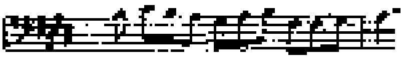
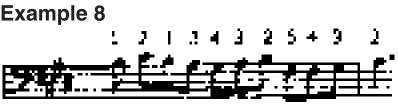
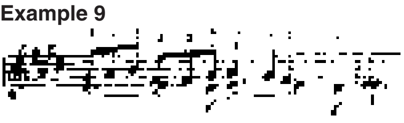
Example 7



Example 8



Example 9



are probably details of the construction of this extremely well thought-out work that I have not noticed yet. Students should be encouraged to undertake as much detective work as they like, picking apart themes and scanning the whole piece for connections.)

Since the pedal note that enters in m. 74 does not change anything about the harmony or anything significant about the counterpoint, it is perhaps there for emphasis. It makes more emphatic the negation or contradiction of two things: first, the B-sharp that has prevailed since m. 71; second, the high tessitura of the section that has just ended.

Measures 75–86

The section that begins after the downbeat of m. 75 is a short fugue in three voices. The subject (Example 7) occurs six times in eight measures, followed by a fairly extended build-up to the final cadence—which this time is completed. This is again a manuals-only section—the lowest voice is too high for the pedal compass. Once again the notes of the middle voice can almost all be reached by either hand. For about five measures' worth of the section, there are actually only two voices being played, so hand choices as such are limited to the remaining measures. (When there are only two voices being played, there is of course rarely a reason not just to split them between the two hands.) The most interesting spots to think about hand choices and fingering are mm. 78 and 82 and perhaps mm. 84–85. Students should try several possibilities and in particular notice differences in the range of possible articulations with different hand/fingering choices.

A particular feature of this fugue subject is the presence of a repeated-note event at a crucial moment in the unfolding of the theme. The articulation and timing of this repetition each time it occurs is probably more important than any other one thing in shaping the overall effect of the passage. Therefore it is a wonderful opportunity for a student to think about planning repeated notes and to listen carefully to them. As I wrote in the column of January 2009, I believe strongly that whenever possible, it is a very good idea to use different fingers for repeated notes. I would, for example, finger the opening statement of this fugue subject as shown in Example 8 (this is in the left hand, of course).

As always, there are many other specific ways to do it. Changing fingers on repeated notes, in addition to giving the player more control over a wider range of articulation and timing possibilities, is also a free shot at repositioning the hand. In a passage like this, which has an active subject and, just for good measure, four sharps, repositioning the hand can be useful. Here is an example of a repeated-note fingering (in the right hand) that also positions the hand to deal easily with the other notes (Example 9).

Measures 87–90

The last of the four sections that we are looking at here is another fairly short non-contrapuntal passage (Example 10). Since the previous section ended with a convincing and well-heralded cadence in B-major, the opening harmony of this section is another instance of abrupt contradiction. The first note in the pedal sounds like it is inviting a continuation of the same harmonic scheme; when the chord is filled out in the hands it negates that harmony quite clearly. This passage is in the form, more or less, of a four-part chorale harmonization. The *Adagio* marking suggests a slow tempo for the section. Again it seems to me that, all else being equal, the slower these measures are, the more effective they will be as a counterweight to the rhythmic and contrapuntal material that surrounds them. The same range of possibilities for dividing the alto voice between the hands is found here as in other sections discussed above. In this case, since the lines are slow and not very complex, the choices are perhaps low stakes. However, in a slow bare-bones texture such as this, the addition of ornaments is always a possibility, and that might shape decisions about hand choices as well as fingering. For example, I like to play a trill on the final quarter note of m. 88. In order to accommodate that trill the most easily, I use a fingering like that in Example 11. There is nothing surprising or particularly original about this fingering. The gist of it is taking the first D-sharp in the left hand in order to permit the right hand to approach the trill in an unconstrained way. Students should try out various ornaments: trills, mordents, appoggiaturas, slides. (I sometimes play a slide all the way down from the high D-sharp to the G-sharp in the measure just above, or between the two pedal notes in m. 89.) It is in principle fine to ornament all of the notes, or none of the notes or anything in between. The important thing is for the student to try things out, and react and think.

Example 10

Example 11

This month's discussion ends in the middle of a cadence, since the unresolved final note of m. 90 is resolved by the first note of the fugue subject of the final section. We will resolve this cadence and discuss the rest of the piece next month. ■

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In the wind . . .

by John Bishop

Expressly expressive

I once heard an orchestral conductor state that the pipe organ is not an expressive instrument because the player cannot alter the volume of a single pipe. This ignorant statement was part of his argument against including an expensive new organ in an even more expensive new concert hall.

One might respond that most of the instruments of the symphony orchestra are unmusical because they can only play one note at a time. By saying "most" I'm excepting the strings of course, which can play two notes at time—maybe three under special circumstances. So an orchestra (by definition) needs many instruments to play music, expressively or not.

Aha! In order for the organ to be an expressive instrument, it comprises thousands of pipes. And big groups of those pipes are enclosed in wonderful expression machines that give the organist all sorts of control over dynamics.

The first Swell boxes were prett simple affairs made of light wood with few shutters in front that were operate by a lever near the floor. You could pus the lever down and a little sideways wit your foot to latch it open, you could let slam closed, or you hold it halfway ope calf muscles a-trembling. Rigs like th are found on very old English organ and there are quite a few nineteent century American organs that still hav expression boxes like that. In 1996 I re stored an organ built by E. & G.G. Hoo in 1868 that had a "ratchet" Swell peda There was a sort of stationary woode gear whose teeth could arrest the mo tion of the pedal in five or six differen places. You could push the pedal a cer tain way to release the ratchet or yo could leave the shutters partially open a any of those positions. And it was a goo idea to release the ratchet as you opene the shutters—otherwise they said "click click-click" as they opened.

The development of the mechani cal balanced Swell pedal was a prett big deal. Most American organs buil between 1870 and 1900 have them. sturdy mechanical linkage connects th pedal to the shutters. Because gravit works on horizontal shutters, balance Swell shutters are almost always vert cal. You can take your foot off the Swe pedal and the shutters stay still righ where you left them. The only problem is that you have to remember to leave th shutters open when you're finished play ing to allow the temperature inside th Swell box to stay as close as possible t the ambient climate of the organ. Leav ing the shutters closed typically results i a different temperature inside the Swe box so the Swell won't be in tune wit the Great. That's not too big a deal b cause as soon as you open the shutter the temperature will moderate and th pitches will come back together—so you're halfway home and realize you'v forgotten to leave the Swell pedal open, don't worry about it too much!

If you get halfway home and wonder if you've left the blower running, then you'd better go back to the church.

And by the way, in most electro-pneumatic organs, the shutters are held open by springs, so when the organ is turned off the shutters open, no matter what position the pedal was left in.

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During the Great Revival of classic styles of organbuilding in the second half of the twentieth century, many of us got used to playing organs that had no expression enclosures. Twenty years into that movement, shutters started finding their way back into organs, and today new organs are built with very sophisticated collections of expression chambers including double expressions—those fancy divisions in which an expression box that encloses ten stops might also enclose another expression box with five or six stops. It's mighty effective when either very powerful voices (Tuba) or very soft voices (Unda Maris) are double-enclosed. The Tuba can start from nothing and Swell to a roar, and the Unda Maris can start from a whisper and vanish into thin air.

I often write about the organ as the most mechanical of instruments. (I'm glad that opinionated ignorant conductor didn't wade into this pond!) A large organ, especially with electro-pneumatic action, can look like a mysterious mechanical monster inside. It's no wonder that the sexton of your church mistakes it for a furnace room and piles it full of folding chairs. (You shouldn't be storing chairs in the furnace room either.)

The organbuilder is forever challenged by the conflict between the organ's mechanical identity and its artistic purpose. If the music is interrupted by too much mechanical noise, the effect is diminished.

The expression shutters can be the biggest culprit. Who among us has not sat through a recital or a worship service marred by a squeaking Swell shutter? I once attended a choral concert in a conservatory concert hall in which several pieces were accompanied on the organ. The Swell shutters were exposed as part of the façade, they squeaked, and the organist had an annoying habit of beating time with the Swell pedal. Flap-flap-flap, squeak-squeak-squeak was all we could hear.

I've made lots of service calls to correct squeaking shutters. Often enough a little squirt of oil or silicone is all that's needed—that'll be $200 for the travel and time and four cents for the squirt.

§

For the organist, the ideal expression shutters can silence the division when closed and allow it to roar when open. They can open or close in a nano-second, and if you operate the pedal slowly they provide infinite gradation of volume —no jerking from one stage to the next. OK, we'll see what we can do.

In order to achieve really effective expression, the box and its shutters must be massive. If you build a Swell box and shutters out of three-quarter-inch-thick wood, you're building more of a soundboard than an enclosure.

Let's start with the fabric of the box. The walls and ceiling of the box should both deaden and reflect the sound of the organ. Deaden—so when the shutters are closed there's no resonance going on. Reflect— so no sound is lost or absorbed by the interior surfaces. In other words, the sound should be effectively contained when the shutters are closed and when the shutters are open the sound should be propelled out through them.

Organbuilders have experimented with all sorts of construction styles. The simplest is heavy soft wood. Use two-inch-thick pine for the walls and you're doing pretty well. Try two one-inch-panels with an airspace between. Just as massive, but the airspace cuts down the transmission of vibration. How about fill the airspace with sawdust? That works great—the sawdust really absorbs sound so the box is most effective when closed. But it's a real drag when you're surprised by fifteen cubic feet of sawdust pouring out by accident when you're dismantling an organ.

There's a material called MDF (maximum density fiberboard). It is manufactured in 4′ x 8′ sheets like plywood. It's made from a sophisticated recipe, but it can be described simply as sawdust and glue cast into sheets. A sheet of three-quarter-inch plywood weighs about 65 pounds, heavy enough. But the same size sheet of MDF weighs 96 pounds. We have built a number of expression boxes using double-thicknesses of MDF. It's hard work because the stuff is so heavy, and because it's so dense it's hard to cut—it burns up saw blades like kindling wood. But it sure makes an effective tonal enclosure.

My first work in organbuilding shops focused mostly on classic-style mechanical-action organs. It was from that bias I heard or read that E. M. Skinner had built cement swell boxes. Cement swell boxes? How decadent. What I pictured was the newly poured foundation of a house with rebar (steel reinforcement bars) sticking up out of it. How could that be musical? But when I finally worked on an organ that had such a thing I realized that my youthful and ignorant bias was exactly that—a youthful and ignorant bias. In fact, the "cement" swell box has a structure of studs and joists something like normal wood-frame construction with heavy plaster surfaces, and a finish coat of Keene's Cement, which is an anhydrous calcined gypsum mixed with an accelerator used as a hard finish, or more to the point, hard plaster. The heavy structure of the walls and ceiling deaden the sound and the Keene's Cement surface reflects it—the best of both worlds. The expression chambers of the mighty Skinner/Aeolian-Skinner organ at the Cathedral of St. John the Divine in New York are built as free-standing rooms in the huge spaces some 90 feet up above both sides of the chancel. The walls are thick and heavy, and the surfaces are finished with Keene's Cement, and those powerful reeds sure go quiet when the shutters are closed.

I shudder to think

What about the shutters? Just like the boxes, there are lots of ways to build expression shutters. They are usually made of wood, ideally an inch-and-a-half thick or more. The edges are usually beveled so they effectively overlap when closed. The edges of the shutters where they come in contact with one another usually have heavy felt or some other soft material glued to them so they close quietly and tightly. Some builders make shutters out of metal and we've even seen them made of glass and Plexiglas. Just like the walls of the expression chamber, the best shutters are massive and shaped and fit so they close really tight. The more massive, the more they contain the sound of the organ.

The shutters are mounted in frames—we call them expression frames. Sometimes the shutters are vertical, sometimes horizontal. As I said earlier, it's easiest to build a balanced mechanical expression action if the shutters are vertical—that way there's no effect of gravity on the weight of the shutters. All you have to balance is the action itself.

Shutters are mounted in the expression frames with some kind of rotary bearing to allow the shutters to pivot. Most often you find a strong steel pin (axle) that pivots in a hole drilled in hard wood. The holes and pins are greased, and if the shutters are vertical, the bottom bearing is figured out so as to keep the shutter high enough that it doesn't rub against the wooden frame. In fact, those bottom bearings are often adjustable—if the shutter settles and starts squeaking against the frame, you can raise it with a turn of a screw.

Some organbuilders go the extra mile and use commercial ball bearings for mounting expression shutters.

It's also ideal for the shutters to be easily removable. In many organs it's necessary to remove shutters in order to tune, but you also want to be able to remove a shutter that has warped and needs to be planed straight.

And something to drive it

Some pneumatic expression systems feature an individual pneumatic to operate each shutter. Each contact on the expression pedal opens one shutter. (Most Möller organs work that way.) But it's more common for the shutters to be linked together by an action that is in turn operated by a single machine. The machines can be electro-pneumatic or all-electric. But what you're looking for is a combination of expression machine, linkage, and shutters that have a large enough travel so the shutters can close tight and open really wide, move silently when operated either fast or slow, and that have plenty of gradation between stages so that the range of expression seems infinite.

Most electro-pneumatic or electric expression machines have eight stages. It's generally agreed that for most organs eight-stage expression are sufficient. I think it was Ernest Skinner who built the first sixteen-stage machines. (Dear reader, if you know otherwise please share it.) Those machines are elegant, fast, and powerful. Dividing the travel of the console expression machine into sixteen stages really gives a smooth operation.

Mr. Skinner called his expression motors *Whiffle-trees*. The term Whiffle-tree was originally used to describe the system of harnesses and reins that tied a team of horses together, allowing the weight of the load to be distributed between the horses according to their individual strength. Mr. Skinner used that principal to harness a row of pneumatic motors together so that each motor (or stage of the machine) contributes to the motion of the shutters and collectively they equal the total motion of the machine. Skinner's Whiffle-tree expression motors were installed in thousands of Skinner and Aeolian-Skinner organs and in my opinion set the standard for electro-pneumatic pipe organ expression.

There are several suppliers to the pipe organ industry that have developed and market all-electric expression motors. The best of these use the powerful, compact, and quiet electric motors developed for wheelchairs. They are equipped with solid-state controls that translate the contacts on the console expression pedal into stages of expression. The organbuilder can adjust them for different distances of travel and adjust the amount of travel and the speed of each stage separately. So, for example, you can make the first step from fully closed be fast on opening (so it responds instantly) and slow on closing (so it doesn't slam shut). Mr. Skinner handled this by using a small exhaust valve for the first stage, which choked its speed, keeping the shutters from slamming.

A rose by any other name

You'll notice that I'm saying *expression box, pedal*, or *shutter* rather than *Swell box*. It's true that most organs with expression are two-manual organs, and on a two-manual organ the expressive division is usually a Swell. But keeping the language clean, I'd rather not put a Choir division in a Swell box—so expression is the word.

§

In a large organ, the shutters of one division might collectively weigh close to a ton. It takes a lot of thought and skilled engineering to get that amount of stuff to move quickly and silently in response to the artistic twitch of an organist's ankle. But when an expression chamber is working well, it can produce breathtaking effects. As familiar as I am with all that gear, I love to think of that big mass of stuff on the move when I'm sitting in the pews listening to an organ. It's difficult to express. ■

Music for voices and organ

by James McCray

Holy Week: Palm Sunday, Good Friday, and Easter

> When Jesus died that appallingly harrowing death, his life seemed to have terminated in complete failure and disaster; the world's opinion of the event, instead, proved to be strangely different, providing the greatest paradox in all history.
>
> *Jesus: An Historian's Review of the Gospels*
>
> Michael Grant

Holy Week, the last week in Lent, is a roller coaster of emotions in the church, and, therefore, the choral music appropriate to worship services during these days requires a wide variety of texts and musical styles. In some churches Palm Sunday features the reading or singing of the Passion story; in others the joyful musical shouts of "Hosanna" dominate the service. Later in the week, Good Friday and Easter services have contrasting moods, so even more diversity is needed. Eventually, the week ends in a spirit of triumphant radiance.

Other emotional celebrations of the week include Holy (or Maundy) Thursday, which commemorates the washing