Installation and Owners Manual
QRS # 70495

OptiScan MIDI Record
for Acoustic Pianos

QRS OptiScan Install Manual

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100% Optical- No Contact With The Key

- Does not affect the touch or regulation of your piano
- Assignable curves to improve the recording accuracy
- Small, adjustable and flexible for ease of installation and minimum modification to your piano

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NOTES

INTRODUCTION

QRS is pleased that you have chosen the OptiScan Optical MIDI Record system. This superb recording system will fit on virtually any piano. It will capture your performances in a digital MIDI format and send them to your preferred storage device (i.e., AMC, PC…). When combined with the QRS patented analog MIDI technology you can capture MIDI data on a video and audio format for playback on all MIDI and Pianomation devices.

The kit is an optical record strip that bounces a light off of the bottom of the key to record the activity of each key. It runs on 110V or 220V systems. All piano keys have a tendency to react differently. The alignment routine of the OptiScan gives you the capability to compensate for the differences of each key. OptiScan is also able to set a global curve for the set of black keys and white keys.

This manual provides procedures for installing, aligning and troubleshooting the QRS OptiScan.

TROUBLE SHOOTING

A WORD ABOUT QRS MUSIC TECHNOLOGIES

Trouble Shooting

1) The test light does not blink, or only blinks when key is fully depressed.

- Check the under side of the key to see if it is a flat surface - many end keys may not be flat. In order to correct this you must glue a piece of wood on or use a white thumb tack under the key.

- Verify the sensor is working by placing a business card over the sensor and pushing the test button. Or hook up the MIDI out to a sound module and use the business card to test. If it still does not work, check to make sure your setup works prior to calling us at the number above.

- If the sensor does work and no dynamics occur. The key may need to be closer to the sensor. This can be achieved by moving the rail up or adding the tape found in the installers kit to the bottom of the key. This brings the key closer and provides a better reflective surface. If you find this is required for most of the keys try shimming the keys first.

2) No Light From Controller When Put in Test Mode and Power Applied.

- Check that the cables are installed with the red lines in line with each other.

- If the red test light on the processor does not go on when the controller is first powered on the cables are not hooked up correctly.

3) After testing OK on the bench or it was running ok in the home a sensor goes out.

- First try to align that bad sensor
- Put toggle in Test
- Turn off power then on
- Put key down and push button to set
- If light cycles you are ok
- Put toggle back to QRS and cycle power

   If light does not cycle we will reset all notes and realign.
   - Put unit toggle in test position
   - Turn power off Turn all dip switches off except 4
   - Turn power on Led goes on
   - Wait at least 45 seconds
   - Turn off power
   - Wait again 45 seconds
   - Flip switch 4 off
   - Then power on
   - Try your dead sensors
   - Realign the whole thing

4) Tested OK but will not output MIDI

- If the unit tested ok, the toggle switch needed to be taken out of test mode prior to cycling the units power in order to store your values, or there nothing will be stored.

When QRS Music Inc. was established in 1900, "music software" meant perforated piano rolls, and "hardware" meant player pianos. Today, QRS is not only the world's oldest and largest manufacturer of player piano rolls; it is a leader in contemporary player piano technology.

It all began with our founder, Melville Clark, who developed the pneumatic player piano as we know it today. Although the meaning of the initials "QRS" has been lost with the passage of time, we believe Mr. Clark's original intentions of "Quality and Real Service" best describe our current philosophy.

A new era in roll recording began in 1912 with the use of the "Marking Piano", an invention which made possible the manufacture of QRS "Hand Played" rolls. The first popular hand played roll to be released was "Pretty Baby," played by the great ragtime pianist Charlie Straight. The "Marking Piano" has now been designated a National Historic Mechanical Engineering Landmark.

QRS bustled with activity during the "Roaring Twenties" under the skillful direction of Thomas M. Pletcher. Recording stars included James P. Johnson, composer of "THE CHARLESTON", and Thomas "Fats" Waller, the subject of the Broadway smash "AIN'T MISBEHAVIN'". Roll sales climbed to nearly 11 million in 1926, and QRS diversified into other home entertainment areas. Movie cameras and projectors, phonographs and records, and QRS Red Top Radio Tubes were among the new product lines.

The genuine flavor of this exciting decade has been preserved forever in our "Roaring Twenties" series. At the height of this expansion, the stock market crashed. Hard times were ahead for QRS, but the dedicated leadership of Max Kortlander and the genius of staff artist J. Lawrence Cook kept QRS alive and well. In fact, the excellence of QRS rolls from the 1930's (and their sister "Imperial" rolls) accounts for the current popularity of our "Fabulous Thirties" series. Roll sales declined gradually to a low of about 200,000 rolls per year in the early 1950's.

When eager "Do-it-yourself" hobbyists began restoring old player pianos, the demand for new player pianos became apparent and new spinet models soon hit the market. They were a great success, and beginning in 1966 with the new ownership of Ramsi P. Tick, QRS roll sales climbed once again toward the million mark. In the 60's, 70's and 80's, over 10,000 new players were produced annually by several manufacturers, and the perseverance of QRS paid off. The song hits of those memorable years are captured in our "Hits of the 60's, 70's and 80's" series.

With the renewed demand for top performers, Melville Clark's Marking Piano returned to active duty. It once more resounded with the keyboard wizardry of America's greatest pianists, just as it did seventy years ago. Liberace, Peter Nero, Roger Williams, and other celebrity artists have chosen to record for QRS, trusting the preservation of their art to the acknowledged experts in the field of player pianos. Their masterpieces have been preserved in our "Celebrity Spectrum" series.

Today, with the knowledge gained from over 90 years of experience in the player piano industry, QRS remains dedicated to bringing live entertainment into your home. The turn of a new century is upon us, and QRS remains on the leading edge of player piano technology. We have created a system for automating any piano, enabling it to play any music flawlessly and expressively, and it's as easy to use as a player piano roll. We call this the **Pianomation Reproducing System.**

Though our founding fathers aren't here to see it, you can trust QRS to bring you the same Quality and Real Service on which they built the business. With **Pianomation**, we are forging a new link in a chain of craftsmanship unbroken since 1900. (We are pleased and proud when we proclaim: QRS Products *are Better.*)

PARTS SUMMARY

QRS Part #	QRS Part #	QRS Part #	Item	Description	QTY	U/M
70495				Full Kit	1	EA
	70528		1	Power Supply	1	EA
	70474		2	Processor assembly	1	EA
		70560	3	Processor w/Base	1	EA
		70532	4	Processor Cover	1	EA
		70534	5	Processor Cover Screws	2	EA
		70536	6	Processor Cover Screw Inserts	2	EA
	70473		7	Sensor Rail notes assembly	1	EA
		70554	8	Sensor PCB 22 notes	4	EA
		70538	9	Sensor Rail Base Plate assembly components (includes cables, screws)	1	EA
		70540	10	R#2 x1/2" flat ail Mount Screws	6	EA
	70477		11	Sensor Rail Ribbon Cables	1	set of 4
	70479		12	PCB Cable Interface	1	EA
	70542		13	Soft/Sustain Sensor	2	EA
	70552		18	MIDI Cable	1	EA
	70979		19	Shipping Box	1	EA
		70080	20	Power Supply Mounting Bracket Screws	4	EA
	70493		21	Installation/Owners manual	1	EA
	70509		22	Power Supply Mounting Bracket	1	EA
70595			23	Tester (comes with white 1/16th inch thick, .5" square tape)	1	EA

Dip Switch Settings

1,7	2,8
Off	Off
On	Off
Off	On
On	On

Minimum Volumes

Setting 4 on and turn power on wait 30 seconds, turn off wait again, flip switch 4 off and turn unit on resets all of the keys settings

Dip switch 3 is for trills and should always be ON

Black Keys are Dipswitches 1 & 2

White Keys are Dipswitches 7 & 8

127 Output 0 Input 127

Standard Initial Position

ON
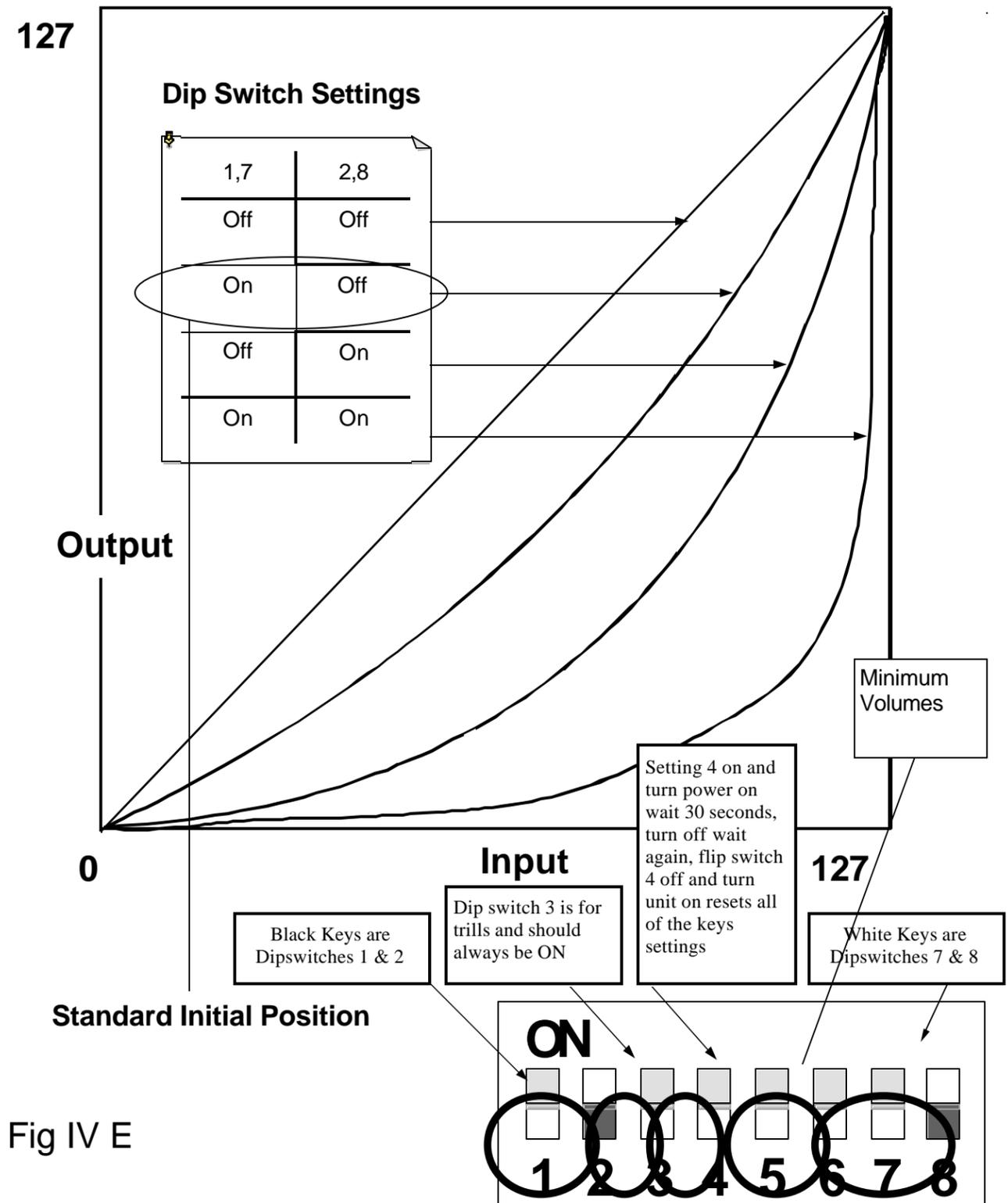
1 2 3 4 5 6 7 8

Fig IV E

INSTALLATION PROCEDURE

Alignment Procedures

Note: Before starting, push each key down as hard as you can and make sure the keys are not hitting the guide rail. If they do, you need to change the height of the rail.

A. Adjusting the velocity levels of each of the keys while the unit is on the bench.

   1) If you are using the main board instead of the remote tester, you may want to locate the main board on the cheek block until you are done with the alignment.

   2) Put the toggle switch to test. If you are using the remote tester plug it in now.

   3) Cycle the power by turning the power supply off and on or by unplugging and plugging it back in at the processor. The LED will light in test mode but not in play mode.

B. While holding down the first key, push the button on the processor (or remote tester), the light should blink once. Let go of the button then the key.

C. Do this for all 88 keys. Try to get each key light to trigger at the same point (When the knuckle engages). Occasionally you will get one key that must go all the way down before the light goes off.

D. To record brush strokes the light will have to go on the second the key starts to move, this may or may not be desirable. This means the rail may have to be closer or you can add reflective tape to the bottom of the key for more sensitivity.

E. **When this process is completed, toggle the switch to M and cycle the power. Your values are now stored**

G. Next, you have the option of 4 velocity curves for the Black Keys and 4 for the White keys.

   1. If the black keys are lower than the units white keys, adjusting the curves can adjust the velocities that are output.

   2. The unit comes preset with the best performance curves we have tested for our pianos, but your application may require a different curve. The settings are listed on page 13 or Fig IVE.

   3. Dip Switches 7 and 8 represent the curves that apply to the white keys.

   4. Dip Switches 1 and 2 represent the curves that apply to the black keys.

H. To clear the memory of all values:

   1. Toggle the button to test.

   2. Set dipswitch four (4) to on.

   3. Cycle Power.

I. After you are done mount all of the components and put the action back in the piano. Double check the alignment by recording or going through the test routine again.
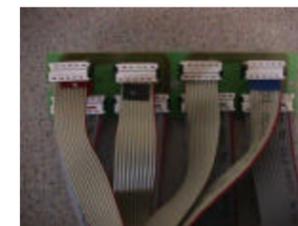
PARTS SUMMARY

QRS Part # 70528, 70509, and 70080

These components make up the power supply assembly. The mounting bracket fits onto the feet of the power supply. When screwed to one of the beams under the piano it will give you complete access to the record strip power supply.

QRS Part # 70479

The PCB Cable interface is attached inside the piano by or on the piano action. The cables disconnect to allow you to pull the action out without feeding cables through a hole in the firewall. The cables should exit in the same direction.
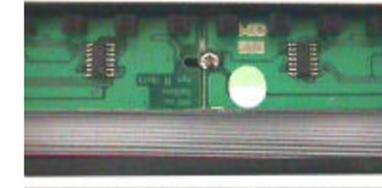
QRS Part # 70473

This assembly consists of 4 PCB sensor boards and a mounting tray. It is thin enough that you should not have to route much of your key frame or route at all. The 4 PCB sensor boards are adjustable side to side for proper alignment.

QRS Part # 70542

This sensor can be mounted on the trap work or the damper tray. The magnet passes by the sensor to turn the sustain on and off.

QRS Part #70552

Run this cable to the controller of your choice from the 'MIDI out' on the connector at the processor.

QRS Part # 70474 which includes 70560, 70532, 70534 and 70536

The processor assembly comes with the processor mounted to a bracket, a cover and screws for mounting to the piano timber. It is mounted to the bass side of the piano.

QRS Part # 70595

On each processor there is a button that allows you to set the sensitivity of each key sensor. Part # 70595 can be used to perform this test in front of the piano. See options (Page 6).

OPTIONS

Remote tester
Part # 70595

This tester plugs into the main record processor and is not required. There is a button on the record processor that can be used. If many installations are required, this is a great tool to have. It allows the test to be performed in front of the piano and eliminates the need to reach down to the processor to conduct the test and alignment.

Analog MIDI Controller or Dual Drive Analog MIDI Controller
Part # 77300

The Analog MIDI Controller will allow you to record your performances, continue to lay down tracks and assign instruments to the various tracks creating your own composition. The Analog MIDI Controller also has two headphone outputs for practicing while your piano keys are silenced with the mute bar. It has left and right hand record and playback capabilities enabling you to take advantage of the vast amount of educational software available. This allows you to practice one hand while the other plays. The Mixed outputs on the back will allow you to broadcast your performance without the need for a mic and the exterior noise they can pick up.

Headphones
Part # 70467

Headphones plugged into the Analog MIDI Controller allow one to hear a piano sound or any sound you choose.

Stop Rail
Part # 700470

This prevents the hammers from striking the strings, allowing silent practice. The OptiScan channels a MIDI signal to a sound source that generates a piano sound to the headphones.

INSTALLATION PHOTO'S

Hole in back using the extension connector.

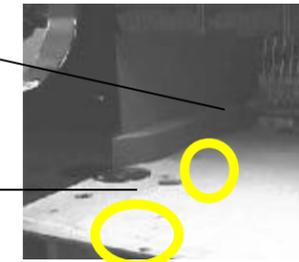Fig II A Hole to feed cables through under the key block.

Fig II A

Sustain Sensor

Sustain Magnet

Fig II A1 In the figure above the OptiScan processor is mounted below the bass end of the piano in front. The cables coming from the rail go through the hole. The nice part about mounting it here is it provides access to all of the ins and outs.

The sustain is activated when the magnet passes over the sensor. Then it is deactivated when it passes back over the sensor. It is generally mounted on the trapwork or the

Fig II B

Fig IIB. Using the cable extender above, you can extend the reach of the existing cables. This allows you to mount the control box under the back of the piano out of sight and gives you a disconnect inside the piano. When the action is pulled out you can easily disconnect the cables without feeding them through the holes.

Sustain Off

Sustain On

Fig IIC1. In this picture the pilot holes for the processor have been drilled. It is important to make sure there is enough room to close the fall board when mounting to the front or side of the
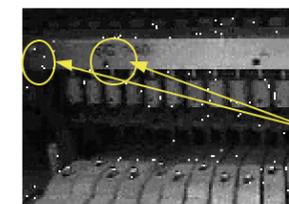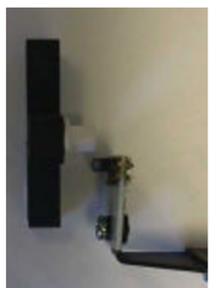

Fig IIC1

Sustain Off

INSTALLATION PROCEDURE

Mounting the processor:

- Read the directions below to decide where to locate the processor. (If you are not using the remote tester to set up the different keys do not mount the processor until the final test is completed.)

A) To locate Processor in the back of the piano. Fig IIA

- A hole must be drilled for an exit of the cables. This hole may be in the rear or under the key block.
- If you can use the existing slot cut for the Pianomation system.

Hook up external devices

- If you are using a remote tester hook this up now.
- Plug in the power supply. Mount the power supply on the back shelf.
- Sustain actuator - mount the pedal sensors on each of the pedals and connect the ribbon cable to the processor.
  - Find a location under the piano that would be suitable for placing the sensor where the foot pedal will trigger the switch. Every piano is different
  - Use the attachment to set the height of the sensor so that it reaches from the pedal to the button of the bracket.
  - Test, does it sustain?

Use cable ties to wrap the cable out of sight.

- Take the MIDI Output into the MIDI input on the Controller of your choice (usually done last)

Note:
QRS has made several changes to the connector in Figure II B, All doing basically the same thing.

GETTING ACQUAINTED

Before beginning, familiarize yourself with the parts in the kit. You must first make sure that the record strip will fit in the piano action (Page 8). After you verify that the record strip will fit, set all the parts on a bench and verify that the unit works properly before installing it.
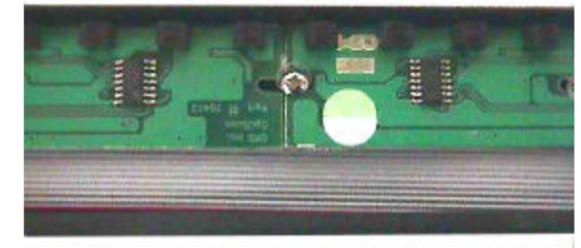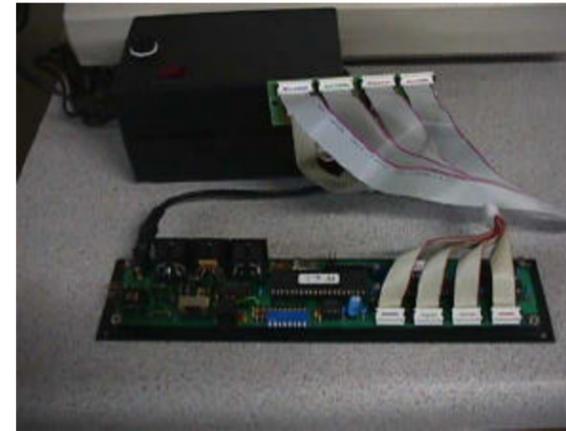
TOOLS REQUIRED

Item	Optional/Maybe
Work Bench	Screw Gun
Paper and Pencil	Sharp Chisel or Dremel Router
6" Ruler Metric and English	Saw
Phillips Head and Standard Head Screw Driver	Chisel
Exacto Knife and or Scissors	Glue
Level	

INSTALLATION PROCEDURE

Grand Piano Installation

- Record Strip Installation Procedure - Grand Piano
- Verify component parts.
- Verify that all of the component parts required for installation were received.
- Verify that you have the appropriate tools to install the system.

Disassemble the piano (Fig B1)

- Remove the fall board, cheek blocks and key slip. Set them in a place where they will not be damaged.
- Remove the action and place it on a clean level workbench.
- Separate the action from the key set. Set it to the side. Set the screws aside in a box
- Remove all the keys.

Will the unit fit? (Fig C1)

- Place the record strip on the key frame and line up each sensor with the bottom of the keys by placing keys at each of the breaks and a few black and white keys through out (Fig C1). When the key is depressed it should cover the sensor.
- **NOTE: THE CABLES NEED TO COME OFF OF THE BASS END.**
- If the record strip sensors do not line up with the keys, you may have to move the Printed Circuit Boards (PCB) together or apart. This is accomplished by loosening the screws that hold it in place (Fig E1), and sliding the boards apart or together. If it still does not fit you can angle the strip.

Setting the Height

- **The bottom of a fully depressed key (simulating a very hard strike) should barely clear the top of the rail guide for optimal performance (Fig G1). We use felt underneath the rail at the break points to achieve an approximate height. If the rail is to high you may have to route the keyframe to reach the appropriate height using the dremel router as described below.**
- Place several keys at the breaks and ends to verify height and alignment Depress the key firmly until it rests just above the top of the rail.
- If the keys are too low you will have to shim them, placing felt under the break points.
- If the rail is to high you will have to do more routing. The best way to do this is to use a dremel router, it is clean and accurate for very shallow cuts. Route to the width of the rail, if you go to deep shim again.
- Once you have done this with your sample keys, take the screws out and screw the rail in place. The screws hold the rail in place, do not compress the shims, this will lower your rail.
- Use a standard head screw driver to lift up the ribbon cable and place the screws in the rail. Then screw it down (Fig. H1).
- Place the rest of the keys in place and put the stack back on.
- Quickly run through another check to make sure your getting the light to trip at/or just before the let off point.

INSTALLATION PHOTO'S

Fig B1- Remove the action and place it on a work bench. The key lift stack sits on top of the keys, remove the screws and set it aside.

Fig G1– The bottom of a fully depressed key should barely clear the top of the rail guide for optimal performance.

Fig C1– Place record strip on the key frame. Do not fasten it to the keyfarme.

Fig H1– Fasten the rail frame to the keyframe by lifting the cables by the breaks and inserting screws.
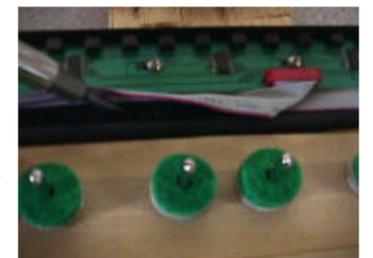

Fig D1– Line up each sensor with the bottom of the keys by placing keys at each of the breaks and a few black and white keys through out.

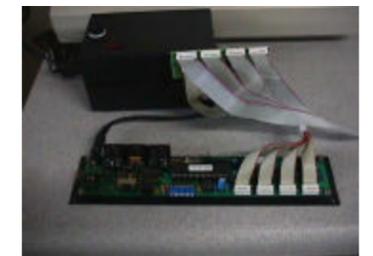Fig I1— Plug in the power supply and processor on the bench next to the action

Fig E1– Loosen the mounting screws if side to side adjustment is required. Then tighten screws after the alignment has been set.
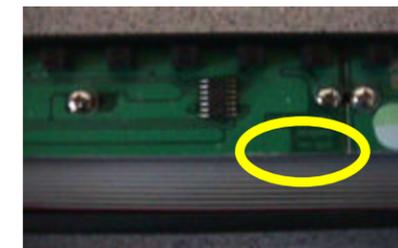

Fig J1— Attach ribbon cables paying close attention to the orientation. The cables are keyed but it is still easy to mix it
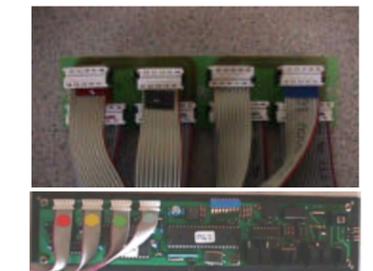

Fig D1– Remove break keys and mark the position of the sensor strip.