# *Converting a Wilhelm Bruder Barrel Organ to play Wurlitzer 150 Rolls*

**Bob Moore**

I have been crazy about band organs for as long as I can remember. My youth was spent in the now long gone Roseland Park on Canandaigua Lake in upstate New York. My father's uncle owned the park and my parents worked there for over thirty years. I was fascinated with the band organ on the carousel and vowed that someday I would own one.

I had co-owned a Gebruder Bruder organ with my brother for about twenty five years. We purchased it as an investment agreeing that we would restore it, rent it out and sell it if someone would agree to our price. We found a buyer in 1999 and as soon as that organ left my shop, my desire to obtain another one was on my mind almost daily.

Figure 1. The organ at Fritz Gellerman's home where I first saw it.

In 2003 I read a posting on the Mechanical Music Digest by Fritz Gellerman offering a Bruder barrel organ for sale. He had planned to convert it to play Wurlitzer 150 rolls and had many of the components needed to do the job. Included with the organ were a new front and drum shelves with drums, a spool frame, a set of orchestra bells, an electric vacuum box and much more. We agreed on a price and I had a new project (**Figure 1**).

The organ was a 48-key Wilhelm Bruder barrel organ. The pump was recently restored and was in excellent shape. The organ played from a nine tune barrel and played loudly. The tunes on the barrel were unrecognizable to me except for two, a German march of which I had heard before but didn't know the title, and *La Paloma*. The general condition of the organ was very good—it just didn't sound good because there was some damage to the pins on the barrel.

I first wanted to get the organ to play as good as I could as a barrel organ. If I could improve the organ's performance, I just might not do the conversion at all. I tuned and regulated the organ and then, using a magnifying glass, examined the pins on the barrel. I straightened pins that looked out of place as best I could. After that work was done, I played it again but there was little improvement.

Based upon the distribution of the pipes for each section of the scale, I felt that the conversion to the 150 scale would be rather straight forward. I was wrong. Closer examination of the notes each pipe played made it apparent that I had to make a decision. If I tuned the organ to play in the key that Fritz had planned to use and would allow me to use the bells he had provided, I would have to replace many of the pipes with pipes I would have to build including several trumpets. If I tuned the organ to play in another key closer to what it was currently playing, only a few pipes would need to be built but I would not be able to use the bells I got with the organ. I decided to put the project on hold and give it more thought before proceeding.

It was around this time I learned that the COAA was going to hold a band organ rally at Knoebels Grove in Pennsylvania. I had been there several times and it is one of my favorite parks to go to. I decided to join the COAA and take the organ to the rally. That was my first of many rallies. Attending rallies are great fun but when you bring an instrument and are a participant, the enjoyment is multiplied. Since my barrel organ was still hand cranked, I was able to involve many of the people who were not COAA members and were not all that familiar with our instruments. Most had never cranked an organ before and they had a great time.

Upon returning home, I decided that I would continue with the conversion. I knew that I would never be happy with the way the organ was playing from the barrel and that its capabilities would be greatly expanded by using the 150 roll. I also decided that I would sacrifice the bells I got from Fritz and use as much of the original pipe work as possible. I was also determined to do the

conversion in such a way that there would be as little modification to the original organ as possible. No original pipes would be modified and any changes made to the organ could be undone if a subsequent owner decided to return the instrument to barrel operation. All original parts would be retained and passed along to the next owner if the organ is ever sold.

My first task was to determine what key to tune the organ in order to get as close to a scale that would use as many original pipes as possible. After several attempts, I decided to tune the melody section where the lowest note would be C and the highest note would be A. The other sections could be tuned to this scale as well leaving about four pipes to be built. I was also faced with adding an additional trumpet, the highest playing note of the trumpet section. Among the items I received from Fritz were two small wood trumpets and after some experimentation, I was able to get one of them to play that missing note. I was now satisfied that I had all the pipes I needed to play a complete 150 scale.

Figure 2. The open back of the organ showing the major components plus the case modification.

I next turned my attention to the case (**Figure 2)**. I needed to square off the back of the case so that the spool frame and other components necessary to play the organ could be accommodated. Two panels were added to the sides and a new top was made to tie it all together. Interior space was limited so my approach was to fit the largest items in first and use the remaining space for the smaller ones. I had three major components to install, a vacuum reservoir, spool frame and electric vacuum box. First, a shelf was installed on which to mount the spool frame. Then the vacuum box was mounted on brackets to the inside right of the case. With the spool frame sitting on the shelf, I was able to measure the remaining space left. This would determine how large I could make the vacuum reservoir which would be mounted to the inside left of the case.

The pneumatic components on the spool frame needed to be restored before it could be permanently installed in the organ. Once that was done, I decided to make sure everything else was functioning correctly. Since this spool frame has its own internal motor, it can be placed on the work bench and operated independent of the organ. The lower spool is driven by a belt drive and used a nylon belt which had deteriorated to the point of being unusable. I decided to replace it with a belt made from round leather belting material. Since leather stretches over time, a spring loaded arm with an idler wheel was added to compensate for this and keep the belt under proper tension.

The original roll brakes for both spools consisted of a spring loaded arm with a piano damper riding on a friction wheel. Since they were constantly being used, regardless of whether the spools were moving forward or backward, the drag caused the belt to slip and the drive motor to slow down. No amount of adjusting could correct this to my satisfaction so I replaced this brake system with one I had seen used on Western Electric coin piano spool frames.

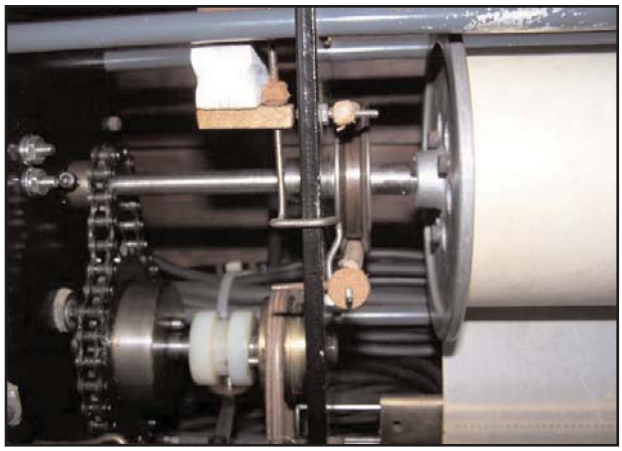
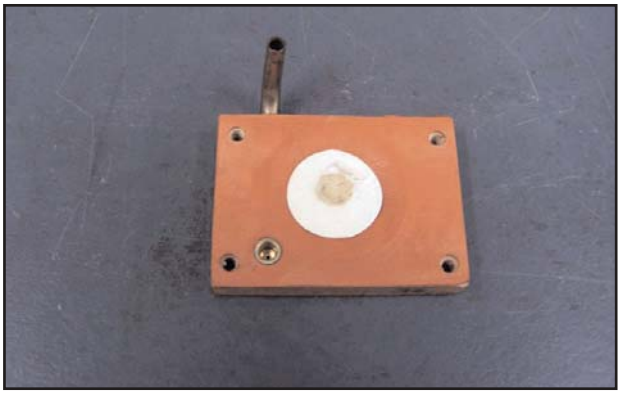


Figure 3. A close-up of the spool frame shows the upper roll brake and the roll tensioning pneumatic.

This consisted of a short piece of round leather belting fixed at one end to the side of the spool frame then wrapped around the friction wheel (**Figure 3**). The other end of the belt has a light duty spring attached to it. The other end of the spring has a small screw eye which goes through another screw eye which is screwed in the side of the spool frame The threaded end of the screw eye has a leather nut which is used to adjust the amount of drag on the roll by adjusting the tension of the spring pulling on the belt. When the surface of the friction wheel is

turning away from the fixed end of the belt, drag is applied. When the wheel turns in the opposite direction, the spring allows the belt to slip and no drag is applied. This system works very well and puts a minimal amount of drag on the motor and roll.



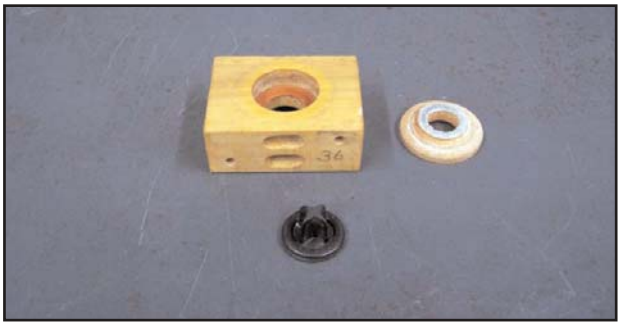


Figure 4 (top). The bottom section of the block valve with the pouch and bleed.
Figure 5 (middle). The main body of the valve block with the valve cover and the bakelite valve.
Figure 6 (bottom). The assembled valve block.

My next job was to fabricate the valves (**Figures 4, 5 & 6**), valve chest and pneumatics. The valves would be based on the Wurlitzer block valve system consisting of a valve of my own design using parts I already had on hand. I used Seeburg valve covers for the top seat and Bakelite valves salvaged from a H.C. Bay player piano for the movable part of the valve. I used ¾ inch thick poplar for the main valve body and ¼ inch thick poplar for the bottom piece. The valve body took several drilling operations to create the valve cavity and the ports for the entrance and exit of the vacuum. The bottom section contains the pouch, bleed and nipple that goes to the tracker bar. The entire surface of this piece is covered with pouch leather which also acts as a gasket when the bottom piece is screwed to the valve body. Both valve seats are leather, one glued to the bottom of the valve cavity in the valve body and the other to the seat of the valve cover. The design works very well and allows easy accessibility to the interior parts of the valve for maintenance.

Figure 7. The newly fabricated valve chest and pneumatics mounted in the organ. The tips on the pneumatic fingers are positioned over the tops of the push rods.

The valve chest was drilled to allow for mounting of the valve blocks and the channels going up to the board on which the pneumatics would be mounted (**Figure 7**). Additional ports were drilled for connection of the vacuum supply from the vacuum box; vacuum supply nipples for the spool frame control valves; and additional valves for lock and cancel functions for the registers and connection of the reservoir.

Figure 8. The push rods going into the wind chest. The pneumatics on the valve chest will push on these to play the organ.

The pneumatics were fabricated and glued to the mounting board on top of the valve chest and would act on the original push rods (**Figure 8**) going into the wind chest.

A transfer block salvaged from another band organ project was restored then mounted to the spool frame shelf. The tubing from the tracker bar is inserted in one side of this and then goes to the valve blocks. I had originally planned to tube a MIDI system to the other side to be used when the roll was rewinding but abandoned that idea because of space limitations in the organ. The transfer block is used to silence the organ during rewind.

At this point, the organ became playable. Additional tuning and adjustments were made and it became possible to get an idea of what the finished project would sound like.

One problem that then became apparent was that when the roll was playing the last couple of songs, the roll would slip causing the music to hesitate due to excessive slack in the paper on the take up spool. I corrected this by adding a pneumatic to the spool frame which when closed pulls on the upper roll brake increasing the drag. The pneumatic is operated by the coin trip perforation which occurs after each song. This stops the upper spool momentarily while the lower spool tightens up the roll to a point that the drag is over come and the roll starts moving again. The coin trip perforation moves from its corresponding hole in the tracker bar and the pneumatic opens reducing the drag on the upper spool and allowing the music to play with no problem.

Mounting the front to the organ came next. Since the front is wider by several inches than the organ case, it was necessary to build a frame matching the dimensions of the organ case. This was attached to the inside of the front and four hinges with removable pins were used to attach the front to the case.

Brackets were made to support the drum shelves (**Figure 9**).. Once they were mounted I could start to build the pneumatic components needed to play the drums. I used the plans for building the snare and bass drum beater assemblies published by the Vestal Press as my guide. While I was not trying to build exact replicas of these components, I did want them to look like they might have been built by Wurlitzer. Both units turned out well and have that Wurlitzer look I was trying to achieve.

Figure 9. The snare drum beater assembly.

I started to check around at several pawn shops to find a glockenspiel and a cymbal. I found a suitable cymbal at one shop and the glockenspiel was found at another. I fashioned the cymbal beater to resemble those used by Wurlitzer and then turned my attention to the glockenspiel. I built the hammers for striking the bells then the pneumatics. The bells and pneumatics were mounted to a valve chest and block valves which I had already made were attached to complete the unit. Mounting brackets were made so the bell unit could be mounted in the mid-center section of the organ and be visible through the opening in the front.

There are two automatic registers being used, one for the bells and the other for the piccolos. A double acting pneumatic controls the moving of a slider turning the piccolos on and off. It works quite well.


Figure 10. The finished organ with the front and drums mounted and the orchestra bells installed in the center section.

At this point, the organ was done (**Figure 10**). I now needed to have the means to transport the organ to different events. I ordered a suitable trailer and prepared for the debut performance of the organ. My wife and I headed to Pennsylvania and Knoebels Grove for the 2010 band organ rally. The organ was well received by several COAA members that saw it so I can only conclude that the conversion was a success. I know I'm pleased with the results.

Bob Moore's interest in band organs goes back to his early childhood. He has been involved with the outdoor amusement industry most of his life and is currently working for Walt Disney World as a parade float mechanic.