TRANSONIQ HACKER

The Independent Ensoniq User's Newsletter

ESQ-TIPS - PROGRAMMING ESSENTIALS

By Jim Johnson

I can hear it now. "Program my ESQ1? Not me - I'm a musician! I'll use commercial sounds, and concentrate on my music." This is actually not a bad idea, since creating sounds on a synth as powerful as the ESQ1 can require a considerable investment of time, especially if it's your first synthesizer. So you order your first set of ESQ sounds. Some of them are great, some stink, and some sound good, BUT.. it's this last set of sounds I'd like to talk to you about; the sounds that are good, but would sound a lot better if some minor changes were made. Unless you just want to throw them away and order more sounds, you'll have to learn enough programming to tweak them yourself.

I will assume that you have read your manual, and that, even though you might not know the significance of all the elements of the ESQ's voices, you know how to find and change the various parameter values. If you don't, put this issue of the Hacker down and reread pages 12-16 of your Owner's Manual.

Back already? Good - let's get to work. Assuming that the sound you're starting with is pretty close to the sound you're after, the things you're most likely to want to change (or at least, the things I usually change when I'm tweaking my own patches for a particular application) are the vibrato, velocity sensitivity, release time, "brilliance", performance control functions, and layering. We'll start with vibrato, since this is the easiest to deal with.

Vibrato is produced by a triangle wave from an LFO modulating the pitch of one or more oscillators. Usually, LFO1 is used as the vibrato source, but since any LFO can be used, be sure to check the MODS on each oscillator to see which one is in use. (Many times, especially on string sounds, two LFOs with slightly different settings will be used to fatten the sound.) Good acoustic musicians, subconsciously or not, usually try to match the speed of their vibrato to the tempo of the music; good synthesists take care to adjust the frequencies of their LFOs in much the same way. The depth, or intensity, of the vibrato is controlled by a combination of the modulation depths on OSC1, 2, & 3, as well as the MOD source and L1 & L2 settings on the vibrato LFO(s). The maximum vibrato intensity is set by the mod depth controls, and should be set between -2 and +2 in most cases; though it's helpful to use more extreme settings while you're experimenting with the LFOs. Most patches will use the WHEEL as the MOD source for the LFO, so that vibrato is introduced with the left hand; however, if you're using a pressure sensitive master keyboard or a CV pedal, it might be more convenient to change this source to PRESS or PEDAL so that both hands will be free for the keyboard. (Be sure and change any other WHEEL routings in the same way, to maintain the same effect.) L1, L2 and DELAY form a crude envelope for the LFO output, and are used either for constant or delayed vibrato. Try setting these parameters to 63, 0, 63 respectively for a continuous vibrato, or to 0, 5, 63 for delayed vibrato. If you don't want any vibrato at all, try setting your vibrato LFO like this:

FREQ=9, HUMAN=ON, WAV=NOI, L1=63, DELAY=63, L2=12, MOD=OFF

This creates a slight random "jitter" in the pitch, which sounds especially good on horns and other wind instruments.

The release time of a sound is how long the sound lingers after a key is released, much like sustain on an organ, and is set with the T4 controls on ENVs 1-4. Since ENV4 is the master envelope for the sound, by virtue of being permanently patched to DCA4, start here. Once this is set, change T4 on the other ENVs by the same amount. You might also want to adjust TK on each ENV by a small amount in the same direction.

The brilliance, or brightness, of a sound is affected by the settings on the filter, as well as the mix of the oscillators and their waveforms. The filter is the best place to start, and the controls to start with are FREQ and KEYBD. These affect the initial cutoff frequency and the amount of keyboard modulation of the filter frequency, respectively. The procedure for adjusting these two parameters is a a specific case of a good method for adjusting any initial setting and keyboard, velocity, or other manual modulation source. Generally speaking, adjust the initial setting when the mod source is set to its lowest value, and the mod depth when the source is at its highest. In this case, adjust KEYBD while playing notes at the top of the keyboard, and change FREQ while playing low notes. By moving back and forth between these two parameters, you can adjust the "brightness balance" of the sound across the keyboard quickly and systematically.

Another way to change brightness is by playing with the levels of each oscillator's DCA. First find which oscillator produces what component of the sound by switching each DCA's output on and off, then adjust the initial level and/or mod settings of the oscillator that seems to be the brightest. Remember that all the "2" waveforms at the upper end of the waveform list (SQR2, BASS2, etc.) are less bright versions of

other waveforms, so try substituting these for a darker sound. Other waveform changes might help, though most will have too great an effect on the sound. Experiment!

Adjusting velocity sensitivity is a little harder than what we've discussed so far, but is essential if you need to compensate for differences between your touch and the programmer's. Every velocity modulation routing, including those built into the envelopes, will need to be tweaked. Start by adjusting LV on ENV4, which controls the way velocity effects the overall volume of the sound. Once this is about right, adjust T1 and T1V on ENV4 using the same procedure described above for balancing the filter tracking. Make changes in T1 (the initial value) when playing soft notes, and change T1V (velocity modulation depth) on loud notes. Now move to the next most important velocity routing (by most important, I mean the mod routing with the largest depth value) and adjust this in the same way - first adjust the initial setting at low velocities, then adjust the mod depth at high velocities. This procedure requires a lot of trial and error, and may take awhile at first; but after you've done it once or twice, you'll get a feel for which velocity routings are important, and which aren't.

Fortunately, changing the split and layer settings is much easier than changing the velocity response. There are two important facts to remember here. First, if you move a patch to another location, you will have to update any patches which use it in a split or layer. This is because the ESQ references patch locations by number, not name; the same holds for patches used in the sequencer. For example, let's say that your first three patch locations hold sounds named GEORGE, FREDDY, and OLIVER, and that FREDDY uses GEORGE in a layer. Now, if you move GEORGE to location 3 and OLIVER to location 1, suddenly FREDDY is layered with OLIVER - even though you didn't change FREDDY. The fix for this is to simply change the layer program back to GEORGE on FREDDY's split/layer page. The other important fact to remember is to TURN OFF any layering when editing a sound, so that you can be sure what component of the sound you're actually working with. This may sound obvious but you wouldn't believe the amount of time I've wasted adjusting the wrong half of a layered sound!

A final point I'd like to make concerns the volume of a sound, which is set by the ENV4 mod depth on DCA4. Many programmers will set this to 63 on all sounds - a dangerous practice! Why? Many sounds can only be produced on the ESQ1 at low volumes; particularly flutes, drums, and other band limited sounds. Organs, brass and other sounds with lots of harmonics come through loud and clear. If your mixer is set up so that your brass sounds play at a normal volume, then you'll never hear your flutes and drums; on the other hand, if you adjust your sound system for your quiet sounds, you'll blow out a speaker when you switch back to the normal sounds! I recommend setting up your system to work with the quiet sounds, and lowering the volume of any loud sounds permanently, on the DCA4 page. Set the output level of your loudest organ patch to 25, and adjust all your other patches to produce roughly the same volume.

I know, if you don't know much about the internal workings of a synth, this may not mean to much to you. I have two pieces of advice in this case. First, try entering some patches from the back pages of the Hacker into your synth; this is a painless and profitable way to become proficient with the mechanics of the ESQ1's programmer. Second, check your local library or music store for any books or articles on analog or modular synthesizers. Yes, I said analog, because from a programmer's viewpoint, the ESQ1 has more in common with an analog synth like a modular Moog or an Oberheim Xpander than it does with a digital machine like a DX7. And don't convince yourself that there's no point in learning any of the basics of synth programming, just because you won't be creating your own sounds from scratch; as you can probably tell from this article, every little bit of synth knowledge can be useful even to the non-programming musician.

MIRAGE MEMORY MODS

A COMPARISON BETWEEN THE MME AND MEGABANK

By Erick Hailstone with technical assistance from Larry Church

FOR: Mirage
PRODUCTS: MME and MegaBank
PRICES: MME: $249.95 plus installation, MegaBank: $399.95 installed
FROM: MME: Virtual Engineering, 2004 Fernwood Rd., Victoria, BC Canada V8T 2Y9. MegaBank: Indian Valley Manufacturing, 69 Madison Ave., Telford, PA 18969.

MME

Price: $249.95 (Professional installation charge approx. $30 - $50)

Features: 1. Adds 4 more banks of memory (a bank = 1 normal upper & lower Mirage load).

2. Can switch back and forth between normal O.S. and MME O.S. Pressing CANCEL returns to normal Mirage O.S. Pressing ENTER selects MME. The display will show which mode is selected. In normal mode the display contains 1 dot to the left of the parameter number. In the MME mode the display shows 2 dots.

Trade offs: While in the MME mode the sequencer is disabled. It will still operate in the Mirage mode by simply pressing cancel. Memory of the sequencer is undisturbed while in MME mode.

Modifications: A board containing the memory is mounted internally. A ribbon cable comes out at the expansion port. At the end of the ribbon cable is an adaptor that plugs into the expansion port. The other end has its own edge connector. This connection sticks out the back of a Mirage about an inch.

Installation: Installing the MME in our test unit didn't present any significant problems. The procedure was somewhat complicated by placement of the jacks for the Quiet Stereo mod. These jacks had to be lowered about 1/4" to allow clearance for the memory board to mount using the standoffs provided with the kit. Stock units without the mod will require no drilling on the chassis as the pcb is supported by nylon standoffs threaded to the Mirage pcb supports.

The installation procedure is well written and easy to understand. Some soldering and rewiring is necessary. If you don't feel confident to accurately follow the procedure, have a professional do it. Digital circuit boards can be quickly destroyed by a wrong power supply connection.

One slight discrepancy worth mentioning: the kit includes two fuses to be installed in place of the existing fuses on the power supply regulator card in a standard Mirage. Most of the Mirages in the field have a different power supply that doesn't have these fuses. If yours has them, then change them. If it doesn't, then don't worry about them.

Bootup: A disk is provided that you bootup with when you want MME operations, taking approximately 49 seconds. After loading the MME operating system, it also loads all 5 upper & lower samples. Although this disk has no provision for copying itself, the production versions will.

Bank Selection: The top row of keys selects the Upper 5 Banks: keys 1, 2, 3, Rec, Upper Sample. The second row of keys selects the lower 5 Banks: keys 4, 5, 6, Play, Lower Sample. The third row of keys selects Both Upper and Lower Banks: keys 7, 8, 9, Load, Save.

Loading MME: The loading procedure is the same, with some enhancements. In normal Mirage mode it is exactly the same. The MME mode procedure is:

Press LOAD Upper or Lower or Both then the sound file number from Disk (1, 2, 3), the Bank number to load into (1, 2, 3, 4, 5) and the Program number (1, 2, 3, 4). Then press ENTER.

For example, to load Upper Soundfile 2 into Upper Bank 4 using Program 3 you would do the following:

Press Load Upper, then press 2, then press 4, then press 3, and then ENTER. The destination Bank and program numbers are optional and you can simply load a sound from disk as usual. The sound is then loaded into the current bank and defaults to Program 1. You can specify the destination bank and omit the program number and the soundfile on disk will be loaded into the destination bank using program 1.

MIDI: You can select any bank via MIDI program change commands. Make sure the Mirage is on the correct MIDI channel to receive MIDI commands. The MIDI patch change commands the MME respond to are:

To Change Lower Banks: MIDI Program change 1, 2, 3, 4, 5 - Select Lower Bank 1 through 5. MIDI Program change 6, 7, 8, 9 - Select Lower Program 1 to 4.

To Change Upper Banks: MIDI Program change 11, 12, 13, 14, 15 - Select Upper Bank 1 through 5. MIDI Program change 16, 17, 18, 19 - Select Upper Program 1-4.

To Change Both Lower and Upper Banks together: MIDI Program change 21, 22, 23, 24, 25 - Select Lower and Upper 1 to 5. MIDI Program change 26, 27, 28, 29 - Select Lower and Upper Programs 1 to 4.

Note: Selecting a bank and selecting a program change are 2 different operations. When you select a sample (bank) it will be whatever program was last selected. If Piano from Ensoniq Disk #1 is in bank 1, MIDI Program change 1 will be piano program 1. MIDI Program change 8 would select program 3. If you load other banks and then come back to MIDI Program change 1 it will still be piano and it will still be program 3. To get back to program 1, you must send the additional MIDI Program change 6. As you can see this requires two commands.

Sampling: Sampling is done in the normal way using the standard Mirage O.S. Remember, pressing the CANCEL button will return to Mirage mode. Make your first sample. Shift to MME mode by pressing the ENTER button and select the next bank you would like to sample into. These procedures allow you to make several samples that you can switch to quickly to make comparisons.

Saving data: Saving data is done the same way it is done on a standard Mirage. I would have liked to have seen a blanket save function. Obviously, a single disk will not hold 5 upper and lower samples, but you could still save 3 samples (the contents of a single disk) at a time.

Comments: This thing is great! Having one Mirage is a blast.

Having five Mirages is a Major Blast. The operation is near idiotproof. All of the normal Mirage functions are either retained or available at the touch of a button. There are only 3 changes I would like to see:

1. As mentioned under the MIDI section, changing banks (samples) and changing programs are 2 separate functions. I would prefer that whenever you called up a bank (sample) it would default to Program one or that more MIDI Program change numbers were used, and that Bank (sample) Select and Program Change functions were incorporated into one command.

2. Under sampling, I mentioned the idea of a blanket save function.

3. Now, I realize that this product was made for the Mirage, not the ESQ, but because of the ability of the ESQ to save data to the Mirage, it would be nice to accommodate this function. I spoke to Virtual Engineering about this and they indicate that this is a software matter, and, in the future, a modified version of the operating system may appear. This, of course, would depend on public demand and how cooperative Ensoniq can be on releasing certain MASOS information.

MEGABANK

Price: $399.95 Installed.

Features: 1. Adds 8 banks of memory (a bank = 1 normal upper & lower Mirage load.) Expander Memory for up to 1333 event sequences.

Tradeoffs: While in the MEGABANK mode there are no sampling functions.

Modifications: A board containing memory is mounted internally. A ribbon cable comes out the expansion port. At the end of the ribbon cable is a connector that plugs into the expansion port. It is the same case used for the Input Sampling Filter and the Mirage's Sequencer Expander. When plugged in, this connector sticks out approximately 3 inches. A 9-volt power supply plugs into the left side (facing the back) of this cartridge. You need to unplug this cartridge when transporting this device. A piece of tape was used to keep it from flopping around, and, with this style connecter, I don't see a way of doing it any better.

Installation: The only externally visible difference on the Mirage equipped with a MegaBank expander is a modified sequencer cartridge installed in the port. The buss connection from the main pcb to the memory board is made through a ribbon cable permanently attached internal to the cartridge. This makes it impossible to remove the cartridge for shipping without first lifting the cover and disconnecting the cable from the memory board. Damage to the cartridge or the main pcb could result from accidental torque on the cartridge as the edge connector provides the only mechanical stability. Once the cover is removed the ribbon cable can be disconnected from the memory board and the cartridge is simple to remove.

Since the mod arrived for review mounted in a Multisampler, we didn't get to do the installation first hand. An inspection of the assembly reveals that the main pcb must be pulled so that IC 13 can be replaced with a socket. A second ribbon cable inserted here provides all other connections to the memory board. Tear down and reassembly time necessary to add this socket appears to be the majority of the procedure.

The memory board is mounted to the rear panel with two small "L" brackets. Locating and drilling the holes for these brackets should be done while the main pcb is removed from the chassis. Additional support to the front of the board could have easily been added resulting in a better survival rate given a fall from the top of a keyboard rack. Even though the impact would more than likely destroy the cartridge edge connector anyway, it would be nice if the memory board survived. With the mounting holes properly drilled, final assembly should be a snap.

Bootup: Two disks are provided for bootup when you want MEGABANK operations. They contain a modified operating system called RAMOS. Additionally, there are two formatting disks that apparently allow you to lift the operating system and drop it on to another disk. This allows you to make special RAMOS disks (or another operating system for that matter). When you first power up and insert a RAMOS disk, it takes approximately 20 seconds for the banks to be checked and initialized. At this point, you can load sounds normally or perform a LOAD ALL function that will load an entire disk (all 3 banks) nonstop in 20 seconds.

Loading MEGABANK: You can load the exact same way you would with a standard Mirage. Whatever bank you are in (1-9) will be where the sample is loaded. You can also load an entire disk in 20 seconds by pressing Sample Lower, Enter. It will start with the currently selected bank. A special autoload function is provided. You can toggle this function on and off with Parameter 74. When turned on immediately after loading the O.S. the entire disk (all 3 banks) will be loaded in 20 seconds. If speed is most important, you may also toggle the initialization process on and off with Parameter 75. When turned off, this will substantially shorten the bootup time. It is worth noting that you can boot up any other operating system by pressing Load Upper, Lower, 0 Enter. This will allow you to temporarily boot up an alternative operating system. As long as you do not turn the power off, you can reboot RAMOS using the same procedure. All memory is retained except the bank that you load into.

Saving MEGABANK: Set-up Parameters 74, 75, as well as a few others, may be saved using Parameter 14: 1, 4, ENTER. You may save 3 banks, the entire contents of a single disk, at once by using Parameter 19: 1, 9, ENTER.

Bank Selection: Pushing the SAMPLE UPPER button now will show you the current bank selected and allow to select any others (1-9). To do so, you press the yellow and grey buttons 1 - 9.

MIDI: You can select any bank via MIDI Program change commands. MIDI program change messages 001 to 108 are used as follows:

001 to 036: all banks 1 - 9 with program variations 1-4 linked.

037 to 072: all banks 1 - 9 with program variations 1-4 occurring only in the lower half. U1-U4 will remain on the last variation picked while L1-L4 change with each new selection.

073 to 108: all banks 1 - 9 with program variations 1-4 occurring only in the top half. L1-L4 will remain on the last variation picked while U1-U4 change with each new selection.

109 to 117: instructs the Mirage to load sounds from the disk installed in the drive into the currently selected bank.

118: instructs the Mirage to load all 3 banks from the disk.

There are 2 new parameters that relate to MIDI in the following ways. If you try to select an empty bank via MIDI, the display will show a flashing "be" and the bank WILL NOT be selected. If you toggle Parameter 76 ON, you can then select an empty bank. Parameter 77 toggles the MIDI Bank load function on and off. When set to on, you can then command the Mirage to load from the currently inserted sound disk to the currently

selected bank(s).

Note: I could not find a way of selecting upper and lower samples from different banks at the same time. Example: Upper Bank 1 piano, Lower Bank 2 strings. There seems to be no way of doing this manually or via MIDI. The only way seems to be loading them one at a time into the same bank.

Sampling: Sampling is not supported using the RAMOS operating system. When you wish to sample you would do so with the normal Mirage O.S., or, better yet, using MASOS.

Comments: The only thing I don't like about this device is how quickly I got used to it. Having one Mirage is terrific, five is better, and nine better yet. This device is great, but I'll tell you I had a hard time deciding which samples to have loaded up at one time. There are two areas that I would like to see slightly different.

1. I would prefer to be able to combine any Upper & Lower sample without having to go to the disk drive. I believe this can be done with a software revision.

2. I would like to see a modified version of RAMOS that would allow any or all of this memory to be used for the ESQ-1. I spoke with IVM and they indicate that the door is wide open for such revisions.

COMPARISONS:

I have laid things out in outline form so that you can make your own comparisons. Here are the highlights.

MME: $249.95, Professional installation approximately $30 - $50.

Adds 4 more banks.

Allows any combination of Upper & Lower sounds manually or via MIDI.

Allows instant switching from MME operating system to Mirage O.S.

Retains sampling functions allowing comparisons from sample to sample (5 in all).

MEGABANK: $399.95 Installed.

Adds 8 more banks.

Allows single command selection of Sample Banks and program changes.

Accesses disk loading via MIDI Program changes.

Retains sequence functions and expands to 1,333 notes.

Allows you to load an entire disk with 1 command.

Allows you to save an entire disk with 1 command.

These are both good products and the type of things I think we all have been waiting for. They both add power and new features to the Mirage at reasonable prices. They both appear to be built well with quality parts and with solid design integrity.

If you believe that putting 9 Mirages into one box is a good idea, then you will be happy to know that

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RND (♩♪♪)

HEY! We're still looking for endorsements. We've called a couple of you out there, and heard things like, "Who, me? I live for the next issue, but I didn't think I was famous or anything." Come on, don't be shy. If your name has ever seen print (other than your yearbook), that's enough! Drop us a post card.

* * *

GOOF ALERT: As you probably gathered from MUG's response to Loren Moore's letter last month, Loren Moore suspected that possibly some of MUG's sounds weren't from their membership (they are). A couple lines got dropped out of Loren's letter. Sorry Loren.

* * *

Ensoniq has set up an official "Sound Designer Program" for people who want to market their ESQ-1 patches through Ensoniq. Ensoniq will pay a royalty of $0.03/sound/sale (or $1.20 for your typical cartridge of 40 sounds) for approved sounds. Royalty period lasts for one year. Sounds must be original and can be submitted on a cassette or Mirage disk. A card listing the developer will be included with each cartridge sold.

* * *

Erick Hailstone mentions a suspected bug that occurs sometimes on some ESQ-1's: "Don't use the Data Entry Slider to change range on the Master Timing. Use single increment buttons. The slider will slam past the 0-12 valid range and your pitch can land in dog-land." If you do this, or anything else that ends up with a hung machine, reinitialize it by (1) Pressing REC & Softbutton 1, (2) Pressing REC & Filter, & (3) Reloading your sounds.

* * *

TRANSONIQ-NET

The following people or organizations have agreed to help with questions:

ESQ-1 QUESTIONS - Tom McCaffrey. ESQUPA. (215) 750-0352, before 11 p.m. Eastern Time.

ESQ-1 QUESTIONS - Jim Johnson, (602) 821-9266. 5 to 10 p.m. Mountain Time (AZ).

MOVING SAMPLES - all over the place. Jack Loesch, (201) 264-3512. Eastern Time (N.J.). Call after 6:00 P.M.

MIDI USERS - Eric Baragar, Canadian MIDI Users Group, (613) 962-0549. Business hours, Eastern Time (Toronto, ONT).

MIRAGE COMPUTER BULLETIN BOARD - Provided by John Connolly of Portland, Oregon for information exchange and file transfer. Phone (voice): 503-641-6260. Phone (BBS/computer): 503-646-2095. Free messages & e-mail to the Hacker. Yearly membership for upload/download: $25.

SAMPLING - Mark Wyar, (216) 323-1205. Eastern time zone (OH). Calls between 6 pm and 11 pm.

MIDI & SEQUENCING - Leslie Fradkin or Elizabeth Rose, MIDI-MAX Studios. Eastern Time (NY). Calls between 10 am and 9 pm. (212) 628-5551.

MIDI & SEQUENCING - Markus McDowell. Any ol' time. (805) 987-9932 (Calif.)

MIRAGE HARDWARE & FIRMWARE - Scott D. Willingham. Pacific Time (CA). Days. (213) 938-6956.

MIRAGE OPERATING SYSTEM - Mark Cecys. Eastern Time (NY). Days. (716) 773-4085.

MASOS - Pete Wacker. Mountain Time (AZ). 3 pm to 9 pm. (602) 937-1177.

SOFTWARE - Paul Braun. (805) 583-5315.

BACK ISSUES

Back issues are $2. each. Issues 1 through 8 and numbers 11 and 17 are no longer available. ESQ-1 coverage started with Issue Number 13. The first two reprints in our "Quick and Dirty Reprint Series" are now available: MIRAGE OPERATIONS, for $5, and SAMPLE REVIEWS for $4. Each contains material from the first 17 issues.

HYPERSONIQ

NEW PRODUCT RELEASES

Valhala has released the ES-1 Patch Sequential Library for the ESQ-1 and Commodore 64/128 with 1541/1571 disk drive and Passport/Sequential or compatible interface. Billed as the ultimate storage program, it simultaneously holds all of sequence memory and three banks of sounds for instant access, or simultaneous access of up to ten banks of voices (400). It supports swapping sounds between banks, single or bulk sends and receives, and stores up to 1560 voices per 5 1/4" disk. To contact Valhala, refer to their ad in this issue.

G3 announces "WaveGuides." This is a set of booklets listing the complete parameters for Ensoniq sound disks for the Mirage. The guides are organized into Vol. 1 and 2, covering Disks 1-15 and 16-23, and (following Ensoniq's new packaging scheme) Vol. A and Vol. B. The guides are also indexed by name and instrument type. They allow the user to easily see everything at a glance and make easy comparisons. For pricing info, see their ad elsewhere in this issue. G3, 134 San Leonardo Way, Huntsville, Alabama 35811.

EYE AND I PRODUCTIONS announces the first of a series of support products for the Ensoniq ESQ-1. VOICE CRYSTAL 1, available at most Ensoniq dealers, is an 80 voice EEPROM cartridge loaded with professional high quality voices. But this is no ordinary cartridge. It is made of solid, semi-translucent blue, high-impact resistant epoxy. Soon to follow are the VC2, VC3, and VC4 Voice Crystals, each with their own unique color and voices. Next time you reach for your Steinway patch you'll know exactly which cart to grab without having to read the fine print on the label. HIGH QUALITY, SUPERB VOICES, LOW PRICE. VOICE CRYSTAL 1 retails for $57.95 (remember this is an EEPROM - fully programable - no batteries). The voices in VC1 are also available in data cassette form for $15.95. EYE AND I Productions, 2151 Old Oakland Rd., #224, San Jose, CA 95131. (408) 943-0139.

CHANGE OF ADDRESS

Please let us know at least four weeks in advance to avoid missing any issues. The Post Office really will NOT reliably forward this type of mail. (Believe us, not them!) We need to know both your old and your new address. (Issues missed due to late or no change notification are your own dumb fault - we mailed them!)

PLAYING BETWEEN THE KEYS

MAKING SPACE IN THE MIRAGE OPERATING SYSTEM

By Dick Lord

This time around, we are going to look at how to cut away some of the operating system to make room for your favorite hack. OS 3.2 is packed tight with features and doesn't have extra bytes lying around unused, so something will have to go.

"Sampling" is a logical candidate for the axe because you can always use another disk to sample (and if you care about your samples you would use MASOS anyway.) If we need more bytes, we can take away the sequencer, but usually that's fun to have around. Stripping out the sampling code gives us 438 bytes from 96F4 to 98AA hex to write our own code in. This isn't enough space to do all the things we would like, but it is enough room for patching temperaments and envelopes.

Of course, it would be a good idea to disable the sampling buttons. It just wouldn't do to accidentally press "Sample Upper" and have the MIRAGE try to execute your new pitch table as code. In OS 3.2 the keypad is scanned during the LED display routine, but the result of the scan is left in a variable at 80AE hex and decoded by a long command interpreter that extends from 90E9 to 96C4 hex. The piece of code we are interested in is where the sample keys are checked and the sampling displays are set up from 949B to 952C hex (refer to the listing at the end of this article). Placing a jump at 949B to 952D hex not only disables sampling, but gives us another 142 bytes to play with from 949E to 952C hex. Simply place 7E 95 2D at 949B - 949D hex to free this space.

Now that we have removed all references to the code space formerly occupied by sampling, we have 580 bytes of space in which we can place patches to the OS for temperament, complex envelopes or your latest whoosywhatsit. You might also want to use this space for a mini-monitor.

Of course, we would also need a way to start this kind of program. Instead of disabling the sample keys we might want to make use of them. We could locate our program (or a jump to it) at 94A7 hex and then we could start it with either sample button.

Another advantage of disabling the sampling code is that several parameters are now available. Parameters 73, 74, 75, 76, and 77 were used exclusively for sampling and are now free. These appear at 8017, 8018, 8019, 801A, and 801B hex, but can be accessed using the 6809's direct page mode at 17 thru 1B hex.

These parameters may not behave just the way we want. Parameter 73 has values between 30 and 99 while parameter 74 steps between 0 and 198 by twos and displays half its value. Parameter 75 is off/on, parameter 76 steps between 0 and 126 by twos, and parameter 77 is off/on. If that's not what our program needs, we will have to make a few more changes.

In OS 3.2 these parameters are controlled by code from 9BED to 9C34 hex. This code sets the upper and lower limits and whether the parameter value changes in steps of one, two, or four. Envelope and filter parameters change by two and velocity parameters by four. A type-table at 9FF3 hex determines whether the parameter is off/on, decimal, or hexadecimal. (For other parameters it also determines offsets into variable tables.) The appropriate type-table entries for parameters 73-77 are found at A03C-A040 and normally have values 09, 09, 81, 09, and 81. The 81 signifies that parameters 75 and 77 are off/on switches. If the 09's were 49's, then the display would be in hexadecimal instead of decimal. For these parameters, the x9 part has no apparent significance.

At present, the code sets the range of parameter 73 to step between 30 and 99, sets parameter 74 to step from 0 to 99 (198) by twos, and parameter 76 to step from 0 to 63 (126) by twos. Step size is set to two by the subroutine call BD 9D38 and upper and lower limit are stored in A0 and A1 direct page (actually 80A0 and 80A1.) The default values are step size of one and limits of 00 minimum and FF maximum. By changing limits, step size, and the entry in the type-table, we can make these five parameters do anything that we need.

Well, that's the story on making space for your own patches. If you plan to make a permanent modification on a bootable system disk, you will need to put the code changes on your disk instead of RAM. The article in Issue #19 of the Hacker shows you how to do just that.

One of the folks who reads this column carefully (Steve Fox of Seattle, WA) was kind enough to help clarify the odd behavior of the sector map. He suggested that while sectors 00 through 04 were 1024 bytes long, sector 05 might be only 512 bytes. I checked this out and he is indeed correct. [Ed. - Ensoniq confirms this. See Interface in Issue 21.] This explains why the segment boundaries change and originally appeared to overlap. The sector map at 00:05 should read 9400-95FF, at 01:05 should read AA00-ABFF, at 02:05 should read AC00-ADFF, and at 03:05 should read AE00-AFFF. Thanks, Steve.

For those folks who are dying to hack without building a hardware monitor, see the UPWARD CONCEPTS ad on page 5.

```
949B 96 AE       KYPD  LDA  KYVAL   get keypad value
949D 81 12             CMPA #18     SAMPLE UPPER ?
949F 27 06             BEQ  SAMPL   if yes, go sample
94A1 8113              CMPA #19     SAMPLE LOWER?
94A3 1026 0086         LBNE KYPD1   no, check other keys
94A7 96 AE       SAMPL LDA  KYVAL   Start of sample stuff

9BED 81 49       PARAM CMPA #73     is it param 73
9BEF 26 0E             BNE  PARM1   no, next param
9BF1 86 1E             LDA  #30     minimum value
9BF3 97 A1             STA  MIN     store in MIN
9BF5 86 63             LDA  #99     maximum value
9BF7 97 A0             STA  MAX     store in MAX
9BF9 8E 8017           LDX  #SAMPLE-TIME-ADJ
9BFC 16 00C2           LBRA DSPLY   display parameter
9BFF 81 4A       PARM1 CMPA #74     param 74
9C01 26 0D             BNE  PARM2
9C03 BD 9D38           JSR  STEP2   set step to 2
9C06 86 C6             LDA  #198    2 x 99
9C08 97 A0             STA  MAX     set maximum
9C0A 8E 8018           LDX  #INPUT-FILT-FREQ
9C0D 16 00B1           LBRA DSPLY
```

Next topic will be envelopes and how they are made in software. Keep hacking till then.

ORGANIZING YOUR MIRAGE DISKS
- FOR PERFORMANCE

By Clark Salisbury

OK. It's the middle of the second set. The band's just finished a smoking rendition of "Watching Scotty Grow", or some such thing, and the dance floor is jammed. You've got the crowd in the palm of your hand, they're hanging on your every note. This next tune will knock 'em out. You pop a disk into your trusty Mirage and hit the load button. The disk drive begins to whir. The band leader begins to count the eady! The disk drive grinds away, the band leader looks at his watch, couples begin to drift off in the direction of the Foosball tables...

Sound familiar? Yeah. You remember when you bought the dang Mirage. "How long does it take to load?", you asked. "Oh, about eight seconds". Sure. Eight seconds. Did you stop to think how long eight seconds really is when the drummer's counting off the tune, and the club owner's staring at the band and trying to get a tally of the number of drinks on your collective tab? Indeed, eight seconds can seem like an absolute eternity. So isn't there anything you can do to help rectify this awful situation?

Of course there is, you sampling maniac, you! Now don't get me wrong. You won't be able to speed up the amount of time it takes to load a disk, of course. But you can arrange things so that you don't have to be changing disks so often. How do you do that? Well, there's a couple of ways I've come across to do that. Interested? Well, I'll tell you anyway.

My idea is a pretty simple one, really. The first thing that you need to do, though, is to determine exactly which sounds you are going to need, and when. In other words, what sounds will you need for the first three songs of the first set, for example? The idea is that if you need piano on the first tune, strings on the second tune, and brass on the third, you're going to try to get all of those sounds onto a single disk load, so that they'll all be in the Mirage's memory at the same time. In this way, you (hopefully) won't be needing to load new disks quite as often, thereby saving valuable time for more important things, like taking notes on your research project on the declining popularity of spandex among those who have reached the age of majority.

Once you've decided which sounds you'll need to group together onto your "performance disk", you'll need to decide how much of the keyboard you have to cover with each instrument. In other words, if the piano part that you play on your first tune is nothing more than comping in the middle two octaves of the keyboard, you might be able to get rid of the samples that cover the low and high octaves of the keyboard. The fewer individual samples you need to use, of course, the more memory you'll have available to stuff other sounds into. So go through the tunes that you want to try to cover. You may even want to play through the tunes, deciding which are the highest and lowest notes you will be using. Now, make a list of the actual samples that are being used to make up the sound in the area that you'll be using it in, and also list the samples that you aren't using (the ones outside of the range of notes you'll be playing). You'll also want to make note of the topkey for each sample, as well as how much memory it uses - we'll get to the reason for this in a moment.

This entire operation should be repeated for each sound that you want to try to squeeze onto your disk. You might even want to make up some "layout charts". These would indicate topkey and wavesample start and end parameters (parameters 60 and 61, respectively) for each individual sample that goes to make up the preset on the Mirage keyboard. I know that this may seem like a lot of work, but developing these "sample layout charts" can save a great deal of effort for you in the long run. If you have everything written down, you'll have these charts available for reference later on as your set list changes and you find yourself needing to re-arrange your disks.

Anyway, now that you're armed with your layout charts, you can begin the work of arranging your custom disks. Let's say that you've found that in the first four tunes on your set list, you need a piano sample, but you only play it in the middle two octaves of the keyboard - from C2 to C4. And let's say that you have determined that the piano disk is made up of seven samples. The first sample goes from C1 to F#1. The second is from G1 to D2. The third is from D#2 to B2, the fourth is from C3 to A3, the fifth is from A#3 to F4, the sixth is from F#4 to C5, and the seventh is from C#5 to C6 (by the way, these split points have been taken from the "piano+1" sample on sound disk 5; this sample is in mix mode, however, so we actually have two wavesamples occupying each area of the keyboard).

It should be immediately obvious that we can dump the first sample, as well as the fifth through seventh samples, and still leave the piano intact in the areas in which it will be needed. This, of course, will help make room for our other samples. What isn't immediately obvious is that we may even be able to dump the second sample, and stretch the third sample down the extra three notes to cover the keyboard down to C2. We might try experimenting to see how this sample works when stretched down the extra three notes - if it sounds okay, great! We can lose sample number two, freeing up more memory for other things.

Let's say, though, that you are going to need four octaves of piano - say from C1 to C4. We can apply these same ideas in a bit more complex way to try to win back the largest amount of memory that we can for our other sounds. Take a look at the distribution of samples on the keyboard - are there any that can be re-arranged to free up some extra space? Would it be possible to take sample three and stretch its high note up to F4, or thereabouts, and then take sample five, and bring its low note down to maybe F#4? If so, we may be able to dump sample number four, and use its memory for something else.

Now when you're checking these things out, try not to think in terms of how the overall preset (in this case, the multisampled piano preset) sounds on its own, but how it will sound in the context of the music that it will be used for. If, for instance, you are comping and also doubling the bass player with your left hand in a particular number, the problems usually associated with stretching a higher piano sample down to cover that extra octave, (rather than using a separate low piano sample up for that octave), may not be as noticeable as it would be if you were playing a solo piano part. In other words, see what you can get away with.

Once you have freed up a chunk of memory by dumping unnecessary samples, start taking a look at the samples you want to try to fit into the open memory. Check out where each of those samples falls on the keyboard, and how much memory each one takes up. Using the techniques described, try to determine the minimum number of samples required to get the sound you will need. Once you know precisely which samples will be required, take a look at how much memory will be needed for them to fit along with your other samples. You can do this by checking each wavesample's start and end points and totaling them up. You may need to convert the figures to decimal first if you don't own a hex calculator.

Next you'll need to go back and find out how much memory you freed up when you dumped the other samples. You may need to total the memory used for the samples you kept and then subtract that number from the overall memory available in the

mirage. If the amount of memory that you have remaining is equal to or greater than the amount you'll need to load the new samples, bingo! You're set, and all that remains is to begin sliding your samples around in the Mirage's version of the old chinese box puzzle, trying to jockey all of your new samples onto the keyboard without disturbing the samples you wish to keep. Check out the "MASOS for the Masses" series from a few issues back if you need help doing that.

If, however, you find that you haven't been able to open up enough memory to load in your new samples, there's another method that might work to help you gain some extra memory. It is the dreaded 're-looping technique'. This can be a tough way to go, but in my experience, a number of the factory samples can be re-looped without doing too much damage. Your new loops may not be quite as nice as the original factory versions, of course, but we're going for utility here, not Art. By using a shorter loop, and truncating the sound closer to its beginning, you can free up valuable bits of memory. You will probably also need to do a bit of data copying in order to get any memory you free up into a single chunk that other samples might fit into. And, as mentioned before, you should also pay attention to the kind of part you will be using each particular sound for; if you are using the horns for brief stabs and hits, you may not need the sound to be looped at all. Check it out.

Anyway, once you have as many different kinds of samples as possible in Mirage memory, you can turn to the relatively pleasant task of arranging the sounds on the keyboard and into presets. By using the initial wavesample parameter (27), you can arrange your samples into distinctly different presets. or, if you want, put them all on the keyboard at once. If you only need three octaves of piano in one tune, and two octaves of horns in another, why not just split the keyboard between the two sounds? After all, there's nothing that says that you need to have a bass sound on the low keys of the keyboard.

So there you have it. If all works well, you should be able to seriously increase the speed with which you can go from sound to sound on the Mirage, freeing up a bit of valuable time. After all, someone has to look into this alarming decrease in the proliferation of spandex... ▭

JAMOS ESQ-1 SOUNDS - VOL. 1

Reviewed by Larry Church

PRODUCT: ESQ1 Programs, Vol. 1
PRICE: $25
FROM: JAMOS Music, 1970 N Hartford #17, Chandler, AZ 85224
FOR: ESQ-1

Since the arrival of my ESQ-1 a couple of months ago I've had a chance to log a couple of hundred serious hours at the controls. The inevitable consequence is that I've become at least slightly out of touch with reality...a great time to pause long enough to put another set of ESQ patches under the microscope, subjectively speaking.

This month fellow hacker Jim Johnson (JAMOS Music) enters the market with Volume 1 ESQ-1 patches. First time readers may not know of Jim's contributions to the Hacker as a software and applications expert. From what I've seen of his work Jim must be at least as addicted to the ESQ as some of the rest of us.

The patches arrived on cassette tape along with a sizable stack of computer paper. The documentation consists of a title page with the patch names each followed by a brief description of the sound, and a printout for each voice with all parameter information and performance tips. Looking at the title page we see that the patches are organized in a logical fashion. The first bank of ten is all strings and pads. The next two banks are a mix of horn and synth effects, bells and basses. The last group is all electronic percussion sounds. Jim is offering an extremely well documented, nicely organized package.

How do they sound? A good number of the patches are very nicely done with the rough edges tuned and balanced to achieve good results over a wide keyboard range. There are a few I wouldn't say that about (more on that later.) While there is a strong percentage of these sounds I like well enough to file away for later use there are only a few that come close to maximizing the potential of the instrument. Perhaps I expect too much, but I'm convinced that the ESQ holds many more surprises before we discover all of its special tricks. I want to hear something that keeps me up all night working on ESQ sequences.

Bank 1: The pads are nice. CHORUS and SUROHC are layered together for a great vocal effect. The CHORUS part is similar to the AHHHH patch but the SUROHC adds a mysterious male quality. ORCH 1 gets kind of interesting with the mod wheel adding a shimmering fluttery quality by LFO detuning and resulting modulation.

JSTRNG is a nice sounding patch depending on the part. DCO's 1 and 2 are synched and DCO 2 is envelope modulated. That trick on this machine with this patch results in a noisy, grainy sound on the attack, especially in the upper octaves. The other two string patches I wouldn't pick. It seems every time I'm mixing in these sounds they have to be fine tuned to the song and the part being played. These patches need too much work - I'd choose a better starting point.

BANKS 2 and 3: My generalizations hold true for these 20 programs. I find Jim's descriptions on the title page to be accurate and credible except for the "soon to be classic ESQ clav" patch, ESQ1. I didn't like it much - harsh on the attack - no warmth to the body of the sound. Jim sent in a setup sheet for a new clav sound that he likes better. I punched it into my synth for a listen as I'm still trying to get a good clav sound myself. It sounded pretty good in the upper octaves but I didn't like it down low. I split it with one I had been working on for the bass end - that was okay except all you sampler hackers know that the transition point is a real problem.

1 HORN and HELMON are two of my favorites from these banks. 1 HORN is a fairly regular sounding horn patch, but it's nicely tuned to give a good amount of extra punch with velocity. HELMON is a patch you have to play with a little to appreciate. It can be real scary. I'm anxious to try it in a sequence. Check out OSC 2 on notes D and E above middle C. The sample and hold effect is apparently caused by trying to retrieve that waveform at a higher frequency than the system can handle. There might be some good stuff hiding in there based on that distortion.

Wheel assignment on most of these programs provides something other than standard vibrato - usually a subtle but significant change in the content of the sound adding to the character of the work.

BANK 4: The kick, snare and cymbals in this bank are as good as I've heard on the ESQ. The closed Hi Hat especially could fool some of the people some of the time. The other electronic percussion sounds are keepers, too. These sounds are still not as good as even a cheap drum machine these days though so why not get one? Save the ESQ voices for the truly awesome stuff.

There is a lot of good information in Jim's performance notes. If your programming skills aren't up to speed you'll get some extremely relevant advice from these editing tips. If editing isn't your bag you'll find lots of stuff here that will work just fine as it is. If you are an intense ESQ hacker just dying for some new sounds that will leave you with dreamy thoughts of tea and spice....this volume didn't totally come through for me. ▭

JAMOS ESQ-1 SOUNDS - VOL. 2

Reviewed by Christian Barth

PRODUCT: ESQ1 Programs, Vol. 2
PRICE: $25
FROM: JAMOS Music, 1970 N Hartford #17, Chandler, AZ 85224
FOR: ESQ-1

There are three types of patches available for synthesizers. First, we have special effects, of which there are already more than we need. Unless you're scoring a movie or composing electronic new age music, you'll find it hard to integrate even the most clever effects more than once or twice into your performances.

Second, we have synthesized sounds, which have no real-life, analog counterpart. The fat synth sounds, which appear all over records from the seventies onward, such as Moog bass, and the thin, bright digital sounds of the Yamaha DX7 (the Miami Vice sound) are an integral part of modern songwriting and recording. Their acceptance over such a brief period of time is pretty amazing, given the resistance faced initially by instruments like the saxophone.

Third, we have imitative sounds, which are marketed as usable imitations of real-life analog instruments. Their value is usually obvious; if the sounds are credible, then one keyboard can replace lots of individual instruments.

This time we're listening to Volume 2 of patches from Jim Johnson of JAMOS Music. I waited with great anticipation for this set, since I have learned greatly from Jim's contributions to publications such as Electronic Musician. The man clearly knows his stuff; would his patches be as valuable as his other contributions?

Volume 2 is a collection of 38 imitative sounds (two others are parts of layers and not used separately). There are no special effects, and no synthesized sounds. Each patch is identified as an instrument. This is an assortment which I would classify as Big Band orchestration: brass, strings, reeds, basses, pianos and organs, and percussions. The volume is sold on data cassette, with data sheets. The performance tips are worth their weight in gold. In particular, Jim discusses the desirability of learning to edit patches for volume, release time, pan and vibrato, and then tells us exactly how to do it on the Ensoniq. Hey, Jim, how about an article for us on this?

Let's start with the compliments. This set contains a few of the most convincing imitative sounds I have ever heard from any synthesizer. CLARNT is an incredibly accurate reproduction of a clarinet. Likewise TUBA, BASSOON, FLUTE and HRPCRD (harpsichord) are standouts. This is no exaggeration. I played these sounds for musicians and non-musicians, using my general limited keyboard technique, and each of these sounds was instantly identified (with accompanying astonishment) by all. It is difficult for me to imagine how the clarinet patch could even be improved upon, except by improvements in the player's technique. The tuba and bassoon were even better with a string bass patch (included in the volume) to put some extra bottom in them. Reverb completed the illusion on all these patches perfectly. If I were responsible for marketing these units at Ensoniq, I'd pay a royalty to get these sounds into the machine as factory presets. There is a tremendous amount of detail in each of these voices and each has earned a permanent spot in my collection.

The other standouts are three organs: a pipe organ, a rock organ with distortion, and a 50's organ. Again, these are also worth the price of admission. Each is perfect and instantly usable in a performing context. The rock organ reminds me of the organ solos from In-A-Gadda-da-Vida (remember the Iron Butterfly?), and the 50's organ works for soap operas at the low end, the baseball park at the high end, and oldies all over. If you added these three sounds to the factory presets and Sims' LESLIE patch which appeared in Issue #19 of the Hacker, you'd have every organ sound you'd ever need. How I wish my old club band had this fifteen years ago, when we had to lug around the old Hammond B3!

The French Horn is pretty good, especially if your band is still playing the overture from the rock opera Tommy. The brass patches are ok but undistinguished. They don't have as much buzz in them as their presets on your machine.

There are three pianos. The grand piano is usable, but the two electric pianos received bad reviews from my test audience. The real disappointments were the saxes. When I saw patches for alto, tenor, and baritone saxes I was hoping these would be the standouts; they are, but for the wrong reasons. I'm sure Jim hears something I don't, but I couldn't hear anything even remotely resembling these instruments, and no one could identify them accurately. There's not even a reed waveform in the bunch, which is probably part of the problem.

I was similarly unimpressed with the remainder of the set. Chimes, steel drums, vibraphone, piccolo, strings - all were dull or unconvincing. Now there are probably people who can bring life into these patches through performance technique, but you can play the keyboard with your elbows and his clarinet patch still sounds like a clarinet.

All patches are marketed as the answer to everyone's prayers. In reality, it's simply not realistic to assume that in a set of 40 patches, that each one will be a winner. A lot of times, it's not even clear if the patches are effects, synthesized, or imitative, yet this is critically important when deciding what to buy. The real test is whether or not you paid for the sounds you can use. If you are using your ESQ-1 in a big band, jazz, theatrical or school setting, then Jim Johnson has the best imitative clarinet, tuba, bassoon, flute, and harpsicord sounds I've ever heard. Add to this three dynamite organ sounds, and in my mind, there is tremendous value in this set, even if you never touch the rest of it.

SON OF M.U.G. SHOTS

- MIRAGE SAMPLES FROM M.U.G.

Reviewed by Erick Hailstone

PRODUCT: Assorted member samples
PRICE: (Members) $12. (Non-members) $17
FROM: M.U.G., 622 Odell Ave., Yonkers, NY 10710
FOR: Mirage.

Here's the most recent sounds sent to us from the International Mirage Users Group.

SAMPLE 1
Lower & Upper: Prophet 5/ OB8

L1/U1: Part of the beauty of the Mirage is that you can use several other sound sources to create a sound, sample it and then boot it up anytime you want. That's just what they have done here. A Sequential Prophet 5 and Oberheim OB8 are combined to create this very fat sound. This reminds me of the sound used in the Van Halen tune "Jump". That particular sound has become the OB8 cliche. It is a very thick synth/brass setting. Velocity controls volume but the range from loud to soft is slight. Notes sustain as long as you hold them down and release as soon as you let go, similar to an organ. There is a noticeable click at the loop point. It is only bothersome in the highest octave.

L2/U2: The attack of the note is longer as is the release time. Notes will sustain briefly after you let go. These changes put this sound into the synth/string category. This is a darker sound than L1/U1 but an odd thing occurs at the loop point. It gets brighter as if it switches to L1/U1 parameters. The MIX MODE (28) is on and when I turned it off this effect stopped.

L3/U3: This sound is slightly brighter then L1/U1 and is chorused. The effect is that it is grittier and more brash. If you hold down a note it will decay after 2 or 3 seconds.

L4/U4 is similar to L2/U2 but the filter is closed way down and a high resonance is added. The filter envelope is set to give it a slow downward whoosh.

SAMPLE 2
Lower & Upper: TX816

A TX816 is the equivalent of having 8 Yamaha DX 7s to play with. Again this is smart usage of the Mirage. Why tie up $4,000 worth of keyboards when you can sample it and free up that gear for other things.

L1/U1: It sounds as if we started with a piano and then started altering it. It is chorused and metallic as if some lightweight metal were laying on the strings. The harder you hit the brighter and more metallic it gets. It is very sensitive to velocity. The attack and release are similar to a piano.

L2/U2: The filter setting is much lower and the filter resonance is much higher. The release time of the filter is also quite high so you get a slow downward filter sweep. Where this filter peaks is controlled by velocity so your touch can yield variations in the filter sweep.

L3/U3: This sound is not quite as bright as L1/U1. The filter seems to peak quicker at the beginning of the notes giving a THUNK/like attack. Notes will sustain for as long as you hold them down. The highest octave has a raspy rude quality to it.

L4/U4: Very similar to L1/U1. The main difference is that velocity does not control how bright the filter opens up. This is under the mod wheel's control. This is a very expressive variation.

SAMPLE 3
Lower & Upper: Chroma Square Wave

L1/U1: This a cliche analog synth sound probably most often remembered from the solo in the Emerson Lake & Palmer tune "Lucky Man". It is a reedy clarinet-like sound with chorusing. Almost all decent analog synths have a setting similar to this. The loop point blends in with the chorusing in the lower and mid range but in the upper range it is somewhat annoying.

L2/U2: The only difference I can find between L1/U1 and this one is a slight variation in the detuning and osc mix. It is almost undetectable.

L3/U3: The filter is set lower and filter resonance is raised to create a thinner, more nasal sound. It is also monophonic (parameter 29).

L4/U4: The filter is almost completely closed which makes things less bright. The filter resonance is set high and once again the filter envelope is set to create the ever so popular moderately slow downward filter sweep.

I look forward to more sounds from M.U.G. and hope there are other third party sources doing as well.

HACKERPATCH

HACKERPATCH is intended to be a place where patch vendors can show their wares and musicians can share their goodies and impress their friends. Once something's published here, it's free for all. Be warned: care is taken in printing these patches, but not all of them can be tried out beforehand - but then, they *are* free.

PROGRAM: SAWSTR

By Tom McCaffrey

SAWSTR is a classic analog string patch a la "Boys of Summer." It's built around three slightly detuned sawtooth waves. Filter settings are bright and buzzy, and a stereo chorusing effect is provided by modulating the panning with LFO2.

PROGRAM: LUSH'S

By Frank Leister ***(Leister Productions)***

As the name describes, a lovely string patch which will sound excellent alone or as a fill sound. MOD wheel adds vibrato.

PROGRAM: BELLO

By Erick Hailstone ***(MIDI Connection)***

This is sort of a cross between a cello and a bell. There is a bell-like attack that fades into a quasi string sound.

PROGRAM: FAIRLT

By David Bell

FAIRLT uses sine waves and is an airy flute sound. It has a sampled quality not normally found with conventional synths. The LFO's assigned to pitch create a random variation. This makes for a good lead patch and can also be mixed for various textures.

ESQ-1 PROGRAM SHEET

PROGRAM: SAWSTR

	OCT=	SEMI=	FINE=	WAVE=	MOD#1	DEPTH	MOD#2	DEPTH
OSC 1	0	0	0	SAW	LFO1	+5	OFF	0
OSC 2	0	0	2	SAW	LFO1	+5	OFF	0
OSC 3	0	0	4	SAW	LFO1	+5	OFF	0

	LEVEL=	OUTPUT=	MOD#1	DEPTH	MOD#2	DEPTH
DCA 1	52	On	OFF	0	OFF	0
DCA 2	52	On	OFF	0	OFF	0
DCA 3	52	On	OFF	0	OFF	0

	FREQ=	Q=	KEYBD=	MOD#1	DEPTH	MOD#2	DEPTH
Filter	89	06	0	ENV3	0	LFO1	0

	Final Vol.(ENV 4)	PAN=	PAN MODULATOR	DEPTH
DCA 4	63	8	LFO2	57

	FREQ=	RESET=	HUMAN=	WAV=	LI=	DELAY=	L2=	MOD=
LFO 1	21	Off	On	TRI	0	0	21	WHEEL
LFO 2	06	Off	On	TRI	0	63	63	OFF
LFO 3		On Off	On Off					

	L1=	L2=	L3=	LV=	T1V=	T1=	T2=	T3=	T4=	TK=
ENV 1										
ENV 2										
ENV 3	63	0	0	26	0	0	18	0	20	0
ENV 4	63	60	60	20	04	05	12	32	39	0

	SYNC=	AM=	MONO=	GLIDE=	YC=	ENV=	OSC=	CYC=
Modes	Off	Off	Off	0	On	Off	Off	Off

	Split/Layer=	Split/Layer Program	Layer=	Layer Program	Split=	Split Program	Split Key=
Split/ Layer	Off		Off		Off		

ESQ-1 PROGRAM SHEET

PROGRAM: LUSH'S

	OCT=	SEMI=	FINE=	WAVE=	MOD#1	DEPTH	MOD#2	DEPTH
OSC 1	0	00	00	SAW	LFO1	+02	ENV1	+03
OSC 2	0	00	05	PIANO	LFO2	+01	ENV1	+02
OSC 3	0	00	03	SAW	LFO2	+02	LFO1	+00

	LEVEL=	OUTPUT=	MOD#1	DEPTH	MOD#2	DEPTH
DCA 1	54	On	OFF	0	OFF	0
DCA 2	54	On	OFF	-09	OFF	-63
DCA 3	52	On	OFF	+63	OFF	0

	FREQ=	Q=	KEYBD=	MOD#1	DEPTH	MOD#2	DEPTH
Filter	16	01	23	ENV3	+05	VEL	0

	Final Vol.(ENV 4)	PAN=	PAN MODULATOR	DEPTH
DCA 4	63	08	OFF	61

	FREQ=	RESET=	HUMAN=	WAV=	LI=	DELAY=	L2=	MOD=
LFO 1	20	Off	On	TRI	0	01	20	OFF
LFO 2	20	Off	On	TRI	0	21	20	WHEEL
LFO 3	06	Off	On	TRI	56	0	20	OFF

	L1=	L2=	L3=	LV=	T1V=	T1=	T2=	T3=	T4=	TK=
ENV 1	16	0	0	30	0	15	17	3	20	9
ENV 2	63	50	45	0	0	0	50	63	12	9
ENV 3	62	17	17	0	22	6	44	63	37	9
ENV 4	42	61	43	22	42	43	29	63	42	9

	SYNC=	AM=	MONO=	GLIDE=	YC=	ENV=	OSC=	CYC=
Modes	Off	Off	Off	0	Off	Off	Off	Off

	Split/Layer=	Split/Layer Program	Layer=	Layer Program	Split=	Split Program	Split Key=
Split/ Layer	Off		Off		Off		

ESQ-1 PROGRAM SHEET

PROGRAM: BELLO

	OCT=	SEMI=	FINE=	WAVE=	MOD#1	DEPTH	MOD#2	DEPTH
OSC 1	0	0	0	BELL	LFO1	-2	LFO1	2
OSC 2	0	0	5	SAW	LFO1	2	LFO1	2
OSC 3	1	0	0	SAW	LFO1	1	LFO1	2

	LEVEL=	OUTPUT=	MOD#1	DEPTH	MOD#2	DEPTH
DCA 1	63	On	ENV2	4	OFF	0
DCA 2	27	On	ENV1	53	LFO1	26
DCA 3	0	On	ENV1	58	OFF	0

	FREQ=	Q=	KEYBD=	MOD#1	DEPTH	MOD#2	DEPTH
Filter	43	0	56	ENV2	19	OFF	0

	Final Vol.(ENV 4)	PAN=	PAN MODULATOR	DEPTH
DCA 4	63	8	LFO1	-45

	FREQ=	RESET=	HUMAN=	WAV=	LI=	DELAY=	L2=	MOD=
LFO 1	21	On	Off	TRI	0	63	14	WHEEL
LFO 2	0	Off	On	NOI	63	63	63	OFF
LFO 3	16	Off	On	NOI	0	1	20	WHEEL

	L1=	L2=	L3=	LV=	T1V=	T1=	T2=	T3=	T4=	TK=
ENV 1	63	41	63	0	0	33	35	22	22	28
ENV 2	63	0	0	24	0	0	8	0	0	0
ENV 3	63	0	0	0	0	0	0	0	0	0
ENV 4	63	22	0	33	0	0	57	35	29	38

	SYNC=	AM=	MONO=	GLIDE=	YC=	ENV=	OSC=	CYC=
Modes	Off	Off	Off	0	Off	On	On	Off

	Split/Layer=	Split/Layer Program	Layer=	Layer Program	Split=	Split Program	Split Key=
Split/ Layer	Off	0	Off	0	Off	0	60

ESQ-1 PROGRAM SHEET

PROGRAM: FAIRLT

	OCT=	SEMI=	FINE=	WAVE=	MOD#1	DEPTH	MOD#2	DEPTH
OSC 1	-1	00	00	SINE	LFO1	+02	ENV1	+03
OSC 2	-1	00	05	SINE	LFO2	+02	ENV1	+02
OSC 3	-1	00	07	SINE	LFO2	+02	OFF	

	LEVEL=	OUTPUT=	MOD#1	DEPTH	MOD#2	DEPTH
DCA 1	63	On	OFF	0	OFF	0
DCA 2	63	On	OFF	0	OFF	0
DCA 3	63	On	OFF	0	OFF	0

	FREQ=	Q=	KEYBD=	MOD#1	DEPTH	MOD#2	DEPTH
Filter	40	03	23	ENV3	+24	ENV4	+05

	Final Vol.(ENV 4)	PAN=	PAN MODULATOR	DEPTH
DCA 4	63	08	OFF	

	FREQ=	RESET=	HUMAN=	WAV=	LI=	DELAY=	L2=	MOD=
LFO 1	22	Off	On	TRI	00	01	20	WHEEL
LFO 2	22	Off	On	TRI	00	21	20	WHEEL
LFO 3	06	On	On	NO1	00	00	20	VEL

	L1=	L2=	L3=	LV=	T1V=	T1=	T2=	T3=	T4=	TK=
ENV 1	16	00	00	30	00	15	19	03	20	09
ENV 2	63	50	45	00	00	00	50	63	12	09
ENV 3	62	17	17	00	22	07	44	63	37	09
ENV 4	63	61	43	22	32	31	29	63	32	09

	SYNC=	AM=	MONO=	GLIDE=	YC=	ENV=	OSC=	CYC=
Modes	Off	Off	Off	0	Off	Off	Off	Off

	Split/Layer=	Split/Layer Program	Layer=	Layer Program	Split=	Split Program	Split Key=
Split/ Layer	Off		Off		Off		

CLASSIFIEDS

USER GROUPS

ESQ-1 Owners in Southeastern Pennsylvania and New Jersey - ESQUPA (ESQ-1 Users of the Philadelphia Area) is the user's group for the ESQ-1 in your area. Patch trading, programming tips, MIDI info, etc. Contact Tom McCaffrey. (215) 750-0352. ESQUPA, PO Box 427, Bensalem, PA 19020.

ESQ-1 user group. If there are enough interested parties, I will form a user group on the West Coast and act as a clearing house for all the patch/sequence trades. Patches should be FREE for the asking. Let's develop a great patch library. Jim Grimes, PO Box 365, Harbor City, CA 90710.

Forming an ESQ-1 Users Group in the Philadelphia area to exchange patches, programming info, tips, etc. Contact Tom McCaffrey. (215) 750-0352.

16-Track recording studio is interested in exchanging samples. We have a huge selection. Also interested in starting a users group in northeastern and central Pennsylvania. Contact Ralph DeLong, Carillon Studios, 19 Turner St., Plymouth, PA 18651 or call (717) 779-9015.

SAMPLES

I urgently need the full, thick, chorus-like sound in the introduction of the song, "All I Wanted" by Kansas. Please somebody! Thanks, Mark Ray, PO Box 2409, Muscle Shoals, AL 35661.

WOW! Novelty Disks - The Three Stooges, Johnny Wiesmeuller "Tarzans", Bugs Bunny, Johnny Carson Show Hits, Warner Cartoon Clips, etc. TOP QUALITY! For free information send SASE to: Talance Recording, 906 E Elmwood Ave., Burbank, CA 91501.

Looking for sound effects samples for radio station identification. Lasers, lightning bolts, power effects of all kinds that reach out and grab your attention. Also looking for bizarre effects, comedy effects, and anything outrageous. Please send a list or a demo tape if possible. Call Herb Bogard, (812) 882-7569 or (812) 254-4300. (Indiana.)

I would like to swap samples with Mirage owners all over the world. Please contact: Edwin van de Weycleven, Spozkenhoutlaan 30, 56U6AJ Eindhoven, The Netherlands, Europe.

SAMPLE-SWAPPERS WANTED: Send your list & I'll send mine. Also interested in user comments on VES and Sequence programs for Apple II+ & Mac. Write or call: Wayne Bice, POB 8692, Naples, FL 33941. (813) 455-5253.

I am in need of flamenco guitar samples - rasqueado, et. al. Anybody out there with a little "duende" in the machine? Sue's-in Zaher-Emig, 2765 Gerry St., Gary, IN 46406.

CHANGE SOUNDS FAST!!! Up to 48 sounds per disk. Recorded in our state-of-the-art computerized studio, these are among the cleanest samples available. Our huge library includes many sounds like those of popular synths, drum machines, samplers, trad. & exotic inst., as well as custom 32 partial additive synthesis. Out custom service dept. will tailor your samples to best suit your needs; performance, sequencing, et al. Call or write for info: WOODSTOCK DIGITAL DESIGNS, PO BOX 1112, WOODSTOCK, NY 12498, (914) 246-6586.

SERVICES

WHY PROGRAM (or SAMPLE) WHEN YOU COULD BE PLAYING?? Livewire markets numerous professional-quality MIRAGE samples. All studio-recorded and computer-edited, from only $8.95! Alternate sound patches for Yamaha DX7/TX7, SPX90 and FB01, Casio CZ, Korg DW8000 and POLY800, Roland JX8P/10, JUPITER6 and all JUNO's, from only $15.95. New!: MEMORYMOOG patches. Casio CZ 64-patch RAM cartridge - $49.95! (Cartridges: add $4 shipping.) Demo cassettes available. For information, please send stamped self-addressed envelope, specify your synthesizer(s). Send $2 for complete DX7, Casio, DW8000, or Mirage sound listing. Livewire Audio, Dept. T, PO Box 561, Oceanport, NJ 07757.

Customizing of disks (moving wavesamples). Also interested in trading sounds. Call or write: Jack C. Loesch. 201-264-3512 after 6 pm Eastern time. 162 Maple Pl., Keyport, NJ 07735.

EQUIPMENT

Mirage (rack mount) 10 months old. With the Mirage are included the following items: Manuals, power, MIDI, and audio cables, Sequencer Expander cartridge, Input Sampling Filter cartridge, 21 disks with music and effects, one formatting disk, 4 MASOS disks (Ver 2), 3 blank disks, one professionally-made cassette tape with 800 sampling sounds (with listing). Price: $1000. Call: 415-523-1658, Alameda Calif.

For sale or trade: Moog Opus-3 polyphonic strings and Roland SH-1000 monophonic (my first synth!), all for $350 or swap for digital delay unit. Write to: Lonnie Pena, PO Box 21105, Houston, TX 77226.

SOFTWARE

Sonus Sonic Editor is now available for Atari 520/1040 ST. FM synthesis, built-in sequencer, MASOS, keyboard display, zoom-in/out. Mouse utilities, cut & paste, displays wavesample parameters. Contact Sonus for dealer nearest you: SONUS CORPORATION, 21430 Strathern Ste. H, Canoga Park, CA (818) 702-0992.

Discount computer software and hardware. We are authorized dealers for DIGIDESIGN, SONUS, DR. T, OPCODE, TRITON, ENHARMONIK, STEINBERG, and other MIDI companies. LOW prices on RAM cartridges, MIDI mergers, interfaces, sequencing and editing software for MIRAGE and other synths. Atari 1040ST color system: $950! Send stamped self-addressed envelope (specify computer) for pricing on our line of MIDI products for ALL computers. Livewire Audio, Dept. T, PO BOx 561, Oceanport, NJ 07757.

Demo versions of Sound Designer and Vision are available now on Mirage-Net for users with computers and modems. After logging on, at the Main Menu Y)ell for the SYSOP and you will be allowed to download the programs free of charge. (503) 646-2095. Also, a new, enhanced version of Mirage-Lib, the Macintosh/Mirage wavetable librarian, is now available. It sends AND receives from the Mirage, as well as the added feature of supporting Sound Designer files for sending/receiving. Existing Mirage-Lib owners can upgrade for no charge. For information, call (503) 641-6260 or send a check or money order for $49 to: Beaverton Digital Systems, PO Box 1626, Beaverton, OR 97075.

I am looking for software for an Atari ST. Write to Ron Goodman, 12702 Emelita St., North Hollywood, CA 91607.

YAMAHA FB-01 VOICING/LIBRARIAN SOFTWARE! The wait is over! If you own a Macintosh 128, 512, or Mac Plus, and an FB-01, then now is the time to purchase software. You can send and receive voices or banks of voices from the FB-01 and save them on Macintosh disks. You can Edit existing voices, or make your own from scratch. This program is a MUST for all Mac/FB-01 owners, and for $69 it's half the price of the competition. For information, call (503) 641-6260 or send a check or money order for $69 to: Beaverton Digital Systems, PO Box 1626, Beaverton, OR 97075.

Transfer your parameters from MIRAGE to any printer with PARAMETER, a new program for your APPLE II. Print parameter number, name, range, and values for all 12x8 wavesample parameters and all 31x4 program parameters in a format like ASG. Requires MIRAGE or MULTISAMPLER, MASOS, PASSPORT compatible interface card, APPLE II+/E. Send US$19.95 or CAN$27.95 to YVES LEVESQUE, 1935 COTE SHAWINIGAN-SUD, QUE CANADA G9P-4W1.

SYNTHASSIST -- THE MIRAGE/IBM-PC LINK!! A COMPLETE VES, PARAMETERS, ANALYSIS, HELP. CONTROL, POWER, SPEED, AND SIMPLICITY. INFO/DEMO CALL/WRITE: NORTHEAST VISIONS, 68 MANOR DRIVE, GLENMONT, NY 12077. (518) 439-0015.

MIRAGE VISUAL EDITING SYSTEM software for Apple II. Includes Apple disk & Mirage disk. $150. Call Marcus, (805) 987-9932.

PATCHES

Ensoniq ESQ-1 Owners, buy the best. Volumn 1: 40 exceptional sound programs. Only $19.95 for data cassette; also tips for effects processing, splits/layers. Quick Delivery! Dark Horse Music, PO Box 295, Crested Butte, CO 81224.

ENSONIQ ESQ-1 OWNERS. ESQ Sets A and B. Each set contains 40 patches on data cassette and program sheets. Send $19.95 for one set or $29.95 for both. For information plus 3 demo sheets from each set, send Self-Addressed Stamped Envelope. ENSONIQ MIRAGE OWNERS. Custom designed diskettes. MIDI layered synthesizer sounds. Send $5.00 for demo cassette, sound list and disk design form. Or, send $7.50 for same package plus demo sound diskette. MADWAY SOFTWARE, PO Box 137, Palestine, IL 62451.

ESQ1 PATCHES and Commodore 64 software from JAMOS MUSIC! Two all-original sets of forty sounds each for the ESQ1 on cassette, with full patch listings and application tips, $25/set. All sounds programmed by Hacker author and ESQ1 expert Jim Johnson. ESQRND: An algorithmic patch generator for the C64 and ESQ1. Reviewed in the Feb. 1987 Hacker, ESQRND is a useful tool for pros and beginners alike. $20. MIDIPRINT2.1: A MIDI data display program for the C64. Features real time or buffered display, variable data filtering, MIDI thru, printer or screen output, and hex, decimal and English display modes. An essential tool for troubleshooting and education, this program is a STEAL at $15. For more information and two free patches send a SASE to JAMOS MUSIC, 1970 N. Hartford #17, Chandler AZ 85224

ESQ-1 SOUNDS: 120 new sounds for the ESQ-1 programmed by Jim Welch and John Fitzgerald. Varied and useful. Available on data-cassette for only $30. For demo tape and samples send $4. LEISTER PRODUCTIONS, 14 Hill Blvd. Mechanicsburg, PA 17055. 717-697-1378.

ESQ-1 (The $1400 Fairlight?) Orchestra sounds, wheel controlled filter sweeps, sampled sounding EFX, choir voices, Hammond B-3 with and without keyclick, wheel controlled Leslie, and more. 40 studio quality patches w/performance notes. Send $16.00 for datasheets or $25.00 for data tape (cassette) to: WEINBECK SOUNDS, 485 Shelard Pkwy, Suite #203, St. Louis Park, MN 55426.

MISC

BLANK 3 1/2" DISKETTES, lifetime guarantee, $1.70 each. Add $0.50 postage per order. Syntaur Productions, 11116 Aqua Vista, #2, North Hollywood, CA 91602.

Ensoniq Sound Disk Parameter Listings: Turtle Beach Softworks announces it is selling a complete set of ASG style printouts of all sounds on all Ensoniq factory sound disks from #1 to #18. The set costs $24.95. Send to Turtle Beach, POB 5074, York, PA 17405. Custom listing service available too.

FREE CLASSFIEDS!

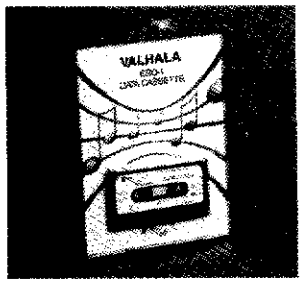
Well, - within limits. We're offering free classified advertising (up to 40 words) to all subscribers for your sampled sounds or patches. Additional words, or ads for other products or services, are 20 cents per word per issue. (Unless renewed, freebie ads are removed after 3 issues.)

TX81Z
$69.95
757 New Voices
on Data
Cassettes

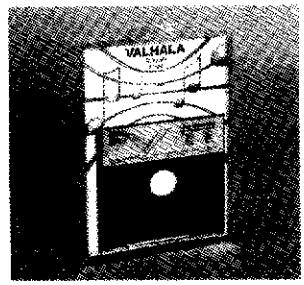
VALHALA:
It's The Difference Between Getting There Or Not!

The ESQ1 Bible
A Programming
Guide
$24.95
includes 40
Patches Explained

Supporting Ensoniq

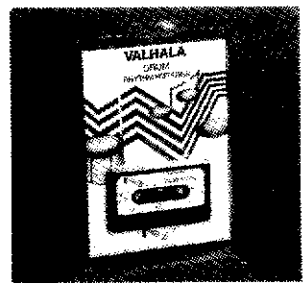


ESQ-1 DATA CASSETTES $19.95
Eight volumes of expressive and original voices for the ESQ-1 on data cassette. Each volume contains 40 different voices as featured in our ROM cartridges.

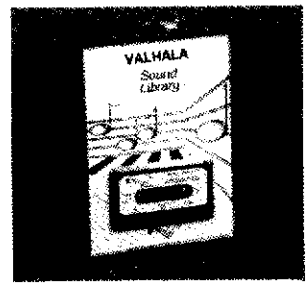


ES1-A/B/C/D $39.95 per volume
Four volumes of original and expressive voices for the ESQ-1, Synthesizer. Requires Valhala's ES1 Librarian Program. Each disk contains 80 professionally programmed voices as featured in our 80 voice ROM cartridges.

Supporting Yamaha



DRUM RHYTHM PATTERN LIBRARIES $29.95
On Data Cassette, available for RX11, RX15, RX21 and TR707.
Contains: Top 40, Latin, Blues, Swing, Rock, Jazz, Funk, Country and many more!

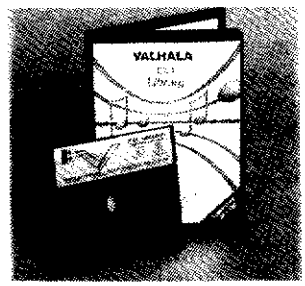


DATA CASSETTES
For Yamaha TX7, DX21, DX27 or DX100
Voice libraries on data cassette. Volume 1 and Volume 2 each contains 380 different voices $44.95 per volume. Or the combined volumes of 757 different sounds for only $79.95

ESQ-1 VOICE CARTRIDGES
80 Voice ROM* Cartridges $59.95
Four different 80 voice ROM cartridges are available at $59.95 per cartridge. ROM 801 thru ROM 804.

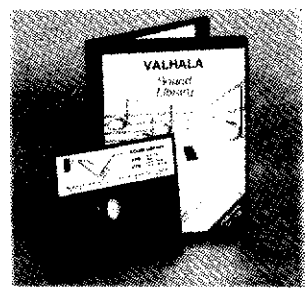
160 Voice ROM* Cartridges $116.95 per cartridge
Two different 160 voice ROM's featuring electronic switching of banks with visual indication by LED's. ROM 1601 contains the voices from ROM 801 and 802. ROM 1602 contains the voices from ROM 803 and 804.

320 Voice ROM* Cartridges $169.95
Includes all voices from our 80 voice cartridges.
**For a ESQ-1 Demo Tape and Sound List send $7.50. (Fee applicable toward purchase price of any ESQ-1 voice cartridge).
*All ROM are permanent voices and cannot be overwritten.



ES1 LIBRARIAN $99.95
The ultimate storage program for your patches and sequences. Simultaneously holds all of sequence memory and three banks of sounds in computer memory for instant access, or simultaneous access of up to ten banks of voices (400 voices) at one time. Supports the swapping of sounds between banks. Permits single/bulk sends and receives. Stores up to 1560 voices per diskette (39 banks). Written in 100% machine language. Commodore 64/128 with 1541/1571 disk drive and Passport/Sequential or compatible interface.

DX7 SOUND PATCH LIBRARY $39.95
Internationally recognized as the industry standard. The DX7 Sound Patch Library contains 757 different sounds and is the only comprehensive library of sounds for the Yamaha DX7 in printed form. A 214 page spiral bound book including algorithm, group and sound indexes. Now in its 3rd printing. Compatible with the NEW DX7IID and DX7IIFD. DX7 Demo tape available for $7.50pp in the U.S.A. Foreign $10.00pp.



DTR SOFTWARE LIBRARY $99.95
For DX7/TX7/DX5/DX21/DX27/DX100
Voice library software for C64 with 1541. Voice libraries hold ten banks of sounds simultaneously in computer for instant transmittal of any bank. Displays all voice names held in memory, swaps between all ten banks. Transmits/receives a voice bank in one second. Sequential/Passport or compatible MIDI interface.

DEALER INQUIRIES WELCOME.

If not available at your local music store, please order direct.

Continental USA Add $3.00 Shipping/Handling. Michigan residents add 4% sales tax. Canada, Alaska, Hawaii add $7.50 Shipping/Handling for surface, $12.00 for airmail. All other countries, $10.00 Shipping/Handling for surface, $15.00 for airmail plus $3.00 for each additional article. All payments must be in U.S. Funds. Prices/Specifications subject to change without notice. VISA/MC orders less than $15.00 add $1.00 service fee.

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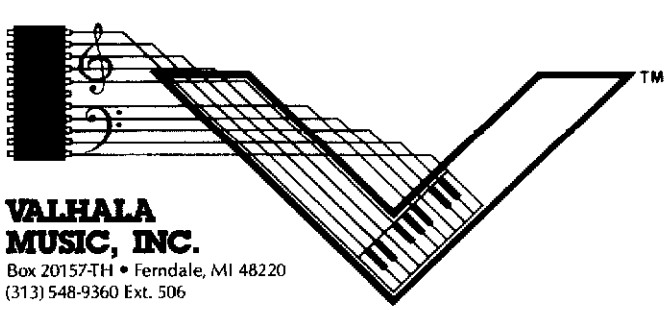

VALHALA MUSIC, INC.
Box 20157-TH • Ferndale, MI 48220
(313) 548-9360 Ext. 506

ESQ-1 is a trademark of Ensoniq, Inc.

THE INTERFACE

Dear Hacker,

1. I bought a US ESQ-1 in Dec. 86 - Next year, I will return to Europe for a long time and I would like to be able to use the ESQ-1 on 220 V 50Hz power.

a) What kind of external transformer will I need (power...)?

b) What is the part number or page of the internal transformer I'll have to replace in order to plug directly to 220V? What fuse? Will the pedal work ok too? (I'll make this change, next year, after the warranty ends).

c) More generally, my Musician's Manual lacks general specs such as power needs, output levels specs..... is there another manual available with such info?

2. Currently, I have no amp. I just plug the ESQ-1 audio outputs to the inputs of a K7 deck recorder. I cannot get stereo pan. More, there is a 60Hz noise and I had to connect the earth of the ESQ-1 to the earth of my K7 deck to get rid of it. Is that normal?

As a very beginner in the world of synthesizers, I have some other questions, more on music.

3. How are the harmonics related with the notes : ie, if A is 660 Hz and 880 Hz, what are the frequencies of A#, B, C, C#, ... G#. What is the formula?

4. From the basic Piano 1, how can I simulate the effect of the pedals of a piano?

5. What kind of hardware/software supports my ESQ-1 to compose new sounds? Does a "general" MIDI editor exist? Is there software providing oscilloscope and spectrum analysis of the sounds?

6. How can I get the preset programs of the ESQ-1 Version 1.?

7. Is there any known user group in Seattle area for ESQ-1.

8. It would be splendid if one could enter new waveform samples to the ESQ-1. Is there any way of doing it?

9. How can you relate the 127 levels of filter cutoff frequency with the real Hz frequency? By the way, what would be the effect of a band pan or high pass filter?

Sincerely,
J Pierre Stroweis
Bellevue, WA

[Ensoniq's response: 1a) You'll need a step-down transformer which converts 220 VAC to 110 VAC @ 500 mA, with a power capacity of 60 to 70 watts. 1b) You can get the new power supply and transformer in Europe. When you arrive, try to find your nearest authorized Ensoniq Repair station to modify your unit. If you have trouble finding them, write to: ENSONIQ Europe, Domplein-1, 3512JC Utrecht Holland. 1c) The power requirements are specified on the serial number label on the rear panel of the unit. The input and output specifications appeared in the Feb '87 issue of the Hacker (#20).

2) The ESQ-1 was designed to plug into typical mixing boards and PA amps. With all voices playing, the ESQ-1 will almost certainly overload your input, which was probably designed to handle home stereo equipment rather than electronic musical instruments. Keeping the ESQ-1 volume low enough to prevent overload will degrade the signal-to-noise ratio, making noise and hum more noticeable. Make sure you are using the Line Inputs and not the Microphone Inputs. As long as both outputs of the ESQ-1 are used, you should be able to pan. Check the ESQ-1 with a normal stereo system to verify operation. It's not unusual to encounter hum-inducing ground loops with audio equipment. This is especially true with equipment that uses two-prong power cords. If these are plugged into a socket flipped, you can get definite grounding problems that can even lead to severe equipment damage. Normally the plugs are keyed to prevent this, but many sockets are not.

3) Each semitone of the equitempered scale (used on the ESQ-1 and most other keyboards) is the twelfth-root-of-two times the frequency of the previous semitone. Incidentally, concert A is 440 Hz, not 660 Hz.

4) The sustain footswitch that comes with the ESQ-1 already simulates a piano sustain pedal. There is no way to simulate the other pedals.

5) Generally speaking, the ESQ-1 is best programmed from its own front panel. There is a random patch generator program called ESQRND available from JAMOS Music (see ads in the Hacker). Since the ESQ-1 is a synthesizer and not a sampler, programs for waveform display and spectrum analysis are of limited value. There is no practical method of deriving synthesizer parameters from sound analysis.

6) Not sure we understand the question. The sounds included with the ESQ-1 are available on the back-up tape which comes with the unit, as well as the STC-8 program cartridge.

8) No, the waveforms are stored in Read-Only Memory which is not addressable by the microprocessor.

9) The filter provides 127 exponential steps between 22 Hz and 22 kHz. However, the steps are not calibrated and, like all voltage-controlled filters, the response is not high-precision and is subject to thermal effects. The auto-tuning software in the ESQ-1 automatically adjusts the filters for proper sound. The ESQ-1 only provides resonant four-pole low-pass filter response, as this is needed in order to reconstruct the waveforms at the output. Other filter responses can be simulated by selecting the appropriate band-limited and/or format waveforms.]

[TH - Regarding (7): We haven't heard from any ESQ-1 user groups in Seattle. If any reader knows of any, please write to us.]

Dear Hacker,

I am a new subscriber and a new ESQ1 owner. Also, I frequent the "MUSIC SIG FORUM" on Compuserve. Lately, there has been a lively discussion on what seems to be a common occurrence with ESQ1's, and I have been asked by the gang on Compuserve to contact you... hoping that you might also pass this along to an Ensoniq factory technician for an answer.

A minor quirk happens on "power up". Sometimes the LED display (and the ESQ software) doesn't always come up when the power switch is switched on. And further turning the switch off then on again will bring up the display/software and the synthesizer successfully. Why does this happen??? And is it normal? All Compuserver subscribers/ESQ1 owners that were polled said they have software version 2.0.

Thanks for your time, and keep publishing the ESQ1 stuff!

Tim Woods
Time Designs
Colton, OR

[Ensoniq's response: We aren't aware of this as a common problem and haven't experienced it ourselves. If you have a unit that does this, it should be checked by a repair center. Without looking at a problem unit, the only thing that immediately comes to mind is marginally low line voltage. The memory protection circuitry in the ESQ-1 is designed to prevent the ESQ-1 from operating if the AC line voltage is too low to maintain proper operating voltages. This prevents the internal memory from being overwritten. It is possible that on lower line voltages, it takes some time for the capacitors to charge to the proper operating voltage and the protection circuitry may time out. Remember that there is anywhere from eight to 30 times more battery-powered memory in the ESQ-1 than in most synthesizers due to the large number of program parameters and the sequencer.]

Hi!

I'm a new user of the ESQ-1 and wanted to voice my concern about Ensoniq's quality control. I had to return two units to my dealer - one unit's display board failed to light up about 50% of the time when I first turned it on (this despite using V2.0 of the ROMware), and it would often lose all patches and sequences. The second unit had a misaligned keyboard - the keys would strike up against the overlying metal cover. Do you have any insight into the Display problem? Apparently, I'm not the first to encounter it.

Stephen Marano
Mirage-Net Mail

[Ensoniq's response: The display "not lighting up" means that the system is not operating - it usually has nothing to do with the display itself. There are literally thousands of possibilities that can keep the ESQ-1 from displaying its power-up message (including low line voltage, which is intentional - see the preceding letter). The fact that you were losing memory is an indication of a more serious problem. Please see our reply to the following letter.]

Dear Hacker:

I hate to insert a dissonant note into the chorus of enthusiastic supporters ('they don't seem to break much'...Larry Church, page 12, Issue 19) but my experience with the ESQ-1 has been ALL bad.

I bought the damned thing in the Bay area and waited about three weeks or more for them to get it and ship it to me (they were, they said, on a quota).

When it arrived I only had time to plunk on it in the evenings...but I waited eagerly for Sunday so I'd have a whole day to play with it. Turned out that it really RESENTED being turned on for more than a few hours. After maybe 2 - 2.5 hours it took to refusing to respond to the lower end (8 or 10 keys) of the keyboard..and the middle of the keyboard sort of produced whatever sound it felt like. Sure seemed like a bad..(heat sensitive)...chip to me. (Maybe sulfur impurities?...chips with bad sites in them can go fast).

So I shipped it off to an authorized repair point in Seattle and after a week I found they hadn't touched it. Why? Well because (as the guy told me) they didn't have any parts to repair it with anyhow - and, as he quaintly put it, 'I've got a shop full of the damned things and Ensoniq is all backed up on parts delivery'. He said he didn't expect parts for several weeks. Ho Hum. So now, presumably, it's on its way back to the place from which it came and they CLAIM they'll fix it or send me a replacement - but by this time I'm not very hopeful.

My whole point here is that things in the Ensoniq house - from the top to the bottom - don't seem very professional. Basically, dealing with Ensoniq and friends has been a lot like dealing with MicroSoft - and, really, I wouldn't wish that on my worst enemy.

So you see - not everyone can be as enthusiastic as most of your writers.

Sincerely,
Mark Harris
Port Angeles, WA

[Ensoniq's response: We are aware that the quality of early ESQ-1's was not up to the standards we set with our other products. The demand for the ESQ-1 was so overwhelming that it taxed our ability to produce and test them. We have since taken steps to ensure that this does not happen and are spending a great deal of effort and money on quality control. Unfortunately, most customers don't realize how small a company we are compared to our competitors - but as we grow, we'll continue to provide better products and service.

We realize this doesn't make anyone who has a problem now feel better and for that reason, customer service is a major priority for Ensoniq. If you (or anyone else) have a problem, please contact out customer service department. We're sorry if you've had a bad experience and we will do our best to help you. To be fair, Ensoniq has consistently won praise from our dealers and customers for our customer service.]

[TH - Not to get all mushy or anything, but we're glad that Ensoniq is the type of company that's willing to publicly deal with customer concerns of this nature.]

Dear TH,

Way up here in Western Canada, it seems to take forever for the Ensoniq distributor to get new Mirage factory disks to us. For instance, it was only around the new year that we finally saw disks twelve through fifteen. Knowing that I am at least eight disks behind what most of my American counterparts have access to is quite frustrating.

My question is this: Is there any other way Ensoniq has of distributing their new sounds? Do any of the Mirage user groups or online services take care of Mirage users with a service like this? How can I get these new disks without the interminable waiting times I currently have to deal with?

P.S. - Please publish my address if you don't have any ready solutions to my problem.

Thanks for your help,
Rob Bryanton
342 Fairview Rd.
Regina, Sask., S4R 6W4 Canada

[Ensoniq's response: Perhaps the most effective approach may be to bug your dealer. If the dealer doesn't order disks, we can't supply them]

[TH - Copyrighted sounds (such as the Ensoniq disks) aren't available for downloading from bulletin boards, and we haven't seen any mail order houses selling Ensoniq disks. Unfortunately, the way things are now, if your dealer doesn't respond to bugging, you'll either need a contact in the US to buy disks for you, or mail order from the third party suppliers.]

Dear Hackerites,

I'm a relative newcomer to your realm, having purchased a Mirage and an ESQ-1 in December of '86. I've been more than pleased with both the keyboards and your fine publication. The answers to the following questions, however, have eluded me:

1. Is there a method for utilizing the MIDI volume parameter with the Mirage? I would like to have the ESQ-1 control the volume of the Mirage with the MIX parameters of the sequencer. What's the story?

2. Is there any software/hardware reason for limiting the ESQ-1 to the 32K/10,000 note boundary. If not, are you privy to any plans by Ensoniq or a third party vendor to produce an expansion cartridge that would offer more storage?

By the way, your new page composition software looks great.

Sincerely,
Page Hite
Houston, Texas

[Ensoniq's response: The sequencer is limited both by the software, the hardware bank-switching circuitry and the power supply capacity. We have heard rumors about memory expanders, but we caution everyone that unless an expansion device is approved by Ensoniq, use of such a device will void the warranty. Unfortunately, many aftermarket designers appear to disregard power supply and bus-loading limits, which can cause serious internal damage to the ESQ-1. The only device approved for the expansion port of the ESQ-1 is the Ensoniq SQX-10 cartridge. However, Ensoniq may introduce additional cartridges for this port in the future.]

Dear TH,

I am a fairly recent proud MIRAGE owner, but I do have a few questions.

Since I'm primarily a sax player, I use the sequencer a lot to play bass lines for me to practice over. Somewhere in the packet of information I got with the MIRAGE it states that one 'records' at "25" so that you can speed up the sequence up to 4 times. In the manual it says the number is "24". This doesn't make sense to me because my machine is always at "48" unless I am overdubbing an existing sequence. Am I doing something wrong or has Ensoniq changed this since the info was printed?

Another question (out of many): Is there any way to move a sampled sound from upper to lower (or vice versa) and is there any way to continue a lower sound to encompass the whole keyboard?

Since my subscription just started with Vol. 3, no. 2, Feb. 1987, I'm sure I've missed a lot of valuable information. Is there any plan to gather information into book form in the future? Perhaps Ensoniq will publish a "corrected" or "updated" Musicians Manual.

Thanks for the help.

Sincerely,
John O'Meara
San Francisco, CA

[Ensoniq's response: As we have updated the Operating System in the Mirage over the years, the original manual has become inaccurate. The best bet would be to get a Mirage-DSK manual, which contains the latest revisions. This can be ordered from your authorized dealer or direct from Ensoniq. To order direct, send a certified check or money order in US funds for $3.95 for the manual and $5.00 for postage and handling. PA residents add 6% to the $3.95 figure.

The process of moving sounds around the keyboard has been covered in the Hacker in a number of issues and in their reprint series. It's not an easy task to do manually and is much easier with one of the visual editing systems such as Sound Lab or Vision.]

[TH - The reprint that you want is #1, "Operations" ($5). We also plan to have another article on wavesample moving, by Jack Loesch, in either this issue or the next.]

Dear TH,

I'm just writing this letter to say how pleased I've been with Ensoniq's dedication to its product and its customers. After I was unable to receive satisfactory service locally on my Mirage, which was experiencing noise problems, I called Ensoniq's customer service department and explained the problem. The rep, who was very friendly and helpful, assigned a return authorization number to my Mirage and requested that I send it directly to the factory for repair. He didn't charge me for the work since the Mirage was never properly repaired during the warranty period. Following the repairs, my Mirage was put through a "burn-in' testing period, as they do with all units they service, to assure that everything was functioning properly.

I got my Mirage back now, and it sounds better that it ever did and works perfectly. Ever since then, my creative ideas have been bursting forth.

I've heard from people in my user's group who have both good and bad things to say about the local authorized service center, but it's clear that Ensoniq truly cares about their customers. This is what sets Ensoniq above other companies that produce sampling keyboards.

Sincerely,
Joe Kohler
Lombard, IL

[Ensoniq's response: Thanks! We're not perfect, but we keep trying.]

Dear Hacker,

Just wanted to drop a line and remind everybody how great the ESQ-1 is! Of course the main reason that I'm writing

is to see if I might not be able to get a little inside info.

I've done a lot of sounds with the ESQ that I would like to get on tape. To do this with the proper eq., reverb, etc. each track has to be recorded separately using mute functions and sync to tape, recording a different part on each pass. This works, but is very time consuming and expensive if you have to pay for studio time. It would seem to me that some sort of mod would be made available to allow for individual outputs. This would greatly improve the overall usefulness of this machine.

I'm sure that I could sit back and wait to see what will evolve, but I hope that by writing it will bring out the same interests that others may have.

Later,
David Bell
Morehead City, NC

[Ensoniq's response: The stereo output circuitry is an integral part of the voice chips used in the ESQ-1. Each voice output signal is available internally, but at such a low level that it wouldn't be useful. Additionally, the ESQ-1, like the Mirage, uses a random voice assignment with dynamic voice allocation. There is no way to control or predict which sound will come out of which output.]

Dear Hacker,

I am disappointed that the rack mount ESQ-1 does not include the sequencer. I am sure that my Mirage owners feel the same way.

I want to thank Tom Metcalf for turning out great sounds. I am never disappointed. I am disappointed when I hear other samplers and look at their price tags.

The 3rd issue of the Hacker said Ensoniq is concentrating on the MIDI port, not the computer port, because it does the same job and is much faster. Is there any advantage to having the computer port you can think of?

I was in a studio with an ESQ-1. I MIDIed my Mirage to it. The ESQ-1 was the controlling board. The Mirage did not follow its pitch bend information. I didn't have time to figure out how to correct this problem in the studio.

A few notes to Don Slepian:

Using the Mirage as a MIDI controlled audio processing device using external audio processed through the VCF's sounds interesting. Any possibility of using the Mirage's sampling ability to create a digital delay effect as well? I hope others call or write P.A.I.A. Electronics requesting such kits.

Will the new Mirage sample in stereo?

Will it already have an input sampling filter built in?

Hope to raise Mirage consciousness among all Hackers.

Sincerely,
John Adams
Elmhust, IL

[Ensoniq's response: So much of what makes the ESQ-1 sequencer so powerful is a result of the comprehensive display/keypad system. Unfortunately, there is no way the ESQ-1 display/keypad can physically fit into a 19" rack enclosure. In addition the price would be dramatically higher. The ESQ-M is designed to add the ESQ-1 sound to any MIDI system, or to be used as a voice expander for an ESQ-1 in MIDI overflow mode.

Three years ago, when the Mirage was designed, the future of MIDI was questionable. Only two other keyboards on the market included MIDI; the Prophet

600 and the DX-7, both of which are now discontinued. The computer port was included to allow computers to talk to the Mirage. When it became apparent that MIDI was here to stay and that it was much more efficient than the computer port, we standardized on MIDI.

In order for the ESQ-1 and the Mirage to track each other, their Pitch Bend Range parameters must be set the same and the Mirage must be running OS 3.2.

Regarding your comments to Don Slepian: The digital delay effect would require sampling and playing back data simultaneously in real-time. The microprocessor in the Mirage would be hard-pressed to pull this off with any quality. With the low price of digital delay lines, it really wouldn't be worth it to attempt this.

The new Mirage's stereo output is simply a stereo pan of the output voices. The only sampling keyboards that sample in true stereo cost in excess of $60,000.

The Mirage DSK has the exact same input filter as the original Mirage (minus the Mic compressor). The expansion port was eliminated to cut cost and due to a general lack of interest in the accessory cartridge. The expansion port is still available on the rack-mount Mirage for those people who want to use the cartridge.]

Dear Editor:

I've been watching the topic of K-Muse samples become a controversy in the Hacker. Since I own them all, I'm writing to share my opinions.

All K-Muse samples are clear and noise free. Most are in tune, but there are a few exceptions (usually brass) in the New York, London and L.A. sets.

I feel the Classical and Techno sets are excellent. They are well worth the $150 price tag they carry here in New York City. In general, I regard these collections to be comparable in quality to Ensoniq factory disks.

The New York, London and L.A. sets are not as strong as the Classical and Techno samples. The principal shortcoming is that some samples sound good but are not musically useful. Judgements regarding usefulness are certainly subjective, but for me about half of the New York, London and L.A. sets are usable.

I was quite surprised to read that the Hacker has had difficulty with K-Muse. Has the problem been resolved? I have found K-Muse to be quite dedicated to customer service. Have any other readers had particularly good or bad experience with this company?

Sincerely,
Gregory L. Neu
New York, NY

[Ensoniq's comments: The only way of judging the "quality" of a sound is how well it works in the context you use it.]

[TH - Still not a peep from K-Muse. I suppose that if they weren't mad before (and we never did have a clue why they didn't respond), they probably are by now.]

Dear Hacker,

I spent my first hour inside an ESQ-1 yesterday. Great machine! We'll be getting an ESQ rack up at the lab (Bellcore), so I'll give a more substantial report later.

The ESQ is based around the CEM 3379 signal processor, so call Curtis at (408) 395-3350 and get their latest catalog if you don't already have the outline for that chip. I opened up the ESQ, removed the keyboard, started up the wonderful sequencer, and got eight separate audio outputs. Like the Mirage, the outputs are grabbed by the 6809 micro in pseudo-random fashion. Each output has a little portion of the sequence. Listening to one of the new outputs, you hear a single drumbeat, then a snippet of bass guitar, then a note of melody, and so on. Like the octal outputs on my Modified Mirages, the outputs are not assigned to specific sounds.

The octal outputs of the ESQ and the Mirage are useful to me because I do my sound mixing in the air rather than in an electronic mixer. When I move one of my volume pedals, a control voltage causes eight VCAs to pass the sounds of eight discrete independent audio signals, which go to eight amplifiers, eight speakers, and get mixed in the air. It's like the difference between hearing a drum kit played live and the same performance recorded and played back through one or two speakers. Immediate, obvious, overwhelming difference.

With the front of the ESQ facing you, the octal outputs are found on the right-hand sides of resistors 105, 114, 123, 132, 141, 150, 159, and 168. Attach 20K resistors to these points, bundle your wires and run them to a DB-9 9 pin connector which you can mount on the back of the unit. You do this at your own risk, and I claim no benefits from this mod. Only multi-channel sound freaks, or people interested in heterogeneous processing (running different types of effects on different notes of the same patch simultaneously) are likely to benefit from octal outputs.

Introducing external sound into the ESQ looks very simple. Eight resistive mixers at pin #8 of the CEM3379s should easily accomplish that. All these instruments

should have a mike jack set up in this fashion so you could process your voice along with the digital oscillators as they get enveloped, filtered, and panned. The best dynamically changing wavetable digitally controlled (human synapses are digital) sound source with servo-controlled amplitude enveloping and variable Q format filtering is Man's original instrument - voice. Let's open up the hardware architecture of these instruments to include it.

Sincerely,
Don Slepian

[TH - Thanks for all the ESQ-1 info. (Gee, since it's a letter, we didn't even have to pay for it - double thanks.) I'm sure there are other readers out there who can't bare to leave their machines alone and have to start hacking.]

Dear Hacker,

Congratulations on a well done and fair review. We caught some inaccuracies in the review and would like to clear them up. The first one is in the "Preview Box" at the top of the article. Vision is the only IBM Visual Editor that is endorsed and distributed by Ensoniq. In the compendium of visual editors on the facing page, our telephone number is listed incorrectly. The number should be 717-741-4972.

There are also several points in the review that we would like to rebut. We feel that the review implies that Vision does not work correctly on an AT or on a Hard Disk system. This is not so. Over 70% of our users have hard disks on their computers and all have installed Vision successfully. The statement that Vision locked up his machine before being configured is misleading. Vision's MIDI driver cannot work correctly unless it knows the CPU speed of the machine. We ship Vision configured for a PC or XT with a color monitor (which is the configuration reported by the majority of users). The fact that the software became confused when misconfigured is not relevant. Regarding hard disk installation: Had Mr. Willing called our customer support number, (the existence of which is not covered in the review) we would have helped him through the process of hard disk installation. Since he seems to have talked to the other developers, we wish he had called us too. One final point regarding the cost of the various packages, Vision is sold by retail music dealers, some of whom have been known to sell things at less than list price.

Keep up the good work!
Roy Smith
Turtle Beach Softworks

[TH - The chart, and any inaccuracies on it, are ours. We plan on redoing it every so often. (We've already received two entirely new listings.) I believe Jim mistook the listings in Ensoniq's "Menu ad" as being a sign of distribution. Jim's response follows.]

[Jim Willing's response - Regarding the preview box - that was a mistaken assumption based on the fact that an Ensoniq ad lists both Vision and Synthassist in their product list.

As to the problems with Vision on my hard disk. In re-reading my article, perhaps I was not as clear on some points as I might have been. I made it a point to specify that I was running an IBM AT since the problem is unique to the 80286 based systems and is not related to your form of copy-protection. Rather it is caused by a conflict between the hard disk controller and the Roland interface. Some software leaves the MPU-401 in such a state that the hard disk can't function. Your MIDICOM driver appears to be such a program. With this clarification I stand by my statement - the software will not function from the hard disk of an 80286 based computer since the hard disk is no longer accessible after the MIDICOM module loads. When started from floppies, the successive programs appear to restore the MPU-401 to a proper state and the system functions properly. This problem should not appear on 8086/8088 based systems with hard disks.

The reference to the software becoming "confused" when not properly configured was intended to suggest that the manual should really be read before proceeding, although in retrospect I would have rather had the program simply indicate that it was not configured rather than try to start up. The fact remains that it did lock up the system when it terminated. But again, this is the MIDICOM program which suffers from the above noted problems.

As to my omission of your customer support number, this is simply an oversight on my part. Sadly, deadlines sometime don't allow for being as thorough as we would like. Additionally, I only spoke to one of the other vendors concerning a problem that would have caused me to seriously downgrade their product if a fix had not been forthcoming. I did not consider the loading problem with Vision serious enough to warrant the call since I had determined it to be a system-specific problem. I would be happy to discuss this with your staff and possibly re-evaluate my position but since I no longer have access to the software this may not be practical.

Regarding the selling price of the packages - while most of us are aware of the pricing policies of the dealers; it's not my place to second guess them. Therefore, I usually quote manufacturer's suggested retail.

Overall, I must admit a lack of clarity on some points of the article for which I apologize. I hope this has helped somewhat.]

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