Build Your Own Band Organ

(It may be easier than you think!)

Burl Updyke

I know what you are thinking; band organs are complicated, with bellows for the pressure system and bellows for the vacuum system. Not to mention dozens of intricate valves, a spool frame, and a hard-to-fabricate crankshaft. The list goes on and on. It doesn't seem like a task for a mere mortal. But I would like to share with you my experience in building an organ that does not require the items just mentioned. Modern methods and technology are employed resulting in a quicker and much easier build. The end result is an organ that can produce the "happy music" that we all enjoy. A fairly well-equipped woodworking shop will of course be an asset, but much can be accomplished with a modest number of tools and determination. The following are not detailed instructions, or a set of plans, but rather information, and suggestions that were helpful to me. As in most endeavors, there are various ways to achieve the same result.

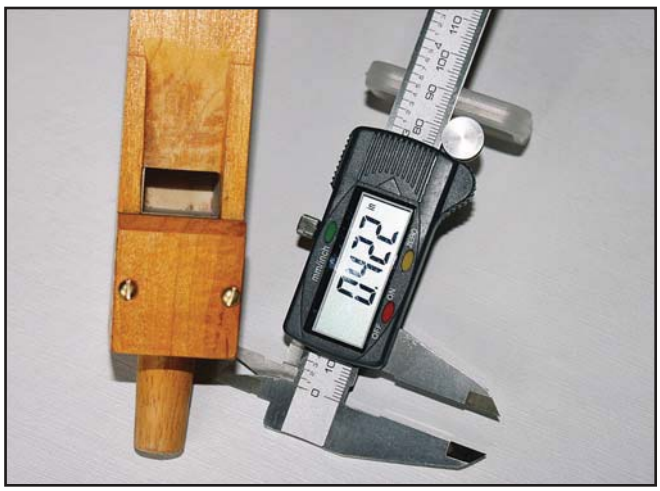


Figure 1. Electronic digital calipers with inch/metric conversion, are very useful during organ pipe construction.

May I suggest at the outset that purchasing the plans available from Bob Stanozek that details the traditional build of a replica Wurlitzer 104/105 is a good investment. (See his ad in this journal.) I used the information and detailed drawings to make the pipes for my organ. If you desire your organ to sound like a Wurlitzer, then it is necessary to build them like the Wurlitzer factory did.

Pipe Building Tips

• Purchase a digital caliper. I prefer a metal one (some are plastic.) for about $30. The calipers will be used extensively in measuring the various parts of a pipe during construction (**Figure 1**).

• An angled feeler gauge set is needed to determine when the wind way is the correct depth. Yes, it is measured in thousands of an inch.

• Start with the melody stopped flutes as they are somewhat easier to build.

• Refer to the two part Pipe Building series by David Wasson published in past issues of the ***Carousel Organ***. David is an experienced organ builder, and his information is most valuable to all would-be pipe builders. If you don't have those issues, I believe they are still available from the Treasurer as back copies.

• Poplar wood is available from Lowes, etc., and comes in thin stock suitable for pipe construction. Maple for the mouth parts is also available. Craft stores carry basswood in thin sheets that can also be used. (I prefer the poplar wood.)

• A bench-top wood planer is of course most helpful, but not necessary. A small bench belt/disc sander is a good choice for making the pipes look nice.

• I used Titebond III$_{TM}$ glue (waterproof) for all the parts except the caps. For them I used either Aleene's Tacky Glue$_{TM}$, or small brass wood screws.

Figure 2. This type of pressure meter may be used during pipe testing, and then later installed in your organ.

• I use a Korg$_{TM}$ digital tuner (chromatic) to tune the pipes, and a simple plastic tube manometer to set the air pressure for testing. A more sophisticated way to check air pressure is to use a Dwyer Magnehelic$_{TM}$ pressure gauge (**Figure 2**). I obtained one on EBay for $30. It has a range of 0-10 inches of water, just right for my organ. A source of air for testing can come from an old vacuum cleaner (use the air output not the vacuum) with a light dimmer to control its speed.

• Don't expect to be overly impressed with the sound a single pipe makes. It's when that pipe is sounding in concert with others that it becomes magical.

• A simple jig using a section of right angle aluminum attached to a board makes it easier to hold the pipes square for gluing.

Are trumpets somewhat finicky to voice? Yes, but you can learn. It's all in the reed.

• Pipes must not bow in or have any bad joints if they are to speak and produce good sound. Take your time when making them, and do your best work. Remember, the pipes are the heart and soul of the organ. Once you get set up and gain some experience, it's possible to make two or three pipes in an evening.

• I constructed the trumpets using ideas gleaned from the internet, and made the shallots of wood instead of brass tubing. This resulted in a somewhat more mellow sound (**Figure 3**).

(www.MMDigest.com/tech/elbasanitrumpet.html)

• Are trumpets somewhat finicky to voice? Yes, but you can learn. It's all in the reed. Get the curve correct and at the proper height above the shallot and you're good to go!

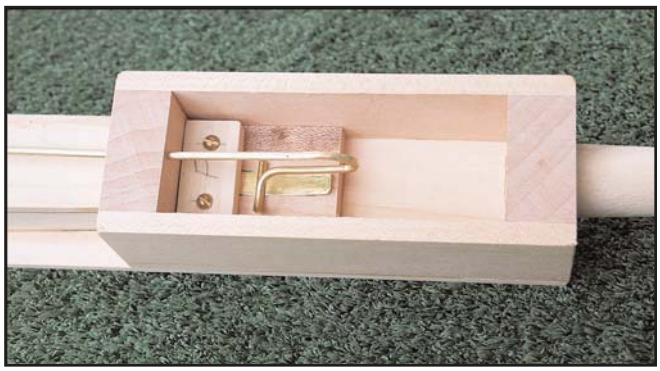


Figure 3. Visible in this photo of a wooden trumpet boot, is the brass reed that vibrates against a wood shallot. The wire is used for tuning. A wood cover attached with screws completes the unit.

Air Supply

Using a blower instead of bellows has many advantages but also some pitfalls to be aware of. It is very tempting to try to cut costs by searching for a surplus blower. Some have been successful, but others have used blowers not suitable for their organ. There is nothing more pitiful than an organ that is wheezing, and starving for air. Under these conditions, it cannot possibly stay in tune or sound good. As the blower is a key component in the "easy organ build concept," a wise choice in its selection is crucial. I followed good advice given to me, and purchased a blower from Kooltronic$_{TM}$, a company that makes blowers for cooling electronic equipment racks. It is model KBR125 with a static pressure of seven inches of water, and CFM rating more than adequate for my organ (**Figure 4**). It cost around $600, but was well worth it. It is able to provide steady air at the pressure needed, and it eliminates the need for a regulator/reservoir. A plywood box enclosure with interior insulation lowers the blower noise so that it is not audible when the organ is playing.

(www.kooltronic.com)

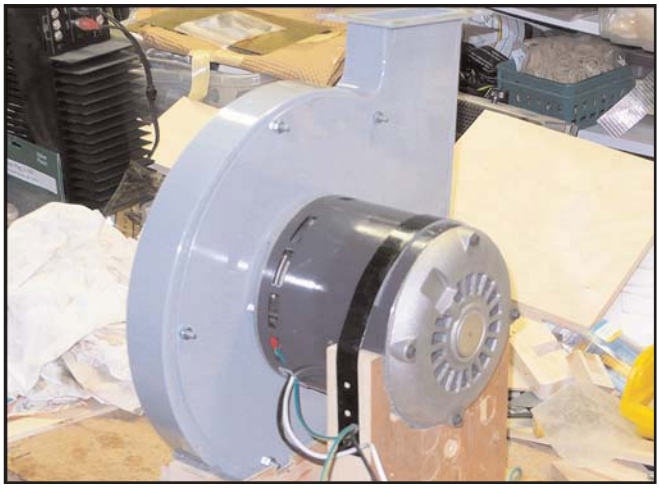


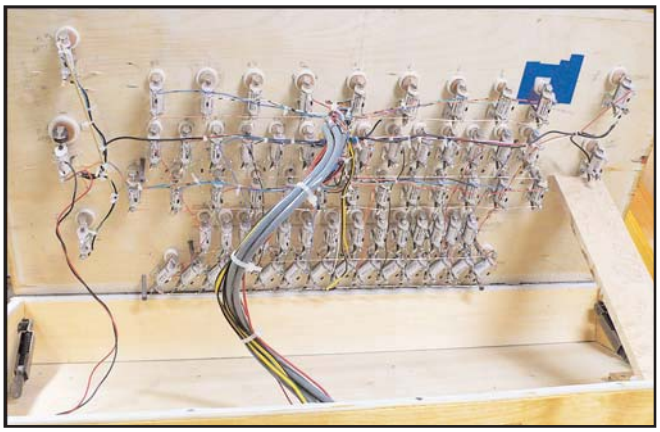
Figure 4. This blower operates on 120 VAC, and easily supplies sufficient air for a 105 type organ. It should be enclosed in an insulated box to lower noise.

Pressure Box

The pressure box/wind chest receives the full output of the blower without the need for regulation of the pressure. Mine is 35 inches wide, 18 inches deep and 4.5 inches high. These dimensions permit a case for the organ that is similar to the size of a Wurlitzer 105. The sides are ¾ " poplar, and the top and bottom are ¼ " plywood. The top is attached to the sides with a 35 inch piano type hinge across the front. This allows the top to be raised to install the pipe valves and wiring. I used

Figure 5 (above). The pipe valves are in place ready to be wired. To lessen the chance of damage to the valves, a low wattage soldering unit is used .

Figure 6 (below). Wiring is completed, and diodes installed. Notice the larger pipe valves on each side that are used to control air to the bass pipes.



Peterson$_{TM}$ pipe valves (solenoids) to control the air going to the pipes situated on the top lid (**Figures 5 & 6**). My organ plays the Wurlitzer 125 music scale, and requires 41 pipes to sound all of the notes. I continued making pipes until I had 55 pipes completed and mounted on the top of the pressure box, and the pipe magnets and control circuits installed, and I was pleasantly surprised to discover that the organ sounded quite nice. They were: 14 melody flutes, 14 Piccolos, 9 Accompaniment, 13 Trumpets, and 5 Bass. It encouraged me to build the case and get it ready to take to rallies (**Figure 7**). I have since built and installed 14 more pipes, (violins), with a goal of making another 14, (5 bass cellos and 9 accompaniment cellos) before the organ is completed to my satisfaction. The original 104/105s also had 14 Flageolets in the melody section. I find them a bit shrill for my taste, and don't plan to use them in my organ.

Figure 7. Melody stopped flutes, wooden trumpets, and accompaniment stopped flutes are completed and in place on the wind chest. The hinge on the front allows the lid to be raised for access to the pipe valves underneath.

Pressure Box Tips

• The pressure box must be air tight. Make sure the sides and bottom fit tightly and are screwed and glued. Seal the inside of the box with several coats of shellac. The hinged top lid must seat against weather stripping or organ packing type leather. At least five ¼ " screws with knobs should be used to hold down the lid securely.

• Use a sheet of smooth 1/8 " hardboard glued to the underside of the lid to provide a smooth seating surface for the pipe valves. (I wish I had done this.)

• Be sure to install the two protection diodes at each pipe valve as recommended by Peterson. They are a must for proper operation.

MIDI

Using MIDI (Musical Instrument Digital Interface) is the secret to simplifying organ construction. Consider these advantages: no need to build the following; a roll frame with tracker bar, vacuum bellows, primary and secondary valves for each note. No need for paper rolls for song playback. A small hand held MIDI player with a $15 memory card can store hundreds of songs. Many song files are available free of charge on the internet. The result is that your organ can play for hours on end if desired. Many of the internet songs are actual scans of original Wurlitzer rolls and have been converted to MIDI files. Thus your organ will be playing the original arrangements, and if you have constructed the pipes using Wurlitzer dimensions, your organ will produce that 'old time' sound! Some would-be builders assume that MIDI is too complicated, and

difficult to learn. But one does not need to understand the 'under the hood' workings of MIDI in order to use it to control their organ.

The three main components are;

1. MIDI file player,
2. MIDI Driver Board,
3. Pipe Valves.

Figure 8. MIDI file player with a SD type memory card that contains over 200 band organ songs. The output of MIDI unit connects to the MIDI driver board.

A small lap top computer with MIDI output may be used to play the MIDI files. I have good success using a small hand held player called Mr. MIDI (**Figure 8**). Information about this unit may be found online at www.sdmidicontroller.com . The other key component is the MIDI driver board. It receives information from the MIDI player via a standard MIDI cable, decodes it, and sends note on/note off signals to the individual pipe valves. The driver board I use is made by JW Electronics in Great Britain. It is well made and reliable. Several models are available including ones with 32 or 64 outputs (**Figure 9**). Each output is able to control loads up to 500 Ma. For higher current loads, booster modules are available to increase the capacity to 1500 Ma. Information may be had at his internet site, (www.j-omega.co.uk).

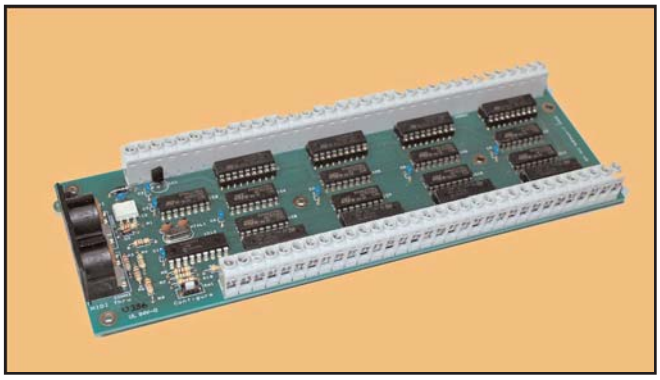


Figure 9. The MIDI driver board, with 64 outputs, controls the pipe valves in the wind chest.

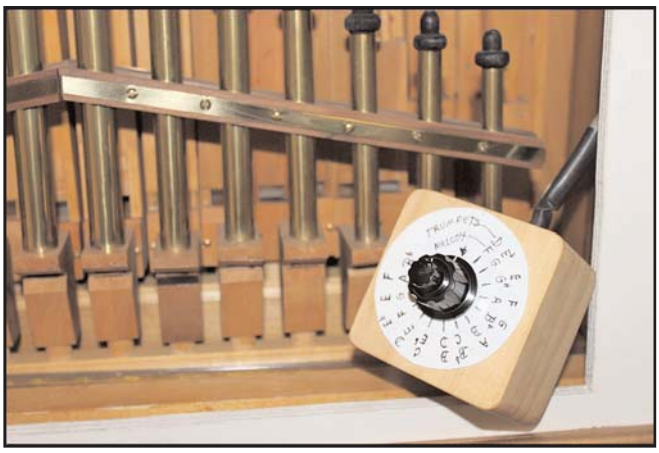


Figure 10. This "tuning box" contains a rotary switch with two decks of contacts. The larger knob turns the melody pipes "on" one at a time for tuning. The smaller knob does the same for the trumpets. The tuning box is stored inside the case when not in use.

Wiring Tips

• Tuning Switch: To make tuning the individual pipes easy, I constructed a small wooden box to contain a multi-position rotary switch. The switch is wired to the MIDI driver board, and is able to turn on the pipes one at a time (**Figure 10**).

• Wire Size: I used 22AWG hookup wire for wiring the MIDI control circuits. Peterson 60 ohm pipe valves draw 200 Ma @ 12 volts dc, with a voltage drop of only .32 volts on a 100 foot wire, so considering the short runs between the driver board and the pipe valves, the loss is inconsequential.

• Soldering: Use a low wattage (7 w) soldering iron, available at Radio Shack$_{TM}$, to make connections. If you have never soldered before, practice first. It's not all that difficult. By the time you finish your organ, you will be somewhat of an expert.

• **Final Tip**: Remember, you are not alone. There resides a vast amount of information and expertise with the members of COAA. I have always found them willing to help. Don't be afraid to ask. I have also found the Internet to be a wonderful resource. Search the archives of the MMD forum, and don't forget YouTube. All of us sharing and encouraging one another will help insure that band organs and "happy music" will still be around for future generations to enjoy.

Figure 11. With the bass pipes completed, the organ was ready for a test run. What a thrill it was to hear that first song. Next step, build a case for it.

Summary

Using the concepts that I have presented to you, it took about two years of enjoyable part time work to arrive at the point where the organ was able to play. I was so encouraged by the results that I was well motivated to build the case for it (**Figure 11**). Soon thereafter I started taking it to rallies. Since then, I have added a bass and snare drum, an animated conductor, and the latest addition, orchestral bells. The result is a fun band organ that looks and sounds like a Wurlitzer 105 (**Figure 12**). It cost much less to build than buying an original one. (I don't know exactly how much as I didn't keep records.) I was able to build my organ in a relatively short time. It is also easy to operate and maintain, but most of all, it brings me great satisfaction knowing that I made it! I praise God for the life He has given me, and the opportunity I have had to build various things. Nothing else I have made has brought me as much joy as the band organ. I enjoy the music it makes, and play it almost every day. The friends my wife, Shirley, and I have made as members of COAA are an additional blessing. I hope that what I have shared will be a help and inspiration to you as you consider making your own band organ.

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Figure 12. Shown playing at a recent rally, with "George" the conductor directing the music, and Shirley and Burl Updyke looking on. Orchestral bells have been added since this photo was taken.

Burl Updyke and Shirley, his wife of 59 years, reside in Northeastern Pennsylvania. They operate two Christian broadcast stations, WRGN-FM and WIVH-FM. Burl is a broadcast engineer and Extra Class Amateur Radio Operator, W3SOC. In addition to band organs, he has had a life-long interest in pipe organs, and plays theatre organ and accordion.

2011-2012 Membership Renewal

Membership renewal letters have been mailed to all COAA members whose membership is expiring (mailing label date on the Journal is "JUL11"). This will be the last journal for memberships that have expired. If you have not yet renewed, please do so as soon as possible so that you don't miss any journals. If you miss a journal because of late renewal, we can mail a single copy to you. However, <u>there will be a $5.00 mailing fee!</u>