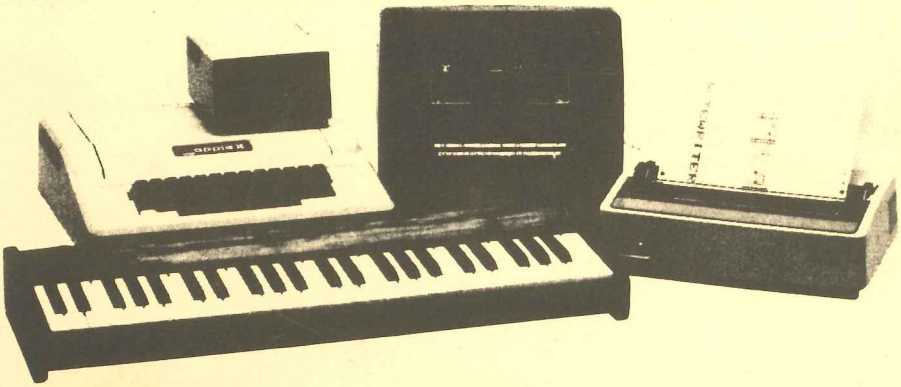
SOUNDCHASER™
COMPUTER MUSIC SYSTEMS

DIGITAL PERFORMANCE SOFTWARE

USERS MANUAL



SOUNDCHASER OWNER REGISTRATION FORM

NAME_____

ADDRESS_____

CITY, STATE, ZIP_____

SOUNDCHASER System

Analog_____Digital_____

Software:_____

Where Purchased:_____

Date of Purchase:_____

Comments:

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Passport Designs, Inc.
Registration
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Half Moon Bay, CA 94019

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INTRODUCTION

SOUNDCHASER Digital is an 8 voice live performance music synthesizer based around the Apple II Computer. It's integrated blend of hardware and software components further extend the modular concept behind SOUNDCHASER. The system consists of:

* SOUNDCHASER Polyphonic Keyboard and Interface Card
* Apple II Plus (or Applesoft)
* Disk Drive and Controller
* Monitor (or T.V.)
* Mountain Computer Music System
* SOUNDCHASER Digital Performance Software

SETTING UP

SOUNDCHASER Digital is very simple to set up. First connect your Apple, Disk, Monitor and Game Paddles together as described in the Apple Manuals.

Next, be sure the power to your Apple is turned off. Inserting or removing circuit boards with the power on can be very dangerous.

Next, unpack your Mountain Computer Music System. It will be helpful for you to read through their manual and experiment with their software. Our software (SOUNDCHASER Digital Performance) was designed from the "ground up" and does not use Mountain's Software. This hardware consists of two boards, one with audio cables and light pen connected to it. The board with the audio cables and light pen goes in slot # 4 with the cables extending to the left side of the board. The other board goes in slot # 5. Please note that the Apple slots are numbered and labeled 0 - 7. The light pen and audio connectors go out the back of the Apple. There should be a ribbon connecting the two boards. Make sure this is secure. You should now have the Music System boards in slots # 4 and # 5, and your Apple Disk Controller Board in slot # 6. Connect the two audio connectors to your stereo sound system.

PERFORMANCE SECTION

SOUNDCHASER/MC Performance Software (MC1) consists of three main sections: Performance, Wavemaker, and Disk. When the system boots, a set of 10 presets (sound definitions) is loaded into the computer' memory. The system then enters the Performance Section.

PRESET SCREEN

```
A1=FF   A2=E0   F =01   O =01   PRESET #= 2
D1=03   D2=78
S1=80   S2=46   L1=10   V =80   W
R1=08   R2=31   L2=21   B =01   Q   E0
```

The Performance Section lets you play the MC Music System with the SOUNDCHASER Keyboard. The particular sound that is created is called a Preset, or SOUNDCHASER'S definition of a sound. SOUNDCHASER can have a total of 10 different preset definitions (0 - 9) in memory at one time. You can select which preset to play by pressing the keys 0 - 9 on the Apple Keyboard. You can change presets while playing the SOUNDCHASER Keyboard for quick timbre changes.

HEX NUMBERS

In the Performance Section, all numbers are displayed in Hexidecimal (Base 16) notation. This number system is exactly like regular base 10 counting (0 - 9) except that you have 16 digits instead of 10. Imagine if you had 16 fingers. Hexidecimal notaion uses 16 digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. Since SOUNDCHASER/MC displays two HEX digits for each value, you can represent 16 X 16 or 256 (base 10) different numbers. The HEX values used here are from 00, the smallest to FF, the largest.

PRESETS

Each preset consists of two indepentent audio oscillators per key depression. This gives you the ability to create complex timbers by mixing two audio waveforms per key. Each oscillator has a fully programmable waveform and an ADSR envelope (described below) to control it's amplitude. Each of these two audio oscillators controls one stereo channel, so you can completely control the waveform and ADSR envelope for each stereo channel independently. ADSR stands for--

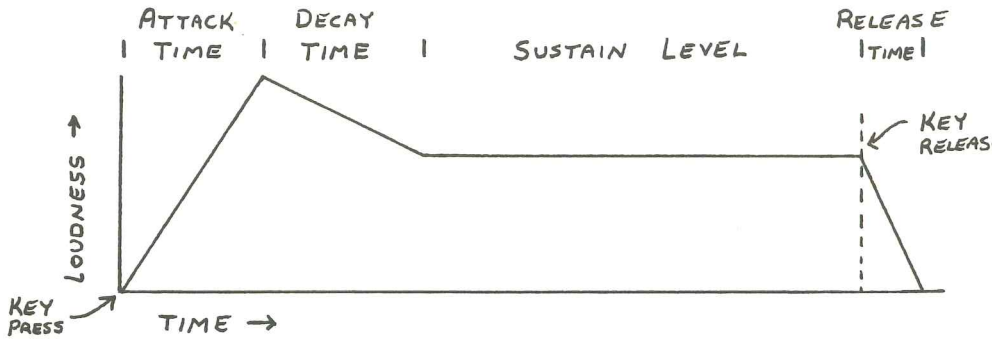
A or Attack is the time from silence to maximum loudness. If the attack is very slow, you hear a very gradual increase in loudness. If the attack is fast, the sound is more percussive in it's beginning. A piano has a fast attack, whereas a violin can create a very slow attack using the bow.

D or Decay is the time from maximum loudness to the sustain level. If the decay is fast the sound falls off quickly to the sustain level. If the decay is slow, it gradually falls off to the sustain level.

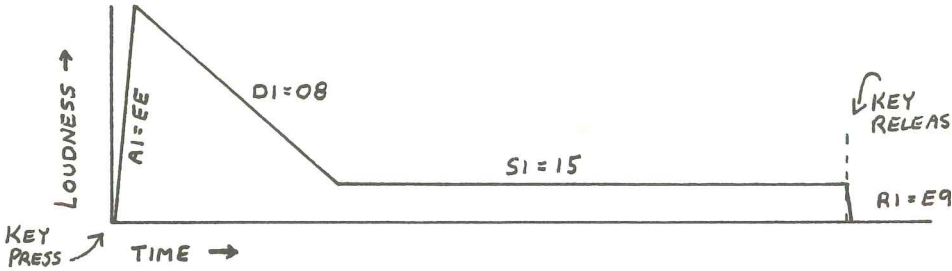
S or Sustain is a loudness level (like a volume control) that you will maintain for as long as you hold down a key.

R or Release is the time from the key release volume to silence. If release time is slow, it will take a long time after you release a key before the sound drops off to silence. If the release time is fast, the sound drops off quickly when the the key is released.

An ADSR envelope is pictured below.



Compare the envelope on the preceding page with the following envelope.



A1=EE (fast attack)
D1=08 (slow decay)
S1=15 (sustains at low loudness)
R1=E9 (fast release)

In actual practice, small time values yield the most useful changes. Remember that the time value selected is the actual amount of change that occurs each time the envelopes are updated. Small values give you the "space" to play with using this technique.

WAVEMAKER SECTION

Pressing "W" brings you to the Wavemaker Section. These programs allow you to Create, Edit, Display, and Smooth Waveforms that you can use as either audio oscillator waveforms or as LFO waveforms. Each option is selected by pressing the key for the first letter of the option. "C" for Create, "D" for Display, etc...

Each preset (0 - 9) consists of two audio oscillator waveforms (1 and 2) and a single LFO waveform (3). The programs that deal with waveforms all ask you to specify a preset and waveform.

In the Wavemaker, you can erase the screen simply by typing "Return". To get back to the Performance Section, type "P" for Play.

CREATE

This program allows you to construct a waveform by specifying the weights for up to 16 harmonics. To create a new waveform:

* Type "C" for Create

First, you are asked which preset and which waveform you wish to change.

Harmonics are represented with a bar graph. The height of each bar shows the relative amplitude for that harmonic as compared to the other harmonics. The bottom of the screen shows a value between 0 and 255 for the harmonic which is being adjusted. A harmonic with a value of 200 will be relatively twice as strong as one with a value of 100. The values for each harmonic are selected using Paddle 1 as follows.

* First type "C" to clear the graph
* Use the right and left arrow keys to determine the movement of the cursor from one harmonic to another.
* Turn the paddle knob clockwise or counter clockwise to raise and lower the hight of the bar. That is, the relative amplitude of that harmonic.
* Press the paddle button to set the amplitude at the value indicated and move the cursor to the next higher harmonic.
* Press the "Return" key to compute the waveform

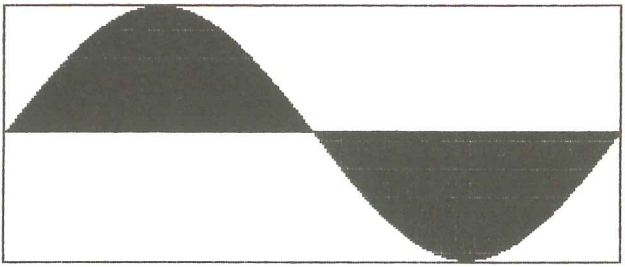
To cancel the Create command:

* Press the "ESC" key

If you don't want to include a particular harmonic, enter "0" for its weight.

MOVE

Normally, in the Create mode you are using sine waves to establish the relative amplitude for each of the harmonics. One complete cycle of a sine wave is represented as follows:



With the Move program you can use any waveform from any of the 3 oscillators in any of the 10 presets as a "base wave" from which to produce other waveforms. In this case, the waveforms for each harmonic will be the same as the fundamental or "base wave". To see this more clearly, try the following experiment:

* First use the display mode to find a sine wave, a wave that looks like the one shown above)
* Next find a waveform with some very different shape. For example:

For the sake of illustration, let's say the sine wave is at Preset 5, Wave 1, and the other waveform is at Preset 9, wave 2.

* Now, with the Wavemaker screen displayed, type "M" for Move.

You are then prompted to enter values for Preset and Wave.

* Type 5 for the preset value
* Type 1 for the waveform

This will cause the Wavemaker screen to be displayed again.

* Now type "C" to enter the create mode.
* Use the paddle and the button to create a waveform with all harmonics at the same weight.
* Enter that waveform as Wave 1, Preset 0.

PLAY

Pressing "Return" in the Wavemaker Section will erase the screen.

Pressing "P" will take you back to the Performance Section.

TUNE

When you boot the system, an "equal tempered" scale (such as found on a well tuned piano) with a reference of A=440 Hertz is loaded. With the "Tune" command you can change this reference to any frequency from 200 Hz to 600 Hz. This is done while the Wavemaker screen is displayed as follows:

* Type the letter "T" for Tune
* Now type the value to which you wish the reference frequency to be changed
* Press the "Return" key to change the reference note A to this frequency

You use this option to tune your SOUNDCHASER to other instruments. Tunings can be saved on the disk. This is described in the Disk section.

A number of other tunings, such as Just Tone and Mean Tone temperments, are soon to be available on a seperate disk.

LINK MODE

Make sure you have the sequencer screen with the LINK mode displayed. You have options between:

R (for Record)
P (for Playback)
O (for Off)

You can also change your record or playback presets by typing (0 -9).
For example, to record:

* Type R
* Type preset (0 - 9)
* Hit the space bar to begin recording.

The LINK mode is key triggered for both Record and playback modes. That is, it waits for you to hit the first key on the SOUNDCHASER keyboard to actually begin recording or playback. In the record mode, the TEMPO is always 1.

* Record a short sequence of notes.
* Hit any note on the SOUNDCHASER keyboard to stop recording.
* Now hit the space bar again to leave the record mode.
* Type P for playback
* Hit the space bar.
* Hit any key on the SOUNDCHASER keyboard to begin playback.
* Hit the space bar to stop playback.

The space bar starts and stops the record or playback sequence mode. You actually begin recording in the LINK mode when you first press any key on the SOUNDCHASER keyboard. The last note played in the record mode will be eliminated in the playback mode. Thus you can easily create a repetitive sequence of notes with consistent tempo by playing a phrase, and then hitting the first note of the phrase to stop the record sequence. You mark the end of the sequence with the last note that you play. That note will not be played back in the playback mode. The word LINK surrounded in white indicates the record or playback mode is activated. The word LINK without white background indicates it is not activated.

TEMPO

Playback tempo can be varied by using the right and left arrow keys to increase and decrease tempo. The tempo used whenever any track is recording is 1. The Tempo increases in exact multiples. In playback, a tempo of a sequence is:

Temp	
1	plays the sequence at the speed at which it was recorded.
2	plays the sequence at twice the speed at which it was recorded.
3	plays the sequence at three times the speed at which it was recorded.
4	plays the sequence at four times the speed at which it was recorded.

Setting the tempo to 0 stops the sequence temporarily until you advance the tempo to 1 or greater.

TRACK PRIORTY

The keyboard always has priorty over any sequenced notes. The track priorty is 1, 2, 3, 4 - notes are added in that order. The ultimate limiting factor is that the software can only produce 8 notes simultaneously. If you put a bass line or some other easily recognized sequence on track 4, you'll know you've reached the 8 note limit if you hear the bass part cut out. If you have 7 or 8 notes tracked, and begin to play chords on the keyboard, you will notice that these tracks will tend to "clip" as you play and release.

KEYBOARD PRESET

Select your keyboard preset on the preset screen (ESC). The keyboard preset will automatically change to the track preset when recording.

DISK SECTION

Typing "Q" brings you to the Disk Section. Here you can Load, Save, or Delete files on your disk and also Catalog or look at what's on your disk. Again, typing the first letter of the desired command will select the command:

L for Load
S for Save
D for Delete
C for Catalog

Type "Return" to go back to the Performance Section from the Disk Section.

SOUNDCHASER Digital's Data is set up as follows:

A Master File consists of 10 preset definitions including all 3 waveforms for each preset. Master Files are saved on the disk with the ".Master" suffix. After designing a group of presets, by creating waveforms and adjusting the parameters of the presets, you can store these as Master Files on the diskette. You might think of each Master File of presets as being like a "sound pallet" which contains 10 sound colors. After you get the colors just the way you want them you can save a particular "pallet" (Master File) for later use.

A Preset File consists the waveforms for each of the two audio oscillators and the Low Frequency Oscillator plus the values for all of the preset parameters. Thus, once you have created a "sound" as defined by the SOUNDCHASER, you can store it on the disk and then load it into any Master File you wish. When a Preset File is saved, the prefix "PRE." is used.

A Waveform File consists of just the 256 amplitude point values for a particular waveform. Waveform Files are saved on the disk with the "Wave." prefix and are compatible with Mountain's Waveform Files.

Trak Files consist of 4TRK or LINK sequences that have been created with the Sequencer. Trak Files are saved on the disk with the ".Traks" suffix.

Tune Files consist of tunings for the 49 keys on the SOUNDCHASER keyboard. Tune files are saved with the prefix "TUNE." on the disk.

When loading or saving files the prefix or suffix is not necessary. When deleting a file the prefix or suffix must be included in the file name.

DELETE

To delete a file from the disk:

* Type "D"
* To delete a file you must specify the full name including the suffix ".Master" or ".Traks", or the prefix "Pre.", "Wave.", or "Tune."

CATALOG

To display the catalog of files on the disk:

* Type "C"
* Type any key to return to the disk menu.

To get back to the Performance Section from the disk menu:

* Type "Return"

CARE OF THE KEYBOARD

A little proper care of your SOUNDCHASER keyboard will help maintain an attractive appearance and provide greater longevity. The case, like any piece of fine furniture, will be preserved by occasional waxing. This should be done carefully to avoid getting wax on the keys. A lemon oil type liguid furniture wax, which can be applied in a thin coat with little residue, works nicely.

The key contacts themselves should be occasionally cleaned with a light application of alcohol. If you remove the four screws on the underside of the keyboard, you can slide the keyboard out of the case as one unit. Be careful of the cable when doing this. Now you can clean underneath the keys with alcohol and a Q-Tip, to avoid bending the little gold wire springs connected to each key.

KEYBOARD

Interfacing

The Polyphonic Keyboard and Interface Card combine to form an excellent input device for computer music applications. The Keyboard is arranged as a matrix of diode isolated switches. The Interface Card connects to this matrix, allowing simple software access to each key and its state.

The Interface has been designed to appear as a single port or memory location. In normal configurations the Interface Card is plugged into SLOT # 7 of the Apple's peripheral connectors. This slot has 16 I/O addresses associated with it that run from $C0F0 to $C0FF hex, or 49392 to 49408 decimal. A reference to any one of these addresses will access the Interface. If you decide to use a slot other than # 7, you can access the Interface by referencing any one of the 16 appropriate peripheral I/O locations for that slot.

The Interface allows you to look at each key individually by first selecting one of the 49 keys, and then reading its state. You select a key by writing its number to the Interface. You read the key's state by reading the Interface. If the number read is 128 or greater (negative), the selected key is down. If the number read is less than 128 (positive), the selected key is up (not pressed). Bit 7 indicates the key's state. 1 = down, 0 = up.

Simple Scanning

This assembly language subroutine will scan the Keyboard returning with the number of the highest key found down in the accumulator. If no keys are found down, the accumulator returns with $FF.

```
SCAN    LDX #$31        ;X HAS THE KEY #
LOOP    DEX             ;X COUNTS THE SCAN
        BMI NOKEY       ;BRANCH IF NO KEYS DOWN
        STX $C0F0       ;SELECT KEY TO LOOK AT
        LDA $C0F0       ;READ SELECTED KEY'S STATE
        BPL LOOP        ;BRANCH IF KEY IS UP
        TXA             ;A GETS DOWN KEY'S #
        RTS
NOKEY   LDA #$FF        ;A GETS $FF (NO KEYS DOWN)
        RTS
```

This simple BASIC program will print the key numbers in decimal of each key found down on the screen.

```
10                              REM  KEYBOARD SCANNER

20      KBD = 49392             REM  SLOT # 7

30      FOR I = 0 TO 48         REM  I COUNTS KEY #

40      POKE KBD,I              REM  SELECT KEY

50      IF PEEK (KBD) > 127
        THEN PRINT I;" ";       REM  PRINT KEY IF DOWN

60      NEXT I                  REM  SCAN ALL KEYS

70      PRINT : PRINT

80      GOTO 30                 REM  SCAN AGAIN
```

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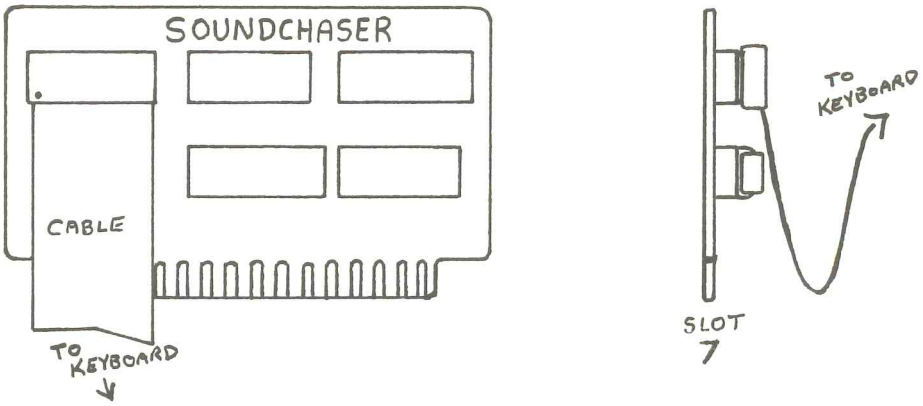
Next, unpack your SOUNDCHASER Keyboard and Interface Card. Connect the ribbon cable coming out of the keyboard to your interface card. This connection is made by inserting the ribbon cable into the empty socket on the interface card so that pin # 1 of the cable is in pin # 1 of the socket (the slanted corner). Your cable should flow out toward the bottom of your interface card.

INTERFACE CARD AND CABLE



Now insert the interface card into slot # 7 of your Apple. The keyboard sits nicely either to the right or directly in front of the Apple. Your hardware should now all be connected properly. Insert your SOUNDCHASER Digital Performance Software into your Disk Drive and turn on your Apple.

After a moment the SOUNDCHASER logo will appear on the screen indicating that the program is "booting." You should eventually see a display of a large waveform screen with four lines of preset parameters beneath it. Your system is now booted and your keyboard is active. Pressing a key should produce a pleasant sound through your audio system.

BE VERY SURE THAT YOU ALWAYS TURN YOUR APPLE OFF BEFORE REMOVING OR INSERTING CIRCUIT CARDS.

PERFORMANCE SECTION

SOUNDCHASER/MC Performance Software (MC1) consists of three main sections: Performance, Wavemaker, and Disk. When the system boots, a set of 10 presets (sound definitions) is loaded into the computer' memory. The system then enters the Performance Section.

PRESET SCREEN

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A1=FF   A2=E0   F =01   O =01   PRESET #= 2
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SCROLLING

To modify any parameter value, type the parameter on the Apple keyboard. You will then see the "=" symbol flash at the selected parameter. You are now in the Scroll Mode. This mode allows you to modify any parameter dynamically while playing the music keyboard.

You can increase a value by typing the "→" Right Arrow key. You can decrease a value by typing the "←" Left Arrow key. Hold either key with the "Repeat" key and Scroll your value. You can also "Roll Over" (up through FF) or "Roll Under" (down past "00"). There is an additional key that you can type to assist you in making very fast, dramatic chnges. Type B for Bump. Notice the value displayed for parameter B toggles between "01" and "10". Type B again to toggle the value. The Bump value is used in the Scroll Mode to Scroll by "01" or "10" HEX. You can use Bump to set the highest digit first, then fine tune in on the desired value with the low digit. Scrolling by "10" is also a key way to make drastic changes in parameters quickly in Performance.

To exit the SCROLL MODE type "Return". You will see the blinking "=" stop blinking and you will be able to change presets. Note here that you cannot change presets while in the Scroll Mode. You must first exit the Scroll Mode by typing "Return".

PRESETS

Each preset consists of two indepentent audio oscillators per key depression. This gives you the ability to create complex timbers by mixing two audio waveforms per key. Each oscillator has a fully programmable waveform and an ADSR envelope (described below) to control it's amplitude. Each of these two audio oscillators controls one stereo channel, so you can completely control the waveform and ADSR envelope for each stereo channel independently. ADSR stands for--

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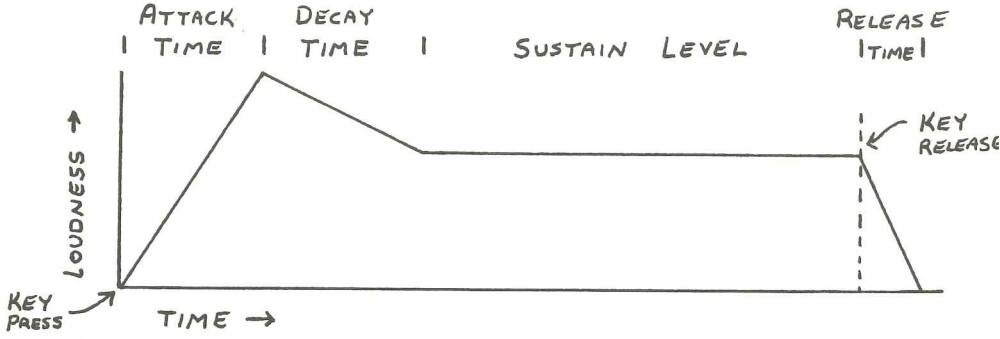
D or Decay is the time from maximum loudness to the sustain level. If the decay is fast the sound falls off quickly to the sustain level. If the decay is slow, it gradually falls off to the sustain level.

S or Sustain is a loudness level (like a volume control) that you will maintain for as long as you hold down a key.

R or Release is the time from the key release volume to silence. If release time is slow, it will take a long time after you release a key before the sound drops off to silence. If the release time is fast, the sound drops off quickly when the the key is released.

An ADSR envelope is pictured below.



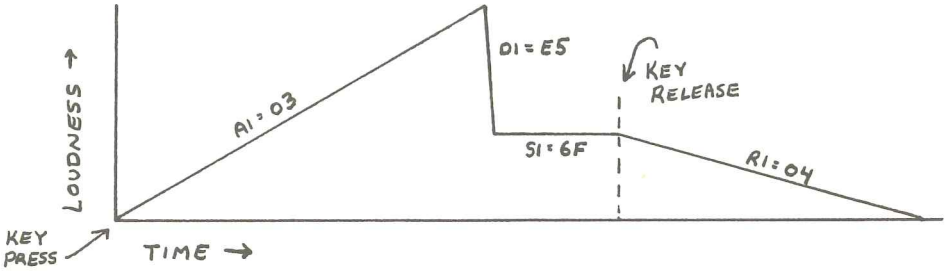
The ADSR Contour controls the shape of your oscillator's amplitude. On the screen you will see A1, D1, S1, R1, and A2, D2, S2, R2 in the Performance Menu. Each column of numbers represents the ADSR envelope for each of the two oscillators.

The oscillators' wave shapes are discussed in the Wavemaker Section of this manual.

Each oscillator's amplitude is described by an ADSR Contour which starts at "00" or silence, progresses to "FF" its loudest value, falls off to some sustain level and then finally when the key is released, falls again to silence (00).

For the ADSR time values, low numbers indicate slow times, high numbers indicate fast times. For example, a value of A1=01 is the slowest attack for oscillator 1. A value of A1=FF indicates the fastest attack. A slow decay for oscillator 2 would be something like D2=08, whereas D2=E8 is a much faster decay.

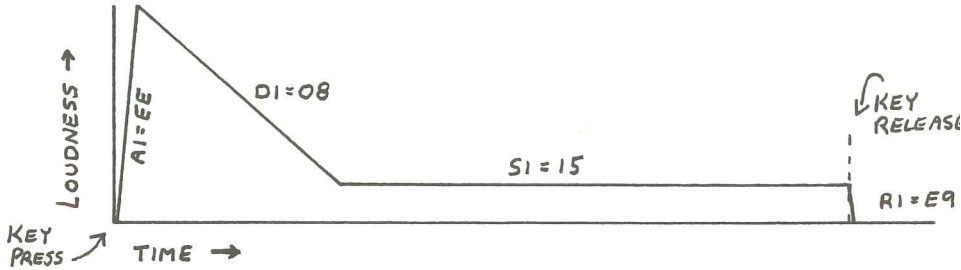
Have a look at the following examples of ADSR envelopes for oscillator 1.



A1=03 (slow attack)
D1=E5 (fast decay)
S1=6F (sustains medium loudness)
R1=04 (slow release)

With this envelope, when you depress a key on the SOUNDCHASER keyboard, the loudness increases gradually to its maximum level (slow attack) then falls off very quickly (fast decay) to a medium level of loudness for the sustain. The loudness remains at that level as long as you keep the key depressed. Finally, when you release the key, the sound falls off gradually (slow release).

Compare the envelope on the preceding page with the following envelope.




```
A1=EE   (fast attack)
D1=08   (slow decay)
S1=15   (sustains at low loudness)
R1=E9   (fast release)
```

In actual practice, small time values yield the most useful changes. Remember that the time value selected is the actual amount of change that occurs each time the envelopes are updated. Small values give you the "space" to play with using this technique.

FREQUENCY MODULATION

The LFO (Low Frequency Oscillator) is a sub-audio oscillator used to modulate the pitch of a tone. Frequency modulation with the LFO affects how rapidly the frequency changes and the actual amount by which the pitch changes. Thus you can have a slow pulsating, slight change in pitch. This gives a nice vibrato. Or you can have a slow pulsating LFO with a lot of pitch variation, creating a sound like a police siren. Other combinations might be a fast pulsating LFO with a lot of pitch variation or a fast pulsating LFO with very small amount of pitch variation.

The parameters F, L1 and L2 displayed on the performance screen control the Low Frequency Oscillator.

* F controls the frequency of the LFO

* L1 controls the actual amount of pitch variation (amplitude of LFO modulation) applied to oscillator 1.

* L2 controls the actual amount of pitch variation (amplitude of LFO modulation) applied to oscillator 2.

V controls the volume of your synthesizer and is a global parameter. The volume does not change with each preset.

The remaining two parameters "W" and "Q" take you out of the Performance Section to the Wavemaker and Disk Sections respectively. You must first exit the Scroll Mode (type "Return") to get to either the Wavemaker or Disk Sections.

WAVEMAKER SECTION

Pressing "W" brings you to the Wavemaker Section. These programs allow you to Create, Edit, Display, and Smooth Waveforms that you can use as either audio oscillator waveforms or as LFO waveforms. Each option is selected by pressing the key for the first letter of the option. "C" for Create, "D" for Display, etc...

Each preset (0 - 9) consists of two audio oscillator waveforms (1 and 2) and a single LFO waveform (3). The programs that deal with waveforms all ask you to specify a preset and waveform.

In the Wavemaker, you can erase the screen simply by typing "Return". To get back to the Performance Section, type "P" for Play.

CREATE

This program allows you to construct a waveform by specifying the weights for up to 16 harmonics. To create a new waveform:

* Type "C" for Create

First, you are asked which preset and which waveform you wish to change.

Harmonics are represented with a bar graph. The height of each bar shows the relative amplitude for that harmonic as compared to the other harmonics. The bottom of the screen shows a value between 0 and 255 for the harmonic which is being adjusted. A harmonic with a value of 200 will be relatively twice as strong as one with a value of 100. The values for each harmonic are selected using Paddle 1 as follows.

* First type "C" to clear the graph
* Use the right and left arrow keys to determine the movement of the cursor from one harmonic to another.
* Turn the paddle knob clockwise or counter clockwise to raise and lower the hight of the bar. That is, the relative amplitude of that harmonic.
* Press the paddle button to set the amplitude at the value indicated and move the cursor to the next higher harmonic.
* Press the "Return" key to compute the waveform

To cancel the Create command:

* Press the "ESC" key

If you don't want to include a particular harmonic, enter "0" for its weight.

As an experiment:

* Pick some preset and create a waveform heavily weighted on the lower harmonics for oscillator 1. For example:

Harmonic	Weight
1	250
2	200
3	200
4	0
.	.
.	.
16	0

* Create a waveform heavily weighted in the upper harmonics for oscillator 2. For example:

Harmonic	Weight
1	0
2	0
.	.
.	.
14	200
15	200
16	250

* Now try playing this preset with the balance on your stereo set all the way to the left channel.
* Then try it all the way on the right channel.
* Next display each of these waveforms as described below.

Another way to listen to each waveform separately, is to set the attack of one ADSR envelope at 00 while listening to the other oscillator. That is, to hear the waveform generated by oscillator 1 only, set A2 at 00.

DISPLAY

This program will display any waveform. You are asked to select which preset and which waveform you wish to display. Type "Return" to return to the Wavemaker Menu.

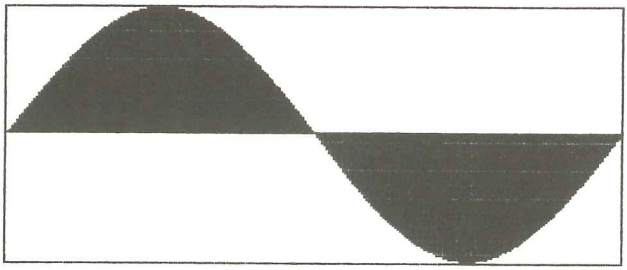
SMOOTH

Smooth is a digital low pass filter (6 dB/oct), which will filter any of the three oscillators in any of the 10 presets. Smooth asks you to specify a cutoff frequency in Hz for the filter. Typical values are 500 to 5000. Use this program to remove bothersome high frequency components in your waveforms. To smooth a waveform:

* Type "S" for Smooth
* Indicate the Preset and Wave to be smoothed
* Enter the value for the cutoff frequency

MOVE

Normally, in the Create mode you are using sine waves to establish the relative amplitude for each of the harmonics. One complete cycle of a sine wave is represented as follows:



With the Move program you can use any waveform from any of the 3 oscillators in any of the 10 presets as a "base wave" from which to produce other waveforms. In this case, the waveforms for each harmonic will be the same as the fundamental or "base wave". To see this more clearly, try the following experiment:

* First use the display mode to find a sine wave, a wave that looks like the one shown above)
* Next find a waveform with some very different shape. For example:

For the sake of illustration, let's say the sine wave is at Preset 5, Wave 1, and the other waveform is at Preset 9, wave 2.

* Now, with the Wavemaker screen displayed, type "M" for Move.

You are then prompted to enter values for Preset and Wave.

* Type 5 for the preset value
* Type 1 for the waveform

This will cause the Wavemaker screen to be displayed again.

* Now type "C" to enter the create mode.
* Use the paddle and the button to create a waveform with all harmonics at the same weight.
* Enter that waveform as Wave 1, Preset 0.

Now go back to the Wavemaker screen and enter the Move mode again.

* Type "M" for move
* Next type "9" for Preset 9
* Then type 2 for Preset 2

This will now be the shape of the fundamental for the next waveform you create. It will also be the shape of each harmonic you add.

* Type "C" for create
* Enter this waveform as Preset 0, Wave 2
* Even out the bars in the graph at the same height you used in creating the waveform out of sinewaves above.
* Press "Return" to compute this waveform.

Finally, use the display mode to look at Wave 1 and then Wave 2 of Preset 0. This will give you the opportunity to compare the two waveforms you have just created.

Of course, in actual practice, you will likely give different weights to the harmonics of waveforms you are creating.

This particular relationship between the Move and Create modes, enables you to develop a wide range of waveforms. Have fun!

EDIT

This program will first display the waveform points then will enter the Edit Mode. You will notice a set of X, Y coordinates displayed on the screen. These numbers correspond to the decimal values of the waveform point and amplitude at the current cursor position.

Notice the horizontal cursor in the middle of the waveform window. You can control this cursor position with your game paddle #1. Moving the paddle knob will move the cursor. Watch the X, Y values change as you move the cursor. To edit the waveform, position the cursor at the desired entry point. Press and release the game paddle button. Your paddle will now control the Y or vertical axis. You can enter new waveform points one at a time by pressing and releasing the paddle button quickly. You can also draw the waveform by holding down the paddle button and controlling the Y dimension with the paddle knob.

You can edit and draw waveforms from any entry point. To get out of the enter mode press "Return". You can now reposition the X cursor to edit another section of the waveform. Press "Return" again to get back to the Wavemaker Menu.

PLAY

Pressing "Return" in the Wavemaker Section will erase the screen.

Pressing "P" will take you back to the Performance Section.

TUNE

When you boot the system, an "equal tempered" scale (such as found on a well tuned piano) with a reference of A=440 Hertz is loaded. With the "Tune" command you can change this reference to any frequency from 200 Hz to 600 Hz. This is done while the Wavemaker screen is displayed as follows:

* Type the letter "T" for Tune
* Now type the value to which you wish the reference frequency to be changed
* Press the "Return" key to change the reference note A to this frequency

You use this option to tune your SOUNDCHASER to other instruments. Tunings can be saved on the disk. This is described in the Disk section.

A number of other tunings, such as Just Tone and Mean Tone temperments, are soon to be available on a seperate disk.

THE SEQUENCER

This diskette contains a polyphonic, multi-track digital sequencer which provides some very useful features for composition and performance.

The sequencer has a 4TRK mode which enables you to record up to 4 independent sequences (or tracks) of sound. These sequences can be manipulated during playback by changing presets and varying the envelopes. The sequencer also has a LINK mode which allows you to create playback loops. With a 48 K apple, you can record approximately 1000 notes per track in the 4TRK mode and a single sequence of approximately 4000 notes in the LINK mode. Here's how the sequencer works.

* First, make sure you have the "preset screen" displayed and are in the Play mode.

* Press the "ESC" key to bring up the "sequence screen."

SEQUENCE SCREEN

```
TRAK 1  MODE=OF PRESET=0   * TEST
TRAK 2  MODE=OF PRESET=0   *  TEMP=1
TRAK 3  MODE=OF PRESET=0   *  KEYB=N 0
TRAK 4  MODE=OF PRESET=0   *  4TRK
```

Notice at the bottom right of the screen it says 4TRK (4 track). Tracks are numbered 1, 2, 3, 4

* Type the "CTRL" and "L" keys at the same time to enter the LINK mode.

Now the bottom of the screen should show the word LINK instead of 4TRK.

* ESC toggles between preset and sequence screens

* "CTRL L" pressed at the same time toggles between 4TRK and LINK modes.

LINK MODE

Make sure you have the sequencer screen with the LINK mode displayed. You have options between:

R (for Record)
P (for Playback)
O (for Off)

You can also change your record or playback presets by typing (0 -9).
For example, to record:

* Type R
* Type preset (0 - 9)
* Hit the space bar to begin recording.

The LINK mode is key triggered for both Record and playback modes. That is, it waits for you to hit the first key on the SOUNDCHASER keyboard to actually begin recording or playback. In the record mode, the TEMPO is always 1.

* Record a short sequence of notes.
* Hit any note on the SOUNDCHASER keyboard to stop recording.
* Now hit the space bar again to leave the record mode.
* Type P for playback
* Hit the space bar.
* Hit any key on the SOUNDCHASER keyboard to begin playback.
* Hit the space bar to stop playback.

The space bar starts and stops the record or playback sequence mode. You actually begin recording in the LINK mode when you first press any key on the SOUNDCHASER keyboard. The last note played in the record mode will be eliminated in the playback mode. Thus you can easily create a repetitive sequence of notes with consistent tempo by playing a phrase, and then hitting the first note of the phrase to stop the record sequence. You mark the end of the sequence with the last note that you play. That note will not be played back in the playback mode. The word LINK surrounded in white indicates the record or playback mode is activated. The word LINK without white background indicates it is not activated.

4TRK

With the sequencer screen displayed, enter the 4TRK mode (if you are in LINK mode, type "CTRL L" together. This mode provides 4 independent polyphonic tracks and is fully layerable. To set Record/Playback/Off modes for each track simply press the desired track # (1 - 4) then the desired mode (R/P/O). To select the Record and Playback preset, again type the desired track # (1 - 4) then the desired preset for that track (0 - 9). For example:

* Type track "1"
* Type R (for record)
* Type track "1" again
* Type some preset (0 - 9)
* Hit the space bar to begin recording
* Record a sequence of notes
* Press some key on the SOUNDCHASER keyboard to end the record sequence.
* Hit the space bar to stop recording.

The 4TRK mode functions much like a 4 track tape deck. When you press the space bar, the sequence will immediately begin record or playback combinations and will not wait for the first key press from the SOUNDCHASER keyboard. Again, the last note recorded in a sequence is eliminated in playback. So be sure to play some note after you have finished recording on each track to mark the end of the track.

The four track mode also <u>does not loop</u> on playback but rather works like tape. In playback mode, you can tell that an individual track has finished playing when the "P" on the screen is surrounded in white. The 4TRK mode also always records at TEMPO 1. To add another track:

* Type 1, then type P (for playback)
* Type 1, then type preset number (0 - 9)
* Type 2, then type R (for record)
* Type 2, then type preset # (0 - 9)
* Hit space bar to begin recording.

You will now hear track 1 played back as you record track 2.

* Be sure to hit one more note on the SOUNDCHASER keyboard after you have finished your sequence.
* Hit the space bar to stop recording.

This process can be continued to record each track independently while listening to any or all other tracks. If you don't want to listen to a track:

* Type the track # (1 -4)
* Type 0 (for off)

YOU CAN ONLY RECORD ON ONE TRACK AT A TIME.

TEMPO

Playback tempo can be varied by using the right and left arrow keys to increase and decrease tempo. The tempo used whenever any track is recording is 1. The Tempo increases in exact multiples. In playback, a tempo of a sequence is:

Temp	
1	plays the sequence at the speed at which it was recorded.
2	plays the sequence at twice the speed at which it was recorded.
3	plays the sequence at three times the speed at which it was recorded.
4	plays the sequence at four times the speed at which it was recorded.

Setting the tempo to 0 stops the sequence temporarily until you advance the tempo to 1 or greater.

TRACK PRIORTY

The keyboard always has priorty over any sequenced notes. The track priorty is 1, 2, 3, 4 - notes are added in that order. The ultimate limiting factor is that the software can only produce 8 notes simultaneously. If you put a bass line or some other easily recognized sequence on track 4, you'll know you've reached the 8 note limit if you hear the bass part cut out. If you have 7 or 8 notes tracked, and begin to play chords on the keyboard, you will notice that these tracks will tend to "clip" as you play and release.

KEYBOARD PRESET

Select your keyboard preset on the preset screen (ESC). The keyboard preset will automatically change to the track preset when recording.

REAL TIME CONTROLS

You can "escape" to the preset screen during a sequence playback and modify any parameter of any preset. Transpose by octaves is one example. On the sequencer screen, you can change any playback preset at any time. This can be very useful in performance in that not only can you change the presets as you are playing "live" passages from the keyboard, but you can also make "real time" changes in prerecorded passages as they are played back.

For example, suppose you had prerecorded sequences on tracks 1 and 2 using presets 5 and 7. While playing back these tracks, you can change presets by typing the track # and then the preset #. You might change the preset on track 2 something like this:

* First type "2" for track 2
* Next type 8 for preset 8

You can then use the "ESC" key to toggle to the Performance screen and vary any of the parameters of that preset. For example, passages can be faded in and out nicely by setting the Bump parameter "B" at 01 and then using the right or left arrow key in combination with the repeat key to raise or lower the volume respectively. Setting "B" at 10 for the same experiment will result in much more radical changes in volume.

You can create some interesting real time sound effects by taking a similar approach with the LFO parameters F, L1, and L2. For example, try setting a low value for F and then use the repeat key with the right and left arrow keys to vary the amount of pitch applied to oscillator 1 or 2. That is, vary the parameters L1 or L2. Agian, notice the difference made by doing this with "B" set at 01 and then at 10.

This technique can also be used for the parameters of the ADSR envelopes. The most noticable changes will be in the attack and decay parameters.

You cannot change the preset of a track that is being recorded.

DISK SECTION

Typing "Q" brings you to the Disk Section. Here you can Load, Save, or Delete files on your disk and also Catalog or look at what's on your disk. Again, typing the first letter of the desired command will select the command:

L for Load
S for Save
D for Delete
C for Catalog

Type "Return" to go back to the Performance Section from the Disk Section.

SOUNDCHASER Digital's Data is set up as follows:

A Master File consists of 10 preset definitions including all 3 waveforms for each preset. Master Files are saved on the disk with the ".Master" suffix. After designing a group of presets, by creating waveforms and adjusting the parameters of the presets, you can store these as Master Files on the diskette. You might think of each Master File of presets as being like a "sound pallet" which contains 10 sound colors. After you get the colors just the way you want them you can save a particular "pallet" (Master File) for later use.

A Preset File consists the waveforms for each of the two audio oscillators and the Low Frequency Oscillator plus the values for all of the preset parameters. Thus, once you have created a "sound" as defined by the SOUNDCHASER, you can store it on the disk and then load it into any Master File you wish. When a Preset File is saved, the prefix "PRE." is used.

A Waveform File consists of just the 256 amplitude point values for a particular waveform. Waveform Files are saved on the disk with the "Wave." prefix and are compatible with Mountain's Waveform Files.

Trak Files consist of 4TRK or LINK sequences that have been created with the Sequencer. Trak Files are saved on the disk with the ".Traks" suffix.

Tune Files consist of tunings for the 49 keys on the SOUNDCHASER keyboard. Tune files are saved with the prefix "TUNE." on the disk.

When loading or saving files the prefix or suffix is not necessary. When deleting a file the prefix or suffix must be included in the file name.

LOAD

To load file (either Master, Waveform, or Traks):

* Type L
* Type the File Name (no prefix or suffix necessary)
* Next type "W" for Waveform , "M" for Master, "P" for preset , "T" for Traks, and "X" for Tuning.

Master files will be loaded directly. If you load a Waveform or Preset file, the program will ask to specify in which preset you wish to enter the waveform, and which of the three waveforms in that preset you wish to replace.

When you load a Trak file, the preset numbers for the four tracks will also be loaded, but you must be sure that you also load the appropriate Master files and/or Waveform files for these tracks.

When you load LINK files and go to the "sequence screen", the 4TRK mode will be displayed. Type "CTRL L" to enter the LINK mode.

SAVE

To save files on the data disk:

* Type "S"
* Type the File Name (no prefix or suffix necessary)
* Type "M" for Master, "P" for Preset, "W" for Waveform "T" for Traks, or "X" for Tuning.

The function of Save is much the same as the function of Load but in this case you are writing data from memory to disk.

Since TRAK files and LINK files are both stored on the disk with the .TRAKS suffix, might want to include the word LINK in the filename for LINK files. For example, you might have such a file that included the date of recording, something like:

RED LINK 8/28/81
BLUE LINK 9/14/81

These would be stored on the disk like this:

RED LINK 8/28/81.TRAKS
BLUE LINK 9/24/81.TRAKS

DELETE

To delete a file from the disk:

* Type "D"
* To delete a file you must specify the full name including the suffix ".Master" or ".Traks", or the prefix "Pre.", "Wave.", or "Tune."

CATALOG

To display the catalog of files on the disk:

* Type "C"
* Type any key to return to the disk menu.

To get back to the Performance Section from the disk menu:

* Type "Return"

CARE OF THE KEYBOARD

A little proper care of your SOUNDCHASER keyboard will help maintain an attractive appearance and provide greater longevity. The case, like any piece of fine furniture, will be preserved by occasional waxing. This should be done carefully to avoid getting wax on the keys. A lemon oil type liguid furniture wax, which can be applied in a thin coat with little residue, works nicely.

The key contacts themselves should be occasionally cleaned with a light application of alcohol. If you remove the four screws on the underside of the keyboard, you can slide the keyboard out of the case as one unit. Be careful of the cable when doing this. Now you can clean underneath the keys with alcohol and a Q-Tip, to avoid bending the little gold wire springs connected to each key.

RUN TIME SPECS

Your system programs are locked files on your MC1 diskette.

HELLO - is an Applesoft Basic Program that is automatically run when you boot the disk. It runs Digital2

Digital2 - is an Applesoft Basic Program. You run this program to start up the system.

SYN.SEQ.V2 - is a Binary file which contains the real time run code for SOUNDCHASER Digital.

DEMO.MASTER - is the Master file that is automatically loaded by Digital2 and contains 10 presets and their waveforms.

TEST.TRAKS - is a demo 4TRK sequence which can be played in the 4TRK mode with all tracks in the play mode.

To set up system diskettes for your own use, you can either copy the MC1 diskette or copy these files using "FID".

If you hit "Reset" either accidently or intentionally, you will wind up in Applesoft Basic with the program Digital2 loaded. All waveform and preset data is still intact in memory. Type "Run 450" to re-enter the system without blowing away your data. Typing "Run" alone re-loads DEMO.MASTER and TEST.TRKS. This will erase any changes you have made in preset data that are not stored on disk.

ERROR HANDLING

There are only a few errors that you can introduce in SOUNDCHASER. Most have to do with either bad disk references (no file found, locked files, etc.) or entering incorrect data (numbers where a file name is expected) SOUNDCHASER will trap these errors and give you a general error message. This will prevent you from bouncing out of the system.

KEYBOARD

Interfacing

The Polyphonic Keyboard and Interface Card combine to form an excellent input device for computer music applications. The Keyboard is arranged as a matrix of diode isolated switches. The Interface Card connects to this matrix, allowing simple software access to each key and its state.

The Interface has been designed to appear as a single port or memory location. In normal configurations the Interface Card is plugged into SLOT # 7 of the Apple's peripheral connectors. This slot has 16 I/O addresses associated with it that run from $C0F0 to $C0FF hex, or 49392 to 49408 decimal. A reference to any one of these addresses will access the Interface. If you decide to use a slot other than # 7, you can access the Interface by referencing any one of the 16 appropriate peripheral I/O locations for that slot.

The Interface allows you to look at each key individually by first selecting one of the 49 keys, and then reading its state. You select a key by writing its number to the Interface. You read the key's state by reading the Interface. If the number read is 128 or greater (negative), the selected key is down. If the number read is less than 128 (positive), the selected key is up (not pressed). Bit 7 indicates the key's state. 1 = down, 0 = up.

LIST OF KEYS AND KEY NUMBERS

Key (low to hi)	Hex Key #	Decimal Key #
C 1	0	0
C#1	1	1
D 1	2	2
D#1	3	3
E 1	4	4
F 1	5	5
F#1	6	6
G 1	7	7
G#1	8	8
A 1	9	9
A#1	A	10
B 1	B	11
C 2	C	12
C#2	D	13
D 2	E	14
D#2	F	15
E 2	10	16
F 2	11	17
F#2	12	18
G 2	13	19
G#2	14	20
A 2	15	21
A#2	16	22
B 2	17	23
C 3	18	24
C#3	19	25
D 3	1A	26
D#3	1B	27
E 3	1C	28
F 3	1D	29
F#3	1E	30
G 3	1F	31
G#3	20	32
A 3	21	33
A#3	22	34
B 3	23	35
C 4	24	36
C#4	25	37
D 4	26	38
D#4	27	39
E 4	28	40
F 4	29	41
F#4	2A	42
G 4	2B	43
G#4	2C	44
A 4	2D	45
A#4	2E	46
B 4	2F	47
C 5	30	48

Simple Scanning

This assembly language subroutine will scan the Keyboard returning with the number of the highest key found down in the accumulator. If no keys are found down, the accumulator returns with $FF.

```
SCAN    LDX #$31        ;X HAS THE KEY #
LOOP    DEX             ;X COUNTS THE SCAN
        BMI NOKEY       ;BRANCH IF NO KEYS DOWN
        STX $C0F0       ;SELECT KEY TO LOOK AT
        LDA $C0F0       ;READ SELECTED KEY'S STATE
        BPL LOOP        ;BRANCH IF KEY IS UP
        TXA             ;A GETS DOWN KEY'S #
        RTS
NOKEY   LDA #$FF        ;A GETS $FF (NO KEYS DOWN)
        RTS
```

This simple BASIC program will print the key numbers in decimal of each key found down on the screen.

```
10                              REM  KEYBOARD SCANNER
20      KBD = 49392             REM  SLOT # 7
30      FOR I = 0 TO 48         REM  I COUNTS KEY #
40      POKE KBD,I              REM  SELECT KEY
50      IF PEEK (KBD) > 127
        THEN PRINT I;" ";       REM  PRINT KEY IF DOWN
60      NEXT I                  REM  SCAN ALL KEYS
70      PRINT : PRINT
80      GOTO 30                 REM  SCAN AGAIN
```

WARRANTY

Soundchasers are fully warranted for a period of 90 days from from date of purchase. This warranty will be null and void if any component appears to have been damaged due to unauthorized service or misuse. Passport Designs, reserves the right to repair or replace defective components at our discretion. PLEASE RETURN YOUR OWNER REGISTRATION FORM. Direct all inquiries concerning service to:

Passport Designs, Inc.
Service Department
116 N. Cabrillo Hwy.
Half Moon Bay, CA 94019

TURBO-TRAKS SYSTEM MANUAL

********** CONTENTS **********

NOTICES

Purchasers of Turbo-Traks receive a single-user license fo Turbo-Traks for use on a single computer music system. **Do no** copy this disk for your friends or associates. That kind o copying is highly illegal and will only discourage us from writin new programs and issuing low cost updates for Soundchaser.

WARRANTY - Soundchasers are fully warranted for a period o 90 days from the date of purchase. This warranty will be null an void if any component appears to have been damaged due t unauthorized service or misuse. Passport Designs, Inc. reserve the right to repair or replace defective components at ou discretion. YOU MUST RETURN YOUR OWNER REGISTRATION CARD.

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---

* This disk contains a high-speed operating system calle Diversi-DOS (tm), which is licensed for use with this progra only. To legally use Diversi-DOS (tm) with other programs, yo may send $30 directly to: DSR, Inc. 5848 Crampton Court. Rockford IL 61111. You will receive a Diversi-DOS utility disk wit documentation.

Introduction

Turbo-Traks is the latest generation of performance software for the Soundchaser Computer Music System. When used with Mountain Computer's Music System, an Apple-type computer, and the Soundchaser keyboard, it forms a complete, integrated, polyphonic stereo music synthesizer and recording system; suitable for live performance, home entertainment, or studio use.

System Overview

Polyphonic----In playing, the keyboard is 16-Note polyphonic; that is, it recognizes up to 16 keys held down in any given instant and plays those pitches. The keyboard can also be split into two independent 8-note sections, and different sounds played on the upper and lower sections.

Presets---------Sixteen preset sounds are instantly available; hundreds more can be just seconds away in disk storage. A preset sound, or **voice**, can consist of up to sixteen different music events that occur on a single keypress.

Oscillators----The system has 16 oscillators (tone sources); each oscillator has its own **waveform** (tone color), **envelope** (volume contour), and **modulation** (vibrato) characteristics. **Oscillators** are combined in groups of up to sixteen to make **presets**.

Sequencer------The sequencer operates like a built-in 16-track tape recorder. It remembers what you play on the keyboard; lets you change the preset, volume, key and tempo as it plays back; lets you listen to what you played while playing along with it, re-cording the new part while keeping the old; up to as many as **sixteen** overlapping layers.

Then you can still go back and change any one of the parts -- or all of them.

A Note to Previous Users

Since the nature of the Soundchaser is determined more by software than by any other factor, the introduction of Turbo-Traks amounts to a major redesign of the instrument. Voice Development in particular has been greatly modified, and we've added tutorials that explain the Wavemaker in more depth: **Read This Book.**

Using This Manual

While we have had some encouraging reports from end-users experimenting with alternative methods (i.e.: sleeping on the manual, using it to prop doors open, etc...) we have not been able to independently confirm the results. Therefore, at this time we still feel the best way to utilize manuals is the traditional way.

Read them.

Seriously. While **Section II. HELP!** can get you out of some binds, there really is no substitute for reading this manual. Even if you've been gigging with your Minimoog for the last ten years - especially if you've been gigging with your Minimoog for the last ten years - the operation of Soundchaser and Turbo-Traks is quite different from any synthesizer you may be familiar with.

The manual is organized into three sections: the **Introduction**, which is what you're glossing over now; **I. Operating Controls**, which covers what buttons to push and when; and **II. HELP!** which is a sort of catch-all covering Care & Maintainance, What To Do When It Doesn't Make Noise, and some of the more commonly asked questions about the instrument.

This manual was designed with the absolute beginner in mind: those of you with somewhat more experience are asked to read along anyway. You will find a few surprises.

Copy Protection

Since losing your Turbo-Traks System Master diskette halfway through a performance would be a major catastrophe, this software is **NOT** copy-protected. Any decent copy program, including COPYA or FID on the Apple System Master diskette, will allow you to back up your Turbo-Traks program or diskette. In fact, we would rather that you copied your Turbo-Traks diskette; use the copy for working and keep the original in a nice, safe place.

YOU HAVE A SINGLE USER LICENSE FOR TURBO-TRAKS. DO NOT COPY THIS DISK FOR ANYONE ELSE. WE WILL PROSECUTE INDIVIDUALS WHO VIOLATE OUR COPYRIGHT TO THE FULLEST EXTENT OF THE LAW.

We also recommend making many copies of your favorite Preset Masters and Sequencer Tracks. Disk storage is cheap. Salvaging a damaged diskette is time consuming, aggravating, and not always possible.

If you are unfamiliar with the process of backing up disks, please read the appropriate section in II. HELP!

We highly recommend that you copy your Turbo-Traks system diskette right now.

Numbering Conventions

Because of the way your Apple deals with information, most of the numbers you will see displayed on the screen during operation of Soundchaser Turbo-Traks are in hexidecimal (base16) notation, usually called "hex code".

Briefly, hex code is a numbering system based on groups of sixteen, rather than the decimal (base10) numbering system we usually use which is based on groups of ten. To get fifteen single digits, it is necessary to use other symbols to represent the values (9+1), (9+2), etc. We use the letters A, B, C, D, E, and F.

Imagine if you had 16 fingers and were counting 1, 2, 3,... through 9, then A, B, C, D, E, and F. You would use all sixteen fingers as digits. Turbo-Traks uses two hex digits to represent most values. The numbers range from 00, the smallest to FF, the largest.

What this means to you is that you will see a lot of things like A0, FF, 6E; as well as your more ordinary numbers.

A second convention is: Values usually start at 00 and go to FF. 00, however, does not mean 'Nothing'. It just means, 'the lowest possible value in a given range'. So while an envelope release value of 00 means 'no release at all' (the least possible release value) a keyboard preset value of 0 **does not** mean 'no keyboard preset at all'. It just means 'the first' (out of sixteen possible presets). In the same way, a WAVE FM value of 0 means 'the first' (out of eight possible modulation waves).

Something else that seems to need explanation is that an Attack value of FF does **not** mean fortissimo. It simply means the fastest possible attack time.

HARDWARE REQUIREMENTS

The following hardware is necessary to fully operate the Soundchaser Computer Music System:

One Apple-type Computer
One Disk Drive with controller card
Mountain Computer MusicSystem Synthesizer Cards
Passport Designs Keyboard with interface
Game Controls
Audio Monitoring System or Stereo
Video Monitor or TV

Re: The Computer

The computer needs to have Applesoft language available in ROM and at least 48k of RAM memory. 64k of RAM is highly recommended for expanded sequencer storage.

We resorted to generic designations for obvious reasons. So far, we have found the system works perfectly well with the following computers:

Apple II+
Apple //e
Franklin Ace 1000

The system does **not** work with the Apple ///.

Re: Game Controls

Our experience has shown that paddle controls work best, followed by non-self-centering joysticks. Since in pitch bend the game control changes the scaling of the entire keyboard, using a self-centering joystick for pitch bend can yield a variety of fascinating, exotic effects. An on-tune keyboard is not one of them, however.

Re: Audio Monitor

The sound comes out of this system via 2 short cables from the Mountain synthesizer cards, which terminate in female RCA pin connectors. Mountain Computer has assigned oscillators 0 through 7 to the left channel, and 8 through F to the right channel. This is fixed in the hardware and cannot be changed. Therefore, it is important that **both** output lines be connected. Otherwise, you will hear only half of what you're supposed to hear and will continually wonder why we call it 16-voice when you can only get 8 out of it.

Optimally, we recommend feeding the Soundchaser out to a stereo recording mixer, and then to a high-quality stereo monitoring system. However, since most of us live in the real world (or a simulation thereof) the Soundchaser can be connected to a home stereo through the AUX or TAPE IN jacks. It can even be directly connected to guitar amps (use the ORGAN or PADDED inputs, if you have them). Connecting the two outputs together in a "Y" cord will produce a mono signal. This is OK if your amp only has one channel- but it will not bring out the full stereo quality of Soundchaser.

Re: Video Monitor

Any monitor, or RF modulator/TV combination, capable of decent Hi-Res graphics will do. However, we have found that some video monitors, and some RF modulators, throw out a substantial amount of hum & noise to interfere with your stereo. If possible, test the monitor before you buy. The Soundchaser does not generate any color displays, so a color monitor is not necessary.

INSTALLATION

Assembling and installing the Soundchaser Digital Music System is only slightly more complicated than hooking up a disk drive and a game control. However, if you haven't gone inside your computer much, now is probably a good time to invite a knowledgeable friend over for some help.

Ready? First, let's make sure we're talking the same language. We assume you are sitting at the keyboard end of your computer. We will call this end the front. Left is towards the ESC and CTRL keys; inside the computer left is towards the power supply (the large, brass-colored box).

Your Soundchaser should have arrived in two boxes: a small blue box containing the Mountain Computer MusicSystem, and a large white box containing the Soundchaser keyboard and software.

First, open the large box and pull the keyboard out. Take a moment to admire the nice woodwork; the elegantly simple design. That circuit card inside the back of your manual is the Keyboard Interface card. Take it out of the bag; find the end of the cable coming from the keyboard. As a preliminary step we will attach the keyboard cable to the interface card. (This is what's called "Building your Confidence")

Holding the card with the chip side facing you, you should be able to read "Soundchaser" along the top of the card. You should also notice an empty socket on the left side of the card.

Now, take a look at the end of the keyboard cable. You will notice a rectangular plug with 16 tiny pins on it. Line the pins up with the socket SO THAT THE RIBBON CABLE TRAILS DOWN and the small white arrow is in the lower left hand corner of the plug. Gently (gently!) press the plug into the socket.

Take another moment to admire your work, and double check the pin match-up. It is easy to misalign the plug; easy to bend the little pins; easy to break the pins off trying to straighten them out again. Everything look okay?

The next step will be a little harder. Unpack the Mountain box. Put the Mountain manual and disks somewhere safe; you probably won't be using them much but they are interesting to experiment with. Now, examine what you have left. You should have two large circuit cards; one with cables and a light pen attached to it. You should also have a few inches of flat, wide, ribbon connector. Mountain usually ships the cards with this connector already installed between the two circuit cards. Pull it apart anyway. Putting it together will be educational.

You should also have a pair of stereo audio cables, and you may have a spare chip as well. Set these aside for now.

The large circuit card with the output cables and the light pen attached to it is the LEFT card. Taking the RIGHT card, find the slot provided for the ribbon connector along the top edge. Now take the ribbon connector and examine it closely. Make sure that it is flat and the corners are not kinked or bent over. Insert it firmly into the slot in the RIGHT card, with the bright metal contact points UP. Don't force it in, but make sure that the cable is firmly seated in the connector slot.

IMPORTANT! A substantial number of equipment problems turn out to be trouble with this connection. This is why I asked you to take the connection apart. If the contact surfaces are not bright and shiny, take a moment NOW to clean them up. An ink eraser works nicely.

Okay now, we have the ribbon connector attached to the RIGHT card. Gently bend the ribbon over the top of the RIGHT card, and insert it into the matching slot on the LEFT card.

Make sure these connections are solid!

Your system is ready to install now.

Step One. TURN OFF YOUR COMPUTER!
Tampering with the insides of your computer while the power is on can not only electrocute you, it can also seriously damage the computer, dissappointing your heirs. So turn off your computer! Pulling the plug is even better.

Step Two. Open the top of your computer.
Actually if you are like most of us, you will have to clear a fair amount of junk off the top of your computer first. Once you've done that, though (is the power off?), you can remove the top of your computer. You will notice, towards the back, a row of empty slots designed to accept circuit cards. Your disk drive interface card should already be occupying one of these slots. Take a closer look.

APPLE II, APPLE II+ and FRANKLIN

There should be 8 slots. If you look just behind the slots you should see a number for each slot. In standard computer fashion, the 8 slots are numbered from left to right, 0 to 7. If you cannot find the slot numbers, remember to count over left to right from 0. Locate slots 4 & 5: install the Mountain cards into these slots, the LEFT card in 4 (the one with the audio cables coming off), the RIGHT card in 5.

APPLE //e & Franklin

There should be 7 slots, labelled left to right, 1 to 7. Again, the LEFT card (the one with all the cables) goes in 4, the RIGHT card goes in five.

The software is set up to operate with the Mountain cards in slots 4 & 5: do not put the cards in, say, slots 2 & 3, or 3 & 4.

In all cases, we have found that it is much easier to connect the Mountain cards to each other BEFORE putting them in the computer. Once you have installed the Music System, make sure that the audio output cables extend out the back of your computer.

Step Three. Make sure any disk drive connections you want to make are made. If you have two disk drives, an RF modulator, and an internal fan, these next steps can be pretty tight. Trust us. It does all fit.
Install the game control into the usual socket.

Step Four. Locate slot 7 (the far right slot in all computers) and insert the Keyboard Interface card, being careful not to knock loose the disk drive cables. Lead the cables out where ever it is convenient, and close the top of your computer.

Step Five. Using the audio cable provided with the Music System, connect the output jacks to your audio monitoring system. Make sure all switches are properly set and set the volume of your monitor to a normally comfortable level. Ignore the light pen. We won't be using it and we can't remove it, so just try to keep it out of the way.

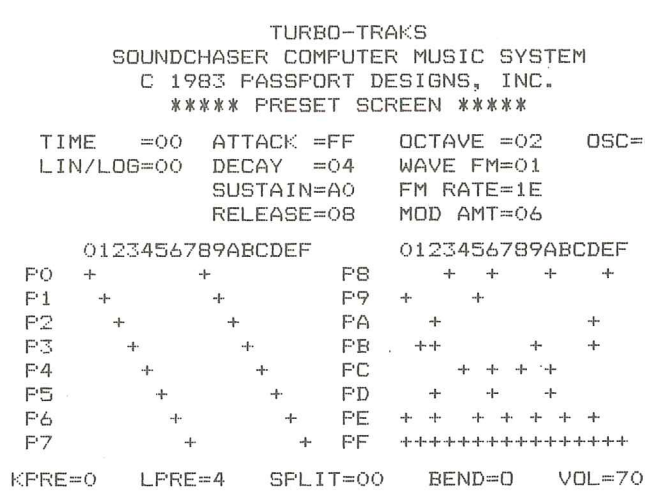
Step Six. Connect video monitor. Reconnect computer power. Turn on your stereo and your video monitor. At this point you may insert the Turbo-Traks system diskette, and proceed to the next section.

I. OPERATING CONTROLS

A. Playing the Soundchaser

If you have not already done so please place your Turbo-Traks Digital Performance Software in disk drive #1. Assuming you've read the Introduction, at this point you should have the system set up and ready to run. Turn the volume down on your amplifier and turn your computer on.

As the power comes on, your disk drive should go into action. At first, three bars will appear across the top of your video screen, informing you that you are loading Passport Designs Turbo-Traks. It takes about fifteen seconds for the system to come up, as Turbo-Traks is also automatically loading a master menu of 16 preset voices, and several tracks of sequencer material.



The most common reaction at this point is, "Gee, look at all those numbers!" Don't be intimidated; your computer really **is** trying to tell you a lot of useful things. You and it haven't reached a mutual understanding, just yet. That's what this manual is for.

Leaving the numbers to look after themselves for a while, you may now do what you've been itching to do ever since you brought the system home. You may play the keyboard -- NOW!

One of three things can happen here.

1.) It can play very nicely. Enjoy it. Play some more.
2.) It can make no sound at all. Check your monitor amp, volume setting, check your connections, then go back to Installation and try again. (See panic situations in the HELP! section of this manual.)
3.) It can play, but the volume blows you out of your chair.

How to control the volume will be our first lesson.

There are two things you need to know before we really get started. The first is: in the Play Mode, which is where we are now, almost all changes are done using the **arrow keys.** Locate these keys now. (On the Apple II & II+, they are on the right side of keyboard, just below the RETURN and REPT keys.) The **left arrow** key always **decreases** a value; the **right arrow** key always **increases** a value. These keys do not repeat when held down(except Apple //e and Franklin); one keypress means one step of change.

The second is a thing called **Index Value.** Index Value is the size of the step taken when an arrow key is pressed. There are two possible index values; 1 and 10. When Turbo-Traks loads up the Index Value is automatically set at 1. To make control changes in steps of 10 instead, press the **I** key. To change back to steps of 1, press **I** again. IMPORTANT! The Index Value is never displayed on the screen. The only way to know what it is is to change something.

Let's take a look at that screen again. Below the three bars with our name, you see a lot of abbreviations and numbers. This is all information about just one of sixteen **oscillators;** there can be several oscillators in a **preset,** and there are sixteen presets altogether.

Below the oscillator information there are two grids, and a whole bunch of "+"s. This is a matrix, showing which oscillators are attached to which presets. We can skip this, too, for the moment.

Keyboard Controls

What we are concerned with is the bottom line of the screen:

KPRE=0 LPRE=7 SPLIT=00 BEND=0 VOL=50

From left to right, these are:

KPRE -- Main keyboard preset; or in the event of a split keyboard, right keyboard preset. This tells you which of the 16 possible preset sounds will be heard when you press keys. Remember, KPRE=0 **does not** mean 'no preset at all'. It means the **first** preset.

LPRE -- Left keyboard preset; only effective with split keyboard.

SPLIT - Tells you **where** the keyboard is split. Again, a split of 00 does not mean no split at all; it means the keyboard is split at the lowest note. A meaningless distinction, you say? Well, no; it's important to the computer.

BEND -- Tells you which direction the keyboard pitch will be bent when you use the game controls. 0, in this instance, is **not** O (zero). 0 is for Off. U is for Up; D is for Down.

VOL --- Yes, here, we finally made it, this is our master Volume setting. And this is the first control you get to change.

Hit "V" on the computer keyboard, and look at VOL on the screen. It should be flickering. This indicates that it is ready to be changed. **Most** (but not all) **on-screen indicators will flicker when they are changeable.** Give the right arrow a push. The VOL number should change by 1. Try it a few more times.

Now push the left arrow key. What happens to the number? It goes down by 1. These are hexadecimal numbers, remember?

By this time you are probably getting impatient, so press the **I** key. Now use the arrow keys, and note that in the VOL number, the left number changes and the right number stays the same. As you move through the range of numbers, play a note at each volume level. This should give you a feel for how the numbers work.

When you have found a VOL level you are happy with, hit the RETURN key. The number should stop flickering; you have selected and frozen a new volume level.

Keyboard Presets

Next we will change the sound of the keyboard. Those five settings along the bottom of the screen are in immediate execution mode; you need do nothing more than hit the first letter of the abbreviation to make the setting changeable.

So, to assign a different preset to the keyboard. Hit **K** on the computer keyboard and pick a number (0-F). Notice that as soon as you hit a number key, the KPRE value changed to what you hit. You have now changed the sound of the keyboard. Play it and hear.

To pick a different preset, type **K** again, followed by a different number. (Remember that we are using hexadecimal notation: possible numbers include A,B,C,D,E,F as well as 0 to 9) Have some fun here, and try out all the presets. K 1 ... K 6 ... K A ... K C ..., etc.

Lower Keyboard Presets

The Lower Keyboard Presets, or LPREs, are selected in exactly the same way that the main keyboard presets are: in fact, they are chosen from the same sixteen sounds. To pick a lower preset type **L** followed by the preset number.

LPREs can be set, but not used until the keyboard is split.

Keyboard Split

Splitting the keyboard is almost indecently simple. Just press **S** on the computer keyboard, and then a key on the music keyboard. The music keyboard is split at that point, with KPRE determining the sound of the right, or upper, keyboard and LPRE determining the sound of the left, or lower, keyboard. KPRE and LPRE can of course be changed at any time, and the point of split can be reset just by hitting **S** and a key again.

Split cannot really be turned off; just reset to the lowest or highest note on the keyboard.

Pitch Bend

You must have a game paddle or joystick plugged into the game socket in the computer in order to use the pitch bend feature. Pitch bend allows more expressive playing through "bending" notes, much as a guitar player can bend strings. The direction of the bend is determined from the computer keyboard; pressing **B** followed by **U** means that when a performer turns Paddle 0 away from its stop, the sound coming from the instrument will be raised in pitch. Pressing **B D** means that turning the Paddle the same direction will lower the pitch. **B O** turns the pitch bend off.

The pitch bend effect is not balanced. Turning the Paddle a given distance will move the pitch of a low note further off tune than that of a high note.

Pitch bend also changes the scaling, or pitch distance between keys, of the keyboard. This means 'bent' chords will not move in parallel. It also means that pitch can be almost impossible to control with a self-centering joystick.

We really do recommend using two game paddles with Turbo-Traks. One of the paddles is used in the Wavemaker screen and the other is used for pitch bend. You might even want to try keeping your pitch bend paddle on or near your Soundchaser keyboard like a pitch bend "wheel" on an analog synthesizer.

Attitude Adjustment Interval

At this point, take a breather. Experiment with the splits and the presets; get used to the touch of the keyboard. Play some of your favorite riffs/progressions/melodies in several different voice combinations. Like all instruments, the Soundchaser will sound better as you learn to relax with it. And you definitely can relax; unless you play very violently there's nothing you can do now to hurt it.

There are, however, a few things to watch for.

1 - With "thick" voices, and particularly with low notes & chords, the system may overload your audio monitor, resulting in crackling distortion or just plain muddiness. The cure is to turn the output volume down; you already know how to do it.

2 - With certain late '82 Apple II+s, the keyboard may lock-up or other bizarre activity can occur. If this happens, turn to Panic Situations in the back of this manual (HELP!).

3 - If you accidently hit the Space Key, the sequencer may start to play back. Hit the Space Key again to stop it.

4 - You might start to notice that with certain voices you aren't hearing all the notes you press down on the keyboard. When you're ready for the explanation, read on.

The Sixteen Oscillator Limit

In our computer music system, there are two kinds of oscillators: **physical** and **logical.** If you're coming to us with analog synthesizer experience, the difference may sound too subtle to be worth understanding, but it is important. Please read on. If it is any consolation, it took me a while to grasp this too.

Physical oscillators are the actual circuits which produce the electrical signals which can be amplified and pushed through speakers to become sound. These are what you have on the Mountain Computer cards; sixteen physical oscillators, eight to a channel. This sets an absolute top limit on the system. You can **never** have more than sixteen sounds occuring at the same time. Physical oscillators are the HARDWARE in the system.

Logical oscillators are the sets of instructions or SOFTWARE which tell the physical oscillator what **kind** of sound to produce.

The confusion stems from, on earlier electronic instruments, the physical oscillators set the limits of what **kind** of sound was possible. On the Soundchaser, the physical oscillators only limit the **number** of things possible at one time. It's the logical oscillators that determine what's really going on. For those of you familiar with the idea of waveforms, the waveform of the physical oscillator is not determined until **(a)** a logical oscillator is selected and **(b)** a key is pressed on the music keyboard.

So if we have two logical oscillators active in a preset, sixteen (total number physical oscillators) divided by two (active logical oscillators) gives us eight notes that can be played on the keyboard at one time. 16 / 2 = 8.

But if we set up a preset that has **four** active logical oscillators to a note, then we can only have **four** notes on the keyboard. **Eight** active logical oscillators? **Two** notes on the keyboard.

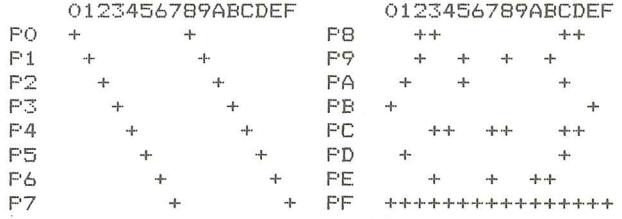
"Ahah!" you say. "Then if I use only one active logical oscillator I can have sixteen notes on the keyboard!"

Well, no. Here we run into one of the other limits of the physical oscillators; the fact that they are split into two groups of eight, usually called the left & right groups. To accomodate this, the logical oscillators also have to be assigned to left **or** right. Which means if you create a one-oscillator voice using, say, logical oscillator 0, then you'll get eight notes from the keyboard -- all on the left channel! The eight physical oscillators of the right channel will just sit there, idle, waiting for instructions.

From this point on, if we say "oscillator" we mean **logical** oscillator or the SOFTWARE you see on the screen, unless otherwise stated.

Assembling Presets

Pushing theory aside (really, time for a beer), let's take a look at the Turbo-Traks screen. Above the KPREs and such, you should see two grid-like areas. Across the top of each grid is a row of numbers, 0 through F. (Hex code, remember?) Down the left sides of each grid are bunches of **P**'s and numbers. And the grids seem full of **+**'s.



The sixteen numbers across the top of each grid are the sixteen oscillators.

The **P**'s are the Preset numbers, that you've been using when you use KPRE and LPRE. The first eight presets (P0 through P7) are in the left grid and the second eight presets (P8 through PF) are in the right grid.

What we are looking at here are two matrices, which show which oscillators are attached to which presets. Where there is a **+**, that shows that that oscillator (the number at the top) is connected to that preset (the **P** number to the left).*

Let's look at an example. Turn off the Split keyboard by pressing **S** then the lowest key (C) on the Soundchaser keyboard. Set the KPRE to 0. Now, look at **P0** in the left matrix. You will find a **+** where P0 across meets oscillator 0 coming down, and another **+** where it meets oscillator 8 coming down. This shows which oscillators (0 and 8), are attached to preset 0.

As mentioned before, the oscillators have to be assigned to either the left or right output channels; oscillators 0 through 7 are left and 8 through F are right. This is <u>not</u> to be confused with having **Presets** on left or right channel.

When you connect your Music System to your amplifier, there is no easy way to determine which connector is the left group and which is the right group. You can change this connection while the system is on to get oscillators 0-7 in the left channel and oscillators 8-F in the right channel.

Therefore in this Preset, oscillator 0 goes to one channel; 8 to the other channel. If you play one note on the keyboard you will notice that slightly different sounds come out of the right and left speakers. (The difference is really dramatic when heard through headphones.)

With a two oscillator sound, you should be able to play eight notes on the keyboard. Notice, again, that the left channel will sound different from the right channel.

<u>Changing Oscillators</u>

Now, let's suppose that, rather than having the sound of oscillator 8 on the right channel, we'd rather have 9. How do we change which oscillators are assigned to which presets?

Press P. This tells it we're going to be changing a preset assignment.

Press 0. This tells it which preset we're going to change.

Press 8. This tells it to change however oscillator 8 was related to preset 0. So if 8 was connected, it's now disconnected.

Just for reference, play a few notes on the keyboard now. Notice that one of the sounds we heard before is completely gone, and that the remaining sound is only coming from the left side. Now, we'll connect up 9 to preset 0.

Press P. This tells it we're going to be changing a preset assignment.

Press 0. This tells it which preset we're going to change.

Press 9. This tells it to change however 9 was connected to preset 0. 9 was disconnected; now connected.

---

* This is very much like the matrix switching used in ARP 2500s, or the pin blocks used in Putney & Synthi equipment.

Important Conceptual Points

Remember, the oscillators we are connecting and disconnecting here are **not** just tone generators. Each oscillator is a complex set of instructions, including pitch, octave, tonal quality, kind and intensity of vibrato, and envelope (change in volume over time) for making just one sound event.

You should look a Sounds file as a "pallate" of timbres or "sound colors" that you are combining and mixing to blend different sounds together. One method of doing this is illustrated in the Sounds files that come with Turbo-Traks. Presets 0-7 are all 2 oscillator presets and presets 8-F recombine the oscillators to yield more complex sounds. Each sounds file is a set of timbres that can be combined in performance and in your recordings.

Some Experiments

Try disconnecting oscillator 9 from the preset, and connect oscillator A instead. Play. Then leave A connected, and connect 2, 3, B, and C as well. What kind of effect does this have on the sound of the instrument, and the number of notes you can play?

Assemble a sixteen-oscillator preset. You are now down to being able to play only one note on the keyboard -- but it sure is one magnificent note, isn't it?

Take as much time as you need here to become comfortable with connecting and disconnecting oscillators in presets. Don't be afraid to change any or all of the presets; since the original presets are still saved on disk you won't lose anything forever.

Modifying the Oscillators

Eventually you'll start to wonder how those instruction sets we call oscillators were put together. Here's the explanation.

Please look at the monitor screen; above the assignment matrices we've just been using, and below the three bars of our logo, you'll see a display like this:

```
                    PRESET SCREEN
TIME    =00   ATTACK =FF    OCTAVE =02   OSC=0
LIN/LOG=00    DECAY  =FF    WAVE FM=00
              SUSTAIN=FF    FM RATE=2E
              RELEASE=FF    MOD AMT=0F
```

Ten of these items are displays of the characteristics of one oscillator. The eleventh item (**OSC** in the upper right corner) is the number of the oscillator being displayed.

In order to demonstrate what & how these controls work, first assemble a preset that has only one oscillator in it. Use osc #1. It doesn't matter which preset you use, so long as it is put on the keyboard. (Press **K** then a **Preset** number).

Next: Before we can alter the characteristics of oscillator #1, we have to see what they are. **Type E** (for edit) followed by **1** (the oscillator name). Some numbers should change; most notably **OSC** should now =1.

We should at this time have a preset with only osc#1 in it as our KPRE. Play a few notes, to familiarize yourself with the sound.

The first characteristic we're going to change is the octave. **Type C** (for Change) followed by **O** (for octave). The octave display should start flickering. Now using the arrow keys, change the octave number. Play the keyboard at each setting. 04 is the lowest octave; 00 is the highest.

You will note that, while **OCTAVE** is active, nothing else can be changed. Even KPRE and VOL are locked as long as the OCTAVE is flickering.

When you have changed the octave all the times you care to, press RETURN. As with the VOL control, RETURN freezes the OCTAVE at the last setting.

Modulation

We're going to deal with the next three settings as being one topic. The settings are **WAVE FM, FM RATE,** and **MOD AMT.** The topic is modulation.

If you have a background in conventional theory, you are already familiar with modulation as being a change in key during the performance of a piece of music. Well, that's not it. Let's instead skip down to Webster's 3rd definition for modulation: an induced change in a periodic phenomenon.

Huh?

As will be explained later and in greater depth in the Wavemaker section, a musical note is a periodic waveform phenomenon; a **wave**, in more digestible terms. We call it periodic, because it can be observed to repeat itself in a measurable span of time. The string on a violin playing high A vibrates 440 times a second; it moves the air around it in some pattern 440 times every second.

Very briefly (again, this rates its own chapter later on), a periodic musical phenomena has three distinguishing features.

Waveform - the shape of the disturbance it makes in the air when it is making sound. We hear this as timbre or tone quality

Amplitude - how big a disturbance in the air it makes. We hear this as volume.

Frequency - how often it repeats in a second. We hear this as pitch.

So therefore when we talk about modulation (we were talking about modulation, remember?) we are talking about changing one of these three features.

Waveform modulation rates its own chapter. Amplitude modulation will be dealt with shortly.

The three controls we are going to deal with right now all have to do with **frequency modulation.** Let's look back to the Turbo-Traks Preset Screen. Underneath the octave control we were just playing with are three controls, labeled **WAVE FM, FM RATE,** and **MOD AMT.** By now you should have guessed that FM stands for Frequency Modulation. The controls translate as follows:

WAVE FM: As will also be explained in the Wavemaker section, there are 4 waveshapes for modulation oscillators that can be defined. A modulation oscillator has two modes; repeat, in which the change it makes is repeated at regular intervals; and one-shot, in which it only makes the change once per musical event.

This makes for a total of 8 possible WAVE FMs. The first four (00 through 03) are the repeating waves and correspond to waves G,H,I,J in the Wavemaker. The second four (04 through 07) are the same waves, but in the one-shot mode.

To Change the WAVE FM:

Type **C** for Change, then **W** for WAVE FM. This control should start flickering. Use the arrow keys to step through the 8 possible settings. Play and hold a note at each setting, and listen for the difference. If you don't hear any difference at all, check to make sure the oscillator you are Editting is actually in the KPRE you are playing. If it is but you still don't hear any difference, don't panic. We haven't touched MOD AMT yet.

As always, RETURN freezes the setting.

FM RATE: This is the frequency **of** modulation. If you are using a one-shot modulation, this sets how fast it happens. If you are using one of the repeating modulations this control sets how often it repeats. In simpler terms if you are using say, modulation wave 01 to do vibrato, this control sets the vibrato speed.

An interesting feature here is that you can use the same FM wave to control several oscillators, but have a different FM RATE for each oscillator controlled. Try that on your Prophet.

To change FM RATE:

Type **C,** followed by **F;** then use the arrow keys. You've got a very wide range here, so remember the INDEX key.

MOD AMT: Modulation Amount is roughly equivalent to a depth control; it sets just how much difference the FM wave is going to make in the pitch of the sound. A MOD AMT of 00 is the least possible modulation; FF is the most.

An important thing to remember here is that the modulation is not balanced; the same MOD AMT setting will throw low notes further off pitch than high notes.

To change MOD AMT:

C M to allow change; RETURN to cancel. Do you begin to detect the pattern here?

Envelopes & Amplitude Modulation

Now that we've got the concept of modulation firmly nailed down, we'll take it from frequency and apply it to amplitude; and on the way we'll cover the remaining six controls.

Amplitude, as we said before, roughly translates as being volume. (This is not totally accurate, but will do for now. MOD AMT, for example, was also an amplitude control.)

Most people are aware of large-scale volume changes: the difference between the whole orchestra playing together and the violinist taking a solo; the difference between lightly tickling the piano keys and beating the stuffings out of them.

But there is also a small-scale volume change that takes place with every single note you play. The note has a particular way of going from silence, to sound, and back to silence again. We call this rise and fall of volume in an individual note the Envelope of the sound, because all the sound is enclosed with- in it. For purposes of simplicity we divide the Envelope into four phases:

ATTACK: The way the note starts; the way it rises out of silence. On hitting a piano key the sound almost instantly jumps up to its loudest point. A bowed violin, by contrast, comes up in volume rather slowly and gently.

DECAY: The way the note drops off after the attack, but while you are still holding it. The piano, again, has a slow but definite tapering off in volume while you're holding the key down and letting the note ring. A pipe organ doesn't have any drop in volume at all.

SUSTAIN: The volume level the note stays at after the DECAY, but while you're still holding the note. A Hammond organ or a fuzz-tone guitar both have an almost instant attack, then a very snappy decay, but they never really die off as long as you're holding the key/string down.

RELEASE: Similar to the decay, but after you let go of the key. A piano cuts off fast. A harpsichord, not so fast. A pipe organ in a nice, echoey cathedral? Slow.

We have added two other features to the envelopes; TIME and LIN/LOG. TIME is a pretty straightforward delay between the time you press a key down, and the time the note actually happens.

LIN/LOG is not an easy one to explain. Let's just leave it as being two different choices of slope for your attacks, decays, and releases. Linear is a smoother, more constant slope; suited for string sounds, organ sounds, and the like. Logarithmic is a more swooping sort of slope; where the drop from loud to soft is much faster than the drop from soft to nothing. Drums, bells, and plucked strings are good examples of sounds with logarithmic Envelope contours.

Changing Envelope Controls:

C for change, then the first letter of the control.

C A makes Attack changeable. Range: FF (instant attack) to 00 (no attack ever)

C D makes Decay changeable. Range: FF to 00.

C S makes Sustain changeable. Range: FF (full volume) to 00 (silence)

C R makes Release changeable. Range: FF (instant release) to 00 (infinite sustain)

C T makes Time changeable. Range: 00 (no lag at all) through FF (infinitesimal lag) to 01 (long lag) Actual time varies depending on LOG/LIN

C L makes LOG/LIN changeable. Range: 00 (linear) to 01 (logarithmic)

As always, only one factor can be changeable at a time. RETURN cancels the change mode, and freezes the control at the last value set.

SUGGESTED EXPERIMENTS

Envelope is probably the biggest single factor in determining why one instrument sounds different from another. If you think about it, what really makes a banjo sound different from a violin? One is abruptly plucked, the other bowed and drawn out...

So this is a good place to do some experimenting, before moving on to other features of the Soundchaser Turbo-Traks. Again using a single oscillator preset, punch new values into the Attack, and get a feel for how FF is different from 0E. Again, don't be afraid to change anything; we haven't gotten to the disk drive section yet, so we won't permanently lose anything important, or save anything embarassing.

Try creating a two-oscillator voice with a very short, fast envelope on one oscillator, and a slower envelope on the other oscillator.

Try creating a four-oscillator voice with short and fast envelopes on all oscillators, and different time lags.

Try creating a multiple-oscillator voice when the oscillators slowly fade in, one at a time.

EXITS

At this point, congratulate yourself. You have now made it through the first screen page of Turbo-Traks. There are only three more screen pages to go...

Fortunately the one we have just finished is the most complex one; it carried the most diverse information, and we had a lot of conceptual baggage to take care of on the way.

There are three places we can go from here:

W -- This will take us to the WaveMaker, where the waveforms we've been using for our oscillators are created.

ESC -- This will take us to the Sequencer, where the system records and overdubs the keyboard.

Q -- This will take us to the Disk, where other groups of presets are lying in wait.

The recommended choice at this point is to select option "Q", the Disk Drive Menu, by simply pressing **Q** on the keyboard. Then turn to the next chapter.

Or, you may take this opportunity to say "Enough for one night!", turn the system off, and go to bed. Sweet dreams.

B. Using the Disk Drive

At this point, we are assuming you've come to this menu page by way of pressing **Q** from the Preset Screen. You should now be seeing the three ever-present bars of our logo, and:

DISK SCREEN

SOUNDS.WORK
TRACKS.WORK

LOAD / SAVE / CATALOG / DELETE / RENAME ?

These are the STATUS LINES and the MENU LINE.

What DISK SCREEN is telling you is "here's where we are: the place you have to be to use the disk drive.

SOUNDS.WORK is telling you which group of sixteen presets is currently loaded into the machine.

TRACKS.WORK is telling you what's loaded into the sequencer.

That long bottom line is the MENU line; it's telling you what your options are at this point. To exercise an option, simply press the first letter of the choice; **L** for Load, **S** for Save, and so on.

The option we're going to start with is **C** for Catalog. Just press **C** on the computer keyboard; no return is necessary. The disk drive whirrs, clacks, grinds, sounds like it's eating your disk (don't worry, all Apple drives do that) and our logo and the menu disappear, to be replaced by a listing of all the files on this disk.

The file names will have one of two formats. **Single word** filenames, such as **Turbo, Clicker,** and **SYN** are the actual synthesizer itself. We don't need to worry about them.

The remaining files will have **Two word** titles; a type name and a specific filename, separated by a period. As in:

(filetype).(filename)
SOUNDS.WORK
SOUNDS.ORGANS
TRACKS.WORK
TRACKS.FUNK
WAVES.CLAV

These are the files we're most concerned with.

File Types

There are four kinds of files you create or use in Turbo-Traks.

SOUNDS.

These files are sets of 16 complete oscillators, including waveform, editting data, and preset connections. All the information we dealt with in the preceding chapter is contained in each SOUNDS. file.

You'll notice that each SOUNDS file has a different name after the "." It's this name after the period that we use when LOADing or SAVEing.

TRACKS.

These files contain a complete set of sequencer information. How to create these files will be explained in the Sequencer section. Again, it's the name after the period, or **filename**, that we will mostly be concerned with.

WAVE.

This is the data set that defines one waveform (without FM or envelope) as created in the Wavemaker section: very useful for moving voices from one SOUNDS.file to another.

TUNEX.

These files hold alternative tunings for the keyboard, (microtonal, just intonation, etc.) and are created by a seperate utility. Write for more details. Note: these files are not the same tuning files as used in previous software.

To return from the CATALOG, press any key.

Loading a New Group of Presets

Pick a likely looking name from among the files labeled SOUNDS. (You may Catalog the disk again, if you need to) When you have the LOAD/SAVE/CAT... menu on the screen again:

Press **L** on the computer keyboard.
Computer responds: **ENTER FILENAME...**

Type in the name of the file (after the period) and RETURN.
Computer responds: **SOUNDS/WAVE/TUNE(X)/TRACKS?**

Press **S** (for SOUNDS) on the computer keyboard. Your disk drive will immediately go into action. Assuming all goes well (if not, see ERROR MESSAGES on the next page); the drive will finish its business and return you to the menu. Look at the status lines.

You should notice that, while the TRACKS.name is still the same, the SOUNDS.name has changed to whatever you just selected. You have just loaded a completely different set of oscillators and presets into the system. From the MENU line hit RETURN, which will take you back to the Preset Screen. Play the new presets. Pretty fast for a radical reprogram of the instrument, eh?

Important Considerations

Sounds files in Turbo-Traks contain information for oscillators as well as presets. They also contain the parameters for KPRE, LPRE, SPLIT, BEND, and VOL. These values will be automatically set each time you load a Sounds file. Likewise, each one of these parameters are saved with the Sounds file each time you save a particular Sounds file on disk. This lets you taylor split keyboards, preset assignments, and overall volume to each Sounds file.

Error Messages

If you spell the filename wrong, or if you try to load a TRACKS.file as SOUNDS, or if you hit a **T** , **W** , or **X** instead of **S** Turbo-Traks will return from the disk with an error message. Hit any key to return to the disk menu.

Changing your mind

Let's say you've gotten as far as **ENTER FILENAME...** or even as far as **SOUNDS/WAVE/TUNE**/etc. and you've decided that you don't want to change your presets after all. Just hit RETURN without entry from the keyboard, and it returns you to the MENU line. Hitting RETURN again dumps you back to the Preset Screen.

Except...

After you've gotten a disk error message, hitting RETURN from the MENU line will send you to the Sequencer page. At this point you might feel like you're in a trap; hitting **Q** gets you to the Disk page easy enough, but RETURN keeps sending you to the Sequencer. If this happens, DON'T PANIC. Get to the Sequencer then hit **ESC** to back out to the Preset page. From there, **Q** to get back to the Disk page, and try again.

Experiments

Try loading the various SOUNDS. files, and go through the presets to hear what they sound like. Be sure to hold down long notes; some of the sample presets have pretty wild things on time delay.

Trouble?

If you're sure you've followed the instructions right, but you're still having trouble loading SOUNDS. files; and particularly if you have a late '82 Apple II+, turn to the HELP! section in the rear of this book.

Saving a SOUNDS. File

Let's say that you've loaded a SOUNDS files and fudged around the envelopes and presets until you've gotten a set of sounds that you'd really like to save for posterity. How do you do it?

Assuming you're starting from the Preset Screen...

First, make sure the disk containing the file we want to rename is in the disk drive. Then:

Q -- brings us to the Disk Menu
R -- for RENAME
Computer responds: **ENTER FILENAME...**

Here's the tricky part. As an added precaution against demolishing something useful, you must now enter the entire filename, including the filetype prefix. The RENAME function is unable to find files with prefixes if you don't enter the prefix.

Type in: **SOUNDS.DYNO** and press RETURN
Computer responds: **ENTER NEW FILENAME...**

Here's the other half of the tricky part. You must again enter the entire filename. While the RENAME function will rename the file anything you care to call it, LOAD will not recognize a SOUNDS, TRACKS, or WAVE file that does not have the right prefix.

Type in: **SOUNDS.CEILING** and press RETURN
Disk drive goes active: MENU returns: it's done.

Again, (because it is worth repeating), when you RENAME a file, you must type in the proper prefix (SOUNDS. or TRACKS.).

One Other Consideration about Renaming

It is quite possible and very easy to get carried away with giving your files functional, meaningful names. Too much detail can be every bit as much of a handicap as too vague a name.

The DELETE Files Command

Sad to say, there will come a time when you and a file must accept a parting of the ways. That's what the DELETE function is for.

DELETE operates very similar to RENAME; except of course that it doesn't ask for a new name.

D -- selects DELETE from the Disk Menu
Computer responds: **ENTER FILENAME...**

Type in the entire filename, including the prefix.
Computer responds: **DELETE** (filename) **? Y / N**

This affords you one last chance to change your mind, by hitting **N** here. Otherwise, hit **Y** and kiss it goodbye.

EXITS

When you've finished using disk functions and are back at the MENU line once again, there are three possible places you can go.

If you came to the Disk Screen from the Preset Screen, just hit RETURN to get back to the Preset Screen.

If you came to the Disk Screen from the Sequencer Screen, or if you came from the Preset Screen but participated in a Disk Error, hitting RETURN will land you back at the Sequencer Screen. From there hit ESCape to get to the Preset Screen.

W will take you to the Wavemaker screen.

Recommended Option: Go to the Preset Screen. Then turn to the next chapter.

C. Using the Sequencer

If there is any one feature of digital synthesizers that set them apart from earlier instruments, it must be the Sequencer: th ability to store, modify, and retrieve, long strings of contro information. Putting it in plain English, we mean the instrumen can be programmed to play itself with greater speed and contro than is "humanly" possible.

Unlike people who've seen too many bad science fiction films we do not view this as a threat to living musicians; rather, it i an enhancement. In the same way a flute extends a person's voice the synthesizer/sequencer extends the creative musician's fingers allowing the performance of music only wished at before.

There, that's enough philosophy. Here's how the thing works

Features

Soundchaser Turbo-Traks is distinguished from earlie computer music systems by the incredible power and flexibility o its Sequencer. Turbo-Traks can support up to sixteen separat AND simultaneous data tracks.

Operation of the Sequencer is a lot like using a 16-trac tape recorder, with overdubbing. You record what you're playin on one track, then play back that track and listen to it whil recording on a second track. Then you can listen to both thos tracks, while playing and recording on a third... on up to sixtee tracks.

This system does things no tape machine ever could, though After a track is recorded, you can change the preset voicing o the track. You can record a piano part and turn it into a strin part instantly.

You can change the key without changing the tempo -- as ofte as you like. Record a melody in C and turn it into a melody tha modulates to F#, C#, G#, and back to C again.

You can change the tempo without changing the key. Recor something at a slow and confident pace, then speed it up to really snappy beat.

You can quickly and easily loop tracks. Meaning you onl have to get the progression right once to have it always right.

Turbo-Traks includes a programmable computer metronome (clic track) to ensure perfect rhythm.

Playback volume for each track can be set independently, an changed while playback is in progress.

Personal Note

This Sequencer is without question the easiest-loading system I've ever used (of course, I date back to the days of archaic analog monsters whose every note's pitch and duration had to be manually tuned). There's no messing with light pens, or hours at the computer keyboard punching in cryptic codes. Quite simply, the Sequencer remembers what you play on the music keyboard. Every note, every chord, every nuance; everything except pitch bend and keyboard split. You play and the computer saves it, ready to play back whenever you ask.

Limits

There are some limits, of course. Foremost among these is the same 16 oscillator limit we talked about in the first chapter. We'll cover that in a bit more depth later on.

The second limit is the size of the Apple's memory. In a 48k RAM machine roughly 11k RAM is available for sequencer material, which translates into approximately 2,800 notes. Turbo-Traks uses dynamic memory allocation, so no memory is wasted; but due to the wide variance of playing styles it's very difficult to accurately translate this into running minutes.

A 64k RAM machine (Apple //e, II+ w/language card, Franklin) has 22k RAM free -- in short, twice the sequencer capacity, or approximately 5600 notes.

GOING TO THE SEQUENCER

Getting to the Sequencer Screen page is easy; from the Preset Screen page just hit **ESC** (you'll find it just above the CTRL key on the left side of the keyboard).

It should look something like this:

```
          TURBO-TRAKS 16 TRACK DIGITAL SEQUENCER

TRK 0    MODE=P    PRESET=5   VOLUME=8
TRK 1    MODE=P    PRESET=7   VOLUME=8
TRK 2    MODE=P    PRESET=9   VOLUME=8
TRK 3    MODE=O    PRESET=4   VOLUME=8
TRK 4    MODE=O    PRESET=O   VOLUME=O
TRK 5    MODE=O    PRESET=O   VOLUME=O
TRK 6    MODE=O    PRESET=O   VOLUME=O
TRK 7    MODE=O    PRESET=2   VOLUME=O
TRK 8    MODE=O    PRESET=O   VOLUME=O
TRK 9    MODE=O    PRESET=O   VOLUME=O
TRK A    MODE=O    PRESET=O   VOLUEM=O
TRK B    MODE=O    PRESET=2   VOLUME=O
TRK C    MODE=O    PRESET=5   VOLUME=O
TRK D    MODE=O    PRESET=A   VOLUME=O
TRK E    MODE=O    PRESET=O   VOLUME=O
TRK F    MODE=P    PRESET=4   VOLUME=8

 KPRE=1   TRANS=N    LOOP=L   TEMPO=6

MERGE (CTRL X)              CLICK (CTRL K)
```

TRK ---- This is the label for track. There are sixteen possible tracks numbered, as always, 0 through F.

MODE ---- This is the function the track is ready to perform.
O -- Track is Off; it will neither playback nor record
P -- Track will Playback when Sequencer is started
R -- Track will Record when Sequencer is started

PRESET -- This is the Preset Voice assigned to the track. The Sequencer uses the same presets as the keyboard (0- F).

VOLUME -- This is the Playback Volume of this particular track. Variable between 0 and 8.
Whenever you Record a track, the Volume of the keyboard preset will be automatically set to 8.

KPRE ---- This shows which preset is assigned to the main keyboard. If you play the keyboard now, this is voice you will hear.
Pitch bend and **Keyboard Split** are automatically shut off on going to the Sequencer.

TRANS --- When Transposition is in the **Normal** mode (**N**), the keyboard is live and playable as usual. When **Transpose**is on (**T**), the Sequencer playback can be shifted up to an octave up or down by simply pressing a key on the music keyboard.

LOOP ---- Causes the Sequencer to endlessly repeat itself. **L** means **Looping**; at the end of the sequence it goes back to the start. **N** means the Loop is off or in **Normal** mode; the Sequence plays through once only.

TEMPO --- Shows the relative speed rate of the sequencer playback. 6 is normal speed; F is extremely fast and 0 is stopped.

MERGE --- Hitting the key combination Control-X invokes a memory merge function that will be explained in detail later.

CLICK --- Hitting the key combination Control-K brings up the metronome subroutine.

ERASE --- Hitting the key combination Control-E will erase all current tracks in memory.

RUNNING THE SEQUENCER

When you started up Soundchaser Turbo-Traks, two files were automatically loaded from the disk: a collection of Preset Sounds labeled SOUNDS.WORK, and a collection of Sequencer Tracks labeled TRACKS.WORK. You can confirm this by sneaking briefly to the Disk Screen (hit **Q**) and looking at the Status Lines. If you've done a good deal of messing with the Presets in this session you might want to take a moment now to save your experiments, then reload the SOUNDS.WORK. Just to be on the safe side, why don't you load TRACKS.WORK as well? (This is our way of testing whether you actually read the last chapter)

All set? Volumes set to comfortable listening levels?

To Start the Sequencer Playing Back

Hit the SPACE BAR.

Note that all MODE, PRESET, and VOLUME indicators are highlighted while the Sequencer is running.

To Stop the Sequencer Playing Back

Hit the SPACE BAR again.

Note, if you will, that while the Sequencer is playing back the keyboard still behaves in a perfectly normal way, and **KPRE** operates exactly the same way it always has.

TEMPO control

Start the Sequencer playing back again and, keeping your eye on the **TEMPO** indicator in the lower right corner, press the **LEFT ARROW** key a time or two. Notice that the music slows down, although the key remains the same.

Now press the **RIGHT ARROW** key a few times. Again, the music stays in the same key, but the pace picks up.

On the Sequencer screen, the arrow keys constantly control the TEMPO. These controls are always active.

LOOP control

The LOOP control is a simple switch. Hitting **L** changes the status of the LOOP, immediately. If the loop is on (L), hitting **L** turns the loop off (N). If the loop is off, hitting **L** turns it back on. LOOP=L means on; LOOP=N means off.

After you've been running the demonstration tracks a while, turn the loop off. Notice that the music goes through once, then stops -- and that all tracks stop together. The first track you record determines the length of the loop; no track can be longer than the first track you record.

TRANSPOSITION control

Transposing means taking something and moving the whole works somewhere else. What this means with the Sequencer is you can record in a comfortable key -- say, A minor -- and play it back where you wanted it to sound -- say, D-flat minor. This saves a certain amount of agonizing over keyboard technique.

You can also Transpose the keyboard itself. This is useful if you can only play well in certain keys. Just Transpose the keyboard to play in the key that you're most comfortable with and play.

The TRANSPOSE function will only transpose sequences during playback.

You cannot selectively transpose; all tracks transpose.

You can transpose at any time, as often as you like, while the tracks are playing.

TRANSPOSE is always reset when you stop playback.

TRANSPOSE will Transpose both the sequencer and the keyboard itself.

You can Transpose, then turn TRANS off without stopping playback. The key change will be "locked in". Now you can play along on the keyboard but remember, the keyboard has also been transposed.

TRANS=N means Transpose is off : **TRANS=T** means Transpose is on

To use the TRANSPOSE function:

Hit **T** to switch between on and off. C3 (Middle C) on the music keyboard is the reference key. Hitting any key between C2 and C4 will shift the pitch that distance and in that direction from C3.

In simpler words: if you press the F above middle C on music keyboard (four keys up) the playback will be moved four keys up, or a musical fourth. If you press the D below C3 (seven keys down) the playback pitch will be moved a musical seventh down (from the origional key).

Of course, while the TRANSPOSE function is active, you cannot play the music keyboard in the normal way. Make the key selection, then turn TRANS off, then play along.

****

MODE in Greater Detail

There are three possible modes, individually set for each sequencer track:

R -- RECORD. In this mode the track stores information on which notes you've pressed on keyboard, and the time relationship in which you've pressed them. In simpler terms, it records what you play. But after you've played and recorded, you can go back in and change the preset, transposition, and volume.

The record function is fully polyphonic; it stores all the notes and chords you play.

>>>>>>>> Only one track can be in RECORD mode at a time.

Recording begins when you press the space bar; to stop recording press the space bar again. However, (and this is important) the actual end of the track as far as the timing is concerned is the last note you played. This note is DELETED when the track is played back. The reason for this is to make it easier to record perfectly timed tracks for loops.

>>>>>>>> The first track recorded determines the maximum length of all other tracks; no track can be longer than the first track you record. The first track recorded also determines the length of loops.

P -- PLAYBACK. When a track is in playback mode, pressing the space bar starts it playing out whatever material may be stored in the track; the sound played is selected by the track PRESET, at the track Volume and Tempo determined by those controls.
Pressing the space bar again stops it.

O -- OFF. When a track is switched off, any sequence as may be recorded there is still there, and still occupying RAM memory, but will not be heard. Tracks can be turned on and off during playback by selecting the modes.

PRESET in Greater Detail

Preset sounds available to the Sequencer are the same sixteen presets (0 through F) available to LPRE and KPRE. Preset can be set independently of all other controls, and changed at any time, including during playback: A feature that can be very useful for orchestrating your compositions.

However, it's important to remember that we're still subject to our old friend, the sixteen-oscillator limit. If you record a track that includes a lot of eight-note chords, in a preset that uses two oscillators per voice, and then change to a preset that uses four oscillators per voice, you are not going to hear some of the notes you recorded.

They're still there on the track, and if you switch to a fewer-oscillator preset you'll hear them again.

>>>>>>>> When Recording, the preset for the track that you are Recording on will be automatically set to KPRE. This way you can select your sound to record with using KPRE as usual, and automatically set the track preset as soon as you hit the space key.

VOLUME in Greater Detail

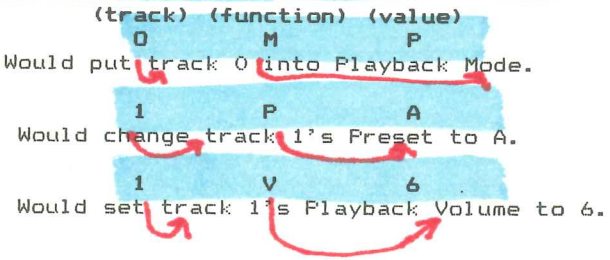
There are nine possible volume settings: 0 (no volume) t 8 (maximum volume). Going up in volume, each setting i twice as loud as the previous setting. That means VOLUME= is twice as loud as VOLUME=6, and half as loud as VOLUME=8. While this may not offer a lot of subtlety in mixing, it i serviceable and an improvement over previous sequencers.

During playback, when transpose is off, the live key board always has the highest volume setting.

>>>>>>>> An effecive mix can be achieved by adjusting the Sustai levels of the individual oscillators involved in the mix, as well as the individual track volumes.

CHANGING MODE, PRESET, AND VOLUME

The command syntax for changing any of these controls is th same: three single keystrokes, specifying track number function to be changed, and new value. As in...



Fun with Playback

At this point, (you should have TRACKS.WORK loaded) I'd suggest turning off all but one track.

Next, press the space bar to hear the track played back, and get familiar with it. If the track is active enough to be interesting, set the sequencer into LOOPing. If not, try a different track.

Now, while the track continues playing back, try changing the Preset of your active track. When you've got a fair idea how that operates, try the Volume settings.

After that, try Transposition, Tempo change, and playing along with the loop on the live keyboard. Then put a second track into playback mode, and try all these things again.

When you feel confident with all these functions, we will record your first track.

RECORDING YOUR FIRST TRACK (without click track)

When recording something with a tape deck, the first step is to start out with some blank tape. When recording with the Sequencer, the first step is to ERASE the tracks currently residing in memory.

ERASE all Tracks (CTRL E)

One command does this. Use this only when you want to start completely fresh! This function obliterates **all** tracks currently in the machine.

While holding down the **CTRL** key on the left side of the keyboard, press **E** . Your computer will moan for a second or so as; all tracks are being erased and reset to Mode Off -- except for Track 0, which is being set to Mode Record.

Now decide what you're going to play. Since this is our first excercise, we suggest something simple and relatively short -- say, a verse of twelve-bar blues.

It is very tempting to try and crowd all your favorite licks into the first track. Resist the temptation; it's bad orchestration technique, and will make things really muddled two or three tracks down the line.

Ready?

To begin recording, just press SPACE BAR and begin playing. Try to hit that SPACE BAR and the first note as nearly as possible at the same time. The Sequencer does record that silent gap between the space bar and the first note, and it can really bugger up your timing on loops.

When you've played through a verse, hit one more note on what would have been the first downbeat of the next verse. Then hit the SPACE BAR. Remember, the Sequencer uses the beginning of that last-played note to mark the end of the track, and deletes that last-played note. Forgetting this little fact about the Sequencer is an easy way to inject exotic meters into your compositions.

Switch Track 0 from Record to Playback Mode

O	M	P
Track	Function	Value

Now, listen back to what you've done (hit space). Don't be alarmed if it sounds a little ragged; we all do, at first.

If you decide, upon listening to Playback, that your first recorded track is horrid and embarassing and you want to do it over again, you must press **CTRL-E** to erase it. Else it's time to move ahead.

RECORDING YOUR SECOND TRACK (and Third, Fourth, Fifth, etc.)

There is an important difference between your first Recorde track and all subsequent Recorded tracks. It has to do wit the way the Sequencer deals with the memory.

You see, your first track is recorded directly into th freshly ERASED RAM memory of your machine. Since Turbo-Trak knows exactly where that free memory starts, it has n trouble deciding exactly where to put the information.

The second track, and all others recorded from then o need to be stored somewhere. Since you might decide t re-record that first track sometime later, we don't want t put the second one right after it in memory.

The solution to this is to have all tracks after th first track record into a separate area of memory. We cal this separate area a "buffer" and you Record all tracks afte the initial one into the buffer.

One additional step is required once you have Recorde your second or third or fourth ... track.

You must **MERGE** the newly recorded track into the mai Sequencer memory before you can listen to it. If you decid before MERGING, that the track is unacceptable, you ma simply re-record it, without having to erase anything first. Re-recording the track will automatically erase the buffer.

After **MERGE**ing, you may still re-record the track, bu you must also re-MERGE it.

Every time you MERGE a track, any previous track that had been playing back will be erased first, then the new track will be MERGED.

So to record your second track:

Make sure your first track (Track 0) is in Playback MODE.
Set your second track (Track 1) into Record MODE.
Select a suitable Preset for your second track (KPRE).
Press the SPACE BAR...

Track 0 will immediately begin playing back. Going to Record MODE, I might add, always turns off LOOP and TRANSPOSE functions.

You can play whatever seems appropriate. But when Track 0 stops playing back, that's it. Anything you play after the end of Track 0's playback will not be saved.

You must still mark the end of the second track with an extra note, which will be deleted.

Press SPACE BAR to stop the Record function.

At this point, if you do not want to keep what you just played, you may press SPACE BAR again to start re-recording this particular track. Else...

While holding down the **CTRL** key, press **X** . The message "M" and the Track number being MERGED will flash briefly on the screen. When it is done, set Track 1 to Playback, and enjoy the results.

RECORDING ADDITIONAL TRACKS

For all additional tracks, follow the procedure you've just used. Remember, each track has to be MERGED (CTRL-X) into the main memory before it can be played back.

Important Point

Each individual track is a unified whole; this means (at least at the present time), that you cannot go in and "fix" just one bad note or one botched downbeat. The only way to clean up a botched note in a track is to re-record the whole track.

USING THE CLICK TRACK

As you probably discovered after a few tries at laying dow tracks, your ability to record good sounding second and thir tracks depends on your ability to lay down a rhythmically stabl first track. Don't be embarassed; many musicians have troubl keeping a perfect beat and still go on to lead interesting, usefu lives. The secret is to know when to go for outside help.

The Click Track is that source of help; a computer- generate stable reference beat. A digital metronome, if you will.

The click track you create is always your first track; click track cannot be added to already existing tracks. In fact using the Click Track program has a similar effect as pressin CTRL E and recording a first track on the keyboard.

To create a click track, it is necessary to have the progra **CLICKER** residing on your Turbo-Traks diskette. From the Sequence Screen, press **CNTRL K** to call up the Click Track program. You disk drive will go active, and in a moment your screen should loo like this:

****
TURBO-TRAKS CLICK TRACK MAKER

CREATES A CLICK TRACK ON TRACK F
CURRENT TRACKS WILL BE ERASED

ENTER TEMPO IN BEATS/MINUTE

HIT RETURN TO ABORT

****

The first thing the Click Track Maker wants to know is tempo. This is expressed in standard metronome markings: i.e., one beat per second is 60, one beat every two seconds is 30, one beat every half second is 120, and so on. Pick a number and press RETURN.

The next thing we need is the number of beats per measure. If you're working in 4/4 time (standard Rock, Country, Dance) you would enter 4 and RETURN. If you're working in 3/4 time (Waltz) you would enter 3. If you're working in 11/8 you probably don't need to read this.

The Click Track Maker cannot deal with mixed meters. If you are working in, say, 3/4, with an occasional measure of 5/8 thrown in for novelty, your best bet is to find the lowest common denominator (in this case, eighth notes) and count the measures yourself.

Next, we need the total number of measures in the Sequence. Why?

Remember, this click track is going to be our first track. The length of the first track determines the length of all later tracks; no tracks can be longer than the first track.

Count out the total number of measures you want to record and enter them.

Finally, the program will ask you if you want to load a very percussive sound into oscillator 0. You can use it in a single oscillator preset as your Click Track sound. Answer **Y** or **N** and hit RETURN.

The computer will respond with:

CALCULATING CLICK TRACK

When it's finished, it says **DONE...LOADING SYSTEM** and your disk drive goes on once more. The system will come up in the Preset Screen. Hit ESC to get to the Sequencer Screen. Note that all tracks are Off, except Track F which is in the Playback Mode. Your click track is already loaded into Track F. If you press the SPACE BAR, you will hear your Click Track.

Please bear in mind that the Click Track is a sequencer track just like any other track; you can manipulate it in the same ways. This in turn can lead to its own special problems.

Since there was no keyboard action involved in creation of the click track, if you assign a pitched preset to the click track you will find that it is the note C. Unless the rest of the tracks you are about to record are also in C, you may find this musically confusing.

The percussive sound that the Click Track program will load in for you, loads into oscillator 0. You can create a single oscillator preset and assign it to track F for playback.

We recommend using a Preset that is so heavily modulated, it has no discernable pitch. Also, to emphasize the beat, we suggest using short, clipped envelopes for the click track preset. And of course, stay away from any preset that has a time delay on the envelope.

RECORDING YOUR SECOND TRACK (with click track)

Recording your second track over the click track is just like recording your second track without it, except that your first track is Track F, not Track 0.

Also bear in mind; like other tracks, the click track can be switched off. After you've laid down a few tracks you probably will not need or want that steady thump in there. You can even re-record Track F and MERGE it in, if you like.

SAVING YOUR WORK

After you've laid down some tracks, adjusting the Presets and Volume levels until you're satisfied, you will probably want to save what you've done. Saving Tracks is very similar to saving Sounds.

Press **Q** to take you to the Disk Screen.

Computer: **LOAD / SAVE / CATALOG / DELETE / RENAME ?**
You would select **S** for Save

Computer: **ENTER FILENAME...**
Give the Tracks an appropriate name, and RETURN.

Computer: **SOUNDS / WAVE / TUNE(X) / TRACKS ?**
Select option **T** for Tracks

When the Disk Menu Line returns, hit RETURN to go back to the Sequencer Screen.

REINFORCING A POINT...

While Turbo-Traks is capable of supporting 16 tracks, our limiting factor is still the number of oscillators available. Using multi-oscillator Presets and playing polyphonic parts, it is easy to use up the sixteen oscillators long before you use up the available track space.

In fact, the only way to use all sixteen tracks at once is to record 16 single-note-line parts, using single-oscillator Presets.

Rather than being a handicap, this lends itself to some interesting alternative applications. You might for example use the 16 tracks to load 4 sets of 4 different tracks. Or you might keep the basic rhythm of the first track, but switch other tracks in and out over it.

People doing "patternistic" music, in particular should find this interesting.

EXITS

From the Sequencer Screen, we can return to the Preset Screen by hitting **ESC** .

We can go to the Disk Screen by hitting **Q** , however a return from the Menu Line of the Disk Screen will bring us back to the Sequencer: We can only back out the way we went in.

We can go to the Wavemaker by hitting **W** .

Care should always be taken to MERGE sequencer Tracks before going to the Wavemaker; on going to the Wavemaker, the tracks buffer is always wiped out, taking with it any unmerged Sequencer Tracks.

I. OPERATING CONTROLS

D: Making Waves

There is one major section of Turbo-Traks left to be explored: The Wavemaker. This is the section where we determine the tonal quality of the oscillators that are used in our Presets, and the way they behave during frequency modulation. Read carefully! Wavemaking is our most powerful, and at the same time our most subtle sonic feature.

The Wavemaker is the same program as contained in our Digital Performance Software and our 4-Track Performance Software. Those manuals (at least one of which you have), will provide another reference on Wavemaking.

Wavemaking is based on the idea that the **shape** of a waveform determines **how** it sounds. If you don't feel comfortable with this idea yet -- you will be, before we're done.

Unlike earlier synthesizers which simply gave you a choice between a few basic waveforms, Turbo-Traks gives you an almost infinite variety of waveforms to choose from. For example, in the Wavemaker section we can quite literally draw the waveform we wish to use.

Getting to Wavemaker

Before going to the Wavemaker: **Plug in Your Game Controls.** The Wavemaker will not operate without game controls, and you can get yourself into some Menu Options that are difficult to get out of without game controls.

>>>> Remember. Going to the Wavemaker Screen will automatically erase the Recording buffer. There is no way around this, but it should not really matter if you Merge your track first.

To get to the Wavemaker Screen from any of the other screens, simply press **W** .

Your video monitor will blank briefly, and then display a rectangular "window" and yet another Menu Line.

WAVEMAKERWAVEMAKERWAVEMAKERWAVEMKAERWAVEMAKER
DISP/EDIT/CREATE/MOVE/SMOOTH/TUNE/PLAY ?

As with the Disk Menu, selecting an option is just a matter of pressing a single key.

D -- DISPLAY This command, when followed by an oscillator number, will plot one cycle of the waveform of that oscillator in high detail in the window.

E -- EDIT This command, when followed by an oscillator number, plots the waveform and then allows you to redraw any section of the wave, using your game paddles.

C -- **CREATE** Bears a certain resemblance to the drawbars on an electronic organ; using the game paddles you specify the relative volumes of the fundamental and fifteen harmonics on a bar chart, and the computer compiles the waveform. For those of your familiar with Fourier or additive synthesis -- this is it.

M -- **MOVE** Ordinarily, the CREATE function works with sine waves; the simplest, purest tone. The MOVE function, though, allows us to take any wave we may've created using the CREATE or EDIT functions and use it as the fundamental for making more complex waveforms with CREATE.

S -- **SMOOTH** This is a digitally-simulated lowpass filter; it lets you take some of the brightness off the sound and is useful for eliminating noise in your waveforms.

T -- **TUNE** This is the place where we show you how to tune your Soundchaser to match your piano.

P -- **PLAY** Pressing "P" from this menu line returns you to the Screen you came from; if you came from the Preset Screen you go back there, if you came from the Tracks Screen, you return to the Tracks Screen.

DISPLAY command in more depth

To help emphasize what we're doing, I suggest that you return to the Preset Screen and assemble a preset that has just one oscillator in it. Say, put Oscillator 7 into Preset 7, and make that your KPRE. Play it enough to get a feel for what it sounds like, and return to the Wavemaker.

Select Menu Option **D** .
Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

Select Oscillator **7**.
The computer will respond by quickly plotting one cycle of that wave in fine detail and high contrast.

When you've seen enough of Oscillator 7's waveform, pressing any key will return you to the Menu Line. Pressing RETURN at the Menu will clear the window.

Now, return to the Preset Screen by pressing **PLAY**, and substitute oscillator 1 for oscillator 7 in your preset. Again, play it and get a taste of how it sounds. Then return to the Wavemaker. Following the directions above, **DISP**lay Oscillator 1 in the window. Notice how the difference in **sound** between oscillator's 1 & 7 is accompanied by a difference in **shape.**

Repeat this process for all sixteen oscillators.

EDIT command in greater depth

The **EDIT** command will allow you to go in and redraw sections of an already-existing waveform, in a process that bears some resemblance to an Etch-A-Sketch.

Pick one of the more complicated waves you looked at in the **DISP**lay mode, and make it your KPRE. Return to the Wavemaker.

To invoke the Edit option, press **E** .
Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**
Enter the number of the oscillator you've chosen. The computer will respond by presenting a point by point plot of the waveform on the screen. You will also notice a flashing vertical line. This is your Editing Cursor. At this time you can only move the cursor left or right.

Using Paddle 0, move the cursor to the area you wish to edit, and press button 0 then let go. (Those of you with Apple //e here's something you can do with that open Apple key).

You can now use the same Paddle 0 to move the cursor up or down; move the paddle and look for a tiny dot moving up and dowm. When you've got it where you want it press the button again, and hold it down.

You'll notice, while you're holding the button down that a continuous line begins inching across the screen, and the paddle controls the up and down movement of the cursor.

When you've made a big enough change in the wave, (or have gotten to the right edge of the window) Press RETURN.

Computer responds: **DISP/EDIT/CREATE/MOVE/** etc....

Press RETURN again to clear the window.
Select **DISP**lay and the oscillator you just editted.

The window should now display the wave, including the bit of redrawing you just did. Hit **P** to go back to the Preset Screen, and listen for the difference in the preset.

This can be an extremely subtle difference. Keep experimenting with the Edit command until you're sure you can hear the difference before and after.

EDIT can be used as a very fast way to see your waveforms. It can take the place of DISPLAY for most waveform work.

CREATE in greater depth

Create is the focal point of the entire Wavemaker section; it is the section that allows us to build natural-sounding voices by piling together overtones, or harmonics.

For this excercise, we'll need to demolish one of our presets. Pick an oscillator you're not particularly fond of and make it your one oscillator voice, and your KPRE. Then return to Wavemaker.

Select **C** from the menu.
Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

Select the appropriate oscillator.
The computer will present you with a screen numbered to 16 across the bottom, and a flashing cursor in the left-most column. Using the paddle control, set this cursor to its highest setting, and then quickly press and release the paddle button.

There should now be a solid bar from the bottom line to the cursor position, and the cursor should have moved over to the next column. Press RETURN to go back to the window and menu line.

Display this oscillator waveform we've just created. What you should see is a simple, clean, sine wave: a gentle up-and-down arc that divides the window neatly in half.

Step out to the Preset Screen and play this preset. You should hear a very "mellow", flute-like sort of sound.

Back to the Wavemaker, and **C**reate.

This time, create the same oscillator, but don't stop at just the first column. Set four columns at different heights by the same process. Use the paddle to adjust the height, or volume, of that particular harmonic; press the paddle button to set the level and move on to the next one.

After you've set four harmonics, RETURN to the menu line and **D**isplay the new wave you've just created.

Again, play the new wave. Notice how the sounds becomes "thicker" and "brighter", the more high harmonics you add.

You have some additional controls available when Creating waveforms displayed on the bottom of the screen.

<-- --> PDL1 CLEAR ESC <CR> WAVE #

* The ARROW keys (<-- and -->) let you move through the 16 harmonics.
* PDL1 is telling you to enter the harmonic amplitudes with game paddle #1.
* Pressing C for CLEAR will clear the screen of all bars.
* Pressing ESC will abort the Create process and return you to the Wavemaker.
* Pressing <CR> for RETURN will start the waveform calculations and return you to the Wavemaker.

MOVE in greater detail

When we constructed waves from harmonics in the CREATE section, we were assembling sine waves (those nice pure arcs) at various pitches.

However, we do not have to use sine waves. The MOVE function enables us to use any wave we may've created in the CREATE or EDIT modes as our basic shape for CREATEing.

Let's go back to the complex wave we created in the last section -- for the sake of illustration we'll call it oscillator 4.

Get a good look at that waveform.

Now, select option **M** on the menu.

Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

Select **4** .

Nothing appeared to happen?

Back at the menu line, select **Create 5** .

When you have the bar settings on the screen again, set just the first column to the top, freeze it with the paddle button and then RETURN to the menu.

Display the waveform you've just **C**reated.

It should look the same as the waveform you have in oscillator 4. You have recreated the same waveform, except instead of doing it by a lot of settings, you've done it with only one.

That complex waveform is now the base waveform of oscillator 5. If you continue the create process, adding more harmonics on oscillator 5, you'll find that waveform grows incredibly complex.

Accompanied, of course, by a tremendous increase in the complexity, or richness, of the sound.

SMOOTH in greater depth

Smooth operates as a filter; it lets you strain out the higher, or brighter, parts of a sound. As you may've noted while playing with Move, sometimes a sound's increase in complexity becomes shrill or annoying. Smooth lets you mellow that out.

Select menu option **S** .

Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

The oscillator we just did all that Create work on is probably a good one to start with.

Computer responds: **ENTER CUTOFF FREQUENCY IN HZ :**

What it needs to know is the place where it should start filtering: a cutoff frequency of 2000 would only take the very brightest edge off the sound, while a cutoff frequency of 200 would muffle it quite a bit.

Enter a number: it's best to start with high ones. The computer will then refigure the wave, allowing for filter factors, and return you to the menu line.

Display the wave you've just filtered. You shoul notice some of the sharper edges have been rounded off. Nex play the wave. You should notice that it's less bright.

Refilter the wave at a lower frequency, and redisplay The wave should progressively take on a more rounded form and play with a more muted sound, the lower the filte frequency.

TUNE in greater detail

This option allows you, keeping your established keyboar tempering and interval structure, to retune the instrument t match other, less easily tuned instruments, or to transpos the keyboard as you like.

Standard tuning is usually referred to as A(440); whic means the key A above middle C is 440 wave cycles per second The octave down from that is 220 cps, the A an octave up i 880 cps.

As you can see, the frequency doubles every octave What this means to you is that there really isn't an eas way to figure out the right numbers for a transposition; yo will have to experiment and figure them out yourself.

To use the Tune command:

Select menu option **T** .

Computer responds: ***TUNE* ENTER FREQUENCY FOR A(440):**

Whatever number you enter here will become the ne frequency for the A above middle C. The range of possibl choices is from 200 to 600.

To TUNE to your slightly sharp grand piano, you migh choose small values such as 445 or 450 and try them.

Type in the number of your choice and press RETURN The computer will digest this a moment, then return you t the menu line.

If you type in a number that exceeds the range, th computer will ignore the entry.

CHANGING YOUR MIND

From any of these menu choices, the appropriate way to bai out of the function is to press RETURN without enterin anything.

CLEARING THE WINDOW

Having several different waves plotted on the window ca sometimes be valuable, but is more often confusing.

From the Wavemaker screen menu line, hit RETURN to eras the window.

EXITS PLAY in greater detail

The **P** option and the exits are one and the same; hitting **P** from the menu line returns you to either the Preset Screen or the Sequencer Screen, depending on where you came to the Wavemaker from.

II. HELP!

A: Care & Maintainence

The Soundchaser Computer Music System is surprisingly maintainence free. It does not require the careful, painstaking, and time-consuming calibration and tuning earlier synthesizers did. In fact, there are **no** hardware adjustment points anywhere in the system!

Tuning is referenced to your computer's internal clock, and is as stable as possible. The system does not require any warm-up time to settle-in or settle-down.

Care and Maintainence procedures are more aptly related to your computer, and your disks.

Care of your computer

* -- Floppy disk drives are prone to inconstant speed as they get older. If your system starts giving you **I/O ERROR**s once in a while, but then boots the disk perfectly the next time, you might want to consider having the drive speed checked and calibrated.

* -- CLEAN YOUR DISK DRIVE!
  A disk drive is just like any other magnetic recording system; it needs to be cleaned regularly. Buy yourself a cleaning kit and use it; it'll probably be best fifteen bucks you ever invested.

* -- When installing and removing your keyboard interface card or your game controls, excercise care to avoid knocking the disk drive cable loose from the disk drive interface card. This connector can appear to be on and still be disconnected just enough to wreak havoc.
  If and when you do knock this connector loose, be very careful to make sure the pin alignment is correct when you reassemble it. It is possible to put it together mismatched by a set of pins; you will know if you do this as soon as you turn the power back on since your disk analog board will instantly go up in a large, foul-smelling, and expensive cloud of smoke.

* -- Of course, don't ever fool with the insides of your computer while the power is on.

* -- When installing or removing extra circuit cards: i.e., the Mountain Hardware Synthesizer cards, the keyboard card, maybe a language card...
  It's best to do these operations in a room without carpet, as all it takes is a tiny static charge from your fingers to blow these delicate microchips away.
  When the system is together and running, it is fairly immune to static; at worst a zap off your fingers seems to cause a "pop" through your monitor speakers.

But when you have the cards or chips out and ungrounded, a spark off your fingers can send your cards back to the repair center.

Always try to touch some other grounded metal before touching your diskettes or equipment.

* -- On many occasions, the ribbon connector between the two Mountain synthesizer cards has caused us trouble. It is a good idea to periodically check to be sure the cable is well seated in both cards. When you have it apart, also examine the connecting faces of the cable. If you do not see bright metal you probably want to clean the oxidation off; a typewriter eraser works nicely.

* -- If the game controls or joysticks do not seem to be working properly, check to make sure they are inserted into their socket correctly. It is possible to put that plug in backwards. That won't hurt anything -- it just won't work, either.

* -- And of course, the advice of most concern to gigging musicians: Never put your drink on top of your computer.

Care and Maintainence of the Keyboard

About the only thing that can be maintained on the keyboard is its' appearance. Since it is real wood, use a nice furniture polish or lemon oil once in a while to buff it to a healthy glow. Be careful to avoid getting wax on the keys.

If you notice that some keys don't seem to have a real consistent attack, it may be time to clean the keyboard contacts. To gain access to them, use a screwdriver to remove the four screws in the bottom of the keyboard case. The keyboard lifts out through the top of the case.

Using Q-tips and alcohol, gently clean the area when the switch wire contacts the buss bar. Then reassemble the keyboard.

Be careful not to crimp the ribbon cable or pull it out of the keyboard socket.

Don't leave lit cigarettes on the keys. I know it looks just bluesy as all get out, but it melts the keys.

If the system travels a lot, it will of course live longer if it travels in a good, bullet-proof case. (Yes, we do make cases. Didn't your sales rep pitch you on one?)

Care & Maintainence of your Diskettes

The diskette you purchased with your system is your synthesizer; it is the most important part of your system.

Therefore, as befits its importance, you should take good care of it. This means, make a backup copy.

How do I copy a diskette?

Haul out your Apple System Master diskette, and boot it up in your disk drive. When you have a prompt, type in:

RUN COPYA and press RETURN.

The computer will prompt you through the rest; if you have only one disk drive your source and your destination disks are both slot 6, drive 1.

This program will copy an entire diskette for you; the synthesizer programs themselves as well as all TRACKS and SOUNDS files that came with your system.

You can create a Turbo-Traks master disk of your own with plenty of room for your own TRACKS and SOUNDS files. If you want to make a spare Turbo-Traks master, you will need to copy only certain specific files.

How do I copy specific files?

Also on your trusty Apple System Master disk, you will find a program named FID. Type:

BRUN FID and press RETURN.

Again, one-disk owners remember that both your source and your destination disks are 6, 1. The system will prompt you.

The files you need to transfer to have a spare working master are **HELLO**
TURBO
CLICKER
SYN
DDMOVER
SOUNDS.WORK
TRACKS.WORK
WAVE.CLICK

The files SOUNDS.WORK and TRACKS.WORK are automatically loaded into the system when the disk boots. You can change the contents of both of these files by SAVING your own material under these names. This way, you can custom taylor your own diskette to boot with your sounds and your tracks.

Be Careful with your Disks

Careless handling can ruin a disk; never touch the surface of the disk (visible through the oblong holes in the jacket).

Disks can be damaged by any strong magnetic field; don't put your disks on top of your monitor, or on top of your speakers.

Disks can be damaged by heat. Don't leave them on top of your amp or directly under any stage lighting.

Don't let the guitar boys play frisbee with your disks.

B: PANIC SITUATIONS!!!!!

DOESN'T MAKE ANY SOUND

1. Check to make sure your monitor amp is on.
2. Check to make sure monitor switch is set to correct input source.
3. Check to make sure monitor volume is up.
4. Check to make sure cables are connected to computer.
5. Check to make sure computer is on Preset Screen. (if you're playing back from Sequencer see next section)
6. Check to make sure computer output volume is up
7. Check to make sure Preset is assigned to keyboard section you are playing.
8. Check to make sure oscillators are assigned to Preset. (Try other Presets)
9. Check to make sure Mountain Cards are in slots 4 & 5.
10. Check interconnection between Mountain Cards.
11. Check to make sure no one has tripped over and ripped out speaker cables.
12. Check to make sure that the ribbon cable is plugged into the Interface card properly.

SEQUENCER DOESN'T PLAY BACK

1. Check Mode of desired playback tracks.
2. Check Volume of desired tracks.
3. Exit to Preset Screen; check Master Volume.
4. Return to Sequencer, check viability of voices. (if your first track was a sixteen oscillator preset and it only plays once in a while, you'll not hear anything on the other tracks.)
5. You <u>did</u> press the space bar, didn't you?

NOISE OR GARBAGE IN ONE OR BOTH CHANNELS

1. Check your audio output cables. Replace, if suspect.
2. Check connector between Mountain cards. This cable should <u>never</u> be kinked. If it is, the quick fix is to swap it end for end and smooth the kink out.

SOME NOTES ON KEYBOARD DON'T WORK SOMETIMES

If you move the system a lot, or twist the keyboard cable up a lot, you may crack one of the wires in the keyboard cable. The symptom is, sometimes some keys will stop working, but if you jiggle the cable they resume working. (I had all my D and F# keys cut out once)

The only fix is to replace the cable. Call Passport.

If some notes don't work sometimes, but jiggling the cable doesn't seem to help, it may be time to clean the keyboard contacts.

NO KEYS ON KEYBOARD PLAY

1. Is keyboard cable connected to interface card?
2. Is keyboard interface card in Apple?
3. Is the ATTACK set to 00? This setting is in effect OFF.

3M's Digital Mastering System costs hundreds of thousands o
dollars.

Q.-- How do I get a sound like a really good acoustic piano?
A.-- Buy a Steinway.

FEEBACK

We like to get feedback from our customers; this manual i
in large part developed from questions asked us by users an
prospective buyers. The PANIC and Q&A sections of thi
manual are intended to be expandable and updated in respons
to inquiries.

All of this means, if you have any questions or comment
please feel free to send them to:

Passport Designs, Inc.
116 N. Cabrillo Hwy.
Half Moon Bay, CA 94019
Attn: Bruce Bethke

And play your Soundchaser! We want to see more Soundchaser
used in concert and on records. If you have live or studi
plans that would benefit from publicity, LET US KNOW!

Thanks for reading, and
may your music be heard.

Bruce Bethke February 198

SOUNDCHASER™
COMPUTER MUSIC SYSTEMS

TURBO-TRAKS SYSTEM MANUAL

A 16-track digital performance and recording package for the Soundchaser Computer Music System.

Software written by David M. Kusek
Manual written by Bruce Bethke

Passport Designs, Inc.
116 North Cabrillo Hwy.
Half Moon Bay, CA 94019
(415) 726-0280

Q -- which gets us to the Disk menu, from the Preset Screen

S -- the SAVE option from the disk menu
Computer responds: **ENTER FILENAME...**

Type in just the filename. (**VERY IMPORTANT:** don't use the name you LOADed the file under. If you do use the same name, it will ERASE the original file) Press RETURN.

Computer responds: **SOUNDS/WAVE/TUNE(X)/TRACKS?**

S -- for SOUNDS. The disk drive proceeds to whir and clank and do all the usual things. When it's done and back to the MENU, CATALOG to see the results of your work. You should see everything that was there before plus the new SOUNDS.file you just created. Turbo-Traks will automatically attach the filetype prefix (i.e., SOUNDS.name, TRACKS.name)

Loading & Saving Sequencer Files

Loading and saving sequencer files operates exactly the same way as the process we've just gone through; except of course that when the **SOUNDS/WAVE/TUNE(X)/TRACKS?** question comes up you hit **T**.

This is not particularly the time or place to experiment with loading sequencer tracks, as TRACKS and SOUNDS are often developed together, and playing back TRACKS without matching SOUNDS can get pretty bizarre. However, if you're feeling adventurous and you just can't wait 'til the next chapter...

As you may have accidently discovered by now, hitting the space bar starts the sequencer playing back. Hitting the space bar again stops it. You can at this time try loading various TRACKS and playing them, but be prepared to hear some strange things.

Loading Tunings

This is not the place where we show you how to tune Sound-Chaser to match your slightly sharp grand piano, or how to make it sound in F# when you're really more comfortable playing in G. For that, see TUNE in the Wavemaker and TRANSPOSE in the sequencer section.

During start-up, Turbo-Traks automatically provides you with standard, piano-like, A440 tempered tuning and scaling. However, as both Renaissance and New Musicians will delight in telling you there are many other ways to approach a keyboard.

Just intonation, mean tuning, microtonals; since the computer sees the keyboard as only a row of switches there's really no reason it has to be tuned any particular way.

A discussion of the reasons why someone might want their keyboard to behave like a guitar with a rubber neck does not belong here. Suffice it to say, some do. (I personally like to use a lot of macrotonals in my compositions) The creation of these alternative tunings is done through a seperate utility program.

Here's the procedure for loading an alternative tuning:

You type **L**, Computer responds: **ENTER FILENAME...**
Enter the name of a TUNE.file and return.
Computer responds: SOUNDS/WAVE/TUNE(X)/TRACKS?
Enter **X** (Since **T** was already being used for TRACKS)
And after that, everything proceeds normally enough.

Saving & Loading WAVEs

About a week after you get your Soundchaser, you will start thinking; "Hey, I've got this really great preset in my SOUNDS.ZOWIE file, and eight more in my SOUNDS.SNARF file. How do I combine them to make one dynamite SOUNDS.file?"
Here's how.

First, load up your SOUNDS.SNARF file, and check out the oscillator assignment matrix. What you're looking for here is to find out which oscillators make up the presets you want to keep, and which oscillators are disposable. Let's say oscillators 1, 3, 5, 9, B, and D are unnecessary. Get some paper and write this down. Oscillators 1,3,5,9,B, and D are your disposable oscillators.

After you've determined that, load up your SOUNDS.ZOWIE file and determine which oscillators make up the presets you want to move. Let's say we find 2 and A are the oscillators in ZOWIE that make up the first preset we'd like to move.
Following so far?

Important Point

The function we are about to use will transfer only the waveform of an oscillator. It will not transfer envelope or FM data, nor will it transfer oscillator/preset linking information. We are not transfering a complete preset; only the waveform of one of the oscillators that make up the preset.
Therefore we suggest that you write down envelope and FM data in order to enter them in later. Also, if the preset is dependant on a unique FM waveform for part of its sound, you will have to transfer the appropriate LFO as well.

Write this information down for each oscillator.

So, the first thing we want to do is get waveforms 2 and A out of ZOWIE. Press **Q** to get us to the disk page.

S -- since we want to SAVE these waveforms out of ZOWIE
Computer responds: **ENTER FILENAME...**

At this time you'd better pick a name for this waveform. Let's say the preset we're moving sounds sort of like a horn, so we'll call the first waveform HONK1 and press RETURN.
Computer responds: **SOUNDS/WAVE/TUNE(X)/TRACKS?**

W -- since we're saving just one waveform.
Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

What it's asking for here is the number of the oscillator (not the Preset) that has the waveform you want to save. Hit **2**. As usual the disk drive grinds into action, and when the MENU line returns CATALOG your disk. You should find a new file, named **WAVE.HONK1**

Repeat this process to save waveform A as HONK2.

Loading Waves

Now let's load these two waveforms into SOUNDS.SNARF. The first thing we want to do is exit the ZOWIE sounds and load the SNARF sounds, which we do by simply LOADing SOUNDS.SNARF. Loading a SOUNDS. or a TRACKS. file automatically erases the previous SOUNDS. or TRACKS. file from memory.

Next, when the MENU comes back up, select LOAD.
Computer responds: **ENTER FILENAME...**

Let's load **HONK1** first. Type that in, and RETURN
Computer responds: **SOUNDS/WAVE/TUNE(X)/TRACKS ?**

W -- for WAVE
Computer responds: **ENTER OSC (0-F) OR LFO (G,H,I,J) :**

This is the important part. It does not matter where we saved the waveform from. What's the computer wants to know now is where to put the waveform.

As you may recall, we said oscillators 1, 3, 5, 9, B, & D were disposable in this preset group. So press **1** to put this waveform into oscillator 1.

Repeat this whole process to install HONK2 into another available oscillator. But remember, please, what we said earlier about oscillator assignment and available notes on the keyboard. Oscillators 0 through 7 are always left; oscillators 8 through F are always right. To maintain the proper stereo perspective, and the proper keyboard characteristics, it is therefore necessary to install HONK2 into either 9, B, or D.

Important Point (Reprise)

It is important to remember that what we have done here is transfer oscillator waveforms from one SOUNDS.file to another. The envelope information, frequency modulation information, and the oscillator/preset connections (as displayed on the PRESET screen) all remain as they were before. To finish transferring a complete voice, then, it is necessary to go to the PRESET screen and reset all these parameters. (You did write down the values, didn't you?)

Saving the New SOUNDS.file

Once you've installed the new waveforms and either adjusted the oscillator parameters or decided to go back to the source SOUNDS.file and find out what the adjustments should be, you will probably want to save your work.

By this time, saving a SOUNDS.file should not be difficult for you. We do recommend, though, that you save this altered SOUNDS.SNARF file under a different name; say (since this is our "dynamite buncha sounds") SOUNDS.DYNO. That way you will avoid altering or erasing the original SOUNDS.SNARF.

"But I don't want to keep those sounds!" you say?

Dent's Second Law of Improbability: The greater your conviction you will never need something again, the higher the probability you will desperately need it tomorrow morning.

The RENAME Files Command

Let's be frank about it; if you have a Soundchaser the odds are that you are a fairly experimental musician, and as we all know, experimental musicians do much of their work at strange times of the day and/or night.

There is therefore a terrific tendency we all have to be finishing up a bit of work at two in the morning with our thoughts already drifting towards something else, and we go to save what we've done and the computer slaps us in the face with **ENTER FILENAME...**

We blank momentarily and then, in an astounding flash of free association, we name the file for the first thing that pops into our minds. Our disk catalogs look like this:

```
SOUNDS.PIZZA
SOUNDS.KATHY
TRACKS.CATFOOD
 WAVES.BEER
TRACKS.WOPBOPALUBOP
```

While these names are cute, colorful, and probably have some clinical value for the insights they offer into the creative mind, they are not particularly descriptive. Two weeks later you look at a file named TRACKS.SNACKS and wonder what it was. Loading and playing the file doesn't help since you don't remember which SOUNDS.file went with it, and you're having trouble getting it to sound like anything coherent.

This is why we have the RENAME function; so once you've created a file you can dump the temporarily meaningful title you used while experimenting, and replace it with something more objective.

For example, when we merged our hypothetical SNARF and ZOWIE files we named the new file SOUNDS.DYNO. Now let's say this file contains all the presets we use when performing our epic concept rock piece, "The Ceiling."

We could hope we always remember, in the manic heat of performance, the name of the file to load between songs.

Or... we can rename the file.

B: PANIC SITUATIONS!!!!!

DOESN'T MAKE ANY SOUND

1. Check to make sure your monitor amp is on.
2. Check to make sure monitor switch is set to correct input source.
3. Check to make sure monitor volume is up.
4. Check to make sure cables are connected to computer.
5. Check to make sure computer is on Preset Screen. (if you're playing back from Sequencer see next section)
6. Check to make sure computer output volume is up
7. Check to make sure Preset is assigned to keyboard section you are playing.
8. Check to make sure oscillators are assigned to Preset. (Try other Presets)
9. Check to make sure Mountain Cards are in slots 4 & 5.
10. Check interconnection between Mountain Cards.
11. Check to make sure no one has tripped over and ripped out speaker cables.
12. Check to make sure that the ribbon cable is plugged into the Interface card properly.

SEQUENCER DOESN'T PLAY BACK

1. Check Mode of desired playback tracks.
2. Check Volume of desired tracks.
3. Exit to Preset Screen; check Master Volume.
4. Return to Sequencer, check viability of voices. (if your first track was a sixteen oscillator preset and it only plays once in a while, you'll not hear anything on the other tracks.)
5. You did press the space bar, didn't you?

NOISE OR GARBAGE IN ONE OR BOTH CHANNELS

1. Check your audio output cables. Replace, if suspect.
2. Check connector between Mountain cards. This cable should never be kinked. If it is, the quick fix is to swap it end for end and smooth the kink out.

SOME NOTES ON KEYBOARD DON'T WORK SOMETIMES

If you move the system a lot, or twist the keyboard cable up a lot, you may crack one of the wires in the keyboard cable. The symptom is, sometimes some keys will stop working, but if you jiggle the cable they resume working. (I had all my D and F# keys cut out once)

The only fix is to replace the cable. Call Passport.

If some notes don't work sometimes, but jiggling the cable doesn't seem to help, it may be time to clean the keyboard contacts.

NO KEYS ON KEYBOARD PLAY

1. Is keyboard cable connected to interface card?
2. Is keyboard interface card in Apple?
3. Is the ATTACK set to 00? This setting is in effect OFF.

KEYBOARD NEVER STOPS PLAYING

A -- If sound doesn't stop, but continues to change pitch in relation to the keyboard, you've got your RELEASE value set to 00, which in effect is no release ever.

B -- If sound doesn't stop, and ignores the keyboard, you've got trouble. On some late production (late 1982) Apple II+'s there is an internal interference problem with the Apple. This will on occasion cause the keyboard to lock up; it sticks on a note, won't change pitch if you press a different key, and won't let you exit to any other screen.

>>>>>>>> This fix does not work on Apple II e.

The fix for this is an extra chip which Mountain is now shipping packaged with their synthesizer cards. If you didn't get one call Mountain Computer (408) 438-6650. Tell the customer service department that you need a DMA Noise Reducer for the Music System.

The chip should be mounted in location **B 11** on the motherboard of your Apple. This is not a job for amateurs. If you've never replaced a chip in your Apple before, if you've never pulled apart the entire chassis of the computer before, leave this job in the hands of a trusted service tech. Or at least, a friend who's done some chip work in the Apple before.

CAN'T LOAD TRACKS.files

If you're sure you've followed directions and you still can't get TRACKS.files to load reliably (and you've already checked out the disk drive) and you also own a late-production Apple II+ : the same problem described above can also interfere with successfully loading binary files.

The fix is the same DMA Noise Reducer chip from Mountain Computer.

CAN'T RELOAD RENAMED FILES

Did you remember to give it the correct prefix (i.e. TRACKS. WAVE. SOUNDS.) when you renamed it?

CAN'T RENAME OR DELETE FILES

Remember, you must use the full name of the file for DELETE or RENAME functions.

LOW NOTES SOUND "WOOZY"

Soundchaser's frequency modulation is not balanced. This means that the same MOD AMT will throw a low note further off pitch than a high note. The only fix is to be more subtle in your use of vibrato; it's very tempting to give your high notes a real siren-like warble -- which results in low notes that wander all over the place.

The other fix is to split the keyboard.

DISTORTION ON LOW NOTES & CHORDS

The most common cause of this is too high a Master Outpu volume. The solution is what your mother's been telling yo for years: TURN IT DOWN!

As an example, running Soundchaser into my Teac Model 2 mixer, line inputs; I find that it doesn't matter what th input channels are set at. If I have the Soundchaser's out- put volume set above 30 I get peak and transient distortion.

Dense, low pitch chords will also overload the output But then, that's bad orchestration technique, too.

RAN OUT OF MEMORY ON MY FIRST TRACK

As stated elsewhere in the manual, the capacity of th Sequencer is not measured in time, but in notes. A 48K Appl has roughly a 2800 note capacity; a 64K machine roughl doubles that. If you're playing slow and stately single-not tracks that capacity can be dragged out to quite considerable amount of time; if you're playing a lot of Ric Wakeman-ish rolling amphetamine chords it is quite possibl to use up those 2800 notes on one track in less than thre minutes.

If it seems you've really fallen far short of that 280 note capacity, though, take your Apple in for memory diagnos tics. It is possible to lose a chip or two in the memory an still have the machine function perfectly most of the time.

LOST THE LAST TRACK I RECORDED

So you recorded your first track without trouble, then wen back and overlaid your second track. Now, just when you wer ready to lay down your third track, you can't find the secon track anywhere.

Did you remember to MERGE the second track before going on?

BLEW MY SYSTEM MASTER DISK!!

Well, lucky thing you made a backup copy.

What, you didn't make a backup copy? Well, at leas you've sent in the warranty card. We can replace the disk but you'll be out a little time. Send in your blow Turbo-Traks diskette for replacement along with $15.

What, you didn't send in the warranty card? Well, gee, that's too bad.

C. Frequenty Asked Questions

Q.-- I want some volume difference between presets, but the Volum control is a pain to use quickly while performing. What do do?

A.-- First, try experimenting with your envelope controls. Ofte what you want is not so much a volume difference as an ATTAC or SUSTAIN difference.

Second, remember that during your CREATE function, each on of those bars represents the amplitude (volume) of a part o

the waveform. The lower the general range of these settings, the lower the overall volume of the oscillator.

Q.-- Can the system be used without the keyboard?
A.-- No. At least, not with our software.

Q.-- Does this thing behave any differently if I have a language card?
A.-- Yes. Included in the software is a program called DDMOVER. This software will check for the presence of a language card and if it's there, automatically load the DOS to the language card. This frees up roughly 11 kilobytes of lower RAM for use by the Sequencer.

The important catch is: if you will not always be using a 64k machine you can get in big trouble. It is possible to create enormous sequencer files on a 64k machine. When you go to retrieve those files on the 48k machine -- oh, it'll retrieve them allright. But because your machine is only 48k and the DOS didn't get moved to the language card; it got loaded to the same lower RAM memory location that this large TRACKS. file is now coming in and writing over.

The TRACKS.file will load and play. It's just, when you go to load or save something, you'll find out that your DOS has been obliterated.

To avoid this, either A: always use a 64k machine.
or B: Press SPACE BAR while booting the system. This causes the program to ignore the language card and treat the computer as is it were a 48k machine.

You lose Sequencer capacity, but gain compatibility.

Q.-- You said this thing is 16-voice. So how come I can only get 8 voices off the keyboard?
A.-- Check the number of oscillators you have in your preset. If you have 2 oscillators per voice then your limit is 8 voices; if you've four oscillators per voice then your limit is four voices, and so on. 16 voices isn't always guaranteed; it's the top limit.

The only way you can have 16 voices on the keyboard is to have the keyboard split and have a single left (0-7) oscillator on one side of the keyboard, and a single right (8-F) oscillator on the other side.

Q.-- You said this thing works like a multitrack recorder. Can I plug a microphone into the cassette input on my Apple and record that, too?
A.-- No. It doesn't work that way. What the computer is collecting and storing is not the actual sound you play but a string of numbers showing which keys were pressed, and in what time relationship.

You cannot record an analog signal, like a microphone, unless you first have an extremely high-speed frequency analyzer, a sampler, and a digitizer. There is a good reason why

NOTEWRITER Version 1.0
USER'S MANUAL

NOTEWRITER: Real-time monophonic music transcriber
and music editor for the
SOUNDCHASER COMPUTER MUSIC SYSTEM

Author: HERB MOORE
Editor: JOHN L. BOROWICZ

SOUNDCHASER™
COMPUTER MUSIC SYSTEMS

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NOTEWRITER
(Introduction)

The Notewriter software enables you to use your Soundchaser Music System to transcribe and edit music. Music can be transcribed in any of 15 keys, 4 tempos, and 16 time signatures. The music notation for melodies played on the Soundchaser keyboard can be displayed on the screen, or printed if you have a dot matrix type ,interfaced via a **Grappler** card, or a Silentype (thermal) printer. The Notewriter software also provides an editor which allows you to make changes, insertions, and deletions of key signs, time signatures, notes, and rests, as well as other parameters of the melody. Note sequences can also be saved on disk for later use. This manual describes the operation of the Notewriter commands.

CAUTION: MAKE A BACKUP

Backup copy procedure:

* Turn Apple off with switch at back left side.
* Put Apple System Master Disk in Drive 1.
* Turn on Apple.
* When System Master Disk is booted...
* Type RUN COPYA
* When copy program is booted...
* Put Notewriter Disk in Drive 1.
* Put blank Disk in Drive 2.
* Press the RETURN key to default for each of the "Source and Destination Drive" prompts that appear.
* When copy is complete, store original in a safe place and put backup in Drive 1. You are now ready to begin.

TERMINOLOGY AND SYNTAX

Before discussing the operation of the Notewriter, a brief description of terms and symbols used in this manual is in order.

TERMINOLOGY

NOTELIST - refers to the entire sequence of notes, from beginning to end, for a particular melody or composition. The notelist is typically entered using the Transciber mode of the Notewriter and then changed or revised using the editor. You can also insert notes into an empty list using the editor.

EDIT WINDOW - the section of the notelist displayed on the screen in the edit mode. The cursor (arrow at bottom of staff) points to individual events in the notelist. It is moved forward or backward in the notelist using the right and left arrow keys on the Apple keyboard. Movement of the edit window itself is detailed in the command descriptions in the EDITOR section.

MUSICAL EVENTS - refers to notes and rests.

STRUCTURED EVENTS - refers to symbols such as bar lines repeat signs, meters, and key signatures.

BRACKETS

Unless otherwise indicated, in this manual a key name enclosed in brackets means you press the key to execute some operation. For example:

<RETURN> means press the RETURN key

<ESC> means press the ESC key

Some operations are automatically executed, but whenever the RETURN key is required, it will be indicated. There are also some cases in which the brackets < > are used as part of a command. These will be carefully noted.

OPERATING THE NOTEWRITER

Okay, its about time to get started. If you haven't already done so, boot the Notewriter...

* Turn off the Apple.
* Put Notewriter in Drive 1.
* Turn on Apple.

When the Notewriter is booted, the main menu appears of the screen with the following options.

TRANS SAVE EDIT QUIT GET

SELECT ONE (T, S, E, Q, G)

Typing one of the four letters above results in the option:

ARE YOU SURE? Y/N

N returns you to the main menu
Y continues with the operation

TRANSCRIBER

The steps from the main menu to transcribe music are:

* Type T for Transcribe
* Type Y for Yes

Screen displays the message:

CONTINUE OR START NEW PIECE C/S

* C for continue will display the staff and add to the end of a notelist already in memory.
* S for start is used to begin a new piece.

Next, you are prompted to select a key signature from the following:

C G D A E B F+ C+ F B- E- A- D- G- C-

\+ is sharp
\- is flat

For example, to transcribe a melody in the key of E flat major:

* Type E- <RETURN>

Or for the key of G major:

* Type G <RETURN>

If you do not specify a key signature and simply type RETURN in response to the Key Signature prompt, the transcriber will default to the key of C major/A minor.

WORDS OF WISDOM??? --- "You'll never **B sharp if you C flat.**"

After selecting the key signature, you are prompted to select a time signature from among the following:

2	2	3	3	3	3	4	4	5	5	5	6	6	7	7	9
2	4	2	4	8	16	2	4	4	8	16	4	8	4	8	8

So, if you wish to transcribe a melody in 3/4 time:

* Type 34 <RETURN>

A time signature of 5/16 would be entered as follows:

* Type 516 <RETURN>

If you do not enter a value for the time signature the transcriber will default to a time signature of 4/4.

You are next prompted to select a tempo from:

SELECT BEATS/MIN 117 78 58 46

Thus, if you wish to transcribe a melody at a fast tempo:

* Type 117 <RETURN>

For a slow tempo:

* Type 46 <RETURN>

If you don't enter a tempo, the transcriber will default to a metronome tempo of 117 when you press <RETURN>.

When these operations are completed, the music staff appears on the screen with the proper tempo, time signature, and key indicated. The message at the bottom tells you to:

PRESS <SPC> TO BEGIN AND END TRANSCRIBING
PRESS <ESC> TO EXIT

When you press the space bar, you will hear the Notewriter's "metronome" click at the appropriate tempo. One measure's worth of clicks will sound before the transcription mode is entered. This is an aid you can use in sync-ing with the Notewriter. Now as you play the Soundchaser keyboard, you will hear the melody you are playing and see it being transcribed on the staff. You must listen to the click and sync your playing to it. Each click represents one beat. So if you are transcribing in 3/4 time each click will represent a quarter note, and there will be 3 beats per measure. If you are transcribing in 5/16 time, each click represents a sixteenth note and there will be 5 beats per measure.

It takes a little time to learn to smoothly synchronize your playing with the Notewriter's click. If you begin a key depression slightly before you intend to, the resulting notation may not accurately represent the note you wished. Likewise, if you release a key to early you will introduce erroneous rests and/or ties in your melody.

For practice it may be helpful to begin with a slow tempo. Then practice striking each key just as the click occurs and releasing just before the next click occurs and you strike the next key. Once you've got a feeling for this, you can then begin to play passages which are synced with the click beat and it will begin to feel more 'natural'. Later you can increase the tempo as your technique with the transcriber becomes more fluid.

OH NO! NOT MORE WORDS OF WISDOM???

While a reasonable amount of experimentation is always admirable, we strongly recommend that you use an approach similar to the one decribed above to develope a smooth or "fluid" technique with the transcriber rather than more eccentric approaches such as soaking the hands in motor oil, especially if you happen to chew your fingernails.

The transcriber analyses musical events in units of time equal to a thirty second note. Events of shorter duration than this will be ignored. In short, your melody is 'quantized' into the closest note value for the time it was held down with the smallest unit being a thirty second note.

You may notice that as you are playing, the pages fill up, blank out and then begin to fill up again. These notes are stored in the computer's memory as a notelist. With the Editor you will learn ways to make changes in the notelist and will be able to play back the melody.

Press the space bar again to end transcribing. You can continue from where you stopped by pressing the space bar again, or you can return to the main menu by pressing the ESC key.

HOW DO I GET OUTTA HERE!!!!

To leave the transcriber and return to the main menu:

* First hit the space bar to end transcribing.
  (You'll know you've stopped transcribing when the clicks have stopped.)
* Next press <ESC> to return to the main menu.

From the Main Menu you can...

... ... re-enter the Transcriber and start a new piece or append onto the current notelist.

... ... enter the "Editor" to make changes or corrections in the notelist.

... ... "Save" your melody or bass line as a file on diskette.

... ... retrieve an 'old' file with the "Get" option and append onto it via the Transcriber or add to it via the Editor.

Or, ... "Quit" and go do something else!

Now it's time to go through the Notewriter Editor commands.

EDITOR

To edit music which has already been transcribed:

* First go to the main menu.

TRANS SAVE EDIT QUIT GET

* Next, type "E" for Edit and then "Y" for YES

There will be a brief pause while the editor in loaded into the computer's memory. If there is a melody already in memory, the screen will display the staff with the beginning measures of that melody. The bottom of the screen displays, in inverse, the editor command list:

B C D E G I J K M N O P R S T W X
<- * ->

You will have a melody in memory if you have been experimenting with the transcriber as described on the previous page. To hear this melody:

* Type P <RETURN>

If there is no note sequence in memory then only the command list will be displayed with the message:

* EMPTY LIST

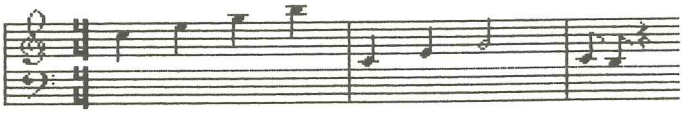
You must either return to the main menu and transcribe a melody, or use the "G" (Get - described below) command to retrieve a previously saved notelist from the diskette. It is also possible to insert notes into an empty notelist but for now we will use a prerecorded notelist.

A SIMPLE SAMPLE MELODY

For the sake of illustration, the following melody has been entered using the transcriber and we will be editing this piece of music as each of the editor's commands is explained. To get this melody into your computer's memory use the following procedure:

* Type G SUN <RETURN>

There should be a brief pause and then the following should appear in the edit window:



EDITOR SYNTAX

The following symbols are used to describe various specifications of musical events (notes and rests) in the Notewriter Editor.

NOTE NAME OR REST

A B C D E F G R — natural is assumed

SHARP OR FLAT

\+ or − following note name, if and only if the note is desired to be sharped or flatted.

OCTAVE

2 (low) through 6 (high) --- 4 is the middle octave

EXAMPLES

A4	A natural, middle octave (440 Hz)
C+ 2	C sharp, 2nd octave
D 3	D natural, 3rd octave
F+4	F sharp, 4th octave
R	Rest
B −3	B flat, 2nd octave

NOTE: SPACES ARE IGNORED.

DURATION OR RHYTHMIC VALUE

W = whole note
H = half note
Q = quarter note
E = eighth note
S = sixteenth note
T = thirty second note
G = grace note (= sixty fourth note)

DOTTED NOTES

Dotted notes are indicated by a period . before the note value. For example:

.S = dotted sixteenth note
.E = dotted eighth note
.Q = dotted quarter note
.H = dotted half note

NOTE: Only, Sixteenth, eighth, quarter, and half notes may be dotted. Further, doublely-dotted notes are not supported.

TRIPLETS

A (1) triplet unit consists of three consecutive musical events (or, you can say, three triplet elements) treated as a single unit. The triplet unit **mode** is defined by a prefix number (also refered to as "the command's loop count") equal to a multiple of 3 (e.g. 3, 6, 9, 12....255) **-AND-** the symbol '3' immediately preceding the triplet's rhythmic value symbol.

There are four triplet units available:

```
3S  =  sixteenth note triplet unit.
3E  =  eighth note triplet unit.
3Q  =  quarter note triplet unit.
3H  =  half note triplet unit.
```

It is also possible to enter unique triplet elements separately using the editor. Examples of how to use triplets as **units** or as **elements** will be given as the various editor commands are described.

A_NOTE_SPECIFICATION

The symbols representing the pitch of a given note, its octave, and its duration or rhythmic value must be ordered as follows:

NOTE NAME SHARP OR FLAT OCTAVE "/" DURATION

EXAMPLES

```
B-3/Q          B flat, 3rd octave, quarter note
F +2/   .S     F sharp, 2nd octave, dotted sixteenth note
G4   /S        G natural, 4th octave, sixteenth note
E-5/.E         E flat, 5th octave, dotted eighth note
```

RESTS

Rests are defined by the same syntax as notes but the symbol "R" is used in place of the note name.

EXAMPLES

```
R/.E           dotted eighth rest
R  /Q          quarter note rest
R/W            whole note rest
```

EDITOR COMMANDS: DESCRIPTION & SYNTAX

The inverse command line is always on the screen for reference. Think of it as a prompter. After a command line has been entered and the command is executing, the prompting character associated with the executing command will either flash or the symbol will change. This is to let you know that it is doing something and don't worry... the Editor will be right back.

The command prompt line(s) is depicted below:

```
B  C  D  E  G  I  J  K  M  N  O  P  R  S  T  W  X
                  <- * ->
```

B for BEGIN

This command is used to move cursor to beginning of notelist. To see this in action....

* First use the right arrow key to move the cursor into the notelist until you see the notes at the left of the edit window disappearing.
* Now type B <RETURN>

This repositions the cursor to the first note in the notelist which will be at the left edge of the edit window.

Typing BEGIN <RETURN>, or BETULGEUSE <RETURN> will also invoke the Begin command.

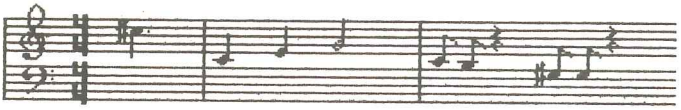
C for CHANGE

With this command you can change the note name, the octave, and the time value of whatever note is pointed to by the cursor. If you wish to change a bunch of notes to a particular specification, merely precede the command letter 'C' with a number that equals your definition of "a bunch"!

Suppose for example, we wish to change the last note in the first measure to the note C sharp instead of B, leave it in the same octave, and make it a dotted quarter note.

* First use the right arrow key to move the cursor until it points to the note.
* Next type C C+5/.Q
* Now press <RETURN>

The result should be:



When using the Change command, the cursor must be pointing to a musical event. Otherwise you will get an "ILLEGAL POSITION" error.

As mentioned above, you can change more than one musical event at a time. This is done by putting your number in front of the command letter. For example, if you wished to change three consecutive musical events to be F#, 4th octave quarter notes, you would:

* Position the cursor to point to the first event.
* Type 3C F+4/Q

The range of prefix numbers available for the Change command is 0 - 255. Prefix values larger than 255 default to 255. A prefix of greater than 999 results in an error message.

NOTE: The Change, Insert, and Rhythm-only editor commands accept multiple specifications on a command line. The prefix number (= command loop count) applies to every individual specification.

For example, the following command line will change the musical event pointed to by the cursor to a C natural, 4th octave quarter note; and the next to a E flat, 2nd octave 32nd note; and the one after that to a G flat, 5th octave dotted half note.

C C4/Q E-2/T G-5/.H <RETURN>

TRIPLETS WITH THE CHANGE COMMAND

You can change a sequence of notes in the notelist to triplet units by adding a prefix number to the Change command which is a multiple of "3" (that is, 3, 6, 9, 12...255). You must then add a prefix of "3" to the value for the notes duration. For example, to change the three note sequence at the beginning of the second measure of our sample melody to F sharp eighth note triplets in the fourth octave:

* Position the cursor to point to the first note in the sequence.
* Then type 3C F+4/3E <RETURN>

The result is:

To change 9 notes in the notelist to form three (3) B flat eighth note triplet units in the second octave:

* Position the cusor to point to the fisrt note in the sequence.
* Then type 9C B-2/3E <RETURN>

Some more examples of the change command are (we left the final <RETURN>s off of the command lines, but they should be there) :

Command Line:	Change note(s) to:
C F+3/.H	F sharp, 3rd octave, dotted half note.
C B-2/Q	B flat, 2nd octave, quarter note.
C G4/E	G natural, 4th octave, eighth note.
2C B-3/Q	Change the next 2 musical events to B flat, quarter notes in the third ocatve.
5C D4/E	Change the next 5 musical events to D natural eighth notes in the 4th octave.
12C A3/3Q	Change the next twelve notes to four sets A natural quarter note triplet units in the third octave.
2C A2/T A3/S B2/SB3/.S C3/.S C4/E	12 notes are changed with this command line. Can you determine what they will be?
7 C R/Q D-5/.E A4 / H	21 notes are changed with this command. Got 'em?

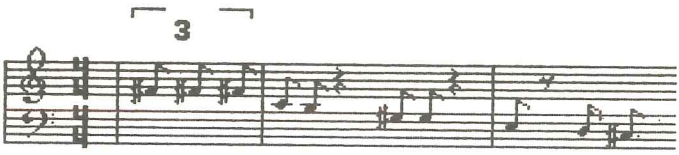
D for DELETE

This command enables you to delete a musical (notes and rests) events pointed to by the cursor. You can also delete several events or several measures using this command. You must specify the number of events you wish to delete by entering the number after the command letter 'D'. **NO DEFAULT NUMBER IS ASSUMED.**

Let's delete the fourth note in the first measure:

* First position the cursor to point to the note
* Next type D1 <RETURN>

The result should be:



Now let's delete the next two notes:

* Type D2 <RETURN>

Now let's delete the entire second and third measures from the notelist. To do this:

* First position the cursor to the first note in the measure.
* Next type D 2! <RETURN>

The exclamation point at the end of the command tells the editor to delete the number of bar lines indicated by the suffix number. In this case two. If the cursor is positioned somewhere in the middle of the measure, it will delete all events from the cursor position until the number of bar lines deleted equals the suffix number. If a key, meter, or stop event is reached before the indicated number of bar lines has been deleted, it will stop there.

Some other examples of correct syntax for the Delete command are:

```
D10   delete ten musical events.
D 7   delete seven musical events.
D 3!  delete three measures.
```

REMEMBER: SPACES ARE IGNORED

E for END

This command moves the cursor to the end of the notelist. The proper syntax for the END command is:

E <RETURN>

G for GET

The Get command is used to retrieve a file (a sequence of notes) from the disk. You have already used this command to retrieve the sample melody from the disk.

The syntax is very simple. Type the command letter 'G' followed by zero or more spaces followed by the file's name and completed by pressing the ol' <RETURN>.

We'd better get a fresh copy of our notelist for the next set of examples. To do this type: G SUN <RETURN>

I for INSERT

This command is used to insert notes or rests in the notelist. EVENTS WILL BE INSERTED IN FRONT OF THE CURSOR POSITION. The note name, octave, and duration value of the note must be indicated. For example, to add a quarter note, F sharp, fourth octave in front of the first note in the first measure:

* First position the cursor
* Now type I F+4/Q <RETURN>

The result should be:

You can also use a prefix number with the Insert command. For example:

3I F+3/E <RETURN> inserts three F# eighth notes in third octave.

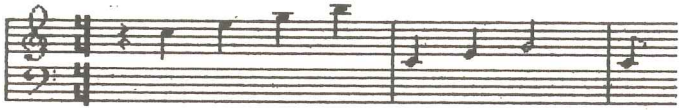
To insert multiples of more than one event, precede the I with the number of events to be added, and then indicate note name, octave, and time value for each event. For example:

2 I B-2/Q F2/E Insert 4 events -- Two B flat, quarter notes in the 2nd octave; and two F natural eighth notes in the second octave.

As an exercise, use the Delete command to take out any notes you have inserted, and then use the Begin command to move the cursor to the beginning of the notelist. You can insert a rest by typing R in place of the note name in the Insert command. For example to put a quarter note rest at the beginning of the first measure:

* Type B <RETURN> to move the cursor to the beginning of the notelist.
* Type I R/Q <RETURN>

The result should be:



TRIPLETS WITH THE INSERT COMMAND

You can insert triplet units using a syntax very similar to that described in the Change command. For example to insert a G natural sixteenth note triplet unit in the fourth octave:

* Position the cursor to the event in front of which the triplet unit is to occur.
* Type 3I G4/3S <RETURN>

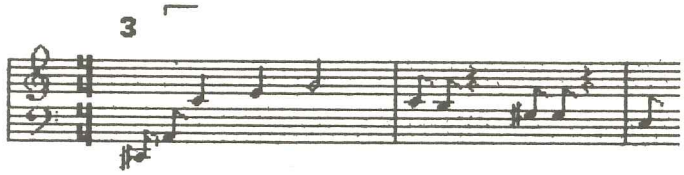
You can also insert/change triplet elements one at a time rather than as a complete unit. To do this, you must tell the editor that you're going to work with triplet elements by adding the string '< n >' , where n = 1, 2, or 3, after the triplet prefix "3" for the note duration. For example:

* Position the cursor to point to the first note in the second measure.
* Now type I A2/3<1>E <RETURN>

This inserts the first triplet element of an eighth note triplet unit which is an A natural in the second octave.

* Now type I C+2/3<2>S <RETURN>

After inserting the two triplet elements as described above you should have:



NOTE: By working with triplet elements you can mix elements from different valued triplet units!

See if you can add the third element of this bizarre group by inserting an E natural as the third element of an eighth note triplet unit. How could you have entered the two previous events and this event on one command line? It's a piece of cake!

Some other examples of the insert command are (with th
final <RETURN> implied):

```
          I  E-4/.S    insert E flat, fourth ocatave, dotted
                       sixteenth note.
          I  C 3/G     insert C natural, third octave, grace not
  2 I  F+3/Q  A 3/.E   insert 4 events, two F sharp quarte
                       notes in the 3 octave; and two A natural
                       dotted eighth notes in the third octave.
         6I C+2/3E     insert two triplet units of C sharp eight
                      notes in the second octave.
  I E-4/3<1>E E-4/3<2>E E-4/3<3>E C4/.H    insert four notes:
                      triplet unit of E flats and a C natural
                      dotted half.
  100 I C4/T E4/.S G4/G C5/T               insert 400 notes!
```

J for JUMP

Jump moves the cursor (or, the cursor and edit window) t
a new event location within the notelist. The movement may b
either forward (toward the end of the list) or backward (toward
the start) within the notelist. The direction is dependent upo
the number following the command letter 'J', this number is "th
event count" number. If a '-' symbol follows the command letter
the direction is negative - toward the start of the notelist. If
'+' symbol follows the 'J' ,or if only digits follow the 'J', the
the direction is positive.

Typing: J <RETURN> invokes a **default** command operation. Th
operation will position the event that is currently just to th
right (out of view) of the right edge of the edit window **to b**
the new leftmost event in a **new** edit window, with the cursor
pointing to it! Got it? Try it!

Let's look at some examples and see what they do. We'll look
at 'jumps' within and outside the current edit window.

* First move the cursor three events to the right
  via the Right Arrow key command (->).
* Now type J-3 <RETURN>

You notice that the cursor 'jumped' back to its original
position. Typing J7 <RETURN> will cause the cursor to jump to th
event (structural or musical) that is seven events to the right.

Here are some more examples for you to try (remember the
implied <RETURN>):

```
J +23          jump to the right 23 events
J   -17        jump to the left 17 events
J              jump  to the next edit window to the
               right
```

K for KEY

THIS COMMAND CHANGES THE NOTATION. IT DOES NOT CHANGE THE ACTUAL PITCH OF THE NOTES PLAYED. When a key change is made, all of the notation, including accidentals, for the section of the notelist encompassed will be adjusted to conform to the new key. The list will, however, sound the same when played back. Techniques for changing the pitch only of the notelist will be discussed in the "Transpose" command section a little later on.

* The initial key of the notelist can be changed but not deleted.
* Key signatures can be inserted, changed or deleted throughout the notelist.

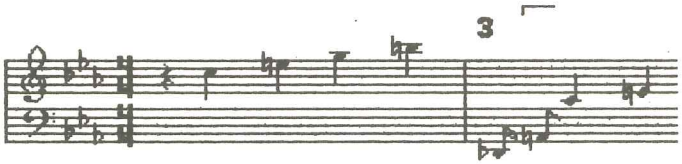
The Key command requires a prefix:

+ for change or insert
- for delete

When changing the initial key, the letter 'I' must follow the command letter 'K'. For example, to change the key signature for our sample melody from A to E flat:

* Type +KIE- <RETURN>

The result should be:

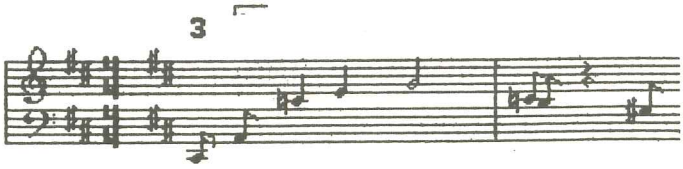


To insert a key signiture elsewhere in the notelist the cursor must be at a structured event (bar sign etc.). To insert a key signature at the second measure:

* First position the cursor to point to the bar line beginning the second measure.
* Next type +KD <RETURN>

The result should be:

NOTE: The key signature event is placed after the structural event. This is always true for new key and meter event insertions.



The "+" prefix means to **insert** a new key signature if the cursor is not pointing to a key event, but to another type of structural event. If the cursor is pointing to a key signature event when you use the "+" prefix, it will **change** that key signature to the new one indicated. For example:

* Point the cursor to the key signature D major which you have just inserted.
* Now type + K G <RETURN>

This will change the key signature to G Major which has one sharp instead of two.

To **delete** a key signature:

* Position the cursor to point to the key signature
* Type -K <RETURN>

Some other examples of syntax for the Key command are:

+ K B	insert or change key to B natural
- K	delete key signature
+ KIC+	change initial key signature to C sharp
+ KF+	insert or change key to F sharp

Use the key command to return to the original key of C major and to delete any key signatures you have added to the sample melody.

M for METER

This command enables you to change the meter of the notelist. You can also insert or delete meter events throughout the notelist. The meter command works much like the key command. It also requires a prefix:

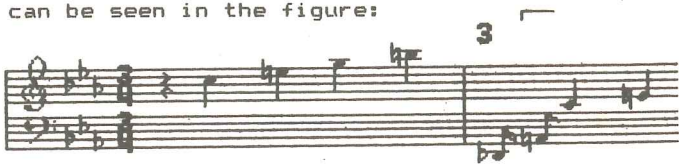
+	for change or insert
-	for delete

To change the <u>initial</u> meter of the sample melody from 4/4 to 3/4:

* Type + M I34 <RETURN>

Remember the letter 'I' following the command letter 'M' means alter the initial meter event.

The result can be seen in the figure:



Note: the edit window is positioned to the beginning of the notelist.

As with the Key command, when inserting a new meter into the notelist, the cursor must be pointing to a structured event (such as a bar line). You can also use the Meter command to change an old meter event (that is, one which was previously inserted). For example to insert a meter of 2/4 at the beginning of the third measure:

* First position the cursor to point to the third bar line
* Next type + M 24 <RETURN>

To change the meter event you have just inserted from 2/4 to 6/8:

* First position the cursor to point the meter event to be changed, if it has been moved.
* Next type + M 68 <RETURN>

This will change the meter event to 6/8.

Some other examples of the syntax for the meter command are:

+ M 44	insert or change meter to 4/4
- M	delete meter event
+ MI24	change initial meter to 2/4
+ M 516	insert or change meter to 5/16
+ MI 38	change initial meter to 3/8

N for NEXT

This command moves the edit window forward or backward to a new position in the notelist. Rather than moving by single events as with the right and left arrow keys, the movement with the Next command is by structured events. Usually this is bar lines, but other structured events such as meter and key signatures are also counted. We will call the distance from one structured event to another one position.

The Next command's direction is determined by the presence a '+' or '-' symbol preceding the "position" count number. neither symbol is present the default direction is forward. short the symbols mean:

+ = move forward
- = move backward

The cursor can be moved more than one position by enter the number of "positions" to be moved after the command let (and possibly after a direction symbol). If no number is prese the edit window moves one position. A position of the edit win is not defined by any specific number of measures. That depending on how many events there are in a given section of notelist, a single position of the edit window might amount to and one half measures, or maybe two measures. To put the fi event of the current measure presently being 'pointed into' by cursor at the left of a new edit window:

* Type N 0 <RETURN>

Some examples of the correct syntax for the Next command are:

N	<RETURN>	move edit window one position
N-4	<RETURN>	move edit window back four position
N3	<RETURN>	move edit window 3 positions forwar

Remember: If no + or - is added when initiating the Next command it defaults to forward movement.

O for OPEN

This command clears the notelist of all data and defaults key of C major/A minor with a meter of 4/4.

Since it has the potential of eliminating a large amount o data, there is the added precaution that you must type the enti word OPEN to execute the command. The proper syntax is:

* Type OPEN <RETURN>

NOTE: If at anytime prior to pressing the RETURN key, you wish to **abort** this command or any other command , press the lef or right arrow key. These are 'command killer keys' .

P for PLAY

This command is used to play all or a portion of the notelist. The proper syntax for the Play command is: (Before you do this get a fresh copy of SUN so the graphics will match from example to example.)

P <RETURN>	will play from cursor position to end of notelist.
P number <RETURN>	plays specified number of measures

If you wish to play the entire notelist:

* Type B <RETURN> to move the cursor to the beginning of the notelist.
* Type P <RETURN> to play the melody.

If you wish to stop the playback at any time:

* Type <ESC> <RETURN>

It is important to the press the RETURN key because this clears the command line.

To play a specified number of measures, you might do something like:

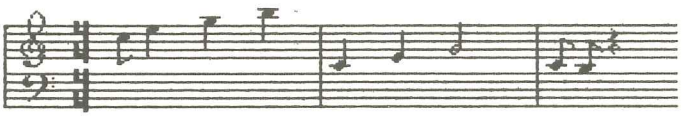
* Type P3 <RETURN>	play three measures from cursor position.
* Type P7 <RETURN>	Play seven measures from cursor position.

R for RHYTHM

This command is used to change the time value of a note or rest without changing the note name or the octave. Suppose for example, you wish to change the first note in the SUN notelist to an eighth note instead of a quarter note:

* First, position the cursor to point to the note
* Next type RE <RETURN>

The result should be:



If the cursor is pointing to a rest, it changes the rhythmi value of the rest in the same way.

You can also change the rhythmic value of several notes a once by including a prefix number in the Rhythm command. Fo example:

```
* 3 RQ <RETURN>   changes the rhythmic value of the
                  next three musical to quarter notes.
```

Some other examples of correct syntax for the Rhythm comman are:

R.E	change the note or rest pointed to by the cursor to a dotted eight note.
R.S	change the note or rest pointed to by the cursor to a dotted sixteenth note.
4 RE	change the next 4 musical events to eighth note values.
R QQ H	Q H Q HQQ change the next 9 events to 2 quarter notes followed by a half, a quarter, a half,....

TRIPLETS WITH THE RHYTHM COMMAND

You can change the notes and rests in the notelist into triple units and triplet elements with the Rhythm command. The prefix number (= command loop count) rules apply to all duration specifications found on the command line. The prefix number rule apply for triplet units as well. Let's examine a couple of command lines.

```
3 R Q 3E W <RETURN>          this command line will
           cause 9 musical events to have their duration
           changed to quarter, quarter, quarter, an
           eighth note triplet unit, and whole, whole,
           and whole.
4 R E 3S<RETURN>             this command has an error!
           The first four events will be changed to
           eighth notes, but the prefix number is not a
           multiple of 3, therefore, the triplet unit
           specification change will not be executed.
R 3<1>Q 3<2>Q 3<3>Q <RETURN>  this command line will
           alter three events into a quarter note
           triplet unit by specifying 3 triplet elements
```

NOTE: The Rhythm command requires that the cursor be pointin to a musical event (note or rest). Otherwise you will get an erro message.

S for SPECIALS

This command is used to add or delete special and structured events such as bar lines, repeat signs, and ties. The Specials command consists of:

A prefix symbol:

+ for insert or change
- for delete

The command letter:

S for this is the Special command we are reviewing!

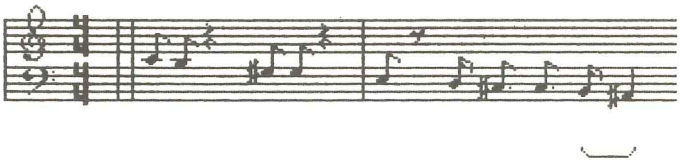
Followed by one of the four special symbols:

: beginning repeat sign
; ending repeat sign
& tie
! bar line

For example, if you planned to insert several notes in the third measure, you could add a **bar line** as follows:

* First, position the cursor to point to the event in front of which the bar line is to occur.
* Next type +S! <RETURN>

The result:



For the sake of illustration let's add **repeat signs** to measures three and four:

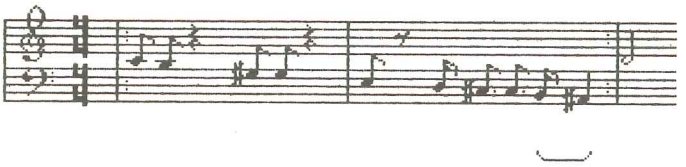
* First position the cursor to point to the bar line at the beginning of the third measure.

* Now type +S: <RETURN>

* Next position the cursor to point to the bar line at the end of the fourth measure.

* Then type +S; <RETURN>

You'll get:



You can also use the Specials command to create a **tie** between two notes.

* Position the cursor to point to the first of the two notes to be tied.
* Then type +S& <RETURN>

You can also delete a tie between two musical events as follows:

* Position the cursor to the event that starts the tie pair.
* Type - S & <RETURN>

To delete a structured event (bar line or repeat), the cursor must be pointed to the event to be deleted and then the command is preceded by a minus sign rather than a plus sign. For example, to delete a bar line:

* Position the cursor to point to the bar line
* Next type -S! <RETURN>

When deleting with the Specials command, if the cursor is not pointing to a structured event, an "illegal cursor position" message will appear.

As an exercise, use the delete mode of the Specials command to remove the other structured events you have just added.

Some other examples of correct syntax for the Specials command are:

+ S :	insert beginning repeat sign.
+ S ;	insert ending repeat sign.
- S :	delete beginning repeat sign.
+ S &	tie note pointed to by cursor to following note.
+ S !	insert bar line.
- S !	delete bar line.
- S &	delete tie between two musical events.

T for TRANSPOSE

The Transpose command enables you to change the pitch value of an individual note or group of notes in the notelist. You can transpose notes up or down a specified number of half steps. The command includes:

the command letter:

T for Transpose command

the direction and amount:

\+ means transpose 'up'
\- means transpose 'down'

followed by a number indicating the number of half steps. The legal range is 1 - 48.

A number preceding the command letter determines the number of notes to be transposed. If there is no prefix number the one note pointed to by the cursor will be transposed. In our sample melody, we'll transpose a note up four half steps .

* First, position the cursor to point to the note.
* Next type T+4 <RETURN>

The result should be:

Now let's transpose the next two notes up 3 half steps.

* Position the cursor to point to the first note.
* Type 2T+3 <RETURN>

To transpose a note down 2 half steps, you would:

* Position the cursor to point to the note.
* Then type T-2 <RETURN>

As was shown in the section describing the Key command, you can use that command to change the key in which the notelist is displayed but this does not change the actual pitch of the notes played. In order to completely transpose or "modulate" the notelist:

* First use the Key command to change to the new key.
* Next use the Transpose command to place the pitch of the notelist in the correct register.

Prefix numbers from 0 - 255 may be used with the Transpos command. The number 0 actually represents 256, so, for example you could transpose 256 events in the notelist up four half step with the command:

0T + 4 <RETURN>

The maximum number of half steps you can transpose is 48, th full four octave range. You could therefore transpose from th lowest to the highest or vice versa. If however, you try t transpose to a pitch beyond the 4 octave range of the Notewriter you will get an error message. For example, if you point th cursor to the first note in the sample melody and type:

T+40 <RETURN>

you will get an error message since this exceeds the maximu number of half steps this note can be transposed up.

Some other examples of the Transpose command are:

3 T -2	Transpose three notes down two half steps
T + 4	Transpose one note up four half steps
2 T + 3	Transpose two notes up three half steps
200 T + 12	Transpose two hundred notes up 12 half step

W for WRITE

This command is used to print a "hard copy" of one or mor edit windows. In it's simplest form it will print one edit windo It is also possible to print more than one edit window. To do thi just type the number of edit windows you wish to print at the en of the command. For example, to print just what you see in th first edit window from the beginning of the notelist:
--- prints one edit window or specified number of positions.

* Type B <RETURN> to move the cursor to the beginning of the notelist.
* Type W <RETURN>

This should print the notes and the music staff as you see i on the screen. If you wish to print the first two edit windows:

* Type W2 <RETURN>

To print a lot of edit windows :

* Type W 199 <RETURN>

Placing an asterisk * after the W in the write command, will result in a "rhythmic consistency check". That is the program will scan your notelist to make sure the sum of the time values of the events in each measure is consistent with the meter governing that measure. If a measure has too much or too little total rhythmic time the Write command will be turned off and the incorrect measure will be displayed in the edit window with the cursor positioned at the firt event in the measure.

Examples:

W * <RETURN> Checks entire notelist for rhythmic consistency, and then if it's okay, prints an edit window.

W * 8 <RETURN> Checks notelist for rhythmic consistency and, if okay, prints 8 edit windows.

NOTE: THE NOTELIST CAN BE CHECKED FOR RYHTHMIC CONSISTENCY AT ANY TIME BY USING THE '*' WITHOUT THE WRITE COMMAND.

To check the notelist for rhythmically inconsistent measures, starting with the first structural event it sees:

* Type * <RETURN>

X for EXIT

This command is used to exit the Notewriter Editor. As you exit, you have three options:

X MAIN <RETURN> exit the editor, and return to the main menu, possibly to continue transcribing.

X SAVE <RETURN> exit editor, save the file on the disk.

If you use the "save" version of this command, you will be given the prompt:

ENTER FILENAME?

Files are stored on the disk with the suffix .NOTES but you should <u>not</u> enter the suffix when saving or retrieving a file. For example:

For filename, you enter --- BEEBOP

The file is stored on disk as --- BEEBOP.NOTES

Wait for the prompt to clear before you enter your filename. The system will save your notelist away and then jump to the BASIC/DOS environment.

Remember, you retrieve a file from the disk with the "G" (Get) command. You also ignore the .NOTES suffix when retrieving a file.

X KILL <RETURN> will cause you to leave the Notewriter program and go into BASIC/DOS.

For example if you wanted to look at the "catalog" of your disk files:

```
* Type  X KILL  <RETURN>
*       TEXT   <RETURN>
*       CATALOG  <RETURN>
```

You could also try out different playback waveforms.

```
* Type  X KILL <RETURN>
*       TEXT   <RETURN>
*       BLOAD WAVE.XXXXXXX,A$5700 <RETURN>
```

To return to the Notewriter program without losing the data in your notelist:

```
* Type      HGR  <RETURN>
*           CALL 38025  <RETURN>
*           B  <RETURN>
```

This will bring you back into the Notewriter Editor with the data in the notelist intact.

This completes the description of the Editor commands. The remaining modes SAVE, QUIT and GET from the main menu, are decribed next.

And here we go.....

****

SAVE

You can save a notelist (file) which you have transcribed or edited by using the SAVE command from the main menu.

* Type S for SAVE

This will result in the prompt:

ENTER FILENAME

You then type the name of your file and press RETURN.

As with the Exit command in the Editor, files are saved on the disk with the suffix .NOTES but you do not include the suffix when saving or retrieving files.

****

QUIT

The QUIT command will cause you to leave the Notewriter program and go to BASIC. You will have about 13 seconds to change your mind and return to the main menu if you want.

This option can be used if you wish to delete an entire notelist from the disk. To delete an entire file from the disk, the .NOTES suffix must be included. For example, if you wished to delete a file named BEEBOP, the procedure would be:

* Go to the Main Menu of the Notewriter
* Type Q <RETURN> to leave the program
* Type DELETE BEEBOP.NOTES <RETURN>

****

GET

You use the GET command from the main menu to retrieve a file from the disk in the same way that you do from the editor. Remember that files are stored on the disk with the suffix .NOTES, which you so not include when retrieving a file. For example if the file is stored on the disk as SEASCALES.NOTES, you retrieve it with the main menu command sequence:

* Type G <RETURN>
* Type Y <RETURN>
  In respones to the prompt:
* Type SEASCALES <RETURN>

CONFIGURE

This program on the Notewriter diskette enables you t specify the correct configuration for a variety of differer printer types. In this section you can also select among different waveforms, each of which provides a different sound fo the transcribing and playback of the notelist.

To run the Configure program on the diskette you must firs leave the Notewriter program and enter Applesoft BASIC. This ca be done using either the QUIT command from the main menu or the KILL command from the edtor. After this is done:

* Type TEXT <RETURN>
* Then type BRUN CONFIGURE <RETURN>

This will result in the following menu appearing on th screen:

******** CONFIGURE ********

SELECT PRINTER MODULE:

PRESS S FOR SILENTYPE
PRESS V FOR GRAPPLER VERT/DBL
PRESS H FOR GRAPPLER HORIZONTAL
PRESS RETURN TO SKIP

After you have selected one of the options above, you wil receive the following prompt.

SELECT A PLAYBACK WAVEFORM (Y?N)?

0 - SINE
1 - TRIANGLE
2 - SQUARE
3 - SAWTOOTH
4 - PULSE
5 - COMPLEX 0
6 - COMPLEX 1
7 - COMPLEX 2
8 - COMPLEX 3
9 - COMPLEX 4

PRESS 0 - 9 TO SELECT
PRESS RETURN TO SKIP

You will then be asked if you want the notelist event displayed in the edit window to be proportionally spaced or if yo want each event to get an equal space.

PROPORTIONAL SPACING (Y/N)?

Finally , you will be asked if you want to select a transcribing waveform. It's menu is similar to the playback (editor) waveform selection.

Your Notewriter is shipped to you in the following configuration :

```
TRANSCRIBER WAVEFORM              =     COMPLEX2
EDITOR 'playback' WAVEFORM        =     COMPLEX2
PRINTER MODULE     =   GRAPPLER / HORIZONTAL
EDIT WINDOW PROPORTIONAL SPACING  =     ON
```

WHAT TO DO AFTER YOU'VE RE-CONFIGURED

To get back into the Notewriter program:

* Type RUN NOTEWRITER <RETURN>

****

This concludes the description of the commands for the Notewriter Software for your Soundchaser Music System. Have fun and be sure to take an occasional break for a peanut butter sandwich..... or whatever...

All of us at Passport Designs, Inc. want to thank you for your patronage and your continued interest and support in our music products. It is our goal to produce functional, hi-quality, reasonably-priced 'musical tools and instruments' that meet your artistic needs.