

Models: P-100/101

*Pianocorder*TM

Reproducing System

GRAND PIANO INSTALLATION MANUAL

SUPERSCOPE

ONLY FOR USE BY
TRAINED AND QUALIFIED TECHNICIANS

marantz®



TABLE OF CONTENTS

FOREWORD -----	1
PREPARATION -----	1
ACTION PREPARATION -----	2
SOLENOID CENTER LINE PROCEDURES -----	3, 4
PREPARATIONS FOR CUTTING SLOTS -----	5
SOLENOID RAIL ALIGNMENT -----	6, 7
SOLENOID RAIL MOUNTING BRACKETS -----	8, 9
TRAP LEVERS -----	10
LYRE MOUNTING -----	10
SUSTAIN LEVER MANUAL -----	11
SOSTENUTO OR BASS SUSTAIN -----	11
SUSTAIN LEVER FIGURES -----	12, 13
SOFT SHIFT PEDAL MANUAL -----	14
ELECTRONIC PEDAL OPERATION (SUSTAIN) -----	15
ELECTRONIC SUSTAIN FIGURE -----	16
ELECTRONIC PEDAL OPERATION (SOFT) -----	17, 18, 20
ELECTRONIC SOFT FIGURE -----	19, 21
KEY SWITCH INSTALLATION -----	22
KEY SWITCH MOUNTING PROCEDURES -----	23
KEY SWITCH MOUNTING FIGURES -----	24, 26
ADJUSTMENT OF KEY SWITCHES (USING SOUND GENERATOR) ---	25, 27
PIANOCORDER TEST BUZZER -----	25A
INSTALLATION OF SOLENOID RAIL -----	28
PROBLEMS WITH KEY SWITCHES AND SOLUTIONS -----	28A
MOUNTING OF ELECTRONIC COMPONENTS -----	29, 31
COMPONENT MOUNTING FIGURE -----	30

TABLE OF CONTENTS

WIRING OF PIANOCORDER SYSTEM -----	32
APPLYING AND TESTING POWER -----	32, 33
SOLENOID RAIL HEIGHT ADJUSTMENT -----	33
PLUNGER SPRING CLIP ADJUSTMENTS -----	34
KEY SOLENOID ADJUSTMENTS -----	34
PERMANENTLY INSTALLING THE SOLENOID RAIL -----	35
PLAYBACK BOARD ADJUSTMENTS -----	36, 37
PEDAL SOLENOID OPERATION (SERVICE BULLETIN) -----	37A - 37F
RECORD SYSTEM PROCEDURES -----	37, 38, 39
ALL UNITS PLAYBACK SYSTEM (SERVICE BULLETIN) -----	38A
PEDAL RECORD SWITCH -----	39, 40
ADJUSTMENT OF KEY SWITCHES (WITH TEST METER) -----	41
FINE ADJUSTMENT OF KEY SWITCHES (TEST METER) -----	42
BUILDING CABINET (BOX) -----	43
CABINET (BOX) FIGURE -----	44

GRAND PIANO INSTALLATION

Installation of a PIANOCORDER REPRODUCING SYSTEM into a grand piano consists of major alterations to the piano trap work and keybed. It is necessary that the technician have a firm knowledge of grand piano regulation practices before attempting a grand installation.

As always, the P-100 system can only perform as well as the piano it is installed in. The instrument should be in perfect regulation, the action should be sturdy and sound. If there are any questions about the stability of the action and the piano, it should be thoroughly inspected by a qualified technician before any work to install the system is done.

Keybeds should also be examined. The keybed should be solid and straight. Any sagging or warped keybeds will hinder the performance of the system; it will be impossible to align the system properly given this condition.

The piano should be in perfect condition and able to withstand many years of use. With a PIANOCORDER SYSTEM installed in a piano it will be played much more than usual.

PREPARATION FOR INSTALLATION

PART ONE

Remove the keycover, cheek blocks, keyslip and the action from the piano. At this time remove the original trap levers from the bottom of the keybed. The reason for this is that these levers run directly across the solenoid center line (SCL) - the line where the slot will be cut. On most larger grands the soft shift lever can be left on; it should not be in the way. On smaller grands the soft shift lever may or may not interfere, at this point the lever can be left on the piano.

Place the action on the work bench. Get the wooden stick from the kit and place it along the very end of the keys. (Under the back catches). Starting with key #5, mark the stick in the center of each key all the way to key #84. This will later be used to align solenoids on the solenoid rail. Label key #5 with a "5" and key #84 with an "84" so you don't reverse the stick later when aligning the solenoids.

ACTION PREPARATION

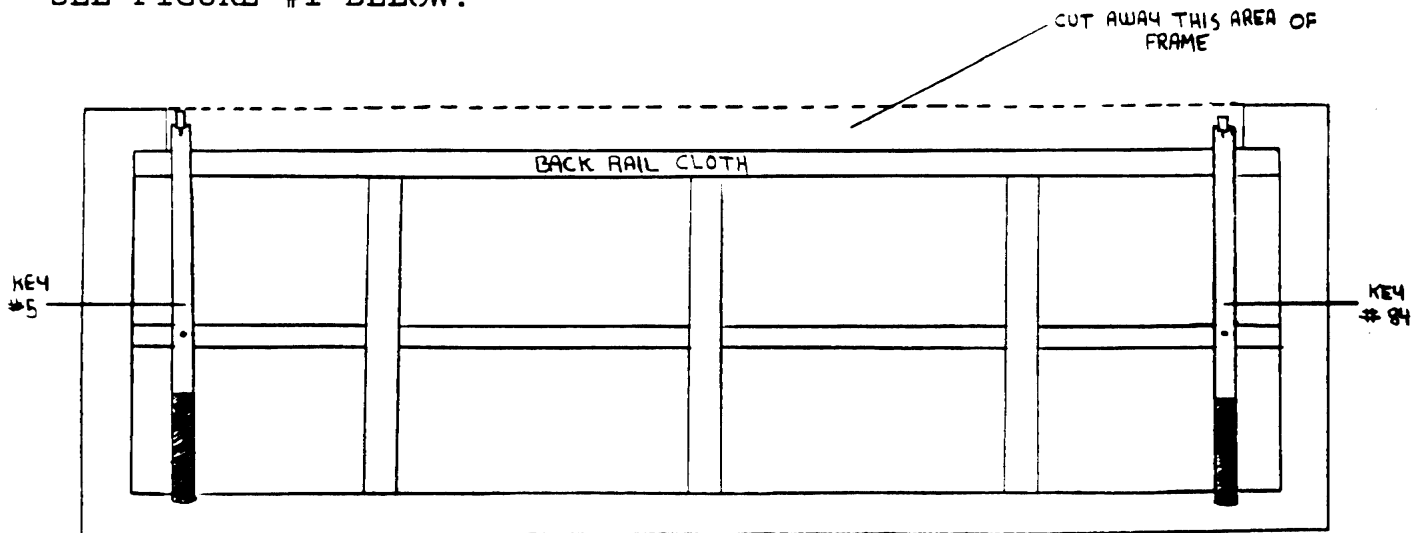
PART TWO

Remove the action and all the keys from the frame. Be sure not to knock off any punchings.

The key solenoid plunger will strike the keys directly under the ends of the keys, usually near the back catch. For the plunger to do this, a section of the action frame must be cut away.

Install keys #5 and #84; these are the first and last keys the system operates. The system plays 80 notes. From the end of the key measure in $\frac{3}{4}$ of an inch and mark the key frame. On the left side of key #5 with a pencil draw a line even with the left side of the key up to the $\frac{3}{4}$ inch mark on the frame. On the right side of key 84 do the same thing. Remove the two keys and with a long straight edge draw a line connecting the two $\frac{3}{4}$ inch marks. This is the area that will be cut away and exposed for the plunger to come up through the keybed and strike the back of the keys.

SEE FIGURE #1 BELOW:



There is no reason to cut under keys #1-4 or under keys #85-88. These keys are not operated by the system.

Before cutting lay a wide piece of masking tape over the balance rail and front rail punchings. This will stop punchings from vibrating off while sawing the action frame. With a jigsaw cut away the section of the action frame marked. Vacuum away any sawdust, being careful not to vacuum up any punchings.

PROCEDURES FOR FINDING SOLENOID CENTER LINE

PART THREE

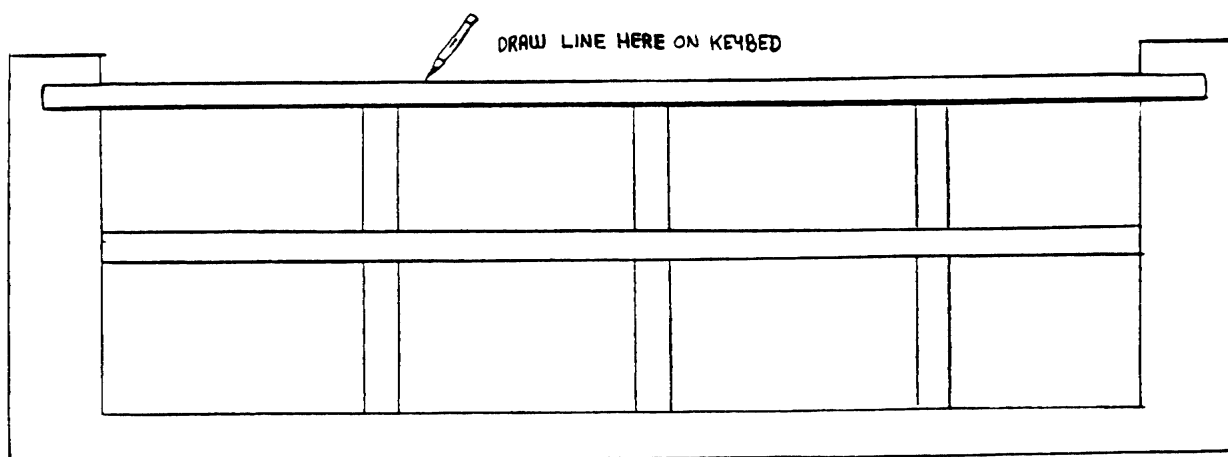
Action stops which are usually screwed and glued on the inside of the keybed should be removed. Remove any screws and, with a chisel, lightly tap under the stop block and pry up.

PROCEDURES FOR FINDING SCL LINE

PART THREE

With a sharp pencil reach into the piano and mark a line along the edge of the action frame onto the keybed.

SEE FIGURE #2:



This line is the front edge of the slot that will be cut. Also mark on the keybed the breaks in the action frame. (Areas between hammer sections) See figure above. There is no reason to cut the slot through this section being that no plunger will be coming through. It also leaves added strength to the keybed. Instead of cutting one long slot there should be four individual slots. It should be pointed out that in some cases it will be necessary to cut one long slot - though the former method is preferred.

With a tape measure, measure from the front edge of the keybed to the line drawn earlier on the inside of the keybed. Do this in several places across the keybed to make sure the depth is even from front to back.

Now on the under side of the keybed measure from the bottom front edge the same distance as measured on the top and mark the keybed. Do this in several areas from bass to

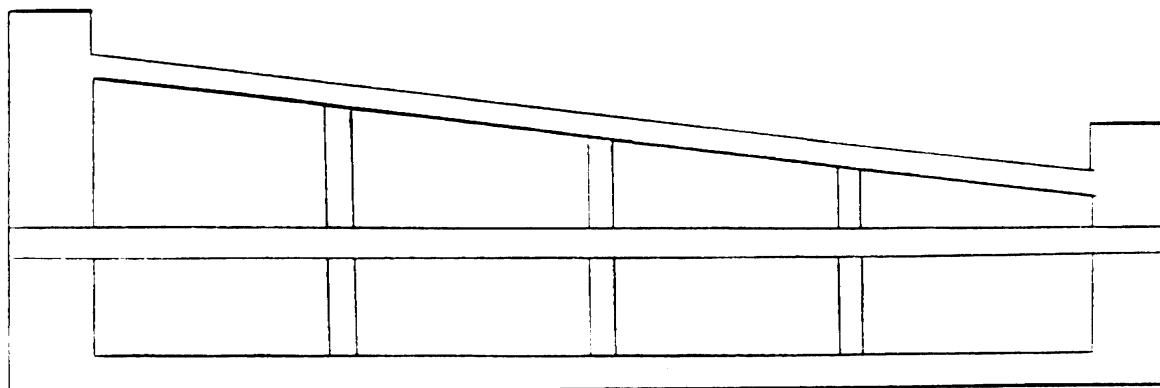
Treble. With a straight edge connect the marks to form a line. This will give you a line directly under the line that is drawn on the upper side of the keybed. Remember this is the front edge of the slot to be cut and not the center line. A 3/4" slot is used on grand pianos. From the line on the underside of the keybed measure back 3/4" and mark the keybed. Again do this in several areas and connect marks with a line. Find the center of the two lines and draw a third line. This is the SCL line.

PROCEDURES FOR FINDING THE SOLENOID

CENTER LINE PART THREE

At this time it should be noted that several piano manufacturers' actions are designed on a slant. The treble keys are shorter than the bass and the distance from the front of key #1 to the hammer is much greater than that same distance on key #88. This situation should not cause any problems but transferring the SCL line is difficult because the key lengths are different. A measurement from the front of the keybed to the action frame line should be taken about every six inches across the keybed and recorded to insure that when transferring from top to bottom the bottom line will fall directly under the upper line. Again remember this is not the SCL line but the front line of the slot. Transferring of the line can be done using the same method.

SEE FIGURE #3 BELOW:



The next step is transferring the break lines. These are the areas between the hammer sections. Place a long straight edge along the break line marked earlier and let it extend out the front of the piano. On the front lip of the keybed, place a square up against the straight edge. This will ensure that the straight edge is squared. Mark the key-

bed. This mark is then to be transferred to the underside of the keybed by using the square again. Using the same method as used on top, intersect the SCL line this time using the mark on the front part of the keybed bottom. If holes from original trap work dowels fall directly in between breaks, it will have to be a continuous slot. If not procede by marking the three breaks. Also mark the lines that fall on the left side of key #5 and the right side of key #88. This will be the end of the slot.

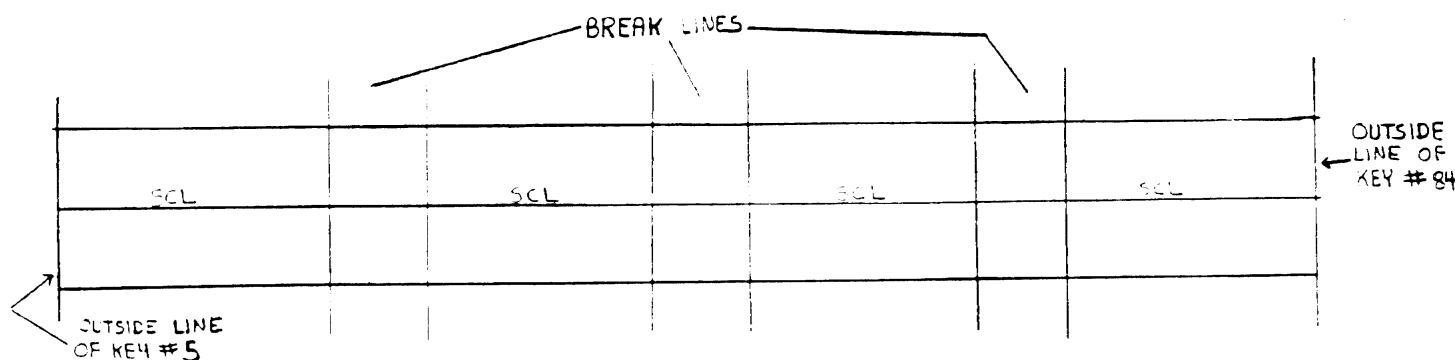
Another method of finding break areas is by using the alignment stick. Place the stick along the SCL line on the underside of the keybed. CAUTION: make sure keymarks #84 & #5 are under their proper keys. The blank areas on the alignment stick represent the break areas. Mark these spots on the keybed and be sure to leave enough room under the two keys on the outside of the break areas so the slot will extend under them.

PREPARATION FOR CUTTING SLOTS

PART FOUR

The next steps can be done with the piano tilted up on its side. If that's not possible, drilling and cutting can be done from under the piano with someone holding a vacuum near the tool being used. Wear Safety Goggles.

CAUTION: At this point there should be three lines across the width of the piano with eight lines intersecting the SCL line.



As mentioned earlier if dowel holes are in between breaks disregard break lines in that area.

Remove the action frame from the piano. Insert a 3/4" drill bit into your drill. The holes will be drilled at

the intersecting lines across the SCL line. Remember the center of the three lines going the width of the piano is the SCL line. Drill through the keybed keeping the drill as straight as possible. After drilling, vacuum and check that the hole on the top of the keybed comes through at the right point. After drilling at all intersecting points, drill another hole in the center of each slot section. This is done so that a jigsaw can start cutting in the center and go in both directions.

Before cutting it's a good idea to double check the holes drilled by installing the action frame back into the piano. By looking through the holes, the back of the action frame should just meet the edge of the hole drilled.

A standard jigsaw with a coarse blade can be used for cutting. Keybeds vary in thicknesses and in woods and cutting through any solid keybed is not easy. When cutting let the saw do the work and take your time. Applying too much pressure to the saw will cause the blade to bend; this will give the slot a "V" shape. If this happens you will have to spend more time rasping the walls of the slot to make them even. If the slot is to be cut while the piano is on its legs, make sure someone is there to assist you by holding a vacuum nozzle close to the blade while the cutting is being done. CAUTION: Make absolutely sure that when cutting, safety goggles are worn.

After cutting, vacuum out keybed and the slot or slots. Inspect to see that the walls of the slot are even and straight. If not use a wood rasp and file as needed. Slots should be straight and as clean as possible. Vacuum again.

SOLENOID RAIL ALIGNMENT

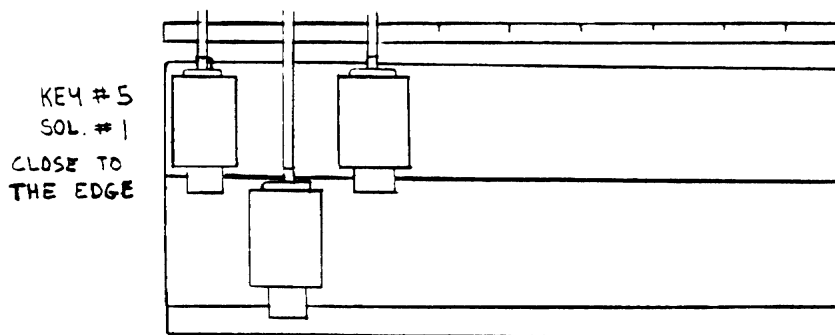
PART FIVE

Place solenoid rail on work bench with plungers facing up away from you. First check for loose spring clips. This is done by applying a moderate amount of pressure on each plunger. If you find the plunger slipping down and the clip not holding, the clip will have to be replaced or taken off and tightened. Do this by removing the plunger from the solenoid, pulling the plastic tip off, being careful not to knock off the felt. With a pliers squeeze the clip and slip it up off the shaft. Crimp the round sides of the clip together slightly. This will cause the clip to grip the plunger shaft tighter. Replace the clip on the plunger shaft and replace the plastic tip with its felt. If this still doesn't cure the problem the clip will

have to be replaced. Reinstall the plunger back into the solenoid; the amount of slug hanging should be uniform with neighboring slugs. This will be a temporary adjustment. Check all 80 solenoids and repair clips if needed. Check for bent plungers. This is done by spinning the lower part of the slug. If the plunger is extremely bent replace with new one from your maintenance kit.

Next place the solenoid alignment stick under plungers flush up against the top of the solenoid rail. Be absolutely sure that key #5 is to the left and key #84 is to the right. The ruler does not have to be centered on the rail, key #5 should start as close to the left edge of the rail as possible. By doing this, it will give clearance between the legs of the piano.

SEE FIGURE #5 BELOW:



SOLENOID RAIL ALIGNMENT

PART FIVE

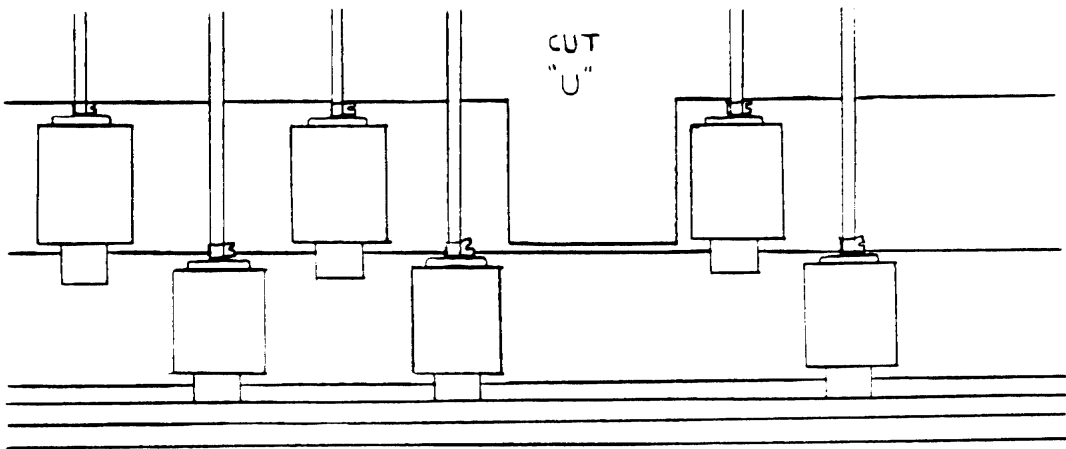
Align each plunger so it is directly over the mark on the stick. This is very important because in grand pianos, the action moves, so if the plungers are not adjusted on the rail directly under its related key it will play two notes when the action shifts. Push the upper and lower solenoids away from the rail's center before tightening. This will insure that each solenoid is straight (squared) and also that each one is at exactly the same height. Leave the breaks between key section clear.

After the alignment of the solenoids is complete, there should be a section of unused rail after solenoid #80. (key 84). This section of the rail should be cut off as close

to the last solenoid as possible. This will give you clearance at the right-leg of the piano. When cutting the rail, it is recommended that a hacksaw be used. Be careful not to cut any solenoid wires. If necessary remove the solenoid, cut, then replace it. File all burrs off the end after cutting. Vacuum all shavings from solenoids and rail.

In the "breaks" or empty areas between solenoid sections, the rail will have to be partially removed to allow trap levers to pass through. The cuts should be made as close to the end solenoid of each section as possible. Cut down 2½" from the top of rail to the middle. Do this again where the next solenoid section starts. With a vice grip clamp the section between the solenoids and bend slowly back and forth. This will cause the blank section of rail to break off. File the rail and vacuum up all shavings. There now should be a "U" shape section of the rail removed.

SEE FIGURE #6 BELOW:



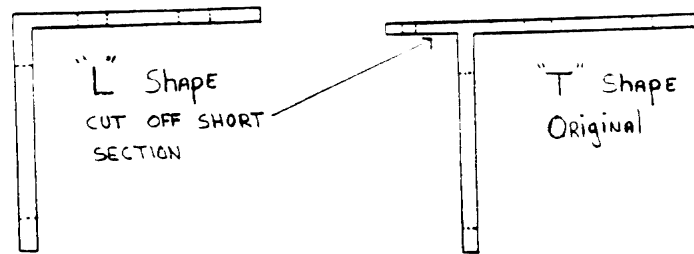
Do this in all the break areas no matter how thin they might be. (The tape recorder cables must also go through one of these breaks.) Thoroughly clean the rail and make sure none of the plungers were damaged while cutting was done. CAUTION: Wear safety goggles while cutting.

SOLENOID RAIL MOUNTING BRACKET MODIFICATION AND PREPARATION

PART SIX

The solenoid rail brackets are "T" shaped. They will be modified to resemble an "L" shape. This is done by cutting the short end of the bracket off. File off rough edges and burrs.

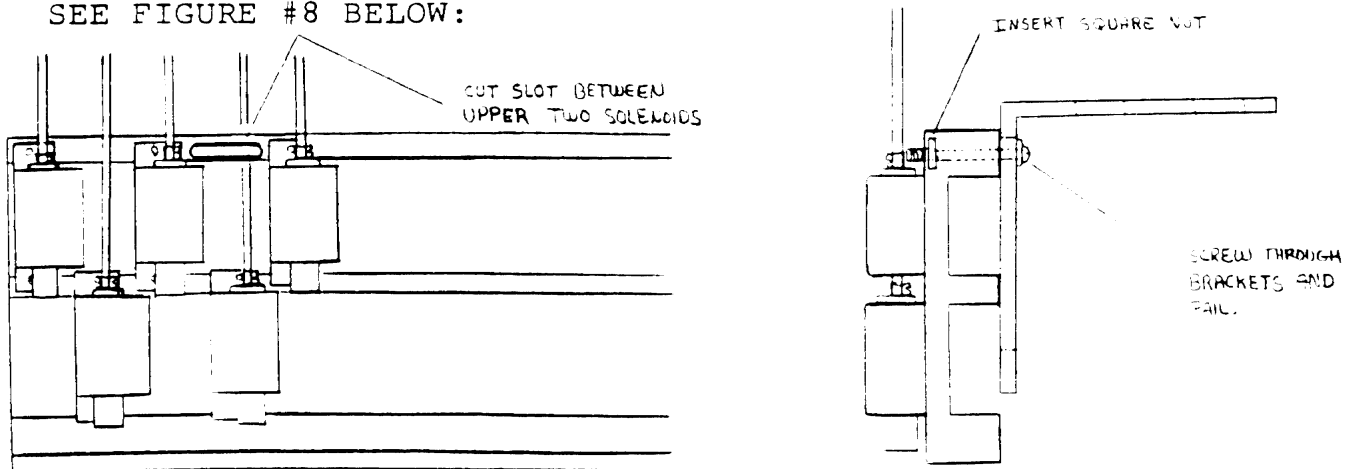
SEE FIGURE #7 BELOW:



MOUNTING BRACKETS TO RAIL

Normally the solenoid rail brackets mount on the "empty" portion of the rail that extends past the end solenoids. On grand installations this portion of the rail has been removed due to the tight clearances between the legs. The brackets will now be mounted behind the rail (on the opposite side of the solenoids). They should be placed as close to the ends of the rail as possible. On the upper row of solenoids each one has a mounting nut which is held in a guide slot. A hole will have to be made between two of the upper end solenoid nuts. Before any drilling is done, the lower solenoid plunger should be removed so it does not get bent while drilling. After removing, realign the upper solenoids as close to their original position as possible and tighten. They will be used for markers when drilling the holes. Using a 5/32" drill bit, drill several holes through the rail between the upper two solenoid mounting nuts. Do this on both ends of the solenoid rail. After drilling carefully use the drill as a reamer and make the holes into a slot. CAUTION: USE SAFETY GOGGLES WHILE DRILLING. Vacuum all shavings off the rail. A nut will have to be slid into the front of the hole. Loosen the upper screws on the solenoids between these holes at the ends of the rail and slide the nuts across. From the hardware bag get an additional square nut and use it to replace the nut for the last solenoid. Do this on both ends. Install a screw through the rail bracket, through the hole drilled in the rail and start the screw into the square nut that was installed.

SEE FIGURE #8 BELOW:



SOLENOID RAIL MOUNTING BRACKET
MODIFICATION AND PREPARATION

PART SIX

Center brackets in the middle of the slot drilled in the rail and lightly tighten the mounting screws. At this point the solenoids should be aligned on the rail and the brackets temporarily mounted. Before the solenoid rail is installed, trap lever redesign should be completed on the piano.

REDESIGNING TRAP LEVERS, SUSTAIN,
SOSTENUTO, BASS SUSTAIN, SOFT, LYRE PLACEMENT

PART SEVEN

Operation of manual pedals in a grand installation usually requires a complete redesign of the trap levers. As mentioned earlier, the original traps cover the solenoid rail slots which would interfere with the plungers striking the keys. The new trap lever system will be designed to operate between the breaks in the keys. There are no plungers in this area and with modifications the pedal systems can work effectively from these positions.

In upright pianos both electronic and manual pedals work off of one trapwork system. In grand piano installations of the PIANOCORDER, the manual pedal operates off of one trap system and the electronic system works off another. Two separate systems must be designed by the technician to do the same thing.

Different piano types will require different types of trap levers. There are many ways to redesign trap levers. The system about to be described is simple, efficient and adapts easily to most pianos. This system is called the "T" system. It consists of two levers A and B; these levers will be pivoted at their ends.

LYRE MOUNTING AND REPOSITIONING

Before any construction of the manual pedals begins it must be determined by the technician if the lyre must be moved forward. On larger grands usually over six feet, there will be enough room between the lyre and the solenoid rail slot to fit the trap work. However, on smaller grands the lyre may have to be moved forward slightly.

This can be determined by remounting the lyre on the piano. Measure from any one of the lyre rods to the center of the slot (SCL line). There must be a minimum of 2½".

If there is less space than this, the lyre must be moved forward. Movement of the lyre should be as little as possible. Move the lyre forward to get the 2½" clearance and refasten it to the keybed. Lyres are fastened to keybeds many different ways, use the best means available to remount it.

On larger grands if the clearance is correct between the lyre and the slot (SCL), remount the lyre in the original position.

SUSTAIN LEVER MANUAL

PART SEVEN

We will now begin to redesign and construct the trap levers. The levers to be made can be constructed out of a good hard wood such as oak. Metal can also be used, but wood is easier to cut and easier to obtain. ¾" thick wood is strong enough to work.

One lever will come off the lyre rod and extend to the far right side of the piano, there it will be pivoted at its end (lever A). The second lever (lever B) will extend through where the break is and rest on top of lever A. This will also be pivoted on its end. Lever B must be thin enough to fit through the break and not cover any of the solenoid rail slot. A hole will be drilled through the keybed directly under the damper lifter rail and aligned directly in the center of the break. A dowel will then be placed in the hole and will rest on top of lever B. When the sustain pedal is depressed both levers will lift also lifting the dowel and the damper rail. Where the two levers meet, they can be notched so they will be flush and still be ¾" thick. Felt or leather should be added to one of the surfaces to reduce noise and friction. Before drilling a hole for the dowel, use a drill that is not much larger than the dowel to be used. This dowel will not be pinned at the top so the hole must act as a guide and keep the dowel from flopping around. Use a felt or leather pad at the top of the dowel where it pushes on the damper rail. The dowel will be pinned underneath where it rests on lever B.

SEE FIGURES #9A and #9B ON THE FOLLOWING PAGE.

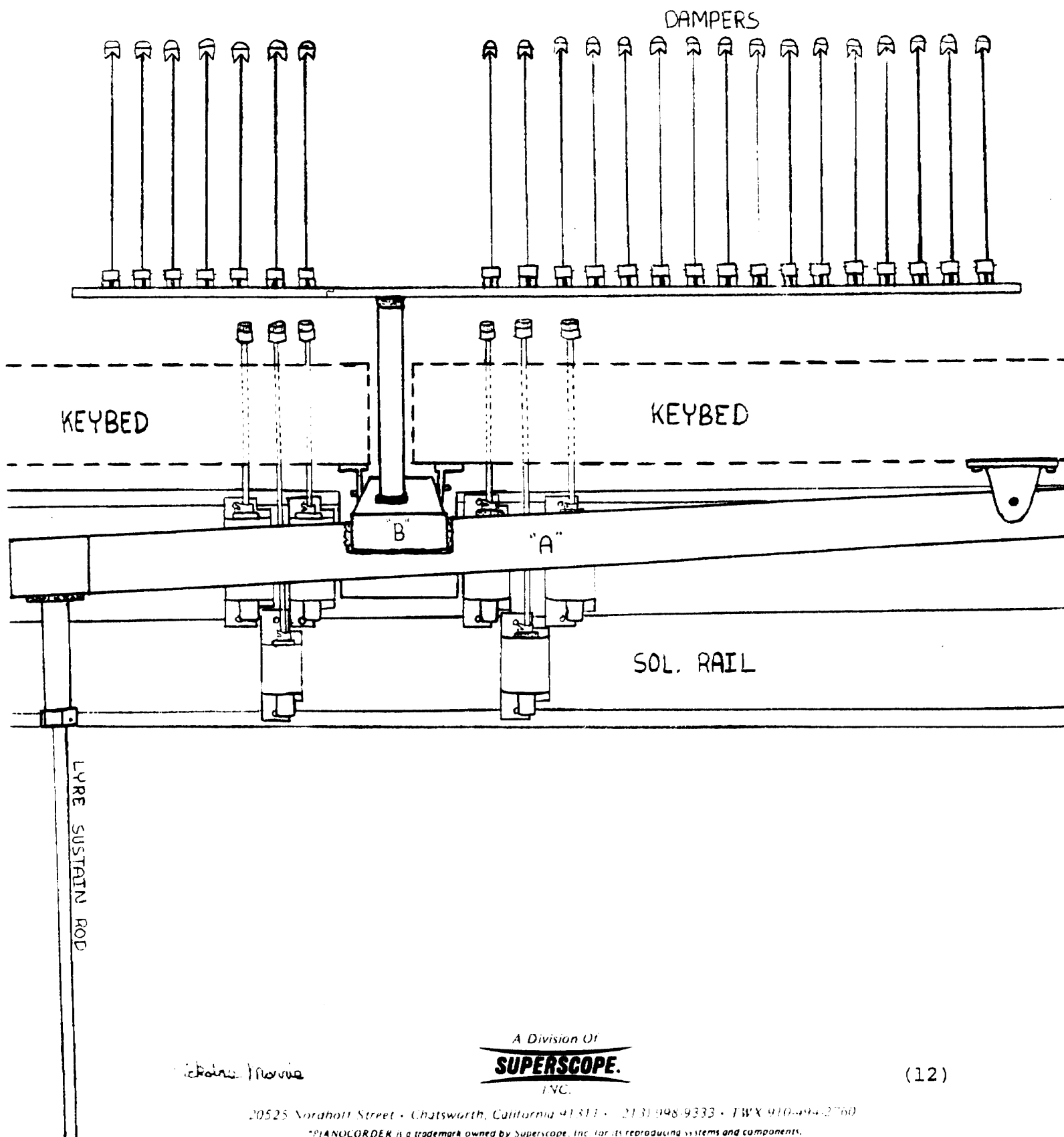
SOSTENUTO OR BASS SUSTAIN

The sostenuto or bass sustain manual lever system can be designed the same way as the sustain system (T lever). These however will go to the opposite side of the piano.

Pianocorder™

Reproducing System

FIGURE # 9A



A Division Of

SUPERSCOPE.
INC.

(12)

20525 Northolt Street • Chatsworth, California 91311 • (213) 948-9333 • TWX 910-494-2760

*PIANOCORDER is a trademark owned by Superscope, Inc. for its reproducing systems and components.

SS-0849 (10/79)

Pianocorder™

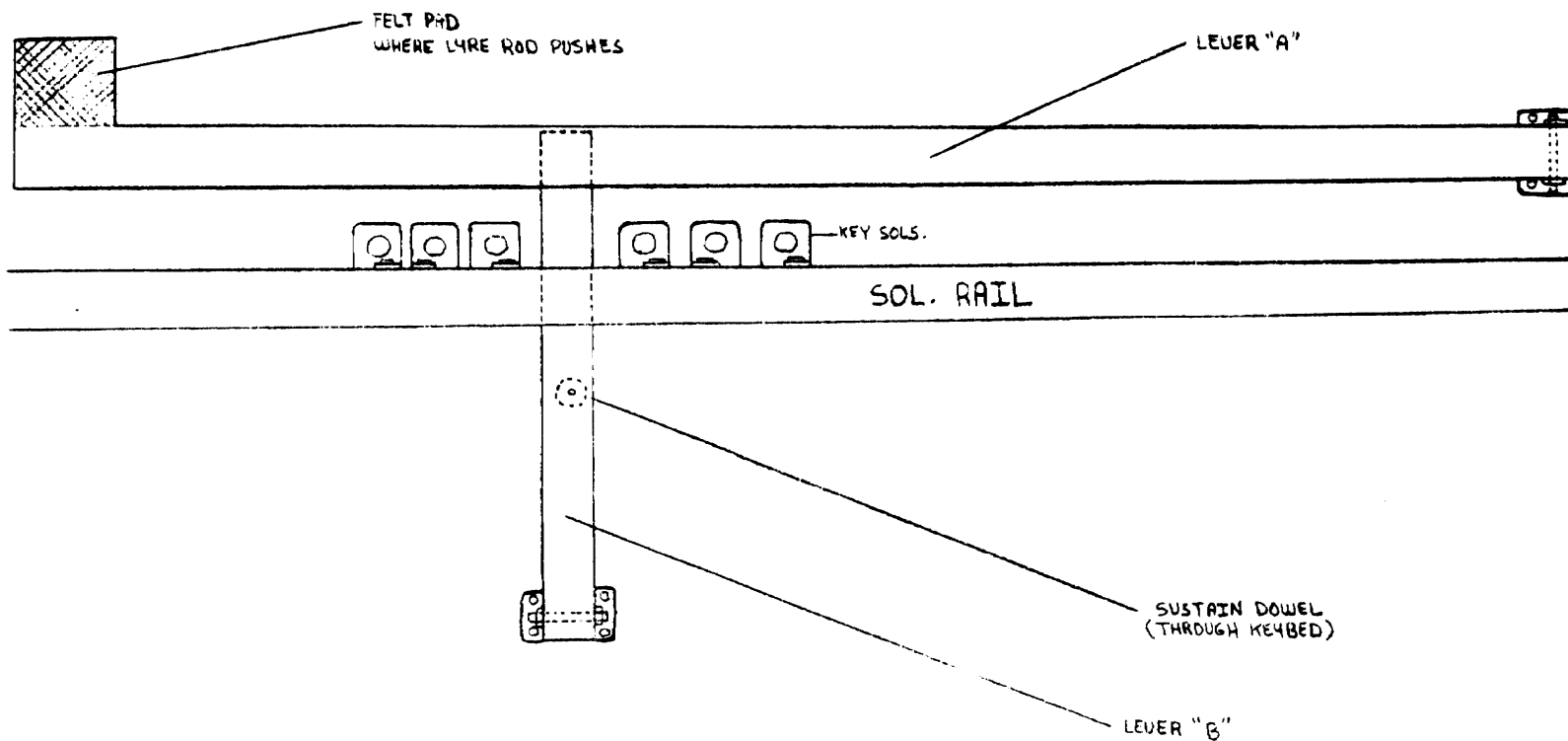
Reproducing System

SUSTAIN LEVER SYSTEM

MANUEL

BOTTOM VIEW

FIGURE # 9B



Hicklas Morris

A Division Of
SUPERSCOPE.
INC.

(13)

20525 Nordhoff Street • Chatsworth, California 91311 • (213) 998-9333 • TWX 910-494-2760

*PIANOCORDER is a trademark owned by Superscope, Inc. for its reproducing systems and components.

SS-0849 (10/79)

Everything will work the same as it does on the sustain except it will operate from the opposite side. The original dowel or rod can be used. Some trimming of levers may be needed on different types of pianos. This should be done by carefully measuring and trimming where needed.

SOFT SHIFT PEDAL

If the lyre on the piano did not have to be moved, the shift lever should mount back in its original position. Sometimes one of the fulcrums closest to the slots may have to be made thinner to give clearance for the solenoid rail to be installed. This can be done by cutting the fulcrum thinner or by making a new one. Usually these fulcrums are made of wood.

If the lyre had to be moved forward, the entire shift lever will also have to be moved. The hole in the keybed will have to be cut forward so the shift lever can be realigned with the new position of the lyre.

Again, cutting can be done while the piano is on its legs or with it tilted on its side. If cutting from under the piano, wear safety goggles and have someone hold a vacuum nozzle close to the saw.

Using the shift lever as a guide, place it where it will be on the underside of the keybed. Mark the keybed. The hole to be cut should not be any wider than the original hole. Lengthen it by cutting toward the front of the piano, but only as much as needed.

The underside of the action frame should have a channel in it where the shift lever pushes the frame. Repositioning the shift lever forward will cause the action frame not to align properly. Extending this channel forward by chiseling or adding an extra piece of wood to the frame should take care of this problem. Action frame designs vary from piano to piano. The above procedure works on most pianos. If it doesn't you will have to design some type of base in the action frame that will allow the lever to push the action frame over. Action return springs are usually very tight, the channel or base must be able to withstand the weight of the action and the spring.

After modifications to the frame have been completed, mount the shift lever on the bottom of the keybed. Place the action frame into the piano (less keys and action). Test by pushing the lever. The frame should move approximately 1/16 of an inch. Some trimming of the frame may be needed. If so

measure and file or cut as needed. After mounting of the soft shift lever, when the lyre is mounted you may find that the rod may have to be lengthened or shortened to make up for the new position of the lyre.

At this point it should be mentioned again that there are many ways to design trap lever systems. The system explained here has been used and proved successful in many pianos. If you feel you can use another method more effectively, do so. The main idea is to have the manual pedals working without interfering with the solenoid plungers.

ELECTRONIC PEDAL SOLENOID OPERATION

SUSTAIN AND SOFT

PART EIGHT

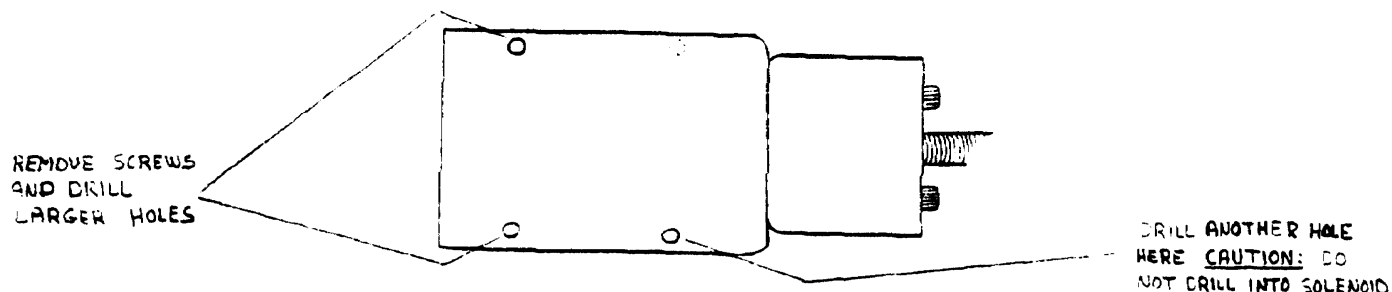
Now that the manual trap levers are complete we will proceed with the electronic pedal solenoid system. The PIANOCORDER REPRODUCING SYSTEM has two operating pedals, sustain and soft. The two electronic solenoids will operate independently from the manual pedal systems.

First we will design the sustain mechanism. This is a very simple system that operates off of one lever. The lever is pivoted by a fulcrum in the middle. The pedal solenoid will push down on one end of the lever causing the other end to raise. This latter end will have a dowel that will push on the damper rail. SEE FIGURE # 10 ON NEXT PAGE.

The piano's original sustain dowel can be used.

It should fall far enough behind the solenoid rail slot so it will not interfere. The pedal solenoid is mounted to one of the beams so that it is pushing down. The restraining wire and two screws will be removed. These two holes must be drilled out larger so that larger wood screws can be used for attaching the solenoid to the beam. A third hole should also be drilled for extra support. Drill this hole near the edge of the housing and be careful not to let the drill cut into the solenoid slug.

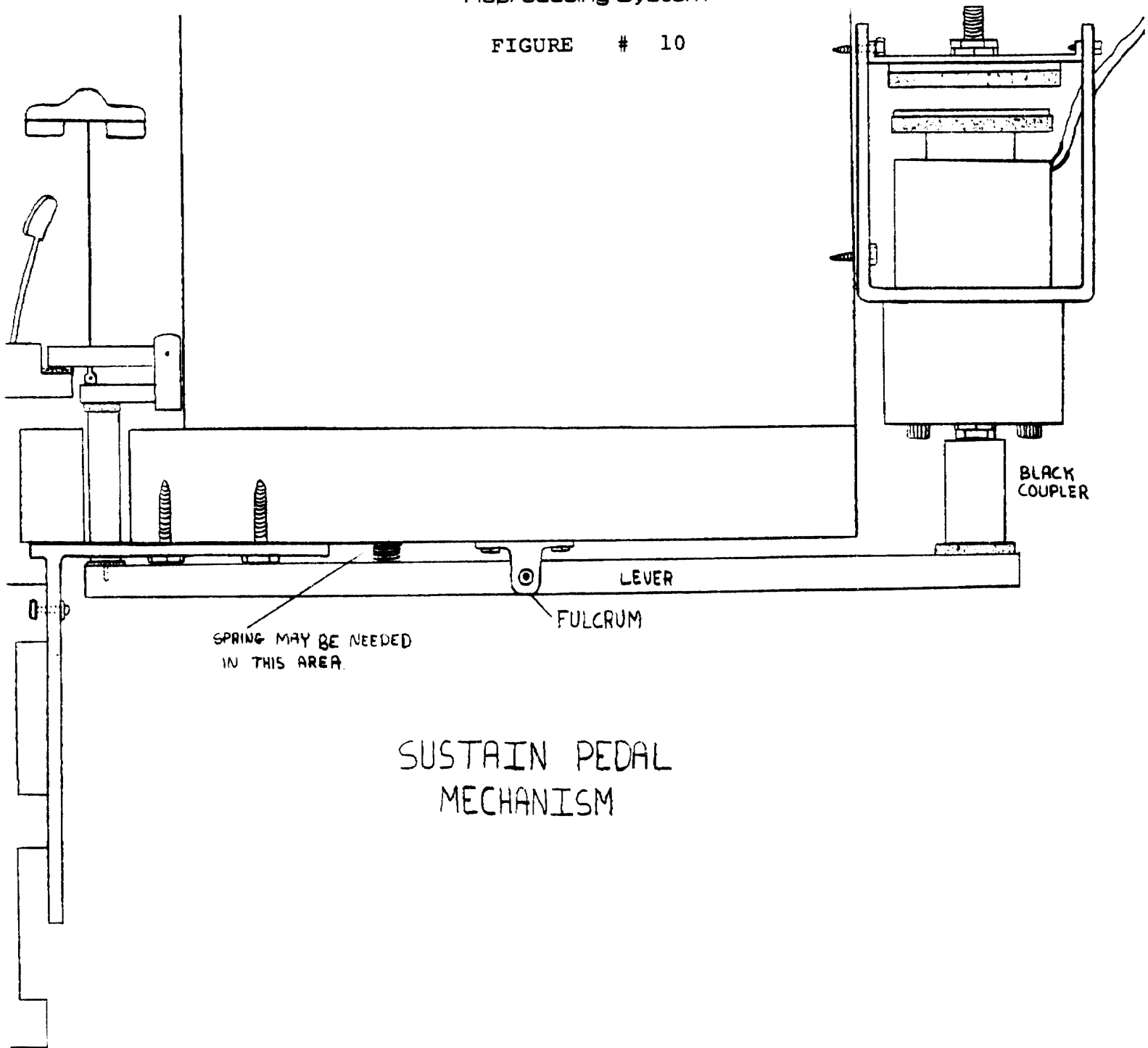
SEE FIGURE #11 BELOW:



Pianocorder[™]

Reproducing System

FIGURE # 10



SUSTAIN PEDAL
MECHANISM

Nickolas Morris

A Division Of
SUPERSCOPE.
INC.

- 16 -

20525 Nordhoff Street • Chatsworth, California 91311 • (213) 998-9333 • TWX 910-494-2760

*PIANOCORDER is a trademark owned by Superscope, Inc. for its reproducing systems and components.

After the solenoid is mounted, measure from the sustain dowel hole to the shaft on the pedal solenoid. From a length of hardwood (oak) cut a lever a little longer than this length. It will need to be approximately one inch wide. A fulcrum or pivot will be installed in the middle of the lever. A dowel will then be installed. Again this dowel will not have a pin on the top; instead you will use a felt or leather pad. Pin and pad the dowel end resting on the lever. The solenoid will have the black coupler screwed onto its end. This coupler will later be used to regulate the amount of throw the solenoid will need to raise the dampers. Mount the lever, making sure it is centered properly and use thin felts on both ends of the lever.

REFER TO FIGURE #10 FOR DETAILS.

On some pianos the damper rail may not have enough weight to push the slug of the solenoid back up. A small, light helper spring can be added to the dowel side of the lever. This will give the extra push needed to allow the dampers to return to their full rest position. The spring should be as light as possible. Too heavy a spring will cause the solenoid to overheat and bind.

ELECTRONIC PEDAL SOLENOID OPERATION

SOFT SHIFT MECHANISM

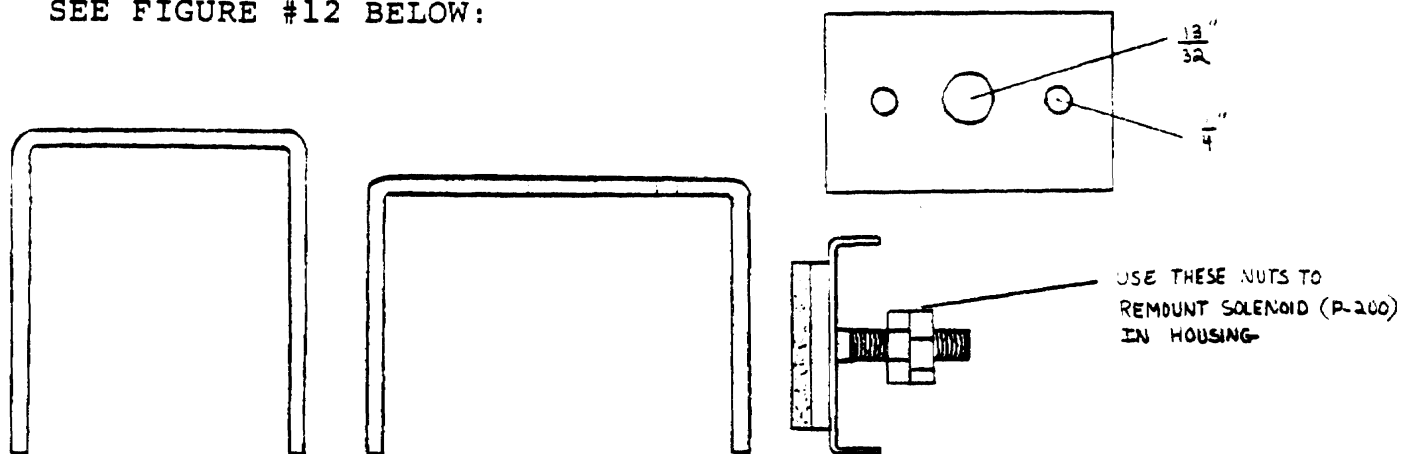
PART EIGHT

This system is more difficult than any of the others to design -- the reason being that space for placement of solenoid and lever is limited and the pressure needed to shift the action is quite great. Here again, there are many ways to design this mechanism. Some technicians have elected not to install the soft shift. The system will operate properly without it but it cannot be called a true reproducing piano. Instead of using the soft shift, some technicians have designed a hammer lift system. This works effectively but is more difficult to design. We will describe the simplest and most effective way to achieve the soft pedal shift operation.

On actions with very tight return springs the standard P-100 pedal solenoid may not have enough power to shift the action. Installing a P-200 vortsetzer pedal solenoid will give the extra power needed. If using a P-200 pedal solenoid, the standard solenoid assembly bracket will require modification. Modifying the pedal solenoid bracket consists of reshaping the aluminum section to fit around the larger slug. The center shaft hole must be drilled larger in the housing,

(13/32" drill) and two new mounting screw holes must be drilled (1/4" drill). The dashpot cylinder or piston do not have to be modified, they will fit as in the standard assembly. The stop pad section of the housing will not have to be reinstalled. The two hex nuts on the threaded shaft of the stop wheel can be used to mount the P-200 slug to the housing and dashpot.

SEE FIGURE #12 BELOW:



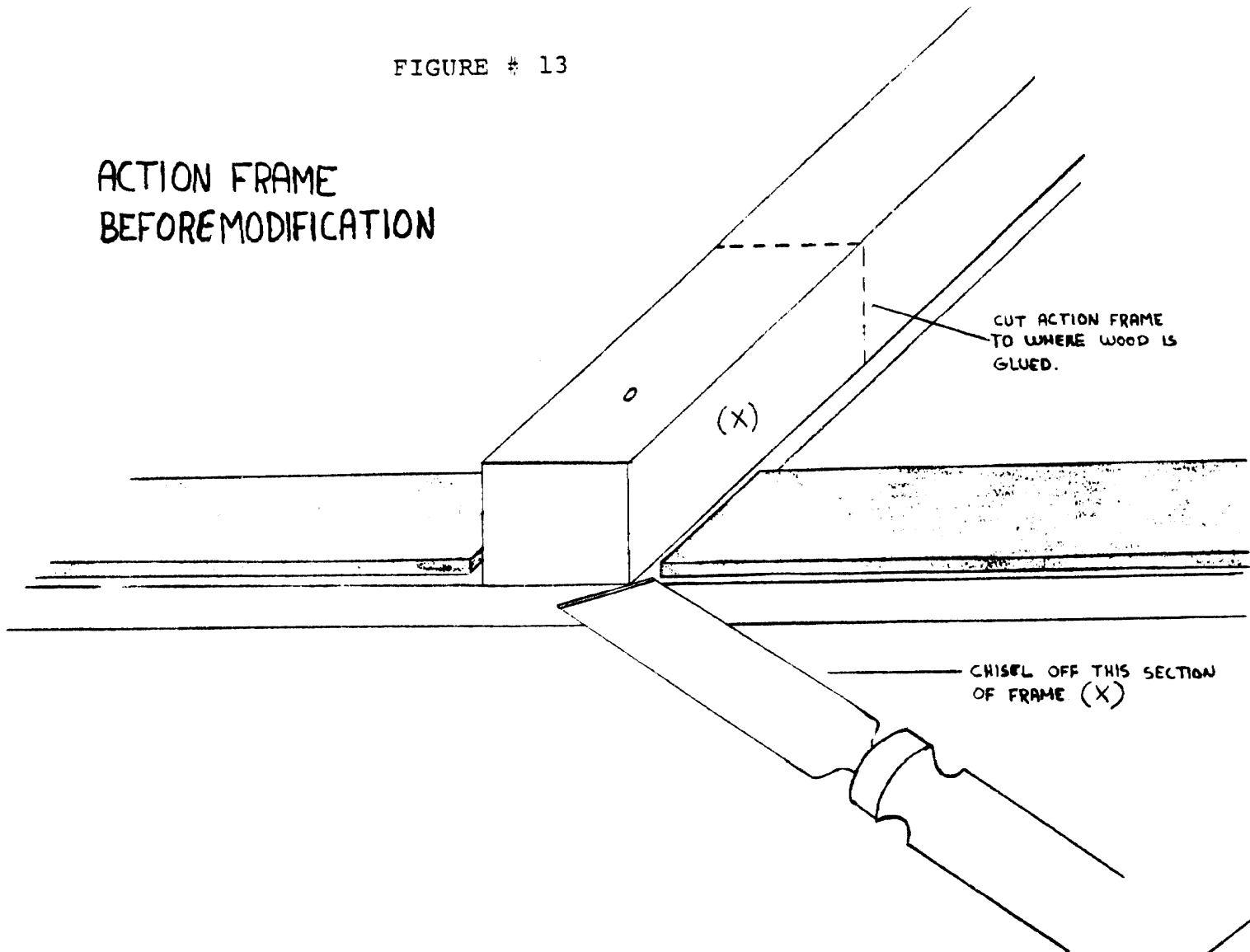
This system will operate much the same as the sustain; only instead of moving up and down, it will move from side to side. With the action frame removed from the piano and looking straight in, you will see the back wall of the piano called the belly rail. Usually this wall is from three to four inches thick. To the right end of the dampers there will be a blank section of belly rail. Through this wall a hole will be cut which will allow the lever to pass through from the rear of the piano. The hole will be drilled in front of the break area. It must be in an area that is clear of the dampers. Find this area and mark the wall with a vertical line.

Before any drilling is done, a base for the lever to push on must be mounted to the action frame. It must be made to extend out a short distance past the end of the keys and yet not interfere with them. The base can be made of hardwood or of metal and must be mounted solidly to the action frame.

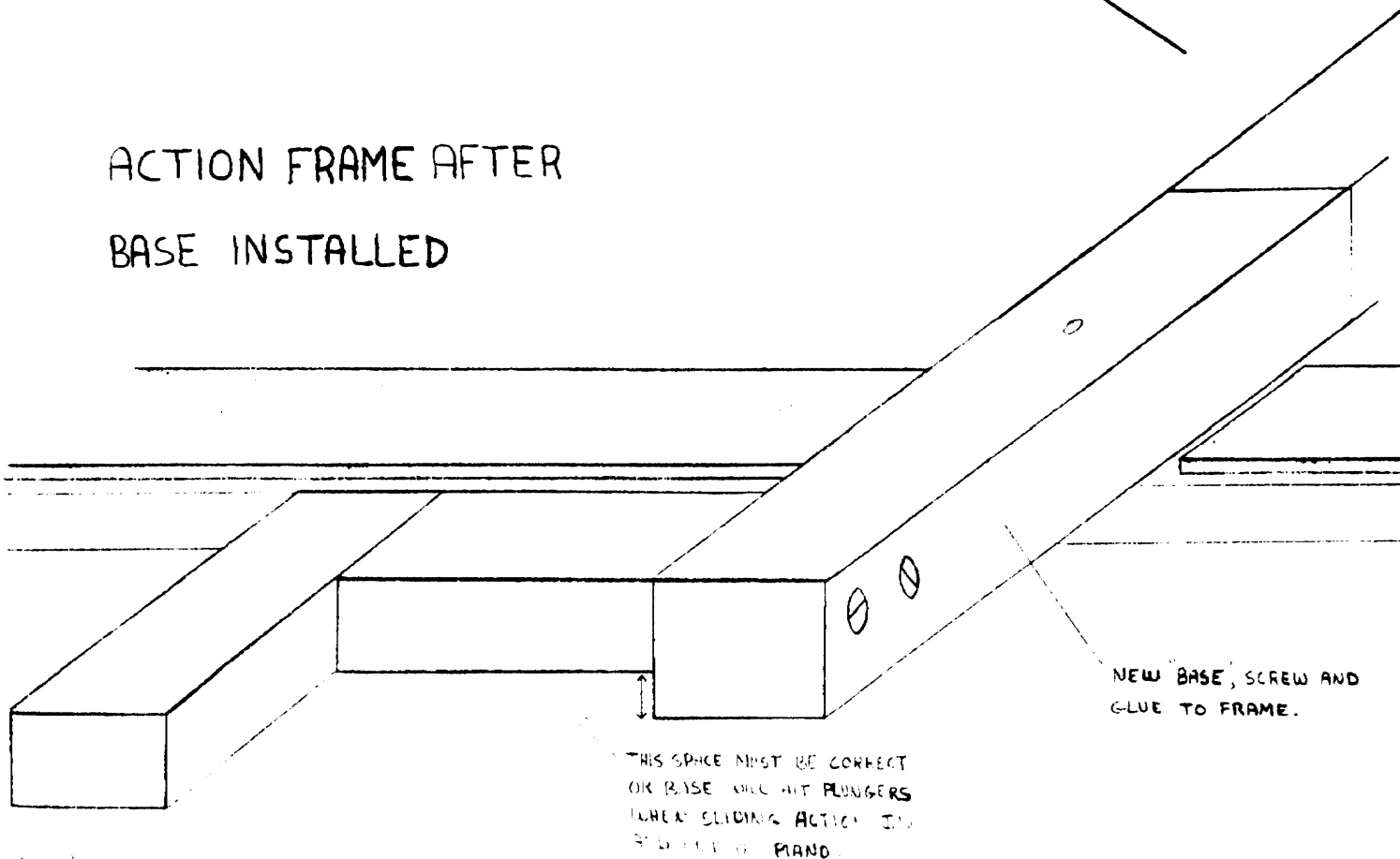
SEE FIGURE #13 ON THE FOLLOWING PAGE.

FIGURE # 13

ACTION FRAME
BEFORE MODIFICATION



ACTION FRAME AFTER
BASE INSTALLED



Hydraulic Pressing

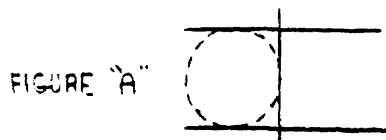
ELECTRONIC PEDAL SOLENOID OPERATION

SOFT SHIFT MECHANISM

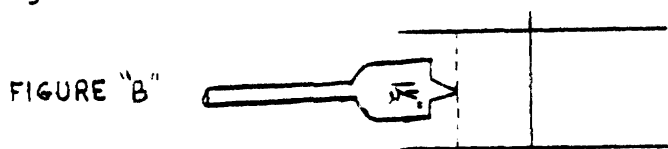
PART EIGHT

After mounting the base, install the action frame back into the piano. The line drawn earlier should be about in the center of where the base extends out from the action frame. Draw a line on the belly rail at the top of the base and at the bottom.

SEE FIGURE #14A and #14B BELOW:



Using a 1 $\frac{1}{4}$ " wood boring bit and starting from the inside of the piano, start the bit to the left side of the center line. See figure:



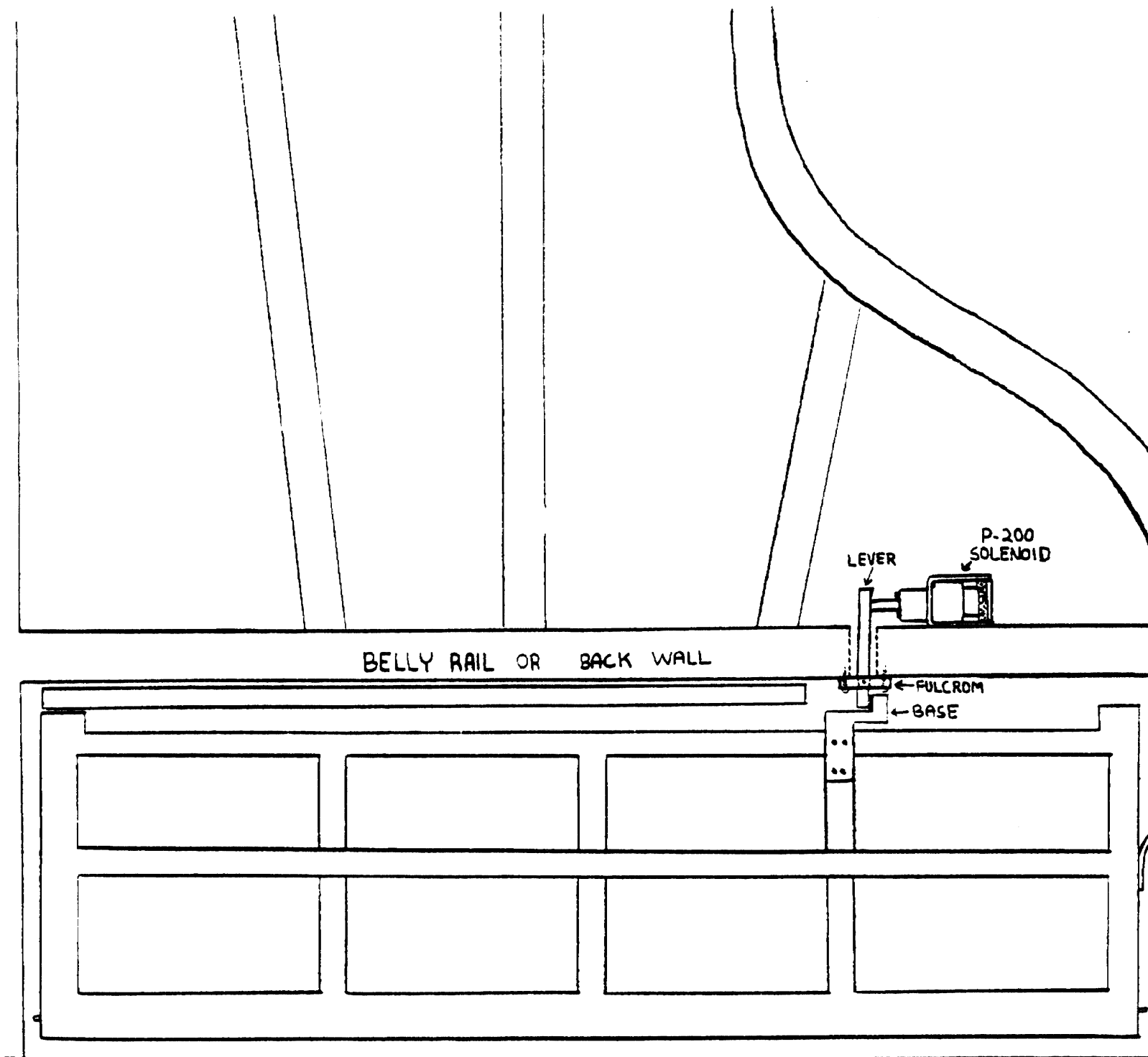
When drilling have someone hold a vacuum nozzle close to the bit. This rail is thick, take your time and let the drill do the work.

When the lever is installed it should rest flush with the left side of the base. A fulcrum will be mounted on the inside of the belly rail. It will not be pivoted in the center of the lever; instead it will pivot toward the front of the lever. The advantage to this is that the solenoid will have to throw more but work less to get the action frame to move. The fulcrums can be made of hardwood or of metal and must be mounted solidly to the belly rail.

The pedal solenoid will push left on the lever causing the other end of the lever to push right on the action frame base thereby moving the action to the right.

SEE FIGURE #15 ON THE FOLLOWING PAGE.

Make sure to cushion the action base and the end of the lever with felt or leather.



GRAND PIANO
ELECTRONIC SOFT SHIFT

H. Magnus

A Division Of
SUPERSCOPE.
INC.

- 21 -

20525 Nordhoff Street • Chatsworth, California 91311 • (213) 998-9333 • TWX 910-494-2760

*PIANOCORDER is a trademark owned by Superscope, Inc. for its reproducing systems and components.

The pedal solenoid can now be mounted on the back wall of the piano. Use a good size wood screw for mounting. Use the black adjusting coupler if possible. This will allow adjustment of the solenoid throw.

If the P-200 pedal solenoid for the soft shift still has to overwork itself to get the action to shift, a helper spring should be installed in the solenoid. This is done by unscrewing the piston with the O-ring and installing the spring over the solenoid shaft. Reinstall the piston. By turning the piston down the spring will be compressed giving more aid to the solenoid. By turning up, it will decrease the spring tension. For proper adjustment of the helper spring the entire assembly must be operative. Too much tension will prevent the action from returning to its original position. Adjust the spring with as much tension as possible while still allowing the action to return.

ELECTRONIC AND MANUAL PEDAL SYSTEMS

PART EIGHT

At this point, all pedal systems should be assembled and ready for operation. Fine adjustments cannot be made until the entire system is operating.

KEY SWITCH INSTALLATION AND ADJUSTMENT

PART NINE

If the P-101 system (playback only) is being installed into the piano, disregard this part of the manual.

Installation of key switches into a grand piano is very different from that of an upright. The switches are mounted directly onto the action frame. Usually the aluminum rail cannot be used due to the close tolerance between the bottom of the keys and the action frame. Once the switches are set on the frame there are no adjusting screws like those used in an upright piano.

The key switches are on-off switches. They have nothing to do with the expression when recording. Expression is interpreted by the record board. Adjustment of the key switches is very critical to achieve good recordings. It is suggested that the key be depressed half way down or more in its dip before the switch makes contact and records. Setting the switches higher usually gives sloppy recordings caused by brushed notes. Most pianists when playing bump or brush notes, which means that their fingers push keys down slightly

even though not intending to play them. The hammer of such a note may not hit the string, but if the switch is set too high it will make contact and send the signal to the recorder telling it that a note has been played. By adjusting the switches lower, (half the dip or more) there has to be a definite key stroke before the key records. Adjustment procedures will be described later in this section.

KEY SWITCH MOUNTING PROCEDURES

As mentioned earlier, the aluminum rail cannot be used in most grand pianos. It causes the switches to be too high. Some technicians have routed out part of the action frame and mounted the aluminum rail lower. This gives extra clearance between the bottom of the keys needed but also weakens the action frame. The method explained here will be to mount the switches onto strips of wood that will be glued onto the action frame. This will keep the switches low and actually strengthen the frame.

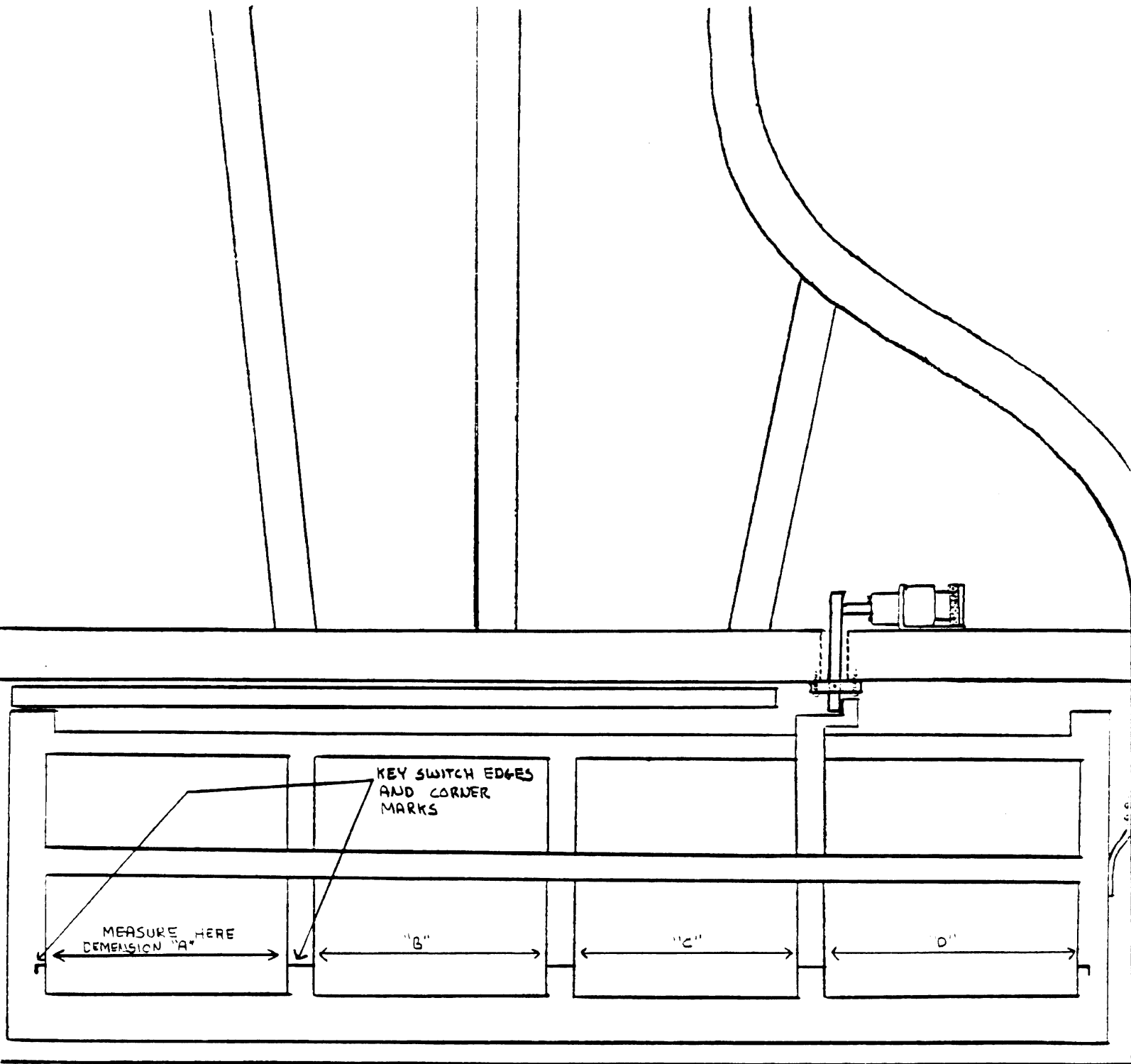
Remove the action frame from the piano and place it on the work bench. Unpack the key switches, connect the three key switch boards together with the sixteen switch board to the right. Inspect the boards, making sure that none of the switches is touching its contact point. The tops of the switches should be as uniform as possible.

Place the switches across the action frame with the 16 keyswitch board to the right. The back edge of the switches should just be touching the front pin rail section of the action frame. Place keys #5, #36, #37, #68, #69, and #84 on the frame. Align the switches so they are under the proper keys. Mark the action frame on the two ends of the switches and at the three other frame support. SEE FIGURE ON NEXT PAGE (#16). These marks will be used to align the wooden supports that will be glued onto the action frame.

Get the alignment stick that was used for aligning the solenoid on the rail. Find another strip of wood with similar dimensions. Starting on the left side of the frame measure the inside dimension between the two action supports.

SEE FIGURE ON NEXT PAGE (#16).

Mark this dimension "A". Do the same for the next three sections: "B", "C", and "D". Starting with dimension "A", measure that distance plus 1/16 of an inch on the alignment stick and mark. The 1/16 is added to make sure the stick fits snugly between the two supports. Cut two pieces with this length. Place the cut piece between the two section ("A"). Center one of the strips on the line drawn on the support.



GRAND PIANO KEY SWITCH MOUNTING

h. morris

A Division Of
SUPERSCOPE
INC.

The other strip should fit snugly up against the front rail.

SEE FIGURE ON 2ND PAGE (#17).

Glue these strips in even with the top of the support. Do the same in areas "B", "C", and "D". Later the boards will be screwed down directly to these strips. Let strips dry before moving action frame.

MOUNTING AND ADJUSTMENT OF KEY SWITCHES

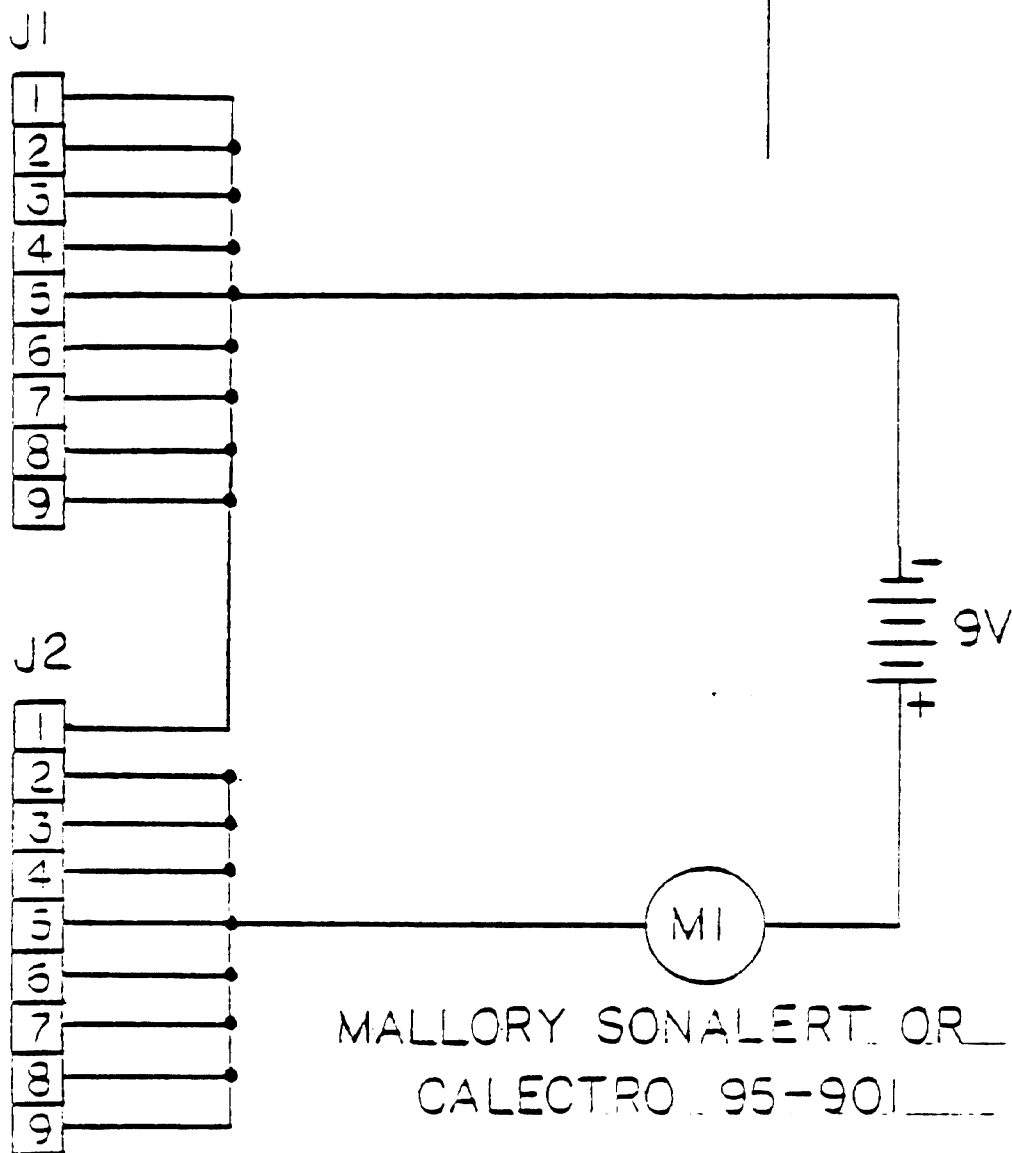
Before mounting the key switches the adjustment procedures must be explained. In grand pianos we run into several problems. On upright pianos, adjustment is done by plugging the test box into an operating system. A wooden jig is cut to stop the key dip at half its travel. The key switch rail is raised by the adjusting screws under the keybed to an initial height. Then the individual springs are adjusted by bending them forward or backward slightly to make contact at the proper point in the dip. Refer to PIANOCORDER Installation and Service Manual for further clarification.

In the grand installation the system is not operating at this point. Removal of a key after the action has been mounted on the frame is impossible. The key switches cannot be adjusted while the action is in the piano.

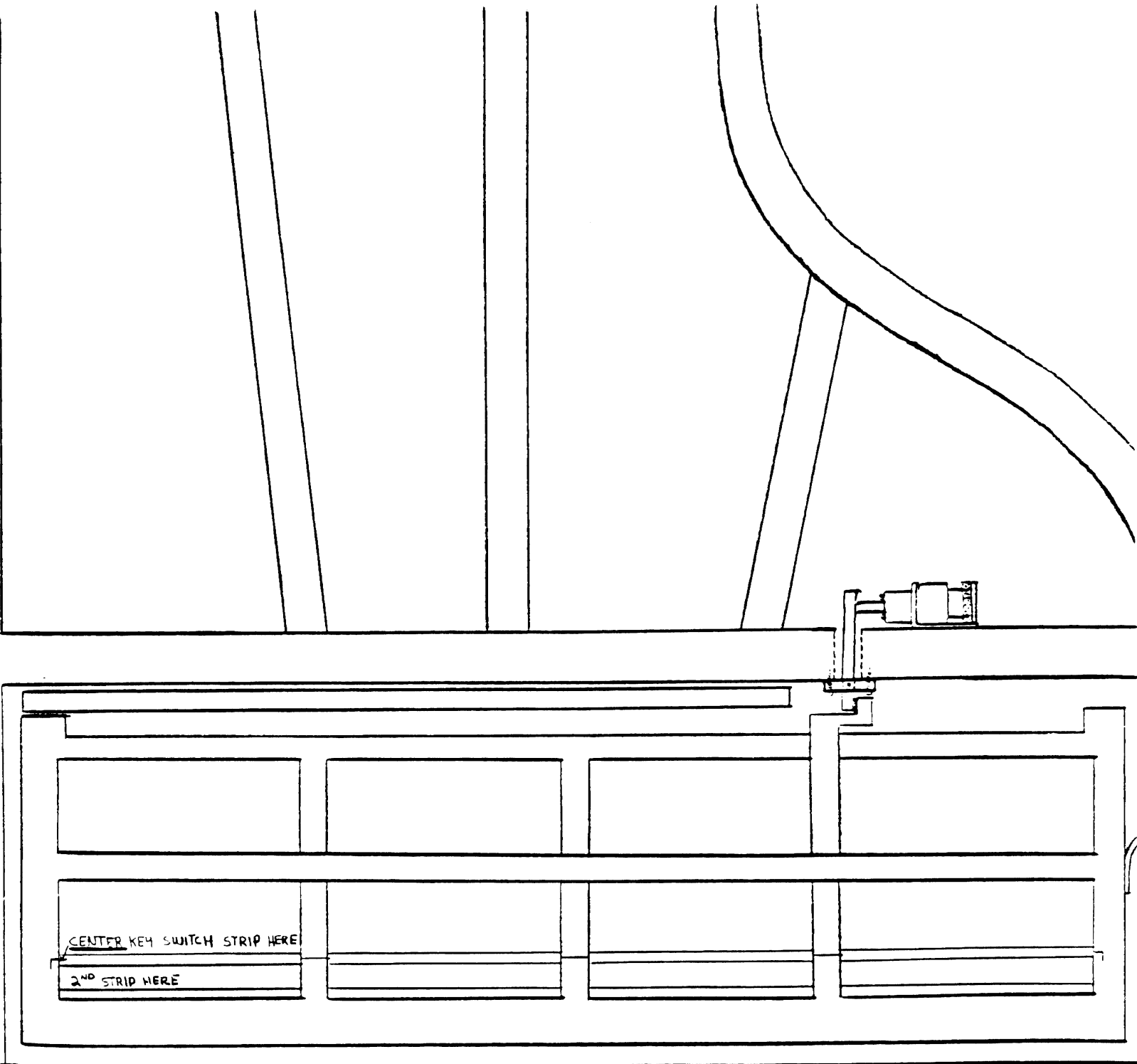
MOUNTING AND ADJUSTMENT OF KEY SWITCHES PART NINE

A new device called a beeper has been designed to make adjustment of the key switches easier. It consists of one cable (cable #13 or #14, red or white, only one of these cables is needed), a small 6 volt battery, a sound generator, and a casing or box for electronics. A cable can be used from your DP-100 maintenance kit, the rest of the parts can be purchased from any electronics store. (See schematic on next page). What the sound generator does is cause a loop circuit which will cause the generator to sound when the switch makes contact. Using this method the switches can be worked on and adjusted away from the piano.

NOTE: If the sound generator box cannot be built and you have a test meter, remount the keys and the action to the frame. Later after the system is operating, the action



		ITEM	QTY.	PART NO.	DESCRIPTION
LIST OF MATERIAL					
RELATED DOCS.	FIRST USED	DIMENSIONS ARE IN INCHES			
UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP CORNERS .015 MAX. SURFACE ROUGHNESS $\sqrt{32}$ MAX. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R. FILLET RADIUS .010 MAX. THREADS - CLASS 2		TOLERANCES UNLESS OTHERWISE NOTED FRACT. ANGLES DEC. = 1/32 = 0° 30' XX = .020 XXX = .010			
SAMPLES FROM THIS PRINT MUST BE SUBMITTED FOR APPROVAL PRIOR TO PRODUCTION		<div> <div> </div> <div> CHATSWORTH, CALIFORNIA </div> </div> <div>PIANOCORDER TEST BUZZER</div>			
DO NOT SCALE DRAWING		<div> <div> </div> <div> 6-4-78 </div> </div> <div> - 25A </div>			



GRAND PIANO KEY SWITCH MOUNTS

h. morris

A Division Of
SUPERSCOPE
INC.

- 26 -

will have to be removed again and then the switches can be mounted and adjusted. With test meter, adjustments can only be made with action frame in piano. Skip this part and go to the next section. Later we will describe another method of adjusting the switches after the system is operating.

After assembling the beeper box, connect plugs to J1 and J2 of the key switch board. Test the box by pushing one of the switches down. When the contact is made the box should beep.

Cut a jig out of wood that will fit under the key and stop its travel at approximately half way or a little more in its dip. This jig will work for both black and white keys.

Remove all keys from the frame. Place the key switches across the action frame and align them with the marks made earlier. Connect the beeper box. Starting with key #5, place the jig under the key and depress it. At this point the switch circuit boards are probably too low, which will cause the beeper not to sound. Using balance rail punchings, shim under the switch board holes to get them up to an initial height. This will be a coarse adjustment. It may be impossible to have all key switches make contact with this adjustment, but make them as close as possible. When the approximate height is found, put a wood screw through the hole in the board and tighten down lightly. This shimming method is a coarse adjustment and will have to be done across the key-board. Shim the front and the back of the switches evenly.

You will notice that the back side of the switches have five and six holes drilled through them. The front side only has two. Shimming only under these two end holes may cause the switch boards to sag in time. One more hole must be drilled through the front edge center of each board using the same size drill as the other holes. Be very careful not to drill through the soldering runs underneath the board. The hole should be close to the front edge of the board and spaced between the contact pads. Shim the amount needed under the new holes in the same way and tighten down.

MOUNTING AND ADJUSTMENT OF KEY SWITCHES

All three switch boards should be at an even height. Test every eighth note. Remove each key after testing. The beeper should sound when the bottom of the key comes close or touches the jig. Additional shimming may be needed in some areas. Making this coarse adjustment as close as possible will make the following fine adjustments much simpler.

The fine adjustment is done one key at a time. Starting with key #5, place the jig under the key. A soldering aid will be needed for adjusting individual switches. Depress the key slowly. If the beeper sounds before the bottom of the key touches the jig, place the soldering aid on the back stem of the switch and bend it back slightly. It should require only a very slight bend. Bending back too far will cause the switch to stick up out of its guide slot.

If the key touches the jig and the beeper doesn't sound, use the same method, only bend the switch slightly forward. Again this adjustment or bend should be very fine, otherwise the switch will be making contact all the time.

For further information and explanations on key switches and adjustments refer to the PIANOCORDER Installation and Service Manual for consoles and spinets. Bulletin #18 is also enclosed, it contains valuable information on key switches. SEE NEXT PAGE. All the switches should now be set perfectly. Each key should make contact at exactly the same point in dip. Replace all the keys back on the action frame. The last four or five keys will have to be notched to give clearance for the cables (red and white). This can be done by filing or cutting where needed. After the notching of the keys, remount the action back on the frame and screw down.

In the lower far right corner of the piano action case a one inch hole must be drilled through the belly rail to permit the red and white cables to pass through. Make sure when drilling not to cut into the side of the piano after going through the back wall. Vacuum all dust and shavings thoroughly.

Connect the white cable to J1 and the red cable to J2 on the key switch board. Use tie wraps on the cables to make them one cable. With the cables connected put the action partially into the piano. Reach into the piano and push the other ends of the cables through the hole drilled. Push the action into its proper position and from underneath pull the red and white cables as far out as they will come. Put the cheek blocks back in to insure that the action is positioned properly.

INSTALLATION OF SOLENOID RAIL

PART TEN

With key switches and action in the piano the solenoid rail is ready to be installed. Check that all felt tips are on and that no plungers are bent. With the brackets

Pianocorder™

Reproducing System

SERVICE BULLETIN

model number
P-100, P-100M

for serial numbers

bulletin number

00018

subject

PROBLEMS WITH KEYSWITCHES
AND THEIR SOLUTIONS

technical services approval

engineering approval

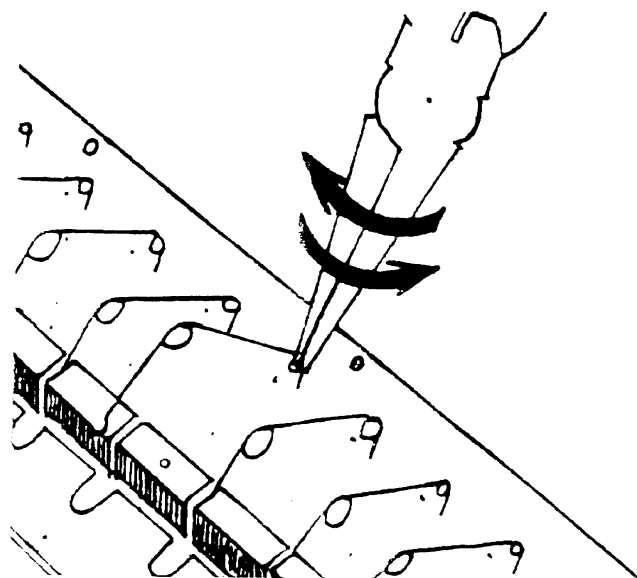
writer

date

PROBLEMS ENCOUNTERED WITH KEYSWITCHES AND THEIR SOLUTIONS

This bulletin is written to assist in the elimination of many of the problems experienced with keyswitch alignment. The following have been found to be causes of double-notes, erratic play, etc.

1. The keyswitch boards have not been properly centered under their respective keys. Those striking the key's underside too close to the edge often slip out and get caught between keys. The switch becomes bent and ends up jammed in its bushing. The note then either plays all the time or never plays. You can correct this condition by re-aligning the keyswitch boards horizontally under the keys.
2. The keyswitches, while being aligned, have been bent to one side. Looking down on the keyswitch, the wiper will be seen to be slightly jammed in its plastic guide slot. This condition will cause random double-notes. You can avoid bending keyswitches to one side if you hold your soldering aid adjustment tool as close as possible at right angles to the keyswitch's stem. To correct a bent keyswitch, gently straighten the keyswitch at the stem.
3. The keyswitch is torqued in its plastic guide slot. This condition is not apparent upon first inspection of the keyswitch boards. To spot it, carefully lift each keyswitch wiper up onto the top of the dust cover. Each wiper should stand directly over its slot. If it twists off to one side when the switch is lifted, the switch is torquing. Using a pair of needle-nosed pliers gently twist the stem and small loop until the wiper remains standing over the center of its slot when released. This procedure will eliminate most of your phantom double-note problems.



A Division Of

SUPERSCOPE.

INC.

- 28A -

20525 Nordhoff Street • Chatsworth, California 91311 • (213) 998-9333/873-2000 • TWX 910-494-2760

0860 (10/78)

*PIANOCORDER is a trademark owned by Superscope, Inc. for its reproducing systems and components.

mounted on the rail, raise the rail up into the piano. Be very careful not to bend the plungers on the walls of the slots or on the trap levers. Install the solenoid rail jacks under the rail once it is high enough to so allow. By turning the jacks, raise the rail up so it just touches the bottom of the keys. Center the rail so the plungers are under their respective keys and centered in the slot. Test by pushing the bottom of the plunger up. Make sure each key is playing its proper note. Start with key #5 and check every tenth note. After the rail is centered, center the solenoid rail buckets in their guide slots that were drilled earlier. Once they're centered get the solenoid rail mounting screws from the hardware bag and screw the brackets to the keybed. Put the screws in the middle of each slotted hole so that the rail can be moved forward and backward if needed. Tighten the rail bracket support screws. This is a temporary setting; after the system is operating the rail height will be adjusted permanently. Make sure all the trap levers are operating properly but not rubbing anywhere on the solenoid rail. Make sure support screws are tight, then remove the support jacks.

MOUNTING OF ELECTRONIC COMPONENTS

PART ELEVEN

Mounting of the electronic boards is simple in grand pianos. They will mount on the beams under the sound board.

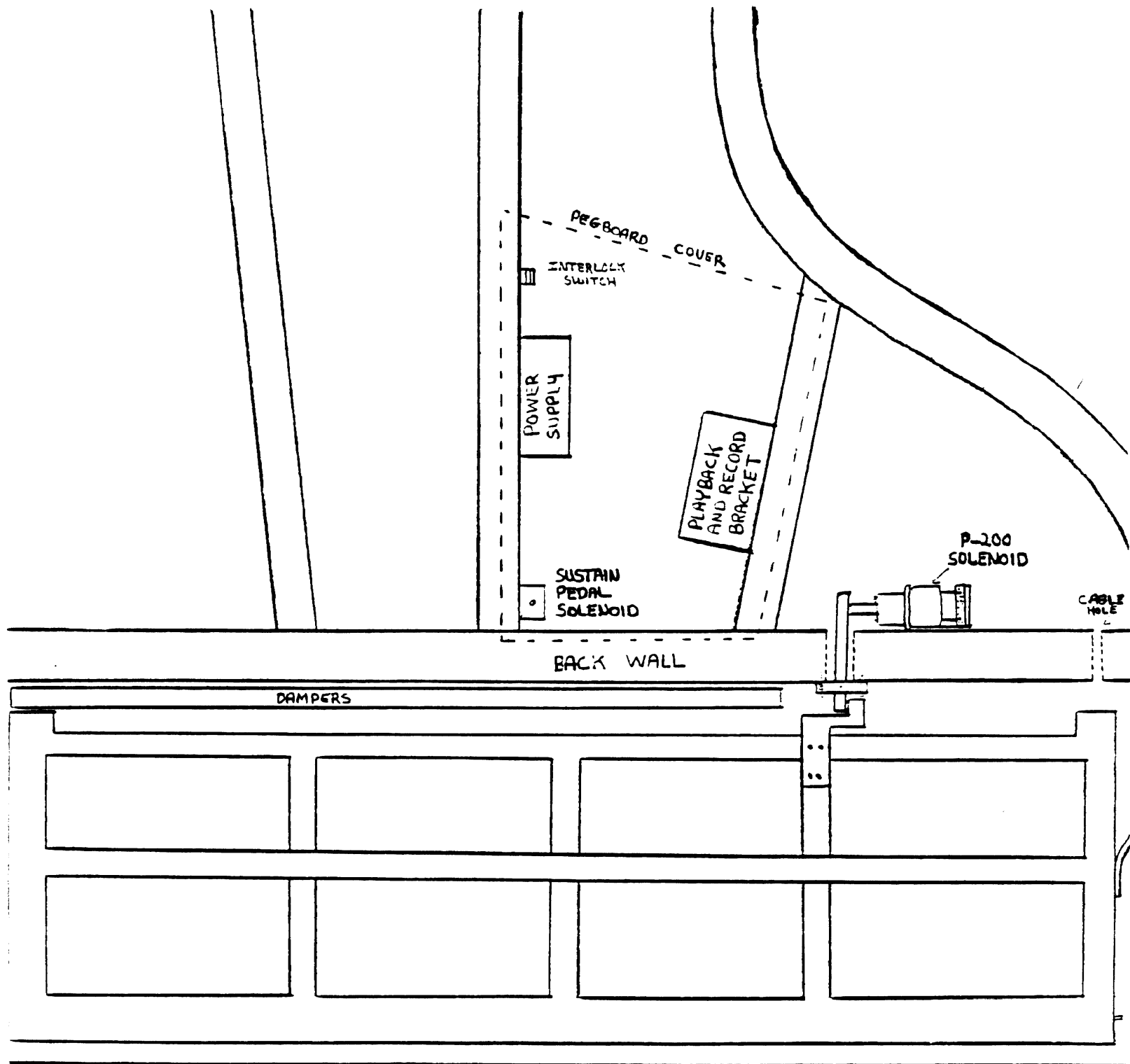
SEE FIGURE #18 ON NEXT PAGE.

For wiring information refer to PIANOCORDER Installation and Service Manual for uprights and consoles.

MOUNTING OF TAPE RECORDER

Mount the tape recorder to the front right side of the piano. Place the tape recorder in the housing and insert the four screws. Place mounting bracket in the housing and place it up on the keybed. Mark the keybed where the bracket will be, remove bracket from housing and insert screws from the hardware bag in holes and fasten to the keybed. Place one of the plastic washers on the top and the bottom of the housing and tighten hex nut onto the shaft.

Run the tape recorder cables through the solenoid rail break in the treble end. These cables must be able to reach the playback board and the power supply. Use cable clamps to secure the cables to the keybed. Make sure the cables do not rub on the plunger shafts.



GRAND PIANO BOARD MOUNTING

- 30 -

H. Morris

A Division Of
SUPERSCOPE
INC.

PLAYBACK & RECORD BOARD

The playback and record board mounting bracket should be placed close to the hole drilled through the belly rail of the piano. This will allow the red, white, and tape recorder cables to reach the boards. Use screws from the hardware bag and mount the bracket on the beam. Plug five short plastic standoffs onto bracket and mount the playback board on standoffs.

POWER SUPPLY

Mount the power supply on the beam opposite the playback board. Check to make sure the orange cable from the playback board and tape recorder housing cable reaches; also check the pedal solenoid cables. If the P-200 pedal solenoid was used for the shift the cable might have to be lengthened. Splice the cable and re-use the plug end that goes to the power supply.

INTERLOCK SWITCH

The interlock switch can also mount close to the power supply on the beam. After the installation is complete a pegboard cover will be made to cover part of the bottom of the piano. This is for safety and will protect the electronics. The interlock switch will be set so when the board is screwed on it will push in the switch, turning the power on. If the board is removed the switch will pop out and shut down the power. The power line can be run out toward the front of the piano or wherever preferred.

MOUNTING OF END DRIVERS AND CENTER DRIVER BOARDS

The driver boards will be mounted on the back of the solenoid rail. Normally they hang off the front of the rail; this would make the box very visible and much larger than needed. The solenoids will connect to the driver boards in the regular way, then the boards will fold up behind the solenoid rail.

Find a stick approximately 3/8" thick by 1" wide by the length of the solenoid rail. This stick will be screwed lengthwise to the lowest part of the back of the solenoid rail. Drill a hole through the stick and into the rail, and, using sheet metal screws, fasten the wooden stick to the back of the rail.

Plug all black and red solenoid wires onto the driver boards and fold boards back and up. The boards should now be upside down. Using wood screws tighten the driver boards to the stick. CAUTION: Make absolutely sure that the backs of the boards are not touching the solenoid rail. This would cause the boards to short circuit as soon as power is applied. Insulate the back of the boards with fiberglass or insulation paper panels if necessary to insure that they will not short out on the rail.

WIRING OF PIANOCORDER SYSTEM

PART TWELVE

With all the boards mounted in place the wiring can now be done. Refer to the PIANOCORDER Installation and Service Manual for wiring procedures.

Support the back of the boards with your hand when plugging in tight connections. Bending any of the boards to an extreme will cause damage.

The yellow cable #8 that goes to the treble driver board sometimes will not reach, get a spare blue cable #9 from the maintenance kit and use it instead of the yellow cable. Do not bundle up wires or use tie wraps at this point. After the system is aligned and operating then the harnessing will be done.

APPLYING AND TESTING POWER

PART THIRTEEN

Before applying power to the system two safety checks must be done.

1. Plug ground fault circuit interrupter into the wall socket.

2. Intercept the red and black cable #4 from power supply to center drive board with the high voltage test lamp. Without doing this there is a risk of blowing out several of the boards. Once the ground fault and the high voltage test lamp are connected, pull the interlock switch out to the on position and turn the tape recorder switch on. The test light should come on for a few second, then go out. If the light stays on refer to the PIANOCORDER Service Manual troubleshooting section under this symptom. Do not disconnect the high voltage test lamp and apply power, this will cause damage to the boards.

If the high voltage test light came on for a few seconds and then went out the system is operating properly so far. Push the interlock switch in to the "off" position and wait sixty seconds. Unplug the test light from the red and black cable and replug the cable to the center driver board. The system is now ready to play.

Insert the alignment and test tape into the cassette deck. Pull the interlock switch to the "on" position and push the play button. The first test is a chromatic scale; this will show that all the notes are playing. Watch the scale as it plays, there may be some double notes. If one is found mark the key, this means that the plunger is hitting the bottom of two notes. Later the individual key solenoid will have to be adjusted on the rail.

SOLENOID RAIL HEIGHT ADJUSTMENT

PART FOURTEEN

The solenoid height adjustment is very critical to insure proper operation of the system. If the rail is too low there will be "bouncing hammers," because the catcher fails to catch the hammer since the key has not reached its full dip. If the rail is too high the key solenoids will give a loud hum.

Install the solenoid rail support jacks under the rail. Insert a standard PIANOCORDER tape into the tape deck and push the play button. At this point the rail is probably too low. Turn the jacks to raise the rail. The hammers will begin to rise, but disregard this for now; it is normal. Later the spring clips will be adjusted so that the hammers return to their original positions. Continue to raise the rail until the hammers catch at their proper height, and the keys are played fully into their dips. This latter test is performed by holding down keys as they are played and feeling for a slight tap on the key. This tap is the top of the plunger hitting the bottom of the back of the key. This will insure that the plunger will depress the key its full amount.

If a loud humming is heard from the solenoids the rail is too high. A small amount of humming will always be present but if its very loud the rail must be lowered. Lower the rail down until most of the humming is gone. Check again to make sure that the hammers are not bouncing and that they are back catching at their proper point. After the rail height is found make sure it has not shifted to one side causing double notes to play. After all the above has been determined tighten the mounting screw on each end of the

rail. The rail is now in its permanent position. For further information on solenoid rail height refer to the PIANOCORDER Service Manual.

PLUNGER SPRING CLIP ADJUSTMENTS

PART FIFTEEN

After the rail height has been determined and is locked in its position the plunger spring clips must be adjusted, because all keys will be slightly depressed.

Turn the interlock switch to the "off" position and wait sixty seconds. Using a pair of pliers and starting with key #5 (the first bass solenoid), squeezing the spring clip and pull gently down on the plunger slug. This will lower the height of the plunger, and thereby bring the key back to its rest position.

There should be approximately 1/32" clearance between the top of the plunger and the bottom of the key. This will allow the action to shift when the soft pedal is used without bending all the plungers or tearing off the felt tips. This adjustment is very important - all eighty clips must be adjusted in this manner. Take your time, do a few notes at a time.

Some of the trap levers may block access to the spring clips. If they do, carefully disassemble the trap levers, adjust the spring clips and replace the levers after the adjustments have been made.

KEY SOLENOID ADJUSTMENTS

PART SIXTEEN

As mentioned earlier, each key solenoid must hit its proper key. Any solenoids striking two notes should be marked from an earlier test.

Turn on the power and rewind the switch test tape to the beginning. Push the play button and set the soft pedal switch to the "on" position. Let the chromatic scale run through with the action shifted. The position of the key relative to the plunger tip is changed. Each solenoid plunger must hit the proper key whether the soft shift is on or off. Mark the keys that are being played in doubles. Turn the power off.

With a phillips screwdriver loosen the individual solenoids on the rail that are not hitting their proper notes and move them slightly to the right or to the left. Do this with double playing notes. Test by pushing on the bottom of the slug, then push the soft pedal lever and test the same note again. All the solenoids must hit only their proper notes with the action in its regular position and in its shift position.

Turn on power, rewind test tape and run the chromatic scale once with the action in its regular position and once in its shift position. All the key solenoids should now be playing their proper notes with the soft shift on or off.

PERMANENTLY INSTALLING THE SOLENOID RAIL

PART SEVENTEEN

On each end of the rail a hole will be drilled through the rail bracket into the rail and then a sheet metal screw will be used to permanently afix the rail to the bracket. Two hex head sheet metal screws that are normally used to attach the solenoid rail brackets to the keybed will be used.

Since the solenoid rail brackets mount directly behind the key solenoids, space for this screw is limited. A hole will have to be drilled between two of the key solenoids.

Get the two screws from the hardware bag and find a drill bit that is slightly smaller. Have someone hold a vacuum close to the drill when cutting so metal chips don't fly off and land on the back of the driver boards. Locate a spot on the front side of the rail between two solenoids that will permit drilling the rail and the bracket without interfering with the key solenoids. Drill through the rail and bracket making certain not to rub the drill on any key solenoid. Vacuum all metal chips carefully. WEAR EYE PROTECTION.

Start the screw in the rail bracket and tighten into the solenoid rail. Be careful not to strip the screw. Do the same for the opposite end of the rail.

The solenoid rail installation is now complete. Remove the solenoid rail jacks.

BASS, TREBLE, SUSTAIN, SOFT
PLAYBACK BOARD ADJUSTMENTS
PART EIGHTEEN

The playback board has six controls. Facing the board with the controls on the left edge, the top two are bass and treble minimums and will be the first adjusted.

Find program seven on the test tape. This is a chromatic scale repeating notes at a minimum expression.

Turn the pianissimo and the fortissimo controls on the tape deck to minimum. Turn on the system and start the test program. The top control on the playback board (Bass) should be turned counterclockwise until the bass section plays as soft as possible. When the scale reaches middle E on the keyboard turn the second control (treble) counterclockwise until the treble is playing as soft as possible.

Program eight on the tape is an arpeggio which will give you a balance between the bass and the treble. If one section sounds louder than the other, readjust the controls until the bass and treble sound even.

Retest the minimum adjustments by playing test program seven again.

SUSTAIN PEDAL CONTROL

The third control from the top is the sustain pedal minimum control. This control adjusts the amount of power that goes to the solenoid. Firstly, adjust the amount of throw the solenoid has by turning the black coupler up or down. The dampers need to lift no more than 1/16 of an inch off the strings. The solenoid should move no more than 1/4 of an inch to accomplish this 1/16 inch lift.

Find test program #9 on the test tape (Sustain pedal on and off) and push the play button. Turn the third control clockwise until the solenoid has enough power to lift the dampers. SEE BULLETINS ENCLOSED.

SUSTAIN PEDAL ELECTRONIC CONTROL

Do not turn the control past 3/4 of a full turn. Doing so will send an excessive amount of power to the solenoid which will cause overheating and binding after a short period of playing time. Turn the control clockwise until the

solenoid just lifts, then turn the control 1/8th of a turn more and leave it in this position. In case of overheating, refer to Bulletin #15.

SOFT PEDAL CONTROL

The fourth control from the top is the soft pedal solenoid minimum control. It is adjusted the same as the sustain control. Turn the pot clockwise until the solenoid moves the action, then turn the pot an 1/8 of a turn more and leave it in this position.

If the voltage has been turned up past 3/4 of a full turn, and the solenoid still doesn't shift the action, tighten down on the helper spring. Turn the solenoid piston down onto the spring to give more tension to it, and thus, aid the soft pedal solenoid. For further information on bass, treble, sustain or soft playback board controls refer to the PIANOCORDER Service Manual.

3/4 BIT AND RANGE CONTROL

These are the bottom two controls on the playback board. Usually they will have two arrows drawn on them facing away from the board. If so, leave these controls have been preadjusted at the factory. For further information on 3/4 bit and range control adjustments refer to the PIANOCORDER Service Manual and Bulletin #19 enclosed.

RECORD SYSTEM PROCEDURES

PART NINETEEN

Unpack the record board, six long plastic standoffs and the violet cable from the kit. Snap the long plastic standoffs into the predrilled holes on the playback board and mount the record board on the standoffs. Make sure the two controls and the microphone are facing away from the beam.

Connect one end of the violet cable #11 to the record board connector J3 and the other end to connector J1 on the playback board. Connect the red and white cables hanging out of the hole drilled through the belly rail of the piano, into connectors J2 and J1 on the record board respectively. Make sure the wires on the plugs are closest to the center of the record board when plugged in. Refer to the Service Manual for further wiring instructions. If key switches were not adjusted by using the sound generator as explained in Part 9, skip ahead to Part 21 (adjustment of record switches with test meter).

3/4 BIT AND RANGE CONTROL

These are the bottom two pots on the playback board. Usually they will have two red arrows drawn on them facing away from the board. If so, leave the pots alone. These have been preadjusted at the factory in these positions. For further information on 3/4 bit and range control adjustments refer to the PIANOCORDER Service Manual and Bulletin #19 enclosed.

RECORD SYSTEM PROCEDURES PART NINETEEN

Unpack the record board, six long plastic standoffs and the violet cable from the kit. Snap the long plastic standoffs into the predrilled holes on the playback board and mount the record board on the standoffs. Make sure the two pots and the microphone are facing away from the beam.

Plug the violet cable #11 from the record board connector J3 to connector J1 on the playback board. The red and white cables should be hanging out of the hole drilled through the back wall of the piano. Plug the white cable to connector J1 on the record board and the red cable to connector J2 on the record board. Make sure the wires on the plugs are facing the record board when plugged on. Refer to the Service Manual for further wiring instructions. If key switches were not adjusted by using sound generator as explained in Part 9, skip ahead to Part 21. (Adjustment of key switches with test box)

To test, place a blank cassette tape into the recorder and turn on system. Zero the tape counter. Push the record and play a chromatic scale up the keyboard. Rewind the tape to zero and push the play button. This will insure that all eighty notes are recording.

Expression adjustments must also be made to the record so that the system will record with maximum expression. The top pot or control (closest to the red and black cable) is the treble control. The second one down is the bass. These controls increase or decrease the amount of sound the microphone picks up.

To test, zero the tape counter. Push the record button and play three chords in the treble section. Play the first one very soft, the second one medium and the third one very loud. Rewind the tape to zero and playback. If the system does not play back with very similar expression the treble control on the record must be adjusted. Turning the control clockwise will make the expression louder, counter-clockwise will make it softer. Turn the control 1/4 to 1/8 of a turn

To test, place a blank cassette tape into the recorder and turn on the system. Zero the tape counter. Push the record and play a chromatic scale up the keyboard. Rewind the tape to zero and push the play button. This will insure that all eighty notes are recording.

Expression adjustments must now be made so that the system will record with maximum expression. The top control on the record board (farthest from the microphone) is the treble expression control. The control below it is the bass expression control. These controls increase or decrease the amount of sound the microphone picks up.

To test the expression, zero the tape counter. Push the record button and play three chords in the treble section. Play the first one very soft, the second one medium and the third one very loud. Rewind the tape to zero, and play back. If the system does not play back with similar expression, the treble control on the record board must be adjusted. Turning the control clockwise will make the expression louder, turning the control counterclockwise will make it softer. Turn the control 1/4 to 1/8 of a turn in the direction needed and test again. This process should be repeated until the expression plays back at as close as possible to the original performance. When the treble adjustment is satisfactory, adjust the base expression.

The bass expression test is performed in the same way, except that chords must be played in the bass, and the bass expression opposite that of the treble control. To increase expression, turn counterclockwise and to decrease, turn the control clockwise. Find the point where the bass records and plays back with expression as near as possible to the original performance, and leave the control at this point. Record an arpeggio up and down the keyboard to make sure the bass and treble record levels are even. If they are not, further adjustments to the record board must be made. For further information refer to the Service Manual.

PEDAL RECORD SWITCHES

PART TWENTY

Mounting of the pedal record switches on a grand is much more difficult than putting them in an upright. Usually they can be mounted directly on the keyboard above the soft and sustain levers.

The idea here is to find a position between the two manual trap levers that will allow the contact points to touch

when the pedal is depressed. The pedal switch assembly will have to be removed from the aluminum bracket it is mounted on. Before removing, mark the sustain side of the switch and the soft side so you will know which side is which.

Looking up from under the piano, find a spot on the keybed between the soft manual lever and the sustain manual lever where the switch can be mounted. The two long ends of the contact must rest on top of these levers so that when the pedal is depressed it will make the contacts touch causing the pedal to record. A small block of wood can be used as a shim for the pedal record switch, if needed to bring them down closer to the levers. If there is no way to mount the pedal switches using the above procedure then do the following.

Separate the switches by carefully cutting them in half with a hacksaw. Again, make sure the sustain and the soft side of the switches are marked. By cutting them in half the ground was also cut off, this ground will now have to be reconnected. Solder a wire to the top or longest section of the sustain switch. The free end of this wire must then be spliced into the yellow wire which is connected to the soft switch. After splicing, use electrical tape to wrap the connection. Without the above connection, the sustain pedal will not record.

There are now two independent switches that can be easily mounted over either lever. Plug the end connector into J4 on the record board. Make sure the wire side of the connector is closest to the center of the record board. The soft switch should make contact when the pedal has been pressed about 1/3rd of the way down. This can be done by either shimming the switch itself or by placing shims under where the contact rests on the lever. The sustain switch must make contact as soon as the dampers lift off the strings.

Turn on the system and push the record button. Depress the sustain lever by hand several times and do the same with the soft. Rewind the tape and playback. The pedals should work when the tape is played. Have a pianist record a piece on the instrument to test the pedals. If the piece played sounds choppy on playback, the sustain pedal switch is making contact too late. If the piece sounds muddy, the sustain switch is making contact too soon. Readjust and re-try. For more information on the record feature refer to the Service Manual.

ADJUSTMENT OF RECORD SWITCHES

WITH TEST METER

PART TWENTY-ONE

If the key switches have not yet been installed, remove the action from the piano. Remove the action and all the keys from the frame and reinstall the frame back into the piano.

Get the key switches and lay them across the action on the mounting strips that were glued in earlier. Plug the red cable onto J2 of the key switch board and the white cable onto J1. Make sure the violet cable #11 is also connected to J1 on the playback board and J3 on the record board.

Gently disconnect the cassette recorder 12 pin connector cable that goes to the playback board and replace it with the 18 pin connector coming from test meter.

Set the standby/play switch on the test meter to the play mode. The bass/treble switch can be set in either position, but the soft pedal should be in the "off" position. Turn on the power to the system.

Lightly pressing any of the key switches down will now cause the associated key solenoid to activate. Prepare a wooden jig to fit under the keys which will stop the keys from travelling no more than from halfway to three quarters of the way through their dip. Install key #5 and, with the jig under it, depress the key until the key rests on the jig. Shim under the keyswitch board mounting holes with balance rail punchings until the keyswitch board is high enough to cause the associated solenoid to activate. This is the height at which all of the boards must be set. Get keys 36 and 37 and place the jig under them. With the keys resting on the jig shim under this section until the solenoids activate as described above. Continue this procedure with keys 68, 69 and 84 or until all three boards are at an even height. Shim each 32-keyswitch board at the middle to avoid sagging in the future. CAUTION: Never leave a key solenoid on for more than one minute, because they can overheat and burn out.

As the height adjustment is completed in any section remove the key or keys from the frame. Make sure all key-switches are off and no solenoid is activated.

After the switches have been raised to an even height across the keyboard insert small wooden screws through the key switch board holes and through the punchings used as shims. Tighten the boards down evenly, avoiding over-tightening of screws which cause bending of the boards. This completes the coarse adjusting of the keyswitches.

FINE ADJUSTMENT OF THE RECORD SWITCHES

WITH THE TEST METER

PART TWENTY-ONE

Place the jig under key 5, depress the key slowly and watch the bottom of the key. As soon as it touches the jig the associated solenoid should activate. If it activates before the key touches the jig, use a soldering aid to bend the rear stem of the switch back slightly. If bending the switch causes the switch to stick out of its guide slot, then some of the shims used to raise the boards will have to be removed. Even the boards out at the new height, and start the fine adjustment procedure again.

If the key touches the jig and the solenoid has not activated, bend the switch slightly forward. If bent too far forward it will make contact at all times causing that note to always record. In this case more shims will be needed to raise the switches up higher. Even the boards out at the new height and start the fine adjustment procedure again. After each switch is adjusted, remove the key, otherwise there is danger of burning out the solenoid.

Continue with this method until all 80 keys are adjusted. In some areas across the keyboard additional shimming may be needed.

After all the switches are adjusted, turn off the power and unplug the red and white cables from the 16-key switch board. Remove the action frame from the piano and install all the keys back on the frame. The bottom of keys 84-88 may have to be trimmed to give clearance for the red and white cables and their connectors. After any key trimming reinstall the action back on the frame and reinstall the entire action back into the piano. Gently connect the red and white cables to the key switches and push the action into position.

At this point refer back to parts 19 and 20
RECORDING SYSTEM PROCEDURES AND PEDAL RECORD SWITCHES.

DESIGNING AND BUILDING A CABINET BOX

PART TWENTY-TWO

After the installation procedures have been completed a box will have to be built to cover the solenoid rail and driver boards, and a peg board cover will be needed to fit over the components mounted on the beams under the sound board. Do not cover the entire bottom of the piano - only that area occupied by the components.

If the piano has a woodgrain finish, use a matching veneer plywood 3/8th inch. If the piano is black or any color, use any veneered plywood. Because it must be painted, the grain doesn't matter.

Measure the width of the solenoid rail plus the thickness including the solenoids and driver boards and the height from the bottom of the keybed to the bottom of the rail. Add a slight amount to each these measurements for extra space. Build a box to these inner dimensions using figure 19 as a guide. The box should have holes drilled in the bottom to allow air to circulate around the rail and driver boards.

After the box is built, trimming of the box to obtain clearance for the legs and trap work is required. Some technicians trim down a portion of the leg to allow the box to fit snugly against the keybed. Another method involves trimming away the box instead of cutting the leg. Either way works well. To bring the box flush with the keybed bottom, notch away the box to clear a path for any trap work in the way. Bundle all cables into a single cable, clamp this cable to the keybed, and notch the box to clear this cable. Stain or paint and finish the box to match the piano.

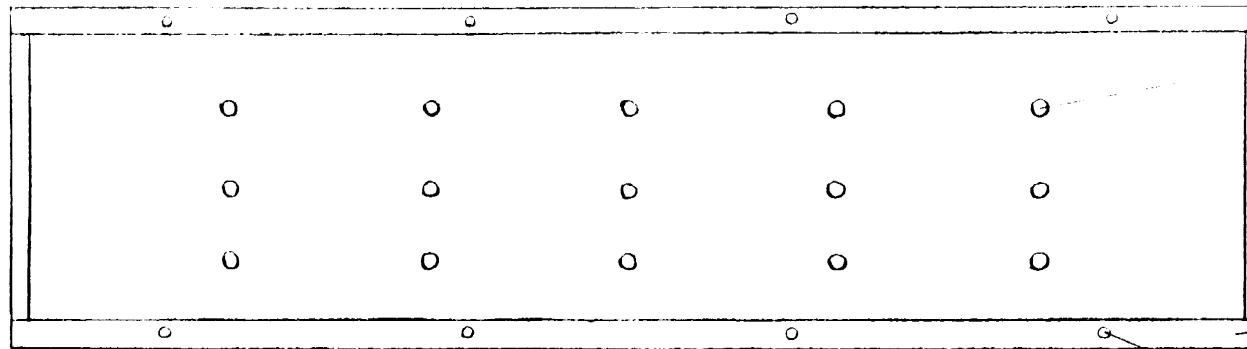
Before delivering the piano it is suggested that the piano be "burned in" while it is still in the shop. It should be played at least four to ten hours before being delivered. This is done so that if any problems occur, they can be taken care of before the customer receives the instrument. For any trouble shooting information refer to the PIANOCORDER Service Manual.

SEE FIGURE #19 ON FOLLOWING PAGE.

CABINET DESIGN AND CONSTRUCTION

FIGURE # 19

TOP VIEW

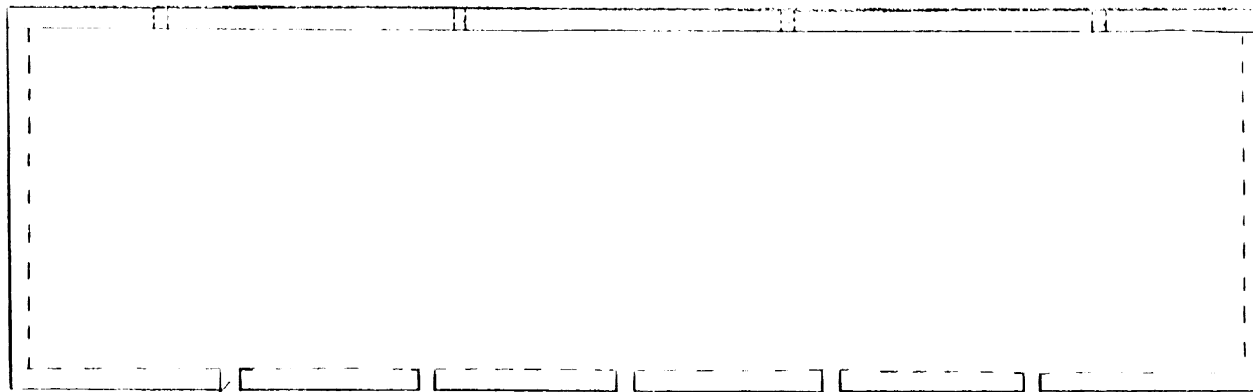


Drill air vent holes
or use peg board for
bottom of box.

3/4"X 3/8" Lip
around front and
back of box.

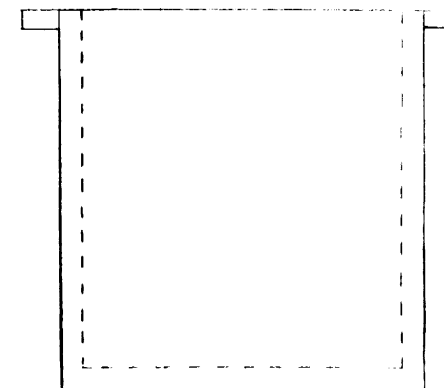
Drill holes in
lip for mounting
of the box to the
keybed.

FRONT VIEW



Air vent holes

SIDE VIEW



EXAMPLE The drawings above are only examples. Trimming in different areas will be needed to get clearances for trap levers and cables. Do this trimming before painting or staining the box.