ROLAND U-20

SAMPLE PLAYBACK
KEYBOARD

By Jim Aikin

FEW PLEASURES IN LIFE CAN COM-
pare with seeing a good idea reach its
full potential. When Roland introduced
their U-110 rack-mount module last
spring (see Keyboard Report, June '89), it was
clear that they had a good idea—sample play-
back with plug-in PCM sound cards and a few
simple types of programmability, just the ticket
for the MIDI musician who needs some extra
voices and doesn't have time to become a synth
whiz. Unfortunately, the U-110 had quite a bit
of hiss in its sound. So it's a pleasure to report
that the U-20 keyboard follows through on
the idea that the U-110 only foreshadowed.
In a word, the U-20 is *quiet*. It also has some
excellent performance features that make it
a very effective master keyboard. And the
seven U-110 PCM sound cards that are cur-
rently available are compatible with the new
unit, so it makes its start in life with a very
reasonable sound library already in existence.

It's *not* simply a U-110 with a keyboard
added, however. Significant differences: There
are only two PCM card slots instead of four,
but a program card slot has been added for
storing your own timbres and multi-timbre
combinations. The signal output section has
been simplified and made more flexible, and
built-in reverb, delay, and chorusing are now
featured. Individual drum sounds can now
be tuned, which makes customizing your kit
a lot easier. And real-time control over the
sound parameters adds immeasurably to the
expressive possibilities.

Overview. The U-20 has quite a variety
of sampled sounds in its 3-Meg ROM mem-
ory. These can be split and layered across
the keyboard, and adjustments can be pro-
grammed into the loudness envelopes and
other parameters, so it's quite possible to
come up with your own sounds. A full set
of percussion samples is included. While the
U-20 has no built-in sequencer, sequencer

users will be
happy to learn that it will play
up on up to seven channels simultaneously—six
for ordinary musical sounds plus a seventh per-
cussion channel.

As in other Roland instruments, you have
to wade through several levels of programming
architecture and nomenclature—keyboard
patches, sound patches, parts, rhythm parts, tim-
bres, tones, and more. Each of these areas con-
tains some powerful features, but when you con-
sider that the primary appeal of this instrument
is likely to be to players who don't want to get
their hands dirty with a lot of sound program-
ming, we can't help feeling that the program-
ming process should have been streamlined
somehow. (In all fairness, we're not sure how.)
Menu selections with names like "MIDI" and
"timbre" are found in several different places,
each with different groups of parameters under

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them, so the program-
ming does entail a
learning curve. Being
experienced at this sort
of thing, we were able
to get up to speed on
the U-20 in only a cou-
ple of hours, but the
potential for confusion
is certainly there.

The memory con-
tains several different
types of data. First, there are 64 simple
"keyboard patches." These contain some
MIDI transmission parameters and some
performance parameters (such as whether
the arpeggiator is switched on or off).

The sounds are called not sounds but
"timbres." The memory holds 128 of
these. A timbre consists of a "tone,"
which is a sampled sound or several
samples split across the keyboard, along
with parameters for things like LFO rate,
envelope, and pitch.

The most important area of the memory for
performance purposes is the 64 "sound patches."
Each sound patch consists of up to six timbres,
which at this point are assigned to "parts." (There
is also a seventh "rhythm part," which plays the
percussion sounds from one of the four pro-
grammable percussion sets.) The parts can be on
the same MIDI channel, in which case they will
be split or layered, or on separate channels for
sequencer operation. They can be routed to dif-
ferent outputs and restricted to key range and ve-
locity range windows. The sound patches also
contain parameters for selecting controller op-
erations and different reverb and chorus algorithms.

Keyboard patches and sound patches can
be selected independently, or, in "link play"
mode, you can hit the program select buttons
and select both a keyboard patch and its asso-
ciated sound patch at the same time. This
is a very flexible system, especially for live
performance, but the LCD display looks ex-
actly the same no matter which of the three
items are going to be recalled when you hit
the program select buttons. (If you hit the
cursor button, some useful information on
MIDI channels will appear; this is *not* the
same in the two modes.) Tiny built-in
LEDs on the keyboard and sound button tell you
which mode you're in, but these are hard
to see from some angles.

Keyboard patches, sound patches, and
timbres can all be given names, which
makes it much easier to keep track of your
work. It's important to remember to name
things; if you don't, you could end up with
a slap bass timbre in a sound called Choir.
Since you don't see the timbre names when
you're at the sound level, failure to enter new
names could make your life less than idyllic.

The manual is a lot better than Roland
manuals used to be, but it isn't as helpful
as it could be for the first-time user who is
trying to sort out all of this stuff. While it's
comprehensive, it's sometimes perplexing.
For example, it jumps right in and shows you
how to use some of the macro shortcuts
found under the "jump" button. Don't mis-
understand—these are great shortcuts. The
trouble is, the hierarchical tree structure of

the edit menus, which is what you're jumping around in, is not even mentioned until more than halfway through the manual, and no comprehensive diagram or list of the menus is ever given! On the positive side, when you're navigating through the menu tree, the top line of the LCD always displays exactly which branch you're in, and little arrows at the ends of the lower line show when you can cursor off to a new page at left or right. These visual aids, which some manufacturers don't provide, make the learning process much easier.

Tones & Timbres. Let's start with the stuff of which music is made, and delve into the technological end later. Many of the sampled tones in the U-20 are the same as those in the U-110, including piano, some organs, a good variety of basses (some real and some synth), punchy vibes and marimba, two excellent saxes, flute, shakuhachi, and so on. If memory serves, the loop in the bottom choir sample has been smoothed out somewhat, but it still isn't our favorite choir sound. New this time around are more than 20 popular sounds taken directly from the D-50 and JP-8. The partials of the D-50 sounds no longer have fractional scaling, so the U-20 isn't really a substitute for the D-50, but it's a reasonable imitation. Basic synth waves (two sawtooths and three pulses) and a couple of attack transient/overtone sounds let you perform additive synthesis tricks by programming a separate timbre for each component of your desired sound and then layering the timbres as parts in a sound patch. These features add a lot to the broad sonic palette offered by the instrument.

One limitation should be noted. All tuning, both coarse and fine, is handled at the level of the timbre; no tuning parameters are found in the parts of the sound patch. What this means is that if you should happen to want to layer two timbres with a detuning between the layers, you have to use up an extra timbre memory slot simply to program the detuning. Most synths include tuning parameters in their combination programs, but the U-20 doesn't.

Many of the 128 ROM tones are actually layered or velocity-switched versions of other tones, but many tones are multi-sampled across the keyboard, and the entire percussion section is considered one tone, so the real number of available tones might be larger or smaller than 128, depending on how you look at it. When a tone consists of a detuned layer, you can program the amount of detuning separately for each timbre—one of a number of unexpected bonuses in the design of the U-20. (For some odd reason, the tone called A.Piano 4, which is one of the detuned layer tones, is not affected by the detune control.)

Once you've chosen a tone for your timbre, you can program other parameters, including coarse and fine tuning, basic loudness, loudness response to channel aftertouch and velocity, loudness ADSR envelope, auto-bend (pitch-shift on attack) rate and depth, and pitch response to both channel and polyphonic aftertouch.

The programmable envelopes are now AD-SRs, which is a significant improvement. (Those on the U-110 offered only attack and release control.) Many of the instrument's parameters have a range from –7 to +7. This isn't very precise con-

trol over an envelope segment, but it's nice to see that velocity response can be negative, as this allows you to do velocity cross-fades between two different timbres. Each tone has an invisible preset envelope, and the ±7 parameter adjustment adds to or subtracts from this preset value. If the attack rate is already instantaneous, as it is on most tones, the range of programmable values between 0 and +7 has no effect, which is kind of a waste, in our opinion.

The pitch-bend depth can be different for positive and negative bends, which is a feature you don't see too often, and is separately programmable for each timbre. Bends down can be as much as 12 half-steps, or two or three octaves. Bends up can be up to 12 half-steps. Too bad you can't cause a "downward bend" to bend up or vice-versa, but the programmable depth lets you layer three timbres and bend single notes into chords, which is a cute effect once in a while.

The vibrato section has a couple of fairly unusual features. Delay and rise time can be separately programmed, and the waveforms include not only square but "trill 1" and "trill 2." The square wave moves the pitch away from center in both directions, while trill 1 moves it only up from center and trill 2 only down. A "random" wave does triangle-wave vibrato in varying depths but at a constant rate.

Apparently, the noise in the U-110 was caused by a technical problem, not by any inherent noise in the sample data. When you plug U-110 cards into the U-20, they sound just fine. The cards contain some very good samples. We were especially taken with the Ethnic card, which contains several tabla hits, some Japanese percussion, nicely articulated koto, and an adequate, though certainly not inspiring, sitar. The Orchestral Strings card has harp and solo pizzicato strings, but the main sounds are solo violin and cello. These are looped with vibrato, which adds to the realism but forces you to plan your part carefully in order to avoid sonic artifacts, such as adjacent notes with too-fast and too-slow vibrato when you cross from one sample to another. The Latin & F.X. Percussions (sic) card complements the built-in percussion very nicely, and the two are set up so that together they fill out the whole keyboard with drum sounds. In the end, our only complaint about the plug-in sounds is that the U-20 only has two card slots compared to the U-110's four. The two slots are recessed, however, making it very difficult to knock a card out even if you leave it in while transporting the unit. This is a great idea, one we wish other manufacturers would pick up on. For some reason, though, the U-20's RAM card slot isn't recessed. Oh, well.

Rhythm Section. Four different drum kits can be stored in memory. Each key on the keyboard can be assigned to any instrument sample in the drum set, or to any other tone in memory. Each key can be individually tuned, panned, routed through reverb or chorus, and given volume level, velocity sensitivity, envelope, and auto-bend values. Up and down pitch-bend values are global for the entire set. This layout is a significant advance over the U-110, and makes the U-20 quite competitive in the percussion department with more expensive instruments like the Korg M1. In some ways it's even better: A pitch randomize parameter, separately programmable for each drum, lets you give more realistic shading to instruments like bongo and cymbals. A mute key parameter lets you choose which other key will mute any sound, so you can not only cut off an open hi-hat with a closed one but cut off the ride cymbal with a tom-tom if you want to—not useful too often, but a well-thought-out bit of design. And the individual control over envelope segments lets you do things like turn a crash cymbal into a smooth mallet roll without affecting the attacks of any other drums.

Output & Effects. The U-20's output section is both simpler and easier to use than the U-110's. For most home studio applications it should provide plenty of versatility. There are four outputs in all, two stereo pairs. If no plugs are inserted into the "dry" outputs, any signals routed there will also be heard at the "mix" outputs. If you route two parts to the dry outputs and pan one left and the other right, the dry outputs become individual sends for those two sounds.

The mix outputs are the only ones on which you'll hear the built-in effects. Every part (and every drum sound in a percussion kit) can be given its own output routing; stereo panning has a resolution of ±7. Another first for the U-20 is the optional "random" setting of the pan parameter, which reassigns each new note to some point in the stereo field. We found this rather disorienting, as it prevented the sound from having a clear spatial location, but it's good to see Roland pioneering some new concepts.

Each part in a sound patch can be routed to either the chorus or the reverb. In addition, for each sound patch the output of the chorus can be pre-reverb or post-reverb. In other words, you can have some parts be chorused and some not chorused, and the chorused sound can be either reverbed or not. We liked the sound of the effects a lot; they compare quite favorably with the built-in effects on other synths.

The reverb offers a choice of two hall algorithms, three rooms, a gate, and two types of delay. Programmable parameters include reverb (or delay) time, processor output level, and delay line feedback. The time value can be set from 0 to 31, but while the longest hall time is quite long, the longest gate time is fairly short: You can't do those long Phil Collins gates. A delay feedback level of 31 produces repeats that last well over two minutes before they finally fade out.

Chorus algorithms include two basic chorus types, another with feedback, a flanger, and a short delay line that works very well for slapback and metallic ringing effects. The parameters are processed signal level, delay time, LFO rate,

depth, and feedback.

Performance Controls. You wouldn't expect this many options on an instrument in the U-20's price range. We're talking programmable one-finger chords, two programmable expression sliders and an expression pedal input jack, a keyboard that transmits release velocity, and a sound generator that responds to polyphonic as well as channel pressure. (The U-20 keyboard only transmits channel pressure, however.)

Lest we forget, the keyboard itself has the same light, springey feel as the one on the W-30. The pitch-bend/mod lever is also of the standard Roland type.

The two programmable sliders are reasonably positioned in the left-hand area, though some people might feel that they should have been nearer the outside edge, in the position occupied by the master volume slider. They can be assigned to any unused MIDI controller number, and can transmit on the global channel, on the same channel used by the current keyboard patch for playing notes, or on a separate controller channel defined for that patch. Three different controller messages, including these two, can be used to control just about any parameter that has an audible effect, including loudness, any of the envelope segments, auto-bend depth or rate, detune depth for layered tones, chorus level, rate, or feedback, reverb level, delay line feedback amount, or vibrato rate, depth, waveform, delay, rise time, or even the amount of vibrato response from the modulation lever.

Only three selections can be made per keyboard patch, but this should usually be plenty. If you're controlling the U-20 from a sequencer, you could conceivably set up a series of keyboard patches and switch from one to another with program changes and thereby get quite a number of parameters under real-time control in a single sequence. We did have to do a bit of manual-reading and head-scratching to get the chorus and reverb parameters to respond to the sliders, as a software switch in another area had to be set to the right position.

The one-finger chord feature is a modest addition to the instrument, but musicians who aren't into wild-eyed experiments are sure to find this feature more useful than a tuning table. If you need to play some tricky accompaniment rhythms, you could set the chords up in advance and greatly simplify the passage. Or how about scales in diatonic sixths with no fingering hassles? Tons o' fun. Eight different chord sets can be programmed. A set contains a different chord for each note in the chromatic octave, and each chord can contain up to eight notes. The chords will be repeated, transposed up or down by octaves, in each octave of the keyboard.

Two front-panel buttons, labelled "chord 1" and "chord 2," are used for recalling chord sets in live performance. Which of the eight chord sets will appear when the buttons are pushed can be programmed individually for each keyboard patch. Also programmable within the keyboard patch is an offset value for the chords, so that diatonic sixths could appear in the key of D in one tune and in F in the next tune.

The keyboard becomes monophonic when the chord feature is in use, which is a shame, as it prevents you from doing bizarre tone clusters with two or three fingers. Retriggering on keyup can be switched on or off, which lets you play trills more comfortably. The release velocity sensing of the keyboard comes into play here: If you hold one note and hit another repeatedly, the held note will retrigger on each release with an attack velocity equal to the release velocity of the key that was just released. This allows you to do rapid chord trills with controlled dynamics—an effect we've never heard before from an electronic keyboard.

MIDI Implementation. In addition to the real-time controller goodies mentioned above, the U-20 has some important features that help in configuring it to the rest of your rig. Each keyboard patch can transmit on a programmed channel if desired. Thus you could set up 16 keyboard patches to the 16 channels and have one-button rechannelization of your output. Alternatively, a keyboard patch can be assigned to the global "setup" channel. This allows you to change keyboard patches to access their other features without changing channel. Some clear thinking went into this design. One definite limitation (not to keep you in suspense) is that while the keyboard will play six-way splits of the internal sounds, it transmits on only one MIDI channel at a time. The arpeggiator can transmit on a second channel, but since the arpeggiator can't sync to incoming MIDI clocks, it's hard to get too thrilled about this.

When it comes to receiving program

changes, the U-20's designers faced a challenge, as three different types of "objects"—keyboard patches, sound patches, and timbres assigned to a single sound patch—might need to be addressed by external commands. Each of the first two can be assigned its own global receive channel, or can be switched to ignore all program changes. Within a sound patch, each part (timbre) can receive program changes on its own channel, provided that a global "timbre receive" switch is switched on. There is no remapping of received program numbers, however.

Each keyboard patch can transmit a program change when called up from the front panel. You can choose any program number you'd like, and the message can be sent either on the keyboard patch's own note channel, on its separate "control" channel, or on the global channel. The instrument doesn't send program changes when sound patches are selected, but this shouldn't be a problem in most cases, as it's easy enough to set up keyboard/sound patch pairs and select the keyboard patches when playing live.

One nice feature that we've never seen before is a velocity transmission range setting. This allows you to scale the velocity output from the keyboard to a restricted range, which could be ideal for controlling other modules (such as an old-model DX7, which really prefers not to see velocities over 100). Inverted ranges can be set, but this won't allow you to do velocity crossfades, as the internal sound will also receive the inverted output. The velocity range is separately programmable for each keyboard patch.

In our tests, the U-20 didn't respond at all

well to dense MIDI data transmissions. First, we sent it a 120 bpm sequence playing a solid eighth-note rhythm of chords containing 11 or 12 notes each, with the notes spread across five MIDI channels—three-note chords on one channel, four-note chords on another, and so on. None of the parts were playing dual-oscillator timbres, so we had plenty of voices to spare, and the "voice reserve" parameter was set properly to reserve enough voices for each part. Even so, the U-20 started lurching—not horribly, but badly enough to mangle the groove. When we programmed a five-channel sequence of more reasonable, musical parts at the same tempo, the instrument had enough breathing space to perform acceptably.

The same type of sluggish response became apparent when we programmed a multitimbral layer and played some chords from the U-20's own keyboard. We set up a sound patch with three timbres layered, one using a single-oscillator tone and two requiring dual oscillators because of detuning within the individual tones. In other words, for each keyboard note five voice channels had to be turned on by the instrument's microprocessor. We then played four-note chords on the keyboard, and heard very audible smearing of the attacks.

Curiosity aroused, we hooked up a sequencer to find out whether the MIDI data output was being smeared, or on the internal voices. With the sequencer running at 120 bpm with a clock rate of 240 ppq, we performed the layered four-note chords in a regular eighth-note rhythm. We found that with the 1.03 system

ROM that was originally installed when we received the instrument, the U-20 required an average of more than 10 clock pulses to send each note-on, which works out to about a twelfth of a second to turn on a four-note chord—not an inspiring performance, to say the least. We later received the 3.01 ROM, which showed a significant improvement, averaging around 7 clocks per note-on with the same layered sound. If you already own a U-20, we definitely recommend that you get the update ROM. (To determine the ROM version of your U-20, go into ROM play mode, then hold down the mark and jump buttons and press enter. This puts you in test mode, and the first screen will show the version. Caution: *Do not do anything else while in test mode!* It is not intended for users, only for service personnel, and fiddling around could seriously mess up your instrument. To exit, hold down mark and jump while pressing the exit button.)

With slow-attack pad sounds, this kind of timing response would never be noticed, but tight rhythm comps would definitely suffer. When we chose a sound patch for the U-20 that required it to turn on only one voice channel per note, its response time improved dramatically, to about 3 clocks per note-on. And when it was set to transmit MIDI without sounding its own voices, the transmission was virtually instantaneous. (For comparison, our M1 showed an average of 1.5 clocks per note-on when we played the chord in single-voice, dual-oscillator mode, and 4.5 clocks per note-on to turn on a three-voice, four-oscillator layer.)

Convenience Features. Since the U-20 uses

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a branching-tree menu/submenu arrangement with cursor left/right buttons that often step through a series of pages at the bottom of the tree, it's a pleasure to see that Roland has devoted some thought to user-friendliness. First, every menu and page remembers where the cursor was when you were last in it, so you can move back down through any part of the tree by hitting the "enter" button several times quickly. Even more useful is a pair of buttons labelled "mark" and "jump." These let you store your current position, go off to some other point, and jump back. Sixteen of your own jump destinations can be stored in memory.

You might be confused at first glance that the U-20 doesn't have a write button, but you quickly get used to the fact that a two-button combination (jump-enter) gets you to the write page for the type of object that you're currently editing. A full menu of write operations is under another button.
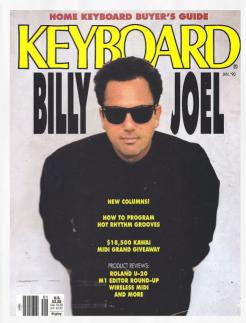
A simple MIDI monitor display is included in the instrument. This can display the last six bytes transmitted or received. The display is in hexadecimal, so it requires some knowledge to get the most usage out of it, but it's certainly a thoughtful extra. Another bonus: Real-time messages can be included in the display, or filtered out.

Another cool first for the U-20 is a write-renumber command. This allows you to store an edited version of a timbre in a new memory location and simultaneously reassign all of the parts in all of the sound patches that used the old timbre so that they will now play the new one.

Conclusions. Those of us who cut our synth programming teeth in the days of the Prophet-5 are inclined to be just a tiny bit snobbish about sample playback synths. But while the U-20 doesn't have oodles of programmable parameters, it has enough great sounds and programming power to make a lot of converts. With 30 voices of polyphony available, you can easily layer two or three tones for some vivid original timbres. There are a lot of good ROM tones to choose from, and the envelope parameters add just enough spice that your U-20 patches don't have to sound like anybody else's.

The left-hand control sliders, chord buttons, and keyboard patch memory make the U-20 an excellent master keyboard, and its seven-channel multitimbral operation makes it a viable choice for home studio recordists who need some extra voices. The built-in reverb and chorus add a lot in both applications.

We could certainly find some causes for concern if we wanted to: The absence of lowpass filtering means that the U-20 doesn't respond as realistically to key velocity as we'd prefer, and the time lags when it has to turn on lots of voice channels at once are rather disturbing. Of course, tight timing response was never one of the prominent features of the Roland D-50 either; it became a classic instrument for other reasons. The U-20's negatives have to be balanced against its unexpected positives—the MIDI data monitor, the compressible velocity transmission, the real-time control over timbre parameters, and more. In the end, we're impressed. Roland has refined the U-series concept far enough to come up with another winner. ■

```
Edit/Chord[1]/Note
F#:        Note=♩♩♩♩♩
```
The U-20 can store 8 chord "sets", each consisting of a different chord assigned to each pitch in the octave.

```
Edit/Sound/Part4/Output
Asgn=Rev Lvl=127 Pan=3▶
```
Each of the six parts can have its own effects on/off, level, and pan setting.

```
I-R3: Electric Set   U:0
C#3: I-128 So:C#3 Mu=Off
```
If you're considering composing, consider this: The U-20 can store four different drum and percussion arrangements, each with its own key assignment, level, panning and tuning.

```
Edit/Sound/Part2/Timbre
Timbre=B35:JP8.Brass
```
Any internal timbre can be assigned to one of six parts. This keyboard, by the way, is multi-timbral with a 30-voice polyphony, making it ideal for live performances.

```
Edit/Sound/Effect/Chorus
◀Out=Pre Rev   Level=17▶
```
Each of the 64 sound patches can have its own reverb and chorus parameters, with each part being assignable to just reverb, just chorus, or both.

```
Rx│01│02│03│04│05│06│10
I-88 #064 : Worlds Apart
```
Since the U-20 will simultaneously receive on up to six MIDI channels plus a rhythm channel, you can create entire arrangements with an external sequencer, and split or layer up to six sounds on the keyboard.

```
Edit/Timbre[1]/Tone
Tone = 03-018 BARAFON 4
```
While any of the 128 preset tones can be assigned to any of the 128 timbre locations, more exotic instruments can be accessed via U-Series ROM cards.

```
Edit/Timbre[5]/Pitch
◀ Bender Range=▼-36 ▲2▶
```
Each of the 128 user-definable timbres has its own flat and sharp bender range, making things like "whammy bar" solos as easy as the proverbial flick of a wrist.

One size fits all.

If we were to tell you that our new U-20 RS-PCM Multi-Timbral keyboard was perfect for any kind of performing, you'd probably mutter something about truth in advertising and go on about your business. So instead of telling you this, we'll let you come to that conclusion all by yourself.

And the reason we expect you to is this: The U-20 possesses an extraordinary diversity of sounds—to the tune of 128 multi-sampled tones, including both acoustic instruments and popular synth sounds, as well as a staggering array of drum and percussion sounds.

And since these sounds are the product of a Re-Synthesized Pulse Code Modulation technology, their quality is remarkable. (Basically, RS-PCM allows sampled sounds, which normally require massive amounts of data, to be re-synthesized so that they deliver great sound quality without taking up a great deal of memory.)

And because of a new, high quality signal processing, you can be as expressive with the sounds as you wish. The Roland U-20, unlike most sample playback machines, offers attack and spectra sounds that enable you to actually "synthesize" your own sounds.

All of which led one magazine to suggest, "...the only problem you'll probably have with the U-20 is finding enough time to explore everything it has to offer!"

Fortunately, it's so affordable you can start right away.

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