

The Pitman Chest And Its Possible Use In Band Organ Construction

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Many of you have probably seen my band organ *Trudy* at several of the organ rallies in the Midwest. This organ has been a sort of test bed for me to work out many of my ideas that I have had over the years about organ building. I am now in the process of building the “finished” version of my organ. One of the many decisions I have faced in construction of the final version is what type of chest work to use. Almost every chest in my prototype organ has been different. The two main types I’ve experimented with are: pallet chests with sliders, and ventil chests with pouch valves. The last chest I built was based on an adaptation of the Pitman design. For me, this chest has been my favorite. Regrettably, it is also probably the most complicated. The stop action on this type of chest is every bit as fast as the key action. I have also come up with a fairly compact design.

The Pitman type chest (**Figure 2**) was first suggested to me by a friend who builds church organs. So I started looking through books on classical organ building, and came up with a design that somewhat simplifies a Pitman chest. The finished chest in my prototype organ has worked so well that I have decided to base all of the chestwork in my new organ on this design.

Most of the construction can be done on a drill press. It is not my goal to describe how every single piece in this chest should, or can be made. With this in mind, I am writing this with the assumption that the reader has reasonable knowledge of woodworking tools. Anyone with the interest to build a chest such as this, should have experience building other mechanisms related to organ construction.

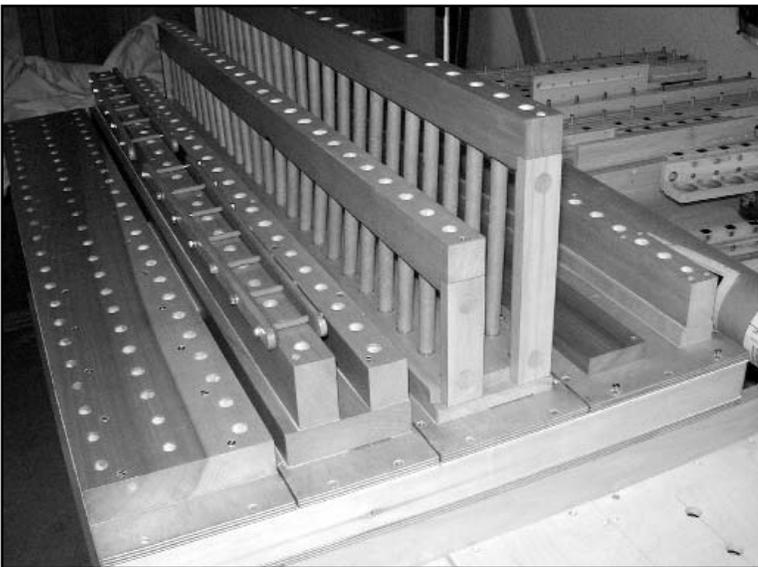


Figure 2. Pitman chest built to control 216 pipes in 4 stops of 24 notes each.

The drawing (**Figure 1**, page 9) is a cross section of the chest showing the valve that lets the air into the pipe. The spring loaded pouch block on the bottom of the chest operates

from a vacuum signal from the main stack. With a bit of redesign, it could just as well work on a pressure signal. The cross section drawing is a bit distorted in order to include the stop action valve. In reality, it is in line with the pipe valves as shown in **Figure 4**. The idea behind this type of chest is to dump the pipe valve pouch to atmosphere. This can only happen when the stop action is activated simultaneously with the key action.



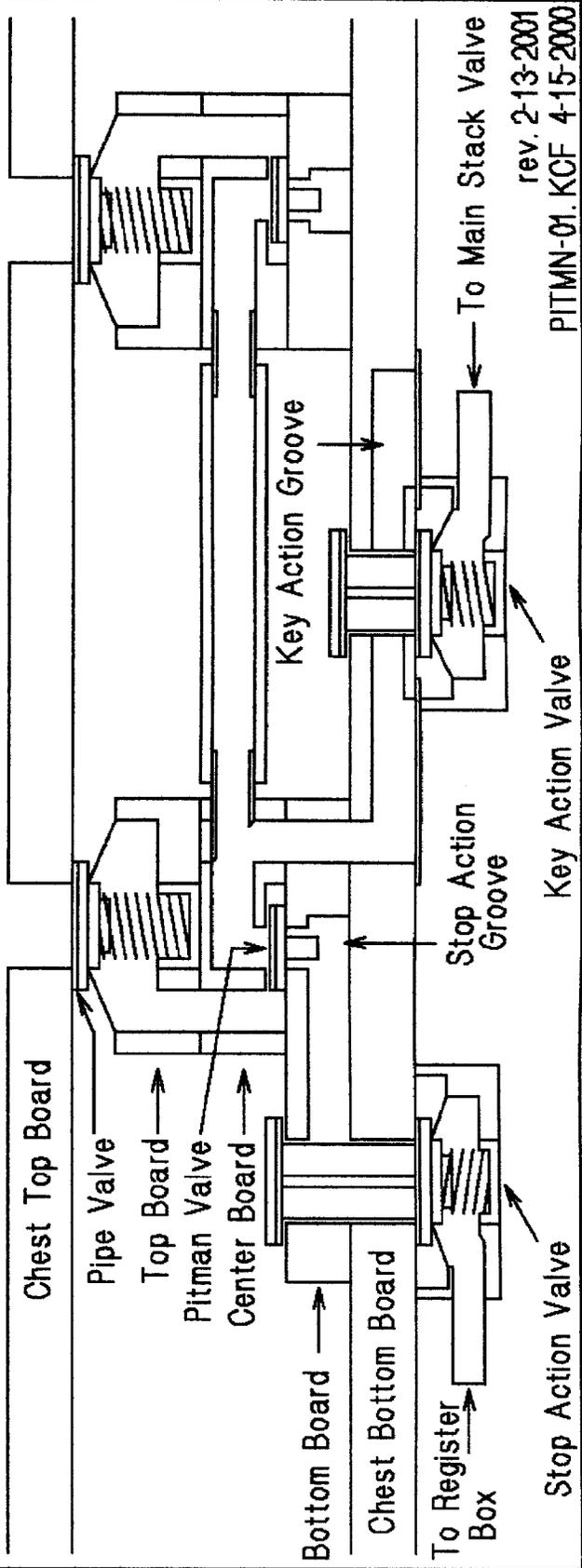
Figure 3. Two of the valve chests inside the main chest.

The principle of operation is as follows: when the key action is exhausted to atmosphere, and the stop action is off, the pitman valve jumps up because of the chest pressure on the bottom. This keeps chest pressure on both sides of the pipe valve pouch, and the pipe does not play. The pitman valve actually moves when the stop action is off. With the stop action on, there is now atmosphere on the bottom side of the pitman. Now, when the key action is exhausted, the pouch is able to dump through the key action, and the pipe plays. I’ve not had the opportunity to observe the movement of the pitman valve, but it is probable that the pouch actually dumps around the pitman and out the stop action valve.

In the drawing, both the stop action and key action are drawn in the off position. In some circumstances, it is not always possible to have the key action groove placed directly under the valve chest. So, I have drawn the chest on the right with its key action coming from the chest on the left, through a tube, instead of from a groove on the bottom. The two chests in (**Figure 3**) are an example of this sort of situation.

Outline for construction order

- attach top and bottom boards to chest
- cut valve boards to length, leave space at one end for stop action valve
- layout top board of chest for pipe locations
- orient valve boards, centered under pipe rank, pin and fasten to chest bottom board
- transfer pipe locations from chest top to top board of valve assembly with 1/16 drill
- drill pouch board
- drill pouch well to center board port 1/4 dia.
- drill center board through bottom board to key action port from top
- drill horizontal port in center board
- groove bottom board for stop action
- drill pouch well for spring retainer, after well is sealed
- drill from bottom, stop action to key action port, through stop groove and into (undrilled) pitman well
- drill pitman well last after all ports are sealed



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Figure 1. A cross section of the Pittman chest.

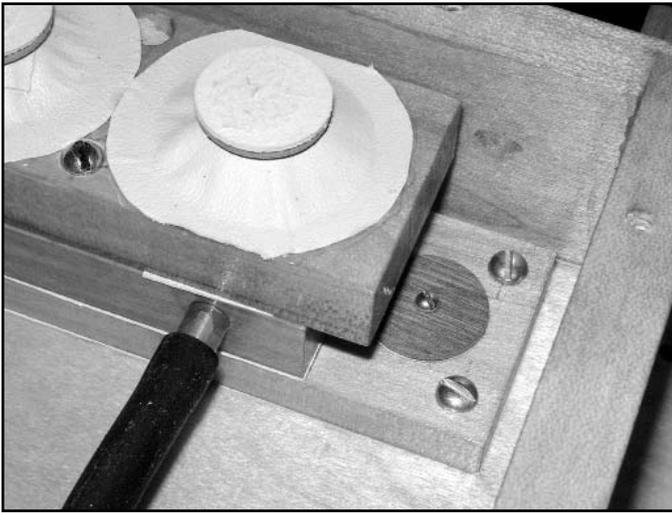


Figure 4. Side view of the three layer valve chest. On the left is a pipe valve and on the right is a stop action valve.

I have purposefully not given any dimensions on the drawing—as it would probably make the drawing more difficult to read. But, for scale, here are some of the important dimensions and a few construction suggestions.

The chest top and bottom board are made of 3/8" baltic birch plywood. Do not confuse this with ordinary construction plywood. This plywood has no voids, and has many more plies per thickness than ordinary plywood. In short, it is nice wood to work with, and is a good choice if you need a large thin piece of wood that is dimensionally stable. The sides of the main chest, and internal valve chests are made of 1/2" poplar. The bottom board of the valve chest is 3/8" thick. This wood is relatively hard, and is much easier on woodworking tools than maple. The overall thickness of this chest, including the pouch blocks on the bottom is about 3". The sides are 1 5/8" tall. With a gasket on the top and bottom, it will be a bit taller. I have not

included the gaskets in the drawing. The leather used for the top and bottom of the chest was normal thickness packing leather, about 1/16" thick or slightly thinner. All of my leather came from Columbia Organ Leather Company.

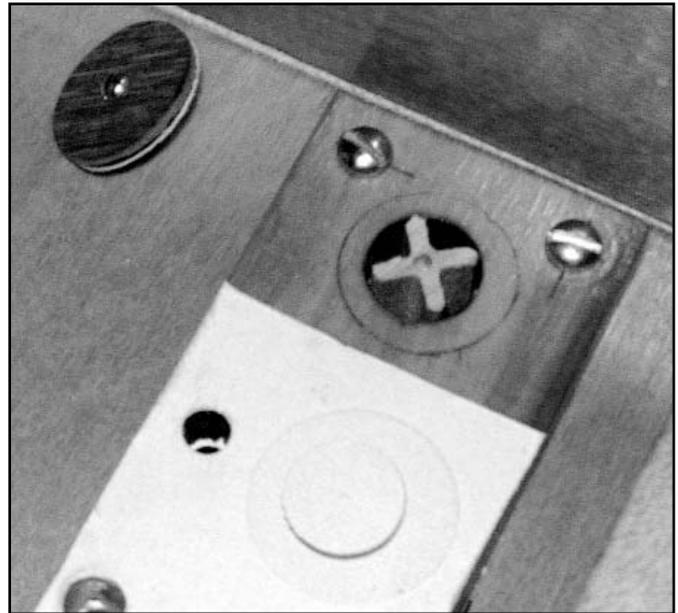


Figure 6. Top two layers of the valve chest and upper valve disk of stop action removed to show fluted valve stem.

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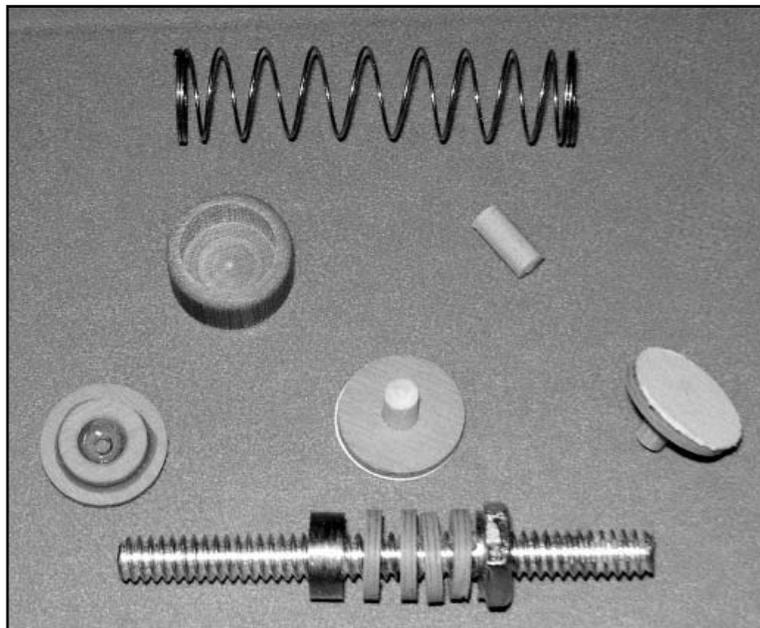


Figure 5. Pouch spring, lower spring retainer, Pitman valve stem, upper spring retainer, Pitman valves and fixture for making upper spring retainer.

The valve chests are 1 1/2" wide (**Figure 4**). The top two boards are 1/2" thick and the bottom board is 3/8" thick. The pouch well is 1 1/4" in diameter. The top board can be made wider to accommodate a larger pouch if it is needed. If the pouch is increased too much in diameter, probably some experimentation will have to be done in order to optimize the size of the ports in the chest. The spring under the pouch should be made as light as possible to allow for good repetition, and maximum air flow when the valve is in the on position. This will vary depending on the pressure of the wind in the chest. For the pipe valve facings I used valve leather about 1/16" thick. All of the drilled ports in the chest are 1/4" in diameter, The hole that the pipe valve covers is 1/2" in diameter, and the valve is 3/4" in diameter. This pouch will work with a hole as large as 5/8" in diameter, but the valve should be increased to 7/8".

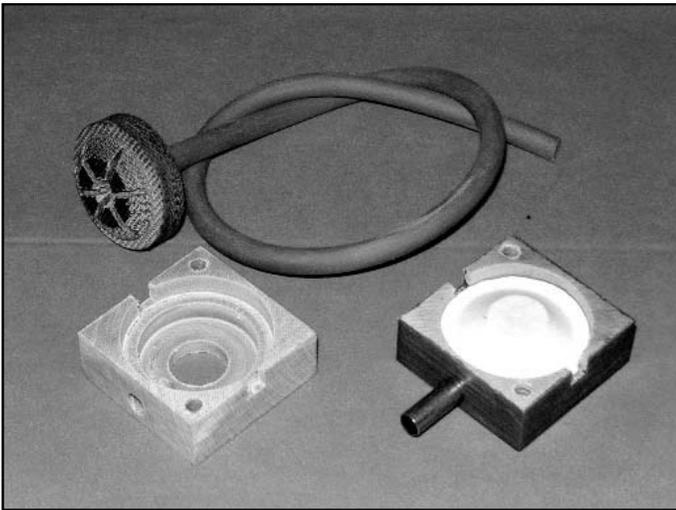


Figure 7. Unfinished and finished spring loaded pouch blocks. On top is a vacuum assisted pouch dish.

The well for the Pitman valve is made with a 7/8" flat bottom drill, to a depth of 1/8". The Pitman itself is made of a 1/2" fibre disk, with one side faced with medium thickness pouch leather (Figure 5). The other side has no facing, as it seats against a surface that already has leather on it. The stem of the valve is a 1/4" long piece of 1/8" dowel pressed into the center, and glued when the leather face is attached.

The key action and stop action valves are made of 3/4" fibre disks covered with medium pouch leather. The valve travel I have used is about 1/32". This seems to work well for both valves. This travel is set by the length of the valve stem. The disks are glued onto the ends of a piece of 1/2" wooden fluted valve stem material. Of special note, is that one end of the stop action valve is attached with a small screw to the valve stem instead of being glued. This is so the valve chest can be removed without having to destroy the stop action valves (Figure 6).

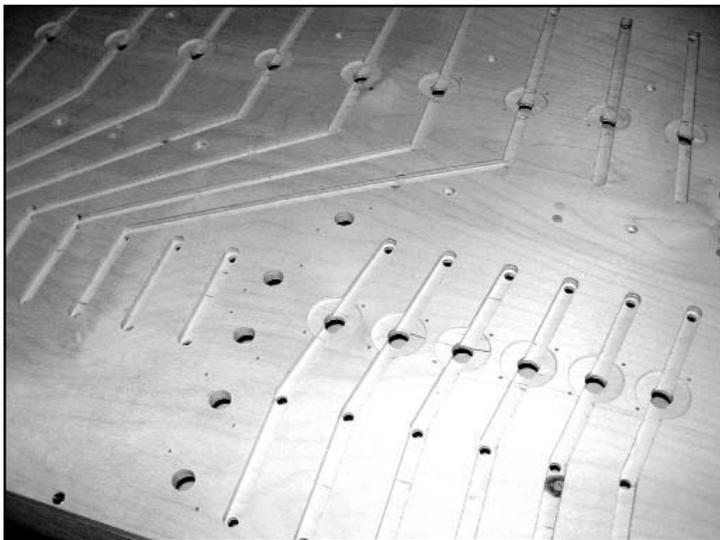


Figure 8. Key Action grooves on an unfinished chest.

The spring loaded valve blocks are made of linen phenolic (Figure 7). They are 1 3/8" square and are 1/2" thick. The valve well is 1" in diameter, and the counterbore is 1 1/4" in diameter. The signal tube is 3/16" in diameter. The pouch blocks for both the key action and stop action are identical. You may have to do some experimenting to decide what strength pouch spring to use. Pouch springs are available from Organ Supply Industries, and are available in several strengths. The lower spring retainer is turned from a 1/2" piece of phenolic rod, and then pressed into the bottom of the block after the pouch is installed. The spring retainer in the valve chest is just the same, except it is 1/4" tall, and the one in the blocks is 1/8" tall. The upper spring retainer is made from two fibre disks glued together. The upper one is 1/2" in diameter, and the lower one is made from a 1/2" diameter disk turned down to just fit inside the spring. I used extra thin pouch leather for the pouch itself. See Figure 5.



Figure 9. Key action pouch blocks and key action grooves covered with pneumatic cloth.

The key action groove is 3/8" wide and 1/4" deep in the bottom board of the chest (Figure 8). The lower key action valve seat is made from a 1 1/4" fibre disk with a 1/2" hole drilled in the center. This valve seat is let into a 1 1/4" hole drilled just deep enough to allow it to be flush with the outer lower surface of the pipe chest. The key action groove is covered with pneumatic cloth with enough overlap to cover the edge of the lower key action valve seat (Figure 9). This may not be the best solution, but so far it seems to work well. The stop action groove is also 3/8" wide and 1/4" deep in the bottom board of the valve chest.

In closing, I would remind you that all boards and ports should be sealed, to help not only for appearance sake, but to make everything reasonably airtight. I have used shellac and it seems to work well for both sealing ports, and finishing the outside and inside of the chestwork. Should you have any questions, email me at wasson@foxtail.com.

David Wasson, along with his wife Darlene, travel extensively from California to attend organ rallies throughout the United States. David has been interested in band organs for 25 years.