

MIDI Conversion of a Roll-Controlled Johnson Style 163 Band Organ

Frank Noell

This band organ is at the Salem Riverfront Carousel in Salem, Oregon. It is a Johnson 163 which is based on a Wurlitzer 165 Band Organ. The band organ is situated in a loft that is about 12 feet from the floor and is not easily accessible. The picture of the band organ (**Figure 1**) that I have is very poor quality, as the picture had to be taken at Christmas time, when a lift (used for decorating) was available to both get far enough away, and above the Carousel. There isn't much light during the Christmas season in Oregon.

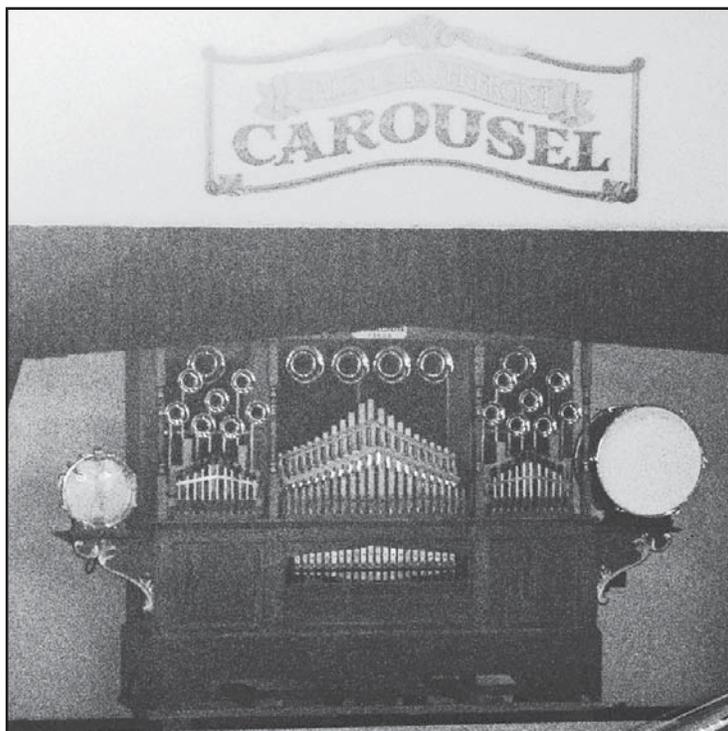


Figure 1. The Johnson 163 organ as seen on the loft of the carousel.

Because of where the band organ is situated, it was very inconvenient to turn it on/off and change rolls. I decided to look into controlling it with a computer. Over 1200 Wurlitzer 165 songs have been converted to MIDI files from Wurlitzer rolls. These songs are available for around \$5 per song (depending on quantity ordered)¹. I found that the tempo of most of the songs is a little faster than I like, so I adjusted the tempo using standard MIDI software. Other than that, most of the songs are ready to go.



Figure 2. The box of valves for the organ.

I chose to tap the vacuum hoses² immediately behind the roll mechanism using plastic drip irrigation tees³. I made a box for the valves and MIDI board (**Figures 2 & 3**) so I could place the box on top of the band organ. Also, I made a place on the box to hold a furnace-type air filter to keep dust out of the vacuum lines. The band organ can still be played with the player rolls. When using the MIDI system, the roll is just placed at the beginning of the roll where there are no holes, and the roll motor is turned off. It is, however, unlikely that the rolls will ever be used again. In reality, I covered up the holes with electrical tape.

The MIDI board in the valve box is a UM0, made by MIDIator Systems⁴ of San Diego, California. The control valves are connected directly to the MIDIator board using ribbon cables. A clamping diode was placed across the valve coils to prevent any back EMF from going to the ICs in the MIDIator. While the MIDIator user manual

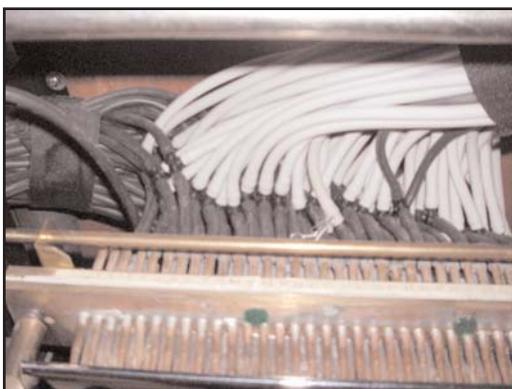


Figure 3. The valve box as it sits on top of the organ.

states that these diodes are not necessary, I chose to put them across the coils anyway. As far as I can tell, the valves I used are no longer available, but a good alternative is the valve from Peterson Electro-Musical Products⁵. In the valve box, the felt on the valve works against a short length of brass tubing⁶, the other end of which can be directly connected to the tubing running to the tee behind the player roll bar (Figures 4 & 5).



Figures 4 (above) and 5 (below). Close-ups detailing the connection from the newly installed valves to the tee behind the tracker bar.



As I am a computer programmer, I decided to write programs to play the MIDI files, rather than use something that wasn't specifically intended for this use. I have written two programs: a server program that runs on a Windows computer that is inside the band organ, and a client program (Figure 6) that runs on any other Windows computer in the network at the Salem Carousel. The client program, however, may also run on the computer in the band organ. I am making this set of programs available for a charge⁷. These programs will work with any MIDI-controlled mechanical device, as they are, essentially, a MIDI "jukebox."

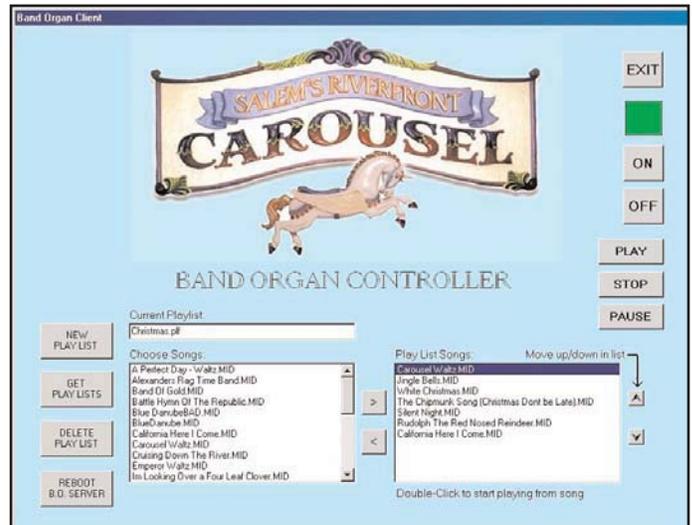


Figure 6. The Windows computer "client program."

All of the control of the band organ is done from the server program, which runs all of the time. It accepts commands from the "client" program, which only needs to be running to send the commands. In other words, the "client" program may be terminated while the Band Organ is playing, without affecting anything. To turn the band organ off (or on), or to modify or make new play lists, the client program may be run whenever it is needed. If the client program is left running, then the song that is currently playing in the play list is highlighted. The client program can be run from any computer in the network as the actual files (both MIDI and play list) are stored in the computer in the band organ.

Additional hardware required is:

- 1) a 12-volt power supply⁸ to power the MIDIator board,
- 2) a relay and electronics to turn the band organ on and off; controlled from the printer port of the computer in the Band Organ; and
- 3) a MIDI output port on the same computer.

I designed and built the parallel port relay box, and I choose to use an Edirol UM-2 (made by Roland) for my MIDI output device from the server computer⁹. The UM-2 attaches to a USB port on the server computer in the Band Organ. The software doesn't care what type of MIDI output device is used, however, as the MIDI device is chosen from the control panel of the operating system of the computer.

The connections diagram for the UM0 MIDI board⁴ is available on my website⁷. The parallel port switch schematic and notes are also available on my website. As the parallel port switch doesn't use many parts and is fairly simple, I chose to use point-to-point wiring on a .10 inch spacing perfboard. Certainly, some experience with electronic wiring is necessary to build the parallel port switch.

Since converting the band organ to MIDI, I have had no problems with it. It has been in use for over a year and a half. Because of the positive vacuum line opening using the valve, the resulting sound is better than a vacuum opening from holes in a roll.

Notes:

- 1 Available from Mike Ames, P.O. Box 1715, Solana Beach, CA 92075 - ames@foxtail.com - There is an article on a similar subject by Mike Ames at <http://www.mmdigest.com/Tech/ames.html> (pay attention to upper/lower case). My computer program replaces the (very old) Viscount player.
- 2 Vacuum hose (tubing) is available from International Piano Supply, in Aurora, Oregon <http://www.pianosupply.com> (tubing is at: <http://www.pianosupply.com/players/player-2.jpg>)
- 3 Irrigation Tee's available from Barry Hill Irrigation <http://www.berryhilldrip.com> item: 40395 qty: 50 for \$9.00 plus shipping
- 4 <http://www.midiator.com/playerp/index.html>
- 5 <http://www.petersonemp.com/products/pdf/Seriesii.pdf>
- 6 Micro-Mark: <http://www.micromark.com> (item #60198)
- 7 <http://www.channel-islands-sw.com/bandorgan.html>
- 8 The power supply should be able to deliver 4 amps at 12 volts DC. They are available from most any surplus dealer. You may also use the 12 volt wires from an old computer power supply. The 12 volt leads are black (-) & yellow (+).
- 9 I used a Roland Edirol UM-2ex, which has 1-in and 2-out Midi ports. Use Google to find a source.

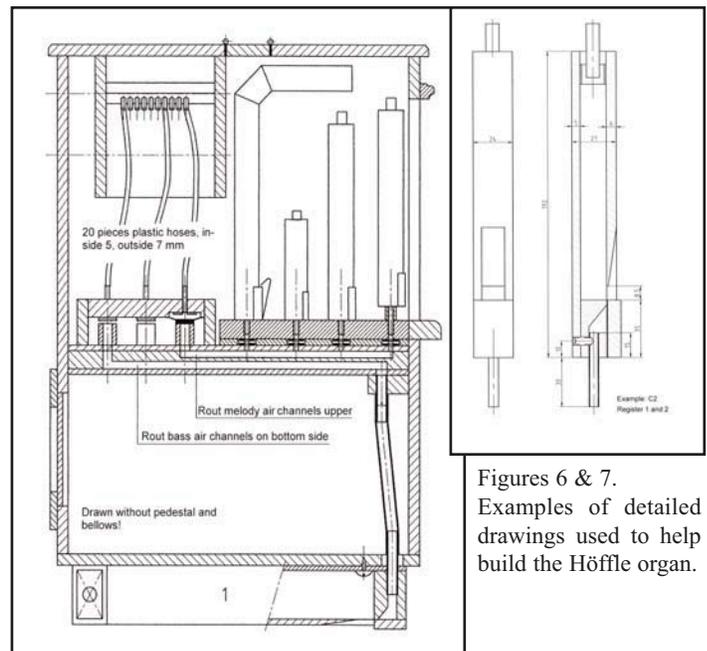
Frank Noell has been tinkering with electronics for 60 years, and has been a computer programmer for nearly 50 years. He has been working with pipe organs (as an amateur) for 15 years. He is married with five grown children. He is not a musician. He feels honored that various groups have trusted him to work on their pipe organs. He considers himself to be a "Nerd" not a "Geek."

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He understood the complexities of building the organ as well as the expense of buying a high quality organ. In his book Walter Höffle notes (retranslated into easy-to-read English—ED):

Because I am aware of only common descriptions in the professional literature I took on the task to give interested organ friends the ability to build a high-quality musical instrument. Based on detailed building descriptions and many construction drawings, it is possible to successfully build a crank organ. Requirements include a shop with a circular saw; a joiner; a drill press, a small lathe and some small shop tools. Those experienced in woodworking will have less difficulty in building (the organ). When assembling the difficult parts an organ friend or furniture maker can give a helping hand. The main thing to consider when building such an instrument is to be precise in your work. I work with a sliding caliper that is up to 0.1 mm precise.

Medical reasons have forced Walter to stop this hobby of organ construction and he has handed over his work and book sales to Wiel Geraats. His web site (full of photos and information on the organ construction) is www.hobbycrankorgan.com. His email is info@hobby-draaiorgel.nl.



Figures 6 & 7. Examples of detailed drawings used to help build the Höffle organ.