

# Comparing Electronic and Acoustic Pianos

BY BOB HINZ

New developments in technology have influenced music in general and keyboard players in particular. The variety of electronic keyboard features and models available offer a wide range of choices for educated buyers but may bewilder pianists purchasing an electronic instrument for the first time. For many of these players, the only familiar aspect is the keyboard itself.

Electronic keyboards produce sound either from a recorded version (or sample) of the timbre or from keyboard circuitry that synthesizes the sounds electronically. Roughly half of electronic keyboards use the first method and half the second. Many newer keyboards combine both methods; for example, the instrument may use a recorded version of a timbre for the basic sound but may also include features for manipulating the sound electronically, altering the original timbre.

Many electronic instruments sold today produce a piano sound by triggering recorded samples of piano timbres for each note. These pianos are referred to as digital because they use a numerical (digital) system to store sounds. Some instruments feature several individual recordings or samples for every key, each sample representing the timbre at a particular dynamic or key-velocity level. The resultant sound quality is quite good, but the requisite memory or storage space

makes the instrument more expensive. More commonly, these recorded piano timbres are spread out over four or five keys by transposing them electronically, altering the pitch of the sample as each key in the keyboard area is played. Instruments using this method are less expensive, and the quality, depending on the care taken in making the samples, is still generally quite good.

Nevertheless, no digital piano can precisely duplicate the sound of an acoustic piano because that sound is partially a product of room or concert-hall acoustics. A sound reproduced electronically is generally devoid of these acoustical qualities. Also, each note played on an acoustic piano affects all other notes sounding simultaneously, and the soundboard resonates with each sounding string. Although a digital piano can reproduce the piano timbre almost perfectly, it cannot duplicate the acoustics surrounding each note or group of notes.

Many keyboards include features to compensate electronically for this deficiency. On the Roland FP-8 and Wersi CPF-1 digital pianos, note position panning creates a sense of movement across the keyboard. The instrument produces sound in stereo so that a note's position on the keyboard corresponds with its left-to-right position between two stereo speakers; thus the lowest pitch on the keyboard sounds

farthest left, while the highest pitch sounds farthest right. As a player moves up the keyboard, the sound gradually moves from left to right.

The effect of the damper pedal in an acoustic piano is difficult to imitate electronically. When the damper pedal is pressed, all the strings of the instrument vibrate sympathetically with any strings set in motion by keys actually played; thus each individual sound affects the overall sound. On a digital piano this resonance is lost; the damper pedal sustains the notes played, but there is no interaction among the individual pitches.

By way of compensation, many digital pianos and synthesizers use reverberation, especially in stereo, to alter and enhance the basic sound electronically. Various reverberation settings, corresponding to the acoustics

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of a small room, large room, hall, or cathedral, enhance the sampled piano sound, making it more lifelike by adding a room or concert hall ambience. While it can never duplicate the effect of an acoustic piano's damper-pedal resonance, reverb results in considerably more convincing electronically produced sounds. Future digital pianos may feature reverb that is triggered by the damper pedal specifically to emulate the sympathetic string vibration of the acoustic piano. In addition to the basic damper pedal, also known as a pedal switch or switch controller, recently introduced digital pianos include other pedal options: sostenuto pedal, soft pedal, and even a pedal for basic volume.

The sound quality of a digital piano in a live performance depends on the quality of the audio system used to amplify it, in addition to the keyboard's inherent sound quality. Two separate speakers produce a more realistic sound than a single monaural speaker; in general the larger the speakers, the better the sound. Heavier speakers make touring more difficult but are still far easier to transport than a grand piano.

Having often played nine-foot grand pianos, digital pianos, and other electronic keyboards, with both mono and stereo sound systems, in both small and large concert halls, I have found the differences not as great as one might expect. The hall itself is significant to the overall sound, rendering differences in the sound sources — an acoustic instrument versus speakers — less noticeable.

An electronic keyboard's success in emulating the sound of its acoustic counterpart also depends on how the instrument is used. A digital piano is much more effective as part of an ensemble than as a solo instrument, because in an ensemble the other instruments mask the unnatural aspects of the digital piano's tone. Also, a digital piano sounds most realistic when amplified to the volume level of an acoustic piano in the same room. A too soft or too loud digital piano sound is unconvincing.

Because the length of each sounded tone on a digital piano may depend on the amount of memory storage space, the decay of the sound is often shorter than on an acoustic piano. Thus the tempo and texture of the music partially determine how effectively an electronic keyboard can substitute for an acoustic one. Long notes

at a slow tempo generally reveal a piano sound's acoustic or electronic origins more readily than fast, thick-textured music.

Digital pianos fall short of acoustic pianos most noticeably in soft playing. The subtle changes in tone color that result from different key velocities are difficult to emulate electronically. Some keyboards use as few as two different timbres for each key: a brighter timbre for faster key velocities and a darker timbre for slower ones. Those with a crossfade feature gradually mix the brighter timbre with the darker timbre as the velocity level increases, until the brighter replaces the darker. The variety of tone color for different key velocities on a digital piano is directly related to the size of the unit's memory for sound samples; the more memory, the more expensive the instrument.

Digital pianos are especially practical in the recording studio because the sound is transmitted electronically via cables; the engineer does not have to spend time arranging microphone placement. Although a digital piano recorded directly into the mixing console may sound remarkably similar to an acoustic piano recorded with microphones, the former may sound sterile because it is not affected by the acoustics of the surrounding space. Recording engineers sometimes augment the direct electronic signal with sound transmitted by speakers and microphones to create the illusion of an acoustical environment and better emulate the sound of an acoustic piano.

Because virtually all digital pianos are MIDI-compatible, computers and sequencing software make them attractive to composers and solo performers working with accompaniments. Many digital pianos also have built-in sequencers for recording what is played. While these usually can record only a limited number of notes, they are valuable for singers and instrumentalists rehearsing without an accompanist. Moreover, almost all digital pianos and electronic keyboards made today include a feature for transposition to any key. Tuning is easily altered using a rotating knob or slider controlling a digital value indication.

Most digital pianos on the market have a limited number of unalterable preset sounds. In some cases basic aspects of these sounds can be altered, but not to the degree possible in a sampler or programmable synthesizer.

A digital piano's preset sounds include not only acoustic piano but also such timbres as electric piano, strings, and mallets. A player can combine these additional timbres with the basic piano sound, balancing two timbres through an internal setting or a volume pedal.

Another concern in purchasing a digital piano is the instrument's keyboard. Virtually all electronic keyboards made today are touch sensitive, also known as velocity sensitive; the volume or timbre of a note is directly related to the force applied to the key. Digital pianos such as the Roland FP-8 allow a player to adjust the touch in terms of how hard the key must be struck to produce a certain level of brightness.

Most touch-sensitive synthesizers and electronic keyboards have non-weighted keyboards, but only a weighted-action keyboard emulates the feel of a grand piano keyboard. The difference can have a psychological effect on how a player hears the sound; the more a keyboard feels like a grand piano, the more it seems to sound like one. Most 61-key keyboards have non-weighted action, and most 88-key keyboards have weighted action; either option turns up on 76-key keyboards.

Many electronic keyboards have no built-in sound system. First-time buyers may prefer an instrument with built-in amplification, but generally the sound quality is inferior to reproduction using an external audio system. Sound quality, volume requirements, and financial considerations will determine whether a keyboard player purchases a separate sound system for live performance.

In selecting an instrument, the most important criterion is sound quality. Listen to the instrument using headphones, a small portable amplifier, a high-quality sound system, and the keyboard's internal sound system if any. The feel of the keyboard action is another important consideration. Some dealers allow a buyer to take home a floor model to try out overnight.

While a digitally recorded compact disc can never fully capture the experience of a performance, it is the next best thing to being there. Similarly, although digital pianos will never replace acoustic pianos in performances and studio recordings, a high-quality instrument offers a practical alternative to the acoustic piano in a wide variety of situations. □