Transoniq Hacker

The Independent Ensoniq Mirage User's Newsletter

NOTE CRUNCHING

LOOPS

RC090317

By Clark Salisbury

Alright, let's talk loops. Those dirty, rotten, unpredictable gremlins that never seem to act the way they should and seem always bent on ruining our hard-won samples.

Every sampling machine loops. Every one of them. And looping can be the hardest of all operations to perform when creating a usable sample.

Fortunately, understanding looping isn't very hard. Making it work, well - that can be tricky. But I'm going to do my best to help you out here. And believe it or not, some kinds of looping are so easy that once you know the trick you'll fall to your knees and thank your sundry gods for shining the light of understanding on your door. But to really understand looping, you need to really understand sampling. And to really understand sampling, well...

WELCOME TO BASIC SOUND THEORY 101.

Here's where we get down to the nitty-gritty, or, "What is this thing called sound?"

It's easy, really. Sound is simply a fluctuation in air pressure, and it has both a negative and a positive component. When you hit a drum head, the drum head is first pushed away from you, creating a negative air pressure (think of it as sucking, if you like). Almost immediately the drum head will snap back toward you, creating a positive air pressure. The drum head will repeat this backward and forward motion a number of times quite rapidly, (we would perceive it as vibrating), and this creates a pattern of positive and negative changes in the surrounding air. This we can call a waveform, the form that the "waves" (changes in air pressure) take in the air. One swing of the drum head from "zero" (at rest) to fully negative, back to zero, then to fully positive and finally back to zero is called one "cycle." With pitched instruments (like guitar) the number of cycles that are completed in one second is called the sound's "frequency", and this is what determines a sound's pitch. A guitar string which completes 440 cycles in one second is said to have a pitch of "A." If we double the frequency we perceive a pitch change of one octave. At 880 cycles-per-second, our guitar will sound an "A" one octave higher than at 440.

In the acoustic world, of course, the air pressure fluctuations create sympathetic vibrations in our eardrums, which are then handily converted to electro-chemical impulses and interpreted by the brain as sound. But how do we convert them to samples? Well, in theory it's pretty simple. First we change the air pressure fluctuations to voltages with some sort of transducer, usually a microphone. The air pressure vibrations strike the diaphragm of the microphone (an analog of our eardrum) and the vibration of diaphragm is electro-magnetically converted to positive and negative voltages which are analogous to the original positive/negative air pressure fluctuations. So far so good.

Now we connect a sampling machine to the other end of our microphone. The sampler periodically measures the voltage present at the output of our microphone. If the output of the microphone happens to be positive when a measurement (sample) is taken, the sampler assigns it a positive number; and the greater the initial air pressure on the microphone's diaphragm, the greater its corresponding output voltage, and the higher the number the sampler will assign it. Similarly, the negative voltages are assigned negative numbers within our sampler. The range of available numbers within the Mirage, by the way, is from -127 to 128.

Now when dealing with sounds that have frequncies in the audio range (and most people can hear sounds with frequencies as low as 20 times per second and as high as 20,000 times per second) our sampling machine must be able to sample very quickly to accurately represent these sounds in terms of numbers. The Mirage has a maximum sampling rate of about 33,000 times per second (usually abbreviated to 33k times per second, or 33 kHertz, or more simply, 33 kHz). This sample rate is expandable to about 50 kHz with the optional Input Sampling Filter. This means that for a one-second sound, the Mirage will take as many as 33,000 samples. That's a lot of numbers to store in memory! The Mirage, however, has 65,563 bytes of memory allocated for each keyboard half (upper and lower) in which to store samples. One byte gets one sample, so we can see that for a two-second sound we can have sample rates as high as 32,768 kHz (65,563 bytes/2). By slowing down the rate at which the Mirage samples, we can buy more sampling time, but there's a tradeoff. Lower sampling times yield lower frequency response. This is due in part to a phenomenon unique to sampling called aliasing, and the problem here is that we need at least two samples to accurately represent one cycle of a sound's

waveform. This means that to sample a sound that contains frequencies in the 15 kHz range, we need to take at least 30,000 samples per second. With a 30 kHz sample rate, we can say that our sampler's frequency response is 15 kHz (commonly known as the Nyquist frequency). So if we want nice, clean samples with plenty of high frequency response, we try to take as short a sample as possible at the highest sample rate, and then loop the sample to get it to sustain.

Still with me? Of course you are, you devils, you. There's just one more thing we need to get straight before we actually start getting into the nuts and bolts stuff about looping. And that is how the Mirage organizes its sample memory. Fortunately, it's very simple.

We can think of the memory for one keyboard half of the Mirage as a single strip of 65,536 bytes. This strip is further divided into 256 pages, each of which is 256 bytes long (256 x 256 = 65,536). When the Mirage samples, the sample will go into one or more of these pages (depending on what the Wavesample Start [60] and the Wavesample End [61] parameters are set to). What we are going to try to do is make a sample, and loop a one-page (256 byte) section of it. This is called a short loop (and you thought short loops was some new kind of breakfast food, didn't you?).

First, load the MASOS disk, Program #1. If you don't have MASOS yet, load any sustaining type of sound you have into the lower keyboard half of the Mirage, hopefully a single-sampled sound. If you don't know how to tell if the sound is single-sampled or not, check out my article on "Keyboard Splitting And The Mirage" from the August (it was August, wasn't it Eric?) [Ed. - Issue Number 3] issue of the Hacker. If you don't have a sustaining sound to load into the Mirage, load Sound Disk #2 (the one with all the synth sounds), start with Lower Program #1 (tubular bells) and set Parameter 54 (Release) to about 0.5, and Parameter 53 (Sustain) to 3.1. Now we're ready to roll.

First, set Multisampling [77] on. If Multisampling is off, the Mirage will reset to its default parameters everytime we do a new sample, which isn't what we want. Turn the Looping Function [65] on - yes, looping can be activated before you do any sampling. Set the Sample Time [73] to 35 (more on this in a moment). Now we're ready to do a sample. I suggest sampling your own voice for right now. Plug in a mic, and make a sample. Now play the 'A' key, first one up from the bottom. If the note doesn't play back at the same pitch that you originally sampled, adjust the Coarse Tune [67] and/or Fine Tune [68] until it does. Now go ahead and make another sample, and when you play it back, hold the key down until you hear the pitch change (if the pitch doesn't change, sample a different note from the one you just did. Don't worry, I know what I'm doing).

That new pitch that your sample jumps up or down to is actually our one-page loop, right at the end of the sound, and what's happening is that the loop is so short and is repeating so fast that we are hearing the pitch of the frequency at which the loop is repeating rather than the frequency of our sample. You see, when we set our Sample Time [73] to 35, we were also seting our sample rate to 28,571 kHz. This means that in one second, our single page can play 28,571/128 times, or about 223 times per second. It just so happens that the frequency of the note 'A' comes in multiples of 55 (110, 220, 440, etc.), so we can see that the frequency of our one-page loop is slightly sharp of 'A' (check it with a tuner if you don't believe me). Now for the fun.

Listen to your sample, and pay attention to the pitch of the sample after the loop kicks in. Memorize the pitch of the loop, then do another sample, but this time sing as closely as possible to the pitch of the loop. It may take a few tries, but when you finally hit the pitch right and play your sample back, the sample should move undetectably into the loop without popping or glitching. The only hint that a loop is present is that the pitch of the sample should become rock stable after the loop point. Got it? Great. Now let's have some fun. RC090317

Set Parameter [34] (Osc Mix) to about 3.1 or so, so that both oscillators are at about equal volume. Add some chorusing by setting Parameter [33] (Osc Detune) to about 1.0. Now add some spaciousness by setting [54] (Release) to about 2.2 or so, and mellow the attack a bit by setting [50] to, say, 1.5. Awesome.

Now the bad news. This technique only works for some loops, namely single waveform loops. The reason is this. When you try to loop a sound containing multiple waveforms (such as a string section or vocal choir) it is very difficult, if not impossible, to get all the different waveforms to line up exactly within the boundaries of one page. If they did, then it would only be because they were all playing at exactly the same pitch. If they were doing that, then they wouldn't sound as rich and chorused as we would want. You can, however, add chorusing to a single waveform sound after the fact, as we did in the previous example. But some sounds just will not work with single-page loops. For those sounds, looping will require nothing more than patience - sometimes a great deal of patience. By the way, if you plan on short-looping low-frequency sounds, like bass guitar, you may need to go to two or four-page loops to get the loop playback frequency low enough. But don't use an odd number (3,7, etc.) of pages; for some mystical reason the Mirage doesn't like them.

Anyway, to recap for single-page loops: set sample time so that it will yield a sample rate which, when divided by 128, is closest to the frequency of the sample you are trying to capture (see chart). Sample a note. Use the Coarse and Fine Tune Parameters [67 and 68] to tune your sample appropriately for the keyboard area into which it's going. Resample, with the Loop Switch turned on (it will automatically default to setting a single-page loop at the end of your sample). Re-tune the instrument (or whatever, you are sampling so that it matches the pitch that the loop plays back at. Keep sampling and re-tuning until your sample drops into the loop without popping or glitching. Save your sample. Run an ad in the Hacker to sell your sample. Make gobs of money and

ENSONIQ PARAMETER LIST - BY NORTHERN LITES AND SOUND STUDIOS

* - INDICATES MASOS ONLY
** - INDICATES EXTERNAL INPUT SAMPLING FILTER ONLY

NOTE : PARAMETERS THAT DO NOT HAVE A REF. PAGE # CAN BE FOUND ON PAGES 26-31 IN THE RED MUSICIAN'S MANUAL.

PARA #	PARA NAME	RANGE	PAGE #
10	none todate		
11	SAVE LOWER KBD. SOUND		
12	SAVE UPPER KBD. SOUND		
13	SAVE BOTH KBD. SOUNDS		
14	SAVE CONFIG. PARAMS		
15	COPY PROGRAM TO LOWER		
16	COPY PROGRAM TO UPPER		
19	none todate		
20	none todate		
21	MASTER TUNE	00-99	
22	PITCH BEND RANGE	00-12	
23	KBD. VEL. SENS.	00-63	
24	KBD. BALANCE	00-63	
25	UPPER/LOWER PROG. LINK	ON/OFF	
26	WAVESAMPLE SELECT	1-8	
27	INITIAL WAVESAMPLE	01-88	13-14
28	MIX MODE	ON/OFF	10,13-14
29	MONO MODE	ON/OFF	
30	none todate		
31	LFO FREQ.	00-99	
32	LFO DEPTH	00-99	
33	OSC. 2 DETUNE	00-99	10
34	OSC. MIX	00-63	10-11
35	OSC. MIX-VEL. SENS.	00-31	10-11
36	FILTER CUTOFF FREQ.	00-99	
37	FILTER RESONANCE	00-40	
38	FILTER KBD. TRACKING	00-04	
39	none todate		

become a god of sampling. Retire to a villa in the Bahamas with an elegant but understated guest house for me to stay in when I come to visit. Eat lots of vegetables. RC090317

Anyway, that's about it for this time out. I'd just like to thank Ensoniq for allowing me to use their Sample Rates Chart from the MASOS manual.

SAMPLE RATES FOR EQUI-TEMPERED PITCHES

Note Name	Freq	Freq*128	Sample Time	Sample Rate	Nyquist
a	110	14080	71	14084	7042
b flat	117	14917	67	14925	7462
b	123	15804	63	15873	7936
c	131	16744	60	16666	8333
c sharp	139	17739	56	17857	8928
d	147	18794	53	18867	9433
e flat	156	19912	50	20000	10000
e	165	21096	47	21276	10638
f	175	22350	45	22222	11111
f sharp	185	23679	42	23809	11904
g	196	25087	40	25000	12500
g sharp	208	26579	38	26315	13157
a	220	28160	35	28571	14285
b flat	233	29834	34	29411	14705
b	247	31608	32	31250	15625
c	262	33488	30	33333	16666
c sharp	277	35479	28	35714	17857
d	294	37589	27	37037	18518
e flat	311	39824	25	40000	20000
e	330	42191	24	41666	20833
f	349	44700	22	45454	22727
f sharp	370	47358	21	47619	23809
g	392	50174	20	50000	25000

PARA #	PARA NAME	RANGE	PAGE #
40	FILTER ATTACK	00-31	
41	FILTER PEAK	00-31	
42	FILTER DECAY	00-31	
43	FILTER SUSTAIN	00-31	
44	FILTER RELEASE	00-31	
45	FILTER ATTACK VEL. SENS.	00-31	
46	FILTER PEAK-VEL. SENS.	00-31	
47	FILTER DECAY-KBD. SCALED	00-31	
48	FILTER SUSTAIN-VEL. SENS.	00-31	
49	FILTER RELEASE-VEL. SENS.	00-31	
50	AMPLITUDE ATTACK	00-31	
51	AMPLITUDE PEAK	00-31	
52	AMPLITUDE DECAY	00-31	
53	AMPLITUDE SUSTAIN	00-31	
54	AMPLITUDE RELEASE	00-31	
55	AMPL. ATTACK-VEL. SENS.	00-31	
56	AMPL. PEAK-VEL. SENS.	00-31	
57	AMPL. DECAY-KBD. SCALED	00-31	
58	AMPL. SUSTAIN-VEL. SENS.	00-31	
59	AMPL. RELEASE-VEL. SENS.	00-31	
60	WAVESAMPLE START	00-FF	17
61	WAVESAMPLE END	00-FF	17
62	LOOP START	00-FF	18
63	LOOP END	00-FF	18
64	LOOP END FINE ADJ.	00-FF	18
65	LOOP SWITCH	ON/OFF	18
66	WAVESAMPLE ROTATE	00-FF	24
67	RELATIVE TUNING-COARSE	00-87	19
68	RELATIVE TUNING-FINE	00-FF	19
69	RELATIVE AMPLITUDE	00-63	20
70	RELATIVE FILTER FREQ.	00-99	20
71	MAX. FILTER FREQ.	00-99	20
72	TOP KEY	01-61	12
73	SAMPLE TIME ADJ.	30-99	22
74	INPUT FILTER FREQ.	00-99	22
75	LINE(ON)/MIKE(OFF)	ON/OFF	23
76	SAMPLING THRESHOLD	00-63	23
77	USER MULTISAMPLING	ON/OFF	23
78	none todate		
79	none todate		
80	none todate		
81	MIDI OMNI MODE	ON/OFF	
82	MIDI CHANNEL SELECT	01-16	
83	MIDI THRU MODE	ON/OFF	
84	MIDI CONTROLER ENABLE	ON/OFF	
85	EXT. SEQ. CLOCK	ON/OFF	
86	EXT. CLOCK JACK SELECT	ON/OFF	
87	INTERNAL CLOCK RATE	00-99	
88	SEQ. LOOP SWITCH	ON/OFF	
89	SEQ. FT. SW./SUS. PEDAL	ON/OFF	
90	none todate		
91	EXT.COMP.PORT ENABLE	ON/OFF	
92	SER.PORT BAUD RATE SW.	ON/OFF	
93	none todate		
94	none todate		
95	none todate		
96	none todate		
97	SOFTWARE VERSION NUMBER	00-99	
98	DISK ERROR CODE	01-88	
99	DISK CONTLR STATUS CODE		
---	MASOS FUNCTIONS		77-81
17*	COPY WAVESAMPLE TO LOWER		26
18*	COPY WAVESAMPLE TO UPPER		26
19*	ROT. CUR. WSAMPLE LEFT		25
20*	ROT. CUR. WSAMPLE RIGHT		25
85*	SOURSE START-PAGE #	00-	80
86*	SOURCE START-SAMPLE #	00-	80
87*	SOURCE END-PAGE #	01-	80
88*	SOURCE END-SAMPLE #	FF-	80
89*	DESTIN. START-PAGE #	00-	80
90*	DESTIN. START-SAMPLE #	00-	80
93**	EXT.INPUT FILTER FREQ.		79
94*	DESTIN. BANK SELECT	LO-	80
95*	SCALE FUNCT. STRT FACTOR	00-	80
96*	SCALE FUNCT. END FACTOR	FF-	80

COPYING CURRENT WAVESAMPLES TO ANOTHER LOCATION

By Steve Coscia

RC090317

There are two MASOS parameters (17 and 18) set up to perform wavesample moves. This article will describe a step-by-step exercise using them to duplicate the upper wavesample data in lower wavesample memory. We then finish up by configuring the topkey assignments and copying the program parameters from upper to lower.

The parameters are [17] and [18], and are defined in the Advanced Samplers Guide on page 26. To begin this exercise, we'll copy the upper harmonica sound on Disk #10 to lower memory using parameter [17]. Let's start by booting-up with a MASOS disk. Then load lower 3 from MASOS (8 wavesamples) and upper sound 3 from Sound Disk #10. Remember to take advantage of the SEQ REC and SEQ PLAY buttons to save time.

When copying a wavesample to another location in memory almost all data will be copied. Unfortunately, topkey data is not transferred and must be defined in the lower memory after you are finished copying wavesamples. Finally, we'll copy the upper programs to the lower memory so both keyboard halves will be identical.

Let's start by setting up a memory map. First, look up the values of parameters [60] and [61] in upper wavesamples 1-8 and note them in a chart. I have provided the values for you, but give yourself the opportunity to look up these values so you can develop some hands-on experience. For you samplers with the Visual Editing System all you need to do is use the Wavesample Memory Map Display.

Table 1. Memory Map.

Upper Wavesample No.	1	2	3	4	5	6	7	8
Wavesample Start [60]	10	40	00	40	80	C0	3C	BC
Wavesample End [61]	3F	7F	3F	7F	BF	FF	3F	BF

Next, create a mirror image of the upper wavesample configuration by adjusting the values of [60] and [61] in lower wavesamples 1-8. Using the values listed in Table 1 as a source of reference, do the following:

Step 1. Press SEQ PLAY
Step 2. Press #1
Step 3. Select Parameter [60]
Step 4. Set value to 10
Step 5. Select Parameter [61]
Step 6. Set value to 3F

You have just made the wavesample start and end parameters of lower wavesample #1 the same as its upper counterpart. Notice that Step 2 defines the wavesample number and Steps 4 and 6 are the start and end of the wavesample. Repeat this procedure with the appropriate values in Steps 2, 4, and 6 for the remaining seven wavesamples.

Now, you're ready to start copying the upper wavesample data into lower memory, as follows:

Step 1. Press SEQ REC
Step 2. Press #1
Step 3. Select Parameter [17]
Step 4. Press #1
Step 5. Press ENTER

You have just copied upper wavesample #1 to lower wavesample #1. Notice that Steps 2 and 4 define wavesample source and destination respectively. Let's continue:

Step 1. Press SEQ REC
Step 2. Press #2
Step 3. Select Parameter [17]
Step 4. Press #2
Step 5. Press ENTER

Now upper wavesample #2 has been copied to lower wavesample #2. Got it? Continue this operation for all eight wavesamples. Once all the upper wavesample data has been copied to lower memory, we'll adjust the topkey values for the lower memory.

Let's look at the topkey values for upper wavesamples 1-8:

Table 2. Upper Topkey Values.

Upper Wavesample No.	1	2	3	4	5	6	7	8
Upper Topkey [72]	41	41	53	53	61	61	57	61

What we want to do is duplicate the upper split-point configuration in the lower keyboard. But wait... the upper harmonica starts on F3, and once it's copied to lower, it will start on C1. I know it's weird, but don't worry! Upper wavesample #1 is the same as lower wavesample #1. For confirmation, notice that F3 has the same pitch as F1, the only difference is the five additional keys below F1.

Ideally we want the lower topkey set up to be the same as it's upper counterpart as follows:

If (upper #1) = (F3 to E4), then (lower #1) = (C1 to E2).

Table 3 illustrates the difference between upper and lower topkey values in this exercise. After examining Table 3, let's go through the steps that will set up the lower split points.

Table 3. Upper and Lower Topkey Comparability

Upper Wavesample No.	1	2	3	4	5	6	7	8
Upper Topkey	41	41	53	53	61	61	57	61
Lower Topkey	17	17	29	29	29	29	29	29

Let's start setting up lower topkey configuration as follows:

Step 1. Press SEQ PLAY
Step 2. Press #1
Step 3. Select Parameter [72]
Step 4. Set value to 17
Step 5. Press SEQ PLAY
Step 6. Press #2
Step 7. Set value to 17

We have just changed the topkey values in lower wavesamples #1 and #2. Now we want to allow lower wavesamples #3 and #4 the same exposure as their upper counterparts as follows:

If (upper #3) = (F4 to E5), then (lower #3) = (F2 to E3)

Notice that the highest topkey value is 29. This is halfway up the keyboard, which is comfortable for me, but you may choose to have it set higher. let's continue:

Step 1. Press SEQ PLAY
Step 2. Press #3
Step 3. Set value to 29
Step 4. Press SEQ PLAY
Step 5. Press #4
Step 6. Set value to 29

Continue this operation on all eight wavesamples using Table 3 as a guide. The value you choose to set for wavesamples #5 and #6 will determine how far up the keyboard you choose to go. After your topkey values are defined, we'll copy the upper programs to the lower memory.

When copying upper programs to lower programs use parameter [15] as follows:

Step 1. Press SEQ REC
Step 2. Press PROG
Step 3. Press #1
Step 4. Select Parameter [15]
Step 5. Press #1
Step 6. Press ENTER

We've just copied upper program #1 to lower program #1. Let's continue:

Step 1. Press SEQ REC
Step 2. Press PROG
Step 3. Press #2
Step 4. Select Parameter [15]
Step 5. Press #2
Step 6. Press ENTER

Continue this operation on all four programs and your lower programs will be identical to your upper programs.

Naturally, this is just one example of how Parameter [17] can be useful. Parameter [18] will yield the same results when copying lower wavesamples to upper memory.

Imagine the possibilities! You can create a keyboard configuration composed of 16 wavesamples, each taken from different sound disks. You can have five or six drums, an octave of bass guitar, an octave of piano or organ, and a lead sound like sax, trumpet or synthesizer. The construction of a configuration like this would be more complicated than this exercise in that the source and destination of wavesample data will not always be the same value. An example would be a source of 00 to 1F that is copied to a destination of 60 to 7F. Notice, both the source and destination are the same number of pages, but they are located in different places in memory. This function will work fine providing you always set your destination to be the same size as your source.

I hope you find this as interesting and useful as I do. Sample on!

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MIRAGE OPERATING SYSTEM VERSION 3 UPDATES

Since the Mirage's Operating System is stored on disk, Ensoniq is able to upgrade with each Sound Diskette or Blank Formatted Diskette. Version 3 (and higher) of the operating system offer some important new features that will enhance the Mirage.

The Mirage's Operating System is loaded into the Mirage when the system is first turned on or when you press Load ALL, Enter on the Mirage Keypad. We recommend that you load the most current version of the operating system into the Mirage at the start of any session. To check the version of the operating system currently loaded into the Mirage, select Parameter 97.

Mirage Operating System 3 and higher offer the following performance enhancements to the Mirage:

1. The ability to receive information from various external MIDI controllers such as: modulation wheel, breath controller, foot pedal, data entry slider, and volume pedal.

2. The ability to receive MIDI After-Touch information.

3. The abilty to receive MIDI Polyphonic After-Touch information.

4. The ability to send and receive MIDI disk loading and program change information.

5. The ability to load a sound from disk and instantly select any of the four programs.

6. The ability to turn off local mode, thereby allowing the Mirage to transmit out MIDI information but not sound internal voices.

The following new parameters are now available on the Mirage. These are in addition to the parameters outlined in the Mirage Musician's Manual (pages 26-31). RC090317

MIDI PARAMETERS	Range	Default
78/LFO Modulator Source	(0-9)	1
79/MIX Modulator Source	(0-9)	1
80/After Touch Modulation Depth	(0-63)	63
84/MIDI Function Enable	(0-3)	2

KEYBOARD PROGRAM PARAMETERS

30/Local On/Off	(On/Off)	ON

You can save any of your own values of these parameters on your operating system diskette by selecting Parameter 14 and pressing the Enter button.

EXTERNAL MIDI CONTROLLERS

The Mirage can now receive information from external MIDI controllers which affect LFO modulation (Parameter 78) and MIX modulation (Parameter 79). You need to set up the Mirage by selecting these parameters and entering the following controller numbers:

Controller Number	Controller
0	No External Controller
1	Modulation Wheel
2	Breath Controller
4	Foot Pedal Controller
6	Data Entry Slider
7	Volume Pedal
8	After Touch
9	After Touch - Polyphonic

Note: To use an external controller for MIX Modulation, you must also set Parameter 32 on the Mirage to 0.

When using aftertouch from an external controller you can control the depth of modulation by selecting Parameter 80 and setting the range from 0 (no effect) to 63 (maximum effect).

Example:

This example works best with a MIDI controller equipped with after touch, such as the DX-7.

1. Connect a MIDI cable from the MIDI-out jack of the DX-7 to the MIDI-in jack of the Mirage.

2. Load in the elecric guitar sound from Sound Diskette #6. This sound is a MIX mode sound which allows a mix between a straight guitar sound and a feedback sound by using a modulator. On the Mirage this is controlled by the modulation wheel.

3. Set Parameter 32 (Upper and Lower) to 0. This enables LFO modulation by the Mirage's mod wheel. You may want to save this setting to disk (Parameter 13).

4. Set Parameter 78 to 1. This enables LFO modulation from an external mod wheel.

5. Set Parameter 79 to 8. This enables MIX Modulation from after touch on an external controller.

6. Play the Mirage from the DX-7 keyboard. You can control the feedback effect by how hard you press on the DX-7 keyboard. You can also control LFO Modulation from the DX-7's mod wheel.

7. Adjust Parameter 80 to scale the after touch to your playing style.

8. Try setting Parameter 78 to 6. This will cause the LFO to be modulated by the DX-7 data entry slider. You will be able to control the LFO by sliding the data entry slider up or down.

9. Try setting Parameter 79 to 2. This will allow you to mix in the feedback effect with a breath controller.

MIDI PROGRAM CHANGE COMMANDS

You can now change sounds and programs on the Mirage from an external MIDI controller.

84/MIDI Function Enable (0-3) Default 2

This parameter has been changed from an Off-On switch

to a four-stage function:

Value:0 - Only MIDI key information is transmitted or received.

Value:1 - Key information and controller information are both transmitted and received.

Value:2 - Same as value 1 with the addition that program changes are both transmitted and received.

Value:3 - Same as value 2 with the addition that to change a program on the Mirage you must also press the MIDI+1/yes button on instruments such as the DX-7. This setting allows you to change sounds on your controller instrument without changing sounds on your Mirage.

Consult the owner's manual of your particular MIDI controller for the proper program transmit number. Following are two tables - the first for the DX-7 and the next for most other MIDI controllers.

DX-7	Mirage Program Number				
	1	2	3	4	
Load All Sound 1	1	4	7	10	
Load All Sound 2	2	5	8	11	
Load All Sound 3	3	6	9	12	
Change Upper/ Lower Program Number	13	14	15	16	
Load Lower Sound 1	17	20	23	26	
Load Lower Sound 2	18	21	24	27	
Load Lower Sound 3	19	22	25	28	
Change Lower Program Number	29	30	31	32	
Load Upper Sound 1	33	36	39	42	Requires Cartridge Programs 1-16
Load Upper Sound 2	34	37	40	43	
Load Upper Sound 3	35	38	41	44	
Change Upper Program Number	45	46	47	48	

Other MIDI Controllers	Mirage Program Number			
	1	2	3	4
Load All Sound 1	0	3	6	9
Load All Sound 2	1	4	7	10
Load All Sound 3	2	5	8	11
Change Upper/ Lower Program Number	12	13	14	15
Load Lower Sound 1	16	19	22	25
Load Lower Sound 2	17	20	23	26
Load Lower Sound 3	18	21	24	27
Change Lower Program Number	28	29	30	31
Load Upper Sound 1	32	35	38	41
Load Upper Sound 2	33	36	39	42
Load Upper Sound 3	34	37	40	43
Change Upper Program Number	44	45	46	47

Note: Changing programs from your MIDI controller will cause the Mirage to display only the value of the program (1,2,3, or 4). The first display on the Mirage will be blank.

Example:

1. Set Parameter 84 on the Mirage to 2. This will allow all key, controller, and program-change information to be transmitted and received.

2. If you select Program #3 on the DX-7 it will cause the Mirage to load Sound 3 and select Program 1.

3. Selecting Program 16 on the DX-7 will change the upper and lower programs of the Mirage to number 4.

4. If you set Parameter 84 on the Mirage to 3, you must press the +1/yes button on the DX-7 following the program selection.

LOADING SOUNDS AND TRANSMITTING PROGRAM CHANGES

You may now load a sound from the front panel of the Mirage and select a program number (1-4) at the same time. Also, the Mirage will now transmit program changes over MIDI.

Sound Loading Procedure:

When loading a lower, upper, or both sounds drom disk, you can select Program 1,2,3, or 4 before hitting the enter key. This will load in the given program along with the sound being loaded.

Transmitting MIDI Program Changes:

If Parameter 84 is set to a value of 2 or 3, then loading a sound from the Mirage will transmit MIDI program-change information as outlined in the previous charts.

If you change programs with the upper/lower link switch (Parameter 25) set ON, then program changes 13 through 16 will be transmitted. If you change a lower program with the link switch set OFF, then program changes 29-32 will be transmitted. If you change upper programs with the link switch off then program changes 45-48 will be transmitted.

Example:

Press Load Upper 2 and enter a 3. This will load Upper Sound 2 from the disk and automatically select Upper Program 3. RC090317

Note that if Parameter 84 is set to 2 or 3, then the Mirage will also transmit a program change through MIDI as in the previous charts.

USING THE MIRAGE AS A MIDI CONTROLLER

The Mirage Keyboard can be set to transmit out MIDI information without playing sounds on the internal Mirage. The Mirage will still sound voices which are coming in from MIDI.

30/Local ON/OFF [ON-OFF] Default ON

When the switch is set on, the Mirage functions as normal. When set off, the Mirage will not sound voices played from the keyboard. This is a useful function when using the Mirage in a multiple-keyboard set-up or when using the Mirage with external MIDI sequencers.

Let's Make An Electric Piano (sort of)

by

Duane L. King

Have you spent $50.00 on MASOS and you still can't make samples that sound as good as the 'factory' sounds? So did I, but do not despair! You didn't waste your money! MASOS opens up the doors to all kinds of sound experimentation, not just making your own samples. For starters you can mix different samples from your 'factory' disk collection to create new sounds. Or you can fade from one factory sound into another, or add waveforms together, or sandwich small segments of several samples together. The point is- look at your collection of 'factory' samples as **raw material**, not as a final product. RC090317

I like the factory disks, but I had decided that I wasn't going to pay $40 for a diskette of samples. Now that the price has come down I've succumbed to the temptation. But I'm still not satisfied with some of the sounds! All that means is I need to modify them to suit my taste and musical needs. So I'm exploring. I'm writing down every parameter for every program and wavesample on every disk in my collection. This is very time consuming! I'm not finished yet but I've already made several discoveries. For example, on **Sound Disk #1**, wavesample 3 of the Wooden Flute is a pure sine wave. Doesn't sound interesting yet? Keep reading. You see, I'm a piano buff. All kinds of piano-type sounds interest me. One day I decided I wanted to try my hand at making my own electric piano sound, just to see what would happen. What I ended up doing was using MASOS to combine one of the upper piano samples with the sine wave and play them in mix mode. In doing this I learned a lot about mixing wavesamples! Now I'm telling you what I did and how I did it to help you get more out of your Mirage. (I'm hoping some of you out there will make some neat discoveries and share them with me so my library will continue to expand...)

The first thing you need is **Sound Disk #1.0**. If you recently purchased your Mirage, you may have **Sound Disk #1.2**. I know that the piano samples are GREAT compared to the 1.0 disk, but I don't know what else has changed- so proceed with caution (when your machine gives you different parameter values from what I list here, always go with what is on your display-- check my work!). You will also need MASOS and a blank diskette. I will be referring to the **Advanced Sampler's Guide**, so keep it handy. We are going to make an upper keyboard sample by moving the sine wave sample and one of the piano samples so they are next to each other. Then they can be played in mix mode.

In "Part II - Mirage Parameters" of the **Advanced Sampler's Guide** (ASG) in the discussion of parameter [28] (mix mode- page 13 in my copy...), a seemingly innocent statement is made- "If Mix Mode [28] is on, then wavesamples are assigned in pairs, and only every other Top Key is considered." This sounds straight-forward enough. But, Top Key isn't the only parameter in the second wavesample that gets ignored. Further on in "Part II - Mirage Parameters" in the section "Relative Tuning, Amplitude and Filter Parameters" (page 21), a cryptic note appears, "Note that in Mix Mode, only one set of relative parameters is used; they are applied to both wavesamples. Oscillator 1's wavesample parameters are active; Oscillator 2's are ignored." This means that the following parameters for the second wavesample will be ignored: [67] Relative Tuning Coarse, [68] Relative Tuning Fine, [69] Relative Amplitude, [70] Relative Filter Frequency, and [71] Maximum Filter Frequency. The values for these parameters will be obtained from the first wavesample and used to control both oscillators! In practical terms this means that you must pick two wavesamples having the **same pitch** if you want the mixed wavesamples to be in tune to each other. This is the first **getcha!** Once I got past this hurdle I was staring the second **getcha!** square in the face- I didn't have any idea what pitches were sampled for the sine wave or the piano samples! The solution? You don't need to know what pitch was sampled if you make one assumption- **all the 'factory' wavesamples are tuned the same.** (They aren't on **Sound Disk #2.0** but so what.) There is only one sine wave sample so I had to find a piano sample tuned to the same pitch as the sine wave. The sine wave's Coarse and Fine Tune parameter values are 5 and 80 respectively. If the Fine Tune parameters of two wavesamples are the same then they are the same pitch. Fortunately I had four upper piano sounds to choose from; wavesamples 1,2,5 and 6. If you configure the mod wheel to mix the piano wavesamples you will discover that the even wavesamples are 'sharp and thin' and the odd wavesamples are 'soft and thick'. I decided to use piano wavesample 1 because I liked it better. You might want to use one of the other candidates. Refer to tables 1 and 2 below.

Now you are ready to follow my footsteps and find out how I made my very own Electric Piano (sort of). First turn your Mirage off (if it was on) and take out the diskette that was in it (or take the diskette out and turn it off), put in the **Mirage Advanced Sampler's Operating System** disk and turn the Mirage on (or turn it on and then put the disk in...). When the disk light goes out, eject the MASOS disk and put in **Sound Disk #1.0**. Press [LOAD UPPER] [1] [START]. When the upper piano sound is loaded, take out the disk and put your blank disk in. Press [12] [?] [START] to save the upper piano sound on your blank disk (replace the '?' with a 1, 2, or 3 to save the sound as upper 1, upper 2, or upper 3 respectively). (Make sure you pull the write protect tat

down so that it covers the little hole or the machine won't let you save the sound on the disk.) When that finishes, remove the blank disk and insert **Sound Disk #1.0** again. At this point I was caught by the third **getcha!**- how do I get the sine wave sample from upper 3 into memory at the same time as the piano sample that I just saved on my blank disk? You can't get there from here- you have to go some place else first. Suddenly it hit me-- move the sine wave to the lower keyboard, reload the upper piano sample, and copy the sine wave to the upper keyboard! This is why you must have booted the Mirage from the MASOS disk- it's the only way to copy wavesamples between keyboard halves. Press [LOAD UPPER] [3] [START] to load the flute sound. Select program U4 (it plays the sine wave like a xylophone). Now we are ready to copy wavesample 3 to the lower keyboard half. Press [26] [VALUE] and press [ON ^] as many times as necessary to make '3' appear in the display. Now press [17] [2] [START] to copy upper wavesample 3 to the lower keyboard half as wavesample 2. This puts the sine wave in the correct wavesample position, but in the wrong keyboard half. Now you can play the sine wave in the second octave. Take out **Sound Disk #1.0** and put your blank disk in. Press [LOAD UPPER] [?] [START] to load the upper piano sound back in (replace the '?' with the number you used when you saved the piano sound). Now you can play 'one' in the first octave, the sine wave in the second octave, and the piano on the rest of the keyboard. Now play an A with the piano sound and an A with the sine wave. They are supposed to be in tune with each other. My next worry was keeping the sine wave sample from colliding with the piano when I copied it to the upper keyboard half. This is the fourth **getcha!** The sine wave is on pages 7E and 7F. The particular piano sample I'm interested in (wavesample 1) is on pages B0 thru FF. So in this case I don't have a problem. Select program L1. Press [26] [VALUE] and press [ON ^] as many times as necessary to make '2' appear in the display. All you have to do now is press [18] [2] [START]. Now when you play in the fourth octave you can hear the sine wave behind the piano! Select program U1. Press [26] [VALUE] and press [OFF V] as many times as necessary to make '1' appear in the display. Press [72] [VALUE] and hold down [ON ^] until '61' appears in the display. Now wavesamples 1 and 2 cover the entire upper keyboard. Press [12] [?] [START] to save the upper keyboard sound (replace the '?' with the number you used the first time you saved the piano sound).

Here's a summary of the procedure we just used to combine upper wavesample 3 of the Wooden Flute with upper wavesample 1 of the piano:

1. Turn the Mirage off and remove any diskette.
2. Put in the MASOS disk and turn the Mirage on.
3. Eject the MASOS disk and put in **Sound Disk #1.0**.
4. Press [LOAD UPPER] [1] [START] to load the upper piano sound.
5. Eject **Sound Disk #1.0** and put in your blank disk.
6. Press [12] [?] [START] to save the upper piano sound.
7. Eject the blank disk and put in **Sound Disk #1.0**.
8. Press [LOAD UPPER] [3] [START] to load the Wooden Flute sound.
9. Select program U4.
10. Press [26] [VALUE] and make '3' appear in the display.
11. Press [17] [2] [START] to copy the sine wave to the lower keyboard.
12. Eject **Sound Disk #1.0** and put in the blank disk.
13. Press [LOAD UPPER] [?] [START] to retrieve the piano sound. RC090317
14. Select program L1.
15. Press [26] [VALUE] and make '2' appear in the display.
16. Press [18] [2] [START] to copy the sine wave back.
17. Select program U1.
18. Press [26] [VALUE] and make '1' appear in the display.
19. Press [72] [VALUE] and make '61' appear in the display (Top Key).
20. Press [12] [?] [START] to save the Electric Piano.

At this point you have a usable electric piano sound for the upper keyboard. You can use this with the rock vamp sound- lower 3 program 4 of **Sound Disk #2**, to cover the whole keyboard. You should spend some time adjusting the various parameters of your new electric piano sound until it sounds 'better'. Pay particular attention to [34] Oscillator Mix, [35] Oscillator Mix Sensitivity, and the velocity sensitivity controls for the filter and amplitude envelopes- [45] thru [49] and [55] thru 59]. Program U1 and U2 are the same right now. You will probably want to change at least one of them. Programs U3 and U4 do not use mix mode so you may want to change parameter [29] in these programs.

SOME REAL SAMPLE IDEAS
by
Duane L. King

Sometimes I get frustrated with my Mirage because I really want to make good samples for it. I haven't had any trouble making bad samples. It's only when I try to make high-quality ones that I have problems. Now, we all know it can be done, we've played the factory disks. So how do we do it? I've been looking for the answer to this question for some time-ever since I made my first sample. All of my problems and frustrations with sampling can be traced back to one or more of these problem areas; 1) poor sampling environment, 2) aliasing of high frequencies, and 3) inadequate or missing equipment. It turns out that the key to good samples is the equipment that is between the sample and the Mirage. Don't give up because you don't have money to shell out for microphones, recording and signal processing equipment! There's a world of low-budget solutions out there. For starters, did you know you don't have to buy pre-formatted diskettes anymore? Ensoniq released their disk formatting program ($19.95). I regularly format and use the same type of diskettes in my Mirage that I use in my Apple Macintosh. These single sided, single density 3 1/2" Sony diskettes cost me between $2.00 and $3.00 each depending on where I buy them. What this means is if I buy Ensoniq's disk formatter and three unformatted diskettes at $3.00 each, I'm already saving money! (The pre-formatted diskettes were selling for about $13.95.) But don't think that every thing is rosy just yet. The Ensoniq formatting program works perfectly except for one little thing. They forgot to explain to you the fact that the diskettes you format with this program shouldn't be put in the Mirage until you have turned it on using a FACTORY FORMATTED DISKETTE. If you turn your Mirage on with one of your own formatted diskettes in it, your keyboard won't make a sound. It only wants to format diskettes. This is a small inconvenience though. Just remember to use one of your expensive factory diskettes when you turn on your Mirage and then you can switch to your home-grown samples on your inexpensive, home-formatted diskettes. We have to have diskettes to store our samples on and this is the cheapest way I've found to get usable diskettes. RC090317

Now, about the equipment that stands between your prospective sample and the Mirage. When I bought my Mirage, the first thing I had to do was sample my own voice. I'll bet you didn't think of doing that did you? O.K., so I'm not unique. But did you make your first 'live' sample using the right channel of a pair of stereo headphones for a microphone? I did, and it makes an incredibly lousy sample! I still don't own a mic. Even if I did, my voice still wouldn't make good samples. I don't have a trained singing voice. I don't even know anyone with a trained singing voice. But I do own a pretty good stereo cassette deck. So instead of singing, I use pre-recorded material as the basis of most of my samples. This eliminates the need for microphones and basically guarantees that the sampling environment will be clean. You can plug your cassette deck directly into your Mirage, but you won't have any gain control that way. If you have a quiet stereo amplifier, use one of the speaker outputs to drive the input on the Mirage, but be VERY careful with the volume control on your amp!! Experiment with the setting of parameter [75]. I normally leave it set to ON (line level input), but you may want to use the mic level setting. I hook the Mirage up to one of the B speaker outputs on the back of my amp. My speakers use the A outputs. If you don't have spare speaker outputs you will have to unplug one of your speakers when you are sampling. Then I select mono L+R output on my amp and A+B speakers. The mono setting is not mandatory and may not be desirable for samples of 'stereo enhanced' material. I use the A+B setting so I am hearing the material the Mirage is going to sample. The main advantage of going through your stereo system is the tone controls. Don't cringe! Most good stereo systems have graphic equalizers of some type (either built-in or add-on). You can use the equalizer to cut or boost certain frequency bands to get a good sample. Now what are we going to sample? No, not records. Most pre-recorded materials are protected with a copyright. If you use samples of copyrighted material in productions that make money, contact the owner of the copyright BEFORE you publish. Usually you can get the rights to use the materials at NO COST! Be sure to explain in writing exactly which song, and how much and what part of it you are using. If you modify the sample sufficiently then it becomes your property and you probably don't need permission to make money with it. DO NOT sample lyrics unless you want to pay for the right to use them! It's also a good idea to stay clear of recognizable melody lines. What does this leave us to sample for free? New material is appearing all the time. Have you seen Korg's new SDD-2000 sampling digital delay? Not interested? That's just because you don't know about THE TAPE! Korg packages a cassette tape with the SDD-2000. This tape contains 167 sounds on it that you can sample into the Mirage! The tape is not copyright protected! If the local Korg dealer won't sell you just the tape, contact someone who owns a SDD-2000 and offer to trade some of your samples for a copy of the tape. I found the percussion sounds and the voice sounds to be the most interesting. There are four or five different voice samples and fifteen or more percussion sounds. The tape also contains acoustic and electric drums, various bass samples, guitars, pianos, brass, etc. AND THAT'S NOT ALL! You also get barking dogs, mooing cows, breaking glass, alarms, gunfire, etc. This is a REAL BARGAIN! Get one! Another good source of samples is nature records. Don't laugh! I've gotten some awesome samples from a recording of the songs of

Humpback whales! Try looping short sections of a natural sound. The results you get can be surprising! If you are making non-commercial samples, try out some of the various sound effect records in your favorite record store.

What about the aliasing problem? When you sample gongs or other sounds with a lot of high frequencies you will overwhelm the sampling rate of the Mirage. We need to raise the sampling rate of the Mirage to handle really 'crisp' or 'sharp' sounds. Don't go out and buy the $50.00 input sampling filter. If you have a reel-to-reel with multiple speeds, a dual speed cassette deck, or a turntable with a speed adjustment you can live without the fancy filter and still get better samples than you can make otherwise. I have a dual speed cassette deck. For difficult samples I record them at 3 3/4 ips. When I'm ready to start the actual sampling session, I play the sample into the Mirage at 1 7/8. This lowers the sample by one octave. If the original recorded sound contained frequency components up to 20 KHz, then playback at 1/2 speed reduces that to 10 KHz. This is well with in the range of a plain vanilla Mirage. After you get a good sample use parameter [67] to raise the sound up one octave. My turntable has a speed adjustment that allows me to slow the turntable down by 3%. Yours may allow you to slow it down even more. Reducing the speed by 3% raises your effective sampling bandwidth by 435 Hz. That may be enough if you use your equalizer to reduce everything above 15KHz. (Many equalizers have a 15 KHz slider!) Yes, this is really a low-rent approach to the aliasing problem. But if it works, no one will know! Remember, all people will hear is the final product. They won't have any idea how you did it, and they probably don't care!

I haven't mentioned any solutions to the problem of making long loops that don't click, pop, or waver. That's because so far I have found only one way to make long loops that work properly. You must have access to THE SOUND LAB software! I didn't say you had to buy it! Just use it. Try this. Put a difficult-to-loop sample on a diskette, put it in you pocket, and stroll into your Ensoniq dealer's showroom. Ask for a demo of the Sound Lab software. When the salesman is ready to load a sample to show you how easy it is to make long loops, hand him your diskette. If he hesitates, tell him that the sample on your diskette is impossible to loop. What self-respecting salesman would turn down a challenge like this? Don't like this idea? Afraid it will only work once? Form a user group or a co-operative with other Mirage owners and purchase the software as a group.

Share your samples with other people (like me...). But before you do, TUNE YOUR SAMPLES! You almost have to buy a guitar tuner ($15.00) if you want all your samples (factory and home-grown) to be tuned the same. Load the factory piano sound and check the tuning of it. Now tune all your other samples to the factory piano. If you do this you will be a better person for it. Be sure to check the samples on Sound Disk #2.0 because they are not all tuned the same! RC090317

Here is a summary of the major tips and ideas in this article:

1. Don't buy pre-formatted diskettes, buy the Ensoniq disk formatting program and make your own formatted diskettes.
2. You can use Sony single-sided, single density 3 1/2" (microfloppy) diskettes in the Mirage for $2.00 to $3.00 each.
3. Use your stereo system components when you make samples.
4. Don't use samples of copyright protected materials to make money.
5. Get THE TAPE shipped with the Korg SDD-2000. It has 167 samples on it.
6. Record the material you are going to sample at a fast tape speed and sample it at a lower tape speed. This effectively doubles the sample rate of the Mirage.
7. If you don't have a multi-speed tape recorder, use the pitch control on your turntable to slow the material down before sampling it.
8. Plan to borrow the Sound Lab software or form a group and purchase it.
9. Get a guitar tuner and tune all your samples to the same pitch.

Duane King is an engineer currently working for SCI Systems, Inc. in Huntsville, Al. Duane has programming experience in several languages and is presently working on adding computer control to his synthesizer collection. This article was hacked on his Mac.