PLASTIC UNIT VALVE

IDEA BOOKLET

This booklet is compiled to
help you make full use of the
PLASTIC UNIT VALVES

Sold by

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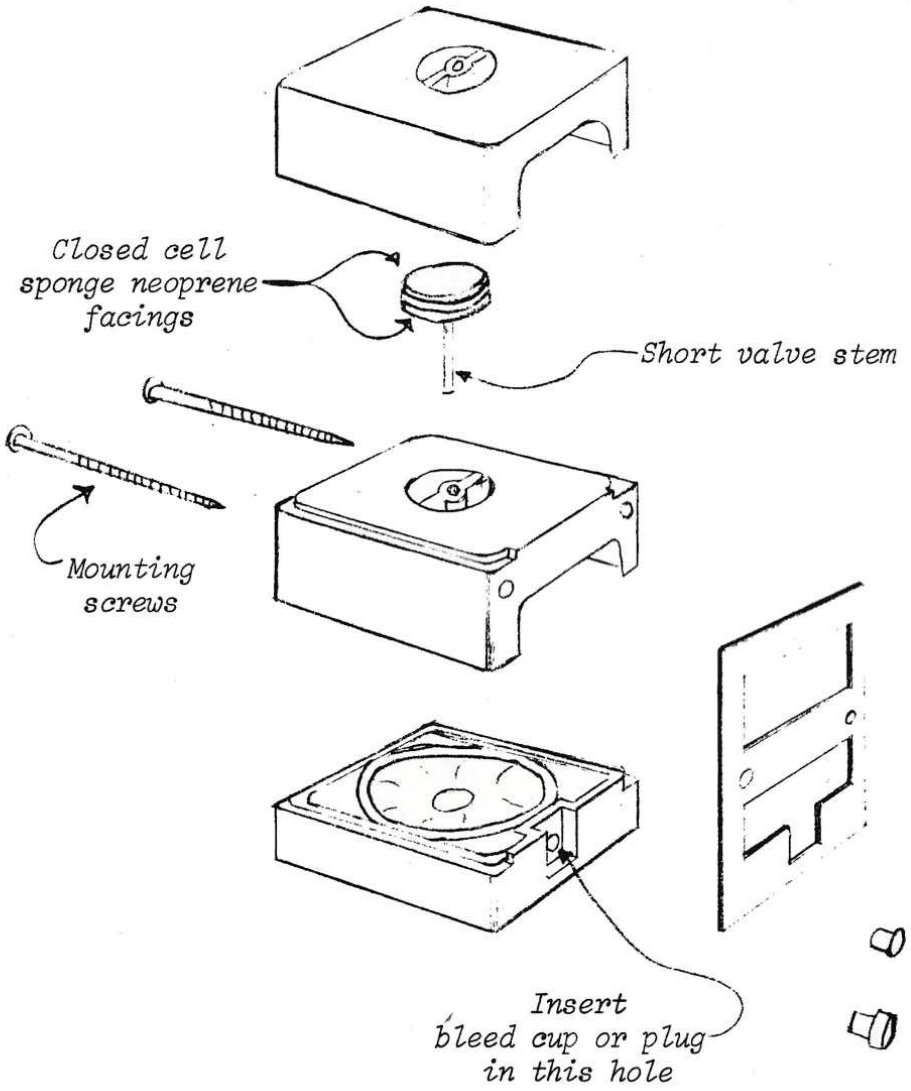
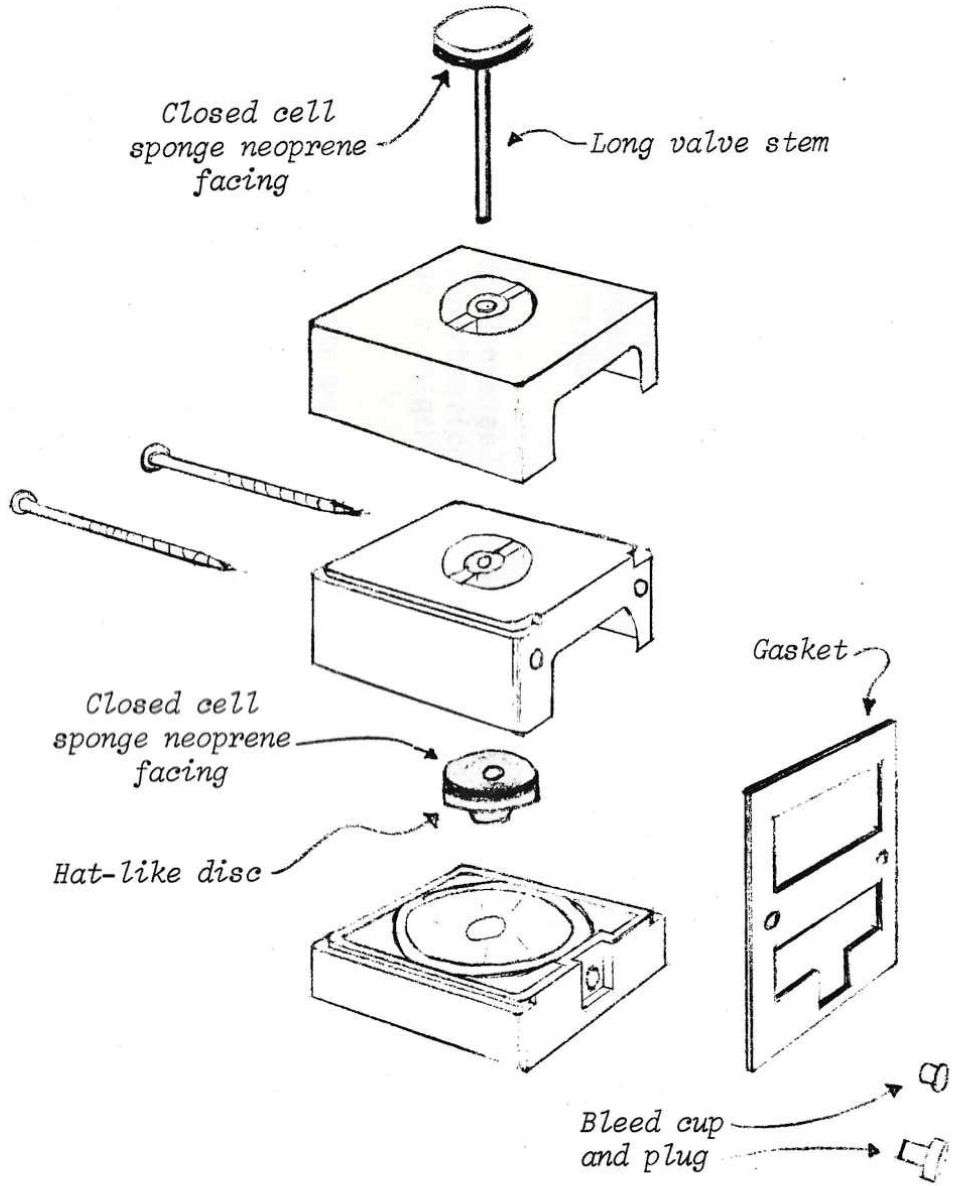
PLASTIC UNIT VALVE ASSEMBLY

STANDARD VALVE



REVERSE VALVE



VALVE ASSEMBLY

While we are happy to assemble the valves for you they are generally shipped unassembled so that you can take advantage of their versatility and assemble them to meet your requirements. We supply 1 3/4" screws which are suitable for use with Hard Maple. If you are using a soft wood you may want 2" screws which we can supply if requested.

VALVE ASSEMBLY INSTRUCTIONS

GLUE. Our Plastic Unit Valves are made of A.B.S. Plastic. As Acetone is a solvent for A.B.S., we find it to be ideal for welding the joints together.

You may put the sections together and run acetone into the joints with a small paint brush. Another faster method is to pour about 1/16 of an inch of acetone into a flat jar lid. Then put the top portion of the joint to be glued into the acetone for a couple of seconds and quickly press it down firmly in place on the bottom section.

FOR STANDARD PNEUMATIC VALVES - (Pneumatic closes when control hole is open to atmosphere).

Glue middle section to bottom section as per one of the methods described above. Assemble valve stem and face by affixing closed-cell sponge neoprene faces onto both sides of the disc. Take care to press down firmly and evenly so that face material is flat. Use the short valve stem for this type of valve. Place valve stem, with faces affixed, into guide hole. Now you are ready to glue on the top section. Do this in the same manner as described for the middle section.

TO ASSEMBLE REVERSE TYPE VALVE - (Pneumatic closed when control hole is closed).

For this type of valve you must first glue the top section to the middle section in the manner previously discussed.

Using long valve stem and hat-like disc, place closed-cell sponge neoprene face on stem side of valve stem disc and on the flat side of the hat-like disc. Next place long stem through both guide holes from top to bottom. Next press bottom seat onto the bottom of the valve stem. When this is complete glue assembled portion to bottom section.

Bleed cup or plug can then be inserted in hole at back of bottom section of valve. Be sure bleed cup is pushed in securely.

To mount valve onto board use a gasket as your template for drilling. In hardwood drill 3/32" holes for the mounting screws.

When gluing sections together take care not to get the acetone on the urethane pouch as it will cause it to disintegrate.

UNIT VALVE IDEAS

This booklet is designed to be an Idea book. You can use any of the mechanisms exactly as shown or you can take an idea and alter it to suit your application. We have built and used everything shown in this book. I do not consider myself to be either an accomplished writer or draftsman so I hope my explanation and drawings are clear. If you have any questions don't hesitate to write.

For the wood parts we use only Eastern Hard Maple. This wood is extremely well suited for pneumatic applications. If you haven't discovered what a joy it is to work with Eastern Maple, I suggest you get some and give it a try.

Some years ago when I started making nichelodions and orchestrions out of old player pianos I realized that I had to have a simple versatile valve. We, therefore, designed and started using these plastic valves. We found that our construction time was greatly reduced, the reliability of the orchestrion was increased and our service was simplified. I hope you have similar success with our valves.

Through this booklet I have used symbols in the schematic drawings. Following is the key:

 - Standard Pneumatic Valve

 - Reverse Pneumatic Valve

B - Bleed Hole

P - Plug (In some applications the hole in which the bleed cup is inserted is plugged with the small plug sent with each valve. Unless a P is shown in the pouch section of the valve it is assumed that a bleed hole exists)

S - Vacuum Supply (Suction)

TB - Tracker Bar

 - Check Valve - Arrow shows direction of air flow

 - Slide Valve

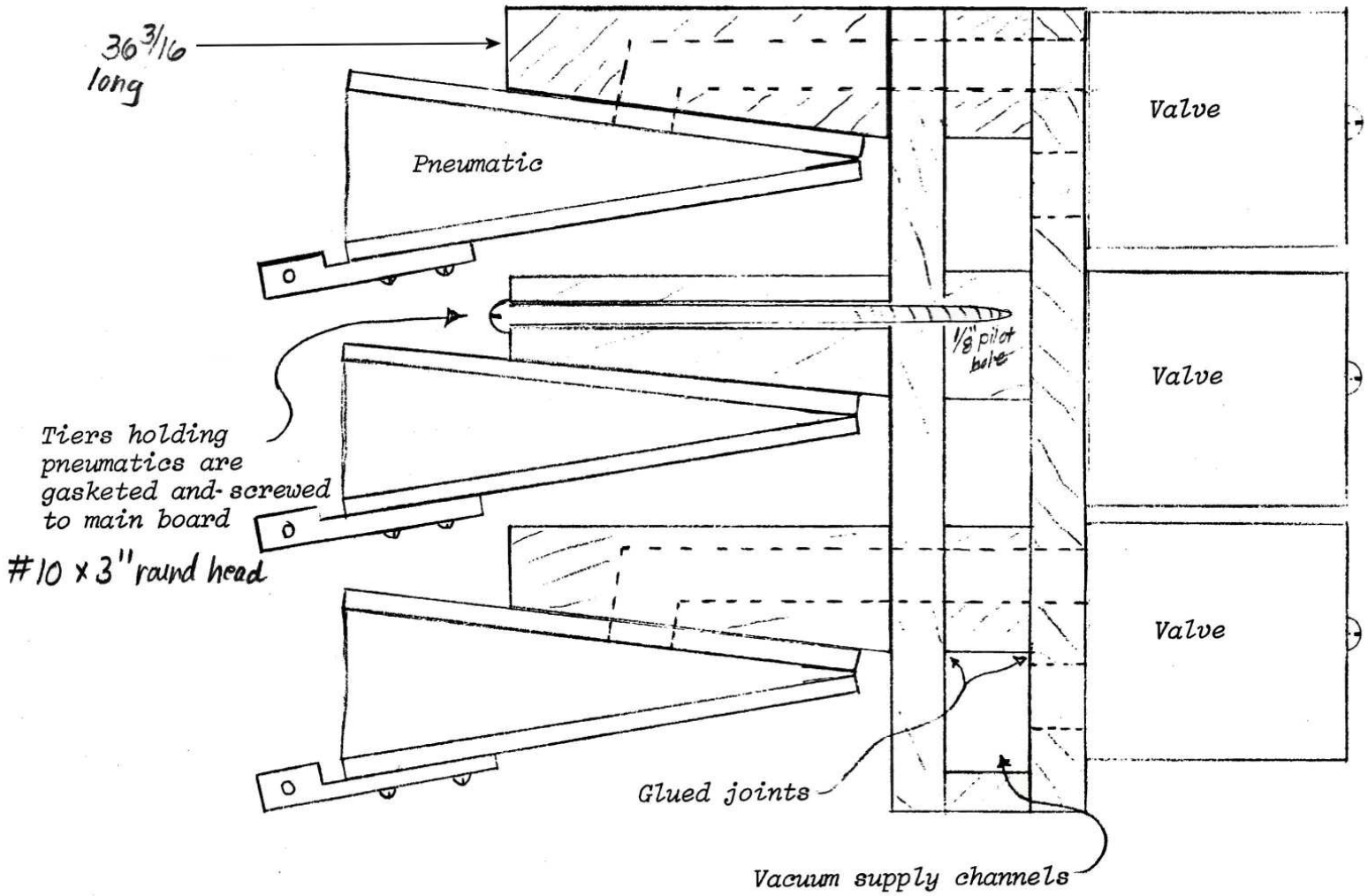
All drawings in this booklet are ACTUAL SIZE unless otherwise indicated.

Cloth 1¼ x 9⅝

PNEUMATIC STACK

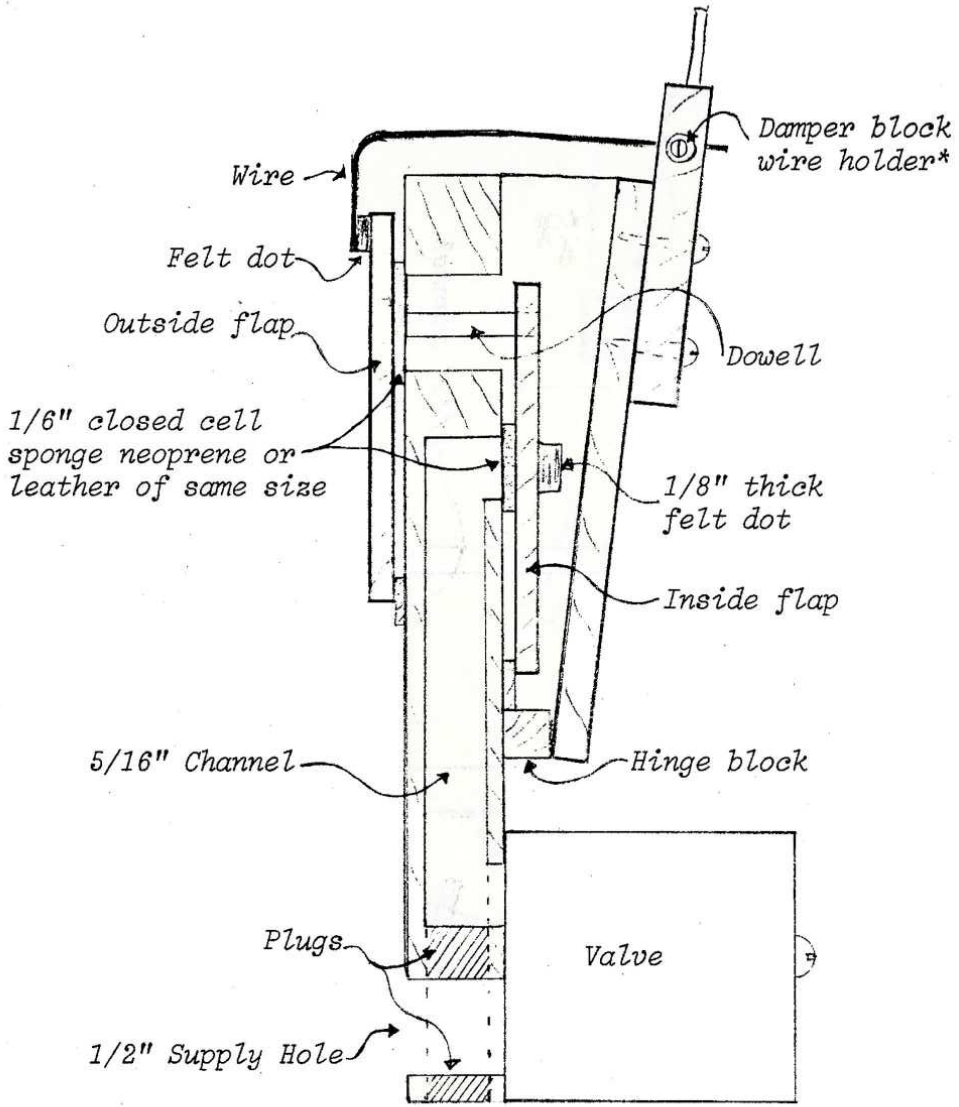
Shown below is a cross sectional diagram of a suggested pneumatic stack lay out. You will probably want to change it somewhat depending upon your application. Our standard valves may be placed as close together as 1½" vertically (1 5/8" for opposite action valves) and 1 9/16" horizonally. These dementions are centre to centre. We suggest you use eastern hard maple for the wood parts.

Supply holes to valves are shown as 3/8". You can use a smaller hole or two smaller holes if you prefer. Don't use too small a hole however, as it will starve the valve and cause it to flutter.



- Drawing is actual size -

REITERATING PNEUMATIC



*Damper Block Wire Holders are used in pianos to hold the damper block to the wire. They are available from piano supply houses or we can supply them. Drill an 11/64" hole into the edge of the wood and a 1/8" cross hole for the wire then insert the holder and the wire and tighten the screw.

PART SIZES

Main board - 4 3/4" x 1 1/2" x 1/2"
Inside flap - 2" x 5/8" x 1/8"
Outside flap - 2" x 3/4" x 1/8"
Pneumatic board - 3" x 1 1/2" x 3/16"
Hinge block - 1/4" x 1/4" x 1 1/2"
Dowell - 1/8" diameter, 3/4" long
Felt dot on inside flap - 1/8" thick
Flap hinge blocks - 1/4" x 1/16" x 3/4"

DATA

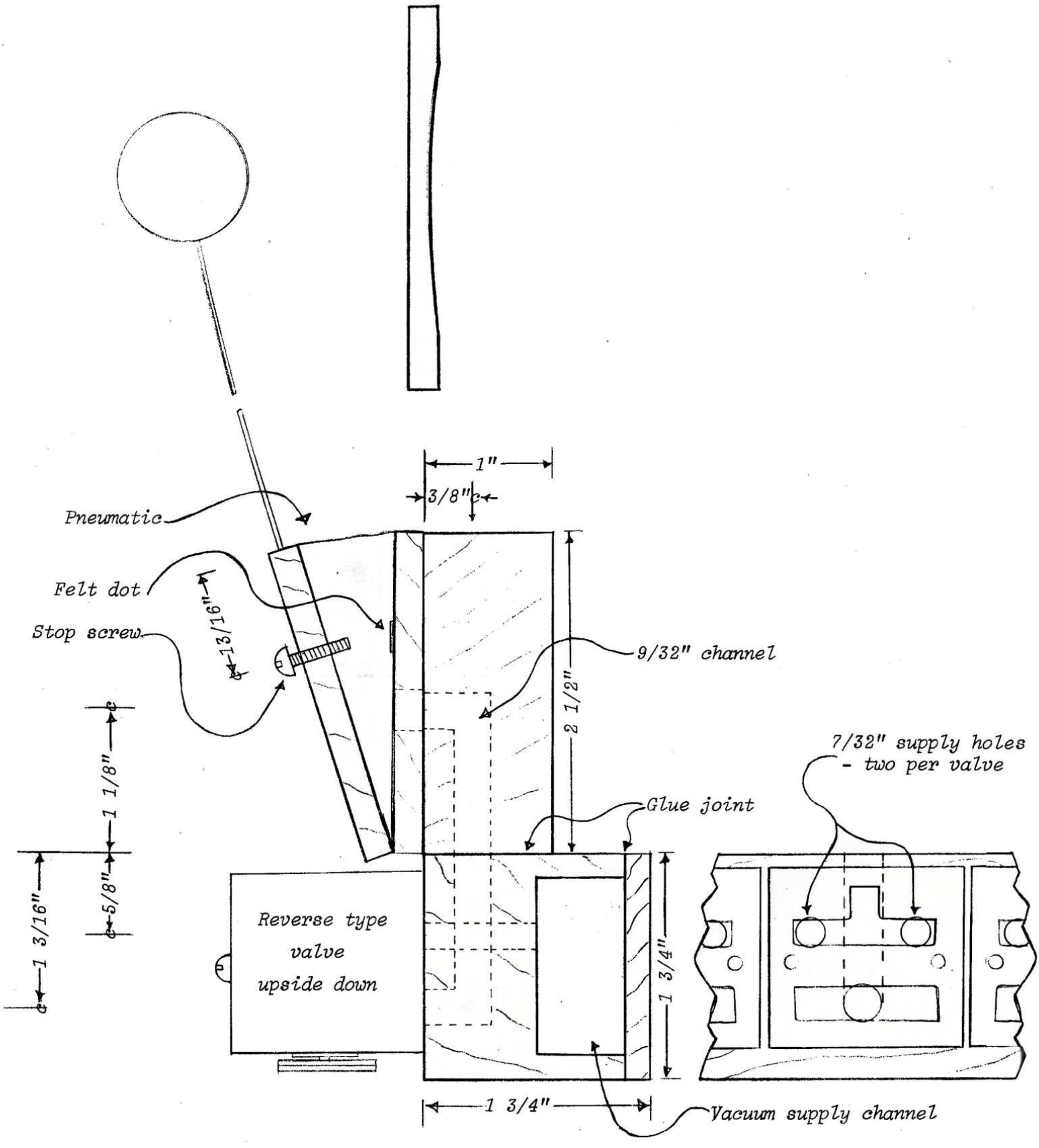
Maximum opening at top of pneumatic - 5/8"
Maximum travel at top of pneumatic - 3/8"
Back flap opens approximately 1/32" when inside flap closed.

NOTES

Both inside and outside flaps are shown in their closed position however in operation only one flap is closed at a time. The dowell on the inside flap is longer than shown in this diagram thus preventing both flaps from closing at the same time.

Drill the 5/16" channel hole first. Drive a 7/8" long plug up from the bottom then drill the 1/2" supply hole.

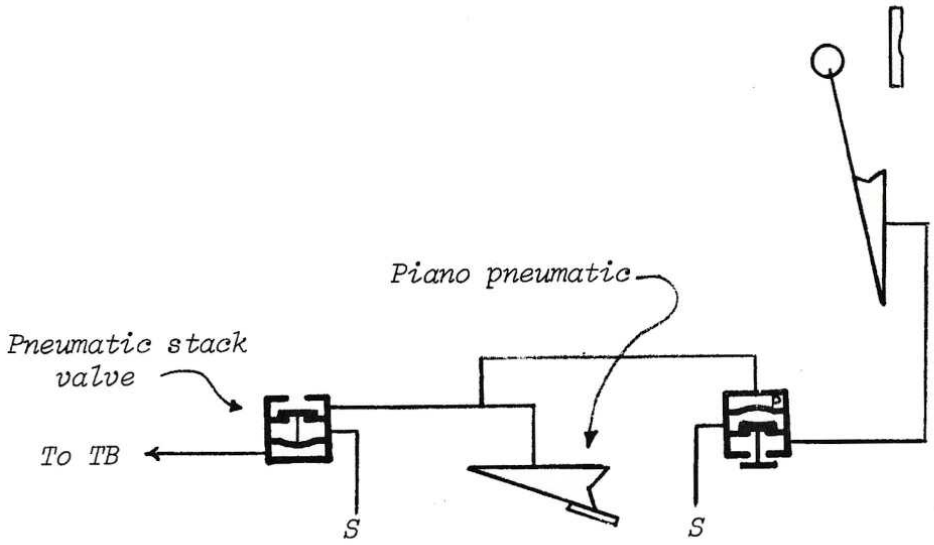
XYLOPHONE PNEUMATIC STACK DETAIL
(SINGLE STROKE)



SINGLE STROKE XYLOPHONE

The Xylophone shown on the following page is one that we have used in many orchestrions. It sounds quite nice with "orchestra bell" type bars struck by wooden balls.

The valve arrangement is designed to operate from the output of the pneumatic stack valve. We generally drill a 5/32" hole into the channel between the valve and its pneumatic in the piano pneumatic stack, this is then connected to the 5/32" control hole of the corresponding Xylophone note.



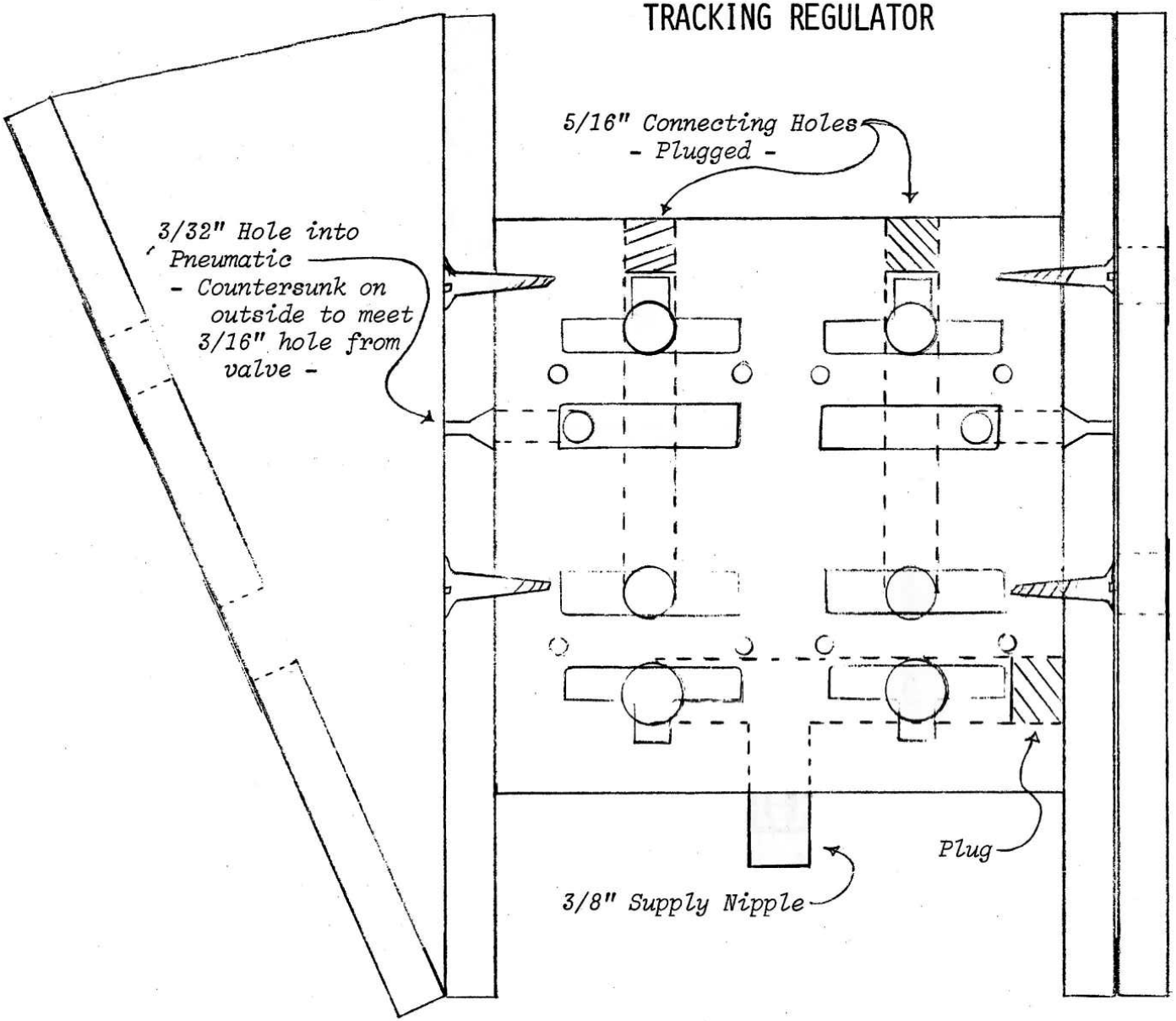
The Xylophone Valve has no bleed as it is controlled by the piano pneumatic stack valve. The upper and lower blocks are drilled first and then glued together. (see detailed drawing next page)

If one wishes to operate the Xylophone directly for a TB or from a reverse primary valve stack a few alterations to the drawing on the next page will be necessary. A standard type valve will be used and it would be adviseable to turn it over (Right side up). The channels will have to be drilled accordingly.

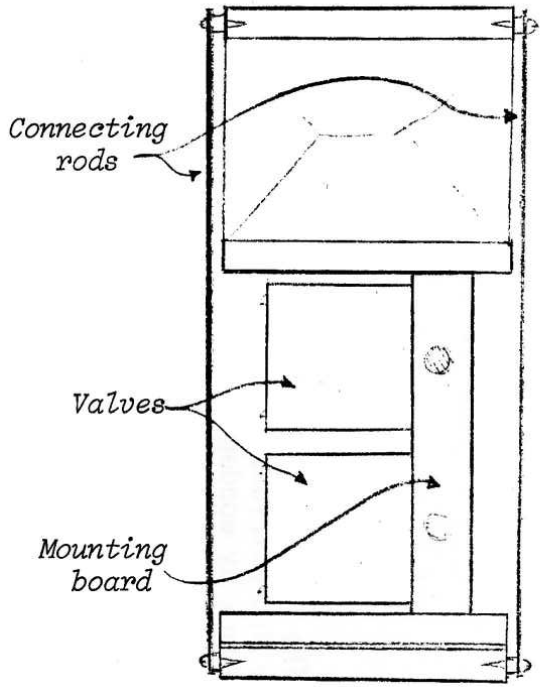
A vacuum cut out pouch in the supply line to the Xylophone valve stack is used to turn the Xylophone on and off.

We make our pneumatics 1" x 2 1/2" and use a 5/8" 5 - 40 Stop screw.

TRACKING REGULATOR

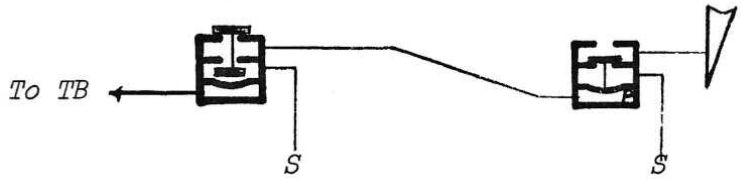


FRONT VIEW SHOWN ACTUAL SIZE



TOP VIEW
SHOWN HALF SIZE

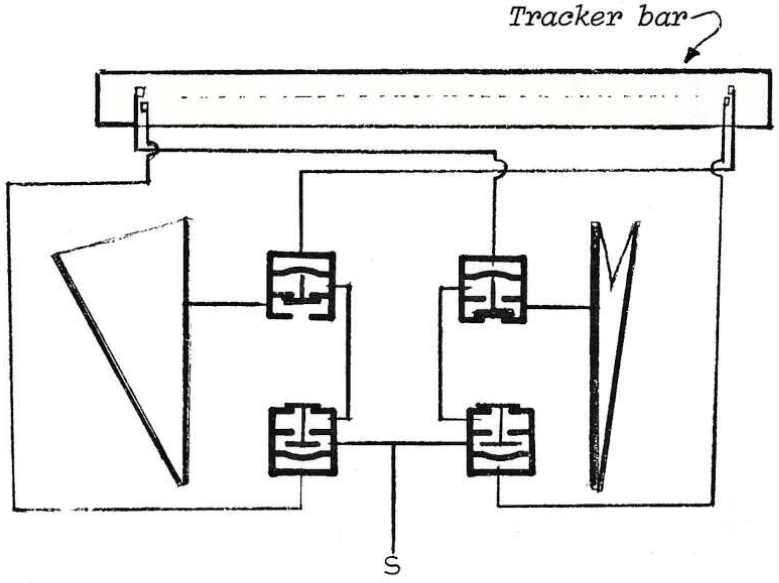
In each of these cases you may reverse the position of the valves: i.e. - Use the reverse valve first and the standard valve second.



The secondary valve that is controlled by the primary valve always has a plug rather than a bleed hole.

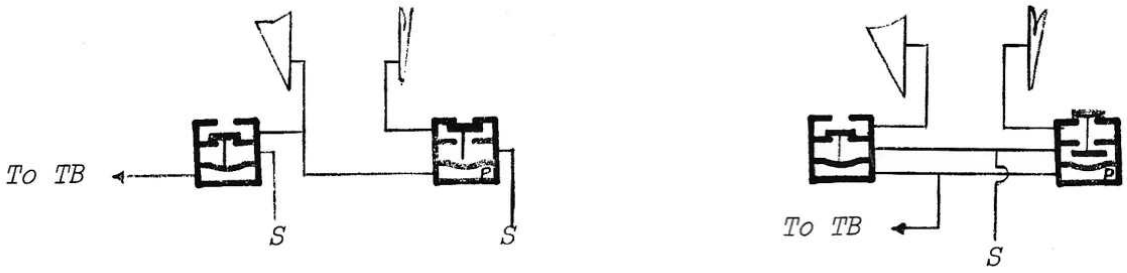
TRACKING REGULATOR

Shown on the next page is a tracking regulator which we have often used when converting 65 note pianos to 88 note pianos or for replacements for some less efficient tracking regulators. Below is the schematic diagram.



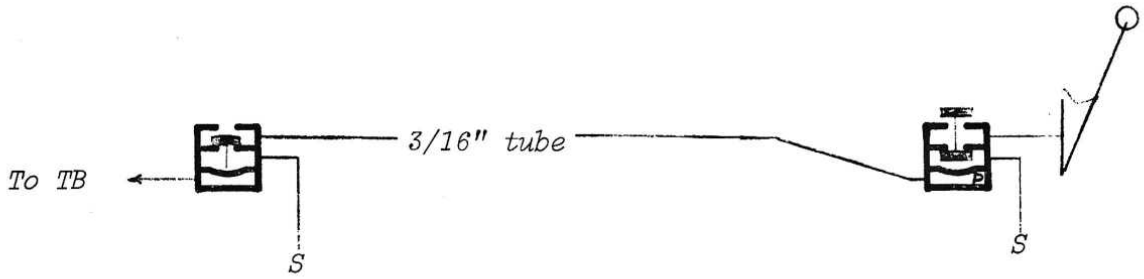
MASTER - SLAVE VALVE

In some applications where a snappy back and forth movement is required such as Castinets, High Hat Cymbal, Sleigh Bells etc., we have used two opposing pneumatics operated in one of the manners shown below:

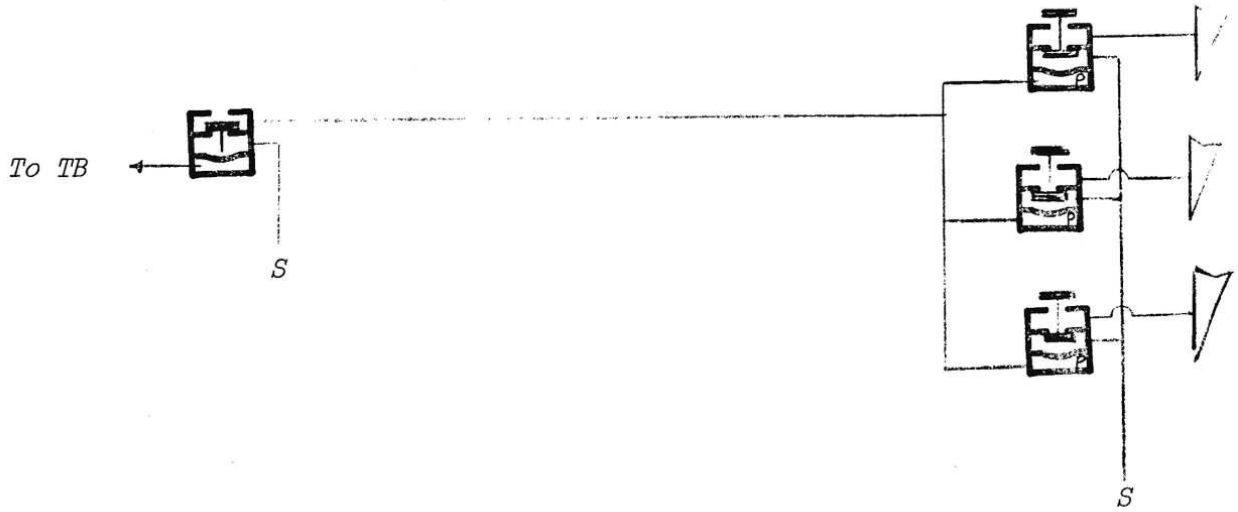


PRIMARY - SECONDARY VALVES

In some cases where a long tube must be run between the tracker bar and an instrument, it is adviseable to go from the tracker bar to a close primary valve then to the instrument some distance away where the secondary valve can be located. This reduces the lag and sloppiness caused by friction in a long tube.

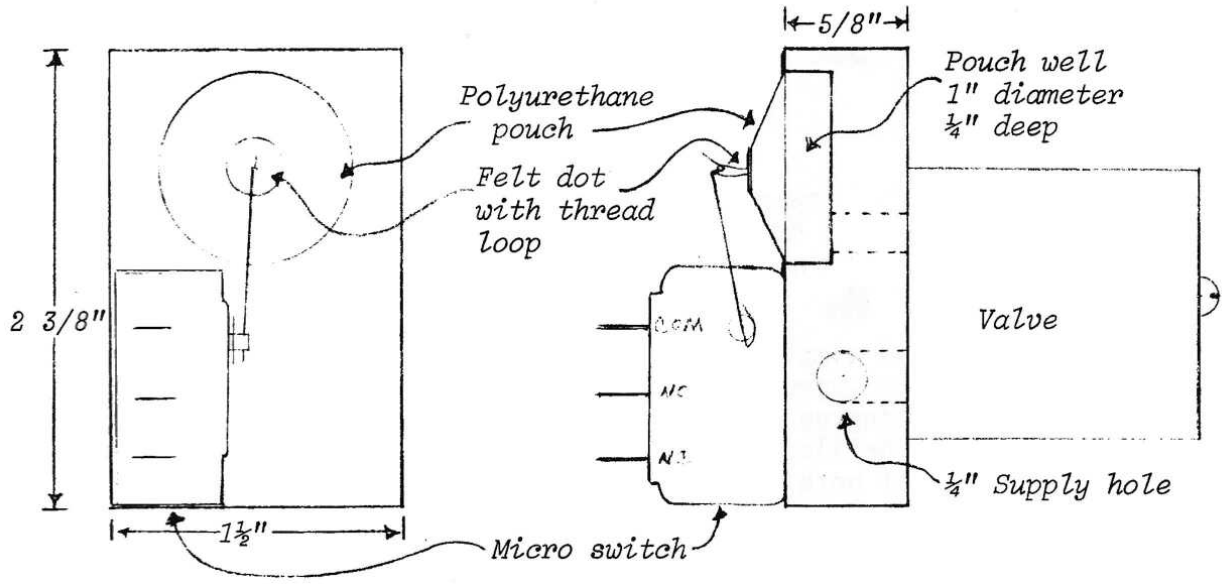


Another use for this arrangement is when a number of valves have to be operated from one TB hole.



PNEUMATIC IMPULSE TO ELECTRIC IMPULSE CONVERTER

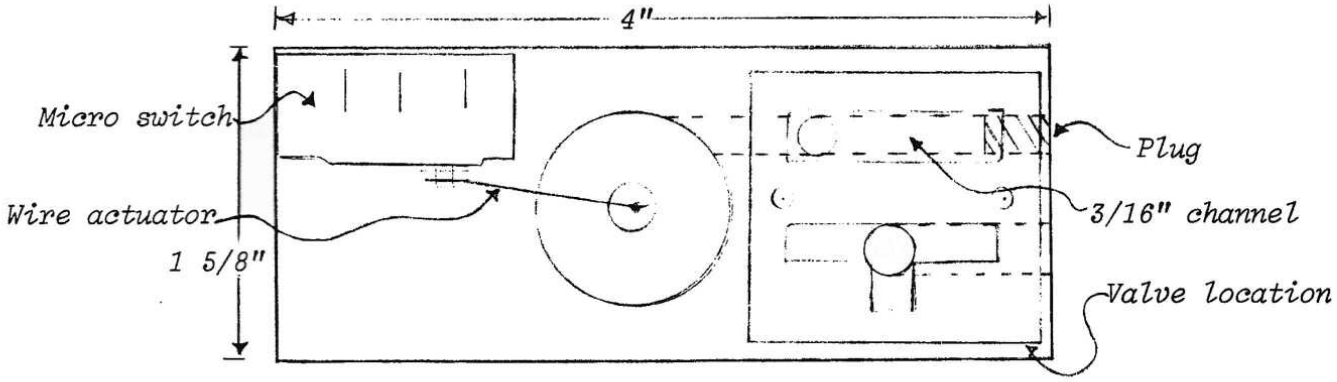
Shown below are two variations of a pneumatic to electric switch. A pneumatic impulse to the valve causes the pouch to pull down operating the rotary action micro switch.



We recommend using a polyurethane pouch as this material is very light and flexable so that the spring of the switch will pull it up. The switch spring is sometimes not strong enough to pull up zephyr skin pouches or leather pouches.

The loop is made of good quality linnen thread woven into a felt dot. The dot is glued to the centre of the pouch. Special glue is used for glueing polyurethane. Pouches and glue are available from Player Piano Co. Inc., Wichita, Kansas.

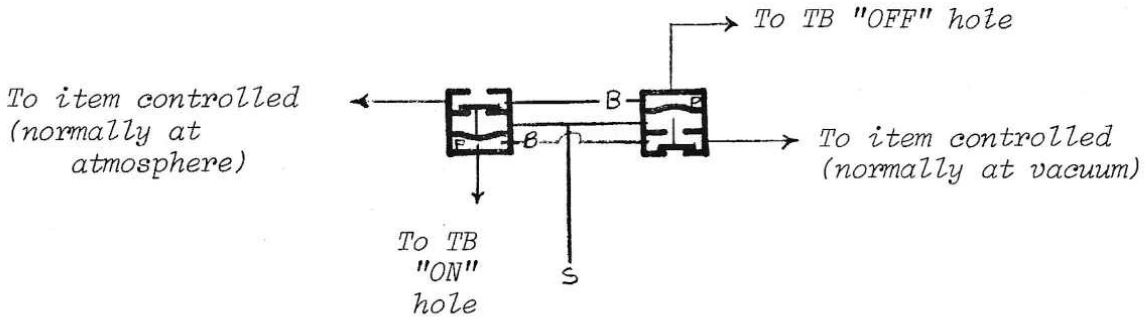
The micro switch shown here is a Cherry #E-51 rotary action switch. These switches are readily available from your Cherry dealer or we can supply them to you.



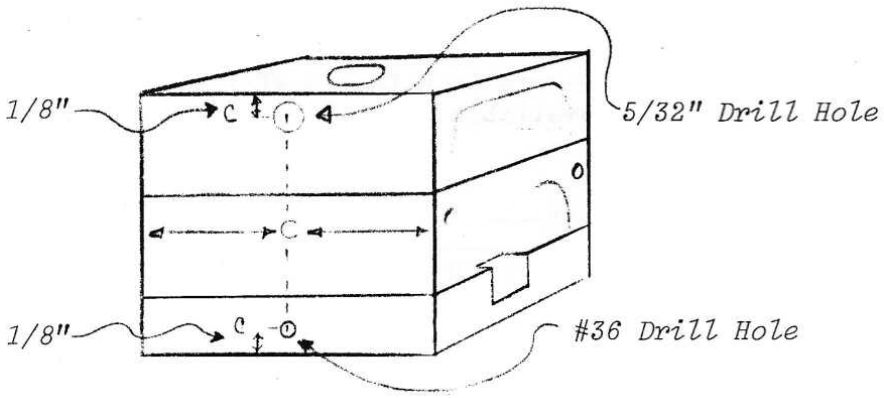
Five minute epoxy is recommended for glueing the micro switch to the block.

LOCK & CANCEL VALVE

Following is the schematic diagram of the Lock & Cancel Valve:



To construct this simple efficient lock and cancel valve you need two valves of the same type. These two valves are to be glued together, side by side, one facing up and the other down. However, before gluing them they have to be drilled as follows: all holes are to be drilled into the right side of both valves (right side as you look at it from the control hole side when it is right side up). Drill a #36 Drill Hole into the centre of the bottom section about 1/8" on centre from the bottom edge - (Take care not to push the drill too far into the valve after the hole is completed as it may damage the pouch). Then drill a 5/32" hole in the centre of the top section about 1/8" on centre, down from the top edge - Do the same on both valves now when the two valves are put together right side to right side - (one valve turned upside down) each small hole (#36 Drill) should line up with the opposite large hole (5/32"). If they do you are ready to continue.

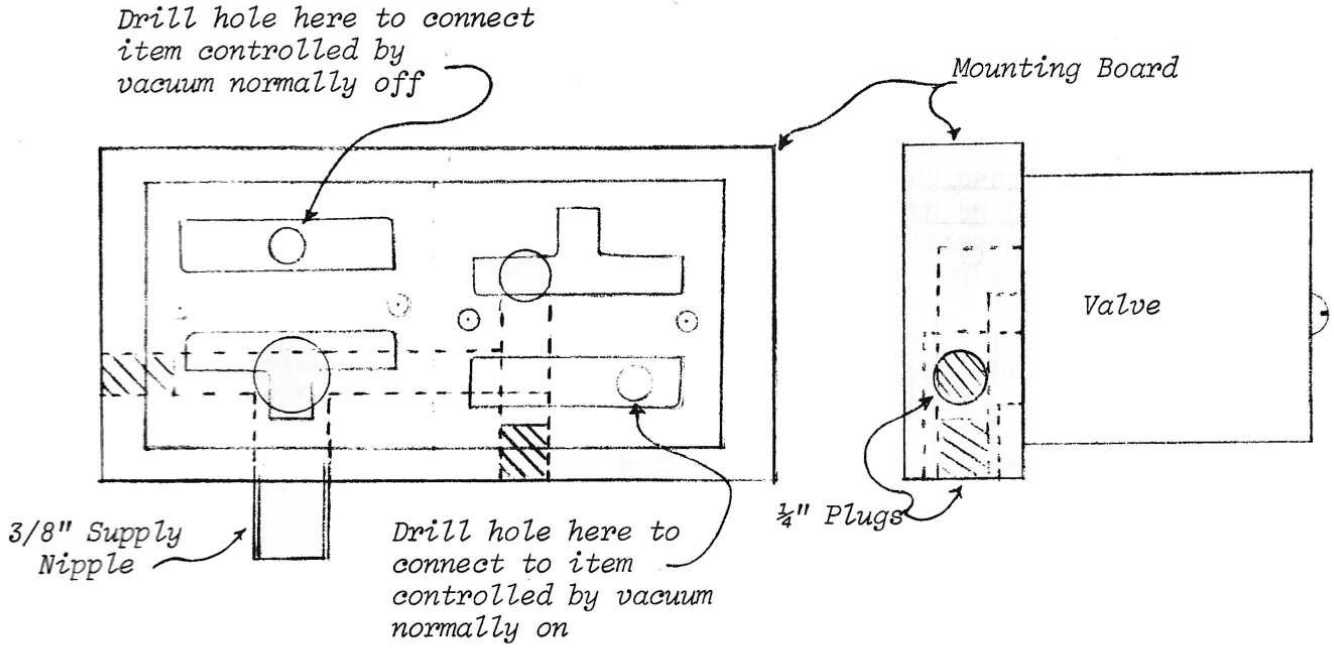


The Right sides of each valve should now be sanded a bit to make sure they are flat so they will glue together well. Next insert a Wurlitzer type bleed cup* in each of the #36 Drill holes. Now you are ready to glue the two valves together.

Dip the sanded side of one valve into a shallow tray of acetone for a couple of seconds then press it to the other valve. Be sure they are glued square and even.

* (see next page)

When the glue has had time to set well put plugs into the hole normally used for the bleed cup and you are ready to mount the lock and cancel valves onto the mounting board.



FRONT VIEW SIDE VIEW

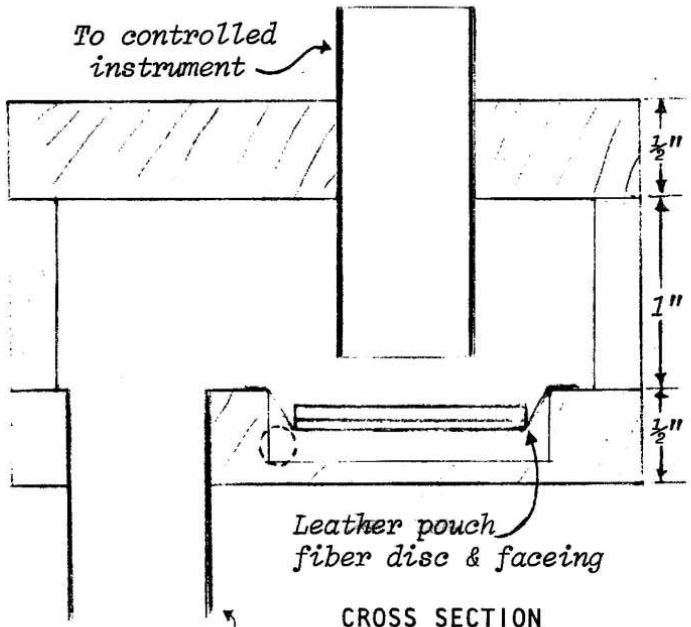
The output side of one valve will be at atmospheric pressure while the output of the other valve will be a vacuum. Operating one of the control holes for a second will reverse this and it will remain reversed until the other control tube is operated. Because one valve is upside down the lock and cancel unit will always start out at the same polarity when vacuum is first applied.

Two applications in which we have used this lock and cancel valve very successfully are for instrument lock and cancels in orchestrions and for controlling the rewind pneumatic in orchestrion roll mechanisms. In the latter use we connect the output of the right-side-up valve (left side in diagram) to the transmission shifting pneumatic and the output of the upside down valve to the vacuum cut out pouch for the stack. Thus on rewind atmosphere is allowed under the stack c/o pouch shutting off the vacuum to the stack. When the machine is in play vacuum is applied under the pouch allowing vacuum to the stack.

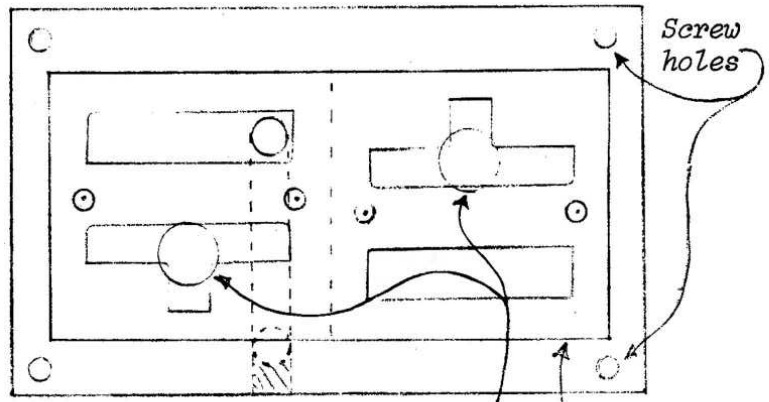
*Wurlitzer bleed cups are long skinny cups about this size ▭ . They work very well in this application. We can supply this type of bleed cup in lieu of the standard bleed cups if requested. We also have Wurlitzer type bleed cups available for sale.

CUT OUT POUCH BLOCK

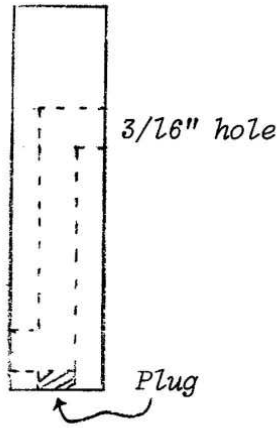
OPERATED BY LOCK & CANCEL VALVES



CROSS SECTION VIEWED FROM FRONT



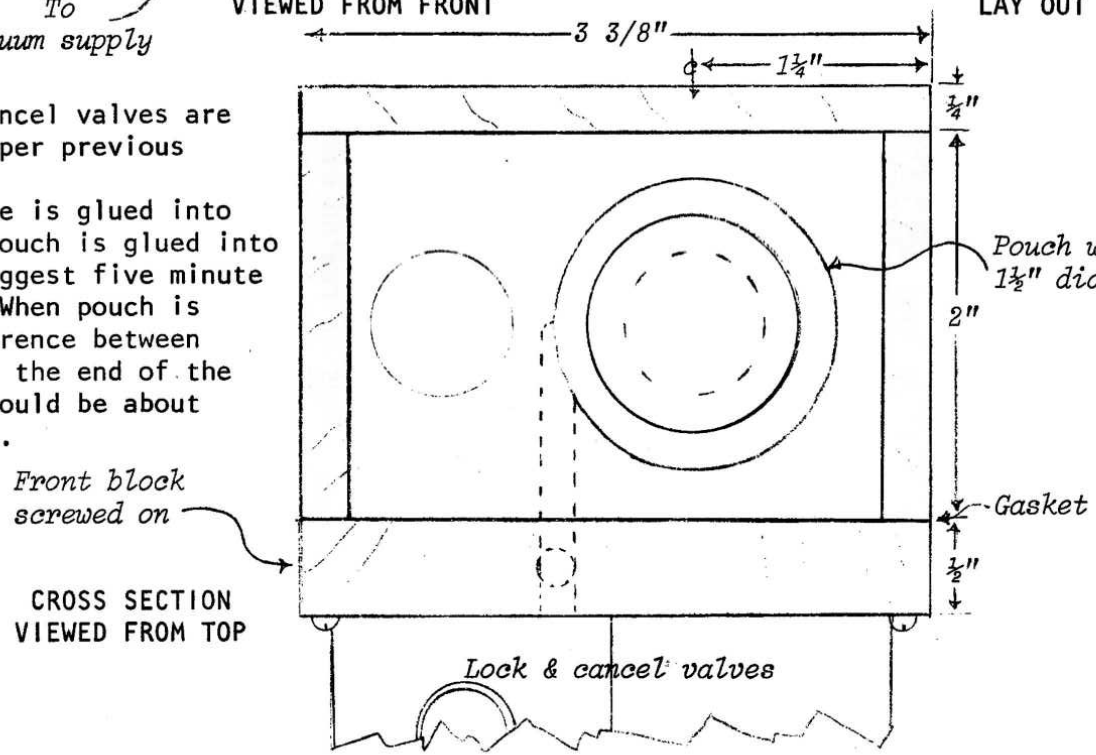
FRONT BLOCK LAY OUT



SIDE VIEW OF FRONT BLOCK

Lock & cancel valves are assembled as per previous instructions.

Top nipple is glued into place after pouch is glued into place. We suggest five minute epoxy glue. When pouch is down the clearence between the pouch and the end of the top nipple should be about 1/8" to 3/16".



CROSS SECTION VIEWED FROM TOP

This pouch block is shown with 3/4" nipples. You may use larger nipples if necessary (up to 1 1/8"). If larger that 1 1/8" nipples are required the demension of the box and pouch well will have to be increased.

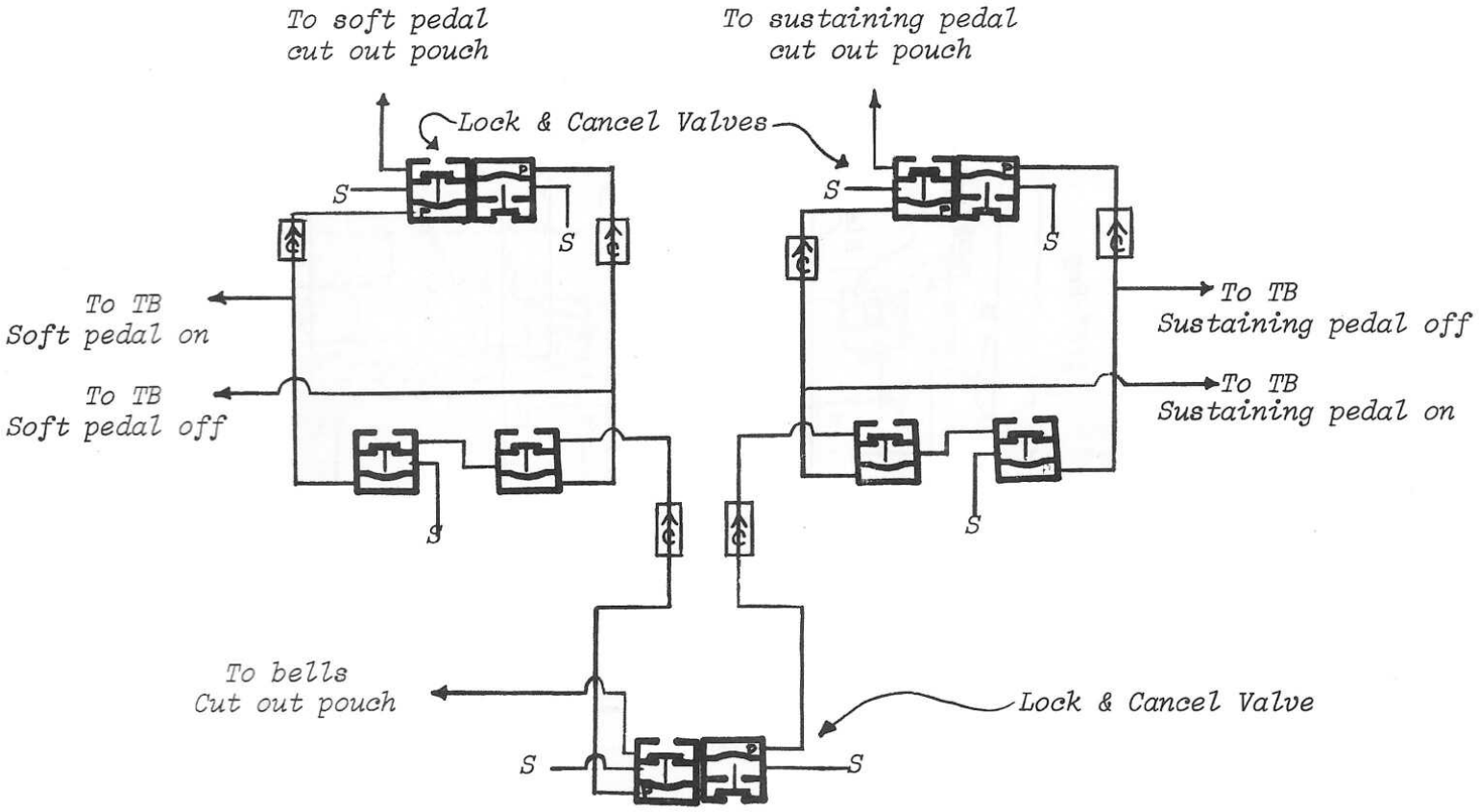
The vacuum supply nipple shown here is let into the bottom. You can put this nipple into the sides, back, or top as well, depending upon your requirements.

When the vacuum comes on the pouch will always start in the off position (not allowing the flow of air).

MULTIPLEXING

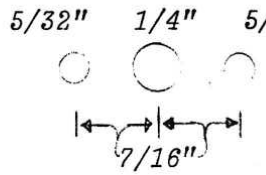
In some orchestrions and organs combinations of two holes were used to effect a third operation. For example, the Wurlitzer APP rolls were programmed in such a way that if the piano sustaining pedal lock and cancel holes were both operated simultaneously it would turn on the Bells. When the soft pedal lock and cancel holes were operated simultaneously, it would turn off the Bells. Shown below is a schematic for this function.

stands for check valve. The arrow indicates the direction of air flow.

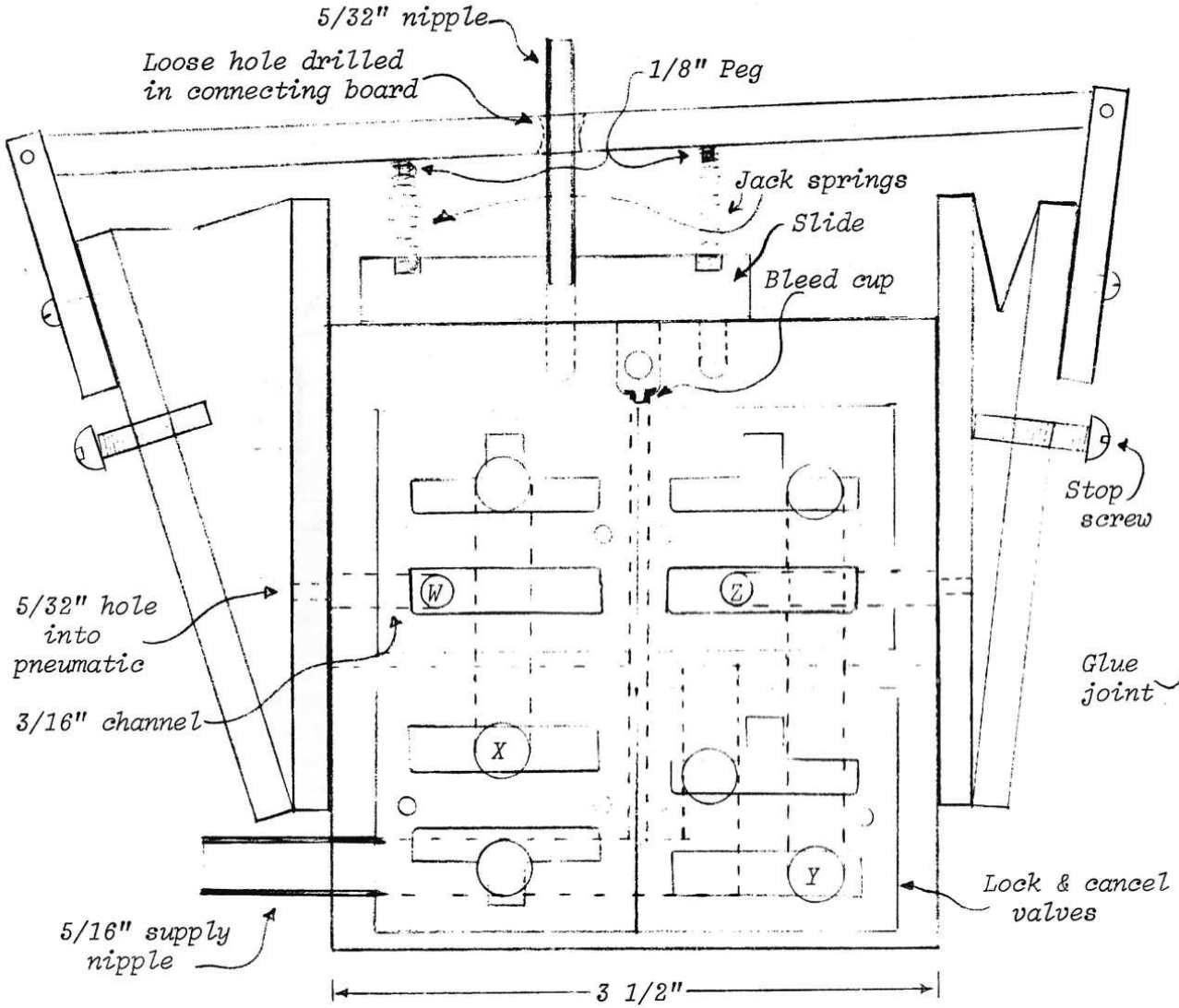


NOTE: Guides for slide valve are not shown in front view diagram.

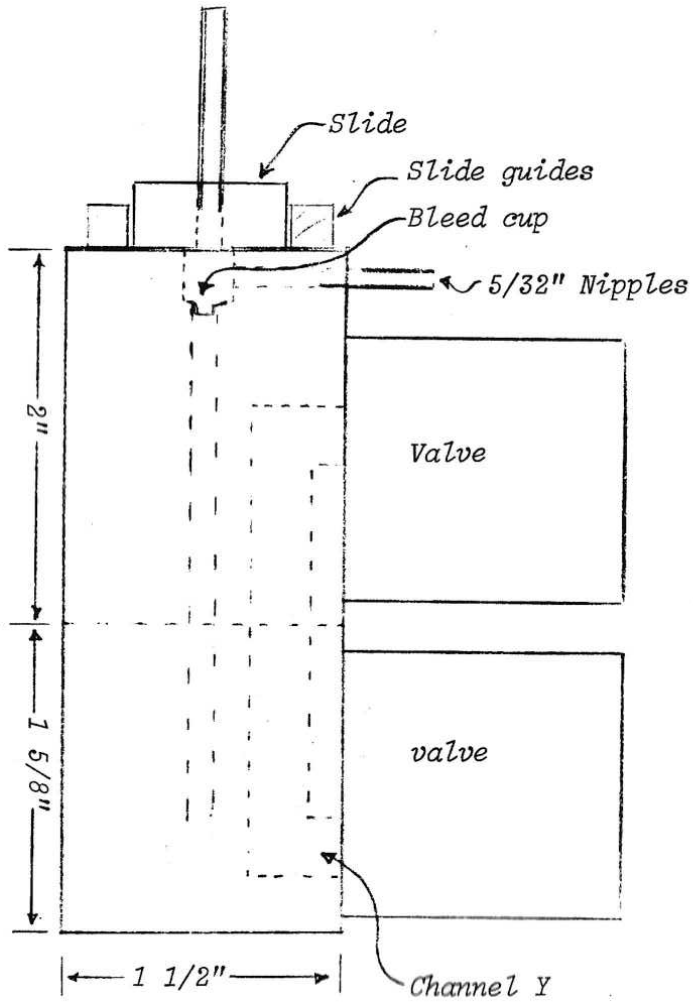
IMPULSE DIVIDER



Pneumatic size: $1\frac{1}{2}$" X $3\frac{1}{4}$"



FRONT VIEW



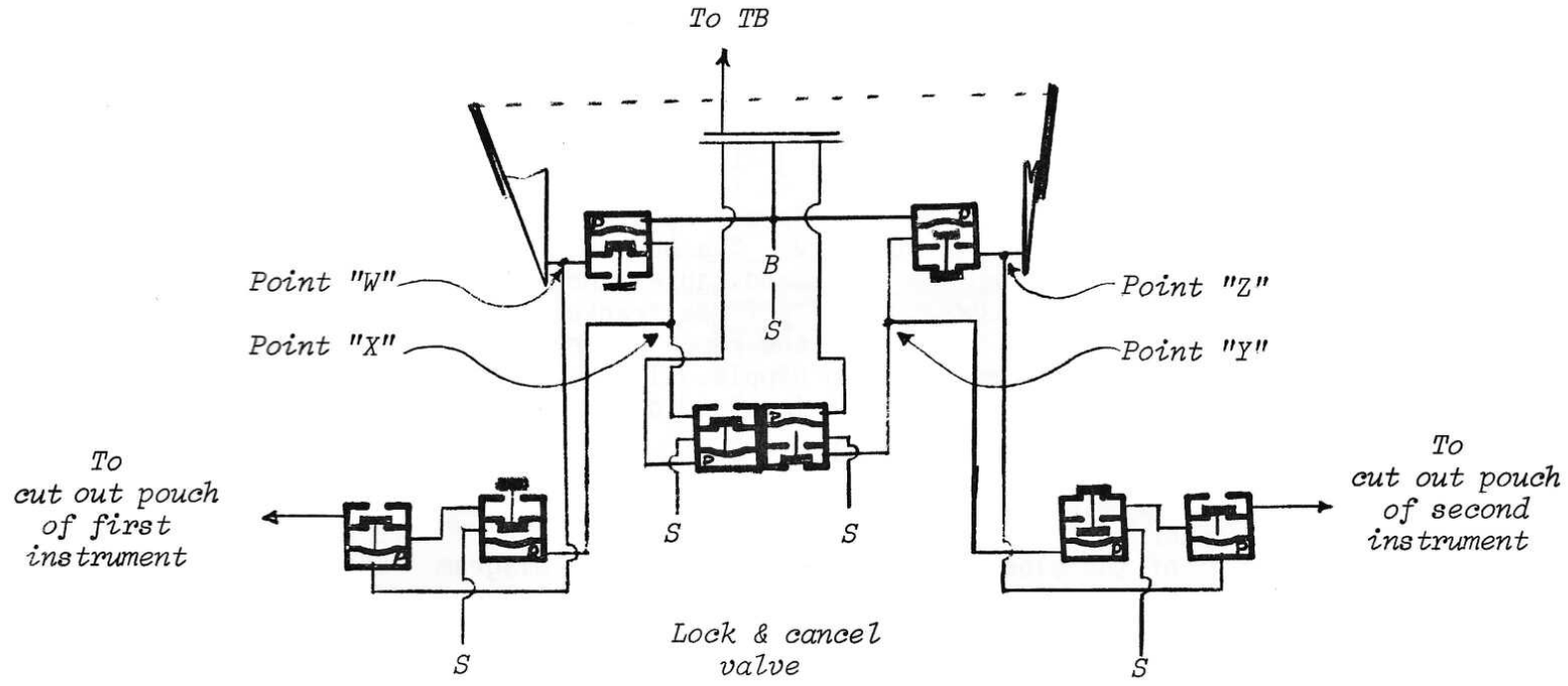
SIDE VIEW

Next the valves can be mounted. The *lock and cancel valves* are mounted on the bottom and the *reverse valves* on the top. The *reverse valves* are mounted upside-down and they are tubed with a "T" to the centre nipple coming from the bottom of the *slide valve*. The two side nipples are tubed to the two *lock and cancel valve* nipples.

"W", "X", "Y", and "Z" are connection points. If this device is to be used to turn on and off one instrument from one tracker bar, it can be used as shown. All that needs to be done is to connect the instrument's cut-out pouch block to point "X" or point "Y". Point "X" will be open to the atmosphere when the unit first comes on. Point "Y" will supply suction when the unit first comes on. To connect to the basic unit a 5/32" hole is drilled through the back at the points marked "X" or "Y" on the detail plan.

To operate two instruments from one tracker bar hole additional valves are required.

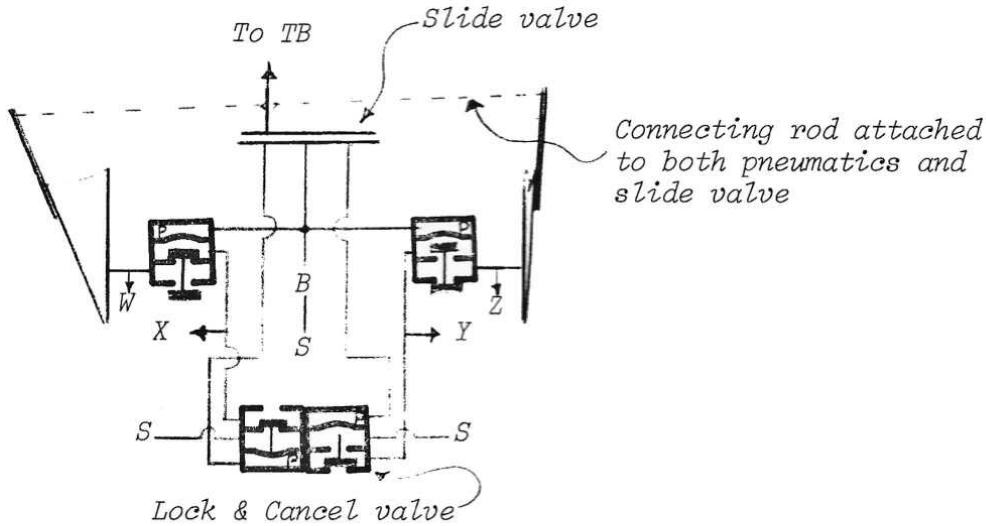
Shown below is the schematic diagram for operating two instruments, one after the other, from a *chain perforation* such as with an A Roll. For this type of operation two additional reverse valves and two additional regular valves are required. Plugs are inserted in place of bleed cups in all four valves.



IMPULSE DIVIDER

This Impulse Divider or "pneumatic flip flop" changes polarity every time the top nipple is opened to atmosphere. This is useful for alternating between two instruments controlled by one tracker bar hole. The first impulse turns on instrument A. The next time an impulse is given from the same tracker bar hole instrument B goes on. It can also be used to turn an instrument on and off from the same hole. The first impulse turns on the instrument, the next impulse turns it off.

Following is the schematic diagram of the basic device.



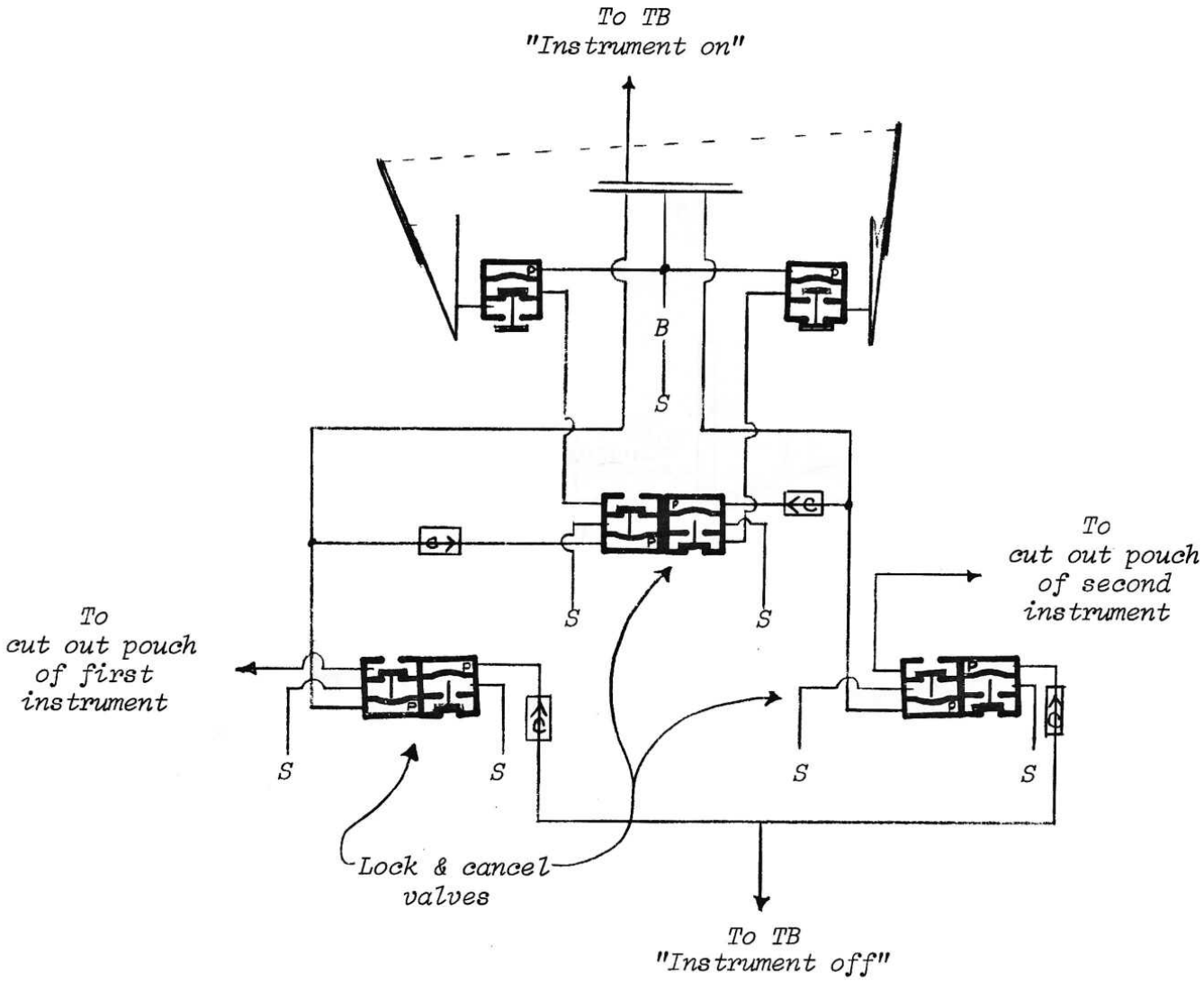
When atmospheric pressure is allowed into the nipple at the top, the *lock and cancel valve* shifts polarity. The output of the *lock and cancel valve* goes through the *reverse valve* and causes the *pneumatic* to begin to close, thus pushing the *slide valve*. If the tracker bar hole remains open the *slide valve* stops in the centre and remains there until the atmospheric pressure is closed off from the top nipple. Then the *slide valve* continues to the other side ready for another impulse to send it back.

To construct this flip-flop prepare the main block as shown. It is made up of two blocks (top & bottom) which are glued together after the holes and channels have been drilled. Channels "X" and "Y" are drilled close to the front of the block as shown in the SIDE VIEW diagram. The supply channels are drilled in the centre of the block. The two 3/16" channels connecting the *reverse valves* with the *pneumatics* are drilled in the centre of the block as well, thus, channel "Z" goes behind channel "Y". The connecting hole in the *pneumatic* is drilled at 3/32" to restrict the flow of air and slow down slightly the speed of the pneumatics.

The *pneumatics* are glued to the ends of the block. The *slide valve* is put in place and is held down by the Jack springs. The nipple goes through the loose hole in the connecting board. The *slide valve* is moved by the connecting board pushing on the nipple.

Shown below is a schematic diagram for operating two instruments, one after the other, from a set of *lock and cancel* holes. When the on hole is opened the first instrument goes on. When the cancel hole is opened it goes off. When the on hole is opened again the second instrument goes on and remains on until the cancel hole is opened.

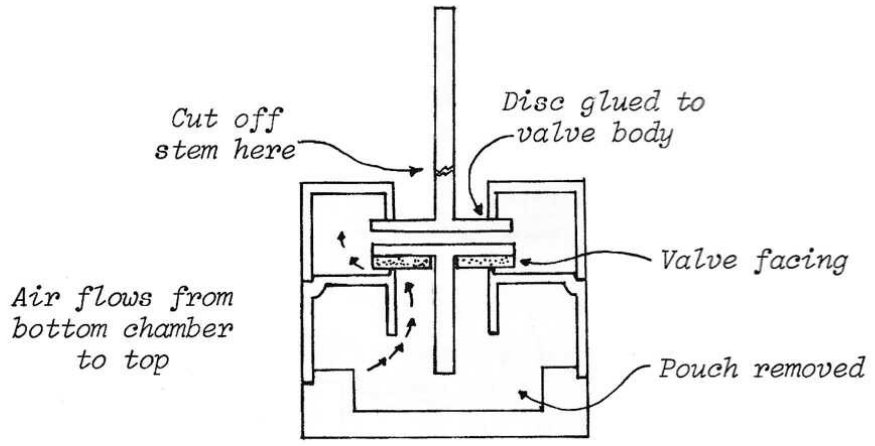
For this operation you need two additional lock & cancel valve units. They are tubed by Y's to the two outside nipples coming from the bottom of the slide valves. Four check valves are also required for this application.



CHECK VALVE

The following check valve design was developed by Dr. Tom Ivy of Big Timber, Montana. Our thanks to Dr. Ivy.

Remove the pouch from the bottom section of of the valve. Next, take the long valve stem used in reverse valves and without facings attached, place it through the hole in the top valve body piece so that the valve stem is sticking out the top and the round disc is against the inside surface. Glue it in this position with a few drops of acetone in the top hole so that the top hole is completely sealed. When the acetone is dry and the hole is sealed you can cut off the portion of the valve stem that is pertruding from the top of the valve. Next take the disc piece with the short stem (the one used in regular valves) and put a facing on the bottom side only. Place this in the middle section as is normally done and you are ready to glue the three sections togather. The check valve is now ready for mounting. It must be mounted in an upright position. If both inlet and outlet are to be drilled into the mounting board you will have to put a plug in the hole usually used for the nipple.



CHECK VALVE

LOCK AND CANCEL VALVE VARIATION

Following is a variation of the lock and cancel described earlier. It has the advantage of not having to drill the sides of the valves and not having to glue the valves together. The channel between the pouch cavity and the output of the opposite valve is drilled in the wood. You simply use regular valves without a plug or a bleed cup in them.

The key to this arrangement is the nipple that protrudes from the wood and is plugged into the bleed cup hole of the valve. The nipple is inserted into the 5/32" hole in the wood and is left protruding far enough so that the other end will plug into the bleed cup hole in the valve when it is screwed onto the wood. We use 5/32" hard nylon tubing for this application but a brass nipple will also work.

To assemble this type of lock and cancel you drill the air holes in the block first then insert the connecting nipples. Next put the valves down over the nipples where they will be located and mark the mounting screw holes with a long center punch. It is important that the valve screw holes be in exactly the right place so that the bleed cup hole will align properly with the protruding nipple when the valve is fastened to the wood.

A regular bleed is inserted into the other end of the 5/32" channel where it connects with the output of the opposite valve.