Transoniq Hacker

The Independent Ensoniq Mirage User's Newsletter

GREETINGS!

And welcome to the first issue of Transoniq Hacker. Since music-generation is rapidly becoming more computer intensive, we think there is a need for the same type of end-user support that has become common in the personal computer market: an independent user's newsletter.

The content of this newsletter will be reader-driven. We feel that the Ensoniq Mirage represents a step-function in digital sampler technology - that's why this newsletter concerns it and not something else. However, this won't be a manufacturer-produced hype sheet. This is an open forum. Ensoniq has been kind enough to offer technical support to questions that arise here, but they also realize the value of maintaining independence and obtaining honest feedback.

The most likely features will include: disk/equipment reviews, new product releases, a question and answer column, letters, a wish-list for future versions, and technical articles on hardware/software applications and augmentation (including computer interfacing), musicianship, pedagogy, and related topics. Since Ensoniq is being fairly aggressive in pricing strategy, we feel that the end users will include more people new to electronic music than the typical synthesizer market. A regular portion of this newsletter will be aimed at this audience.

We need your help. This is an open invitation to send us material you think will be of interest to other Mirage owners: questions you'd like answered, bugs you've found, maybe a particular system you've put together or some interesting sampling technique you've developed - whatever. (We do pay for articles.) Also, requests are very welcome. If you'd like to see something we haven't mentioned, please let us know.

A FIRST LOOK AT THE MIRAGE

by Clark Salisbury

A notion that has long tantalized musicians, composers, and instrument designers is that somehow an instrument could be built that would put the power of an orchestra, with its vast range of tonal colors, under the direct control of a single musician. We've all seen the advertising headlines. "Have an orchestra at your fingertips" has almost become a cliche'. And how many times have you run out to see the new "Rolaha DJ-C3PO" which, according to the ad, "has 400,000 user programmable presets, motion-sensing keyboard, joystick, game paddles, resynthesis of digitally interlocking parameter access, and doubles as a microwave oven" only to find that the best sounds it seems capable of producing all seem vaguely related to the bagpipe family.

Contrary to popular belief, however, the manufacturers do not sink all of their capital into advertising hype. The research into instruments with greater capabilities and new sources for the production of sounds continues. The latest, and I think most important recent technology, to emerge, is that of digital sampling. As is usually the case, though, the first instruments have been a bit on the, shall we say, expensive side, and this has put them out of reach of most of us ordinary musicians and electronic music enthusiasts. With the introduction of the Mirage, though, all that has changed.

The Mirage, of course, is the first digital sampling instrument to come available in a price range more suited to a musician's budget than that of a corporation. It is the logical offspring of a family of sampling instruments that boasts such illustrious names as Synclaviar, Fairlight, and E-mu. As a matter of fact, it's design philosophy is surprisingly similar to that of E-mu System's $8000 dream machine, the Emulator II. Given the relatively short history of digital sampling, the Ensoniq folks must have done their homework to produce a product this comprehensive, with so many sensible functions.

(continued on next page)

In this article, I want to take a basic look at the Mirage as a whole, and probably the easiest way to do that is to look at its functions individually. So let's start with the biggie - sampling.

SAMPLING

Sounds can be sampled into the Mirage via a 1/4"-jack located on the rear panel. Input can be either mic or line level, selectable from the main keypad. The frequency at which the Mirage samples, called the sample rate, can be varied from approximately 33 kHz to approximately 8 kHz. At the maximum sample rate, the sample time will be about two seconds at either half of the keyboard (about four seconds total). Sampling time can be extended to as much as eight seconds per keyboard half at the lowest sample rate, but there's a tradeoff. Lower sample rate means lower frequency response. And since frequency response can be no more than half the sample rate (unless you are fond of aliasing noise) this means that at eight seconds you will get a frequency response of only about 3.5 kHz or so. So you may find that you'll want to keep your samples as short as possible, and loop them to get sustain.

Looping is a digital technique common in sampling, and it's very much like tape-looping. The idea is to take a portion of your sampled sound, and play it over and over without any space between replays, so that the sound can be sustained indefinitely. This is probably the most difficult operation to perform satisfactorily with any sampling machine, and the Mirage is no exception. Practice, intuition and clean living will all prove a great help here.

There are five functions that deal with looping in the Mirage. The first is the loop on/off switch, and it simply tells the Mirage to start a loop within the current sample. This function is also used to truncate (erase) the end of a sample. Truncating is usually done after the loop, to erase the unused portion of the sample and free up memory for other samples.

The next function sets the loop start point. In normal circumstances, you want your loop to start somewhere in the middle of the sound. If the loop is too near the beginning, you may get some or all of the sound's attack repeating over and over as the loop is replayed. Of course, you may want this effect in some instances. But generally, a good loop should be undetectable, and your sound should sustain smoothly.

The next two functions deal with the loop end point. This sets the point at which the Mirage stops playing the current sample and instantly returns to the loop start point to begin replaying the loop. The Mirage includes coarse and fine loop end adjustments.

The last function is a command called "wavesample rotate," and it is somewhat esoteric. Suffice it to say that wavesample rotate is used to move data from one end of your sample over to the other end, and its main purpose is to help in finding appropriate loop points.

Since pitch changes of a sample are affected by playback speed, (i.e. faster playback yields higher pitch and slower playback yields lower pitch) it may not be feasible to distribute a single sample over the entire keyboard. Anyone who has played back a tape recording of a singer at twice normal speed has found that not only is the singing higher, (by one octave actually), but that it now sounds like Alvin and the Chipmunks. This effect, (sometimes called munchkinization), is not noticeable with all sounds. Many keyboard sounds do not suffer too much from pitch-shifting. But sounds which have greatly varying resonant characteristics throughout their range, such as voice and saxophone, can suffer greatly from pitch-shifts of even a few notes.

There is a solution, however. It's called multi-sampling. It allows the user to take a number of different samples and distribute them across the keyboard. Using multi-sampling, you could sample your voice singing at a number of different pitches, assigning each sample to an appropriate area of the keyboard. In this way, no single sample will have to be shifted in pitch very far; you only need to shift it a few notes either way before you're into an area of the keyboard that is occupied by another sample. Then by looping each sample you can get realistic, sustaining vocals at any area of the keyboard. Provisions are made in the Mirage to take as many as eight samples per keyboard half, 16 total. You can then adjust each sample's tuning, volume, and filtering in order to balance the sound across the keyboard.

Of course you don't have to use the same type of sound for each sample when multi-sampling. You can use each sample to capture a different sound, making the Mirage a multi-timbral instrument. For example, you could sample a bass drum onto the lowest key of the Mirage, a high-hat on the next key, a snare drum on the next key, a tom-tom on the next octave of keys, (remember, one tom-tom sample will be pitch-shifted to yield the sound of 12 chromatically tuned toms) an octave or so of bass guitar, and finally three or so octaves of piano. These sounds may be hard to play all at once, of course. But by overdubbing parts on the built-in sequencer, you can quickly become your own one-man or one-woman band. And finally, there's a way to use the multi-sampling for layering effects. By sampling two different sounds, one on the even-numbered wavesamples and one on the odd, then pairing the even and odd samples together, you can get two distinct sounds under each key.

ANALOG FUNCTIONS

Now that you have your samples in the Mirage, you may wish to do some processing to beef them up a bit. This is where the analog functions come into play, and these functions are quite straight-forward in terms of more "traditional" synthesizers. Since there is a great deal of printed material already available dealing with analog systems, I think we'll just touch on the analog functions within the Mirage.

Included in the analog section are eight (one for each voice) 24 db-per-octave filters with variable resonance (or "Q"). The filters can be adjusted for percentage of keyboard tracking, and each has its own five-part (attack, peak, decay, sustain, release) envelope generator. There are eight more envelope generators (again, one per voice) dedicated to dynamic control. Any or all segments of the envelope generators can be controlled by keyboard velocity, including release time, which is controlled by how quickly you release the keys. The digital oscillators can be paired and detuned to create digital chorusing effects. Eight LFOs are included. These can be routed to control pitch, for vibrato effects, and/or filtering.

SEQUENCER

The sequencer in the Mirage is also quite straightforward. It is a real-time sequencer, meaning it plays back exactly what is put into it, with timing variations and all. Its capacity is somewhat small. One Ensoniq brochure lists its capacity at 333 notes, but a representative of the company tells me it's 333 events. Since pressing and releasing a key are each counted as separate events, this would mean that the sequencer capacity is closer to 165 notes. Ensoniq does plan to expand this memory, however.

The sequencer allows you to lay down a basic track and overdub as many times as you want to as long as you don't exceed the eight-note polyphonic capability of the Mirage. Individual overdubs cannot be erased, but is you save each sequence to disk between overdubs, you can always recall the previous version of a sequence if you blow it while over dubbing. The sequencer supports all real-time controllers including pitch blend and mod wheels, sustain pedal and key velocity. It can be synced to drum machines or other clocked devices through its sync input on the back pane, or it can be synced through MIDI. Interestingly, the Mirage will still transmit MIDI clock data when it is synced through its clock input. This means you may be able to use it to synchronize some MIDI and non-MIDI devices.

BACK PANEL

The back panel of the Mirage includes audio out, audio in (for sampling input), footswitch input (either for sustain pedal or sequencer start/stop footswitch - selectable from the keypad), sync input, computer port (RS-232, baud rate selectable from the keypad), MIDI in, and MIDI out/thru (also selectable from the keypad).

EXPANSION

Ensoniq Corp. has some interesting enhancements in the works for the Mirage. As mentioned before, there will an expander for the sequencer which will add some 1024 events to its capacity. There will also be a new disk, called MASOS. MASOS stands for Mirage Advanced Sampling Operating System, and it will be a must for the serious sampling enthusiast. Among other things, it is supposed to make sampling easier and quicker by reducing the number of keystrokes needed to perform some operations. It will also allow you to play samples backwards, examine the value of individual samples, and achieve sample rates up to 50 kHz (!) when used in conjunction with a new input filter to be made available soon.

The next enhancement, projected for May or so, utilizes the MASOS and an Apple IIe, allowing the Apple to access wavesamples and parameter functions to create a high-powered visual editing system for the Mirage. Pretty heady stuff, here!

To sum up, then, the Mirage represents a breakthrough in keyboard instruments; its features and functions are surprising indeed in this price range. Sampling, of course, can get somewhat technical and time-consuming, but the rewards can be great for those willing to make the commitment.

I welcome any sort of correspondence, questions, comments, or good jokes - address, mail to me, care of this publication. Until next time -

Clark Salisbury

Clark Salisbury is Product Specialist with Portland Music Co. in Oregon, and is also a partner in "The Midi Connection," a Portland-based consulting firm. He has been actively involved in the composition, performing, and recording of electronic music for over five years, and is currently involved in producing and marketing his own pop-oriented compositions on cassette tapes.

FREE CLASSIFIEDS!

Well, - within limits. We're offering free classified advertising (up to 50 words) to all readers for exchanging or selling your sampled sounds on Mirage-readable disks. Additional words, or ads for other products or services, are 15 cents per word.

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THE MIDI CONNECTION

AN INTRODUCTION TO MIDI

by Erick Hailstone

I'd like to welcome all Mirage owners into the world of MIDI. We're going to start off with a novice's look at MIDI, its history, its present and future applications, and some of the problems and pitfalls.

MIDI stands for Musical Instrument Digital Interface. It is a standard interface for connecting synthesizers, sequencers, computers, drum machines, and signal processing devices. The list of devices that can be interconnected is growing. Almost every month it seems there is some new product coming under MIDI control.

The concert for MIDI began in 1981 when American synthesizer manufacturers started an on-going dialogue with Japanese manufacturers for a universal synthesizers' interface. By mid-1982 a MIDI specification began to take form. Most of this development took place in Japan. By the beginning of 1983 a working spec existed. Roland and Sequential introduced instruments equipped with MIDI. For the first time, you could take a synthesizer from one company and one from another and have them talk to each other. Before this, it took special modifications (usually expensive and often unreliable and unpredictable) to accomplish this.

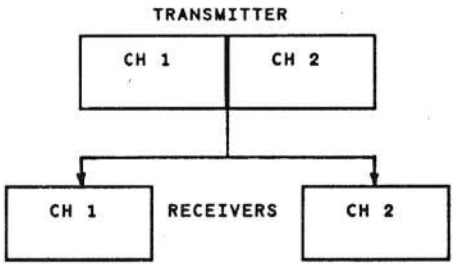
In practical terms, this means you could connect one synth to another, play the keyboard on one and have it sound on the other - or have two sounds at once. The beginning of a revolution for the multi-keyboardist.

These, being the first of their kind, were not without problems. Roland and Sequential had accomplished their main goal, but had taken different approaches with some of the synth functions. For MIDI to realize its potential, a more inclusive specification was needed. In August, 1983, Sequential, Yamaha, Roland, Korg, and Kawai came up with the MIDI 1.0 Spec. So we now have a brief history of MIDI. Again, the original idea was the ability to connect one keyboard to another.

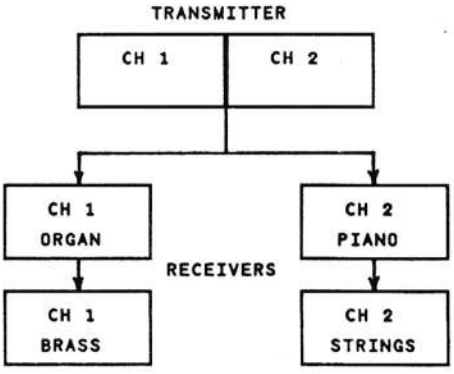
A MIDI instrument usually can send and receive information. A device such as a remote keyboard usually has no sound generating equipment built in so it may just transmit data and not have provision to receive. There are also devices that have no keyboard and are just sound generating devices that will only receive and not transmit.

MIDI sends messages over 16 channels. Where originally we were concerned with one keyboard talking to another, our spec deals with a system that can be expanded and has a lot more potential.

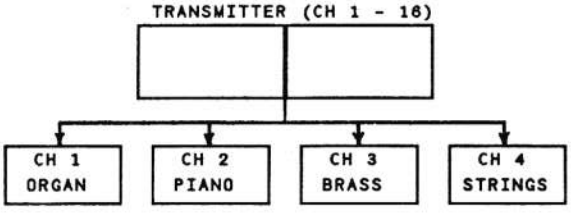
We now have the ability to send different information from one device to several others. Here's an example. Let's start with a master keyboard divided into two areas. Transmitting on MIDI Channel 1 is the lower section of the keyboard. The upper section is assigned to MIDI Channel 2. Then we can have two different sound generating devices, connected via MIDI, one set to receive Channel 1, and the other to receive Channel 2. In the configuration shown below, the bottom half of the keyboard will sound like a piano, and the top half will sound like an organ.



More modules can also be added to get a layering of sounds:



In this configuration, when the lower half of the keyboard is played, we'll get organ and brass. The top half will produce piano and strings. Since we have 16 channels to send and receive, we can also reconfigure the system to look like this:



We can now have either half of the keyboard address any receiving module and still add 12 more devices. The Mirage is unique in that you can split the keyboard many times. If fact, you could have 16 different sounds at one time. We have just scratched the surface here, as each sound generating device has the ability to create many complex sounds. There are also more types of transmitting devices.

Since we are talking in terms of transmitting and receiving devices, let's draw up a few categories of possible systems.

Transmitting Devices:

Synthesizers
Sequencers
Controllers
Remote keyboards (no synth capabilities)
Pad Controllers (for drum machines, etc.)

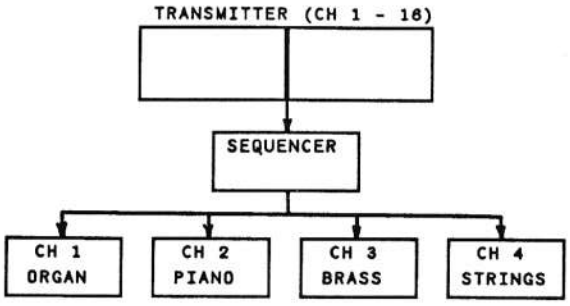
Receiving Devices:

Synthesizers
Sequencers
Synthesizer Modules (no keyboard)
Drum Machines, etc.

MIDI synthesizers can both transmit and receive over some or all MIDI channels (1-16). So a synth can control many different sound devices or be controlled by another transmitting device. The Mirage can transmit and receive on all MIDI channels.

A sequencer is essentially a dedicated computer whose task is to record and playback information sent by a synth and other MIDI devices. In its most complete form a sequencer can record over all 16 channels from any transmitting device. Once this info is recorded, it can be played back, transmitted, over all 16 channels to any receiving device.

Let's look at the last system we had, and add a sequencer.

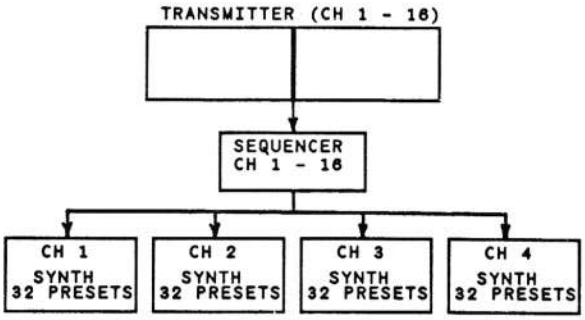


We can start off with our controller addressing a sound device and record what we play into the sequencer. In this system we just have four devices, but again, since we have 16 channels, we can address 16 sound devices (if we can afford them).

Now it is also possible to buy a home computer and, with the right software, duplicate the functions of a sequencer. There is presently software of this type available for the Commodore 64, the Apple II, the Macintosh, the IMB PC, and a few others in various versions of the MIDI Spec 1.0.

To fully understand the power here, it's time to break down a single synth (or synth module) and see exactly what is controlled via MIDI.

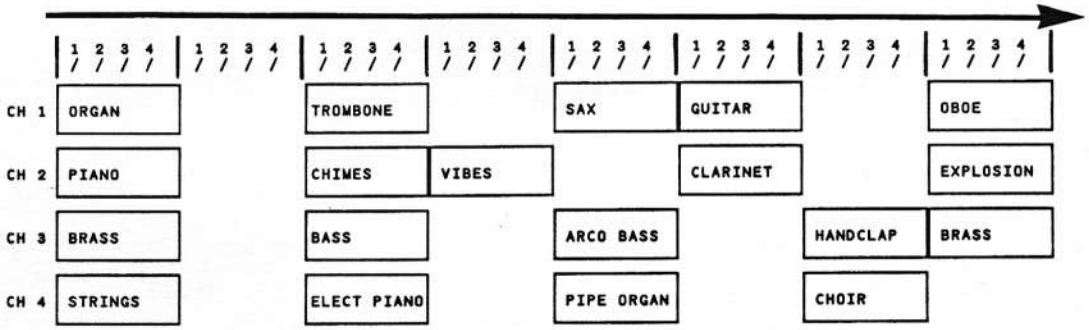
The most basic analog synth (controlled by MIDI) has at least six voices (six notes at a time). In analog synths a single oscillator is the origin of the sound. This oscillator has different waveforms; sawtooth, square, rectangular, or variations of these. These waveforms are then manipulated and altered by various voltage controlled filters and amplifiers. You can create many different sounds with these building blocks and store them in the memory of the machine. The least number of these preset sounds you can store is usually 32. Larger memories will have 100 or more. A MIDI control device can switch from one preset to another. So any one synth or synth module can sound like many different instruments by itself. If we look at our system again, it becomes much more powerful:



We can have a piece of music where new sounds come in and out under our control. On the left will be our module with a starting sound followed by bars of music indicating when these modules are changing presets.

We can do all of this from the keyboard controller in real time; have the sequencer record it and then play it back by itself.

In addition to preset changes, MIDI will transmit and receive pitch wheel changes, modulation, sustain pedals, keyboard velocity info, and aftertouch enabling these devices to respond to a player's nuances and not sound sterile.



I'll cover more on this in future columns. My intent in these columns is to explain MIDI and its application in practical terms (i.e. push this, get this; turn this knob, hear this). We'll publish the MIDI Spec 1.0 and an explanation of its particular code for those who wish to write software for the Mirage or other MIDI systems.

I hope my enthusiasm for these products will come across in these pages. The other day I realized that with a minimal cash investment I can now reproduce a symphony in my music room. I have a 4-track tape recorder, an 8-track sequencer, three synthesizers, and a digital drum machine. Before the Mirage, to get three or four different sounds at once I would have to overdub them on the tape recorder. The Mirage will produce all four sounds at once, by itself. And before the Mirage, I was always dealing with approximations of sounds, now I have the real thing waiting for me on disk. The Mirage is a true break-through. No other device at this price can offer so many functions and capabilities.

In future columns we'll get into more of MIDI's capabilities. We'll touch on some of the signal processing equipment that is now controlled by MIDI and other devices that are not musical instruments per se'. We'll look at Sync-to-Tape functions and other recording techniques that benefit from MIDI. The music educational possibilities are staggering by themselves. We will also more fully explore the Mirage next time.

Erick Hailstone studied composition and arranging at the University of Nevada and at Berklee College of Music. He has been involved with synthesizers and the related technology for the past seven years. Primarily a guitarist, his orientation has been in performing and recording with these devices.

HYPERSONIQ

- New Product Releases -

PASSPORT DESIGNS, INC. Announces New Software.

Passport Designs, Inc., recently announced their introduction of several new software packages, including MIDI/4 PLUS and MIDI/8. Both the four and eight channel recording programs feature auto-correct (perfecting every performance rhythmically down to 32nd note triplets), punch-in and punch-out (allows editing within the piece without re-recording previously entered parts), fast forward/rewind (which allows the user to travel through the piece quickly and easily), plus the features of the original MIDI/4 program. With the addition of the Passport POLYWRITER and POLYWRITER UTILITIES programs, musicians can have a completely integrated recording, editing, and printing system for MIDI-equipped synthesizers. The programs come on 5 1/4-inch floppies, for Apple IIe, II+, or Commodore 64 computers.
MIDI/4 PLUS: $99.95 (or as an update to MIDI/4: $35), MIDI/8: $149.95. Passport Designs, Inc. (415) 726-0280.

ENSONIQ Corp. Announces New Software for Mirage.

Ensoniq Corp. has released several new disks of sampled sounds since the introduction of the Mirage. New disks include: Sound Disk #2 (16 analog and digital sounds, 2 sound effects), Sound Disk #3 (strings and horns). A percussion disk should also be available by the time you read this. Each disk always contains the latest version of the Mirage Operating System. Ensoniq is also planning on releasing another version of their piano disk sometime this summer. A new operating system disk is also in the works: MASOS (Mirage Advanced Sampler's Operating System), which is intended to greatly facilitate recording and manipulating samples. Additional software will be released early this summer that will run on an Apple IIe equipped with a Passport or Yamaha compatible Apple/MIDI Card and will allow easy creating, editing, and manipulation of displayed waveforms. Additional information will be published here as it becomes available.

Manufacturers are requested to send information regarding new products to: PRODUCTS, Transoniq Hacker, 5047 SW 26th Dr., Portland, OR 97201.

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Editor: Eric Geislinger
Associate Editor: Jane Talisman
Subscriptions (U.S. Funds): $15/12 issues, Overseas: $25.
Advertising Rates: Please send for rate card.
Rates for Authors: 4 cents/word upon acceptance.

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FUTURE ISSUES

One of the tricky things about putting out the first issue of a user's newsletter is that one of the key ingredients is missing - the users. Fortunately, we've had a very high local level of interest in the Mirage. There are people right in the area that are writing MIDI software, working on construction and modification projects, and interfacing the Mirage with everything from IBM PC s to a VAX. We plan on covering all of this in future issues. And if the interest level is anything similar in the rest of the world, (and from what we've heard, it is), you can expect this newsletter to grow substantially. Again, as mentioned on the front cover letter, we need your help - letters, questions, comments, suggestions, articles, and complaints are all welcome.

RANDOM NOTES

We've just received a preliminary copy of Ensoniq's Advanced Sampler's Guide. In addition to information on advanced sampling techniques and the use of the Ensoniq MASOS (Mirage Advanced Sampling Operating System) disk, the guide also contains a lot of general info on the Mirage and technical information on the Mirage MIDI implementation (both standard and MASOS versions). The guide went to print in early April, so it should be available by the time you read this. The MASOS disk is included with the guide. The total cost for the package is $49.95 - a bit steep, but this is a "must" if you're serious about getting the most out of your Mirage. Contact your local Ensoniq dealer.

QUESTIONS & ANSWERS

QUESTION: A couple times I've managed to cause my Mirage to lock-up so it won't respond to the keypad. Is there any way to reset it besides powering off?

ANSWER: Unfortunately, if the keypad is locked-up, there's nothing you can do but power down. As Ensoniq publishes new disks they always include the latest operating system, so a lot of these little glitches should go away. (If your disks are Version 2.0 or later, it is possible to do a "warm boot" from the keypad by doing a LOAD 0. This will reload the operating system.) There is also a reset pin on the central processor - we may do an article in the future on how to modify your Mirage so you can toggle this (of course, it will probably void your warranty and it may not be all that useful).

QUESTION: My Roland foot pedal seems to work in reverse with the Mirage. What's the deal?

ANSWER: Some synthesizers are wired to accept pedals whose switch is wired "normally open," while some are wired for "normally closed." The pedals themselves usually contain a switch that can be wired either way. If you have an extra pedal, it's relatively easy to open it up and move the wire connected to the lugs at one end of the switch to the lugs at the other end.