The Guitar Controller's Guide to Imitative Synthesis

Part Four: Pipe Dreams

BY BILL PURSE

Although nothing can exactly duplicate the complex sonority of a large pipe organ, synthesized or sampled pipe organ patches make an especially potent sound palette available to guitar synthesists. For centuries the pipe organ has been the instrument of choice in worship, has filled concert halls and echoed throughout ancient cathedrals, has highlighted Rolling Stone and Led Zeppelin recordings, and has been featured in concerts complete with light shows at the Fillmore East by organ virtuoso Virgil Fox. Although your next gig probably will most likely not be a Chapel Meister position, studying idiomatic techniques of pipe organ imitation will widen your synthesis horizons.

About the Instrument

Much of the terminology we presently use as synthesists has evolved from jargon in the pipe organ field.

Synthesizer octave ranges relate to pipe organ lengths; an eight foot pipe produces a pitch that corresponds to the pitch written, while a four foot pipe sounds an octave higher and a sixteen foot pipe sounds an octave lower. The pipe organ ranges in pitch from C-2 to C7, triggered by two or more keyboards (each called a *manual*, with as many a seven per organ) and a set of pedals (*pedal clavier*). Manuals are not velocity-sensitive; the swell pedal provides foot controlled dynamics by opening and closing shutters in the pipes. The lower pipes take longer to speak, similar to the tracking of a pitch to MIDI guitar synth. The sounds of many different pipes are combined in "registrations" similar to the way that patches in a synthesizer are combined into performance combinations.

Modern organs may have between one and several hundred sets of pipes called *ranks*, with each rank having a distinctive tonal quality. These ranks can be assigned to one or more manuals in layers, a precursor to today's additive synthesis. A collection of ranks is called a *division*, and is often given a descriptive name, such as swell organ, great organ, positive organ, or choir organ. Each of the ranks can be turned on or off by means of a knob or tab located at the front of the instrument, like a synth preset or patch.

While there are many different sizes and shapes of pipes there are only two basic sound types—the Flute pipe and the Reed pipe. Flute pipes are like a recorder where air is forced over a lip to produce a sound. Similar to a flute, these pipes produce primarily the fundamental—with very little overtone content. Reed pipes contain a brass reed like a simple New Year's Eve horn, and greater waveform overtone content. There are two basic varieties of reed pipe: chorus reed stops and solo reed stops. Chorus reed stops generally produce tones that sound "buzzy", powerful, and possess a penetrating effect. Solo reed stops sound like the instruments they are named for, i.e trumpet, clarinet, and English horn.

Programming Tips

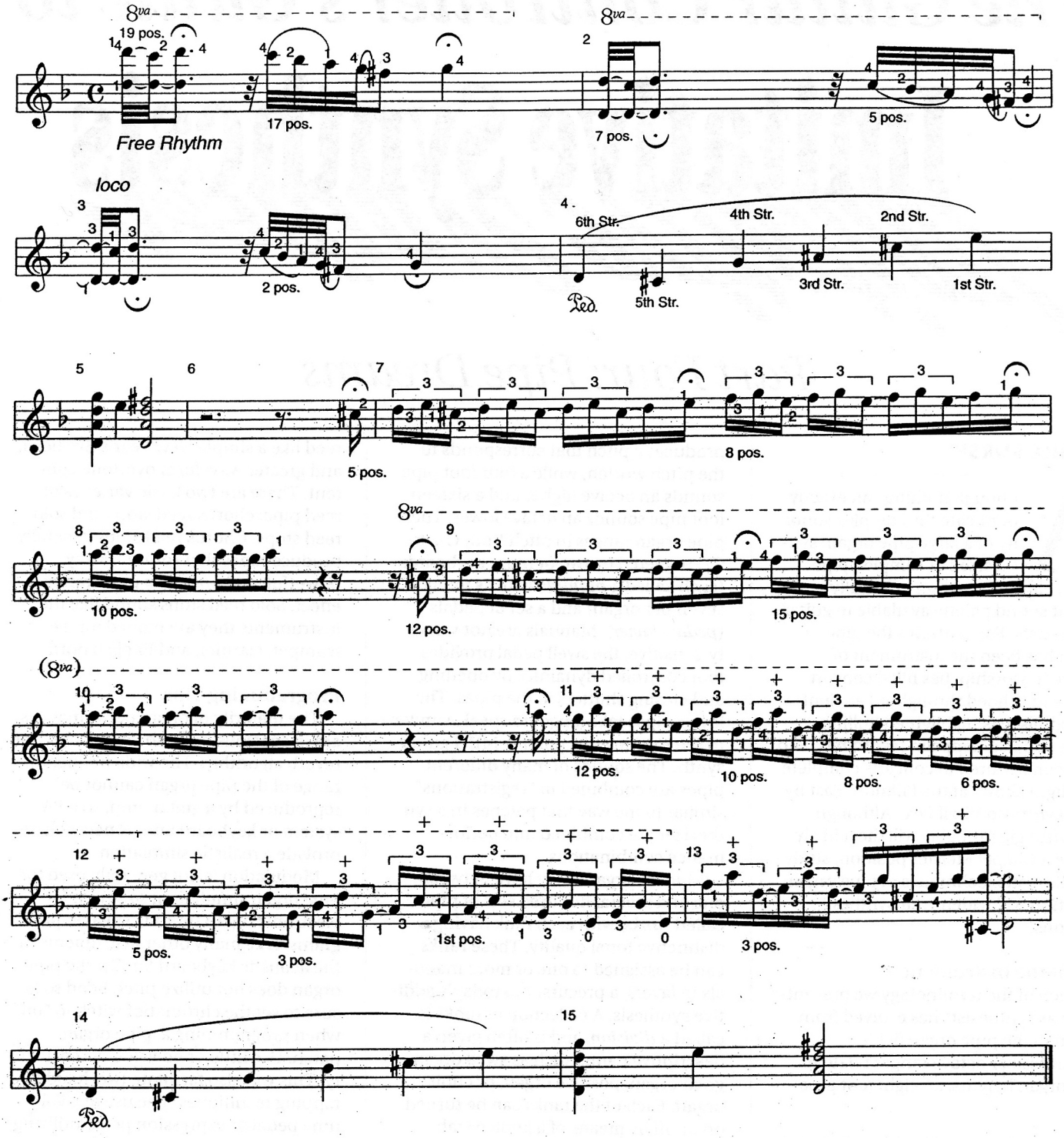
The majority of organ performances are in spacious halls, so use a Large Hall reverb algorithm. The wide frequency range of the pipe organ cannot be reproduced by a guitar amp, so a PA system or keyboard amp is necessary to provide a realistic simulation.

Modulation is not generally used for pipe organ simulation, so save it for electronic organ rotating speaker programs. Like many other instruments in the acoustic keyboard family, the pipe organ does not utilize pitch bend so be sure to set the chromatic switch to "on" when programming a pipe organ patch. Use little or no velocity sensitivity. This will also facilitate two-handed tapping techniques. The use of a volume pedal or expression pedal utilizing continuous controller number seven is a must to simulate organ swells.

The two basic types of pipes should be taken into consideration when creating a combination in your synth module. Experiment combining the basic pipe patches with flute tones; for example, add pan flute to various pipe organ patches. The solo reed sounds (clarinet, English horn, chimes, bells, trumpet, and cornet) add a completely different

Bill Purse is the Chair of the Guitar Department and Coordinator of Music Synthesis for the Duquesne University School of Music. He specializes in developing accelerated learning techniques for guitar, and has been a consultant for Fender Musical Instruments and Apple Computer. He has performed in concert with Al Di Meola and Emily Remler, and has toured the world with the synthesizer ensemble AERGO.

Toccata—J.S. Bach



texture when mixed with pipe organ patches. Experiment with these combinations in layers, velocity switched, velocity mixed, or multi-split. Always be sensitive to maintaining compatible levels.

You can add authenticity to your organ patches by programming in a chiff in the attack portion of a sound (noise component at the start of a pipe, like the sound of blowing over a bottle); many modules have this sound as a timbre and can breath realism into your patch. Try combining two pipe organ timbres and slightly detune one of the timbres to emulate the natural "slightly out-of-tune" quality of many pipes.

The range of the guitar controller can

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be extended to cover the extensive range of the pipe organ by tuning the lower two strings, the 6th and 5th, an octave lower. It is also interesting to set the 4th string to velocity switch where a low velocity will be an octave lower than the string's pitch and the velocity above the threshold sound at pitch and the second timbre.

Bach Toccata

Two hands and pedals create a wide range for sounding note possibilities, so use two-handed techniques to handle the large interval leaps. Notes with a "+" are to be tapped with the right hand index finger and slurred notes hammered-on with the left. Set the velocity sensitivity so that a light pick stroke or right hand tap will trigger a high or maximum note volume.

By expanding our awareness of traditional instruments we grow as musicians, arrangers, and songwriters, but it is just as important to go beyond the scope of imitative synthesis and enter the world of sound design and abstract synth programming. The next featured article will present the necessary tools and principles for creative abstract synth programming. So stay tuned (no pun intended) and I hope you'll sample (sorry) my next installment: "The Guitar Controller's Guide to Abstract Synthesis".

Bibliography

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Sound Canvas

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3. Set up channel 8 to be your "Poly Wet" channel—chorus about 40, some more reverb.

4. If you need to, set up additional channels for other effect combinations.

Then, when I set up different presets on the controller. For example, the "GS Vibes" preset transmits in Poly on channel 8 for a great wet vibes sound, the "GS Piano" preset transmits in Poly on channel 7 for a good acoustic piano sound with no reverb, and the "GS Trumpet" patch transmits in Mono on channels 1-6 for realistic horn sounds.

Pro: Understands Hold and Sostenuto Messages—Even the Soft Pedal

For GR-50 and PMC 10 footcontroller owners, this is a boon, since you can get around the GR-50's crippled Hold and Sostenuto implementation (at least as far as the external Branches are concerned). Send the GR-50 Controller 64 and 66 messages on its control channel, and it will rechannelize these and send them to the Canvas with wonderful results.

The Soft pedal is a subtle effect that I can barely hear on the Piano patch, and can't hear at all on the others, but it's a step in the right direction.

Con: Typical Roland Manual

Need we say more? At least the device itself is fairly simple, so there's not that much to explain badly.

Pro: Some Fine Sounds

The pianos are quite usable. The violins are nice. Some of the trumpet, muted trumpet and sax sounds really work. The bandoneon is great. The 5ths Lead synth sound is stunning. All in all, there are a lot of great samples to work with, although the programmability of the sounds is limited (see the section on GR-1 sounds elsewhere in this issue for more information).

Conclusion

This is an excellent sound module for sequencing. It gives you a basic library of very useful sounds. For a live performance module, it also works well, but you have to be somewhat sophisticated to get the most out of it due to its lack of performance presets.