

Introduction to the EMS Quadra and Software

The Experimental Music Studios (EMS) computer is a Macintosh Quadra 840 AV with 8 megabytes (meg) of physical memory, 16 meg with RAM Doubler, and a 230 meg internal hard drive. It is currently configured with freeware and shareware to generate, record, and edit digital sound. The Quadra is patched into the audio system so that the studio's analog synthesizers (Moog, and Arp) can be digitally recorded and edited. Taped and non-electronic sounds may also be digitally recorded and subjected to digital concrete manipulations.

EMS Digital Sound Software

A digital sound file is a series of binary numbers which represents a sound. The software currently installed on the EMS Quadra will generate, record, edit, and transform digital sound files. The main applications which we will use are: **Sound Effects**, **Sound Hack**, and **MUSIC 5**. These are non-commercial programs which students may copy and install on their own Macintosh computers. The features of each program are described below.

Sound Effects is a digital editor which allows sound files to be recorded and edited in multiple tracks which can be assembled into a composition. Features include:

- Normalize
- Gain Change
- Fade In
- Fade Out
- Pitch Change
- Mix
- Filter
- Echo, Flange, and Reverb
- Reiterative crossfading (morphing)
- Sample Hose
- Granular Synthesis

Sound Hack is a digital editor which transforms sound files. Features include:

- Continuous Pitch Change
- Continuous Time Compression/Expansion
- Varispeed (continuous pitch/time shift)
- Mutation (or "morphing")

MUSIC 5 is a sound-computation program which generates digital sound files from user-defined "scripts." Features include:

- Waveform generation
- Subtractive synthesis
- Additive synthesis
- FM synthesis
- Envelope generators
- Noise generators
- Delay and reverb
- Reads sound files

Other programs which we will use, **Sound Sculptor** and **Lemur**, will be discussed later.

Basic Operations of the EMS Quadra

1. Mac Skills


If you are not already comfortable on a Macintosh, you should read the Macintosh User's Guide in Studio Two and do the Macintosh Basics tutorials which are found on the Macintosh computers in the ITC lab.

2. Keyboard Commands

Because working with sound files entails doing a number of quick, repetitive actions, you should learn as soon as possible the keyboard commands that replace mouse actions. Keyboard commands (also called "hotkeys") will be described as follows:

cmd + S



- Hold down the command key (labeled  on the keyboard) while typing the letter S.
- The letters of a command are case-insensitive, so do not hold down the shift key unless it is part of a command key sequence.

opt + cmd + E

- Hold down the option key and the command key while typing the letter E.

3. The Finder

At any given moment, a Macintosh computer is in one of two modes: it is either in the **Finder** (this obscure term is Apple's) or it is running an **application**. The Finder lets you perform general tasks, like copying or moving files, creating or moving folders, etc. The EMS Quadra has been configured to display a customized **Finder Menu Bar** at the top of the screen when it is in the Finder, as shown below.



Notice that the menu items beginning with "Studio Files" and those to the right of it are not standard Macintosh menu items and will not be found on other Macintosh computers.

When an application is running, an **Application Menu Bar** will be shown at the top of the screen, such as the one shown below for Microsoft Word.

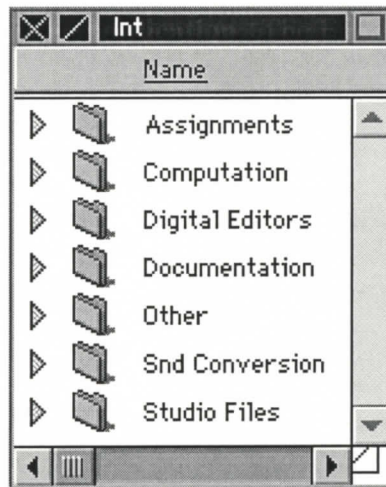


Notice that the Finder icon in the upper right corner has been replaced by the application icon. To return to the Finder, either:

- click anywhere on the desktop
- pull down the application icon and select "Finder", or
- quit the application. To do this either:
 - pull down the application's "File" menu and select "Quit", or
 - type **cmd + Q**

4. Finder Windows

Double-clicking on the EMS drive icon in the upper right corner of the desktop will open the internal drive Finder Window, shown below.



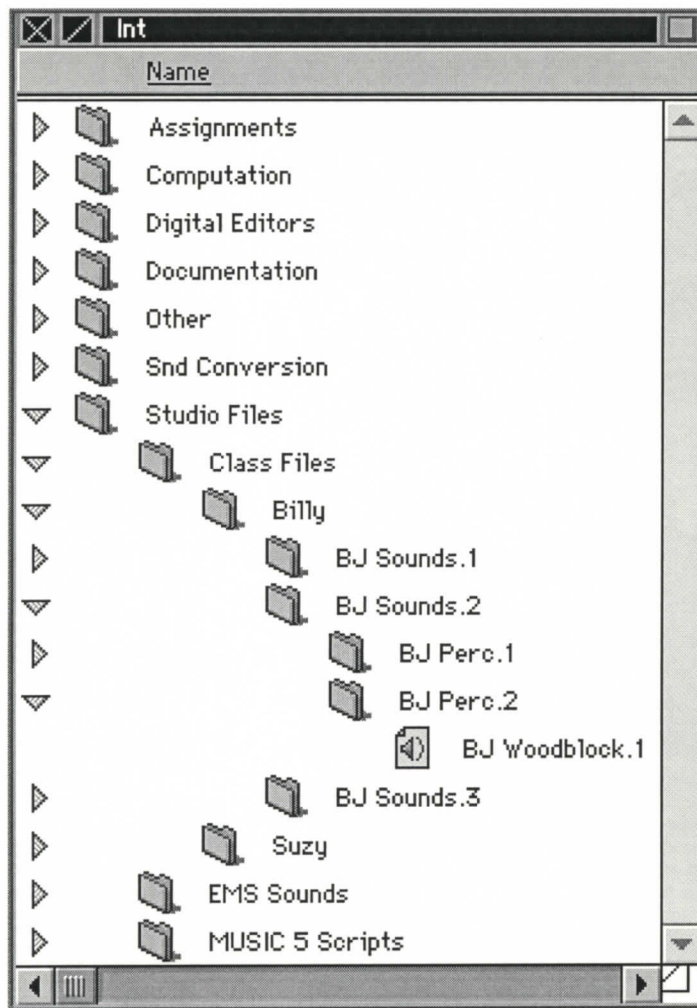
A Finder Window can be closed either by:

- clicking in the box in the upper left corner, or
- typing **cmd + W**.

Clicking on the second box to the left will create a Folder window icon. Items in the window may be viewed by using the horizontal or vertical scrollbars or by selecting view options from the Finder Menu Bar "View" menu. For convenience, the EMS Quadra Finder windows are set to view "by name".

5. Folders, Applications, Files

The internal drive Finder Window contains seven **folders**. These folders contain other folders (and other folders within those), applications, and files. An **application** is a computer program which allows the user to create text files, graphics files, sound files, etc. A **file** is a user-created document which may be opened and altered not only by the application that created it, but sometimes by other applications as well. Due to the large number of sound files that composers work with, it is usually convenient to organize these into folders and sub-folders, as shown below.



By clicking on the arrow to the left of a folder, we can see its contents. We can see deeper into the subfolders by likewise clicking on their arrows. In the window above, we see that the file "BJ Woodblock.1" is contained in the folder "BJ Perc. 2", which itself is contained in the folder "BJ Sounds.2", and so on. We can easily represent the organization of folders by using the following notation:

EMS/Studio Files/Class Files/Billy/BJ Sounds.2/BJ Perc.2/BJ Woodblock.1

6. Folder and file naming protocol

In order for users to keep track of their work, we need to agree on a folder and file naming protocol, which will remain in effect until further notice:

- all students will store their files in EMS/Studio Files/Class Files in a folder which is labeled by the student's first name only (just like "Billy");
- the names of ALL subfolders and ALL files created by the student MUST begin with the student's initials (just like "BJ", for "Billy Jones").

7. Using the "Find..." command

If you accidentally misplace a file and cannot remember its exact name, either:

- in the Finder, pull down the "File" menu and select "Find...",
- in the Finder, type **cmd + F**.

When prompted, type your initials (like BJ), and all files beginning with those initials will be displayed.

8. Copying Folders and Files

Since you should NEVER edit or make changes to your only version of a sound file, you should get in the habit of first making a copy of it and then working on this version. This means you will always have a good copy of the file in case the computer crashes while you editing (it will happen). Also, most sound editing programs do "destructive" edits, which means that any changes you make to your file are undoable.

To make a copy of a folder (and its contents) or a single file, first click on the folder or file icon in a Finder Window and either:

- pull down the "File" menu and select "Duplicate", or
- type **cmd + D**

A new folder or file previously named "BJ Honk" will appear as "BJ Honk Copy". If you duplicate "BJ Honk Copy", the copy will appear as "BJ Honk Copy 2". To save space in naming files, it is a good practice to type ".1", ".2", etc. at the end of each version, so that various versions of a file are named "BJ Honk.1", "BJ Honk.2", etc. You can delete old versions of files by dragging them to the trash.

If you are working on a file in an application, you can make a copy of it by pulling down the application's "File" menu and selecting "Save As...". You will be prompted to rename this file.

It is VERY IMPORTANT to make frequent copies of your work. Except for being late for class, the worst thing in the world is losing your data.

9. Launching Applications

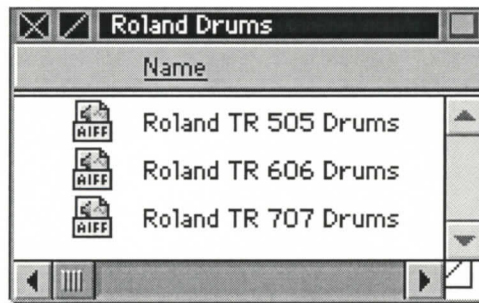
There are four ways to launch an application on the EMS Quadra:

- 1) Find the application icon in the appropriate folder and click on it. Not recommended.
- 2) In a Finder window, click on an appropriate file created by that application.
- 3) Pull down "Apps" menu from the Finder Menu Bar and select application.
- 4) The recommended procedure is to use the following keyboard shortcuts to launch the application:

- to launch Sound Effects, type: **opt + cmd + E**
- to launch Sound Hack, type: **opt + cmd + H**
- to launch MUSIC 5, type: **opt + cmd + M**

10. Opening files from Finder windows

A file may be opened in a **Finder Window** by clicking on the ^{EMS}"In" icon and the arrows found on the left of the appropriate folder and subfolders until the desired file icon is visible. Alternatively, clicking on a folder itself will open its own Finder Window, such as the one shown below.



In either case, once the file icon is visible, you may click on it and get one of the following results:

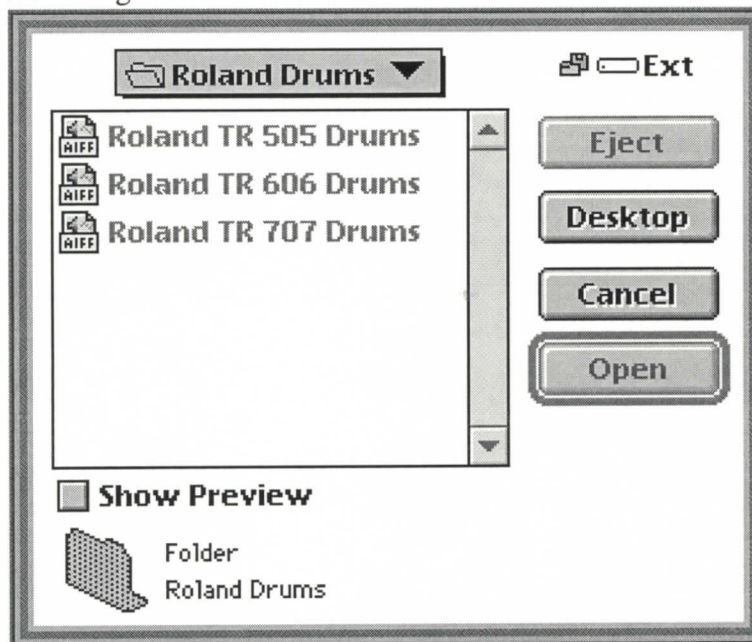
- the application that created the file will be launched and the file will automatically open
- if it is a certain type of sound file, a sound may be played and no application will be launched
- an Alert Window may open saying that the file is unreadable

11. Opening files from within an application

It is often more convenient to open files while an application is running. To do this, select one of the options from the application's "File" menu:

- Open
- Open any...
- Import...

After selecting one of these options, an **Open Dialogue Window** will appear. You may either select an item displayed in the list of files or you may search for another folder by pulling down the **folder bar**, such as the one shown indicating the folder "Roland Drums" below.










12. Opening sound files and scripts in Finder and Open Dialogue windows.

Sound files may be of a number of different types, depending on how the numbers are encoded. Macintosh computers read two types of files:

- AIFF (Audio Integrated File Format)
- SND (also known as "sys7" and "sfil")

The EMS Quadra uses software which reads both AIFF and SND files. File types which are not read by the EMS software may usually be converted to AIFF or SND formats.

EMS sound files are represented either by the icon of the application which created or converted it or by generic SND and unidentified icons. As shown below, files whose icons are represent the application which it any it can be opened in the Finder Window or from the application's Open Dialogue Window.

<u>Icon</u>	<u>File type</u>	<u>Result of double-clicking icon in Finder window.</u>	<u>How to open the Open Dialogue window.</u>
	Sound Effects AIFF.	Launch Sound Effects and open file.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open". • Launch Sound Hack.
	Sound Hack AIFF.	Launch Sound Hack and open file.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open". • Launch Sound Hack.
	MUSIC 5 script.	Launch MUSIC 5 and open script.	<ul style="list-style-type: none"> • Launch MUSIC 5, select "Open".
	MUSIC 5 AIFF.	Launch MUSIC 5.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open". • Launch Sound Hack.
	MUSIC 5 SND.	Play sound.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open". • Launch Sound Hack, cancel Open Dialogue, select "Import SND Resource".
	Generic SND.	Play sound.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open". • Launch Sound Hack, cancel Open Dialogue, select "Import SND Resource".
	Unidentified.	Open Alert Window, saying application not found.	<ul style="list-style-type: none"> • Launch Sound Effects, select "Open"? • Launch Sound Hack, cancel Open Dialogue, select "Open any ..."?

- SND files are not application-specific. Clicking on a SND file in a Finder Window will play the sound. Both Sound Effects and Sound Hack can open SND files in their Open Dialogue Windows.
- MUSIC 5 Scripts are not sound files and so can only be read by MUSIC 5.
- Unidentified sound files may possibly be open in Sound Effects, or, more likely, Sound Hack (using the "Open any..." command). In some cases, other software converters will need to be used to open unidentified sound files.

13. Pros and Cons of AIFF and SND formats.

Advantages of AIFF format:

- easily opened by Sound Effects and Sound Hack
- read by MUSIC 5

Advantages of SND format:

- may be played from Finder window without opening an application
- common format for sounds on the Internet
- Macintosh format for system sounds and game sounds

Disadvantages of AIFF format:

- cannot be played from Finder window without opening an application

Disadvantages of SND format:

- must be imported by Sound Hack
- cannot be read by MUSIC 5

AIFF is the recommended format for composing on the Macintosh. But if you download many short sounds from the Internet, it might be more convenient to leave them in SND format for testing purposes and either convert your favorites to AIFF or simply paste them into larger AIFF files.

14. Recommended sound file type, sample rate, and sample size

The technical aspects of this will be explained later, but for now you need to know that the best sound format for our purposes is:

- AIFF
- 44.1kHz sampling rate
- 16-bit sample size

If you are going to use a sound file that is SND, then convert it to AIFF. If it has a sampling rate of less than 44.1kHz, then **resample** it to 44.1kHz. If it has a sample size of 8 bits, then **upsample** it to 16 bits. Try to "upgrade" your sounds as early as possible, that is, before you start transforming them.