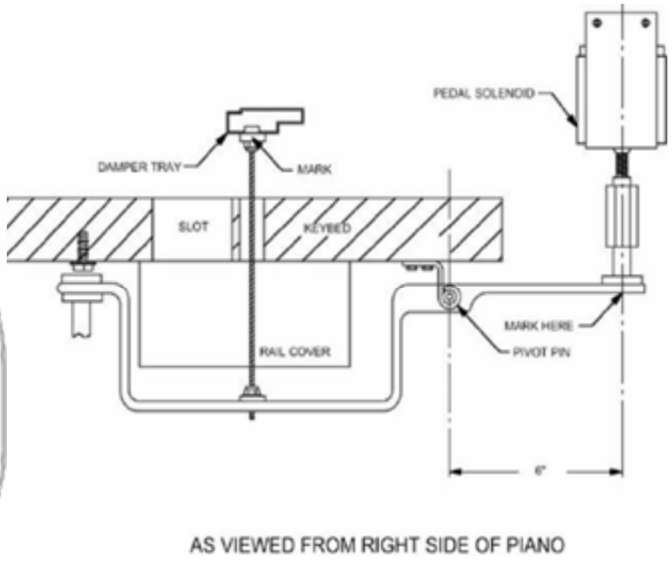


Figure 16A **Figure 16B**

D. **Locating the best place for the pedal solenoid.** Glue felt to the side of the pedal solenoid to cushion between the beam and solenoid. Center the sustain lever over the solenoid rail cover outline. Place the pedal solenoid on the beam aligning with the 6”(152mm) location established in step C. Attach the pedal solenoid at this time.

NOTE: It may be necessary to place a block of wood on the beam as a spacer for better alignment.

Pianos with no support beam. In this case, it is necessary to install a beam of wood to mount the sustain solenoid and possibly a speaker. Use a 4” x 6”(101mmx152mm) piece of wood attached by metal “L” brackets on the belly rail. At the other end attach to the leg base console with glue and two screws.

E. **Mount the sustain lever.** Place the sustain lever between the rail cover outline in line with the lyre sustain pedal rod and pedal solenoid. Mount lever in place with screws supplied in the installation kit.

F. **Threaded rod (pitman arm).** The threaded rod will need to have access to the damper tray outside of the solenoid slot area. Look down the sustain lever at the keybed and mark the amount of wood to be cut for access to the damper tray. Make this cut with a jig saw.

G. **Installing the rubber grommet in the damper tray.** With the sustain lever back in place look down the sustain lever and at the damper tray and mark the loca tion to drill a 23/64" (9 mm) hole for a rubber grommet. Locate the rubber grom met, supplied in the kit, and glue in the grommet with contact cement or super glue.

Step 19 Prepare the sustain lever for operation

A. Center the sustain pedal rod adjusting screw (Acorn nut), and center the 3/4 inch (19 mm) nut on the pedal solenoid. Place the appropriate felt and spacer (if necessary) between the sustain lever & pedal rod.

B. **Prepare the threaded rod.** Place a self locking nut on the 8/32" (6.35mm) rod with ½"(13 mm) of rod exposed. Glue a flat washer onto the nut for more support area. Use super glue or contact cement. (I prefer contact cement)

C. **Measuring and cutting the threaded rod.** Place the threaded rod (nut end) into the grommet on the damper tray. (It may be necessary to remove some of the thread of the rod to fit into the grommet.) Now pull the dampers down to the strings and the damper tray up to the damper leavers. Now, mark the threaded rod, to be cut off flush with the bottom of the sustain lever. At the same time, mark the location where threaded rod hole will be drilled on the sustain lever.

D. **Marking the area to be cut off on sustain lever.** Where the sustain lever makes contact with the pedal solenoid, mark ¼" (6 mm) past the ¾" nut contact area and place a mark to cut off excess lever.

E. **Drilling threaded rod hole and cutting excess section of lever.** Remove the threaded rod and sustain lever. Drill the sustain lever with a ¼" (6 mm) drill at the location marked in step C. Turn the lever over and drill a 23/64" (9 mm) hole halfway through the lever to receive the rubber grommet. Glue grommet in place with C & A (super) glue or contact cement. Cut off excess section of lever that was described in step D. Also, at the contact point of the solenoid to the lever, sand the relief angle off to give a flat contact surface for the benefit of the solenoid.

F. **Cutting the threaded rod.** Cut the threaded rod at the location marked in step C. Place a self locking nut onto the rod threaded at a distance of ¾" or 19 mm and glue a flat washer onto the nut. Some of the threads may need ground off to fit easily into the grommet.

G. **Marking location and installing sustain lever return spring.** On most pianos, the sustain pedal feels lighter that the original trapwork. To replace the same feel to the pedal, a spring can be added to the sustain pedal as follows:

1. Remove the bottom of the lyre and the sustain pedal.
2. Drill a 1" (51 mm) hole ½" (25 mm) deep into the lyre.
3. Felt the circumference to the hole with thin felt.
4. Place the spring in the hole and reassemble the lyre.

Step 20 Sostenuto lever installation- push type

Note: PianoDisc requires a working sostenuto or bass sustain on all pianos - which ever came equipped on the piano.

Determine the type of sostenuto action. In grand pianos there are two methods used to operate the sostenuto pedal. One method engages the sostenuto by pushing up under the sostenuto lever, called a "push" action. (See Fig. 17) The other method, pulls down a lever which engages the sostenuto, called a "pull" action. (See Fig. 20). Determine which type of sostenoto is on the piano and follow the instruction appropriate for your situation.

A. **Mark ball linkage location.** Locate the sostenoto connection at the bass/tenor break. Place a 90 degree square across the keybed at the sostenoto location. Draw a line from the back of the keybed across the slot. This is the ball linkage location. Place the lyre on the piano. Hold the lever #1 (See Fig. 17) under the sostenuto rod, parallel to the solenoid slot, and mark the lever #1 for the ball linkage location. (See Fig. 17)

B. **Cut excess from lever #1.** Measure 2" (51 mm) past the ball linkage location and mark lever #1 for cutting. Cut off the excess.

C. **Place pivot pins in lever #1.** Using a # 20 (4 mm) drill bit, drill both ends of lever #1 and tap in pivot pins. (Use a small amount of grease to aid with installing the pivot pins.)

D. **Drill hole in lever #1 for the ball linkage screw.** At the ball linkage location, established in step 20 – A, Drill a 3/16" (5 mm) hole. (See Fig. 17)

E. **Mount the ball linkage to lever #1.** Using a 10/32 (4 mm) x 3/4" (19 mm) pan head slotted screw and the 3/4" (19 mm) spacer, attach the ball linkage to lever #1(See Fig. 17)

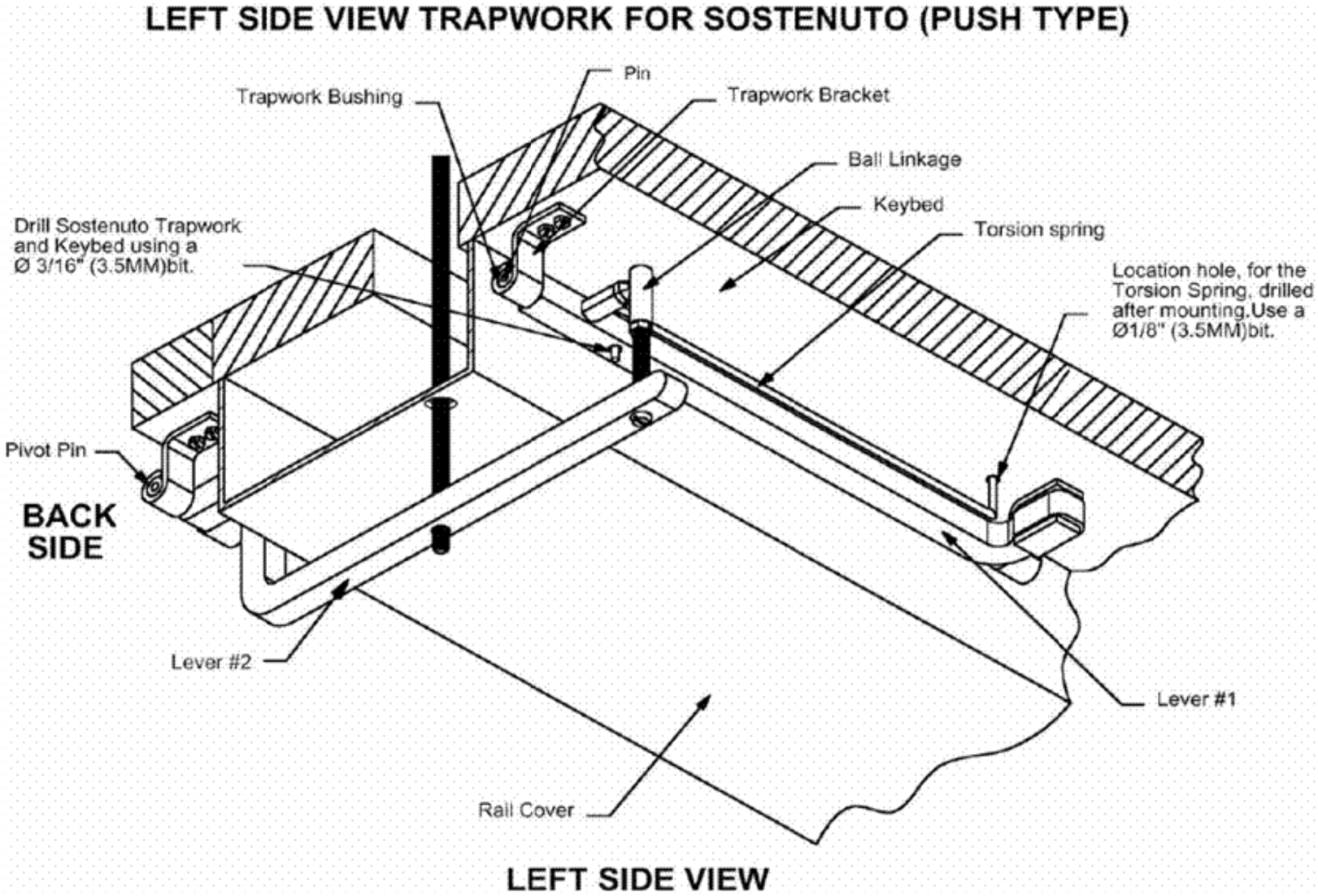


Figure 17 "Push" Action

F. **Assemble the pivot brackets to lever #1.** In the kit there are six “L” shaped (left and right) mounting brackets. Use two of them as pivot brackets for lever #1. Slide left and right brackets onto the pivot pins on each end of lever #1.

NOTE: A thrust washer is built into the pivot bracket. Always place the shoulder side of the washer towards the lever.

G. **Mount lever #1 onto the piano.** Place lever #1 under the sostenuto rod parallel to the solenoid slot, positioning it equal distance between the sostenuto lever and the solenoid slot. Allow enough room for the ball linkage screw to clear the solenoid rail cover. Using the 1” hexhead screws supplied in the kit, secure lever #1 to the keybed.

H. **Establish location for torsion spring.** Locate the torsion spring supplied in the installation kit. Note that one end of the spring has a longer L-shaped bend than the other. Hold the spring parallel to lever #1, placing the end with the longer bend at the top. Place the other end of the spring as close to the ball linkage as possible. You should be within 1/2” (13 mm) of the ball linkage. Place a mark on the keybed where long “L” of the torsion spring will be placed into the keybed.

I. **Mount one side of the torsion spring.** Remove the lower pivot bracket of lever #1, and slide lever #1 out of the other bracket. With a 9/64” (3.5 mm) drill bit, drill a hole into the keybed at the point marked in the previous paragraph. **Be sure not to drill all the way through the keybed!** In most cases a 1” (25 mm) deep hole is adequate. Now, slide the (long end) torsion spring into the hole in the key bed.

J. **Mount the other side of the torsion spring.** To determine where to drill the hole to mount the other side of the torsion spring, put lever #1 back into its original spot, sliding it into the top bracket and temporarily re-attaching the bottom bracket. The torsion spring should once again be touching the lower end of lever #1. Mark the spot on the lever where the contact is made; this is where to drill the hole to mount the other side of the torsion spring.

K. **Place pivot pin in lever #2.** Drill a hole in lever #2 for the pivot pin. (See Fig. 16A & 19) Tap the pivot pin into the hole. (Use a small amount of grease

L. Before proceeding, it is important to determine exactly how the sostenuto linkage is done on this particular piano. This linkage varies a great deal from one piano to another.

In examples A thru C, the rod connects in various ways. In example A, use a 5/8" x 2 ½" (16 mm x 76 mm) wood dowel to make the connection. Approximately half of the rod must be cut off. Using the correct size of die, thread 1" (51 mm) of the rod. Then use the correct size of drill bit (screw in fit) to drill the dowel. Use superglue on the rods during assembly.

In example B, it is necessary to drill out the end of the dowel and screw the rod into the dowel with superglue.

In example C, the rod is secured with two nuts. These are only three examples and there are other styles of connections, If you have any trouble with this, please call PianoDisc tech support.

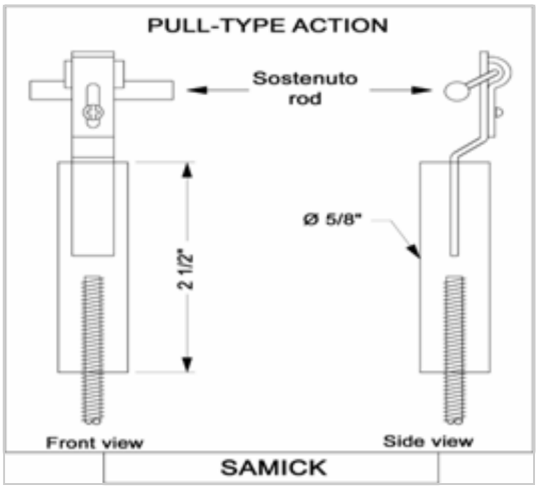


Figure 18A

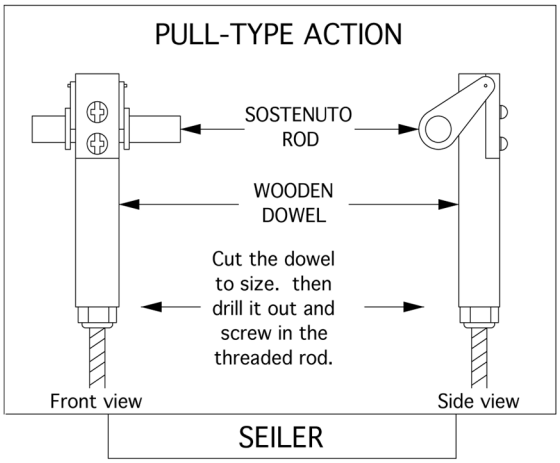


Figure 18B

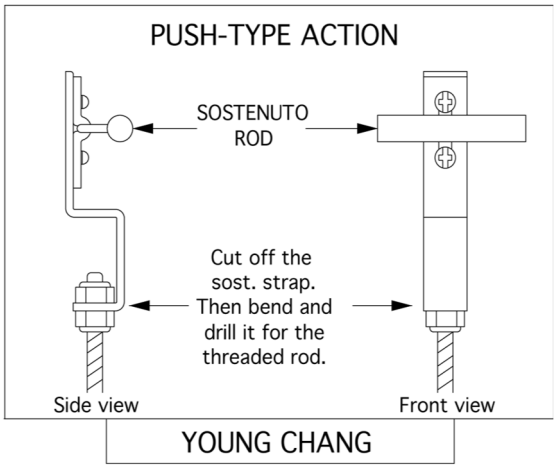


Figure 18C

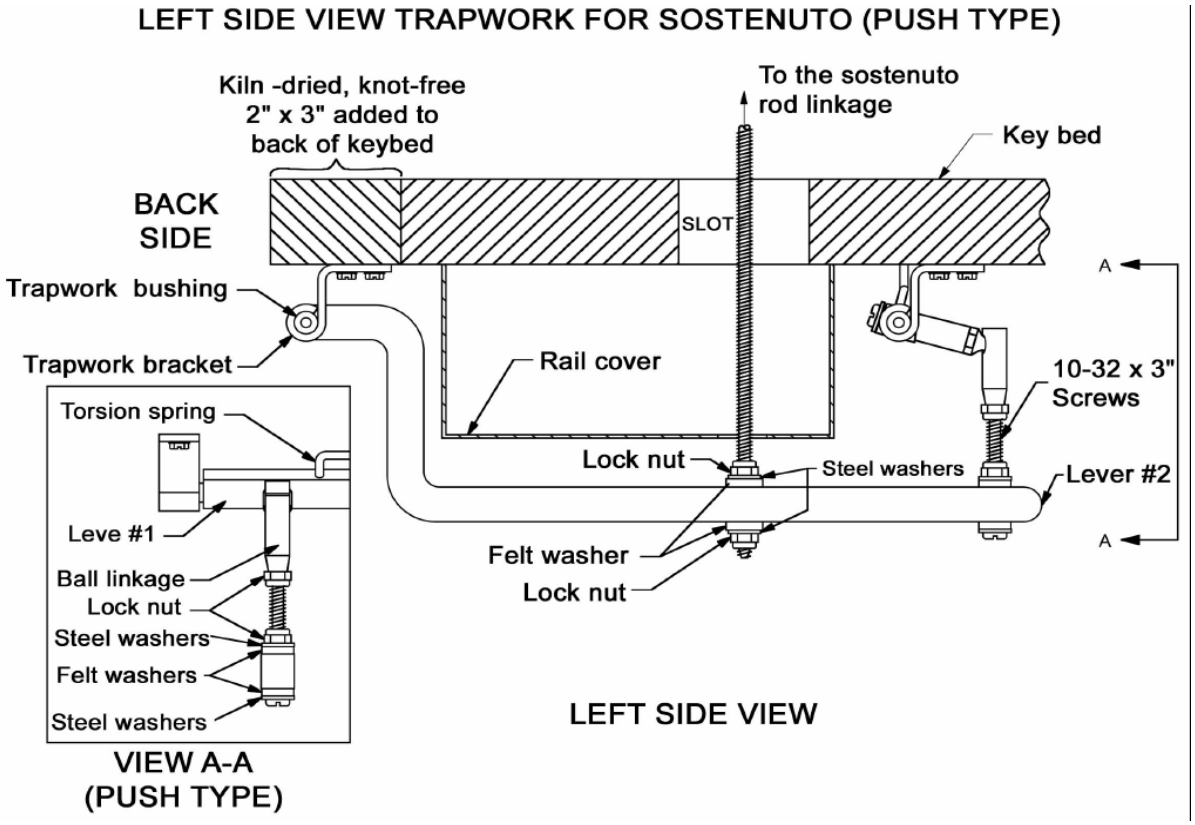


Figure 19

M. **Determine the connection point of the threaded rod to the sostenuto lever.** As the illustration above indicates, the threaded rod should form a perfect right angle with keybed. So determine the place on the lever where the threaded rod should be mounted to form the 90°angle to the keybed. Mark this point on the lever.

N. **Determine the proper length for the threaded rod.** The threaded rod should extend 1/2” (13 mm) past lever #2. Mark the rod to indicate where to cut off the excess.

O. **Remove lever #2 and drill access hole**. Now, remove lever #2 and the threaded rod. Using a 1/4" (6.35 mm) drill bit, drill all the way through lever #2 at the point located in step N.

P. **Trim the threaded rod.** At the mark made in step 20-N, trim off the excess length from the threaded rod. Clean off burr from threaded rod on the grinder wheel or with a file.

Q. **Glue felts and grommet to trapwork.** Contact cement works best.

R. **The trapwork levers.** The trapwork levers are powder coated black from the factory. So it is not necessary to paint the trapwork except for felt pen on the end cuts.

Step 21 Sostenuto lever - pull type

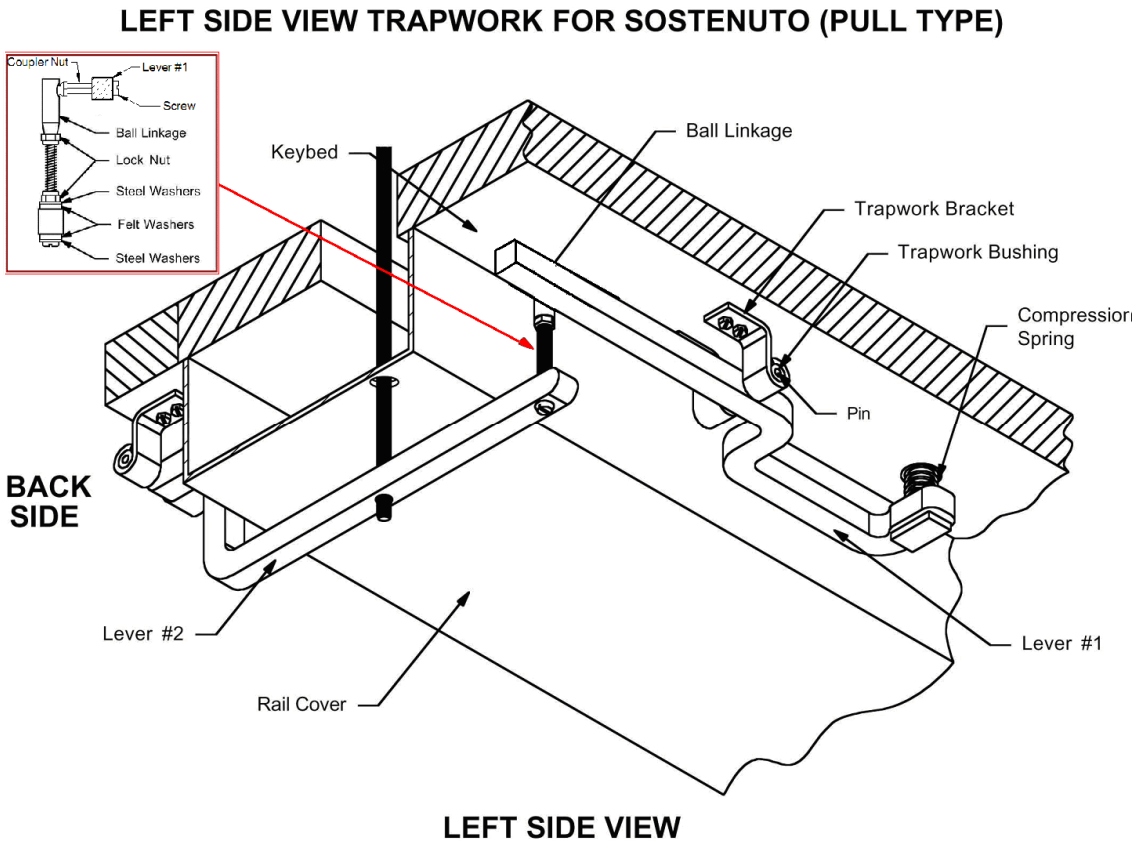


Figure 20

A. **Mark ball linkage location.** Locate the sostenoto connection at the bass/tenor break. Place a 90 degree square across the keybed at the sostenoto location. Draw a line from the back of the keybed across the slot. This is the ball linkage location. Place the lyre on the piano. Hold lever #1, (See Fig. 20) under the sostenuto rod, parallel to the solenoid slot and mark the location for the mounting the ball linkage.

B. **Pivot bracket location.** Measure from the sostenoto pedal rod to the ball linkage line on the keybed. Divide the distance by 2 and mark the lever for the pivot pin. Get as close to a 1 to 1 ratio as possible.

C. **Place a pivot pin in lever #1.** Using a #20 (4 mm) drill bit, drill a hole in lever #1 at the location from step 21-B. Place a little grease on the pivot pin and tap into the hole with a hammer.

D. **Cut excess from lever #1.** Measure 1/2" (13 mm) past the ball linkage line and mark the lever for cutting. Cut off the excess.

E. **Drill holes for ball linkage.** (See Fig. 22) Drill a 3/16"(4.5 mm) hole at the ball linkage line location found in step 21-A.

F. **Mount the ball linkage to lever #1.** Using a 10/32 (4 mm) x 3/4" (19 mm) pan head slotted screw attach the ball linkage to lever #1.
Do not use the 3/4" spacer for the pull style.

G. **Assemble the pivot brackets to lever #1.** In the kit there are six "L" (three Left and three right) shaped mounting brackets. Use two of them as pivot brackets for lever #1. Slide two of these brackets onto the pivot pins on each side of lever #1.

NOTE: A thrust washer is built into the pivot bracket. Always place the shoulder side of the washer towards the lever.

H. **Mount lever #1 onto the piano.** Place lever #1 under the sostenuto rod parallel to the solenoid slot, positioning it equal distance between the sostenuto lever and the solenoid slot. Using the 1" hex head screws supplied in the kit, secure lever #1 to the keybed.

I. **Establish the location for the coil spring.** PianoDisc does not supply a coil spring for the sostenuto trapwork. The reason is simple: This type of spring is typical in conventional sostenuto trapwork, and consequently, is probably already available from the trapwork of the piano you are working on presently. In fact, since most pianos have the "push" type sostenuto trapwork you will likely acquire an abundance of discarded springs from other installations.

at that point. (See Fig. 20) Once this location is determined, mark this spot on the keybed and prepare to drill.

J. **Mount the coil spring.** Remove the right pivot bracket on lever #1, then slide lever #1 off the other pivot bracket, removing the lever. Using a 1" spade drill bit, drill a hole 1/4" (6.5 mm) deep into the keybed at the point that was marked. Use silicone to glue the coil spring in place, and secure it with masking tape until it dries.

K. **Place pivot pin in lever #2**. Drill a hole in lever #2 for the pivot pin (See Fig. 22). Lightly grease the pivot pin and tap the pivot pin into the hole.

L. **Place a connecting link in lever #2.** Drill a ¼" hole thru lever #2 for the connecting screw to the ball linkage. (See Fig. 22) Locate the screw, washers, Felts and nuts in the kit. Assemble the hardware on lever #2.

M. **Mounting lever #2 .** First, place a pivot bracket on each side of the pivot pin. Next, attach the connecting screw, on lever #2, to the ball linkage on lever #1. (See Fig. 22) Then, center the lever #2 on the line at the bass/tenor break. This is the ball linkage line established in step 21-A. Then Position lever #2 so it will mount outside of the rail cover area. Attach the lever with the 1" hex head screws supplied in the kit.

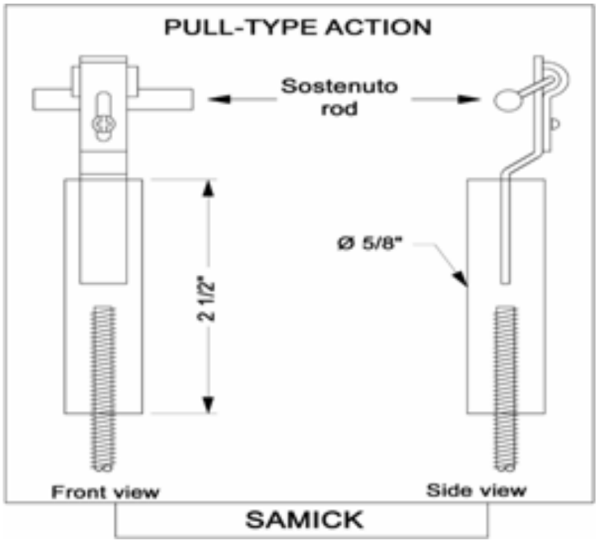


Figure 21A

N. **Connect the threaded rod to the sostenuto linkage.**

Before proceeding it is important to determine exactly how the sostenuto linkage is done on this particular piano. Linkage varies a great deal from one piano to another, so you can customize this part of the installation process.

In examples A thru C, the rod connects in various ways. In example A, use a 5/8" x 2 ½" (16 mm x 76 mm) wood dowel to make the connection.

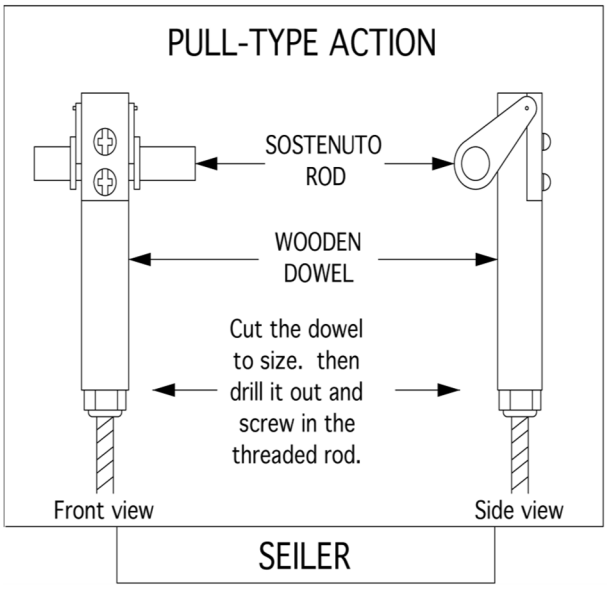


Figure 21B

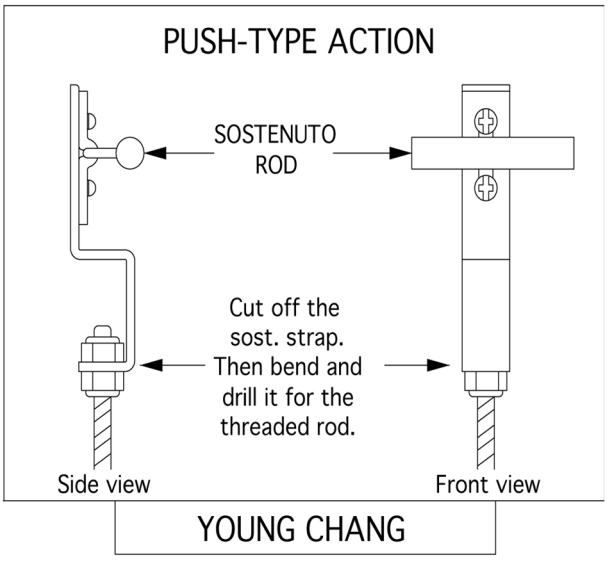


Figure 21C

Approximately half of the original sostenoto rod must be cut off. Using the correct size of die, thread 1" (51 mm) of the rod. Then use the correct size of drill bit (screw in fit) to drill the dowel. Use superglue on the rods during assembly.

In example B, it is necessary to drill out the end of the dowel and screw the rod into the dowel with superglue.

In example C, the rod is secured with 2 nuts and 2 flat washers.

These are only three examples and there are other styles of connec tions.

If you have any trouble with this, please call PianoDisc tech support.

O. **Determine the connection point of the threaded rod to the sostenuto lever.** As the illustration above indicates, the threaded rod should be at an exact right angle to keybed. Determine the place on the lever where the threaded rod needs to be mounted to form the 90°angle. Mark this location on the lever.

P. **Determine the proper length for the threaded rod.** You will need to trim off excess length from the threaded rod before completing this assembly. The rod should be trimmed so that it will stick through lever #2 about 1/2" (13 mm). Mark the rod to indicate where to cut off the excess.

Q. **Remove lever #2 and drill access hole.** Remove lever #2 and the threaded rod assembly from the sostenuto rod. Using a 1/4" (6.35mm) drill bit, drill all the way through lever #2 at the point where the threaded rod will pass through.

R. **Trim the threaded rod.** At the mark made in step 21-M, trim off the excess length from the threaded rod. Grind or file off the threaded rod so a nut can be started on the threads.

S. **Glue all the felts and grommet to the trapwork.**

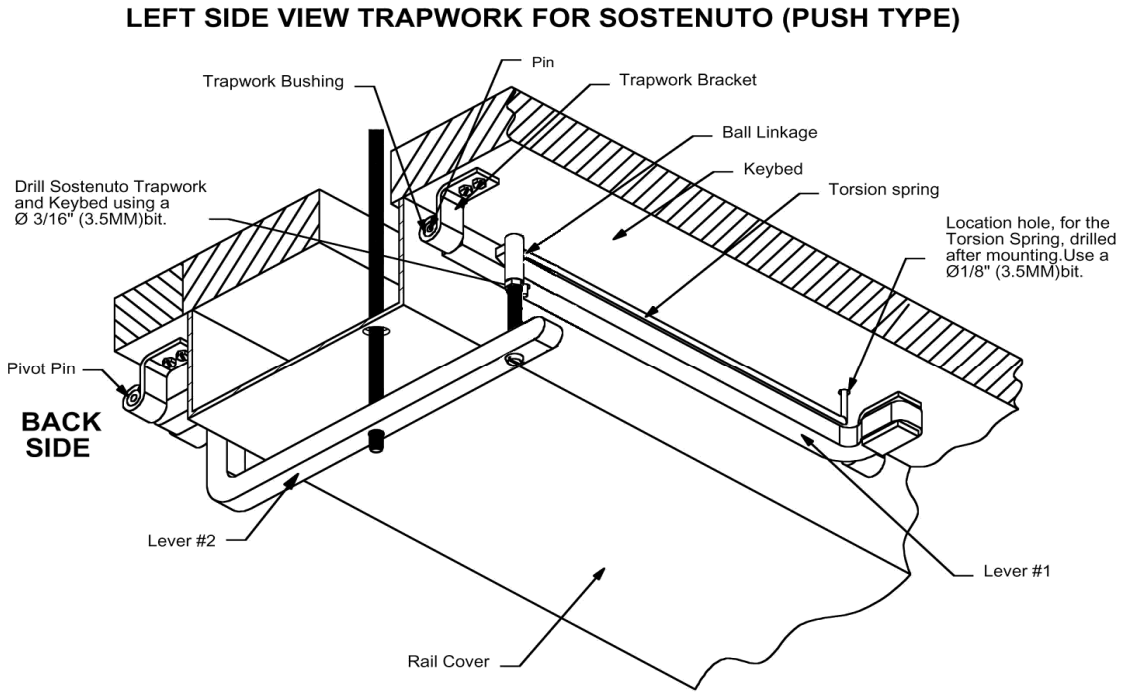


Figure 22

T. **Paint the trapwork levers.** In times past, the trap levers were not painted. But now they are powder coated black from the factory. It is not necessary to paint the trapwork except for felt pen on the end cuts.

Steinway Sostenuto

Because we cut a solenoid slot in the keybed, we lose the guide hole for the American Steinway sostenuto. This is not a problem, as we have a perfect solution.

A. The bass section on all American Steinway pianos have an even number of keys. By starting with a short stem solenoid for No. 1 key, you will end up with a long stem solenoid at the bass/ tenor break.

B. First, cut the black wire off of a “spare” top row solenoid. This solenoid will only be used as a guide hole to the “monkey”. (see Figure 25)

C. Place the solenoid on the bass solenoid rail after the last key soleniod. The solenoid will be in the break area under the sostenoto monkey. It will be used as a guide only. Position the guide solenoid directly under the sostenuto monkey.

D. Remove the stem from the solenoid plunger with a pair of pliers. Place plunger into the drill press vise and drill a 1/4” hole (6 mm) - 1/2” (13 mm) deep.

E. Place a rubber plunger tip onto the 8/32” threaded rod and insert into the newly drilled hole in the plunger. Notice, it acts like a ball and socket, giving some flexibility. (See Fig. 23)

F. Insert the threaded rod/plunger into top of guide solenoid. (See Fig. 23) with the plunger and you will notice the plunger bottom will be contacting the “monkey”. (See Figs. 23, 24, 25, 26)

G. Also for more surface contact area to the monkey, a 3/8” (9.5 mm) flat washer and felt can be glued to the plunger.

Place rubber tip on threaded rod. Drill ¼” (6 mm) ½” (13 mm) deep hole in plunger

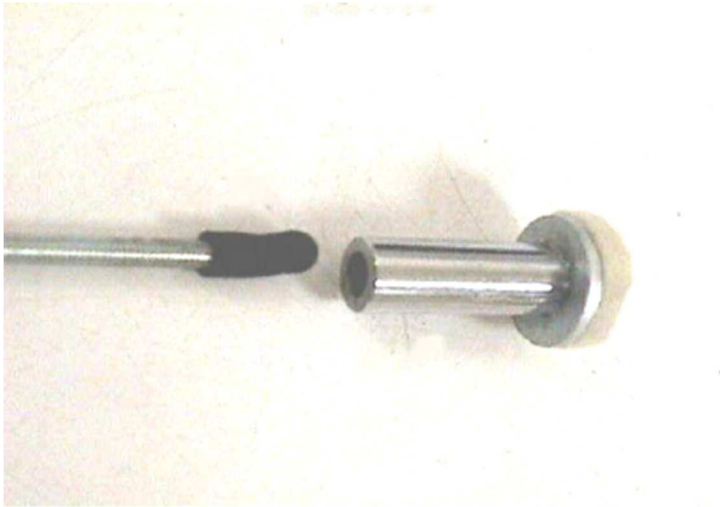


Figure 23

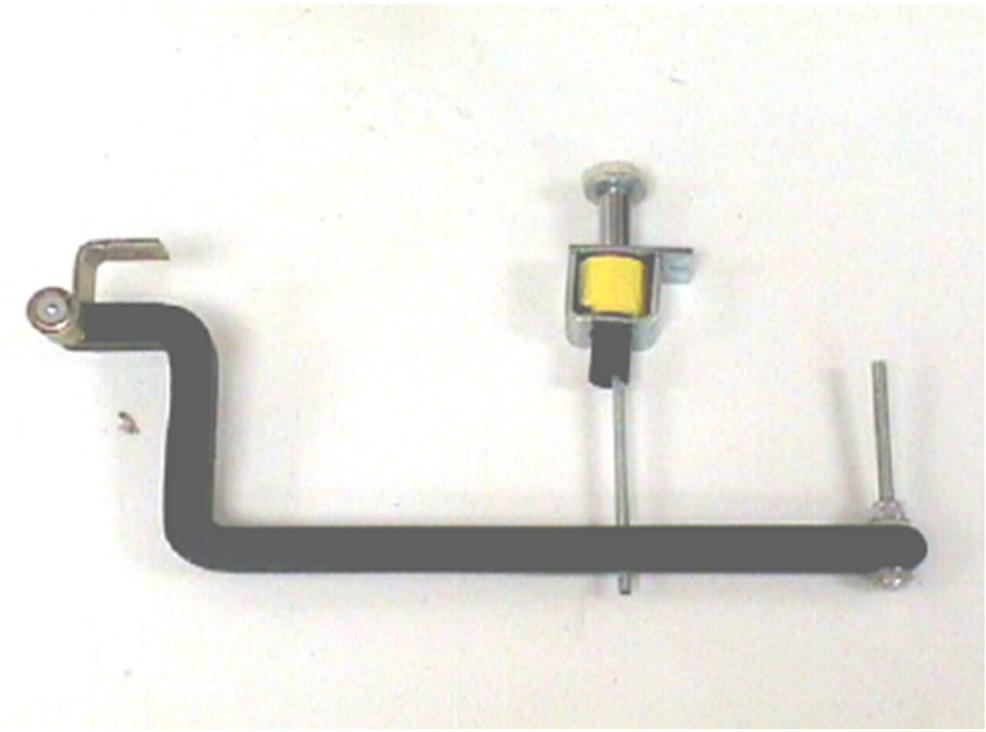


Figure 24—Solenoid is used as a guide for Steinway sostenuto

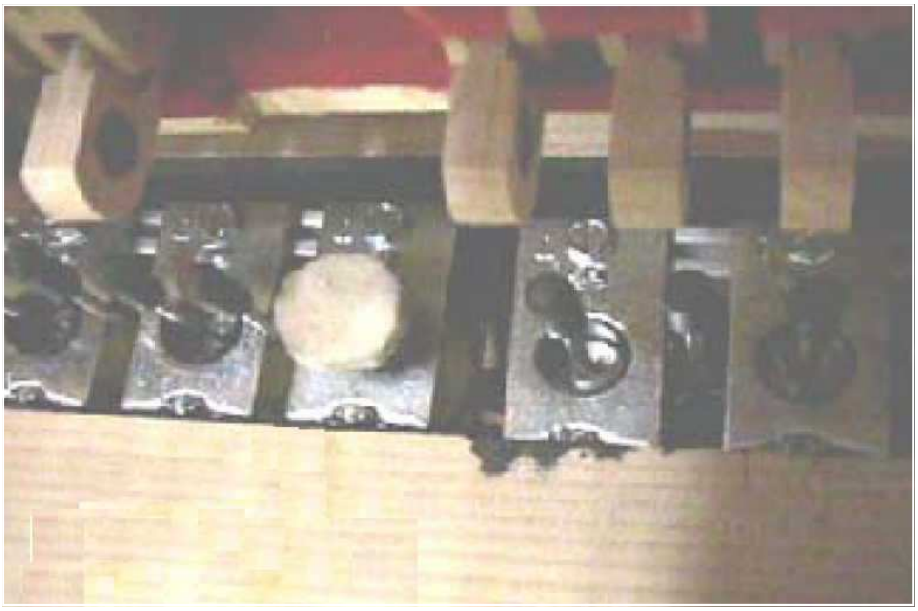


Figure 25—Steinway Sostenuto

Secure spring attachment on monkey with veneer glued to the sides.

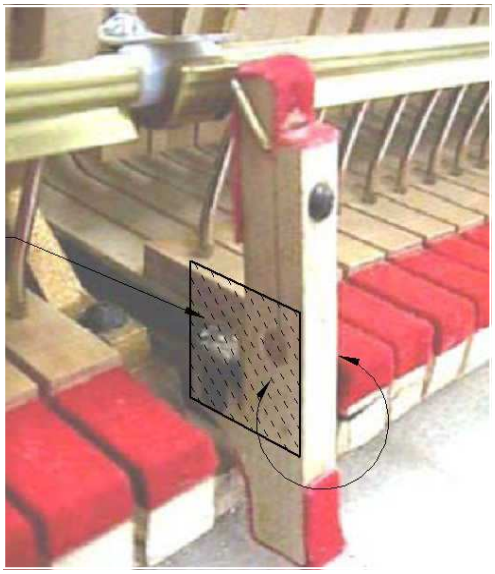


Figure 26

Step 22 Mounting the CPU in the piano

Note: CPU is mounted outside of the rail cover on the piano beam area.

A. Locate the CPU and mounting screws in the kit.

B. Find a convenient and accessible location to mount the CPU on a piano beam.

NOTE: It is important to keep the CPU close enough to the power supply for the connection of cables and ground strap. The CPU ground strap will connect to the power supply under the mounting flanges.

NOTE: Also place the CPU antenna away from metal objects for best reception.

C. Mount the CPU in the selected location, from Step 22-B, with the 4—3/4" (19mm) hexhead screws provided in the kit.

D. Wiring will be done later after all parts are installed.

Figure 27

Step 23 Prepare the rail cover

A. Mount the rail cover on the keybed in the location outlined.

B. Place the sustain and the sostenuto trapwork back on the piano. Next, place the lyre on the piano.

C. Looking through the drilled pitman holes of the 2 levers, place a mark on the rail cover. These two marks will be punched out to allow access for the threaded rod to pass through.

NOTE: You can also use a square on each side of the levers to transfer the exact image of the lever to the cover.

E. Mark the rail cover for the two-screw locations for securing the cover plate to the rail cover.

G. Remove the trapwork and rail cover.

H. Drill two 3/8" (9.5 mm) holes through the rail cover for the threaded rod and use a 1" (25mm) Greenlee hole punch to finish the hole cut. You need have a 1" (25mm) hole for the rubber grommet. (See fig. 28)

Figure 28—Greenlee hole punch

I. Install the two black rubber grommets into the 1" (25 mm) access holes.

J. **Drilling cover plate holes**. Use a size 47 (.078) or (2.0 mm) drill bit to drill the two holes for the cover plate to rail cover connections. This is important as it provides a ground connection. Clean off the metal burrs with a file.

Step 24 Building Solenoid Rails

A. Starting with the bass key solenoid section, clamp the bass rail to a work bench with the recessed side up elevated by a 2” x 2” (51 mm x 51 mm) block of wood.

Note: The key center marking on rail is facing toward you. (See Fig. 29)

B. Locate the bag of solenoid screws in the kit—6x32x3/8”(10mm). Place a screw at each line made earlier in step 2 (page 4). Just start the screw so a key soleniod can be placed there later. (See Fig. 29)

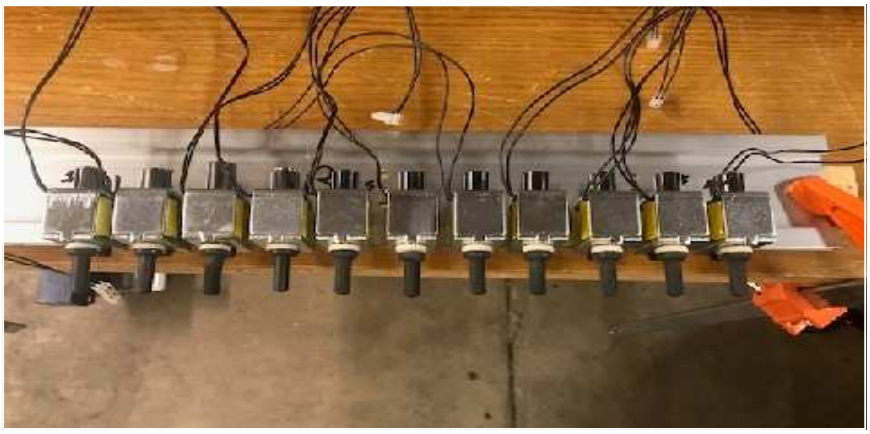
NOTE: When installing the screws, put some pressure on the screw and start slowly to establish the location to keep screw from traveling. Use a variable speed drill.

Figure 29

C. Place a short stem (black wire) solenoid on each screw and secure to the rail. (See fig. 30)

NOTE: Adjust the torque of the drill to keep from breaking screws. It is best to practice on an area of the rail not being used to find the correct torque setting.

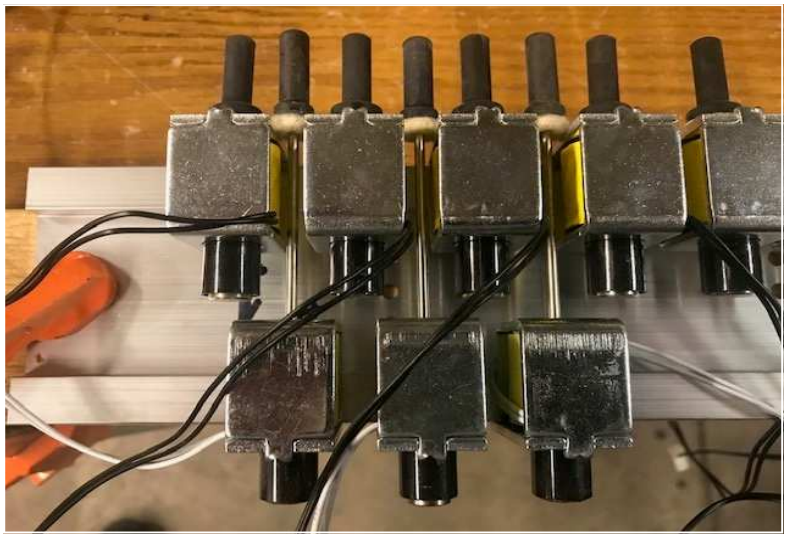
Figure 30



D. Remove the holding clamps from rail plate and rotate rail 180 degrees. Clamp the rail back to the bench.

E. Place a long stem key solenoid between the short stem solenoids and attach With screw. (See fig. 31)

Figure 31



NOTE: The long stem solenoid tip and felt rest on the top row of solenoids. (See Fig. 31)

F. Now repeat steps A thru E on the tenor and Treble rails.

NOTE: If there is an odd number of soleniod on a section and you end up with a short soleniod. For the next solenoid rail, start with a long stem solenoid. This will make plugging in the wire easy to remember, so the pattern will be black and white on the diver boards.

G. If the section ends with a long stem solenoid then install a support plate at the end of the rail, they are supplied in the kit. (See Fig. 32)

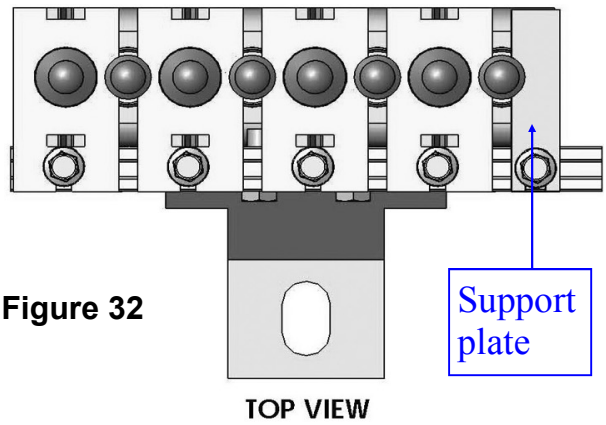


Figure 32

H. Twist the solenoid wires to help manage the wires as well as the ease of plugging them into the driver boards.

NOTE: When starting with a short stem solenoid, the wire lay nicely because they line up better than starting with a white wire solenoid. (See fig. 36)

NOTE: The wire twisting tool in fig. 35 can be made out of wire easily to place in a variable speed drill to twist the wires, but use **caution** not to pull too hard on the plug connection or over twist as the wires can come loose from the plug. If this happens, use a small straight screw driver to re-insert the wire.

I. Put a black and white wire connector in the wire hook and place you hand at the base of the wires (see fig. 33) and twist the wires together as much as seen in fig. 34.

Figure 33

Figure 34

Figure 35

Figure 36

J. Tape down plunger stems to solenoids with masking or clear tape to keep plunger from falling out. Cut the excess rail plate off with a band saw, file off any metal burrs and blow off with compressed air.

NOTE: It is best to draw a cut line and remove the end key solenoid before cutting to keep from damaging the solenoid or wires. (See fig. 37)

Figure 37

K. Attaching the bracket to the rail requires two #10x1/2" (13 mm) hex-headed screws per bracket, which are provided in the kit. Each rail bracket position has three sets of mounting holes. (Fig. 38) Depending on the thickness of the piano keybed, the middle set of holes should be sufficient for most applications. The top set of holes are for thin keybeds—1 1/2" (38 mm) or less. The bottom set of holes are for thick keybeds, 2" (51 mm) or thicker. (See Fig. 38)

NOTE: The bracket should be positioned so that the mounting screws are approxi mately in the middle of the bracket slot. (See Fig. 38A)

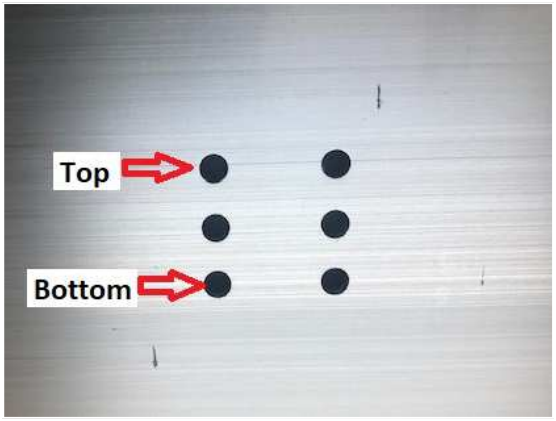


Figure 38

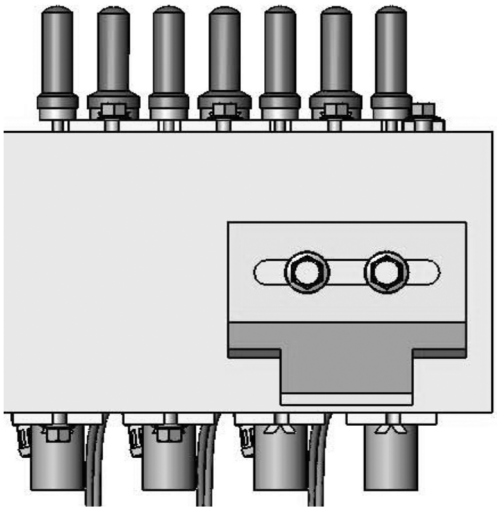


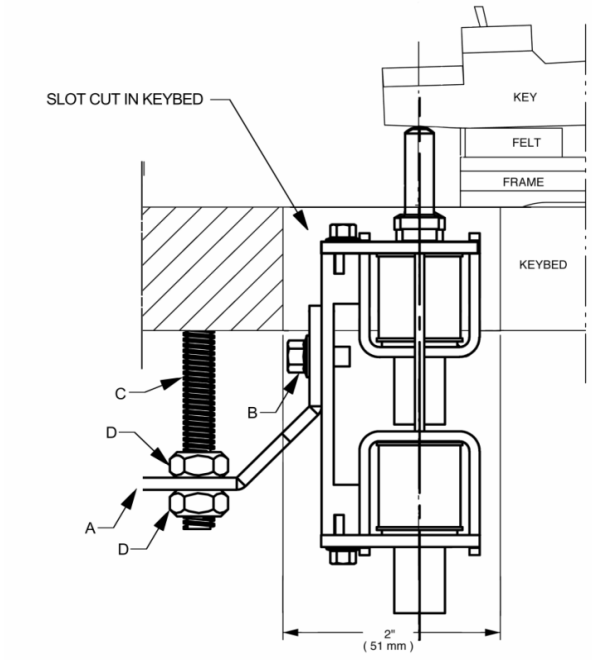
Figure 38A

Step 25 Install the solenoid rail

Locate and installing the hanger bolts

A. Place end keys of each section on the key frame. Put the key frame in the piano and put the action end blocks in place. To determine where to drill the holes in the keybed hold the completed section of a rail in the slot and align plunger tips with the end keys. With a pencil outline the bracket hole on the keybed. Repeat this procedure for the other 2 rails. (See Fig. 39)

B. Use a 4' (22cm) straight edge and draw a line 3/4" (19mm) away from the back edge of solenoid slot at each end of the slot. This will locate all 6 hanger bolts in a straight line 3/4" (19mm) from the solenoid slot. (See Fig. 40)



A - MOUNTING BRACKET
B - #10 X 1/2" HEX HEAD SELF-THREADING SCREW
C - HANGER BOLT
D - 5/16 - 18 JAM NUT

Figure 39

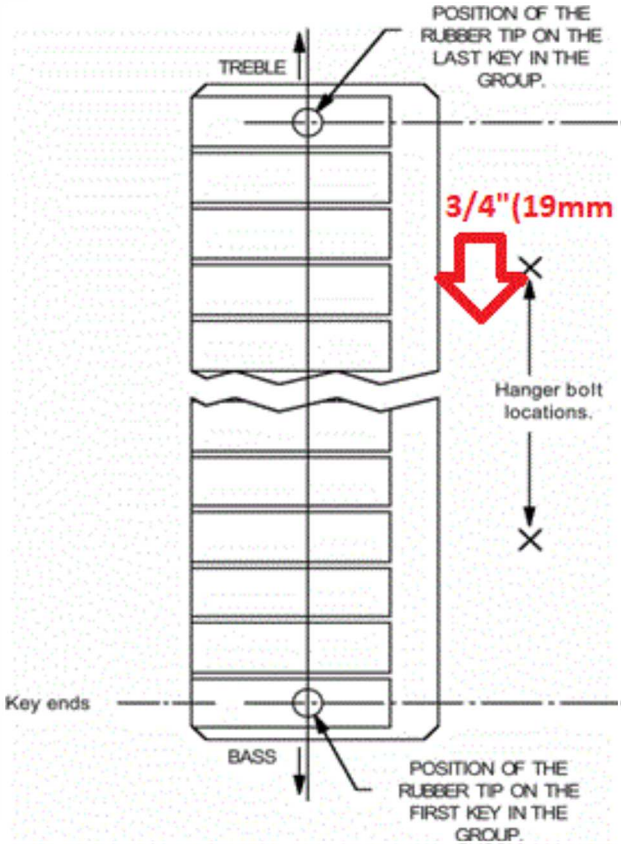


Figure 40

C. A 1/4" (6 mm) hole must be pre-drilled approximately 1" (25 mm) deep for the hanger bolt, and it must be drilled straight. This can be accomplished by using either a guide block or a drill guide.

D. To insert the hanger bolt, use a "stud installer", (Fig. 41) available from PianoDisc and install into the keybed. Another option is to put both nuts on the stud, tighten them against one another and screw the stud into the keybed. With the hanger bolts in position, remove one of the jam nuts from each stud.

E. Place the solenoid rail on the two studs, adjusting the nuts so that the rubber tips of the plungers barely touch the bottom of the keys at rest. Replace the remaining jam nuts to hold the rail in place.

F. Check to see if the plunger tip is centered on the keys, adjust side-to-side if necessary. If you need to adjust the bracket, place a reference line on the rail.

NOTE: This is the temporary position of the solenoid rail. Action regulation must be done before the final height adjustment of the solenoid rails.

Figure 41—Stud Installer

Step 26 Mounting & connecting key driver boards

NOTE: The 3 key driver boards are identical.

A. Connecting solenoids to key driver boards. There are 30 plug connections on each driver board with a total of 90 for 3 boards, so 2 positions will not be used on the last board. Attach the connector of solenoid #1 to the first key solenoid header pins (near the pedal connector) on the bass driver board. Continue moving to the right until all 88 connections have been completed. This means, that the last two sets of output pins on the treble board (at the right-most end) will remain empty.

NOTE: In the event of space limitations, where not all 88 solenoids were used within the piano, it will be necessary to omit the first two or three connections. Every two pins on the key driver board are used for one key solenoid connection.

So, if 2 solenoids were omitted at the bass end, leave 4 pins open and start with pins 5 and 6 for the first key soleniod. Failure to do this will automaticly transpose the piano.

B. **Mount all driver boards to the piano.** Three identical key driver board assemblies are to be mounted on the keybed behind the solenoids using #6 x 5/8 screws. (See Fig. 34A)

Note: Be sure to include the ESD ground strap under treble driver board to t tenor driver board. Another ground strap from tenor driver board to the bass driver board and another ground strap from the bass driver board to the ground post on cover plate.

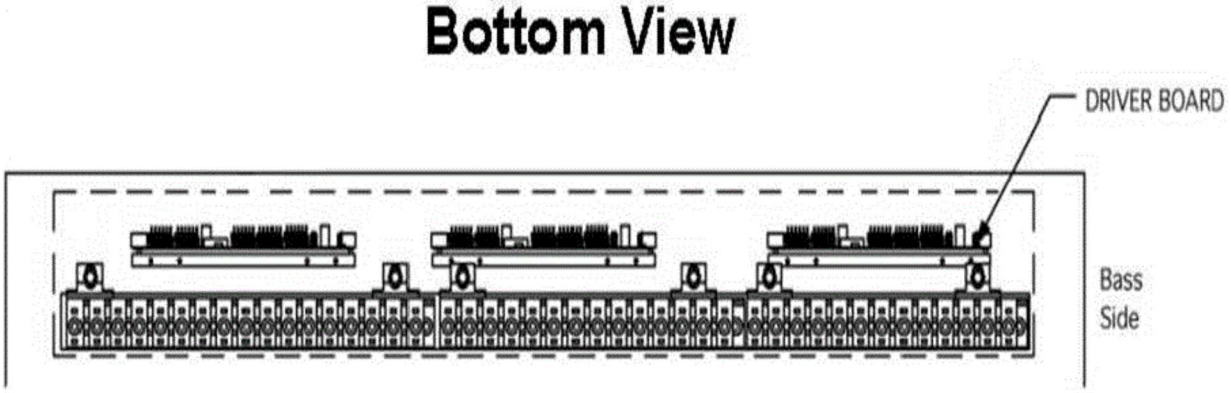


Figure 42—key bed

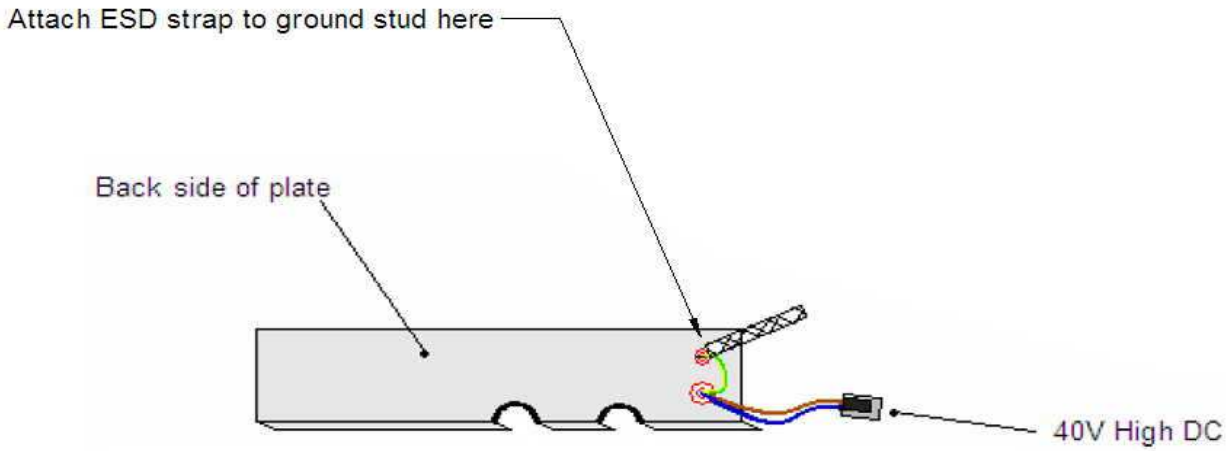


Figure 43—Cover

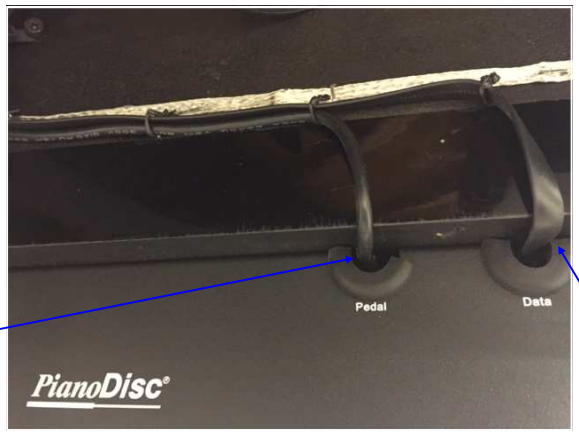
Step 27 Connect the power and data cables

A. **Connecting the driver harness cable:** The gray cable has a 3 pin plug and 3 equally spaced 4 pin plugs. Plug the 2-pin plug into the two pin cable attached to the cover plate. Starting at the bass, plug the remaining 3 plugs in each Key driver board.

B. **Connecting the driver data (phone) cable:** Two gray 8" (204 mm) data cables are supplied in the kit. Plug the first data cable from treble to the tenor board and then the second data cable from the tenor board to the bass board. Locate the 48" black data cable. Plug one end into the CPU and route neatly to the cover plate; then run the cable thru one of the moon holes on the cover plate and plug into the bass driver board. (See Fig. 42)

C. **Connect the pedal cable:** Route the pedal cable neatly to the cover plate. then route the cable thru the moon hole and plug into the bass driver board. (see fig. 42)

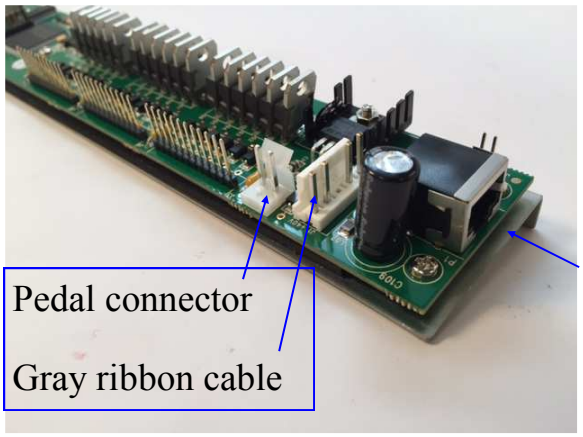
Figure 44



Pedal cable into cover plate

Data Cable

Figure 44A



Pedal connector

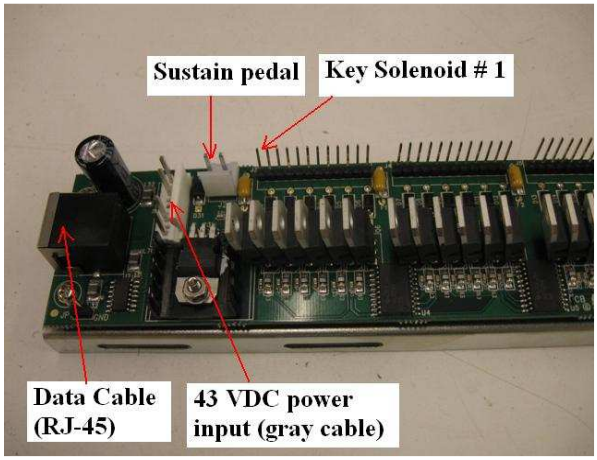
Gray ribbon cable

RJ-45 Data cable from CPU connection.

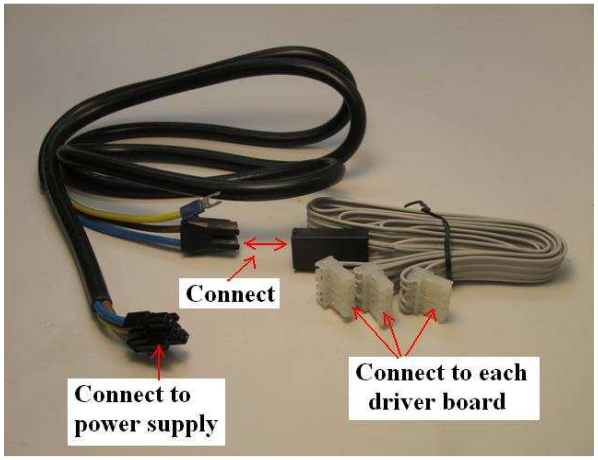
Prodigy CPU front view

Prodigy CPU Right Side

Prodigy CPU Left Side



Driver Board Connections



40 VDC Cables

Step 28 Mount the power supply

The power supply should be mounted in such a position that its cables will be of sufficient length to reach the driver CPU board. Test different positions of the power supply (with cables attached) to determine which position will produce the best results. (See fig. 45 below) Mount the power supply using the mounting hardware provided. Prior to securing the power supply, attach the ESD ground strap to the exposed under side of power supply. The other end of the ground strap should be attached to the other ground strap that connects from the bass driver board/cover plate. This connection will be inside the rail cover. Use an extra solenoid screw to attach the ESD strap to the other ESD strap.

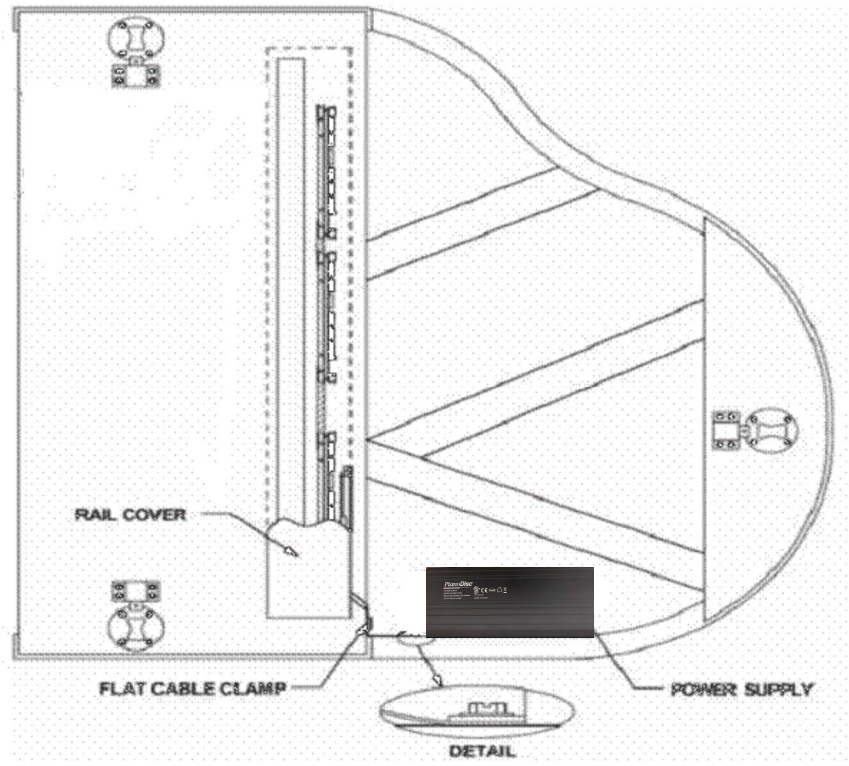


Figure 45

Add black shrink wrap to grd. strap

Step 29 Lyre support rods

If the lyre support rods do not clear the rail cover, select the correct thickness of wood to elevate the rod enough to clear the rail cover. Three inch square blocks of plywood, of proper thickness, will work well. Paint the blocks to match the bottom of the piano and secure with wood glue and screws. Discarded keybed material may also work.

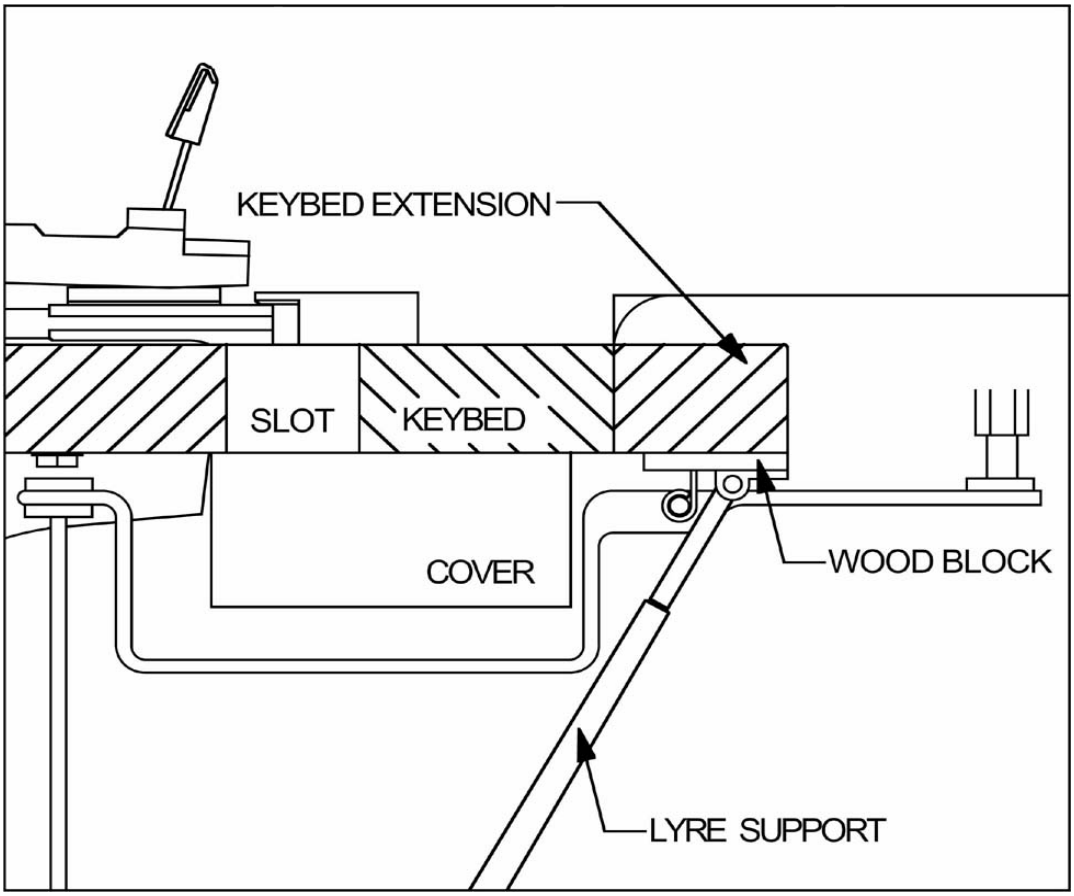


Figure 46

Step 30 Set the piano on its legs

At this point, the piano legs should be re-attached and the piano should be moved to the horizontal (upright) position.

Step 31 Checking key height

The key height was previously measured and recorded. This measurement must now be taken again and a careful comparison made between the two measurements. If there is a difference, insert cardboard shims, 1/2" (13 mm) wide, under the key rest felt to bring the key height back to its original measurement. Occasionally, cutting of the key rest felt is what causes the front of the keys to be higher. The only correct remedy is to add cardboard shims to the bottom of the key rest felt.

Step 32 Action regulation procedure

The PianoDisc system will perform optimally when the piano action is operating at the manufacturer's specifications. The following items represent a typical regulation checklist.

Adjust the following:

1. Bed keyframe.
2. Align hammers to strings.
3. Align whippens to hammer knuckles.
4. Align and square back checks to hammer tails
5. Lubricate action.
6. Adjust whippen spring tension. (Repetition spring)
7. Align and position jacks.
8. Repetition lever height (winking jacks).
9. Hammer blow distance.
10. Let off.
11. Drop height.
12. After touch.
13. Back Check (checking).

If all adjustments are set correctly, after touch has a movement of approximately .040" (1mm) after drop.

Step 33 Action installation

NOTE: The current springless design key solenoid was released in Jan. 2005. Proir to 2005 the key solenoid was spring loaded which requires the keys to be depressed, or the action to be lifted as the action is moved into position. This is necessary to ensure that the action clears the rubber tips of the plungers, thereby preventing damage to the plunger stems.

It is also necessary to depress the sustain pedal to allow the key tails to clear the underlever assembly. The key slip can be used to depress the keys.

Step 34 Key solenoid rail adjustment

NOTE: Before raising the solenoid rails to their final position, check the hammer line and make any necessary adjustments.

A. **The proper height of the rails is achieved when the rail is as high as possible without lifting the hammers.** The total travel of the solenoid is .460 (12 mm) and most grand piano keys travel about 3/8" to 7/16" (9.5 to11.5 mm). The proper rail adjustment is essential in order for the piano to play correctly. Adjust the rail height by moving the 5/16" nuts on the hanger studs.

B. Make a final check of the alignment of the plunger tips relative to the keys. If the rail needs to be moved in order to center the plungers to the keys, remove the solenoid rail, loosen the brackets and make the adjustment. (See Fig. 38 – 39)

NOTE: To check the key to plunger tip alignment from the top, side the action out 1" and look thru the strings to observe the alignment.

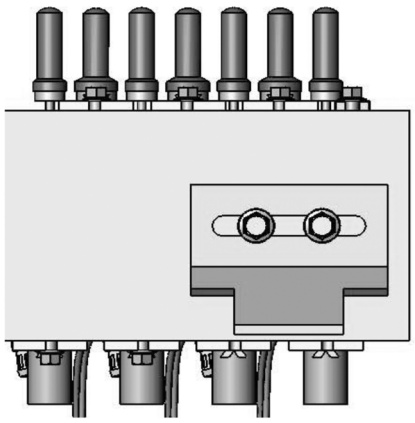


Figure 47

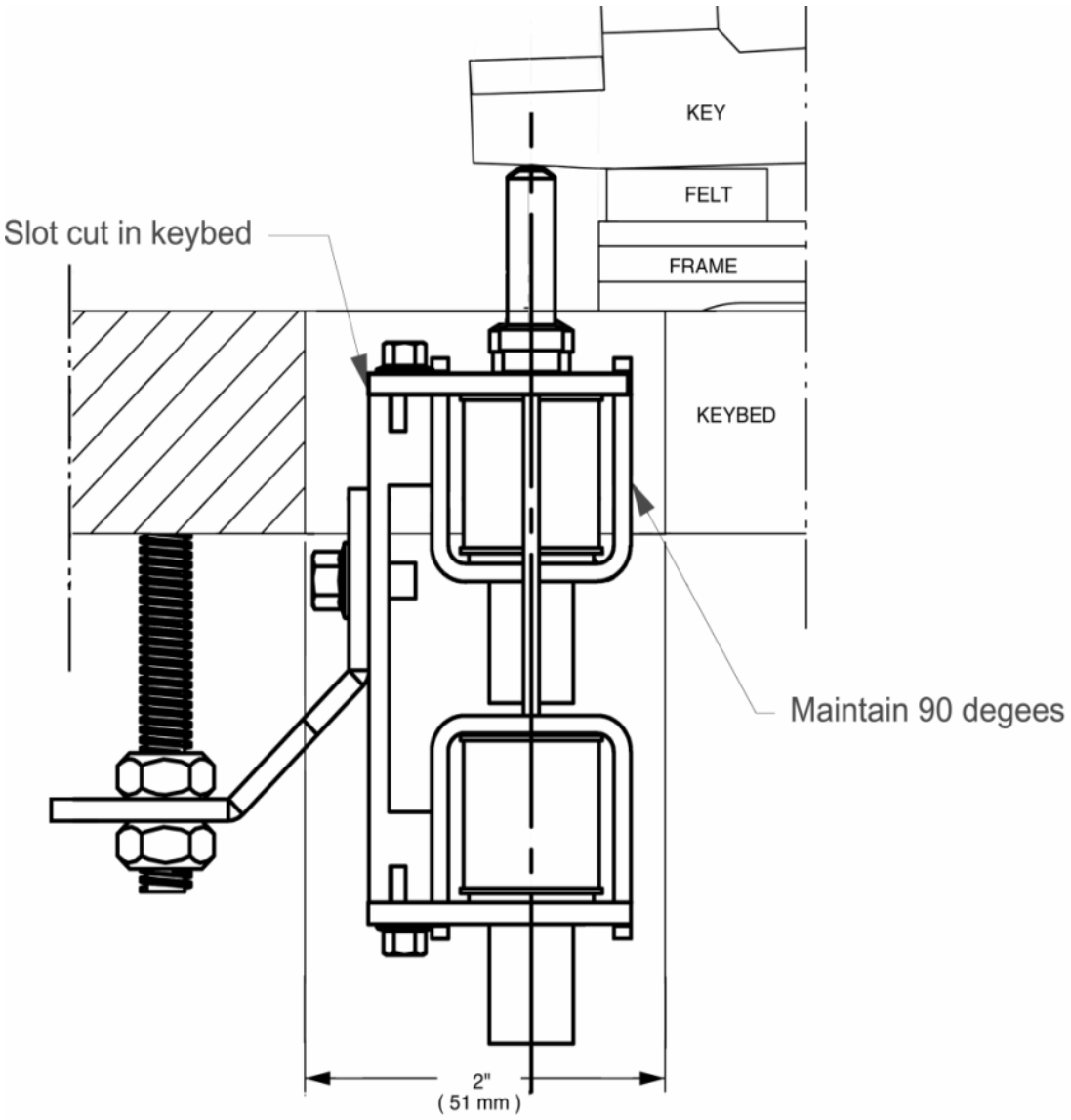


Figure 48

A. Look across the bottom of all three solenoid rails for a quick check to see the level of accuracy of the height adjustment. All three rails should line up straight.

Step 35 System start up

A. Check all cable connections.

B. Plug the system into a power outlet.

C. Turn on the power strip.

D. The soft light and sustain light on the driver CPU will flash.

E.. Press test button located on the C.P.U. interface. (See Fig. 49) This will start the playing of the solenoids from the Bass to the Treble end. If the solenoids fail to play, disconnect the power and check all cable connections.

F. The reset button is used for restarting the program for driver board operation. This button is a soft reset.

Figure 49

Step 36 Sustain pedal Trapwork set-up and solenoid Adjustment

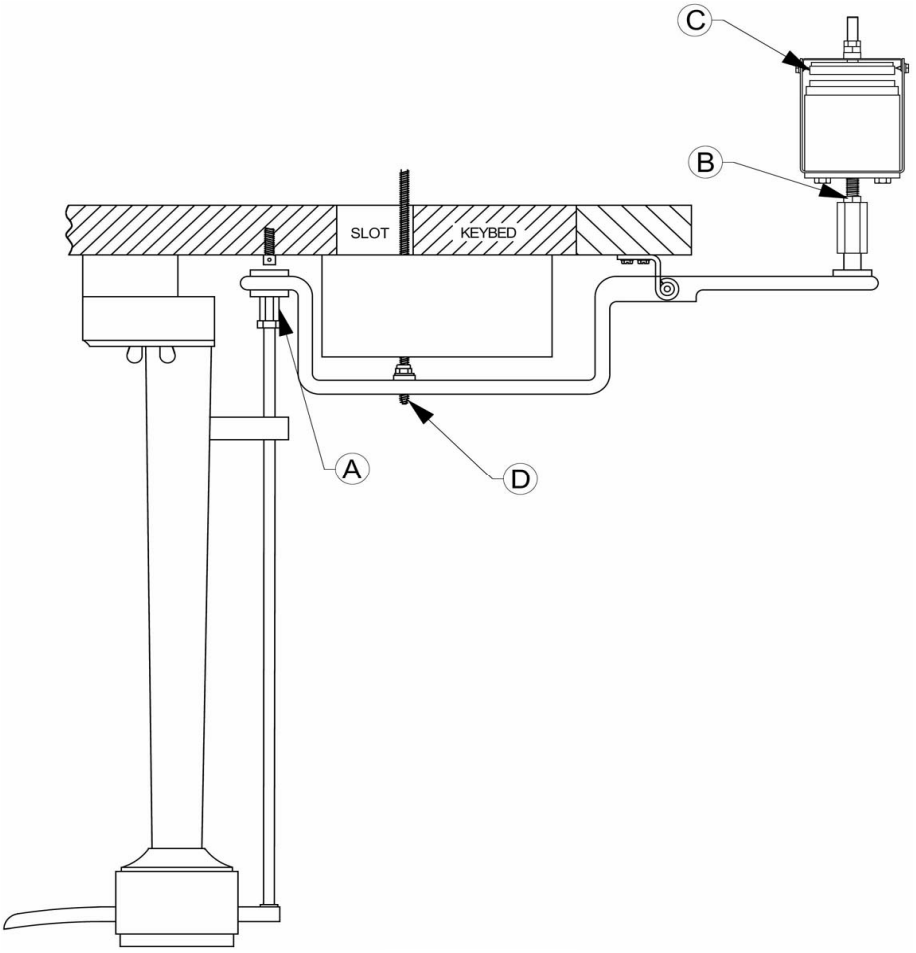


Figure 50

NOTE: Adjust the stroke of the pedal solenoid to give a damper lift of 1/8” (3mm) off the strings. Occasionally, as a result of either a poor regulation or worn parts, the solenoid stroke must be adjusted to a longer distance than is desirable. Keep in mind, however, that the longer the stroke, the more heat will develop, and this will shorten the life of the solenoid. The wedge shaped dampers should be just clear the strings. The least amount of travel for sustain to occur is the proper setting.

A. Adjustment begins wih the pedal solenoid operation. (See Fig. 50, previous page)

1. Loosen (C) pedal solenoid stop pad and adjust it upward by turning it clockwise. (looking up from the bottom)

2. Loosen (B) pedal solenoid lock nut and adjust it upward by turning it clockwise. (looking up from the bottom)

3. Adjust (A) manual sustain pedal rod for minimal free play between damper tray and bottom of damper lever. Adjustments may also be done at the pitman arm (D) or sustain threaded rod.

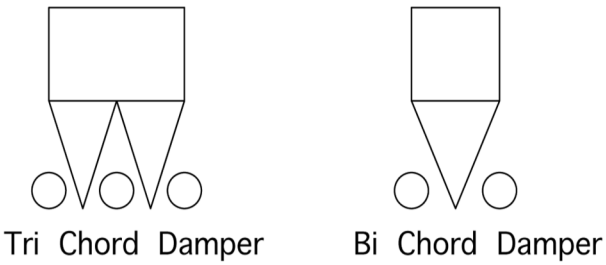


Figure 51

B. Sustain pedal solenoid adjustment:

1. Go the the PD calibration app, it is a free download from the Apple Store.
2. Once in the PD calibration app, go to “SilentDrive” and select “Pedal Solenoid Strike Force” and press the “test”.
2. Observe the wedge damper lift, the dampers should just clear the strings. Adjust the lift by turning the long ¾” (19 mm) nut. Looking from the bottom, counter clockwise is more lift and clockwise is less. After the adjustment is complete, Tighten the ½” (13 mm) jam nut. (B Previous page)

3. Adjust the loss motion in the pedal solenoid, by rotating the large steel washer. (C) There should be only 1/16” (2 mm) of loss motion between the damper tray and the sustain lever. After adjustment is complete, tighten the ½” jam nut on top.

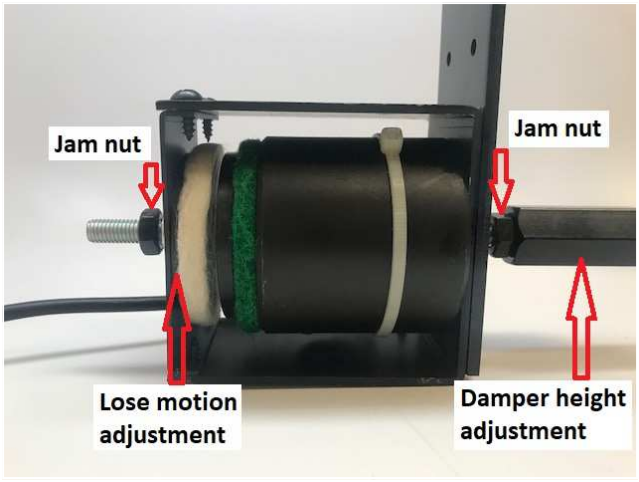


Figure 52

Step 37 Final check list

A. Make sure to do the complete calibration with the PianoDisc Calibration app. Verify that all solenoids, keys, and pedals are functioning properly. It is very important that all calibrate is performed for the piano to function properly

B. Neatly secure all cables and cords to the beams with the proper fasteners.

C. Check the components to ensure that they are securely installed:

Power supply	Driver boards
Solenoid rails	Pedal solenoid (ensure that jam nuts are tight)

D. Check that all of the hammers are in the rest position.

E. Operate the system for at least 8 hours continuously. Recheck the piano and the PianoDisc system for proper operation.

NOTE: Never do calibration with a hot system, if the PianoDisc system has been playing for some time, allow 2 hours to cool down before any setup.

Appendix A - Keybed removal

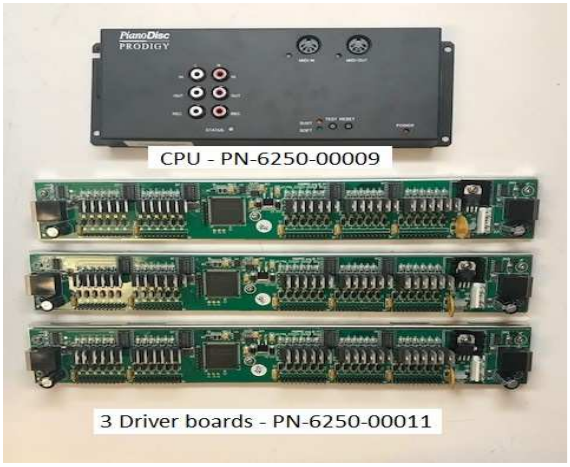
Grand pianos with removable keybeds in production today

Boston
Estonia
Fazioli
Kawai
Petrof
Pearl River
Mason & Hamlin
Samick
Yamaha
Young Chang

Grand Pianos with non-removable keybeds in production today

Steinway and Sons
Sauter
Forster
Schimmel
Steingraeber
Blunthner
Walter
Playel

PianoDisc Standard Parts ID



Key Driver Set

Multi Plug Strip

Driver Cables Grand

Driver Mounting Baggie, Grand

Key Solenoid Screw Bag

Key Solenoids

PianoDisc Standard Parts ID

User Pack PN: 8500-00006

iQ Accy. Baggie

Keybed Guide pins

Power Supply, 10 VDC

PianoDisc Standard Parts ID (cont.)

Rail Cover

Solenoid Rails

Rail Cover Bag-

HD Cover Plate

Trapwork Hardware Bag-

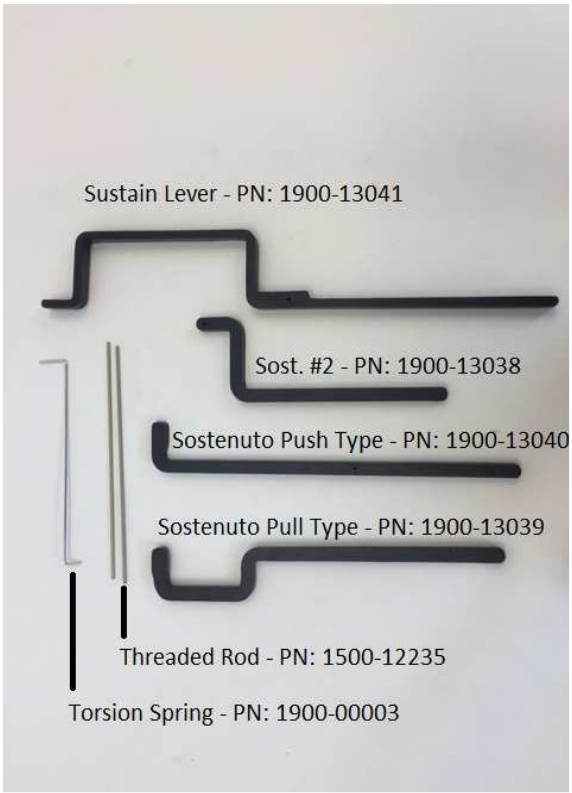
End Support Plate

PianoDisc Standard Parts ID (cont.)

Wiring Hardware Baggie

Pedal solenoid Extension Cable

Solenoid Rail Mounting Baggie



Pedal Trapwork

PianoDisc Standard Parts ID

Power Supply/Pedsol Hardware Baggie

Pedal Solenoid PN: 8000-00002-01

Power Strip Mounting Bag