Models: P-100
P-100M
P-200

Pianocorder™

Reproducing System

SUPERSCOPE®

ONLY FOR USE BY
TRAINED AND QUALIFIED TECHNICIANS

marantz®

INSTALLATION and FIELD SERVICE MANUAL

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Pianocorder™
Reproducing System

SUPERSCOPE®

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MARANTZ CO., INC., is a wholly owned subsidiary of Superscope, Inc., Chatsworth, California 91311

FOREWORD

The intent of this manual is not to teach piano tuning and regulation, however, a well regulated and tuned instrument will greatly enhance the performance of the PIANOCORDER™ Reproducing System.

INTRODUCTION

This manual details the procedures for the installaton of the Superscope Model P-100 PIANOCORDER Reproducing System in pianos with Direct Blow Actions (uprights and consoles) and those with Drop Actions (spinets) and the installation of the Marantz Model P-200 PIANOCORDER Vorsetzer Reproducer on all types of pianos. Installation of the Model P-100 PIANOCORDER System in grand pianos is detailed in an addendum (available separately) to this manual. Alignment and Trouble Analysis sections, which apply to the Superscope Model P-100, also apply to the Marantz Model P-100M Reproducing Piano. To insure correct installation of the P-100 and P-200 Systems, please read the following CAUTIONS and Safety and Introductory NOTES below.

A. SAFETY PROCEDURES AND CAUTIONS

1. CAUTION:
NEVER APPLY POWER TO THE SYSTEM UNTIL YOU MAKE SURE ALL THE GROUNDING STRAPS ARE SECURED TO THE GROUNDING PLATE AND SYSTEM PARTS.

2. CAUTION:
DUE TO THE HIGH VOLTAGES PRESENT IN THE SYSTEM, ALWAYS DISCONNECT THE POWER CORD AND WAIT ONE (1) MINUTE BEFORE ATTEMPTING WORK ON THE SYSTEM.

3. CAUTION:
IF IT IS NECESSARY TO WORK ON THE SYSTEM WHILE POWER IS ON, REMOVE ALL JEWELRY, such as watches, rings, or pendants, BEFORE WORK IS ATTEMPTED.

4. CAUTION:
EXERCISE EXTREME CAUTION WHEN WORKING NEAR SYSTEM PARTS WITH POWER APPLIED TO THE SYSTEM. HIGH VOLTAGES ARE PRESENT ON ALL SYSTEM PARTS.

5. CAUTION:
IF YOU DETECT DEFECTIVE CABLES OR CIRCUIT BOARDS IN THE SYSTEM, DO NOT ATTEMPT TO MAKE REPAIRS, such as splices or the resoldering of defective components. REPLACE DEFECTIVE PARTS WITH NEW ONES FROM YOUR MAINTENANCE KIT AND RETURN THE DEFECTIVE PARTS TO SUPERSCOPE, INC. Follow parts ordering procedures outlined in this manual.

6. BEFORE delivering the system to the customer, always make sure all fuses, interlocks, safety labels, and the Lower Frame Locking Hardware for the system are installed and functioning correctly.

A. SAFETY PROCEDURES AND CAUTIONS (cont'd)

7. During the process of installation, while using power tools, observe proper precautions for the use and handling of the tool being used and wear safety equipment, such as goggles or face shields, when drilling or cutting is required.

8. It is imperative that you read each step and related NOTE or CAUTION thoroughly until you are sure you understand what is required BEFORE starting the step to ensure your safety and that the installation is correct.

B. INSTALLATION NOTES

1. BEFORE starting the installation, check the piano cabinet to make sure it is structurally sound.

2. To insure system fit, several measurements of the cabinet interior must be taken. Be sure you make all these measurements as detailed in Section 1, PIANO PREPARATION.

3. Follow all Steps in the sequence given in each Section and utilize the Check List supplied (see page xi and use the Check List shown to make copies for use) to make sure all Steps are completed. As each Step is finished, check the box on the Check List at the appropriate Step.

4. In some cases, it will be necessary for you to make several calculations. These should be done on the Check List in the space provided.

5. Because of the wide variations in piano construction, this manual deals only with general installation of the Model P-100 Assembly. Should you encounter any unique problems, contact the PIANOCORDER DIVISION - Technical Service Department at the following:

Call: 1-800-447-1970----------(Continental US)
1-800-447-0890 ---------- (Alaska and Hawaii)
1-800-322-0800 ---------- (Illinois)
or write: PIANOCORDER Div. - Technical Services Dept.
20525 Nordhoff Street
Chatsworth, California 91311

6. When instructed to do so, pad exterior surfaces of the piano cabinet to protect the finish from damage.

7. Measurements identified by a Capital Letter, i.e., A, B, C, etc., that appear on two or more illustrations are equal, and indicate the same measurement.

8. Please study the illustrations that are referred to in the text of a step. These are provided to help you visualize what is required in the step before proceeding.

9. In some instances, completion of some steps will require your expertise as a piano technician in determining the best way to accomplish the work required. Because of the variations in construction techniques, detailed installation procedures cannot be given at all times.

10. In order that there will be no confusion over the names for the various parts of the piano, please study the following FIGURES and become familiar with the nomenclature used for the piano parts since these are the names that will be employed in this manual.

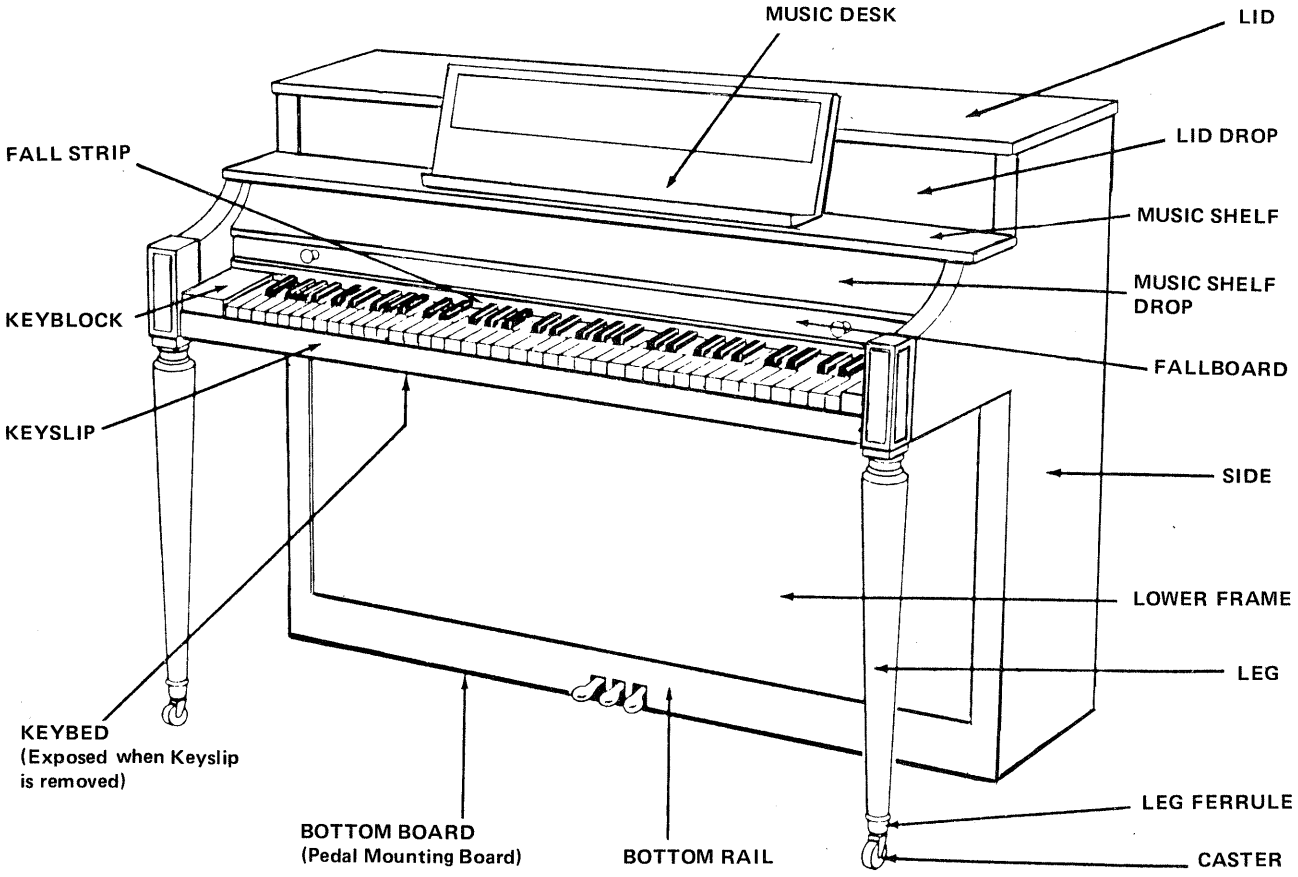


FIGURE B-1 Piano Cabinet parts nomenclature.

A. FIGURE B-1 shows a typical piano cabinet and lists the part names that will be used in this manual.

B. FIGURE B-2 shows a typical Drop Action in cross-section. Parts identified are those named in the installation procedures, which follow. For a complete parts identification, see FIGURE B-4. This type of Action is called a Drop Action because it is located below the keyboard. On this Action the Whippens are connected to the keys with Lifter Elbows and Inverted Stickers or Drop Stickers. Except for the Inverted Stickers the Action works exactly like the Direct Blow Actions shown in FIGURES B-3 and B-4.

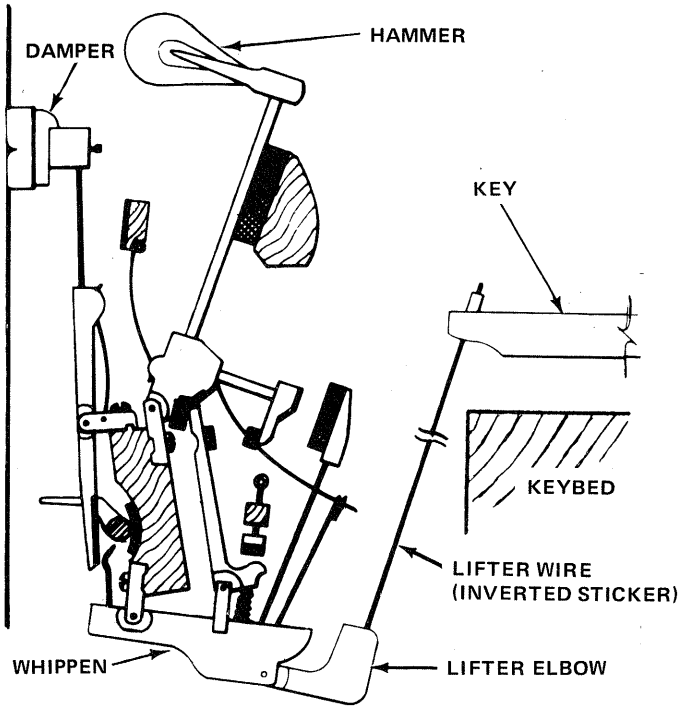


FIGURE B-2 Typical Drop Action.

FIGURE B3

Typical Console Action.

C. FIGURE B3 is a drawing of a typical Console Action. Basically, this type of Action is the same as the Upright Action shown at the left. It differs from the Upright Action in that it has no Sticker. The Capstan Screw strikes directly on the Whippen.

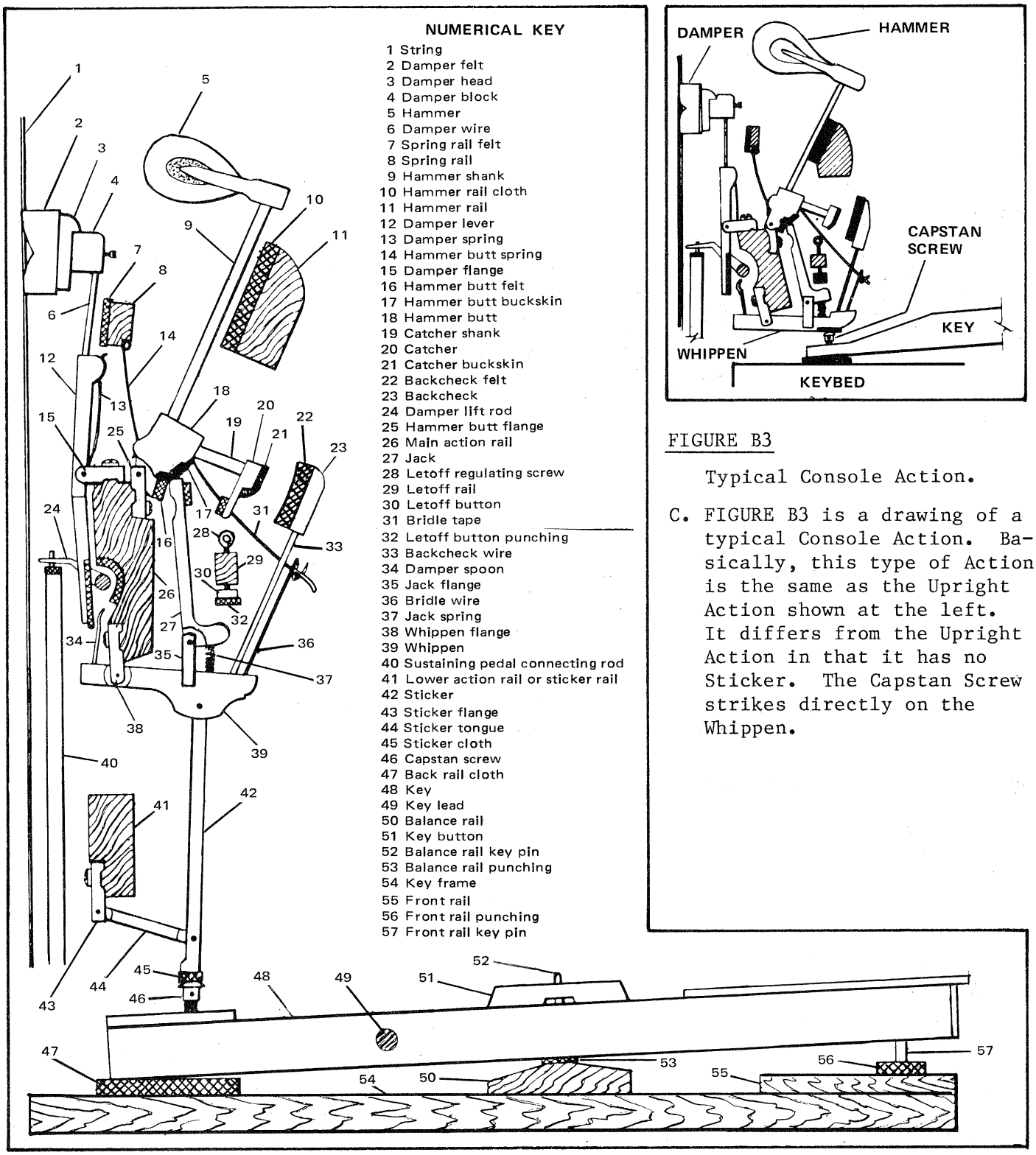


FIGURE B4 Typical Upright Action Nomenclature.

D. FIGURE B4 shows a typical Upright Action and gives the names for the various various parts of the Action. These part names apply to all the Actions, except as noted in the text.

B. INSTALLATION NOTES (cont'd)

11. Before an installation is done on a piano, you must determine if the system will, indeed, fit in the piano. Below, is a chart of the minimum specifications a piano must meet for an installation to be feasible.

MINIMUM PIANO SPECIFICATIONS			
Min. in Inches	Area of piano to measure	Type of Action	FIGURE NUMBER
16 1/2"	Underside of keybed to floor of the piano.	Direct Blow	B5 (A)
16 1/2"	Underside of Action Support Bar to floor of piano	Drop Action	B5 (B)
53 1/2"	Interior width of piano from right side to left side	All	B6
4 3/4"	From any part of the Piano Plate to the BACK of Bottom Rail on the piano	All	None
3 1/4"	From bottom of key to underside of thickest keybed support*	Direct Blow	None
3 1/4"	From bottom of Lifter Elbow or Whippen to underside of thickest Piano Plate Bar Support*	Drop Action	None
NOTE: *These dimensions obtainable only after the piano is partially disassembled.			

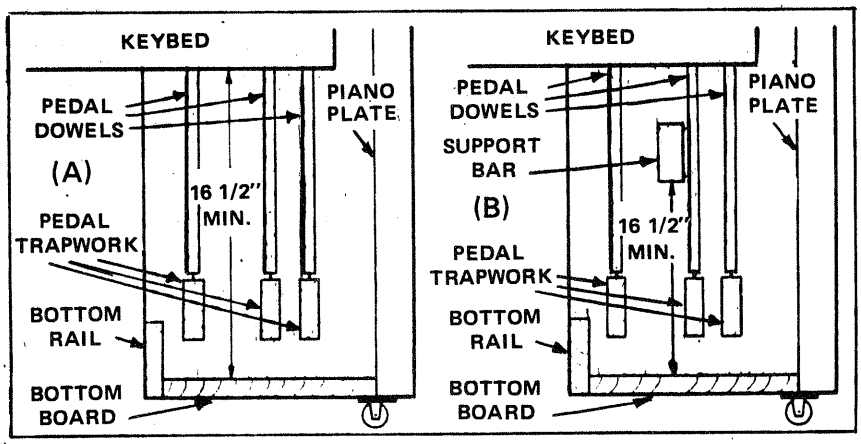


FIGURE B5 Heighth measurements for Direct Blow Actions (A) and Drop Actions (B)

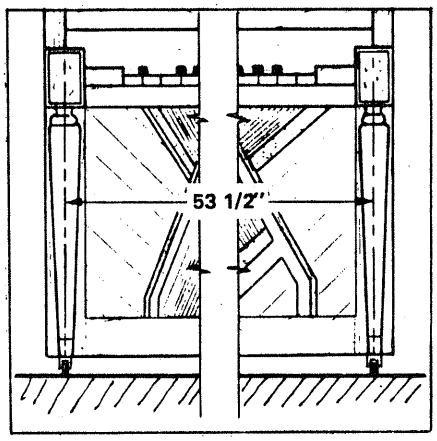


FIGURE B6 Width measurement.

NOTE:

The methods to be used when making these measurements are explained in greater detail in Section 1, PIANO PREPARATION.

B. INSTALLATION NOTES (cont'd)

12. A minimum clearance of 1/2" must be maintained between components of the system and between components of the system and the parts of the piano, except as noted in these procedures.

13. Determine if there is a minimum of 2" clearance around the Soft and Sustain Pedal Dowels from the bottom of the dowels up to a height of 16". If there is not, determine the following:

    a. Can the Pedal Trapwork be repositioned to obtain this clearance?

    b. Can this clearance be obtained if the Sostenuto Pedal Dowel is removed? (In some cases it will be necessary to remove the Sostenuto Pedal Dowel. THIS WILL NOT AFFECT THE OPERATION OF THE SYSTEM.)

14. If Pedal Dowels are located at the center of the Keybed or to the RIGHT side of the piano, determine if they can be relocated to the LEFT side of the piano.

    NOTE:

    If the Sostenuto Pedal Dowel is located at the center of the piano or at its RIGHT side it may be removed from the piano, if necessary, and will NOT affect the operation of the system.

15. Any Pedal Trapwork located between the Sustain Pedal and the RIGHT side of the piano will have to be relocated to the left side of the piano or removed completely so the Power Supply and, in some cases, the Playback Logic and Expression/Record Boards can be installed on the floor of the piano.

16. IF THE SOLENOID RAIL TOUCHES THE PIANO PLATE AFTER IT IS INSTALLED, THE PIANO PLATE MUST BE GROUNDED TO THE GROUNDING PLATE OF THE SYSTEM.

17. Generally, the photos in this manual are photos of one piano, but, in some cases, photos of a second piano are used to show differences in construction such as you will encounter in the field. The piano used most often for the pictures will be labelled Piano #1, while the second piano used will be labelled Piano #2 in photos where it is used.

18. In some cases, photos or illustrations are repeated so it is not necessary for you to turn back pages to refer to the illustration or photo.

19. Unless otherwise noted, these procedures apply to pianos with Direct Blow Actions (consoles or uprights) or Drop Actions (spinets).

TOOLS REQUIRED LIST

1. SAFETY EQUIPMENT

a. Face Shield or Goggles
b. Respirator
c. First Aid Kit
d. Rubber Gloves
e. Ground Fault Circuit Interrupter (Sears #34A5316 or equivalent)
f. Rubber Floor Mat

2. POWER TOOLS

a. 3/8" or 1/4" Electric Drill
b. Saber Saw (1" Stroke recommended)

3. HAND TOOLS

a. Set of Wood Chisels
b. Awl
c. Rawhide Hammer
d. Claw or Ball Pein Hammer
e. Backsaw (Miter Saw)
f. 6" Slip-Joint Pliers
g. Screwdrivers:
   1. Phillips #2 pt.
   2. Common 1/8" and 1/4" blades
h. 1/4" and 5/16" Nutdrivers
i. Putty Knife
j. Center Punch
k. Hack Saw
l. Wood and Metal Files

4. MISCELLANEOUS OTHER ITEMS

a. 1/2" Wood Boring Bit
b. 12" Adjustable Square
c. 48" Steel Ruler
d. 6' Tape Measure
e. High Speed Drill Bits:
   Fractional Sizes
   1/16" 1/8"
   3/32" 9/32"
f. X-acto Knife & spare blades
g. Coarse-toothed Saber Saw blades (12 teeth to the inch)
h. Soldering Aid (fork and reamer tips)
i. Masking Tape (3/4" or 1" wide)
j. Pencil or Felt Pen
k. Padding Material
l. White Glue

NOTE: You should also carry a supply of piano Felt of various thicknesses and piano punchings and a supply of hammer felt.

RECOMMENDED OTHER TOOLS

1. Piano Action Cradle
2. Piano Tilter
3. Table Saw
4. Piano Dolly

NOTE:
The list above details only the general tool requirements for the installation of the system. There may be cases where specialized tools (such as Allen Hex Drivers, Spline Screwdrivers, etc.) may be required due to the construction of the piano on which you are working. In these cases you will have to obtain additional tools not listed above.

PIANOCORDER MODEL P-100 ASSEMBLY
PN 100-00C001 PARTS LIST

PEDAL SOLENOID ASSEMBLY PN 100-01D010-1			2 ea.
2 ea.	Dowel Assy	(6")	PN: 100-01B007-1
2 ea.	Dowel Assy	(24")	100-01B007-3
2 ea.	Coupler		100-02A051-1
2 ea.	Pedal Solenoid		100-01C009-1
2 ea.	Support Assy		100-01B008-1
2 ea.	Wood Base		100-02A049-1
4 ea.	Wood Screw #6 X 1" long		
EXPRESSION - PLAYBACK ASSEMBLY PN 100-01D036-1			1 ea.
1 ea.	Bracket, Playback - Record/Expression Boards		100-02D127-1
1 ea.	PC Board, Record/Expression		100-04D010-1
1 ea.	PC Board, Playback		100-04D011-1
6 ea.	Support, Plastic		DLCBS-14N
6 ea.	Support, Plastic		CBS-8N
4 ea.	Screw, Hex Washer Hd. #6 X 1/2" long		
SOLENOID RAIL ASSEMBLY PN 100-01J024-1			1 ea.
2 ea.	Bracket, Rail		100-02C067-1
1 ea.	Pedal Switch Assembly		100-01C003-1
4 ea.	Screw, Pan Hd. 6-32 X 1/2" long		
4 ea.	6-32 Square Nut		
10 ea.	Screw, Hex Washer Hd. #6 X 3/16" long		
2 ea.	PC Boards, Treble and Bass Drivers		100-04D003-1
1 ea.	PC Board, Middle Driver		100-04D004-1
8 ea.	Screw, Hex Washer Hd. #10 X 1" long		
4 ea.	#6 Flat Washer		
2 ea.	1/4 20 Hex Nut		
2 ea.	1/4 - 20 X 1" long Screw, Hex Hd.		
2 ea.	1/4" Flat Washer		
2 ea.	1/4" Lock Washer		

KEY SWITCH ASSEMBLY PN 100-01D028-1	1 ea.
1 ea. Dust Cover	100-02B070-1
1 ea. Key Switch Rail	100-02C073-1
2 ea. PC Board, Key Switch (32 Switches)	100-04F005-1
1 ea. PC Board, Key Switch (16 Switches)	100-04F006-1
22 ea. Screw, Pan Hd. #4 X 3/16" long	
4 ea. Leveling Screw	100-02B071-1
KEY SWITCH ASSEMBLY PARTS (cont'd)	
4 ea. "Tee" Nut (1/4 - 20)	SS59029
4 ea. Snap Ring	5133-25
4 ea. #10 Flat Washer .031" Thick	
4 ea. Wave Washer	U250-0110
POWER SUPPLY ASSEMBLY PN 100-01F041-1	1 ea.
4 ea. Screw, Hex Washer Hd. #6 X 1/2" long	
1 ea. ID Plate (P-100)	
6 ea. Screw, Hex Washer Hd. #8 X 3/4" long	
SAFETY INTERLOCK SWITCH ASSEMBLY PN	
3 ea. Screw, Hex Washer Hd. #6 X 1/2" long	
1 ea. Cable Clamp 5/16" - 3	
HARNESS ASSEMBLY PN 100-09F014-1	1 ea.
1 ea. Cable #4 Assy (BLK & RED)	100-09C001-1
2 ea. Cables #5 & #6 Assy, (BLK & RED)	100-09C001-3
1 ea. Cable #7 Assy, (GRN)	100-09C002-1
1 ea. Cable #9 Assy, (BLU)	100-09C003-1
1 ea, Cable #8 Assy, (YEL)	100-09C004-1
1 ea. Cable #13 Assy, (WHT)	100-09C005-1
1 ea. Cable #14 Assy, (RED)	100-09C005-3
1 ea. Cable #11 Assy, (VIO)	100-09C006-1
1 ea. Cable #3 Assy, (ORG)	100-09C007-1
2 ea. Cables #17 & #18 Assy, (GRN - with Lugs)	100-09C010-5

TAPE RECORDER BRACKET ASSEMBLY PN 100-01C047-1		1 ea.
1 ea. Tape Recorder Bracket		
6 ea. Screw, Hex Washer Hd. #8 x 3/4" long		
MISC. PARTS KIT PN PL-100-01-061-0		1 ea.
2 ea. Lower Frame Grilles	100-02A158-1	
11 ea. Wood Screws, Phillips Hd. #6 x 1/2" long		
10 ea. Tie Wraps	08350	
1 ea. Lower Frame Lock Bracket	100-02B161-1	
1 ea. Label, User Warning	100-02C162-1	
5 ea. Pads	100-02A001-1	
5 ea. Tinnerman Clips	C26217-017-4	
5 ea. Caps	100-02B013-1	
1 ea. System Grounding Plate	100-02B163-1	
1 ea. Name Plate (PIANOCORDER REPRODUCING PIANO)	896-3028-000	
2 ea. Screws for Name Plate	896-3029-000	
1 ea. UL Label		
2 ea. Screw, Hex Hd. Sheet Metal #6 x 1/2" long		
2 ea. Stove Bolt 10 - 32 x 2" long		
2 ea. Hex Nuts 10-32		
1 ea. Wooden Alignment Stick 48" x 1" x 1/4"		
PT-100 TAPE RECORDER		1 ea.
OWNER'S MANUAL (PN 199-1407-000)		1 ea.
PRE-RECORDED TAPE KIT (RP-213)		1 ea.

1. PIANO PREPARATION

To prepare the piano for system installation it will be necessary to determine if the system will fit in the piano. You must remove several cabinet parts to expose the keybed and the interior of the cabinet to make these measurements.

This section explains which measurements are to be taken and where to take them. Also noted are the locations of the Pedal Dowels, cause installation cannot take place unless the dowels can perform their functions while not interfering with the parts of the system to be installed.

Cabinet parts to be removed are listed and the order of their removal given. Care must be taken that cabinet parts are not damaged during and after their removal. Please observe the precautions stated in the NOTES or CAUTIONS relating to some steps.

CAUTION:

BEFORE STARTING THE INSTALLATION, READ THE SAFETY AND INTRODUCTORY NOTES.

STEP 1-1

Pad the legs and sides of the Piano.

STEP 1-2

Since you will be working in the area below the Keybed in STEPS 1-3 through 1-12, the work is most easily done with the piano on its back. If you have a piano tilter, lay the piano on its back with the tilter.

NOTE:

STEPS 1-3 through 1-9 are done to locate the Lower Frame (LF) Line. This line is used as a reference for measurements in later Steps.

STEP 1-3

At the RIGHT side of the piano, hook your tape measure on the BACK edge of the Lower Frame and measure to the FRONT edge of the piano's side as shown in FIGURE 1-1. Write the measurement (labelled A in FIGURE 1-1) on Line A under this Step on the Check List.

STEP 1-4

Remove the Lower Frame (see FIGURE 1-2), pad it, and set it aside away from the work space.

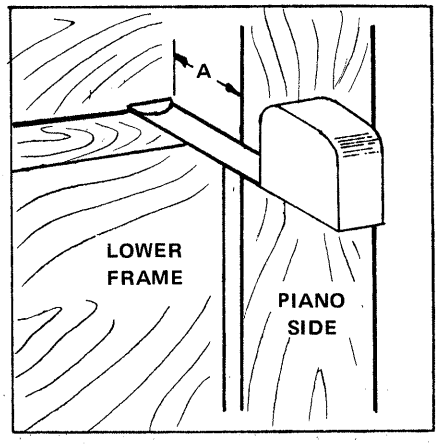


FIGURE 1-1 Measure dimension A above.

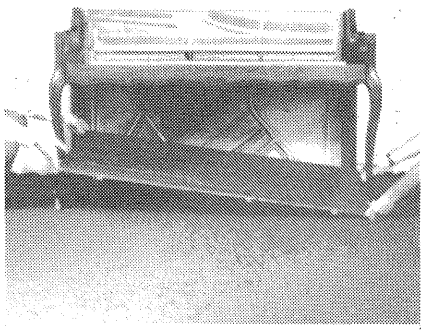


FIGURE 1-2 Remove the Lower Frame.

STEP 1-5

Place a small piece of tape on the underside of the Keybed near the RIGHT side of the piano. Refer to STEP 1-3 on the Check List and, using the measurement (A) written there, measure in from the FRONT edge of the Piano's side and mark the tape as shown in FIGURE 1-3 (dimension A).

NOTE:

Dimension A will also be used to locate the Safety Interlock Switch when it is installed later in these procedures.

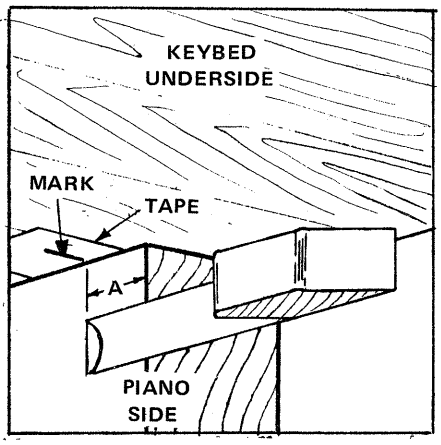


FIGURE 1-3 Measure dimension A and mark the tape.

STEP 1-6

Measure from the REAR of the Keybed to the mark on the piece of tape (See FIGURE 1-4), then write the measurement on Line B under this Step on the Check List.

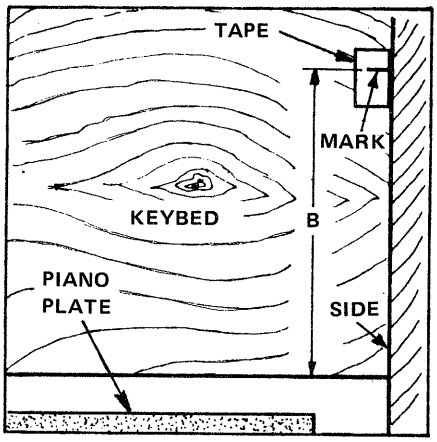


FIGURE 1-4 Measure dimension B above.

STEP 1-7

Use the measurement from Step 1-6 and measure from the REAR of the Keybed near the Lower Frame Lock (see FIGURE 1-5). Mark the Keybed as shown in the Figure.

STEP 1-8

Repeat the procedure detailed in STEP 1-7 at the LEFT side of the piano and mark the Keybed.

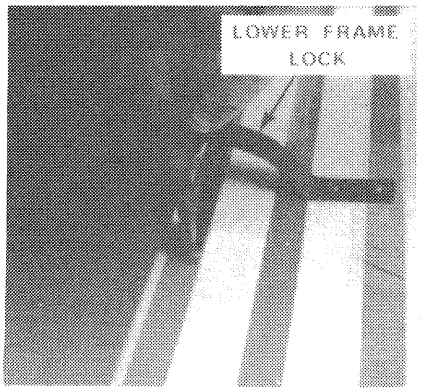


FIGURE 1-5 Measure in from the rear of the Keybed and mark it.

STEP 1-9

Using a pencil or felt pen and a straight-edge, draw a line across the underside of the Keybed connecting the mark on the tape and the marks made in STEPS 1-7 and 1-8 as shown in FIGURE 1-6. At each end of the Keybed, label the line "LF". This line will be used as a reference when taking measurements in later steps.

STEP 1-10

Measure from the UNDERSIDE of the Keybed (see FIGURE 1-7A) on pianos with Direct Blow Actions or the UNDERSIDE of the Action Support Bar (see FIGURE 1-7B) on pianos with Drop Actions to the Bottom Board of the piano. On BOTH types of pianos, the measurement MUST be 16-1/2" minimum or the system cannot be installed in the piano.

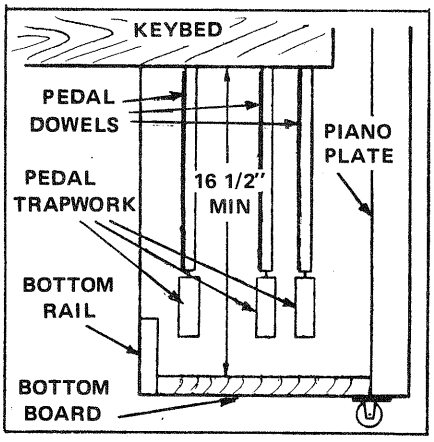


FIGURE 1-7A Measure from the Keybed to the Bottom Board.

STEP 1-11

Measure the interior width of the piano as shown in FIGURE 1-8. Take the measurement near the REAR of the Keybed. This measurement MUST be 53-1/2" minimum or the system CANNOT be installed in the piano.

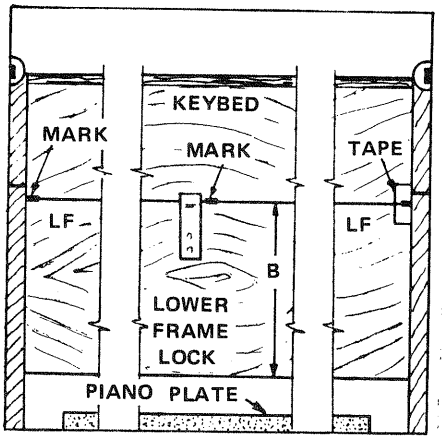


FIGURE 1-6 Draw a line across the Keybed connecting the marks Label the Line "LF".

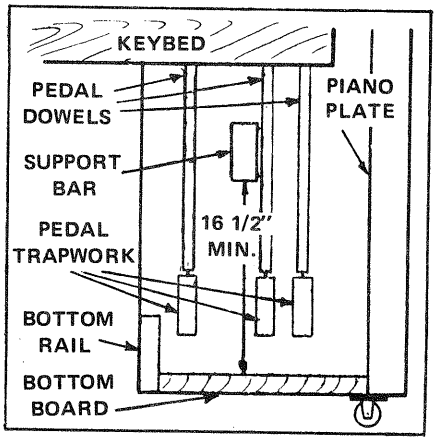


FIGURE 1-7B Measure from the Support Bar to the Bottom Board.

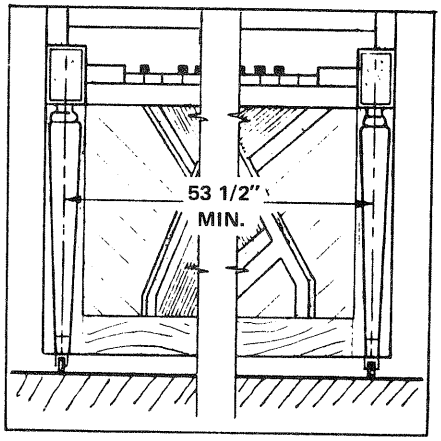


FIGURE 1-8 Measure the interior width of the piano.

STEP 1-12

Refer to FIGURE 1-9 and note the location of the shaded areas. These areas define the approximate space required for the installation of the Power Supply. Notice that the shaded area begins 2" from the end of the Pedal Trapwork and 14" from the right side of the piano. The 14" allowance at the right is the space required for the installation of the Playback and Expression/Record Circuit Boards, if it is necessary to install them in this location. (Installation of these circuit boards will be detailed later in these procedures.) In the shaded area, find a space 12" x 6" x 4-3/4" (min.) as indicated by the rectangle shown in FIGURE 1-9. This is the space required for the actual installation of the Power Supply. There MUST be 4-3/4" minimum between any part of the Piano Plate and the BACK of the Bottom Rail or the system CANNOT be installed in the piano. See the NOTES below.

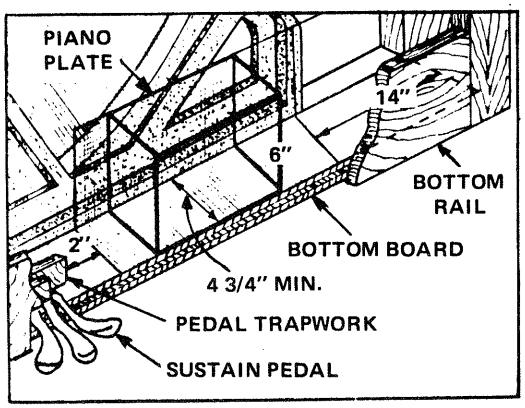


FIGURE 1-9 Location of the Power Supply.

NOTES:

1. If Pedal Trapwork runs through this area, disregard it for now. (The handling of the Trapwork will be covered later in these procedures.)

2. In special instances, because of space limitations, it may be necessary to mount the Power Supply and the Playback and Expression/Record Boards on the Bottom Board. Normally, the Playback and Expression/Record Boards are mounted on the right side of the piano.

STEP 1-13

If the piano is laying on its back, tip it up on its feet with the piano tilter.

STEP 1-14

In this Step you will expose the top of the Keybed by removing several cabinet parts. Refer to FIGURE 1-10 on the next page and remove the cabinet parts listed, in the order indicated by the numbers preceding the part names, on the Figure. See the NOTES below.

1. Due to the variation in piano construction employed by different manufacturers, two or more parts listed separately in FIGURE 1-10 may be removed as an assembly (see FIGURES 1-11 through 1-16 on pages 5 and 6). In such cases, it is NOT necessary to separate the parts either before or after their removal from the piano.

2. FIGURES 1-11 through 1-16 show the disassembly of two different pianos. Piano #1 is the piano used in most of the photos in this manual. Photos of Piano #2 are used as examples of differences you may encounter in the field.

3. The numbers in parentheses following the part names in Figure titles refer to the order of their removal listed in FIGURE 1-10.

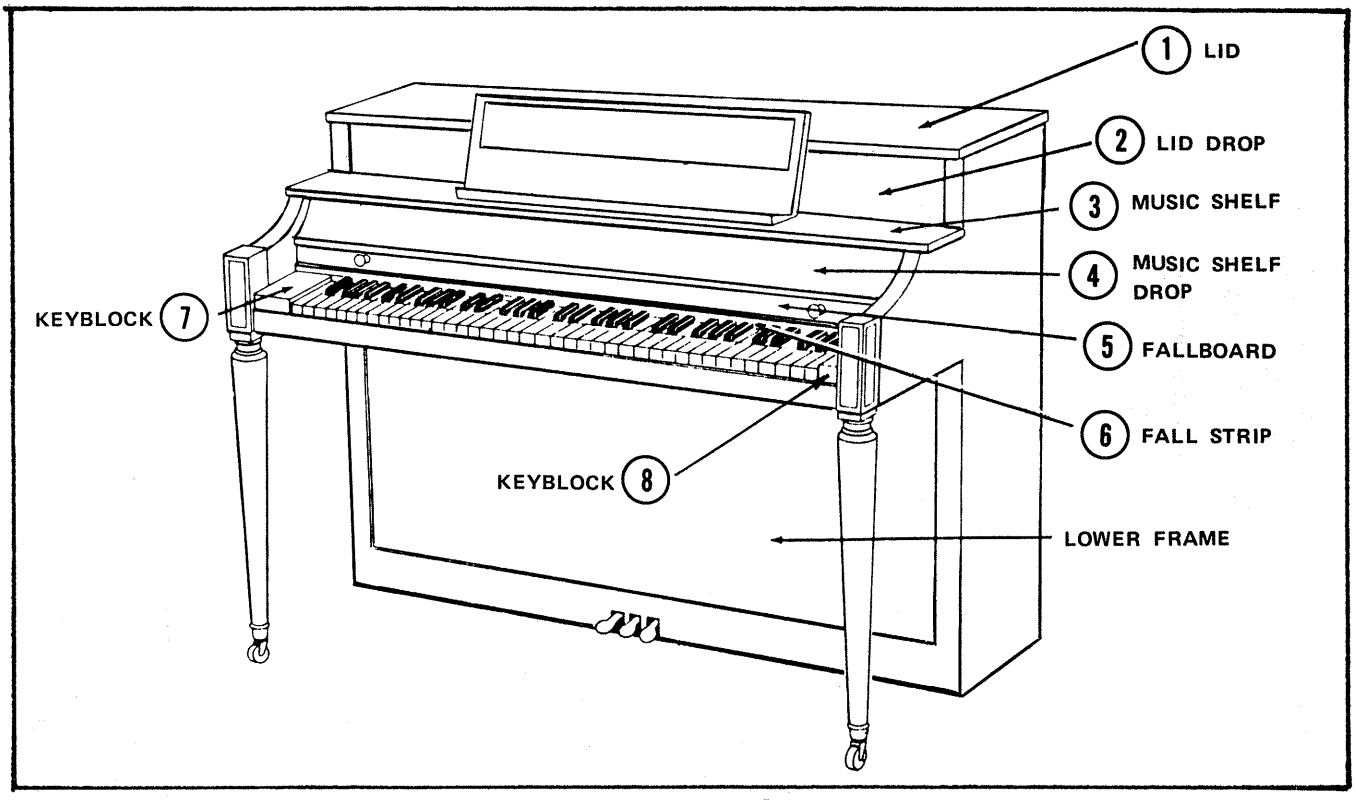


FIGURE 1-10 Cabinet parts to be removed.

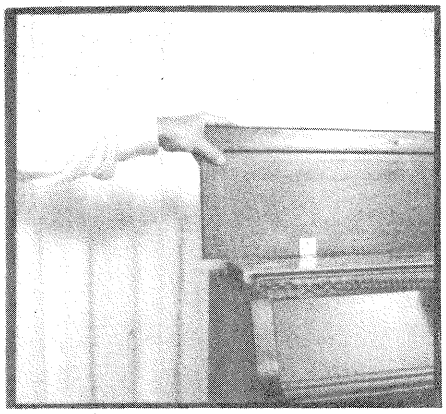


FIGURE 1-11 Piano #1- Lid (1).

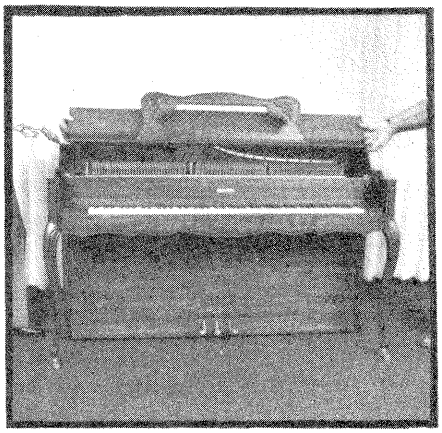


FIGURE 1-12 Piano #1- Lid Drop (2) and Music Shelf (3).

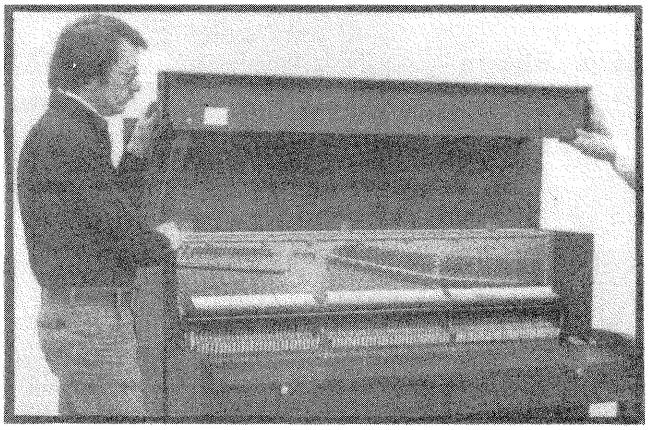


FIGURE 1-13 Piano #2 - Lid (1), Lid Drop (2), Music Shelf (3), and Music Shelf Drop (4).

NOTES (Cont'd)

4. Notice that the parts removed from Piano #1 shown in FIGURES 1-11 and 1-12 are removed as an assembly on Piano #2 as shown in FIGURE 1-13. Note, also, that the Music Shelf Drop (4) on Piano #1 (see FIGURE 1-14) is also part of the first assembly removed from Piano #2 as shown in FIGURE 1-13.

FIGURE 1-14 Piano #1 - Music Shelf Drop (4) and Fallboard (5).

NOTES:

5. On Piano #1, the Music Shelf Drop (4) and Fallboard (5) are removed as an assembly as shown in FIGURE 1-14, while on Piano #2, the Fallboard (5) is removed separately as shown in FIGURE 1-15.

6. Since Piano #1 has no Fall Strip (6), with the removal of the Fall Strip (6) from Piano #2 (see FIGURE 1-16 below), both pianos are disassembled to the same degree.

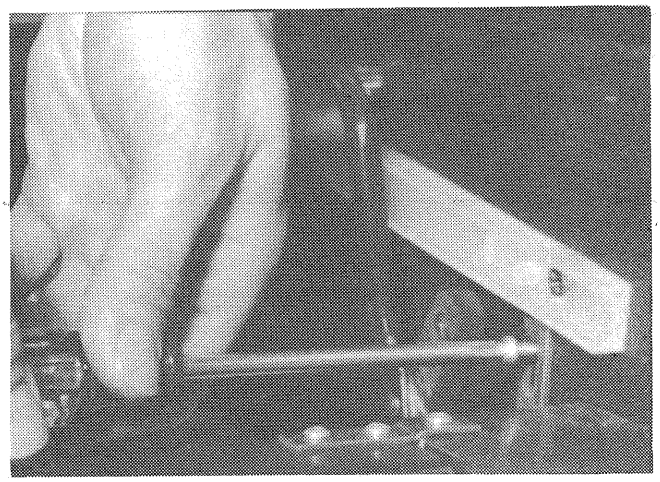


FIGURE 1-15 Piano #2 - Fallboard (5).

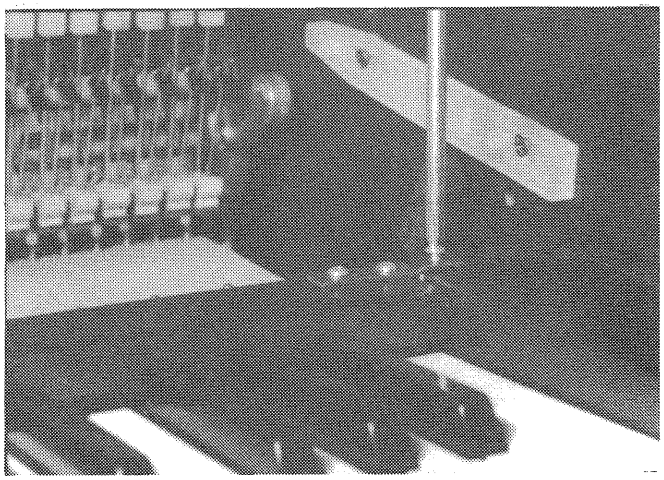


FIGURE 1-16 Piano #2 - Fall Strip (6).

NOTES (Cont'd)

7. The removal of the Key Blocks (7 and 8) was the same for both pianos, so the removal of one from Piano #1 is shown in FIGURE 1-17.

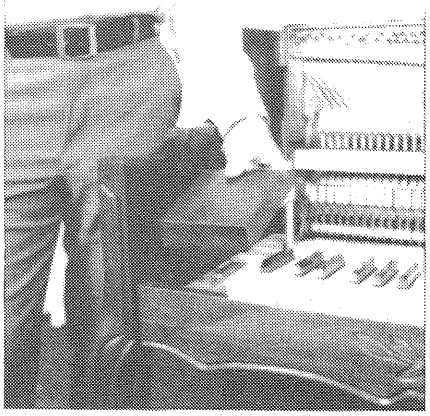


FIGURE 1-17 Piano #1 - Key Blocks (7 and 8).

STEP 1-15
Unless the keys are numbered and the numbers are CLEARLY legible, number the keys from 1 to 88, starting from the first key (1) on the LEFT end to the last Key (88) on the RIGHT as shown in FIGURE 1-18 below.

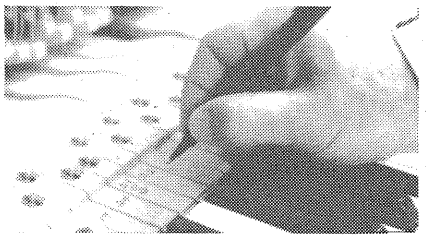


FIGURE 1-18 Number the keys from 1 to 88.

NOTE:
STEPS 1-16 and 1-17 are done to determine if the Pedal Solenoids can be installed in the piano. If they CANNOT, the system CANNOT be installed.

STEP 1-16

Note the location of the Pedal Dowels in the piano. As examples, see FIGURES 1-19 (Piano #1) and 1-22 (Piano #2). Regardless of the Dowel arrangement in the piano, ALL the Pedal Dowels MUST be located at the LEFT side of the piano to permit the installation of the system. Determine if the Dowels can be relocated at the LEFT side of the piano, if they are not so located. See the NOTES below.

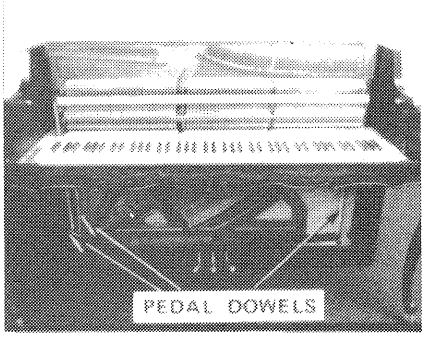


FIGURE 1-19 Piano #1 - Pedal Dowel locations.

NOTES:

1. If Pedal Dowels must be relocated, it will be necessary to modify the Action and Pedal Trapwork.

2. When modifications to the Action and Trapwork are necessary, your expertise as a piano technician is relied upon for determining the best and fastest way the modifications can be done. Also, it is not within the scope of this manual to describe the procedures necessary to accomplish these modifications because of the variations in piano construction employed by different manufacturers.

3. In making the determinations above and the measurements to follow in STEP 1-17, you are mainly concerned with the Soft and Sustain Pedal Dowels. In some cases, the Sostenuto (middle) Pedal Dowel may have to be removed to permit the installation. Should it be necessary to remove this dowel, the operation of the system is NOT affected, but the SOSTENUTO Pedal will NOT operate when the piano is played manually.

4. If relocation of the Pedal Dowels is NOT possible, the system CANNOT be installed in the piano.

STEP 1-17

If the Dowels are located or can be relocated at the left side of the piano, determine the following:

A. With BOTH the Soft and Sustain Pedal Dowels at the left side of the piano, see if a clearance of 4" minimum is available between these dowels and that the 4" clearance is maintained from the top of the Trapwork up to a height of 8" as shown in FIGURE 1-20.
B. If the 4" clearance is NOT available, determine if the Pedal Dowels can be repositioned to obtain the clearance.

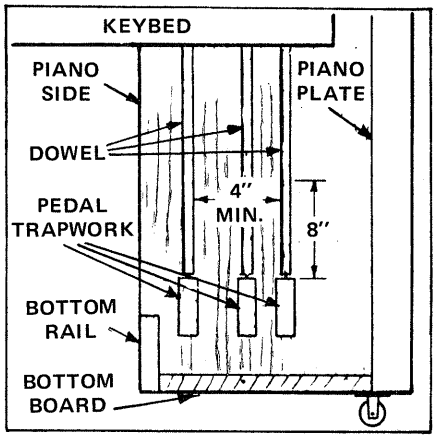


FIGURE 1-20 Determine if a clearance of 4" is available.

STEP 1-17 (cont'd)

C. If the 4" clearance cannot be met, see if a clearance of 2" is available or can be made available by repositioning the Dowels so that the Pedal Solenoid height can be staggered. The 2" minimum clearance MUST be maintained from the top of the Pedal Trapwork up to a height of 16" as shown in FIGURE 1-21. If this clearance cannot be obtained, the system CANNOT be installed in the piano.

D. If the Sostenuto (middle) Pedal Dowel is to remain in the piano, a clearance of 2" minimum MUST be maintained between it and the Soft and Sustain Pedal Dowels from the top of the Trapwork up to a height of 16".

E. If the 2" clearance cannot be made available by repositioning the Dowels, the system CANNOT be installed in the piano. See the NOTE below.

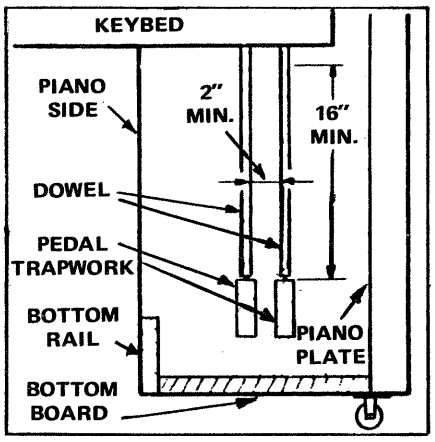


FIGURE 1-21 Determine if a clearance of 2" is available to a height of 16".

NOTE:
If permitted by the customer, the Sostenuto (middle) Pedal Dowel may be removed from the piano should you be unable to get the 2" clearance. When the Dowel is removed, the Sostenuto (middle) Pedal will not operate when the piano is played manually, but system operation is NOT affected.

STEP 1-18
Label the LEFT Pedal Dowel "SOFT", the MIDDLE Pedal Dowel "SOSTENUTO", and the RIGHT Pedal Dowel "SUSTAIN" as shown in FIGURE 1-22. (This is a photo of the Dowel arrangement in Piano #2.)

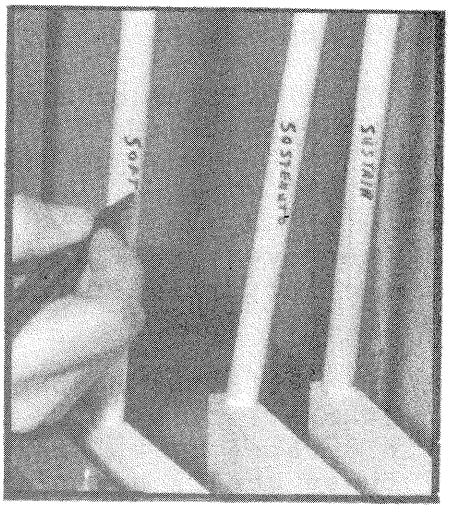


FIGURE 1-22 Label the Pedal Dowels as shown.

STEP 1-19
Pad the Bottom Rail and Key Slip to protect the finish.

NOTE:
STEPS 1-20 through 1-29 are done to insure the fit of the Solenoid Rail in pianos with Drop Actions. If you are working on a piano with a Direct Blow Action, please proceed to STEP 1-30 on page 12. Because the Key Solenoid Rail placement is different in pianos with Direct Blow Actions and Drop Actions, procedures described for installation will be different, however, measuring to insure that the system will fit in the piano is basically the same.

STEP 1-20

Measure from the BOTTOM of the Lifter Elbows centered over the Piano Plate Bar Supports to the BOTTOM of the Bar Supports as shown in FIGURE 1-23. These measurements MUST NOT exceed 3-1/4" or the system CANNOT be installed in the piano.

NOTE:

The Actions on some makes of pianos differ from that shown in FIGURE 1-23 in that the Whippens themselves extend over the Support Bar (see FIGURE 1-27). On these, the measurement is taken from the BOTTOM of the Whippen.

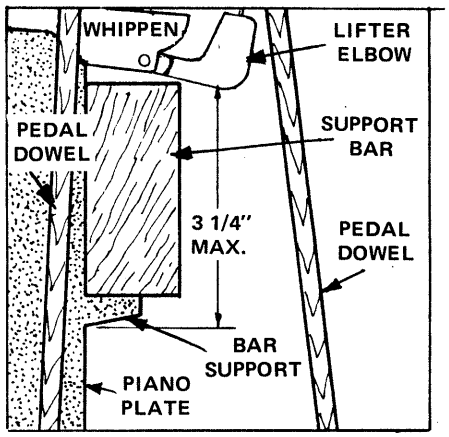


FIGURE 1-23 Measure from the Bottom of the Elbows to the bottom of the support as shown above.

STEP 1-21

Use a pencil or felt pen and outline the Keybed Support where it attaches to the Keybed and the Support Bar so it can be reinstalled in its proper position. Remove the Keybed Support and set it aside with the other piano parts. (See FIGURE 1-24 for location of the Keybed Support.)

STEP 1-22

At the LEFT end of the Action, mark the fifth (Key 5) Lifter Elbow (or Whippen) with a pencil or felt pen, then, at the RIGHT end, mark the Key 84 Elbow (or Whippen). See FIGURE 1-24 for the location of the Lifter Elbows (or Whippens).

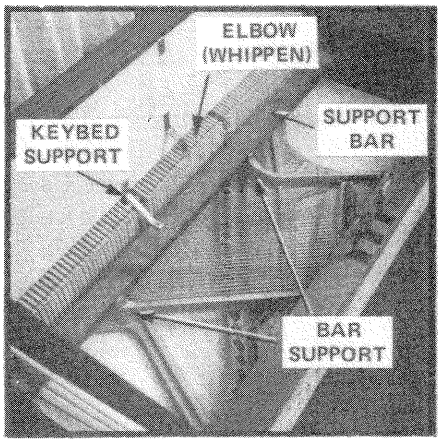


FIGURE 1-24 Drop Action parts identification.

STEP 1-23

Measure from the OUTSIDE edge of the Key 5 Elbow to the OUTSIDE edge of the Key 84 Elbow and mark the center of the measurement on the Action Support Bar as shown in FIGURE 1-25. Label the mark with a "C". This mark indicates the center of the Solenoid Rail, when it is installed in the piano. It will also be used to center the Solenoid Alignment Ruler before the ruler is marked at the centers of the Lifter Elbows in STEP 1-28.

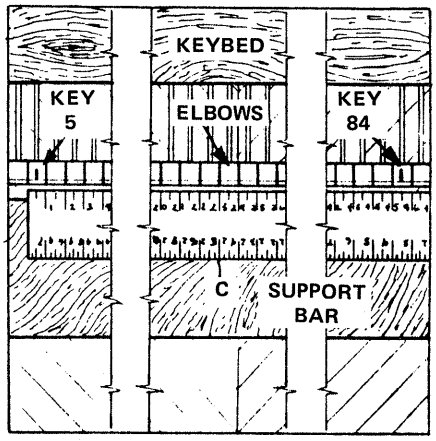


FIGURE 1-25 Mark the center point between the Key 5 and Key 84 Whippens.

NOTE:

In STEPS 1-24 and 1-25, you will determine where the ends of the Solenoid Rail (SR) fall when it is installed in the piano and also determine if it is necessary to modify the rail so it will fit in the piano.

STEP 1-24

Measure from the mark labelled "C" (on the Support Bar), out 25" toward the LEFT side of the piano (see FIGURE 1-26). This measurement equals half the 50" length of the Solenoid Rail. Determine the following:

A. If the measurement ends 1/4" or more to the right side of the Pedal Dowel next to the FRONT of the Support Bar, mark the end of the measurement, and label the mark "SR" as shown in FIGURE 1-26. This mark indicates where the left end of the Solenoid Rail falls when it is installed.

B. If the measurement ends AT, BEHIND, or to the LEFT of the Pedal Dowel next to the FRONT of the Support Bar (see FIGURE 1-28), determine the following:

   1. See if there is 1-1/2" minimum between the FRONT of the Support Bar and the Dowel (see FIGURE 1-27) or if the Dowel can be repositioned to obtain the 1-1/2" clearance. If this condition is met, mark the end of the measurement on the Support Bar and label the mark "SR" then proceed to STEP 1-25.

   2. If the 1-1/2" clearance cannot be obtained, determine how far to the RIGHT (dimension C in FIGURE 1-28) the end of the Solenoid rail must be trimmed so its end will be 1/4" to the RIGHT of the Dowel. Write the measurement on Line C under this Step on the Check List and label the mark "SR". See the NOTE below.

NOTE:

The amount to be trimmed from the end of the Solenoid Rail (dimension C above) must NOT exceed 1/2", if more, the system CANNOT be installed in the piano.

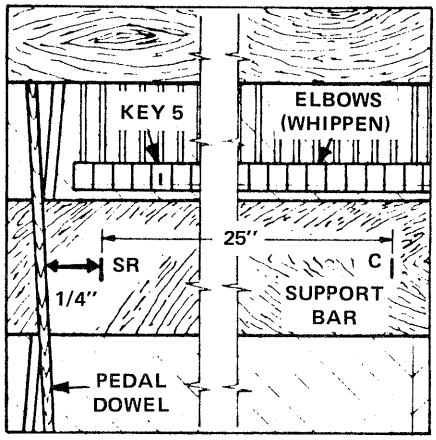


FIGURE 1-26 Measure out 25" and mark and label the Support Bar.

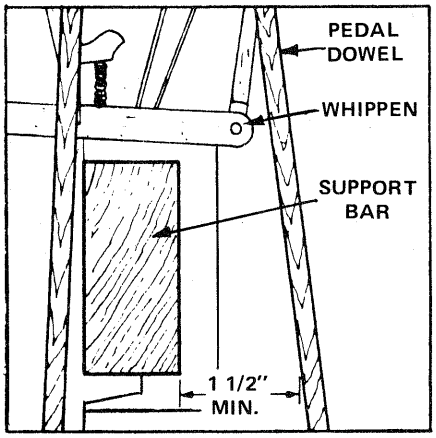


FIGURE 1-27 Measure for a clearance of 1-1/2" as shown above.

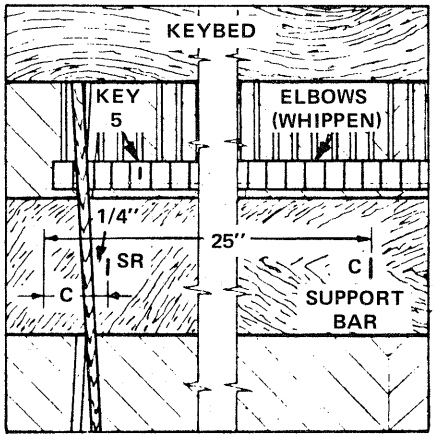


FIGURE 1-28 Measure dimension C and mark the Support Bar.

STEP 1-25

From the mark labeled "C" on the support Bar, measure out 25" toward the RIGHT side of the piano (see FIGURE 1-29) and determine the following:

A. If the measurement ends 1/4" or more to the LEFT of the piano's side, mark the end of the measurement on the Support Bar, label the mark "SR" as shown in FIGURE 1-29, then proceed to the next Step.
B. If the measurement ends AT or BEYOND the side of the piano as shown in FIGURE 1-30, determine how far to the LEFT the Solenoid Rail will have to be trimmed so its end will be 1/4" from the piano's side (dimension D in FIGURE 1-30) and write this dimension on Line D under this step on the Check List. Mark the point 1/4" from the side of the piano and label the mark "SR" as shown in the Figure. See the NOTE below.

NOTE:

The amount to be trimmed from the rail (dimension D above) MUST NOT exceed 1/2", if more, the system CANNOT be installed in the piano.

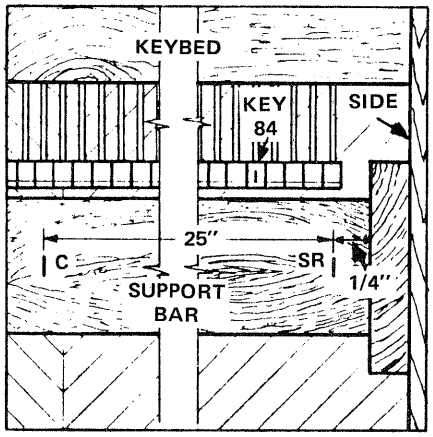


FIGURE 1-29 Measure out 25" and mark the bar.

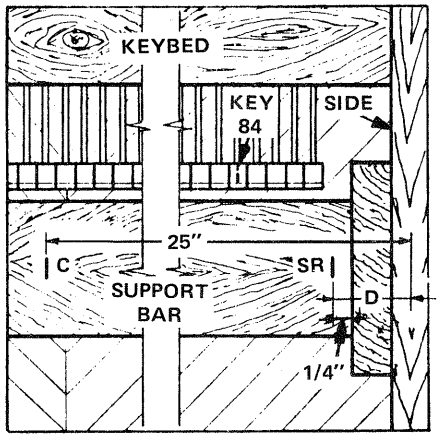


FIGURE 1-30 Measure dimension D above and mark the Support Bar.

STEP 1-26

Locate the mark labelled "SR" on the LEFT side of the Support Bar. Use a pencil or felt pen and a square to draw a line from the mark (SR) to the bottom of the bar as shown in FIGURE 1-31. Repeat this procedure at the mark (SR) at the RIGHT side of the bar. See the NOTE below.

NOTE:

These lines indicate the position of the OUTSIDE edges of the Key Solenoid Rail Brackets when they are installed in the piano.

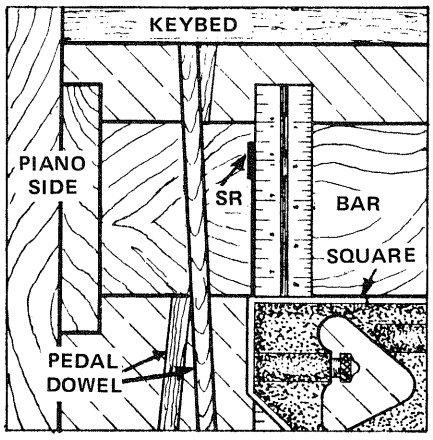


FIGURE 1-31 Draw a line from the mark (SR) to the bottom of the Support Bar.

STEP 1-27

Get the wooden stick (48" x 1" x 1/4") from the shipping carton. Measure its length and mark the center of the measurement at the edge of one side. Label the mark with a "C", then set the stick against the Support Bar directly under the Elbows with the mark labelled "C" toward the BOTTOM of the piano (see FIGURE 1-32). Align the mark (C) on the stick with the mark (C) on the Support Bar as shown in FIGURE 1-32. Tape the stick in place with masking tape as shown.

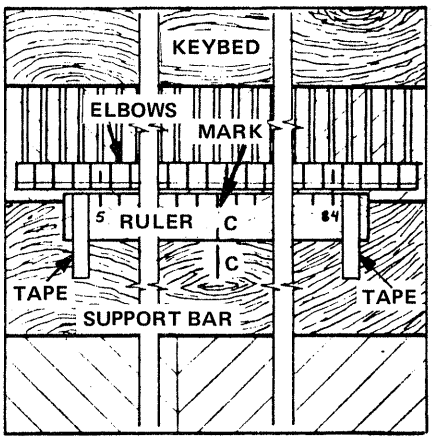


FIGURE 1-32 Align the mark (C) on the stick with the mark (C) on the Support Bar.

STEP 1-28

Mark the centers of the Lifter Elbows on the stick, starting from the Key 5 Elbow on the LEFT and going to the Key 84 Elbow on the RIGHT (the Key 5 and Key 84 Elbows are those that were marked). Label the first Elbow center mark on the LEFT end of the stick "5" and the last mark on the RIGHT "84". This stick will be called the Solenoid Alignment Ruler from this point on because it will be used to align the Key Solenoids in Section 5. If you are working with a helper, give the Solenoid Alignment Ruler to him so he can align the solenoids in Section 5 when he is ready. The Elbow center marks are shown on the ruler in FIGURE 1-32 above.

STEP 1-29

Install the Keybed Support as shown in FIGURE 1-33. Be careful to align the Support to the exact position it was in before it was removed.

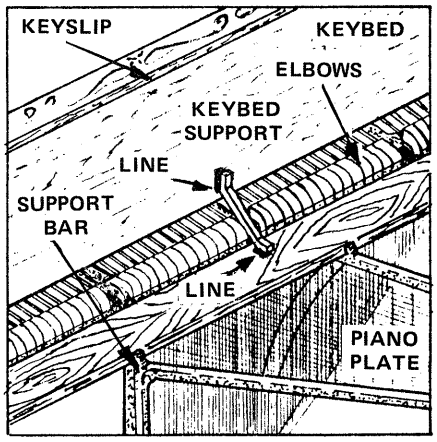


FIGURE 1-33 Keybed Support installed.

STEP 1-30

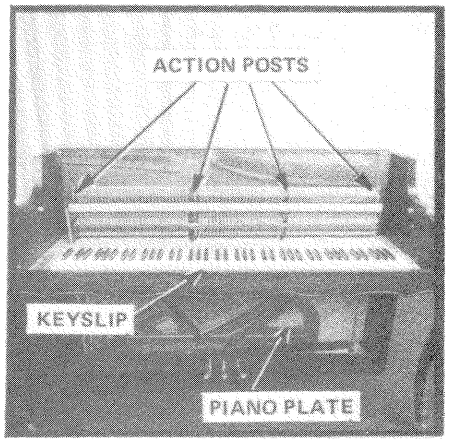
Label and remove the Pedal Dowels from the piano and set them aside with the other piano parts

NOTE:

In some pianos, the Keybed Support may interfere with the Solenoid Rail, when the Rail is installed. In such cases the Keybed Support must be modified. This condition will be checked later in Section 5.

STEP 1-31

Refer to FIGURE 1-34 for the location of the Action Posts. Remove the knurled nuts (see FIGURE 1-34A on next page) or screws (see FIGURE 1-34B on next page) at the tops of the Action Posts and set them aside with the other piano parts.



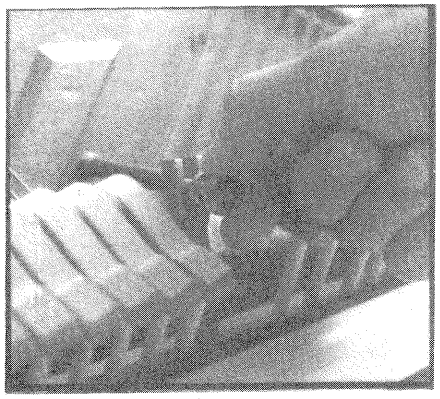


FIGURE 1-34A Knurled Nuts used in Piano #1.

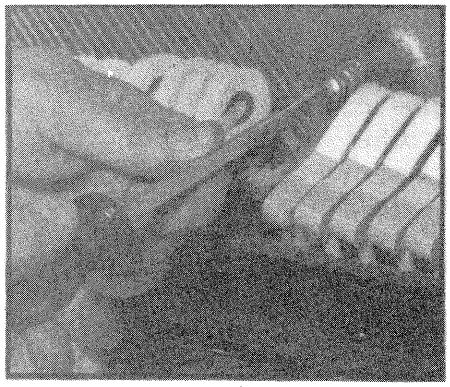


FIGURE 1-34B Screws used in Piano #2.

CAUTION:

DO NOT DAMAGE THE HAMMERS OR DAMPERS WHILE PERFORMING STEPS 1-32 AND 1-33 BELOW.

STEP 1-32

Pull the tops of the Action Posts forward until they clear the Spacers (see FIGURE 1-35--Piano #1) or Piano Plate Protrusions (see FIGURE 1-36--Piano #2).

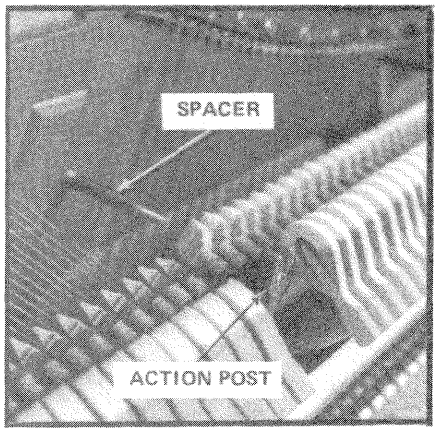


FIGURE 1-35 Pull the tops of the Action Posts forward.

STEP 1-33

Lift the Action up and out of the piano as indicated by the arrow in FIGURE 1-36 below. (The Piano Plate Protrusions shown in FIGURE 1-36 serve the same function as the Spacers shown in FIGURE 1-35.)

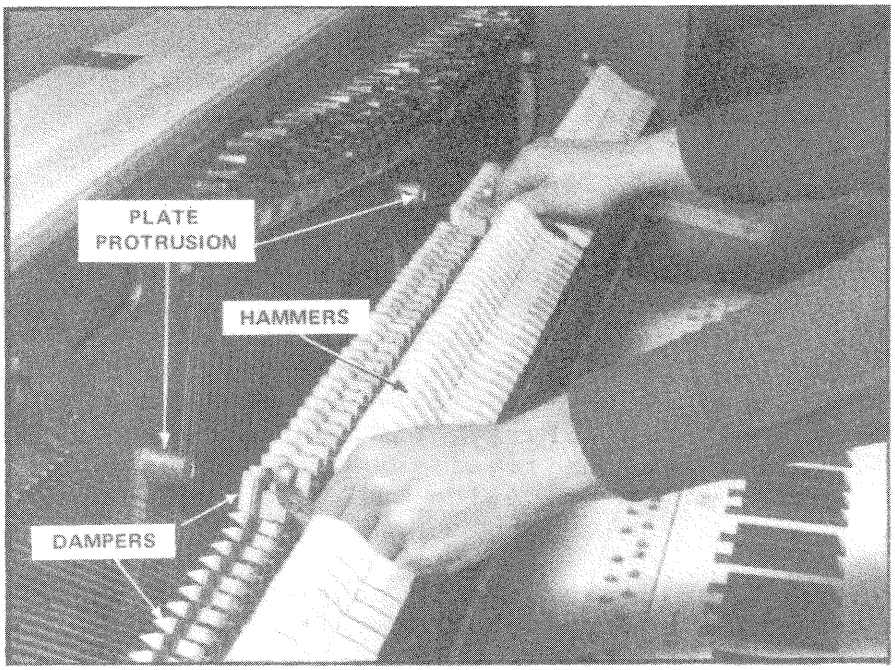


FIGURE 1-36 Lift the Action up and out of the piano.

STEP 1-34

If you have an Action Cradle, secure the Action in the cradle as shown in FIGURE 1-37, then move the cradle away from the work space to prevent accidental damage to the Action. If you don't have a cradle, stand the Action upright on a padded table and prop it up securely so it can't fall.

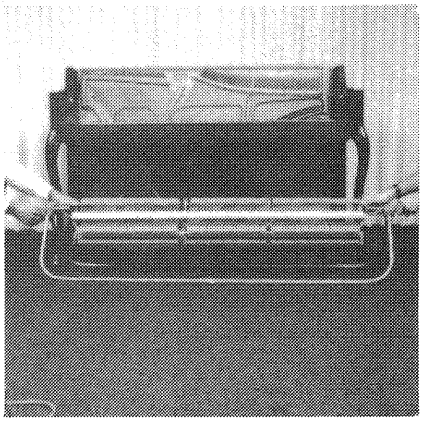


FIGURE 1-37 Secure the Action in the cradle.

NOTES:

1. If you are working with a helper, he can proceed to Section 3, KEY SWITCH INSTALLATION, and do STEPS 3-1 through 3-9.

2. Make sure none of the punchings from the Balance or Front Rails stick to the bottoms of the keys as the keys are removed in STEP 1-35. Remove any that stick to the keys and place them back on the rail from which they came.

STEP 1-35

If you are working on a piano with a Direct Blow Action, remove Keys 1 through 4 and 85 through 88 and set them aside with the other piano parts, then proceed to the next Step. If you are working on a piano with a Drop Action, remove ALL the keys and set them aside with the other piano parts, then proceed to Section 2, KEYBED PREPARATION.

NOTES:

1. In STEPS 1-36 through 1-43, you will determine the location of the slots that are cut in the keybed of pianos with Direct Blow Actions. It is through these slots that the Key Solenoids strike to play the keys. Because of the critical nature of the data to be covered in these Steps, the procedures will seem complex, therefore, it is imperative that you read each Step thoroughly BEFORE attempting the procedure since you will be using this information to cut the slots in the Keybed.

2. In these Steps, the term, Solenoid Centerline, and its abbreviation, SCL, will be used. This term refers to an imaginary line passing through the centers of the Key Solenoid plungers and it is the position of this line (determined in these Steps), which locates the point on the Keybed where the slots will be cut. Ideally, this line should fall directly below the centers of the Key Capstan Screws (the solenoid plungers strike the bottoms of the Keys directly under the Capstan Screws), but, due to the construction of some pianos, it may be necessary to displace the Solenoid Centerline slightly. This condition will also be covered in STEPS 1-36 through 1-43.

3. The next two Steps (1-36 and 1-37) are done to determine one of the factors which may necessitate displacement of the Solenoid Centerline. The limit of 3-3/16" placed on the measurement reflects the length of the Key Solenoid plungers from their tips to the TOP of the Solenoid Rail on which the Key Solenoids are mounted.

STEP 1-36

At Key 5, measure from the BOTTOM of the key to the UNDERSIDE of the Keybed as shown in FIGURE 1-38 (dimension E). Write the measurement on Line E under STEP 1-37 on the Check List.

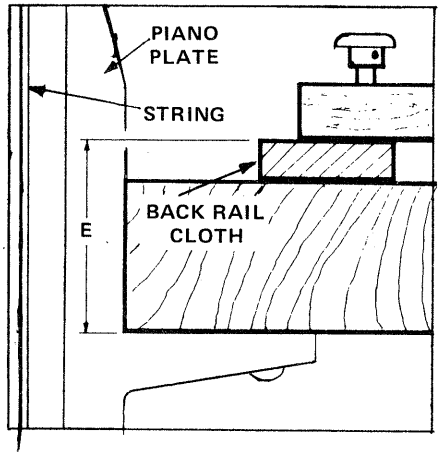


FIGURE 1-38 Measure dimension E as shown.

NOTE:

This Step and the following Step determine if the Keybed Supports will interfere with the Solenoid Rail when the rail is installed in the piano.

STEP 1-37

Measure the thickness of each Keybed Support as shown in FIGURE 1-39 (dimension F). Write the measurement of the THICKEST Support on Line F under this Step on the Check List. Add Lines E and F as indicated on the Check List and write the total on Line G. If the total on Line G is 3-3/16" or LESS, proceed to the next Step. If the total on Line G exceeds 3-3/16", proceed to STEP 1-39. If the total on Line G exceeds 3-3/16", the Solenoid Rail may interfere with the Supports.

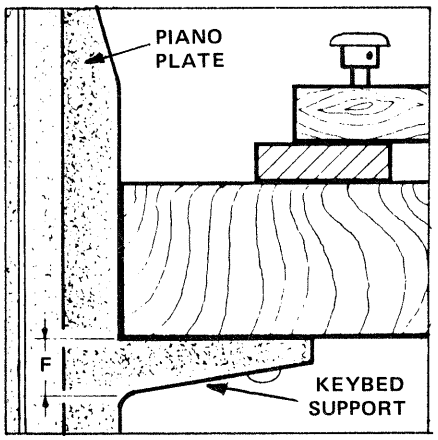


FIGURE 1-39 Measure dimension F as shown.

STEP 1-38

On the TOP of the Keybed, measure from the REAR of the Keybed to the Center of the Key 5 Capstan Screw as shown in FIGURE 1-40 (dimension H). Write the measurement on Line H under STEP 1-41 on the Check List.

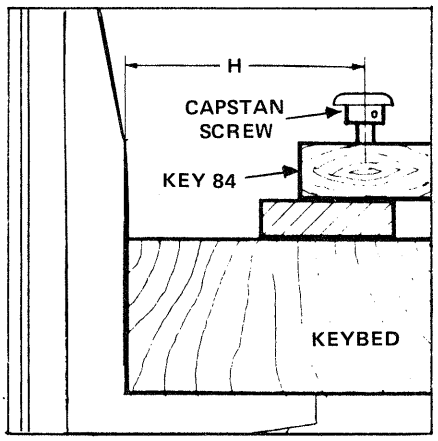


FIGURE 1-40 Measure dimension H as shown.

NOTE:

The measurements taken in the next two Steps are used to determine if it will be necessary to displace the Solenoid Centerline from the ideal position under the Capstan Screws, how far to displace it, and if it will be necessary to trim the Keybed Supports in order for the Solenoid Rail to fit in the piano.

STEP 1-39

Measure the length of EACH Keybed Support from the REAR of the Keybed as shown in FIGURE 1-41. Determine which is the LONGEST and measure from its end when doing the next Step.

NOTE:

The 1-1/8" added to the length of the Keybed Support in the next Step reflects the distance measured from the Back of the Solenoid Rail to the CENTER of the Solenoid plungers (which is the Solenoid Centerline).

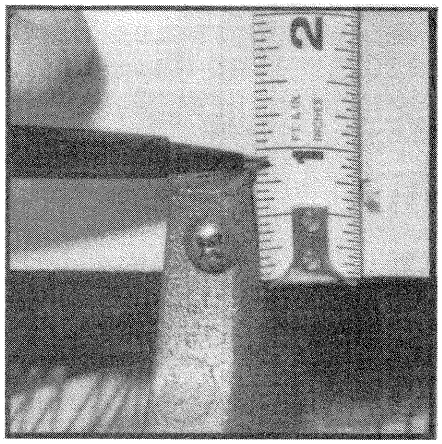


FIGURE 1-41 Measure each Keybed Support as shown.

STEP 1-40

Measure from the REAR of the Keybed along side the LONGEST Keybed Support out 1-1/8" past the end of the Support and mark the Keybed as shown in FIGURE 1-42. Write this measurement on Line I under Step 1-41 on the Check List. Label the mark on the Keybed with an "I", then measure along side the other Keybed Support(s) a distance equal to dimension I, mark the keybed, and label the mark(s) with an "I".

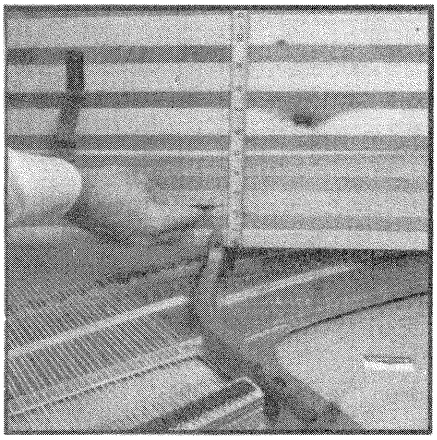


FIGURE 1-42 Measure from the rear of the Keybed and mark the Keybed as shown above.

STEP 1-41

Refer to STEP 1-37 on the Check List. If the measurement on Line G under this Step is 3-3/16" or LESS, do point A below. If the measurement on Line G is GREATER than 3-3/16", do Point B on the next page.

A. Refer to the measurement on Line H under this Step on the Check List. Near the RIGHT side of the piano on the UNDERSIDE of the Keybed, measure from the REAR of the Keybed a distance equal to the measurement on Line H and mark the Keybed as shown in FIGURE 1-43 (dimension H) and label the mark "SCL". Repeat this procedure at the middle and LEFT side of the piano, then proceed to STEP 1-42.

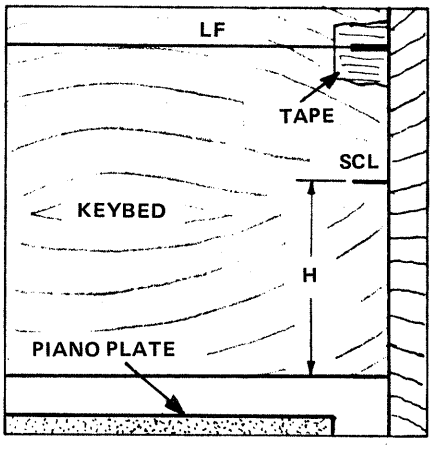


FIGURE 1-43 Measure dimension H, mark and label the Keybed as shown.

STEP 1-41 (cont'd.)

B. Refer to the measurements on Lines H and I under this Step on the Check List. If the measurement on Line H is GREATER than that on Line I, follow the procedures detailed in Point A of this Step. If the measurement on Line H is LESS than that on Line I, read the procedures below and do those that are applicable.

1. Refer to the measurement on Line H under this Step on the Check List. Along side each Keybed Support, measure out from the REAR of the Keybed a distance equal to the measurement on line H, mark the Keybed, and label the mark "H" as shown in FIGURE 1-44.

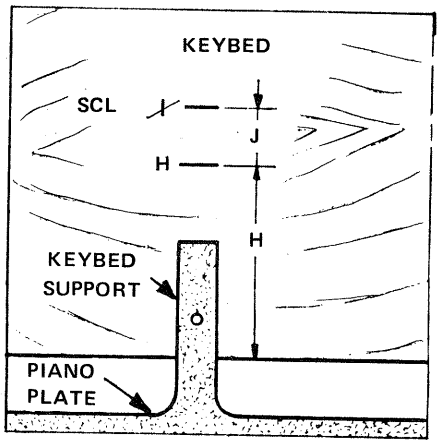


FIGURE 1-44 Measure dimension H, mark and label the Keybed as shown.

2. Measure between the marks labelled H and I on the Keybed as shown in FIGURE 1-44 (dimension J). If the measurement is 1/2" or LESS, cross out the label I and relabel the marks "SCL", then proceed to STEP 1-42. If the measurement EXCEEDS 1/2", proceed to Point 3 below.

3. Measure out 1/2" from the marks labelled H, mark the Keybed, and label the marks "SCL" as shown in FIGURE 1-45. See the NOTE below, then proceed to Point 4.

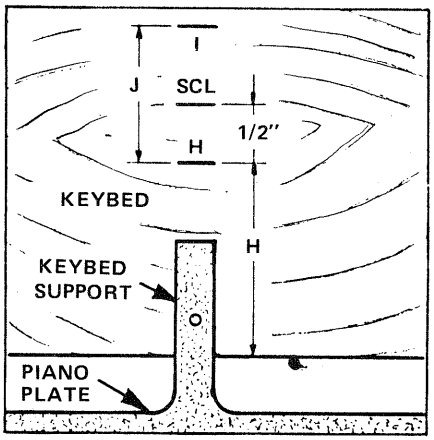


FIGURE 1-45 Measure 1/2" from mark H, mark and label the Keybed.

NOTE:

For optimum performance, the solenoids should strike the keys within 1/2" of the Capstan Screws (indicated by dimension H). In the next Point, the measurement of 1-1/8" reflects the distance between the BACK of the Solenoid Rail and the CENTER of the Solenoid plungers.

4. Measure from the marks labelled SCL, along side each Keybed Support, 1-1/8" TOWARD the REAR of the Keybed and mark the Keybed Supports. If the measurement ends beside the Support, the mark(s) on the Keybed Support(s) indicate the amount that will have to be trimmed from the end of the Support(s). See FIGURE 1-46. Proceed to STEP 1-42.

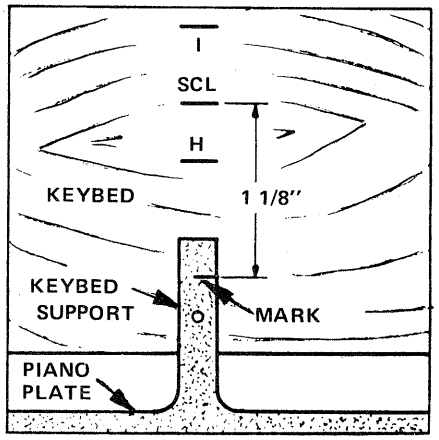


FIGURE 1-46 Measure toward the rear of the Keybed 1-1/8" from the SCL marks.

STEP 1-42

Measure from one of the marks labelled SCL to the Line labelled LF as shown in FIGURE 1-47. This measurement MUST be a minimum of 1-1/2" or the system CANNOT be installed in the piano.

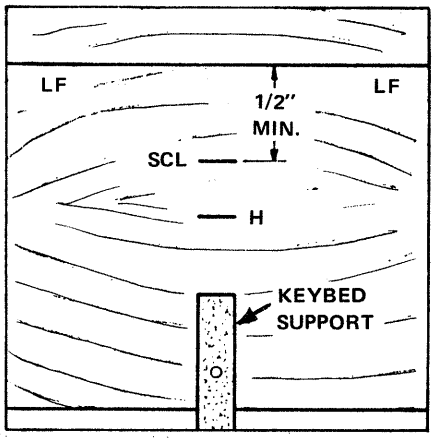


FIGURE 1-47 Measure between the SCL mark and the line LF.

NOTE:

If the measurement is between 1" and 1-1/2", you may try relocating the SCL marks but you will have to check that the Solenoid Rail will NOT interfere with the Keybed Supports by repeating Point 4 of STEP 1-41 but measuring from the new SCL marks.

STEP 1-43

Measure from the REAR of the Keybed to one of the SCL marks. Write the measurement on Line K under this Step on the Check List, then, on the TOP of the Keybed at each end of the Back Rail Cloth, measure in from the REAR of the Keybed a distance equal to the measurement on Line K. Mark the Keybed, and label the marks SCL as shown in FIGURE 1-48 (dimension K).

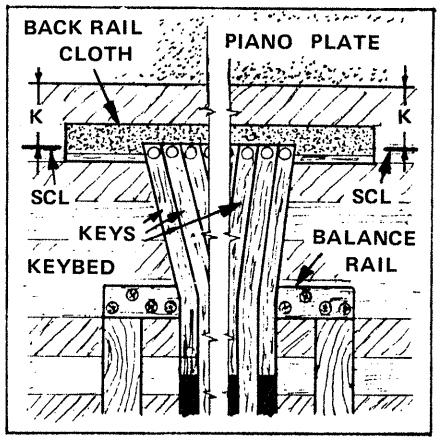


FIGURE 1-48 Measure dimension K, mark and label the Keybed as shown.

STEP 1-44

Get the wooden stick from the shipping carton. Measure its length and mark the center of the measurement at the edge of one side and label the mark "C".

STEP 1-45

Place the stick across the keys and against the Capstan Screws as shown in FIGURE 1-49.

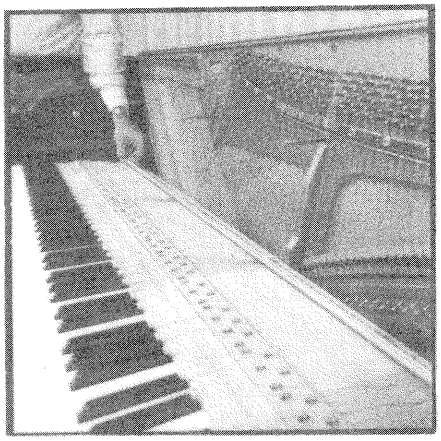


FIGURE 1-49 Place the stick across the Keys.

NOTE:

After the stick is marked in the next Steps, it will be used to align the Key Solenoids on the Solenoid Rail, therefore, it will be referred to as the Solenoid Alignment Ruler. In the next Step, you will center the Solenoid Alignment Ruler on the Keys. When the Ruler is centered, the marks to be made on the Ruler will be centered. When the Ruler is then centered on the Solenoid Rail, the Key Solenoids can be aligned so their plunger tips will strike the bottoms of the Keys properly.

STEP 1-46

Align the BACK edge of the Solenoid Alignment ruler with the SCL marks, adjust the position of the Ruler until the amount it extends past the OUTSIDE edges of the first and last keys (5 and 84) is equal. Measure to verify that the amount of overhang is equal and make sure the BACK edge of the Alignment Ruler is aligned with the SCL marks as shown in FIGURE 1-50. In the Figure, dimensions L and M are equal. See the NOTES below.

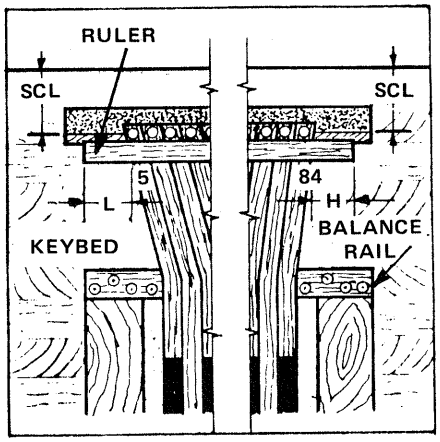


FIGURE 1-50 Center the Ruler on the Keys.

NOTES:

1. In the example shown in FIGURE 1-50, the SCL marks are at the centers of the Capstan Screws (the ideal position for the Solenoid Centerline). If the SCL marks are in FRONT of the Capstan Screws, the Ruler would then be aligned as shown in FIGURE 1-51. If this is the case, you must still make sure the Ruler is centered on the Keys (dimensions L and M are equal).

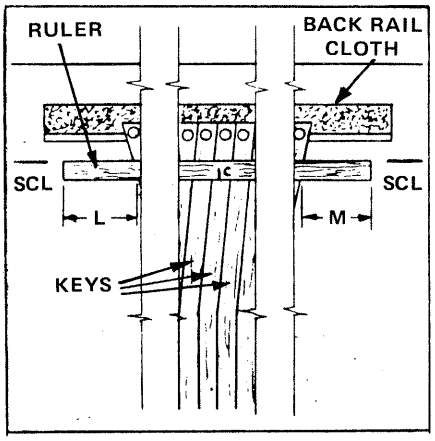


FIGURE 1-51 Ruler centered in front of the Capstan Screws.

CAUTION:

1. DO NOT move the Ruler when doing the next Steps.

STEP 1-47

Mark the FRONT edge of the Alignment Ruler at the point it rests on the OUTSIDE edges of Keys 5 and 84. See FIGURE 1-52. These marks will enable you to realign the Solenoid Alignment Ruler, if you move it during the next Step.

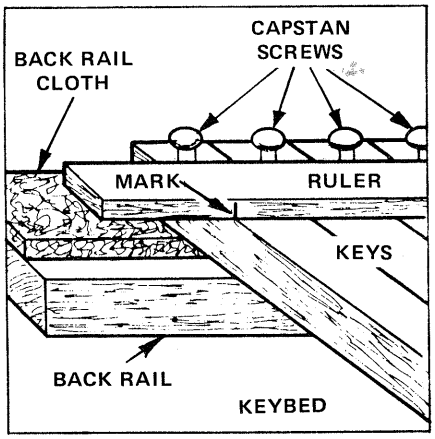


FIGURE 1-52 Mark the front edge of the Ruler as shown above.

STEP 1-48

Starting from the LEFT end of the Ruler, mark it as follows:

A. If the SCL marks are in line with or very nearly in line with the Capstan Screw centers, mark the centers of the Capstan Screws on the Ruler as shown in FIGURE 1-53. Make the marks at least 1/4" long and as perpendicular to the edge of the Ruler as possible. Label the first and last marks "5" and "84", then set the Ruler aside or give it to your assistant, if you have one, so he will have it available when he is ready to align the Key Solenoids in Section 5.

B. If the Solenoid Alignment Ruler is set in front of the Capstan Screws as shown in FIGURE 1-51 on the previous page, mark the centers of the Keys as shown in FIGURE 1-54. (This is done so the Key Solenoids strike in the centers of the Keys.) Label the first and last marks "5" and "84", respectively, then set the Ruler aside or give it to your assistant, if you have one, so he will have it available when he is ready to align the Key Solenoids in Section 5.

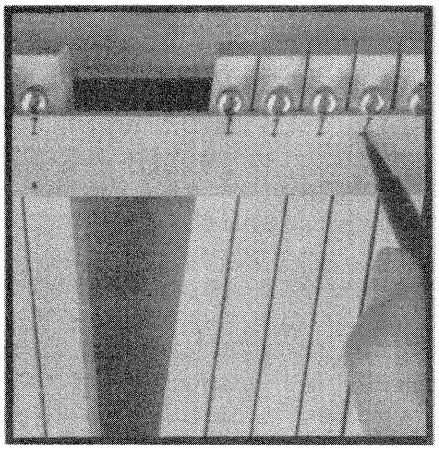


FIGURE 1-53 Mark the centers of the Capstan Screws.

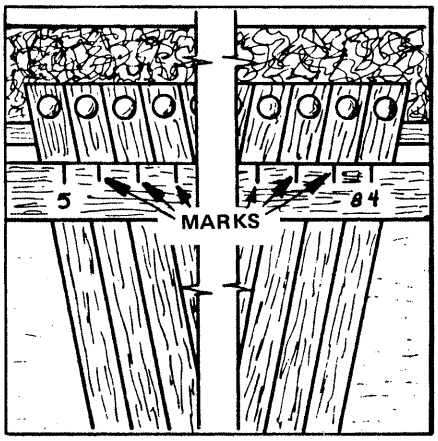


FIGURE 1-54 Mark the centers of the Keys.

NOTES:

1. Make sure none of the punchings from the Balance or Front Rails stick to the bottoms of the Keys as they are removed in the next Steps. If any stick to the Keys, place them back on the rail from which they came.

2. As Keys are removed in the next Steps, set them aside in numerical order away from the work space.

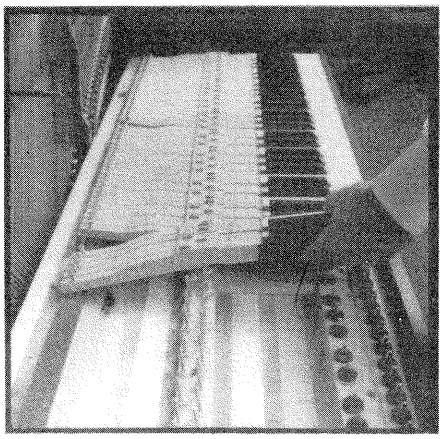


FIGURE 1-55 Remove the Keys to the left of the first split.

STEP 1-49

Notice that the Keys divide into sections at the back of the Keybed. Starting from the LEFT side, remove all Keys to the LEFT of the first division as shown in FIGURE 1-55. Write the numbers of the first and last Keys of this group next to their Key Pins on the Balance Rail. The first key of this group is Key 5 and the last will be referred to as Action Post Key #1 in following Steps.

STEP 1-50

Remove the Keys between the first and second splits and write the numbers of the first and last Keys of the group on the Balance Rail next to their Key Pins. The first Key on the LEFT is called Action Post Key #2 and the last Key on the RIGHT is Action Post Key #3.

STEP 1-51

Remove the Keys of the last group and write the numbers of the first and last Keys next to their Key Pins on the Balance Rail. The first Key on the LEFT is Action Post Key #4 and the last Key is Key 84.

NOTE:

This concludes Section 1, PIANO PREPARATION, please proceed to Section 2, KEYBED PREPARATION.

2. KEYBED PREPARATION

In this Section, you will complete the procedure to verify that the system will fit in pianos with Direct Blow Actions and begin the actual installation procedures. On pianos with Direct Blow Actions, it will be necessary to modify the Keybed by cutting slots in it. These slots are the openings through which the Key Solenoids strike the Keys. On Drop Action pianos, the slots are not necessary because the solenoids strike the Lifter Elbows (or Whippens) on the portion of the Action below the Keybed. To prevent irrepairable damage to the piano, it is imperative that you reach each step thoroughly to understand completely what is required BEFORE you begin the procedure.

CAUTION:

WHEN CUTTING OR DRILLING IS REQUIRED, ALWAYS USE THE REQUIRED SAFETY EQUIPMENT (RESPIRATOR AND GOGGLES OR FACE SHIELD). OBSERVE ALL SAFETY PROCEDURES FOR THE USE AND HANDLING OF POWER TOOLS.

STEP 2-1

Cut the wooden spacers between the Balance and Front Rails as close to the rails as possible as shown in FIGURE 2-1. Cut the spacers with a wood chisel or a Back Saw as shown.

NOTE:

If you are working on a Drop Action piano, proceed to Section 3, KEY SWITCH INSTALLATION.

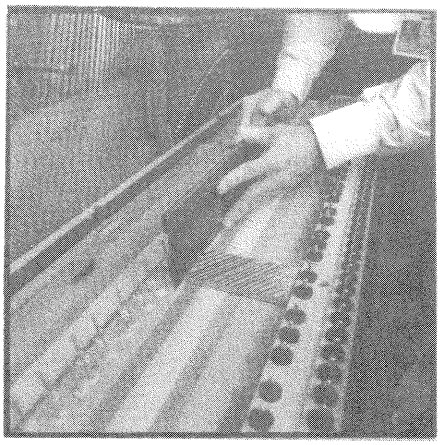


FIGURE 2-1 Cut and remove the spacers.

STEP 2-2

There are several types of Back Rails. Type 1 (used in Piano #1) is a thick felt strip glued directly onto the Keybed as shown in FIGURE 2-2A. Type 2 (used in Piano #2) consists of a felt strip glued to a wooden rail (the Back Rail), which is fastened to the Keybed with screws as shown in FIGURE 2-2B. Determine which type is installed in the piano being modified.

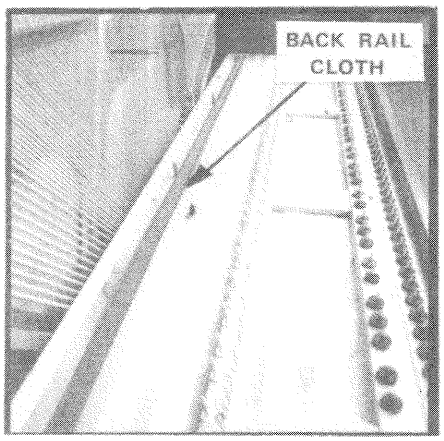


FIGURE 2-2A Type a Back Rail Cloth--Piano #1.

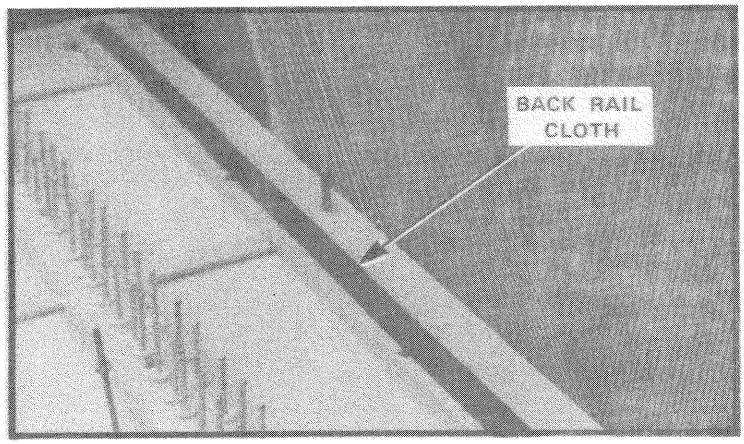


FIGURE 2-2B Type 2 Back Rail Cloth--Piano #2.

NOTE: Outline the right and left edges or the Back Rail or Back Rail Cloth so that it can be reinstalled as close to its original position as possible. Relocating the Back Rail or Back Rail Cloth to extremes may create a need for the piano to be re-regulated after the installation is completed.

STEP 2-3

If the Type 1 Back Rail (with cloth glued to the Keybed) is installed in the piano, remove it by forcing a putty knife under it with one hand, while pulling up on it with the other as shown in FIGURE 2-3. Do this carefully so you don't damage the Back Rail Cloth (if undamaged, the Back Rail Cloth will be reinstalled later). Proceed to STEP 2-9.

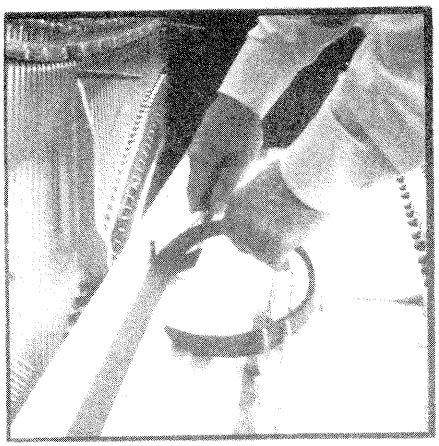


FIGURE 2-3 Remove the Type 1 Back Rail Cloth.

NOTE:

In STEPS 2-4 through 2-8, preparation of the Type 2 Back Rail and its removal is detailed. Ideally, this type of Back Rail should be reinstalled in the same place from which it will be removed, but, in some instances this is not possible. These instances will be covered in these Steps.

STEP 2-4

Observe the location of the SCL marks at the ends of the Back Rail. If the marks fall along side the ends of the rail, the rail should be repositioned. If the marks are in this area, proceed to STEP 2-6. If the SCL marks are at the FRONT edge or in FRONT of the Back Rail, the rail may have to be trimmed so it does not interfere with the 1/2" wide Solenoid Slots (see the shaded area in FIGURE 2-4). To determine if the Back Rail should be trimmed, proceed to Point A below.

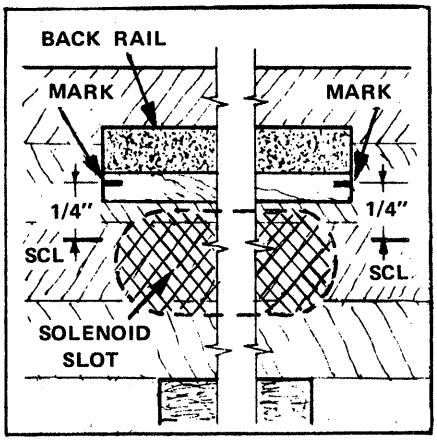


FIGURE 2-4 Measure in 1/4" toward the rail and mark the rail.

A. Measure from the SCL marks 1/4" toward the REAR of the Keybed. If the measurements end beside the Back Rail, mark the rail at those points as shown in FIGURE 2-4, then proceed to the next Step. If the measurement ends in front of the rail, proceed to the next Step.

STEP 2-5

Align your straightedge with the two marks on the Back Rail and, using a pencil or felt pen, draw a line across the rail connecting the two marks as shown in FIGURE 2-5.

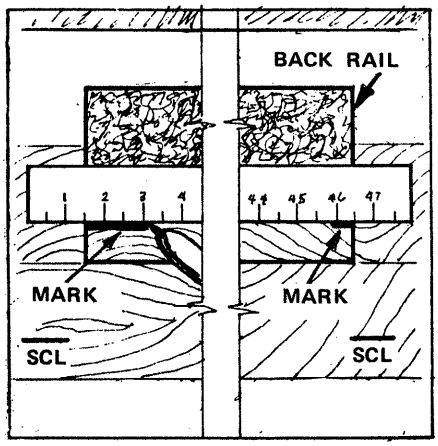


FIGURE 2-5 Draw a line across the Back Rail.

STEP 2-6

Remove the Back Rail from the keybed. If there are wooden spacers between the Back Rail and the Balance Rail cut them as close to the rails as possible (see FIGURE 2-6) and remove them before removing the Back Rail.

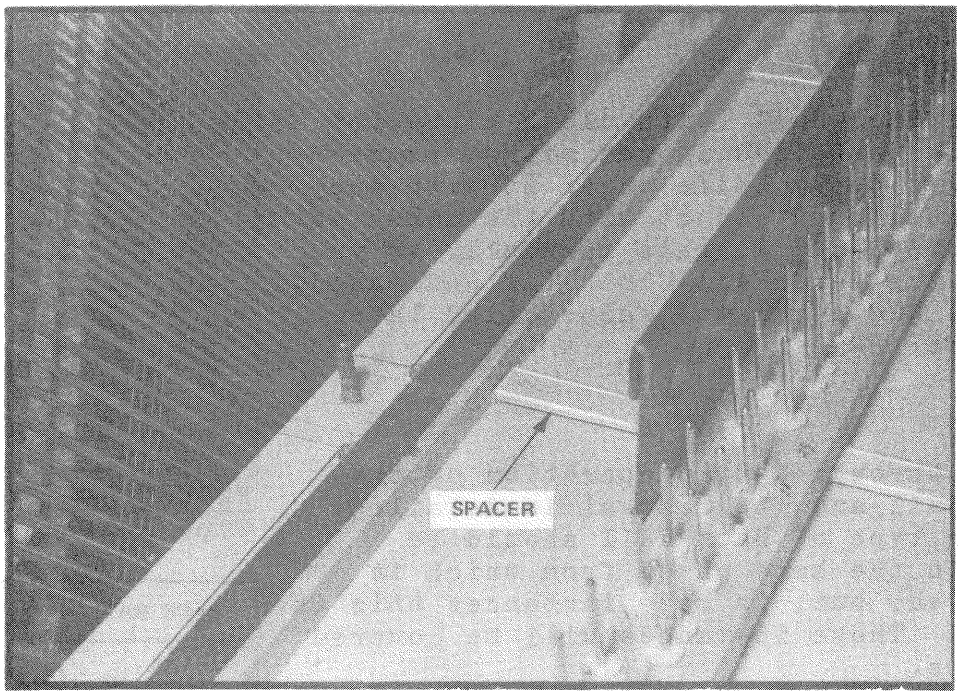


FIGURE 2-6 Remove the spacers between the Balance and Back Rails.

STEP 2-7

Trim the Back Rail to size on a table saw (see FIGURE 2-7) and set the rail aside. Proceed to STEP 2-9.

CAUTION:

OBSERVE SAFETY PRECAUTIONS WHEN OPERATING THE SAW AND WEAR PROTECTIVE SAFETY EQUIPMENT (RESPIRATOR AND GOGGLES OR FACE SHIELD).

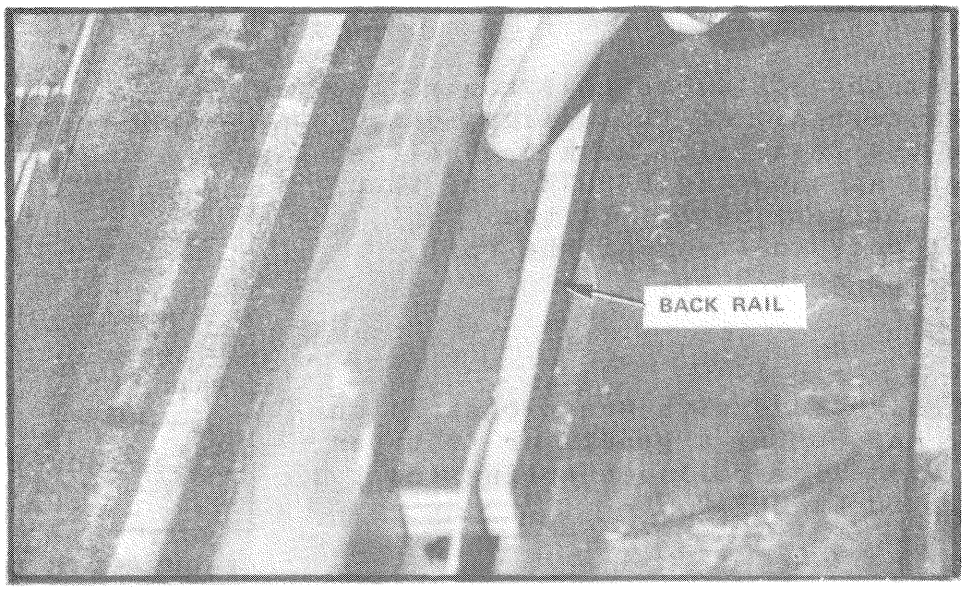


FIGURE-2-7 Trim the Back Rail to size.

STEP 2-8

Draw a line across the keybed connecting the two marks labelled "SCL". FIGURE 2-8 shows the line drawn on the keybed. This line is the Solenoid Centerline on the TOP of the keybed and indicates the points where the Key Solenoid plungers come through the keybed.

FIGURE 2-9 Solenoid Centerline.

STEP 2-9

Install keys 5 and 84 and the four Action Post Keys in their correct locations on the keybed. Refer to the numbers written next to the Key Pins on the Balance Rail for the numbers of the Action Post Keys. See FIGURE 2-9.

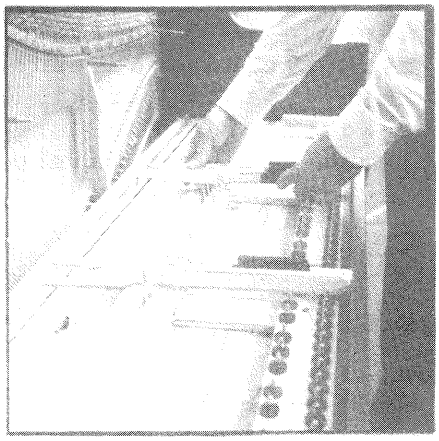


FIGURE 2-9 Install the keys on the keybed as shown above.

STEP 2-10

Using the sides of the keys listed below as straightedges, draw lines intersecting the Solenoid Centerline. Action Post Key #1 is shown as an example in FIGURE 2-10. Use the sides of the keys as follows:

A. LEFT side of Key 5

B. RIGHT side of Action Post Key #1

C. LEFT side of Action Post Key #2

D. RIGHT side of Action Post Key #3

E. LEFT side of Action Post Key #4

F. RIGHT side of Key 84

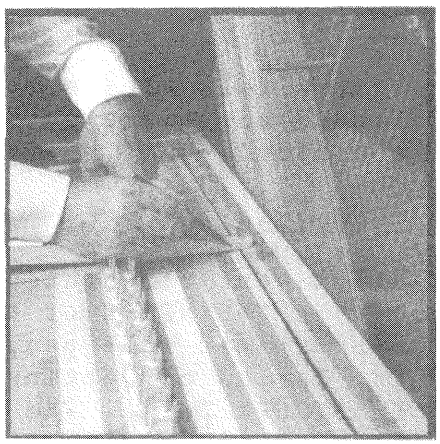


FIGURE 2-10 Draw lines intersecting the Solenoid Centerline.

STEP 2-11

Remove the Keys and set them aside with the others.

STEP 2-12

Center punch the marks made in Step 2-10 at their points of intersection with the Solenoid Centerline.

NOTE:

The following steps are necessary to determine the actual location of the Solenoid Rail in the piano. Here you will locate the positions of the ends of the rail to determine if it will be necessary to modify the rail by trimming off a portion of the rail so it does not interfere with the Pedal Dowels.

STEP 2-13

Install a 1/8" drill bit in your electric drill and, using the first and last punch marks as drilling centers, drill through the keybed. These holes must be drilled as vertically as possible (see FIGURE 2-11) so they strike the Solenoid Centerline on the underside of the keybed. These holes mark the outside ends of the first and last keybed slots and will be used as references to determine the centering of the Key Solenoids on the Solenoid Rail. See the CAUTION below.

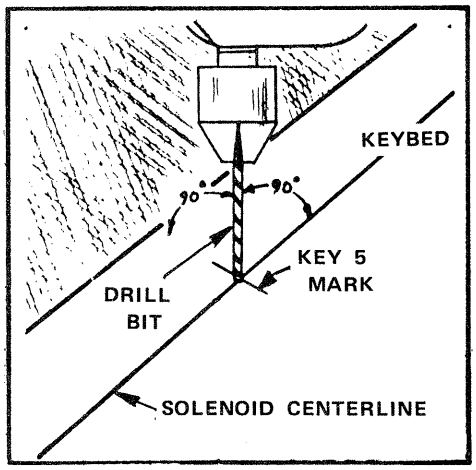


FIGURE 2-11 Drill vertically through the keybed.

CAUTION:

WHEN DRILLING, WEAR YOUR SAFETY EQUIPMENT.

STEP 2-14

STEPS 2-15 through 2-18 are most easily done with the piano on its back, therefore, place the piano on its back with the piano tilter, if you have one.

NOTE:

In the following step you will determine the center of the Key Solenoid positions on the Solenoid Rail when the rail is installed in the piano.

STEP 2-15

Align your straightedge with the SCL marks on the UNDERSIDE of the Keybed and, using a pencil or felt pen, draw a line across the Keybed connecting the marks as shown in FIGURE 2-12. The two 1/8" holes should be centered on the line. This line is the Solenoid Centerline on the underside of the Keybed.

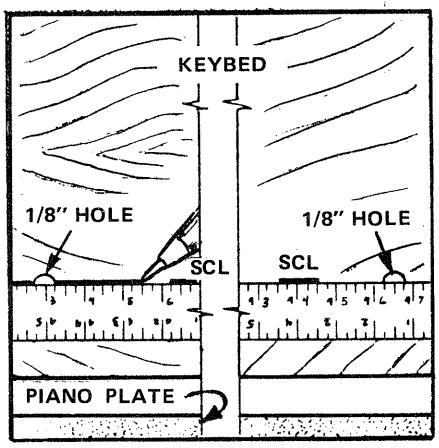


FIGURE 2-12 Draw a line across the Keybed.

STEP 2-16

Measure between the two 1/8" holds and mark the center of the measurement on the Solenoid Centerline as shown in FIGURE 2-13. This mark indicates the center of the Solenoid Rail when it is installed in the piano. Label the mark "C" as shown in the Figure.

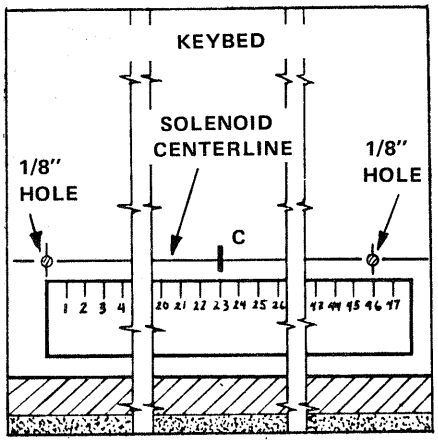


FIGURE 2-13 Mark the center point between the two 1/8" holes.

NOTE:

In STEPS 2-17 and 2-18, you will determine where the ends of the Solenoid Rail (SR) will fall when it is installed in the piano. You will also determine if it will be necessary to trim the rail so it will fit in the piano and how much to trim from the rail.

STEP 2-17

Measure from the mark labelled "C" out 25" toward the LEFT side of the piano (see FIGURE 2-14). This measurement equals half the 50" length of the rail. Determine the following:

A. If the measurement ends 1/4" or more to the RIGHT of the Pedal Dowel Slot, mark the Solenoid Centerline at the end of the measurement, label the mark "SR", then proceed to STEP 2-19.

B. If the end of the measurement falls at the RIGHT edge, on, or to the LEFT of the Pedal Dowel Slot, determine how far to the RIGHT of the Slot the end of the rail will have to be trimmed so it ends 1/4" to the RIGHT of the slot (dimension N in FIGURE 2-15) and write the amount of Line N under this Step on the Check List. Place a mark 1/4" to the RIGHT of the Slot and label the mark "SR" as shown in FIGURE 2-15. See the NOTE below.

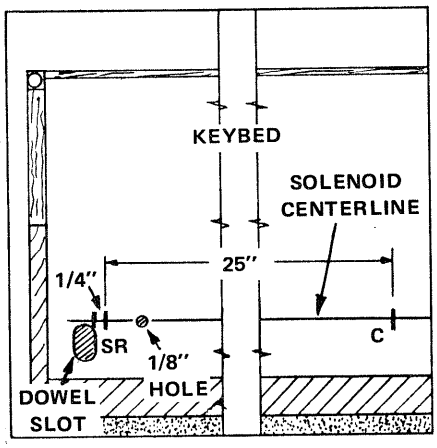


FIGURE 2-14 Measure 25" out toward the Left side of the piano.

NOTE:

The amount to be trimmed from the Solenoid Rail (dimension N above) must NOT exceed 1/2". If more than 1/2", the system CANNOT be installed in the piano.

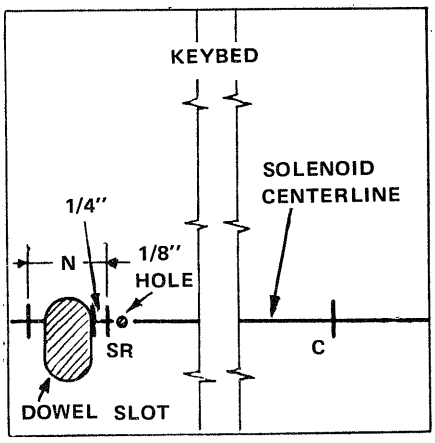


FIGURE 2-15 Measure dimension N and mark the Solenoid Centerline.

STEP 2-18

Measure from the mark labelled "C" out 25" toward the RIGHT side of the piano (see FIGURE 2-16) and determine the following:

A. If the measurement ends 1/4" or more to the LEFT of the piano's side, mark the end of the measurement on the Solenoid Centerline, label the mark "SR", then proceed to STEP 2-19.

B. If you cannot measure the full 25" or if the measurement ends within 1/4" of the right side of the piano, determine how far to the LEFT the end of the Solenoid Rail will have to be trimmed so it ends 1/4" to the LEFT of the piano's side (dimension O in FIGURE 2-17) and write the amount on Line O under this Step on the Check List. Make a mark 1/4" to the LEFT of the piano's side and label the mark "SR" as shown in FIGURE 2-17. See the NOTE below.

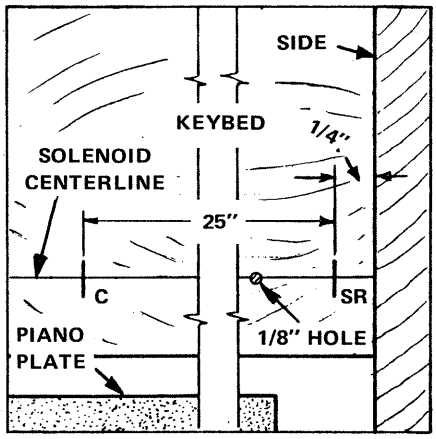


FIGURE 2-16 Measure out 25" toward the RIGHT side of the piano.

NOTE:

The amount to be trimmed from the Solenoid Rail must NOT exceed 1/2". If greater than 1/2", the system CANNOT be installed in the piano.

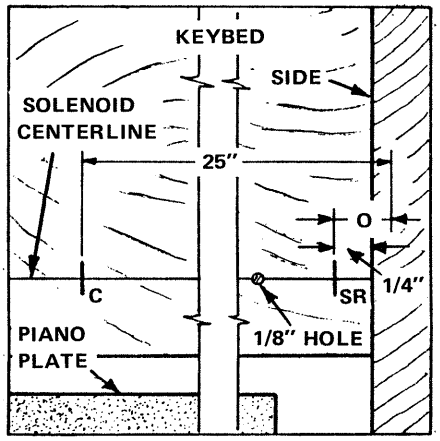


FIGURE 2-17 Measure dimension O and mark the Solenoid Centerline.

STEP 2-19

If the piano is laying on its back on the tilter, tilt it up on its feet.

STEP 2-20

Remove the 1/8" bit from your drill and replace it with a 1/2" wood bore. Drill through the keybed, using the two 1/8" holes and the four punch marks on the Solenoid Centerline on the top of the keybed as drilling centers. Drill these holes as vertically as possible so the Key Solenoid plungers won't rub on the sides of the holes. See FIGURE 2-18. These holes mark the ends of the three Solenoid Slots to be cut in the keybed. See the CAUTION below.

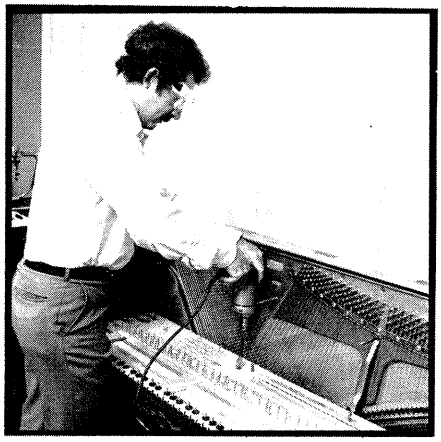


FIGURE 2-18 Drill through the keybed.

CAUTION:

WEAR YOUR SAFETY EQUIPMENT WHEN DRILLING THE HOLES.

STEP 2-21

Place a straightedge on the LEFT side of the keybed. With the straightedge and a pencil or felt pen, draw lines tangent to the FRONT and BACK edges of the first two holes on the left, then do the same for the next two holes and for the final two holes. See FIGURE 2-19

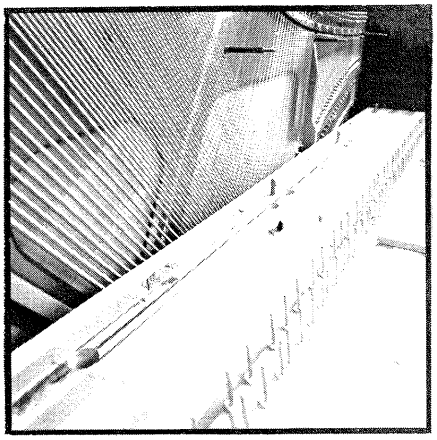


FIGURE 2-19 Draw lines tangent to the front and back edge of each pair of holes.

CAUTION:

WHEN DRILLING OR CUTTING, WEAR YOUR SAFETY EQUIPMENT (GOGGLES OR FACE SHIELD AND RESPIRATOR).

STEP 2-22

Place the tip of the 1/2" bore on the Solenoid Centerline about midway between the first two holes on the left, then drill vertically through the keybed. Repeat this procedure between the next two pairs of holes. See the CAUTION above and FIGURE 2-20.

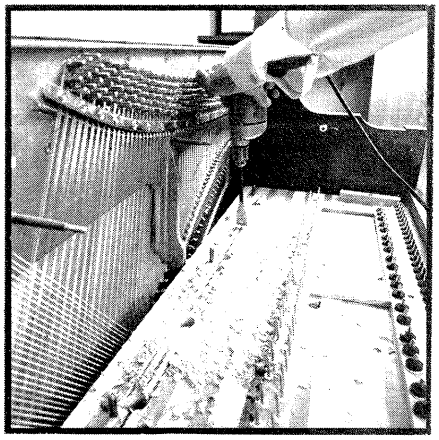


FIGURE 2-20 Drill midway between each pair of holes.

NOTE:

The three extra holes in the middle of each slot will allow you to start your cut with the saber saw.

STEP 2-23

Vacuum the keybed. Make sure none of the punchings from the Balance or Front Rails is picked up when you vacuum.

STEP 2-24

Install a stiff, coarse-toothed blade in your saber saw. Starting from the hole between the first two holes on the left, cut along the lines toward the hole on the left, then cut along the lines toward the hole on the right. Repeat this procedure for the next two pairs of holes. See FIGURE 2-21.

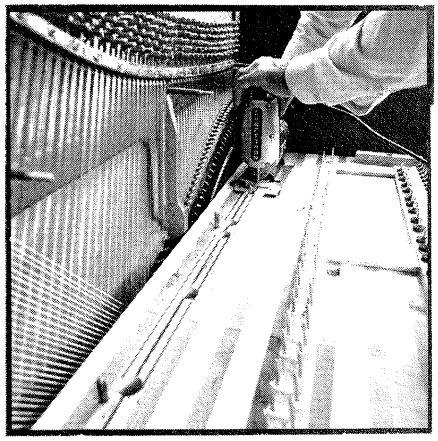


FIGURE 2-21 Cut from the center hole to the outside holes.

NOTE:

Make sure the sides of the slots made in STEP 2-24 above are as vertical as possible so the Key Solenoid plungers won't rub on the sides of the slots. If your saber saw will not cut from hole to hole because the Action Bolts interfere, use a small hand saw to complete the slots.

STEP 2-25

Sand the edges and sides of the slots with a wood file or medium grade sandpaper. Make sure the slot edges are vertical.

STEP 2-26

Thoroughly vacuum the Keybed. Make sure you do not vacuum up any of the punchings from the Balance or Front Rails.

STEP 2-27

If you have the Type 1 Back Rail (just a thick length of felt), place it on the keybed at the back of the slots. If the Action Bolts interfere with the Back Rail Cloth, lay the Back Rail Cloth behind the Action Bolts and mark the places the cloth is to be cut as shown in FIGURE 2-22. Cut just enough of the Back Rail Cloth to clear the Action Bolts. See the NOTE below.

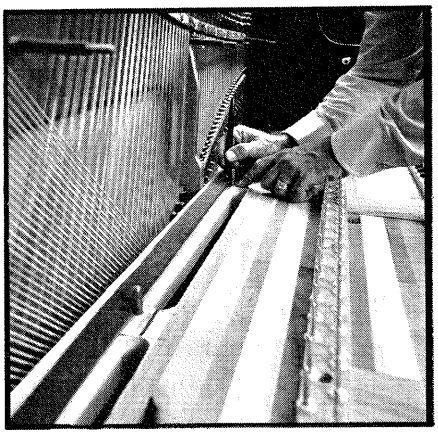


FIGURE 2-22 Mark the Back Rail Cloth for cutting.

NOTE:

If the Back Rail Cloth was damaged when it was removed, replace it with another length of felt of the SAME THICKNESS so the regulation of the piano won't be affected. If the Back Rail is relocated a considerable distance from its original position, the piano may need re-regulation.

STEP 2-28

Glue the pieces of the Back Rail Cloth to the keybed as shown in FIGURE 2-23, then proceed to Section 3, KEY SWITCH INSTALLATION, on page 32.

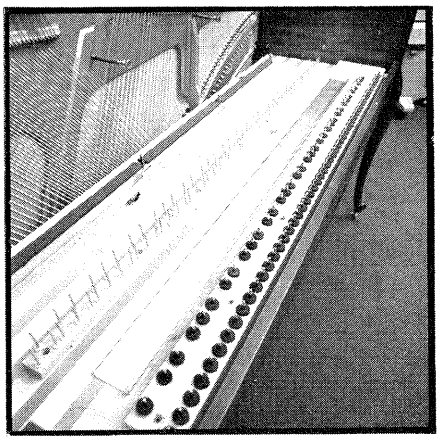


FIGURE 2-23 The Back Rail Cloth glued in place on the keybed.

CAUTION:

WHEN DRILLING IS REQUIRED, WEAR THE PROPER SAFETY EQUIPMENT AND OBSERVE THE SAFETY PROCEDURES FOR THE USE AND HANDLING OF THE DRILL.

STEP 2-29

To reinstall a Type 2 Back Rail (the cloth mounted on a wooden rail), follow these procedures:

A. If the Back Rail was trimmed to clear the Solenoid Slots, reinstall it in its original position by following these steps:

   1. If trimming the rail did NOT damage the screw holes or cut within 1/4" of the holes, reinstall the Back Rail in its original position with the mounting screws.

STEP 2-29 (cont'd.)

A. (cont'd.)

2. If the screw holes were damaged by the trimming, or if they are less than 1/4" from the edge of the Back Rail, drill new screw holes in the rail. Make sure the new holes are at least 1/4" from the edge of the rail and from the original holes.

3. Place the Back Rail in its original position, mark the location of the new mounting holes, drill the proper size pilot holes, and remount the rail. See NOTE below.

NOTE:

If you apply parafin or soap to the screws, they can be inserted easily.

B. If relocation of the Back Rail is necessary, remount it by following these procedures:

1. Place the rail at the BACK edges of the solenoid slots, but, if the Action Post guide pins interfere, place it at the FRONT edges of the slots.

2. If the Back Rail is placed near its original position and its mounting holes overlap (see FIGURE 2-24 below) or are within 1/4" of the original holes in the Keybed, you must drill new mounting holes in the Back Rail and Keybed and the new holes MUST be a minimum of 1/4" away from the original holes as indicated in FIGURE 2-24 below.

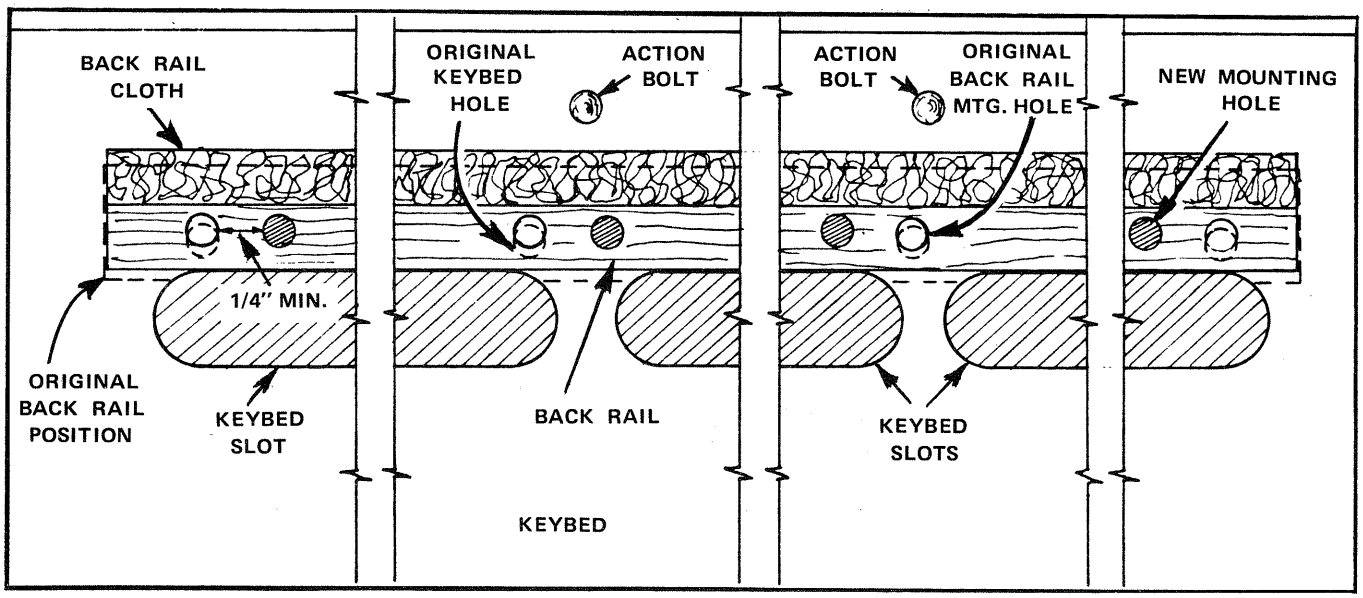


FIGURE 2-24 Drill new mounting holes in the Back Rail and Keybed.

3. Mark the positions of the new holes on the Back Rail, center punch the marks, and, while holding the Back Rail firmly in place drill pilot holes through the Back Rail and into the Keybed. Remove the Back Rail from the Keybed and open the mounting holes by drilling them with a drill bit that is slightly larger than the mounting screw body. Countersink the mounting holes in the Back Rail so the heads of the mounting screws are flush with or slighly below the top surface of the Back Rail.

4. Mount the Back Rail to the Keybed with the mounting screws.

This concludes Section 2, KEYBED PREPARATION, please proceed to Section 3, KEY SWITCH INSTALLATION.

3. KEY SWITCH INSTALLATION

In this section you will install the Key Switches. These switches tell the Record Logic Board which keys are being depressed when the system is in the RECORDING mode of operation. For correct installation of the switches, please follow each step carefully.

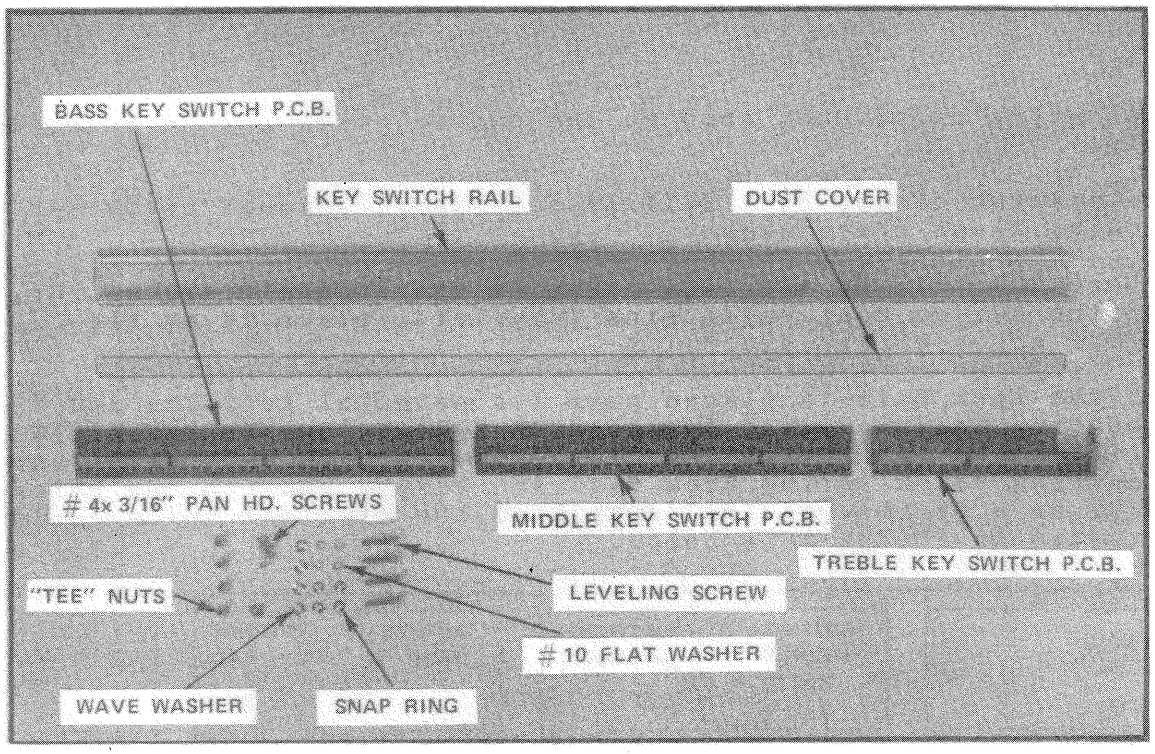


FIGURE 3-1 Key Switch Assembly parts.

STEP 3-1

Refer to FIGURE 3-1 above and unpack the Key Switch Assembly (PN 100-01D028-1). As the parts are unpacked, inspect them for damaged or missing components and replace defective parts with new ones from the Spares or Maintenance Kits.

1	ea.	Dust Cover	PN 100-02B070-1
4	ea.	Leveling Screws	PN 100-02B071-1
1	ea.	Key Switch Rail	PN 100-02C073-1
2	ea.	Key Switch PC Board (Bass and Middle)	PN 100-04F005-1
1	ea.	Key Switch PC Board (Treble)	PN 100-04F006-1
4	ea.	"Tee" Nut	PN SS59029
4	ea.	Wave Washer	PN U250-0110
4	ea.	Snap Ring	PN 5133-25
4	ea.	#10 Flat Washer (.031" thick)	PN *
22	ea.	#4 x 3/16" Pan Head Screws	PN *

* Available locally

STEP 3-1 (cont'd.)

Study FIGURE 3-2 and DETAIL A below. These illustrations show what a completed installation will look like in cross-section.

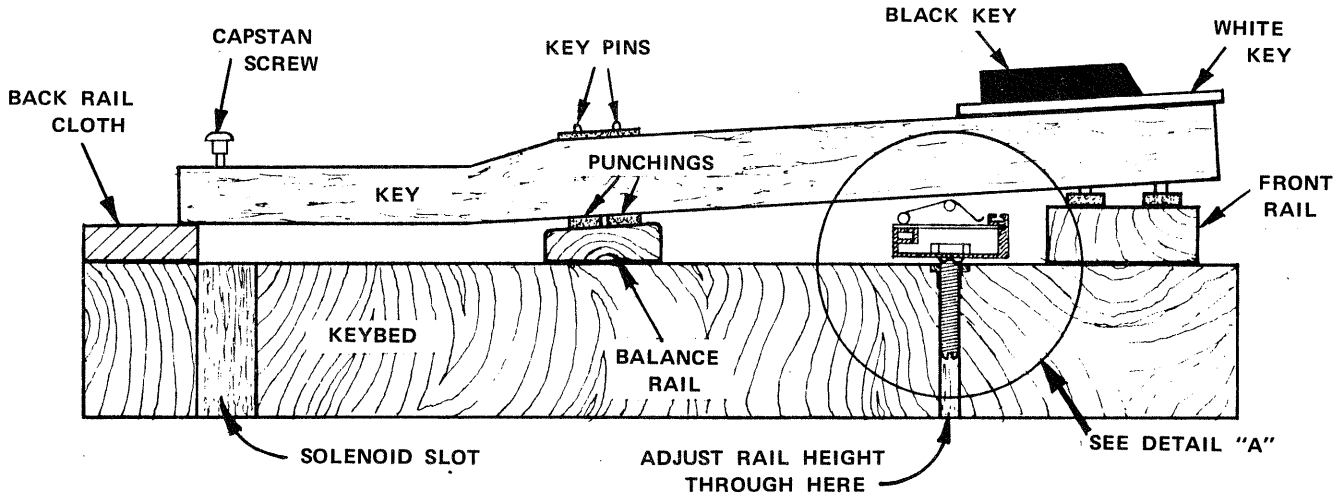
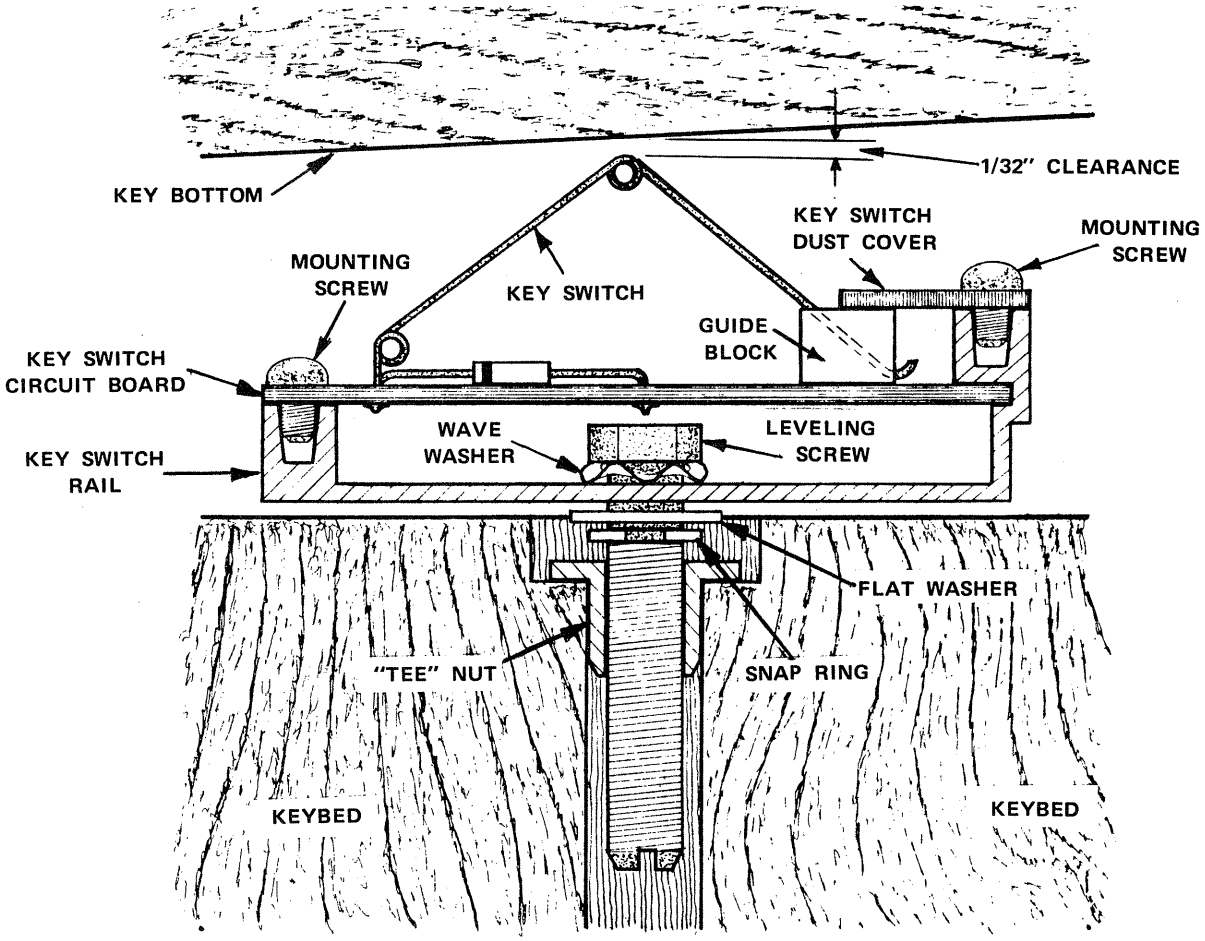


FIGURE 3-2 Cross-section of Key Switch Rail and keybed.



DETAIL A Cross-section through Rail.

STEP 3-2

Place the three Key Switch PC Boards on your work bench. Place one section in front of you with the switches facing you as shown in FIGURE 3-3.

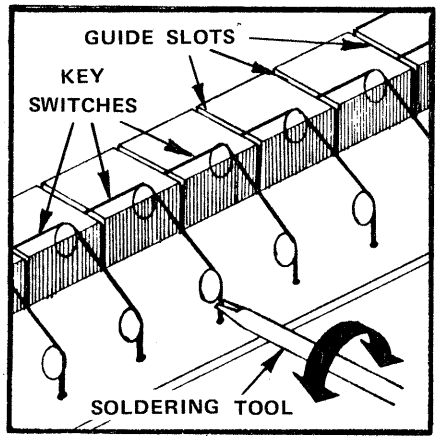


FIGURE 3-3 Straighten bent switches.

CAUTION:

TAKE CARE THAT YOU DON'T BEND THE SWITCHES WHEN HANDLING THE CIRCUIT BOARDS.

STEP 3-3

Inspect the Key Switches to make sure the free ends are riding in the guide slots (see FIGURE 3-3) and are not bent to one side. If any are bent, use the double pronged end of the Soldering Tool, applied to the base of the switch, to straighten it until it is vertical. See FIGURE 3-3.

CAUTION:

DO NOT APPLY EXCESSIVE FORCE TO THE BASE OF THE SWITCHES TO AVOID DAMAGING THE SWITCH OR ITS SOLDER CONNECTION TO THE BOARD.

STEP 3-4

If the height of a switch is MUCH lower or higher than the average, it should be properly adjusted. Adjust individual switches if necessary so they all look like the one in FIGURE 3-4. See the CAUTION above. Switches can be aligned by using the Soldering Tool shown in FIGURE 3-3. See Alignment Procedures for final adjustments.

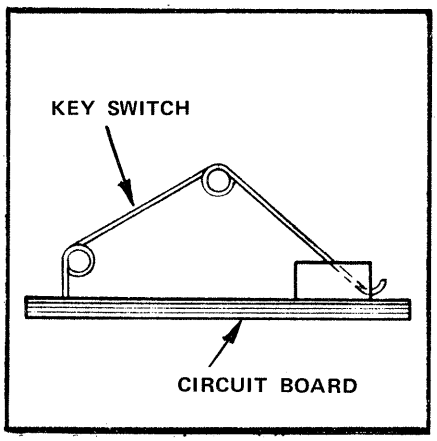


FIGURE 3-4 Switch height after adjustment.

STEP 3-5

Repeat the procedures detailed in STEPS 3-3 and 3-5 on the other two printed circuit boards, then set the boards aside.

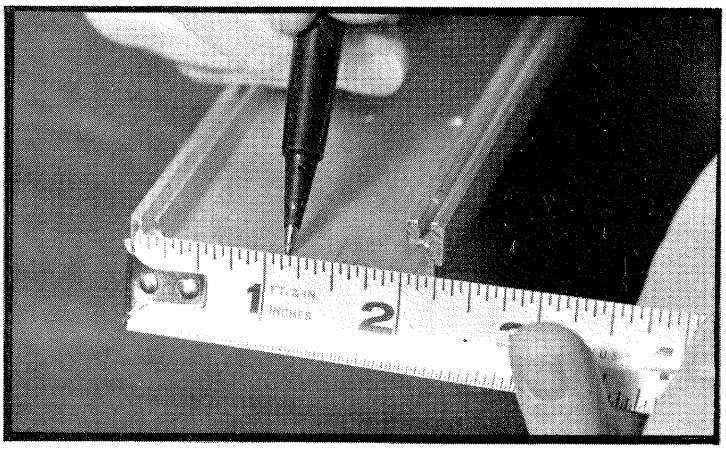


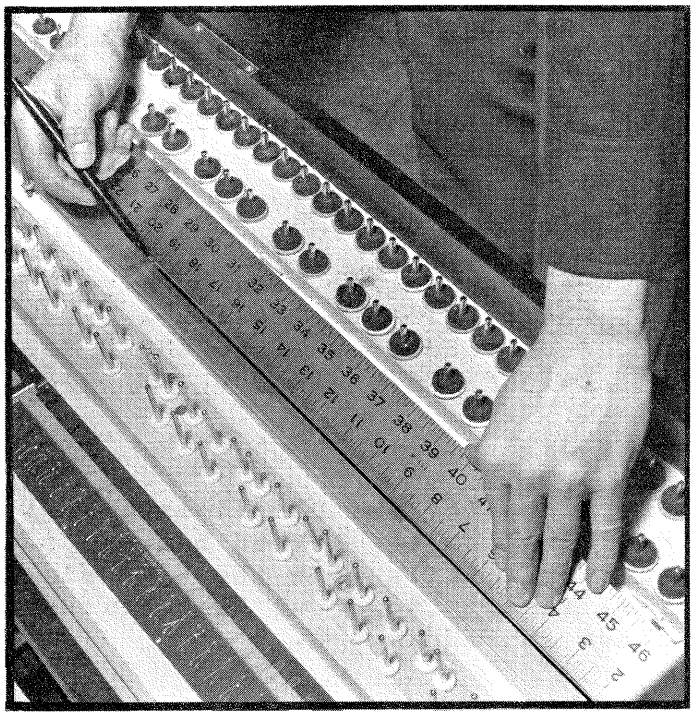
FIGURE 3-5 Measure the width of the rail and mark the center point.

STEP 3-6

Place the Key Switch Rail (PN 100-02C073-1) in front of you with the HIGH side of the rail facing you. Measure the width of the rail and mark the center of the measurement on the rail as shown in FIGURE 3-5. Mark the other end of the rail in the same way.

STEP 3-7

Use a pencil or felt pen and a straightedge to draw a line down the center of the rail connecting the two center marks as shown in FIGURE 3-6.



NOTE:

If you are working alone, STEPS 3-6 and 3-7 can be done on the piano as shown in FIGURES 3-6 and 3-7. Place the aluminum rail on the Keybed with the HIGH side facing the Front Rail of the piano.

STEP 3-8

Hook your tape measure on the LEFT end of the Key Switch Rail, measure along the rail centerline, and mark the centerline at 3" (see FIGURE 3-7 below), 15", 27" and 39". These marks indicate the locations of the Leveling Screws to be installed later. The screw positions are offset from the center of the length of the rail, so the last screw on the right will not interfere with the Tape Recorder Bracket when the bracket is mounted to the underside of the Keybed.

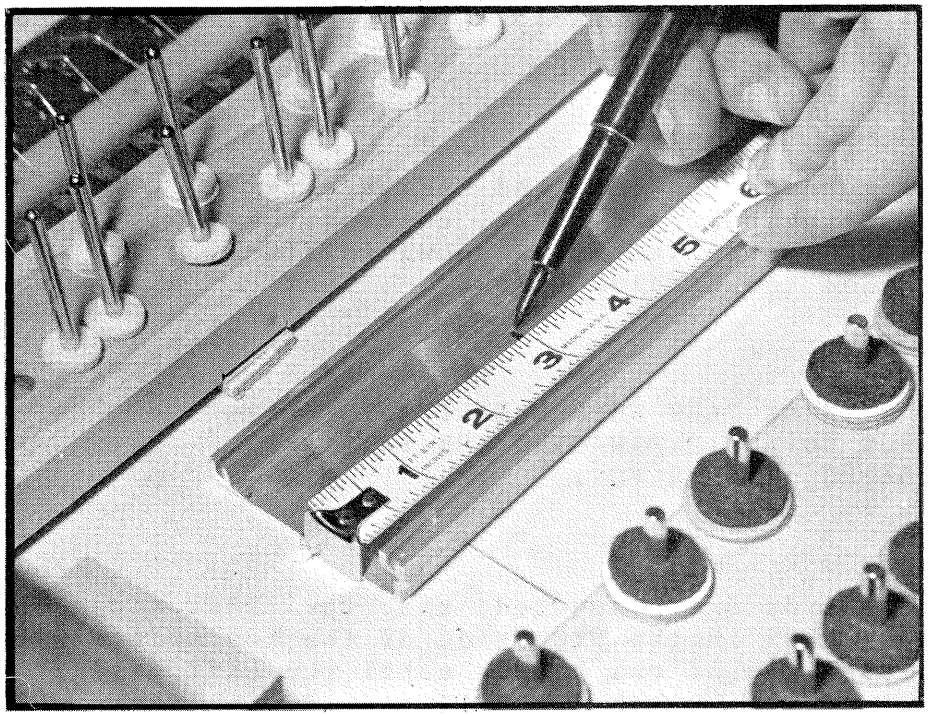


FIGURE 3-7 Mark the centerline at 3" (shown), 15", 27", and 39".

STEP 3-9

Center punch the marks at their points of intersection with the rail centerline.

NOTE:

If you are working with a helper and he has not reached this point in the installation, clear a large area on your work bench, then proceed to Section 5, SOLENOID RAIL INSTALLATION, and do STEPS 5-1 through 5-7. If you are working alone proceed to the next step.

STEP 3-10

Place the Key Switch Aluminum Rail (PN 100-02C073-1) on the Keybed between the Balance and Front Rails with the HIGH side of the rail facing the Front Rail of the piano, as shown in FIGURE 3-8.

FIGURE 3-8 Place the rail on the Keybed.

CAUTION:

TAKE CARE THAT YOU DO NOT BEND THE SWITCHES WHEN HANDLING THE CIRCUIT BOARDS.

STEP 3-11

Place the Key Switch PC Boards on the Key Switch Rail in the following order:

Bass (32 switches) Key Switch Board at the LEFT end of the rail, Middle (32 switches) Board at the middle of the rail, and the Treble (16 switches) Board at the RIGHT end of the rail. All boards should be positioned with the male connector facing the RIGHT side of the piano.

STEP 3-12

Carefully connect the Bass and Middle circuit boards together and, then, connect the Middle board to the Treble as shown in FIGURE 3-9. See the CAUTION below.

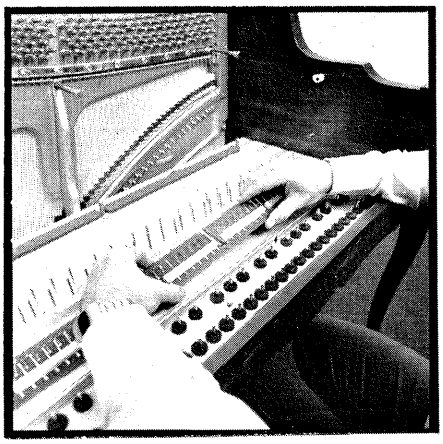


FIGURE 3-9 Connect the circuit boards.

CAUTION:

EXERCISE EXTREME CARE WHEN HANDLING THE CIRCUIT BOARDS TO AVOID DAMAGING THE SWITCHES OR THE BOARDS, THEMSELVES.

STEP 3-13

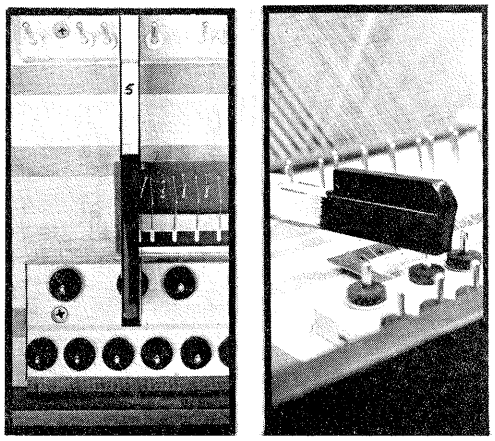
After the boards are connected, slip the FRONT edges of the boards into the channel in the HIGH side of the Key Switch Rail, then adjust the position of the boards until the LEFT end of the Bass circuit board is flush with the LEFT end of the aluminum rail.

STEP 3-14

Determine the numbers of the Keys which align over the first and last Key Switches of each Switch Section, write the numbers of these Keys next to their Key Pins on the Balance Rail, then place the Keys in their correct locations on the Keybed. (The first Key on the LEFT is Key 5 and the last on the RIGHT is Key 84.)

STEP 3-15

Adjust the position of the Key Switch Rail so each Key Switch is centered under its respective Key and there is, approximately, 3/32" clearance between the tops of the switches and the bottoms of the Keys as shown in FIGURE 3-10. See the NOTE below. The back of the key must be resting on the back rail.



NOTE:

1. On some pianos, you may not be able to perfectly center the switches under the Keys. If this happens, adjust the position of the Key Switch Rail so the first and last switches on the MIDDLE PC Board are centered as closely as possible under their respective Keys.

2. If there are depressions, such as notches (see FIGURE 3-11) or holes, in the bottoms of the Keys, verify that none of the switches are centered beneath these depressions. If necessary, adjust the position of the Key Switch Rail so the switches are under the flat of the Key bottom. Recheck the centering of the Key Switches under their respective Keys, if the rail was moved.

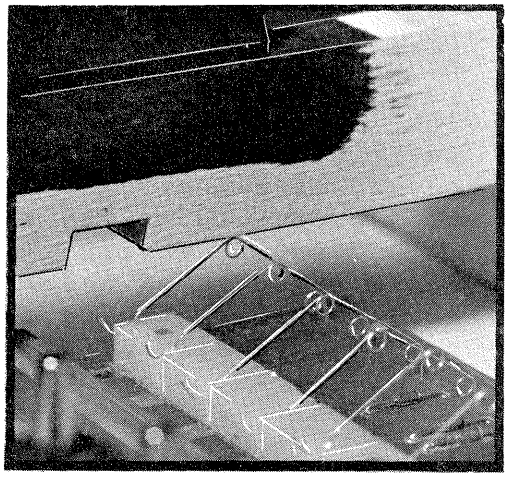


FIGURE 3-11 Notched key bottom.

STEP 3-16

Inspect the bottoms of the other keys and check those with depressions you feel may interfere with the Key Switches by placing them on the Keybed in their correct positions and observing if the depressions interfere with the switches. If necessary, adjust the rail. Recheck the centering of the switches under the Keys if the rail was moved.

STEP 3-17

Remove all Keys, EXCEPT the Keys used to center the rail, and set them aside. Next, remove the centering Keys and set them on the Keybed between the Balance Rail and the Back Rail since they will be used again, shortly. See the NOTE below.

NOTE:

Make sure you do not disturb the rail when removing the Keys. Check the centering of the switches under the keys at each end of each Key Switch Section, after the other Keys have been removed. Make sure you have a minimum of 3/32" clearance between the bottoms of the keys and the tops of the Switches with the aluminum rail sitting on the Keybed. Optimum clearance is gained when the key switch rail is nearest the front rail of the piano.

STOP 3-18

Hold the rail firmly in place and draw a line along the left end, across the back, and along the right end of the Key Switch Rail as shown in FIGURE 3-12. Check the centering of the switches under the keys, occasionally, to make sure they are centered and the rail hasn't moved.

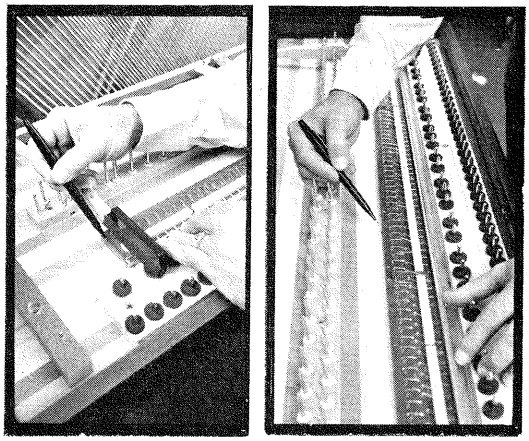


FIGURE 3-12 Draw lines along the ends and back of the Key Switch Rail.

NOTE:

If the Keys over the first and last Key Switches of the MIDDLE PC Board were used to position the rail, proceed to the next Step. If Keys 5 and 84 were used to position the rail, proceed to STEP 3-22.

STEP 3-19

Reinstall the Keys that were removed previously in their correct locations on the Rails.

STEP 3-20

Use two of the #4 x 3/16" Pan Head Screws to secure the Middle circuit board to the rail. Install a screw at each end of the board.

STEP 3-21

Gently, open up the connector between the Bass and Middle PC Boards until the first and last Key Switches on the Bass PC Board are centered, as closely as possible, under their respective Keys. Repeat this procedure at the connector between the Middle and Treble Circuit Boards. Verify that the first and last Key Switches on each PC Board is centered under its respective Key and that the Key Switch Rail is still aligned with the lines on the Keybed. If necessary, repeat this Step until the switches are properly centered.

STEP 3-22

Remove all the Keys and set them aside with the others, then remove the two screws holding the Middle PC Board to the Rail.

NOTE:

It is NOT necessary to disconnect the circuit boards when performing the next Step.

STEP 3-23

Remove the Key Switch Circuit Boards from the rail and set them aside on your work bench. To lift and carry the boards, grasp the Bass and Treble Boards near their connections to the Middle Board. See the CAUTION below.

CAUTION:

WHEN LIFTING AND CARRYING THE PC BOARDS, EXERCISE CAUTION TO AVOID CRACKING THE BOARDS OR DAMAGING THE KEY SWITCHES.

STEP 3-24

Check the alignment of the Key Switch Rail with the lines drawn on the Keybed and adjust the position of the rail, if necessary.

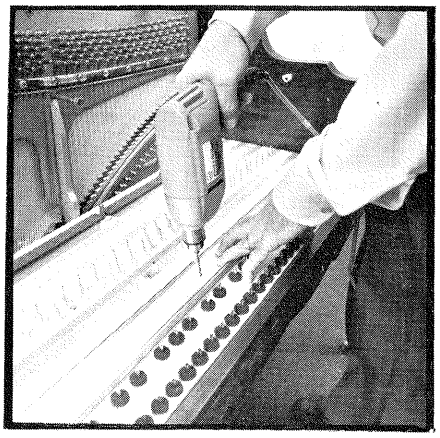


FIGURE 3-13 Drill at the punch marks on the Key Switch Rail.

CAUTION:

WEAR YOUR RESPIRATOR AND GOGGLES OR FACE SHIELD WHEN USING THE DRILL IN THE FOLLOWING STEPS.

STEP 3-25

Insert a 1/16" drill bit in your electric drill and, while holding the Key Switch Rail firmly in place, drill through the rail at the punch marks on its centerline and SLIGHTLY into the Keybed. (The 1/16" holes in the Keybed will be used as drilling centers for the holes to be made for the Leveling Screws.) See the NOTE below.

NOTE:

BEFORE each hole is drilled, verify that the rail is aligned with the lines on Keybed.

STEP 3-26

Remove the Key Switch Rail from the Keybed and set it aside on your work bench.

STEP 3-27

Remove the 1/16" bit from your drill and replace it with a 1/2" wood boring bit. If you have a FLAT type bore (illustrated in FIGURE 3-14), wrap a piece of masking tape around it 5/16" from its tip as indicated in FIGURE 3-14.

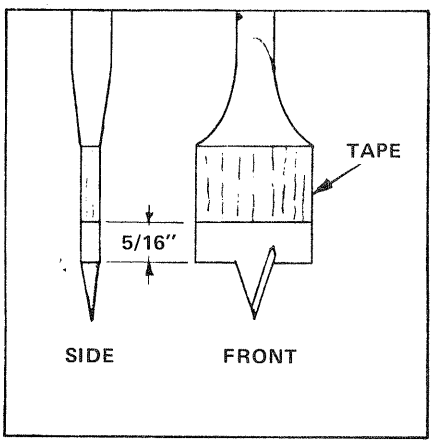


FIGURE 3-14 Flat wood boring bit.

STEP 3-28

Using the 1/16" holes in the Keybed as drilling centers, drill to a depth of 5/16" (marked by the tape on a flat type boring bit) with the 1/2" bore as shown in FIGURE 3-15. See the NOTE below.

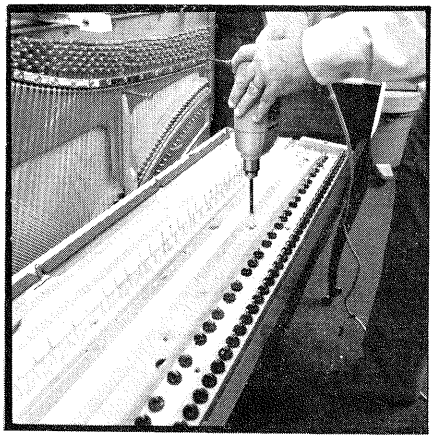


FIGURE 3-15 Drill into the Keybed 5/16".

NOTE:

If you are using the Round type wood boring bit, you will have to check the depth of the hole by measuring it.

STEP 3-29

Remove the 1/2" wood bore from the drill and replace it with a 9/32" bit. Drill THROUGH the keybed at the centers of the 5/16" deep, 1/2" diameter holes as shown in FIGURE 3-16.

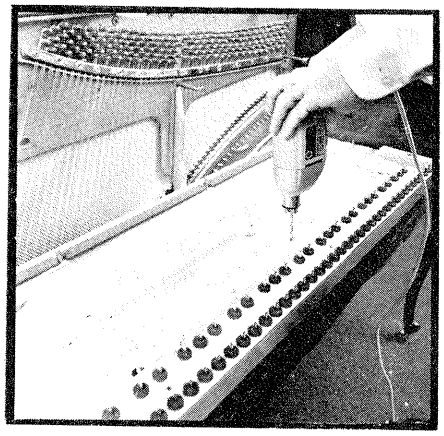


FIGURE 3-16 Drill through the keybed.

CAUTION:

MAKE SURE TO DRILL AS VERTICAL AS POSSIBLE SO THAT THE KEY SWITCH RAIL WILL BE LEVEL UNDER THE KEYS WHEN INSTALLED.

STEP 3-30

Vacuum up the wood shavings from the area covered by the Key Switch Rail, place the rail on the keybed with the HIGH side of the rail facing the front of the piano, and align the rail with the lines on the keybed.

STEP 3-31

Hold the rail firmly in place and drill through the rail with the 9/32" bit, using the 1/16" holes on the centerline as drilling centers. See FIGURE 3-17.

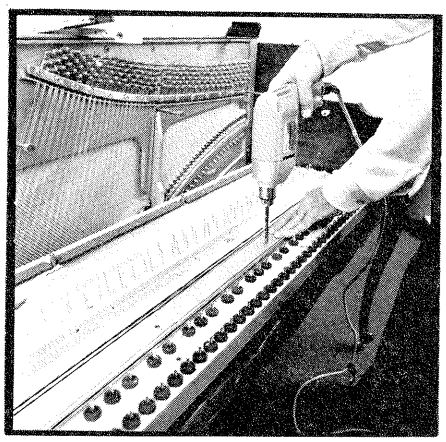


FIGURE 3-17 Drill through the rail with the 9/32" bit.

STEP 3-32

Remove the Key Switch Rail from the Keybed, remove the burrs around the holes with a reamer, and set the rail aside on the work bench.

STEP 3-33

Thoroughly vacuum the keybed. Make sure you don't vacuum up the punchings on the Balance and Front Rails.

STEP 3-34

Insert a "Tee" Nut in each of the 9/32" holes in the keybed and seat them with a pin punch as shown in FIGURE 3-18.

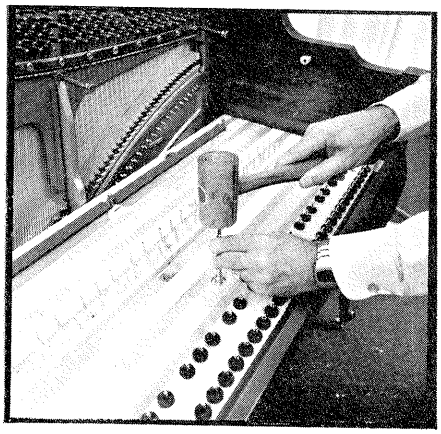


FIGURE 3-18 Install the "Tee" Nuts with a punch.

NOTE:

Refer to FIGURE 3-19 (on the next page) while reading STEPS 3-35 and 3-36.

STEP 3-35

Slip a Wave Washer (PN U250-0110) on each of the four Leveling Screws (PN 100-02B71-1) and insert a Leveling Screw through each of the 9/32" holes in the Key Switch Rail. See FIGURE 3-19 on the next page.

STEP 3-36

Slip a #10 Flat Washer on the first Leveling Screw at the left end of the rail, slide it up to the bottom of the rail, and lock one of the Snap Rings (PN 5133-25) in the groove in the screw to trap the Flat Washer in place. See FIGURE 3-19. Repeat this procedure with the other three Leveling Screws.

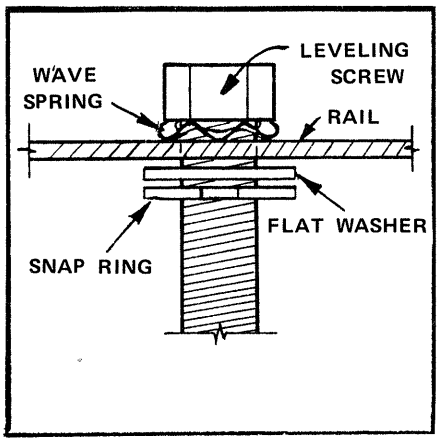


FIGURE 3-19 Leveling Screw assembly.

STEP 3-37

Place the Key Switch Rail on the keybed (HIGH side of the rail facing the front of the piano) and center the Leveling Screws in the "Tee" Nuts, then start the screws into the nuts. See FIGURE 3-20.

FIGURE 3-20 Center the Leveling Screws in the "Tee" Nuts.

NOTE:

To prevent damage to the screw or nut, make sure you DO NOT cross-thread the screws when you start them in the nuts. When lowering the aluminum rail tighten each screw only one or two turns, so the rail does not bend and the "Tee" Nuts will not pull out of the keybed.

STEP 3-38

Lower the rail to the keybed by ALTERNATELY tightening each Leveling Screw until the rail rests on the keybed. See FIGURE 3-21.

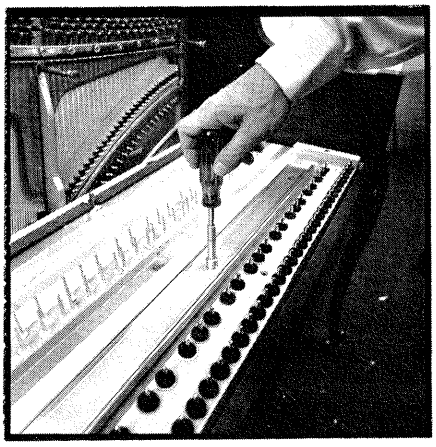


FIGURE 3-21 Lower the rail to the keybed.

CAUTION:

WHEN MOVING THE PC BOARDS IN THE NEXT STEP, EXERCISE CAUTION TO AVOID CRACKING THE BOARDS OR DAMAGING THE KEY SWITCHES.

STEP 3-39

Place the Key Switch PC Boards on the Key Switch Rail and slip the front edges of the boards into the channel on the HIGH side of the rail. See FIGURE 3-22. When placing the boards on the rail, make sure the Treble Board (16 Key Switches) is at the RIGHT end of the rail.

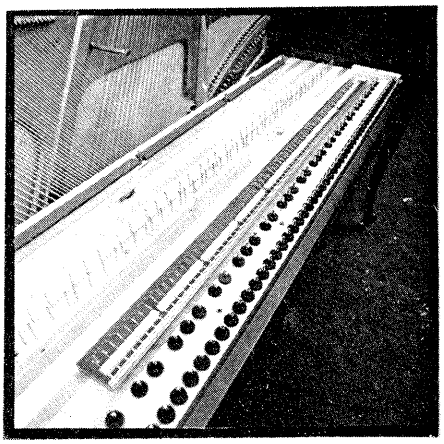


FIGURE 3-22 Place the PC Boards on the rail.

STEP 3-40

Install Keys 5 and 84 and the Keys which align over the first and last Key Switches on each PC Board at their correct locations on the Keybed. Refer to the numbers written on the Balance Rail for the numbers of these Keys.

STEP 3-41

Adjust the position of the circuit boards on the Key Switch Rail until the first and last Key Switches on each board are centered under their respective Keys, then mount the boards to the rail with the twenty-two (22) #4 x 3/16" Pan Head Screws.

STEP 3-42

Install the Keys which are most nearly centered over the four Leveling Screws in their correct locations on the Keybed.

STEP 3-43

Through the holes in the underside of the Keybed, adjust the height of the rail until there is approximately 1/32" between the tops of the switches and the bottoms of the Keys. See FIGURE 3-23 and the CAUTION and NOTE below.

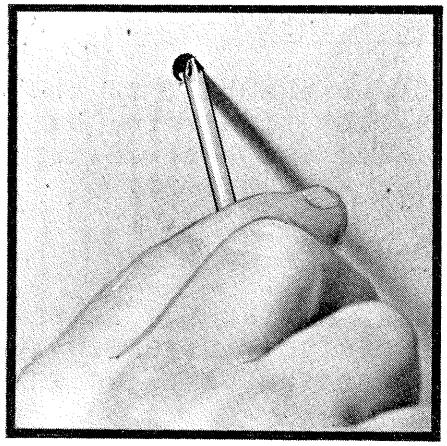


FIGURE 3-23 Adjust the Leveling Screws through the holes in the Keybed.

CAUTION

WHEN ADJUSTING THE RAIL HEIGHT, TURN EACH LEVELING SCREW ONLY A FEW TURNS AT A TIME AND ALTERNATE BETWEEN SCREWS TO AVOID BENDING THE RAIL.

NOTE:

Use a small common screwdriver to turn the Leveling Screws (the ends of the screws are slotted).

STEP 3-44

Remove all Keys and set them aside with the others.

This concludes Section 3, KEY SWITCH INSTALLATION, please proceed to Section 4, RECORDER BRACKET AND POWER CORD INSTALLATION.

4. RECORDER BRACKET AND POWER CORD INSTALLATION

The PT-100 Tape Recorder is mounted externally on the piano cabinet. This Section details the installation of the Bracket which holds the Recorder on the piano cabinet. FIGURE 4-1, below, shows the Recorder and the Recorder Bracket mounted on a piano. The procedures for installing the AC Power Cord on the piano are also covered in this Section. To avoid possible electrical shock when the system is turned on, the Power Cord MUST be installed properly, therefore, you MUST follow the procedures in sequence and do each step completely.

FIGURE 4-1 PT-100 Tape Recorder and Tape Recorder Bracket.

STEP 4-1

Unpack the items listed below from the shipping carton. Check for missing or damaged parts and replace defective components with new ones from your Maintenance Kit.

1 ea. PT-100 Tape Recorder

1 ea. Tape Recorder Bracket ---------- PN 100-02J-147

4 ea. 3mm x 6mm Round Head Screws ---------- PN 511-0030-6H9

8 ea. #8 x 3/4" Hex Washer Hd. Screws

STEP 4-2

Pass the cable from the Recorder through the hole in the back of the Bracket and align the mounting holes in the Recorder with those on the Bracket, then mount the Recorder to the Bracket with the four 3mm x 6mm Round Hd. Screws as shown in FIGURE 4-2.

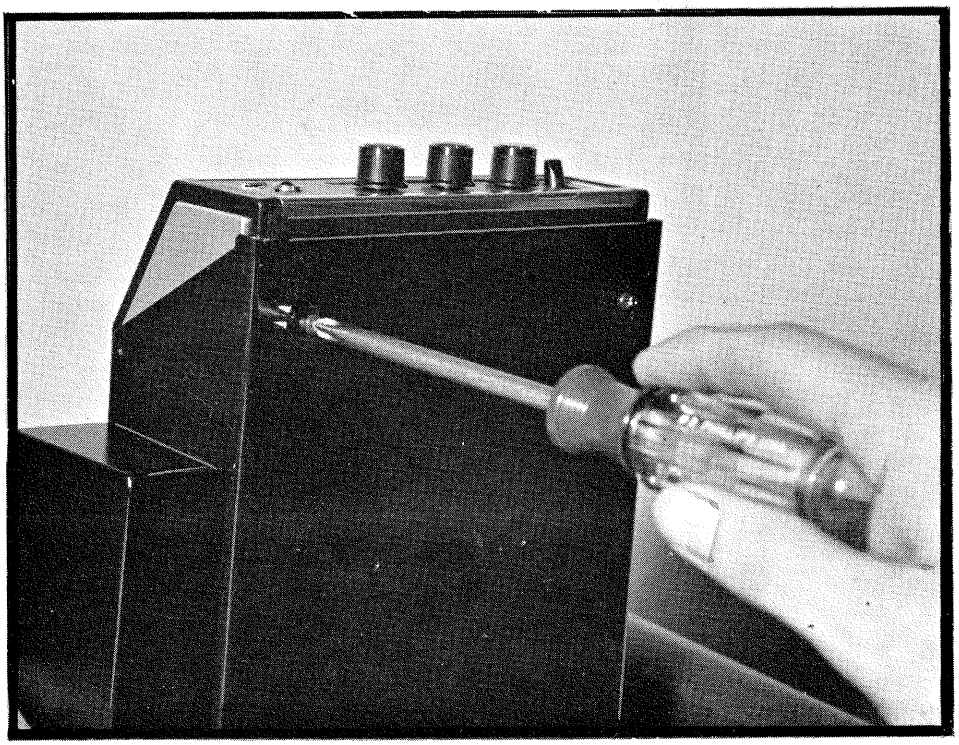


FIGURE 4-2 Mount the Recorder on the Bracket.

STEP 4-3

Rotate the Bracket Pivot Plate to the open position shown in FIGURE 4-3.

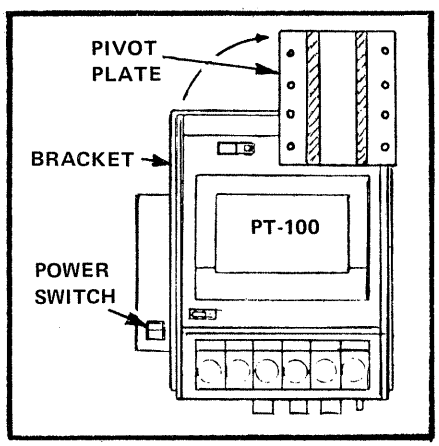


FIGURE 4-3 Bracket in open position.

STEP 4-4

Place the Bracket against the UNDERSIDE of the keybed close to the leg of the piano and position it so the Tape Counter on the Tape Recorder is visible as shown in FIGURE 4-4. See the NOTE below.

NOTE:

On some pianos, it may not be possible to place the Bracket directly against the keybed because of the cabinet work (see the flare on the piano leg in FIGURE 4-1). When this occurs, it may be necessary to install a block under the keybed before installing the Tape recorder Bracket. The block should be glued and mounted with screws to the keybed.

FIGURE 4-4 Position the Bracket and Tape Recorder as shown above.

STEP 4-5

Hold the Bracket in place and mark as many of the mounting holes as you can reach. See FIGURE 4-5.

STEP 4-6

Set the Bracket on your work bench and remove the rubber cap from the end of the Pivot Plate Shaft (see FIGURE 4-5). Remove the nut from the end of the shaft and separate the Bracket from the Pivot Plate.

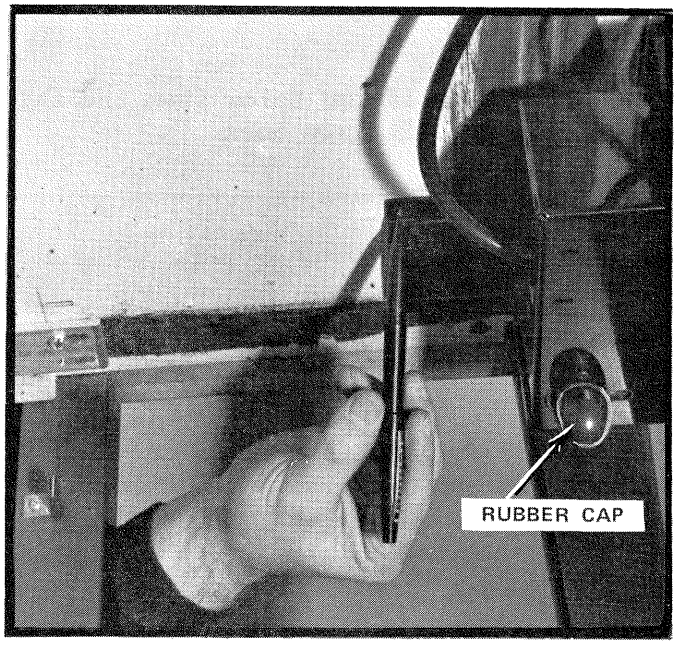


FIGURE 4-5 Mark the mounting screw holes.

STEP 4-7

If you have a piano tilter, lay the piano over on its back.

NOTE:

Refer to FIGURE 4-6 while reading through STEPS 4-8 through 4-11.

STEP 4-8

Position the Bracket Pivot Plate on the Keybed and align the mounting holes with the marks on the Keybed. Mark the centers of the unmarked holes on the Keybed, then set the Pivot Plate aside.

STEP 4-9

Center punch the marks on the Keybed.

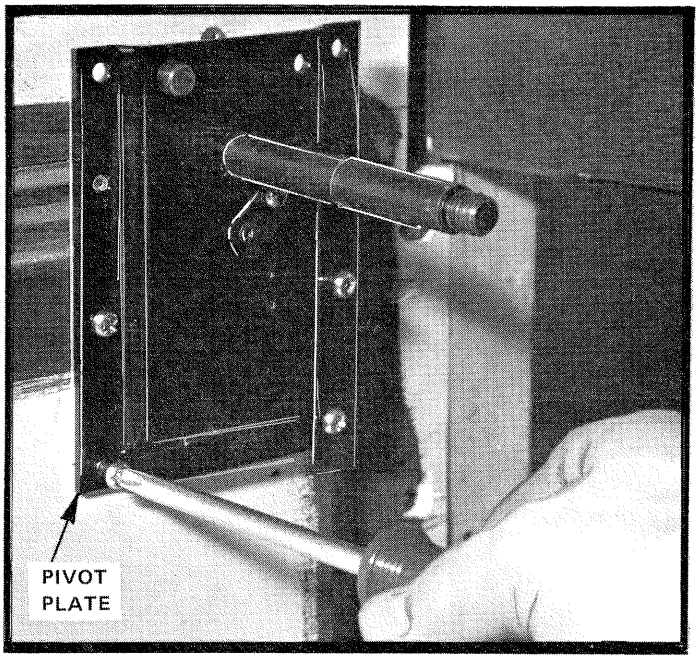


FIGURE 4-6 Mount the Pivot Plate on the Keybed.

STEP-4-10

Insert a 1/8" bit in your drill, wrap a small piece of masking tape around the bit 3/4" from its tip, and drill the punch marks on the Keybed to a depth of 3/4" (marked by the tape on the bit). See the CAUTION below.

CAUTION:

WHEN DRILLING, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

STEP 4-11

Mount the Pivot Plate on the Keybed with the eight (8) #8 X 3/4" Hex Washer Hd. Screws as shown in FIGURE 4-6. (Apply parafin or soap to the screws to ease their installation.)

STEP 4-12

Unpack the items listed below from the shipping carton. Check for damage and replace defective parts with new ones.

1 ea. Power Cord ----------(PN 100-01B031-1)

3 ea. Cable Clamps

3 ea. #6 X 1/2" Hex Washer Hd. Screws

STEP 4-13

Near the FRONT, RIGHT corner of the Bottom Board, measure in 3" from the RIGHT side of the piano and mark the Bottom Board. See FIGURE 4-7 on the next page.

STEP 4-14

Loosen the padding on the Bottom Rail at the RIGHT end of the piano to move it out of the way, then place your square againt the Bottom Rail, align the square with the mark made in the previous Step, and draw a line through the mark.

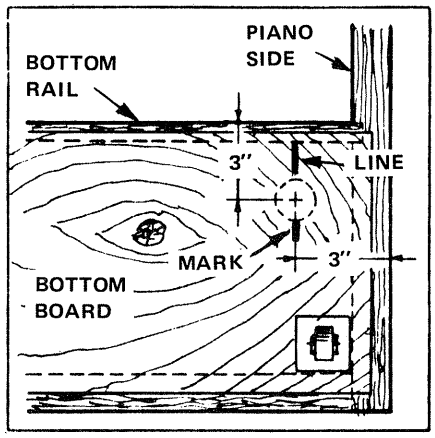


FIGURE 4-7 Mark the Bottom Board as shown above.

STEP 4-15

Measure in 3" from the Bottom Rail along the line made in the previous Step and mark the Keybed. See FIGURE 4-7. Attach the padding back on the Bottom Rail to protect the finish.

STEP 4-16

Center punch the point where the mark intersects the line shown in FIGURE 4-7.

STEP 4-17

Insert a 1/2" wood boring bit in your drill and drill through the Bottom Board at the punch mark. See the CAUTION below.

CAUTION:

WHEN DRILLING, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

STEP 4-18

Replace the 1/2" wood bore in your drill with a 3/4" Countersink. Break the upper and lower edges of the 1/2" hole drilled in the previous Step.

STEP 4-19

Use medium grade sand paper or a wood file to smooth the edges of the hole.

STEP 4-20

Pass the end of the Power Cord through the hole in the Bottom Board and pull about 18" of the cord into the interior of the piano cabinet.

STEP 4-21

Slip a Cable Clamp on the portion of the Power Cord outside the piano cabinet and slide it down until it is 1/2" from the hole in the Bottom Board. Hold the clamp against the Bottom Board, and mark the center of its mounting hole on the Bottom Board. See FIGURE 4-8.

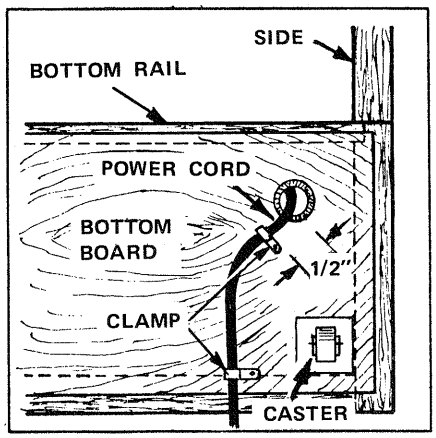


FIGURE 4-8 Cable Clamp positions.

STEP 4-22

Center punch the mark made in the previous Step.

STEP 4-23

Remove the 1/2" wood bore from your drill and replace it with a 1/8" drill bit. Wrap a small piece of masking tape around the bit 1/2" from its tip, then drill a pilot hole 1/2" deep (depth marked by the tape on the bit) using the punch mark as the drilling center. See the CAUTION below.

CAUTION:

WHEN DRILLING, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

STEP 4-24

Mount the Cable Clamp to the Bottom Board with a #6 X 1/2" Hex Washer Hd. Screw. See FIGURE 4-9.

STEP 4-25

Slip a Cable Clamp on the portion of the Power Cord outside the piano cabinet and place it against the Bottom Board 1" away from the Caster and near the BACK of the piano cabinet as shown in FIGURE 4-9.

STEP 4-26

Hold the Cable Clamp in position and mark the center of its mounting hole on the Bottom Board.

STEP 4-27

Center punch the mark made in the previous Step.

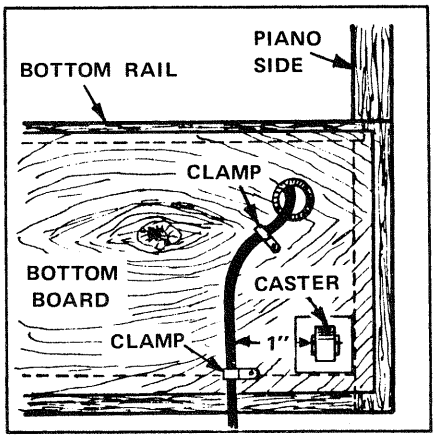


FIGURE 4-9 Cable Clamp positions.

STEP 4-28

With the 1/8" drill bit and using the punch mark as the drilling center, drill to a depth of 1/2" (marked by the tape on the drill bit).

STEP 4-29

Mount the Cable Clamp to the Bottom Board with a #6 X 1/2" Hex Washer Hd. Screw.

STEP 4-30

Slip a Cable Clamp on the Portion of the Power Cord INSIDE the piano cabinet and slide it down until it is 1/2" from the entry hole of the cord. Hold the clamp against the Bottom Board and mark the center of its mounting hole on the Bottom board. See FIGURE 4-10 for the clamp location.

STEP 4-31

Center punch the mark made in the previous Step.

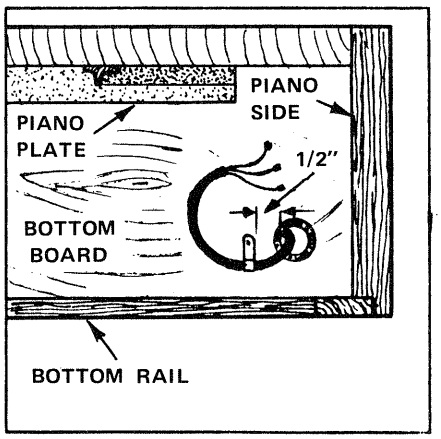


FIGURE 4-10 Interior clamp location.

STEP 4-32

With the 1/8" drill and using the punch mark as the drilling center, drill to a depth of 1/2" (marked by the tape on the drill).

STEP 4-33

Mount the Cable Clamp to the Bottom Board with a #6 X 1/2" Hex Washer Hd. Screw.

This concludes Section 4, RECORDER BRACKET AND POWER CORD INSTALLATION, please proceed to Section 5, SOLENOID RAIL INSTALLATION.

5. SOLENOID RAIL INSTALLATION

This Section details the installation of the Solenoid Rail in pianos with Drop or Direct Blow Actions. Procedures for the modification of the Solenoid Rail, if this is necessary, are also covered. Read each Step and its related NOTE or CAUTION thoroughly. You MUST fully understand what is required BEFORE beginning any procedure.

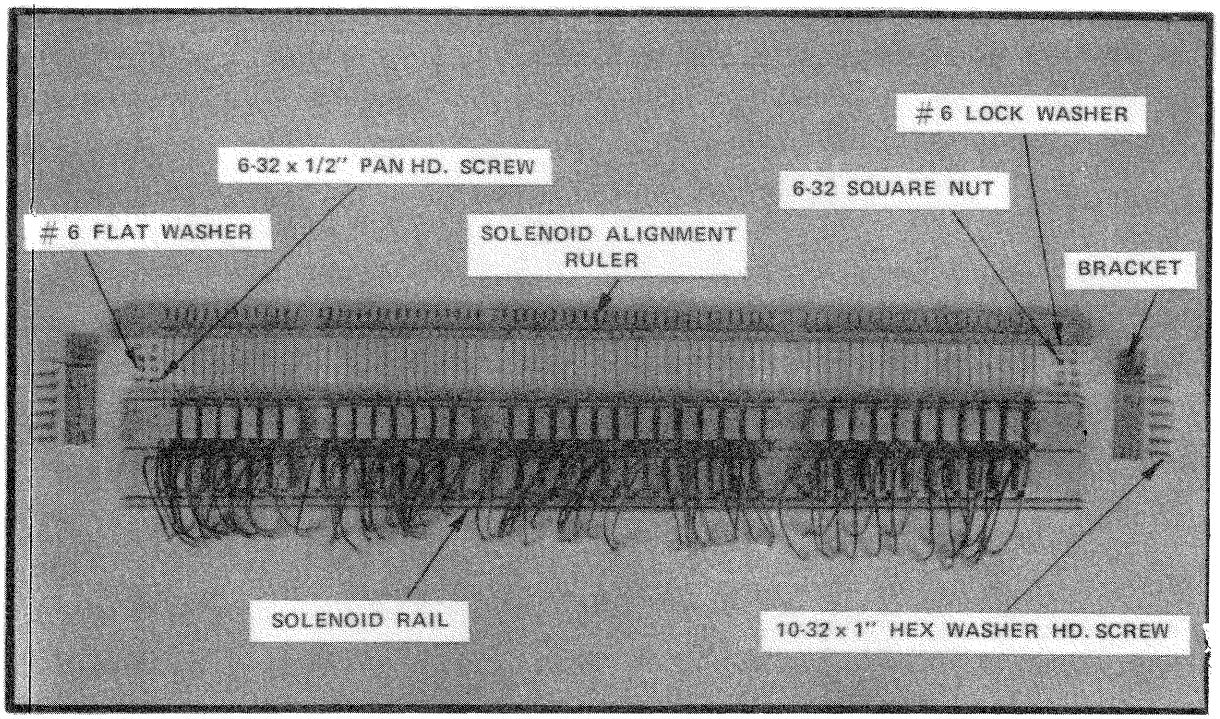


FIGURE 5-1 Solenoid Rail Assembly.

STEP 5-1

Refer to FIGURE 5-1 and unpack the items listed below from the shipping carton. Check for missing or damaged parts and replace those that are defective with new ones from the Spares or your Maintenance Kit.

1 ea.	Solenoid Rail Assembly	PN 100-01J024-1
1 ea.	Pedal Switch Assembly	PN 100-01C003-1
2 ea.	Rail Brackets	PN 100-02C067-1
2 ea.	Driver PC Boards, Middle and Bass	PN 100-04D003-1
1 ea.	Driver PC Board, Treble	PN 100-04D004-1
2 ea.	1/4-20 x 1" Hex Hd. Screws	PN *
2 ea.	1/4-20 Hex Nuts	PN *
2 ea.	1/4" Flat Washers	PN *
2 ea.	1/4" Lock Washers	PN *
2 ea.	10-32 x 2" Stove Bolt	* } not supplied with kit
2 ea.	10-32 Hex Nuts	* } not supplied with kit
12 ea.	#10 x 1" Hex Washer Hd. Screws	PN *
4 ea.	6-32 x 1/2" Pan Hd. Screws	PN *
4 ea.	6-32 Square Nuts	PN *

STEP 5-1 (cont'd.)

4 ea. #6 Flat Washers ----------PN *
10 ea. #6 x 3/16" Hex Washer Hd Screws----------PN *

* These items have no part Number since they are common hardware and can be purchased in any hardware store.

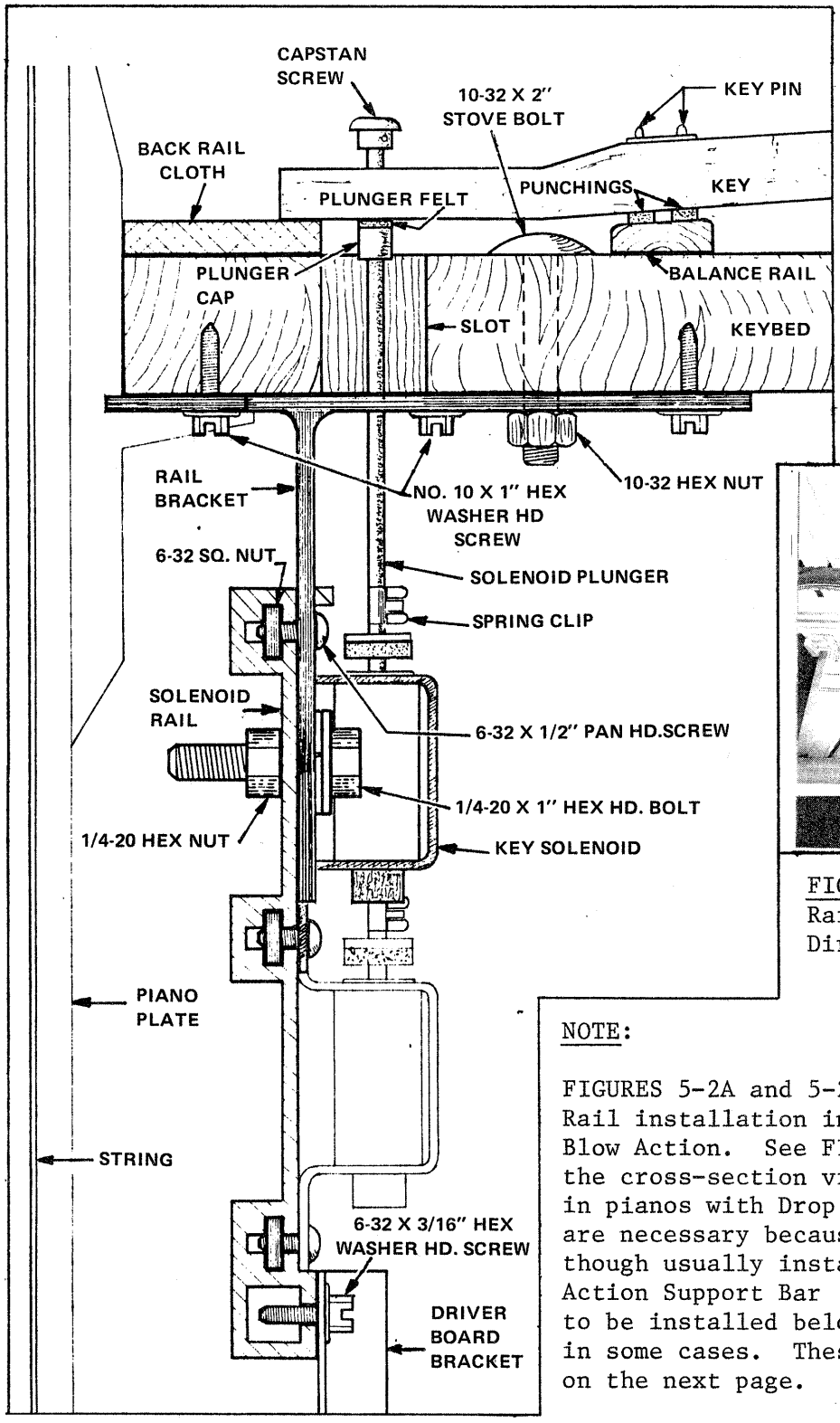


FIGURE 5-2A Cross-section view of Rail installation in a piano with a Direct Blow Action.

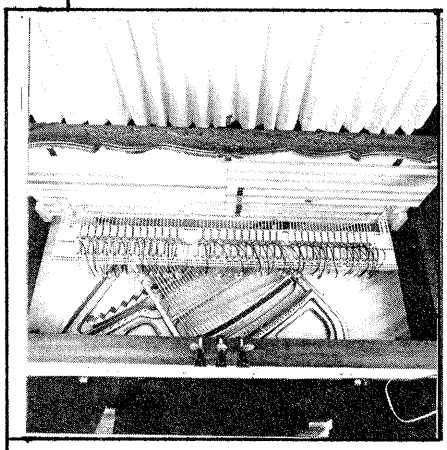


FIGURE 5-2B Front view of Rail installation in a Direct Blow Action piano.

NOTE:

FIGURES 5-2A and 5-2B illustrate the Solenoid Rail installation in a piano with a Direct Blow Action. See FIGURES 5-2C and 5-2D for the cross-section views of Rail installation in pianos with Drop Actions. Two illustrations are necessary because the Rail Brackets, though usually installed on the TOP of the Action Support Bar (FIGURE 5-2C), may have to be installed below the bar (FIGURE 5-2D) in some cases. These Figures are located on the next page.

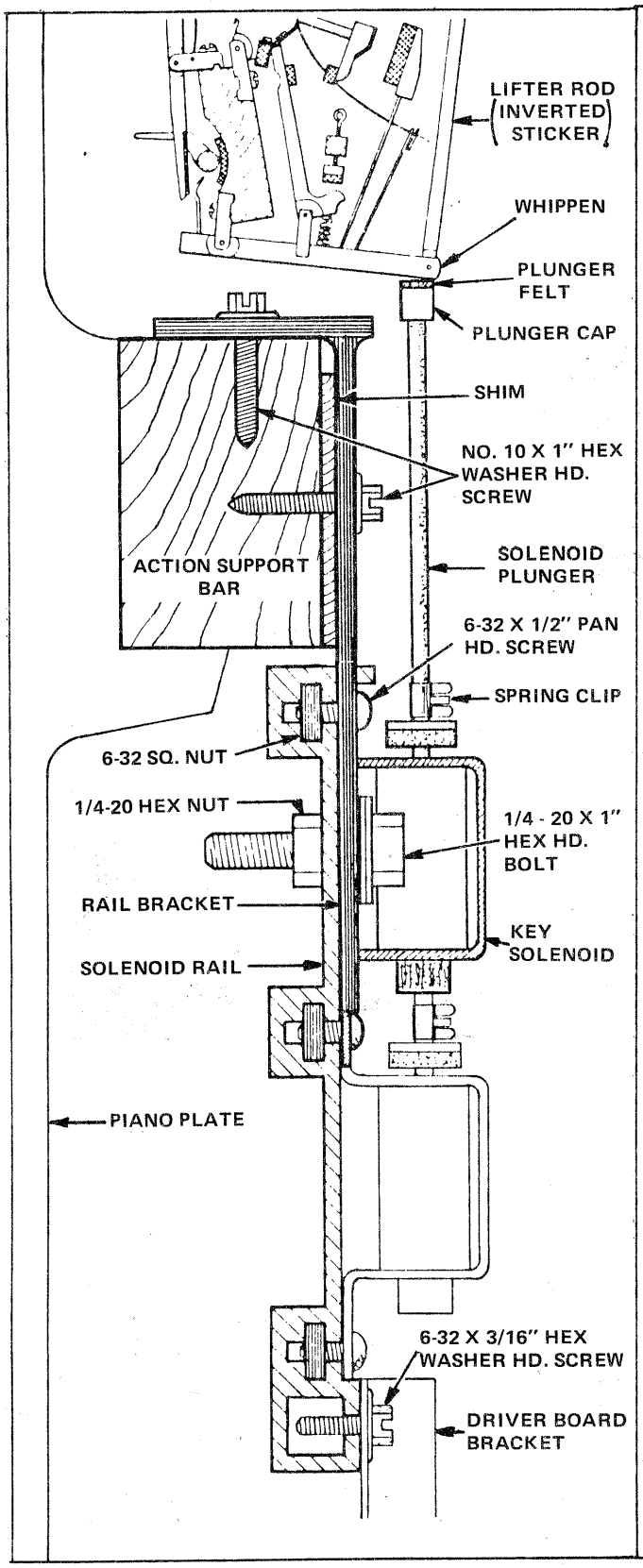


FIGURE 5-2C Cross-section view of Rail installation in a piano with a Drop Action (bracket mounted on top of the Support Bar).

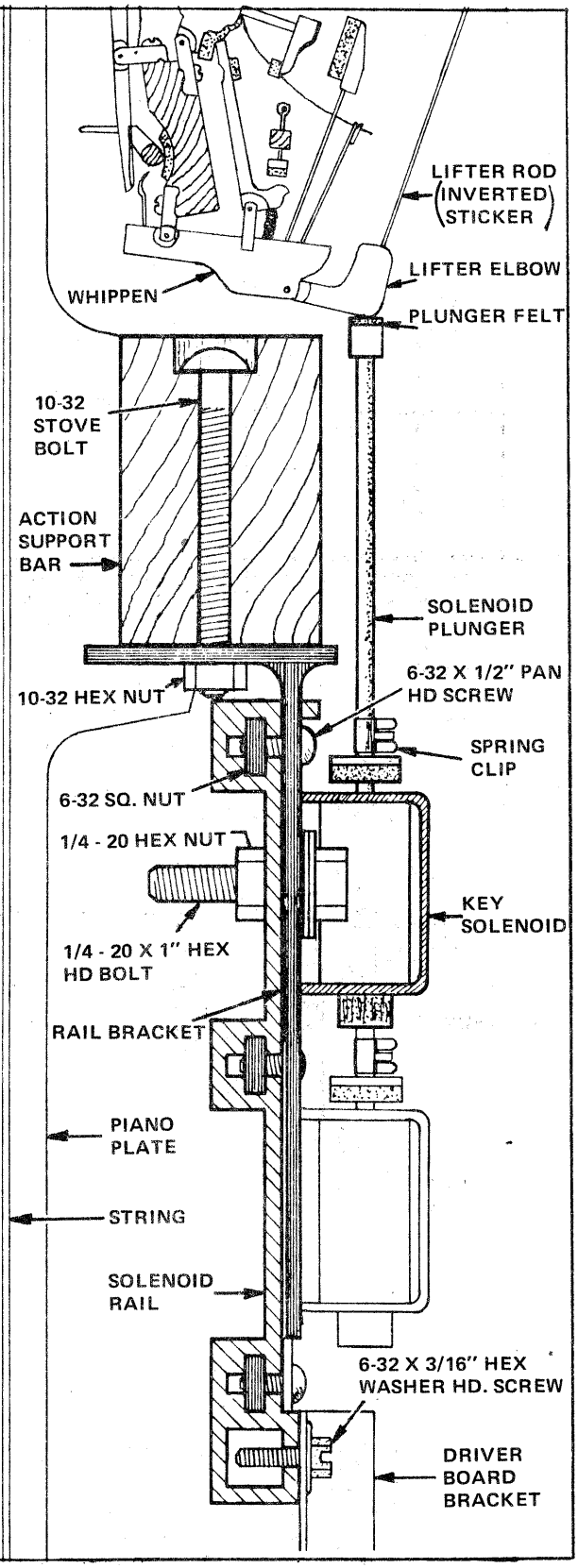


FIGURE 5-2D Cross-section of Rail installation in a piano with a Drop Action (bracket mounted below the Action Support Bar).

STEP 5-2

Place the Solenoid Rail on a table or work bench with the Solenoid plungers facing away from you. See FIGURE 5-3.

STEP 5-3

Locate the Solenoid Alignment Ruler (48" x 1" x 1/4") and place it against the back of the Solenoid Rail under the plungers with the end labelled "5" to the LEFT. See FIGURE 5-3.

STEP 5-4

Measure the length of the rail and mark the center of the measurement on the plunger side of the rail.

STEP 5-5

Align the center mark on the Alignment Ruler with the center mark on the rail, then tape the ruler to the rail and both to the bench so they won't move while you're doing the next step.

STEP 5-6

Starting from the LEFT end of the rail, loosen the two (2) screws holding the first solenoid to the rail, then slide the solenoid over until the plunger is aligned directly over the first mark on the ruler (labelled "5"). Make sure that the solenoid is perpendicular to the back edge of the rail. Tighten the two holding screws, then repeat this procedure with the next Key Solenoid at the next mark on the Solenoid Alignment Ruler. See FIGURE 5-3.

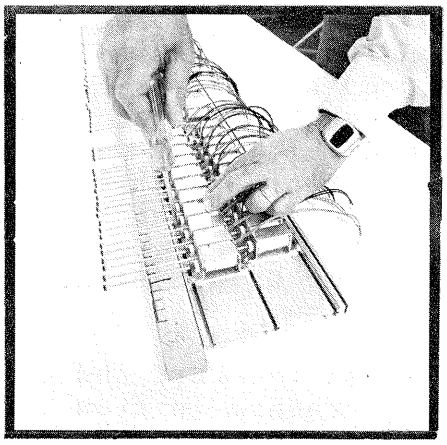


FIGURE 5-3 Align the solenoid plungers with the marks on the ruler.

NOTE:

1. As you position each solenoid, check the tip for a missing cap or felt pad and replace the missing cap or felt pad with a new cap from your maintenance kit.

2. Make sure you don't move either the rail or the ruler while adjusting the solenoids. If the solenoids are misaligned at this time, you may have difficulty when you insert the plungers through the slots in the keybed in the pianos with Direct Blow Actions.

STEP 5-7

Remove the tape from the ruler and set the ruler aside.

STEP 5-8

Locate the two Rail Brackets (PN 100-02C067 -1). If you are working on a piano with a Drop Action, do Point A below. If you are working on a piano with a Direct Blow Action, do Point B (on the next page).

A. Cut both of the brackets at the point indicated by the dotted line in FIGURE 5-4. Remove any burrs and rough edges with a file.

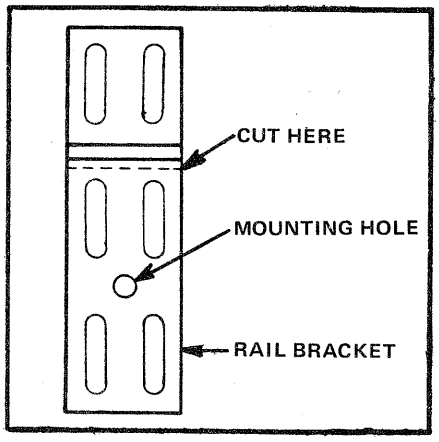


FIGURE 5-4 Cut both of the brackets along the dotted line.

STEP 5-8 (cont'd.)

B. Refer to FIGURE 5-5. Measure 5/8" along the side of the bracket and mark it as shown in the Figure. Measure and mark the other side of the bracket in the same manner. Repeat this procedure on the other bracket. These marks will be used to align the bracket with the Solenoid Centerline when the brackets are installed later in this Section.

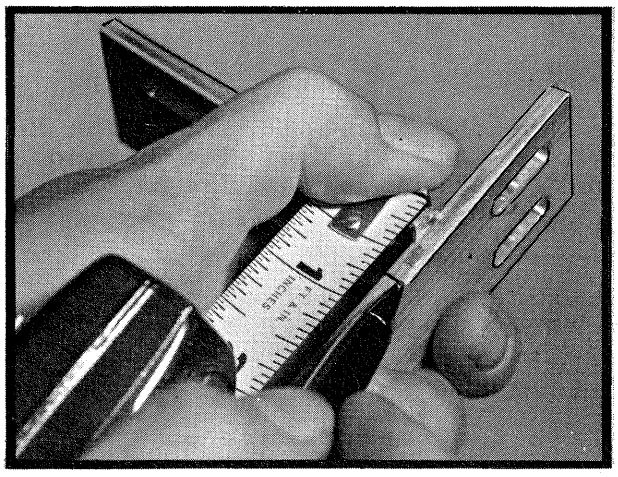


FIGURE 5-5 Measure and mark the brackets as shown above.

STEP 5-9

Refer to the Check List to determine if it will be necessary to trim the Solenoid Rail to fit the piano. For Drop Actions, refer to STEPS 1-24 (Line C) and 1-25 (Line D) on the Check List. For Direct Blow Actions, refer to STEPS 2-17 (Line N) and 2-18 (Line O) on the Check List. If there are NO measurements written on either line, see the NOTE under STEP 5-13. If a measurement appears under Line C (for Drop Actions) or Line N (for Direct Blow Actions), do Point A below. If a measurement appears on Line D (for Drop Actions) or Line O (for Direct Blow Actions), do Point C below.

A. At the LEFT end of the Solenoid Rail measure in from the end of the rail a distance equal to the measurement written on Line C, STEP 1-24 (for Drop Actions), or Line N, STEP 2-17 (for Direct Blow Actions), and mark the rail. See FIGURE 5-6 for the location of the mark.

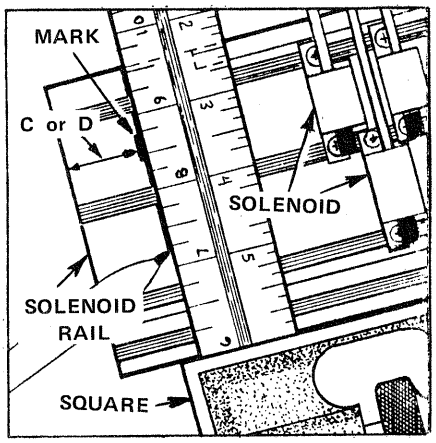


FIGURE 5-6 Draw a line through the mark.

B. Use a square and a pencil or felt pen to draw a line parallel to the end of the rail and through the mark as shown in FIGURE 5-6. If there is a measurement written on Line D, STEP 1-25 (for Drop Actions), or on Line O, STEP 2-18 (for Direct Blow Actions), proceed to point C below. If there is no measurement written on the line, proceed to the next Step.

C. At the RIGHT end of the Solenoid Rail, measure in from the end of the rail a distance equal to the measurement written on Line D, STEP 1-25 (for Drop Actions), or Line O, STEP 2-18 (for Direct Blow Actions), and mark the rail.

D. Use a square and a pencil or felt pen to draw a line parallel to the end of the rail and through the mark.

NOTE:

STEPS 5-10 through 5-13 apply to both Drop and Direct Blow Actions.

STEP 5-10

Get the two Rail Brackets (PN 100-02C067-1). If both ends of the Solenoid Rail will have to be trimmed, do Points A and B below. If only the LEFT end of the rail is to be trimmed, do Point A; if only the RIGHT end of the rail is to be trimmed, do Point B.

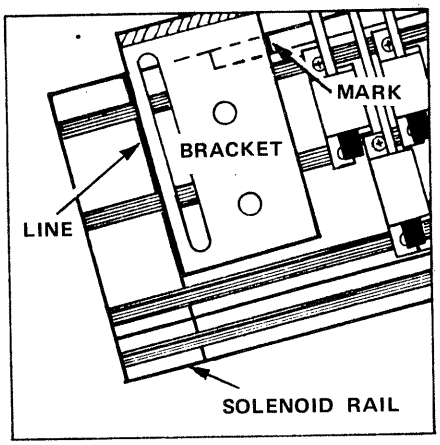


FIGURE 5-7 Align the bracket with the line on the rail and mark the lip on the rail.

A. Place one of the brackets against the LEFT end of the rail as shown in FIGURE 5-7. Align the OUTSIDE edge of the bracket with the line drawn on the rail as indicated in the Figure. If the INSIDE edge of the bracket rests on the lip at the top of the Solenoid Rail, use the edge as a straightedge and draw a line to mark the lip as shown in FIGURE 5-7. This mark indicates the amount to be trimmed from the lip of the rail so the bracket will fit.

B. Place one of the brackets against the RIGHT end of the rail and align its OUTSIDE edge with the line drawn on the rail. If the INSIDE edge of the bracket rests on the lip at the top of the rail, use the edge as a straightedge to draw a line to mark the lip. The mark on the lip indicates the amount to be removed from the lip so the bracket will fit the rail.

STEP 5-11

Use a hack saw to trim the Solenoid Rail along the lines drawn at the ends of the rail, then remove any burrs or rough edges with a file.

STEP 5-12

Use a file to remove the portion of the lip from the end of the lip up to the mark (see the shaded area in FIGURE 5-8).

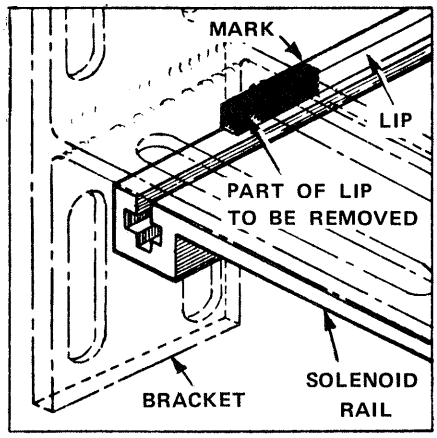


FIGURE 5-8 File down the portion of the lip shown shaded above.

STEP 5-13

THOROUGHLY vacuum the rail to remove all metal particles from it.

NOTE:

If you are working with another person and he has not reached this point in the installation, assist him to complete his tasks.

STEP 5-14

If you have a piano tilter, lay the piano on its back.

NOTE:

STEPS 5-15 through 5-21 detail the installation of the brackets on pianos with Drop Actions; 5-22 through 5-26 detail bracket installation on pianos with Direct Blow Actions.

DROP ACTION RAIL BRACKET INSTALLATION

NOTE:

If you are working with another person, he can be doing the procedures detailed in STEPS 5-15 through 5-20 at the RIGHT end of the Action Support Bar, while you are doing them at the LEFT end of the Bar.

STEP 5-15

Locate the RB label next to the line drawn through the SR mark at the LEFT end of the Support Bar. Notice that the label is located near the TOP or BOTTOM edge of the Bar. This label indicates which surface the Rail Bracket will be mounted to when it is installed. If the RB label is near the TOP of the Bar (see FIGURE 5-9) or the BOTTOM of the Bar, place your square against that edge and draw a line across the Bar. See FIGURE 5-9. In the Figure the RB label is at the top of the Support Bar, therefore, the line is drawn across the TOP of the Bar. If the RB label is at the BOTTOM of the Bar, the line would have been drawn across the BOTTOM of the Bar.

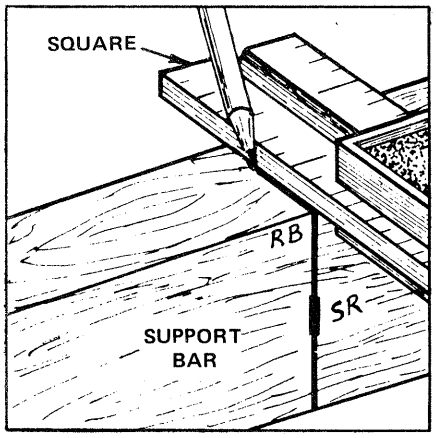


FIGURE 5-9 Draw a line across the Bar at the RB label as shown above.

STEP 5-16

Place one of the Rail Brackets against the Support Bar as shown in FIGURE 5-10A (TOP mounted Bracket) or 5-10B (BOTTOM mounted Bracket), align the Bracket to the Line drawn across the TOP or BOTTOM of the Bar, mark the centers of the Bracket slots (as shown in the Figures), set the Bracket aside and center punch the marks.

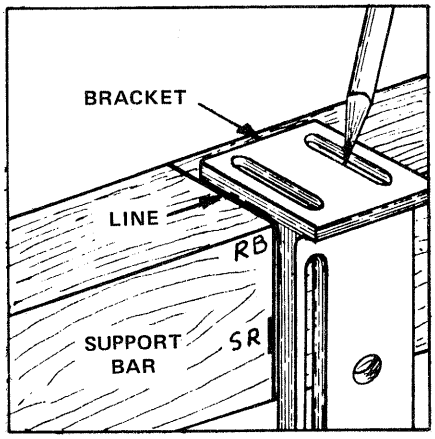


FIGURE 5-10A Align the Bracket with the line on the TOP of the Bar and mark the centers of the slots.

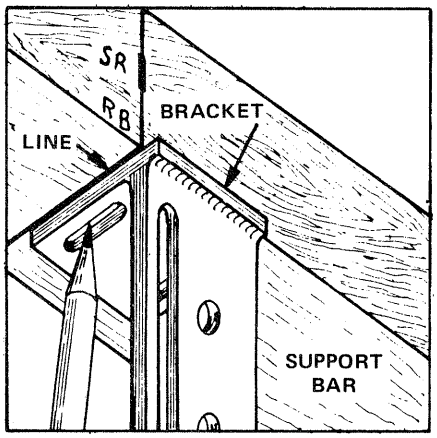


FIGURE 5-10B Align the Bracket with the line on the BOTTOM of the Bar and mark the centers of the slots.

STEP 5-17

Insert a 1/8" bit in your drill, wrap a piece of tape around the bit 1" from its tip, and drill at the punch marks to a depth of 1" (indicated by the tape on the bit). See the CAUTION below.

CAUTION:

WHEN DRILLING IN THESE PROCEDURES, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

NOTE:

If you are mounting the Bracket to the TOP of the Support Bar, proceed to STEP 5-20; if you are mounting the Bracket to the UNDERSIDE of the Bar, proceed to the next Step.

STEP 5-18

Replace the 1/8" bit with one of 3/16" diameter and drill THROUGH the Support Bar at the 1/8" hole toward the side of the piano. See FIGURE 5-11, which shows a cross-section view of the hole to be drilled.

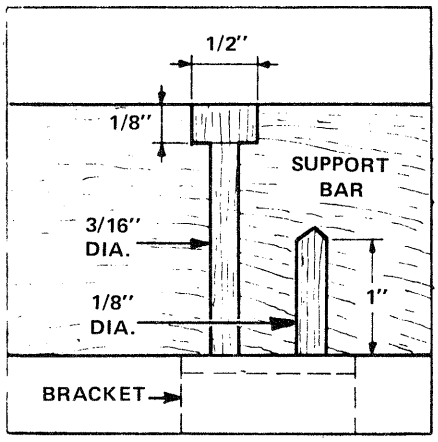


FIGURE 5-11 Cross-section view of mounting hole (Bracket mounted to BOTTOM of the Bar).

STEP 5-19

Replace the 3/16" bit with a 1/2" wood bore and countersink the 3/16" holes at the TOP of the Bar as shown in FIGURE 5-11. Countersink the hole to a depth of approximately 1/8".

STEP 5-20

Mount the Rail Bracket to the Support Bar. If you are mounting the Bracket to the TOP of the Bar, do Point A below; if you are mounting it to the BOTTOM of the Bar, do Point B below.

A. Secure the Bracket to the Bar with two #10 x 1" Hex Washer Hd. Screws as shown in FIGURE 5-12A, then proceed to STEP 5-21 on the next page. See the NOTE below.

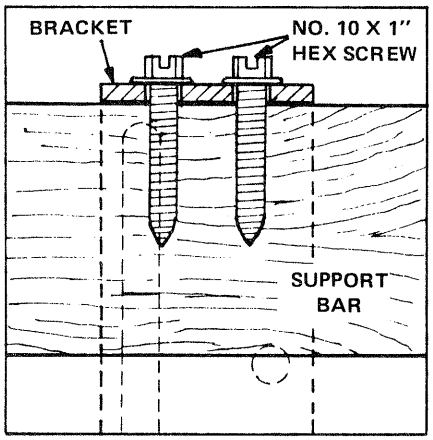


FIGURE 5-12A Cross-section view of mounted Bracket (on TOP of Bar).

B. Secure the Bracket to the Bar with one #10 x 1" Hex Washer Hd. Screw at the inside slot, then pass one of the 10-32 x 3-1/2" Stove Bolts (you must supply this item) through the hole in the TOP of the Bar and use a 10-32 Hex Nut to secure the Bracket to the Bar as shown in FIGURE 5-12B. Proceed to STEP 5-21 on the next page. See the NOTE below.

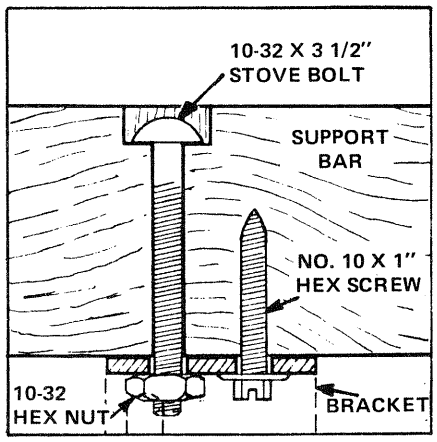


FIGURE 5-12B Cross-section view of mounted Bracket (on BOTTOM of the Bar).

NOTE:

If you are working alone, repeat STEP 5-15 through 5-20 at the RIGHT end of the Bar BEFORE proceeding to STEP 5-21.

STEP 5-21

Refer to FIGURES 5-13 and 5-13B. Get the Action and place it on a work bench or table. If the Action is equipped with Lifter Elbows as shown in FIGURE 5-13A, do Point A below; if it has Whippens as shown in FIGURE 5-13B, do Point B below.

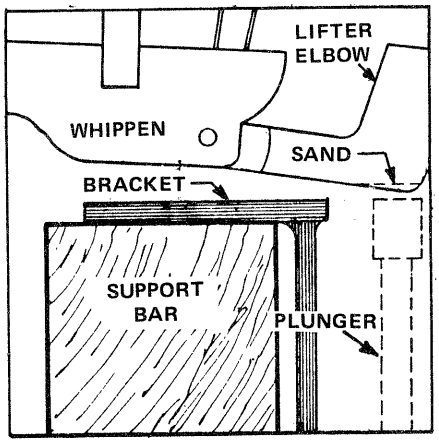


FIGURE 5-13A Sand the ends of the Lifter Elbows as indicated by the dotted line above.

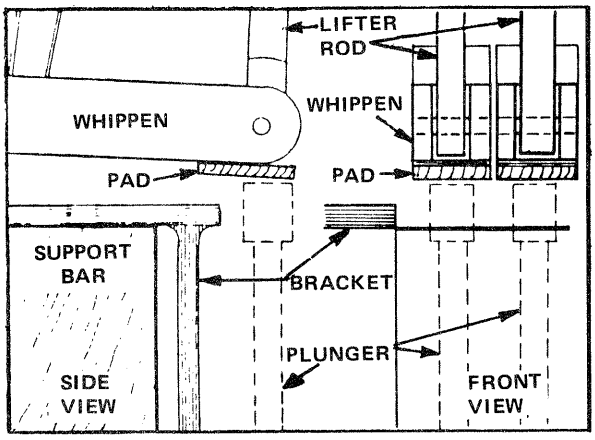


FIGURE 5-13B Glue a wood or plastic pad on the Whippen as shown above.

A. Sand the ends of he Lefter Elbows so the Solenoid plungers will strike the Elbows more directly. See FIGURE 5-13A. Proceed to STEP 5-27.

B. Glue a small wood or plastic pad on the end of each Whippen. See FIGURE 5-13B. Proceed to STEP 5-27.

DIRECT BLOW ACTION RAIL BRACKET INSTALLATION

NOTE:

If you are working with another person, he can be doing the procedures detailed in STEPS 5-22 through 5-26 at the RIGHT end of the Action Support Bar, while you are doing them at the LEFT end.

STEP 5-22

Refer to FIGURE 5-14. At the LEFT side of the piano, place a Rail Bracket (PN 100-02C067-1) against the UNDERSIDE of the Keybed, align the outside edge of the bracket with the mark labelled SR, and align the marks on the sides of the bracket with the Solenoid Centerline as shown in the Figure.

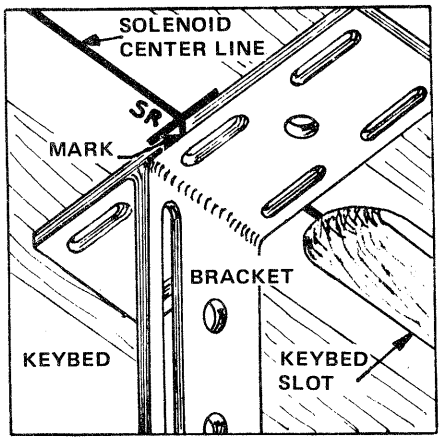


FIGURE 5-14 Align the bracket to the SR mark and he Solenoid Centerline as shown above.

STEP 5-23

Hold the bracket firmly in place and mark the positions of the bracket slots on the Keybed as shown in FIGURE 5-14. Set the Bracket aside.

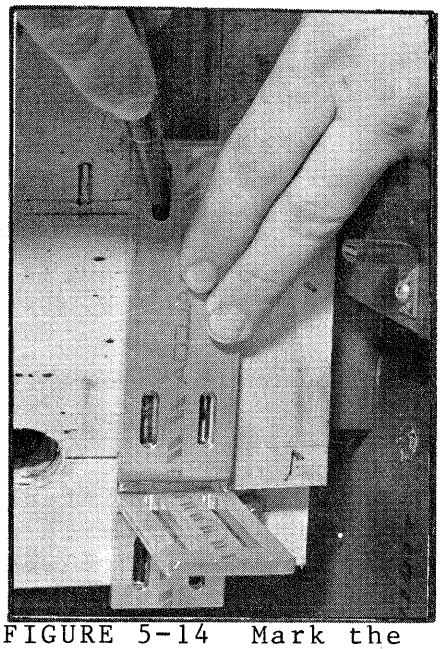


FIGURE 5-14 Mark the positions of the slots.

STEP 5-24

Center punch the centers of the marks on the Keybed.

STEP 5-25

Insert a 5/32" drill bit in your drill, wrap a piece of masking tape around the bit 1" from its tip, and drill to a depth of 1" at the punch marks. (The tape indicates the depth of the drill.)

STEP 5-26

Mount the bracket to the Keybed with six #10 x 1" Hex Washer Head Screws. BEFORE fully securing the bracket, make sure it is aligned with the SR mark and the Solenoid Centerline as detailed in STEP 5-22. See the NOTE below.

NOTE:

If you are working alone, repeat the procedures detailed in STEP 5-22 through 5-26 at the RIGHT side of the Keybed, then proceed to STEP 5-27.

STEP 5-27

If the piano is laying on its back, tip it up on its feet.

STEP 5-28

If any Pedal Trapwork is within 2" of the area directly below the Rail Brackets, loosen it and move it out of the way.

SOLENOID RAIL INSTALLATION

NOTE:

The following procedures are the same for pianos with Drop or Direct Blow Actions.

STEP 5-29

Slip one of the 6-32 Square Nuts into the TOP channel at the LEFT end of the Solenoid Rail as shown in FIGURE 5-15. (The arrow drawn on the rail in the photograph indicates the TOP of the rail.) Place a piece of masking tape over the end of the channel to trap the nut. Repeat this procedure at the RIGHT end of the rail.

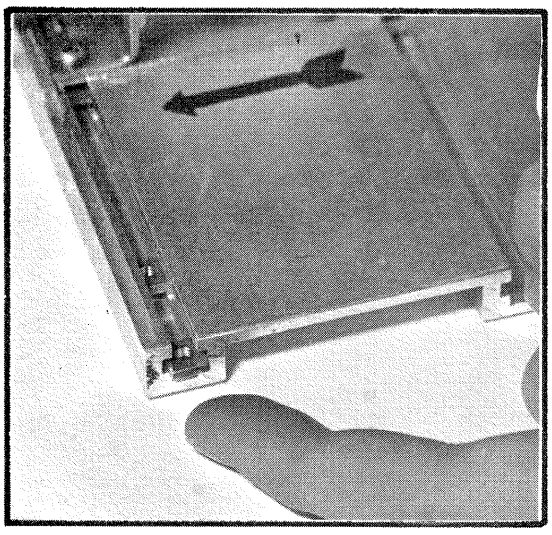


FIGURE 5-15 Insert the Square Nut into the TOP channel.

STEP 5-30

Measure from a point 1" above the bottom of the long slot in the vertical arm of the Rail Bracket to the Bottom Board of the piano as shown in FIGURE 5-16 (dimension P). Write the measurement on Line P under this Step on the Check List.

STEP 5-31

Get the two Rail Support Jacks (see FIGURE 5-17) and the spare set of Adjustment Rods from the Maintenance Kit. Attach a Support Jack at each end of the Solenoid Rail as shown in FIGURE 5-17 and secure them to the Rail with the Wing Screws.

STEP 5-32

Refer to the measurement on Line P under STEP 5-30 on the Check List. Adjust both Support Jacks until the distance measured between the TOP of the Solenoid Rail and the TIP of the Support Jacks equals the measurement on Line P. See the NOTE below.

NOTE

If you are unable to adjust the Support Jacks to the measurement on Line P, replace the Adjustment Rods with the spare set and try to adjust the Jacks to the measurement on Line P. The range of adjustment (measured from the TOP of the Rail to the TIP of the Jack) with the SHORT (6-3/8") rod is from 14" to 19", while that with the LONG (11-3/8") rod is from 19" to 24". Make sure that, when you select the rod, its range is sufficient to raise the TOP of the Rail from the bottom to the top of the slot in the vertical arm of the Rail Bracket. See FIGURE 5-18 for the location of the slot.

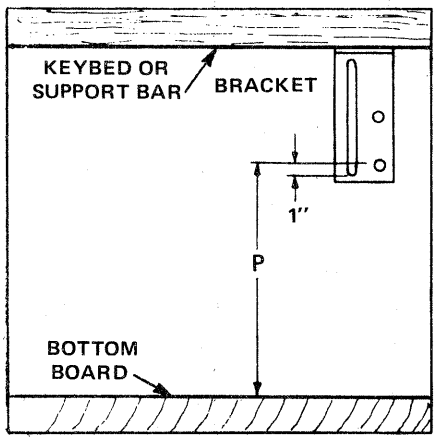


FIGURE 5-16 Measure dimension P.

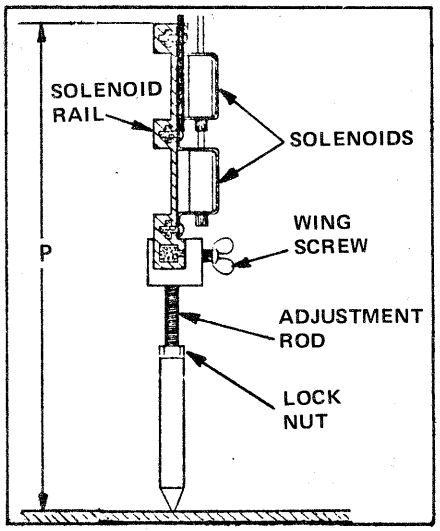


FIGURE 5-17 Secure the Support Jacks to the Rail and adjust them to equal dimension P as shown.

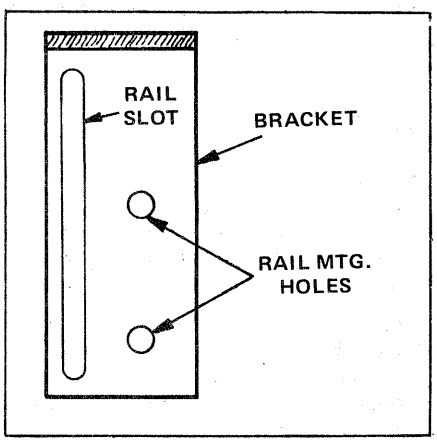


FIGURE 5-18 Rail slot in the Rail Bracket.

CAUTION:

THE NEXT TWO STEPS MUST BE DONE WITH THE ASSISTANCE OF ANOTHER PERSON.

STEP 5-33

Lift the Solenoid Rail and align it so the TOP channel in the rail is BEHIND the slots in the Rail Brackets. On pianos with Direct Blow Actions, as you are placing the rail in the piano, you MUST CAREFULLY insert the Key Solenoid plungers through the slots in the Keybed BEFORE aligning the Top channel in the rail behind the Rail Brackets. FIGURES 5-19A and 5-19B show the alignment of the Solenoid Rail in pianos with Drop Actions (5-19A) and Direct Blow Actions (5-19B). See the CAUTION below.

CAUTION:

MAKE SURE YOU DO NOT BEND THE SOLENOID PLUNGERS AS YOU INSERT THEM THROUGH THE KEYBED SLOTS.

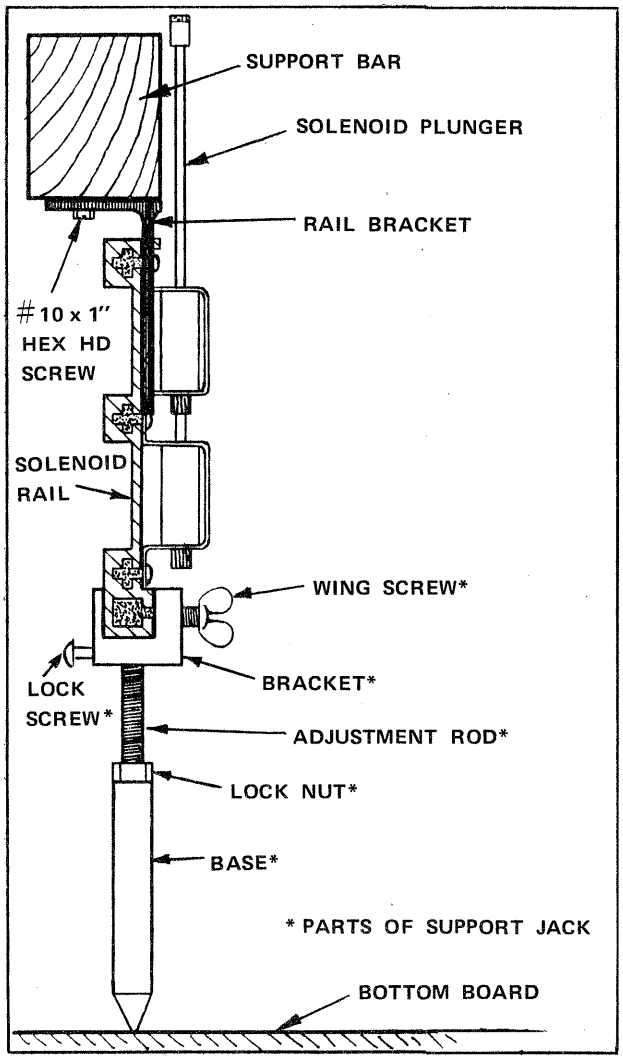


FIGURE 5-19A Cross-section view of the Solenoid Rail aligned behind the Rail Brackets in a Drop Action piano. Bracket mounted to underside of Support Bar.

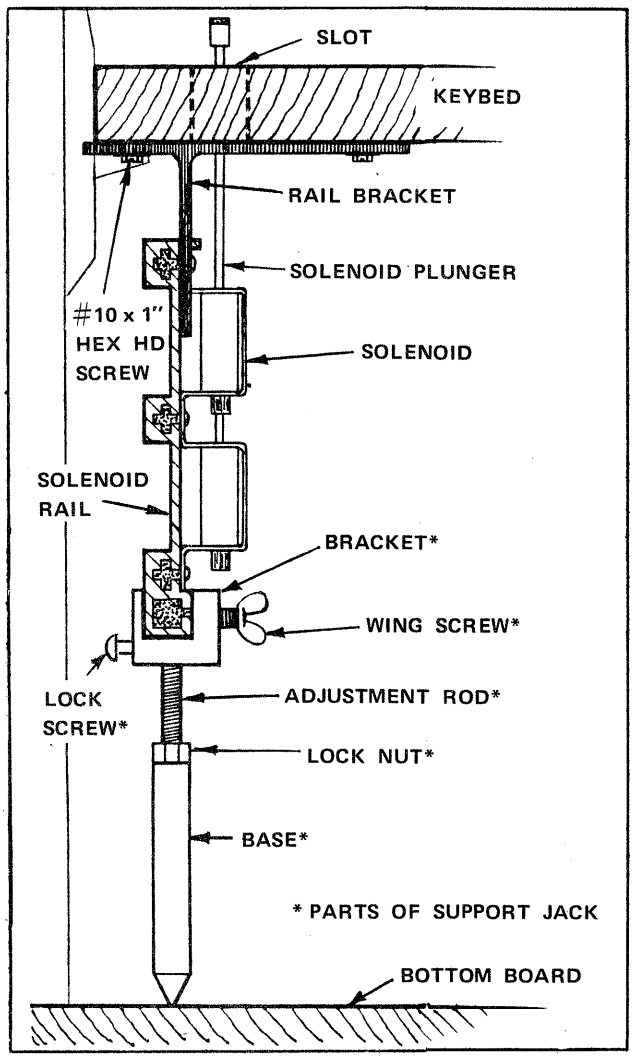


FIGURE 5-19B Cross-section view of the Solenoid Rail aligned behind the Rail Brackets in a Direct Blow Action piano.

STEP 5-34

While one of you balances the Solenoid Rail on the Support Jacks, the other should get the two 6-32 x 1/2" Pan Head Screws and put a #6 Flat Washer on each screw, then set the screws down near each end of the rail. Also, get the person supporting the rail a jeweler's screwdriver and one for yourself.

STEP 5-35

While balancing the rail on the jacks, each person should use his jeweler's screwdriver to position the 6-32 Square Nuts in the top channel in the rail behind the slots in the Rail Brackets.

STEP 5-36

Start the 6-32 x 1/2" Pan Head Screws into the 6-32 Square Nuts and tighten them just enough to hold the rail to the brackets, yet allow the screws to slide in the slots in the brackets. See FIGURE 5-20 below. (The bracket shown is that installed in a Drop Action piano. The bracket in a piano with a Direct Blow Action will look similar, but, will be mounted to the Keybed.)

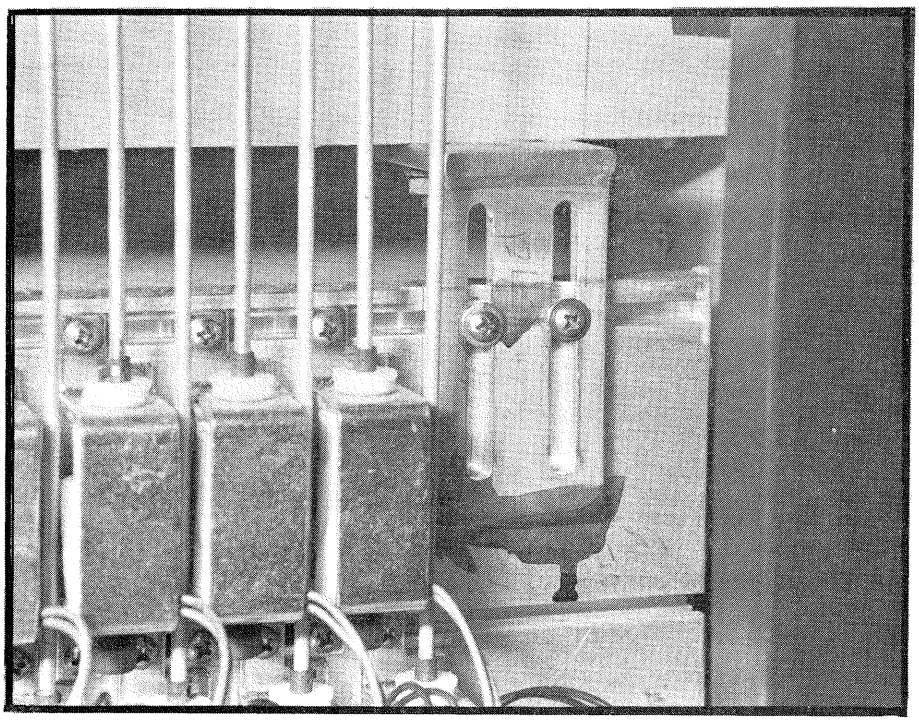


FIGURE 5-20 Rail mounted on the Rail Bracket (in a Drop Action piano).

STEP 5-37

On pianos with Direct Blow Actions, install Keys 5 and 84 and the Action Post Keys in their correct locations on the Keybed. Refer to the numbers written on the Balance Rail for the numbers of the Action Post Keys. Do NOT confuse the Action Post Key numbers with the numbers of the keys used to align the Key Switch Rail. The Action Post Keys will align over the ends of the slots in the Keybed. On pianos with Drop Actions, proceed to the next Step.

STEP 5-38

Lower the Support Jacks until the 6-32 x 1/2" Pan Hd. Screws are at the BOTTOM of the Slots in the Rail Brackets.

STEP 5-39

Install the Action on the piano. See the CAUTION below.

CAUTION:

EXERCISE CARE WHEN INSTALLING THE ACTION TO AVOID DAMAGE TO THE HAMMERS, DAMPERS, AND STICKER CLOTHS (on uprights), WHIPPEN CLOTHS (on consoles), OR LIFTER ELBOWS (on spinets). STICKER AND WHIPPEN CLOTHS ARE VERY FRAGILE, THEREFORE, MAKE SURE YOU DON'T HOOK THEM ON THE KEY CAPSTAN SCREWS WHEN INSTALLING THE ACTION. REFER TO FIGURES 5-21A, 5-21B, 5-21C, AND 5-21D FOR THE LOCATION OF THE ITEMS MENTIONED.

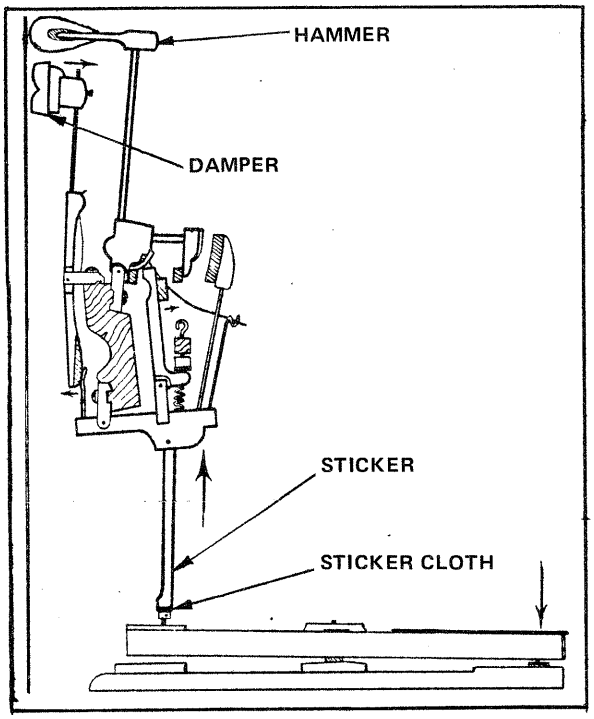


FIGURE 5-21A Upright Action.

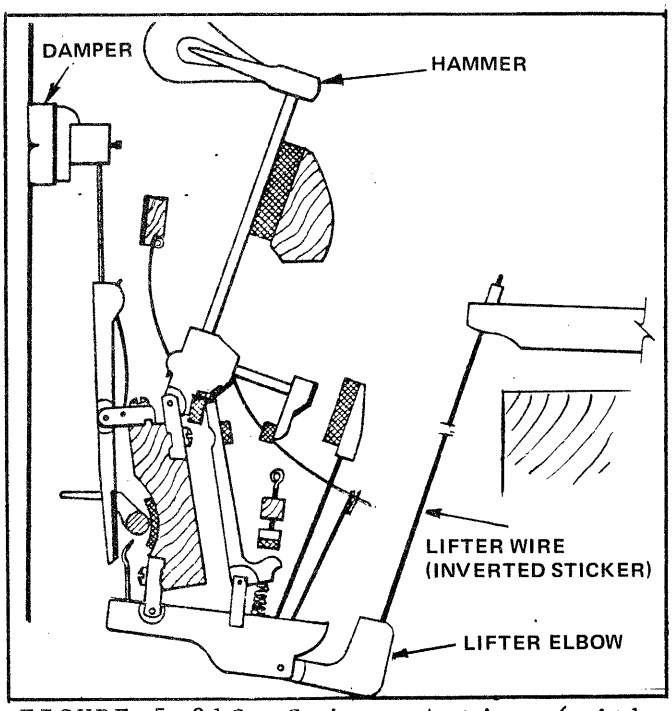


FIGURE 5-21C Spinet Action (with Lifter Elbow).

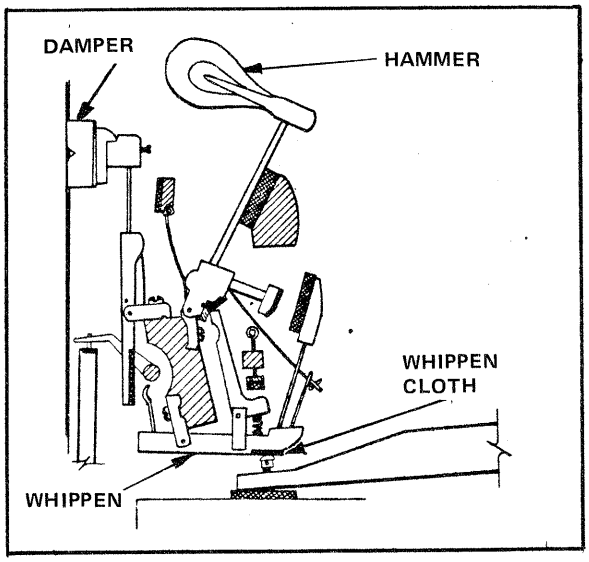


FIGURE 5-21B Console Action.

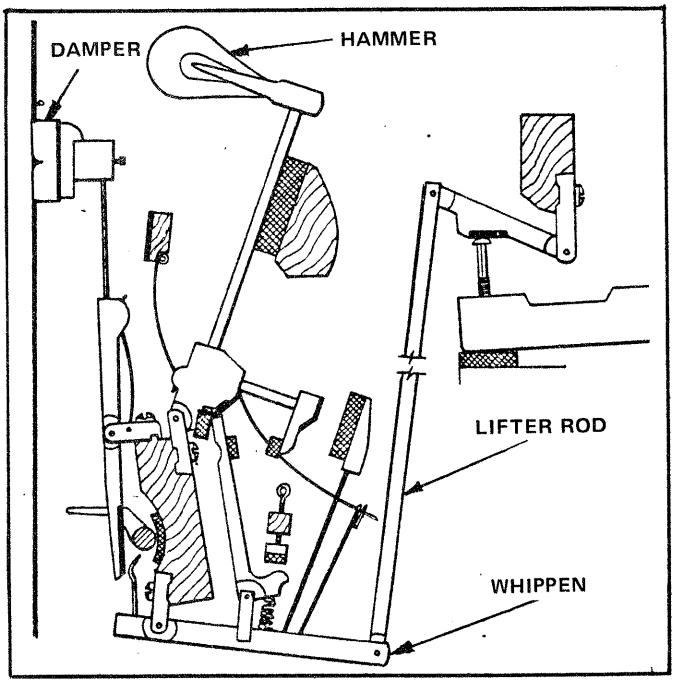


FIGURE 5-21D Spinet Action (with whippen).

STEP 5-40

Adjust the height of the Solenoid Rail by turning the Bases of the Support Jacks (clockwise to LOWER - counter-clockwise to RAISE) until the tips of the Solenoid plungers just touch the bottoms of the Keys, on pianos with Direct Blow Actions, or the bottoms of the Lifter Elbows (or Whippens) on Drop Action pianos. See FIGURE 5-22A and 5-22B below.

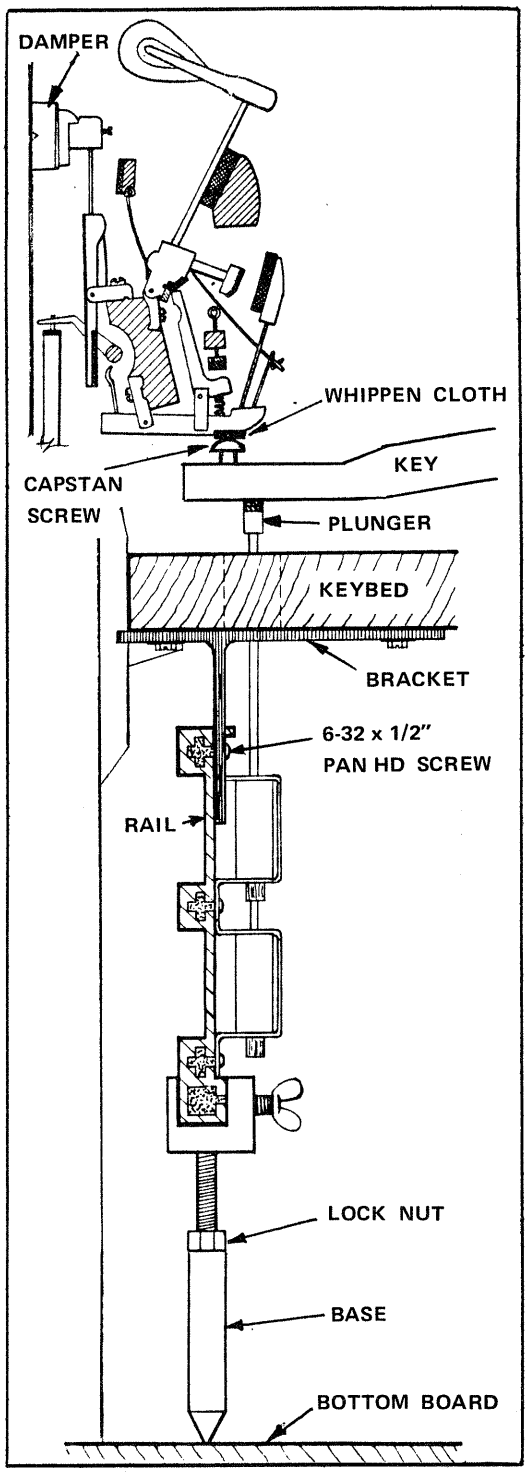


FIGURE 5-22A Plunger tip touches Key bottom on Direct Blow Actions (console shown above).

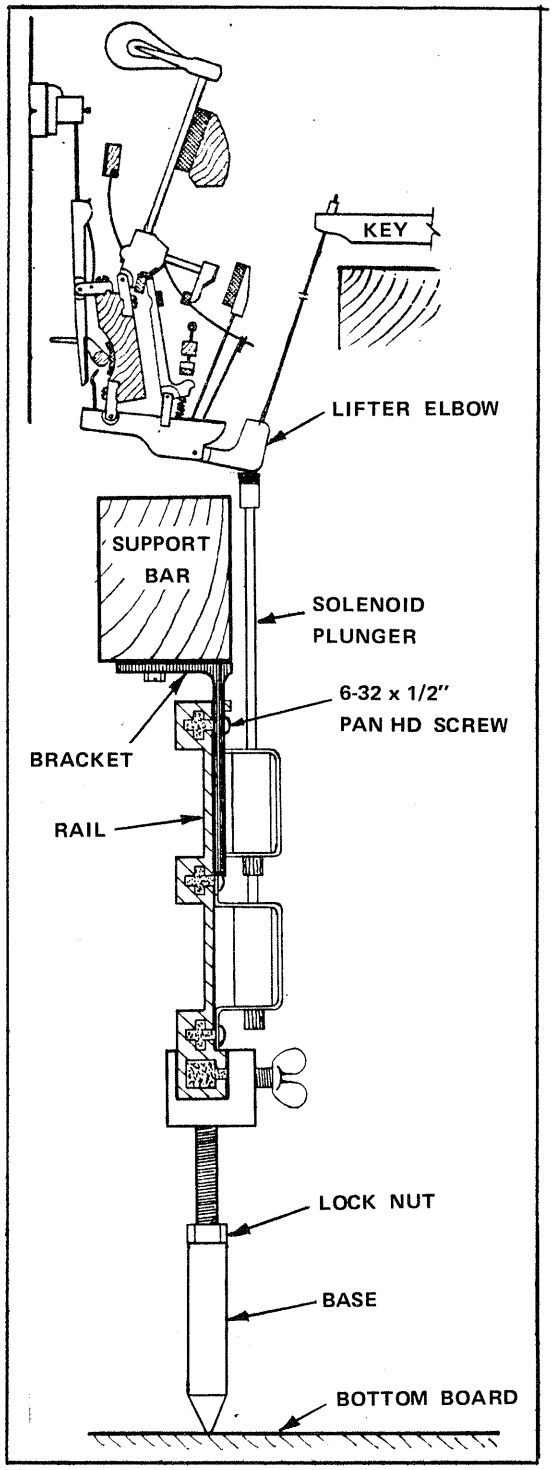


FIGURE 5-22B Plunger tip touches Lifter Elbow (or Whippen) on Drop Actions.

STEP 5-41

Tighten the Lock Nuts on the Support Jacks (see FIGURES 5-22A and B on the previous page for the location of the nuts). This is done to ensure that the height of the Solenoid Rail won't change while the next Step is being done.

STEP 5-42

Verify that the Solenoid plungers are centered under the Keys (on Direct Blow Actions) or under the Lifter Elbows or Whippens on Drop Actions. If necessary, adjust the position of the Solenoid Rail by sliding it to the right or left until the Solenoid plungers are as closely centered under the Keys (on Direct Blow Actions) or Lifter Elbows or Whippens (on Drop Actions) as possible. Tighten down the 6-32 x 1/2" Pan Hd. Screws holding the Rail to the Brackets.

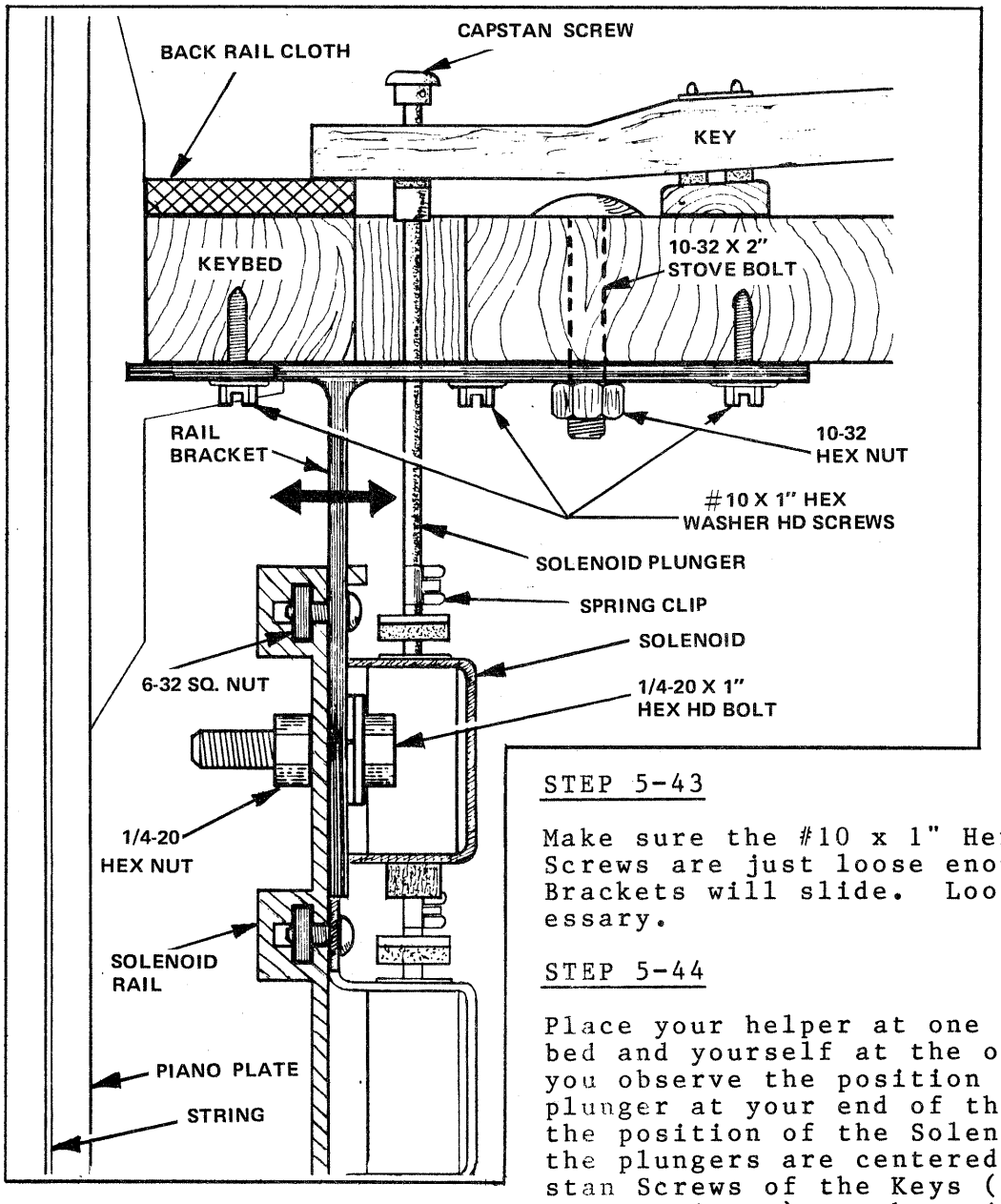


FIGURE 5-23 Adjut the position of the rail by sliding the brackets forward or backward. See the Arrow in the Figure.

STEP 5-43

Make sure the #10 x 1" Hex Washer Head Screws are just loose enough so the Rail Brackets will slide. Loosen them if necessary.

STEP 5-44

Place your helper at one end of the Keybed and yourself at the other. Each of you observe the position of the Solenoid plunger at your end of the piano. Adjust the position of the Solenoid Rail until the plungers are centered under the Capstan Screws of the Keys (on Direct Blow Action pianos) as shown in FIGURE 5-23 or the Lifter Elbows or Whippens (on Drop Action pianos) by sliding the Rail forward or backward. See the NOTE in the next page.

NOTE:

Once the Rail is positioned so the Solenoid plungers are centered under the Capstan Screws as closely as possible, verify that NONE of the Solenoid plungers is rubbing against the sides of the slots in the Keybed on pianos with Direct Blow Actions. If necessary, readjust the position of the Rail until the plungers don't rub.

STEP 5-45

Tighten the #10 x 1" Hex Washer Head Screws to secure the Brackets to the Keybed (on Direct Blow Actions) or the Support Bar (on Drop Actions).

STEP 5-46

Mark the center of the Bolt hole in the bracket (see FIGURE 5-24) on the Keybed, then center punch the mark. Repeat this procedure at the other bracket. See the NOTE below.

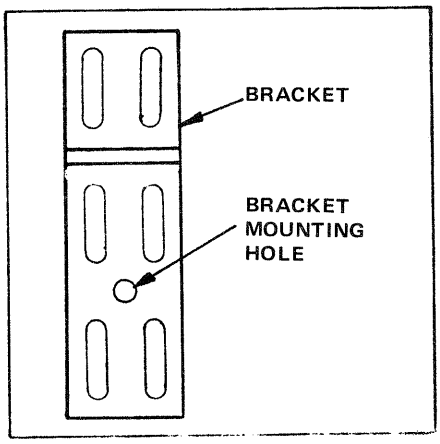


FIGURE 5-24 Bracket mounting Bolt hole.

NOTE:

Remove keys 5 and 84 or the drill might strike them when you drill through the Keybed in the next Step.

STEP 5-47

THOROUGHLY vacuum the Solenoid Rail and interior of the piano to remove ALL the wood chips and sawdust.

STEP 5-48

Secure the Pedal Trapwork in its original location or relocate Trapwork that went to the RIGHT side of the paino, then install the Pedal Dowels between the Trapwork and the Action.

STEP 5-49

Verify that there is a minimum of 1/4" between the dowels and any part of the Solenoid Rail or the Rail Brackets. Adjust the position of the Pedal Trapwork, if necessary.

STEP 5-50

Determine what modifications, if any, must be made to the Action and remove the Pedal Dowels and set them aside.

STEP 5-51

Remove the Action from the piano, secure the Action in the Cradle, if you have one, and place the Action on your work bench (if you don't have a cradle, prop the Action upright on the bench).

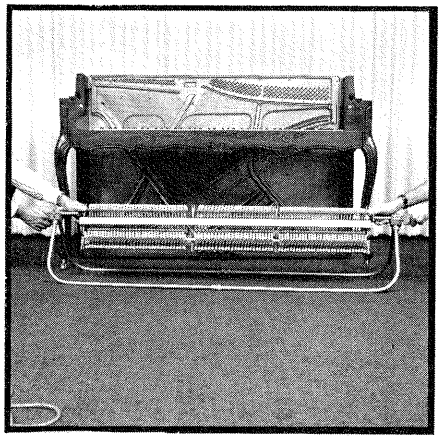


FIGURE 5-25 Secure the Action in the cradle.

STEP 5-52

Perform any modifications to the Action and Keybed that may be necessary.

NOTE:

If Pedal Trapwork was relocated from the RIGHT to the LEFT side of the piano, it will be necessary to perform several procedures to ensure optimal operation of the piano. Refer to Points 1 through 6 below.

1. In some cases, it may be necessary for you to procure or make a new Pedal Trap Lever to replace the original when Trapwork is relocated to the LEFT side of the piano.

2. If the Sostenuto Pedal is disabled because it was necessary to remove its Pedal Dowel and/or Trapwork to obtain required clearances, you will have to install a spring to hold the Pedal in its rest position.

3. When the SUSTAIN Pedal Trapwork is relocated to the left side of the piano, it will be necessary to strap the split Damper Lifter Rod. This can be done by using a small hose clamp to join the two pieces of the rod.

4. Any time the SUSTAIN Trapwork is relocated, ALWAYS check Damper regulation and reregulate, if necessary. Check that all Dampers lift at the same time and that they begin lifting as soon as the SUSTAIN Pedal is depressed.

5. After the Keys are installed, check to make sure that the Hammers are all resting against the Hammer Rail and that the Hammer Butts are resting on the Jacks. Reregulate the Capstan Screws on the Keys that do not conform to these conditions.

6. If a new Trap lever is to be installed, make certain that the fulcrum point of the lever is correctly positioned so the pedal mechanism operates normally when the pedal is pushed manually.

STEP 5-53

Install all Keys in their correct locations on the Keybed. If you are working on a Drop Action piano, make sure the Lifter Rods are connected. If you are working a Direct Blow Action piano, as you install the keys, verify that the Solenoid plungers are centered under them. If necessary, adjust the positions of the individual Solenoids that are incorrectly aligned under the Keys (on Direct Blow Actions) or Lifter Elbows or Whippens (on Drop Actions) by loosening the two mounting screws, moving the Solenoid into position, and retightening the screws.

CAUTION:

EXERCISE CARE WHEN INSTALLING THE ACTION IN THE NEXT STEP TO AVOID DAMAGING THE HAMMERS, DAMPERS AND STICKER OR WHIPPEN CLOTHS. STICKER AND WHIPPEN CLOTHS ARE EASILY DAMAGED, IF YOU HAPPEN TO HOOK THEM ON THE KEY CAPSTAN SCREWS. YOU MUST ALSO AVOID DAMAGING THE LIFTER RODS (INVERTED STICKERS) ON DROP ACTION PIANOS.

STEP 5-54

Install the Action in the piano and secure the Action Posts to the Piano Plate (see FIGURE 5-26 for the location of these items) with the Knurled Nuts (See FIGURE 5-26A) or Screws (see FIGURE 5-26B)

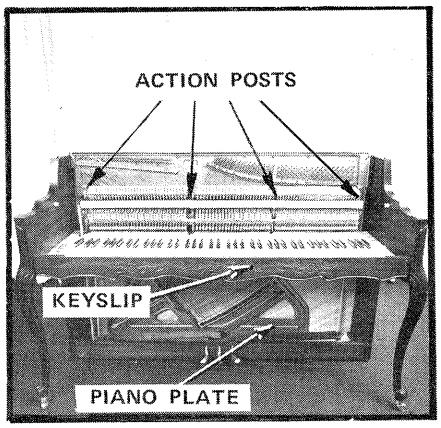


FIGURE 5-26 Action Post locations.

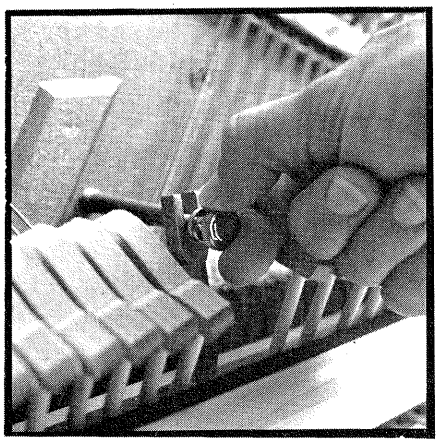


FIGURE 5-26A Knurled Nuts - Piano #1

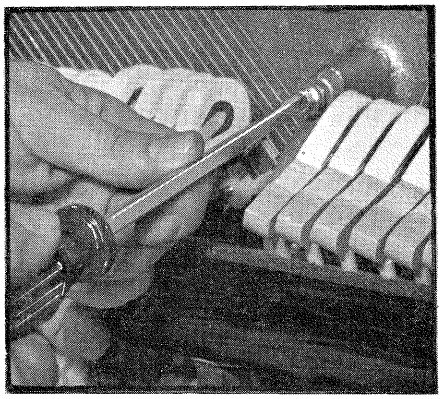


FIGURE 5-26B Screws - Piano #2.

STEP 5-55

Notice the heights of the Keys at the rear of the Keybed. If any appear to raised off the Back Rail Cloth, adjust the height of its Solenoid plunger. To adjust plunger height, compress the tabs on the Spring Clip with a pair of pliers (see FIGURE 5-27) and slide the plunger shaft down until the Key rests on the Back Rail Cloth. Proceed to STEP 5-26 on the next page. See the NOTE below.

NOTE:

This Step and the following should only be done on Solenoids that are noticeably out of alignment. Finer adjustments will be done later in these procedures.

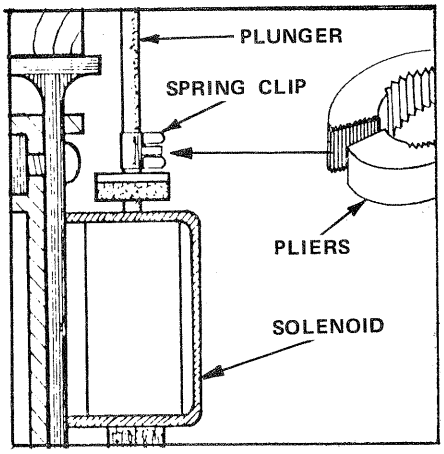


FIGURE 5-27 Compress the Spring Clip tabs with a pliers.

STEP 5-56

Observe the bottoms of the Solenoid plungers. If any are noticeably lower than the rest, adjust the height of the plunger by compressing the Spring Clip with your pliers (see FIGURE 5-27) and pulling up on the plunger shaft. Check for lost motion (caused by a gap between the tip of the plunger and the bottom of the Key) by pushing up on the bottom of the plunger as shown in FIGURE 5-28. The Back of the Key should rise as soon as the plunger is pushed, if not, readjust the plunger height as detailed above.

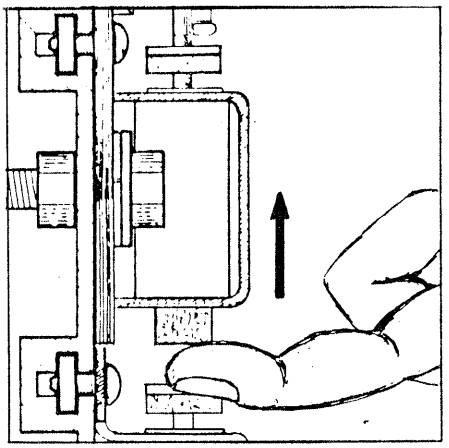


FIGURE 5-28 Push up on the bottom of the Solenoid plunger.

This concludes Section 5, SOLENOID RAIL INSTALLATION. please proceed to Section 6, PEDAL SOLENOID INSTALLATION.

6. PEDAL SOLENOID INSTALLATION

The installation of the Pedal Soleniods, which actuate the Soft and Sustain Pedal mechanisms, is detailed in this Section. It may be necessary, in some cases, to relocate the Pedal Trapwork to provide the necessary clearances between the Pedal Dowels to accommodate the installation of the Pedal Solenoids. Due to the variety of Dowel arrangements employed by the different manufacturers, the installation, in some Steps, is detailed in a general manner. Your expertise as a piano technician is relied upon for determining the best and fastest way to handle the modifications to the piano that may be necessary. Should you encounter unique conditions, which pose a problem, contact the PIANOCORDER™ Technical Services Department at the phone number or address listed in the INTRODUCTORY NOTES at the beginning of this manual.

STEP 6-1

Unpack the items listed below from the shipping carton. Check for damaged or missing parts and replace any that are defective with new ones from the Spares or Maintenance Kits.

2 ea. Pedal Solenoids ----------PN 100-11A001-1

2 ea. Pedal Dowel Ass'y (6") ---------- PN 100-01B007-1

2 ea. Pedal Dowel Ass'y (24") ---------- PN 100-01B007-3

2 ea. Coupler ---------- PN 100-02A051-1

2 ea. Support Ass'y ---------- PN 100-01B008-1

2 ea. Wood Base ---------- PN 100-02A049-1

4 ea. #6 x 1" Wood Screw ---------- PN *

* These parts have no part number since they are common hardware and can be purchased at any hardware store.

NOTE:

FIGURES 6-1A and 6-1B below show the two ways the Solenoids may be installed in a piano. Normally, the side-by-side arrangements shown in FIGURE 6-1A is used, but, in some cases, where clearance does not permit a normal installation, the staggered arrangement shown in FIGURE 6-1B may be used.

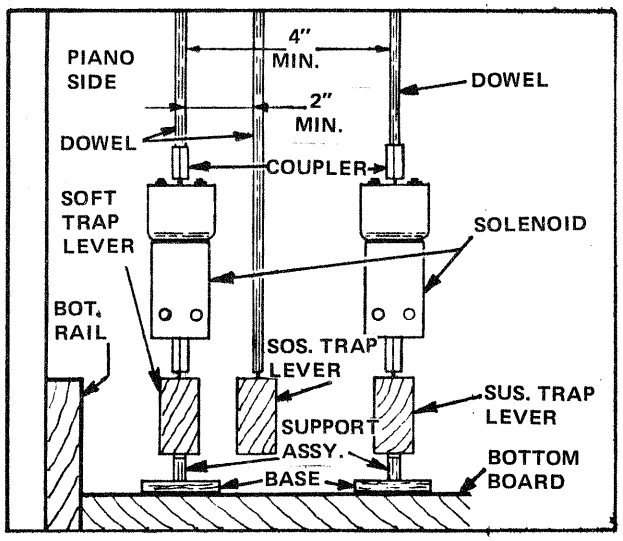


FIGURE 6-1A Side by Side arrangement.

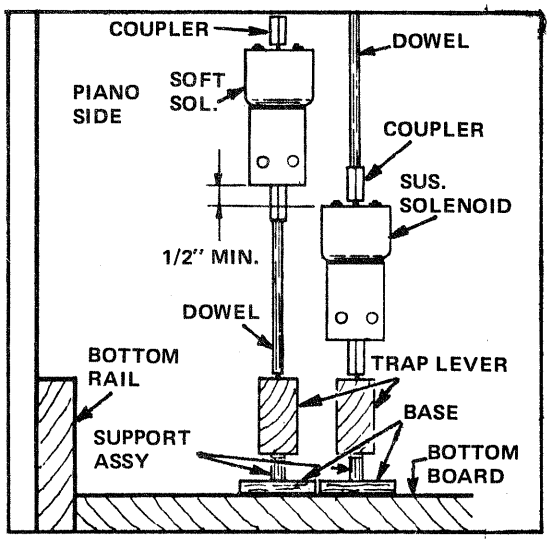


FIGURE 6-1B Staggered arrangement.

STEP 6-2

Install the Pedal Dowels at their correct locations in the piano.

STEP 6-3

Measure the clearance between the SOFT and SUSTAIN Pedal Dowels. There should be a minimum of 4" between the dowels from the top of the Trapwork to a height of 8" as shown in FIGURE 6-2. If not, try adjusting the position of either or both the Soft and Sustain Pedal Trapwork until this clearance is obtained. If this condition is met, proceed to STEP 6-5; if not, proceed to the next Step.

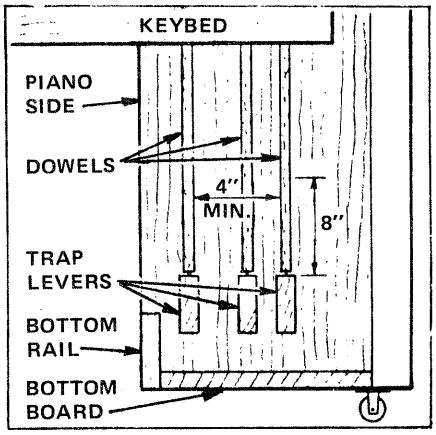


FIGURE 6-2 Determine if the 4" clearance is present.

NOTE:

If this condition is met, the Pedal Solenoids can be installed side by side and meet the required clearance (1/2") to be maintained between system components.

STEP 6-4

Determine if there is a minimum of 2" between the SOFT and SUSTAIN Pedal Dowels from the top of their Trapwork up to a height of 16". See FIGURE 6-3. If the clearance is not available, adjust the position of either or both the Soft and Sustain Pedal Trapwork to obtain it.

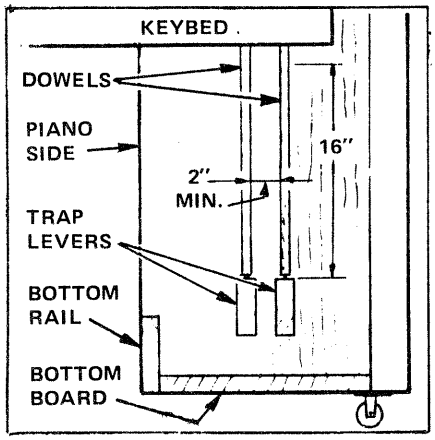


FIGURE 6-3 Determine if the 2" clearance is present.

NOTE:

If this condition is met, the Pedal Solenoids must be staggered (one placed higher than the other) when they are installed.

STEP 6-5

Determine if there is a minimum of 2" between the SOSTENUTO Pedal Dowel and both the SOFT and SUSTAIN Dowels. If not, adjust the position of any or all of the Dowels to obtain the clearance. If the clearance cannot be obtained, the Sostenuto Dowel may be removed and its removal will NOT affect the operation of the system, but, the Sostenuto Pedal will be inoperative when the piano is played manually. See FIGURE 6-4 and the NOTE below.

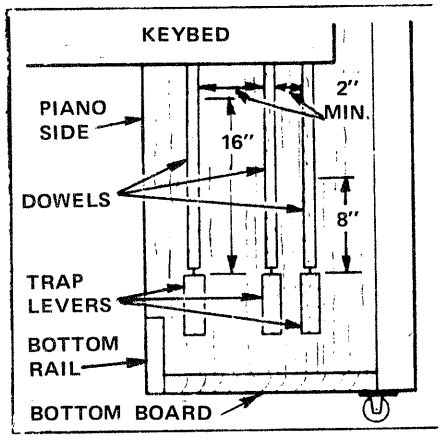


FIGURE 6-4 Determine if the 2" clearance is present between the Sostenuto Dowel and the other dowels.

NOTE:

The Sostenuto Dowel should only be removed with the permission of the customer.

STEP 6-6

If the Trapwork was relocated in any of the preceding Steps, mark the location of the Trapwork Spring(s) on the Bottom Board by drawing a line around the base(s) of the Spring(s). This is done so there will be no confusion between the original location and the new location.

STEP 6-7

Determine if there is a minimum of 2" between the SOFT and SUSTAIN Pedal Dowels and the LEFT side of the piano (see FIGURE 6-5) and between the Dowels and any other part of the piano from the TOP of the Trapwork up to a height of 8" (if the Pedal Solenoids are to be mounted side-by-side) or 16" (if the Solenoids are to be staggerd).

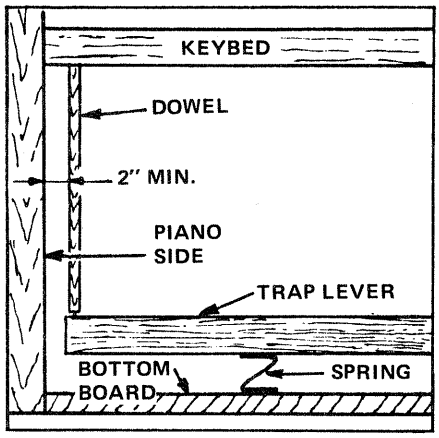


FIGURE 6-5 See if 2" clearance is available between the side of the piano and the Dowels.

STEP 6-8

If it is necessary to move the point that the Dowels attach to the Trapwork to obtain the 2" clearance between the Dowels and the side of the piano, mark the new attachment point and modify the Trapwork.

STEP 6-9

Secure the Trapwork in the desired position, then measure between the Bottom Board and the UNDERSIDE of the Trap Levers (see FIGURE 6-6) for the SOFT and SUSTAIN Dowels and write the measurements on the lines labelled SOFT and SUS. under this Step on the Check List.

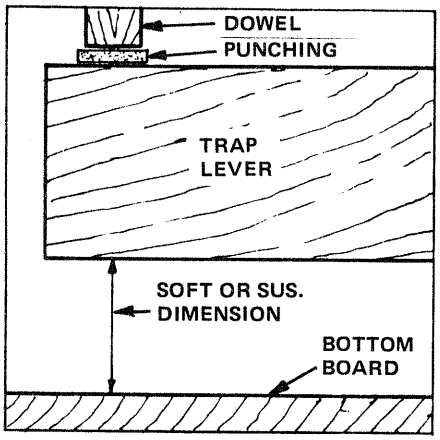


FIGURE 6-6 Measure from the bottom of the Trap Lever to the Bottom Board.

STEP 6-10

Get the two (2) Support Assemblies (PN 100-01B008-1), refer to the measurements on the lines labelled SOFT and SUS. under step 6-9 on the Check List and trim one dowel to the length listed on Line SOFT and the other to the length listed on Line SUS. As you cut them, label the assemblies SOFT or SUS as applicalble. See the NOTE below.

NOTE:

When measuring the Support Assemblies, measure from the felt padded end of the dowel.

STEP 6-11

Get the two (2) Wood Bases (PN 100-02A049-1) and place them on the Bottom Board. Insert a Support Assembly in the hole in each of the Bases (felt padded end up). Slide the Base with the SUS Support Assembly under the SUSTAIN Trap Lever and align the Support Assembly directly under the Pedal Dowel as shown in FIGURE 6-7.

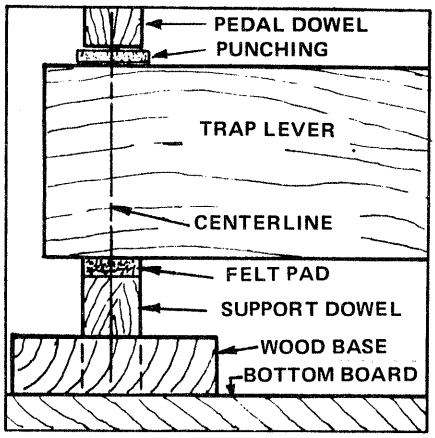


FIGURE 6-7 Align the Support Dowel under the Pedal Dowel.

STEP 6-12

Insert your awl in one of the mounting holes in the Base and give it a hard tap with a hammer, then insert the awl in the other hole and do the same.

STEP 6-13

Mount the Wood Base to the Bottom Board with two (2) #6 x 1" Wood Screws.

STEP 6-14

Repeat the procedures detailed in STEPS 6-11 through 6-13 to mount the SOFT Support Assembly.

STEP 6-15

Remove the Pedal Dowels from the piano and set them on your work bench, then get the two (2) Pedal Solenoids (PN 100-11A001-1), the two (2) Couplers (PN 100-02A051-1), the two (2) 6" Dowel Assemblies (PN 100-01B007-1) and the two (2) 24" Dowel Assemblies (PN 100-01B007-3) and place these items on your work bench also.

STEP 6-16

Install a Coupler on each of the Solenoids and screw them on until the threaded shaft of the Solenoid is half way to the shoulder inside the Coupler as shown in FIGURE 6-8 (A).

STEP 6-17

Adjust the metal coupler on the other end of each Solenoid until the threaded shaft of the Solenoid is to the first shoulder inside the Coupler as shown in FIGURE 6-8 (B).

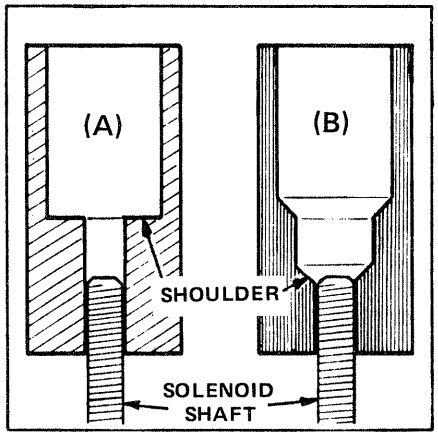


FIGURE 6-8 Adjust the couplers as shown.

STEP 6-18

Insert a 6" Dowel in the metal coupler at the end of each Pedal Solenoid (pin end out) and a 24" Dowel in the coupler at the other end of each Solenoid, then place them on your work bench beside each other. Place the SOFT Pedal Dowel next to one of the Solenoid assemblies and the SUSTAIN Dowel next to the other on your work bench.

STEP 6-19

Compare the length of the SUS Pedal Dowel with that of the Solenoid assembly next to it and determine the following:

A. If the Pedal Dowel is LONGER than the Solenoid assembly by more than 1", the Dowels supplied with the PIANOCORDER Kit CANNOT be used and you will have to modify the SUS Pedal Dowel by removing a section from the Dowel that is equal to the length of the Solenoid and inserting the Dowel pieces in the couplers on the Solenoid. See FIGURE 6-19, then proceed to STEP 6-20.

B. If the SUS Pedal Dowel EQUALS or is LONGER or SHORTER than the Solenoid assembly by MO MORE than 1", the Solenoid assembly can be used with NO modification. See the NOTE below STEP 6-20, Point D, on the next page.

C. If the SUS Pedal Dowel is SHORTER than the Solenoid assembly by MORE than 1", use the Dowels supplied with the Kit and proceed to STEP 6-20.

STEP 6-20

To trim the SUS Pedal Dowel or PIANOCORDER Dowel assemblies, follow the procedures below. If the SUS Pedal Dowel is to be modified, do Points A and B below; if the PIANOCORDER Dowels are to be used, do Points C and D below.

A. Measure 1-1/4" from the labelled end of the SUS Dowel and mark the Dowel at that point, then measure 6-1/4" from the mark and mark the Dowel again as shown in FIGURE 6-10 (A).

B. Cut the Dowel at the marks, then insert the SHORT piece in the metal coupler and the LONG piece in the nylon coupler on the Solenoid as shown in FIGURE 6-10 (B). See the NOTE below Point D of this Step on the next page.

C. Measure the difference in length between the SUS Dowel and the Solenoid assembly and write the measurement on Line Q under this Step on the Check List. The difference in length between the Dowel and the Solenoid assembly is the amount to be trimmed from the 6" Dowel piece to make the Solenoid assembly the same length as the SUS Dowel it will replace. The lower (6") Dowel piece is trimmed so the Solenoid is installed low in the piano to give sufficient clearance when the Solenoids are staggered. See FIGURE 6-11.

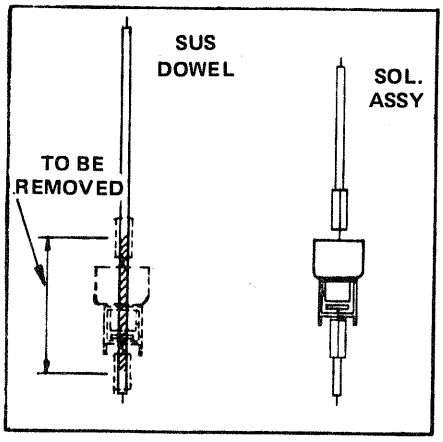


FIGURE 6-9 Section of Dowel replaced by the Solenoid.

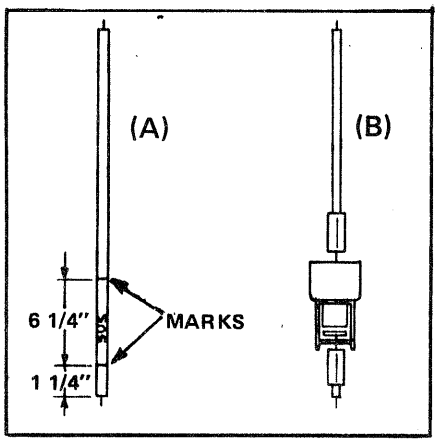


FIGURE 6-10 Measure and mark the Dowel as shown in (A) and assemble as shown in (B).

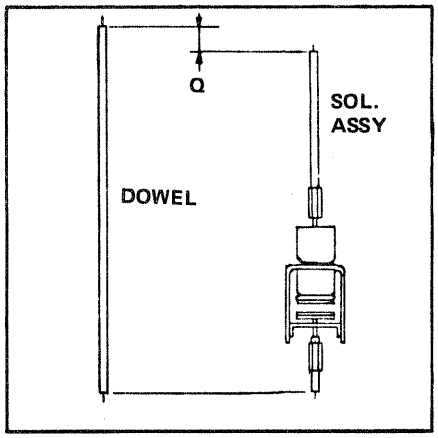


FIGURE 6-11 Compare the lengths of the SUS Dowel and the Solenoid assembly.

STEP 6-20 (cont'd.)

D. Remove the 6" Dowel piece from the Solenoid assembly, refer to the measurement on Line Q under this Step on the Check List and use the measurement to mark the Dowel as shown in FIGURE 6-12 (dimension Q). Trim the Dowel at the mark, insert the Dowel in the coupler on the Solenoid, and remove the punchings from the SUS Pedal Dowel and place them on the pins on the Solenoid Dowels.

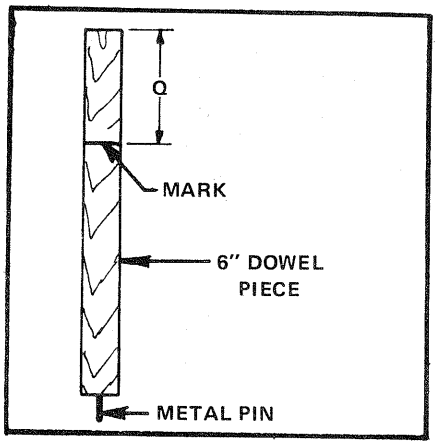


FIGURE 6-12 Measure dimension Q and mark the Dowel.

NOTE:

If the Solenoids are to be installed side by side, repeat the procedures detailed in STEPS 6-19 and 6-20 using the SOFT Pedal Dowel and the other Solenoid assembly, then proceed to STEP 6-23. If the Solenoids are to to be staggered, proceed to the next Step.

STEP 6-21

Place the SUSTAIN Pedal Solenoid assembly next to the SOFT Pedal Dowel, Measure 1/2" past the TOP of the Solenoid, and mark the SOFT Dowel at that point, then measure 6-1/2" past the mark and mark the Dowel again as shown in FIGURE 6-13.

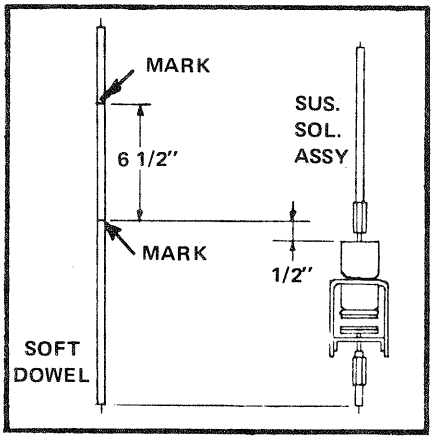


FIGURE 6-13 Measure and mark the Dowel as shown

STEP 6-22

Cut the SOFT Dowel at the marks, remove the PIANOCORDER Dowels from the SOFT Solenoid, and insert the SHORT piece of the SOFT Pedal Dowel in the metal coupler and the LONG piece in the Nylon Coupler.

STEP 6-23

Install the SUSTAIN and SOFT Pedal Solenoid assemblies and the SOSTENUTO Pedal Dowel (if removal of this dowel is not necessary) in the piano. See the NOTE below.

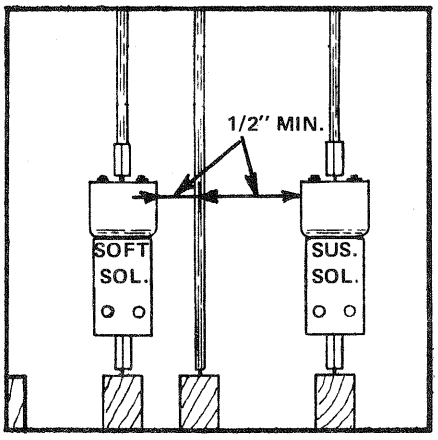


FIGURE 6-14 Check for 1/2" clearance as shown.

NOTE:

Make sure you install the punchings from the original Pedal Dowels on the Pedal Solenoid assemblies at TOP and BOTTOM to minimize the noise of Pedal Solenoid operation.

STEP 6-24

Verify that there is a minimum of 1/2" between the Solenoid assemblies and the SOSTENUTO Dowel (see FIGURE 6-14) and between the Solenoids and any other part of the piano or PIANOCORDER System.

STEP 6-25

Rotate the SUSTAIN Solenoid until the Restraint Wire attached to it faces the side of the piano and bend the lugs so the lug on the end of the wire can be held against the piano's side as shown in FIGURE 6-15.

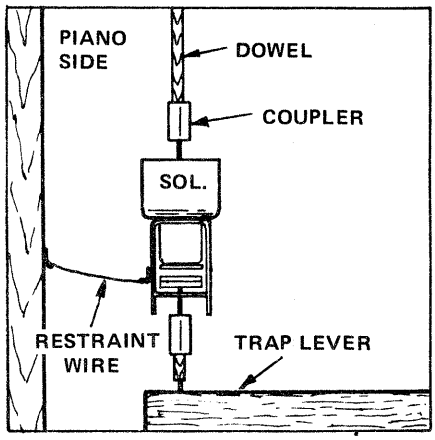


FIGURE 6-15 Restraint Wire position.

STEP 6-26

Hold the lug against the side of the piano, depress the SUSTAIN Pedal, and make sure the Restraint Wire DOES NOT interfere with the movement of the Solenoid assembly, then use an awl to make a starter hole on the side of the piano at the center of the lug. See FIGURE 6-16.

STEP 6-27

Mount the Restraint Wire lug to the side of the piano with a #6 x 1/2" Hex Hd. Screw.

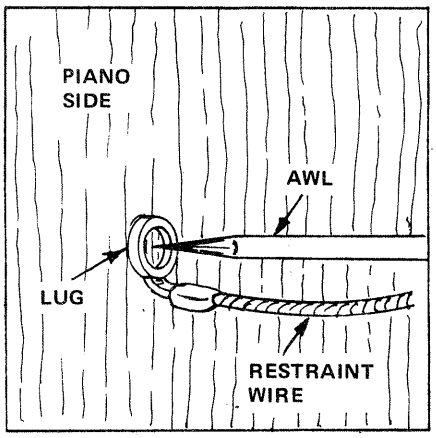


FIGURE 6-16 Mark the center of the lug with an awl.

STEP 6-28

Repeat the procedures detailed in STEPS 6-25 through 6-27 with the SOFT Pedal and SOFT Pedal Solenoid Assembly, then proceed to the next Step.

STEP 6-29

Verify that BOTH of the Solenoid assemblies can move freely when their respective pedals are depressed.

STEP 6-30

Verify that the Solenoids are positioned as vertically as possible.

This concludes Section 6, PEDAL SOLENOID INSTALLATION, please proceed to Section 7, INSTALLATION OF THE ELECTRONICS.

/. INSTALLATION OF THE ELECTRONICS

This Section details the installation of the system's electronic components. Incorrect installation of these parts can create a severe safety hazard, therefore, read each Step and its related NOTE or CAUTION, if any, THOROUGHLY and be ABSOLUTELY CERTAIN you understand what is required BEFORE you begin the procedure.

CAUTION:

DO NOT PLUG IN THE POWER CORD AT ANY TIME DURING THESE PROCEDURES. POWER WILL NOT BE APPLIED TO THE SYSTEM UNTIL THE ALIGNMENT PROCEDURES ARE TO BE DONE.

STEP 7-1

Unpack the items listed below. Check each part for missing or damaged components and replace any that are defective from the Spares Kit or your maintenance Kit.

1 ea. Playback Logic Board ----------PN 100-04D011-1

1 ea. Expression/Record Logic Board ----------PN 100-04D010-1

1 ea. Playback and Exp./Record PCB Bracket ----PN 100-02D127-1

6 ea. Plastic Supports ----------PN DLCBS-14N

6 ea. Plastic Supports ----------PN CBS-8N

4 ea. #6 x 1/2" Hex Washer Hd. Screws ---------PN *

* These items have no Part Number since they are common hardware and may be purchased in any hardware store.

NOTE:

If you are working with another person, he can proceed to STEP 7-14 and begin connecting the Key Solenoid leads to the Driver Boards.

STEP 7-2

Place the Playback and Exp./Record PCB Bracket (PN 100-02D127-1) against the RIGHT side of the piano 1/2" below the BOTTOM of the Solenoid Rail and 1/2" in FRONT of the Piano Plate, then mark the centers of the mounting holes on the side of the piano as shown in FIGURE 7-1. See the NOTE below.

NOTE:

In pianos where you cannot meet the 1/2" requirements stated above, you may mount the Bracket on the Bottom Board of the piano. Place the Bracket so there is 1/2" between it and the Piano Plate and so the RIGHT end of the Bracket is 1/2" from the RIGHT side of the piano, then mark the centers of the Bracket's mounting holes.

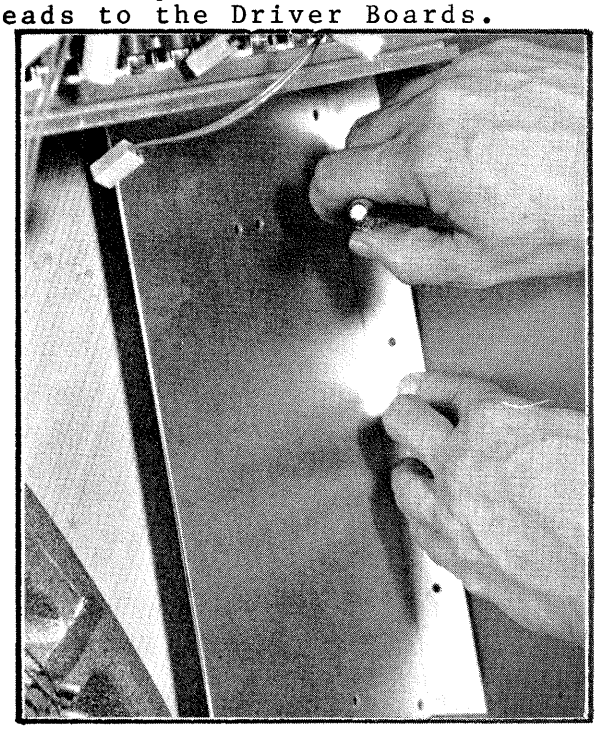


FIGURE 7-1 Mark the centers of the mounting holes.

STEP 7-3

Set the Bracket aside and center punch the marks on the side (or Bottom Board).

STEP 7-4

Insert a 1/16" bit in your drill, wrap a small piece of masking tape around it 1/2" from the tip, and drill the punch marks to a depth of 1/2" (indicated by the tape on the bit). See FIGURE 7-2.

STEP 7-5

Mount the Bracket in position with the four (4) #6 x 1/2" Hex Washer Hd. Screws.

STEP 7-6

Insert the six (6) short plastic Supports (PN CBS-8N) in the Bracket as shown in FIGURE 7-3. Please notice the way the Supports are installed on the Bracket and the position of the center Supports.

STEP 7-7

Place the Playback Logic Board on the Supports and gently press it down at each Support until it locks on the Support. See FIGURE 7-4 below and note the orientation of the circuit board.

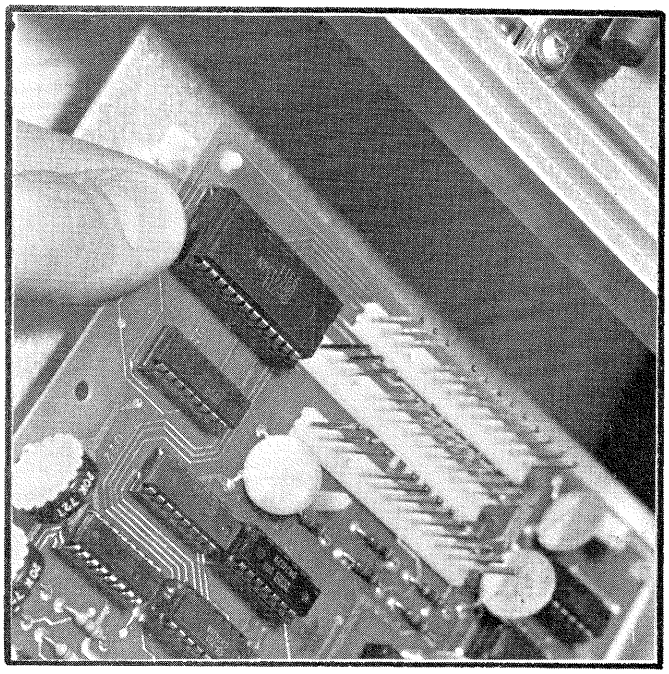


FIGURE 7-4 Mount the Playback Circuit Board on the Supports.

FIGURE 7-2 Drill to a depth of 1/2" at the punch marks.

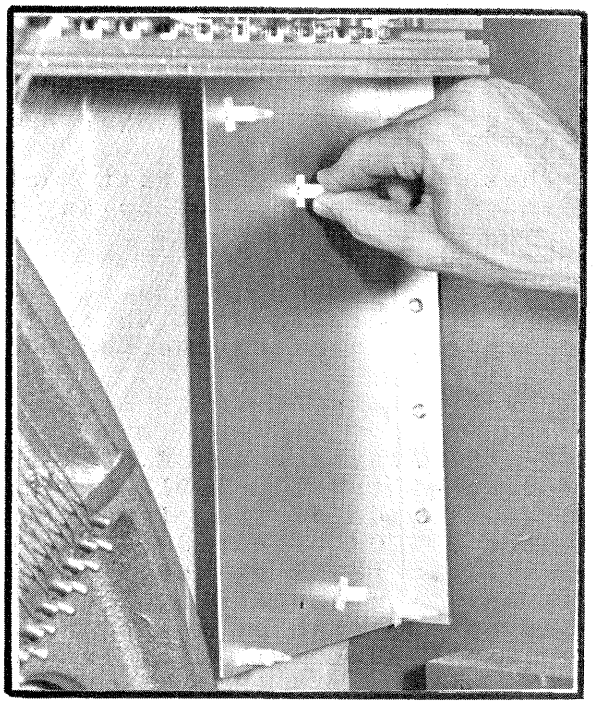


FIGURE 7-3 Insert the Supports in the holes in the Bracket.

STEP 7-8

Get the following items:

1 ea. Pedal Switch Assembly ---------- PN 100-01C003-1

2 ea. #6 x 3/16" Hex Washer Hd. Screws --------- PN *

* These items have no Part Number since they are common hardware and may be purchased in any hardware store.

STEP 7-9

Place the mounting holes in the Pedal Switch Assembly over the BOTTOM channel in the Solenoid Rail and center the Switch Assembly over the CENTER Pedal (or between the two pedals, if the piano has no center pedal). See FIGURE 7-5.

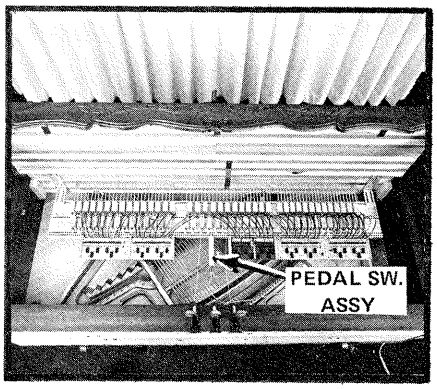


FIGURE 7-5 Center the Switch Assembly over center pedal.

STEP 7-10

Mount the Switch Assembly to the Solenoid Rail with the two (2) #6 x 3/16" Hex Washer Hd. Screws.

STEP 7-11

Attach the Pedal Switch Actuators to the Pedal Trap Levers. Attach the LEFT Pedal Switch Actuator to the SOFT Pedal Trap Lever by removing the nut on the rod from the Pedal, slipping the Lug of the Actuator on the rod, and reinstalling the nut as shown in FIGURE 7-6. Repeat this procedure with the other Actuator at the SUSTAIN Pedal Trap Lever.

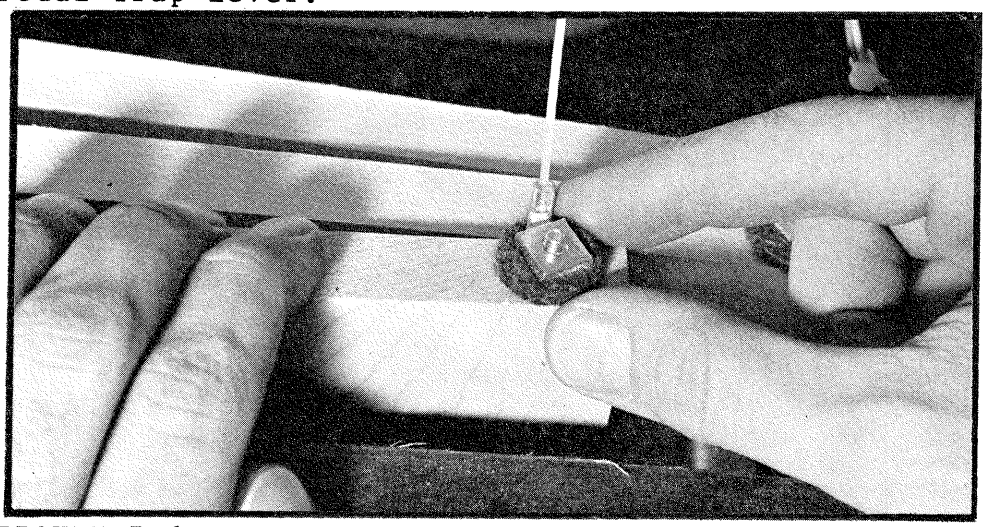


FIGURE 7-6 Attach the Pedal Switch Actuators to the Pedal Trap Levers of the SOFT and SUSTAIN Pedals.

STEP 7-12

Adjust the Actuator for the SOFT Pedal Switch by depressing the SOFT Pedal until the Hammer Rail just begins lifting the Hammers, then adjusting the Spring Clip on the Actuator until the SOFT Pedal Switch closes.

STEP 7-13

Adjust the Actuator for the SUSTAIN Pedal Switch by depressing the SUSTAIN Pedal until the Dampers just begin lifting from the strings, then adjust the Spring Clip on the Actuator until the SUSTAIN Pedal Switch closes at this point.

NOTE:

If you are working with another person and he is working on or has completed STEPS 7-14 through 7-22, proceed to STEP 7-23.

STEP 7-14

Get the following items and check each for damage:

2 ea. Driver Boards (Bass and Treble) --------- PN 100-04D003-1

1 ea. Middle Driver Board ---------- PN 100-04D004-1

8 ea. #6 x 3/16" Hex Washer Hd. Screws -------- PN *

*These items have no Part Number since they are common hardware and may be purchased in any hardware store.

STEP 7-15

Get the Bass Driver Board (PN 100-04D003-1) and, starting from the LEFT end of the Solenoid Rail, connect the leads from the Key Solenoid to the connectors at the top of the circuit board as shown in FIGURE 7-7. Connect the first (Key 5) Solenoid leads (RED) to the first pair of pins, then the second (Key 6) Solenoid leads (BLACK) to the next pair of pins and so on alternating RED and BLACK leads from each Solenoid in sequence. See the CAUTION below.

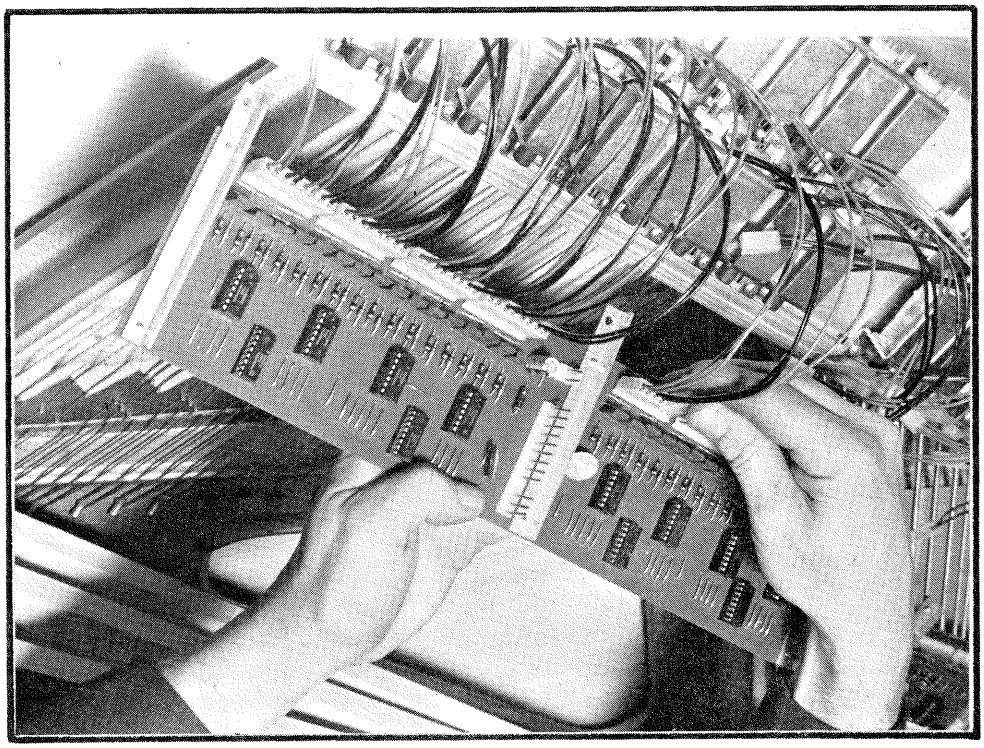


FIGURE 7-7 Connect the Key Solenoid leads to the circuit board.

CAUTION:

CONNECT THE LEADS SEQUENTIALLY AND DO NOT MISS ANY OF THE PINS. RECHECK ALL CONNECTIONS TO VERIFY THAT THEY ARE CORRECT. THESE COMPONENTS USE THE 180V DC POWER.

STEP 7-16

Center the circuit board between the first and last Key Solenoids in the group which are connected to it with the mounting holes in the circuit board brackets over the BOTTOM channel in the Solenoid Rail, and mount the circuit board to the rail with three #6 x 3/16" Hex Washer Hd. Screws as shown in FIGURE 7-8.

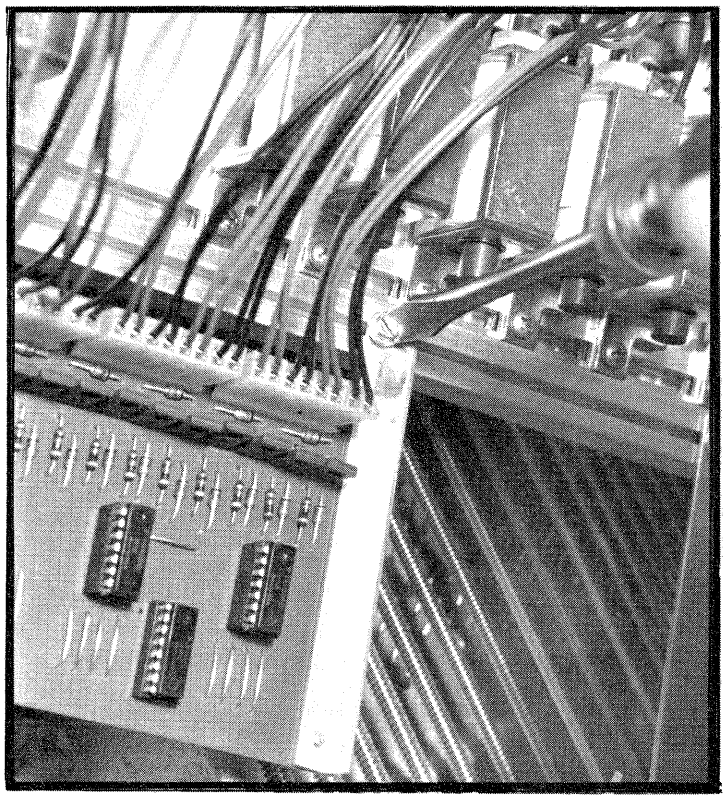


FIGURE 7-8 Mount the board to the rail.

STEP 7-17

Get the Middle Driver Board (PN 100-04D004-1) and plug the RED lead from the Solenoid next to the last Solenoid which was connected to the Bass Driver Board to the first pair of pins on the Middle Driver, then alternate BLACK and RED leads just as you did on the Bass Driver circuit board until all of the pins on the board are connected to Solenoids. See the CAUTION under STEP 7-15.

STEP 7-18

Position the circuit board to the RIGHT of the Pedal Switch Assembly with the mounting holes in the brackets over the BOTTOM channel of the Solenoid Rail. Center the board as closely as possible between the first and last Solenoids connected to it and mount it to the rail with two #6 x 3/16" Hex Washer Hd. Screws.

STEP 7-19

Trim the Pedal Switch Actuators about 1/4" below the BOTTOMS of the Bass and Middle Driver Boards to prevent interference.

STEP 7-20

Get the Treble Driver Board and plug the RED lead from the Solenoid next to the last Solenoid which was connected to the Middle Driver to the first pair of pins of the Treble Driver, then alternate BLACK and RED leads just as you did previously. See the CAUTION under STEP 7-15.

STEP 7-21

Center the circuit board between the first and last Solenoids which are connected to it with the mounting holes in the Brackets aligned over the BOTTOM channel in the Solenoid Rail. Mount the LEFT and CENTER Brackets to the Rail with two (2) of the #6 x 3/16" Hex Washer Hd. Screws.

STEP 7-22

Get the 21" Grounding Strap (GRN) Wire (PN 100-09C010-5), slip a #6 x 3/16" Hex Washer Hd. Screw through one lug on the wire and mount the ground wire to the RIGHT Bracket of the Treble Driver Board and the Solenoid Rail as shown in FIGURE 7-9.

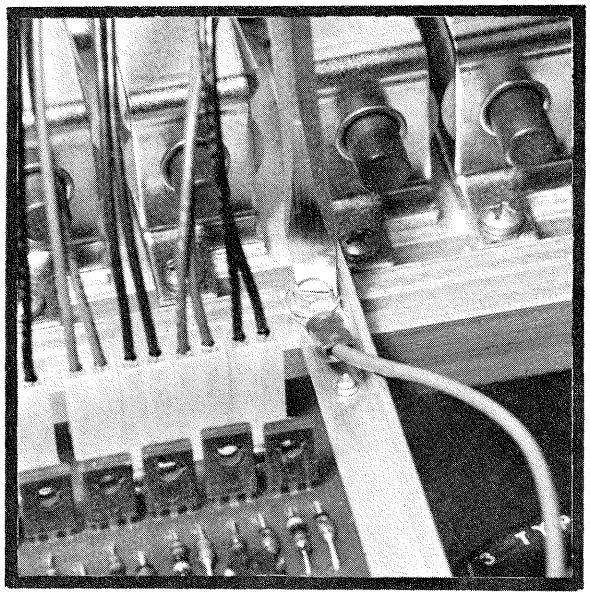


FIGURE 7-9 Mount the Grounding Strap to the Bracket and Rail.

NOTE:

If you are working with another person, he will do STEPS 7-23 through 7-36, therefore, please proceed to STEP 7-37; if you are not, proceed with STEP 7-23.

STEP 7-23

Get the following items and check them for damage:

1 ea. Power Supply ---------- PN 100-01F041-1

1 ea. System Grounding Plate (2" x 4") ---------- PN 100-02B013-1

1 ea. 7" Grounding Strap (GRN) Wire ---------- PN 100-09C010-3

6 ea. #8 x 3/4" Hex Washer Hd. Screws ---------- PN *

1 ea. #6 x 1/4" Hex Washer Hd. Screw ---------- PN *

* These items have no Part Number since they are common hardware and may be purchased in any hardware store.

NOTE:

STEPS 7-24 through 7-26 are done to ground the Piano Plate.

STEP 7-24

Center punch a point on the lower, righthand corner of the Piano Plate.

STEP 7-25

Insert a 1/8" bit in your drill, wrap a piece of masking tape around the bit 1/4" from its tip, and drill into the Piano Plate at the punch mark 1/4".

STEP 7-26

Slip the #6 x 1/4" Hex Washer Hd. Screw through one of the lugs on the Grounding Strap (PN 100-09C010-3) and attach the wire to the Piano Plate at the 1/8" pilot hole.

STEP 7-27

Place the Power Supply (PN 100-01F041-1) on the Bottom Board of the piano with the heat sink of the Power Supply toward the Piano Plate as shown in FIGURE 7-10 below.

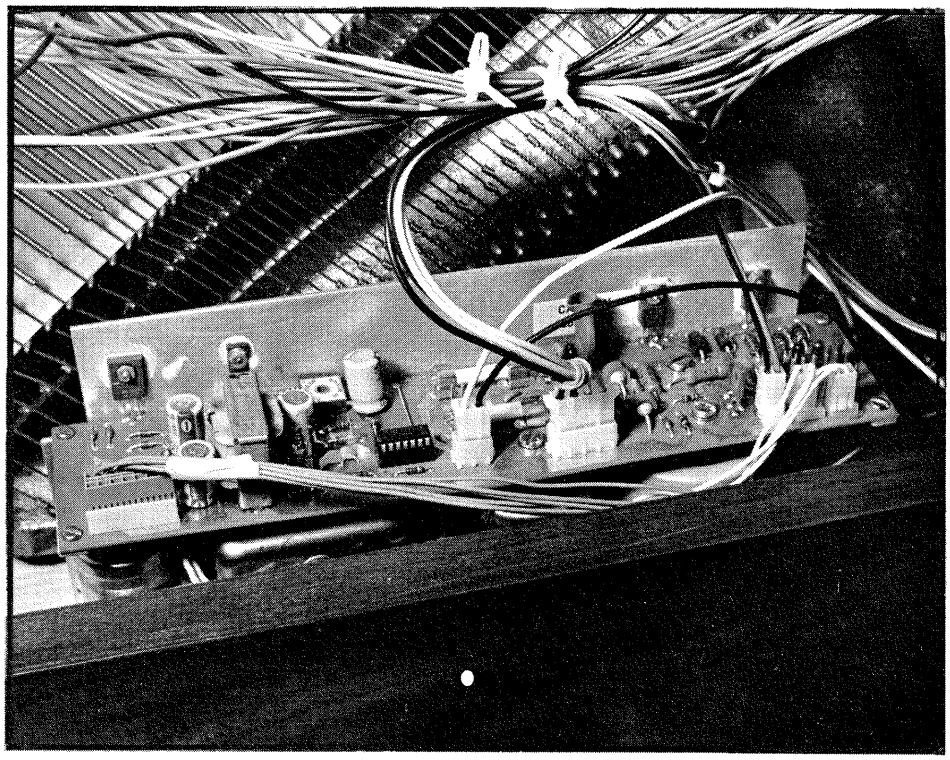


FIGURE 7-10 Place the Power Supply on the Bottom Board of the piano as shown above.

STEP 7-28

Adjust the position of the Power Supply so there is a minimum of 1/2" between it and the Piano Plate, Pedal Trap Levers, Bottom Rail, and the Playback and Exp./Record PCB Bracket. See FIGURE 7-10A and 7-10B.

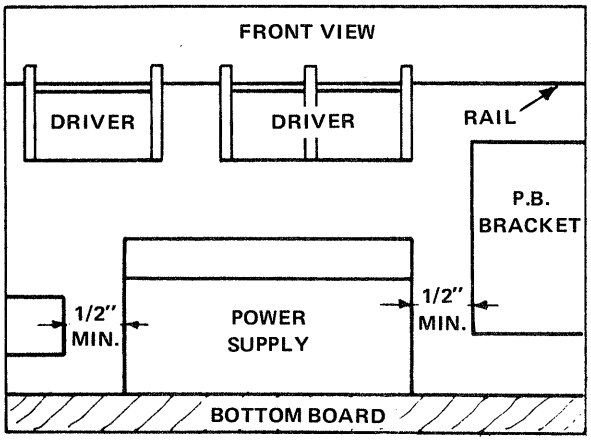


FIGURE 7-10A Maintain 1/2" clearance minimum between the Trap Levers and PCB Bracket and the Power Supply as shown above.

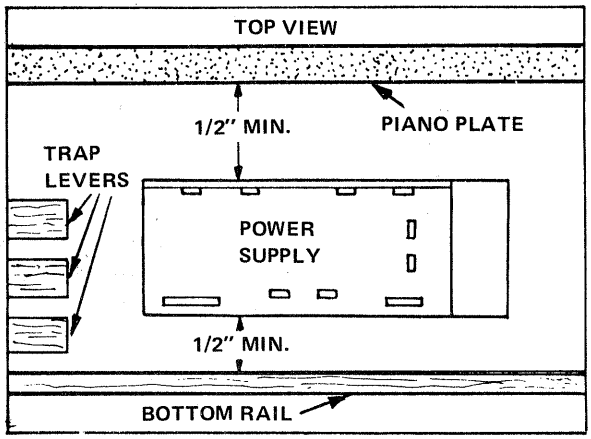


FIGURE 7-10B Maintain 1/2" clearance minimum between the Piano Plate and Bottom Rail and the Power Supply as shown above.

STEP 7-29

Slip the System Grounding Plate (PN 100-02B013-1) under the RIGHT end of the Power Supply and align the pair of holes on the LEFT side of the Grounding Plate with the mounting holes of the Power Supply chassis. See FIGURE 7-11.

STEP 7-30

Check to make sure that the 1/2" minimum clearance around the Power Supply is maintained, then mark the centers of the mounting holes in the Power Supply chassis and the Grounding Plate on the Bottom Board with a pencil or felt pen.

STEP 7-31

Remove the Power Supply and Grounding Plate from the Bottom Board and center punch the marks.

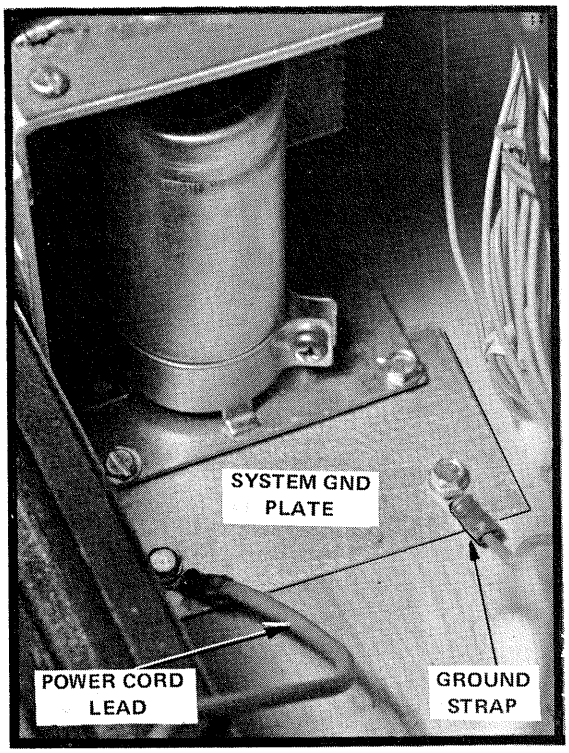


FIGURE 7-11 Grounding Plate installation completed.

STEP 7-32

Insert a 3/32" bit in your drill, wrap a small piece of masking tape around it 3/4" from its tip, and drill to a depth of 3/4" at the punch mark on the Bottom Board. See the CAUTION below.

CAUTION:

WEAR YOUR RESPIRATOR AND GOGGLES OR FACE SHIELD WHEN DRILLING.

STEP 7-33

THOROUGHLY vacuum the Bottom Board to remove ALL wood particles.

STEP 7-34

Place the Power Supply and Grounding Plate in the piano and align their mounting holes with the pilot holes in the Bottom Board, then mount the Power Supply to the Bottom Board with four (4) of the #8 x 3/4" Hex Washer Hd. Screws.

STEP 7-35

Get the two (2) Grounding Strap (GRN) Wires and pass a #8 x 3/4" Hex Washer Hd. Screw through their lugs and mount the Grounding Straps to the System Grounding Plate at the hole toward the back of the Piano. See FIGURE 7-11 above.

STEP 7-36

Pass the remaining #8 x 3/4" Hex Washer Hd. Screw through the Lug on the GREEN lead from the Power Cord, then mount the Power Cord lead to the System Grounding Plate at the hole toward the front of the piano. See FIGURE 7-11 above.

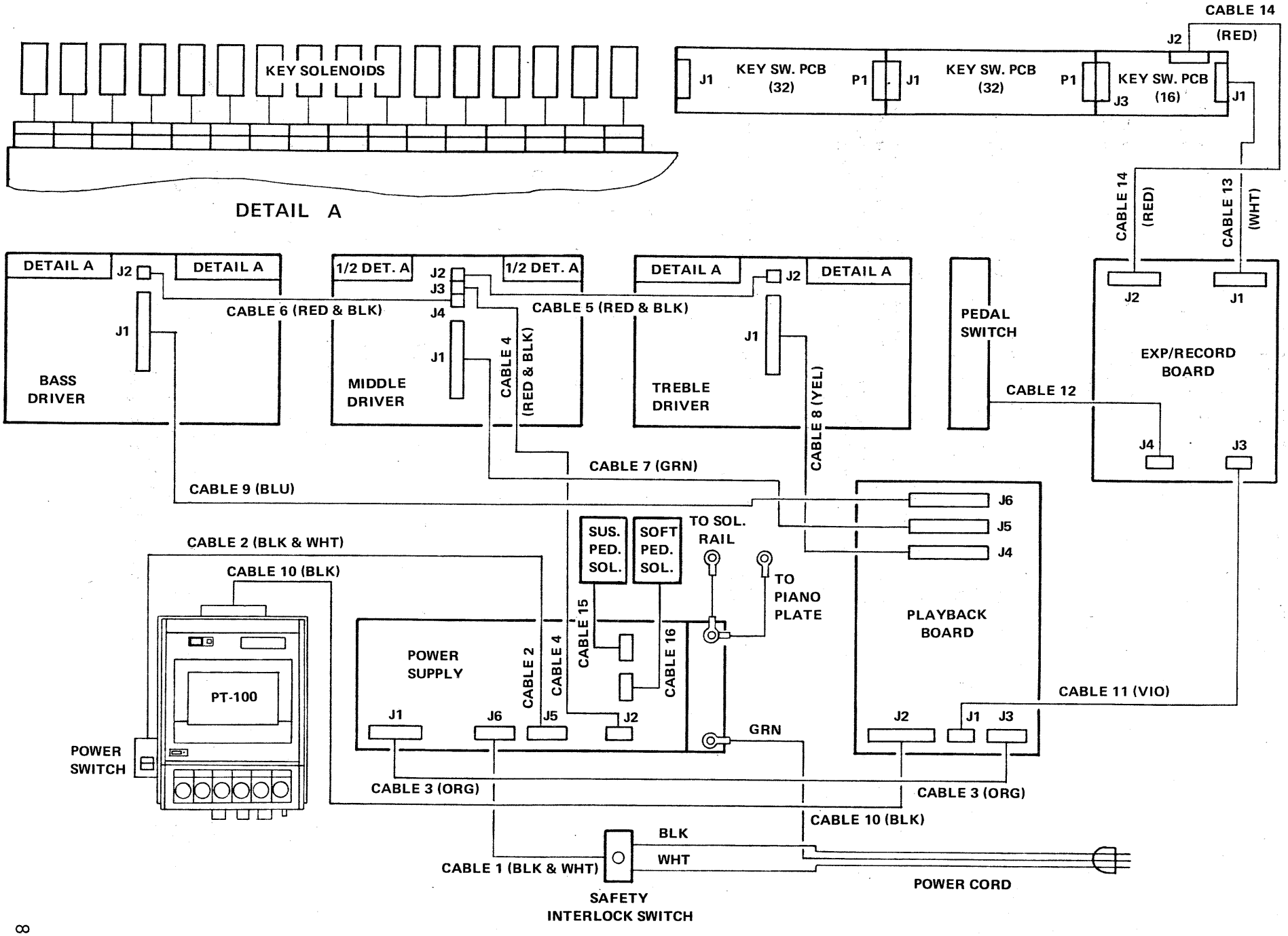


FIGURE 7-12 Interconnecting Wiring Diagram

NOTES:

1. If you are working with another person, he can do STEPS 7-37 through 7-50. Please proceed to STEP 7-51.

2. In the following procedures, installation of the system wiring is covered. Please read each Step and any related NOTE or CAUTION thoroughly to make sure you understand what is required BEFORE beginning the procedure.

3. Since the cables you will be installing are keyed, if a connector on the cable does not fit the connector on the circuit board, reverse the cable and connect the other plug.

CAUTION:

WHEN PLUGGING CONNECTORS ON THE CIRCUIT BOARDS, SUPPORT THE CIRCUIT BOARD WITH ONE HAND TO PREVENT DAMAGE TO THE BOARD. EXCESSIVE FLEXING OF THE BOARD WHEN CONNECTING PLUGS CAN CAUSE THE BOARD TO CRACK, THUS PERMANENTLY DAMAGING IT.

4. FIGURE 7-12 on the previous page is the Interconnecting Wiring Diagram for the PIANOCORDER System. Please study this illustration carefully to give yourself and idea of system wiring. Although each Step in the wring process will be accompanied by a simplified diagram, refer to this illustration for an overall view of system wiring occasionally.

STEP 7-37

Unpack the items listed below. Check for damaged connectors and broken wires and replace defective parts.

1 ea. Cable #4 (RED & BLK - 48" long) ------- PN 100-09C001-1

1 ea. Cable #5 (RED & BLK - 18" long) ------- PN 100-09C001-3

1 ea. Cable #6 (RED & BLK - 30" long) ------- PN 100-09C001-5

1 ea. Cable #7 (GRN) ---------- PN 100-09C00 -1

1 ea. Cable #8 (YEL) ---------- PN 100-09C00 -1

1 ea. Cable #9 (BLU) ---------- PN 100-09C00 -1

NOTE:

The following is a list of abbreviations of the color coding of the cable wires used in these procedures:

BLK	BLACK	GRN	GREEN
WHT	WHITE	BLU	BLUE
YEL	YELLOW	VIO	VIOLET
ORG	ORANGE		

Cables which are identified with two color codes (BLK & WHT for example) are composed of wires of each color. Please note that photos of Cables #4, #5, and #6 are pictures of the prototype cables and differ from the production cables you received with the kit. (The connectors on these cables have been changed.)

STEP 7-38

Connect one end of Cable #4 (RED & BLK - 48" long) to Connector J2 on the Power Supply as indicated in FIGURE 7-13 below. See CAUTION below.

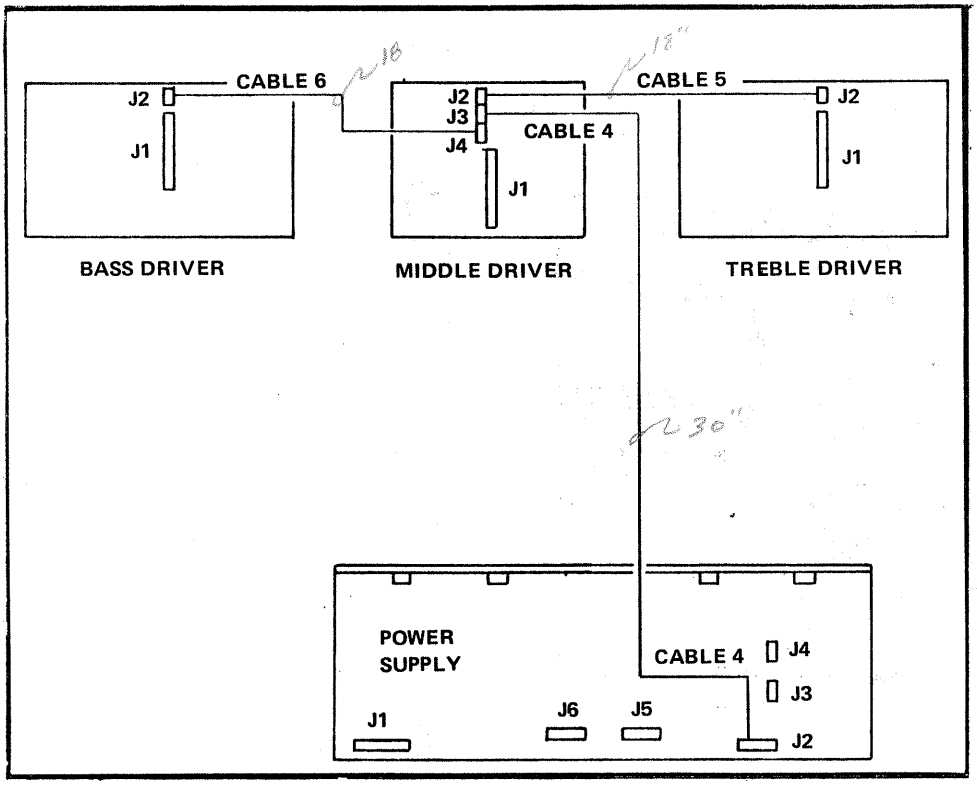


FIGURE 7-13 180V Interconnecting Wiring Diagram.

CAUTION:

SUPPORT THE CIRCUIT BOARD WITH ONE HAND WHEN INSERTING THE PLUGS ON THE CONNECTORS TO AVOID CRACKING THE CIRCUIT BOARD.

STEP 7-39

Connect the other end of Cable #4 to Connector J3 on the Middle Driver PC Board as indicated in FIGURE 7-13 and shown in FIGURE 7-14 at the right. SEE THE CAUTION ABOVE.

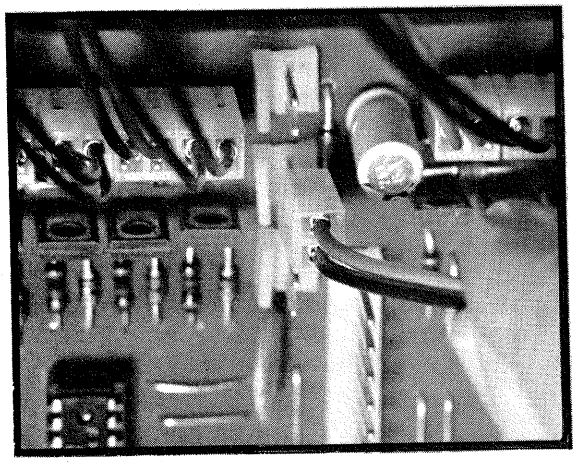


FIGURE 7-14 Connect Cable #4 to J3 on the Middle Driver PC Board.

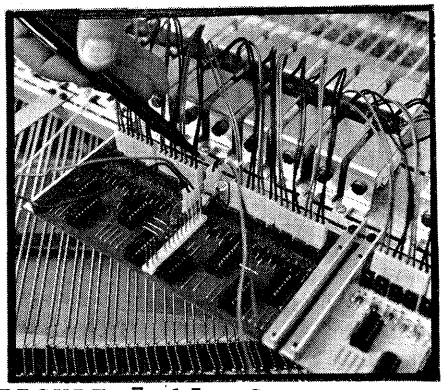


FIGURE 7-15 Connect Cable #5 to J2 on the Middle Driver PC Board.

STEP 7-40

Connect one end of Cable #5 (RED & BLK - 18" long) to Connector J2 on the Middle Driver PC Board as indicated in FIGURE 7-13 and shown in FIGURE 7-15 at the left. SEE THE CAUTION ABOVE STEP 7-39 AT THE RIGHT.

STEP 7-41

Connect the other end of Cable #5 to Connector J2 on the Treble Driver PC Board as shown in FIGURE 7-16.

STEP 7-42

Connect one end of Cable #6 (RED & BLK) to Connector J4 on the Middle Driver PC Board as shown in FIGURE 7-17 below.

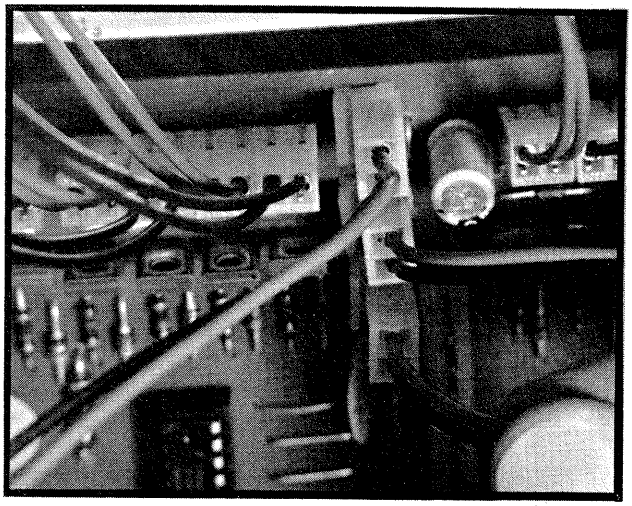


FIGURE 7-17 Connect Cable #6 to J4 on the Middle Driver.

STEP 7-43

Connect the other end of Cable #6 to Connector J2 on the Bass Driver Board as shown in FIGURE 7-18 at the right.

STEP 7-44

Connect one end of Cable #9 (BLU) to Connector J1 on the Bass Driver Board as shown in FIGURE 7-19 at the right. See the CAUTION and NOTE below.

CAUTION:

SUPPORT THE CIRCUIT BOARD WHEN INSERTING THE PLUG ON THE CONNECTOR ON THE BOARD TO PREVENT CRACKING OF THE BOARD.

NOTE:

Refer to FIGURE 7-20 on the next page for the wiring diagram of the Cables connected in STEPS 7-44 through 7-49. Notice the orientation of the plugs in FIGURES 7-19 through 7-25.

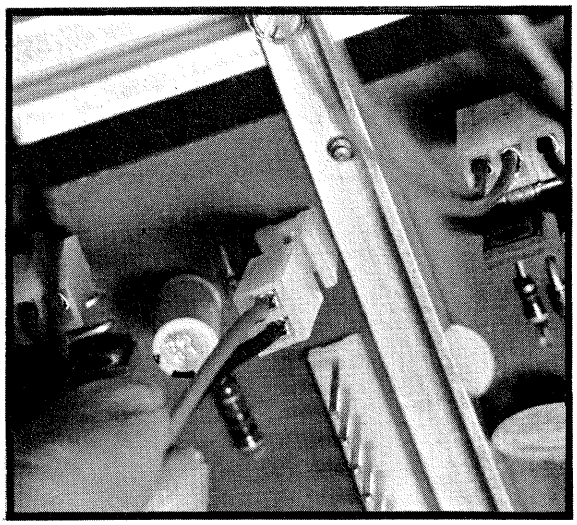


FIGURE 7-16 Connect Cable #5 to J2 on the Treble Driver.

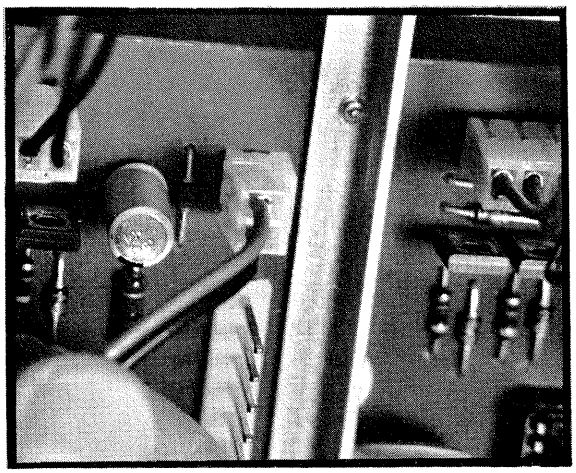


FIGURE 7-18 Connect Cable #6 to J2 on the Bass Driver.

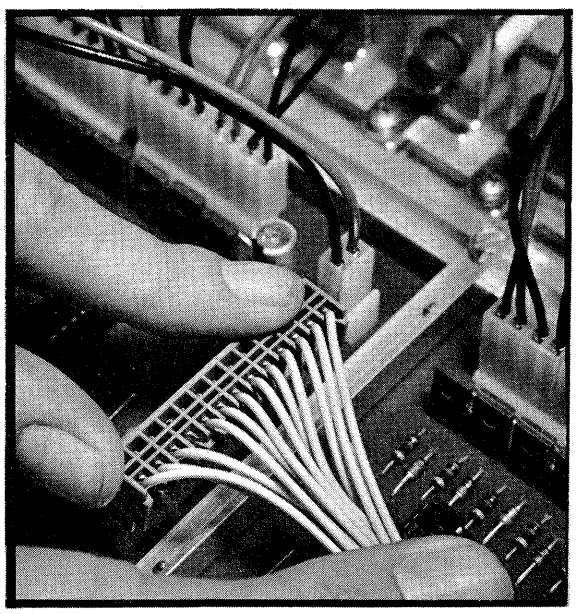


FIGURE 7-19 Connect Cable #9 to J1 on the Bass Driver.

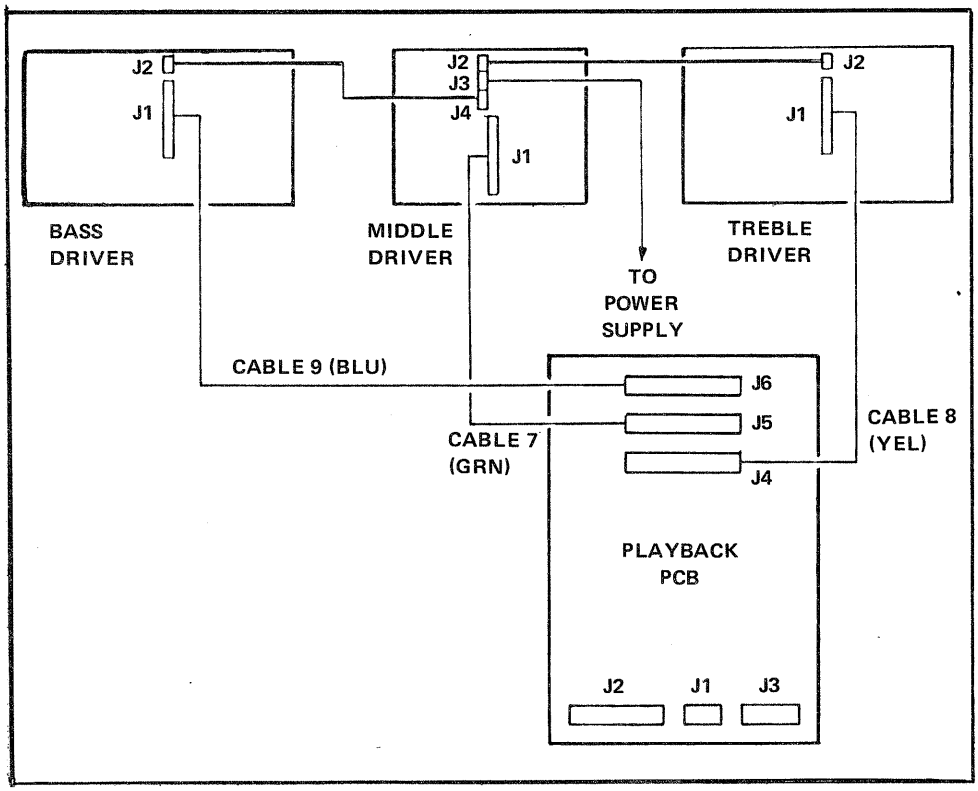


FIGURE 7-20 Interconnecting Wiring Diagram - Playback PCB to Driver PC Boards.

STEP 7-45

Connect the other end of Cable #9 (BLU) to Connector J6 on the Playback PC Board as shown in FIGURE 7-21

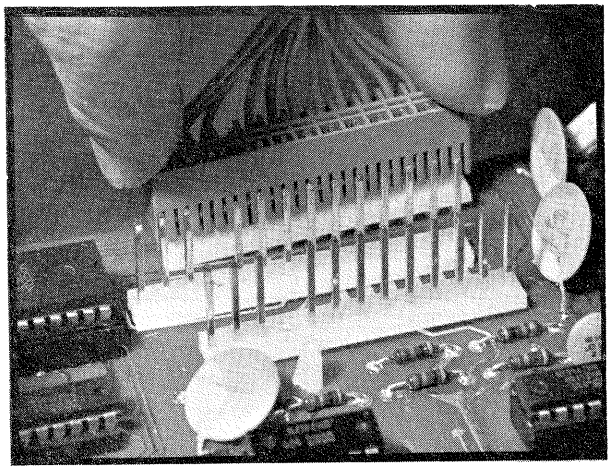


FIGURE 7-21 Connect Cable #9 to J6 on the Playback PC Board.

step 7-46

Connect one end of Cable #7 (GRN) to Connector J1 on the Middle Driver Board as shown in FIGURE 7-22 below.

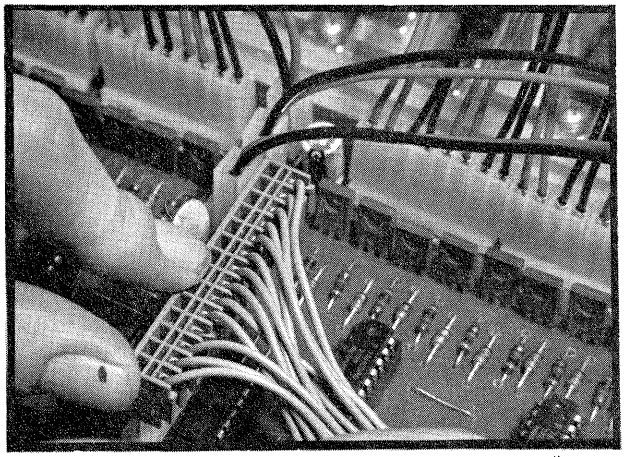


FIGURE 7-22 Connect Cable #7 to J1 on the Middle Driver Board.

CAUTION:

WHEN INSERTING THE PLUG ON THE CONNECTOR OF A BOARD, ALWAYS SUPPORT THE BACK OF THE BOARD TO PREVENT CRACKING THE BOARD.

STEP 7-47

Connect the other end of Cable #7 (GRN) to Connector J5 on the Playback PC board as shown in FIGURE 7-23

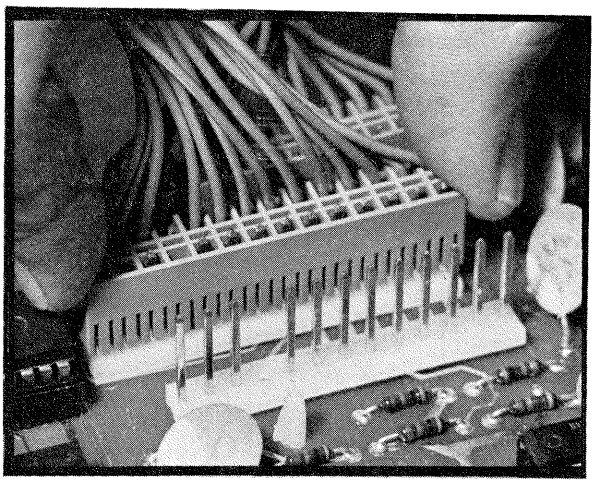


FIGURE 7-23 Connect Cable # 7 to J5 on the Playback Board.

STEP 7-48

Connect one end of Cable #8 (YEL) to Connector J1 on the ~~Bass~~ TREBLE Driver Board as shown in FIGURE 7-24 below.

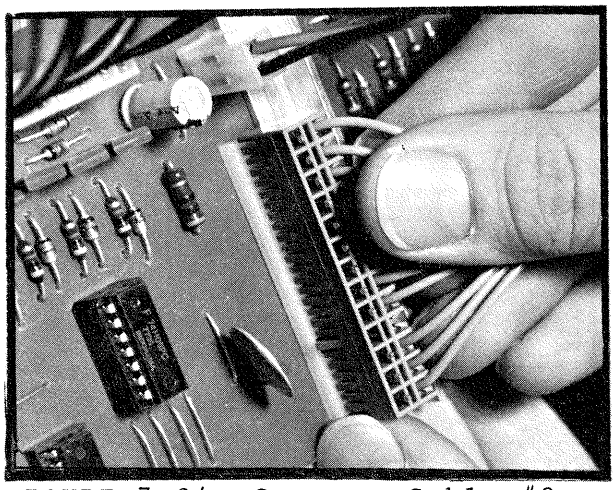


FIGURE 7-24 Connect Cable #8 to J1 on the Bass Driver.

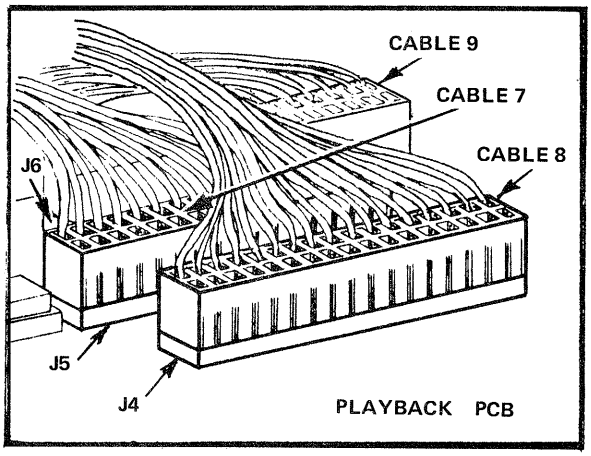


FIGURE 7-25 Connect Cable #8 to J4 on the Playback Board.

STEP 7-49

Connect the other end of Cable #8 (YEL) to Connector J4 on the Playback Board as shown in FIGURE 7-25 at the right.

STEP 7-50

Recheck all connections made in STEPS 7-38 through 7-49 and verify them against FIGURE 7-26 below.

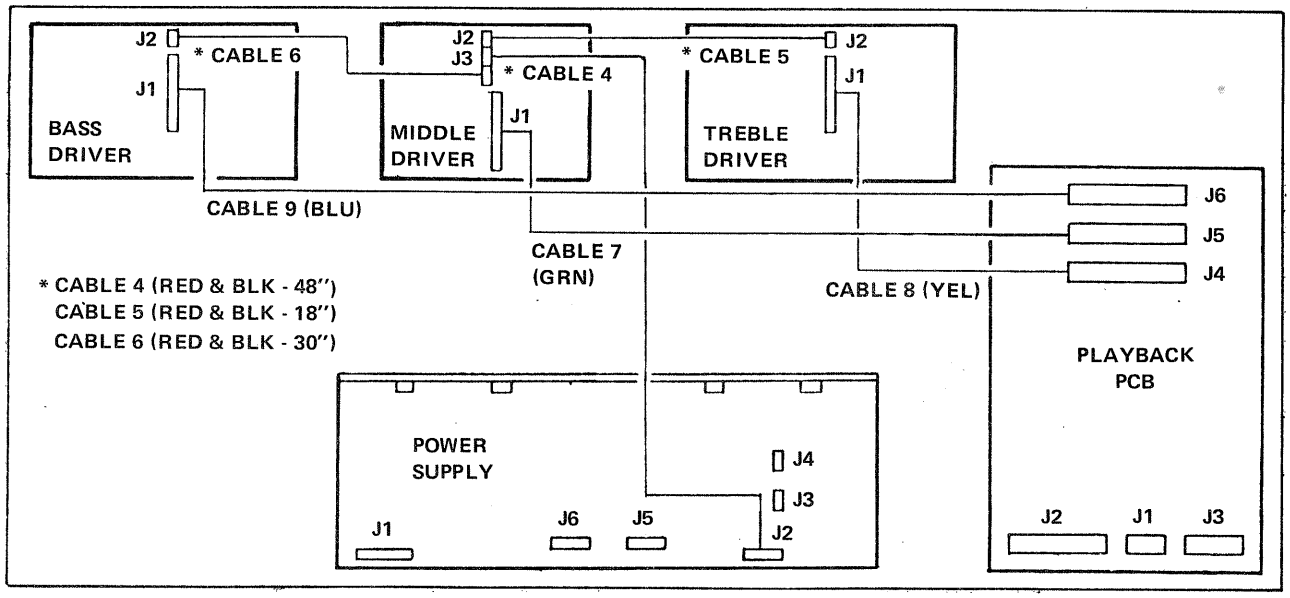


FIGURE 7-26 Interconnecting Wiring Diagram for the Driver Boards.

NOTE:

If you are working with another person, he can assist you in doing the remaining Steps of this Section.

STEP 7-51

Get the following items and check them for damage:

1 ea. Expression/Record PC Board ---------- PN 100-04D010-1

6 ea. Plastic Supports ---------- PN DLCBS-14N

1 ea. Cable #11 (VIO) ---------- PN 100-09C006-1

1 ea. Cable #13 (WHT) ---------- PN 100-09C005-1

1 ea. Cable #14 (RED) ---------- PN 100-09C005-3

STEP 7-52

Insert the six (6) Plastic Supports (PN DLCBS-14N) in the mounting holes in the Playback PC Board as shown in FIGURE 7-27. See the NOTE below.

NOTE:

To verify which holes are to be used, simply hold the Exp./Record PC Board over the Playback Board and visually align the holes in the one with those in the other.

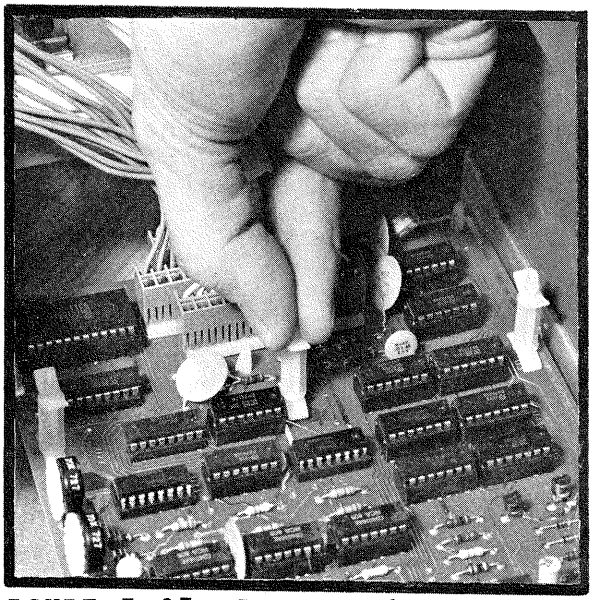


FIGURE 7-27 Insert the Supports in the holes on the Playback PC Board.

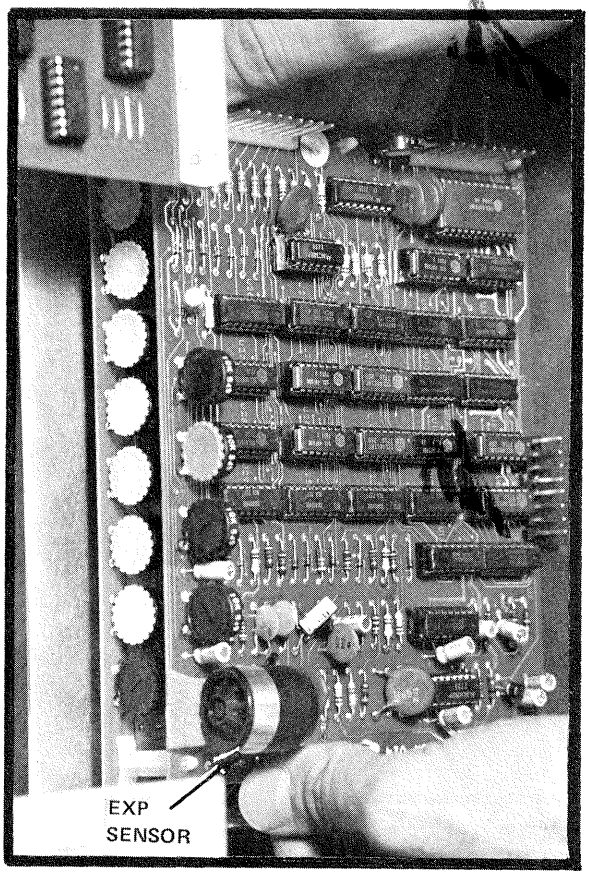


FIGURE 7-28 Snap the Exp./Record Circuit Board on the Supports.

STEP 7-53

Snap the Exp./Record Board on the Supports as shown in FIGURE 7-28 at the left. Provide support for the Playback Board to avoid cracking it as you press the Exp./Record Board on the Supports. See the NOTE below.

NOTE: If the Bracket for these circuit boards is mounted on the Bottom Board instead of the side of the piano, GENTLY pry the Expression Sensor loose from the Exp./Record Board (see FIGURE 7-28 for the location of this part) and glue it to the Board so it faces the Bass end of the piano. USE EXTREME CAUTION TO AVOID DAMAGE TO THE WIRING OF THIS COMPONENT.

STEP 7-54

Refer to FIGURE 7-29. This Figure indicates the cable connections to the Exp/Record PC Board, the cable numbers, and the termination points of the cables.

STEP 7-55

Connect one end of Cable #11 (VIO) to Connector J3 on the Exp/Record Board as indicated in FIGURE 7-29.

STEP 7-56

Connect the other end of Cable #11 to Connector J1 on the Playback PC Board as indicated in FIGURE 7-29.

STEP 7-57

Connect one end of Cable #13 (WHT) to Connector J1 on the Exp/Record Board. See FIGURE 7-30 for the location of the Cable.

STEP 7-58

Connect one end of Cable #14 (RED) to Commector J2 on the Exp/Record Board. See FIGURE 7-30 for the location of the Cable.

STEP 7-59

Pass the ends of Cables #13 and #14 up around the end of the Keybed between the right end of the Action and the right side of the piano.

STEP 7-60

Connect the end of Cable #13 (WHT) to Connector J1 on the Treble Key Switch Circuit Board. See FIGURE 7-31 for the location of the cable.

STEP 7-61

Connect the end of Cable #14 (RED) to Connector J2 on the Treble Key Switch PC Board as shown in FIGURE 7-31.

STEP 7-62

Connect the Cable (#12) from the Pedal Switch Assembly to Connector J4 on the Exp/Record PC Board as indicated in FIGURE 7-29.

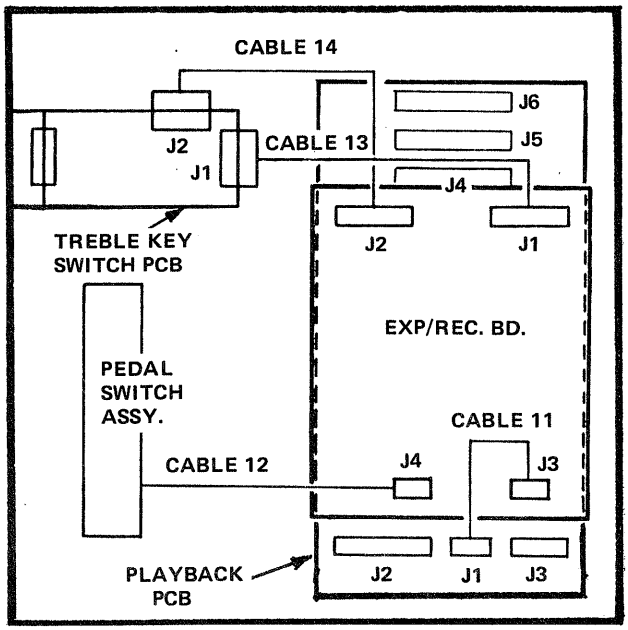


FIGURE 7-29 Interconnecting Wiring Diagram for the Exp/Record PC Board.

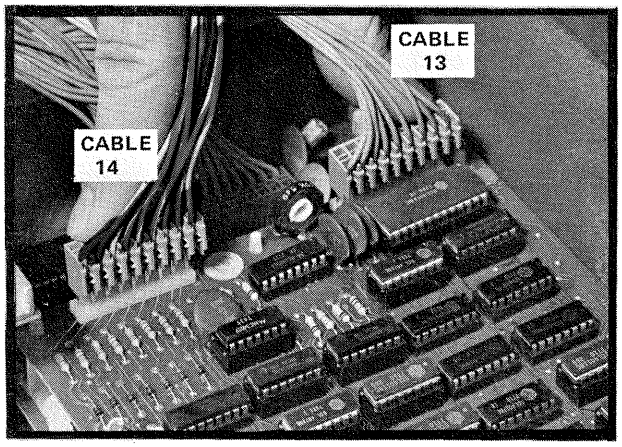


FIGURE 7-30 Connect Cables #13 #14 to the Exp/Record Board.

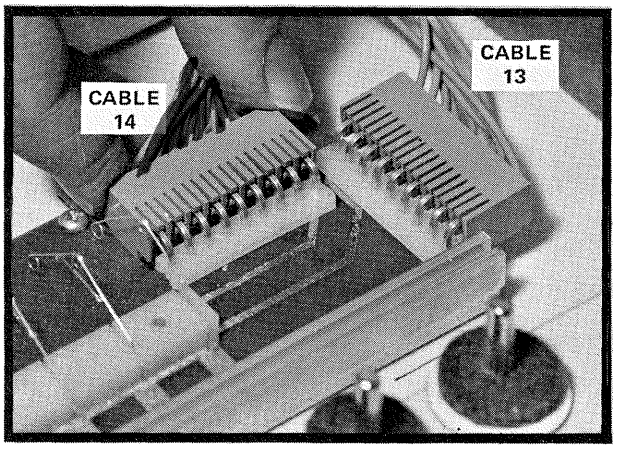


FIGURE 7-31 Connect Cable #14 to the Treble Key Switch Board.

STEP 7-62

Connect the Cable (#12) from the Pedal Switch Assembly to Connector J4 on the Exp/Record PC Board as shown in FIGURE 7-32.

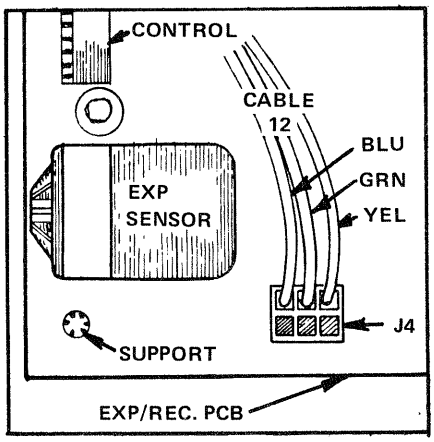


FIGURE 7-32 Connect Cable #12 (wires up) as shown above.

STEP 7-63

Get the RIGHT Key Block and place it in its normal location on the Keybed. Make sure you move the wires from Cables #13 and #14 out of the way.

STEP 7-64

Get the 1/2" Cable Clamp, slip it on the wires of the Cables, place it on the Keybed so it holds the wires away from the Key Block, and mark the center of the clamp's mounting hole on the Keybed.

STEP 7-65

Using a 1/16" drill bit, drill a hole about 1/2" deep at the mark, then mount the Cable Clamp to the Keybed with a #6 x 1/2" Hex Washer Hd. Screw. Remove the Key Block and set it aside with the other piano parts. Vacuum the wood particles from the Keybed.

STEP 7-66

Get the following items and check them for damage:

1 ea. Cable #1 (BLACK & WHITE - 2 wire) ---------- PN 100-09C011-1

1 ea. Cable #3 (ORANGE) ---------- PN 100-09C007-1

1 ea. PB-100A Recorder Bracket ---------- PN 100-01D046-1

1 ea. Safety Interlock Switch Assembly ---------- PN 100-01C035-1

1 ea. 5/16" Cable Clamp ---------- PN *

ea. #6 x 1/2" Hex Washer Hd. Screws ---------- PN *

* These items have no Part Number since they are common hardware and may be purchased in any hardware store.

STEP 7-67

Place a piece of masking tape on the RIGHT side of the piano, approximately 6" to 8" above the Bottom Rail and directly above its BACK edge. See the NOTE below.

NOTE:

If the side of the piano is recessed, you will have to get a 2" x 2" wood block thick enough to fill in the void between the side of the piano and the right end of the Lower Frame. Place the wood block about 6" above the Bottom Rail and mount it to the side of the piano with glue and a screw. Then place the piece of tape on the wood block. See FIGURE 7-33.

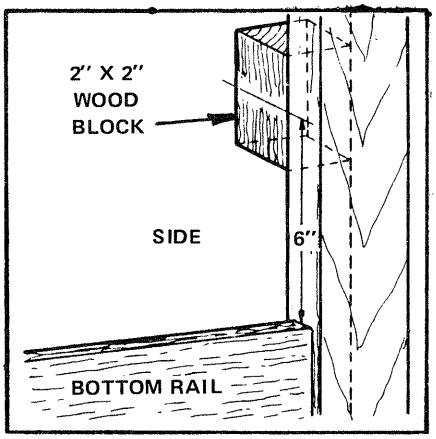


FIGURE 7-33 mount the wood block on the side of the piano as shown.

STEP 7-68

Refer to Line A under STEP 1-3 on the Check List. Using the measurement written on Line A, measure in from the FRONT edge of the piano's side and mark the tape as shown in FIGURE 7-34.

NOTE:

The mark made on the tape in the previous Step indicates the approximate location of the back side of the Lower Frame. The back of the Lower Frame is used to close the Interlock Switch, which you will install in the following Steps. This switch turns off system power when the Lower Frame is removed from the piano.

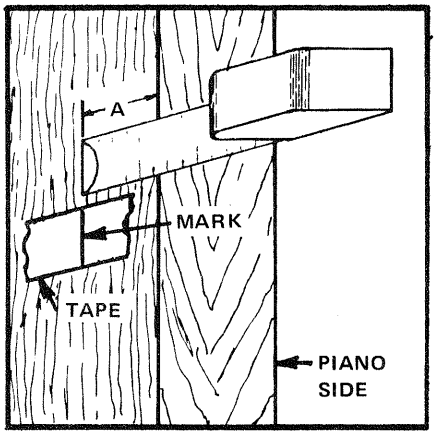


FIGURE 7-34 Measure dimension A and mark the tape as shown.

STEP 7-69

Assemble the Safety Interlock Switch Assembly, compress the button on the switch fully, place the Bracket of the switch against the side of the piano, and align the end of the button (keep the button depressed) with the mark on the tape as shown in FIGURE 7-35.

STEP 7-70

Hold the Switch Assembly firmly in place and draw a line around the Bracket to mark its location.

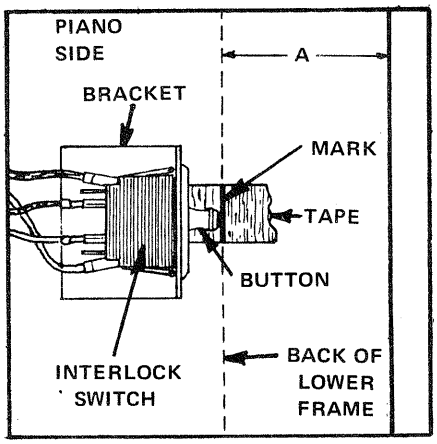


FIGURE 7-35 Align the end of the button with the mark on the tape.

STEP 7-71

Separate the Switch from the Bracket, then align the Bracket with the lines on the piano's side and mark the centers of the two Bracket mounting slots as shown in FIGURE 7-36.

STEP 7-72

Center punch the marks, insert a 1/16" bit in your drill, and drill pilot holes about 1/4" deep at the punch marks. See the CAUTION below.

CAUTION:

WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES WHEN DRILLING.

STEP 7-73

Mount the Bracket on the piano side with two #6 x 1/2" Hex Washer Hd. Screws. Leave the screws loose so the Bracket can be moved.

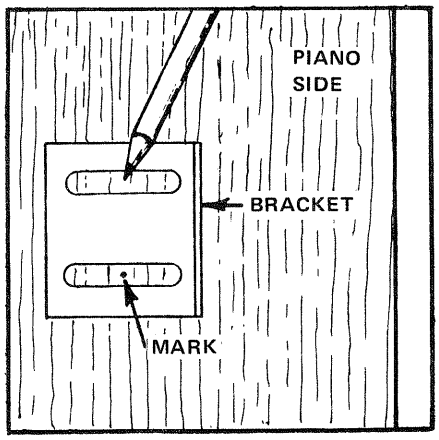


FIGURE 7-36 Mark the centers of the slots.

STEP 7-74

Insert the switch in the Bracket and connect the BLACK and WHITE wires from the Power Cord to the two OUTSIDE pins on the back of the switch as shown in FIGURE 7-37.

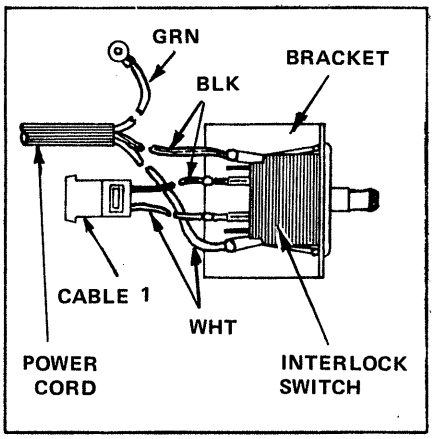


FIGURE 7-37 Connect the wires from Cable #1 and the Power Cord as shown.

STEP 7-75

Get Cable #1 and connect the BLACK wire to the INSIDE pin next to the BLACK wire from the Power Cord, then connect the WHITE wire from Cable #1 to the INSIDE pin next to the WHITE wire from the Power Cord as shown in FIGURE 7-37.

STEP 7-76

Get the PB-100A Recorder Bracket (with the PT-100 Tape Recorder Attached) and mount it on the Pivot Shaft on the underside of the right, front corner of the Keybed as shown in FIGURE 7-38 below.

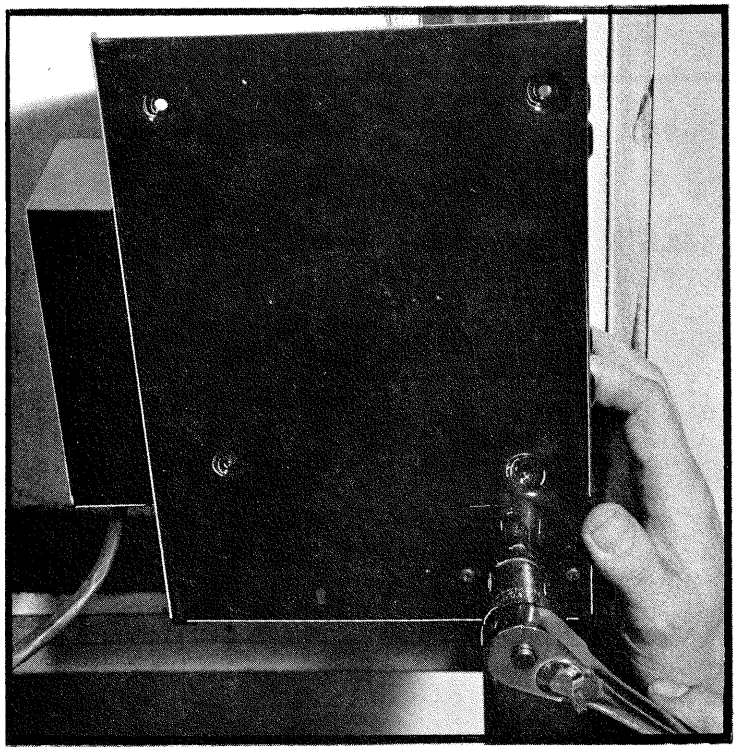


FIGURE 7-38 Install the Bracket on the Pivot Shaft.

STEP 7-77

Install the rubbercap on the end of the Pivot Shaft.

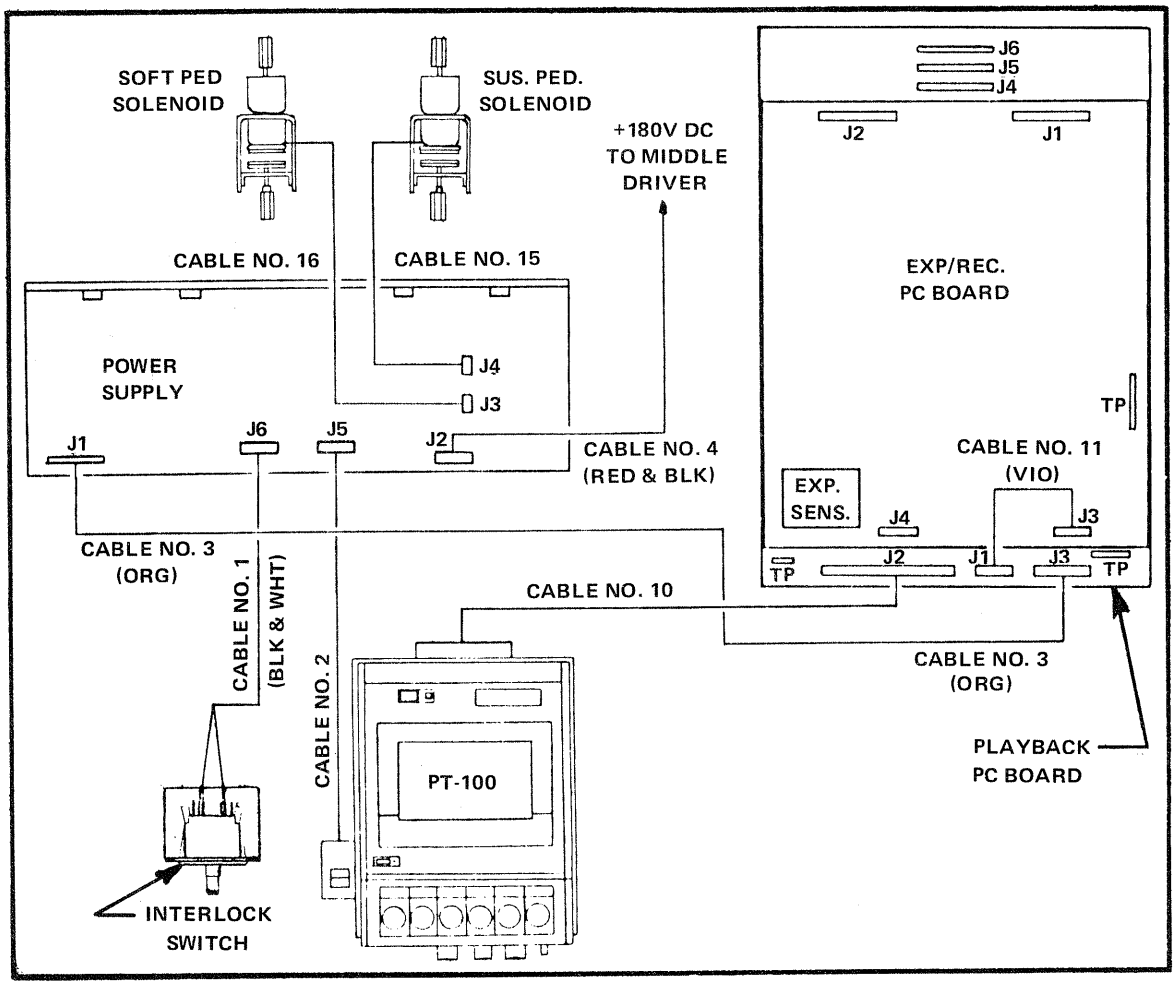


FIGURE 7-39 Power Supply Interconnecting Wiring Diagram.

STEP 7-78

Connect Cable #1 (BLK & WHT - from Interlock Switch) to Connector J6 on the Power Supply as indicated in FIGURE 7-39.

STEP 7-79

Connect Cable #2 (from the Power Switch on the Recorder Bracket) to Connector J5 on the Power Supply as indicated in FIGURE 7-39.

STEP 7-80

Get Cable #3 (ORG) and connect one end to Connector J1 on the Power Supply as indicated in FIGURE 7-39.

STEP 7-81

Connect the other end of Cable #3 (ORG) to Connector J3 on the Play-Back PC Board as indicated in FIGURE 7-39.

STEP 7-82

Connect the Cable (#10) from the PT-100 Tape Recorder to Connector J2 on the Playback Board as shown in FIGURE 7-39.

STEP 7-83

Connect the Cable (#15) from the SUSTAIN Pedal Solenoid to Connector J4 on the Power Supply as indicated in FIGURE 7-39.

STEP 7-84

Connect Cable #16 from the SOFT Pedal Solenoid to Connector J3 on the Power Supply as indicated in FIGURE 7-39 on the previous page.

STEP 7-85

Recheck all connections to verify that they are correct.

STEP 7-86

Slip the 5/16" Cable Clamp on the Power Cord and Cable #1 wires near the Interlock Switch, hold the Clamp against the side of the piano, and use an awl to mark the center of the clamp's mounting hole.

STEP 7-87

To make a starter hole for the screw, give the awl a firm tap with a hammer, then mount the Cable Clamp to the side of the piano with a #6 x 1/2" Hex Washer Hd. Screw. See the NOTE below.

NOTE:

Leave a small loop in the wires before securing the clamp. The loop is necessary so that there is no stress on the wire connections to the Interlock Switch. Mount the Clamp about half way between the Interlock Switch and the Bottom Board of the piano.

If you are working with another person, he can proceed to Section 8, FINAL ASSEMBLY PROCEDURES.

This concludes Section 7, INSTALLATION OF THE ELECTRONICS, please proceed to Section 9, ALIGNMENT AND TEST PROCEDURES.

8. FINAL ASSEMBLY PROCEDURES

In this Section, the procedures for completion of the installation of the PIANOCORDER Assembly, Model P-100, are detailed. Please follow the procedures in the sequence given and read each Step and related NOTE or CAUTION, if any, THOROUGHLY before beginning the Step.

STEP 8-1

Unpack the following items and inspect them for damage:

1 ea. Lower Frame Lock Bracket ---------- PN 100-02B161-1

2 ea. Lower Frame Guards ---------- PN 100-02A158-1

1 ea. #6 x 1" Wood Screw ---------- PN *

6 ea. #6 x 1/2" Wood Screws ---------- PN *

2 ea. #8 x 1/2" Wood Screws ---------- PN *

* These items have no Part Number since they are common hardware and may be purchased in any hardware store.

STEP 8-2

Temporarily install the Lower Frame (see FIGURE 8-1) in the piano. Make sure that the cables from the Tape Recorder and the Power Switch are NOT pinched between the Lower Frame and the underside of the Keybed. If pinching occurs, proceed to STEP 8-3; if not, proceed to STEP 8-5.

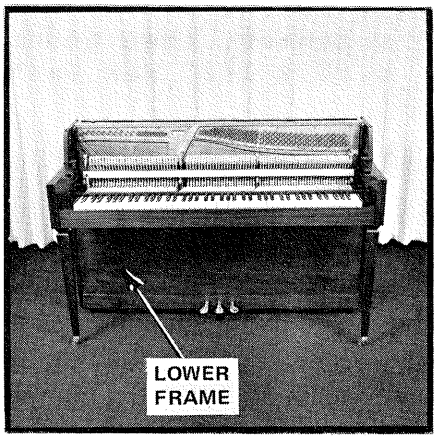


FIGURE 8-1 Lower Frame installed.

STEP 8-3

Determine how much of the upper right corner of the Lower Frame has to be removed to prevent pinching of the cables. Place masking tape on the upper right corner of the Lower Frame and draw lines on the tape defining the area of the corner to be removed.

STEP 8-4

Remove the Lower Frame and cut along the lines on the Tape, then reinstall it.

STEP 8-5

Measure the width of the Lower Frame Guards (PN 100-02A158-1) and write the measurement on Line (1) under STEP 8-6 on the Check List.

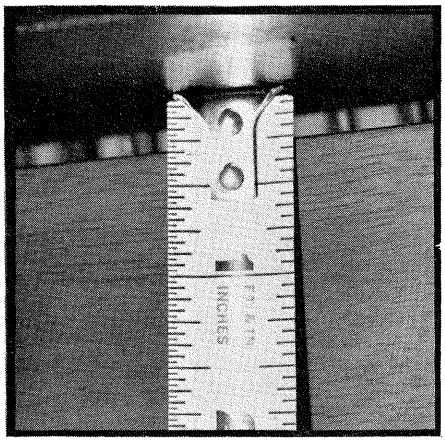


FIGURE 8-2 Measure the gap between the Keybed and Lower Frame.

STEP 8-6

Measure the gap between the Lower Frame and the underside of the Keybed near each end of the Lower Frame (see FIGURE 8-2) and write the measurement on Line (2) under this Step on the Check List, then subtract the measurement on Line (2) from that on Line (1) and write the difference on Line (3) under this Step. See the NOTE on the next page.

NOTE:

The difference dimension will be used to draw a line across the back of the Lower Frame. The line will be used to align the Lower Frame Guards when they are installed.

STEP 8-7

Wrap a piece of masking tape over the top edge of the Lower Frame next to each edge of the Spring Lock as shown in FIGURE 8-3. See the NOTE below.

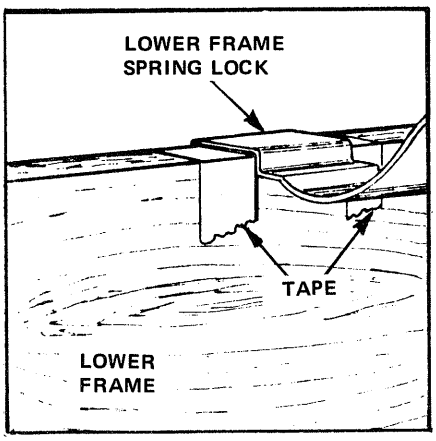


FIGURE 8-3 Place tape along both sides of the Lower Frame Lock.

NOTE:

The tape to the LEFT of the Spring Lock will be use to align the Lock Bracket when it is installed in STEP 8-12. The piece of tape on the RIGHT will be used to align the right Lower Frame Guard when it is installed in STEP 8-22.

STEP 8-8

Measure the gap between the Lower Frame and the Keybed next to the Spring Lock as shown in FIGURE 8-4, then write the measurement on Line (1) under this Step on the Check List.

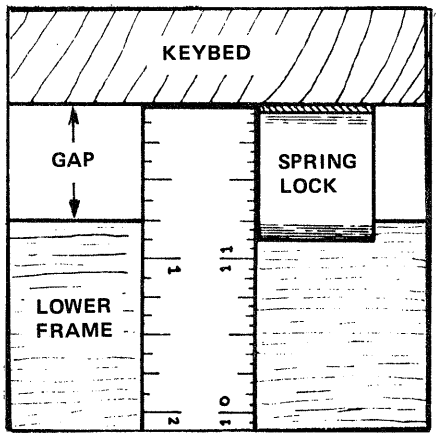


FIGURE 8-4 Measure the gap next to the Spring Lock.

STEP 8-9

Pad the top of your work bench, then place the Lower Frame face down on it with the TOP of the Lower Frame facing you.

STEP 8-10

Refer to Line (3) under STEP 8-6 on the Check List. Use the measurement written there to measure down from the TOP of and mark the back of the Lower Frame near both ends. See FIGURE 8-5.

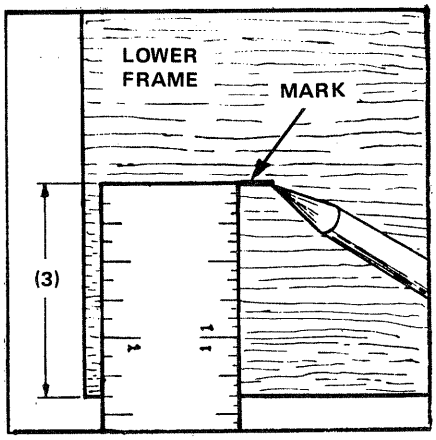


FIGURE 8-5 Mark the back of the Lower Frame.

STEP 8-11

Use a pencil or felt pen and a straightedge to draw a line across the back of the Lower Frame connecting the two marks made in the previous Step. See the NOTE below.

NOTE:

This line will be used to align the Lower Frame Guards.

STEP 8-12

Get the Lower Frame Lock Bracket (PN 100-02B161-1) and place it on the back of the Lower frame as shown in FIGURE 8-6 and align the RIGHT edge of the Bracket with the RIGHT edge of the piece of tape on the LEFT at the top, center of the Lower Frame.

STEP 8-13

Refer to line (1) under STEP 8-8 on the Check List. Using the measurement written there, adjust the top of the Bracket until it is a distance equal to the measurement above the top of the Lower Frame as shown in FIGURE 8-7 (dimension X).

STEP 8-14

Mark the centers of the slots on the Lower frame as shown in FIGURE 8-8.

STEP 8-15

Remove the Bracket, set it aside, and remove the masking tape.

STEP 8-16

Center punch the marks, install a 1/6" bit in your drill, wrap a piece of tape around the bit 1/2" from its tip, and drill pilot holes 1/2" deep (indicated by the tape) at the punch marks. See the CAUTION below.

CAUTION:

WHEN DRILLING WEAR YOUR RESPIRATOR AND GOGGLES OR FACE SHIELD.

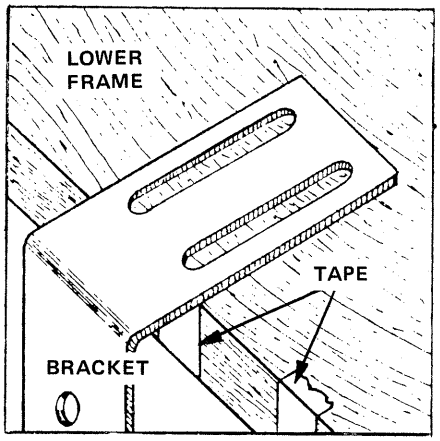


FIGURE 8-6 Align the edge of the Bracket to the masking tape.

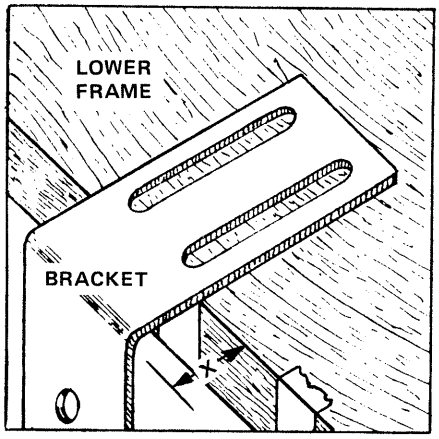


FIGURE 8-7 Adjust the Bracket to dimension X as shown.

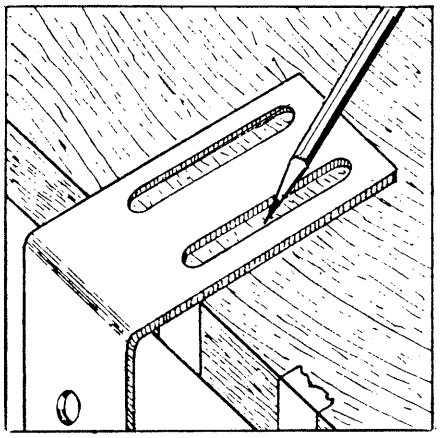


FIGURE 8-8 Mark the centers of the slots.

STEP 8-17

Vacuum the wood particles from the Lower frame.

STEP 8-18

Mount the Bracket to the Lower Frame with two (2) #6 x 1/2" wood screws as shown in FIGURE 8-9. See the NOTE below.

NOTE:

The brackets shown in FIGURE 8-9 and 8-10 are prototypes. The washers shown in FIGURE 8-9 and 8-10 are NOT required with the production Lock Bracket.

STEP 8-19

Get one of the Lower Frame Guards (PN100-02A158-1), place it on the top of the Lower Frame, align the bottom of the Guard with the Guard Line, and butt the end of the Guard against the Bracket as shown in FIGURE 8-10.

STEP 8-20

Place a piece of marking tape across the Guard centered on the point the LEFT end of the Lower Frame strikes it.

STEP 8-21

Using the edge of the Lower Frame as a template, draw a line on the tape as shown in FIGURE 8-11. This line will be used to trim the Guard to size.

STEP 8-22

Get the other Lower Frame Guard and align its bottom edge with the "Guard Line" and its LEFT end with the LEFT edge of the remaining piece of tape.

STEP 8-23

Place a piece of tape across the Guard centered on the point the RIGHT end of the Lower Frame strikes it.

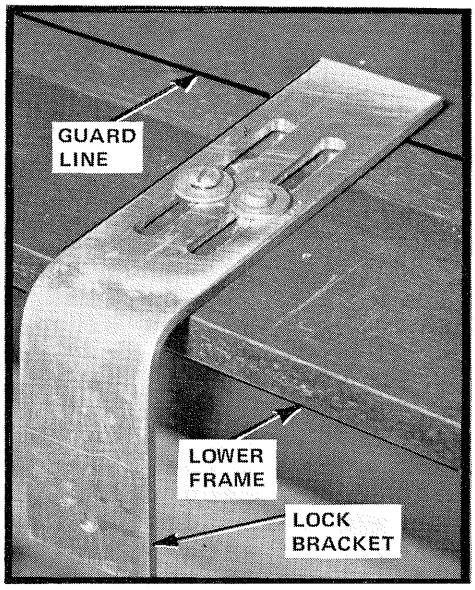


FIGURE 8-9 Mount the Bracket to the Lower Frame.

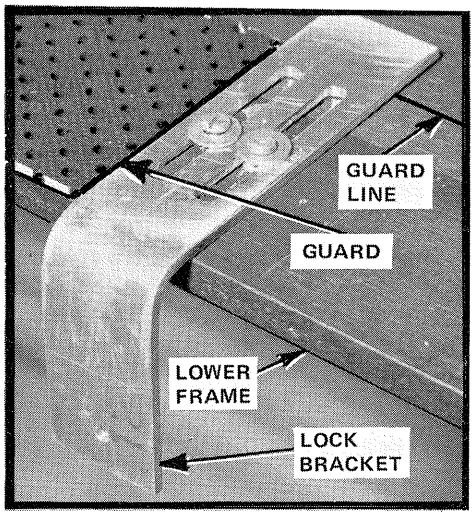


FIGURE 8-10 Butt the Guard against the edge of the Bracket as shown.

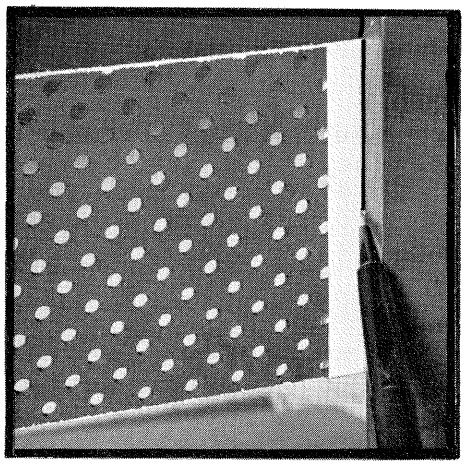


FIGURE 8-11 Align the end of the Guard with the edge of the tape.

STEP 8-24

Using the edge of the Lower Frame as a template, draw a line across the width of the Guard.

STEP 8-25

Cut both Guards along the INSIDE edge of the lines drawn on the tape. Use the INSIDE edge of the line so the Guards won't overlap the ends of the Lower Frame.

STEP 8-26

Align the Guards to the "Guard Line" and to the ends of the Lower Frame as shown in FIGURE 8-12, then drill pilot holes 1/2" deep with a 1/16" drill bit near the ends and center of each Guard (use any of the perforations in these locations as guides), then mount the Guards with the six (6) #6 x 1/2" Wood Screws.

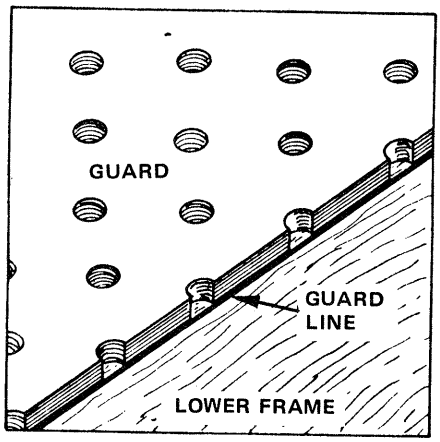


FIGURE 8-12 Align the Guards to the "Guard Line."

STEP 8-27

At the RIGHT corner of the Lower Frame, cut a notch in the Guard 1/2" wide by 3/4" long as shown in FIGURE 8-13. This notch is for the cables from the Power Switch and the PT-100 Tape Recorder.

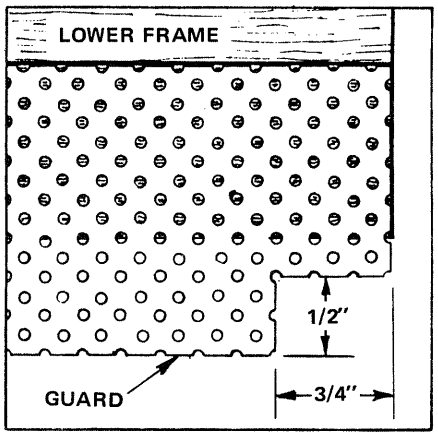


FIGURE 8-13 Notch the Guard as shown.

NOTE:

The following Steps must be done AFTER the TEST AND ALIGNMENT PROCEDURES (Section 9) are completed. If you are working with another person and he has NOT completed Section 9, assist him; if he has completed Section 9, proceed to the next Step.

CAUTION:

TURN THE POWER SWITCH OFF, DEPRESS AND RELEASE THE INTERLOCK SWITCH, AND WAIT 1 MINUTE BEFORE PROCEEDING.

STEP 8-28

Use some paper or padding material to cover the Power Supply and Bass and Treble Driver PC Boards to protect them from the wood and metal chips created by the drilling procedures in the following Steps.

If you have an assistant, have him hold the nozzle of the vacuum cleaner next to the place where you are drilling so that most of the particles from the drilling are picked up as you drill. You should have him do this EVERY time you drill in the following procedure to lessen the amount of debris inside the piano.

CAUTION:

WHEN DRILLING HOLES IN THE FOLLOWING STEPS, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

NOTE

STEP 8-29 through 8-33 only apply to pianos with Direct Blow Actions. For pianos with Drop Actions, please proceed to STEP 8-34.

STEP 8-29

Use a center punch to mark the centers of the Bracket mounting holes in the Rail Brackets. See FIGURE 8-14.

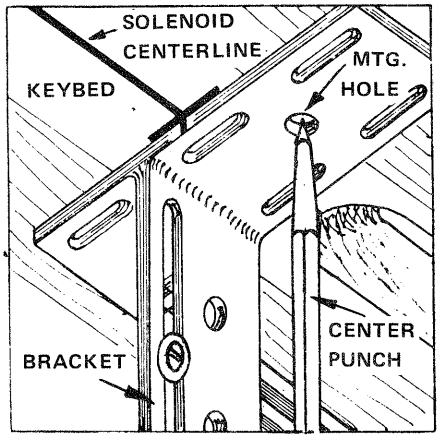


FIGURE 8-14 Mark the center of the mounting hole.

STEP 8-30

Carefully remove Keys 1 through 6 and 83 through 88. Before removing the Keys, lift their Stickers or Whippens so the Sticker or Whippen Cloths are not damaged hold the Stickers or Whippens UP as you remove the Keys.

STEP 8-31

Insert a 3/16" bit in your drill and drill vertically up through the Keybed at the punch marks at the centers of the mounting holes.

STEP 8-32

Pass the 10-32 x 2" Stove Bolt through the hole in the top of the Keybed, start the 10-32 Hex Nut on the Bolt and tighten it down securely. See FIGURE 8-15. Repeat this procedure with the other bolt and nut at the other Bracket.

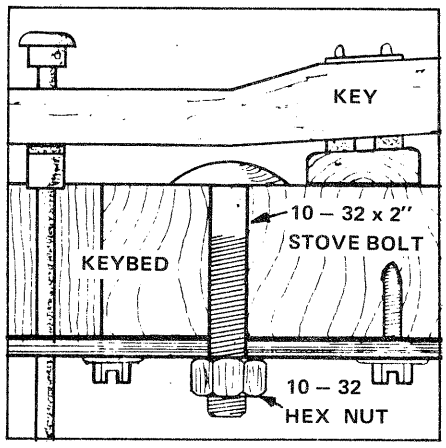


FIGURE 8-15 Stove Bolt installation.

STEP 8-33

THOROUGHLY vacuum the top of the Keybed.

NOTE:

STEPS 8-34 through 8-38 only apply to pianos with Drop Actions where the Rail Bracket is mounted on TOP of the Action Support Bar. Proceed to STEP 8-39 if you are working on pianos with Direct Blow Actions or Drop Actions with the Rail Bracket mounted on the UNDERSIDE of the Support Bar.

STEP 8-34

Use a center punch to mark the Support Bar at a point in the center of the Rail Slot about in the middle of the Support Bar as shown in FIGURE 8-16.

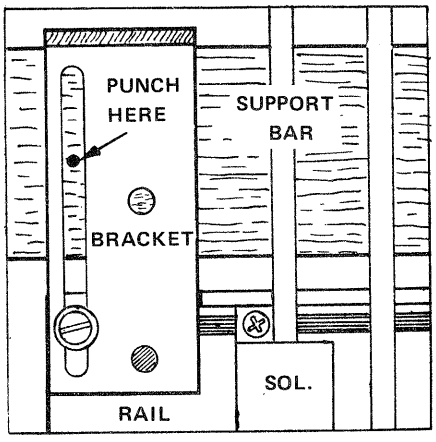


FIGURE 8-16 Center punch the Support Bar.

STEP 8-35

Check the width of the gap between the back of the Rail Bracket and the Support Bar at the top and bottom of the Bar. Make a shim to fit in the gap. This shim will hold the Bracket vertical when the screw is installed in the next Steps. See FIGURE 8-17 and the NOTE below.

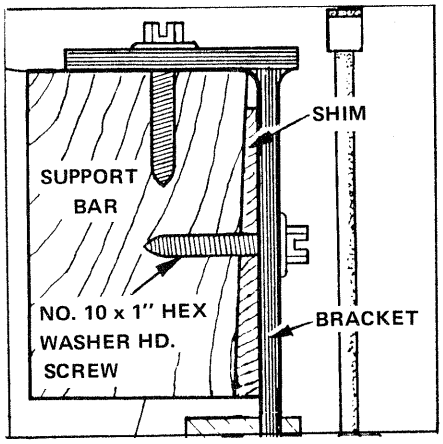


FIGURE 8-17 Shim and #10 x 1" Screw installation. (Cross-Section)

NOTE

The gap must be checked at top and bottom because the face of the Support Bar may not be vertical.

STEP 8-36

Insert a 1/8" bit in your drill, wrap a piece of tape around it 1" from its tip and drill 1" into the front of the Support Bar. The depth of your drill at 1" is indicated by the tape on the bit.

STEP 8-37

Replace the 1/8" bit with a 3/16" bit in your drill and drill through the Rail Bracket Slot at the 1/8" hole to open up the Rail Slot for the #10 x 1" Hex Washer Hd. Screw to be installed in the next Step. DO NOT drill into the Support Bar.

STEP 8-38

Install a #10 x 1" Hex Washer Hd. Screw in the hole in the Bracket and tighten it down. This screw is installed for additional strength in the bond between the Bracket and the Support Bar. See FIGURE 8-17.

NOTES:

1. Repeat STEPS 8-34 through 8-38 on the Bracket at the other end of the Rail.

2. STEPS 8-39 through 8-51 apply to pianos with either Direct Blow or Drop Actions.

STEP 8-39

Notice that there are two 1/4" holes in the vertical arm of each Rail Bracket. Either hole may be used in the following Steps, if it is NOT aligned over the moldings for the channels in the Solenoid Rail. See FIGURE 8-18.

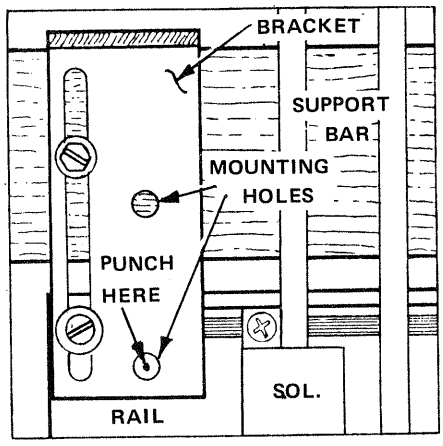


FIGURE 8-18 1/4" Bracket mounting holes.

STEP 8-40

Center punch the center of the selected 1/4" mounting hole in each of the Brackets.

CAUTION

WHEN DRILLING IN THE FOLLOWING STEPS, WEAR YOUR RESPIRATOR AND FACE SHIELD OR GOGGLES.

STEP 8-41

Insert a 1/8" bit in your drill and drill through the Solenoid Rail at the punch mark in the center of the 1/4" hole in each Rail Bracket. See the NOTE below.

NOTE:

As you drill, support the back of the Solenoid Rail with one hand or have your assistant, if you have one, support the rail. KEEP YOUR HAND WELL AWAY FROM THE DRILLING AREA WHEN DRILLING.

STEP 8-42

Replace the 1/8" bit with a 9/32" bit and redrill the 1/8" holes. See the NOTE below.

NOTE:

Drilling is done in two stages to lessen the chance that the drill bit will wander and lessen the lateral force against the Solenoid Rail and Brackets imposed by the process of drilling.

STEP 8-43

Get the two (2) 1/4-20 x 1" Hex Hd. Bolts and slip a 1/4" Lock Washer and 1/4" Flat Washer on each bolt, then insert a bolt through each 9/32" hole. Thread a 1/4" Hex Nut on each bolt and tighten them down all the way. See FIGURE 8-19. THOROUGHLY vacuum the interior of the piano to remove ALL metal particles.

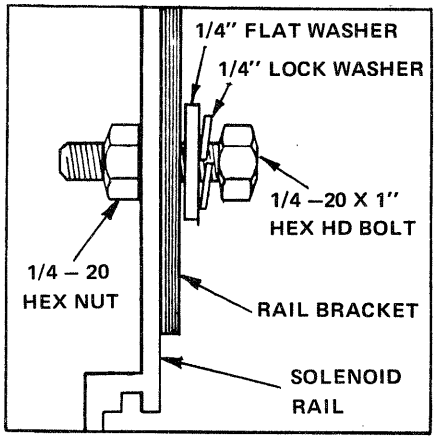


FIGURE 8-19 1/4-20 bolt installation.

NOTES:

1. In the following portion of this Section, the loose cables of the system will be bundled and tied into a wire bus. The purpose of this procedure is to prevent the wires from interfering with any of the moving parts in the piano and, especially, to prevent the wires from touching parts that become heated when the system is operating. Should wires contact parts that are hot, the possibility that wire insulation could break down and an electrical short circuit occur is present.

2. When tying cables together with the Cable Ties, always leave a loop large enough so the plugs on the cables can be disconnected from the circuit boards without causing undue stress on the connections of the other cables.

3. FIGURE 8-20 on the next page denotes the points at which the cables will be tied together. These points are indicated by a circled number (the number denotes the order in which the tie is made). Circled numbers followed by the letter A indicate possible additional points where the cables may have to be tied to keep them together. Please study the Figure carefully to give yourself an overall picture of the procedures to follow.

4. In some cases, when cables are extremely long, it may be necessary to double the cables up before tying them with the Cable Ties.

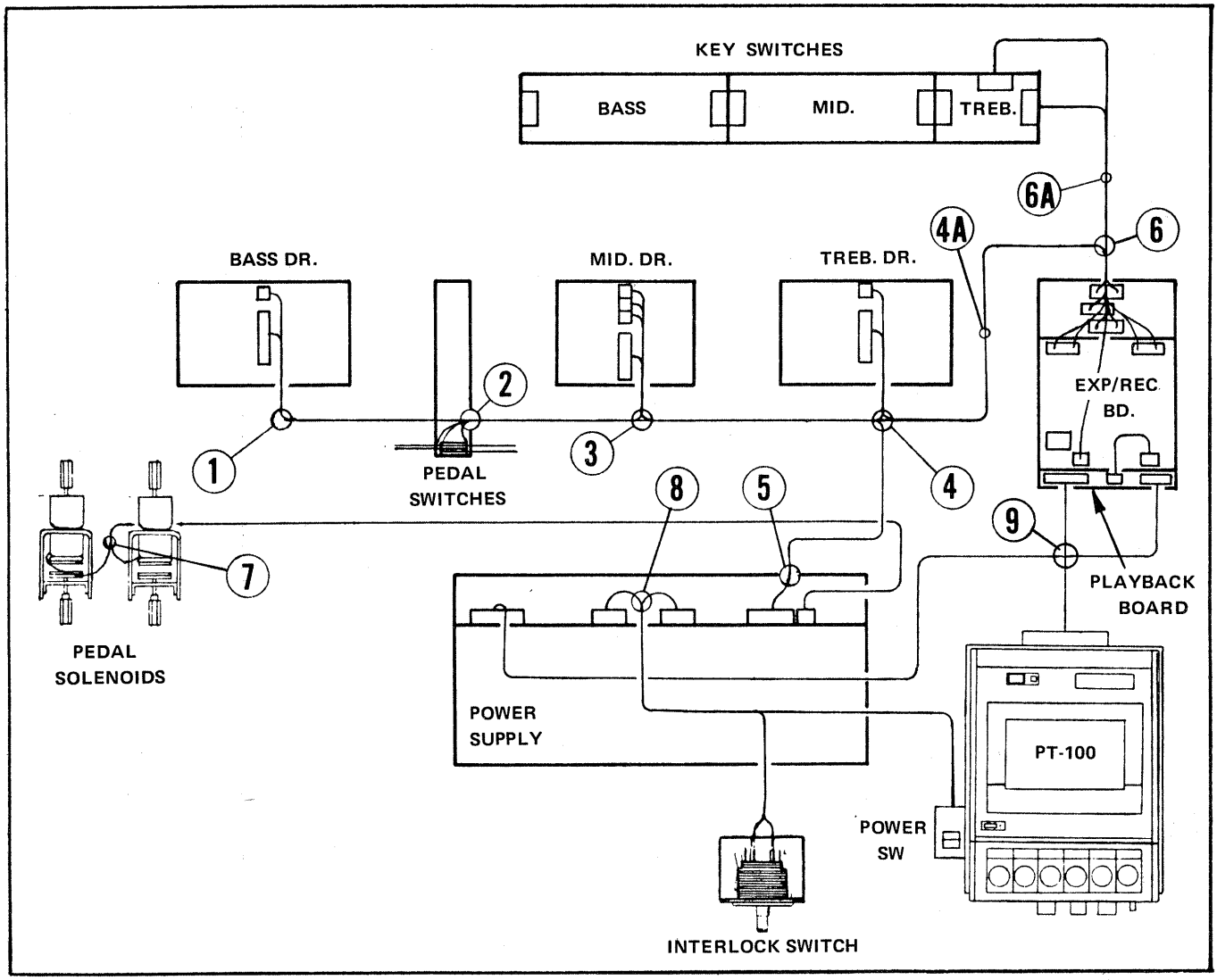


FIGURE 8-20 Cable tie points and order of their installation.

STEP 8-44

Get the ten (10) Tie Wraps (PN 08350). Bundle Cables #6 and #9 from the Bass Driver Board and tie them together with one of the Tie Wraps so they hang about 1/2" below the bottom of the Driver Board as shown in FIGURE 8-21. See the NOTE below.

NOTE:

Leave enough loop in each Cable so its connector can be removed from the Driver Board WITHOUT putting undue stress on the connection of the other Cable. This should also be done when you tie together the Cables at the Middle and Treble Drivers and especially at the ties made at the Playback and Exp/Record PC Boards.

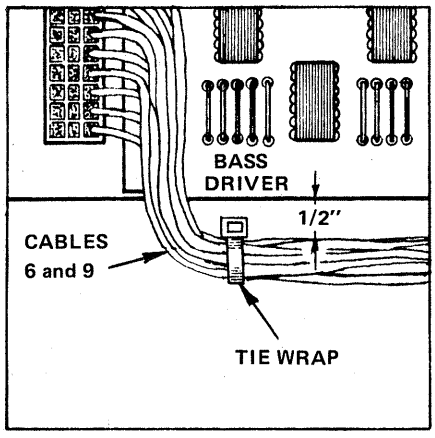


FIGURE 8-21 Tie point 1.

STEP 8-45

Bring up the wires (Cable #12) from the Pedal Switch Assembly and join them to the wire bus from the Bass Driver. Make sure none of the wires from the Pedal Switch Assembly interfere with the operation of either Pedal Switch. Use a Tie Wrap to join all the wires above the Pedal Switches as shown in FIGURE 8-22. (This is tie point 2 in FIGURE 8-20 on the previous page.)

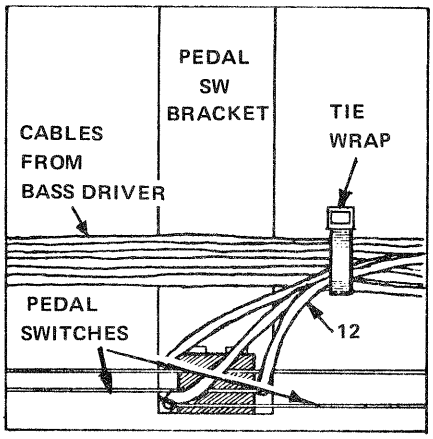


FIGURE 8-22 Tie point 2.

STEP 8-46

Bundle Cables #4, #5, #6, and #7 1/2" below the bottom of the Middle Driver and tie them together with the Cables coming from the tie point at the Pedal Switch Assembly. Fan the wires from the Driver and cross-wrap a Tie Wrap around the junction as shown in FIGURE 8-23. (This is tie point 3 in FIGURE 8-20.) See the NOTE under STEP 8-44 on the previous page.

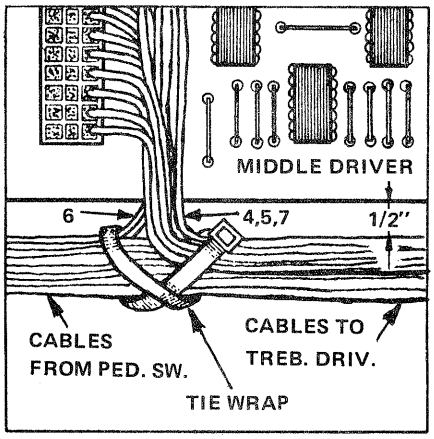


FIGURE 8-23 Tie point 3.

STEP 8-47

Bundle Cables #5 and #8 1/2" below the bottom of the Treble Driver and tie them together with the Cables coming from the Middle Driver. Fan the wires from the Driver and cross-wrap a Tie Wrap around the junction as shown in FIGURE 8-24. (This is tie point 4 in FIGURE 8-20.) Make sure there is at least 1/2" between the Cables and the top of the Power Supply heat sink (the metal plate at the back of the Power Supply.) See the NOTE under STEP 8-44.

STEP 8-48

Double up the excess wire of Cable #4 (RED & BLK wires to Connector J2 on the Power Supply) and tie the doubled wire with a Tie Wrap so the Cable is held away from the Power Supply heat sink (the metal plate at the back of Power Supply). See tie point 5 in FIGURE 8-20.

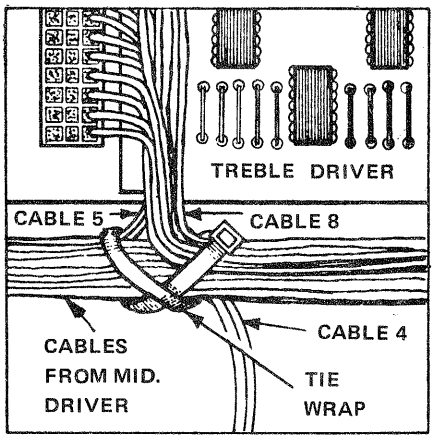


FIGURE 8-24 Tie point 4.

NOTE:

If the Exp/Record and Playback Boards are mounted on the side of the piano cabinet, do STEP 8-49. If they are mounted on the Bottom Board of the piano, proceed to STEP 8-50.

STEP 8-49

Bundle Cables #7, #8, and #9 from the Playback Board and Cables #12, #13, and #14 from the Exp/Record Board together about 3" from Connector J6 at the end of the Playback PC Board, fan the wires, and cross-wrap a Tie Wrap over the junction as shown in FIGURE 8-25. (This is tie point 6 in FIGURE 8-20 on page 106.) See the NOTE below.

NOTE:

Make sure you leave enough loop in each Cable so its connector can be removed from the PC Board WITHOUT placing undue stress on the connectors of the other Cables. After this Step is completed, proceed to STEP 8-52.

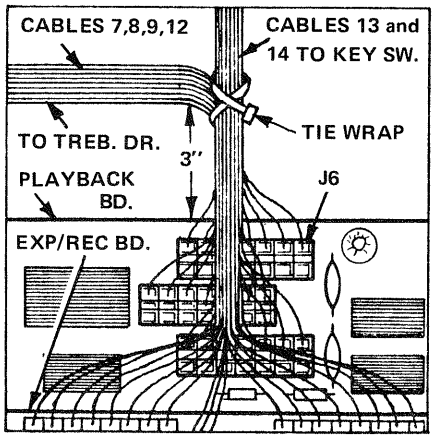


FIGURE 8-25 Tie point 6.

STEP 8-50

Bundle Cables #7, #8, and #9 from the Playback Board and Cables #12, #13, and #14 from the Exp/Record Board together and tie them together with a Tie Wrap about 1/2" from the end of the Playback Board as shown in FIGURE 8-26. See the NOTE above.

STEP 8-51

Fan the wires from the Playback and Exp/Rec Boards and cross-wrap a Tie Wrap over the junction as shown in FIGURE 9-26. The tie point should be placed so that, when you pull up on Cables #13 and #14, the other Cables hang about 3" above the top edge of the circuit boards as shown in FIGURE 8-26.

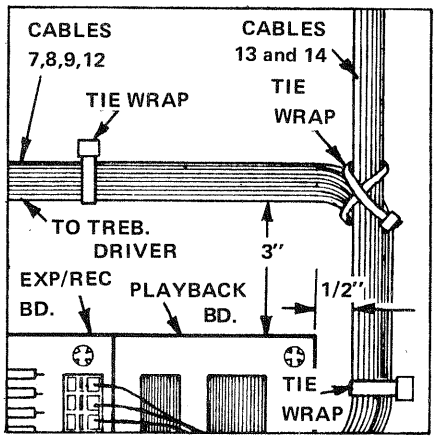


FIGURE 8-26 Tie points for Cables when the PC boards are on the Bottom Board.

STEP 8-52

Double up the excess wires from Cables #7, #8, #9, and #12 between the tie points at the Treble Driver (tie point 4) and Playback and Exp/Rec Boards (tie point 6) and secure them with a Tie Wrap so they are held away from the Solenoid Rail, Piano Plate, and the Power Supply. (This is tie point 4A in FIGURE 8-20 on page 106.)

STEP 8-53

Double up any excess wire in Cables #13 and #14 between the end of the Keybed and the tie point at the Exp/Rec and Playback PC Boards and secure them with a Tie Wrap so they hang away from the Solenoid Rail, Piano Plate, and Power Supply. (This is tie point 6A in FIGURE 8-20 on page 106.)

STEP 8-54

Tie the white wires from the Pedal Solenoids (Cables #15 and #16) together with a Tie Wrap. Push the Soft Pedal down with your hand and check to see that there is enough loop in the Cables at the Tie Wrap to allow free movement of the Solenoid and with no stress being placed on the wires at their connection to the Solenoids. If necessary slide the Tie Wrap farther up the Cables to remove stress on the connections. (See tie point 7 in FIGURE 8-20 on page 106.)

STEP 8-55

Slip a Cable Clamp on Cables #15 and #16 at their connections to the Power Supply (J3 and J4). Slide the Clamp down the Cables to the Bottom Board of the piano. Pull the Cables through the Clamp to form a loop in the wires so that the wires can be positioned as shown in FIGURE 8-27. The wires should NOT touch the Fuses, the heat sink, or the System Ground Plate.

STEP 8-56

After the loop is formed and the wires positioned, hold the Clamp against the Bottom Board, place the tip of your awl at the center of the Clamp's mounting hole, and give the awl a sharp blow with your hammer. Set the awl and hammer aside and mount the Clamp to the Bottom Board with a #6 x 1/2" Hex Washer Hd. Screw as shown in FIGURE 8-27.

STEP 8-57

Straighten Cables #15 and #16 so that they lie together half way between the Piano Plate and the Pedal Trapwork. Slip a Cable Clamp over the Cables and hold it against the Bottom Board near the Pedal Solenoids. See FIGURE 8-28.

STEP 8-58

Place the tip of the awl at the center of the Clamp's mounting hole and give the awl a sharp tap with your hammer. Set the hammer and awl aside, double up the excess wire in the Cables between the Pedal Solenoids and the Clamp, slip the doubled wires into the Clamp, and mount the Clamp to the Bottom Board with a #6 x 1/2" Hex Washer Hd. Screw as shown in FIGURE 8-28. (Make sure you don't pinch any wires under the head of the Screw.)

STEP 8-59

Depress the Soft Pedal manually and make sure there is enough loop in the Cables to allow free movement of the Pedal Solenoid without placing undue stress on the Cable connections to the Solenoids.

STEP 8-60

Use a Tie Wrap to join Cables #1 and #2 near the front of the Power Supply as shown in FIGURE 8-29. (This is tie point 8 in FIGURE 8-20 on page 106.)

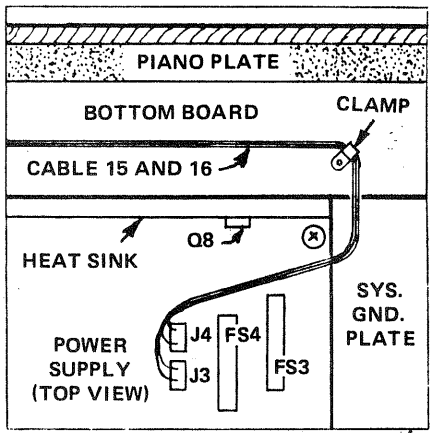


FIGURE 8-27 Cable Clamp mounted at Power Supply.

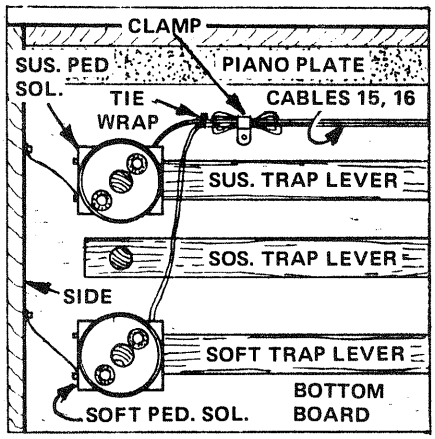


FIGURE 8-28 Cable Clamp mounted near the Pedal Solenoids.

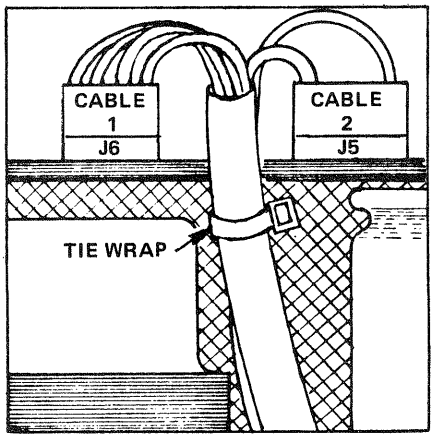


FIGURE 8-29 Tie point 8.

STEP 8-61

Position Cables #1 and #2 so they lay on the Bottom Board directly against the back of Bottom Rail.

STEP 8-62

Slip a 5/16" Cable Clamp on the Cable (#10) from the Tape Recorder and another on the Cable (#2) from the Power Switch. When you put the Clamps on the cords face the mounting tabs toward each other as shown in FIGURE 8-30.

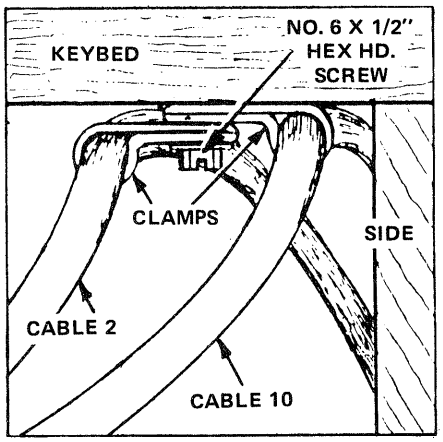


FIGURE 8-30 Cables #2 and #10 Clamp installations.

STEP 8-63

Hold both Cables (#2 and #10) against the underside of the Keybed about 1/2" in front of the upper right corner of the opening for the Lower Frame, then slide the Cable Clamps to that point, align the mounting holes in the Clamp tabs over each other, and hold the Clamps firmly in place.

STEP 8-64

Swing the Tape Recorder in and out and adjust the loops in the Cables between the Recorder and the Clamps until the Recorder can be swung in and out WITHOUT placing stress on the Cable connections at the Recorder and Power Switch.

STEP 8-65

Hold the Clamps against the Keybed with their mounting holes aligned, place an awl at the center of the mounting holes and give it a sharp tap with your hammer. Set the awl and hammer aside and mount the Cable Clamps to the underside of the Keybed with a #6 x 1/2" Hex Washer Hd. Screw as shown in FIGURE 8-30 above.

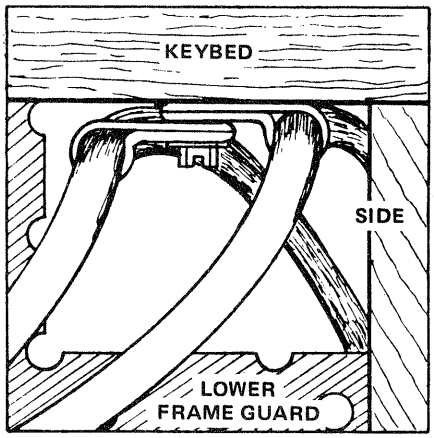


FIGURE 8-31 Pass the Cables through the notch in the Guard.

STEP 8-66

Drape Cable #3 (ORG) over the front side of the Power Supply so that it hangs below the top edge of the Bottom Rail but about 1/2" ABOVE Cables #1 and #2 (which are laying on the Bottom Board). Secure Cable #3 to Cable #10 (from the Tape Recorder) so it stays in position above Cables #1 and #2. (The space between Cable #3 and Cables #1 and #2 is necessary to prevent false electrical signals being coupled from the two 120V AC cables into Cable #3.)

STEP 8-67

Install the Lower Frame in the piano. Make sure you lead the Cables from the Tape Recorder and Power Switch through the notch in the Lower Frame Guard as shown in FIGURE 8-31 above.

STEP 8-68

Place the tip of your awl at the center of the mounting hole in the Lower Frame Lock Bracket and give the awl a sharp tap with your hammer. Set the awl and hammer aside and secure the Lock Bracket to the underside of the Keybed with a #6 x 1" Wood Screw.

STEP 8-69

Get the "USER WARNING" Label (PN 100-02C165-1) and affix it to the Lower Frame beneath the Lock Bracket and Spring Lock as shown in FIGURE 8-32.

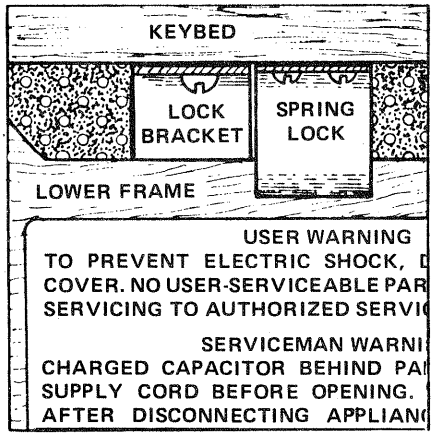


FIGURE 8-32 USER WARNING Label location.

STEP 8-70

Reinstall the piano cabinet parts in the order listed below (this is the reverse of the order in which they were removed):

1. Key Blocks
2. Fall Strip
3. Fallboard
4. Music Shelf Drop
5. Music Shelf
6. Lid Drop
7. Lid

See FIGURE 1-10 on page 5 for parts identification.

STEP 8-71

Lift the Lid of the piano and affix the CAUTION Label (PN 100-02C164-1) on the TOP of the Pin Block at the center of the piano as shown in FIGURE 8-33.

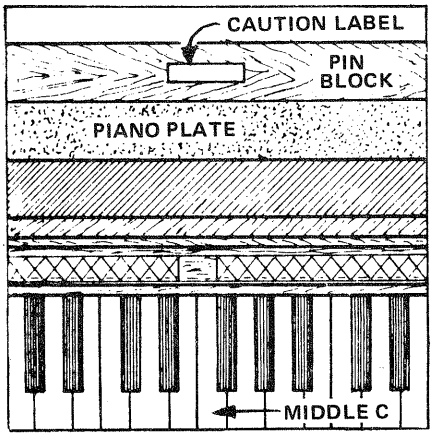


FIGURE 8-33 CAUTION Label location.

STEP 8-72

Get the Identification Plate (PN 896-3028-000) place it against the Key Slip centered over the Tape Recorder as shown in FIGURE 8-34. Mark the Key Slip with an awl at the centers of the plate's screw holes. Set the Plate and awl aside.

STEP 8-73

Insert a #54 drill bit in your drill, wrap a piece of tape around it 1/4" from its tip, and drill 1/4" into the Key Slip at each awl mark. Mount the Plate to the Key Slip with two (2) 3/32" Round Hd. Slotted Screws. See FIGURE 8-34.

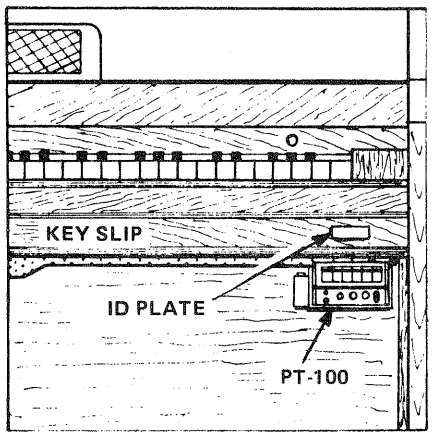


FIGURE 8-34 Identification Plate location.

STEP 8-74

Make sure that the P-100 Owner's Manual (PN 199-1407-000), the Prerecorded Tape Kit (PN RP-213), and the Document Kit are included with the PIANOCORDER system and prepare the piano for shipment.

9. TEST AND ALIGNMENT PROCEDURES

This Section details the procedures for testing and alignment of the PIANOCORDER reproducing systems. Should you encounter any malfunctions during these procedures, refer to Section 10, TROUBLE ANALYSIS, locate the symptom most like the trouble encountered, and follow the Steps under the heading, SOLUTION, to the right of the symptom.

TOOLS AND TEST EQUIPMENT REQUIRED	
1 ea. GROUND FAULT CIRCUIT INTERRUPTER (supplied with Maintenance Kit)	
1 ea. PIANOCORDER Alignment Test Tape ---------- T 426	
1 ea. Superscope Blank Cassette Tape HF-62 (or equivalent)	
1 ea. PIANOCORDER Maintenance Kit ---------- PN 100-0104-81	
1 ea. High Voltage Circuit Tester (supplied with Maintenance Kit)	
1 ea. PIANOCORDER Test Box (supplied with Maintenance Kit)	
1 ea. Slip Joint Pliers	1 ea. 3/4" Open-end Wrench
1 ea. Soldering Tool	1 ea. 7/16" Open-end Wrench
1 ea. Jeweler's Screwdriver	1 ea. 5/16" Nutdriver
1 ea. Phillips Screwdriver #2 pt.	1 ea. 1/4" Nutdriver
1 ea. 1/4" Common Screwdriver	1 ea. 4' x 6' Rubber Mat
1 ea. 1/8" Common Screwdriver	1 pr. Rubber Gloves

NOTE:

When performing Test and Alignment procedures on pianos with the system previously installed, make sure the Power Switch is OFF, unplug the Power Cord, and WAIT 1 MINUTE BEFORE attempting any service.

CAUTION:

UNLESS OTHERWISE SPECIFIED IN THESE PROCEDURES, ALWAYS TURN THE POWER SWITCH OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE ATTEMPTING THE WORK.

REMOVE ALL JEWELRY, such as watches, rings, and pendants, BEFORE BEGINNING THESE PROCEDURES.

DO NOT APPLY POWER TO THE SYSTEM UNTIL IT IS REQUIRED IN THESE PROCEDURES.

STEP 9-1

Put on the rubber gloves and place the rubber mat on the floor in front of the piano.

STEP 9-2

If necessary, remove the Lower Frame from the piano. SEE THE NOTE ABOVE.

STEP 9-3

Plug the Power Cord into the Ground Fault Circuit Interrupter.

STEP 9-4

Depress the button on the Safety Interlock Switch, then release it to make sure the switch isn't sticking and that it is OFF.

STEP 9-5

Check the wiring in the piano to make sure none of the wires are touching the Heat Sink on the Power Supply or any of the Solenoids (Pedal or Key). Make sure, too, that wires aren't touching the strings or positioned so that they may be pinched in the Pedal Trapwork or by other moving parts.

STEP 9-6

Swing out the PT-100 Recorder until the Bracket Rotation stops and holds the Recorder in the position shown in FIGURE 9-1 below.

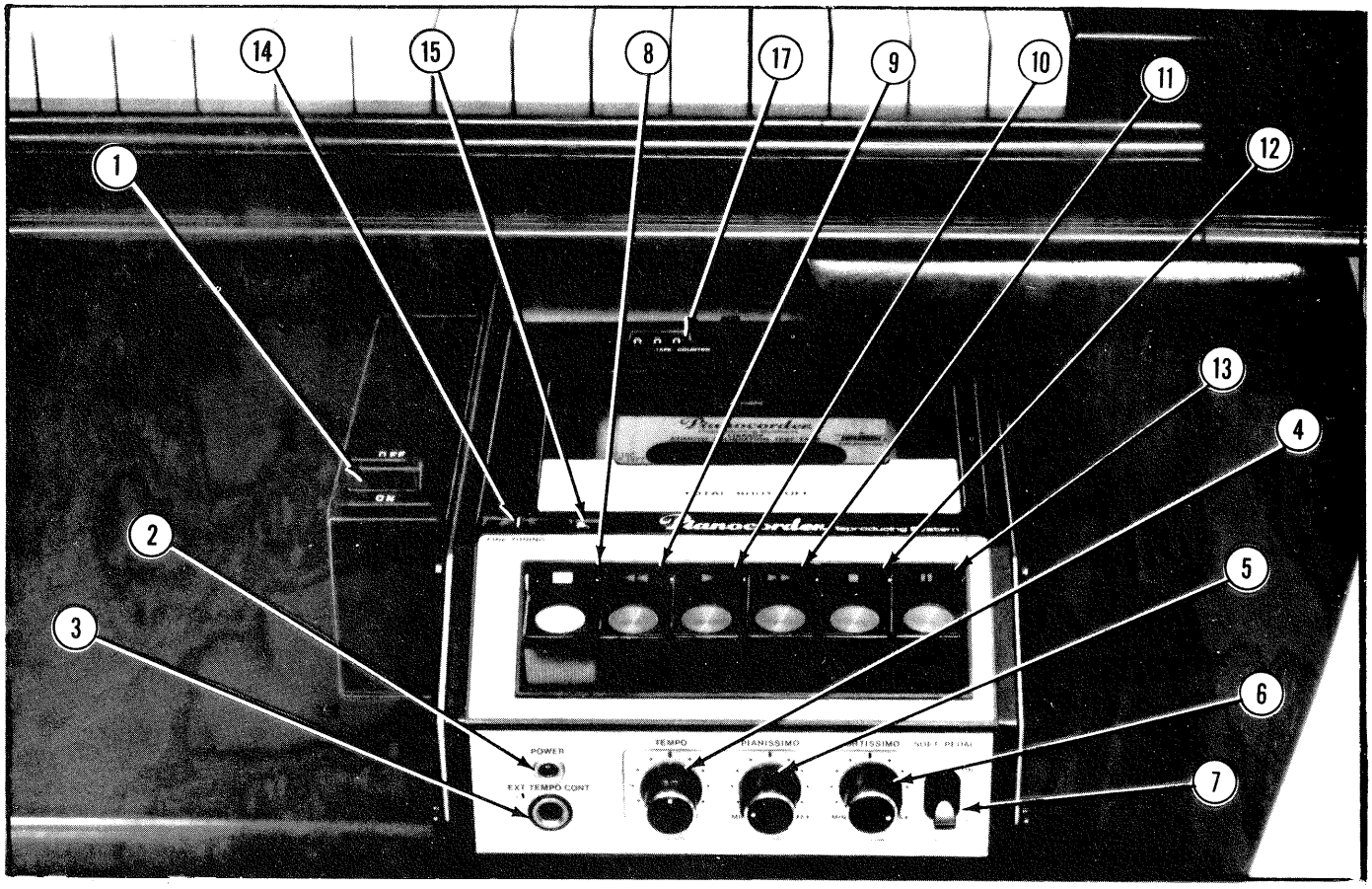


FIGURE 9-1 Control locations and settings.

STEP 9-7

Refer to FIGURE 9-1 above and familiarize yourself with the Controls and their locations. The Reference Symbols in the Figure correspond to those used in the following text. SET THE CONTROLS AS FOLLOWS:

(1) POWER Switch ---------- OFF
(4) TEMPO Control---------- Normal (12 o'clock - at detent)
(5) PIANISSIMO Control ---------- Normal (9 o'clock)
(6) FORTISSIMO Control ---------- Normal (9 o'clock)

(continued next page)

STEP 9-7 (cont'd)

(7) SOFT PEDAL Switch ---------- OFF (down)
(14) FINE TUNING Control ---------- Normal (white line centered)
ALL Pushbuttons ((8) through (13)) ---------- OFF (up)

STEP 9-8

Disconnect Cable #4 (RED & BLK) from Connector J2 on the Power Supply. Get the High Voltage Circuit Tester, connect the male plug of the tester to Cable #4 and the female plug on Connector J2 on the Power Supply as shown in FIGURE 9-2.

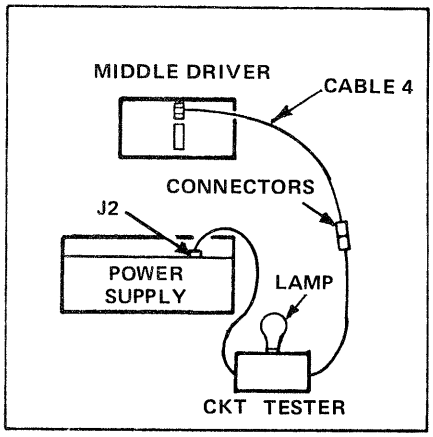


FIGURE 9-2 High Voltage Circuit Tester connections.

STEP 9-9

Plug the Ground Fault Circuit Interrupter into a 120V AC, 50/60 Hz, 15 Amp wall socket.

STEP 9-10

Pull the button on the Interlock Switch all the way out (LOCKED ON).

NOTE:

The Reference Symbols (circled numbers) used in the following Steps correspond to those shown in FIGURE 9-1. If necessary, refer back to FIGURE 9-1 on page 113 for the location of the Control denoted in the following text.

STEP 9-11

Depress the (1) Power Switch to turn it "ON" and observe that the following conditions are met:

A. The lamp on the High Voltage Tester is OUT.

B. The (2) POWER Lamp on the front of the Recorder is ON.

C. The (15) FINE TUNING Lamp on the top of the Recorder is ON.

See the NOTES below.

NOTES:

1. If the Ground Fault Circuit Interrupter activates and removes power or the lamp on the High Voltage Circuit Tester lights, TURN THE (1) POWER SWITCH OFF IMMEDIATELY AND UNPLUG THE POWER CORD. A malfunction is present in the primary (120V AC) power lines or the high voltage circuit. Refer to Section 12, TROUBLE ANALYSIS, for repair of the trouble.

2. If the (2) POWER Lamp is OUT but the (15) FINE TUNING Lamp is ON, a malfunction is present in the 12V DC power supply or associated circuitry. Refer to Section 12 for repairs.

3. If the (15) FINE TUNING Lamp is OUT but the (2) POWER Lamp is ON, there is trouble in the 5V DC power supply or associated circuitry. Refer to Section 12 for repairs.

NOTES (cont'd)

4. If repairs were necessary, repeat STEPS 9-1 through 9-11 BEFORE proceeding to STEP 9-12.

STEP 9-12

Turn the (1) POWER Switch OFF, depress the button on the Interlock Switch to turn it OFF, and WAIT 1 MINUTE before going to the next Step.

STEP 9-13

Disconnect the cord from the High Voltage Circuit Tester at Connector J2 on the Power Supply, disconnect the cord from the Circuit Tester to Cable #4 (RED & BLK), then connect Cable #4 to Connector J6 on the Power Supply and set the Circuit Tester aside.

STEP 9-14

Pull the button on the Interlock Switch all the way OUT to turn it ON and turn the (1) POWER Switch ON.

STEP 9-15

Depress the (12) STOP/EJECT Pushbutton on the Recorder to open the cassette lid, then insert the PIANOCORDER Alignment Test Tape T 426 into the Recorder (Side A up) and make sure the cassette seats properly in the cassette compartment.

STEP 9-16

Depress the (9) REW Pushbutton to rewind the tape to the beginning (the Recorder will shut off automatically when the tape is fully rewound). This will ensure that the tape begins at the start of Test Program 1.

STEP 9-17

Depress the (17) TAPE COUNTER Reset Button to reset the Tape Counter (the reading in the counter window should be "000"). Doing this will permit you to find the beginning of a specific Test Program, if you log the counter readings as each program begins.

NOTE

Test Program 1, which you will use in STEPS 9-18 through 9-22, checks the operation of each individual Key Solenoid and its associated circuitry by signaling the Solenoid to strike its piano key five times in succession.

STEP 9-18

Depress the (10) PLAY Pushbutton to begin Test Program 1. Make sure the tape is running properly, if not, refer to Section 12 for repairs.

STEP 9-19

Observe that the (15) FINE TUNING Lamp goes OUT as or slightly BEFORE Program 1 begins. If the Lamp does NOT go out or blinks, perform the procedures detailed on the next page.

STEP 9-19 (cont'd)

A. Turn the (14) FINE TUNING Control Clockwise until the lamp goes OUT. If it doesn't go out, turn the Control COUNTER-clockwise until it does, then proceed to Point B. If the Lamp does not go out with adjustment of the control, proceed to Point C on the next page.

B. Reset the knob on the Control so that the white line on the knob is centered in the window, then do the following:

1. Insert a jeweler's screwdriver through the hole in the Recorder case (see FIGURE 9-3) and into the screw head at the bottom of the hole.

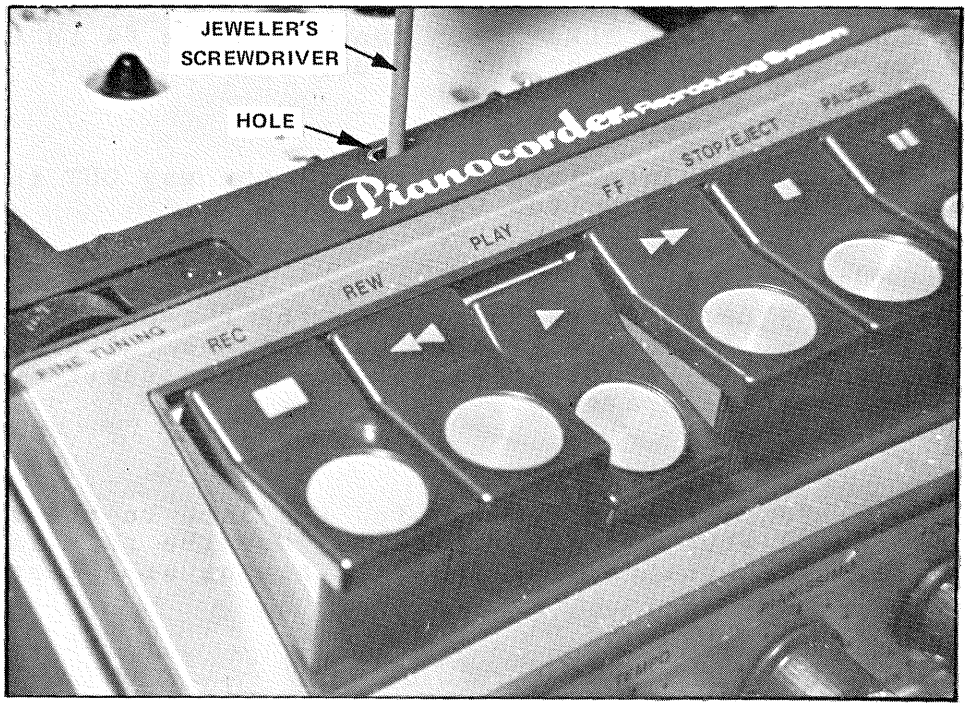


FIGURE 9-3 Insert the screwdriver through the hole in the Recorder case.

2. Turn the azimuth screw clockwise several turns until the lamp goes OUT. If it doesn't go out, turn the screw COUNTER-clockwise until it does.

3. Continue turning the azimuth screw past the point the lamp went out until it begins flashing again. As you turn the screw, count the number of turns between the point the lamp went out and the point it begins flashing again.

4. Turn the azimuth screw IN THE OTHER DIRECTION HALF the number of turns you counted. This sets the azimuth of the Recorder's tape head for proper tape tracking.

5. Stop the tape and remove it from the Recorder by depressing the 12 STOP/EJECT Pushbutton. Apply a SMALL drop of clear nail polish to the base of the azimuth screw's head (the polish locks the screw in place), then reinsert the tape, rewind it by depressing the (9) REW Button, and repeat STEPS 9-18 and 9-19 before proceeding to STEP 9-20.

STEP 9-19 (cont'd)

C. Stop and remove the tape by depressing the (12) STOP/EJECT Pushbutton. Reset the (14) FINE TUNING Control so that the white line on the knob is centered in the window. Insert a standard PIANOCORDER music tape from the tape library supplied with the system in the Recorder and repeat STEPS 9-18 and 9-19. If the (15) FINE TUNING Lamp goes out, the Alignment Test Tape is defective and must be replaced. Return the defective tape to Superscope for replacement. If the Lamp DOES NOT go out or blinks, the 3/4 Bit and/or Range Controls must be adjusted. Since these Controls interact, it will be necessary to alternate back and forth between them in order to adjust tempo range properly. To adjust the 3/4 Bit and Range Controls, do the following:

1. Stop the music tape, remove it, and insert a good Alignment Test Tape in the Recorder.

2. Press the (9) REW Button and fully rewind the tape (the Recorder will shut off automatically when the tape is fully rewound).

CAUTION:

SINCE THE FOLLOWING ALIGNMENTS ARE DONE WHILE THE SYSTEM IS ON, YOU MUST OBSERVE PROPER SAFETY PROCEDURES. WEAR THE RUBBER GLOVES, KEEP YOURSELF TOTALLY ON THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

3. Push the (10) PLAY Pushbutton to start the tape. As Program 1 plays, adjust the 3/4 Bit Control (screwdriver adjustment - see FIGURE 9-4) by turning it SLIGHTLY clockwise or counterclockwise until the (15) FINE TUNING Lamp goes OUT. If the Lamp does NOT go out, turn the Range Control SLIGHTLY clockwise or counterclockwise until it does. See the NOTE below.

NOTE:

It may be necessary to alternately adjust the 3/4 Bit and Range Controls a few times to achieve the optimum setting of the Controls.

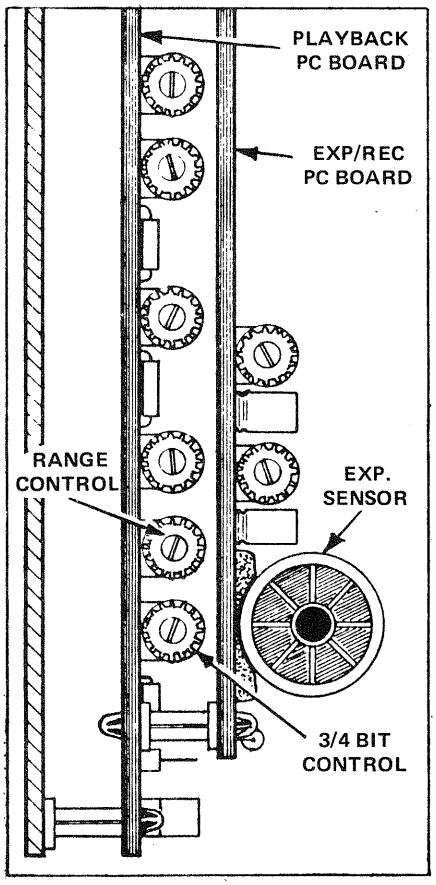


FIGURE 9-4 3/4 Bit and Range Control locations.

4. Turn the (4) TEMPO Control on the Recorder through its ENTIRE range from S (slow) to F (fast) and observe the (15) FINE TUNING Lamp. If the Lamp lights or flashes in the range of the (4) TEMPO Control, leave the Control at the setting at which the Lamp is lit or flashes and adjust the Range Control (see FIGURE 9-4 above) SLIGHTLY clockwise or counterclockwise until the (15) FINE TUNING Lamp goes OUT. If the Lamp does not go out when the Range Control is adjusted, rotate the 3/4 Bit Control SLIGHTLY clockwise or counterclockwise until it does. See the NOTE above.

STEP 9-19 C (cont'd)

5. After locating the point at which the (15) FINE TUNING Lamp extinguishes, continue turning each Control 1/8 turn past the point the Lamp went out.

6. Repeat procedures 4 and 5 to verify that the Lamp remains OUT throughout the entire range of the (4) TEMPO Control. See the NOTE below.

NOTE:

If, after these procedures have been tried, you cannot make the Lamp go out, refer to Section 10, TROUBLE ANALYSIS, for system repairs procedures.

7. Stop the Alignment Test Tape, remove it, and insert a standard PIANOCORDER music tape in the Recorder. Press the (10) PLAY Button and play one side of the cassette.

8. As the tape is playing, observe the (15) FINE TUNING Lamp and make sure that it stays OUT during each selection (the Lamp should light between selections and when the tape is stopped). If the Lamp lights up or blinks during a selection or lights up at the end of a selection and does NOT go out when the next selection starts, the 3/4 Bit and/or Range Controls should be adjusted SLIGHTLY until the lamp goes OUT. See the NOTE below.

NOTE:

If the Lamp does NOT go out after adjustment of the Controls, stop the tape, remove it, and try another tape in the Recorder. If the Lamp still does not go out, refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

9. After checking the system with the music tape, remove the tape from the Recorder, insert the Alignment Test Tape in the Recorder, press the (9) REW Button, and allow the tape to fully rewind (the Recorder will shut off automatically when the tape is rewound completely).

10. Push the reset button on the (17) TAPE COUNTER so the reading in the Counter window is "000".

11. Read STEP 9-20 and its related NOTES thoroughly, then press the (10) PLAY button and perform the Step.

STEP 9-20

During Test Program 1, all notes repeating (medium expression), watch the operation of the Key Solenoids and the piano mechanism. Each piano key will be struck five (5) times in succession. Look to see that the Hammer Butt of the key being played DOES NOT bounce on the Jack and listen for dampening of the strings as they are struck. Observe the operation of each Key Solenoid to make sure its plunger is moving freely. See the NOTES below and on the next page.

NOTE:

1. Allow Program 1 to run through COMPLETELY. This will permit you to determine if any malfunctions are present, if they are mechanical or electrical in nature, and if the trouble is limited to individual solenoids or related to the alignment of the Solenoid Rail, itself.

NOTES (cont'd):

2. Place a small piece of masking tape on any keys which may not be operating correctly and mark the tape with an "A", if the trouble appears to be alignment, or with an "E", if the trouble appears to be electrical in nature.

3. No adjustments to the individual Key Solenoids will be made at this time since you must first check the overall alignment of the Solenoid Rail (checked by Programs 2, 3, and 4) to make sure it is correct.

STEP 9-21

When Program 1 is finished, depress the (12) STOP/EJECT Button to stop the tape. Note the reading in the counter window and write it down on a piece of paper (this is the counter reading for the beginning of Test Program 2, Notes held for height adjustment). See the NOTE.

NOTE:

The (15) FINE TUNING Lamp will light when any program ends or when the tape is stopped.

STEP 9-22

If no malfunctions were present, proceed to the next Step. If electrical troubles were present, refer to Section 10, TROUBLE ANALYSIS, for their repair, then repeat all Steps in this Section up to this point before proceeding to STEP 9-23. Remove the bits of tape labeled with an "E" after repairs are completed. See the CAUTION below.

CAUTION:

UNLESS OTHERWISE SPECIFIED, TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE ATTEMPTING SOLENOID ALIGNMENT OR ELECTRICAL REPAIRS.

NOTE:

Test Programs 2, 3, and 4 are similar, except that each checks different areas of the keyboard. During each program, a group of keys are struck and held to allow you to see that all keys played in each group are raised to the same height by their respective Key Solenoids or if any or all Key Solenoids must be adjusted so they operate uniformly. This allows you to determine if alignments to individual Solenoids or to the Solenoid Rail, itself, are necessary.

Test Program 2 checks Key Solenoid operation in the Bass and Treble sections of the keyboard at one time. This test is especially useful to determine if the Solenoid Rail is aligned correctly. Test Program 3 checks Solenoid operation in the Bass Section only, while Program 4 checks it in the Treble section.

STEP 9-23

Push the (10) PLAY Pushbutton and play Program 2, 3, and 4.

STEP 9-24

During each program, listen for damping of notes and watch for keys lifting from the Balance Rail (conditions caused by Solenoid plungers rising too high) and for Hammer Butts bouncing on the Jacks (a condition caused by Solenoid plungers, which are not lifting the keys high enough). See the NOTE below.

NOTE:

You will also notice a humming noise coming from the Key Solenoids as they operate. If the humming is VERY LOUD, the Solenoids are lifting the keys too high. This means that the Solenoid Rail is too high and must be lowered. Be advised that some humming of the Solenoids as they operate is normal and will NOT be audible when the Lower Frame is installed, but, when the hum is very loud, alignment of the Rail is necessary.

STEP 9-25

At the conclusion of Program 4, stop the cassette by depressing the (12) STOP/EJECT Button. Note the reading in the Tape Counter window and write the reading on the piece of paper for later reference (this is the reading for the beginning of Test Program 5).

STEP 9-26

Refer to the Program 2 Counter reading written on the slip of paper, press the (9) REW Button, allow the tape to rewind, then push the (12) STOP/EJECT Button when the Counter reading is reached.

NOTE:

If alignment of the Rail height is necessary to correct either of the conditions stated in STEP 9-24, proceed to the next Step. If neither of these conditions is apparent, do STEPS 9-27 through 9-30, then proceed to STEP 9-34.

STEP 9-27

Turn the (1) POWER and Interlock Switches OFF, unplug the Power Cord from the Circuit Interrupter, and WAIT 1 MINUTE BEFORE PROCEEDING.

STEP 9-28

Attach a Rail Support Jack near each end of the Solenoid Rail. Secure the Jacks to the Rail with the Wing Screws (see FIGURE 9-5). See the CAUTION on the next page.

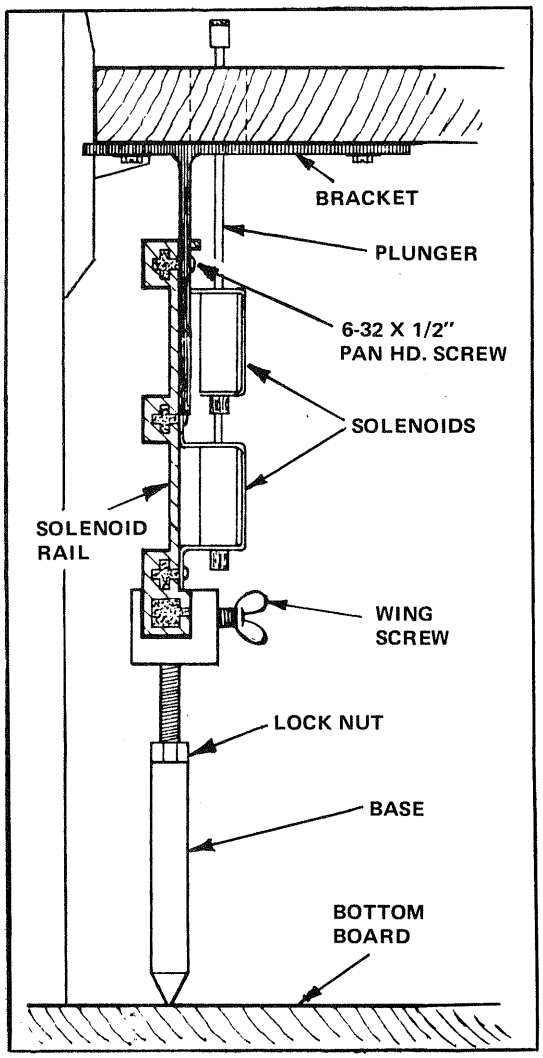


FIGURE 9-5 Support Jack installation and parts identification.

CAUTION:

WHEN INSTALLING THE SUPPORT JACKS, MAKE SURE YOU DO NOT PINCH ANY OF THE WIRING AND THAT THE JACKS ARE NOT IN CONTACT WITH ANY OTHER SYSTEM PARTS.

STEP 9-29

Loosen the 6-32 x 1/2" Pan Hd. Screws holding the Rail to the Rail Brackets (see FIGURE 9-5 on the previous page).

STEP 9-30

Plug the Power Cord into the Circuit Interrupter, then turn the Interlock and (1) POWER Switches ON. See the CAUTION and NOTE below.

CAUTION:

SINCE YOU WILL BE WORKING ON THE SYSTEM WHILE IT IS ON, YOU MUST OBSERVE PROPER SAFETY PROCEDURES. WEAR THE RUBBER GLOVES, KEEP YOURSELF TOTALLY ON THE RUBBER MAT AS YOU WORK, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

NOTE:

The following alignments are VERY critical and MUST be correct for optimum performance of the PIANOCORDER system. If the piano is improperly regulated, you may find that uniform operation is impossible. If the piano is out of regulation, YOU MUST REGULATE IT to ensure uniform operation of all keys BEFORE attempting these system alignments.

STEP 9-31

Depress the (10) PLAY Button and, when the piano begins playing, adjust the Rail height in the following manner:

A. If a majority of the Solenoids hum LOUDLY and/or a majority of the Hammers damp the Strings of the Keys being played at either or both ends of the Keybed, the Solenoid Rail is too HIGH, where these conditions exist, and must be LOWERED. To lower the Rail, SLOWLY turn the base(s) of the Support Jack(s) CLOCKWISE until the problem is corrected.

B. If a majority of the Hammer Butts bounce on the jacks of the Keys being played at either or both ends of the Keybed, the Solenoid Rail is too LOW, where this condition exists, and must be RAISED. To raise the Rail, SLOWLY turn the base(s) of the Support Jack(s) COUNTERclockwise until the problem is corrected.

C. If a combination of the troubles stated in Points A and B above is present, the Rail is low on one end and high on the other. To remove the trouble, follow the procedures detailed in Points A and B, as applicable, to correct the troubles.

STEP 9-32

Depress the (12) STOP/EJECT Button to stop the tape, refer to the counter reading for Program 2 on the piece of paper, press the (9) REW Button and allow the tape to rewind, then press the (12) STOP/EJECT Button when the counter reading is reached.

STEP 9-33

Tighten the 6-32 x 1/2" Pan Hd. Screws until they are snug.

STEP 9-34

Manually depress and hold down a group of keys in the Bass and Treble sections of the Keyboard. As the Keys are held down in each section, observe the position of the Hammers in relation to the Strings after the Backchecks have caught the Catchers. (When the Keys are played by the PIANOCORDER system, the Hammers must stop in the same position as when the piano is played manually.)

STEP 9-35

Push down the (10) PLAY Button and observe the positions of the Hammers as the Keys are played after the Backchecks have caught the Catchers and determine the following:

A. If the Hammers are CLOSER to the Strings than when the piano was played manually, the Solenoid Rail is too HIGH and must be lowered slightly.

B. If the Hammers are FARTHER from the Strings than when the piano was played manually, the Rail is too LOW and must be raised slightly.

Loosen the 6-32 x 1/2" Pan Hd. Screws and adjust the Rail height, if necessary by following the same procedures detailed in STEP 9-31, Points A through C, as applicable.

STEP 9-36

Stop the tape, rewind it to the beginning of Program 2, then turn the (1) POWER and Interlock Switches OFF, unplug the Power Cord, and WAIT 1 MINUTE BEFORE proceeding to the next Step.

STEP 9-37

Tighten the two 6-32 x 1/2" Pan Hd. Screws holding the Solenoid Rail to the Rail Brackets.

STEP 9-38

Loosen the Wing Screws on the Support Jacks and remove the Jacks from the piano.

NOTE:

The following procedures require two people to perform them, therefore, you will need the assistance of another person to help you do them.

STEP 9-39

Starting at Key 5 and working through Key 84, perform the procedures detailed on the next page.

STEP 9-39 (cont'd)

A. Compress the tabs on the Spring Clip with a pair of slip-joint pliers as shown in FIGURE 9-6. Keep the Spring Clip tabs compressed (loose on the plunger shaft) and push up on the slug at the bottom of the plunger shaft (see FIGURE 9-7) until the bottom of the slug is flush with the bottom of the Solenoid frame.

B. Remove your finger from the bottom of the slug but keep the Spring Clip tabs compressed.

C. Have your assistant push down FIRMLY on the back of the Key directly over the plunger shaft. He should use a nutdriver to do this and press hard enough to compress the Back Rail Cloth.

D. When your assistant has pushed the Key down fully, remove the pliers from the Spring Clip, then your helper can release the Key.

E. Depress the front of the Key, then SLOWLY release it and make sure that the Jack flips back under the Hammer Butt without binding on the Hammer Butt Buckskin. If the Jack hangs up on the Hammer Butt Buckskin, the Solenoid plunger is still too high and you will have to repeat procedures A through E to correct the trouble.

F. Repeat the procedures detailed in Points A through F at each successive Key until all Solenoids are properly aligned.

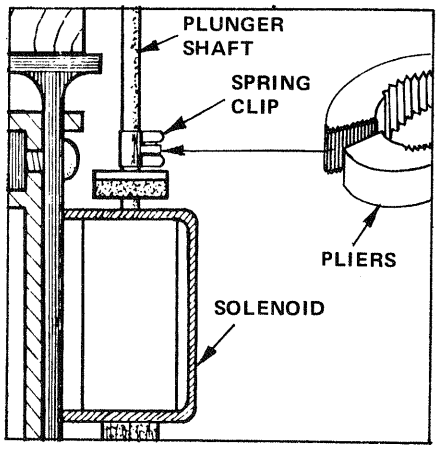


FIGURE 9-6 Grip the tabs with the pliers.

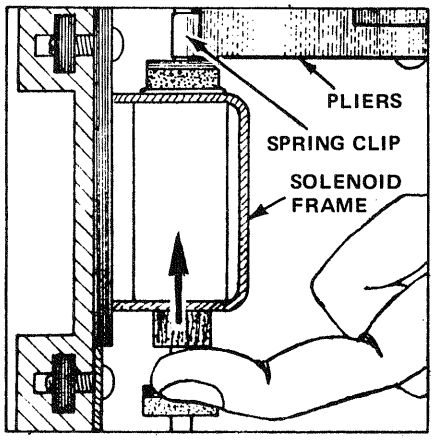


FIGURE 9-7 Push up on the plunger slug.

STEP 9-40

Remove the PIANOCORDER Alignment Test Tape from the PT-100 Recorder by depressing the (12) STOP/EJECT Pushbutton, insert a music tape from the PIANOCORDER music library in the Recorder, and depress the (10) PLAY Button.

STEP 9-41

Listen to the performance of the piano and observe the operation of the piano Action and the Key Solenoids to determine if further adjustments are necessary.

STEP 9-42

Stop the tape, refer to the Program 2 Tape Counter reading on the slip of paper, rewind the tape by pushing the (9) REW Button down, then depress the (12) STOP/EJECT Button when the counter reading is reached and remove the music tape from the Recorder.

STEP 9-43

Insert the PIANOCORDER Alignment Test Tape (with the same side up that you used to this point), press the (10) PLAY Pushbutton, and listen to the piano to verify that it is operating correctly or perform any further alignments that may be necessary by following all the procedures detailed in STEPS 9-23 through this Step.

STEP 9-44

At the completion of Test Program 4, when all alignments are finished and the piano is performing properly, depress the (12) STOP/EJECT Button, turn the (1) POWER and Interlock Switches OFF, unplug the Power Cord, and WAIT 1 MINUTE BEFORE proceeding to the next Step.

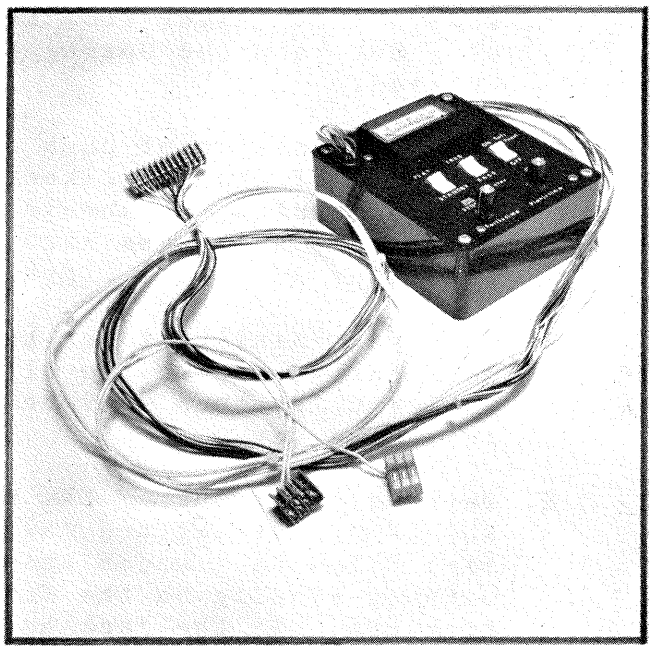


FIGURE 9-8 PIANOCORDER Test Box.

STEP 9-45

Get the PIANOCORDER Test Box (supplied with your Maintenance Kit). See FIGURE 9-8.

STEP 9-46

Connect the 3 pin Plug to the Test points, TP1 and TP2 (wire to TP2), and the 4 pin Plug to Test Points, TP5, TP3, and TP7 (wires to TP3 and TP7). The 4 pin Plug is keyed to fit only one way. See FIGURE 9-9. See the CAUTION below.

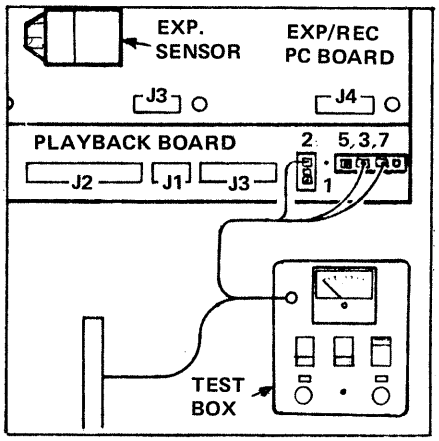


FIGURE 9-9 Test Box connection.

CAUTION:

WHEN CONNECTING THE PLUGS ON THE TEST POINTS, SUPPORT THE PLAYBACK BOARD TO AVOID PLACING EXCESSIVE STRESS ON IT WHICH COULD CAUSE IT TO CRACK.

NOTE:

Test Program 5, Bass expression test, is used to calibrate the meter on the Test Box. This meter visually displays the expression level during the program to indicate to you that the expression circuit is or is not funcing properly.

CAUTION:

DO NOT TURN THE SYSTEM ON UNTIL INSTRUCTED TO DO SO BY THESE PROCEDURES.

STEP 9-47

To calibrate the Test Box meter, perform the following procedures:

A. Make sure the LARGE connector on the Test Box cable is out of the way OUTSIDE the piano cabinet.

B. Set the METER - TREB/BASS Switch (see FIGURE 9-10) to the BASS position.

C. Set the PIANISSIMO Control to position 2 and the FORTISSIMO Control to position 8 as shown in FIGURE 9-10.

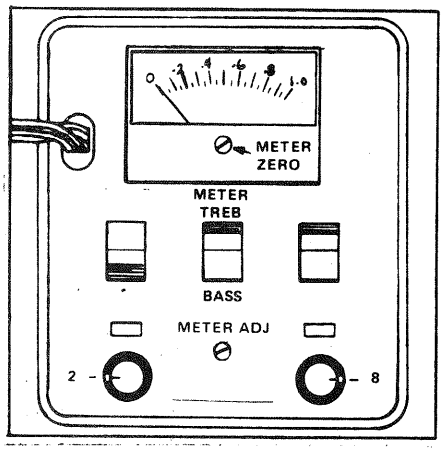


FIGURE 9-10 Test Box settings for meter calibration.

D. If the meter pointer is not resting on the zero mark, adjust it so it does by turning the Meter Zero screw (see FIGURE 9-10) with a common screwdriver.

NOTE:

During Test Program 5, Bass expression test, a chord in the bass section will be played seventeen times at levels varying from pianissimo to fortissimo to pianissimo. To calibrate the meter, the sixteenth (fortissimo) level will be used. Count each level as the tape plays to locate the level sixteen. If you lose count, listen for a sudden drop in the level from fortissimo to pianissimo (this point is at the end of level sixteen and the beginning of level seventeen), then stop and rewind the tape to the start of level sixteen.

E. Plug the Power Cord into the Circuit Interrupter, turn the Interlock and (1) POWER Switches ON, depress the (10) PLAY Button and allow the tape to play to the beginning of level sixteen, then adjust the METER ADJ screw on the front of the Test Box so that the meter pointer rests on the last (1.0) mark at the right of the meter face. This completes the meter calibration.

F. Stop the tape, rewind it to the beginning of level sixteen, and replay level sixteen to verify that the meter reads 1.0 (full scale) during level sixteen.

G. Stop the tape, refer to the Program 5 reading on the slip of paper, and rewind the tape to the beginning of Program 5.

NOTE:

The meter operates ONLY during the Play Mode when the tape is running - at all other times the display is random and can be disregarded.

STEP 9-48

Depress the (10) PLAY Button, listen to the expression of the chord being played, and monitor the Test Box meter readings to verify that the expression circuit is operating properly (the meter readings increases from a reading of approximately .4 - .5 at level 1 up to 1.0 at level sixteen, then drops to a reading of approximately .4 - .5 at level seventeen).

STEP 9-49

At the end of Program 5, flip the METER - TREB/BASS Switch to the TREB position as shown in FIGURE 9-11. Monitor Test Program 6, Treble expression test, in the same way as you did for Program 5. The meter indications will be the same as those during Program 5.

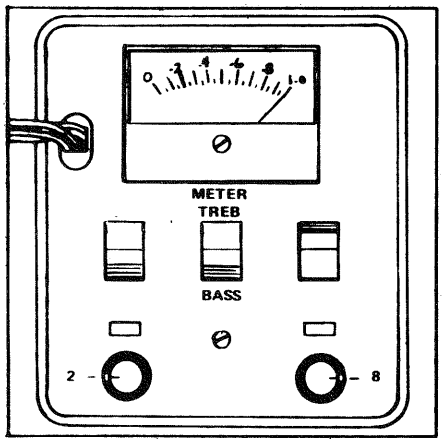


FIGURE 9-11 Test Box setting for Program 6.

STEP 9-50

At the end of Program 6, stop the tape, note the reading in the counter window, and write it on the slip of paper (this is the reading for the start of Test Program 7).

STEP 9-51

Set the PT-100 Tape Recorder Controls as follows:

(4) TEMPO CONTROL ---------- Normal (12 o'clock - at detent)
(5) PIANISSIMO Control ---------- MIN. (fully COUNTERclockwise)
(6) FORTISSIMO Control ---------- MIN. (fully COUNTERclockwise)
(7) SOFT PEDAL Switch ---------- OFF (down)

STEP 9-52

Set the Test Box Controls as follows (see FIGURE 9-12):

MODE - PLAY/STANDBY Switch to STANDBY

METER - TREB/BASS Switch to BASS

SOFT PEDAL - ON/OFF Switch to OFF

PIANISSIMO and FORTISSIMO Controls as set previously.

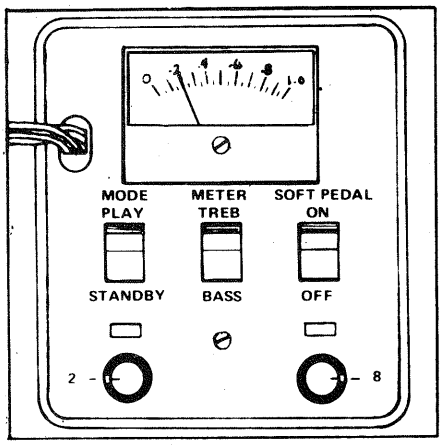


FIGURE 9-12 Test Box settings for Program 7.

NOTE:

Test Program 7 is used to adjust the minimum expression settings for BOTH the Bass (through Middle C) and Treble (Middle C# through Key 84) sections of the piano. During this Program, each Key will be struck five (5) times in succession and should sound at the minimum sound level. Allow the Program to run through COMPLETELY before attempting any alignments. This will give you an overall idea of how the piano is performing as it is played pianissimo and also give you an idea of the sound level balance between the Bass and the Treble sections of the Keyboard. As the Program plays, listen as each Key is struck. The Key should sound at minimum level and each strike should be definite.

STEP 9-53

Depress the (10) PLAY Pushbutton and allow Program 7 to play through completely. As each Key is struck, listen to verify that it is played at the minimum sound level and that each strike is CLEARLY defined.

STEP 9-54

At the conclusion of the Program, press the (12) STOP/EJECT Push-button to stop the tape, refer to the Program 7 reading on the slip of paper, and rewind the tape to the beginning of Program 7.

STEP 9-55

Push the (10) PLAY Button and replay Program 7. Adjust the Bass Level and Treble Level Controls on the Playback PC Board (see FIGURE 9-13) so each note is played as SOFTLY as possible yet provide a definite strike as the Key is played the five (5) times in succession. See the CAUTION below.

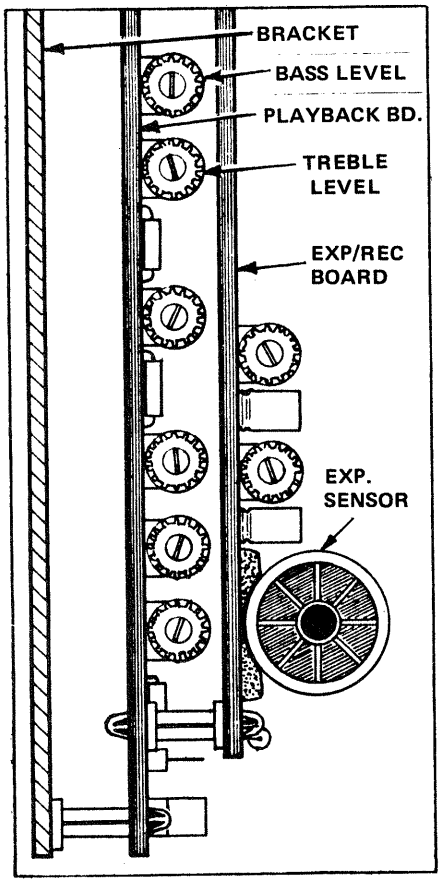


FIGURE 9-13 Playback Board Controls.

CAUTION:

SINCE YOU WILL BE WORKING ON THE SYSTEM WHEN IT IS ON, YOU MUST OBSERVE PROPER SAFETY PROCEDURES. WEAR THE RUBBER GLOVES, STAY TOTALLY ON THE RUBBER MAT AS YOU WORK, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

NOTE:

If you find that you cannot adjust the system to play correctly, stop the tape and refer to Section 10, TROUBLE ANALYSIS, for repair procedures.

During Program 7, monitor the meter readings as each note is played. The meter should indicate a reading of approximately .4 - .5 on the scale for most pianos - this is only an average reading for comparison purposes and may differ slightly on some pianos. In any case, the meter readings should NOT vary greatly during Program 7 on any one piano.

STEP 9-56

After all adjustments and repairs (if any were necessary) are completed, rewind the tape to the start of Program 7 and play it again to verify that the system is operating properly.

STEP 9-57

At the conclusion of Program 7, stop the tape, note the reading in the TAPE COUNTER window, and write it on the slip of paper (this is the reading for the beginning of Program 8).

NOTE:

Test Program 8, Note crossing key break for balance adjustment (minimum expression), is used to check the sound level balance at minimum expression between the Bass and Treble sections of the Keyboard. If necessary you will have to adjust the Bass and/or Treble Level Controls on the Playback Board so that each section is played as SOFTY as possible and neither is played louder than the other.

STEP 9-58

Press the (10) PLAY Pushbutton, listen to the sound level of each section of the Keyboard, and adjust the Bass and/or Treble Level Control on the Playback Board, if necessary, so that both sections play at the same level (are balanced) and as softly as possible without notes dropping out. See the NOTE below.

NOTE:

If adjustment was necessary, rewind the tape to the beginning of Program 8 and replay it to make sure the balance adjustment is correct. If you are unable to adjust the balance, refer to Section 10, TROUBLE ANALYSIS, for repair procedures.

STEP 9-59

After adjustments (if they were necessary) are made and you have rechecked the balance, allow the tape to run to the end of Program 8, then stop the tape, note the reading in the TAPE COUNTER window, and write it on the slip of paper you are keeping for this purpose.

NOTE:

The following procedures are VERY critical to the proper operation of the PIANOCORDER reproducing system. It is extremely important that the piano be properly regulated BEFORE the next procedures are attempted. Check the regulation of the piano. If necessary and if you are qualified to regulate the instrument properly, do so. If not, secure the services of a qualified piano technician to do so.

CAUTION:

TO PREVENT ELECTRIC SHOCK, TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING.

STEP 9-60

Strike and release groups of Keys in several areas of the Keyboard. Listen for notes being sustained after each group of Keys is released (if the notes are sustained, the SUSTAIN Pedal Solenoid Assembly is too long (on Models P-100 and P-100M) or the SUSTAIN Pedal Actuator is too long (on the Model P-200) and must be adjusted). If the notes are NOT being sustained, proceed to Point C. If notes are being sustained, do Point A (on Models P-100 or P-100M) or Point B (on the Model P-200).

A. Loosen the Lock Nut on the Upper Coupler (see FIGURE 9-14), turn the Upper Coupler CLOCKWISE a turn or two, strike and release groups of Keys, and listen for notes being sustained. Repeat this procedure until the notes are no longer sustained, then tighten down the Lock Nut until it is finger tight. In turning the Upper Coupler CLOCKWISE, you are shortening the length of the SUSTAIN Dowel. See the NOTE on the next page.

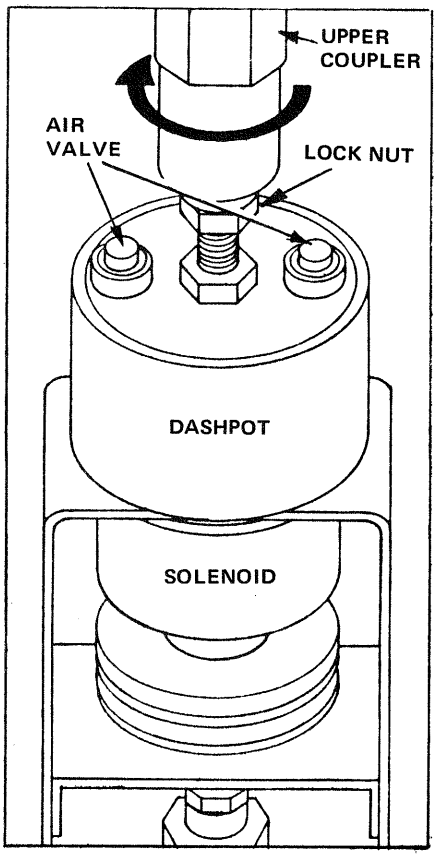


FIGURE 9-14 Pedal Solenoid parts identification.

NOTE:

If you are unable to shorten the Pedal Dowel length enough by adjusting the Upper Coupler, use the procedure detailed in Point A on the previous page to adjust the Lower Coupler (see FIGURE 9-15). After the Dowel length is adjusted, proceed to Point C below.

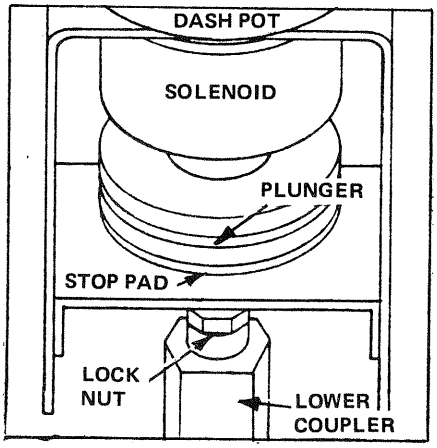


FIGURE 9-15 Lower Coupler adjustment parts.

STEP 9-60 (cont'd)

B. Loosen the Lock Nuts at the top and bottom of the Adjustment Sleeve on the SUSTAIN Pedal Actuator (see FIGURE 9-16), turn the Adjustment Sleeve CLOCKWISE a turn or two, strike and release a group of Keys, and listen for notes being sustained. Repeat this procedure until the notes are no longer being sustained, then tighten the Lock Nuts until they are finger tight. See the NOTE below.

NOTE:

The Lock Nuts will be fully tightened after all other adjustments are made because the Actuator length may have to be readjusted later. Since Points C through E do not apply to the Model P-200, proceed to STEP 9-61 at this time.

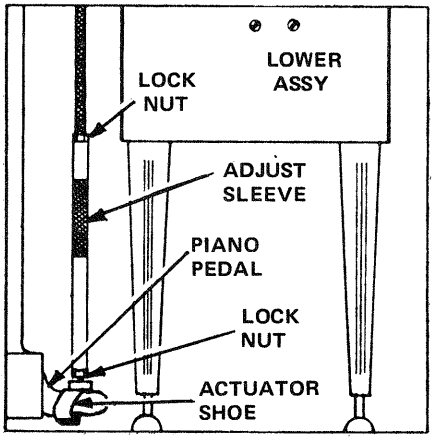


FIGURE 9-16 Pedal Actuator adjustment parts.

C. SLOWLY depress the SUSTAIN Pedal manually and observe the operation of the piano Action. As soon as you start to press down on the Pedal, the Damper Lifter Rod should begin lifting the Dampers from the piano Strings.

D. If the Dampers do not all lift at the same time, the piano is out of regtion and must be regulated. If the Dampers are not lifting or do not lift as soon as you press the SUSTAIN Pedal, lost motion is present and the Pedal Solenoid assembly is too short and must be lengthened. To increase the length of the Solenoid assembly, loosen the Lock Nut under the Upper Coupler, turn the Coupler a turn or to COUNTER-CLOCKWISE, and repeat procedure C above. If necessary, repeat this procedure until the Solenoid assembly operates the piano Action correctly. See the NOTE below.

NOTE:

If you find that the length of the Solenoid assembly cannot be increased enough by adjusting the Upper Coupler, adjust the Lower coupler in the same way as you did the Upper until the Action operates correctly.

E. When the adjustment of the Solenoid assembly length is completed, tighten the Lock Nut(s) on the Coupler(s) until finger tight. (The Solenoid assembly length may have to be readjusted after some of the following alignments, therefore, the Lock Nuts will not be fully tightened until later.

STEP 9-60 (cont'd)

F. Strike and release groups of Keys in several areas of the Keyboard. Listen for notes being sustained after each group of Keys is released. If notes are being sustained, the Solenoid assembly is too long and must be shortened. Repeat Procedure A on page 128.

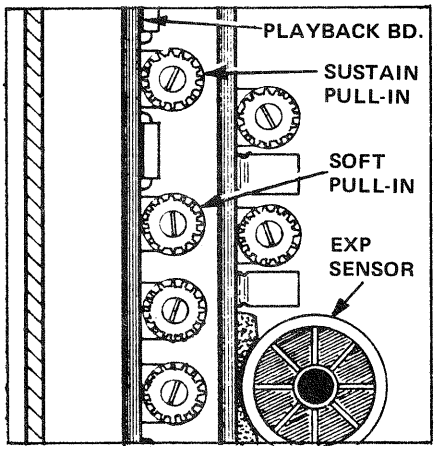


FIGURE 9-17 Pull-in Control locations.

STEP 9-61

Set BOTH the SUSTAIN and SOFT Pull-in Controls on the Playback Board (see FIGURE 9-17) to their maximum positions (fully CLOCKWISE).

STEP 9-62

Plug the Power Cord into the Ground Fault Circuit Interrupter, then turn the Interlock and (1) POWER Switches ON.

NOTE:

Test Program 9, Sustain on/off test, is used to check the operation of the SUSTAIN Pedal Solenoid. During this test you will determine if the Helper Spring in the Pedal Solenoid must be removed, engaged, or replaced with a stronger one and you will also adjust the Pedal Solenoid for proper operation. During Program 9, the SUSTAIN Pedal Solenoid will be actuated five (5) times (no notes will be played) to allow you to observe both the ON and OFF operations of the Solenoid.

STEP 9-63

The following is a list of items you should check as Test Program 9 runs. The items are listed in the order in which they are to be checked so study the list carefully and become familiar with the requirements.

A. Observe that the SUSTAIN L.E.D. (see FIGURE 9-18) on the Power Supply lights, then goes out five times during the Program. If it does not, no signal is coming from the Playback Circuits. Refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

B. If the SUSTAIN L.E.D. is lit on the Power Supply, make sure that the Solenoid is actually working.

C. Check to see that the stroke of the Solenoid is 1/4". Stroke is determined by the travel of the Solenoid plunger as shown in FIGURE 9-19.

D. Check to see that ALL Dampers lift at the SAME TIME and that they are lifted 1/6" from the Strings when the SUSTAIN Solenoid is activated. (This procedure is done to verify that the regulation of the piano is correct.)

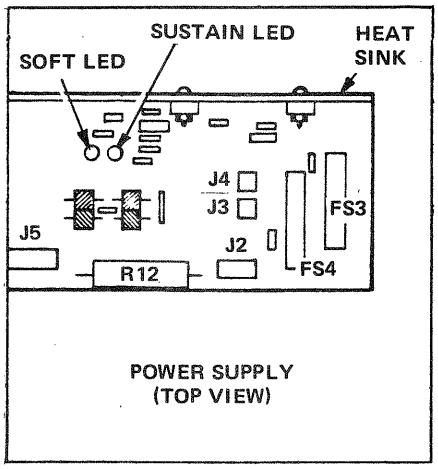


FIGURE 9-18 SUSTAIN L.E.D. location.

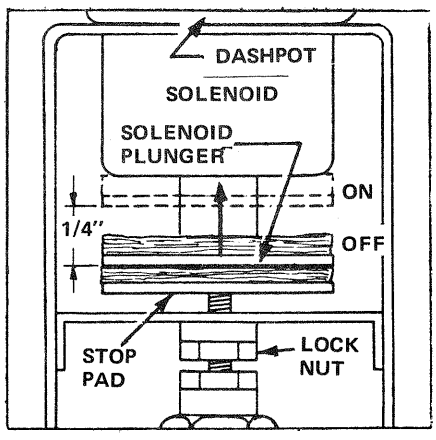


FIGURE 9-19 Pedal Solenoid stroke measurement.

STEP 9-63 (cont'd)

E. Listen for excessive noise (clunking) as the Solenoid actuates and/or releases.

STEP 9-64

Depress the (10) PLAY Button and check for the items listed under STEP 9-63 as Program 9 runs. If the Solenoid is working correctly, proceed directly to STEP 9-65 on page 141. If the Solenoid doesn't operate or operates weakly and/or sluggishly, do Procedures A through K beginning below (on Models P-100 and P-100M) or Procedures A through N beginning on page 135 (on the Model P-200). If the Solenoid is excessively noisy (clunks) when it actuates and/or releases, do Procedures L through P beginning on page 133 (on Models P-100 and P-100M) or Procedures O through X beginning on page 138 (on the Model P-200).

MODELS P-100 AND P-100M SUSTAIN SOLENOID ADJUSTMENTS

A. If the SUSTAIN L.E.D. on the Power Supply (see FIGURE 9-18 on the previous page) does not light or otherwise does not function correctly, refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

B. If the SUSTAIN L.E.D. is lit, but the SUSTAIN Solenoid does not appear to be working, stop the tape, and remove the Solenoid from the piano. See the CAUTION below.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE REMOVING THE SOLENOID.

C. After removing the Solenoid, plug the Power Cord into the Circuit Interrupter, turn the Interlock and Power Switches ON, and hold the Solenoid upright (hold the upper Dowel piece when doing this). Apply enough pressure downward on the Dowel piece so that the bottom of the Solenoid plunger rests against the Stop Pad (see FIGURE 9-19).

D. Press the (10) PLAY Button and, while Program 9 is running, observe the operation of the Solenoid. If the Solenoid still does not work, refer to Section 10, TROUBLE ANALYSIS, for repair procedures. If the Solenoid does work, proceed to Point E below.

E. Check the stroke of the Solenoid. The plunger travel should be approximately 1/4" (see FIGURE 9-19 on previous page). If not, loosen the Lock Nut on the Stop Pad Shaft and turn the Stop Pad CLOCKWISE to SHORTEN or COUNTERCLOCKWISE to LENGTHEN the stroke of the Solenoid. See the CAUTION below.

CAUTION:

THIS ADJUSTMENT MUST BE MADE WHEN THE SYSTEM IS OPERATING, THEREFORE, YOU MUST OBSERVE PROPER SAFETY PRECAUTIONS: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

F. After the stroke has been adjusted, install the Solenoid back in the piano, repeat STEP 9-60 to realign the Solenoid assembly length, and check to see if it is operating correctly. See the CAUTION on the next page.

STEP 9-64 (cont'd)

CAUTION:

STOP THE TAPE, TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, AND WAIT 1 MINUTE BEFORE REMOVING THE SOLENOID.

G. If the Solenoid operates correctly, proceed to Point P on page 134. If the trouble still exists, loosen first one, then the other of the Air Valves (see FIGURE 9-20) on the top of the Dashpot to lessen the internal resistance of the Dashpot. See the CAUTION and NOTE below.

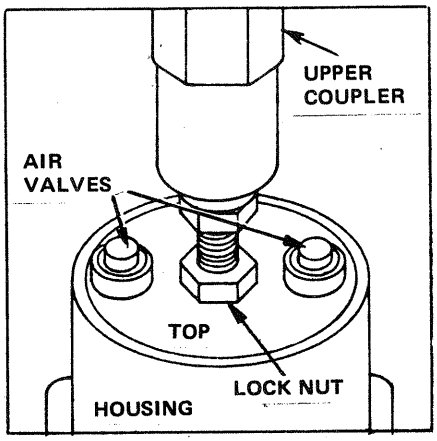


FIGURE 9-20 Dashpot adjustment parts.

CAUTION:

SINCE THIS ADJUSTMENT IS MADE WHEN THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, STAY ON THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

NOTE:

If you notice that the Solenoid is noisy (clunking) when it releases, the internal resistance of the Dashpot is too low and the Air Valves will have to be tightened even though it affects the operation of the Solenoid (this can be corrected by the following procedures).

H. If the Solenoid operates correctly, proceed to Point P on page 134. If the Solenoid still does not have sufficient thrust to lift the Dampers, the Dashpot Helper Spring should be engaged to increase the thrust. Refer to FIGURE 9-20. To engage the Helper Spring, loosen the Lock Nut at the top of the Dashpot and turn the top of the Dashpot CLOCKWISE until the Solenoid lifts the Dampers. See the CAUTION under Point G above.

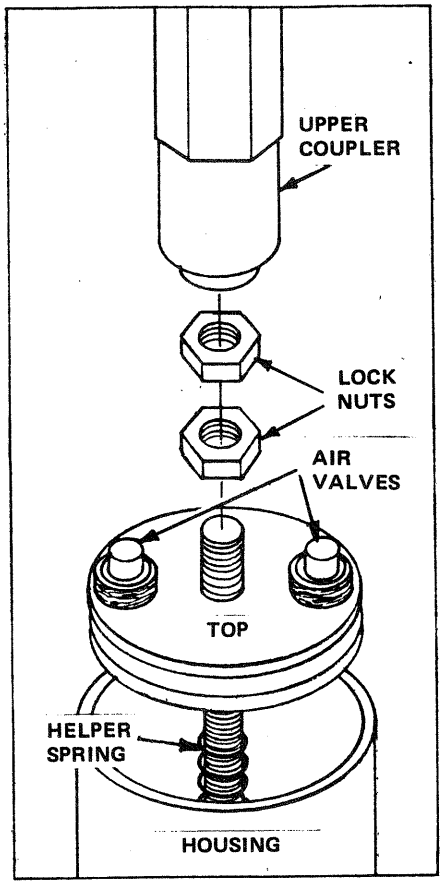


FIGURE 9-21 Dashpot disassembly.

I. If the Solenoid is operating correctly, proceed to Point P on page 134. If you were unable to increase the thrust enough, replacement of the Helper Spring may solve the trouble. To replace the Helper Spring, remove the Solenoid from the piano (see the CAUTION below), disassemble the Dashpot as shown in FIGURE 9-21, remove the Helper Spring, and replace it with the stronger Spring (PN 100-02B149-3) from the parts kit. Reassemble the Dashpot and reinstall the Solenoid assembly in the piano. Proceed to Point J.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE REMOVING THE SOLENOID.

STEP 9-64 (cont'd)

J. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Repeat STEPS 9-60 through 9-64 (A through G) to realign the Solenoid assembly completely. If the Solenoid is functioning properly, proceed to point P on page 134. If it is not, proceed to Point K below.

K. TO INCREASE SYSTEM RELIABILITY and increase the thrust of the Solenoid, it is suggested that you add an extension to the Damper Lifter Rod. This extension increases the amount of leverage the Solenoid can apply to the Lifter Rod and, since a great deal of force is required to lift the Dampers, this extension greatly reduces the amount of work the Solenoid must do. To accomplish this, make a small metal plate, drill a hole near each end of the plate, and attach the plate to the Damper Lifter Rod by means of a screw and nut, then slip the Dowel pin of the Solenoid assembly through the free hole in the plate (see FIGURE 9-22). After doing this procedure, you will have to repeat STEPS 9-60 through 9-64 (A through I) to realign the Solenoid. See the NOTE below, then proceed to Point P on page 134.

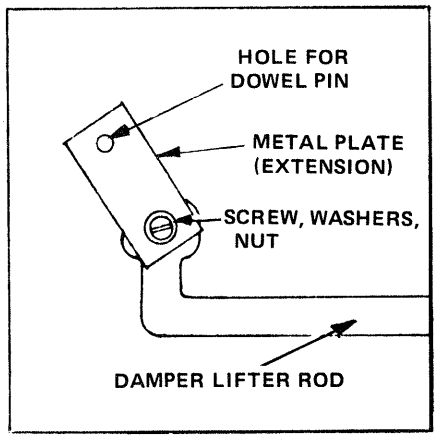


FIGURE 9-22 Damper Lifter Rod extension.

NOTE:

The size of the extension plate depends on the amount the Solenoid assembly Dowel can be displaced from its normal position and on the amount the leverage must be increased (the longer the extension, the greater the amount of leverage the Solenoid can exert on the Lifter Rod). The screw should be a 6-32 machine screw. The length of the screw is determined by the thickness of the plate and Damper Lifter Rod.

L. If the Solenoid is noisy (clunks) when it actuates (pushes too hard on the Damper Lifter Rod), turn the SUSTAIN Pull-in Control (see FIGURE 9-23) SLOWLY COUNTERCLOCKWISE until the Damper Lifter Rod is no longer slamming. (See the CAUTION below.) If the Solenoid is operating properly, proceed to Point P on page 134. If it is not, proceed to Point M on the next page.

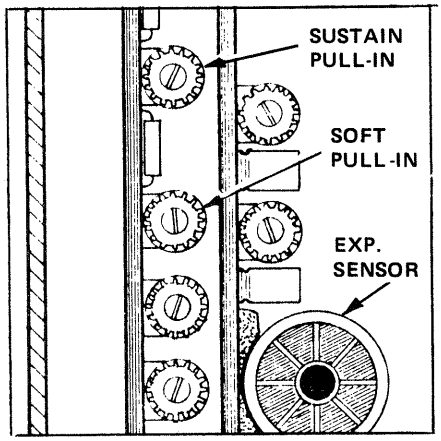


FIGURE 9-23 SUSTAIN Pull-in Control.

CAUTION:

SINCE THIS ADJUSTMENT MUST BE MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

STEP 9-64 (cont'd)

M. If you cannot adjust the Pull-in Control to the point where the Damper Lifter Rod does not slam and the Solenoid operates correctly, readjust the Pull-in Control to the point where the Solenoid operates correctly, stop the tape, and remove the solenoid from the piano, then disassemble the Dashpot (see FIGURE 9-21 on page 132) and remove the Helper Spring. See the CAUTION below, then proceed to Point N.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, and WAIT 1 MINUTE BEFORE REMOVING THE SOLENOID.

N. After removing the Helper Spring, reassemble the Dashpot and reinstall the Solenoid in the piano. Repeat the procedures detailed in STEP 9-60 to adjust the length of the Solenoid assembly, then plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Repeat the procedures detailed under STEP 9-64, as necessary, to realign the Solenoid. If, after this, the Solenoid functions correctly, proceed to Point P. If the Solenoid is still noisy on actuation, proceed to Point O below. Read the CAUTION below.

CAUTION:

SINCE THE ADJUSTMENT UNDER POINT O BELOW MUST BE MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PRECAUTIONS: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

O. Tighten, first, one and then the other of the Air Valves on the top of the Dashpot (see FIGURE 9-24) to decrease the noise of Solenoid operation. After making this adjustment, replay Program 9 and check to make sure the Solenoid has enough thrust to lift the Dampers. If necessary, repeat Procedures A to L under this Step (starting on page 131) to increase its thrust. See the NOTE below.

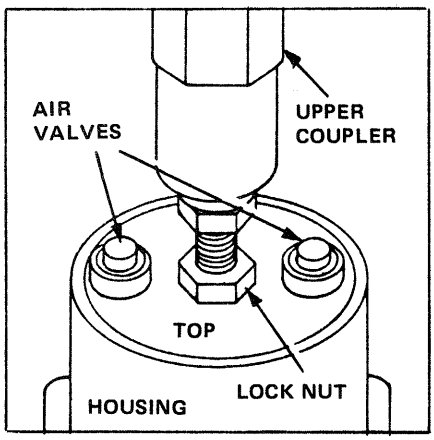


FIGURE 9-24 Dashpot Air Valves.

NOTE:

Residual excess noise that is not eliminated by the previous procedures (L through O) can be quieted by the judicious application of additional felt pieces at points, where your experience as a piano technician tells you, the noise may be generated.

P. After these procedures have been completed, rewind the Tape to the beginning of Program 9, then play Programs 9 AND 10 and observe and listen carefully to the operation of the SUSTAIN Pedal Solenoid. See the NOTE below.

NOTE:

Test Program 10 checks the operation of the SUSTAIN Pedal Solenoid when notes are played. The sequence of operations that occur during this program are as follows:

STEP 9-64 (cont'd)

NOTE (cont'd):

1. A Bass chord is struck, the SUSTAIN Pedal Solenoid energizes, the Keys release, then the Solenoid releases.

2. A Treble Chord is struck, the SUSTAIN Pedal Solenoid energizes, the Keys release, then the Solenoid releases.

As soon as the Keys release, you should listen carefully to make sure that the notes are being sustained and, when the Solenoid releases, you should make sure that the notes are damped. If the notes are NOT being sustained when the Solenoid actuates, repeat the alignments detailed in STEP 9-64. If notes are not damped when the Solenoid releases, repeat the procedures given in STEP 9-60. When the Solenoid is operating correctly, proceed to STEP 9-65 on page 141.

MODEL P-200 SUSTAIN SOLENOID ALIGNMENT

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING.

A. If the Vorsetzer is attached to the piano, remove the Actuator Shoes from the Pedals, unlatch the Upper Cabinet and tilt it back until it locks, then move the unit away from the piano so that you can observe the Pedal Solenoids and Power Supply.

B. If in place, remove and set aside the Lower Cabinet Guard so that you can observe the Solenoids and Power Supply.

C. Plug the Power Cord into the Ground Fault Circuit Interrupter, plug the Interrupter into the wall socket, and turn the Interlock and (1) POWER Switches ON.

D. Play Program 9. If the SUSTAIN L.E.D. on the Power Supply (see FIGURE 9-26) does NOT light or otherwise does not function correctly, refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

E. If the SUSTAIN L.E.D. was lit when the unit played Program 9, but the Solenoid did not appear to be working, check the operation of the Solenoid at this time. If it does operate, verify that its stroke is 1/4" (see FIGURE 9-27) and, if necessary, adjust the stroke by following Procedure F on the next page. If the Solenoid does NOT operate, refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

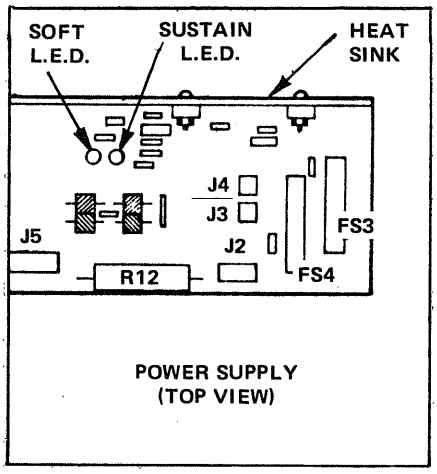


FIGURE 9-26 SUSTAIN L.E.D. location.

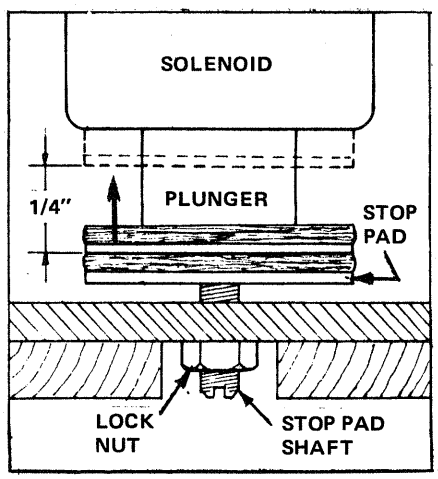


FIGURE 9-27 Solenoid stroke measurement.

STEP 9-64 (cont'd)

F. To adjust the stroke of the Solenoid, loosen the Lock Nut on the Stop Pad Shaft (see FIGURE 9-28) with a 7/16" Nutdriver, then insert a common screwdriver in the slot in the end of the Stop Pad Shaft and turn the Shaft CLOCKWISE to SHORTEN or COUNTERCLOCKWISE to LENGTHEN the stroke of the Solenoid until its stroke is 1/4", then tighten the Lock Nut and proceed to Point G below. See the CAUTION below.

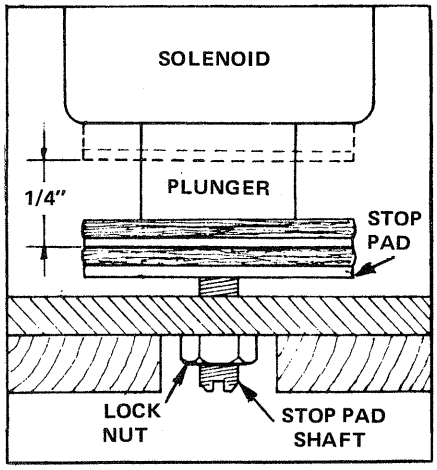


FIGURE 9-28 Stroke adjustment parts.

CAUTION:

THIS ADJUSTMENT MUST BE MADE WHILE THE SYSTEM IS OPERATING, THEREFORE, YOU MUST OBSERVE PROPER SAFETY PRECAUTIONS: WEAR THE RUBBER GLOVES, PLACE THE RUBBER MAT ON THE FLOOR NEXT TO THE UNIT AND KEEP TO THE MAT AS YOU WORK, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

G. Once the stroke of the Solenoid is set, roll the unit up to the piano, center it, and screw the Centering Shaft into the Clamp Pad. Attach the Pedal Actuator Shoes to their respective Pedals and unlatch the Upper Cabinet Assembly and GENTLY lower it until it locks down, then repeat STEP 9-60 to adjust the Actuator length. See the CAUTION below.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE MOVING THE VORSETZER. BEFORE MOVING THE UNIT, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

H. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Press the (10) PLAY Push-button and observe the operation of the Solenoid. If the Solenoid is functioning properly, proceed to POINT X on page 141. If the Solenoid still requires more thrust to operate the Pedal, stop the tape and remove the unit, then proceed to Point I below. See the CAUTION under Point G above.

I. Check the tightness of the Air Valves on the top of the Dashpot (see FIGURE 9-29). If they are very tight, loosen each one approximately 1/2 turn to decrease the internal resistance of the Dashpot, then proceed to Point J below.

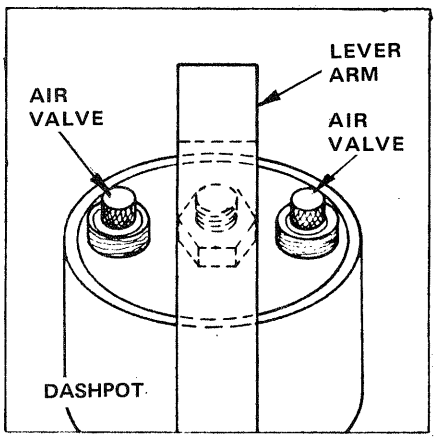


FIGURE 9-29 Dashpot Air Valves.

J. Move the Vorsetzer back to the piano and secure it in place. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Press the (10) PLAY Button and play Program 9. If the Solenoid is functioning correctly, proceed to Point X on page 141. If the Solenoid still displays the trouble, proceed to point K on the next page.

STEP 9-64 (cont'd)

K. Remove the Vorsetzer from the piano, disassemble the SUSTAIN Dashpot (see FIGURE 9-30), remove the Helper Spring, and install the Stronger Spring (PN 100-02B149-3) from the Hardware Kit, then proceed to Point L. See the CAUTION below.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE MOVING THE UNIT. WHEN MOVING THE VORSETZER, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

L. Reassemble the Solenoid, move the unit up to the piano, secure it, attach the Pedal Actuator Shoes to the Pedals, and repeat STEP 9-60 to align the Actuator length. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Push the (10) PLAY Button and observe the operation of the Solenoid. If the Solenoid is operating correctly, proceed to Point P on page 138. If the Solenoid requires still more thrust, proceed to Point M below. See the CAUTION under Point K above.

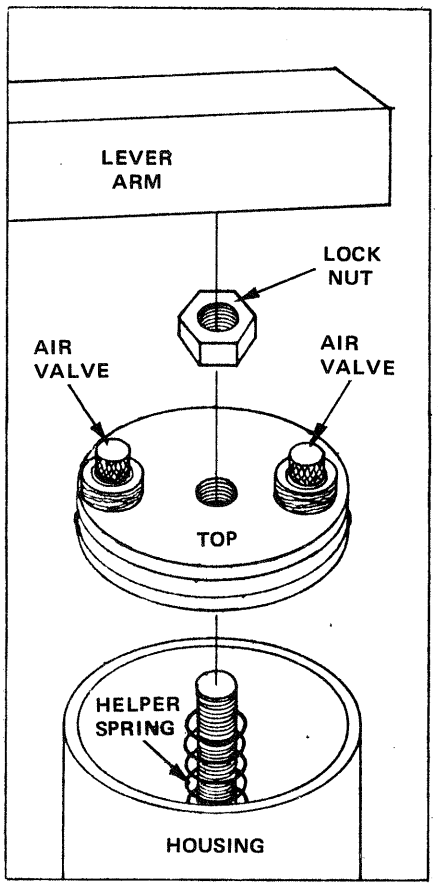


FIGURE 9-30 Dashpot disassembly.

M. Stop the tape, remove the Vorsetzer from the piano (see the CAUTION under Point K above), and adjust the fulcrum point of the Solenoid Lever Arm by removing the Screw from the Lever Arm and the two (2) Screws securing the Fulcrum to the Base Plate (see FIGURE 9-31 below). Move the Fulcrum one set of holes TOWARD the Actuator end of the Lever Arm and secure it to the Base Plate with the two (2) mounting Screws. Pin the Lever Arm to the Fulcrum with its mounting Screw (use the first hole TOWARD the Actuator end of the Lever Arm from the original mounting hole that was used previously). See FIGURE 9-31 below. See the NOTE at the top of the next page, then proceed to Point N.

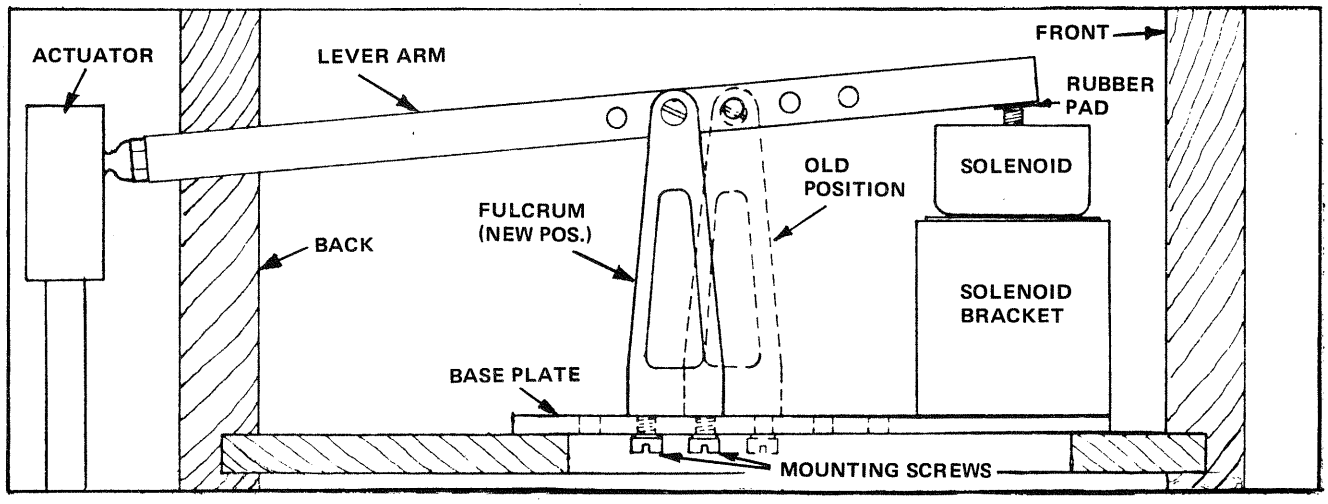


FIGURE 9-31 Fulcrum adjustment.

STEP 9-64 (cont'd)

NOTE:

After moving the Fulcrum, always make sure that the rubber pad on the Lever Arm (see FIGURE 9-31 on the previous page) is positioned over the Solenoid plunger.

N. Install the Vorsetzer on the piano, plug the Power Cord into the Ground Fault Circuit Interrupter, and turn the Interlock and (1) POWER Switches ON. Repeat STEP 9-60 to adjust the length of the SUSTAIN Pedal Actuator. Press the (10) PLAY Button and play Program 9. Observe the operation of the SUSTAIN Solenoid. If it is functioning correctly, proceed to Point P below. If still more thrust is required of the Solenoid, repeat Points M (on the previous page) and N (this Point) until the Solenoid is properly aligned, then proceed to Point P. See the CAUTION and NOTE below.

CAUTION:

BEFORE MOVING THE UNIT, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

NOTE:

Moving the Fulcrum of the Lever Arm TOWARD the Actuator end of the Arm increases the thrust of the Solenoid. Moving the Fulcrum AWAY from the Actuator end of the Lever Arm, in effect, decreases the thrust of the Solenoid.

O. If the Solenoid is noisy (causes the Damper Lifter Rod to slam), the SUSTAIN Solenoid is pushing too hard against the SUSTAIN Pedal. To eliminate this problem, try turning the SUSTAIN Pull-in Control (see FIGURE 9-32) SLOWLY COUNTER-CLOCKWISE until the noise stops. See the NOTE below.

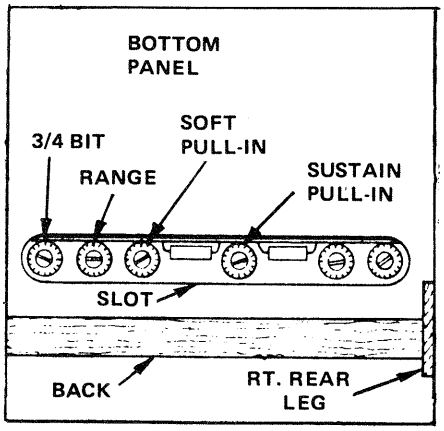


FIGURE 9-32 Pull-in Control location.

NOTE:

Access to the control is available through the slot in the right, rear corner of the BOTTOM of the Lower Assembly. If the Solenoid stops operating or operates erratically when you have adjusted the control to stop the noise, return the Pull-in Control to the setting at which the Solenoid functioned correctly (even though the noise begins again - it can be eliminated again by one of the following procedures).

P. If the Solenoid is operating correctly, proceed to Point X on page 141. If you were unable to adjust the Control to the point where the noise was eliminated yet the Solenoid operated correctly, turn the Control CLOCKWISE until the Solenoid functions properly, stop the tape, turn the power OFF, and unplug the Power Cord. See the CAUTION below.

CAUTION:

AFTER UNPLUGGING THE POWER CORD, WAIT 1 MINUTE BEFORE PROCEEDING TO POINT Q. BEFORE MOVING THE UNIT IN POINT Q, ALWAYS MAKE SURE THAT THE UPPER CABINET IS LOCKED IN THE UP POSITION.

STEP 9-64 (cont'd)

Q. Move the Vorsetzer away from the piano. Check the tightness of the Air Valves on the top of the Dashpot (see FIGURE 9-33). If they are finger tight, proceed to Point R below. If they are loose, turn each one 1/4 turn CLOCKWISE (this increases the internal resistance of the Dashpot and decreases the speed of the Solenoid). Proceed to Point R.

R. Move the unit back to the piano and connect it to the piano (see CAUTION below). Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Play Program 9 and check the operation of the Solenoid. If the Solenoid functions properly, proceed to Point X on page 141. If the Solenoid does not work correctly, try repeating Points Q and R or, if that does not work, proceed to POINT S below.

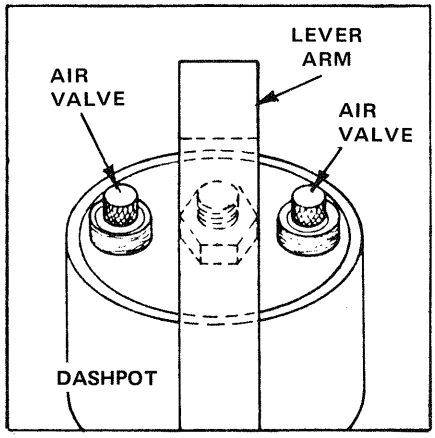


FIGURE 9-33 Dashpot Air Valves.

CAUTION:

BEFORE MOVING THE UNIT, ALWAYS MAKE SURE THAT THE UPPER CABINET IS LOCKED IN THE UP POSITION.

S. Move the Vorsetzer away from the piano (see the CAUTION below). Disassemble the Dashpot (see FIGURE 9-34) and remove the Helper Spring. Reassemble the Dashpot (without the Spring) and repeat STEP 9-60 to adjust the length of the Actuator. Proceed to Point T.

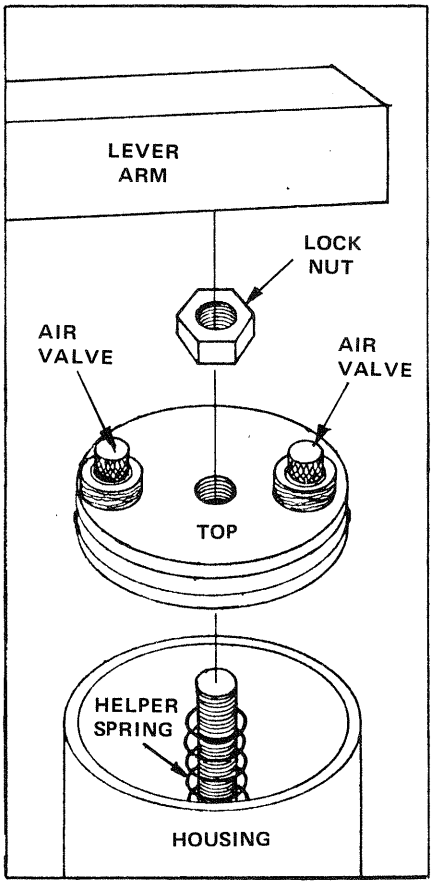


FIGURE 9-34 Dashpot disassembly.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE MOVING THE UNIT. BEFORE MOVING THE UNIT, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

T. Move the Vorsetzer back to the piano and reinstall it. Plug the Power Cord into the Circuit Interrupter, turn the Interlock and (1) POWER Switches ON, and press the (10) PLAY Pushbutton. As Program 9 plays, observe the operation of the Solenoid. If it is functioning correctly, proceed to Point X on page 141. If it is not, proceed to Point U on the next page.

STEP 9-64 (cont'd)

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING. BEFORE MOVING THE UNIT, MAKE SURE THAT THE UPPER CABINET IS LOCKED IN THE UP POSITION.

U. Move the Vorsetzer away from the piano and adjust the Fulcrum point of the Lever Arm. To adjust the Fulcrum point, remove the Screw through the Lever Arm and the two (2) mounting Screws on the bottom of the Fulcrum (see FIGURE 9-35). Move the Fulcrum back one set of holes TOWARD the Solenoid and remount it to the Base Plate with the two (2) mounting Screws. Mount the Lever Arm to the Fulcrum with its mounting Screw (use the next hole TOWARD the Solenoid from the original hole that was used). See FIGURE 9-35 below. Proceed to Point V.

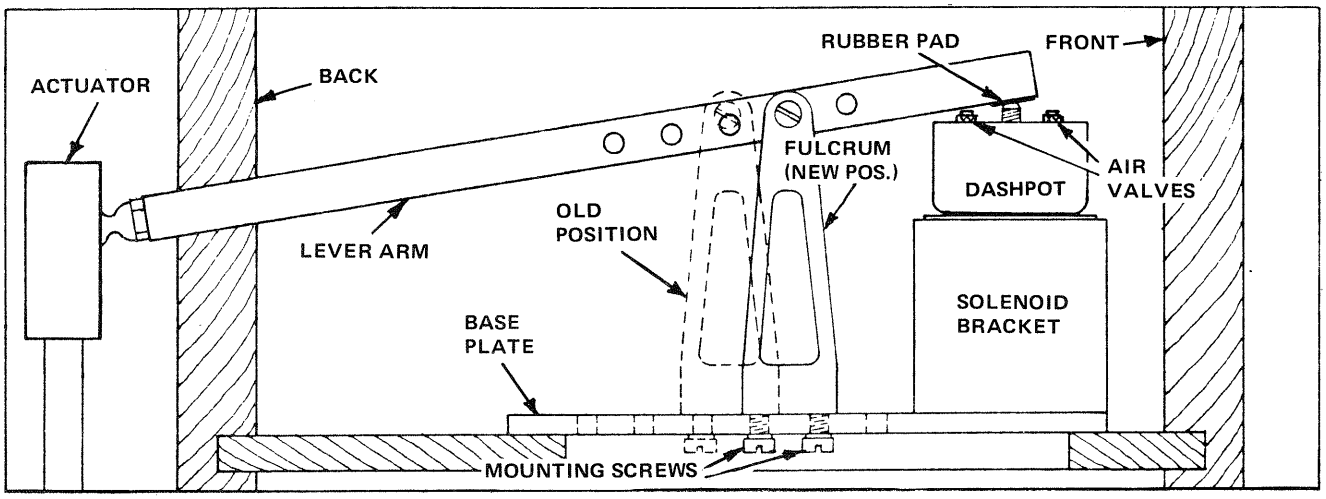


FIGURE 9-35 Fulcrum adjustment.

V. Move the Vorsetzer back to the piano and install it. Plug the Power Cord into the Circuit Interrupter, turn the Interlock and (1) POWER Switches ON, and press the (10) PLAY Button. Observe the operation of the Solenoid. If it is operating correctly, proceed to Point X on the next page. If it is not, repeat Points O through V until the noise is eliminated.

W. If the Solenoid is noisy when it releases, the internal resistance of the Dashpot is too low. To adjust the resistance of the Dashpot, move the unit away from the piano (see the CAUTION at the top of this page), tighten one of the Air Valves (see FIGURE 9-31 above) 1/2 turn, install the Vorsetzer on the piano, reapply power, and play Program 9. Observe the operation of the Solenoid. If it still is noisy, move the unit away from the piano (see the CAUTION at the top of this page), tighten the other Air Valve, install the Vorsetzer on the piano, apply power, and try the Solenoid again. See the NOTE below.

NOTE:

Residual excess noise that is not eliminated by the procedures above can be quieted by the judicious application of additional felt pieces at points, where your experience as a piano technician tells you, the noise may be generated.

STEP 9-64 (cont'd)

X. After all the procedures have been completed, install the Vorsetzer on the piano, unlatch the Upper Cabinet and lock it in the Down (PLAY) position. Rewind the tape to the beginning of Program 9, then play Programs 9 AND 10 and observe the operation of the SUSTAIN Solenoid. If necessary, realign the Solenoid by following the applicable procedures listed under this STEP until the Solenoid is operating correctly. See the NOTE below:

NOTE:

Test Program 10 checks the operation of the SUSTAIN Pedal Solenoid when notes are played. The sequence of operations that occur during this program are as follows:

1. A Bass chord is struck, the SUSTAIN Pedal Solenoid energizes, the Keys release, then the Solenoid releases.

2. A Treble chord is struck, the SUSTAIN Pedal Solenoid energizes, the Keys release, then the Solenoid releases.

As soon as the Keys release, you should listen carefully to make sure that the notes are being sustained and, when the Solenoid releases, you should make sure that the notes are damped. If the notes are NOT being sustained when the Solenoid actuates, repeat the alignments detailed in STEP 9-64. If the notes are NOT being damped when the solenoid releases, repeat the procedures given in STEP 9-60. When the Solenoid is operating correctly, proceed to STEP 9-65 below.

STEP 9-65

At the end of Program 10, stop the tape, note the reading in the (17) TAPE COUNTER window, and write it on the slip of paper. ← 248

STEP 9-66

Slowly depress the SOFT Pedal manually. There should be a slight bit of lost motion before the Hammer Rail is lifted, therefore, as you begin pressing the Pedal, the Dowel should travel approximately 1/32" before it begins lifting the Hammer Rail. When the Pedal is fully depressed, the Hammers hould be lifted 1/2" from their normal rest position by the Hammer Rail. If no adjustment to the Solenoid assembly is necessary, proceed to the next STEP. If adjustment is required, do the following:

DOWEL ADJUSTMENT ON MODELS P-100 AND P-100M

A. If the Hammer Rail begins lifting as soon as the SOFT Pedal is depressed, loosen the Lock Nut under the Upper Coupler, turn the Coupler approximately 1/8 of a turn CLOCK-WISE then press the Pedal again and check for the slight bit of motion - readjust the Coupler, if necessary, until the 1/32" of is achieved. Tighten the Lock Nut until it is finger tight. See FIGURE 9-36, and the CAUTION below:

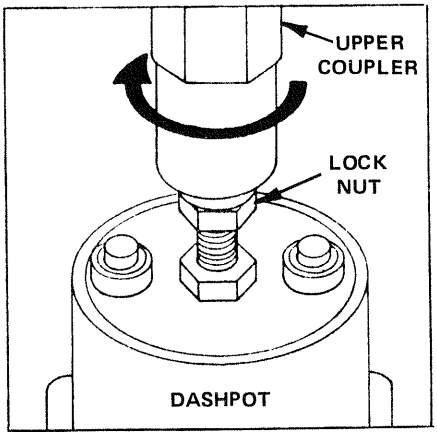


FIGURE 9-36 Upper Coupler Adjustment.

CAUTION

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE ATTEMPTING THE WORK.

STEP 9-66 (cont'd)

B. If you were unable to obtain the 1/32" free play in the Dowel by adjusting the Upper Coupler, adjust the Lower Coupler to obtain it. To adjust the Lower Coupler, loosen the Lock Nut above it, turn the Coupler approximately 1/8 turn CLOCKWISE, then press the SOFT Pedal again and recheck the free play. Readjust the Coupler as necessary until the 1/32" lost motion is obtained. See FIGURE 9-37. When the lost motion is correct, tighten the Lock Nut until it is finger tight.
Proceed to STEP 9-67 below.

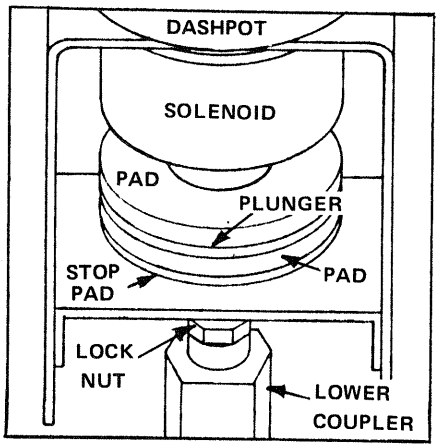


FIGURE 9-37 Lower Coupler adjustment parts.

C. If there is too much lost motion when you press the Pedal, adjust either or both of the Couplers by turning them COUNTERCLOCKWISE to increase the length of the Dowel, check for the 1/32" lost motion, readjust if necessary, then tighten the Lock Nuts finger tight and proceed to STEP 9-67 below:

NOTE:

Unlike the SUSTAIN function, the SOFT Pedal function of the piano requires very little force from the Solenoid to operate. Normally, the Solenoid is adjusted to supply as little force as possible to the Action, therefore, upon initial set-up of any of the three systems, you will be decreasing the thrust of the Solenoid first, (this is just the opposite of the procedures required to set-up the SUSTAIN Solenoid).

STEP 9-67

Plug the Power Cord into the Ground Fault Circuit Interrupter and turn the Interlock and (1) POWER Switches ON, if STEP 9-66 was performed.

NOTE:

Test Program 11, Soft pedal test on/off, is used to check the operation of the SOFT Pedal Solenoid. During the program, the SOFT Pedal Solenoid will be actuated five (5) times (no notes will be played) to allow you to observe the ON and OFF operations of the Solenoid. This test is used to determine if the Helper Spring in the SOFT Solenoid should be removed or engaged, to adjust the setting of the Pull-in Control, and to check to see if the length of the Solenoid assembly (on Models P-100 and P-100M) or the Pedal Actuator (on Model P-200) is correct.

Step 9-68

The following is a list of items you should check as Test Program 11 runs. The items are listed in the order in which they are to be checked so study the list carefully to become familiar with the requirements of a properly operating Solenoid.

STEP 9-68 (con't)

A. Observe that the SOFT L.E.D. (see FIGURE 9-38) on the Power Supply lights, then goes out five times during the program. If it does not, no signal is coming from the Playback Circuits. Refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures.

B. If the SOFT L.E.D. lights on the Power Supply, verify that the SOFT Pedal Solenoid is actually working.

C. If the Solenoid is working, check to see that its stroke is 1/2". Stroke is determined by the travel of the Solenoid plunger as shown in FIGURE 9-39.

D. Check to see that the Solenoid is lifting the Hammers 1/2" from their rest position.

E. Check to see that the Hammers are NOT being lifted too hard by the Hammer Rail. If this is occurring, the Hammers may be thrown against the Strings when the Solenoid actuates.

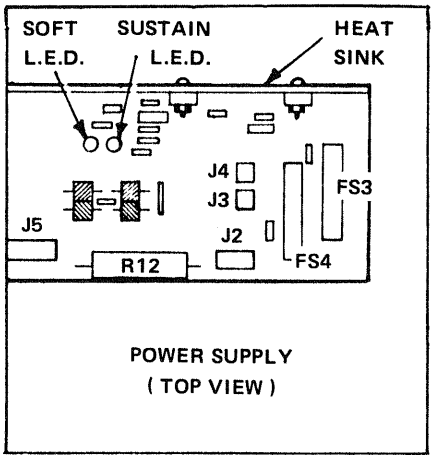


FIGURE 9-38 SOFT L.E.D. location.

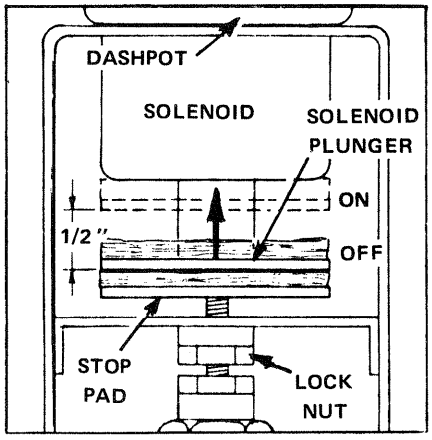


FIGURE 9-39 Pedal Solenoid stroke measurement.

STEP 9-69

Depress the (10) PLAY Pushbutton and check for the items listed under STEP 9-68 as program 11 runs. If the Solenoid is functioning correctly, proceed to STEP 9-70 on page 149. If the Solenoid does NOT operate correctly, perform the alignment Procedures, A through H, beginning below (on Models P-100 and P-100M) or Procedures A through P, beginning on page 146 (on Model P-200). If the Solenoid causes noise when it actuates and/or releases or causes the Hammers to be thrown against the Strings, do Procedures I through N, beginning on page 145 (on the Models P-100 or P-100M) or Procedures O through X beginning on page 149 (on the Model P-200).

SOFT SOLENOID ADJUSTMENTS FOR THE MODELS P-100 AND P-100M

A. If the SOFT L.E.D. on the Power Supply does NOT light when the PROGRAM is played, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures. Refer to FIGURE 9-38.

B. If the SOFT L.E.D. is lit, but the Solenoid does NOT appear to be working, turn the power OFF, unplug the Power Cord (*Refer to the CAUTION NOTE). Remove the Solenoid from the piano, then proceed to STEP C on page 144.

*CAUTION:

AFTER UNPLUGGING THE POWER CORD, WAIT 1 MINUTE BEFORE ATTEMPTING TO REMOVE THE SOLENOID.

STEP 9-69 (cont'd)

C. After removing the Solenoid from the piano, plug the Power Cord into the Circuit Interrupter, and turn the Interlock and (1) POWER Switches ON. Hold the Solenoid upright by the Dowel, apply just enough downward pressure on the Dowel to bottom the Solenoid plunger against the Stop Pad (See FIGURE 9-40), and press the (10) PLAY BUTTON. Observe the operation of the Solenoid. If it does NOT work, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures. If it works, proceed to Point D. * (NOTE: CAUTION below).

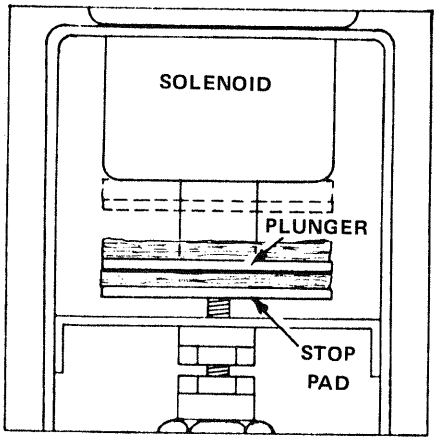


FIGURE 9-40 Plunger bottomed against the Stop Pad.

* CAUTION:

STOP THE TAPE, TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING.

D. Reinstall the Solenoid in the piano. Plug the Power Cord into the Ground Fault Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Depress the (10) PLAY BUTTON and observe the Solenoid. *(NOTE: CAUTION below) then proceed to Point E.

*CAUTION:

SINCE THIS ADJUSTMENT MUST BE MADE WITH THE SYSTEM OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

E. Verify that the SOFT Pull-in Control (FIGURE 9-41) is set at maximum by turning the Control fully CLOCKWISE. This adjustment supplies the Solenoid with maximum power. If the Solenoid works, proceed to Point F. If the Solenoid does NOT work, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures.

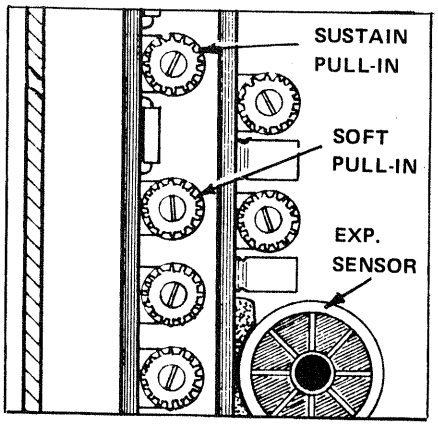


FIGURE 9-41 SOFT PULL-IN Control.

F. Read the CAUTION under Point D above. Verify that the Stroke of the Solenoid is 1/2" (See FIGURE 9-42). Adjust the stroke if necessary, by loosening the Lock Nut at the bottom of the Stop Pad, turning the Stop Pad CLOCKWISE to SHORTEN or COUNTERCLOCKWISE to LENGTHEN the stroke, then securing the Lock Nut when the stroke is adjusted. (See FIGURE 9-42). Refer to the NOTE ON PAGE 145.

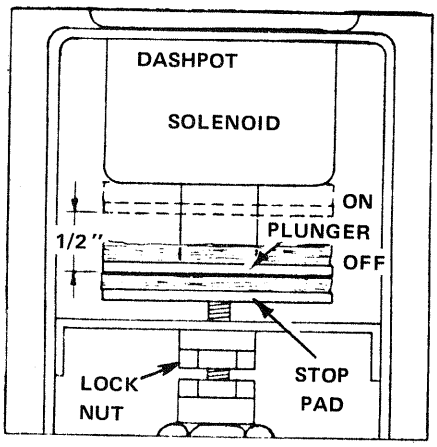


FIGURE 9-42 Stroke Measurement.

STEP 9-69 (cont'd)

NOTE:

After the stroke has been adjusted, check to see that the Hammer Rail is lifting the Hammers 1/2" from their rest position. If not, repeat the procedures under STEP 9-66 to adjust the length of the Solenoid assembly. Proceed to Point G.

G. If the Solenoid appears to be sluggish when it operates, check the tightness of the Air Valves on the top of the Dashpot (See Figure 9-43). If they are tight, turn BOTH of them 1/4 turn COUNTERCLOCKWISE. This will decrease the internal resistance of the Dashpot and speed the actuation of the Solenoid. * (NOTE: CAUTION below). Proceed to Point H.

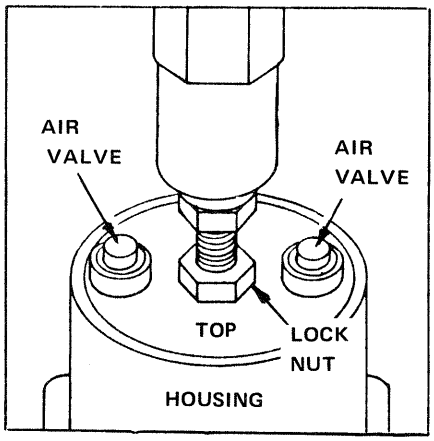


FIGURE 9-43 Dashpot Air Valves.

*CAUTION:

SINCE THIS ADJUSTMENT MUST BE MADE WITH THE SYSTEM OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

H. If it appears that the Solenoid still does not have enough thrust, Loosen the Lock Nut at the top of the Dashpot (See FIGURE 9-43) and turn the top of the Dashpot CLOCKWISE until the Solenoid operates correctly, then tighten down the Lock Nut. Proceed to Point 'N' on page 146. (See NOTE below).

NOTE:

Turning the top of the Dashpot CLOCKWISE engages the Helper Spring in the Dashpot. With the Spring engaged, the Solenoid has more thrust.

I. If the Solenoid creates noise when it actuates (and may throw the Hammers against the Strings), the SOFT Pull-in Control may be set too high. (See FIGURE 9-41, on page 144) To adjust the control, turn it SLOWLY COUNTERCLOCKWISE until the noise stops. If the Solenoid operates correctly, proceed to Point 'N' on page 146. If the Solenoid stops working or its operation becomes erratic, proceed to Point 'J', (REFER TO THE ABOVE CAUTION).

J. Return the Control to the point where the Solenoid starts operating correctly, then check the tightness of the Dashpot Air Valves, (See FIGURE 9-43). If they are loose, tighten them just enough to stop the noise. If the Solenoid begins to function correctly, proceed to Point 'N' on page 146. If it does not function correctly, proceed to Point 'K . (REFER TO CAUTION above).

K. Loosen the Lock Nut at the top of the Dashpot (See FIGURE 9-43) and turn the top of the Dashpot COUNTERCLOCKWISE until the Helper Spring in the Dashpot disengages. When performing this operation, DO NOT adjust the top of the Dashpot beyond the point where it is flush with the top of the Dashpot Housing when the Solenoid is actuated. If the Solenoid functions correctly, proceed to Point 'N' on page 146. If the thrust of the Solenoid is still too great, proceed to Point 'L' on page 146. Refer TO THE CAUTION ABOVE.

STEP 9-69 (cont'd)

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING TO THE NEXT POINT.

L. Remove the Solenoid assembly from the piano, disassemble the Dashpot, and remove the Helper Spring from the Dashpot, THIS IS DONE TO DECREASE THE THRUST OF THE SOLENOID. (See FIGURE 9-44). Reassemble the Dashpot, install the Solenoid assembly in the piano, and repeat STEP 9-66. Plug the Power Cord into the Ground Fault Circuit Interrupter, turn the Interlock and (1) POWER Switches ON, and repeat STEP 9-69 to align the Solenoid. Proceed to Point 'M'.

M. If the Solenoid is noisy when it releases--the internal resistance of the Dashpot is too low. To adjust the Dashpot, tighten either or both (if necessary) of the Air Valves on top of the Dashpot, (See FIGURE 9-44) until the noise stops. (REFER TO THE NOTE below). Proceed to Point 'N'.

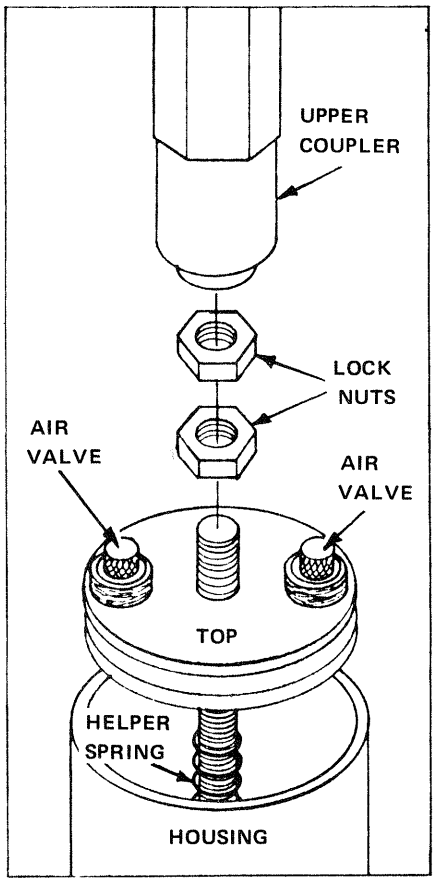


FIGURE 9-44 Dashpot disassembly.

NOTE:

Residual excess noise that is not eliminated by the previous procedures (I through M) can be quieted by the judicious application of additional felt pieces at points where your experience as a piano technician indicates the noise may be generated.

N. When ALL adjustments have been completed, rewind the tape to the beginning of Test Program 11, REPLAY PROGRAM 11. Observe the operation of the Solenoid to make sure it is functioning properly. Repeat any of the adjustments of STEPS 9-66 and 9-69, if necessary, then proceed to STEP 9-70 on page 152.

SOFT SOLENOID ADJUSTMENT FOR THE MODEL P-200

CAUTION:

BEFORE MOVING THE VORSETZER UP TO, OR AWAY FROM THE PIANO, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

A. If the Vorsetzer is attached to the piano, remove the Actuator Shoes from the Pedals, unlatch the Upper Cabinet and tilt it UP until it locks, then move the unit away from the piano. THIS MUST BE DONE SO THAT YOU CAN OBSERVE THE ACTUATORS AND THE POWER SUPPLY. (See FIGURE 9-45).

B. If in place, remove and set aside the Lower Assembly Guard so that you can observe the Power Supply.

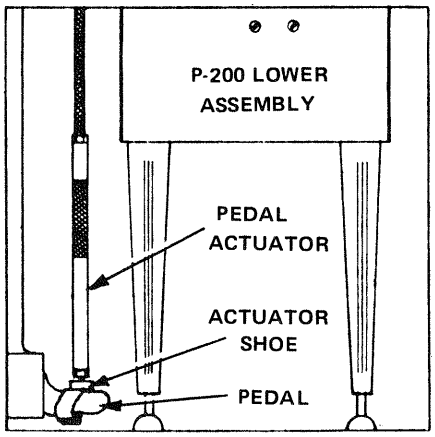


FIGURE 9-45 Pedal Actuator Shoe.

STEP 9-69 (cont'd)

C. Plug the Power Cord into the Circuit Interrupter, plug the Interrupter into the wall socket; turn the Interlock and (1) POWER Switches ON.

D. Play PROGRAM 11. If the SOFT L.E.D. on the Power Supply (See FIGURE 9-46) does NOT light or otherwise does not function properly, REFER TO SECTION 10, TROUBLE ANALYSIS for system repair procedures.

E. If the L.E.D. is lit and the Solenoid is actuating, check to see that its stroke is 1/2". (See FIGURE 9-47). If necessary, adjust the stroke of the Solenoid by loosening the Lock Nut on the Stop Pad Shaft and turning the Stop Pad CLOCKWISE to SHORTEN or COUNTER-CLOCKWISE to LENGTHEN the stroke of the Solenoid. (See FIGURE 9-47 and the CAUTION below), then proceed to Point 'F'.

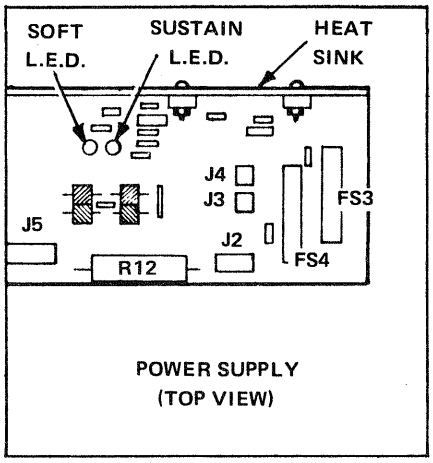


FIGURE 9-46 SOFT L.E.D. location.

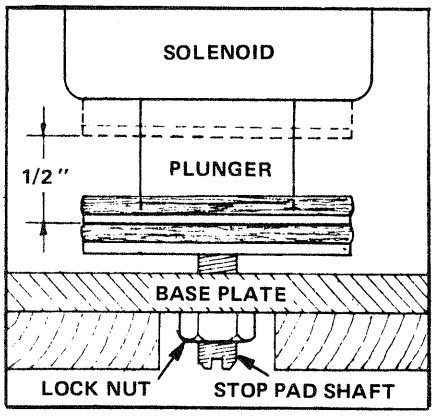


FIGURE 9-47 Stroke Measurement and Adjustment Parts.

CAUTION:

SINCE THIS ADJUSTMENT IS MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, KEEP TO THE RUBBER MAT, AND WATCH THE POSITION OF YOUR ARMS AND HANDS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

F. Check to see that the SOFT Pull-in Control (See FIGURE 9-48) is set at maximum by turning it fully CLOCKWISE. THIS IS DONE TO ENSURE THAT THE SOLENOID IS OPERATING AT FULL POWER TO MAKE SURE IT WILL PUSH THE SOFT PEDAL. IT WILL BE ADJUSTED TO ITS PROPER LEVEL LATER IN THESE PROCEDURES). (See THE CAUTION below). Then Proceed to Point 'G'.

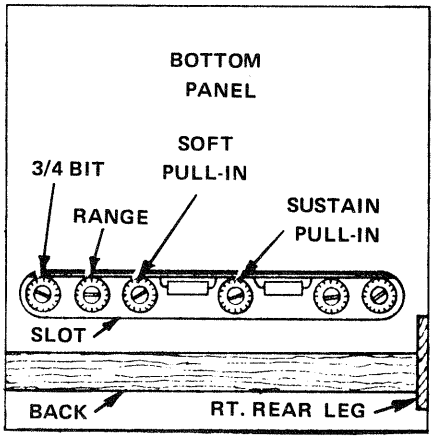


FIGURE 9-48 SOFT PULL-IN CONTROL LOCATION.

CAUTION:

BEFORE MOVING THE VORSETZER, ALWAYS MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

G. Roll the unit up to the piano, center it on the Keyboard, screw the Centering Shaft into the Clamp Pad until it is snug, and attach the Pedal Actuator Shoes (See FIGURE 9-45 on page 146) to their respective Pedals. Unlatch the Upper Cabinet Assembly and GENTLY lower it until it locks in the down (play) position, then proceed to Point 'H'.

H. Plug the Power Cord into the Ground Fault Circuit Interrupter and turn the Interlock and (1) POWER SWITCHES ON. Press the (10) PLAY BUTTON and observe the operation of the SOFT Pedal Solenoid. If it operates properly, proceed to Point 'X' on page 152. If it does NOT operate properly, proceed to Point 'I' on page 148.

STEP 9-69 (cont'd)

1. If it appears that the Solenoid does not have enough thrust to lift the Hammer Rail, or to shift the keys, stop the tape, turn the (1) POWER AND INTERLOCK Switches OFF, unplug the Power Cord and move the unit away from the piano. (See the CAUTION below). Proceed to Point J.

CAUTION:

AFTER UNPLUGGING THE POWER CORD, WAIT 1 MINUTE BEFORE MOVING THE UNIT. BEFORE MOVING THE UNIT, MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

J. Check the tightness of the Air Valves on the top of the Dashpot (See FIGURE 9-49). If they are tight, turn each one 1/4 turn COUNTERCLOCKWISE to decrease the internal resistance of the Dashpot (which increases the thrust of the Solenoid). If they are loose, proceed to Point 'L'. After adjusting the Air Valves, install the Vorsetzer on the piano (See the CAUTION above), plug the Power Cord into the Circuit Interrupter turn the Power ON, and try the Solenoid again If the Solenoid functions correctly, proceed to Point 'X' on page 152. If it does not function correctly, proceed to the next Point (K).

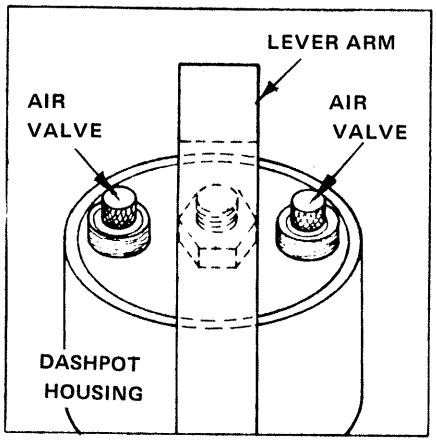


FIGURE 9-49 Dashpot Air Valves.

K. If installed, remove the unit from the piano (See CAUTION above), loosen the Lock Nut at the top of the Dashpot (See FIGURE 9-49), and turn the top of the Dashpot CLOCKWISE a turn or two. Install the Vorsetzer on the piano and try the Solenoid again. If necessary, readjust the top of the Dashpot by this procedure until it is operating correctly, then tighten down the Lock Nut. If the Solenoid is adjusted and working properly, proceed to Point "X' on page 152. If this procedure was ineffective, proceed to Point L below.

L. Stop the tape, turn the (1) POWER and Interlock Switches OFF, unplug the Power Cord (See the CAUTION above), and move the unit away from the piano (See the CAUTION above), then proceed to

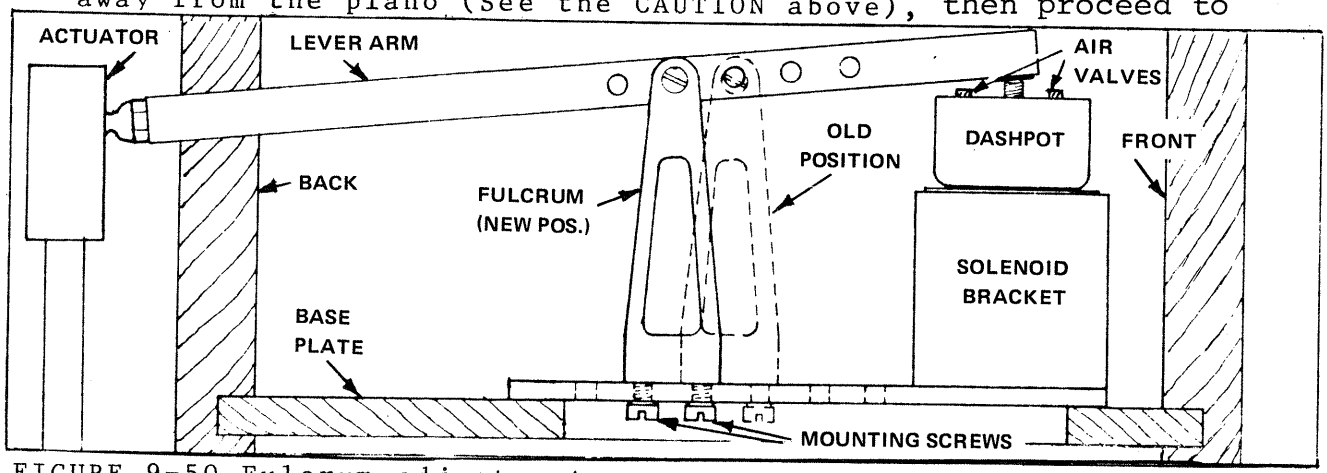


FIGURE 9-50 Fulcrum adjustment.

STEP 9-69 (cont'd)

M. Refer to FIGURE 9-50 at the bottom of page 148. Remove the screw pinning the Lever Arm to the Fulcrum and the two screws securing the Fulcrum to the Base Plate. Align the Fulcrum with the next set of holes (TOWARD the BACK of the Vorsetzer as shown in FIGURE 9-69) and secure it in place. Attach the Lever Arm to the Fulcrum with the screw, but use the next hole TOWARD the Actuator end of the Lever Arm from the original mounting hole. This procedure increases the thrust of the Solenoid by increasing the leverage it can apply to the Pedals. Proceed to Point 'N'.

N. After adjustment of the Fulcrum point has been completed, roll the Vorsetzer to the piano (See CAUTION below) and install. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Repeat Points A through N of this STEP to align the Solenoid. Proceed to Point 'P'.

CAUTION:

BEFORE MOVING THE UNIT, ALWAYS MAKE SURE THAT THE UPPER CABINET IS LOCKED IN THE UP POSITION.

P. Check to see that the Hammers are lifted 1/2" by the Hammer Rail when the Solenoid functions or that the keys shift properly. If they do, proceed to Point 'X' on page 152. If they do not function properly, loosen the Lock Nuts at the top and bottom of the Actuator Adjustment Sleeve (See FIGURE 9-51), turn the Adjustment Sleeve CLOCKWISE to SHORTEN or COUNTER-CLOCKWISE to LENGTHEN the Actuator until the Hammers are lifted 1/2" by the Solenoid, then tighten down the Lock Nuts. Proceed to Point 'X' on page 152.

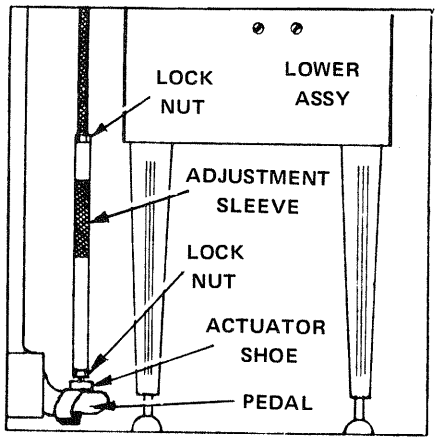


FIGURE 9-51 Pedal Actuator adjustment parts.

Q. If the Solenoid creates noise (and may throw the Hammers against the Strings) when it actuates, the the SOFT Pull-in Control may be set too high. To adjust the Pull-in Control (See FIGURE 9-52), turn the Control COUNTERCLOCKWISE until the noise stops. If this corrects the problem, proceed to Point 'X' on page 152. If the Solenoid stops operating or functions erratically before the problem is cured, return the Control to the point where the Solenoid operates normally. (See the CAUTION BELOW), and proceed to Point 'P' on page 150.

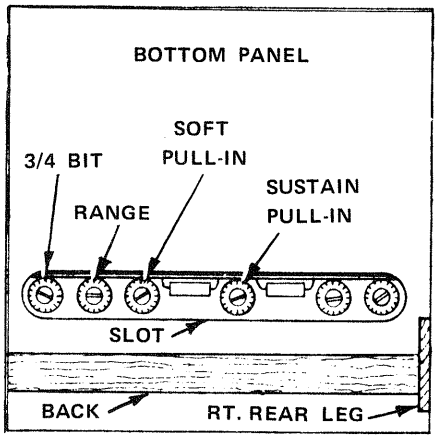


FIGURE 9-52 SOFT PULL-IN Control location.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE MOVING THE UNIT. BEFORE MOVING THE UNIT, MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

STEP 9-69 (cont'd)

P. Move the Vorsetzer away from the piano. Check the Air Valves on the top of the Dashpot (see FIGURE 9-53). If they are tight, see the CAUTION below, and proceed to Point 'Q'. If they are loose, turn each one 1/4 turn CLOCKWISE to increase the internal resistance of the Dashpot (DECREASE THE THRUST OF THE SOLENOID). Note CAUTION and proceed to Point Q.

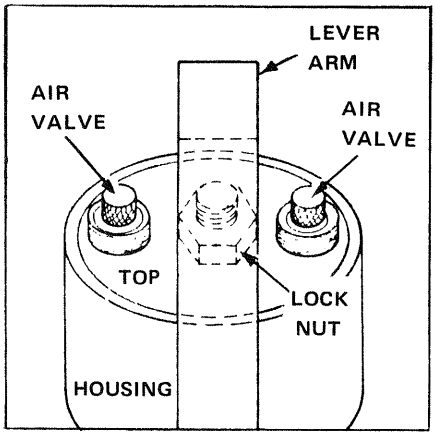


FIGURE 9-53 Dashpot Air Valves and Adjustment Parts.

CAUTION:

BEFORE MOVING THE UNIT, MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

Q. Roll the unit up to the piano and install. Plug the Power Cord into the Ground Fault Circuit Interrupter; turn the Interlock and (1) POWER Switches ON. Press the (10) PLAY Button and play Program 11. If the Solenoid functions properly, proceed to Point 'X' on page 152. If it does not work properly, NOTE the CAUTION below, then proceed to Point 'R'.

CAUTION:

BEFORE MOVING THE VORSETZER, TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, WAIT 1 MINUTE, AND MAKE SURE THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

R. Move the unit away from the piano. Remove the Screw pinning the Lever Arm to the Fulcrum and the Screws holding the Fulcrum to the Base Plate. Adjust the position of the Fulcrum one set of mounting holes TOWARD the Solenoid and secure it to the Base Plate as shown in FIGURE 9-54. Attach the Lever Arm to the Fulcrum with its mounting Screw, but use the next hold TOWARD the Solenoid end of the Lever Arm from the original mounting hole. SEE NOTE below and CAUTION ON PAGE 151.

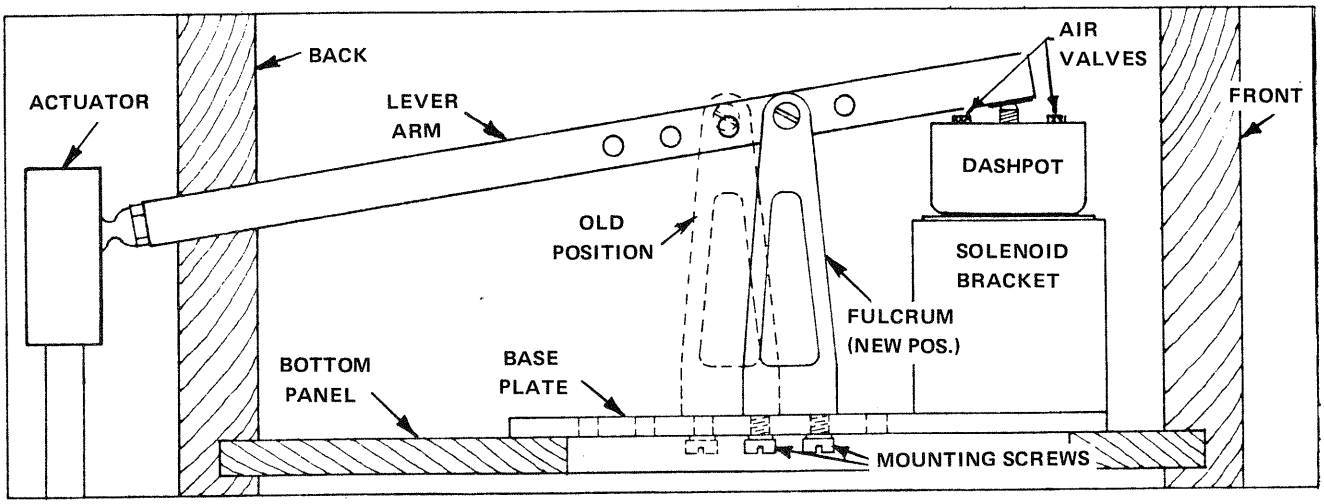


FIGURE 9-54 Fulcrum adjustment.

NOTE:

Make sure that the rubber pad on the Lever Arm (See FIGURE 9-54) is fully contacting the tip of the Solenoid plunger after the adjustment is made. This adjustment decreases the thrust of the Solenoid by decreasing the amount of leverage it can apply to the pedal.

STEP 9-69 (cont'd)

CAUTION:

BEFORE MOVING THE UNIT, MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

S. Roll the Vorsetzer up to the piano and install it. Check the adjustment of the SOFT Pedal Actuator. If it does not require adjustment, proceed to Point 'T'. If adjustment is required, loosen the Lock Nuts at the top and bottom of the Adjustment Sleeve (See FIGURE 9-55) and turn the sleeve CLOCKWISE to SHORTEN or COUNTERCLOCKWISE to LENGTHEN the Actuator, then tighten down the Lock Nuts after the adjustment is made.

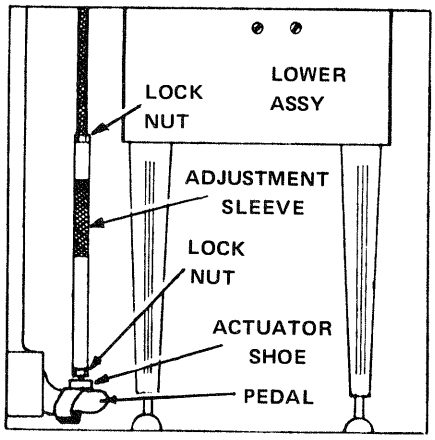


FIGURE 9-55 SOFT Pedal Actuator adjustment parts.

T. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Depress the (10) PLAY Button and observe the operation of the SOFT Pedal Solenoid. If it works properly, proceed to Point 'X' on page 152. If it requires a further reduction in thrust, NOTE THE CAUTION below, and proceed to Point 'U'.

CAUTION:

BEFORE MOVING THE UNIT, TURN THE 1 POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, WAIT 1 MINUTE, AND MAKE SURE THAT THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

U. Move the Vorsetzer away from the piano. Disassemble the Dashpot (See FIGURE 9-56) and remove the Helper Spring. Reassemble the Dashpot and roll the unit up to the piano and install it. NOTE CAUTION at top of page, then proceed to Point 'V'.

V. Plug the Power Cord into the Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. Press the (10) PLAY Button and observe the operation of the Solenoid. If necessary, repeat Procedures A through V of this STEP to align the Solenoid, then proceed to Point 'X' on page 152.

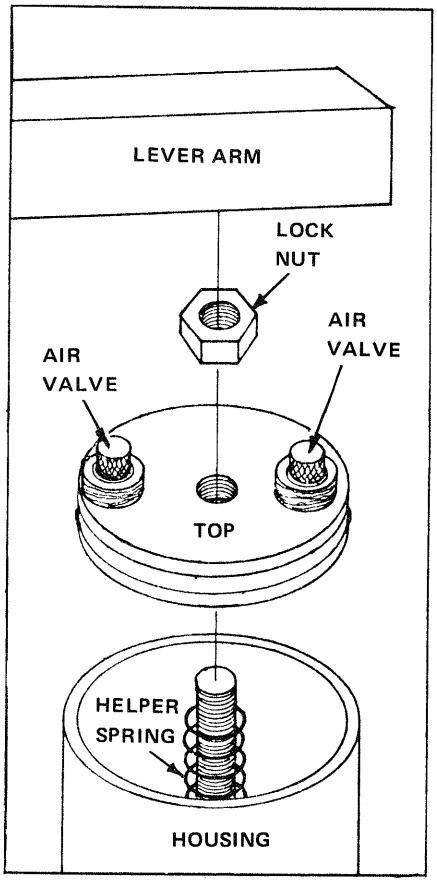


FIGURE 9-56 Dashpot disassembly.

W. If the solenoid creates noise when it releases, the internal resistance of the Dashpot is too low. Read the CAUTION Under Point 'T', then move the Vorsetzer away from the piano. Turn each of the Dashpot Air Valves (See FIGURE 9-56) CLOCKWISE 1/4 turn. Reinstall the unit on the piano and check to see that the noise is eliminated. If it is NOT, repeat this procedure until correct. SEE NOTE ON PAGE 152 and do Point 'X'.

STEP 9-69 (cont'd)

X. When ALL adjustments are completed, stop the tape and rewind it to the beginning of Program 11. Press the (10) PLAY Pushbutton and observe the operation of the Solenoid. Check for the items listed under STEP 9-68. If necessary, readjust the Solenoid by performing the procedures under STEP 9-69 until the Solenoid is properly adjusted before proceeding to STEP 9-70.

STEP 9-70

At the end of Test Program 11, stop the tape, note the reading in the (17) TAPE COUNTER window, and write it on the slip of paper you are keeping for this purpose.

NOTE:

Test Program 12 is used to check the overall operation of the system with music. During this test you will observe the operation and listen to the actual performance of the system under normal playback conditions. You will also be required to verify the proper operation of the various Controls on the PT-100 Recorder.

STEP 9-71

Depress the (10) PLAY Pushbutton and listen carefully to and observe the operation of the system as the music plays.

STEP 9-72

Check to see that the (15) FINE TUNING Lamp is OUT as, or slightly before the program begins and look at it occasionally to make sure it stays out during the selection. If it lights continuously or blinks during program material, further adjustment of the 3/4 Bit, Range, or Fine Tuning may be required -- if this does not help -- Refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures.

STEP 9-73

Vary the setting of the (4) TEMPO Control, slowly, through its entire range. As the Control is turned CLOCKWISE, the music should play FASTER and, as it is turned COUNTERCLOCKWISE, the music should play SLOWER. Watch the (15) FINE TUNING Lamp as you turn the Control. If the Lamp does NOT Light, return the Control to its Normal (12 o'clock position -- at detent) and proceed to the next STEP. If the Lamp should flash or light continuously as the Control is turned, do Procedure A below, and B on page 153.

A. Leave the (4) TEMPO Control set to the Point the Lamp lights and, while watching the Lamp, adjust the Range Control (see FIGURE 9-57) slightly CLOCKWISE or COUNTERCLOCKWISE, (whichever direction turns the Lamp OFF). Continue turning the Control 1/8 turn past the point the Lamp went out, then turn the (4) TEMPO Control through its entire range to be sure that the Lamp does NOT light and proceed to STEP 9-74. If turning the Range Control does NOT extinguish the Lamp, reset the Control to the point the Lamp is out the longest and proceed to Point B on page 153.

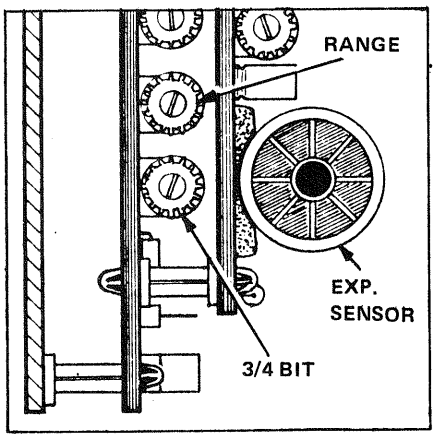


FIGURE 9-57 Range and 3/4 Bit Controls locations.

STEP 9-73 (cont'd)

B. Turn the 3/4 Bit Control (See FIGURE 9-57 on page 152) slightly CLOCKWISE or COUNTERCLOCKWISE (try both directions until the Lamp goes OUT), continue turning the Control 1/8 turn past the point the Lamp went out, then repeat Points A and B until the Lamp stays OUT throughout the entire range of the (4) TEMPO Control. Proceed to STEP 9-74.

STEP 9-74

Reset the (4) TEMPO Control to its Normal (12 o'clock - at detent) position, then flip the (7) SOFT PEDAL Switch to "ON". The SOFT Pedal Solenoid should engage and the piano should play softly. If the switch does not work, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures. Turn the switch OFF. The SOFT Solenoid will release and the piano will play normally (if this section of the tape is recorded pianissimo, the piano will continue playing softly and the Pedal Solenoid will remain actuated).

STEP 9-75

Depress the (13) PAUSE Pushbutton. The button should lock down, the tape should stop, and the (15) FINE TUNING Lamp should light. If the Button does NOT Lock and/or the tape does NOT stop, the PT-100 Recorder is defective and should be replaced. If the Lamp does NOT light, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures. Push the (13) PAUSE Button again. It should release, the tape should begin running, and the (15) FINE TUNING Lamp should go OUT (if there is program material at this point on the tape). If the Recorder does not do either, or both of the first two operation, the Recorder is defective and should be replaced. If the Lamp does NOT go OUT or flashes, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures.

STEP 9-76

Turn the (5) PIANISSIMO Control through its entire range (from MIN TO MAX). You should note some variation in the sound level at which the piano is playing, if not, refer to SECTION 10, TROUBLE ANALYSIS, for System repair procedures.

STEP 9-77

Return the (5) PIANISSIMO Control to its Normal (9 o'clock) position and turn the (6) FORTISSIMO Control through its entire range (from MIN TO MAX). You should note some variation in the sound level at which the piano is playing, if not, refer to SECTION 10, TROUBLE ANALYSIS, for system repair procedures.

STEP 9-78

Return the (6) FORTISSIMO Control to its Normal (3 o'clock) position, then depress the (12) STOP/EJECT BUTTON. Press the (11) FF (Fast Forward) Pushbutton. The tape should run forward at a high rate of speed, and the piano SHOULD NOT PLAY. If either of these conditions are NOT met, the Recorder is defective and should be replaced. Push the (12) STOP/EJECT BUTTON to stop the tape. (See the NOTE below).

NOTE:

This concludes the Playback Alignment portion of SECTION 9, TEST AND ALIGNMENT PROCEDURES, if no repairs or realignments are necessary, go to STEP 9-79 on page 154, and begin the Record Alignment portion of SECTION 9.

RECORD CIRCUIT ALIGNMENT PROCEDURES

NOTE:

Before proceeding with the following alignments, it is imperative that the Playback Circuits be properly aligned, therefore, if you have not done so, return to page 112 and follow the procedures detailed there to align the Playback circuitry.

The purpose of the following adjustments is to align ALL Key Switches to function at the SAME point as the Keys are depressed and to adjust the Record Circuits for optimum performance. Please follow each Step carefully and read each one and any related CAUTION or NOTE through THOROUGHLY so that you fully understand what is required BEFORE starting the Step.

CAUTION:

TURN THE (1) POWER AND INTERLOCK SWITCHES OFF, UNPLUG THE POWER CORD, AND WAIT 1 MINUTE BEFORE PROCEEDING.

KEY SWITCH ALIGNMENT

STEP 9-79

If necessary, expose the Keybed and remove all Keys, except Keys 5 and 84 and the four (4) Action Post Keys. See FIGURE 9-58 and the NOTE below.

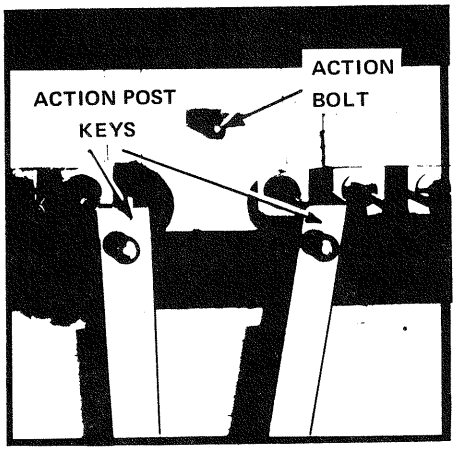


FIGURE 9-58 Action Post Keys.

NOTE:

The Action Post Keys are those immediately to the right and left of the two (2) center Action Bolts (See FIGURE 9-58).

STEP 9-80

Inspect each Key Switch and verify that it is NOT bent, does NOT bind when depressed, and that it is centered as closely as possible on the width of each of the six Keys on the Keybed, (5 and 85 and the four Action Post Keys). Inspect all Key Switch contact points for debris and remove it. Straighten and/or free any bent or binding Switches, (use the Soldering Aid -- See FIGURE 9-59 -- to straighten bent or binding Switches as shown in FIGURES 9-60 and 61 on page 155). If the legs of the Switch are spread, compress them between your thumb and forefinger to close them. (See the CAUTION and NOTE below).

CAUTION:

DO NOT APPLY EXCESSIVE FORCE TO THE BASES OF THE SWITCHES WHEN YOU STRAIGHTEN OR FREE THEM TO AVOID DAMAGING THE SWITCHES, THEMSELVES, OR THEIR SOLDER CONNECTIONS TO THE CIRCUIT BOARDS.

NOTE:

The Soldering Aid may be purchased in most electronics supply stores. The use of this tool is recommended over the use of pliers because it will not nick or weaken the the spring contact of the switch. Also, you will have better control of the amount of force applied to the Switch.

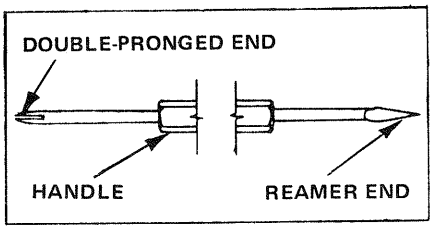


FIGURE 9-59 Soldering Aid.

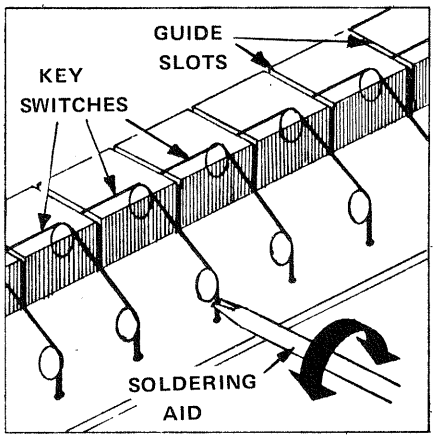


FIGURE 9-60 Lateral adjustment.

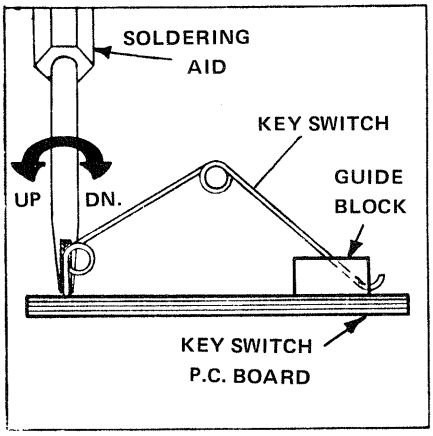


FIGURE 9-61 Height adjustment.

STEP 9-81

In order to ensure that each Switch functions at the same point when its Key is depressed, it will be necessary for you to make a Test Jig from a piece of wood. The Jig will be placed between the Front Rail Punchings of the Black and White Keys. Its width, therefore, is determined by the distance between these Punchings, its height by the distance between the bottom of the Key (when depressed half-way down through its travel) and the top of the Front Rail, and its length by convenience (the length should be between 4" and 6"). See FIGURE 9-62 and the NOTE below.

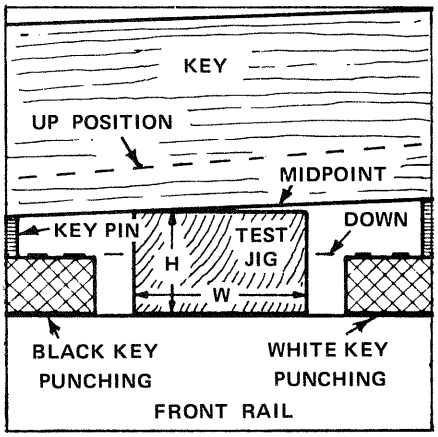


FIGURE 9-62 Test Jig dimensions.

NOTE:

After making the initial Test Jig, get a supply of shims that you can use to adjust the height of the Jig when working on other pianos.

STEP 9-82

Place the Test Jig on the Front Rail between the Black and White Key Punchings (see FIGURE 9-63). As you SLOWLY depress Key 5, observe its Key Switch and note whether the Key Switch makes contact as or before Key 5 touches the Jig or if it does NOT make contact at all. Repeat this procedure at each of the four (4) Action Post Keys and at Key 84. See the NOTE below.

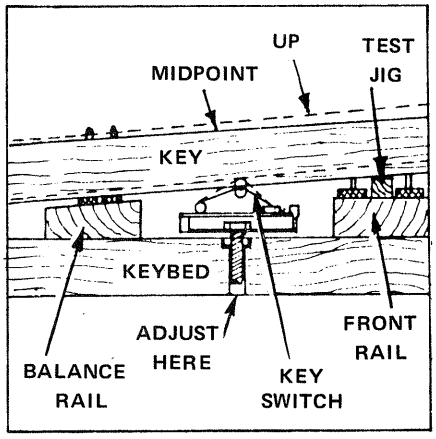


FIGURE 9-63 Key Switch check.

NOTE:

If NONE of the Key Switches make contact when their Keys touch the Test Jig, do Procedure A on page 156. If they ALL make contact BEFORE their Keys touch the Jog, do Procedure B on page 156. If they ALL make contact as their Keys touch the Test Jig, proceed to STEP 9-83. If the Switches on one side do NOT make contact and the Switches on the other make contact BEFORE their Keys touch the Test Jig, do Procedure C on page 156.

STEP 9-82 (cont'd)

A. If the Switches do NOT make contact, the Key Switch Rail is too LOW and must be raised. To raise the Rail, insert a common Screwdriver through the holes in the underside of the Keybed and turn each Leveling Screw CLOCKWISE a few turns at a time, then repeat the procedure detailed under this Step on the previous page. See the CAUTION and FIGURE 9-64 below.

CAUTION:

TO AVOID BENDING THE KEY SWITCH RAIL OR LOOSENING THE "TEE" NUTS WHEN ADJUSTING RAIL HEIGHT, TURN THE LEVELING SCREWS ONLY A TURN OR TWO AT A TIME UNTIL THE RAIL IS PROPERLY ADJUSTED.

B. If the Switches make contact BEFORE their Keys touch the Test Jig, the Key Switch Rail is too HIGH and must be lowered. To lower the Rail, insert a common screwdriver through the holes in the underside of the Keybed and turn each Leveling Screw COUNTERCLOCKWISE a few turns, then repeat the procedure detailed under this Step on page 155. See the CAUTION above and FIGURE 9-64 below.

C. If the Switches at one end do NOT make contact, that end of the Key Switch Rail is too LOW and must be raised by following the procedure detailed in Procedure A above at that end of the Rail. If the Switches at one end make contact BEFORE their Keys touch the Test Jig, that end of the Rail is too HIGH and must be lowered by following the procedure detailed in Point B above at that end of the Rail.

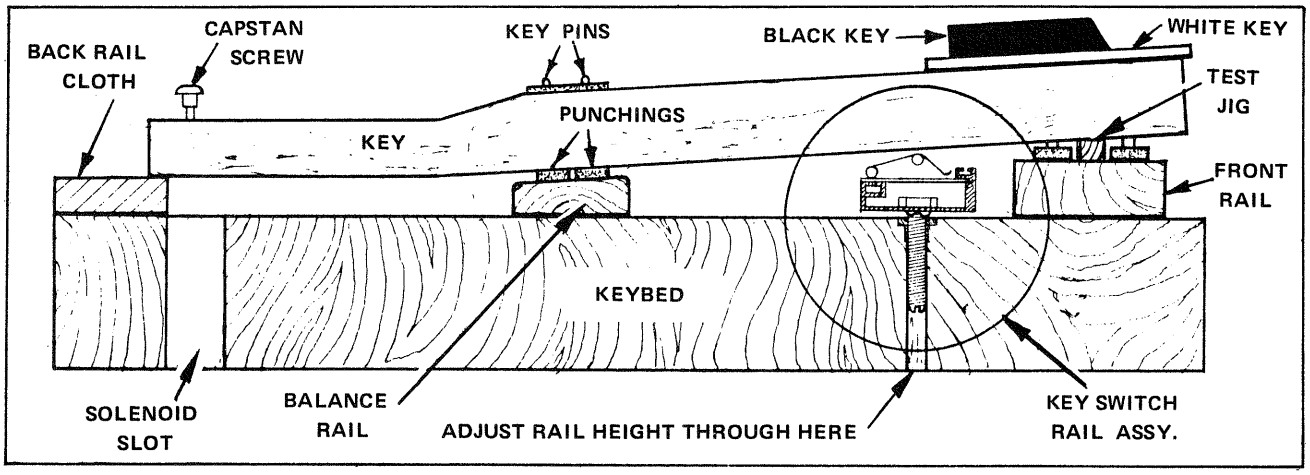


FIGURE 9-64 Cross-section through Keybed.

NOTE:

The adjustments above are done to minimize the number of Key Switches that require further adjustment, thus, saving time and shortening a tedious procedure.

CAUTION:

WHEN MAKING THE CONNECTIONS TO OR DISCONNECTING FROM THE PLAYBACK PC BOARD, ALWAYS PROVIDE SUPPORT FOR THE BOARD WITH ONE HAND TO AVOID DAMAGING THE BOARD OR THE CONNECTORS.

STEP 9-83

Disconnect Cable #10 (to the PT-100 Recorder) from Connector J2 on the Playback Board and connect the 12 pin connector of the Test Box to Connector J2. If not connected, connect the 4 pin connector of the Test Box to TP5, TP3, and TP7 on the Playback Board (this connector is keyed to fit only one way on the Test Points) and connect the 3 pin connector to TP1 and TP2 (wire to TP2) as shown in FIGURE 9-65.

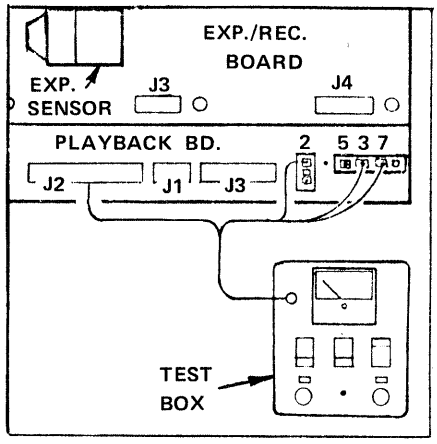


FIGURE 9-65 Test Box connections.

STEP 9-84

Note the position of the Pointer in the Test Box Meter. It should be resting at the "0" (first on the left) mark. If it is not, set it there by adjusting the Meter Zero Control shown in FIGURE 9-66.

STEP 9-85

Refer to FIGURE 9-66 and set the Test Box Controls and Switches as follows:

MODE - PLAY/STANDBY Switch to PLAY

METER - TREB/BASS Switch to BASS

SOFT PEDAL - ON/OFF Switch to OFF

PIANISSIMO Control to Position 2 (9 o'clock)

FORTISSIMO Control to Position 8 (3 o'clock)

METER ADJ. Control as set previously.

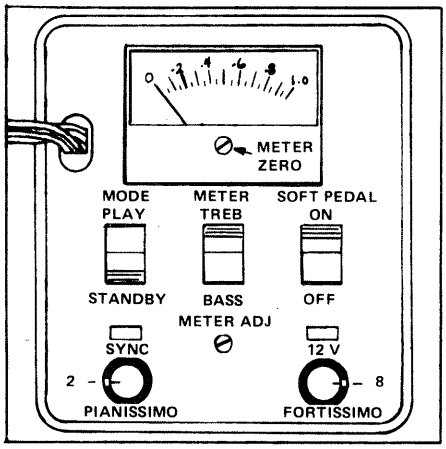


FIGURE 9-66 Test Box settings.

STEP 9-86

Plug the Power Cord into the Ground Fault Circuit Interrupter and turn the Interlock and (1) POWER Switches ON. When the (1) POWER Switch is turned ON, the 12V Lamp on Test Box should light and the SYNC Lamp stay OUT. If either or both do not function as stated, refer to Section 10, TROUBLE ANALYSIS, for system repair procedures.

STEP 9-87

Place the Test Jig under Key 5 between the Black and White Key Punchings on the Front Rail as shown in FIGURE 9-67. SLOWLY depress Key 5. When the bottom of Key 5 touches the Jig, the Key 5 Solenoid should energize and cause the Hammer to strike the Strings. If the Switch does not energize the Solenoid or it does before the Key touches the Jig, see the CAUTION on page 158, then do Points A and B under this Step on the next page.

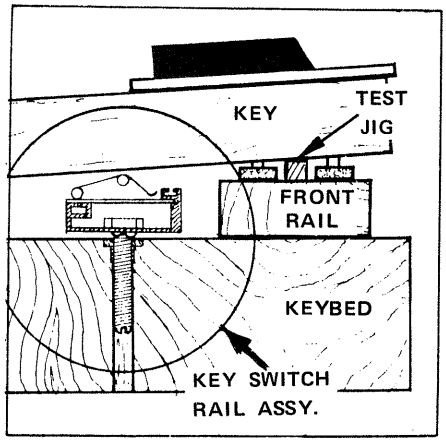


FIGURE 9-67 Key Switch Test Jig placement.

STEP 9-87 (cont'd)

CAUTION:

SINCE THIS ADJUSTMENT MUST BE MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, STAY ON THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS, ARMS, AND TOOLS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

WHEN ADJUSTING THE KEY SWITCHES, DO NOT APPLY EXCESSIVE FORCE TO THEIR BASES AS YOU ADJUST THEM TO AVOID DAMAGING THE SWITCHES, THEMSELVES, OR THEIR SOLDER CONNECTIONS TO THE CIRCUIT BOARDS.

A. If the Key Switch makes contact BEFORE the Key bottom touches the Test Jig, the Key Switch is too HIGH. To adjust the height of the Key Switch, place the double pronged end of the Soldering Aid at the base of the Key Switch and bend the Switch FORWARD. See FIGURE 9-68, recheck the operation of the Switch and readjust it, if necessary, until it works properly, see the NOTE below and proceed to STEP 9-88.

B. If the Key Switch does NOT make contact when the Key bottom touches the Test Jig, the Switch is too LOW. To adjust the Key Switch height, place the double pronged end of the Soldering Aid at the base of the Switch and bend the Switch BACKWARD slightly, recheck the operation of the Switch, and readjust, it necessary, until it works properly. See the NOTE below, then proceed to STEP 9-88.

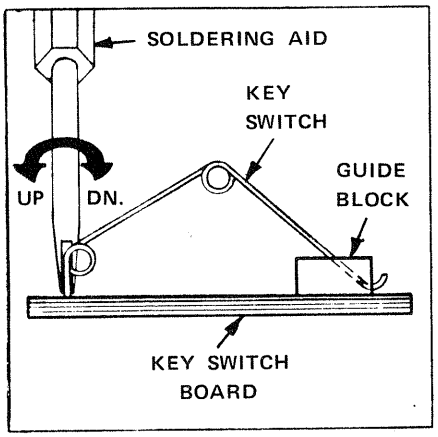


FIGURE 9-68 Key Switch height adjustment.

NOTE:

After adjusting the Key Switch, check to see that it is not bent to one side. If it is, place the Soldering Aid at the base of the Switch and bend the Switch to the right or left to straighten it. See FIGURE 9-69.

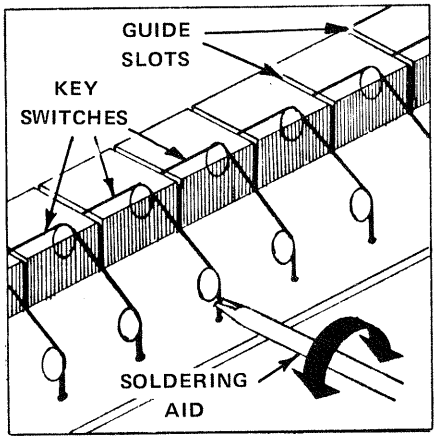


FIGURE 9-69 Straightening a bent Switch.

STEP 9-88

Install Key 6 on the Keybed and repeat the procedures detailed in STEP 9-87 on Key 6, then install the next Key, repeat STEP 9-87 on it and so on until ALL Key Switches are aligned.

CAUTION:

SINCE THE FOLLOWING ADJUSTMENTS MUST BE MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, STAY ON THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS, ARMS, AND TOOLS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

STEP 9-89

On the Test Box, set the MODE - PLAY/STANDBY Switch to STANDBY (see FIGURE 9-70), then select two (2) Keys at the Center of the Bass half of the Keyboard and play a trill. Begin playing pianissimo and gradually build to fortissimo. While playing, observe the reading on the Test Box Meter. The Meter should register a fluctuating reading which causes the Meter to move off the nominal reading of .4 to .5 while you are playing pianissimo and gradually rise to a reading of 1.0 as you begin playing fortissimo. If the Meter pointer fluctuates GREATLY as you play pianissimo or reaches a reading of 1.0 before you actually are playing the Keys fortissimo, do Point A below. If the Meter registers only slightly OR NOT AT ALL, when you play pianissimo, or does not reach a reading of 1.0, when you play fortissimo, do Point B below.

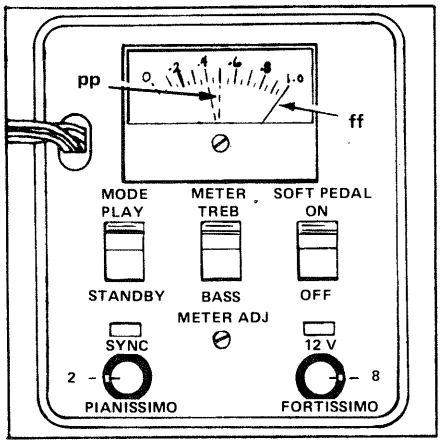


FIGURE 9-70 Test Box setting and Meter readings.

A. To decrease the Bass Expression Level (which corrects the first trouble stated above), turn the Bass Expression Level Control (see FIGURE 9-71) CLOCKWISE SLIGHTLY while playing the two Keys pianissimo and fortissimo and observing the Test Box Meter. Continue adjusting the Control until the Meter registers correctly during this test, then proceed to STEP 9-90.

B. To increase the Bass Expression Level (which corrects the second trouble stated above), turn the Bass Expression Level Control (see FIGURE 9-71) COUNTERCLOCKWISE SLIGHTLY while playing the two Keys pianissimo and fortissimo and observing the Test Box Meter. Continue adjusting the Control until the Meter registers correctly during this test, then proceed to STEP 9-90.

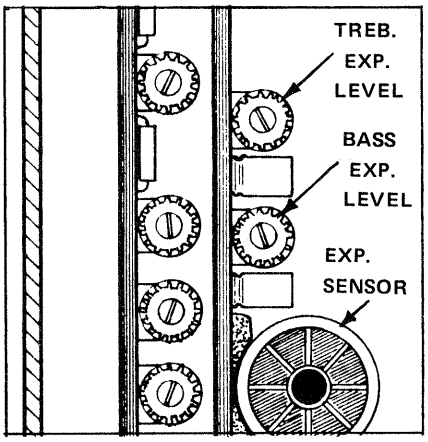


FIGURE 9-71 Bass and Treble Expression Level Controls.

STEP 9-90

On the Test Box, set the METER - TREB/BASS Switch to TREB (see FIGURE 9-72) and leave all other controls as set previously. Select two (2) Keys at the center of the Treble half of the Keyboard and trill them (use the same two fingers as you used to play the Bass Keys). Begin playing pianissimo and gradually build to fortissimo. As you play, observe the reading on the Test Box Meter - it should register in the same manner as it did for the Bass in STEP 9-89. If the Meter displays the first trouble stated in STEP 9-89 during the playing of the Treble Keys, turn the Treble Expression Level Control (see FIGURE 9-71) COUNTERCLOCKWISE to decrease level. If the Meter displays the second trouble stated in STEP 8-89, turn the Treble Expression Level Control CLOCKWISE to increase the level.

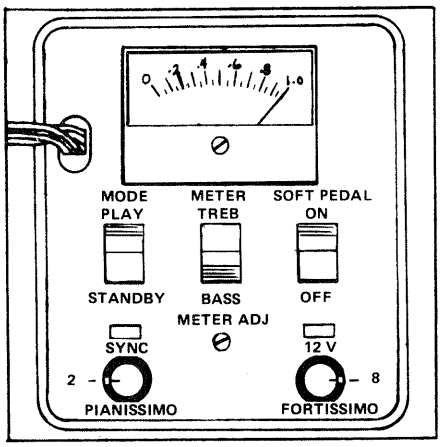


FIGURE 9-72 Test Box settings.

NOTE:

If you cannot adjust either the Bass Expression Level or the Treble Expression Level, the Record Circuit Board may be defective. Refer to Section 10 to correct the trouble.

STEP 9-91

Slowly depress the SUSTAIN Pedal to the point where the Damper Lifter Rod just begins to lift the Dampers, then look at the SUSTAIN Pedal Switch (see FIGURE 9-73) and it should just begin making contact. If it does not make contact, adjust the Spring Clip on the Pedal Switch Actuator by sliding it down the Actuator. Recheck by repeating these procedures and readjusting, if necessary, until the Switch operates correctly. If the Switch closes too soon, slide the Spring Clip up the Actuator, recheck and readjust as necessary. See the CAUTION below.

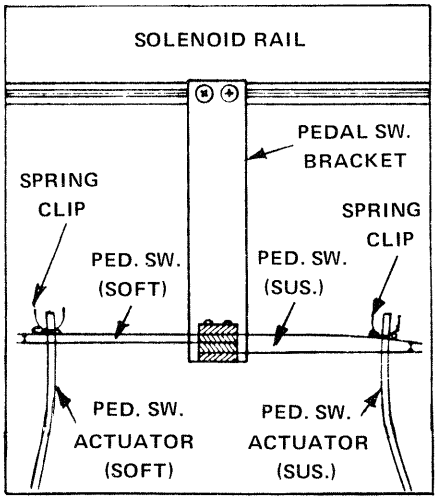


FIGURE 9-73 Pedal Switch Actuator adjustment.

STEP 9-92

Slowly depress the SOFT Pedal to the point where the Hammer Rail just begins lifting the Hammers, then look at the SOFT Pedal Switch (see FIGURE 9-73 above) and it should just begin making contact. If it is not making contact or it makes contact too soon, adjust the Spring Clip by following the procedures detailed under STEP 9-91 above. See the CAUTION below.

CAUTION:

SINCE THESE ADJUSTMENTS ARE MADE WHILE THE SYSTEM IS OPERATING, YOU MUST OBSERVE PROPER SAFETY PROCEDURES: WEAR THE RUBBER GLOVES, STAY ON THE RUBBER MAT, AND WATCH THE POSITION OF YOUR HANDS AND ARMS TO AVOID COMING IN CONTACT WITH THE HIGH VOLTAGES PRESENT IN THE SYSTEM.

STEP 9-93

If you are a musician or have one available, make a recording using the system. Play back the recording and check the operation of the system. If you note a slurring of notes during trills, the Key Switch Rail is too HIGH and must be adjusted. Repeat STEP 9-82. If notes are missed or trills sound choppy, the Key Switch Rail is too LOW. Repeat STEP 9-82. If the sound levels between the bass and treble are uneven, repeat STEPS 9-89 and 9-90 to balance them. If you notice that the SUSTAIN or SOFT Pedal Solenoids are actuated for too long or too short a time, readjust their respective Pedal Switches as detailed in STEPS 9-91 and 9-92.

STEP 9-94

Insert the PIANOCORDER Alignment Test Tape and play it to recheck all playback functions. If necessary, readjust the system for optimum performance, then stop the tape and remove it.

STEP 9-95

Insert a music tape from the tape library into the Recorder and Play the tape. Allow the system to play for, at least, 1 hour to verify that it is working properly and to allow the moving parts to work in. After this playing period, refer back to Section 8, FINAL ASSEMBLY PROCEDURES, to close up the piano upon completion of the Model P-100 PIANOCORDER assembly installation (these procedures are not required on the Models P-100M and P-200). Install the Lower Cabinet Guard on the Model P-200.

This concludes Section 9, TEST AND ALIGNMENT PROCEDURES refer to Section 8, FINAL ASSEMBLY PROCEDURES, to close up the piano after the installation of the PIANOCORDER Model P-100 Assembly.

PIANOCORDER™ REPRODUCING SYSTEM

TROUBLE ANALYSIS GUIDE INTRODUCTION

This guide is intended to assist the technician in servicing the PIANOCORDER™ reproducing systems. Every effort has been made to manufacture the PIANOCORDER systems with the highest quality materials and to insure that in every respect they are high quality products. Before servicing a PIANOCORDER™ reproducing system, study this Trouble Analysis Guide and familiarize yourself with the methods suggested to analyze, diagnose, and isolate the trouble and to replace the faulty assembly.

Two points should be understood before any attempt at servicing is undertaken. First, carefully read and take note of the Trouble Analysis procedure you are following. Second, the sequence of servicing is important. The sequence of suggested procedures should be followed. For example, once it is understood that the Power Supply is operating, then, and only then, should you proceed to servicing the playback system. In a like manner, the recording system should only be serviced if the playback system is in perfect operating order.

To help you understand the operation and interaction of the PIANOCORDER™ reproducing system, we have provided block diagrams and a brief functional description at the head of each section. To further familiarize yourself with the system, you should read the owner's manuals supplied with the various PIANOCORDER systems.

CAUTION: IT IS OF UTMOST IMPORTANCE THAT THE GROUND FAULT CIRCUIT INTERRUPTER UNIT SUPPLIED WITH YOUR DP-100 MAINTENANCE KIT BE INSTALLED AND THAT THE PIANOCORDER SYSTEM IS CONNECTED TO IT, AND NOT DIRECTLY TO THE AC POWER SOURCE. FAILURE TO HEED THIS PROCEDURE CAN RISK POSSIBLE DESTRUCTION OF THE SYSTEM AS WELL AS EXPOSING THE TECHNICIAN TO POSSIBLE LETHAL SHOCK HAZARDS.

Proper trouble analysis techniques for the PIANOCORDER™ reproducing system are based upon, first of all, determining if the alignment of the system is correct (this may mean first determining if the operation and regulation of the piano is correct). Detailed procedures in the installation portion of this manual should be followed exactly when aligning the PIANOCORDER system. In all trouble analysis and maintenance procedures, the most important part of the procedure is ALIGNMENT! Any time you replace a part, change a control setting, or move and adjust a mechanical part, you SHOULD ALWAYS RE-CHECK THE ALIGNMENT AND ADJUST AS NECESSARY. Following this procedure will insure the maximum benefit for you and for the customer.

If during your trouble analyses you encounter difficulty, call the PIANOCORDER system service information department. A technical representative will return your call and assist you in the maintenance of the PIANOCORDER™ reproducing system. The number to call is 1-800-423-5224 in the continental United States; except California, call 1-213-998-9333.

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

Change No. 2 -- 8/15/78

PIANOCORDER™ Reproducing System

TROUBLE ANAYSIS GUIDE

Section One: AC MAIN POWER AND THE POWER SUPPLY

Change No. 2 -- 8/15/78

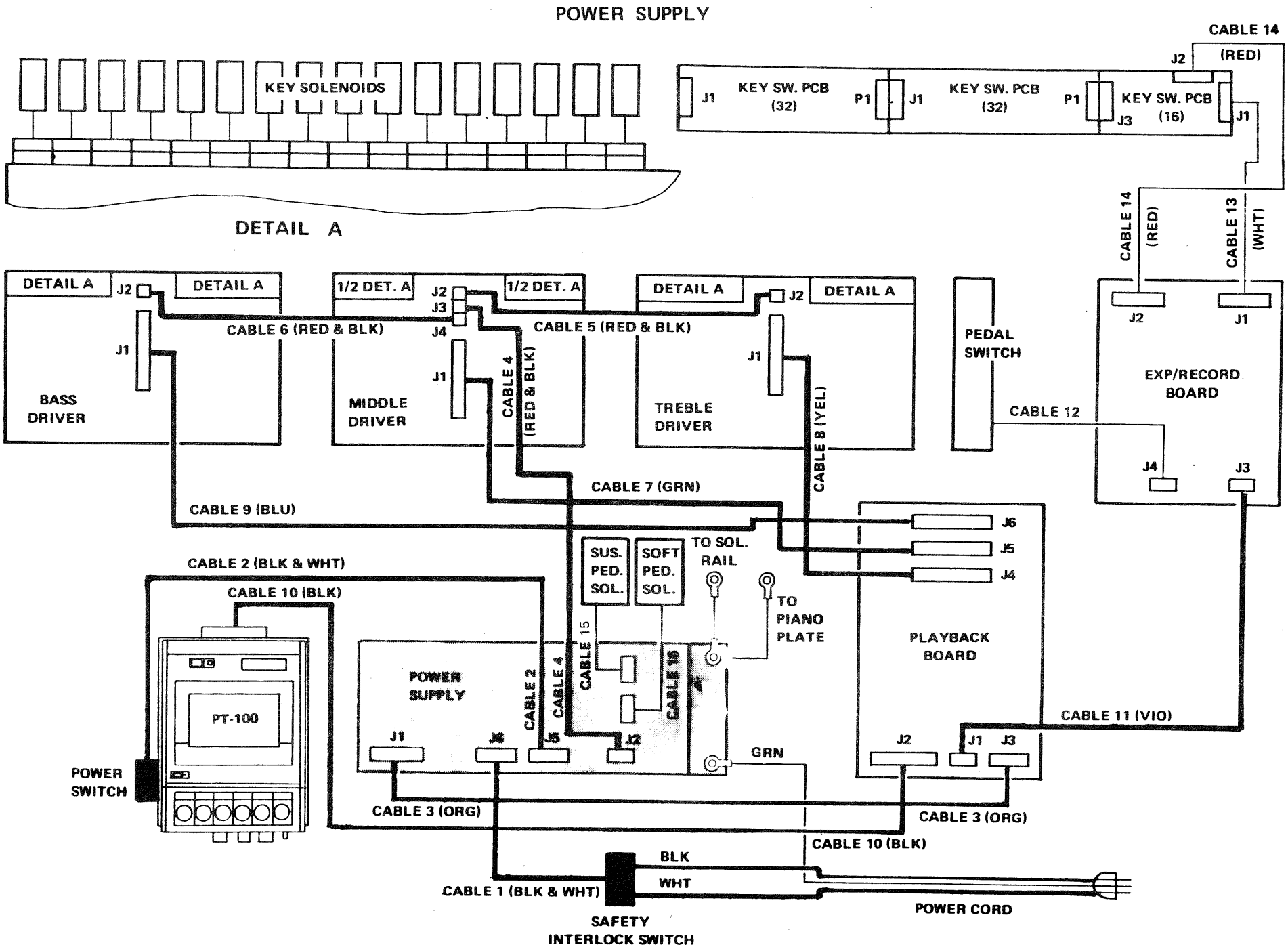


FIGURE A - Power Supply Wiring Diagram

PIANOCORDER™ REPRODUCING SYSTEM

SECTION ONE: AC MAIN POWER AND POWER SUPPLY FUNCTIONAL DESCRIPTIONS

NOTE:

Refer to FIGURE (A) while reading these descriptions.

AC MAIN POWER

The 110V AC power enters the system through the AC MAIN POWER circuitry consisting of the Power Cord, Interlock Switch, Cables 1 and 2, and the POWER Switch. When connected to a wall socket, the power passes through the Power Cord to the Interlock Switch. If on, the Switch passes the current through Cable 1 to Connector J6 on the Power Supply. At this time, the Power Supply acts as a junction between Cables 1 and 2 and as a safety device. The safety feature is Fuse FS1 (12 Amps). After leaving Fuse FS1, the power exits through Connector J5 through a set of wires in Cable 2 to the POWER Switch. If the POWER Switch is ON, the electricity returns through another set of wires in Cable 2 and Connector J5 back into the Power Supply, where it is converted into system power.

POWER SUPPLY

In the Power Supply, the 110V AC is converted into the various DC Voltages used to energize the system. The Power Supply has the following four functions:

1. To generate the +5V DC which powers the Playback Logic Board (through Cable 3) and the logic devices on the Key Solenoid Driver Boards (through Cables 7, 8, and 9).

2. To generate the +12V DC to power the Tape Recorder (through Cable 10) and the Expression/Record Logic Board (via Cable 3 to the Playback Logic, back out of the Playback Logic Board through Cable 11 to the Expression/Record Logic Board).

3. To generate the +180V DC to power the Key Solenoids (through Cables 4, 5, and 6) and the SOFT Solenoid (through Cable 16) and the SUSTAIN Solenoid (through Cable 15).

4. To provide the drive for the SOFT and SUSTAIN Pedal Solenoids. The Driver circuitry for the Pedal Solenoids is located on the Power Supply as are the SOFT and SUSTAIN L.E.D.'s, which indicate that input signals are being received from the Playback Logic Board (through Cable 3).

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

Change No. 2 -- 8/15/78

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Neither the FINE TUNING nor POWER Lamp lights when power is applied.	A. System is NOT plugged in.	Plug the Power Cord into the AC outlet and retest.
	B. Power is NOT present at outlet.	Unplug Power Cord from outlet (See CAUTION above) and plug the leads from the 110V Test Lamp (supplied with DP-100 Maintenance Kit -- see NOTE below) into outlet. If the Lamp does NOT light, no power is present at outlet -- try a second outlet and retest as detailed above. If power is not present at second outlet, check to see that the Fuses and Circuit Breakers of both outlets are functioning. If working, wiring for outlets or the outlets themselves, are defective and you must locate a working outlet which can supply 15 Amps to the system. If NOT working, have the Fuses replaced or the Circuit Breakers activated by a QUALIFIED TECHNICIAN, then retest as detailed above.
	C. Interlock NOT engaged by Lower Frame.	Remove Lower Frame. Plug the Power Cord into the Circuit Interrupter, then PUSH IN AND HOLD the Interlock Switch. If the system functions, the Interlock Switch is not correctly aligned. Refer to SECTION 7, STEPS 7-68 thru 7-75, pages 94 and 95, for alignment procedures. If the system DOES NOT function, proceed to (D). TURN POWER OFF AND UNPLUG POWER CORD.
	D. No 110V AC to Power Supply.	TURN POWER OFF AND UNPLUG UNIT. Temporarily remove 12 Amp Fuse (FS1) from the Power Supply. Spread the leads of the 110V Test Lamp so that each will contact a spring clip on the ends of the (FS1) Fuse Holder when touched to it. (See FIGURE B. Plug the Power Cord into the Circuit Interrupter and TURN POWER ON. Pull out the button on the Interlock Switch until it locks in the OUT (TEST) position. While holding the case of the Test Lamp WITH ONE HAND, touch the Test Lamp leads to the spring clips on the (FS1) Fuse Holder. If the Lamp lights, the Power Supply is receiving power - proceed to (J) on page 168. If the Lamp DOES NOT Light, proceed to (E) on page 167.

NOTE: WHEN REFERENCE IS MADE TO "THE KIT" IN THESE PROCEDURES, THE KIT REFERRED TO IS THE DP-100 MAINTENANCE KIT, WHICH CONTAINS REPLACEMENT PARTS AND SOME TEST FIXTURES.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Neither the FINE TUNING nor POWER Lamp light when power is applied. (continued)	E. Power Cord, Cable 1, and Power Supply	Visually inspect the Power Cord and Cable 1 for broken or burned wiring and damaged connectors and the Power Supply for burned components or other signs of damage. If no defects are detected, proceed to (F). If any or all are defective, replace them with new ones from the kit and retest. If no trouble is observed after repair, proceed to repair any other system defects. If the problem continues, proceed to (F).
	F. Power Cord	See the CAUTION above. Reinstall the 12 Amp Fuse (FS1) removed in 1-D. Disconnect the Power Cord connectors from the Interlock Switch, insert one of the 110V Test Lamp leads in the connector on the BLACK Power Cord Wire and the other Test Lamp lead in the connector on the WHITE wire, and place the Test Lamp so it DOES NOT touch any part of the System. Plug the Power Cord into the Circuit Interrupter. If the Lamp lights, the Power Cord is good -- go to (G). If the Lamp DOES NOT light, replace the Power Cord with a new one from the kit and retest as detailed above.
	G. Interlock Switch	See CAUTION above. Carefully disconnect Cable 1 from the Interlock Switch and adjust the leads of the 110V Test Lamp so that they contact the Cable 1 pins on the Interlock Switch (See FIGURE 1B). Plug the Power Cord into the Circuit Interrupter, HOLD THE BARREL OF THE TEST LAMP WITH ONE HAND, and push in the Button on the Interlock Switch. If the Lamp lights, the Switch is good in the IN (FUNCTION) position. Keep the Test Lamp leads in contact with the Cable 1 pins on the Switch, then pull the Switch button OUT until it locks in the ON (TEST) position. If the Lamp lights, the Switch is good in the TEST position. If the Lamp DOES NOT light in either, or both positions, the Switch is defective and should be replaced with a new one from the kit. Unplug the Power Cord and replace the Interlock Switch, then retest as detailed above.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Neither the FINE TUNING nor POWER Lamp lights when power is applied. (continued)	H. Interlock Switch Wiring	UNPLUG POWER CORD FROM CIRCUIT INTERRUPTER (See CAUTON above). Disconnect Cable 1 from Connector J6 on the Power Supply. Insert a lead from the 110V Test Lamp in the Cable 1 connector at the BLACK wire and the other Lamp lead in the connector at the WHITE wire. Plug the Power Cord into the Circuit Interrupter, then pull the button on the Interlock Switch OUT until it locks in the ON (TEST) position. If the Test Lamp lights, Cable 1 is good -- proceed to (I). If the Lamp DOES NOT Light, check the Cable 1 connectors at the Interlock Switch (See CAUTION above). Try again. If the Test Lamp still will not light, UNPLUG POWER CORD and replace Cable 1 with a new one from kit, then retest as detailed above.
	I. Power Switch or Cable 2 defective.	TURN POWER OFF. Get a new Power Switch and Cable 2 from the kit and connect them together. Disconnect the original Cable 2 from Connector J5 on the Power Supply and connect the new cable to J5. Place the new Cable 2 and Power Switch so that they DO NOT contact any part of the system (leave outside piano). TURN POWER ON. If the system functions, either the old Power Switch or Cable 2 is defective. TURN POWER OFF. Disconnect the old Cable 2 from the Power Switch in the Tape Recorder Bracket and connect the new cable. TURN POWER ON. If the system functions, the old Cable 2 is defective. Leave the new cable connected and close the cover over the Power Switch. If the system is inoperative still, the Power Switch is bad and must be replaced. Remove the original Power Switch and replace it with the new, then retest as detailed above.
	J. 12 Amp AC Fuse (FS1) is blown.	TURN POWER OFF AND UNPLUG THE POWER CORD. Reinstall the 12 Amp Fuse (FS1 -- removed in (D) on page 166). Adjust the leads of the 110V Test Lamp so they contact the end clips of the FS1 Fuse Holder. TURN POWER ON. HOLD THE BARREL OF THE TEST LAMP WITH ONE HAND and touch its leads to the end clips of the Fuse Holder. If the Lamp lights, the fuse is bad. Replace it with a good one from the kit, and retest as above. If the Lamp

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Neither the FINE TUNING nor POWER Lamp lights when power is applied. (continued)	K. 1.5 Amp Fuse (FS2)	TURN POWER OFF. Remove the 1.5 Amp Fuse (FS2) from the Power supply and visually inspect it. If the wire in the glass section of the fuse is broken or burned, the fuse is blown and should be replaced with a new one from the kit. TURN POWER ON. If the fuse was good or the new fuse did not solve the problem, proceed to (L). If the replacement fuse blew when power was applied, proceed to SYMPTOM 3 on page 170.
	L. Tape Recorder	TURN POWER OFF. Make sure Cable 10 is properly plugged onto Connector J2 on the Playback Logic Board. If necessary, reconnect it -- DO NOT SKIP PINS. Visually inspect Cable 10 wires and plugs for damage. After checking, TURN POWER ON. If problem remains, TURN POWER OFF. Disconnect Cable 10 from Connector J2 on the Playback Logic Board. Get the PIANOCORDER Test Box from the kit and plug the 12 pin Test Box plug onto Connector J2 on the Playback Logic Board. Set the MODE - PLAY/STANDBY Switch to STANDBY. TURN POWER ON. If the SYNC and 12V Lamps on the Test Box light, TURN POWER OFF, and replace the Recorder. If the Test Box lamps DO NOT light, proceed to (M
	M. Power Supply	TURN POWER OFF. Remove ALL plugs from Power Supply. Get a new Power Supply from the kit and connect all plugs to it outside the piano. TURN POWER ON. If the Problem is corrected, replace the old Power Supply. If the trouble remains, reconnect the original Power Supply.
	N. Playback Logic Board	TURN POWER OFF. Disconnect Cables 7, 8, 9, and 11 from Connectors J5, J4, J6, and J1, respectively, on the Playback Logic Board. Visually inspect the PC Board for burns or defective components and Cables 3 an 10 for damaged wires or connectors. Make sure all plugs are connected properly. TURN POWER ON. If the FINE TUNING and POWER Lamps still DO NOT light, TURN POWER OFF and replace the Playback Logic Board.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
2. The Ground Fault Circuit Interrupter actuates when power is applied.	A. Ground wire from the AC outlet is shorted to the AC line.	Perform procedures detailed under SYMPTOM 3.
3. The 12 Amp Fuse (FS1) on Power Supply blows when power is applied.	A. Power Supply	TURN POWER OFF AND UNPLUG POWER CORD. To determine if fuses determine if fuses are blown, do the test procedures under SYMPTOM 1, POSSIBLE CAUSES (J) and (K) on page 168. Remove ALL plugs from the Power Supply. Visually inspect ALL PC boards for burns or damaged components. Replace any defective boards or fuses. Plug Cables 1 and 2 on the Power Supply. Connect the High Voltage Circuit Tester between Connector J2 on the Power Supply and Cable 4 (RED & BLK wires) ** SEE NOTE. TURN POWER ON. If the lamp on the Tester lights, TURN POWER OFF and replace the Power Supply, then retest. If problem remains, proceed to (C).
	B. Cable 4	TURN POWER OFF AND UNPLUG UNIT. Visually inspect the wires and plugs of Cable 4. Install the Circuit Tester between the plug on Cable 4 and Connector J2 on the Power Supply. Make sure all plugs are properly connected. Unplug Cable 4 from the Center Driver Board. TURN POWER ON. If the lamp on the Circuit Tester lights, Cable 4 is shorted and should be replaced with a new one from the kit. TURN POWER OFF, replace Cable 4 and retest. If the Lamp DOES NOT light, proceed to (C).

** NOTE: ANY TIME THE CIRCUIT TESTER LAMP LIGHTS, IT INDICATES THAT THERE IS A SHORT IN THE +180V DC LINE -- THE LAMP ALSO PREVENTS THE FUSE FROM FAILING. USING THIS TESTER AS A FAULT INDICATOR, PROCEED WITH THE TROUBLE ANALYSIS OF SYMPTOM 3, POSSIBLE CAUSES (A) THROUGH (G). DO NOT REMOVE THE HIGH VOLTAGE TESTER UNTIL YOU HAVE SOLVED THE TROUBLE (WHEN POWER IS APPLIED WITH NO TAPE PLAYING AND THE LAMP DOES NOT LIGHT, THE PROBLEM IS CURED).

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. The 12 Amp Fuse (FS1) the Power Supply blows when power is applied. (continued)	C. Center Driver Board, Playback Board, Cable 7, or Solenoid(s) shorted.	1) TURN POWER OFF. Disconnect Cables 5, 6, and 7 from the Center Driver, then visually inspect the Center Driver for burns or damaged components and the cables for broken wires and damaged connectors. Replace damaged parts with new ones from the kit. 2) Connect Cable 4 to the Center Driver (J3). TURN POWER ON. If the lamp on the High Voltage Circuit Tester lights, TURN POWER OFF, replace the Center Driver, and retest. If the lamp DOES NOT light, inspect each Key Solenoid connected to the Center Driver for burned or discolored coils or wires Replace any burned or discolored Solenoids and retest, then proceed to (3). 3) TURN POWER ON MOMENTARILY. If the Tester Lamp lights, check to see if one or more Solenoids is actuated and stays on constantly. If one or more light, replace them with new ones from the kit and retest. 4) If the Solenoids check OK (DO NOT actuate and stay on) after retest, but the Tester Lamp is still lit, TURN POWER OFF and disconnect ALL solenoids from the Center Driver. TURN POWER ON MOMENTARILY. If the Tester Lamp lights, replace the Center Driver and retest. IF the lamp DOES NOT light, proceed to (5). 5) TURN POWER OFF. Connect the first Key Solenoid to its connector at the left end of the Center Driver, TURN POWER ON MOMENTARILY, and observe the Circuit Tester. If the Tester Lamp DOES NOT Light, the Solenoid is good; if the

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. The 12 Amp Fuse (FS1) on the Power Supply blows when power is applied. (continued)	C. Center Criver Board, Playback Board, Cable 7, or Solenoid(s) shorted. (continued)	6) TURN POWER OFF AND UNPLUG UNIT. Plug Cable 7 onto the Center Driver (J1). TURN POWER ON. Check to see that the Tester lamp is OUT and that none of the Solenoids actuate and stay on. If one or more Solenoids actuate and stay on, and/or the Circuit Tester lamp is lit, TURN POWER OFF and replace Cable 7 with a new one from the kit.
		7) TURN POWER ON. Check to see that none of the Solenoids actuate and stay on and that the Tester lamp is OUT. If no Solenoids actuate and stay on, proceed to (D). If Solenoid(s) actuate and stay on and/or the Tester lamp lights, TURN POWER OFF and replace the Playback Logic Board, then retest.
	D. Cable 5	TURN POWER OFF. Visually inspect the wires and connectors of Cable 5. Connect Cable 5 to the Center Driver (J2) and disconnect it from Connector J2 on the Treble Driver. TURN POWER ON. If the Circuit Tester lamp lights, replace Cable 5, and retest. If the lamp DOES NOT light, proceed to (E).
	E. Treble Driver Board, Playback Board, Cable 8, or Solenoid(s) shorted.	1) TURN POWER OFF and disconnect Cables 5 and 8 from the Treble Driver, then visually inspect the PC Board for burns and damaged components and the Treble Driver Key Solenoids for burned or discolored coils and wires. Replace damaged parts with new ones from the kit.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. The 12 Amp Fuse (FS1) ON THE Power Supply blows when power is applied. (continued)	E. Treble Driver board, Playback Board, Cable 8, or Solenoid(s) shorted. (continued)	2) Connect Cable 5 to the Treble Driver (J2). TURN POWER ON. If the lamp on the Circuit Tester lights, TURN POWER OFF, replace the Treble Driver, and retest. If the lamp DOES NOT light, inspect each Key Solenoid connected to the Treble Driver for burned or discolored coils or wires. Replace any burned or discolored Solenoids and retest, then proceed to (3). 3) TURN POWER ON MOMENTARILY. If the Tester lamp lights, check to see if one or more Solenoids actuate and stay on constantly. If one or more do, replace them with new ones from the kit and retest. 4) If the Solenoids check OK (DO NOT Actuate and stay on) after retest, but the Tester lamp is still lit, TURN POWER OFF and disconnect ALL Solenoids from the Treble Driver. TURN POWER ON MOMENTARILY. If the Tester lamp lights, replace the Treble Driver and retest. If the lamp DOES NOT light, proceed to (5). 5) TURN POWER OFF. Connect the first Key Solenoid to its connector at the left end of the Treble Driver, TURN POWER ON MOMENTARILY, and observe the Tester. If the lamp DOES NOT light, the Solenoid is good; if the lamp lights, the Solenoid is bad and should be replaced. After replacing a Solenoid, retest it. When the Solenoid checks OK, repeat this procedure on the other Solenoids until ALL Treble Driver Key Solenoids are checked OK, then proceed to (6).

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. The 12 Amp Fuse (FS1) on the Power Supply blows when power is applied. (continued)	E. Treble Driver board, Playback board, Cable 8, or Solenoid(s) shorted. (continued)	7) TURN POWER ON. Check to see that none of the Solenoids actuate and stay on and that the Tester lamp is OUT. If no Solenoids actuate and stay on, proceed to (F). If Solenoid(s) actuate and stay on and/or the Tester lamp lights, TURN POWER OFF and replace the Playback Logic Board, then retest. Proceed to (F).
	F. Cable 6	TURN POWER OFF. Visually inspect the wires and connectors of Cable 6. Connect Cable 6 to the Center Driver (J4) and disconnect it from Connector J2 on the Bass Driver. TURN POWER ON. If the Circuit Tester lamp lights, replace Cable 6 and retest. If the lamp DOES NOT LIGHT, proceed to (G).
	G. Bass Driver Board, Playback Board, Cable 9, or Solenoid(s) shorted.	1) TURN POWER OFF and disconnect Cables 6 and 9 from the Bass Driver, then visually inspect the PC Board for burns and damaged components and the Bass Driver Key Solenoids for burned or discolored coils and wires. Replace damaged parts with new ones from the kit. 2) Connect Cable 6 to the Bass Driver (J2). TURN POWER ON. If the Lamp on the Circuit Tester lights, TURN POWER OFF, replace the Bass Driver, and retest. If the lamp DOES NOT light, inspect each Key Solenoid connected to the Bass Driver for burned or discolored coils or wires. Replace any burned or discolored Solenoids and retest, then proceed to (3). 3) TURN POWER ON MOMENTARILY. If the Tester lamp lights, check to see if one or more Solenoids actuate and stay on constantly. If one or more do, replace them with new ones from the kit and retest.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. The 12 Amp Fuse (FS1) on the Power Supply blows when power is applied. (continued)	G. Bass Driver Board, Playback Board, Cable 9, or Solenoid(s) shorted. (continued)	4) If the Solenoids check OK (DO NOT actuate and stay on) after retest, but the Tester lamp is still lit, TURN POWER OFF and disconnect ALL solenoids from the Bass Driver. TURN POWER ON MOMENTARILY. If the Tester lamp lights, replace the Bass Driver and retest. If the lamp DOES NOT light, proceed to (5). 5) TURN POWER OFF. Connect the first Key Solenoid to its connector at the left end of the Bass Driver, TURN POWER ON MOMENTARILY, and observe the Tester. If the lamp DOES NOT light, the Solenoid is OK: if the lamp lights, the Solenoid is bad and should be replaced. After replacing a Solenoid, retest it. When the solenoid checks OK, repeat this procedure on the next in line until ALL Bass Driver Key Solenoids are checked OK, then proceed to (6). 6) TURN POWER OFF AND UNPLUG UNIT. Plug Cable 9 onto the Bass Driver (J1). TURN POWER ON. Check to see that the Tester lamp is OUT and that none of the Solenoids actuate and stay on. If one or more Solenoids actuate and stay on and/or the Tester lamp is lit, TURN POWER OFF and replace Cable 9 with a new one from the kit. 7) TURN POWER ON. Check to see that none of the Solenoids actuate and stay on and that the Tester lamp is OUT. If no Solenoids actuate and stay on and the Tester lamp is OUT, see the NOTE BELOW, then proceed to other repairs (if necessary). If the Solenoids actuate and stay on and/or the Tester lamp is lit, TURN POWER OFF and replace the Playback Logic Board and retest. See the NOTE below.

** NOTE: WHEN SYMPTOM 3 IS CORRECTED, REMOVE THE HIGH VOLTAGE CIRCUIT TESTER AND RETEST TO VERIFY THE REPAIR.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
4. 1.5 Amp Fuse (FS2) on the Power Supply blows when power is applied.	A. Power supply	TURN POWER OFF. Remove ALL connectors from power supply. REPLACE FUSE (FS2). Visually inspect the Power Supply PC Board for burns or damaged components. Plug Cables 1 and 2 onto the Power Supply (J6 and J5, respectively) and TURN POWER ON. If the fuse (FS2) blows, TURN POWER OFF and replace the Power Supply, then retest.
	B. Cable 3	TURN POWER OFF. Visually inspect Cable 3 for broken wires and damaged connectors. Connect Cable 3 to Connector J1 on the Power Supply and disconnect it from Connector J3 on the Playback Logic Board. TURN POWER ON. If Fuse FS2 blows, replace the fuse and Cable 3. Retest.
	C. Playback Logic Board	TURN POWER OFF. Disconnect Cables 7, 8, 9, 10, and 11 from Connectors J5, J4, J6, J2 and J1, respectively, on the Playback Logic. **See NOTE. Visually inspect the PC Board for burns and damaged components. TURN POWER ON. If Fuse FS2 blows, replace the fuse and Playback Logic Board. Retest.
	D. Cable 11	TURN POWER OFF. Visually inspect Cable 11 for broken wires and damaged plugs. Connect Cable 11 to the Playback Logic, and disconnect it from the Exp/Rec. Board (J3). TURN POWER ON. If the fuse blows, replace it and Cable 11. Retest.
	E. Exp/Rec Logic Board	TURN POWER OFF. Visually inspect the Exp/Rec Logic Board for burns and damaged components. Connect Cable 11 to Connector J3 on the Exp/Rec Logic Board. TURN POWER ON. If FS2 blows, replace the fuse and the Exp/Rec Board and retest.

** NOTE: THESE CABLES ARE NOT TO BE RECONNECTED TO THE PLAYBACK LOGIC BOARD UNTIL SO SPECIFIED BY THESE PROCEDURES.

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SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
4. The 1.5 Amp Fuse (FS2) on the Power Supply blows when power is applied.	F. Cable 7	TURN POWER OFF. Visually inspect Cable 7 for broken wires and damaged plugs. Connect Cable 7 to the Playback Logic Board (J5) and disconnect it from the Center Driver. TURN POWER ON. If Fuse FS2 blows, replace the fuse and Cable 7, then retest.
	G. Center Driver Board	TURN POWER OFF. Visually inspect the Center Driver for burns and damaged components. Connect Cable 7 to J1 on the Center Driver. TURN POWER ON. If Fuse FS2 blows, replace the fuse and the Center Driver. Retest.
	H. Cable 8	TURN POWER OFF. Visually inspect Cable 8 for broken wires and damaged connectors. Connect Cable 8 to the Playback Logic (J4) and disconnect it from the Treble Driver (J1). TURN POWER ON. If FS2 blows, replace it and Cable 8, then retest.
	I. Treble Driver Board	TURN POWER OFF. Visually inspect the Treble Driver for burns and damaged components. Connect Cable 8 to Connector J1 on the Treble Driver. TURN POWER ON. If Fuse FS2 blows, replace it and the Treble Driver and retest.
	J. Cable 9	TURN POWER OFF. Visually inspect Cable 9 for broken wires and damaged connectors. Connect Cable 9 to the Playback Logic (J6) and disconnect it from the Bass Driver (J1). TURN POWER ON. If the fuse blows, replace it and Cable 9, then retest.
	K. Bass Driver Board	TURN POWER OFF. Visually inspect the Bass Driver for burns and damaged components. Connect Cable 9 to the Board at J1. TURN POWER ON. If the fuse blows, replace it and the Bass Driver. Retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. SOFT and SUSTAIN Pedal Solenoid Fuses (FS3 and FS4) blow.	A. Power Supply or Pedal Solenoids.	TURN POWER OFF. Disconnect Cables 15 and 16 (from the SUSTAIN and SOFT Solenoids, respectively) from J4 and J3 on the Power Supply. Replace the Fuses (FS3 and FS4), then TURN POWER ON. If the fuses DO NOT blow, the Power Supply is good and the Pedal Solenoids should be replaced. If EITHER or BOTH fuses blow, the Power Supply is defective and must be replaced. If only ONE fuse blew, the Power Supply should be replaced as should the Solenoid that was connected to the fuse that DID NOT blow (because it blew the original fuse).
6. SOFT Solenoid Fuse (FS3) or SUSTAIN Solenoid Fuse (FS4) blows.	A. Power Supply of Pedal Solenoid.	TURN POWER OFF. Disconnect the Cable from the Solenoid, whose fuse is blown, and replace the bad fuse. TURN POWER ON. If the fuse blows, replace the Power Supply. If the Fuse DOES NOT blow, replace the Solenoid.
7. The lamp on the High Voltage Circuit Tester lights when power applied.	A. +180V Power Supply section shorted.	Refer to SECTION ONE, SYMPTOM 3, page 170 and perform procedures detailed there (as if the 12 Amp Fuse (FS1) blows).
8. POWER Lamp is lit, FINE TUNING Lamp will NOT Light.	Power Supply	TURN POWER OFF. Disconnect ALL Cables from the Power Supply. Examine the Power Supply PC Board for burns or damaged components — replace if any damage is found. If no defects are detected, connect all Cables to a known good Power Supply (place outside of piano). TURN POWER ON. If the trouble is corrected, replace original Power Supply. If the trouble is NOT corrected, TURN POWER OFF, reconnect original Power Supply and proceed to (B).
	B. Cable 3	TURN POWER OFF. Disconnect Cable 3 at the Power Supply (J1) and Playback Board (J3), get a new Cable 3 from the kit and install it. TURN POWER ON. If the FINE TUNING Lamp lights, the original Cable 3 is defective and should be replaced. If the lamp DOES NOT light, disconnect the new Cable 3 and reconnect the original.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
8. POWER Lamp is lit, FINE TUNING Lamp will not light when power is applied. (Continued)	C. Playback Board or Tape Recorder	TURN POWER OFF. Disconnect ALL Cables, except 3 and 10, from the Playback PC Board. TURN POWER ON. If the FINE TUNING Lamp on the Recorder lights, the trouble is located on one of the Driver Boards or in Cables 7, 8, or 9 -- proceed to (D). If the Lamp DOES NOT light, TURN POWER OFF, disconnect Cables 3 and 10 at Connectors J3 and J2, respectively, on the Playback Board. Get a new Playback Board from the Kit, connect Cables 3 and 10 to it, and TURN POWER ON. If the FINE TUNING Lamp lights, the original Playback Board is defective and should be replaced. If the Lamp DOES NOT Light, the Tape Recorder is bad and should be replaced. Retest after making repairs.
	D. Cable 7	TURN POWER OFF. Connect Cable 7 to Connector J5 on the Playback Board and disconnect it from J1 on the Center Driver Board. TURN POWER ON. If the FINE TUNING Lamp illuminates, Cable 7 is good -- proceed to (E). If the Lamp DOES NOT light, Cable is bad and should be replaced.
	E. Center Driver Board	TURN POWER OFF. Connect Cable 7 to J1 on the Center Driver Board. TURN POWER ON. If the FINE TUNING Lamp lights -- proceed to (F). If the Lamp DOES NOT light, the Center Driver Board is defective and should be replaced.
	F. Cable 8	TURN POWER OFF. Connect Cable 8 to J4 on the Playback Board and disconnect it from J1 on the Treble Driver. TURN POWER ON. If FINE TUNING Lamp lights -- proceed to (G). If the Lamp DOES NOT light, Cable 8 is bad and should be replaced.
	G. Treble Driver Board	TURN POWER OFF. Connect Cable 8 to J1 on the Treble Driver Board. TURN POWER ON. If the FINE TUNING Lamp lights, proceed to (H). If the Lamp DOES NOT light, the Treble Driver is defective and should be replaced.
	H. Cable 9	TURN POWER OFF. Connect Cable 9 to J6 on the Playback Board and disconnect it from J1 on the Bass Driver Board. TURN POWER ON. If the FINE TUNING Lamp lights, proceed to (I). If the Lamp DOES NOT Light, Cable 9 is defective and should be replaced.
	I. Bass Driver board	TURN POWER OFF. Connect Cable 9 to J1 on the Bass Driver board. TURN POWER ON. If the FINE TUNING Lamp lights, the trouble is corrected. If the Lamp DOES NOT Light, the bass Driver Board is defective and should be replaced.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: THE POWER SUPPLY

SYMPTOM	POSSIBLE CAUSE	SOLUTION
9. FINE TUNING Lamp is lit, POWER Lamp will not light when power is applied.	A. Power Supply	TURN POWER OFF. Disconnect ALL Cables from the Power Supply. Examine the Power Supply Board for burns and damaged components. If damage is found, replace the Power Supply. If no damage is detected, get a new Power Supply from the kit and connect all Cables to it (outside the piano). TURN POWER ON. If the POWER Lamp lights, the original Power supply is bad and should be replaced. If the Lamp DOES NOT light, TURN POWER OFF, disconnect the new Power Supply, reconnect the original Power Supply, and proceed to (B).
	B. Cable 3	TURN POWER OFF. Disconnect Cable 3 at J1 on the Power Supply and J3 on the Playback Board. Get a new Cable 3 from the kit and install it, temporarily. TURN POWER ON. If the POWER Lamp lights, the original Cable 3 is bad and should be replaced. If the Lamp DOES NOT light, disconnect the new Cable 3, reconnect the original, and proceed to (C).
	C. Playback Board or Tape Recorder	TURN POWER OFF. Disconnect ALL Cables, except 3 and 10, from the Playback Board and inspect the Board for burns and damaged components. If damage is discovered, replace the Playback Board. If no defects are found, TURN POWER ON. If the POWER Lamp is lit, the problem is on the Exp/Rec Board or in Cable 11, proceed to (D). If the Lamp DOES NOT Light, TURN POWER OFF. Disconnect Cables 3 and 10 at J3 and J2, respectively, on the Playback Board, get a new Board from the kit, and connect Cables 3 and 10 to it. TURN POWER ON. If the POWER Lamp lights, the Playback PC Board is defective and should be replaced. If the Lamp DOES NOT light, the Tape Recorder is defective and should be replaced.
	D. Cable 11	TURN POWER OFF. Disconnect Cable 11 at J3 on the Exp/Rec Board. TURN POWER ON. If the POWER Lamp lights, Cable 11 is good -- proceed to (E). If the Lamp DOES NOT light, replace Cable 11 with a new one from the kit.
	E. Exp/Rec Board	TURN POWER OFF. Connect Cable 11 to the Exp/Rec Board. TURN POWER ON. If the Lamp lights, the Board is good. If the Lamp DOES NOT light, the Board is defective and should be replaced.
10. SOFT Pedal L.E.D. does NOT light, SOFT Pedal Solenoid operates normally.**	A. Power Supply	TURN POWER OFF. Replace Power Supply.
11. SUSTAIN Pedal L.E.D. DOES NOT Light, SUSTAIN Pedal operates normally.	A. Power Supply	TURN POWER OFF. Replace Power Supply.

** NOTE: THESE PROBLEMS DO NOT HAMPER THE OPERATION OF THE SYSTEM (THE L.E.D.'s ARE USED ONLY DURING TROUBLE ANALYSIS PROCEDURES).

PIANOCORDER™ Reproducing System

TROUBLE ANALYSIS GUIDE

Section Two : THE PLAYBACK SYSTEM

PROBLEM ISOLATION BY SYMPTOM

CONDITIONS: THE AC MAIN POWER AND POWER SUPPLY SYSTEMS ARE OPERATING PROPERLY. WHEN POWER IS APPLIED, BEFORE THE PLAY BUTTON IS DEPRESSED, THE FINE TUNING AND POWER LAMPS ARE ON.

PART A: MECHANICAL MALFUNCTIONS

SYMPTOM:

PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM:

Section Two: THE PLAYBACK SYSTEM

PROBLEM ISOLATION BY SYMPTOM (continued)

PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS (continued)

SYMPTOM:

PART C: SOFT AND SUSTAIN PEDAL SOLENOID MALFUNCTIONS

SYMPTOM:

PART D: EXPRESSION MALFUNCTIONS

SYMPTOM:

Section Two: THE PLAYBACK SYSTEM

PROBLEM ISOLATION BY SYMPTOM (continued)

PART D: EXPRESSION MALFUNCTIONS (continued)

SYMPTOM:

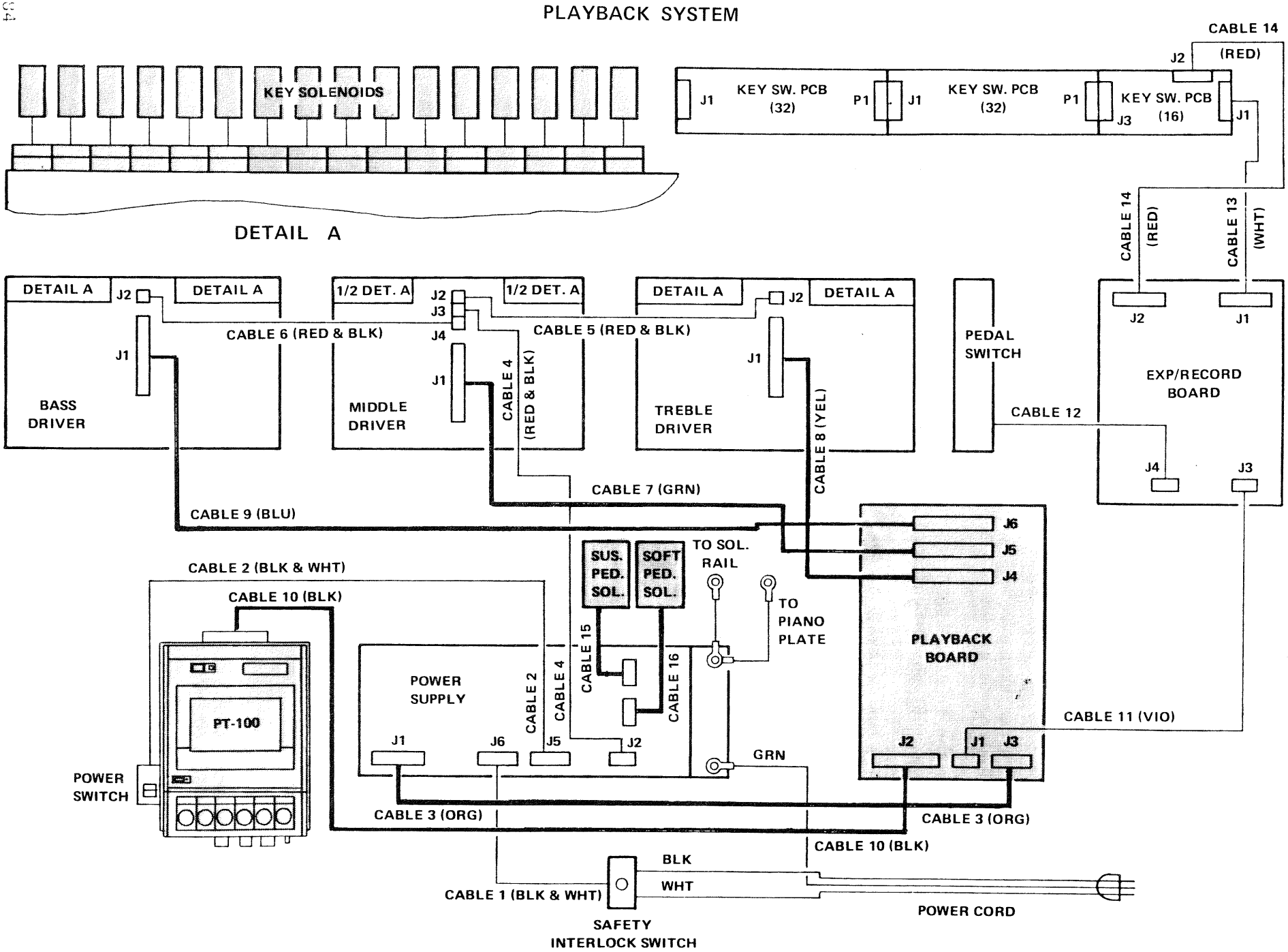

FIGURE B - Playback System Wiring Diagram

SECTION TWO: PLAYBACK SYSTEM FUNCTIONAL DESCRIPTION

NOTE:

Refer to FIGURE "B" while reading this description.

The Playback system consists of five basic sections. A brief description of each section is given detailing its purpose and effect on the other components of the Playback system. Read each description carefully. A good basic knowledge of the system's operation will reduce the time required for repairs.

TAPE RECORDER

The first section of the system is the Tape Recorder. The Recorder's primary functions are to playback the digitally encoded magnetic cassette tapes; record actual music performances by digitally encoding the performances onto the magnetic tape, and provides the user with the controls with which to select playback or record mode. In the playback mode there are controls to tailor the expression and tempo of a musical selection.

During the playback mode, the Record/Play Head in the recorder reads the signals off the cassette tape and the circuits in the recorder amplify the signals to a level sufficient to drive the Playback Logic Board, which in turn, processes the information for the rest of the playback system.

During the record mode, the circuits in the recorder receive the information from the Expression/Record Board and amplifies it. The Record/Play Head then imprints the digital data on the cassette tape. Please note that all data, either from the Recorder to the Playback Logic Board, or to the Recorder from the Exp/Rec Board by way of the Playback Logic Board, is transmitted through Cable 10.

The Recorder is also the Control Center for the PIANOCORDER™ system. Mode selection is provided by the PLAY and REC. (record) Pushbuttons. These buttons, also start the tape transport mechanism running at its normal speed of 3 3/4 inches per second (9.5 cm/s). The PIANISSIMO, FORTISSIMO and TEMPO Controls tailor the expression and tempo of a musical selection. These controls are defeated when the system is placed in record mode. The Fast Forward (FF) Button advances the tape quickly, and to rewind the tape, the REW Button is depressed. To stop the cassette tape, or to eject it, the STOP/EJECT pushbutton is employed. Please note that this button must be pressed, released, then pressed again to eject the cassette. This double operation is necessary to ensure that the tape is completely stopped before the tape is raised from the tape path to prevent damage to the magnetic tape.

PLAYBACK LOGIC BOARD

The second section of the system is the Playbck Logic Board, which is the heart of the Playback system. Its primary function is to decode the digital information from the Tape Recorder and to integrate expression tailoring and tempo commands with the decoded information. Once the information is processed, the Playback Board distributes the data to the Bass, Center, and Treble Driver Boards via Cables 9, 7 and 8 respectively; and to the Pedal Solenoid Drivers, located on the Power Supply, via Cable 3. It also distributes the +12V DC power required for the operation of the Tape Recorder, through Cable 10; and for the Exp/Rec Board, through Cable 11; and the +5V DC used by the Bass, Center, and Treble Driver Boards, through Cables 9, 7 and 8 respectively. Besides signal processing and power distribution, the Playback Logic Board provides a driver signal to the FINE TUNING Lamp on the Recorder, via Cable 10, which turns off the Lamp when the Tape Recorder and Logic Board circuits are properly tuned.

BASS, CENTER, TREBLE KEY SOLENOID DRIVER BOARDS

Section three of the Playback system consists of the Bass, Center, and Treble Driver Boards. These PC Boards operate in the same manner but control different groups of Key Solenoids. Functionally, each board receives processed data from the Playback Logic Board, separates the data into signals for the individual Key Solenoids it controls, and actuates the Solenoids.

PEDAL SOLENOID DRIVERS AND PEDAL SOLENOIDS

In section four of the system, the Pedal Solenoid Drivers, located on the Power Supply, receive processed data through Cable 3 from the Playback PC Board and actuate the Pedal Solenoids, through Cable 15 (SOFT), and 16 (SUSTAIN), which in turn, operate the SOFT and SUSTAIN Pedal Mechanisms of the piano action.

KEY SOLENOIDS

The Key Solenoids are the fifth and last section of the Playback system. These devices, when actuated by their respective Driver Boards, convert the electrical signals into mechanical motion to play the piano keys. When actuated by its respective Driver Board, each Key Solenoid creates a magnetic field which acts upon its plunger throwing it against the underside of the piano key, thus playing the key. Expression, the loudness or softness, of the notes played is determined by the force of the Key Solenoid plunger throw, which is controlled by the decoded information from the cassette modified by the PIANISSIMO and FORTISSIMO Control settings made by the user and transmitted through the Solenoid's related Driver Board. Expression control happens so rapidly that individual notes can have different values of intensity.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: PART A: MECHANICAL MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Tape DOES NOT run when the PLAY Button is depressed. **SEE NOTE.	A. PAUSE Button engaged	Release PAUSE Button.
	B. Cassette	Stop the tape and remove it from the Recorder. Insert the Alignment Test Tape and push the PLAY Button. If the tape runs, the original tape is defective; if NOT, proceed to (C).
	C. Tape Recorder	Stop the tape and remove it from the Recorder. Visually inspect the tape path for obstructions. Press the PLAY Button and verify that the Take-Up (RIGHT) Spindle is turning, then grasp it LIGHTLY between thumb and forefinger. If the Spindle stops under light pressure, the Recorder is bad and should be replaced. If the Spindle is OK, verify that the Pinch-Roller is touching the Capstan, if NOT, the Recorder is defective and should be replaced. If the Pinch-Roller contacts the Capstan, check for oil on the Capstan and Pinch-Roller and remove it with a cotton swab SLIGHTLY dampened with DENATURED alcohol.
2. TEMPO Control has NO effect on speed of performance.	A. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board, and retest.
3. Tape Recorder Auto Shut-Off DOES NOT stop Recording at end of tape in any mode.	A. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board and retest.
4. Tape Recorder will NOT Fast Forward or Rewind tape.	A. Tape	Stop and remove the tape and insert the Test tape. TURN POWER ON and try the REW and FF Buttons. If the problem is solved, the original tape is defective; if NOT, proceed to (B).
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board, and retest.

**NOTE: THE FOLLOWING CONDITION PREVAILS BEFORE EACH OF THE SYMPTOMS OF THIS SECTION OCCURS: THE POWER AND FINE TUNING LAMPS ARE ON WHEN POWER IS APPLIED TO THE SYSTEM. IF EITHER OR BOTH LAMPS ARE OUT, REFER TO SECTION ONE FOR SYSTEM REPAIR PROCEDURES, BEFORE ATTEMPTING REPAIRS DETAILED IN THIS SECTION.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION ONE: PART A: MECHANICAL MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. Take-Up tension erratic. Tape loops around Capstan and jams Recorder.	A. Tape	Stop and remove tape. Insert the Test Tape and press the PLAY Button. If the trouble is corrected, the original tape is defective; if NOT, Proceed to (B).
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board, and retest.
6. Depressing the STOP/EJECT Button DOES NOT stop the tape.	A. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board, and retest.
7. Tape will NOT eject when STOP/EJECT Button is depressed a second time.	A. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder), get the Recorder from the kit and connect it to J2 on the Playback Logic Board, and retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Tape RUNS but the Recorder will NOT playback and the FINE TUNING Lamp will NOT go out.	A. Tape Path	Stop and eject the tape. Inspect the Tape Path for oxide build-up on the Record/Play and Erase Heads, Capstan, Pinch Roller and Tape Guides and clean, if necessary, with a cotton swab SLIGHTLY dampened with DENATURED alcohol. Reinsert cassette and try again. If the Problem is NOT corrected, do Procedure (B).
	B. Tape	Stop and eject the tape, install the Alignment Test Tape, and press the PLAY Button. If the trouble is corrected, the original cassette is defective; if NOT, proceed to (C).
	C. FINE TUNING Control	Set the TEMPO Control on the Recorder at its Normal (12 o'clock - at detent) position, center the FINE TUNING Control (it is centered when the white line on the knob is centered), and push the PLAY Button. If the FINE TUNING Lamp stays ON, slowly turn the FINE TUNING Control first to the right, then to the left until the Lamp goes OUT. When the Lamp goes out, continue turning the Control (in the same direction) 1/8 turn past the point the Lamp went out. Stop the cassette and remove it. Reset the FINE TUNING Control to its center position and try the Test Tape. If the Lamp DID NOT go OUT or blinked, when the FINE TUNING Control was adjusted, or if it had to be re-adjusted when the Test Tape was tried, refer to Section 9, STEPS 9-16 thru 9-19 beginning on page 115. If the problem remains unsolved, proceed to (D).
	D. Tape Recorder or Playback Logic Board	TURN POWER OFF. Unplug Cable 10 (from the Recorder) at connect J2 on the Playback Logic Board. Get the PIANOCORDER Test Box from the kit, plug its 12 pin Connector on J2 of the Board, and set its MODE - PLAY/STANDBY Switch to PLAY. If the Lamp goes OUT, replace the Tape Recorder. If it DOES NOT go out, try adjusting the 3/4 Bit and Range Controls by performing the procedures detailed in Section 9, STEP 9-19, Point C on pages 117 and 118. If the Lamp remains lit after the Controls are adjusted, replace the Playback Logic Board. If the Problem is NOT solved by replacement of the PC Board, it may involve a combination of Boards. Change the Tape Recorder, Playback Logic, and Exp/Rec Board, try the system and isolate the trouble by connecting each original system component, one at a time, until the defective units are found and replaced. SEE THE CAUTION ABOVE.

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR BROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
2. Tape RUNS but the Recorder DOES NOT playback. The FINE TUNING Lamp is OUT. Pedal Solenoids may or may not function.	A. Tape	Stop and eject the tape. Insert the Alignment Test Tape and depress the PLAY Button. If the system operates correctly, the original tape is defective. If it DOES NOT, proceed to (B).
	B. Power Supply or Cable 4	Advance the Test Tape to Test Program 11. Press the PLAY Button and allow Program 11 to run. Observe the SOFT and SUSTAIN L.E.D.s and the Solenoids. If the L.E.D.s are flashing and the Solenoids are operating, the Power Supply is good and Cable 4 may be bad. To check Cable 4, TURN POWER OFF, inspect the Cable for broken wires or damaged plugs (replace if damaged, and retest), then disconnect it at J1 on the Center Driver, get the 110V AC Test Lamp and insert its leads into the plug on Cable 4. TURN POWER ON. If the Test Lamp lights, Cable 4 is OK. Proceed to (C). If the Lamp DOES NOT light, replace Cable 4 and retest. If the SOFT and SUSTAIN L.E.D.s DO NOT Light and the Pedal Solenoids DO NOT operate, TURN POWER OFF and replace the Power Supply, then retest.
	C. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it. SEE CAUTION BELOW. CAUTION: PLACE THE LOGIC BOARD SO THAT IT CANNOT CONTACT BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON. If the Recorder plays back, the original Logic Board should be replaced. If the problem is not solved, TURN POWER OFF, disconnect the new and reconnect the original Board, and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
2. Tape RUNS but the Recorder DOES NOT playback. The FINE TUNING Lamp is OUT. Pedal Solenoid may or may NOT function. (Continued)	D. Key Solenoid Driver	TURN POWER OFF. Disconnect Cable 4 from J2 on the Bass Driver, Cable 5 from J2 on the Treble Driver, and Cable 4 from J3 on the Center Driver. Connect Cable 4 to J2 on the Bass Driver. TURN POWER ON and press the PLAY Button. Check to see if the Bass Key Solenoids operate. TURN POWER OFF. Disconnect Cable 4 from J2 on the Bass Driver and connect it to J2 on the Treble Driver. TURN POWER ON and push the PLAY Button. Check to see if the Treble Key Solenoids operate. TURN POWER OFF. Replace all Driver Boards, which did NOT operate correctly and retest. If NONE of the Driver Boards operated, proceed to (E).
	E. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder) at J2 on the Playback Logic Board. Get the PIANOCORDER Test Box from the kit and connect its 12 pin plug at J2 on the Playback Logic Board. TURN POWER ON. Set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Depress each piano Key and the SOFT and SUSTAIN Pedals one at a time. To release actuated Solenoids, you must switch the MODE - PLAY/STANDBY Switch from PLAY to STANDBY. You should do this after each Solenoid actuates to prevent damage to the system that could occur if the Solenoid remains actuated continuously. Return the Switch to the PLAY position BEFORE you check the next Solenoid. If ALL the Solenoids actuate during this test, replace the Tape Recorder and retest.
3. When the system is playing, one or more notes DO NOT function.	A. Tape	Stop and eject tape. Insert Alignment Test tape and retest. If problem is solved, the original tape is defective; if not, proceed to (B).
**SEE NOTE.	B. Piano	Manually play all Keys to verify that the piano is operating normally. If OK, proceed to (C); if not, repair piano and retest.

**NOTE: USE A SMALL PIECE OF MASKING TAPE TO MARK EACH INOPERATIVE SOLENOID, REMOVE THE TAPE AFTER REPAIRS ARE COMPLETED.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. When the system is playing, one or more notes DO NOT function. (Continued)	C. Key Solenoid(s) binding	TURN POWER OFF. Physically push up on the Solenoid slug of each affected Key and determine where the binding occurs. If the binding occurs between the slug and the coil sleeve, replace the Solenoid. If the binding is caused by the plunger shaft rubbing against the coil of an adjacent Solenoid, loosen the mounting screws of each affected Solenoid and move it to the right or left until the trouble is cured. If the binding is due to the plunger shaft or tip rubbing against the Keybed slot, remove piano keys in the affected area of the Keybed slot and each affected Solenoid, then open up the slot with a wood file so the plunger shaft will clear the slot. THOROUGHLY vacuum the interior of the piano and reinstall the Key(s) and Solenoid(s), then retest.
	D. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board, get the Playback Board from the kit, and connect the Cables to it outside the piano. See the CAUTION. CAUTION: PLACE THE LOGIC BOARD SO THAT IT CANNOT CONTACT ANY BARE METAL PART OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the new Board causes the system to operate properly, replace the original Board. If it DOES NOT, TURN POWER OFF and reconnect the original Playback Board, then proceed to (E).
	E. Cables 7, 8, or 9	TURN POWER OFF. Disconnect the Cable(s) from the affected Driver Board(s) at the Driver(s) and Playback Board. Get the new Cable(s) from the kit and connect in place of the Original Cable(s). TURN POWER ON and retest. If the trouble is corrected, replace the original Cable(s); if NOT, reconnect the original Cable(s) and proceed to (F).

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. When the system is playing, one or more notes do not play. (Continued)	F. Key Solenoid(s) or Driver Board(s)	TURN POWER OFF. Disconnect Cable 10 (from the Recorder) at J2 on the Playback Board. Get the PIANOCORDER Test Box from the kit and connect its 12 pin plug to J2 on the Playback Board. Set the Test Box MODE - PLAY/STANDBY Switch to PLAY and TURN POWER ON. Strike each affected piano Key (one at a time) and the two Keys adjacent to it. Watch the Solenoids of all three Keys to see if the Solenoids of the Keys adjacent to the affected Key function correctly. Note whether either or both adjacent Solenoids operate properly. When you depress the Keys, their solenoid will lock on. DO NOT allow the Keys to stay down too long because this could damage the system. To release the Solenoids, flip the MODE - PLAY/STANDBY Switch to STANDBY. (The Switch will have to be placed in PLAY position before you check the next defective Solenoid.) TURN POWER OFF. Disconnect the defective Solenoid's leads and the leads of an adjacent WORKING Solenoid. Connect the working Solenoid's leads to the pins of the defective Solenoid on the Driver Board. TURN POWER ON. Depress the Key of the affected Solenoid. If the WORKING Solenoid functions, the Driver Board is good and the Solenoid of the defective Key is bad and should be replaced. If the WORKING Solenoid DOES NOT function, the Driver Board is bad and should be replaced. Repeat this procedure at any other defective Key until all are repaired.
4. Skips notes or wrong notes play. FINE TUNING Lamp FLASHES. **SEE NOTE:	A. Tape Path	Stop and eject the tape. Inspect the Tape Path for oxide build-up on the Record/Play and Erase Heads, Capstan, Pinch-Roller, and Tape Buides. Clean, if necessary, with a cotton swab SLIGHTLY dampened with DENATURED alcohol. Check to make sure that the pressure pad (located on the leaf spring behind the tape in the center window of the cassette case) is NOT missing, then insert the cassette in the Recorder and retest. If the problem is NOT corrected, proceed to (B).

**NOTE: BEFORE MAKING REPAIRS OR ADJUSTMENTS, MAKE SURE THAT THE FINE TUNING CONTROL IS CENTERED (THE WHITE LINE ON ITS KNOB IS CENTERED IN THE WINDOW).

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
4. Skips notes or wrong notes play. FINE TUNING Lamp FLASHES.	B. FINE TUNING Control (Due to slight variation in azimuth between different tapes.)	Leave the pre-recorded cassette running and adjust the FINE TUNING Control to the right or left until the FINE TUNING Lamp goes OUT and continue turning it (in the same direction) 1/8 turn past that point. If the Control has no effect or must be adjust to the extreme right or left, proceed to (C).
	C. Azimuth adjustment or Cassette or 3/4 Bit and/or Range Controls adjustment	Stop and eject the cassette and insert the Alignment Test Tape in the Recorder. Set the FINE TUNING Control so it is centered (white line on its knob is centered in the window), then depress the PLAY Button. If the FINE TUNING Lamp goes OUT and all the notes play, the azimuth is properly adjusted and the original pre-recorded tape is bad. If the problem is the same, refer to Section 9, STEP 9-19, page 115 for azimuth, 3/4 Bit, and Range Control alignment procedures, then retest the pre-recorded tape. If the problem is NOT cured by these procedures, proceed to (D).
	D. Tape Recorder or Playback Board	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board. Get the PIANOCORDER Test Box from the kit and connect its 12 pin plug to J2 on the Playback Board. Set the Test Box MODE - PLAY/STANDBY Switch to PLAY and TURN POWER ON. If the SYNC Lamp on the Test Box is OUT, replace the Recorder. If it is lit, adjust the 3/4 Bit Control on the Playback Logic Board slightly CLOCKWISE or COUNTER-CLOCKWISE until the SYNC Lamp goes OUT. Continue turning the Control (in the same direction) 1/8 turn past the point the SYNC Lamp extinguished. If adjustment of the 3/4 Bit Control did NOT cause the Lamp to go OUT, try adjusting the Range Control on the Playback Board slightly CLOCKWISE OR COUNTERCLOCKWISE until it does. Continue turning the Control (in the same direction) 1/8 turn past the point the Lamp went OUT. **SEE NOTE. If adjustment of both Controls DOES NOT correct the trouble, replace the Playback Logic Board and, if necessary, refer to Section 9 to align it.

**NOTE: WHEN ADJUSTING THE 3/4 BIT AND RANGE CONTROLS, IT MAY BE NECESSARY TO ALTERNATELY ADJUST THEM FOR OPTIMUM PERFORMANCE. THIS IS NECESSARY BECAUSE ADJUSTMENT OF ONE AFFECTS THE ALIGNMENT OF THE OTHER.

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. Skips notes and FINE TUNING Lamp FLASHES when TEMPO Control is at MIN or MAX Setting.	A. Tape Path	Stop and eject the tape. Inspect the Tape Path for oxide build-up on the Record/Play and Erase Heads, Capstan, Pinch-Roller, and Tape Guides. Clean them with a cotton swab SLIGHTLY dampened with DENATURED alcohol. Insert the pre-recorded tape and retest. If the problem continues, proceed to (B).
	B. FINE TUNING Control (Due to slight variation in azimuth between different tapes.)	Leave the pre-recorded tape running and adjust the FINE TUNING Control to the right or left until the FINE TUNING Lamp goes OUT and continue turning it (in the same direction) 1/8 turn past that point. If the Control has no effect or must be adjusted to the extreme right or left, proceed to (C).
	C. Azimuth adjustment, Tape, or 3/4 Bit and/or Range Control adjustment	Stop and eject the tape, then insert the Alignment Test Tape in the Recorder. Set the FINE TUNING Control so it is centered (white line on its knob is centered in the window), then depress the PLAY Button. If the FINE TUNING Lamp goes OUT and none of the notes are skipped, the azimuth adjustment is correct and the pre-recorded tape is defective. If the Lamp stays ON or FLASHES, refer to Section 9, STEP 9-19, page 115 for azimuth, 3/4 Bit, and Range Control alignment procedures, then retest the pre-recorded tape. If the trouble is still present after these procedures have been completed, proceed to (D).
	D. Tape Recorder or Playback Board	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board. Get the PIANOCORDER Test Box from the kit and connect its 12 pin plug to J2 on the Playback Board. TURN POWER ON. Set the Test Box MODE - PLAY/STANDBY Switch to PLAY. If the SYNC Lamp on the Test Box goes OUT, replace the Recorder. If the Lamp remains lit, adjust the 3/4 Bit Control slightly CLOCKWISE or COUNTERCLOCKWISE until the SYNC Lamp goes OUT and continue turning the Control (in the same direction) 1/8 turn past that point. If adjustment of the 3/4 Bit Control did NOT extinguish the Lamp, try adjusting the Range Control slightly CLOCKWISE or COUNTERCLOCKWISE

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. Skips notes and FINE TUNING Lamp FLASHES when TEMPO Control is at MIN or MAX Setting. (continued)	D. Tape Recorder or Playback Board. (continued)	until the Lamp goes OUT and continue turning it (in the same direction) 1/8 turn past that point. **SEE NOTE. If adjustment of both Controls DOES NOT correct the trouble, replace the Playback Logic Board and refer to Section 9 to align it.
6. Plays two adjacent notes when only one should play.	A. Tape	Stop and eject the tape, then insert the Alignment Test Tape and locate Program 1. Depress the PLAY Button and allow Program 1 to play through. If the piano operates correctly, the pre-recorded tape is defective. If two notes are still played, proceed to (B).
	B. Key Solenoids	Stop and rewind the Test Tape to the beginning of Test Program 1. Press the PLAY Button and observe the Key Solenoids as the Program plays. When you observe that one Solenoid causes two notes to sound, stop the tape immediately and mark the Solenoid with a small piece of masking tape, then press the PLAY Button again to check for other misaligned Solenoids until all are checked. At the end of Program 1, stop the tape and visually inspect each marked Solenoid for a bent plunger shaft or improper centering under its key. Straighten bent plunger shafts. If improper centering is the trouble, loosen the Solenoid mounting screws and adjust the position of the Solenoid, then secure the mounting screws and retest the system by playing Program 1 again. If neither of these solutions correct the trouble, proceed to (C).
	C. Key Solenoid Driver Boards	Rewind the Test Tape to the beginning of Program 1, then push the PLAY Button. If the two adjacent Solenoids that are playing, when one should, are connected to the SAME Driver Board, TURN POWER OFF and disconnect ALL Cables to

**NOTE: WHEN ADJUSTING THE 3/4 BIT AND RANGE CONTROLS, IT MAY BE NECESSARY TO ALTERNATELY ADJUST THEM FOR OPTIMUM PERFORMANCE. THIS IS NECESSARY BECAUSE ADJUSTMENT OF ONE AFFECTS THE ADJUSTMENT OF THE OTHER.

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WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
6. Plays two adjacent notes when only one should play. (continued)	C. Key Solenoid Driver Boards (continued)	the Board. Get a new Driver Board from the kit and connect the Cables to it. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW BOARD CANNOT COME IN CONTACT WITH ANY BARE METAL PARTS OF THE REST OF THE SYSTEM OR OF THE PIANO. TURN POWER ON, rewind the Test Tape to the beginning of Program 1, and push the PLAY Button. Allow Program 1 to run through completely and observe the operation of the Solenoids. If the malfunction still exists, TURN POWER OFF, disconnect ALL Cables from the new Board, and reconnect them to the original, then proceed to (D). If the trouble is corrected, replace the Driver Board.
	D. Cable 7, 8, or 9	TURN POWER OFF. Disconnect the Cable (7, 8, or 9) to the affected Driver Board, get a new Cable from the kit, and connect it to the affected Board. TURN POWER ON and play Test Program 1. If the trouble is corrected, replace the defective Cable; if not, TURN POWER OFF, disconnect the new Cable, and reconnect the old, then proceed to (E).
	E. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Playback Board, get a new Board from the kit, and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON. Retest. If the new Board corrects the trouble, replace the original Board.
7. Random notes play when power is applied (no tape is playing).	A. Ground connections	Check to make sure that ALL Grounding wires are properly secured and are NOT damaged. Replace defective Ground wires and retest.

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
7. Random notes play when power is applied (no tape is playing). (continued)	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 from J2 on the Playback Logic Board. Get the Recorder from the kit and connect it to J2 on the Playback Board (outside the piano). TURN POWER ON. If the system DOES NOT play random notes, replace the original Recorder. If the trouble is still present, TURN POWER OFF, disconnect the new Recorder, and reconnect the original, then proceed to (C).
	C. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW PLAYBACK BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE REST OF THE SYSTEM OR OF THE PIANO. TURN POWER ON. If the new Board corrects the problem, replace the original Board; if not, TURN POWER OFF, disconnect ALL Cables from the new Board, and reconnect Cables 3 and 10 to the original Board, then proceed to (D).
	D. Cable 7 or Center Driver Board	Disconnect Cable 7 from the Center Driver Board. Get the Cable 7 from the kit and connect it to the Playback Board and Center Driver Board. TURN POWER ON. If the random notes stop playing in the Center section (Keys 37 thru 52), replace Cable 7; if not, replace the Center Driver PC Board and retest. Proceed to (E).
	E. Cable 8 or Treble Driver Board	TURN POWER OFF. Disconnect Cable 8 from the Treble Driver. Get the Cable 8 from the kit and install it on the Playback and Treble Driver Boards. TURN POWER ON. If the random notes in the Treble section stop playing, replace Cable 8; if not, replace the Treble Driver Board and retest, then proceed to (F).

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
7. Random notes play when power is applied (no tape is playing). (continued)	F. Cable 9 or Bass Driver Board	TURN POWER OFF. Disconnect Cable 9 from the Bass Driver Board. Get the Cable 9 from the kit and install it on the Playback and Bass Driver Boards. TURN POWER ON. If the random notes in the Bass section stop playing, replace Cable 9; if not, replace the Bass Driver Board and retest.
8. Random notes sound when a pre-recorded tape is playing. FINE TUNING LAMP IS OUT.	A. Ground connections	Check to make sure that ALL Ground wires are properly secured and are NOT damaged. Replace defective Ground wires and retest.
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 from J2 on the Playback Logic Board. Get the Recorder from the kit and connect it to J2 on the Playback Board (outside the piano). TURN POWER ON. If the trouble is corrected, TURN POWER OFF and replace the original Recorder, then retest. If the malfunction remains the same, TURN POWER OFF, disconnect the new Recorder, and reconnect the original, then do (C).
	C. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW PLAYBACK BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the problem stops, TURN POWER OFF and replace the original Board; if it is NOT, TURN POWER OFF, disconnect ALL Cables at the new Board, and reconnect Cables 3 and 10 to the original Playback Board, then proceed to (D).

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
8. Random notes sound when a pre-recorded tape is playing. FINE TUNING LAMP IS OUT. (continued)	D. Cable 7 or Center Driver Board	Disconnect Cable 7 at J1 on the Center Driver Board. Get a new Cable 7 from the kit and install it on the Center Driver and Playback Logic Boards. TURN POWER ON and push the PLAY Button. If the random notes DO NOT play, TURN POWER OFF and replace the original Cable 7. If the problem still exists, TURN POWER OFF and replace the Center Driver Board, retest, then proceed to (E).
	E. Cable 8 or Treble Driver Board	TURN POWER OFF. Disconnect Cable 8 at J1 on the Treble Driver Board. Get a new Cable 8 from the kit and install it on the Playback Logic and Treble Driver Boards. TURN POWER ON and press the PLAY Button. If the trouble stops, TURN POWER OFF and replace the original Cable 8; if it remains, TURN POWER OFF and replace the Treble Driver Boards, retest, then proceed to (F).
	F. Cable 9 or Bass Driver Board	TURN POWER OFF. Disconnect Cable 9 at J1 on the Bass Driver Board. Get a new Cable 9 from the kit and install it on the Playback Logic and Bass Driver Boards. TURN POWER ON and depress the PLAY Button. If the malfunction ceases, TURN POWER OFF and replace Cable 9; if NOT, TURN POWER OFF and replace the Bass Driver Board, then retest.
9. Hammers are boucing on Jacks and double hitting the Strings during playback.	A. Piano	Manually play ALL Keys of the piano to make sure that it is properly regulated and tuned. THE PIANO MUST BE OPERATING CORRECTLY FOR THE PIANOCORDER SYSTEM TO FUNCTION.
	B. Solenoid Rail or individual Key Solenoid alignment	Remove the Lower Frame and pull the button on the Interlock Switch out until it locks in the OUT (TEST) position, then press the PLAY Button. Observe the Hammers as the piano plays. If MOST of the Hammers display the trouble, the Solenoid Rail is too LOW and must be raised. TURN POWER OFF, remove the Safety Bolts securing the Rail to the Rail Brackets, refer to Section 9, STEPS 9-28 through 9-37, pages 120 through 122. **See NOTE below. If the trouble occurs with only a few Keys, TURN POWER OFF and refer to Section 9, STEP 9-39 (A thru F) on page 123 to align the Solenoids.

**NOTE: IF THE SOLENOID RAIL MUST BE RAISED OR LOWERED, IT MAY BE NECESSARY TO REDRILL OR FILE THE SAFETY BOLT HOLES IN THE RAIL AND/OR BRACKET BEFORE SECURING THE RAIL IN ITS NEW POSITION.

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SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
10. Hammers dampen Strings during playback.	A. Piano	Manually play ALL Keys of the piano to make sure that it is properly regulated and tuned. THE PIANO MUST BE OPERATING CORRECTLY FOR THE PIANOCORDER SYSTEM TO FUNCTION.
	B. Solenoid Rail or individual Key Solenoid alignment	Remove the Lower Frame and pull the button on the Interlock Switch out until it locks in the OUT (TEST) position, then press the PLAY Button. Observe the Hammers as the piano plays. If MOST of the Hammers display the malfunction, the Solenoid Rail is too HIGH and must be lowered. TURN POWER OFF, remove the Safety Bolts securing the Rail to the Brackets, refer to Section 9, STEPS 9-28 through 9-37, pages 120 through 122 for Rail alignment procedures. **See NOTE below. If the trouble is confined to only a few Solenoids, TURN POWER OFF and refer to Section 9, STEP 9-39 (A thru F) on page 123 for Solenoid alignment procedures.
11. ALL Keys play when PLAY Button is depresssed (12 Amp Fuse (FS1) may also blow).	A. Tape	Stop and eject the tape, insert the Alignment Test Tape, and press the PLAY Button. If the trouble is corrected, the pre-recorded tape is bad; if NOT, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get a new Board from the kit and connect the Cables to it outside the piano. See CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW PLAYBACK BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the malfunction is cleared, TURN POWER OFF and replace the original Playback Board; if NOT, refer to SECTION ONE, SYMPTOM 3, pages 170 through 175 and perform the procedures detailed there.
12. Key(s) stay(s) down after being played.	A. Tape	Stop and eject the tape, insert the Alignment Test Tape, and press the PLAY Button. If the trouble is corrected, the pre-recorded tape is defective; if NOT, proceeed to (B).

**NOTE: IF THE SOLENOID RAIL MUST BE RAISED OR LOWERED, IT MAY BE NECESSARY TO REDRILL OR FILE THE SAFETY BOLT HOLES IN THE RAIL AND/OR BRACKET BEFORE SECURING THE RAIL IN ITS NEW POSITION.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
12. Key(s) stay(s) down after being played. (continued)	B. Piano	Manually play ALL Keys of the piano to make sure that it is operating properly. THE PIANO MUST BE OPERATING CORRECTLY FOR THE PIANOCORDER SYSTEM TO FUNCTION.
	C. Solenoid(s) binding	Stop and rewind the Alignment Test Tape to the beginning of Test Program 1, then push the PLAY Button. As the tape runs, observe each binding Solenoid to determine if the trouble is caused by a bent plunger shaft, the plunger slug binding in the coil sleeve, the plunger shaft rubbing on the coil of an adjacent Solenoid, or the plunger shaft or tip rubbing against the side of the Keybed slot. To repair, do the following: 1. If the plunger shaft is bent, straighten it and retest. 2. If the plunger slug is binding in the coil sleeve, replace the Solenoid and retest. 3. If the plunger shaft is rubbing against the coil of an adjacent Solenoid, loosen the mounting screws of the malfunctioning Solenoid and adjust its position so the shaft does NOT rub, then secure the mounting screws and retest. 4. If the plunger shaft is rubbing against the Keybed Slot, remove several Keys over the affected area and the binding Solenoid, then open the Keybed slot with a wood file. After filing, THOROUGHLY vacuum the interior of the piano, reinstall the Solenoid and Keys and retest. If the problem is NOT caused by the Solenoid(s) or is NOT corrected by following these procedures, proceed to (D).
	D. Cable(s) to Driver Board(s) or Driver Board(s)	TURN POWER OFF. Disconnect the Cable (7, 8, or 9) from the Driver Board (Center, Treble, or Bass, respectively) connected to the malfunctioning Solenoids and at the Playback Logic Board. Get the replacement Cable from the kit and install it.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
12. Key(s) stay(s) down after being played. (continued)	D. Cable(s) to Driver Board(s) or Driver Board(s) (continued)	TURN POWER ON and press the PLAY Button. If the problem is corrected, TURN POWER OFF and replace the original Cable; if not, replace the Driver Board, carefully inspect its related Solenoids for signs of damage and replace any that are defective, then retest. If the malfunction is NOT corrected, proceed to (E).
	E. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Playback Logic Board. Get a new Board from the kit and connect the Cables to it outside the piano. See CAUTION below. CAUTION: MAKE CERTAIN THAT THE NEW PLAYBACK BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the original Playback Logic Board.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART C: SOFT AND SUSTAIN PEDAL SOLENOID MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. SOFT and/or SUSTAIN Pedal Solenoids DO NOT function.	A. Tape	Stop and eject the tape, insert the Alignment Test Tape, fast Forward the Tape to Test Program 12, stop the tape and press the PLAY Button. If the SOFT and SUSTAIN L.E.D.s light and the Pedal Solenoids function, the pre-recorded tape is defective; if NOT, proceed to (B).
	B. Power Supply or SOFT and/or SUSTAIN Pedal Solenoids	Leave the Test Tape running and observe the SOFT and SUSTAIN L.E.D.s on the Power Supply. If the L.E.D.s DO NOT light, proceed to (C). If the L.E.D.s light, TURN POWER OFF, disconnect Cables 15 and 16 from J3 and J4 on the Power Supply, and remove the 1 Amp Fuses (FS3 and FS4) from the Power Supply. Visually inspect the fuses to see if the wire inside the glass section of the fuse is burned or broken. Replace defective fuses with new ones from the kit and install the good fuses on the Power Supply. TURN POWER ON. If the fuse(s) blow(s), replace the Power Supply; if not, replace the Solenoid(s). Retest.
	C. Cable 3	TURN POWER OFF. Disconnect Cable 3 at J1 on the Power Supply and J2 on the Playback Logic Board, get a new Cable 3 from the kit, and install it. TURN POWER ON and press the PLAY Button. If the SOFT and SUSTAIN L.E.D.s light and the Pedal Solenoids function, replace the original Cable 3. If the L.E.D.s light but the either or both Pedal Solenoids DO NOT function, reconnect the original Cable 3 and refer to Section 9, STEP 9-60 thru 9-69, pages 128 thru 152, to verify that the alignment of the Solenoids is correct. If these procedures DO NOT correct the trouble, proceed to (D). If the L.E.D.s and the Pedal Solenoids DO NOT FUNCTION, reconnect the original Cable 3 and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART C: SOFT AND SUSTAIN PEDAL SOLENOID MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. SOFT and/or SUSTAIN Pedal Solenoids DO NOT function. (continued)	D. Playback Logic Board or Power Supply	TURN POWER OFF. Disconnect ALL Cables to the Playback Logic Board. Get a new Playback Logic Board from the kit and connect Cables 3 and 10 to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the SOFT and SUSTAIN L.E.D.s light and the Pedal Solenoids function, replace the original Playback Logic Board; if they DO NOT, replace the Power Supply. Retest.
2. SOFT Pedal Solenoid DOES NOT actuate when the SOFT PEDAL Switch is ON, but operates normally with tape.	A. Normal operation	The SOFT Pedal Solenoid will NOT actuate until the tape is playing and the FINE TUNING Lamp goes OUT.
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 (from the Recorder) at J2 on the Playback Logic Board. Get the Recorder from the kit and connect it to J2 on the Playback Logic Board. TURN POWER ON and press the PLAY Button. Turn the SOFT PEDAL Switch to its ON position. If the SOFT Pedal Solenoid actuates, replace the original Tape Recorder; if NOT, disconnect the new and reconnect the original Recorder, then proceed to (C).
	C. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE PIANO OR OF THE SYSTEM. TURN POWER ON, press the PLAY Button, and set the SOFT PEDAL Switch to the ON position. If the SOFT Pedal Solenoid actuates, replace the original Playback Logic Board and retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART C: SOFT AND SUSTAIN PEDAL SOLENOID MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. SOFT or SUSTAIN Pedal Solenoid clicks (caused by metal to metal contact) or its operation is noisy.	A. Felt	TURN POWER OFF. Disassemble the noisy Solenoid (see FIGURE C4-A and remove its plunger. Remove the plunger felt. Cut a thin piece of felt or a piece of cardboard (about the thickness of a manila folder) in the shape of the plunger felt. Place the thin felt or cardboard piece on the Solenoid plunger, then the plunger felt, then reassemble the Solenoid. Reinstall the Solenoid in the piano and retest.
4. Solenoid plunger rubs against Dashpot Housing.	A. Dashpot Housing off centered	TURN POWER OFF and remove the defective Solenoid from the piano. Remove the Top of the Dashpot and set it aside. Loosen the two (2) 10-32 Nuts (see FIGURE C4-A) just enough so you can move the Housing by pressing it firmly on the side. Screw on the Top of the Dashpot and turn it down until it sits inside the Housing, then adjust the Housing so the Dashpot Top is centered in it. Work the Solenoid plunger shaft to make sure the Top DOES NOT rub against the Housing, then remove the Top and secure the 10-32 Nuts (make sure you DO NOT change the position of the Housing as you do this). Spray DRY powdered graphite onto the "O" Ring on the Top of the Dashpot and install the Top again. Work the Solenoid plunger to make sure the Dashpot Top slides freely in the Dashpot Housing. Perform the alignments in Section 9, STEPS 9-60 thru 9-69 on pages 128 thru 152 to adjust the Solenoid.

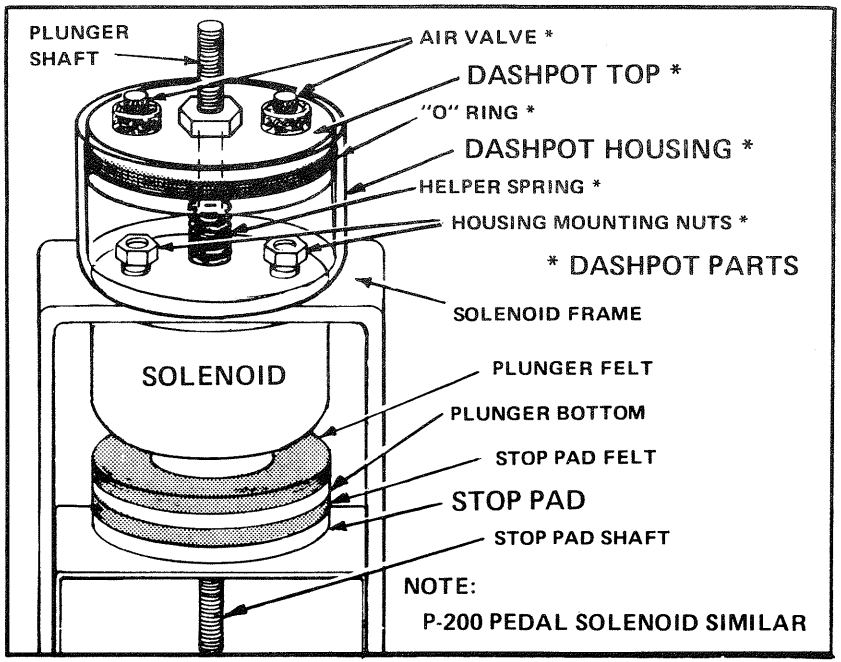

FIGURE C4-A Pedal Solenoid parts identification.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. NO Expression during playback.	A. Bass and Treble Level Control alignments or Tape	TURN POWER OFF, remove the Lower Frame, and insert the Alignment Test Tape. Run the Test Tape to Program 12 and check the expression. If expression is good, the pre-recorded tape is defective; if NOT, refer to Section 9, STEP 9-59, pages 124 thru 128 and perform the Bass and Treble Level Control alignments. If these procedures DO NOT correct the problem, proceed to (B).
	B. Tape Recorder	TURN POWER OFF. Check to see that Cable 10 (from the Tape Recorder) is correctly connected (no pins are skipped) to J2 on the Playback Logic Board. If NOT correctly connected, connect the Cable properly and retest. If it is properly plugged onto the Board, TURN POWER OFF, disconnect Cable 10, get the Recorder from the kit and connect it at J2 on the Playback Board. Retest. If the trouble is removed, replace the original Recorder; if NOT, TURN POWER OFF, disconnect the new Recorder, and reconnect the original, then proceed to (C).
	C. Cable 3	With power OFF, disconnect Cable 3 at J1 on the Power Supply and J3 on the Playback Logic Board. Get the Cable 3 from the kit and install it. TURN POWER ON and press the PLAY Button. If the trouble disappears, replace the original Cable 3; if NOT, disconnect the new Cable, reconnect the original, and proceed to (D).
	D. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the Playback Logic Board. Retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
2. NO expression in Treble Section (Keys 53 thru 84) - Bass and Center Sections normal.	A. Treble Level Control alignment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT correct the trouble, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect Cables 3, 8, and 10 to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the problem is cleared, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the new board and reconnect the original, then proceed to (C).
	C. Cable 8	With power OFF, disconnect Cable 8 at J4 on the Playback Logic Board and J1 on the Treble Driver Board. Get Cable 8 from the kit and install it. TURN POWER ON and press the PLAY Button. If the malfunction is corrected, replace the original Cable 8; if NOT, TURN POWER OFF, disconnect the new Cable and reconnect the original, then proceed to (D).
	D. Treble Driver Board	With power OFF, disconnect ALL Cables from the Treble Driver Board. Get the Treble Driver Board from the kit and connect ALL Cables to it. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD CANNOT CONTACT ANY BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the Treble Driver Board.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. NO expression in Treble half of Keyboard (Middle C# up) Bass half (Middle C down) normal.	A. Treble Level Control Alignment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT correct the problem, proceed to (B).
	B. Cable 3	TURN POWER OFF. Disconnect Cable 3 at J1 on the Power Supply and J3 on the Playback Logic Board. Get Cable 3 from the kit and install it. TURN POWER ON and press the PLAY Button. If the malfunction is corrected, replace the original Cable 3; if NOT, TURN POWER OFF, disconnect the new Cable 3 and reconnect the original, then proceed to (C).
	C. Playback Logic Board	With power OFF, disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and push the PLAY Button. If the trouble is corrected, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the new Board and reconnect the original, then proceed to (D).
	D. Cable 8	With power OFF, disconnect Cable 8 at J1 on the Treble Driver Board and J4 on the Playback Logic Board. Get Cable 8 from the kit and install it. TURN POWER ON and press the PLAY Button. If the malfunction is corrected, replace the original Cable 8; if NOT, TURN POWER OFF, disconnect the new Cable 8 and reconnect the original, then proceed to (E).
	E. Treble Driver Board	With Power OFF, disconnect ALL Cables to the Treble Driver Board. Get the Treble Driver Board from the kit and connect ALL Cables to it. TURN POWER ON. If the trouble is gone, replace the original Treble Driver Board; if NOT, TURN POWER OFF, disconnect the new Board and reconnect the original, then proceed to (F).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. NO expression in Treble half of Keyboard (Middle C# up) Bass half (Middle C down) normal. (continued)	F. Cable 7	With power OFF, disconnect Cable 7 at J1 on the Center Driver Board and J5 on the Playback Board. Get the Cable 7 from the kit and install it. TURN POWER ON and push the PLAY Button. If the trouble is cleared, replace the original Cable 7; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 7, then proceed to (G).
	G. Center Driver Board	With power OFF, disconnect ALL Cables to the Center Driver Board. Get the Center Driver Board from the kit and connect ALL Cables to it. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE CENTER DRIVER CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the problem is solved, replace the Center Driver Board.
4. NO expression in Middle Section (Keys 37 thru 52).	A. Bass and Treble Level Control alignment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures have no effect, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the malfunction is cleared, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Playback Board, then proceed to (C).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
4. NO expression in Middle Section (keys 37 thru 52). (continued)	C. Cable 7	With power OFF, disconnect Cable 7 at J1 on the Center Driver Board. Get the Cable 7 from the kit and install it. TURN POWER ON and depress the PLAY Button. If the problem is corrected, replace the original Cable 7; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 7, then proceed to (D).
	D. Center Driver Board	With power OFF, disconnect ALL Cables from the Center Driver Board. Get the Center Driver Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE CENTER DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and push the PLAY Button. If the problems is solved, replace the original Center Driver Board.
5. NO expression in Bass half of Keyboard (Middle C down) Treble half (Middle C# up) normal.	A. Bass Level Control alignment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT correct the trouble, proceed to (B).
	B. Cable 3	TURN POWER OFF. Disconnect Cable 3 at J1 on the Power Supply and J3 on the Playback Logic Board. Get Cable 3 from the kit and install it. TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Cable 3; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 3, then proceed to (C).
	C. Playback Logic Board	With power OFF, disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. NO expression in Bass half of Keyboard (Middle C down) Treble half (Middle C# up) normal. (continued)	C. Playback Logic Board (continued)	TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the original Playback Board; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Playback Logic Board, then proceed to (D).
	D. Cable 7	With power OFF, disconnect Cable 7 at J1 on the Center Driver Board and J5 on the Playback Logic Board. Get Cable 7 from the kit and install it. TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Cable 7, if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 7, then proceed to (E).
	E. Center Driver Board	With power OFF, disconnect ALL Cables to the Center Driver Board. Get the Center Driver Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE CENTER DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is eliminated, replace the original Center Driver; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Center Driver, then proceed to (F).
	F. Cable 9	With power OFF, disconnect Cable 9 at J1 on the Bass Driver Board and J6 on the Playback Logic Board. Get Cable 9 from the kit and install it. TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the original Cable 9; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 9, then proceed to (G).
	G. Bass Driver Board	With power OFF, disconnect ALL Cables from the Bass Driver Board. Get the Bass Driver Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE BASS DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. NO expression in Bass half of Keyboard (Middle C down) Treble half (Middle C# up) normal. (continued)	G. Bass Driver Board (continued)	TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the Bass Driver Board.
6. NO expression in Bass Section (Keys 5 thru 36) only.	A. Bass Level Control alignment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT solve the problem, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect Cables 3, 9, and 10 from the Playback Logic Board. Get the Playback Logic Board from the kit and connect Cables 3, 9, and 10 to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and push the PLAY Button. If the trouble is corrected, replace the original Playback Board; if NOT, TURN POWER OFF, disconnect Cables 3, 9, and 10 from the new Board and reconnect them to the original Playback Board, then proceed to (C).
	C. Cable 9	With power OFF, disconnect Cable 9 at J1 on the Bass Driver Board and J6 on the Playback Logic Board. Get Cable 9 from the kit and install it. TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Cable 9; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable 9, then proceed to (D).
	D. Bass Driver Board	With power OFF, disconnect ALL Cables to the Bass Driver Board. Get the Bass Driver Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE BASS DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
6. NO expression in Bass Section (Keys 5 thru 36) only. (continued)	D. Bass Driver Board (continued)	TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Bass Driver Board.
7. Piano misses notes when playing very softly or when PIANISSIMO Control is set at MIN position.	A. Bass and Treble Level Control adjustments **SEE NOTE.	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT solve the problem, proceed to (B).
	B. Piano alignment	TURN POWER OFF. Manually play all notes on the piano to verify that it is operating properly. For optimum performance from the system, the piano must be properly tuned and regulated. If the piano is functioning correctly, proceed to (C).
	C. Key Solenoids	With power OFF, inspect the malfunctioning Key Solenoids. Determine if any are binding and where they are binding. Check for bent plunger shafts, plunger tips and/or shafts rubbing against the Keybed slots, or slugs binding in the Solenoid coils. Straighten any bent plunger shafts. If the plunger tip and or shaft is rubbing against the side of the Keybed slot, you must remove the piano Keys over the affected area and the Key Solenoids below, then open the Keybed slot in the affected area with a wood file. After filing the slot, THOROUGHLY vacuum the interior of the piano, reinstall the Keys and Solenoids, then retest. If the slug is binding in the Solenoid coil, replace the Solenoid. In cases where the plunger shaft rubs against the coil of an adjacent Solenoid, loosen the mounting screws of the Solenoid and adjust its position, then secure the mounting screws. After these procedures are completed, retest the system. If the trouble remains, proceed to (D).

**NOTE: When playing VERY FAST selections, the system WILL NOT play as softly as it will with long, slow notes. This has been taken into consideration when the system was designed, therefore, the PIANISSIMO Control is provided to enable the user to increase the playing level of rapid, soft passages to insure that all notes are struck. When the FORTISSIMO Control is decreased, it may be necessary to increase the setting of the PIANISSIMO Control to produce a balanced performance from some tapes. Read the OWNERS MANUAL and Section 9, TEST AND ALIGNMENT PROCEDURES of the INSTALLATION AND FIELD SERVICE MANUAL for a better understanding of system operation.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
7. Piano misses notes when playing very softly or when PIANISSIMO Control is set at MIN position. (continued)	D. Solenoid Lost Motion alignment	With power OFF, check to see if there is any lost motion at each Key Solenoid. To do this, push up on the bottom of the Solenoid slug and observe the piano Key above the Solenoid. Lost motion is present if the back of the Key DOES NOT begin to rise as soon as the slug is pushed up. Refer to Section 9, STEP 9-39, on pages 122 and 123 to eliminate the lost motion.
8. System plays too loudly DOES NOT play softly with FORTISSIMO and PIANISSIMO Controls set at MIN positions.	A. Tape	Stop and eject the tape, insert the Alignment Test Tape, and push the PLAY Button. If the trouble is cleared, the pre-recorded tape is defective; if NOT, leave the Test Tape in the Recorder and proceed to (B).
	B. Bass and Treble Level Control alignments. **SEE NOTE	Stop the tape, then refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT correct the problem, proceed to (C).
	C. Playback Logic Board	TURN POWER OFF. Remove ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect ALL Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and push the PLAY Button. If the problem is solved, replace the original Playback Logic Board.

**NOTE: When playing VERY FAST selections, the system WILL NOT play as softly as it will with long, slow notes. This has been taken into consideration when the system was designed, therefore, the PIANISSIMO Control is provided to enable the user to increase the playing level of rapid, soft passages to insure that all notes are struck. When the FORTISSIMO Control is decreased, it may be necessary to increase the setting of the PIANISSIMO Control to produce a balanced performance from some tapes. Read the OWNERS MANUAL and Section 9, TEST AND ALIGNMENT PROCEDURES of the INSTALLATION AND FIELD SERVICE MANUAL for a better understanding of system operation.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
9. PIANISSIMO and FORTISSIMO Controls DO NOT function properly in the Bass, Middle, or Treble Sections.	A. Tape	Stop and eject the tape, insert the Alignment Test Tape, and press the PLAY Button. If the trouble is eliminated, the prerecorded tape is defective; if NOT, proceed to (B).
	B. Bass and Treble Level Controls adjustment	TURN POWER OFF. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT correct the trouble, proceed to (C).
	C. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board. Get the Recorder from the kit and connect it to J2. TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Recorder; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Recorder, then go to (D).
	D. Playback Logic Board	With power OFF, disconnect ALL Cables from the Playback Logic Board. Get the Playback Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the malfunction is cured, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the Cables from the new and reconnect them to the original Board, then proceed to (E).
	E. Cable 7, 8, or 9	With power OFF, disconnect the Cable (7, 8, or 9) at the affected Driver Board (Middle, Treble, or Bass) and at the Playback Logic Board. Get a new Cable from the kit and install it. TURN POWER ON and push the PLAY Button. If the trouble is cleared, replace the original Cable, if NOT, TURN POWER OFF, disconnect the new and reconnect the original Cable, then proceed to (F).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
9. PIANISSIMO and FORTISSIMO Controls DO NOT function properly in the Bass, Middle, or Treble Section. (continued)	F. Bass, Middle, or Treble Driver Board	With power OFF, disconnect ALL Cables to the affected Driver Board. Get the replacement Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is corrected, replace the original Driver Board and retest.
10. Bass half of piano plays with expression, but too loudly, Treble half plays normally.	A. Bass and Treble Level Controls adjustment	Stop and eject the tape and insert the Alignment Test Tape. Refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128 and do the alignments detailed there. If these procedures DO NOT solve the problem, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Playback Logic Board. Get the Playback Logic Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the malfunction is corrected, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect all Cables from the new and reconnect them to the original Playback Board, then proceed to (C).
	C. Bass, Center, or Treble Driver Board	TURN POWER OFF. Disconnect ALL Cables to the affected Driver Board, get its replacement from the kit, and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
10. Bass half of piano plays with expression, but too loudly, Treble half plays normally. (continued)	C. Bass, Center or Treble Driver Board (continued)	TURN POWER ON and press the PLAY Button. If the problem is solved, replace the original Driver Board and retest.
11. Bass half of piano plays with expression, but too softly, when playing pre-recorded tapes, Treble expression normal.	A. Bass Level Control adjustment	Stop and eject the tape, insert the Alignment Test Tape, and refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128. Do the alignments detailed there. If these procedures DO NOT correct the malfunction, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Playback Logic Board, get its replacement from the kit, and connect all Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the trouble is cleared, replace the original Playback Board; if NOT, TURN POWER OFF, disconnect the new and reconnect the original Playback Logic Board, then proceed to (C).
	C. Bass and/or Center Driver Board	With power OFF, disconnect ALL Cables to the affected Driver Board(s), get the replacement Board(s) from the kit and connect the Cables to it (them) outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD(S) CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE PIANO OR OF THE SYSTEM. TURN POWER ON and depress the PLAY Button. If the malfunction is corrected, replace the original Driver Board(s) and retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
12. Treble half of piano plays with expression, but too loudly, Bass half normal.	A. Treble Level Control alignment	Stop and eject the tape, insert the Alignment Test Tape, and refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128. Do the procedures detailed there. If these procedures DO NO correct the malfunction, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Playback Logic Board, get its replacement from the kit, and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and press the PLAY Button. If the problem is cured, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the Cables from the new and reconnect them to the original Playback Board, then proceed to (C).
	C. Treble and/or Center Driver Board	With power OFF, disconnect ALL Cables to the affected Board, get the replacement from the kit, and connect the Cables to it (them) outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD(S) CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and depress the PLAY Button. If the malfunction is cleared, replace the original Driver Board(s) and retest.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION TWO: THE PLAYBACK SYSTEM -- PART D: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
13. Treble half of piano plays with expression, but too softly, Bass half normal.	A. Treble Level Control adjustment	Stop and eject the tape, insert the Alignment Test Tape, and refer to Section 9, STEPS 9-45 thru 9-59, pages 124 thru 128. Do the procedures there. If these procedures DO NOT correct the malfunction, proceed to (B).
	B. Playback Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Playback Logic Board, get its replacement from the kit, and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and depress the PLAY Button. If the problem is solved, replace the original Playback Logic Board; if NOT, TURN POWER OFF, disconnect the Cables to the new and reconnect them to the original Playback Logic Board, then proceed to (C).
	C. Treble and/or Center Driver Board	With power OFF, disconnect ALL Cables to the affected Driver Board(s), get the replacement Board(s) from the Kit and connect the Cables to it (them) outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE DRIVER BOARD(S) CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and depress the PLAY Button. If the trouble is cured, replace the original Driver Board(s) and retest.

PIANOCORDER™ Reproducing System

TROUBLE ANALYSIS GUIDE

Section Three: THE RECORDING SYSTEM

PROBLEM ISOLATION BY SYMPTOM

CONDITION: The AC MAIN POWER, POWER SUPPLY, and the PLAYBACK SYSTEMS are ALL functioning properly.

PART A: TAPE RECORDER MALFUNCTIONS

SYMPTOM:

PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

NOTE: Before attempting any repairs, TURN POWER OFF, remove the Lower Frame, pull OUT the button of the Interlock Switch so it locks in the OUT (TEST) position, and expose the Keybed by performing STEP 1-14, Points 1 thru 7 on pages 4 thru 6 in Section 1.

SYMPTOM:

Section Three: THE RECORDING SYSTEM

PROBLEM ISOLATION BY SYMPTOM (continued)

CONDITION: The AC MAIN POWER, POWER SUPPLY, and PLAYBACK SYSTEMS are ALL functioning properly.

PART C: EXPRESSION MALFUNCTIONS

NOTE: Before attempting any repairs, TURN POWER OFF, remove the Lower Frame, pull OUT the button of the Interlock Switch so it locks in the OUT (TEST) position, and expose the Keybed by performing STEP 1-14, Points 1 thru 7, on pages 4 thru 6 in Section 1.

SYMPTOM:

Change No 2 -- 8/15/78

RECORD SYSTEM

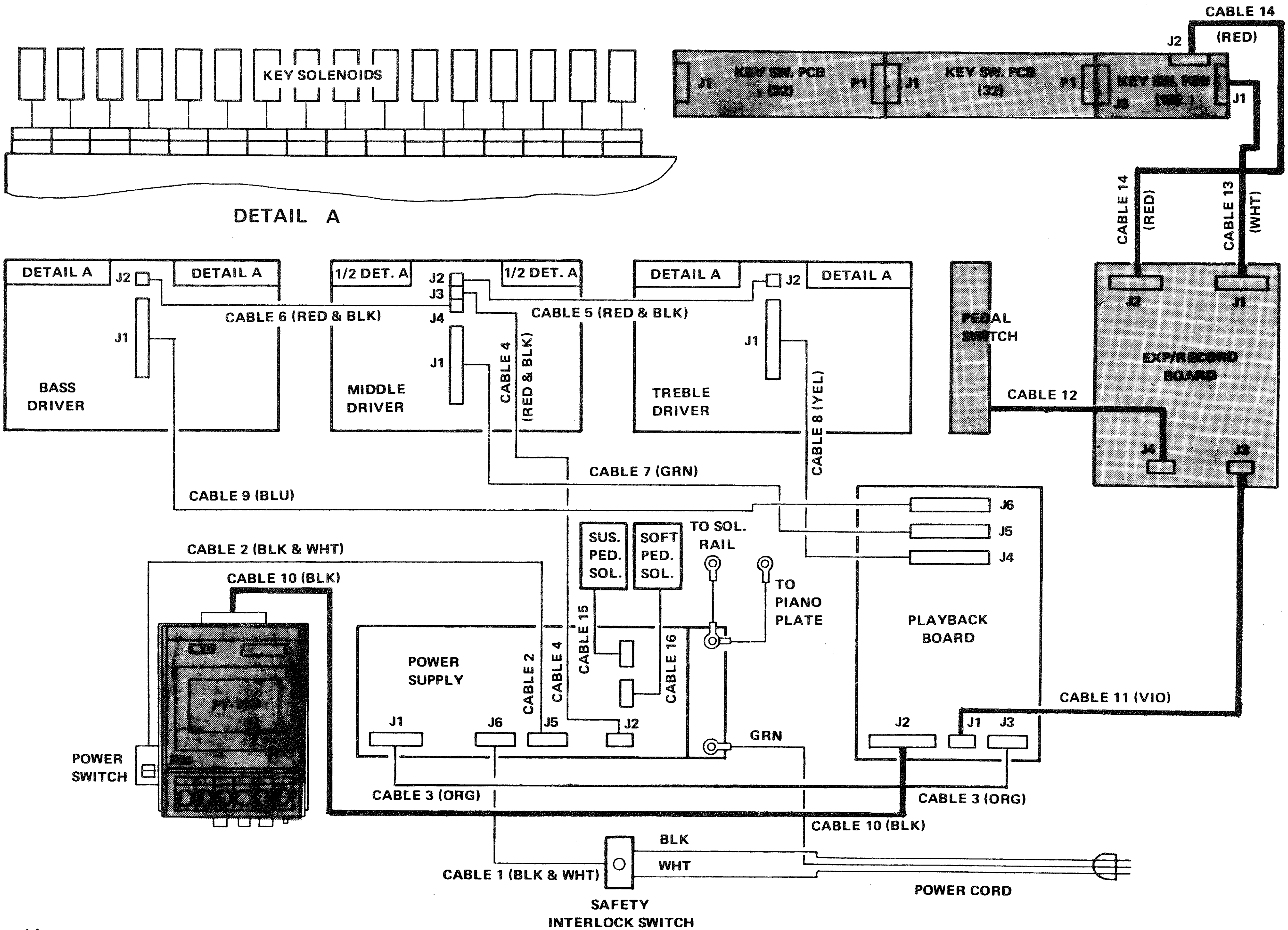

FIGURE C - Record System Wiring Diagram

SECTION THREE: THE RECORDING SYSTEM

NOTE:

Refer to FIGURE C while reading this description.

The RECORDING SYSTEM is composed of four sections: the Bass, Middle, and Treble Key Switches; the Pedal Switches; the Record Logic Board; and the Tape Recorder. The functions of each section are detailed as follows:

a) The Bass, Middle, and Treble Key Switches provide the date which informs the Record Logic Board as to which Keys are depressed and how long they are held. The Bass Key Switches are actuated by Keys 5 through 36; the Middle by Keys 37 through 68; and the Treble by Keys 69 through 84. Data is sent to the Record Logic Board through Cables 13 and 14.

b) The Pedal Switches supply the Record Logic Board with pedaling information. One switch is actuated by the SOFT Pedal, while the other is operated by the SUSTAIN Pedal. Data from these switches is transmitted through Cable 12 to the Record Logic Board.

c) In section three of the RECORDING SYSTEM, the Record Logic Board, the Key data from the Key Switches and the Pedaling data from the Pedal Switches is integrated into a composite digital signal. This Circuit Board also contains the Expression Sensor, which provides the Board with data concerning the expression (intensity) with which the notes are played. The expression data is then combined with the Key and Pedal information by the Record Logic Board to form a data stream which is transmitted through Cable 11 to the Playback Logic Board. The Playback Logic Board merely acts as a junction between the Record Logic Board and the Tape Recorder. The digital information enters the Playback Logic Board through Cable 11 and passes out through Cable 10 to the Recorder.

d) The Recorder receives the composite digital signal from the Record Logic Board (via the Playback Board) and imprints it on the magnetic cassette tape. Once the information is stored on the cassette tape, it can be retrieved at any time and reconverted into the mechanical operations to play the piano by utilizing the PLAYBACK SYSTEM described previously.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART A: THE TAPE RECORDER

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. With power applied, the RECORD Button CANNOT be depressed.	A. Tape	Stop and eject the cassette. Check to see if the knock-out tabs in the rear of the cassette are missing. If missing, replace the cassette with one with the tabs in place. **SEE NOTE below. If NOT missing, proceed to (B).
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board. Get the Recorder from the kit and connect its Cable at J2 on the Playback Logic Board. TURN POWER ON. Insert the cassette with the knock-out tabs in place into the Recorder and press the RECORD Button. If the trouble is corrected, replace the original Recorder.
2. With power applied, the RECORD Button is depressed but the tape DOES NOT run.	A. PAUSE Button	Release PAUSE Button. If problem is NOT solved, proceed to (B).
	B. Tape	Stop and eject the tape and replace it with another and try again. Make sure that the replacement tape has the knock-out tabs in place. If the trouble is NOT corrected, proceed to (C).
	C. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board. Get the Recorder from the kit and connect its Cable at J2 on the Playback Logic Board. TURN POWER ON and depress the RECORD Button. If the malfunction is corrected, replace the original Recorder.

**NOTE: Refer to the OWNERS MANUAL of the system you are repairing for the illustration of the knock-out tabs on the cassette.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. System DOES NOT record ANY note or pedal data.	A. Tape	Stop and eject the tape and replace it with another cassette. Make sure the knock-out tabs have NOT been removed from the replacement cassette. Retest. If the trouble is NOT corrected, proceed to (B).
	B. Tape Recorder	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board, get the PIANOCORDER Test Box from the kit, and connect its 12 pin plug at J2. TURN POWER ON. Set the MODE - PLAY/STANDBY Switch on the Test Box to the PLAY position. Manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If ALL the Solenoids operate correctly, replace the Tape Recorder. If NONE of the Solenoids respond, proceed to (C). If ONLY the Treble Section Solenoids respond, proceed to (H). If ONLY the Bass Section Solenoids DO NOT respond, proceed to (I).
	C. Cable 11	TURN POWER OFF. Disconnect Cable 11 at J1 on the Playback Logic Board and J3 on the Record Logic Board, get its replacement from the kit and connect it. TURN POWER ON. With the Test Box MODE - PLAY/STANDBY Switch set in the PLAY position, manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If the trouble is corrected, replace the original Cable 11. If NONE of the Solenoids respond, TURN POWER OFF, disconnect the new and reconnect the original Cable 11, then proceed to (D).
	D. Record Logic Board	With power OFF, disconnect ALL Cables from the Record Logic Board. Get the Record Logic Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in ALL sections of the Keyboard,

CAUTION: TO PREVENT DAMAGE TO THE SYSTEM THAT COULD OCCUR WHEN A SOLENOID IS ON CONTINUOUSLY, AFTER EACH SOLENOID ACTUATES, FLIP THE TEST BOX MODE - PLAY/STANDBY SWITCH FROM PLAY TO STANDBY, THEN RETURN THE SWITCH TO THE PLAY POSITION TO CHECK THE NEXT SOLENOID.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. System DOES NOT record ANY note or pedal data. (continued)	D. Record Logic Board (continued)	one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If ALL Solenoids respond, replace the original Record Logic Board. If NONE respond, TURN POWER OFF, disconnect the new and reconnect the original Record Logic Board, then proceed to (E).
	E. Playback Logic Board	With power OFF, disconnect ALL Cables from the Playback Logic Board, get its replacement from the kit and connect the Cables to the Board outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE PLAYBACK LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to the PLAY position. Manually depress each Key in ALL sections of the piano, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If ALL Solenoids actuate properly, replace the orginal Playback Logic Board. If NONE actuate, TURN POWER OFF, disconnect the new and reconnect the original Playback Logic Board, then proceed to (F).
	F. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 at the Treble Key Switch Board and the Record Logic Board. Get their replacements from the kit and install them. TURN POWER ON. Set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If ALL Solenoids actuate properly, replace the original Cables 13 and 14. If NONE do, TURN POWER OFF, disconnect the new and reconnect the original Cables 13 and 14, then proceed to (G).

CAUTION: TO PREVENT DAMAGE TO THE SYSTEM THAT COULD OCCUR WHEN A SOLENOID IS ON CONTINUOUSLY, AFTER EACH SOLENOID ACTUATES, FLIP THE TEST BOX MODE - PLAY/STANDBY SWITCH FROM PLAY TO STANDBY, THEN RETURN THE SWITCH TO PLAY BEFORE CHECKING THE NEXT SOLENOID.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. System DOES NOT record ANY note or pedal data. (continued)	G. Treble Key Switch Board	With power OFF, disconnect Cables 13 and 14 from the Treble Key Switch Board, then disconnect the Board from the Middle Key Switch Board and remove it. Get the Treble Key Switch Board from the kit and install it and connect Cables 13 and 14 to it. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If the Solenoids respond correctly, TURN POWER OFF and replace the Treble Key Switch Board, then refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to adjust the Key Switches; if NOT, TURN POWER OFF, dosconnect and remove the new Board and reinstall the original, then proceed to (H).
	H. Middle Key Switch Board	TURN POWER OFF. Remove the Middle Key Switch Board and replace it with the Board from the kit. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If the Solenoids actuate properly, TURN POWER OFF, leave the new Board installed, and refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to align the Key Switches. If the Bass Key Solenoids still DO NOT respond, TURN POWER OFF and proceed to (I).
	I. Bass Key Switch Board	TURN POWER OFF and remove the Bass Key Switch Board and replace it with the Board from the kit. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in ALL sections of the Keyboard, one at a time, then the SOFT and SUSTAIN Pedals. SEE THE CAUTION BELOW. If the new Board corrects the trouble, TURN POWER OFF, then refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to align the Key Switches.

CAUTION: TO PREVENT DAMAGE TO THE SYSTEM THAT COULD OCCUR WHEN A SOLENOID IS ON CONTINUOUSLY, AFTER EACH SOLENOID ACTUATES, FLIP THE TEST BOX MODE - PLAY/STANDBY SWITCH FROM PLAY TO STANDBY, THEN RETURN THE SWITCH TO PLAY BEFORE CHECKING THE NEXT SOLENOID.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
2. System DOES NOT record SOME NOTES, pedal data OK.	A. Tape	Stop and eject the tape, TURN POWER OFF, and insert the blank cassette you have used previously for record testing and that you know is good. Disconnect Cable 10 at J2 on the Playback Board, get the PIANOCORDER Test Box from the kit, and connect its 12 pin plug at J2. TURN POWER ON and set the Test Box MODE - PLAY-STANDBY Switch to PLAY. Place the Recorder in the RECORD Mode, then manually depress each Key in ALL sections of the Keyboard, one at a time. SEE THE CAUTION UNDER SYMPTOM 1 on page 228. After all Keys have been played, stop the tape and rewind it to the beginning, then press the PLAY Button on the Recorder. If all notes are recorded, the original cassette is defective; if NOT, see the NOTE below, then proceed to (B).
	B. Defective Key Switches	If there is NO pattern in the notes that do not record, use a a small piece of masking tape to mark each Key that DOES NOT record. Remove the marked Keys. Visually inspect each Key Switch and align, if necessary, by performing the procedures detailed in Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158. If the malfunction is still NOT corrected, refer to SYMPTOM 1 and do the SOLUTIONS for POSSIBLE CAUSES, F, G, and H on pages 227 and 228.
3. System records SOME notes when NO Keys are depressed.	A. Record Logic, Playback Logic, or Key Switch Circuit Boards or Cables 13 and 14	Determine if the notes being recorded follow a pattern. If there is NO pattern, proceed to (B). If a pattern (every 8th note, groups of 8 notes, etc.) is noted, refer to SYMPTOM 1 and do the SOLUTIONS for POSSIBLE CAUSES D thru I on pages 226 thru 228.

NOTE: Each Solenoid should respond when its Key is depressed HALF WAY through its travel. If any do NOT, refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to align the switches.

If you note a pattern in the notes that do not record (every 8th note or groups of 8 notes, etc. as example), refer to SYMPTOM 1 and perform the SOLUTIONS for POSSIBLE CAUSES D thru I on pages 226 thru 228.

Change No. 2 -- 8/15/78

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
3. System records SOME notes when NO Keys are depressed. (continued)	B. Defective Key Switches	Mark each Key that is recording with a small piece of masking tape. Remove the marked Keys. Visually inspect each Key Switch and align, if necessary, by performing the procedures detailed in Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158. If the problem is NOT solved, refer to SYMPTOM 1 and do the SOLUTIONS for POSSIBLE CAUSES F, G, and H on pages 227 and 228.
4. System records ALL notes in Bass section (Keys 5 through 36) when NO Keys are depressed.	A. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Record Logic Board, get its replacement from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON. If the trouble is cleared, replace the original Record Logic Board; if NOT, TURN POWER OFF, disconnect the new Board and reconnect the original, then proceed to (B).
	B. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 at the Record Logic and Treble Key Switch Boards. Get the replacement Cables from the kit and install them. TURN POWER ON. If the malfunction is corrected, replace the original Cables; if NOT, TURN POWER OFF, disconnect the new Cables and reconnect the originals, then proceed to (C).
	C. Key Switch Rail alignment	With power OFF, visually inspect the alignment of the Bass end of the Key Switch Rail. If the Rail is too HIGH and the Bass Key Switches are held ON by the Keys, refer to Section 9, STEPS 9-81 and 9-82 on pages 155 and 156 to align the Rail, then retest. If Rail alignment DOES NOT solve the problem, TURN POWER OFF and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
4. System records ALL notes in Bass section (Keys 5 through 36) when NO Keys are depressed. (continued)	D. Bass Key Switch Board	With power OFF, disconnect and remove the Bass Key Switch Board. Get the replacement Board from the kit and install it. Refer to Section 9, STEPS 9-79 through 9-88 on pages 154 thru 158 to align the Key Switches, then retest.
5. System records ALL notes in Middle section (Keys 37 thru 68) when NO Keys are depressed.	A. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Record Logic Board. Get the replacement Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the problem is corrected, replace the original Board; if NOT, TURN POWER OFF, disconnect the Cables from the new Board and reconnect them to the original, then proceed to (B).
	B. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 from the Record Logic and Treble Key Switch Boards. Get the replacement Cables from the kit and install them. TURN POWER ON and retest. If the malfunction is removed, replace the original Cables; if NOT, TURN POWER OFF, disconnect the new Cables and reconnect the originals, then proceed to (C).
	C. Key Switch Rail alignment	With power OFF, visually inspect the alignment of the Middle Key Switches. If the Key Switch Rail is too HIGH and the Middle Key Switches are held ON by the Keys, refer to Section 9, STEPS 9-81 and 9-82 on pages 155 and 156 to adjust Rail height, then retest. If the Rail height is correct, but the problem remains, TURN POWER OFF and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
5. System records ALL notes in Middle section (Keys 37 thru 68) when NO Keys are depressed. (continued)	D. Middle Key Switch Board	With power OFF, disconnect and remove the Middle Key Switch Board. Get the replacement Board from the kit and install it. Refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to align the Switches, then retest.
6. System records ALL notes in Treble section (Keys 69 thru 84) when NO Keys are depressed.	A. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Record Logic Board. Get the replacement Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the malfunction is gone, replace the original Board; if NOT, TURN POWER OFF, disconnect the Cables from the new Board and reconnect them to the original, then proceed to (B).
	B. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 from the Record Logic and Treble Key Switch Boards. Get the replacement Cables from the kit and install them. TURN POWER ON and retest. If the problem is solved, replace the original Cables; if NOT, TURN POWER OFF, disconnect the new Cables and reconnect the originals, then proceed to (C).
	C. Key Switch Rail alignment	With power OFF, visually inspect the alignment of the Treble Key Switches. If the Key Switch Rail is too HIGH and the Treble Key Switches are held ON by the Keys, refer to Section 9, STEPS 9-81 and 9-82 on pages 155 and 156 to adjust Rail height, then retest. If the Rail height is correct, but the problem remains, TURN POWER OFF and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
6. System records ALL notes in Treble section (Keys 69 thru 84) when NO Keys are depressed. (continued)	D. Treble Key Switch Board	With power OFF, disconnect and remove the Treble Key Switch Board. Get the replacement Board from the kit and install it. Do STEPS 9-79 thru 9-88 in Section 9 on pages 154 thru 158 to align the Switches, then retest.
7. System records ALL notes when NO Keys are depressed.	A. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables from the Record Logic Board. Get the replacement Board from the kit and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the problem is solved, replace the original Board; if NOT, TURN POWER OFF, disconnect the Cables from the new Board and reconnect them to the original, then proceed to (B).
	B. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 from the Record Logic and Treble Key Switch Boards. Get the replacement Cables from the kit and install them. TURN POWER ON and retest. If the trouble is gone, replace the original Cables; if NOT, TURN POWER OFF, disconnect the new Cables and reconnect the originals, then proceed to (C).
	C. Key Switch Rail alignment	With power OFF, visually inspect the alignment of the Key Switches. If the Key Switch Rail is too HIGH and the Key Switches are held ON by the Keys, do STEPS 9-81 and 9-82 in Section 9 on pages 155 and 156, then retest. If the malfunction is NOT corrected by these procedures, TURN POWER OFF and proceed to (D).

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
7. System records ALL notes when NO Keys are depressed. (continued)	D. Treble Key Switch Board	With power OFF, disconnect and remove the Treble Key Switch Board. Get the replacement Board from the kit and install it. TURN POWER ON and retest. If the trouble is eliminated, replace the original Board, align the Switches, and retest.
8. System DOES NOT record or misses some notes during fast performance.	A. Key Switch alignment	When a pianist plays fast passages, he may sometimes not depress the Keys as deeply as when he plays slowly. If a great number of notes are not recorded during fast passages played by the individual, it may be necessary to raise the Key Switch Rail to suit the performer. TURN POWER OFF. Visually inspect Key Switch Alignment and align, if necessary by doing STEPS 9-79 thru 9-88 in Section 9 on pages 154 thru 158. After the Key Switches and Key Switch Rail height are adjusted properly, TURN POWER ON and have the individual perform while recording. If notes are still missed during fast passages, raise the Key Switch Rail a little bit at a time, retest, and continue doing this until the performance by the individual is recorded properly.
9. System DOES NOT record trills properly.	A. Key Switch Rail height alignment	When a pianist plays trills, he may not depress the Keys very deeply. Play back the trills recorded by the performer and observe the Keys. If the Keys move, but their Hammers DO NOT strike the Strings, the Key Switch Rail is too LOW. If the Keys stay DOWN too long during the trill, the Key Switch Rail is too HIGH. To align the Rail height, do STEPS 9-81 and 9-82 in Section 9 on pages 155 and 156. After the alignment is completed, have the performer record some trills, then play them back. If necessary, readjust Rail height until the trills record properly.
10. System records Two (2) notes when only one (1) Key is depressed.	A. Key Switch Alignment	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Board. Get the PIANOCORDER Test Box from the kit and connect its 12 pin plug at J2 on the Playback Board. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. Manually depress each Key in all sections of the Keyboard.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
10. System records two (2) notes when only one (1) Key is depressed. (continued)	A. Key Switch Alignment (continued)	SEE THE CAUTION BELOW. Use a small piece of masking tape to mark any Keys which DO NOT function properly. Remove a few Keys on either side of each marked Key. Depress the marked Key and observe its Key Switch to check the alignment of the Switch. Make sure that each marked Key DOES NOT cause two (2) Key Switches to actuate. Adjust the position of the Key Switches, if necessary, then retest the system. If the malfunction is still present, TURN POWER OFF and proceed to (B).
	B. Bass, Middle, or Treble Key Switch Board	With power OFF, disconnect and remove the Key Switch Board (Bass, Treble, or Middle) connected to the Solenoid of the malfunctioning Key. Get the replacement Board from the Kit and install it. TURN POWER ON and retest. Refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to align the Key Switches of the new Board. If the problem is solved, replace the original Driver Board.
11. System records SEVERAL notes when only ONE (1) Key is depressed.	A. Bass Key Switch Board	TURN POWER OFF. Disconnect and remove the Bass Key Switch Board. Get its replacement from the kit and install it. Do STEPS 9-79 thru 9-88 in Section 9 on pages 154 thru 158 to align the Bass Key Switches, TURN POWER ON and retest. If the problem is NOT corrected, TURN POWER OFF, disconnect and remove the new Bass Key Switch Board and reinstall the original, then proceed to (B).
	B. Middle Key Switch Board	With power OFF, disconnect and remove the Middle Driver Board. Get its replacement from the kit and install it. Do STEPS 9-79 thru 9-88 in Section 9 on pages 154 thru 158 to align the Key Switches, then TURN POWER ON and retest. If the problem is NOT solved, TURN POWER OFF, disconnect and remove the new Key Switch Board and reinstall the original, then proceed to (C).

CAUTION: TO PREVENT DAMAGE TO THE SYSTEM THAT COULD OCCUR WHEN A SOLENOID IS ON CONTINUOUSLY, AFTER EACH SOLENOID ACTUATES, FLIP THE TEST BOX MODE - PLAY/STANDBY SWITCH FROM PLAY TO STANDBY, TO RELEASE THE SOLENOID, THEN BACK TO PLAY BEFORE CHECKING THE NEXT SOLENOID.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
11. System records SEVERAL notes when only ONE (1) Key is depressed. (continued)	C. Treble Key Switch Board	With power OFF, disconnect and remove the Treble Key Switch Board, get its replacement from the kit and install it. Do STEPS 9-79 thru 9-88 in Section 9 on pages 154 thru 158 to align the Key Switches, then TURN POWER ON and retest. If the trouble is still present, TURN POWER OFF, disconnect and remove the new Key Switch Board and reinstall the original, then proceed to (D).
	D. Cables 13 and 14	With power OFF, disconnect Cables 13 and 14 from the Record Logic Board and the Treble Driver Board. Get the replacement Cables from the kit and install them. TURN POWER ON and retest. If the malfunction is removed, replace the original Cables; if NOT, TURN POWER OFF, disconnect the new Cables and reconnect the originals, then proceed to (E).
	E. Record Logic Board	With power OFF, disconnect ALL Cables from the Record Logic Board, get its replacement from the kit, and connect the Cables to it outside the piano. See the CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the malfunction is corrected, replace the original Board and retest.
12. Systems records notes that DID NOT sound. *SEE NOTE	A. Key Switch Rail alignment	If the Key Switch Rail is too HIGH, Keys depressed slightly may actuate and cause the notes to be recorded. Refer to Section 9, STEPS 9-79 thru 9-88 on pages 154 thru 158 to properly align the Key Switches and Rail height.

*NOTE: This symptom can also be caused by sloppy technique. Before proceeding with repairs, you might have the customer play so you can observe his technique.

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART B: INDIVIDUAL NOTES OR GROUPS OF NOTES MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
13. System DOES NOT record SOFT and/or SUSTAIN Pedal data, Key data OK.	A. Pedal Switch adjustment	TURN POWER OFF. Disconnect Cable 10 at J2 on the Playback Logic Board, get the PIANOCORDER Test Box from the kit and connect its 12 pin plug at J2. TURN POWER ON and set the Test Box MODE - PLAY/STANDBY Switch to PLAY. SEE THE CAUTION BELOW. Manually depress the defective Pedal(s) and check to see that the Pedal Switch(es) are making contact. If the Switch(es) are NOT making contact, refer to Section 9, STEPS(S) 9-91 and/or 9-92 to align the Switch(es) then re-test. If the Switches are making positive contact, but the problem persists, TURN POWER OFF and proceed to (B).
	B. Record Logic Board	With power OFF, disconnect ALL Cables from the Record Logic Board, get its replacement from the kit, and connect the Cables to it outside the piano. See CAUTION below. CAUTION: MAKE CERTAIN THAT THE RECORD LOGIC BOARD CANNOT MAKE CONTACT WITH BARE METAL PARTS OF THE SYSTEM OR OF THE PIANO. TURN POWER ON and retest. If the malfunction is corrected, replace the original Board and retest.

CAUTION: PREVENT DAMAGE TO THE SYSTEM THAT COULD OCCUR WHEN A SOLENOID IS ON CONTINUOUSLY, AFTER EACH SOLENOID ACTUATES, FLIP THE TEST BOX MODE - PLAY/STANDBY SWITCH FROM PLAY TO STANDBY TO RELEASE THE SOLENOID, THEN BACK TO PLAY BEFORE CHECKING THE NEXT SOLENOID.

Change No. 2 -- 8/15/78

****** CAUTION ****** ******** IMPORTANT ******** ****** LETHAL HAZARD ******

WHEN SERVICING UNIT, MAKE SURE THAT POWER IS OFF AND WAIT 1 MINUTE BEFORE REMOVING PLUGS OR COMPONENTS WHEN POWER IS APPLIED, USE EXTREME CAUTION WHILE PERFORMING ALL TESTS OR ADJUSTING CONTROLS ON CIRCUIT BOARDS. THE GROUND FAULT CIRCUIT INTERRUPTER SUPPLIED WITH EACH DP-100 MAINTENANCE KIT MUST BE INSTALLED BETWEEN THE PIANOCORDER SYSTEM AND THE AC MAIN POWER SOURCE (WALL SOCKET). FAILURE TO HEED THIS PROCEDURE CAN RESULT IN DESTRUCTION OF THE SYSTEM AND WILL EXPOSE THE TECHNICIAN TO LETHAL SHOCK HAZARDS.

SECTION THREE: THE RECORDING SYSTEM -- PART C: EXPRESSION MALFUNCTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. All notes record, but with NO expression.	A. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Record Logic Board and remove the Board. Get the replacement Board from the kit, install it, and connect the Cables to it. Refer to Section 9, see the NOTE at the bottom of page 158, then do STEPS 9-89 and 9-90 on pages 159 and 160 to align the Board. Retest.
2. Bass or Treble notes record with only a little expression.	A. Record Logic Board alignment	Refer to Section 9, see the NOTE at the bottom of page 158, then do STEPS 9-89 and 9-90 on pages 159 and 160 to align the Board. If Board alignment DOES NOT correct the trouble, proceed to (B).
	B. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Record Logic Board and remove the Board. Get the replacement Board from the kit, install it, and connect the Cables to it. Refer to Section 9, see the NOTE at the bottom of page 158, then do STEPS 9-89 and 9-90 on pages 159 and 160 to align the Board.
3. Bass and/or Treble expression erratic, DOES NOT follow performance.	A. Record Logic Board alignment	To align the Board, refer to the NOTE at the bottom of page 158, then do STEPS 9-89 and 9-90 on pages 159 and 160 of Section 9. If the alignment procedures DO NOT correct the problem, proceed to (B).
	B. Record Logic Board	TURN POWER OFF. Disconnect ALL Cables to the Record Logic Board and remove the Board. Get the replacement Board from the kit, install it, and connect the Cables to it. See the NOTE at the bottom of page 158, then do STEPS 9-89 and 9-90 on pages 159 and 160 of Section 9 to align the Board. Retest.

PIANOCORDER$_{tm}$ REPRODUCING SYSTEM
SPECIAL TROUBLE SHOOTING APPARATUS

The DP 100 PIANOCORDER$_{tm}$ Reproducing System servicing kit includes three special trouble shooting devices. Use and operation of the three fixtures is described below.

While the test procedures are simple, the following safety precautions should be taken:

A. Remove watch, rings and other metallic objects prior to working on the PIANOCORDER$_{tm}$ system.

B. Use only one hand, if possible, while testing high voltage section of the unit. Keep the other hand outside the unit.

C. Wear insulated shoes and be sure that the work surface (floor) is completely dry, and if possible the floor should have a rubber mat to further insulate the technician from this surface.

TEST KIT CONTENTS

1. AC TEST LAMP (Figure A-1) Lights when connected to a voltage source more than 90 volts DC. Use it to test the presence or absence of the high voltage (180 volts DC) and line voltage (110 volts AC).

PROCEDURE

Connect the test fixture to points noted in trouble-shooting guide when instructed by the procedure. USE CAUTION NOT TO SHORT test lamp connectors to each other while using, and use

PROCEDURE (continued)

CAUTION NOT TO SHORT PARTS OF THE PIANOCORDER and system together. Lamp will light when:

A) More than 90 volts DC is present

B) 110 volts AC is present

2. SHORT TEST INDICATOR CABLE ASSEMBLY (Figure A-2) used in high voltage line

INSTALLATION AND USE

1. Turn power off and wait one minute.
2. Remove drop panel and expose PIANOCORDER system.
3. Remove cable 4 from power supply (connector J2)
4. Install short test cable to power supply and the free end of cable 4. (Fits one way only)

TO TEST:

Turn power on. Lamp should not be lit.

NOTE: If even dimly lit, the indication is that a fault is present in the 180 volt DC line. This problem must be corrected prior to further testing or operation.

** See Section 1 of trouble shooting guide for detailed explanation of this apparatus.

3. TEST BOX - (Figure A-3) Use to service unit in record and playback modes.

PLAYBACK MODE FUNCTION: To monitor the operation of expression circuits on the playback board.

PROCEDURE: Connect the 2 test point plugs to the playback board with the POWER OFF. (See installation procedure for diagram). Turn power on and play a pre-recorded tape.

PLAYBACK MODE FUNCTION (continued)

The test box will display the expression level transmitted to the solenoid driver boards ONLY while actually playing. At other times, it will have a random display.

A. The center switch (of the 3 upper switches) selects bass or treble readings for meter display.

B. Meter adjust control is provided to set the meter to "0" when no expression is present. (The procedure for this set-up is covered in the installation procedure).

RECORD MODE FUNCTION: In this mode the test box assembly is used to replace the tape recorder for trouble shooting and for alignment of the record circuit and key switches. It also enables the technician to monitor expression values as it is being generated by the record card and associated circuitry.

PROCEDURE: WITH THE POWER OFF, connect the 12 pin connector plug to the logic card after removing cable 10 (cable to tape recorder from logic card). Place mode switch in STANDBY, meter switch in BASS, soft pedal off, fortissimo control in 3 o'clock position, and pianissimo control in 9 o'clock position. Turn on power and observe display on test box. You will observe both sync and + 12 volt pilot lamp are on. (if not see trouble shooting procedure for repair of system.) By placing the mode switch into the PLAY position you are feeding signals from the record circuit into the playback circuits. This allows you to exactly set the point at which notes record (by depressing key until you feel solenoid come "on"), and also

RECORD MODE FUNCTION: (continued)

to quickly check the function of these circuits. You will note that the sync light should GO OUT when the mode is switched to play. NOTES WILL HOLD "ON" during this test and they SHOULD NOT BE ALLOWED to remain depressed for any great length of time as DAMAGE TO THE KEY SOLENOID could result. To release held notes, put switch to standby or manually lift key to break switch contact. You can also test operation of pedal solenoids by moving the individual pedal switches to actuate the pedals. The soft pedal operation can also be tested from the test box by means of the SOFT PEDAL switch. Note: Use caution when actuating this switch on some pianos the hammers will be thrown forward enough so that the back checks will depress the keys and switch on notes which will be held on. If this occurs, go to STANDBY on the mode switch. Meter calibration is performed in playback system alignment and DOES NOT have to be performed EACH time the box is used. The record expression alignment and balance is checked by actuating the keys manually by playing a trill on both bass and treble sections and observing the meter deflection (switch to BOTH bass and treble), while increasing and decreasing the force with which you play. A pianissimo trill should JUST cause meter to start to deflect from its minimum value (.4 to .5) and then go to full deflection as the force is increased. Balance is set by using equal force in your test playing and adjusting meter for equal readings on both bass and treble.

RECORD MODE FUNCTION: (continued)

NOTE: For proper playback of recorded tapes, you must MATCH volume or expression with pianissimo and fortissimo controls.

NOTE: SEE YOUR INSTALLATION MANUAL ALIGNMENT SECTION FOR FURTHER INFORMATION AND INSTRUCTION.

HIGH VOLTAGE INDICATOR

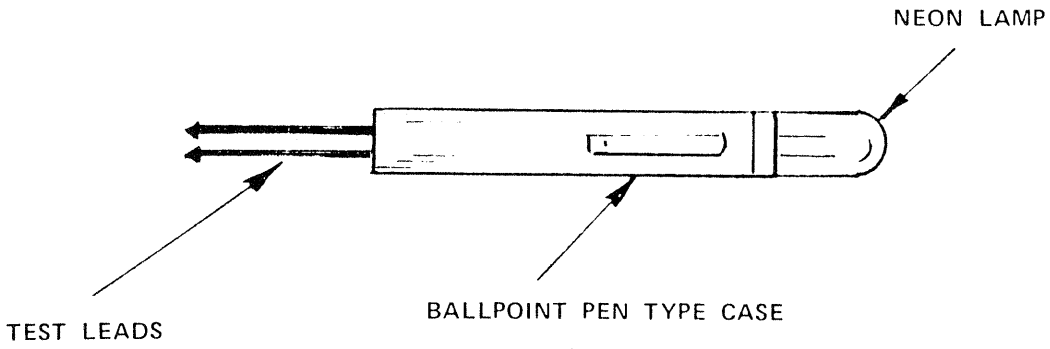

Figure A-1

SHORT CABLE INDICATOR

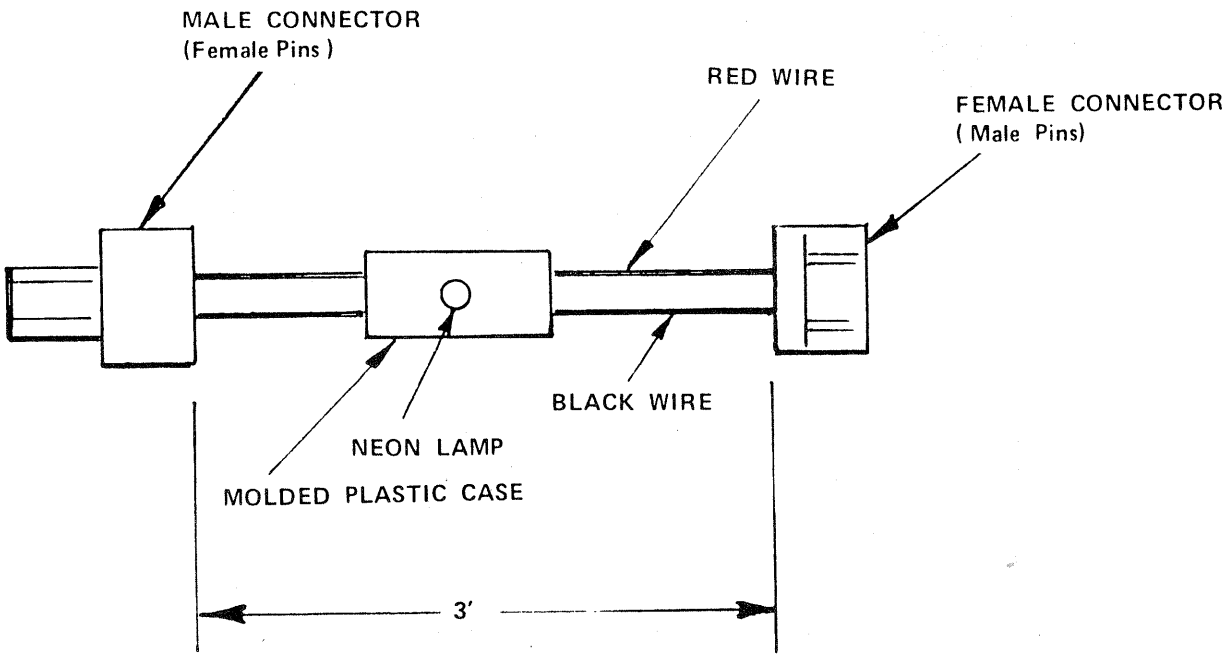

Figure A-2

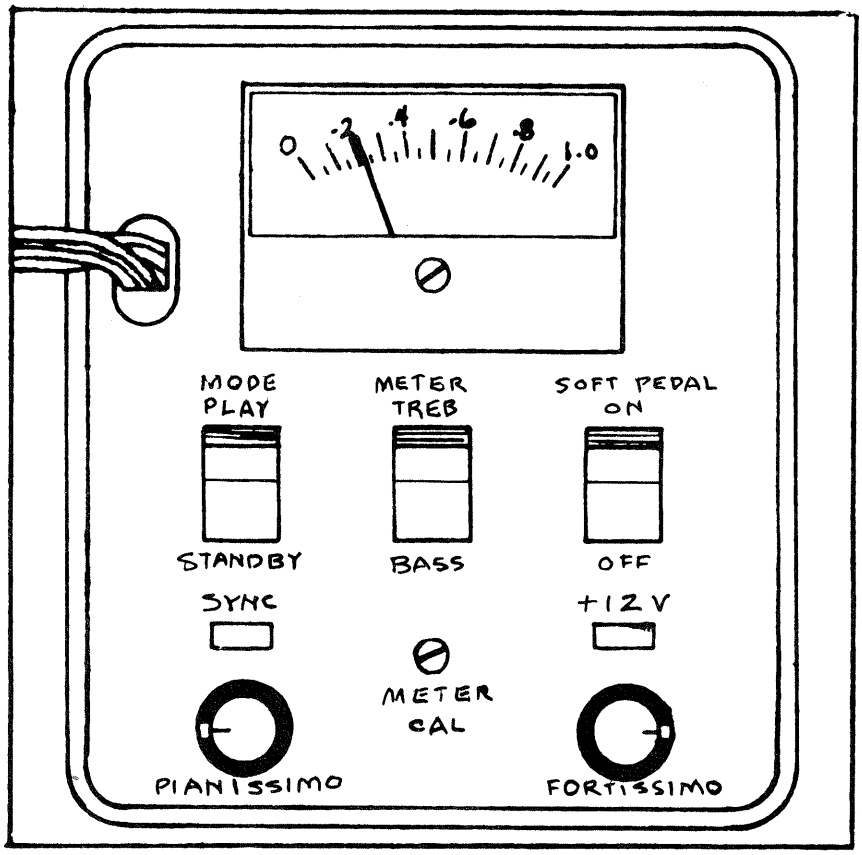
0
-2
-4
-6
-8
-10
MODE
PLAY
STANDBY
METER
TREB
BASS
SOFT PEDAL
ON
OFF
SYNC
+12V
METER
CAL
PIANISSIMO
FORTISSIMO

Figure A-3

11. VORSETZER REPRODUCER INSTALLATION

This Section details the installation procedures for the Model P-200 PIANOCORDER Vorsetzer reproducer. Follow each Step in sequence and read each Step and related CAUTION or NOTE (if any) THOROUGHLY before doing it so you will fully understand what is required and to avoid costly mistakes. This will ensure proper installation of the system.

STEP 11-1

Unpack the unit from the shipping carton by following these procedures:

A. SLOWLY tip the carton up on end (see FIGURE 11-1), and open the BOTTOM of the carton as shown in the Figure.

B. Fold ALL Bottom Flaps flat against the side of the carton as indicated by the arrows in FIGURE 11-1.

C. Grip the top two legs of the Vorsetzer and gently lower them until the unit is sitting upright on the floor.

D. CAREFULLY lift the carton up off the Vorsetzer and turn it upside down.

E. Remove the hardware package and other assembly parts from the pocket in the top of the carton, then move the carton and packing material away from the work space.

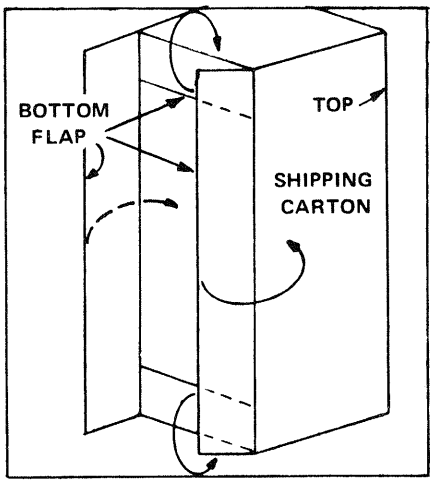

FIGURE 11-1 Tip the carton on end.

F. Unpack the following assembly parts and inspect them for damage as you do so:

1 ea. Centering Shaft ---------- PN 100-01B052-1

1 ea. Pedal Actuator Assembly (SUS.) ------- PN 100-01C021-1

1 ea. Pedal Actuator Assembly (SOFT) ------- PN 100-01C021-3

4 ea. Casters ---------- PN None

1 ea. Hardware Kit containing:

- 1 ea. Clamp Pad ---------- PN 100-02B006-1
- 3 ea. #4 x 1/2" Clamp Pad Screws ----- PN None
- 1 ea. Dashpot Spring ---------- PN 100-02B149-3
- 2 ea. Depth Adjustment Stops --------- PN 100-01B015-1

STEP 11-2

Carefully inspect the Upper and Lower Cabinets and legs of the Vorsetzer for physical damage such as scratches, nicks, and dents.

STEP 11-3

Carefully inspect each Solenoid plunger for missing tips, tips missing felt pads, and for bent shafts. Replace missing or defective parts at this time.

NOTE: Several of the following Steps are most easily done with the assistance of another person, therefore, if you have a helper, have him assist you.

STEP 11-4

Place padding on the floor in back of the Vorsetzer, then lay the unit over on its back on the padding.

STEP 11-5

Get the four (4) Casters and insert one in each of the legs. Seat them in the legs by giving them a firm tap with a rubber mallet, then lift the unit up on its feet.

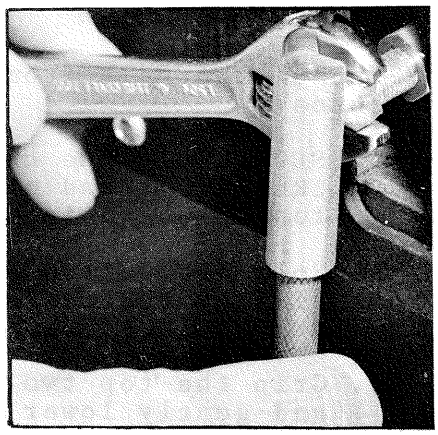

FIGURE 11-2 Install the Actuators.

STEP 11-6

Remove the Screws holding the Lower Assembly Guard, remove the Guard and set it aside.

STEP 11-7

Install the Pedal Actuators (PN 100-01C021-1 and PN 100-01C021-3) in the Lever Arms as shown in FIGURE 11-2.

STEP 11-8

Install the Depth Adjustment Stops at each end of the Vorsetzer in the position shown in FIGURE 11-3 below.

STEP 11-9

Roll the Vorsetzer up to the piano until it is a couple of inches in front of the Keyboard. See FIGURE 11-3 and the NOTE below.

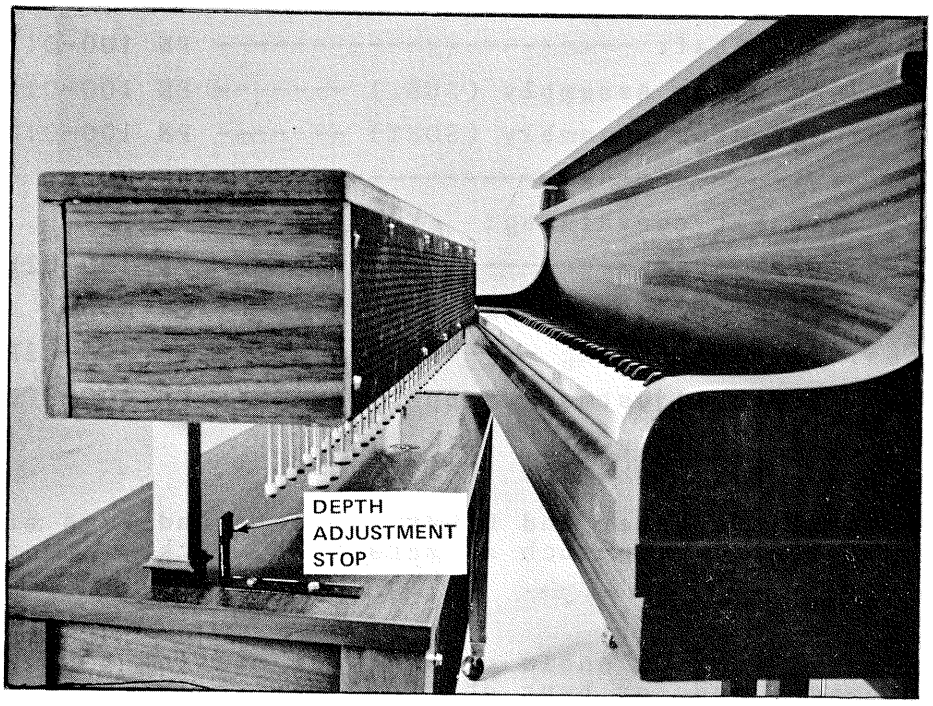

FIGURE 11-3 Roll the Vorsetzer up to the piano.

NOTE:

STEPS 11-10 and 11-11 are most easily done with the assistance of another person, therefore, if you have a helper, have him assist you.

CAUTION:

BEFORE AND DURING ADJUSTMENT OF THE UPPER CABINET ASSEMBLY HEIGHT, HOLD THE UPPER CABINET SUPPORT FIRMLY SO THAT THE UPPER CABINET CANNOT DROP AND DAMAGE THE KEY SOLENOID PLUNGERS.

STEP 11-10

Insert a Common Screwdriver into the holes in the end of the Vorsetzer (see FIGURE 11-4), grasp the Upper Cabinet Support FIRMLY near its base, and loosen the Height Adjustment Screws.

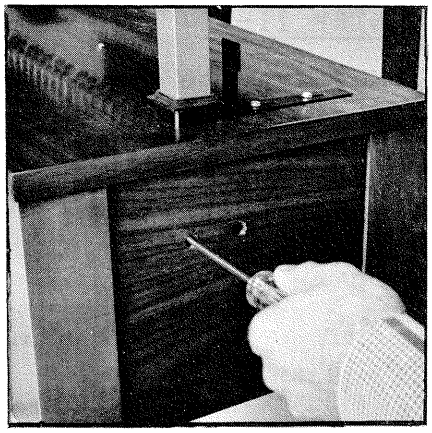

FIGURE 11-4 Insert the screwdriver in the hole.

STEP 11-11

Work the Upper Cabinet up until the Solenoid plungers are approximately 1" above the Keys, then snug down the Height Adjustment Screws.

STEP 11-12

Roll the Vorsetzer up to the piano, roughly center it on the Keyboard, and adjust its position forward or back until the wide Solenoid pads are positioned approximately at the front edge but fully over the BLACK Keys, then find the Middle C plunger and adjust the position of the Vorsetzer so that the Middle C plunger is centered on the Middle C Key.

STEP 11-13

Grasp the Upper Cabinet Support FIRMLY, loosen the Height Adjustment Screws, and GENTLY lower the Upper Cabinet until the plungers just touch the Keys as shown in FIGURE 11-5 below. Tighten the Height Adjustment Screws. See the CAUTION below.

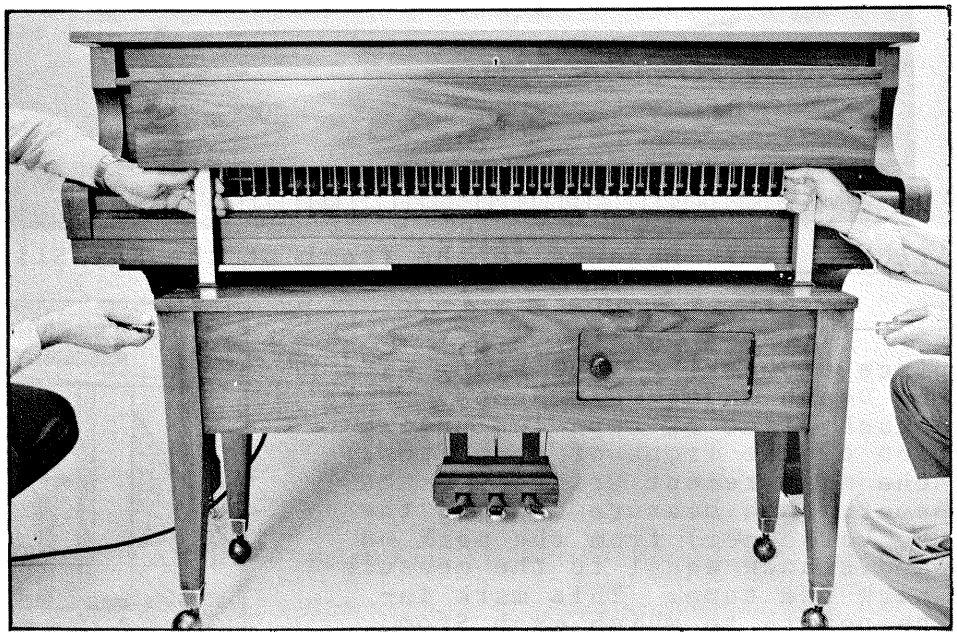

FIGURE 11-5 Lower the plungers to the Keys.

CAUTION:

HOLD THE UPPER CABINET SUPPORT FIRMLY SO THE UPPER CABINET ASSEMBLY DOES NOT DROP AND DAMAGE THE SOLENOIDS.

STEP 11-14

CAREFULLY readjust the position of the Vorsetzer until ALL the BLACK Key plunger Pads are sitting at the front edge but fully on the Black Keys as shown in FIGURE 11-6. Also make sure that the Middle C plunger is centered on Middle C.

FIGURE 11-6 Plungers at the front of Black Keys.

STEP 11-15

Measure the distance from the FRONT of the Depth Adjustment Stops (located in front of the Upper Cabinet Supports) and the front of the Key Slip as shown in FIGURE 11-7. Write the measurement on a slip of paper for later reference.

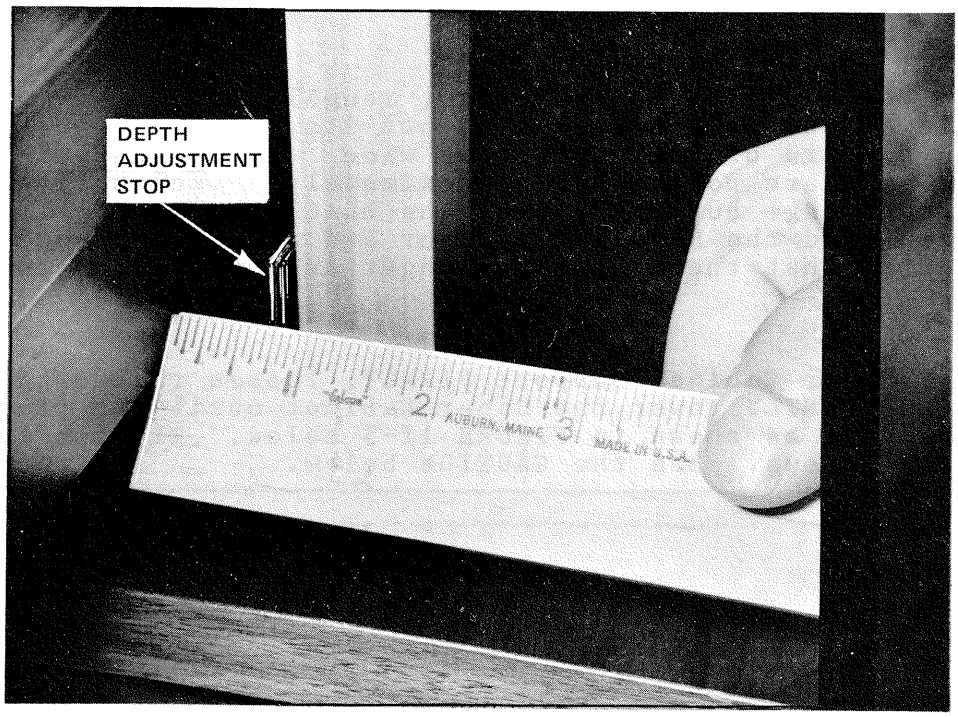

FIGURE 11-7 Measure to the front of the Key Slip.

STEP 11-16

Place a piece of masking tape along side each of the Depth Adjustment Stops. Make a mark on each piece of tape indicating the location of the front of each Stop. Refer to the measurement written on the slip of paper, then measure (toward the rear of the Vorsetzer) from the mark on the tape a distance equal to the measurement and mark the tape. This mark indicates the points to which each Stop must be adjusted.

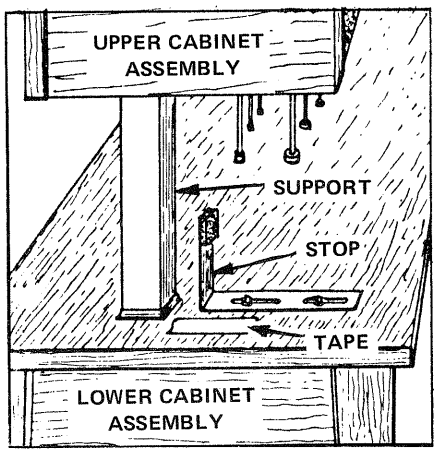

FIGURE 11-8 Place the tape along side each bracket.

CAUTION:

BEFORE MOVING THE UNIT IN THE NEXT STEP, MAKE SURE THE UPPER CABINET ASSEMBLY IS LOCKED IN THE UP POSITION.

STEP 11-17

Unlock the Upper Cabinet Assembly, tilt it back, and lock it in the UP position. Roll the Vorsetzer away from the piano to give yourself access to the Depth Adjustment Stop Screws, loosen the Stop Screws and adjust the Stops to the marks on the tape as shown in FIGURE 11-9, then tighten down the Stops Screws and remove the pieces of tape.

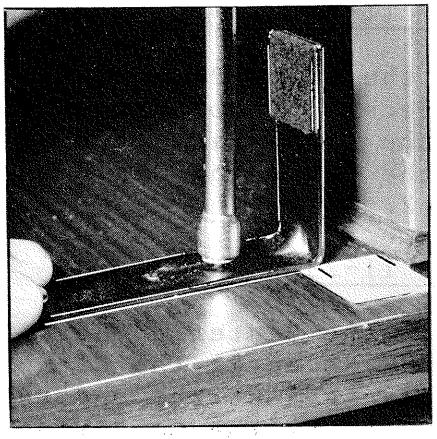

FIGURE 11-9 Adjust the Brackets to the marks on the tape.

STEP 11-18

Roll the unit back to the piano and adjust its position until the Middle C plunger is centered over Middle C. Support the Upper Cabinet with one hand, unlatch it, and gently Lower it until it locks in the down (play) position.

STEP 11-19

Carefully adjust the position of the Vorsetzer until the Middle C plunger is centered on Middle C as shown in FIGURE 11-10.

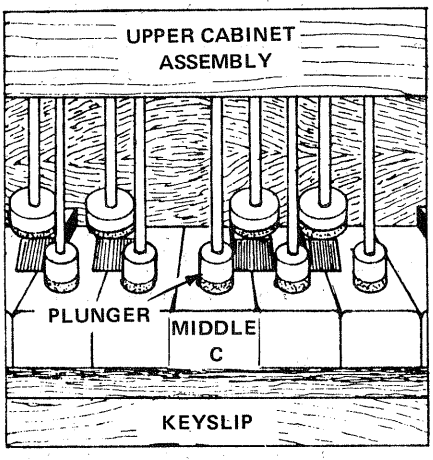

FIGURE 11-10 Plunger centered on Middle C.

STEP 11-20

If you are installing the unit on a grand piano, depress the SOFT Pedal to ensure that the plunger pads will still actuate the Keys after they are shifted. If necessary, adjust the position of the Vorsetzer so that all the plungers strike their Keys properly. See the NOTE below.

NOTE:

The spacing and position of the plungers and Pads has been calculated to allow the piano to play even when the Keys are shifted. It should be noted that the Pads will NOT be evenly aligned on all the Keys either before or after they are shifted.

STEP 11-21

Get the Centering Shaft (PN 100-01B052-1) insert it through the hole in the center of the Bottom Panel of the Vorsetzer (see FIGURE 11-11), screw it into the plate in the top of the Lower Cabinet Assembly until about 3/8" of the Shaft protrudes above the top of the Lower Cabinet Assembly.

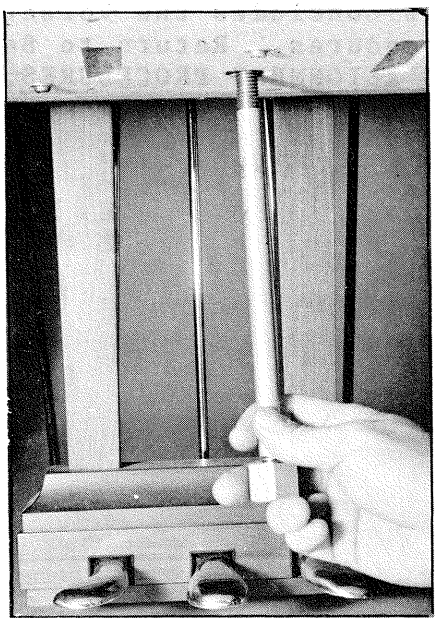

FIGURE 11-11 Insert the Shaft through the hole.

STEP 11-22

Get the Clamp Pad (PN 100-02B006-1), place a piece of Double-sided tape on the bottom of the Clamp Pad, then place the Clamp Pad on the Centering Shaft as shown in FIGURE 11-12.

STEP 11-23

Raise the Centering Shaft by turning it CLOCKWISE until the Clamp Pad is pressed firmly against the underside of the Keybed. Lower the Centering Shaft and the Clamp Pad should stick to the Keybed.

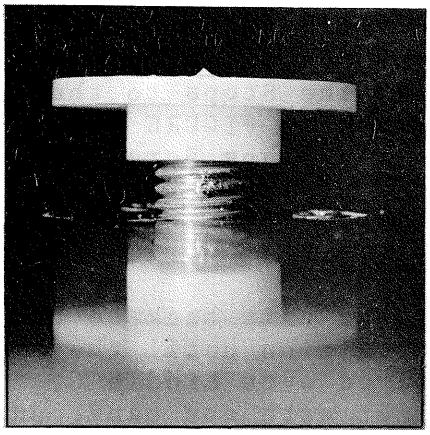

FIGURE 11-13 Place the Clamp Pad on the Shaft.

STEP 11-24

Unlock the Upper Cabinet and tilt it back until it locks in the UP position, then move the Vorsetzer away from the piano.

STEP 11-25

Insert a 1/16" bit in your electric drill, wrap a small piece of masking tape around it 3/8" from the tip, then drill 3/8" deep holes in the Keybed at the centers of the three (3) mounting holes in the Clamp Pad.

STEP 11-26

Secure the Clamp Pad to the Keybed with the three mounting Screws as shown in FIGURE 11-14.

This concludes the Vorsetzer installation procedures. Return to Section 9, TEST AND ALIGNMENT PROCEDURES, to align the system.

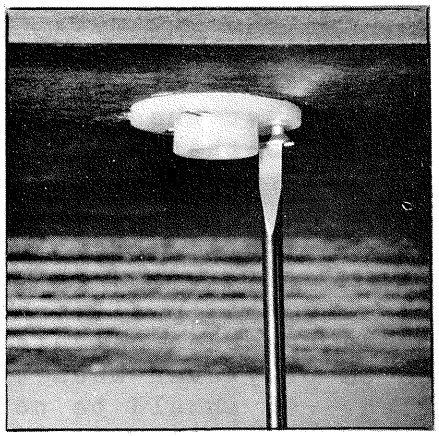

FIGURE 11-14 Secure the Clamp Pad to the Keybed.

20051

ATTENTION PARTS DEPT.

INVOICE NO. 11- 2414

SUPERSCOPE.

Pianocorder™

Reproducing System

A Division of SUPERSCOPE, INC. 20525 Nordhoff St., Chatsworth, CA 91311

When ordering parts use toll free number 800 423 5108

PARTS RETURN FORM

a copy of the invoice on which replacement parts were ordered must accompany this form.

CUSTOMER NAME

ADDRESS (1)

CITY STATE ZIP

DEALER NAME

ADDRESS (2)

CITY STATE ZIP

MODEL NO. (3) | SERIAL NO. (4) | DATE PURCHASED (5) Mo. Da. Yr. | DATE RECEIVED (6) Mo. Da. Yr.

ACCOUNT NO. (7) | DATE COMPLETED (8) Mo Yr. | WARRANTY STATUS (9) ☐YES ☐NO | OVERRIDE (10) ☐ ☐YES

SYMPTOM (11)	QTY	SCHEM DESIG	PART NUMBER	UNIT PRICE	TOTAL

WORK PERFORMED (12) (14)

BY TECH (13)

DISTRIBUTION

1 – WARRANTY ADMIN. COPY *2 – SUPERSCOPE PARTS DEPT. COPY* *3 – DEALER COPY*

PARTS ORDERING INSTRUCTIONS

The following is a detailed description of the procedures you must follow to order parts for defective units. By adhering to these procedures, you will expedite the processing of your parts order.

1. Call the toll free number shown in the upper right-hand corner of the PARTS RETURN FORM.

2. When your call is answered, give the following information:

   a. Dealer Name and full address including the Zip Code.

   b. Dealer Account Number.

   c. Part Number, description, and quantity of the item(s) being ordered.

3. Upon receiving the replacement part(s), do the following:

   a. Remove the PARTS ORDER FORM and a copy of the SHIPPING INVOICE from the carton containing the replacement part(s).

   b. Pack the defective part(s) and place the PARTS ORDER FORM and SHIPPING INVOICE in the carton with the parts.

NOTE:

Refer to the PARTS RETURN FORM on the facing page for the items listed under Point c. The circled numbers shown on the form correspond to the numbers of the item numbers listed under "c".

c. Fill out the PARTS RETURN FORM as detailed below:

   1. Under CUSTOMER NAME and address in the upper left-hand corner write the customer's name and address in full.

   2. Fill in the Dealer's Name and full address in the blocks on the upper right corner of the form.

   3. In the block titled MODEL NO., write in the system model number (P-100, P-100M, P-200).

   4. In the block titled SERIAL NO., write in the system serial number (located on the plate on the bottom of the PT-100 Tape Recorder).

   5. Write in the date the customer purchased the unit in the block titled DATE PURCHASED.

   6. In block 6, DATE RECEIVED, write in the date the customer requested repairs.

   7. WRITE YOUR DEALER ACCOUNT NUMBER in the block titled, ACCOUNT NO.

   8. In the DATE COMPLETED block, write in the date the repairs on the system were completed.

   9. Check the appropriate box in the block titled, WARRANTY STATUS.

   10. The block titled, OVERRIDE, is for office use and should NOT be marked.

   11. Describe the customer complaint in the block titled, SYMPTOM.

PARTS ORDERING INSTRUCTIONS

3c (continued)

12. In block 12, WORK PERFORMED, detail the work that was done to repair the unit.

13. Block 13, BY TECH, should contain the name of the person who repaired the system.

14. In the QTY. block, write in the number of parts being ordered and, in the PART NUMBER block, the Part Numbers of the items being ordered. Disregard the SCHEM. DESIG., UNIT PRICE, and TOTAL blocks (they are for office use only.)

15. Retain Copy 3 of the PARTS RETURN FORM, DEALER COPY (pink), for your records and enclose copies 1 (WARRANTY ADMIN. COPY) and 2 (SUPERSCOPE PARTS DEPT. COPY) with the document package consisting of the PARTS ORDER FORM and SHIPPING INVOICE that you are sending with the defective part(s). See the NOTE below.

NOTE:

When a part is ordered by telephone, the DEALER ACCOUNT Number is billed. Upon receipt of the defective part and the document package, the DEALER ACCOUNT Number will be credited.

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Reproducing System

PART NO. 199-1411-000
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