

Spencer's

E-Roll Player System II

▪ Installation and Service Guide ▪

Congratulations!

You have purchased the most advanced MIDI valve retrofit system for pneumatic players made today. Properly installed, this system will deliver unparalleled performance and long, trouble-free service. Every system component has been thoroughly tested prior to shipping. Each valve has been certified as meeting all specifications (repetition, sustained operation and leakage) over its entire operating range. Complete function of every electronic component has been confirmed.

Please take the time to read this manual thoroughly before installing any components or software and make frequent reference to the relevant chapters during installation. If at any point you are not confident that you understand the directions thoroughly, please contact us for clarification before proceeding.

We have designed the system to be as easy to install as possible, but occasionally questions arise. We will gladly offer telephone and/or e-mail assistance to help your installation go as smoothly as possible.

In this manual, the following symbols are used:



DO – the green check mark means “YES” or “DO” this. This is an essential step.



DON'T – the red “X” means “NO” or “DON'T” do this. The system will not function or perform properly.



RECOMMENDED – Recommended items are marked “thumbs up!” We believe items marked this way are good ideas or good practice.



NOT RECOMMENDED items are marked “thumbs down!” Although your system may function, either performance or service life may be degraded.



WARNING or DANGER - We cannot be responsible for any damage or system failures caused by failing to pay attention to warnings marked with this symbol.

The last page of this manual contains a list of important warnings and suggestions. Please read this page and print it to have for reference during installation.

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1. WARNINGS



REVIEW THE FOLLOWING WARNINGS BEFORE PROCEEDING

Prevent pump motor overheating, risk of fire or damage.



The Spencer's E-Roll Player system enhances owners' enjoyment of their instruments to such an extent that many people find that they play them much more often and for longer periods of time than before they installed the system. Unfortunately, most of the electric pump motors in these instruments are over 70 years old and have not had the benefit of regular lubrication, cleaning and maintenance. When motors have not been regularly maintained, prolonged periods of usage may place greater stress on motors and electric wiring that were previously used only infrequently. Overheating and risk of fire or damage to your instrument may result. It is also likely that line voltage is higher than the design voltage of the original motor. This as well as other factors can cause excessive heating. When available, a document that thoroughly addresses these issues will be added to the end of this manual. Please check for updates.

This is not a flaw of the E-Roll Player system design. It is the result of an often-overlooked aspect of instrument maintenance and restoration, and is a fact of life when dealing with electrically operated antiques. The exact same risk exists without the E-Roll player system.



DO be sure to have your electric pump motor and all associated wiring thoroughly checked by a competent small motor specialist, (preferably one with knowledge of mechanical musical instruments). Most original player motors were not thermally protected and may operate in excess of their design temperature if operated for extended periods. Have the motor and wiring serviced, repaired, replaced or rebuilt as recommended by your specialist.



DO be sure to check all original electrical wiring in the piano especially where new connections are to be made. The original wire insulation was typically cloth-over-rubber. Practically all insulation of this type is dry and cracked today. Replacement of all original wiring is highly recommended. Be extremely careful when making connections or repairs to old wiring, as bare wire is often exposed when old wiring is disturbed. In the interest of safety, it is better to remove and replace all original cloth-covered wire.



DON'T install this system without taking the precautions listed above. If there is any doubt about the condition of the pump motor or wiring

and their ability to play for extended periods without overheating, you run a high risk (even without the E-Roll Player System). We cannot assume responsibility for problems related to the condition your instrument, pump motor or wiring.

Handling static-sensitive electronic components



DON'T handle static sensitive circuit boards and components without taking appropriate precautions. The valve block control boards contain circuitry that may be damaged by static discharge. They are internally protected and are unlikely to sustain any damage once installed, but normal precautions should be taken when handling the boards during installation. Despite the fact that damage by static discharge is very unlikely, it does happen on rare occasion. It is best to take reasonable precautions, especially in high-static environments.



DO use the same techniques as for handling computer components. If the humidity is low (below 45% relative humidity) it is best to run a humidifier to raise the humidity prior to working with sensitive electronics. If working in an environment with synthetic carpeting or other static generating materials, especially in low humidity conditions, it may be necessary to establish a static free work place with grounded wrist straps and a tested ground to which discharge is achieved prior to handling boards. Hold circuit boards only by the edges.



DON'T touch circuit board traces (wiring) or components.



DO place the valve blocks in a static-safe environment prior to opening. Touch a known ground connection to discharge yourself before removing the valve blocks from their anti-static bags or before handling the circuit boards.

Proper torque for fasteners



DON'T over-torque fasteners. Do not over-tighten screws holding the printed circuit board to the valve body. Distortion of components and possible damage will result. When installing or servicing the valve blocks, tighten screws until they contact the circuit board lightly and then tighten an additional 1/4 turn and no more.

Proper installation of wiring and heat generating components

All line-voltage AC wiring must be installed in accordance with applicable codes and recommended practices. If you are not qualified to do this work yourself, be sure to obtain qualified assistance. It is best to hire an electrician who is familiar with restoration work and the wiring that is to be found in vintage electrical devices. Although the power supplies valve interface circuitry and power switch module are

very efficient, they do generate a small amount of waste heat. Please install these components in well-ventilated surroundings and check for excess heating after extended play. Conditions vary from one installation to another so it is best to check for excess heat buildup after extended play on any new installation.

Environmental contamination and filtering

The magnetic components of the valve block are contained deep inside and are unlikely to attract magnetic particles except when disassembled. Filters (included) which adhere to the valve block and cover the vent port openings will keep contaminants from blocking the valve seats and from getting to the internal magnets. It is also possible to install the blocks in cloth filter bags made of a suitable lightweight filter material. This would be recommended only for commercial installations where dust is known to be a problem.



NEVER connect or disconnect internal cables with power applied. Other than the MIDI connections on the face of the MIDI controller, cables should NEVER be connected or disconnected from any part of the E-Roll Player System while the power supplies are plugged in.

Disconnect AC power at the wall socket before performing ANY kind of service that requires disconnecting or connecting any power or data cable to any valve block or to the MIDI controller. Generally speaking, service and maintenance should be done with the main AC power disconnected.

The only exception to this rule is that the 5 pin MIDI cable connections to the MIDI controller on the face of the MIDI controller can be made with power applied.



NEVER work on or near the pump motor with power applied. The pump motor can come on unexpectedly, causing serious personal injury or damage to your instrument if any part of your body or other foreign object should get caught in any part of the pump mechanism (belt, pulleys, etc.)

2. Hardware installation



General Considerations:



When planning the valve block installation, be sure to allow enough tubing to make future servicing of the system simple. It is best to use connector tubes that are long enough to allow the block to be disassembled and moved to a free location where it can be easily disassembled for cleaning or service. If the tubing will not be covered with a belly cloth, it may be necessary to use cord to prevent the

tubes from hanging down visibly. They may be lightly bundled with small diameter shock cord and secured to any convenient location.



Be sure to locate the valve blocks where metallic components of the instrument will not contact the exposed circuit boards. Be sure that linkages and other moving parts do not contact the boards when

moved to their extreme positions. Also make sure that the blocks are not free to move into contact with metallic objects. Test all screws and metal parts that may loosen and fall onto the boards. If in doubt, replace any such screws with new ones that will not loosen, or provide covering material that will prevent them from falling onto the boards.



Be sure to leave room for airflow/ventilation. Although the valve blocks don't require much airflow or cooling, be sure to leave at least a small amount of clearance around the vent slots on the sides of the valve blocks and around the circuit board. A small airspace is required to permit the valves to open properly and to prevent heat build-up. Severely restricted airflow acts much like kinked tubing and interferes with normal valve function.



When planning your valve block installation, be sure to take the power and data cables into consideration. These cables are discussed in detail below. Also, pay attention to the block and valve numbering conventions (details below under "Data Cable Installation" and "Mapping").



It is often helpful to "dry-fit" your system together on a table top to help in planning mounting locations for the various system components.

Choose a tubing connection style:

Valve blocks in the E-Roll Player System are supplied with holes on only one side of the block. For cases where it is necessary to install the block directly in the run of tubing, through holes will be drilled on a custom order basis.

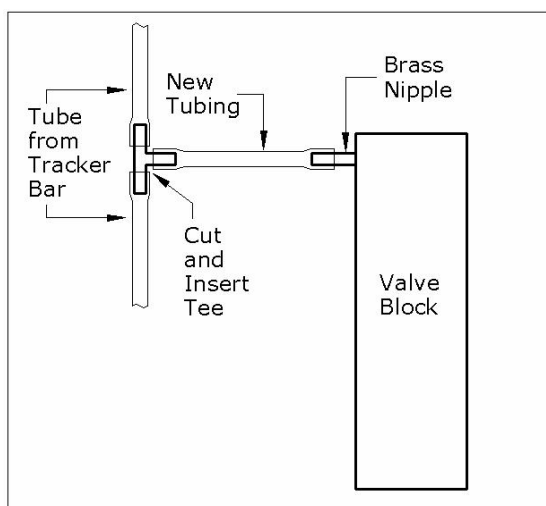
Single-side connections are made using small brass or plastic "tees" or "wyes" which are inserted into your instrument's existing tubing runs. A short piece of new tubing is run from each "tee" to the appropriate brass nipple. A brass nipple is inserted into each valve block hole. The circuit board may be removed and reversed in order to position the nipples on the other side of the assembled block.

Through-tee connections (optional) **Adjusting hold voltage**

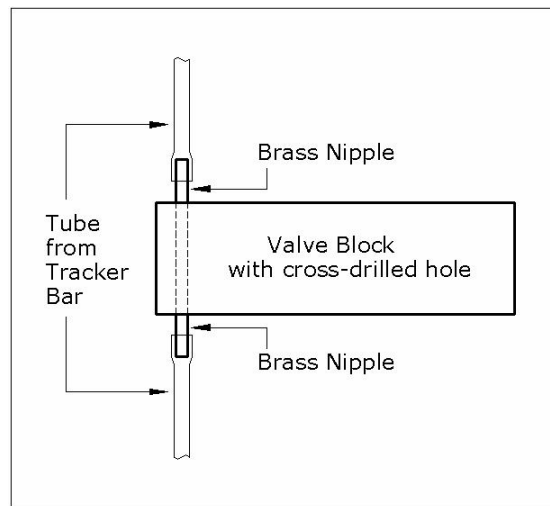
are made by inserting brass nipples into BOTH ends of the cross-drilled holes in the valve blocks. Please allow us to drill these holes if needed as they can be more accurately drilled with CNC drilling equipment. Then, your instrument's existing tubing connections are cut and the

two cut ends of the existing tubing are connected to brass nipples on opposite ends of a cross-drilled hole.

Examples of the two types of tubing connections are shown in the figures below:



Single side connection



Through-Tee Connection
(optional)

Installing Brass Nipples



To install the brass nipples into the holes in the valve blocks, press them straight in with the insertion tool (wooden golf tee) provided. Be sure that they are perpendicular to the block. Do not force them. They will press in easily if aligned correctly. Please note that there are two through-holes on the bottom ends of each block and are for mounting. They will not accept nipples.



Tubes may be connected to either end of the cross-drilled holes (optional) as long as the opposite end is plugged (single-side connection style). Alternating sides may allow for easier tube alignment in certain installations. If using wye fittings be sure that the tubes from the tracker bar and the valve block point toward the source of vacuum (toward the stack in player systems).

**Installing Filter Strips**

A roll of filter material is included in the E-Roll player package. It should be installed over the long vent slots on the sides of the valve

blocks to prevent dirt, dust, or other debris from entering the valves. The filter strip is applied after inserting the nipples. An adhesive strip is applied to each side of the valve block. Simply peel off the protective liner from the adhesive and place the filter strip so it completely covers the vent slot. Trim with a razor blade or scissors.

Power supplies and power cords

The E-Roll Player System uses a switching-type power supply, which operates on line voltages from 88 to 260 Volts AC (40 to 70 hertz) and therefore is compatible with mains voltages throughout the world. The standard system comes with power cords adapted for standard North American 3-prong power connections. Separate IEC cables (or adapters) with the proper wall receptacle plug may be needed in other locations.



It is recommended that you connect the E-Roll Player System's power supply cord to a switched outlet and to turn power off at the outlet when not in use. Switching power supplies are very efficient and have very low idle current consumption. They may be left on indefinitely without concern for wastage of power. It is best, however, to disconnect the power supply when the system is not to be used for an extended period of time, such as when leaving for vacation. The main reason for this is to prevent damage to the E-Roll Player System in the event of lightning strikes or power surges, especially when power is restored after an outage. Low mains voltages are not likely to damage the system, but extreme voltage surges that result when power is erratic could conceivably cause damage.



If your household uses an alternative electrical power source, such as solar wind or micro-hydroelectric systems, be sure to check that the power inverters used by your electrical system produce "sine wave power". Some older inverters (especially those produced up until the mid 1990's) produce "square wave" power, or other high-frequency pulsed waveforms that may damage the switching supplies in the E-Roll Player System. Inverter idle mode waveforms may damage the power supply circuitry. If your inverter does produce non-sine-wave power, a linear supply may need to be substituted. However, linear supplies are much less efficient than switching supplies, and this is generally not recommended. It is best to acquire an inverter that is compatible with switching supplies and ideally a true sine wave model.



NEVER connect the E-Roll Player's AC power cord to a power inverter with square wave output.



The E-Roll Player's power supplies are compatible with power inverters that produce true "sine wave" output. The use of a surge protector is recommended.



Low-Voltage Power Cables

IMPORTANT

Power is distributed by connecting the power supply connector to the MIDI controller and output cables from there to the valve block connection terminals. The cover of the controller must be removed in order to connect the power cable plugs. Wires may be extended to suit installation requirements but make sure that polarity is correct on connectors.

The MIDI controller is connected to the power supply with the pre-installed connector. Please note that the color of wires from the power supply may vary from those indicated on the controller layout diagram. The negative or common wires will be black or blue or green. There may be two wires connected to each of the two terminals. The positive wires will be red yellow or white. See the diagram on page 24 for details.

Power is supplied to the valve blocks with 2 wires to each circuit board. 2-pin screw terminal pluggable connectors (5mm pin spacing), one for each valve block in your system, are used to connect to the valve block circuit boards.

Two 3-pin screw terminal pluggable connectors connect to 2 of the 3 power output connectors on the controller. These connectors are wired to the connectors, which connect to the valve block boards. Sufficient wire is provided for most installations. See the controller layout diagram for the location of the connectors on the controller.

Each screw terminal connection will fit a maximum of two wires although it is best to put only one wire under each screw. This will insure the best connection. You may wire from one block to the next in a daisy chain fashion but make sure that both wires are securely connected under the screw. It is best to provide a separate power feed for each group of three or fewer blocks.

The best approach is to use a bus system with a pair of main power wires from the controller and individual pigtails connecting to each block. As stated above, it is best to power each group of three or fewer blocks from a single feed wire.

Please note that the screw terminal connectors have pin entry holes in two locations. You may therefore plug the connector onto the pin strip headers in either of two orientations. Generally the valve block boards will have the connector installed with the wires in a horizontal orientation. The connectors on the controller will have the wires in a vertical orientation to allow exit through the notches in the front panel. This will provide a degree of strain relief to the wires.

If wires are removed from the connectors, be sure to press the wire shield back against the screw before reinserting wires. This guard prevents damage to the wires from the tightened screws and is pressed into them when the screw is tightened. When the screw is loosened, it will not retract and must be pressed back with a screwdriver.

When using the bus method, be certain to make good connections to the bus with properly sized IDC, screw terminal or soldered connections. Be sure to insulate all exposed power connections.

Blue Scotch IDC tap connectors are supplied with the system. These simply press onto the wires without the need to strip or solder. One wire may be passed through the open hole in the tap connector and a pigtail or tap lead is inserted in the hole that has a closed end. Make sure that the wires are properly inserted and squeeze the metal contact into the wires with a pair of pliers. Once the contact is fully pressed in, close the cover and squeeze with pliers to lock it. This makes a reliable connection if done carefully. Please note that the last block on a bus system does not need a tap connector. Just continue the bus wire to the last block.

When making screw terminal connections to the provided connectors (or to other connectors), be sure to strip the proper amount of insulation from the wire ends that will allow for full insertion of the wire in to the connector.

The metallic clamp should clamp bare wire, not insulation. The stripped portion should also not be excessive as exposed bare wire may short. In addition, the insulated wire is better able to resist bending without breaking.

Be especially careful when installing two wires in one screw terminal position. Twist the strands of each wire together. Tinning with solder is recommended. Do not twist two wires together before inserting into the connector as this produces a weaker connection. Carefully tighten the clamp screw and insure that the wires are securely held and that

shorting of wires is not possible. Use a screwdriver that fits the clamp screws properly to insure a tight connection and no damage to the screws.



Voltage polarity is critical.

On the valve block circuit boards, the positive power supply lead is always connected to the terminal that is closer to the center of the circuit board. The negative or common lead is closer to the board edge.

On the controller, the common lead is on the left of each group of three terminals. The right most pin of each group is the 12-volt positive connection. The center pin of each of the output connectors is a switched ground connection that is used in conjunction with the 12-volt connection to provide power to operate a motor relay. Connect the power supply to the left most 3-pin group and the cables to the valve blocks to the other 3-pin groups. See the diagram on page 24 for additional information.

Three 3-pin connectors are provided. Two of these will be used for power to the blocks. One is supplied connected to the power supply cable.

Be sure to consider that the combined output of all connectors may not exceed 5 amps for either the 5 or 12-volt supplies and that any current drawn through these connections is provided by the 12-volt power supply provided with the system.

If high current devices are connected to the controller outputs, there may not be sufficient available power to play large numbers of notes simultaneously. The system is designed to provide full polyphony while operating a solid-state motor relay and one or two extra 12-volt magnets for other functions such as the soft pedal on an Ampico.

Proper functioning with more than the standard connected load will require a larger power supply.



It is recommended that the convention of using a green or black wire for common and a red or white wire for positive supply voltage be used.

Be sure to test for proper polarity before plugging the connectors on to the controller or valve block circuit boards. They are not reverse polarity protected and are not warranted against damage caused by reverse connection.

The circuit boards are short circuit and overheat protected, but connecting the supply backwards will definitely damage them.

Before connecting AC power, check and double check that the power connectors are correctly installed and that the each connector is making contact with the proper pins on the circuit board.

Improper connection of power wires may cause serious damage to the circuit board, which will not be covered under the E-Roll Player System warranty.

If you do not feel confident to assemble the required power wiring yourself, please ask for assistance. Cable sets will be made to fit the location of valve blocks specified.

Data Cables

Data cables are connected between the controller and each valve block. One cable is used for each valve block. Two standard cable sets are available for mounting the controller either at one end of the valve block run or in the center. You will receive the set that was requested when the system was ordered.

The data cable set for end mounting of the controller contains one of each of the following lengths: 22", 28", 34" and 40" 46" and 52". The set for center mounting contains two cables of each of the following lengths: 16" 22" and 28".

If the center-mounted controller must be mounted more than 8 inches off the centerline of the valve blocks then additional cable length needs to be added. If the end-mounted controller will be more than 14 inches from the first block, more cable length will be needed.

The standard configuration provides 6 data cable connectors on the controller board. These are marked B(20) through G(7). There is space for two additional connectors A(1) and H(8) but these are only installed if requested. Data cables should be connected while the controller cover is removed for the installation of power wiring.

In order for the cables to exit the controller enclosure at the rear, it is necessary to fold the cables to a right angle. It is also possible to cut a slot (or slots) in the cover to allow the cables to exit on the side(s) of the enclosure if this is preferred.

In order to have all cables in a flat bundle from the controller to the valve blocks, it may be necessary to do some clever folding inside the

controller enclosure. Cables may be folded in a variety of ways in order to achieve a neat installation. Where the cable connects to a valve block, it may be necessary to fold the cable over the connector to have it face the desired direction. Custom cables can be made to eliminate these extra folds and bends but a little time spent with the cables can produce very neat results with the stock cables.

It is recommended that the cables be bundled together with high quality tape or cable ties once proper functioning is verified. Once proper operation is demonstrated, the cover may be reinstalled.

Excess wire may be bundled wherever convenient and may be held in place with a high quality tape or cable ties. It is best to wait until all components are in their final installed positions before taking up slack in the cables.

In most cases, there is sufficient cable that folding and or looping will allow the connectors to reach each valve block comfortably. For unusual installations we will gladly provide custom cables of any required length.

Please do not hesitate to contact us if you need custom cables. We have the facilities to assemble and test them.

All cables should be installed and checked for firm connection before turning on power. **Make sure that they are installed in the correct direction in the sockets. Each socket has a slot and each connector a locating tab that must be inserted into this slot. The red stripe on the cable is of no significance. It does not indicate proper orientation. It is possible to force connectors in backwards. This may damage the controller circuit board and is not covered under warranty.** At the end of this manual are photographs of correct and incorrect data cable installation. In installations where wiring may be disturbed, it is advisable to secure the cables to keep the data cable connectors from pulling out of their sockets on the valve blocks.

Mounting the Valve Blocks

The valve blocks may be mounted in many ways depending on the constraints of the instrument in which they are installed.

There are small thru holes on each end of the block, which may be used for mounting by passing a wire or cord through them and

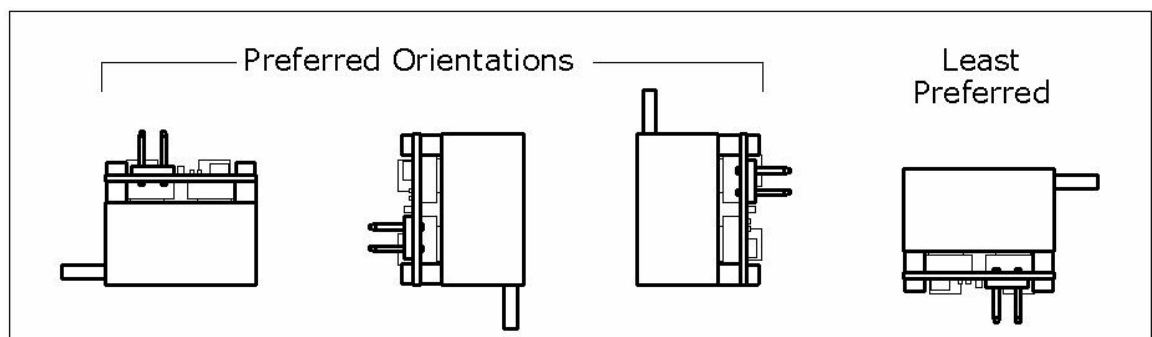
securing it to convenient locations. This is the method used with the optional Grand Piano Installation Kit.

The blocks may be fastened with self adhesive Velcro strips to any convenient location in the instrument but be aware that Velcro does eventually tear loose if left under tension. Therefore it is only recommended for installations where the blocks are held to the Velcro by gravity or other means.

One convenient material for mounting the blocks is plastic drywall corner bead that is available from a supplier of building materials. The right angle material can be used to create a shelf for mounting the blocks with Velcro. It is white in color but can be painted to match the surrounding materials with a spray paint that is approved for plastic.

The preferred orientation of the valve blocks is with the circuit board on top or to one side as shown below. Valve seating at the lowest vacuum levels is best in these positions.

Upside down mounting (circuit board on the bottom) is recommended only when vacuum levels will not be less than 10 WCI, or where large bleeds are present. Although the valves will operate in the upside-down orientation, even at low vacuum levels, repetition rate and valve closing time may be adversely affected. Only at higher vacuum levels when vacuum assists in keeping the valve firmly seated while closed, will upside-down mounting be practical.



For best sealing at relatively low vacuum (3 to 6 inches) it is best to face the circuit board up. For mounting behind the spool box in an upright piano it will be best to orient the block with the nipples facing down from one side of the block. This will allow for the most flexibility in routing tubing to the tracker bar.

Before deciding on a valve block orientation, it is a good idea to connect one or more blocks and test for operation at vacuum and repetition levels typical for the installation in different orientations. If

this is not feasible, it is a good idea to allow for changing of the orientation if performance is not ideal. Players vary in their flow and

vacuum requirements. This system is adjustable in various ways to accommodate these variations, however it is best to use the default configuration whenever possible. Some players will work best with a vertical orientation and others will work best with a horizontal

orientation. If there are any questions or problems, contact us for recommendations.

If the nipple holes are on the wrong side of the block, the circuit board may be removed and replaced in the opposite orientation. After replacing the board, tighten the screws only to the point that they contact the circuit board (while it is pressed onto the valve block) and then tighten one additional quarter turn. They must not be over tightened or valve operation may be compromised.



DON'T locate valve blocks very close to magnetic materials (large iron brackets, castings, large screws – anything that is attracted by a magnet).

The valve blocks contain very strong permanent magnets and should not be mounted close to iron-bearing materials or other magnetic materials. The appropriate distance depends upon the size of the magnetic materials in question, but a couple of inches is sufficient clearance for screws and brackets. Valve block distance from large iron castings should be greater. Due to the magnetic shielding in the valve blocks, magnetic influence is not likely to be a problem in most installations. Just keep this in mind when planning the installation.

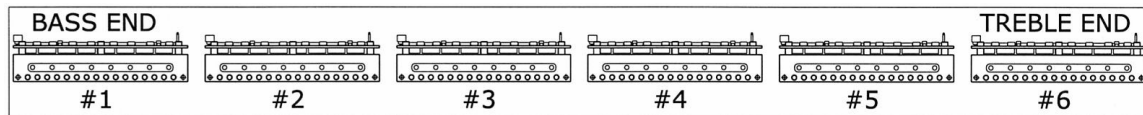


NEVER place magnetic media (floppy disks, magnetic tapes, credit cards) on or near the valve blocks. The strong magnets in the valve blocks may erase them.

Valve blocks may be suspended by their tubing alone if inserted into a well-supported tubing run. Ordinarily, however, it is best to use brackets to support them. We can provide custom brackets upon request.

Noises will be minimized if the blocks are not placed in direct contact with rigid or resonant structures. If this is unavoidable, they should be placed on a sound isolating material such as felt or sound deadening urethane foam.

Note Maps and Data Cable connection



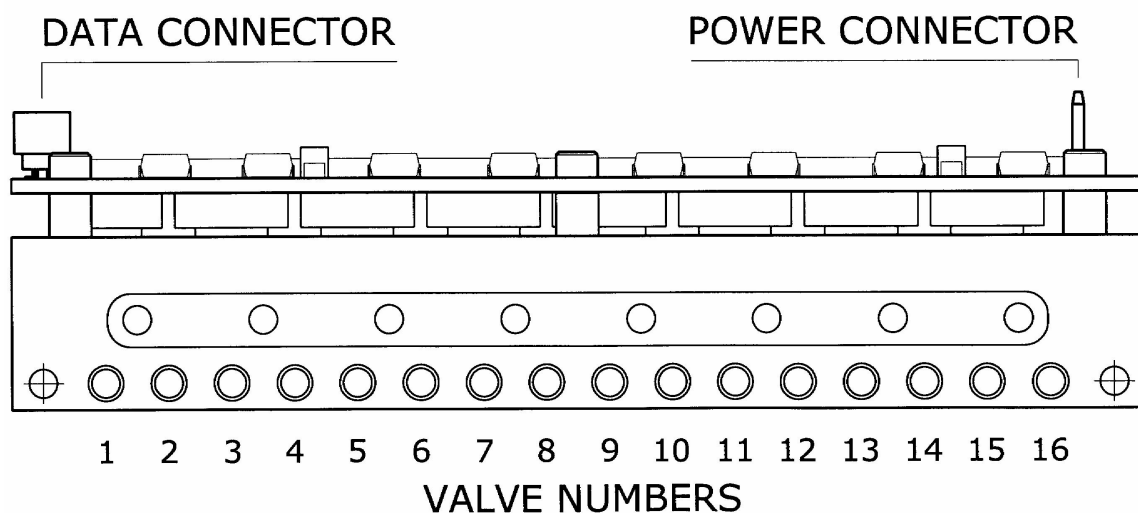
The controller has 6 (as many as 8) connectors for data cables to the valve blocks. Connectors are designated by letters A through H. Not all systems will use all connectors.

88 note and reproducing pianos use connectors B through G.

Connectors A through H will be used for a straight mapping of all 128 MIDI notes to valves on 8 blocks. Mapping will allow for any valve to be associated to any MIDI note number so the valves can be connected at random and the order sorted out in mapping, however it is recommended that the standard tubing charts be used whenever possible.



Note that each note and expression tube has a specific valve block and valve number assignment. The valves on each valve block are numbered from 1 to 16, starting at the data connector end of the block. Please note that the circuit board may be installed in either direction so that valve numbers may go from left to right or right to left. In either case the valves are still numbered from the data connector end.



Mounting the Power Supplies

Be careful when mounting power supplies and associated wiring to locate screws away from electronic components and power terminals. Please plan carefully before installation to be sure that there is sufficient cable to connect the controller, blocks and power supplies before mounting them. Custom cables may be ordered separately.

The standard power supply does not need to be mounted to the piano but it is recommended to at least anchor the output wiring to prevent it from pulling loose. If using the upgrade, or box type power supplies, they should be mounted to the instrument frame.

**Mounting the MIDI Controller**

The midi controller may be placed anywhere within the limitations of data cable length, but should be secured so that it will not fall out of place.

**Connection to computer**

The MIDI controller is connected to your computer with a standard MIDI cable (5 pin DIN male both ends) to the MIDI output of a MIDI interface card, sound card or game port of the host computer.

Up to 100 feet of high quality shielded cable is permitted. MIDI cables are available at most music stores that carry electronic instruments, and at many computer stores.

If connecting to a PC 15 pin game port connection you must obtain the required Game Port MIDI adapter (available at many computer stores, such as CompUSA).

Connect the MIDI OUT port from your computer to the MIDI IN port on the front of the MIDI controller.

3. Controller Settings, Valve Block Settings and System Testing**Controller Mapping**

Mapping may be accomplished in three ways. For standard systems, which follow the supplied note charts (supplied on disc), MIDI files are provided which will map the controller by putting it in configuration mode and simply sending the MIDI file from any MIDI player.

The second method allows for locating each valve and selecting the MIDI note to which it will be mapped (see below).

The third method allows for editing of a note map in a text file and running a utility program that will produce a MIDI file, which can be sent to the controller when it is in configuration mode. A sample text file and the program used to make this MIDI file will be found on the system CD in the Valve Mapping program folder along with a text file describing the use of the program.

Controllers can be supplied with either a default map (notes 1 through 128 mapped to outputs 1 through 128 on connectors A(1) through H(8) or mapped to a requested standard or custom map.

Remapping may be accomplished by the following method:

The internal output-to-note map may be re-defined as required by placing the controller into its configuration mode. Configuration mode is selected by switching the configuration (labeled "config") switch up. The chart on page 24 shows the position of this switch. This and all switches must be switched when the power to the controller is off as they are only read when power is applied. Once in the configuration mode (after power is turned on again) the indicator LED will flash rapidly and output number 1 will be switched on.

Upon receipt of a MIDI 'note on' event on the channel given by the selector switches, the unit will assign the note number just received to output 1 in the configuration map, then it will turn off output 1 and turn on output 2. The note number of the next 'note on' event received will be assigned to output 2, etc.

This process will continue until 128 'note on' events have been received, at which point the unit will end its configuration mode and commence normal operation.

If the same note is allocated to more than one output, only the last output defined by that note will be mapped.

Any notes which are not defined at all during the configuration phase, will remain mapped in the way that they were prior to configuration.

Turn off system power and switch the configuration switch back to the run position. When power is reapplied, the system will respond to the new map. Be sure to allow 15 seconds between power off and on cycling.

Selecting MIDI channel

To set the controller to respond to MIDI messages on a single channel set the channel select switches according to the controller layout diagram.

If the 'Omni' switch is in the ON position, the settings of channel switches A, B, C and D are ignored and the circuit will respond to any MIDI channel. Channel selection is read when the system power is applied so make sure to remove power before changing settings. Wait 15 seconds for the residual voltage in the system to dissipate and then turn on power.

Note maps and test files are found on the software CD and on the following web page:

<http://www.spencerserolls.com/Files4Download.html>

Setting Controller Timeout Period

Upon receipt of a MIDI message, the controller will turn on power to the valve blocks and also to a motor control relay if connected. The power will remain on for the duration set by the timeout adjusting control. Refer to the controller layout diagram for the location of the timeout adjusting control. Turn it clockwise to increase the period and counterclockwise to decrease it. Refer to "Installing" for instructions on connecting a relay to the controller. The controller will update the new timeout setting whenever it is changed. It is not necessary to cycle power to the controller but the new timeout period will only take effect after an active timeout period has expired without any MIDI messages being sent to the controller. Upon receipt of new messages, the new timeout period will apply.

Adjusting hold voltage

As shipped, the valves will operate properly under most circumstances. The hold voltage level has been adjusted to provide operation at vacuum levels as high as 90 water column inches with 32 notes sounding simultaneously. To achieve this operation, the default hold voltage setting is 3 volts. This limit is not likely to be exceeded in any ordinary music as more than 32 notes are not likely to be struck at the same time and the vacuum could not be maintained at 90 inches if they were. Held notes do not effect this limit in the same manner. If it is necessary to increase maximum simultaneous polyphony (not recommended) the hold voltage may be increased. Hold voltage may also be reduced to provide quieter operation on systems that do not have high vacuum levels. Each valve block circuit board has a small

adjustment screw for setting this level. It is located next to the power connector. Turning the screw clockwise will increase hold voltage. Initial turning of the screw may be difficult as it is locked with a sealer. It is best to monitor the coil voltage when making this adjustment. A measurement of 3.5 volts, at the coil, is the highest recommended setting unless it is known that notes will not be held for extremely long periods. This may be measured across the bypass diode when the valve is held open. If a digital voltmeter is used, be sure the polarity reads correctly as – voltage will be different from + voltage due to the bypass diode. The bypass diodes are the 16 small black components located nearest to the board edges. The diode for each coil is the one located closest to it. Lowering the voltage will produce quieter operation but be sure to test for reliable operation with the virtual keyboard and with demanding music. The hold voltage does not need to be the same for each valve block if the vacuum level on different blocks is different. For example, one block may be used for pedal and expression control on a Duo-Art piano. Vacuum will rarely exceed 30 inches so the hold voltage on that block may be reduced to reduce noise and heating as the expression and pedal valves may be on for extended periods of time.

Adjusting valve gap

The valve gap is set by means of a paper shim placed between the coils and the valve block body. A .010" shim is provided which will provide proper valve gap for virtually all situations. The stock configuration of a .010" shim and a hold voltage of 3 volts was chosen as a default setting. Operation against vacuum as high as 100 inches is possible with most systems. Bleed size of player valves and other factors contribute to repetition in response to the E-Roll Player valves. Orientation of the valve block also contributes to valve response times. The .010" shim was chosen to allow optimal operation with most players when the valve block is installed in a horizontal position with the circuit board facing up. If the valve block is in a vertical position with the circuit board facing to the side, the repetition rate may suffer. If this is the case, removing the paper shim may improve repetition. Please follow the instructions in the maintenance section when removing and reinstalling the circuit board. Shims may also be requested in different thicknesses but it is unlikely that anything other than the provided shim will be needed. If performance is not as expected, please contact us for suggestions to optimize performance.

Setting signal polarity

When setting switch positions on the DIP configuration switch, be sure to leave the "invert outputs" switch in the down position as it is when shipped. This setting is for compatibility with other systems including the previous model of the E-Roll Player. Moving the switch to the up position will cause all valves to be open until a MIDI note on is sent upon which it will close. If this is how you want the valves to operate, please contact us for recommendations before using this setting.

Testing

Testing for proper mapping and valve response may be readily accomplished with the use of the MIDI Virtual Keyboard program supplied on the software disc.

This program presents a graphical keyboard on the PC screen. By clicking keys with the mouse, they may be played through a midi interface connected to the computer.

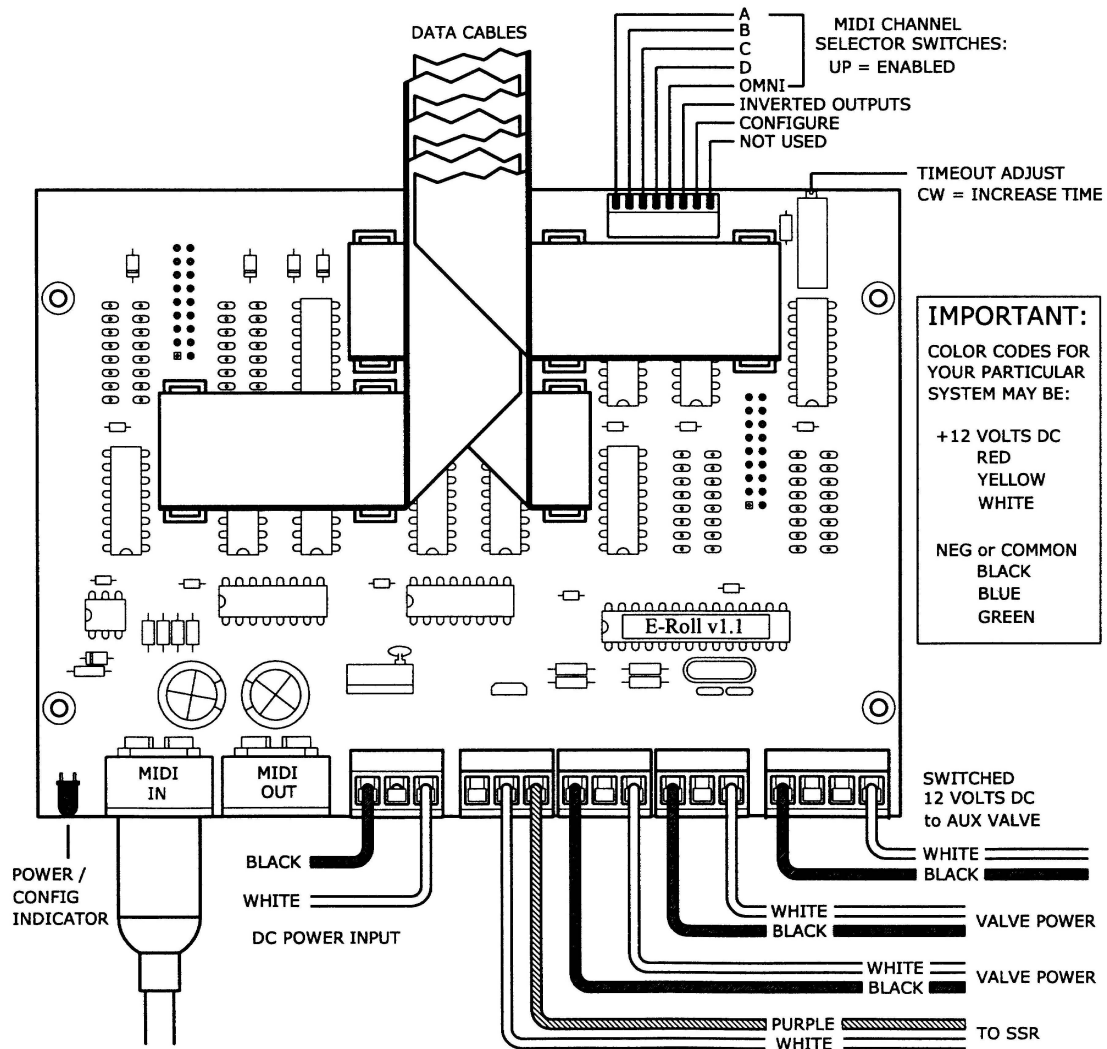
Notes may be played with a left mouse click and will play as long as the mouse button is held down or they may be held on indefinitely by clicking with the right mouse button.

This allows for the holding of any note or expression valve open while investigating operation as well as setting expression levels while testing note functions.

Three other modes allow for playing notes for timed durations, repeated or in rapid succession:

- Timed notes may be played in order to test for proper valve and action function with quick notes.
- Notes may be played repeatedly to check for repetition problems caused by valve or action problems.
- Arpeggio mode allows for playing notes in rapid succession by dragging the mouse cursor over the keyboard. This is helpful for quickly checking proper note order.

Every valve on every block has been tested to meet vacuum and repetition specifications. Optimal performance will occur only after a break in period. Even though all surfaces have been machined to high tolerances of fit and surface finish, sliding surfaces will improve with use. Repetition and precise note timing will improve as the sliding parts polish themselves with use. Lack of repetition, uneven note timing and sticking notes indicate problems that should be investigated but minor irregularities should be ignored until the system has been in use for a while. The virtual keyboard program may be used to test and exercise valves that appear to be sticking. Please note that when using the virtual keyboard to play repeated notes, the precise note timing may vary slightly. If no other applications are running and if mouse and keyboard activity is limited, the timing accuracy will be quite good but certain windows processes take priority over the playing of notes and there can be some minor irregularity of note timing.



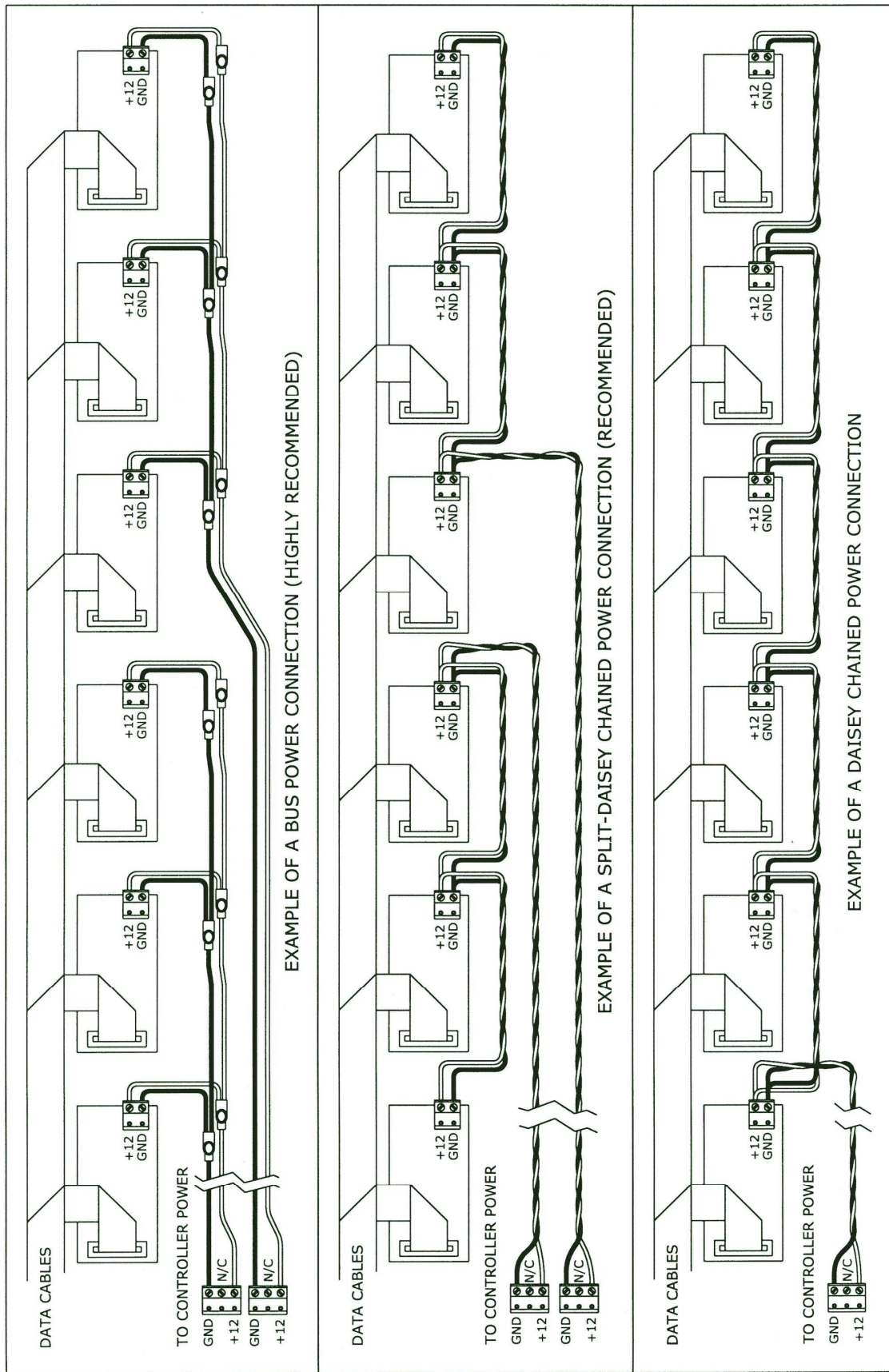
Please note that power supply wire colors may vary. Black Blue or Green are used for negative or common voltage and Red Yellow or White are used for positive voltage. Data cables may be folded in a variety of ways. This diagram shows only one possibility.

Setting the MIDI Channel Number

The circuit can respond to any MIDI channel number in the range 1 to 16, according to the settings on five of the 8-way switch unit. Moving a switch slider up turns that switch on and moving it down turns it off.

MIDI Channel Settings

MIDI Channel	Sw D	Sw C	Sw B	Sw A	MIDI Channel	Sw D	Sw C	Sw B	Sw A
1	OFF	OFF	OFF	OFF	9	ON	OFF	OFF	OFF
2	OFF	OFF	OFF	ON	10	ON	OFF	OFF	ON
3	OFF	OFF	ON	OFF	11	ON	OFF	ON	OFF
4	OFF	OFF	ON	ON	12	ON	OFF	ON	ON
5	OFF	ON	OFF	OFF	13	ON	ON	OFF	OFF
6	OFF	ON	OFF	ON	14	ON	ON	OFF	ON
7	OFF	ON	ON	OFF	15	ON	ON	ON	OFF
8	OFF	ON	ON	ON	16	ON	ON	ON	ON



4. Playing MIDI files and Paper Rolls

Any MIDI source may be connected to the MIDI input of the controller. Most likely you will be using a personal computer to send MIDI data to the E-Roll Player. The software file player included with the system give the most flexibility and control and is highly recommended. Other file players such as VanBasco's Karaoke Player or Q Midi for the Mac are also good software file players.

To play from a MIDI source, simply connect it to the MIDI input on the controller box and start the process for sending the file. If a motor relay has been installed, the piano pump motor will switch on and play will begin. The motor will shut off when no MIDI messages have been received by the controller for a period of time determined by the setting of the Controller Timeout Period.

When playing MIDI files with the E-Roll Player, the tracker bar must be covered in order to seal up all the holes. A static cling vinyl strip is included which may be used for this purpose. It will stick to the tracker bar and may be removed without leaving any residue. The strip and the bar must be clean in order for the strip to stick. The strip must also be completely smooth and flat. If there are any wrinkles, dip it into hot water to allow it to relax. Boiling water is too hot so let it cool a while if you heat the water in this manner. Very hot tap water should be adequate but tap water temperature varies. A paper roll may also be used to cover the tracker bar but it should be a roll in good condition or there may be leaks. Serious problems with playing may result on certain players if the tracker bar holes are not completely sealed. Ampico may not supply full vacuum to the stack if one of the holes is leaking. For this reason, it is best to use either the vinyl strip, carefully applied to a clean bar (you may wet the vinyl slightly but not so much as to cause the tracker bar to tarnish) and smoothed carefully to seal all holes, or a removable tape strip. There are many tapes such as blue painter's masking tape that will not leave a residue. Be sure to check the tape periodically for looseness or deterioration of the adhesive. Use only a good quality tape such as those made by 3M. Cheaper brands are not likely to be reliable and may cause damage if their adhesive turns to powder or gunk. High quality, acid free paper repair tape such as those made by Filmoplast are also good. Do not use the thin tissue, only the heavier paper tape.

For the sake of appearance and reliability of the tracker bar seal, it is best to cover the vinyl strip or tape with a regular piano roll that is wound onto the take up spool. Be sure to turn the spool motor tempo to 0 to prevent the paper from moving. If the tempo control will not

stop paper movement, it must be adjusted properly so it will allow no paper movement.

Many players have devices in the take up spool that detect the presence of paper. Duo-Art uses a hole in the take up spool which must be covered with paper in order to play. Ampico B uses a lever that falls into a slot if there is less than a full wrap of paper on the take up spool. These and similar devices must be covered with paper or there may be no vacuum to the stack and the piano will not play in spite of E-Valve activity. For this reason, it is best to always have a roll in the spool box and several turns of paper on the take up spool.

To play paper rolls, simply remove any covering over the tracker bar and play the roll the normal way. You can stop the roll, at any point and play from the E-Roll Player but be sure to stop the roll at a point where there are no holes. Be sure that your tempo control will stop the roll motor completely or you may be playing both the paper and E-Rolls at the same time. This is not likely to be very musical unless carefully planned.

The E-Roll Player will introduce very little contamination into the piano valves so regular tracker bar pumping is not necessary unless paper rolls are also played. Buildup of dust under the valve pouches caused by years of paper roll playing may still be present so it is a good idea to do a thorough pumping of the tracker bar before blaming the E-Roll Player for performance problems.

5. Optional Equipment and Accessories

Installing Optional Pump Motor Relay Kit

An optional Pump Motor Relay Kit is available for controlling your instrument's pump motor, thereby allowing the pump motor to be turned on only when needed.

The pump motor relay operates in tandem with your instrument's original pump motor switch, permitting the instrument to be switched on and off manually when the E-Roll Player is not being used.

The relay is controlled by MIDI activity. Upon sensing the first MIDI event from your computer, the MIDI controller signals the pump motor relay to turn on. After a period of complete inactivity (i.e., after a selection has finished playing), the MIDI controller signals the pump motor relay to turn off. This inactivity timeout period may be adjusted by turning the timeout adjuster, clockwise to increase the period and counterclockwise to decrease it. The location of the adjuster is shown in the "controller layout diagram". All "Spencer's E-Rolls" MIDI files (and most others as well) transmit a non-playing note (MIDI event) several seconds before the actual start of each song, allowing the pump sufficient time to develop the proper vacuum level.

The optional Pump Motor Relay Kit consists of a Solid-State Relay (SSR), four crimp-on terminals, and low-voltage hookup wire. All components are pre-assembled and ready to plug on to one of the three power output connectors.

The SSR can be mounted anywhere that is convenient with the following precautions:

- The included relay will switch current to any motor up to 2 HP without damage. However, heat must be considered with large motors and it may be necessary to mount it to a metal heat sink.
- For ordinary motors under ¼ HP, this is not necessary and the relay may be mounted directly to wood. If you are using an SSR other than the one provided by us, be sure to use one of sufficient rating and provide a heat sink if necessary. If it gets more than slightly warm to the touch, it should be mounted on a metal heat sink and not directly on a combustible surface.
- If you are using your own relay you can connect it to any one of the three connectors provided.

- 12 volt switched power are both provided on these connections. When MIDI data is being received (and for a specified time thereafter) the power is switched on.
- Consider that the current available at these connections is limited and is provided by the 12 volt main power supply. Excessive current draw will reduce the current available to operate the valves.

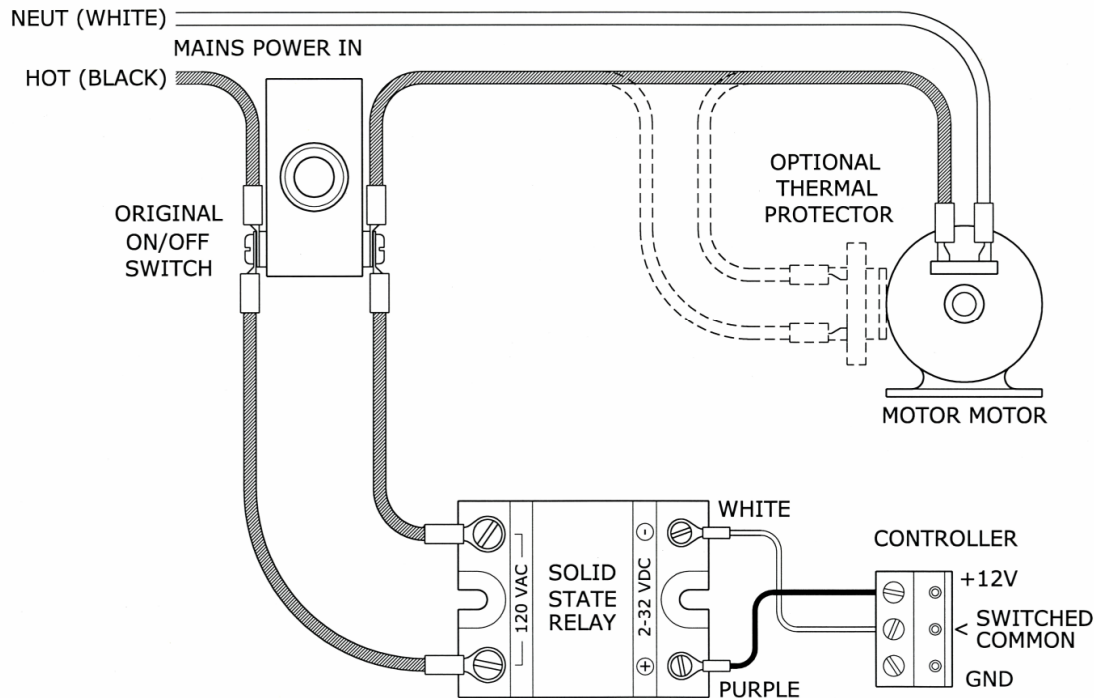
SSR Connections:

Connection from the SSR to the MIDI controller is made with small gauge hookup wire, one white wire and one purple wire (included).

To make the SSR connections, perform the following steps:

1. Connect the purple wire to the SSR's DC plus (+) input terminal,
2. Connect the white wire to the SSR's DC minus (-) input terminal.
3. Strip approximately 3/8" of insulation off of the cut ends of the white and purple wires.
4. Connect the white and purple wires to positions two and three of a three-position connector with the white wire in position two and the purple wire in position three. The wires for the SSR may be inserted into one of the connectors that provides power to the valve blocks. Each connector terminal may hold two wires so it is not necessary to use a separate connector for the SSR alone. (See the diagram on page 24 to identify the three position connectors.) If the polarity is incorrect, the relay will not work but neither the relay nor the controller will be damaged. Simply reverse the wires and try again.
5. Locate the existing pump motor switch, and verify that it is in series with the pump motor. (If you are not sure how to do this, contact a competent electrician or service technician for help with the remaining step).
6. Connect wires from the two sides of the pump motor switch to the two AC terminals on the solid-state relay (SSR). The SSR acts like a switch. When connected in parallel with the original motor switch, either the SSR the original piano switch will turn the pump on.

SSR WIRING AND ADDED THERMAL PROTECTOR

**IMPORTANT NOTES**

1. The A.C. terminals are connected across the original piano switch, in parallel and therefore allow the piano to be controlled by either the SSR or the original switch. Use extreme care in connecting to this wiring, as it may be brittle with age. If in doubt, replace old wiring, terminals, plugs, etc. with new ones.

2. ALL AC power connections must be covered or insulated to minimize risk of electrocution. This is especially important where small children or pets might crawl under your instrument and gain access to the electrical wiring.

Optional Auxiliary Valve Connections

For systems that require up to 3 more valves than are available with the valve blocks, (Ampico A and B for example) three switched high current auxiliary outputs are provided.

An optional connector is available to connect to these outputs. Up to 1 amp per circuit may be switched, but be aware that this must be supplied by the power supply and adding two or more high current switched devices may exceed its output capability. A larger supply may be needed for these cases.

An integral back-EMF protection diode is provided for each circuit to allow for inductive loads such as solenoid coils. Simply connect a 12

volt valve between the common contact of the auxiliary output connector and any one of the three auxiliary switched outputs. Check to make sure that the 1 amp rating of the switched outputs is not exceeded.

If your valve or solenoid has a built-in back-EMF diode, it is essential that the polarity be correct or damage to the output transistors will result. If in doubt, it is best to remove any built-in back-EMF diode as the internal one is more than adequate.

The three auxiliary outputs are connected to outputs 125 126 and 127 and can be mapped to any note as with any other output. Standard Ampico maps will operate the first valve from MIDI 111 which is the soft pedal. Connect the extra valve to the first and the fourth pins of the 4 pin connector on the far right of the controller board. The right most pin is the common connection and the first three are for valves 1 2 and 3.

Optional Grand Piano Mounting System

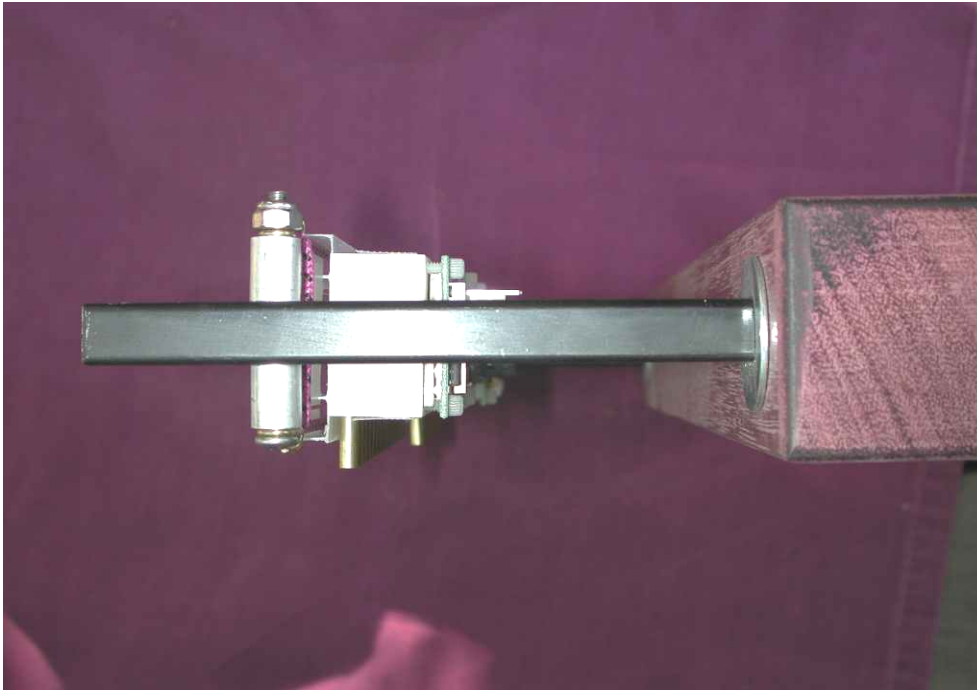
The optional mounting kit includes the following components and can be used to mount the blocks in most grand pianos.

- 12 feet of strong mounting cord
- Two mounting stanchion assemblies
- Spring for tensioning the cord
- Screw eyes for mid-span support of cable
- Plastic covered wire for connecting blocks to cable runs, mid-span supporting of the cord runs and for temporary support during installation

To install:

- Plan the installation carefully to allow the blocks to be mounted so that they do not contact any other piano parts. Contact will conduct noise to the frame of the piano. Contact of the circuit boards with metallic components may cause shorts and damage to the circuits
- Assemble the stanchion arms (hardware included) to the stanchions. The S-hooks (enclosed) attach to the ends of the arms. They should appear as shown in the installation photo below:
- Mount the two stanchions on opposite ends of the underside of the keybed. The spaced-apart S-hooks on the stanchion arms
-

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- are used to string the cable. The S-hooks are laterally separated to support two parallel runs of cable approximately 1-1/4" apart.



To mount the stanchions to the key bed:

- Drill a 3/16" hole at the desired location of each stanchion.
- Screw the stanchions into the holes using a wrench. Make sure that the stanchion is tightened adequately. The stanchion should be perpendicular to the keybed when fully tightened even if the pilot hole was drilled slightly off axis.
- If the keybed is very thin, use caution when drilling. It may be necessary to grind the points off of the screw ends of the stanchions in extreme cases.
- Secure the spring to an S-hook on one side of one stanchion. (Alternatively, the S-hook can be removed and the spring can be secured directly to the stanchion arm).
- Attach one end of the cable to the spring. String the cable from the spring through the both S-hooks on the opposite stanchion,

-
- and then back to the remaining S-hook on the stanchion with the spring to form two parallel runs of cable.
- Pull the cord taut to partially extend the spring and tension the cord before attaching the cord to the remaining S-hook.
- Insert lengths of plastic insulated wire through the end holes in the blocks and wrap this around the long cables to secure the blocks. Please note that the end holes are the ones that do not have nipples installed in them. The photos show a slightly older mounting system with plastic shelves stuck to the blocks. These are no longer needed with the extra holes in the blocks.
- Mount the screw eyes (included) into the underside of the keybed at appropriate points between the stanchions, in between planned locations of your valve blocks. (Loops of the plastic covered wire will be attached to these screw eyes and used later to support the cable runs mid-span).

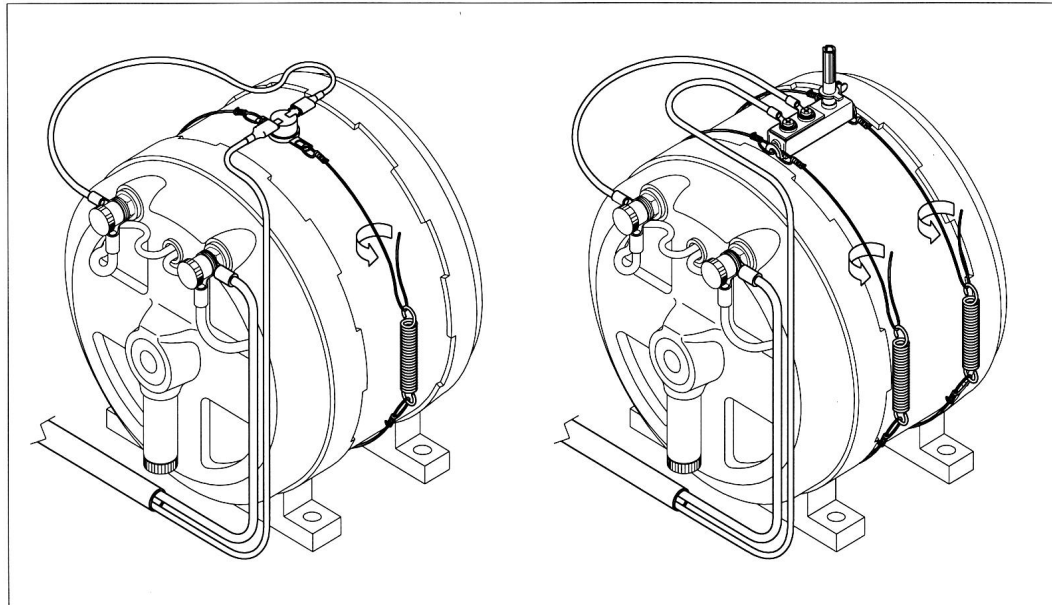
Optional Motor Overheat Protector Installation

This optional thermal cutout will shut off the motor at a predetermined temperature thereby protecting the motor from heat damage and lessening the chance of fire. It is for use with AC motors up to and including ¼ HP. It is a safety device and not a switch. It is not designed for frequent operation.

If the motor is cycling off frequently, there is a problem, which must be remedied. An unsafe motor condition exists which the overheat protector is not designed to protect. With a ¼ HP motor, this thermal cutout is rated for 6000 cycles only. After that it may fail closed and no longer offer protection.

Two thermal cutouts are offered, fixed and adjustable. The adjustable unit is installed with two spring-loaded wires but the fixed one is installed with a single wire.

The diagrams below show how both units are mounted to a motor.



Fixed Temp. Protector

Adjustable Temp. Protector

The bottom of the thermal cutout must be in firm contact with the motor housing. It should never be mounted over nameplates or labels, only on a smooth metal or painted surface.

- On the adjustable model, wrap each wire fully around the motor and through one of the bent tabs on either side of the cutout, or through the hole in the insulating plate used with the fixed cutout.
- Loop the free end of the wire through the opposite end of the spring to which the other end of the wire is already attached. Pull it tight until the extended length of the spring is 3" and give it a sharp bend to hold it temporarily.
- Secure the wire by wrapping it through the open spring loop several times and then back around the wire. If the wire is too long to allow for stretching of the spring to 3", cut off a portion of the long connecting length and reattach.

Adjustable-Temperature Motor Protector

The thermal cutout is to be connected in series with the motor wiring. It may be necessary to cut one of the motor wires and to use the wire nuts (supplied) to make the connection.

If you are not qualified to make this connection with line voltage wiring, please obtain the assistance of someone who is.

Once the cutout is installed, check to make sure that there is a firm contact between the base of the sensing unit and the motor.

For the fixed temperature cutout it is necessary to fill the space between the switch base and the motor with the thermal grease provided. Tilt the cutout against the pull of the spring and squeeze the contents of the capsule onto the motor or the cutout base and allow it to spring back.

The adjustable cutout does not need this compound as the sensing area is much larger. Once the wires are installed, be sure that there is a firm contact between the cutout and the motor or the shut off temperature may be elevated.

The adjustable thermal cutout is calibrated such that the extreme clockwise rotation of the adjustment shaft will set it to shut off at a motor housing temperature of 160 degrees F. This is a safe setting for motors with cotton covered wiring as the wiring runs at a cooler temperature than the motor housing and the wire is rated for 190 degree F operation.

To shut the motor off at a lower temperature, rotate the shaft counterclockwise. Each quarter turn will change the setting by about 30 degrees.

If you would like the thermal cutout calibrated to a maximum temperature, of your choice between 90°F and 215°F, please return it with the desired temperature specified.

Please be warned that high voltage is present at the wire connections to the cutout. Do not touch these connections when the motor switch is on.

If the cutout is installed in a position where it may be accessible, it is recommended that these connections be covered with either "liquid electrical tape" (available at electrical supplies and hardware stores) or with a good grade of silicone seal.

IMPORTANT

The optional motor overheat protector is intended only to offer a measure of protection against an overheating pump motor.

It does not, however, correct or negate any pre-existing problems with your pump motor, nor does it prevent problems from developing after installation.

Regular inspection and maintenance of the pump motor is necessary with or without the E-Roll Player System, and with or without the motor overheat protector.

We cannot assume any responsibility for system failures or instrument damage due to faulty motors or motor wiring, nor do we warrant against such failures or damage.

On the last page of this manual is a warning label which must be printed out and installed in a conspicuous location in the vicinity of the motor.

6. Software installation and use

Installation and usage guides for the MIDI file player and various utilities are found in the Utilities and Docs folder on the software disc.

7. Maintenance and Troubleshooting

Most problems with missing notes, bad repetition or improper expression on reproducing pianos are the result of using incorrect file types. If you experience these types of problems, check with us to make sure you are using the correct type of file for your installation.

The controller and valve blocks contain sophisticated circuitry and occasionally get confused, usually due to a momentary interruption of power or corrupted input data. A reset will restore correct functioning.

In case of irregular playing of any kind, try resetting the controller before taking any other action. This may be done by pressing and holding the reset switch for 5 seconds.

It is actually easier to just remove power from the system for several seconds. Unplug the power cord and leave it unplugged for a minute to be sure.

Installation of upgraded or third party power supplies

The power supplies included with your system have been tested with polyphony that exceeds all reasonable musical needs. It is not likely that a larger supply will be needed.

Any modern switching type power supply of sufficient current rating will work with this system. Be sure to use a supply that is short circuit protected and that meets local code requirements.

Do not use open frame supplies with exposed line voltage connections unless such a supply is installed in a protective enclosure. Be sure that the input voltage and frequency are correct for your location.

Do not use a multi voltage supply unless its outputs will be loaded to suit its minimum load requirements. The E-Roll Player system draws very little power and may not satisfy the minimum load requirement of a multi voltage supply. Under loaded supplies may produce over voltage conditions, which may damage the system.

If you feel you need a larger supply or wish to use a supply of your own choosing, please contact us to make sure it is suitable.
We will not be responsible for damage caused by the use of an unsuitable power supply.

Cleaning & Lubrication – (Disassembly required)

Although the block will be easier to handle if the tubes are disconnected, it may be possible (depending on the particular installation) to simply remove the printed circuit board from the valve block while the unit is in place.

Be sure to disconnect power from the system before any disassembly is performed. Remove the power and signal connectors first. Then remove the 6 socket head cap screws that retain the circuit board and gently lift it away from the block. Lift it straight up without tilting it excessively. If it seems to be stuck, gently ease it from several different points along the perimeter of the board to loosen.

Do not insert any tools into the space between the circuit board and the block or you may damage coils and wiring. If the board does not move with gentle persuasion, please return it to us for repair.

Set the board aside for cleaning of the affected valve or valves and be sure to place it on a static protected surface. Avoid touching any component leads or circuit traces especially if the relative humidity is low or if there are synthetic carpets or other sources of static electricity. If you are working under low humidity or other conditions of high static potential it is best to use static protection techniques when handling circuit boards.

The valve plungers can be removed easily by attracting them one by one to an iron-bearing tool such as a small screwdriver. When lifting the plungers out, lift them straight up and avoid other plungers, as they will attract each other.

Be sure that there are no iron-bearing chips on the tool or in the area in which you are working or they will be attracted to the magnet in the plunger and can be very difficult to remove. Store the plungers in a clean envelope or plastic bag when not installed in the valve block, to prevent contamination.

The valve cavity may be cleaned with a dry cotton swab. Do not use any solvents unless necessary. If necessary, use only 99% isopropyl alcohol.

Lubrication should not be necessary unless cleaning was done with alcohol. The only allowable lubricant is a light coating of common talc.

Check to make sure that lint from the swab does not remain before reinserting the plunger. If the seal has dirt stuck on it, it maybe cleaned in the same manner.

The valve plunger can be gently wiped with a soft cloth dampened with alcohol. Be careful not to drop it where it may attract magnetic material or other dirt. If magnetic material does become stuck to the plunger, use a soft cloth and wipe the material off carefully. This will take some time and care as the magnetic dirt will be strongly attracted to the magnet.

Before returning the plunger to the block, give it a light dusting with common talc. Baby powder with light fragrance is OK but do not use corn starch based powders. No other lubrication is necessary or recommended.

When reassembling the printed circuit board to the Delrin block be careful to locate the coils above their locating bosses and move the board and coils into contact with the block without jarring the coils. The fine wires can be easily damaged.

After replacing the board, tighten the screws only to the point that they contact the circuit board (while it is pressed to the valve block) and then tighten one additional quarter turn. They must not be over tightened or valve operation will be compromised.

Troubleshooting Guide:

Problem	Possible Cause	Solution
Unit does not turn on. Pilot light is off.	Not plugged in	Plug the unit in
	Loosing power wiring to controller.	Check power wire connections.
Pilot light is on and responds to MIDI input but valves do not operate	Internal program corrupted.	Unplug power supply for 1 minute.
	Unit is in configuration mode.	Switch to play mode, unplug and re-plug.
	MIDI data not on selected channel.	Set channel select to match or Omni.
Pilot light is on but does not indicate MIDI input. Light should blink in response to each MIDI event.	MIDI interface is not properly installed.	Reinstall MIDI interface drivers and software and configure correctly.
	MIDI interface is defective.	Replace MIDI interface.
Valves operate (clicking is heard in response to MIDI file) but piano does not play.	Piano pump is not running.	Turn on manually or check relay operation.
	Piano stack is not receiving vacuum.	Make sure tracker bar and take up spool are covered with paper, vinyl strip or tape.
Note or notes inoperative	Loose cables or connectors	Double-check connections, reseal connectors
	Foreign substance in valve	See "Cleaning" above
Notes staying on	Loose Signal Cable	Reseat all data cable connectors
	Foreign substance in valve	See "cleaning" above
Sustained notes are clipped when played at high vacuum.	Hold voltage too low.	Increase hold voltage but not above 3.5 volts.

Problem	Possible Cause	Solution
Missing notes, repetitions or improper expression on reproducing pianos.	Incorrect MIDI file type. Type must be tracker bar image for the installed system	Check file type and replace if it is not the correct type. Contact distributor for information.
Buzzing from valve blocks.	Data cable improperly connected or damaged.	Remove and replace or swap with another cable to test.
Unit does not turn off	MIDI File Player crashed	Re-open MIDI File Player and close normally
	Defective MIDI Controller	Replace
Excess Heating (<i>the E-Roll Player System does not generate much heat. If this condition occurs, contact us to determine if repair or replacement is necessary</i>)	Extreme, prolonged repetition from music source	Stop playing, allow some time for valve(s) to cool before restarting
	Defective MIDI File or Player	Install latest software updates, replace MIDI File
Missing of quickly repeated notes	Valve gap is too large	Remove paper shim between coils and valve block, if installed.
All notes stay on	“Invert outputs” switch in the wrong position	Switch the “Invert outputs” switch to the down position
Buzzing from the player stack and intermittent playing of E-Rolls	Bad seal of vinyl strip, tape or piano roll over the tracker bar . Or inadequate paper on the take up spool. This can cause the stack cutout valve to operate intermittently.	Reapply the seal and make sure it is airtight. Use a different sealing method if necessary. Read the relevant section of the installation manual for more information.

8. Tips for Owners

When moving a piano with the valve system installed, it is important to prevent the valve blocks from damage during both local and long distance moving of the piano. Depending on the method used to mount the blocks and other components, it may be necessary to provide temporary extra support.

If this is not possible, it is recommended that the system be removed for shipping. Numbering of the tubes with a paint marker will make reassembly easier.

We have a "moving kit" available which consists of two perforated plastic tubes which are split so as to fit over the valve blocks. This allows them to be firmly secured to the piano with shock cord and or tape. Please contact us if this kit is needed. This kit will be most needed for installations in which the blocks are suspended from the legs as they must be removed for moving.

Other components such as the midi controller and power supplies should be secured adequately or removed for moving.

System Specific Tips

Duo-Art Grand:

The optional Grand Piano Mounting Kit is strongly recommended. The valve blocks may be mounted in front of the stack. They will show from a low sight line and should be covered with a "belly cloth" to improve appearance and to reduce valve noise. Mounting behind the stack is another possibility but will require longer tubing runs. For easy access during installation, remove the lyre and pedal linkages to have easy access to the bleed rail.

Note valves

Connect the tubing wyes just ahead of the bleed rail. The first step is to identify the number of pneumatics in the stack. Some are 80 note and others are 88 note. It is easiest to connect to the 80 center notes only. If this is done on an 88-note stack, be sure not to connect to the first and last four tubes on the bleed rail. If these notes are to be used, the connections must be made on the tracker bar side of the expression cut off blocks in order to be able to switch from Duo-Art to 88 note operation. This will require routing tubes from the blocks around the key bed and frame. It is also possible that there may be 8

spare positions in the connection blocks that connect the notes tubes through the key bed. If present, these may be used.

Check to be sure the notes are connected in the correct order and mark the MIDI numbers (from the tubing chart) on the bleed rail fabric (or temporary tape applied to it). Run the tubes for the dynamic valves around the stack on both sides as well as for the sustain pedal. The theme valves may be connected at the pallet valves in the keyslip. Other connections will be made easily as follows:

Dynamic valves:

Insert wyes in the tubing run on the way to the dynamic valve box at the rear of the piano. Whether there is an installed pump and how the tubes are routed will determine at what point the tubes become easily accessible. The tubes to the valve blocks can be run around the stack on either side.

Soft pedal:

The easiest connection point for this is on the pallet valve for the modifying lever. This is the lever in the keyslip that has a position for soft playing. With the piano running and the tracker bar blocked off, operate the lever to determine which position operates the hammer rail lift or the una corda, whichever is chosen too operate from the roll. Then determine which pallet valve opens when this happens and identify the tube connected to it. This is the tube into which the wye for connection to the valve block should be inserted.

Sustain pedal:

The easiest connection point is right at the pedal pneumatic / control valve unit. Just insert a wye into the signal tube to this unit.

Theme actuation valves: (theme primaries)

The easiest connection point is at the theme actuation levers pallet valves. These are the two small levers marked with a B and T. Locate the tube connecting to each pallet valve and insert a wye and the tube to the appropriate valve block.

After connecting the blocks in the vicinity of the pedal linkages, allow the blocks to hang from their tubing and carefully reinstall the pedal linkages. Be sure that the lever to the sostenuto pedal is above the lever end on the long linkage as it will be more difficult to correct after the blocks are installed. The remaining blocks should be placed so as to not interfere with the mounting of the lyre. It may be best to test fit it a few times during the installation as there is some tubing congestion in this area.

Once the valve blocks are positioned it is advisable to place twisted wire on the cords to maintain their side-to-side positions to avoid contact with solid surfaces of the piano. The plastic covered wire, included with the mounting kit) is best for this. This will minimize sound conducted to the piano frame.

Duo-Art Upright

Due to the limited space behind the spool box careful planning and installation of tubing is necessary in order to prevent interference with the piano action. For new installations it is recommended to use only thin walled tubing. For retrofit installations, it may be necessary to rearrange the original tubing to make it more compact.

When cutting the signal tubes from the tracker bar to the stack for the purpose of inserting wyes, make sure to stagger the positions of the cuts vertically. If the wyes are not staggered it will be difficult to obtain clearance between the tubing and the piano action since the tubes will cross over each other numerous times and it will not be possible to press them down for clearance.

The signal tubes may be staggered randomly or they can be installed in vertically spaced rows and these rows can be used to identify the tubes. For example, all the tubes to a particular valve deck may be all located on one row. This will make it easier to trace the tubes when connecting to the valve blocks.

It is recommended that the wyes not be installed in the horizontal portion of the original signal tubing runs. It is difficult to add them here without causing interference with the piano action. In addition, it will require excess tubing to be used which is not good for accurate signal propagation.

Ampico A/B

Ampico piano installations require 97 valves, which is one more valve than is available on 6 valve blocks. Rather than supply an additional valve block (leaving 15 of the 16 valves unused), it is generally preferred to use a single additional valve driven by the MIDI controller's auxiliary switched output #1 to operate the (relatively undemanding) soft-pedal pneumatic. In fact, the "standard" Ampico A/B mapping is set up for an extra valve on the soft pedal.

We can supply a suitable valve to you, if you want. Otherwise, contact us for recommendations about what type of valve to use.

Simply connect a 12-volt valve between the common contact of the auxiliary output connector and any one of the three auxiliary switched outputs.

Do not exceed the 1 amp rating of the switched outputs. The three auxiliary outputs are connected to outputs 125 126 and 127 and can be mapped to any note as with any other output.

9. Features

- Small size: fits in tight spaces
- Modular design for flexibility of installation
- Self closing spring less valves for all reliable operation
- Pulse Width Modulation technology and Pick and Hold circuitry assure cool and quiet operation at high vacuum levels
- Wide range of operating vacuum (2 to 85+ WCI)
- Simple Note mapping capabilities
- Durable
- Easily serviced
- Supplied as a complete system, including controller, valve blocks, power supplies, cables and installation hardware
- Valve Mapping: Individually mapable to any note

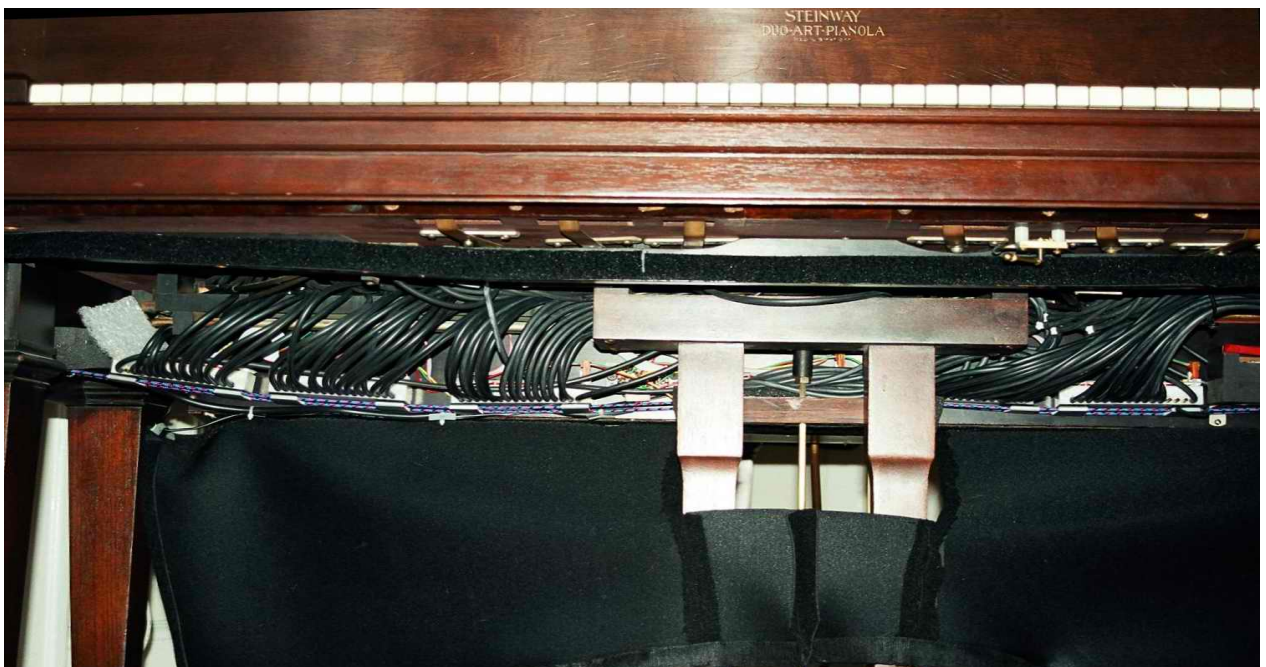
Specifications

- Valve Block Dimensions:
1.25"H x 1.4"W x 5.0"L, (32mm x 36mm x 127mm)
- Valves per block: 16
- Material: White Delrin with light weight valve components
- Performance:
Repetition Rate: 20+ Hz from 2" to over 85" WCI
- Positive pressures: 5+" H2O WCI
- Custom units are available for higher positive pressures
- Interface: 2mm 20 conductor ribbon cable
- Electrical: 12 volt supply
- Number of Valves: 6 valve blocks (96 valves total) up to 128 valves with 8 blocks and custom configured controller.
- Multiple controllers can be "ganged" for very large installations
- Controller:
MIDI, One "IN" and one "THRU"
Optically isolated inputs
Omni or single channel selectable
3 discrete digital I/O (extra valves and controls)
12 volt switched output for pump motor control

10. Installation Photographs:



Duo-Art Grand with system installed



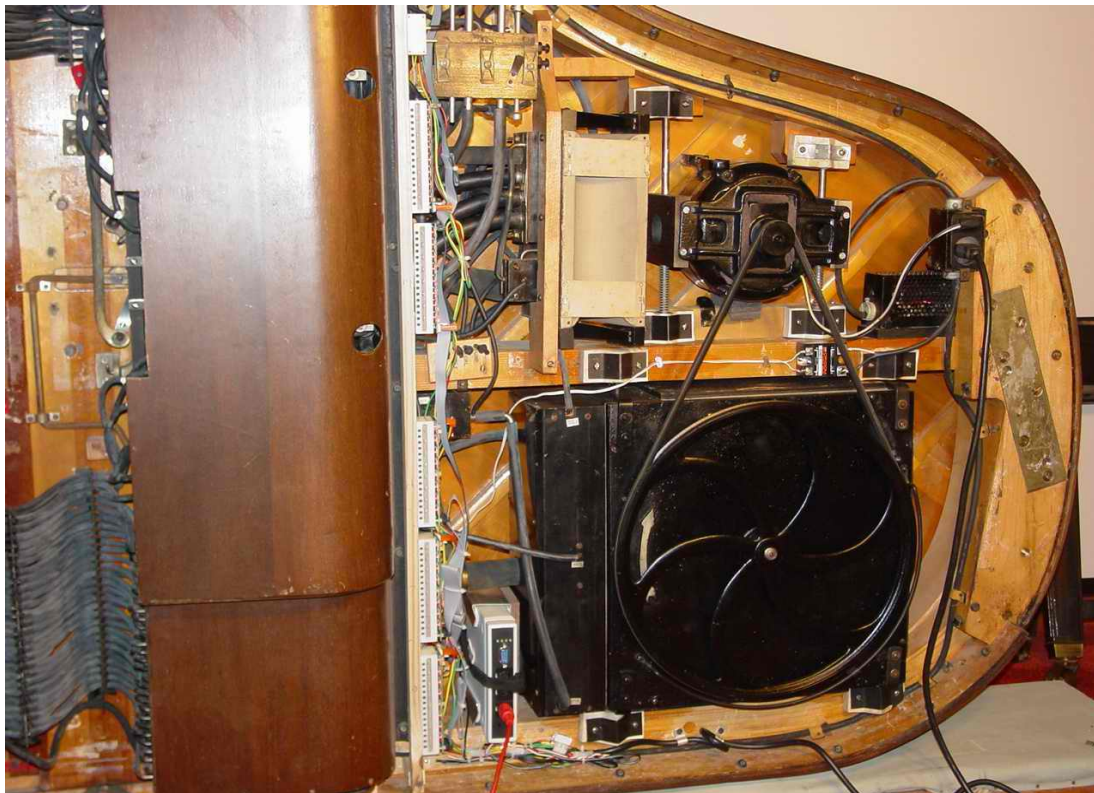
Above piano with cover removed



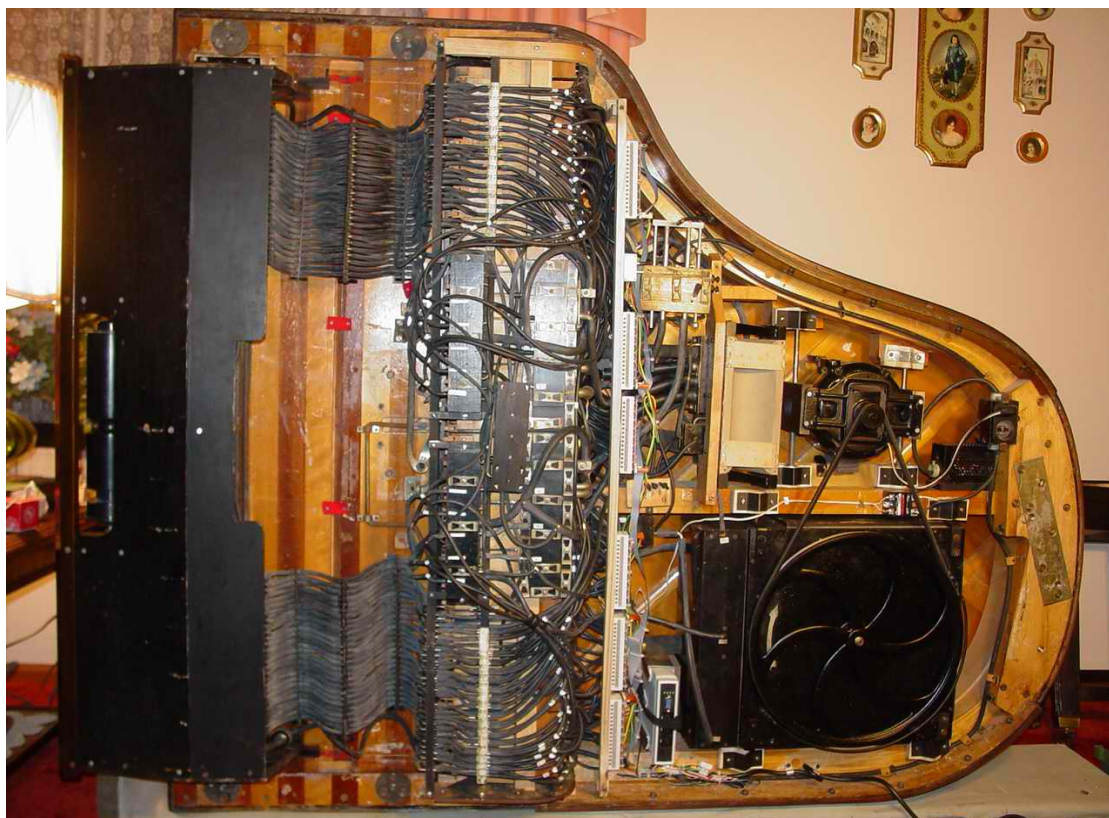
Art Cased Duo-Art Grand with invisible installation



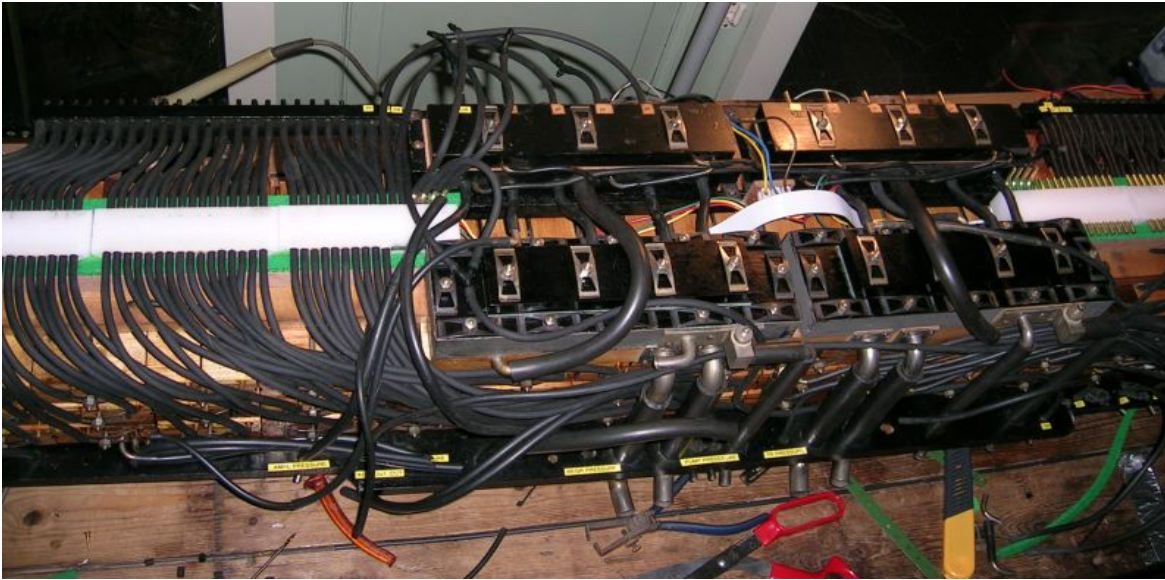
Upright Duo-Art with valves installed behind the spool box



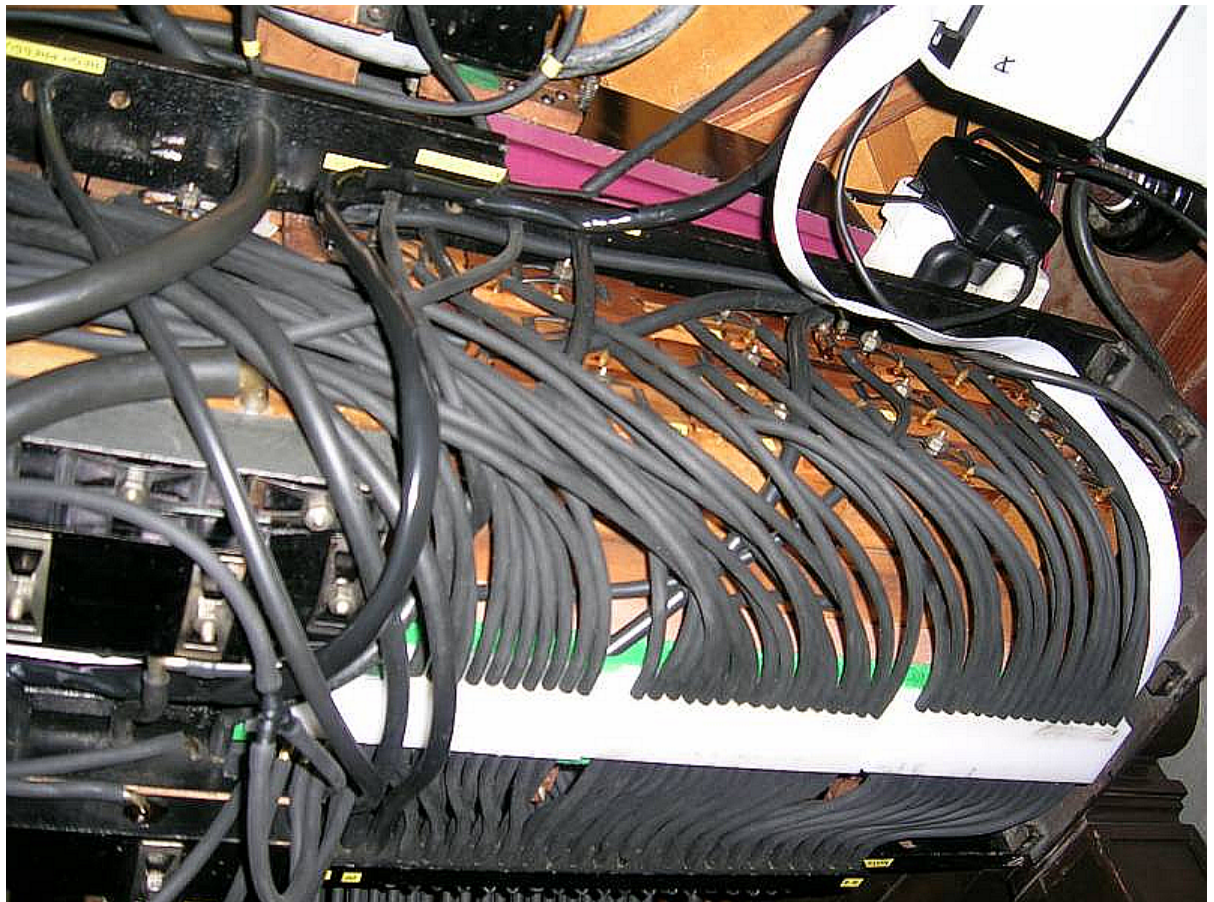
Ampico B Grand with stack cover installed



Above piano with stack cover removed



Ampico B in progress. The valve blocks are installed in the tubing run under the stack cover for an invisible and very quiet installation once the cover is in place. With no added tubing, the system can play from the E-Valves at a less than 3 water column inches of vacuum.



The following warning must be printed and installed in a conspicuous location in the vicinity of the motor.

Warning!! This motor is thermally protected and may self-start after cooling from an overheat condition. To avoid serious personal injury, always disconnect power when working in the vicinity of this motor

NOTES:

This manual has been adapted from a manual from a previous E-Roll Player model. Photographs may differ slightly from the currently available system. These photographs will be replaced when time permits.

Note maps and test files are found on the software CD and on the following web sites:

[http:// www.spencerserolls.com](http://www.spencerserolls.com)

<http://www.spencerserolls.com/Files4Download.html>

Warnings and suggestions

Please read the rest of this manual for full instructions as many important points can not be addressed in this one page.

Power supply voltage polarity is critical. Power supplies are prewired. All that is necessary is to connect the plug to the controller as indicated in the chart on page 24. Negative is the left pin of the connector and positive is the right pin. As provided, the plug from the power supply is correctly inserted if the screws, which clamp the wires, are pointed toward the rear of the controller or away from the front faceplate. If you have re-wired the connector check the polarity with a meter before connecting to the controller. Reverse polarity **will** damage the controller.

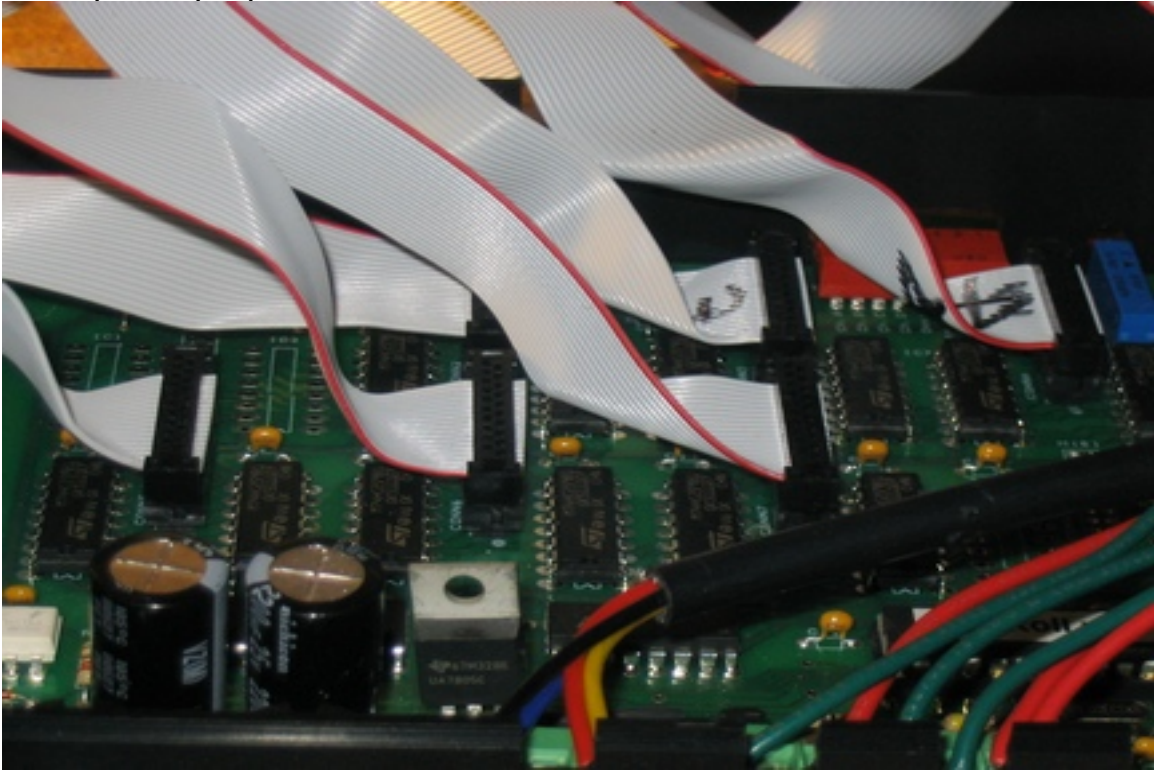
Polarity of data cables is critical. If you make your own cables, be sure to check for orientation of connectors before using them. Instructions are in the "Making Custom Cables" document. When installing the cables be sure to align the polarization tabs so that the connectors insert easily. If force is required a connector is most likely backwards. They should insert easily. Using an improperly made cable or inserting a connector backwards will **cause severe damage to the controller.**

Controller and valve block boards are static sensitive. They are protected as are all modern electronics but cannot be protected against extreme static discharges. Do not handle circuit boards under conditions of low humidity and especially in the presence of static generating materials such as synthetic carpet. Increase the humidity or provide other means of reducing static if it is necessary to touch the circuit boards during installation or repair. Handle the boards only by the edges and discharge yourself before touching them. You may do this by touching a known good ground (earth) connection. The circuit boards are well protected but it is possible to have extreme static conditions against which they cannot be protected.

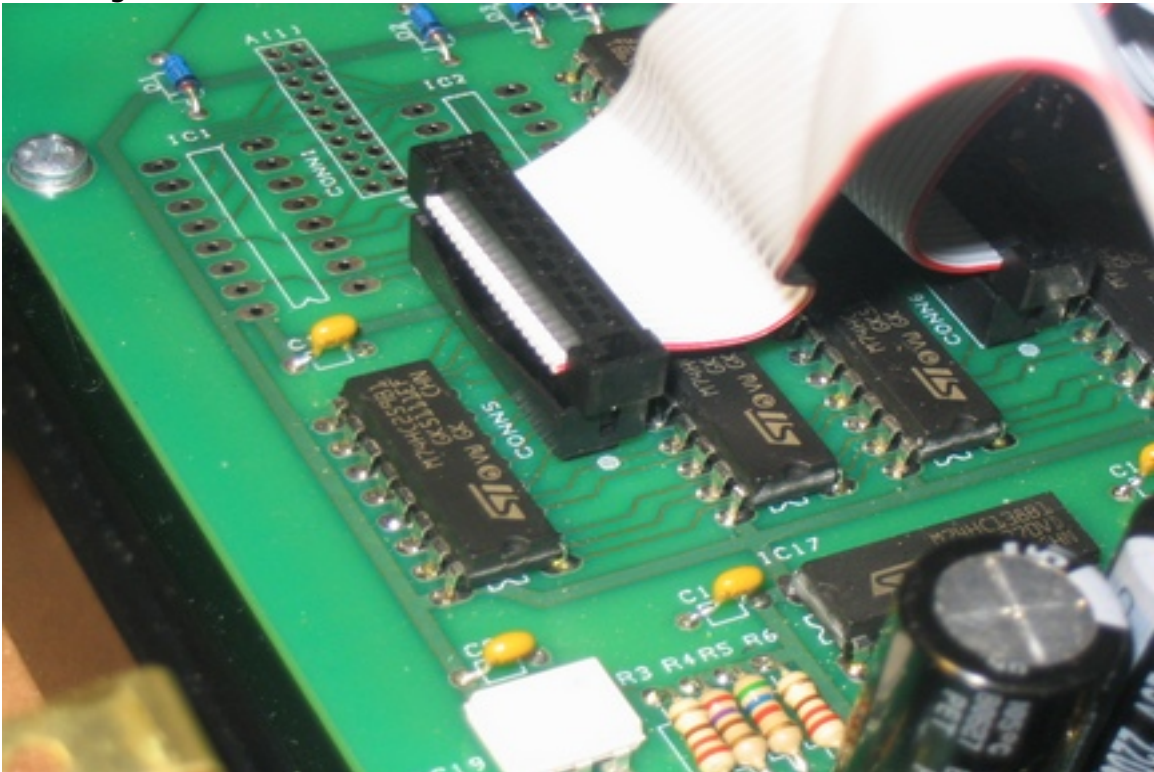
Prevent damage in moving. If valve blocks have not been installed under a protective cover, be sure to remove them or provide adequate protection if the piano is going to be moved and there is any chance of movers contacting the valve blocks. Damage from static charge is possible when moving a piano under conditions of very low humidity. Make sure that valve boards and disconnected power or data cables are not accessible. If this is not possible, it is best to remove all system components.

Detailed photographs:

Example of proper installation of data cables in controller.



Incorrect installation of data cable. Note the bulge on the connector housing.



Correct connection of connectors. Note that this is a view from the rear of the board. Also note that the exact appearance of components may vary but the connectors are the same on all systems. The connector on the left is for an extra valve for Ampico. When connected this way, the valve will operate on MIDI 111 with a standard note map installer. The middle connector in this picture shows solid-state relay wires together with power wires to the valve blocks. The connector on the right shows the power supply connector in the correct orientation. Note that the screws on the connectors face the center of the board.

