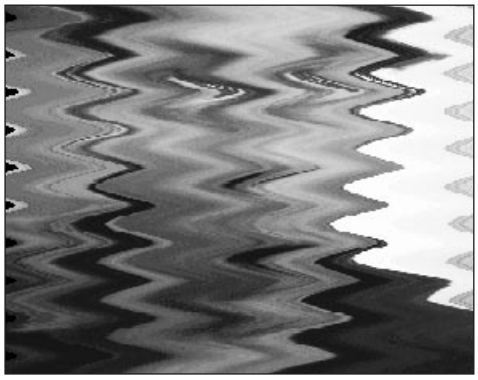
Image/ine Manual

Program by Tom Demeyer



Version 1.0

Manual by Sher Doruff

Table of Contents

Chapter Two: Basic Concepts

Chapter Three: Overview

Chapter Four: The Mapping Window

Chapter Five: The Stills Buffer

Chapter Six: PreSets, DisplayStates and Tables

Chapter Seven: Alpha Channels, Movie and Text Files

Chapter Eight: Draw and Warp Mode

Appendix

Glossary

Index

Introduction

This manual will introduce you to the basic concepts and techniques employed in Image/ine and help you to optimize its use. For information on system requirements and setting up, see the next chapter on Getting Started. For information regarding standard Macintosh® operation check your Mac documentation or the Macintosh Guide. Appendices and Glossary in the Reference Section of this manual are a handy source for additional technical information on digital video and Midi. A Tutorial Section will walk you through several scenarios and help you get acquainted with the most fundamental aspects of the program.

Image/ine is a program that allows a user to manipulate source material in a digital video environment including:

- **Video (live and recorded)**
- **QuickTime movies**
- **Text**
- **Scanned images**
- **Pict files with alpha channels**

Note: These will be referred to as Input Sources throughout the manual.

Unlike digital video editing programs such as Adobe Premiere, Image/ine works in real time. There is no compression slowdown, no compiling time - the digital filtering effects are immediate and variable.

Image/ine's strength lies in the ability to integrate three basic techniques:

- **Keying**
- **Temporal manipulation**
- **Image displacement**

By combining these techniques with an abundance of input possibilities, variable parameters and a wide range of controllers (there are over 60 parameters and 27 assignable program controllers), Image/ine becomes a dynamic imaging tool. Add to the mix the ability to control these functions with Midi and you have your hands on a powerful performance application.

As a time-based imaging tool, Image/ine allows the user to assign controlling parameters to all the functions of the program. This can range from:

- **Total computer keyboard control of all functions**
- **Full Midi control of assigned functions**
- **Randomized auto-dynamic control**
- **Unlimited combinations of the above**

For example, to scale (zoom in and out) an image you might assign the mouse as the controller, scaling as it moves along the X axis. Or, you might assign scaling to the data slider on your Midi keyboard or you may want it to function auto-dynamically.

A cursory knowledge of Midi will facilitate in understanding the depth of possibilities available in the program. Using Midi control also allows for a variety of peripheral hardware controllers, as well as the computer keyboard. These could include a typical Midi keyboard controller, dedicated midi controller devices such as the Peavey PC-1600, sensors, another computer, a Wacom drawing tablet, a voice, etc.

Although Image/ine is not an editing program, the composited output can have the appearance of a well-crafted video with a surprising array of effects. Output resolution is of course an issue, this being a real time application, and system dependent. Advances in computer speed and compression/decompression methods will continue to influence the playability and projection quality of the program. Have fun!

Manual Conventions

The 63 Parameters in Image/ine are distinguished throughout the manual by appearing in **Helvetica Bold Condensed.**

All step-by-step instructions appear in 65 Helvetica Medium.

All Pulldown menu items appear in Geneva.

Sidebars with a screened background provide additional technical information on various subjects.

Chapter One: Getting Started

First we'll take you through some of the basic requirements for efficiently running this program. You don't need to be a power-user to operate Image/ine but it sure doesn't hurt. The faster your computer, the more RAM in your system, the better Image/ine will run. A second monitor is a great enhancement, as is the availability of peripheral input equipment which can multiply your manipulation options. What's important to realize is that Image/ine can be run from a single computer setup, with only the computer keyboard as a means of control. Here are the bare-bones requirements:

Hardware/System Requirements

- **Macintosh PowerPC with a minimum 120MHz running on System 7.1 or higher and a minimum 32MB of RAM.**
- **color monitor**
- **Apple QuickTime system extension software version 2.5 or higher**

Optional

- **Second monitor**
- **video digitizing (capture)board that supports the QuickTime format (see Video Input/Output in this chapter)**
- **Video source (see Video Input/Output in this chapter)**
- **Midi Interface (see Midi Implementation in this chapter)**
- **OMS system software (see Midi Implementation in this chapter)**
- **Midi controller device**
- **Adobe ATM system software for text**

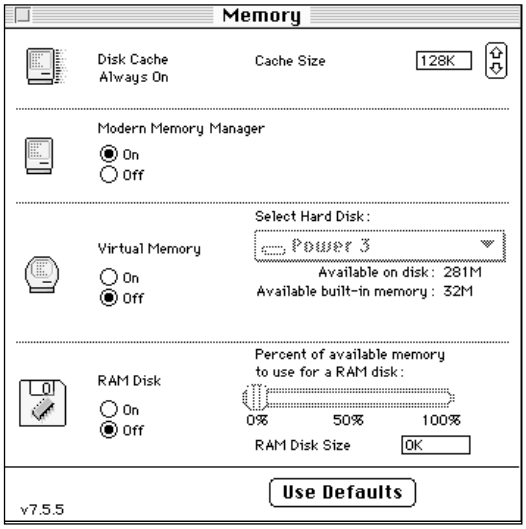
Preliminary system setup

Before you boot up the program it's important to optimize your system so Image/ine can run as efficiently as possible. There are a few preliminary setup steps involved which include, setting the systems monitor(s) resolution, checking virtual memory status, connecting the audio input source (if applicable), and maximizing the applications memory.

After bootup there are additional setups within the program that include video, Midi, monitor resolution and color depth for the Image/ine performance window. First let's look at the system settings.

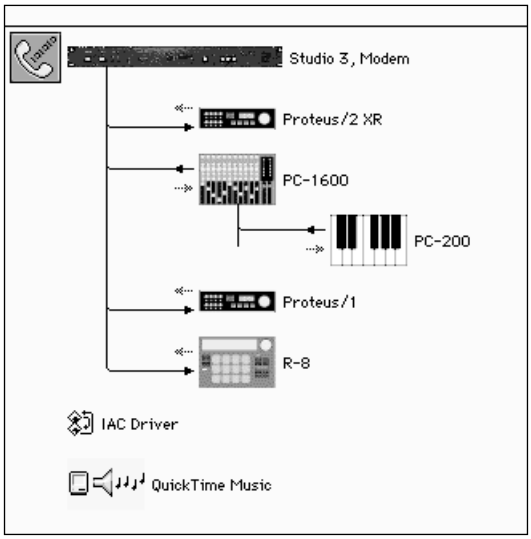
Virtual Memory

You need the Apple QuickTime extension in your system to run Image/ine. If you don't have it installed you can download the latest version from *www.quicktime.apple.com*. Virtual memory is not recommended with the QuickTime extension.



To turn Virtual memory OFF:

1. Under the Apple pulldown menu, Go to Control Panel
2. Select Memory
3. If Virtual Memory is ON, turn it OFF
4. Restart your computer



Sample OMS setup window
This sample setup includes midi sound modules, a Peavey PC -1600 and a keyboard.

OMS for Midi

If you intend to use Midi control you need to have the OMS extension installed in your system. If you don't have it you can download the latest version from *www.opcode.com*. Consult the OMS read me file for installation and setup instructions.

Monitor Resolution

Image resolution, color depth, frame size and compression are vital elements in making digital video realizable on desktop computers. There are many combinations of trade-offs for achieving workable solutions without sacrificing quality. Monitors have three types of resolution:

• **device resolution** - 72 or 75 dots per inch

• **display resolution -** number of pixels in one horizontal scanline times the number of scanlines in one full screen **640x480 = 307,200 pixels**

• **image resolution** - resolution of the displayed image

Image resolution is an important element in the quality of an analog video signal and in the quality of the digitized signal. This image quality is measured by the number of pixels that make up the image. Each pixel in an image projects chroma (color) and luminance (brightness). The analog video signal (NTSC, PAL, SECAM format), is sampled (digitized) by your computer and displayed at your monitor resolution setting. The greater the number of pixels, and the greater the color depth (measured in bits per pixel - 8, 16, 24, 32) the higher the resolution, the better the image quality. For the average user, in Image/ine as with other digital video applications - **Better image quality = slower frame rate (speed), faster frame rate = poorer image quality.** Until full frame/full speed desktop video is a reality on average workstations, you must make a choice. Ultimately this is an aesthetic decision based on your source material and style of play.

Monitor Resolution

You will be faced with several options when determining the resolution settings for your monitor(s). The choices you make will affect image quality and overall program performance in terms of speed and effect artifacting. Before setting up the monitor resolution check the sidebar for clarification of a few technical issues regarding the display of video on standard RGB computer monitors and video monitors.

Setting monitor resolution in the system

There are two discrete steps for setting monitor resolution and color depth. The first step involves setting the monitor resolution in your system control panel. The second step involves setting the resolution and color depth of the Image/ine display window. This is accomplished in the Preferences dialog window in Image/ine after you've booted the program.

First let's take a look at the resolution of your main monitor. This is an initial setting and will retain the same settings you normally use if your monitor is a standard RGB type.

To check your current configuration:

1. Return to the Control Panel and select Monitors & Sound

2. Click on the Monitor icon

With a standard RGB computer monitor

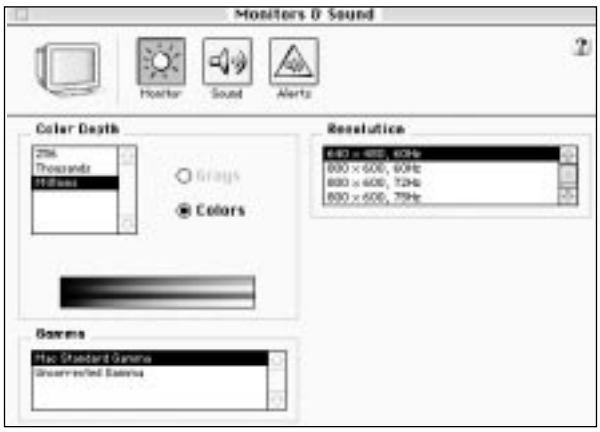
In the resolution window you'll see the current setting for your monitor highlighted. If you have a standard monitor you won't have a choice of resolution and can close the window. For example, with a standard Apple 14" display your resolution will be 640x480. With an Apple 16" it will be 832x624, with 21" 1152x870. With a 15" multisync you may have 640x480, 800x600, 1024x768, all at different frequencies or refresh rates.

If your monitor is a multisync (or multiscan) type, you'll have some choices to make here before selecting a resolution setting.

With a multisync computer monitor

When you open the Monitors & Sound window and are using a multisync monitor, your resolution options will be displayed in the box on the right. These choices will vary depending on your brand of monitor. The greater the resolution, the smaller icons and windows are displayed. Depending on memory allotment, higher resolution settings will result in a decrease in pixel depth options.

Image/ine will run optimally and provide a larger performance window with a resolution of 640x480. Higher resolution settings will give higher quality images if the incoming video signal is of a corresponding resolution. Higher resolutions also decrease window and icon sizes making for more editing area on your desktop but with a smaller performance window in the bargain.



Monitors & Sound window
The appearance of the window with a single multisync monitor.

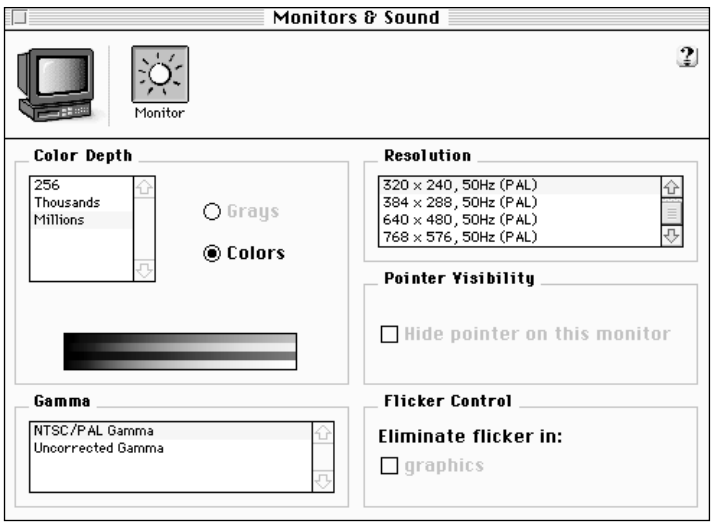
Note: Remember, these settings are not written in stone. You can always alter these choices, depending the material your using in a specific project.

Second Monitor Setup

Monitors & Sound window
With a second monitor connected an Arrange button appears which indicates the relative position of your monitors. The smiling Mac icon indicates the start-up screen.

A second computer monitor or video monitor is highly recommended although Image/ine is designed to run efficiently in a single monitor set-up. The biggest drawback to a single monitor setup is of course, the viewing area of the performance window which sits on top of the main screen. Depending on your monitor screen size and the Image/ine display window size, it may obstruct viewing the Feedback Indicators in the main screen. The availability of a second monitor affords a dedicated performance display, with the main monitor as the editing environment. If you will be using a second monitor it's important to distinguish between the performance of a computer monitor and a video monitor or video projection device. *See the sidebar in Video Output.*

With a second monitor connected from the Video OUT jack of the computer or capture board, two additional windows will open when you select Monitors & Sound from the Control Panel. Clicking on the Arrange icon let's you assign the position of the monitors. If the second monitor is a video monitor, you'll need to choose the appropriate standard (NTSC, PAL or SECAM) and a resolution setting of 320x240 available on AV model Macs with 4 Mb of vram . On non 8500s this resolution (quarter NTSC or quarter PAL) is probably not available and you'll have to use the closest possible resolution to the intended output resolution.



Monitors & Sound window
With a second monitor connected an additional window opens for setting its resolution and color depth. In this case the monitor is PAL video.

Color Depth

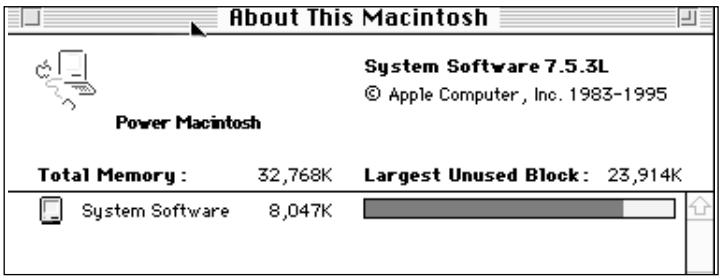
As resolution refers to the number of pixels in your monitor display, color depth refers to how many bits of data are contained in each pixel. Typically, the average monitor has settings for:

8 bit	**256 colors or grays**
16 bit	**Thousands of colors (approximately 32,000)**

Depending on your hardware/software configuration and your resolution setting, you may also have:

24 bit	**Millions of colors (approximately 16 million)**

Color depth options are set in Image/ine and will override the system setting in accordance with the specifications of your setup. It's good to be aware of the maximum color depth your setup allows. This is relative to the amount of VRAM and your monitor size and type. If you're running your monitor from a peripheral video (graphics accelerator) card, color depth (and speed) are dependent on the cards specifications. See Image/ine Setup for info on setting color depth.



Macintosh Apple menu window

Application Memory

The more RAM you can allocate to Image/ine, the better it will run. The first step is to allocate the optimal amount of RAM in your system to the program. Image/ine doesn't have an install scheme so just drag the Image/ine Folder from the floppy disk to your hard drive.

To change the memory allocation of the application:

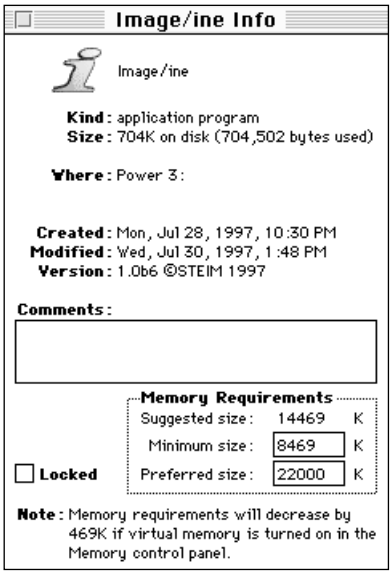
1. Make sure no applications are running.

2. Choose About this Macintosh from the Apple menu.

3. Check the Largest Unused Block value. Subtract about one meg from this value.

4. Close this window and click and highlight the Image/ine icon. Choose Get Info from the File menu or hit ⌘-I.

5. Enter the number found in Step 3 into the Preferred Size option and close.



Image/ine Info window

Video Input/Output

Video INPUT

Some models of the PPC family have a built-in video digitizer. If your computer does not have built-in digitization you'll need a video capture board of which there are many third party manufacturers. These boards vary greatly in performance and price. Image/ine only compresses the output of the composited performance and Buffer capture as movie clips so the lower-end boards are sufficient for use with this program. Most of these boards have S-Video I/O connections which are compatible with QuickTime. Consult your documentation for the proper installation and connection procedures. Possible source connections to the Video Input include:

Video camera	AV Macs accept video cameras from the three broadcast standards - NTSC, PAL, SECAM and from all formats (Hi-8, VHS, S-video, Betacam, Digital, etc.) If you're using a third party video capture board, input is dependent on supported standards. Check your documentation.
VCR, Video mixer	Output from these devices can also be digitized through the Video INPUT

Image/ine needs to know the standard of your video input signal. See Video Setup in this Chapter for configuring info.

Connections
If you're using an AV PPC such as the Apple Macintosh 8500 or 8600, you can connect from your camera into the RCA video input (coded yellow) or S-video INPUT.

RCA	Connect a standard RCA cable from the video OUT jack of your camera into the video IN jack on your computer or video board or
S-video	Connect a standard S-video cable (Y/C cable) from the S-video OUT jack on your camera to the S-video IN jack on your computer or video board.

Video OUTPUT

The outgoing signal from your performance is routed from either the built-in Video OUT on your computer or the Video OUT from your capture board. This signal must be encoded for display on a video monitor. This is done transparently in software. The sidebar provides a bit of background information on RGB to NTSC/PAL conversion.

One other video output configuration that needs setting is the compression codec for the captured output of the performance. *Refer to Video Setup in this Chapter for further configuring info.*

Interlaced and Non-interlaced Displays

Video and computer monitors are similar in that they are CRT's (cathode ray tubes) coated with phosphorescent dots called pixels that glow when bombarded by electrons. One horizontal line of pixels is called a **scanline.** When a sawtooth waveform is applied to this scanline it moves horizontally from left to right and then shuts off and jumps back to other side. This **horizontal blanking** or **retrace** repeats to fill the screen from the upper left corner to the bottom right corner. A second sawtooth wave is timed to shut off and then reposition the electron flow back to the upper left hand corner after the last horizontal scanline is completed. This is called **vertical blanking** and is synchronized to the **vertical sync signal**.

Standard RGB computer monitors **rasterize** (complete one horizontal retrace cycle) the screen at a rate of 1/60 of a second. This is called a **non-interlaced signal**, whereas video monitors retrace in two separate fields of even and odd scanlines at a rate of 1/60th of a second per field, or 1/30th of a second for one complete frame. This is called an **interlaced signal.**

There are a few areas which require conversion between RGB and video display:
a) Video is **overscanned** (is a slightly larger format than the boundaries of the monitor frame) whereas computer screens are **underscanned** (there is a black border around the visible screen)
b) color gamut (range of displayable colors) is greater in RGB
c) pixel aspect ratios must be compensated for - RGB has a 1:1 (square) pixel ratio, video formats 1:1.17 (rectangular).

When video images are ported from the computer to a video display they are generally encoded into one of the standard formats, NTSC, PAL or SECAM. In Image/ines' Preferences window you'll choose that format as well as setting the resolution for the Image/ine display.

Connections
The Video OUT jack on your computer or video board is used for porting the outgoing video signal to an external monitor or projector and for saving the video performance to tape by connecting Video OUT to the Video IN of a VCR. Mac PPC 8500 and 8600s have a built-in video hardware scaler that allows you to view a 320x240 image as full screen. Aside from size restrictions, the best quality output is available from an RGB projector.

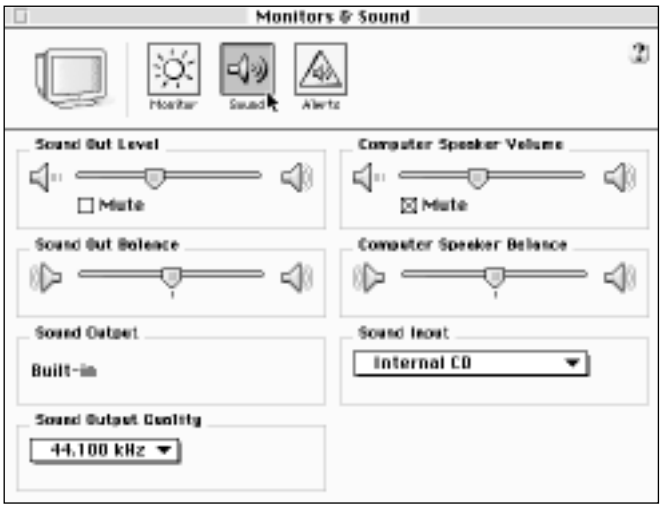
RCA Connect a standard RCA cable from the Video OUT of your computer or video board to the Video IN on your second monitor, television or VCR.

S-video If your using S-video equipment, connect an S-video cable from the S-video OUT on the video board to the S-video IN on your monitor or VCR.

Audio Input/Output

Audio INPUT

The audio input on your built-in digitizer or the standard Apple audio miniplug Input on the back panel of your computer, lets you bring sound into Image/ine as a controlling parameter (see Sound in the Program Controllers Chapter) from an external CD player, tape deck, microphone, mixer, etc. If your computer has an internal CD-ROM player, it can also be used as an audio source.



To select which type of audio input you intend to use:

1. Go to the Control Panel and choose Monitors and Sound if you're using System 7.5.3 or higher. If you're using System 7.5 - Go to Sound .

2. Select the sound icon and go to the Sound Input menu bar

3. Select Internal CD if you wish to control some parameters in Image/ine with sound from a CD. Select External Microphone if you plan to bring your sound into the computer from a microphone or mixer.

Audio OUTPUT

In Image/ine only the video signal is processed so it is not necessary, in most cases, to send the audio back out as long as your using an external mixer for output to your speakers. If you're using QuickTime clips with an audio track, use the built-in Audio Output directly to your mixer or speakers.

Controller Input/Output

Computer Keyboard

Image/ine is designed to function with the computer keyboard as the sole input device. An extended keyboard is required however, as some of these key maps are 'hardwired' in the program.

External Controllers

Since Image/ine is fully implemented for Midi, any Midi controller in your set-up can be used to control Image/ine's parameters. Sliders for continuous controllers and buttons or keys as toggles are the most useful. Any keyboard synthesizer that has a Midi out port can be used as a controlling device. In most cases, an external Midi controller will augment the use of the computer keyboard (as the primary controller device). Dedicated controllers such as the Peavey PC-1600 make excellent additional controllers as they are designed for extensive continuous control functionality.

Midi Implementation

If you don't already have OMS (Open Music System) from Opcode Systems in your system, you'll want to install it if you would like to have Midi control of some or all of the parameters. You'll also need a Midi Interface connected to at least one of the serial ports of your computer. The device outputting Midi commands must be a controller such as:

- **Synthesizer Keyboard, wind or drum controller**
- **External controller device such as the Peavey PC-1600.**
- **Second computer or dedicated sequencer**

Each Midi setup is different and there are a wide variety of Midi interfaces and patchers. It is beyond the scope of this manual to discuss connectivity options as it's idiosyncratic to each individual workstation or setup. In the simplest scenario you need to route the Midi OUT signal from your Midi controller to your Midi interface IN. The Midi Interface Midi OUT signal is then routed to one or both of the serial ports, Modem or Printer, on your Mac. This connection is completed in the Midi SetUp window of Image/ine. There are synchronization options for advanced use with Midi controllers and external devices such as laser disc players and variable speed VCRs.

Image/ine setup

With some understanding of the performance trade-offs and peripheral connectivity, it's finally time to bootup the program. The next chapter gives you an overview of the window content in the program. We'll jump ahead a bit here and describe three windows that facilitate setup of the program. First let's start the program up.

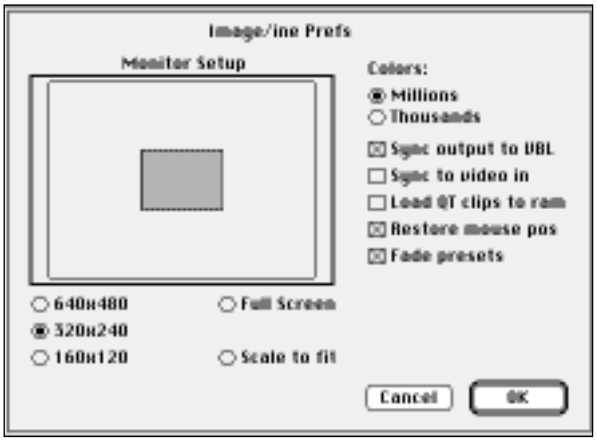
Image/ine Bootup

1. Double click on the Image/ine icon.

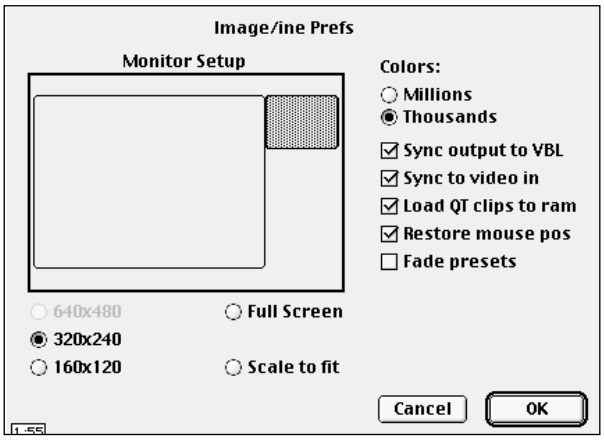
2. On startup the Image/ine Preferences Window opens for setting monitor resolutions and color depth.

Preferences

When you first initialize the program, the Preferences window will open.

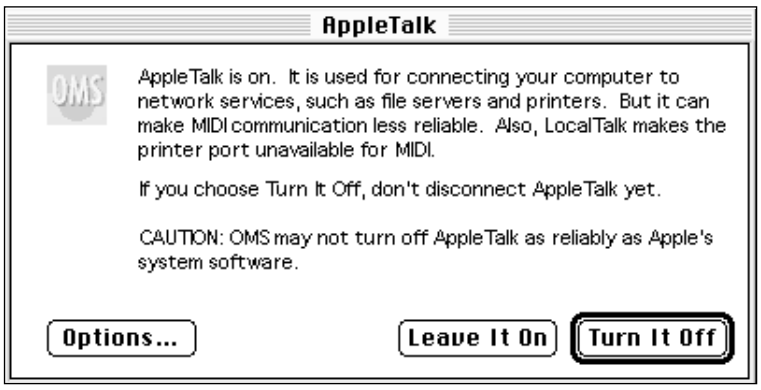


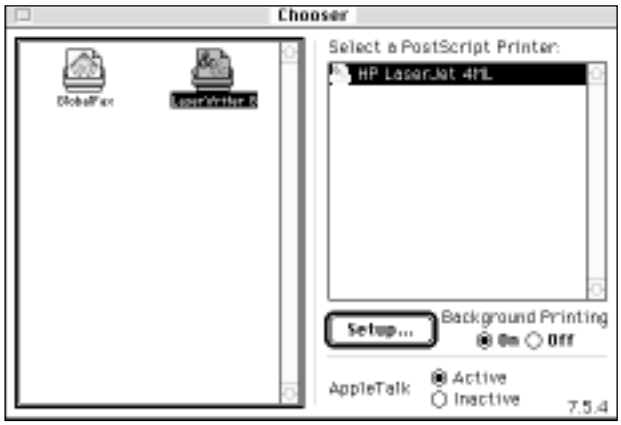
1a. If you're using one monitor the window will show only one tinted screen outline. The default setting for the Image/ine display is 320x240 with 16 bit (thousands of colors) depth. This is probably optimal unless you have a very fast computer and can attain enough speed with 640x480 resolution.



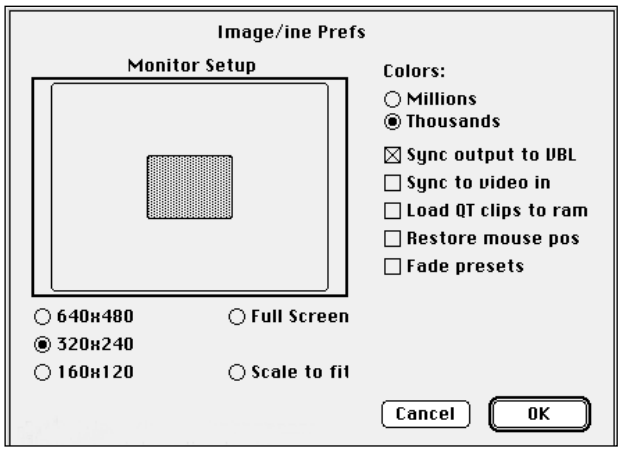
1b. If you're using a second monitor the window shows two outlines. In most cases you'd use the second monitor for displaying the Image/ine performance window.

2. Select the second monitor. On 8500 Macs this requires 4 mb of vram so that you will be able to access the external video. On non 8500s this resolution (quarter NTSC or quarter PAL) is probably not available and you'll have to use a resolution setting closest to the Image/ine resolution.





With a setting of 640x480 (in Monitors & Sound) you should have millions of colors available. This is optimal for Image/ine. Often, the difference between 16 bit and 24 bit color is difficult to see with video or QuickTime images. 24 bit color runs from 25 to 40 percent slower than 16 bit. There are more brightness levels available in 24 bit color and this has an effect in Image/ine with displacement effects. Using 24 bit color also helps in 'masking' the lack of resolution; *apparent* resolution is much higher when you run in 24 bit. Another image quality over speed choice.



Preferences default window

3. After configuring your monitor(s) another pop-up window will appear if your using OMS and Midi and have completed your SetUp, You will be asked to Turn AppleTalk OFF. Do it. An Options Menu gives you the choice of having OMS turn AppleTalk back on after quitting Image/ine or you can choose to do it manually.

4. You'll also be asked to make sure your Midi interface is properly connected. Click OK if this is so.

5. The program boots to a default preset.

Other Options

There are five additional check boxes:

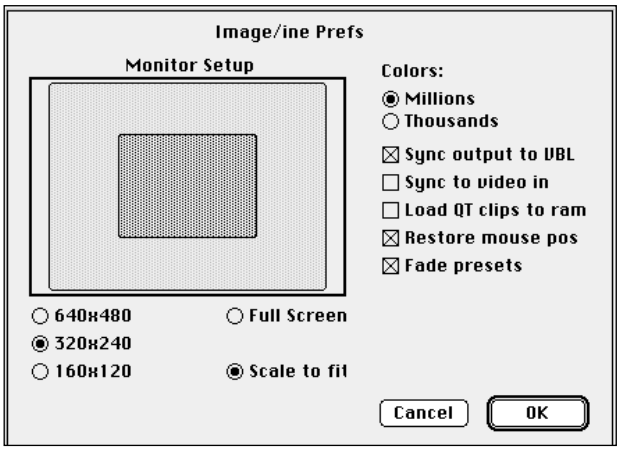
Sync output to VBL
The default setting for this checkbox is ON. It syncs the performance output to the vertical blanking interval of the display monitor.

Sync to video in
Syncs the output to the incoming video. This function is most useful with a multiprocessor system as half of the video display is processed by each CPU. Helps to avoid 'tearing.' It's possible to select both syncing methods - a setup that will improve 'tearing' but slow performance speed.

Load QT clips to ram
If you have enough available RAM to handle the size of the QuickTime movies you're loading, you have the option of running them from RAM instead of directly from your hard drive. There can be significant speed advantages.

Restore mouse pos
Restores the mouse to its last position with a particular modifier key combination

Fade presets
When switching between Presets, the closing Preset will automatically fade. Holding down the spacebar defeats this function until the spacebar is released.



Preferences window for a single monitor setup with **Scale to Fit** selected.The system resolution has been set to an even multiple - 640x480 of the Image/ine display size - 320x240.

Scale to Fit Button
Another option for achieving a fullscreen display (especially suited for single monitor users). Scales the output display to full screen without interpolation so the image may be visibly pixelated. This option has a major slowdown affect on performance speed so its use is only recommended when a full screen display is a priority over performance speed. If you need to use this option, it's optimal to scale in doubled ratios: 320x240 scaled to 640x480, etc.

Recap: Single Monitor Setup

If your hardware setup consists of a single multisync monitor it's advisable to set the system resolution (Monitors & Sound) to the lowest possible resolution, 512x384 or 640x480, to maximize the Image/ine performance window at 320x240. Set color depth to Millions if you prefer image quality over speed.

Recap: Dual Monitor Setup

If your hardware setup includes an additional monitor first set the desired resolution of each monitor in Monitors & Sound. The main monitor can be set to higher resolutions if desirable. In Image/ine's Preferences window, set the second monitor resolution to **320x240** (if possible, otherwise choose the lowest resolution available) with the desired color depth.

Midi Setup

After you've configured OMS for your midi setup:

1. Go to the Window pulldown Menu and select Midi Setup.

2. Click on the In box. If your OMS setup is properly configured it should contain the name of your current Midi controller device. If this is not the case, return to your OMS setup application and check it.

3. Click on the Out box. It may offer you a choice of modules in your setup to choose from for outputting sound. Choose one.

4. If your Mac is in the middle of the Midi chain you may want to check the Midi Thru box.

OMS Setup Button
The OMS Setup button links to the Current OMS Setup. If the Midi Setup window doesn't properly show the midi devices in your setup then click this button to directly check it in OMS.

FrameDoneSync
In this setting you can hear the pulse rate by assigning a Note On event
(90 = Note On, channel 0)
(60 = middle C)
(85 = velocity).
In this case, with AutoSynchr. set to 50, you'll hear middle C triggered once every second. See Autosynchr. on the next page.

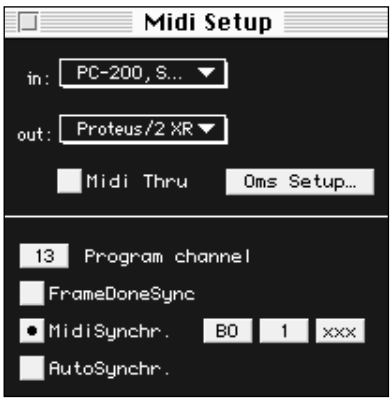
An additional group of Midi control options is available. The three numerical boxes are used for setting the values of the Status byte, and Data bytes respectively. If a message requires only one data byte you will not see the second numerical. The xxx option is available as a 'don't care' value.

Program Channel

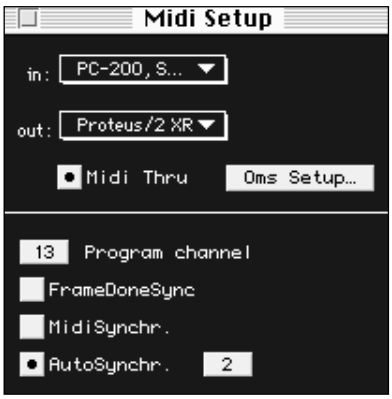
Select the channel you want to send Program change data on. Useful for selecting Presets with Midi. Channels 1-16 are available.

FrameDoneSync

When enabled allows you to specify a Midi message, which will be sent out every time Image/ine has completed a frame. This is especially useful to synchronize external devices in the case that Image/ine is processing frames well below real time speed. If you're talking to a controllable VCR, for example, it could then be instructed to record one frame and wait for the next.



MidiSync
If you play a movie with Solo enabled, for instance (over 100 fps on a 200 Mhz machine with no sync), sending Image/ine 50 pulses per second will cause Image/ine to update only 50 times per second. In the example above, a controller is assigned to Midi channel 0 (B0 in the Status byte numerical). The controller is defined as the Modulation Wheel in the first Data byte with any velocity (assigned in the second Data byte).



AutoSync
Autosynchronization set to a value of 2 in the numerical which will half the frame rate. This is indicated on the main screen in parentheses next to the fps indicator.

Features for non-real time use of Image/ine.

When either of these options is enabled, Image/ine synchronizes itself to a (midi) clock.

MidiSynchr.

Allows you to specify a Midi message as the pulse. The timing is relative to 50 fps.

Autosynchr.

Has Image/ine generate its own clock. Relative to 50 fps. Useful for incrementally slowing down the frame rate (controlled slow motion) and time lapse recording.

Synchronization

MidiSynchronization

As the timing is relative to 50 fps, when Midisync is enabled and the Midi message is received exactly 50 times per second, Image/ine will run at the same speed as if there were no synchronization, although limited to 50 frames per second. Of course, when Image/ine is not able to keep up with the clock, the frame rate will be slower.

Sending Image/ine 25 pulses per second causes all LFOs and QuickTime playback to go half speed, 10 pulses one fifth speed etc. Accelerating time by sending more than 50 pulses per second is also possible, but quite useless. Setting AutoSync to a value of 50 provides the opportunity for single frame advance.

AutoSynchronization

If you use AutoSync the number you will specify is a divisor:

1	will sync to 50 fps (real time)
2	will sync to 25 fps (half time)
10	will sync to 5 fps (one tenth time)
50	will sync to 1 fps (one fiftieth time)
1000	will advance one frame every 20 seconds.

DiskFree Indicator

When you use the **Capture Output** option to record QuickTime to disk, the Diskfree FeedbackIndicator on the main screen will give you some extra information when you run Image/ine in sync mode.

During compression of a frame (since you are now able to slow the frame rate it will start to make sense to use better quality, thus slower, output compressors) the Diskfree indicator draws in boldface. If the compressor runs slower than the frame rate as dictated by the sync pulses, and as a consequence the QuickTime output will not be time accurate, the Diskfree indicator will flash in red. In this case, increase the AutoSync value until you don't see the red anymore.

Animation
Cinepak
Component Video
Graphics
Motion JPEG A
Motion JPEG B
None
Photo JPEG
Planar RGB
Video

QuickTime Codecs
The current compression/decompression methods available.

Video setup

If you're using a video camera or VCR as input you need to configure this setup. The Compression window is a standard Macintosh QuickTime dialog box for selecting a compression type for Capturing Output and Capturing the Buffer. Once again we have a wide range of trade-offs regarding image quality and speed (the time it takes to decompress the captured movie for playback. There is a substantial performance variance between these methods. If you're using a third party capture board you may have additional compression plug-ins that shipped with the hardware. Other importable codecs are available that may better suit your needs. *For more detailed specifications on these codecs see Appendix C.*

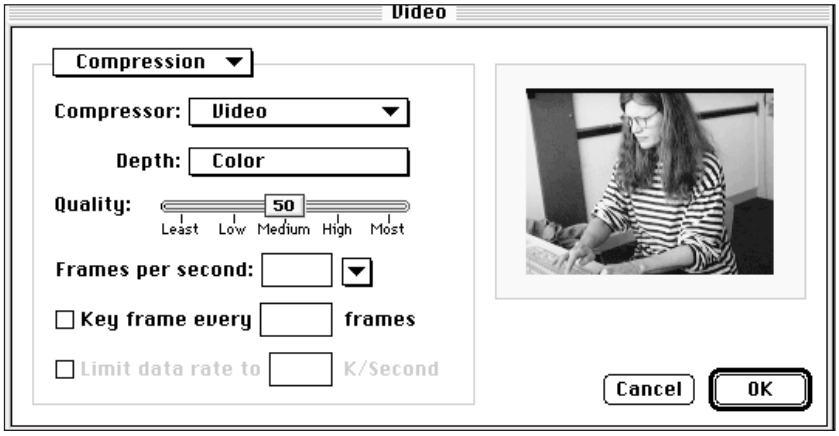
1. Go to the Window pulldown Menu and select Video Setup

2. In this window, in the first pulldown box you'll see the word Compression. Holding this menu down reveals a submenu with the QuickTime software compression types. In Image/ine, these compression methods affect the captured output of the performance.

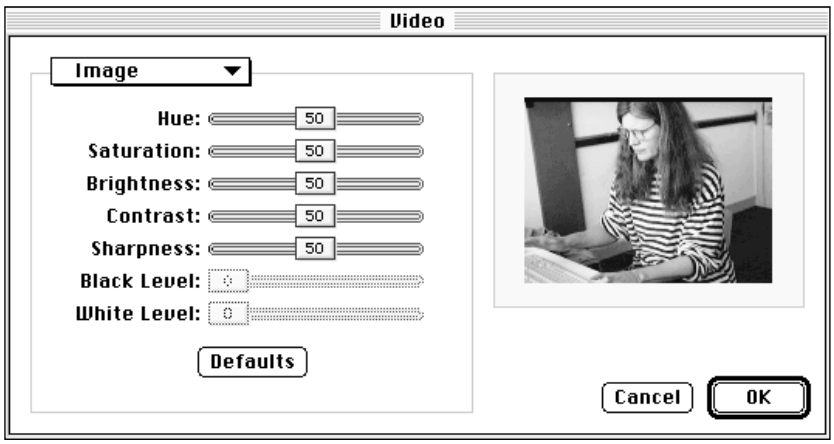
Compression Window Quality
The quality slider determines how much compression is applied. Most refers to the least amount of compression and subsequently bigger files (which can slow down performance).

Frames per Second
Selects the number of frames per second to be captured. Full frame rate (25-30 fps) isn't presently practical. Depending on the speed of your hardware, 10-15 fps is workable.

Key frame
Temporal compression or **frame differencing**. It compresses the 'changes' per frame while storing a full reference frame periodically. For most video, one key frame every second works pretty well. Just set the key frame number to match the fps rate.



After selecting a compression method, choose Image from the pulldown menu. In this dialog box there are six sliders for adjusting levels of the incoming video source. Hue, Saturation, Brightness, Contrast and Sharpness can be modified.



Hue Adjusts the overall color balance of the video input source.

Saturation Adjusts the intensity of the color.

Brightness Adjusts the luminance value of all the pixels.

Contrast Adjusts for differences in brightness between image areas. The most extreme case is 0% brightness against 100% brightness (no grey values).

Sharpness A kind of *focusing* that adjusts the contrast between adjacent pixels.

3. Dragging the sliders with the mouse 180^0+ and 180^0- may enhance the video feed.

4. After selecting Source in the pulldown menu, choose Built-in or your capture board as the digitizer.

5. Choose Composite or S-video as the type of signal.

6. Select the broadcast format of your equipment.

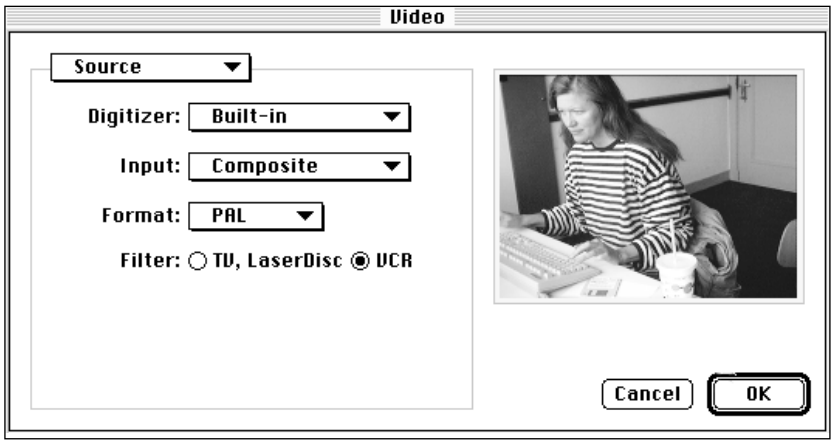
In the **Source** dialog box you'll define your hardware setup.

Digitizer
Select between the built-in digitizer on the computer (with AV models) or the installed video capture board

Input
Selects the type of input from your video source. Usually composite (RCA cable) or S-video (Y/C cable).

Format
Selects the broadcast standard of your equipment - NTSC, PAL or SECAM.

Filter
VCR is the default.



Performance Improvement Issues

Memory

Image/ine needs a minimum 8 meg of RAM with a 320x240 resolution and a color depth of thousands or 10 meg of RAM at 320x240 with a color depth of millions. It checks for the size of both it's own memory partition and the left over system ram. For the buffer it uses the bigger of the two.

As stated, safest and best is to give Image/ine all the RAM you have minus about one meg. So, quit all applications, restart with only the extensions you need. Check in the finder for the biggest free block, and allocate Image/ine this block minus 1 to 1.5 meg.

Resolution

Note: **Mechanical scaling may** be possible when you are actually using a video beam or projector. This means that Image/ine will place the 320x240 smaller window of your choice in the bigger window of the external monitor, surrounded by black border. This means that you may be able to zoom the projector to a larger setting so that the small 320x240 window appears at the proper size.

When working with just one monitor (or projecting the RGB image from the main monitor) on a computer with less than stratospheric performance, set the monitor resolution to 640x480 (the minimum resolution) and the Image/ine window to 320x240. Hit the keypad **<enter>** key to toggle through the different display modes for the main screen.

Choice of Effects

The choice of effects and combinations of effects can also severely influence the frame rate you'll be able to achieve. When displacing, even the material you use as a displacement map may influence the frame rate. To have a full screen output at a reasonable speed you currently need a PowerPC 8500 or 8600, because at this moment they are the only systems that allow switching the external video monitor to a full screen, overscanned , 320x240 resolution for NTSC and a full screen overscanned resolution of 384x288 for PAL. Third party video capture boards typically have a resolution of 640x480. For example, the ATI Xclaim VR has an underscanned resolution of 512x384. Listed in Appendix B are example frame rates from Image/ine running on a UMAX S900/200.

Sample System Setup

System:
UMAX Pulsar S900/200
512 cache
ATI Xclaim VR

Monitor setup:
output window 320x240
16 bit color

QT clip compressed at :
15 fps,Cinepak, 320x240

Preferences:
Sync video OFF

Some example Cost Factors - Keying

Image	1.00
QuickTime	1.25
ATI video	1.66
Displace	1.66
Blend	1.06
Displace angle	3.57
Rotate	4.54
If keying to an image costs	**1.0**
keying to QT costs	1.2
keying to output costs	1.3
displacing costs	1.1
displacing angle costs	2.0
rotating costs	2.7

Chapter Two: Basic Concepts

Input sources supported by the three screen layers:

The Foreground Screen
Video signal
Quicktime movies
Still images
Text
FrameSelect1
FrameSelect2
FrameSelect13
Drawing

The Background Screen
Video signal
Quicktime movies
Still images
Text
FrameSelect1
FrameSelect2
FrameSelect13
Output
Color

The Displacesrc Screen
Video signal
Quicktime movies
Still images
Text
FrameSelect1
FrameSelect2
FrameSelect13
Output
Color
Sound

Before we begin with an overview of the windows and graphic interface of Image/ine, it's important to understand a few basic principles of the program. Essentially there are three basic techniques - Keying, Temporal Manipulation and Image Displacement - which are applied in three distinct layers or channels - **Foreground, Background and Displacesrc.** Manipulating the parameter functions with a varied assortment of controllers and these techniques provide a versatile canvas for combining images.

Screen Layers

Image/ine is a layered environment in which images and text are dynamically filtered in real time. There are three available screen layers or channels called:

- **Foreground**
- **Background**
- **Displacesrc** (DisplaceSource)

These screens are assignable parameters. Each of these screen parameters supports a number of Input Sources.

The **Foreground** channel is the top layer and keying screen, acting like a superimposition channel, cutting through to the background layer(s). The Foreground channel is also the layer that is displaced or distorted and color shifted by the image in the **Displacesrc** layer.

The **Background** channel is the screen keyed to - what's viewed through the transparencies in the **Foreground** screen when it's acting as a keyer.

The **Displacesrc** screen selects which Input Source will be displacing (distorting) the image in the **Foreground** channel. It also acts as a second background layer when **Extkey** is enabled, giving three visible layers of imaging.

So if for example, the **Foreground** screen is displaying - Text, the **Background** screen -Video and the **Displacesrc** -Color, and **Extkey** is ON activating the **Displacesrc** as a second background, then video will be keyed and visible through the Text surrounded by the color selected.

When **ScrBG1** and **ScrBG2** are triggered to captured the current composited screen, these images are saved (until overwritten) to the **Background** layer and **Displacesrc** layer respectively. The word ***Captured*** will appear in the Feedback Indicator on the main screen.

With a basic understanding of how the screen layers behave, we can break Image/ine down into three function groups: Keying, Temporal manipulation and Image displacement.

Keying

Keying is a technique common in video and film (in film it's called 'matting') in which a portion of the superimposed or **Foreground** image is transparent, leaving a 'key hole' through to the **Background** image. There are many different kinds of keys. Some are color-based, defining transparency by chroma, others use alpha channel mattes.

Image/ine uses luminance keying which gives transparency levels for the grey values in the **Foreground** image and alpha channel while retaining it's pixel color.

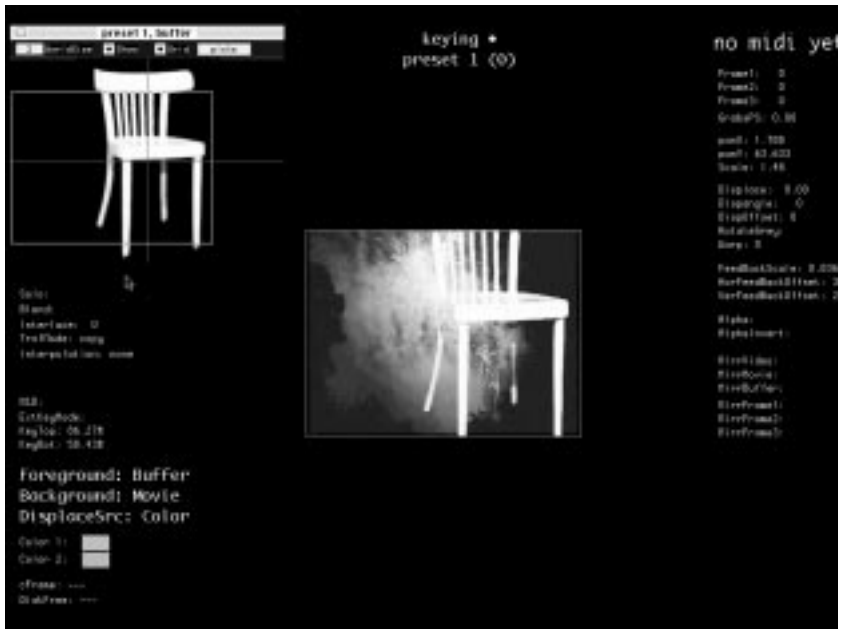
Performance window with
Foreground (Buffer) - KeyTop - 100%
Background (Movie) - KeyBot - 0%

The **KeyLevelWhite** and **KeyLevelBlack** parameters control the point of luminance (brightness) in a *self keying* mode where the brightness of one image selects between itself and another image. In Image/ine's case the cutting signal is the **Foreground** image and the source signals are the **Background** and **Displacesrc** images. Using an alpha channel is another way to precisely key around objects (silhouetting for instance). Image/ine supports pictures with an embedded alpha channel.

An **ExtKey** parameter provides a second keying layer or second **Background** screen. With **ExtKey** toggled ON it sends a cutting signal between two source signals, making portions of the three screen layers or channels visible. The **KeyAndDisplace** parameter permits keying through to the first **Background** screen while that same **Foreground** is being displaced.

Performance window with
Foreground - KeyTop - 86.27%
Background - KeyBot - 58.43%

Performance window with
Foreground - KeyTop - 0%
Background - KeyBot - 100%



Note: You can add a separate alpha channel for your movies and stills in Adobe Premiere and Photoshop.

Temporal Manipulation

This is a one of Image/ine's most exciting features. It works with the stills Buffer layer and implements a continuously updatable field of video and movie captures as well as imported still images. Image/ine creates a mutable environment of past and present image captures. A single frame image captured milliseconds earlier (from live video, a movie, etc.) and stored in the Buffer can be keyed and composited with, for example, the incoming live video signal to create a sense of time displacement. The ability to insert live video into this Buffer which is pannable, scalable and can be merged with the original video signal gives the opportunity for remarkable temporal effects.

Within this gridlike Buffer, position, speed, timing and scale are all variable. The choice of controller is another important variable here and can lead to wildly diverse results. The Buffer imports:

Video stills
Movie stills
Screen stills
Pict images
Pict images with alpha channels from Photoshop
Live video
Noise is also a built-in option

Besides the ability to pan in all directions at varying speeds, zoom in to a single pixel or out to the entire Buffer 'canvas', the **FrameSelect** parameters allow further control of movement in the Buffer. Areas of this landscape can be individually defined as frame capture regions (Video, Movie, Screen). Loaded images can be assigned safe regions so they're not overwritten by incoming frame captures. Three such regions are available, **FrameSelect1,2,3**, and can be independently mapped to any of the screen layers.

Other features include the possibility of embedded alpha channels, which produce accurate keying, and random noise screens, which can produce interesting results in combination with **Scale** and **Displace** parameters. *See Chapter Five: The Stills Buffer for more detailed information on applying these techniques.*

Image Displacement

Much like luminance keying, displacement uses the brightness or luminance levels of the grey pixels to shift the image. The **Displacesrc** channel or layer acts as the selection screen for the displacing image. This image displaces the Input Source (Video, Movie, Buffer, Text, etc.) material in the **Foreground** screen, in this case the displacement map. With a **Displace** value greater than 0, movement in the **Displacesrc** layer will shift, pixel for pixel, the image in the **Foreground** screen.

Used together with the Buffer, which has panning and scaling capability, it's possible to create some extraordinary textural movement.

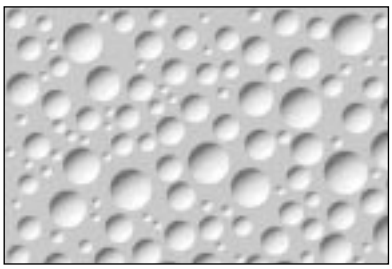
For example, placing the Buffer in the **Displacesrc** channel with **Displace** set to a value other than 0 will shift and distort any image in the **Foreground** screen corresponding to the current panning and scaling parameter values. Buffer images can be specially created from ultra-responsive grey values to heighten this effect.

This text file was displaced with a **Displace** value of 11.

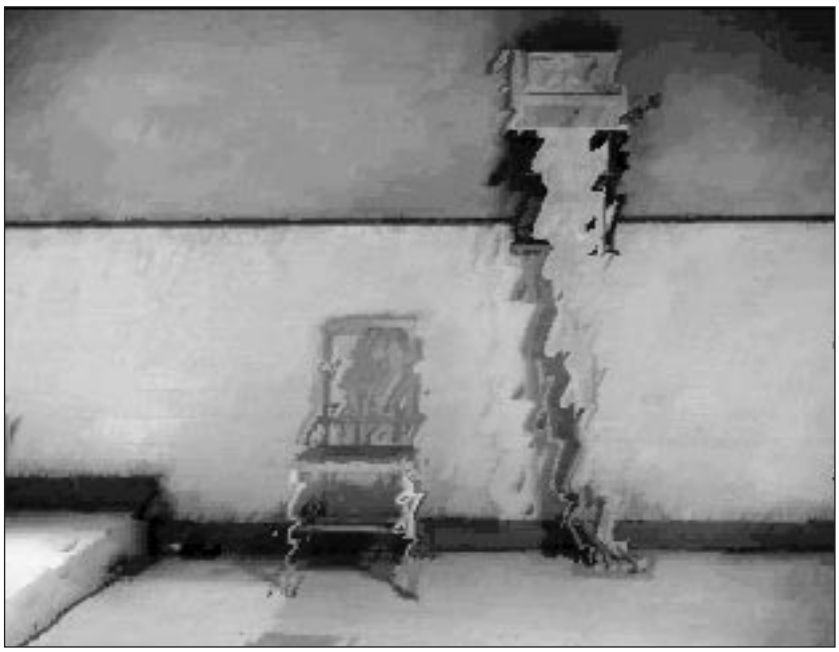
There are six different displace parameters to distinguish:

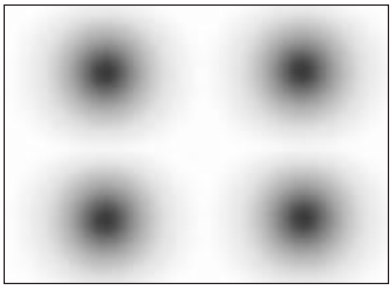
Displacesrc	Screen layer that implements the displacing
Displace	Shifts the image in accordance with its grey values
Displace angle	Determines the angle of displacement.
DisplaceOffset	Offsets the displace values for each grey value
RotateGrey	Rotates the image corresponding to the grey level of the **Displacesrc** pixels; allows toggling between linear and rotational displace ment
WarpMap	Uses an editable warping map for displacement

Let's take the example of a movie in the **Displacesrc** channel with **Displace** set to a value other than 0. The movie will shift and distort Text in the **Foreground** Screen corresponding to the movement in the clip. The larger the **Displace** value, the greater the displacement or distortion effect. All of the displace parameters can be ON simultaneously except for WarpMap which overrides all the other settings. To key while any displace parameter is set to a value other than 0, **KeyAndDisplace** must be ON. Remember that displacing, especially more than one parameter, will eat into your frame rate.

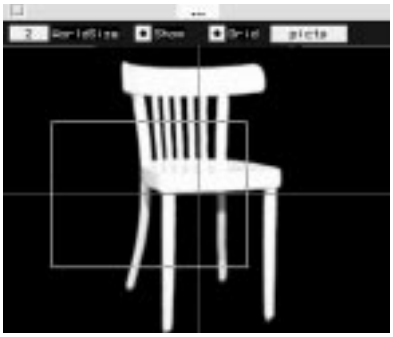


Simple displacement
With babyBubbles in the the Buffer and **PanX** and ***P*anY triggered** by a Sine wave at a rate of about 0.340 the image in the ***F*oreground** layer will be displaced similar to the image on the right with a **Displace** value of 11.50.





This image was displaced in the same manner with the above image in the Buffer with **Displace, DisplaceAngle and RotateGrey** enabled.



This image was displaced with the **Displace and DisplaceOffset** parameters enabled.

To assign an **Input Source** to the **Foreground** screen, press the appropriate Fkey.

F1 - Video
F2 - Movie
F3 - Stills Buffer
F4 - Text
F5 - FrameSelect1
F6- FrameSelect2
F7 - FrameSelect3
F8 - Draw

To assign an Input Source to the **Background** screen, press Shift plus the appropriate Fkey.

F1 - Video
F2 - Movie
F3 - Stills Buffer
F4 - Text
F5 - FrameSelect1
F6- FrameSelect2
F7 - FrameSelect3
F8 - Output
F9 - Color

To assign an Input Source to the **Displacesrc** screen, press Control plus the appropriate Fkey.

F1 - Video
F2 - Movie
F3 - Stills Buffer
F4 - Text
F5 - FrameSelect1
F6- FrameSelect2
F7 - FrameSelect3
F8 - Draw
F9 - Color
F10 - Sound

Keyboard Strokes

There is a set of built-in macros or keyboard strokes to help you quickly assign the Input Sources to the **Foreground**, **Background** or **Displacesrc** Screen. The **F keys 1 through 7** on an extended keyboard are automatically designated.

The **F1 -F8** select the input source for the **Foreground** layer.

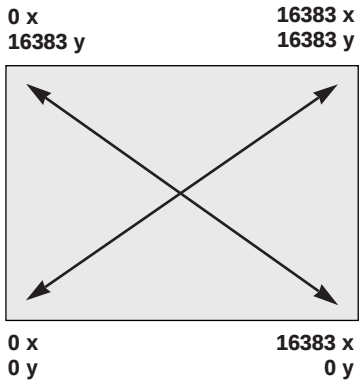
The **F1 -F9** plus the **Shift key** select the input source for the **Background** layer.

The **F1 -F10** plus the **Control key** select the input source for the **Displacesrc** layer.

*Note: It is also possible to cycle through the Input Source choices by toggling the **f** (**Foreground**), **g** (**Background**) and **h** (**Displacesrc**) keys. These are the default settings and are, of course, reprogrammable.*

Screen Coordinates

When using the mouse as a data slider, you're tracking the X/Y coordinates of your monitor display. Positioning the mouse in the top lefthand corner of your monitor will give you a 0 (zero) value for X, which has a variety of interpretations depending on the particular parameter setting. Diagonal movement in both directions can be desirable for parameters mapped and linked to mouse X and mouse Y control.



esc return from Perform	F1 Video	F2 Movie	F3 Stills	F4 Text	F5 Frame1Select	F6 Frame2Select	F7 Frame3Select	F8 Draw Output	F9 Color	F10 Sound

` `	1 ScrBG1	2 ScrBG2	3	4	5	6	7 ⌘7 Warp	8 Mirr Vid	9 Mirr Movie	0 Mirr Buffer	-	⌘-= Rearrange All	delete

tab Select frame in Buffer	q	w	e	r grey rotate	t	y	u	i Inter-polate	o	p	⌘-[Move to Front	⌘-] Move to Back	⌘-\ Size to 320x240

caps Keying	a alpha INVERT	s Solo	d	f Foregrd	g Backgrd PERFORM	h DisplScr	j	k Key/Disp	l	;	‘	return

shift Backround	z Trans mode	x Ext Key	c Capture buffer	v Vid on	b Blend	n	m Movie on	,	.	/	shift

control Displace	option	command ⌘	spacebar Fade Release	command	option	control

Chapter Three: Overview

Main Screen

Image/ine has a functional but non-standard Graphic User Interface (GUI). When you boot the program you are in the main screen - a black background with yellow text. The text refers to Mapping window controls and essentially gives you feedback as to the current status of visible operations. These Feedback Indicators are turned on and off in the 'S' column of the Mapping window. They are freely positionable by dragging and you can change their font and size by option and command clicking. Clicking on the 'S' in the Mapping window will toggle all the Feedback Indicators ON or OFF.

If you're using one monitor you have three options for viewing the performance window. Toggle through the possibilities with the **<enter>** key. The example on the right is the third selection which removes the upper pulldown menu.

A few of these text boxes remain on the main screen at all times but are repositionable:

File name
Preset name and (current Display State)
Incoming Midi indicator
fps (Frames per second) indicator
Text and Movie loaded indicators
cFrame (captured frames from Buffer) indicator
DiskFree indicator

Pull Down Menus

File Pulldown /*standard Macintosh functions*

New	Begin a new file with a new name
Open	Open an existing Image/ine file
Close	Close the current Image/ine window
Save	Save changes to the current Image/ine file
Save As	Save changes to the current Image/ine file and rename as a new file
Quit	Quit Image/ine. You'll be prompted to save any changes to the open file. Quitting OMS may turn AppleTalk back on

Edit Pulldown /*standard Macintosh functions affecting the Image/ine buffer.*

Cut	Cut an image from the Buffer, a Preset or Table. Temporarily saved to the clipboard
Copy	Copy an image from the Buffer, a Preset or Table. Temporarily saved to the clipboard
Paste	Paste an image to the Buffer, a Preset or Table from the clipboard
Clear	Clear the image, Preset or Table

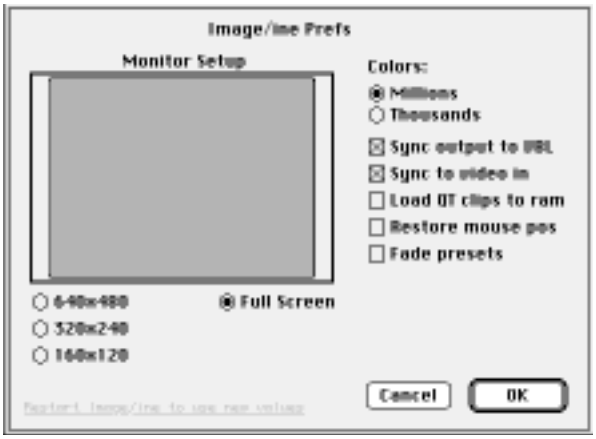
Edit Pulldown /*non-standard Macintosh functions affecting the Image/ine buffer.*

Move to Front	Moves an image on top of another image
Move to Back	Moves an image behind another image
Size to 320x240	Automatically resizes a loaded image to the default cell size of 320x240 and snaps it to the topleft grid position.
Rearrange All	All loaded images are arranged across the Buffer

Load Picture Places a Pict file into the Buffer. The image size (as definable in an image editing program such as Photoshop, can be any size). It's resizable in the buffer window to suit your needs. These images can also carry an alpha channel for additional transparent effects. *See Chapter Seven for more info on alpha channels*

Insert Video Places live video into the buffer so it can be zoomed and panned. This live video is resizable which can be a powerful function but it costs in speed

Preferences **sync to vbl**: this syncs the output to the monitor vertical retrace. You may switch it off for a small performance gain and deterioration of image quality



Example of the Preferences window with both syncing methods selected.

sync to video in: helps to avoid 'tearing' especially when using a computer with multipro cessing capability

load QT clips into ram: this will cause less disk access during the playing of QuickTime clips, giving you a small speed advantage

Restore mouse: Restores the mouse to its last position with a particular modifier key combination

Fade presets: automatically sets fades between Presets.Holding down the spacebar delays the Fade In until release

Windows Pulldown

Mapping (⌘-1)

This is the most important and often used window in Image/ine. At first glance it may appear a bit daunting as its design is atypical of a standard Macintosh application. Once you're familiar with the functions of the parameters and their controllers, you'll find editing accessible and quick; features well-suited to a real time application. All 60+ parameters can be individually mapped to a variety of controllers. These controls have specific parameter settings of their own. Mapping windows can be individualized and saved as presets. For example, Preset 0 may be retained as the original default window, Preset 1 may be mapped to utilize only computer keyboard commands while Preset 2 switches to primary control with an external midi controller. From this window you'll import movies and text files. It is also where you'll map parameters to tables. *See Tables in this section*.

Text... none Movie... none

parameter	control	--	--	--	--	Chan	Min	Max	Table	C	I	S	X
Pan X	mouse X	----d				--	0.000	100.000	--			•	
Pan Y	mouse Y	----d				--	0.000	100.000	--			•	
Scale	mouse X	--c-d				--	0.000	2.000	--			•	
Frame1Select	Saw	0.000	0	norm		--	0	3	--			•	
Frame2Select	Saw	0.000	0	norm		--	0	3	--			•	
Frame3Select	Saw	0.000	0	norm		--	0	3	--			•	
Screen->Buffer	Fixed	0				--	0	3	--			•	
Video->Buffer	Fixed	0				--	0	3	--			•	
Movie->Buffer	Fixed	0				--	0	3	--			•	

The Mapping window

The editable values can be scrolled with the mouse or typed in. There are three techniques for scrolling :

drag scrolling — dragging the mouse up and down in the number box.

accelerated drag — hold down the option key while scrolling to a new scrolling value, the numbers increment (or decrement) by in large values. Holding down the Control key while dragging increments the values in even larger values. A much quicker way of scrolling from a low value (0.000) to a high one (100.00)

auto scrolling — placing the mouse cursor on the top portion of the number box scrolls up; bottom scrolls down

You can quickly set a value by highlighting the current value in the box and typing in the new value. This window will be discussed in detail, parameter by parameter in Chapter Four.

Buffer (⌘-2)

This is the window that displays the images that are imported or captured to the buffer.

The rate at which single frame images are captured is dependent upon the controller selected in the mapping window (keyboard command, oscillator, midi controller, sound, etc.) This window does not automatically update the images. Repeated ⌘-2 commands will display the most current Buffer landscape. The **PanX, PanY, Scale, FrameSelect1,2,3, Video->Buffer, Screen->Buffer, Movie-Buffer and Capture Buffer** parameters function only with this window.

Input source images

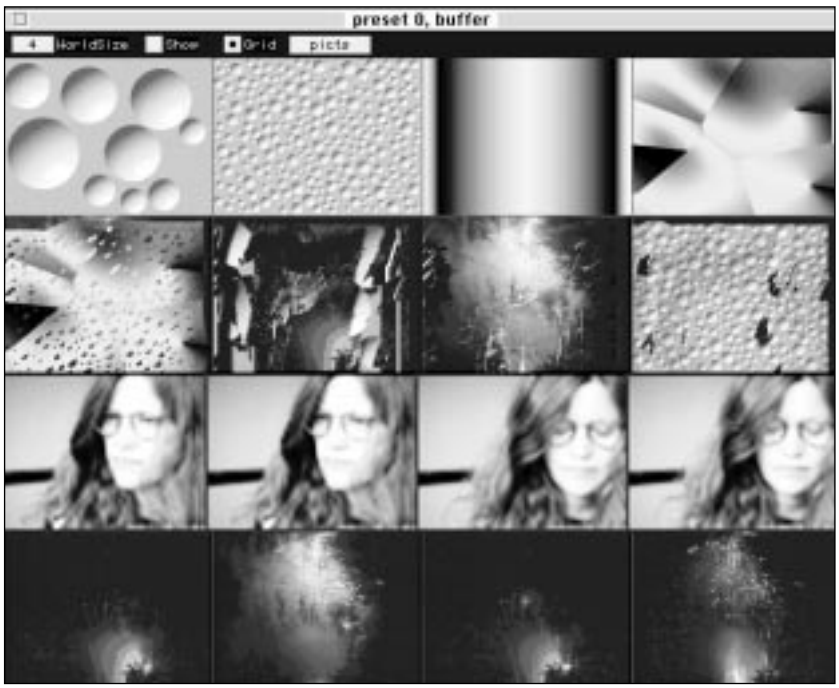
In this sample 4x4 Buffer window

Row One is comprised of loaded pict images.

Row Two is displaying Screen images (keying between Row One and Row Four).

Row Three is displaying video frame captures.

Row Four is displaying Movie still captures.



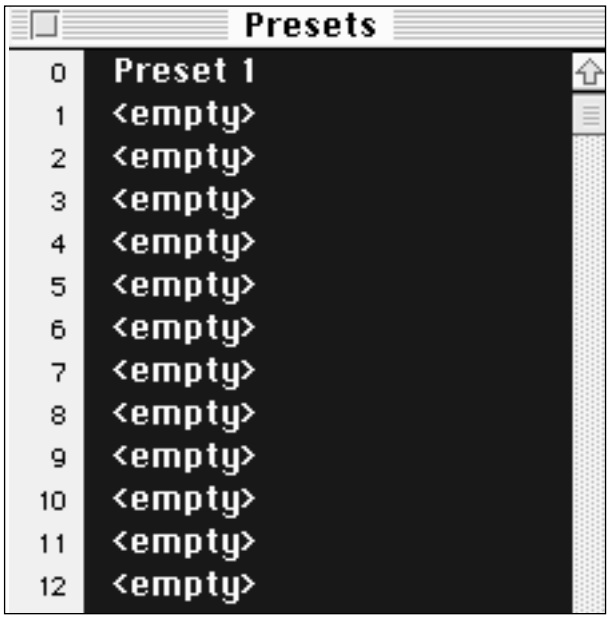
Presets (⌘-3)

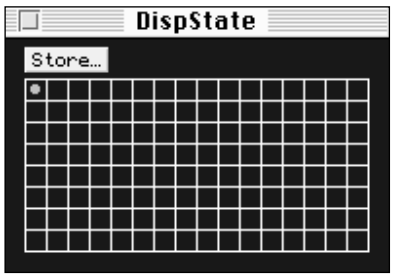
A Preset is the current state of the Mapping window. This includes all the editable parameter control settings as well as the choice of an imported QuickTime movie, text files and pictures loaded into the stills Buffer. Each Preset also incorporates 126 possible Display States.

If you choose to edit any parameter value in the Mapping window and save these changes while keeping the old values, double click on an <empty> Preset. Presets can be renamed when highlighted. The Mapping window will then reflect this name in its title. Subsequently, if you double click an <empty> Preset, a new Preset will be created with exactly the same content as the one you were just editing, ready for you to change.

Selecting Presets

Hitting Return after highlighting a Preset activates that Preset.The up and down arrow keys will advance the selection of a Preset but not activate it.





DisplayState Window
126 possible performance snapshots of the current program values. Click on a cell in the grid to Recall a state. The 0 - 9 keys on the keyboard will access the first ten Display States of a Preset.

Storage Shortcut
Use the asterisk key plus the Display State number from the number keypad to quickly store a DispState from 0 - 9.

Display States (⌘-4)

A Display State is essentially a snapshot of the current state of the program or the current performance values. Once the parameter control settings are mapped in the Mapping window and you begin a 'performance' (⌘-G) the variables are in a constant state of flux. When you save a display state, you capture this state. There are 126 possible display states per Preset. With the Display State window open on your main screen (⌘-4), it's likely you'll want to trigger different states of a particular Preset mapping. This is a dynamic method for cuing and quickly accessing multiple changes within a Preset map. The arrow keys can also be used to access a grid position. *For more on this window see Chapter Six.*

Tables (⌘-5)

This is an optional mapping method through which you can route your parameter values. Since Image/ine works with 14 bit numbers as program coordinates, the tables also reflect this convention. The values however are set in decimal quantities from 0.00 to 100.00. Linear, random, exponential and logarithmic patterns and curves can be edited here. *See Chapter Six for more information.*

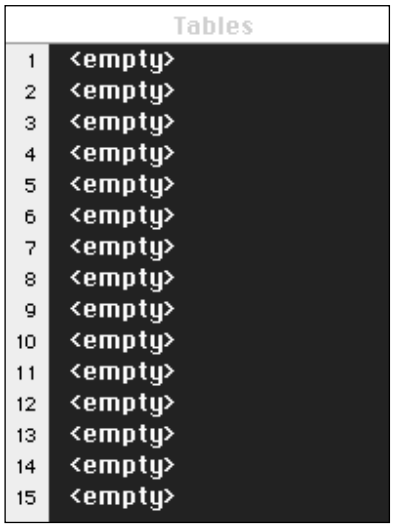
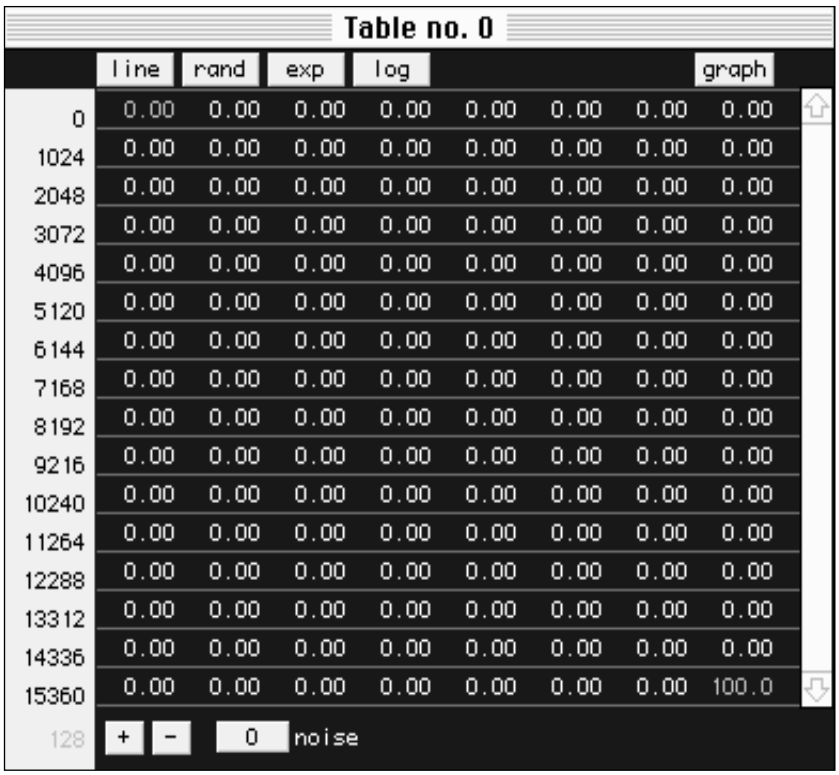
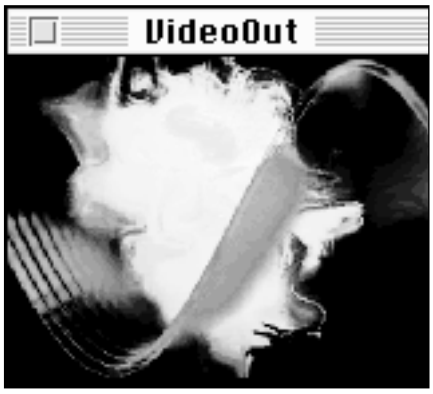


Table Windows
Two of several windows dedicated to creating table maps. The table above is the first window that opens when select Table from the pulldown menu. This In this window you'll name and store the maps. Double-clicking on the first entry opens the Table.



Video Out Spy (⌘-6)

A handy 80x60 view of the performance display. Useful if you're using an external monitor or beam for the performance output and would like a view of the composited image on your main editing screen. When this window is open it significantly slows down the program performance.



Midi Setup (⌘-7)

For Midi controllers. Allows you to select the serial port and Midi controller(s) in your setup. You can select the output device of your choice within your setup in the Out pulldown menu. Midi thru is also selectable in a checkbox. A direct link to your OMS Setup is accessed through the OMS Setup button. The Program change channel is also assigned in this window. Additional functions for Midi control of frame rate synchronization are available here.

FrameDoneSync sends a Midi message every time Image/ine is has completed a frame.

MidiSynchr syncs the frame output rate with Midi messages.

AutoSynchr lets Image/ine generate its own clock with 50 fps as the real time factor. Specified numbers in the numerical are divisors of this rate, so a 2 would signify 25 fps or half time. *See page 13 for more info.*

AutoSync
With an Autosync setting of 2 which sends a pulse rate of 25 fps to Movie clips and LFOs, the Feedback Indicator will display the 'real time factor' in parentheses to the right of the current frame rate. (**1.000)** is normal time, **(0.500)** is half time, (**0.20)** is one fifth time, etc. An AutoSync value of **2** then, will display (**0.500)**.

An Autosync value of **50** will display **(0.020)**.

Video Setup (⌘-8)

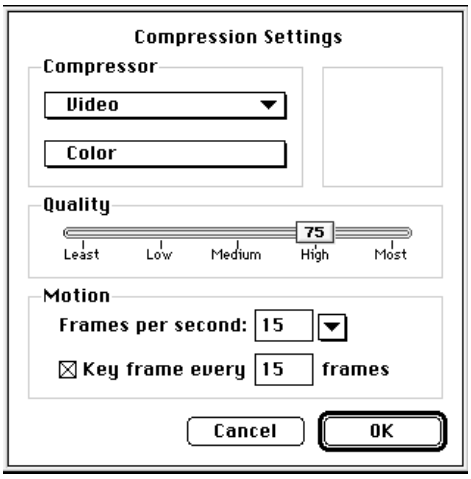
An initial setup window if you're using a camera for a live video signal. There are three menu options from the pulldown menu:

Compression

Image/ine doesn't need to use a compression scheme for digitizing the incoming video signal as the filtering is all real time. If however, you want to capture your performance output as a movie file, there needs to be some type of compression applied to this output.

Compression window

If you do not have a video source connected to the Video IN of your computer, the Compression window will not include the video image display. See page 14 for a comparison.



There are two kinds of codecs (compression-decompression types) - hardware-based (ship with video digitizing boards) and software based. QuickTime has it's own stable of software codecs but choosing the best codec for your needs is not always a simple matter. Refer to Appendix C for more information on choosing a codec type. The default compression setting is Video. Cinepak is also recommended due to its fast playback speed and excellent image quality.

Image Controls for Video Source

Hue
Saturation
Brightness
Contrast
Sharpness
Black Level
White Level

Note: Black and White Level adjustments are unavailable in Image/ine.

Image

Graphic slider controls for calibrating your incoming video signal.

Source

Choose the video format of your camera or VCR.

Digitization

Built in
Video capture board if you're using one

Input

Composite
S-video

Format

NTSC
PAL
SECAM

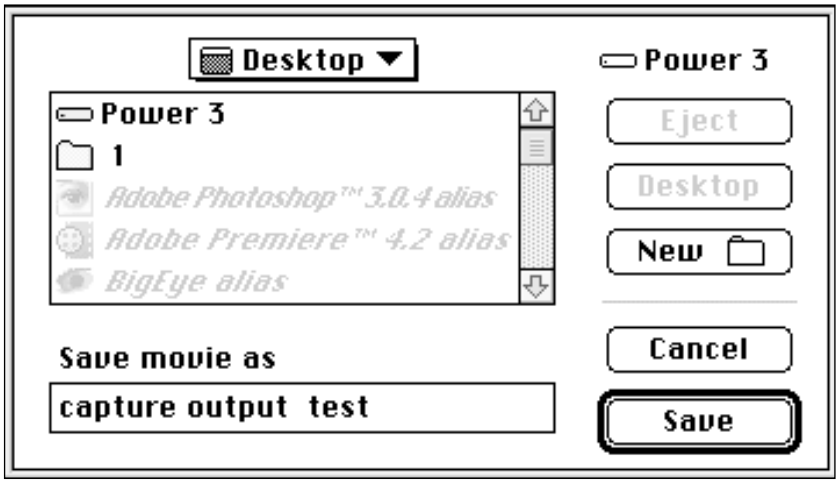
Action Pulldown

Perform (⌘-G)

To go to Performance mode after you've finished editing the Mapping and the Buffer hit ⌘- G, to exit performance mode hit the ***escape*** key. Some initialization is done when you go to Performance mode, so things may be a bit different than they are in the 'spy' window, especially after serious editing. Switching to Performance mode and back will synchronize both windows.

Capture Output /Stop Capture (⌘-M)

Captures the composited image in the performance window and saves it as a movie file that can be imported via the Mapping window to any preset. When selecting **Capture Output**, a window will appear and ask you to name the movie to be captured and where to store it. After saving the named file you're ready to record the movie. After recording you return to the Action pulldown menu (or hit ⌘-M) and select **Stop Capture.** This completes the capturing process.



Record /Pause Record(⌘-R)

Records on-the-fly, the portion of the performance you want to save as a movie. After naming the movie to be created in the **Capture Output** window, select Record (or hit ⌘-R) when you want to begin recording the performance output. When you've finished recording the segment, return to the pulldown menu (or hit ⌘-R again) and select **Pause Record.** Selecting **Stop Capture** (⌘-M) completes the recording process.

Chapter Four: The Mapping Window
Parameters and Program Controllers

The Interface

The Mapping window is the most important window in Image/ine. It's here that all the mapping choices and editing occurs. All 60+ parameters are grouped by function and editable on a line by line basis. It's time for an in depth look at the parameters and controllers of the program.

preset 0, mappings

Text... none Movie... none

parameter	control	--	--	--	--	Chan	Min	Max	Table	C	I	S	X
Pan X	mouse X	----d				--	0.000	100.000	--			•	
Pan Y	mouse Y	----d				--	0.000	100.000	--			•	
Scale	mouse X	--c-d				--	0.000	2.000	--			•	
Frame1Select	Saw	0.000	0	norm		--	0	3	--			•	
Frame2Select	Saw	0.000	0	norm		--	0	3	--			•	
Frame3Select	Saw	0.000	0	norm		--	0	3	--			•	
Screen->Buffer	Fixed	0				--	0	3	--			•	
Video->Buffer	Fixed	0				--	0	3	--			•	
Movie->Buffer	Fixed	0				--	0	3	--			•	
VideoActive	Keypress	v				--	--	--	--			•	
VideoOneFrame	Keypress	c				--	--	--	--				
MovieOn	Keypress	m				--	--	--	--				
MovieSpeed	mouse X	--co-				--	-1.000	3.000	--			•	
MoviePos	Fixed	0.043				--	0.000	100.000	--			•	
MovieStartPoint	mouse X	---o-				--	0.000	100.000	--			•	
MovieLoop	mouse Y	---o-				--	0.000	100.000	--			•	

The Mapping Window:
Portion of the Mapping Window with the Default control and control parameter settings. Numbers and values are entered into the grid regions in four ways:
a) drag scrolling
b) speed scrolling
c) auto-scrolling
d) typing in

First let's take a look at a performance example and then open the Mapping Window to see how the parameters are assigned.

Go to the Windows Pulldown Menu and select Mapping or hit ⌘-1. This is the main editing window in the program. Let's look at it line by line.

Text Button

On the first line you'll see a button labeled 'Text...' When you click on this button a window will appear asking you what text file you want to download to this Preset. *See Chapter 7 for more information on the preparation of text files.*

Movie Button

On the right of the Text button is the Movie button. Similarly, this is where you load a QuicktTme movie to the Preset.

Parameter Info

At the far right of the top line of the window you'll see a short definition appear as your mouse passes over any item in the horizontal column of the table.

The next line gives the subhead columns for the mapping table.

Parameters

This column lists all of the parameters

Control

Holding down the mouse on items in this column opens a menu that lists the possible controller selections for the parameter (These will be discussed in detail in the next chapter).

p1 - p4

These columns indicate the controller parameters. When the mouse passes over a command in these columns the subhead will change to notify you of the parameter type. (If your selected controller is an oscillator, the parameter will be interpreted as a frequency or Hz.) In most cases, only one parameter setting is available. For some keyboard commands, for example, all four parameters may be applied.

Min/Max Example:
You might want to set limitations to the full range of program coordinates in order to more accurately determine an effect. If for example you want your Background1 color(Color1) to fall with a certain spectrum - blues- you would set the **Min** value to about 7800 and the **Max** value to about 11000.

Specifc Range
Some parameters will have specialized range limitations due to their functions. For example, **FrameSelect1-3** will have a selectable range determined by the world size of the Buffer grid. For a 4x4 Buffer, 0 to 15 will be possible.

Chan

Indicates the midi channel assigned to the controller of the parameter. value between 1 and 16.

Min

The minimum value from 0.00 to 100.00. Some parameters have specific range possibilities suited to their function.

Max

The maximum value from 0.00 to 100.00. Some parameters have specific range possibilities.

Table

If a table is employed with a controller, this column identifies the table number.

C

stands for cycle. A dot or bullet in the column indicates that this parameter will cycle through and select from a set of parameters that would otherwise be individually mapped. Cycle only works in one direction.

I

stands for Invert. A dot or bullet in the column indicates that this parameter will invert the value.

S

stands for Show. A dot or bullet in the column indicates that this parameter will be visible in yellow type on the black main screen of the program. These are dynamic settings and give feedback status reports of the activity of the parameter. Does not function with the trigger parameters.

X

leads to an external mapping window. This window has 20 additional global mapping possibilities. They can provide added real time control to the controllers and are particularly effective with the LFO controllers. If a sine wave is assigned to a parameter and you want to fluctuate the frequency of that LFO you can assign another controller in this window to manipulate the rate. Assignments are made in an identical manner as in the main mapping window.

preset 0, mappings

Text... none Movie... none

parameter	control	p1	p2	p3	p4	Chan	Min	Max	Table	C	I	S	X
X mapping 1	Fixed	0				--	0	16383	--				
X mapping 2	Fixed	0				--	0	16383	--				
X mapping 3	Fixed	0				--	0	16383	--				
X mapping 4	Fixed	0				--	0	16383	--				
X mapping 5	Fixed	0				--	0	16383	--				
X mapping 6	Fixed	0				--	0	16383	--				
X mapping 7	Fixed	0				--	0	16383	--				
X mapping 8	Fixed	0				--	0	16383	--				
X mapping 9	Fixed	0				--	0	16383	--				
X mapping 10	Fixed	0				--	0	16383	--				
X mapping 11	Fixed	0				--	0	16383	--				
X mapping 12	Fixed	0				--	0	16383	--				
X mapping 13	Fixed	0				--	0	16383	--				
X mapping 14	Fixed	0				--	0	16383	--				
X mapping 15	Fixed	0				--	0	16383	--				
X mapping 16	Fixed	0				--	0	16383	--				
X mapping 17	Fixed	0				--	0	16383	--				
X mapping 18	Fixed	0				--	0	16383	--				
X mapping 19	Fixed	0				--	0	16383	--				
X mapping 20	Fixed	0				--	0	16383	--				

Parameters

A parameter is one of a set of measurable factors, such as **Hue1** and **PanX,** that define a system and determine its behavior within a range of variations. We begin with descriptions of the 60+ parameters in Image/ine on a line by line basis, as they appear in the Mapping window. The controller function is listed as *'continuous', 'toggle', 'trigger'* and *'select.'*

<*Continuous* > *controllers* control values in a continuous range, much like a potentiometer. These work best with sliders (on a midi keyboard or midi controller), the mouse or any generated control that streams data in a continuous flow (in midi between 0-127 or in midi hi res, 0 - 16383).

<*Toggle* >is an OFF/ON switch, best applied with a button, key stroke or synth key.

<*Triggers*> signal an event to occur. As with 'toggle' it works best with buttons, keystrokes or note numbers from a Midi instrument.

<*Select*> allows the choice of a set number of parameter options. This is only applicable for a few parameters:

- **Foreground, Background** and **Displacesrc**
- **Transfermode**

Feedback Indicators

Each parameter has a <*controller*> type and a Feedback Indicator description which defines the values displayed on the main screen for these functions.

Templates

In Appendix D you'll find some sample templates. When first getting to know Image/ine and familiarizing yourself with the parameters and their controllers, it can be helpful to have a mnemonic aid for remembering your editing choices per Preset. This is especially useful for computer keystroke and mouse assignments.

Stills Buffer Parameters

PanX *<continuous>* **Feedback Indicator** 0.00 to100.00

This function selects a position to be displayed from the buffer, but will not snap to accurate frame positions. Low values will make a section of the Buffer move towards the visible left; high values move the selection rectangle towards the right. Current panning is viewable in the Buffer window.

parameter	control	--	--	--	--	Chan	Min	Max	Table	C	I	S
Pan X	mouse X	----d				--	0.000	100.000	--			●
Pan Y	mouse Y	----d				--	0.000	100.000	--			●
Scale	mouse X	--c-d				--	0.000	2.000	--			●
Frame1Select	Saw	0.000	0	norm		--	0	3	--			●
Frame2Select	Saw	0.000	0	norm		--	0	3	--			●
Frame3Select	Saw	0.000	0	norm		--	0	3	--			●
Screen->Buffer	Fixed	0				--	0	3	--			●
Video->Buffer	Fixed	0				--	0	3	--			●
Movie->Buffer	Fixed	0				--	0	3	--			●

PanY *<continuous>* **Feedback Indicator** 0.00 to100.00

Exactly as the previous function; though this one controls the vertical axis. Current panning is viewable in the Buffer window.

Scale *<continuous>*

Feedback Indicator 0 = one pixel, 1 = size of current output screen, size of buffer grid

Scaling with Alpha Channels
A limitation in the current version of Apple QuickDraw prevents Scaling with an alpha channel enabled.

This function controls how big a part of the buffer will be visible if one of **Foreground, Background, or Displacesrc** is set to **Buffer**. The yellow feedback numerical on the main screen will show a value from 0.00 to the size of your current buffer (2.00, 3.00, 4.00, etc). The default setting is 1.00 corresponds to the current output screen worth of pixels (normally 320x240 or 640x480). Decreasing this number results in magnification or zooming in. Increasing the number will reduce or zoom out of the image size. Current scaling is viewable in the Buffer window.

FrameSelect1,2 and 3 *<continuous & toggle>*

Feedback Indicator Current frame position in Buffer grid

These parameters select the current image to be displayed from the *stills* Buffer of the program. If the **Foreground, Background, or Displacesrc** layers are set to **FrameSelect1, 2 or 3**, the area of the Buffer selected by this parameter in the mapping window will be viewable. Three discreet **FrameSelect** parameters allow images to be loaded and displayed in the Buffer in three separate, definable groups. The number of available frames is the square of the 'size' numerical in the world window. This number (9 in a 3x3 Buffer, 16 in a 4x4) can be divided among the three **FrameSelect** functions in the Min and Max columns of the Mapping window. The numericals available will reflect the grid size (0 to 15, for instance, if the current Buffer size is 4). If, for example, **FrameSelect1** is

assigned to frames 0-3, only these frames will be displayed in the layer assigned. **FrameSelect** can also function with toggle controllers if ***cycle*** is selected in the Mapping window. *See Chapter Five for more details on this feature.*

Screen->Buffer *<trigger>* **Feedback Indicator** GrabsPS

Grabs the current frame as seen on the screen at this moment and stores it in the Buffer at a location which runs from top left to bottom right. This location index is updated automatically. The indicator means Grabs per second. Min/Max values are linked to the Buffer size.

Video->Buffer *<trigger>* **Feedback Indicator** GrabsPS

Grabs the current frame of video as seen by the camera at this moment and stores it in the Buffer at a location which runs from top left to bottom right. This location index is updated automatically. Min/Max values are linked to the Buffer size.

Movie->Buffer *<trigger>* **Feedback Indicator** GrabsPS

Grabs the current frame of a QuickTime movie that is turned on (may or may not be visible in the performance window). And stores it in the Buffer at a location which runs from top left to bottom right. This location index is updated automatically. Min/Max values are linked to the Buffer size.

VideoActive	Keypress	v				--	--	--	--			●
VideoOneFrame	Keypress	c				--	--	--	--			
MovieOn	Keypress	m				--	--	--	--			
MovieSpeed	mouse X	--co-				--	-1.000	3.000	--			●
MoviePos	Fixed	0.043				--	0.000	100.000	--			●
MovieStartPoint	mouse X	---o-				--	0.000	100.000	--			●
MovieLoop	mouse Y	---o-				--	0.000	100.000	--			●

Video and Movie Parameters

This group of parameters refers to the status of incoming live video and imported QuickTime movies.

VideoActive *<toggle>* **Feedback Indicator** active/non-active

Switches on and off continuous grabbing or capturing of a live video source.

VideoOne Frame *<trigger>* **Feedback Indicator** none

When the video grabber is not operated in continuous mode (videoActive is OFF) this trigger will grab one frame and store it in the video channel.

MovieOn *<toggle>* **Feedback Indicator** see moviespeed: --- or number

Starts and stops playing of the QuickTime clip. When stopped, the last QuickTime frame will remain available in the movie channel.

MovieSpeed *<continuous>* **Feedback Indicator** -.01 to 3 see chart

Adjusts the speed and direction of the movie. The yellow feedback info on the main screen interprets these mapped coordinates as numbers from -1.00 to 3.00. A reading of:

Feedback Indicator	MovieSpeed/Direction
0.01 - 0.99	degrees of slow motion
1.00	full speed forward
2.00	double speed forward
3.00	triple speed forward
-1.00	full speed backward
-0.01 - -0.99	degrees of backwards slow motion

If you want to just stop the movie it is more efficient to use the above **Movieon** toggle. If, however you want to stop and use the **Moviepos** parameter you cannot switch the movie off, you'll have to use speed zero.

MoviePos *<continuous and toggle>* **Feedback Indicator** min:sec:frame

Jumps the movie (if it is not switched off) to the location given by the parameter value.

0.000 will take you to the MovieStartPoint
100.000 will take you to the endpoint of the MovieLoop

When the **Moviepos** Maximum value is set to 0, **Moviepos** changes into a toggle type parameter and advances the movie one frame ahead when the **Moviespeed** is set to 0.000.

MovieStartPoint *<continuous>* **Feedback Indicator** min:sec:frame

This parameter sets the start (in) point of the clip. When playing, the clip will loop back to this point, and when 'shuttling' **Moviepos** this will be the earliest point in the clip you can go to.

MovieLoop *<continuous>* **Feedback Indicator** min:sec:frame

This parameter sets the length of the loop, thereby establishing an end (out) point. When playing the clip will loop from the **MovieStartPoint** through the designated length of the loop. This is clear if you watch the yellow feedback info for the **MovieLoop** parameter on your main screen. It will indicate in minutes, seconds and frames (like SMPTE time code), the current length of the loop.

Draw Parameters

These drawing functions are compatible with all the controllers so penlike strokes can be applied to the Foreground and Displacesrc screens in a variety of ways. A Wacom drawing tablet in your setup enables seven additional controllers for use with all the parameters in Image/ine.

DrawX <*continuous*> **Feedback Indicator** none

The position on the x axis (horizontal) of the drawing pen.

DrawX	t xpos					--	0	319	--			
DrawY	t ypos					--	0	239	--			
DrawPenSize	PenPress					--	0	63	--			
ErasePenSize	Er.Press					--	0	63	--			
ClearDraw	t button					--	--	--	--			

DrawY <*continuous*> **Feedback Indicator** none

Same as above except it utilizes vertical position (y axis) of the pen.

DrawPenSize <*continuous*> **Feedback Indicator** none

A non-zero value in this parameter enables drawing. The value is equivalent to the pixel width of the stroke.

ErasePenSiz <*continuous*> **Feedback Indicator** none

Sets the pixel width of the erase stroke.

ClearDraw <*toggle*> **Feedback Indicator** none

Clears the drawing layer.

Color Parameters

These parameters control the 2 solid color channels available in background (the 1's) and displacesrc (the 2's). They control color (chroma) and brightness (luminance).

Color/Fixed
If you want to keep a particular Hue fixed or stable in either Background screen, simply assign **Hue1**or **Hue2** the control value of **Fixed** and the control parameter number that best matches the color you want displayed.

Hue1 <*continuous*> **Feedback Indicator** Current color in Color 1 box

The hue selects the color, as an angle. This means that the hue parameters cycles from red at zero through all the colors to arrive again back at red at 100.000. Individual hues can be selected or the entire palette can be cycled through, depending on the controller setting. It has effect on the **Background** screen only. Some approximate example program coordinates:

Number	Color
0.000	red
10.000	orange
15.000	yellow
35.000	green
55.000	light blue
65.000	dark blue
75.000	purple
85.000	magenta
100.000	red

Note: There are 16,382 colors or hues to choose from.

Sat1 *<continuous>* **Feedback Indicator** Current color in Color 1 box

The saturation parameter runs from no color at 0.000 to full saturation at 100.000. As with **Hue, Saturation** can be a assigned a constant value or can be cycled. Has effect on the **Background** screen only.

0.000	no color (white)
100.000	full saturation

Val 1 *<continuous>* **Feedback Indicator** Current color in Color1 box

Val (value) is the brightness of the color; 0.000 is black, 100.000 is full brightness. Lower settings give subtle, subdued colors with grey values. Higher values give a truer, brighter hue. Has effect on the **Background** screen only.

0.000	black
100.000	full brightness

Hue1	mouse X	ls---				--	0.000	100.000	--			
Sat1	mouse Y	ls---				--	0.000	100.000	--			
Val1	Fixed	100.000				--	0.000	100.000	--			
Hue2	mouse X	l-c--				--	0.000	100.000	--			
Sat2	mouse Y	l-c--				--	0.000	100.000	--			
Val2	Fixed	100.000				--	0.000	100.000	--			

Hue2 *<continuous>* **Feedback Indicator** Current color in Color2 box

Same as **Hue1** only effective in the **DisplaceSrc** with **ExtKey** ON.

Sat2 *<continuous>* **Feedback Indicator** Current color in Color2 box

Same as **Sat1** only effective in the **DisplaceSrc** with **ExtKey** ON.

Val2 *<continuous>* **Feedback Indicator** Current color in Color2 box

Same as **Val1** only effective in the **DisplaceSrc** with **ExtKey** ON.

Text Parameters

See Chapter Eight for text generation and scripting information.

TextSize <*continuous* > **Feedback Indicator** none

Sets the textsize, overriding the size currently set by commands in the text file. A new size command in the text file will take control again, when it is encountered.

TextSize	Fixed	255				--	0	255	--			
TextAdvance	Keypress	t				--	--	--	--			
Scr2BG1	Keypress	1				--	--	--	--			
Scr2BG2	Keypress	2				--	--	--	--			
CaptBuffer	Keypress	c				--	--	--	--			

TextAdvance <*trigger*> **Feedback Indicator** none

Advances the text layer to the next word; executing any embedded scripting commands it may find along the way. *See Chapter Seven for more info.*

Some Image Capture Parameters

Scr2BG1 <*trigger*> **Feedback Indicator** none

This trigger copies the current output image to the background1 buffer, and the background parameter is set to use this image as the current **Background**. This image is *volatile* in that any change of input to the background1 layer will permanently replace the image.

Scr2BG2 <*trigger*> **Feedback Indicator** none

This trigger copies the current output image to the background2 buffer, and the **Displacesrc** parameter is set to use this image as the current source of displacement. As with **Scr2BG1**, this image is *volatile*.

CaptBuffer <*trigger*> **Feedback Indicator** Current frame being compressed

Captures the entire buffer to an importable movie format and loads automatically as a movie file into the current Preset. The Feedback Indicator for this parameter is permanently on the screen as **cFrame**.

Screen Layer Parameters

Parameters of the three screen layers. The Input Sources can be cycled through by continually depressing the 'assigned keystroke (f' key for Foreground) or selecting via the Fkeys (see Chapter Three - Keyboard Strokes).

Foreground	Keypress	f				--	--	--	--	•		•
Background	Keypress	g				--	--	--	--	•		•
DisplaceSrc	Keypress	h				--	--	--	--	•		•

Foreground mapping
In the default mapping window (Preset 0 on bootup) the f key is assigned to cycle through the Input Layers in the **Foreground** screen - Video, Movie, Buffer, Text and Draw, in that order.

Foreground *<select>-*

Feedback Indicator	Current Input Source -Video,Movie,Buffer,Text, FrameSelect1,2,3, Draw

This parameter selects the foreground channel. This is the channel that is displaced or keyed, or acts as the 'cutting' signal when extkey is on. It can have one of five possible Input sources : **Video, Movie, Buffer, Text and Draw.**

Background *<select>*

Note: When **Scr2BG1** and **2** are triggered for capturing the screen image to the **Background1** and **2** layers, **'Captured'** will appear in the appropriate channel indicator.

Feedback Indicator	Current Input Source -Video,Movie,Buffer,Text, FrameSelect1,2,3, Output, Color,

Selects the background layer, the layer you key to, the layer which will come through the holes you cut in the foreground with the keyer. In addition to **Video, Movie, Buffer and Text,** you also can select **Output** and **Color** here.

DisplaceSrc *<select>*

Feedback Indicator	Current Input Source -Video,Movie,Buffer,Text, FrameSelect1,2,3, Output, Color, Sound

Selects the source of displacement, and doubles as the second background for the extkey function. **Video, Movie, Buffer, Text, Output, Color and Sound.**

Image Displacement Parameters

Displace *<continuous>*

Feedback Indicator	0 to 99.99. 0 = OFF, 99.99 = full displacement

Controls the strength of the displacement effect. If this parameter is set to zero, the displacement module is switched off. If **Displace** has any value other than 0 all keying will be disabled unless you turn ON **KeyAndDisplace.** *See Image Displacement in Chapter Two for more.*

DisplOffset *<continuous>*

Feedback Indicator	-100 to 100

Offsets a displaced image. With **Displace** the offset is horizontal. With **DisplaceAngle** the offset will tend to be diagonal and with **RotateGrey** the offset will be circular. Combinations of these parameter values will produce varying results.

DisplaceAngle *<continuous>* **Feedback Indicator** 0 to 359 degrees

Sets the angle of displacement; a major speed hog when set to non zero! At zero the displacement will be horizontal.

RotateGrey *<trigger>* **Feedback Indicator** ON/OFF

Displaces along a circular path instead of a linear one. White = -180^0, Black = $+180^0$. **Displace Angle** is dysfunctional when **Rotate Grey** is ON.

Warp *<continuous & special mode>* **Feedback Indicator** 0 to 32

A special mode with its own window for creating the effect. In the Mapping window you select one of 32 possible WarpMap states. The **Displace** value must be non-zero for Warp to be enabled. The value affects the strength of the warp.

Displace	mouse X	---od				--	0.000	100.000	--			•
DisplOffset	Fixed	0				--	-100	100	--			•
DisplaceAngle	mouse Y	---od				--	0	359	--			•
Warp	Fixed	0				--	0	32	--			•
GreyRotate	Keypress	r				--	--	--	--	•		•
KeyAndDisplace	Keypress	k				--	--	--	--			

Keying Parameters

KeyAndDisplace *<toggle>* **Feedback Indicator** ON/OFF

This toggle determines whether you go through the keyer after displacing or not. When displacing the image, many times it is necessary to take pixels from 'outside' the image; in these cases they are set to black. A good way to mask this is to switch on the keyer (by setting **KeyAndDisplace** to true or ON) and key in the original image. Using both the keyer and the displacement module costs a lot in terms of speed.

KeyLevel White *<continuous >*

Feedback Indicator Current percentage of brightness

This function controls the point of luminance (brightness) below which the **Foreground** is displayed and above which the **Background** is displayed.

KeyLevel Black *<continuous >*

Feedback Indicator Current percentage of brightness

This function controls the point of luminance (brightness) below which the **Background** is displayed and above which the **Foreground** is displayed. If **KeyLevelBlack** is set higher than the **KeyLevelWhite**, you would no longer see the **Foreground** image anymore.

Keysoftness <*continuous*> **Feedback Indicator** none

Controls how *steep* the change from **Back- to Foreground** is and vise versa. A zero here will (at any of the two key levels) change image abruptly. Higher values allow you to make this transition more gradually (soft keying) by mixing parts of the fore and background image for a particular luminance range.

Interpolation	Keypress	/				--	--	--	--	•		•
Solo	Keypress	s				--	--	--	--	•		•
ExtKey	Keypress	x				--	--	--	--	•		•
Blend	Keypress	b				--	--	--	--	•		•
Alpha	Keypress	a				--	--	--	--	•		
InvertAlpha	Keypress	A				--	--	--	--	•		
MirrorVideo	Keypress	8				--	--	--	--	•		•
MirrorMovie	Keypress	9				--	--	--	--	•		
MirrorBuffer	Keypress	0				--	--	--	--	•		
MirrorFrame1	Keypress	5				--	--	--	--	•		
MirrorFrame2	Keypress	6				--	--	--	--	•		
MirrorFrame3	Keypress	7				--	--	--	--	•		

General Parameter functions

Interpolation <*toggle*> **Feedback Indicator** bicubic, linear, none

Has to do with the evaluation of pixel color when **Scale** is decreased below 1.0 or zoomed in. When enabled, its effect will not be visible until the scaling movement has stopped. It perceptively slows things down.

bicubic The best interpolation method but costs the most in speed

linear Faster but less smooth.

none If you're not excessively scaling your image material it's best to keep interpolation OFF. It sometimes runs slower than the **FrameSelect** rate and will not bring the buffered image to the composite in time.

Solo <*toggle*> **Feedback Indicator** ON/OFF

Plays the **Foreground** layer without effects. When ON, all other program parameters except **Blend**, are locked out. Very effective with Buffer play of captured images. Also a good way to see the optimal frame rate of a movie clip without other effects slowing it down.

ExtKey *<toggle>* **Feedback Indicator** ON/OFF

The **ExtKey** parameter, when activated, switches from 'self keying' where the brightness of one image selects between itself and another image, to proper keying (external keying) where you have a 'cutting' signal which cuts between two source signals. In our case the cutting signal is the **Foreground** image and the two source images are the **Background** and the **Displacesrc** images.

Blend *<toggle>* **Feedback Indicator** ON/OFF

When **Blend** is ON, the newly generated frame (field, actually, if you have **Interlace** set to non-zero) will be mixed 50/50 with the currently displayed output. When it's OFF, the new image will just replace the old one.

Alpha *<toggle>* **Feedback Indicator** ON/OFF

Implements an existing alpha channel in an imported pict file or movie. Selects **Alpha** as a keying method in 24 bit resolution only.

Invert Alpha *<toggle>* **Feedback Indicator** ON/OFF

Inverts the alpha channel in an imported pict file from Photoshop. Selects **InvertAlpha** as a keying method in 24 bit resolution only.

Mirror Video *<toggle>* **Feedback Indicator** ON/OFF

Flips the incoming video image horizontally to give a mirror image.

MirrorMovie *<toggle>* **Feedback Indicator** ON/OFF

Flips the QuicktTime movie image horizontally to give a mirror image.

MirrorBuffer *<toggle>* **Feedback Indicator** ON/OFF

Flips the images in the **Buffe**r horizontally to give a mirror image.

MirrorFrameSelect1 *<toggle>* **Feedback Indicator** ON/OFF

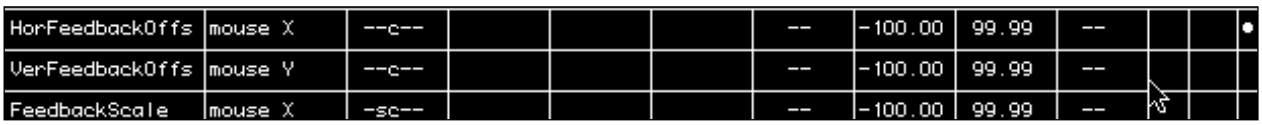
Flips the images in the assigned **FrameSelect1** area of the Buffer horizontally to give a mirror image.

MirrorFrameSelect2 *<toggle>* **Feedback Indicator** ON/OFF

Flips the images in the assigned **FrameSelect2** area of the Buffer horizontally to give a mirror image.

MirrorFrameSelect3 *<toggle>* **Feedback Indicator** ON/OFF

Flips the images in the assigned **FrameSelect3** area of the Buffer horizontally to give a mirror image.



HorFeedbackOffs *<continuous>*

Feedback Indicator Current distance in pixels horizontally 0 = no offset

When the output is fed back to the input (select *Output* as **Background**) of the program, this parameter allows you to give the output a horizontal offset before it's fed back. The distance over which this offset works is dependent on the **FeedbackScale** parameter.

VerFeedbackOffs *<continuous>*

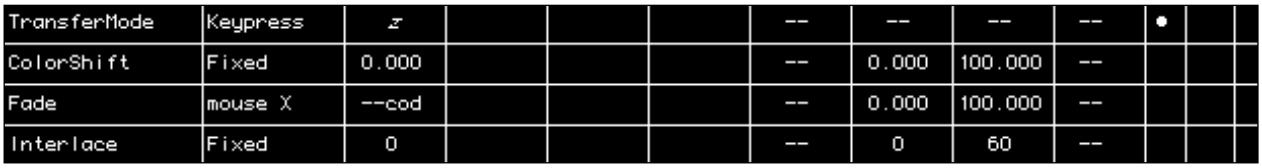
Feedback Indicator Current distance in pixels vertically 0 = no offset

Vertical version of the **HorFeedbackOffs** parameter.

FeedbackScale *<continuous>*

Feedback Indicator 0 = no scaling: from -(number) to + (number)

This allows you to scale (enlarge or reduce) the output before you use it again by selecting the *Output* as **Background**. Zero is no enlargement.



TransferMode *<select>* **Feedback Indicator** copy, xor, and, or

Selects the transfer mode, the way in which fore- and background are combined before they are displayed on the screen. The effects generated are dependent on the keyer settings. There are four possibilities:

copy **Foreground** replaces **Background**

xor **Foreground** bitwise ***xor*** background replaces **Background;**

or **Foreground** bitwise ***or*** background replaces **Background** (things get lighter)

and **Foreground** bitwise ***and*** background replaces **Background** (things get darker)

ColorShift *<continuous>* **Feedback Indicator** none

A global shift of color that's difficult to predict. A weird effect. Experiment.

Fade <*continuous*> **Feedback Indicator** none

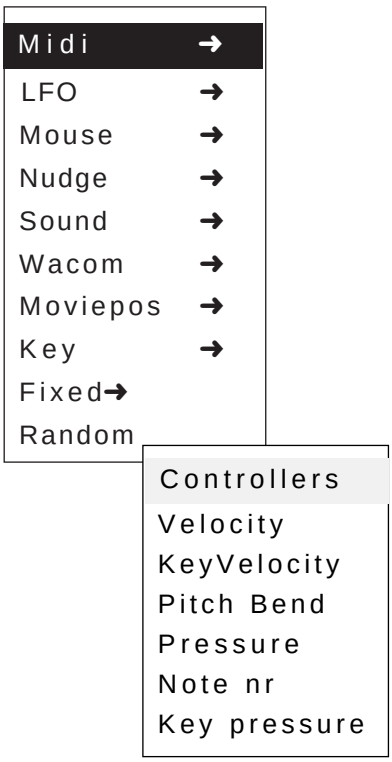
This parameter fades the display in (at value zero) and out. A global fade between Presets can be enabled in the Preferences window.

Interlace
If you're running the Image/ine performance window in 640x480 resolution, you might try fixing Interlace to '1' for a major speed advantage.

Interlace <*continuous*>

Feedback Indicator Number of skipped scan lines per field

This parameter determines the number of fields per frame, if set to one, the screen update will skip every other line; so it will update: even, odd, even, etc. Set to higher values it will become a very noticeable effect-experiment.



Controller selection
To select a controller function click the mouse on the region in the Mapping window directly adjacent to the parameter you want to control. A pop-up menu of ten controller categories will appear. Holding the mouse down on a category brings up another window in which you'll select the controller type for the category. For instance, you might select a Midi continuous controller 7 (volume) for the PanX parameter .

Program Controllers

Image/ine gives you the possibility of manipulating its many parameters in a variety of ways. If you're a Midi musician you may want to assign some or all of your control to Midi commands, playing the image material through your instrument. If you're using a Wacom drawing tablet you can control the performance with the strokes of your pen. Wave pattern generators provide a measure of auto-dynamic control. All of these methods can be used independently or intermixed within a Preset. Each of the 60+ parameters can be controlled by any of the 27 controllers. The general controller categories are:

Midi	**7 controller types**
LFO's	**4 controller types**
Mouse	**3 controller types**
Nudge	**2 controller types**
Sound	**2 controller types**
Wacom Tablet	**7 controller types**
MoviePosition	**2 controller types**
Key	
Fixed	
Random	

There are submenu categories for most of the general controller categories and they are described below.

Most of these controllers have additional parameter settings, not to be confused with the program parameters that they control. These are placed in the 4 columns to the right of the control column and labeled *p1, p2, p3, p4.* In most cases there will be one value placed in the first column. The heading of this column is dynamic, dependent on the controller. Theses headings are:

Midi Controller Parameter Types

- *value*
- *ctrNum*

LFO Controller Parameter Types

- *Hz*
- *phase*
- *mode*
- *width*

Mouse Controller Parameter Types

- *Modif(ier)*

Nudge Controller Parameter Types

- *Note-/Key-*
- *Note+/Key+*
- *scale*
- *mode*

Sound Controller Parameter Types

- *low*
- *high*

Wacom Controller Parameter Types

- *Pen Pressure*
- *Eraser Pressure*
- *x position*
- *y position*
- *x tilt*
- *y tilt*
- *Button*

MoviePos Parameter Types

- **None**

KeyPress Controller Parameter Types

- *None*

Fixed

- *None*

Random

- *None*

Note: Certain controllers such as Midi/Velocity and Midi/Pressure have no additional variables. Others, such as Nudge/note duration, have four.

Midi

If you want a parameter or a selection of parameters to be controlled by incoming Midi data, you have several choices:

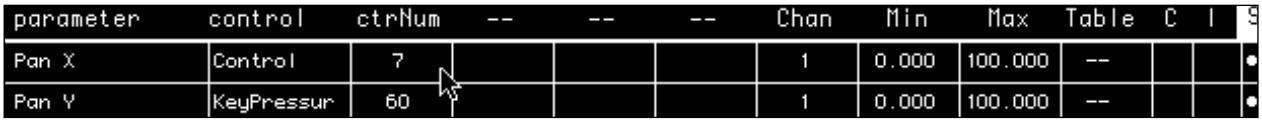
Controllers

The most often used Midi control numbers:

1 - Modulation Wheel
4 - Foot Pedal
5 - Portamento Time
6 - Data Entry
7 - Volume
10 - Pan Position

A controller is generally a switch, button, slider or mouse movement that implements a function. Each of the 16 midi channels can be assigned one of 128 controller numbers (0-127). Image/ine uses 14 bit coarse/fine resolution in which the range is from 0-16383. In coarse resolution, continuous controllers are assigned to numbers 0-31 which have their least significant 7 bits mapped to controllers 32 to 63. In Imagine, control resolution is always coarse/fine. In standard midi specs most of the controllers are predefined.

For the complete Controller Chart see Appendix A. In the Mapping window, if you choose Midi/Controllers, you'll enter the controller number of your choice in the value column.



parameter	control	ctrNum	--	--	--	Chan	Min	Max	Table	C	I
Pan X	Control	7				1	0.000	100.000	--		
Pan Y	KeyPressur	60				1	0.000	100.000	--		

Mapping Window:
This is how the selection of Midi Control 7 would appear in the Mapping Window. It has been assigned to Midi channel 1.

Velocity

Velocity essentially refers to how fast a key is pressed (emulating the touch of a finger on a keyboard). In this case it's dynamically tracking the velocity of an assigned channel. There is no other value to be set.

Velocity
Let's use an example for manipulating the **Scale** parameter of the buffer window. If you're playing a riff on a midi keyboard controller and have assigned the parameter to respond to Velocity, playing will cause the buffer image(s) to zoom In and out, depending on how hard (loud) the playing is. In the case of **Scale**, the harder you play the smaller the images in the buffer (bigger numbers = smaller images). If Invert is checked ON, the opposite applies.

Key Velocity

This continuous controller also measures velocity but it acts more like a trigger as it sends the velocity information from an assigned key.

Pitch bend

Most synths are equipped with a pitch bend wheel. The stable or detent position of the wheel will have no effect on the parameter. Bending up (in Midi 0 to 64) sends larger numbers and bending down (0 to -64) smaller numbers. There is no other value to be set.

Pitch Bend
To use the **Scale** parameter as an example again - If Pitch bend is assigned as the controller, moving the wheel up (bending notes up) would cause the buffer image(s) to zoom out or become smaller. Bending notes down would zoom in on the Buffer.

Pressure

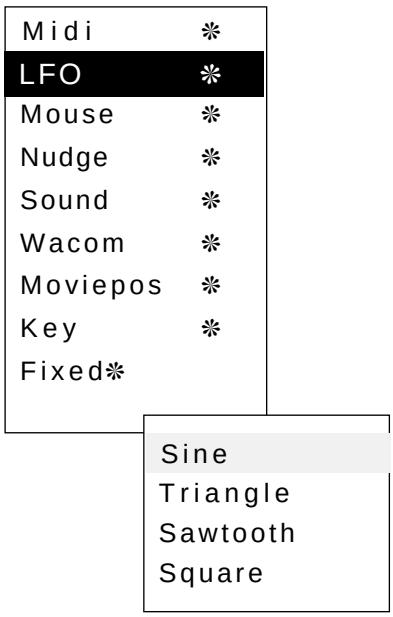
Averages the pressure applied to the instrument overall, of all the keys you're currently holding down. No control of individual keys as with Aftertouch.

Note nr

When a key or note on a midi instrument is depressed, the midi value of the pitch (for example middle C = 60) is the applied value to the parameter. There is no other value to be set.

Key pressure

Where KeyVelocity controls velocity on a designated note, Keypressure controls pressure applied to an individual key. This feature is only found on better synths.

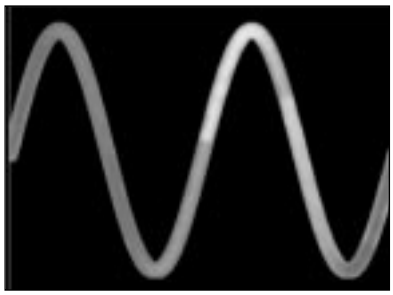


LFO's - Low Frequency Oscillators

These waveform generators are useful for creating auto-dynamic control of specified parameters. They are, simply, waves in the sub-audio range which repeat at a slow rate and are generally used as a control source for, in Image/ine's case, automatic triggers or continuous control.

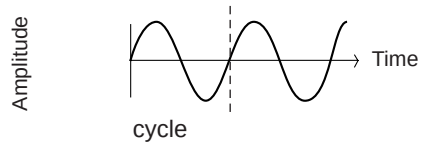
The shape of the wave is described by three attributes: amplitude, the amount of the signal measured by fluctuations in voltage; period, the time between amplitude peaks, measured in seconds and phase, determined by the point at which a wave reaches its amplitude and crosses the horizontal axis. Their frequencies are measured in cycles per second or Hertz (Hz). Negative values invert the shape.The waveform types are:

Sine



Example of a Sine wave drawn by Image/ine with the Draw Parameter.

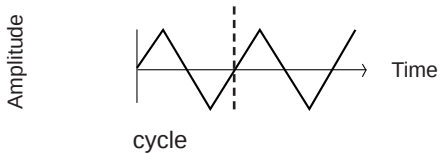
sine wave — signal output where the voltage rises and falls smoothly



Triangle

Example of a Triangle wave drawn by Image/ine with the Draw Parameter.

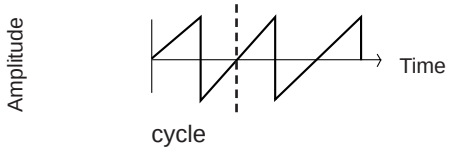
triangle wave — signal output from the LFO that rises and falls smoothly with a sharp corner between the posi tive ramp up and the negative ramp down.



Sawtooth

Example of a Sawtooth wave drawn by Image/ine with the Draw Parameter.

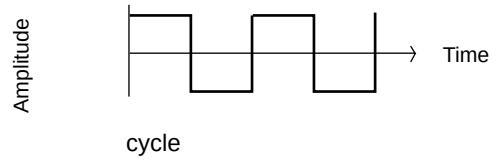
sawtooth wave — signal output from the LFO that either rises smoothly from a low value to a high value and then suddenly falls back to its original position or, oppositely, declines steadily from a higher value to a lower value and then jumps back to the original high level.



Example of a Square wave drawn by Image/ine with the **Draw** parameter and a movie clip keyed in the **Background.**

Square

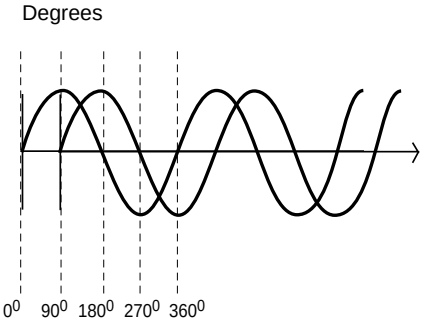
square wave a pulse wave that changes abruptly



cycle

parameter	control	Hz	Phase	Mode	--	Chan	Min	Max	Table	C	I	S
Frame1Select	Sine	0.372	0	norm		--	0	2	--			•
Frame2Select	Sine	0.372	90	x 1		--	3	5	--			•
Frame3Select	Square	0.354	0	shot	50	--	6	8	--			•

In this example the **FrameSelect 1,2,3** parameters are each assigned to an LFO at varying frequencies and phase relationships. **FrameSelect1** is set to normal mode, **FrameSelect2** to the xmapping window and **FrameSelect3** to a Midi controlled cycle advance with a pulse width of 50.



Two sine waves, 90^0 out of phase.

Control parameters for the LFO controllers

Sine, Triangle and Sawtooth

p1 ***Hz*** or frequency, which is the reciprocal of the period (1/period) or the number of peaks per second.

p2 *phase* - sets the phase of the LFO

p3 ***mode***

norm = normal setting; LFO runs freely and will be retriggered when (re)selecting a DisplState.

shot = LFO runs for only one cycle and then stops. (Re)selecting a DisplState allows the LFOto repeat another cycle.

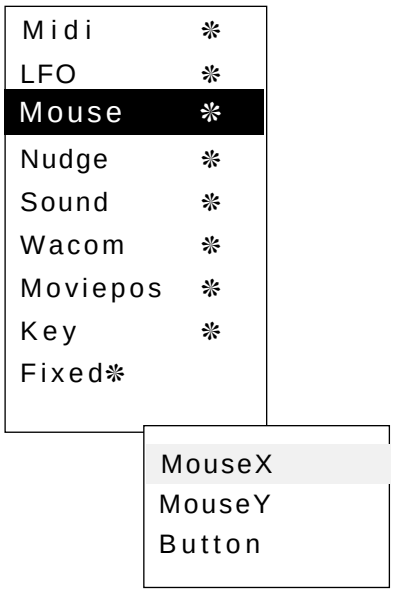
x-mapping = same as shot but controlled by the indicated setting in the external mapping window. Will also be (re)triggered by the x-map.

Square

p1-3 same as the other waveforms

p4 ***width*** of the pulse

Note: Selecting a DispState with either a keyboard number or a program change command via Midi will retrigger all the LFO's.



Mouse

Image/ine is designed to work efficiently with only the mouse and computer keyboard as input controllers. With the keyboard alone, smooth continuous control is impossible as the keystrokes step you through values or toggle functions ON and OFF. Enter the ubiquitous Mouse as Slider. Image/ine works with the mouse direction on two axes- X - horizontal and Y-vertical. By defining directional movement with one of 30 possible keyboard modifiers, the mouse can accomplish most of your continuous commands.

Mouse X	tracks the continuous horizontal, left and right, movement of the mouse
Mouse Y	tracks the continuous vertical, up and down, movement of the mouse
Button	the click in this case is best used as a trigger control

parameter	control	Modif	--	--	--	Chan	Min	Max	Table	C	I	S
Pan X	mouse X	----d				--	0.000	100.000	--			●
Pan Y	mouse Y	----d				--	0.000	100.000	--			●

Mapping Window
Example of mouse controllers.

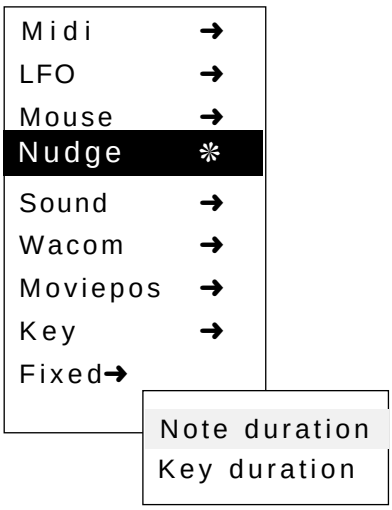
Mouse Modifiers
If you choose to control **Scale** with the mouseX controller you would select Mouse/mouseX. The next step is to designate a key combination. (There are 15 combinations which are easier to depress at once because they don't involve the Caps Lock key. There are a secondary set of 15 combinations that include the Caps Lock key).**--c-d** is the default modifier. Place the stills buffer in the foreground screen. Now, if you depress the control and command key simultaneously and move your mouse in a horizontal direction, you'll zoom out (images get smaller) as you move to the right and zoom in when you move left.

Image/ine uses the following keyboard combinations as modifiers, allowing the mouse movements to be mapped to several parameters in one Preset. There are 30 possible combinations for mouse X and Y, independently. In many instances you'll want to map the same modifier to both directions. These command keys and their modifiers are:

Command	Modifier
Caps Lock	l
Shift	s
Control	c
Option	o
Command	d

If you select Mouse/mouse X as a control for a parameter in the mapping Window, you'll see a sequential combination of these letters in the next column (*p1*). For any particular function you should select a combination that feels comfortable and memorable. The labeling convention in this column is more straightforward than it first appears. The key commands are always in the same order. Unused keys in a sequence are dashes, '**-**'.

Note: Caps Lock is the default key for KeyLevelWhite(mouse X) and KeyLevelBlack (mouse Y).



Nudge

Nudge works by stepping through a function with continual keystrokes, incrementing or decrementing the value of a parameter. It's a bit like a notched slider. There are two controllers, one for a midi instrument and the other for the computer keyboard. They function similarly.

Note duration	notes depressed from a Midi instrument controller
Key duration	computer keyboard keystrokes

parameter	control	Note-	Note+	scale	mode	Chan	Min	Max	Table	C	I	S
Hue1	ndgNoteDur	63	65	3000		1	0.000	100.000	--			●

parameter	control	Key-	Key+	scale	mode	Chan	Min	Max	Table	C	I	S
Hue1	ndgNoteDur	63	65	3000		1	0.000	100.000	--			●
Sat1	ndgKeyDur	?	A	3000		--	0.000	100.000	--			●

Mapping Window
Nudge/Note duration in the Mapping Window if selected to control **Hue1. Sat1 is controlled by Nudge/Key Duration.**

Both of these controller functions have four parameters:

p1 *Note- /Key-* nudge down key or note number

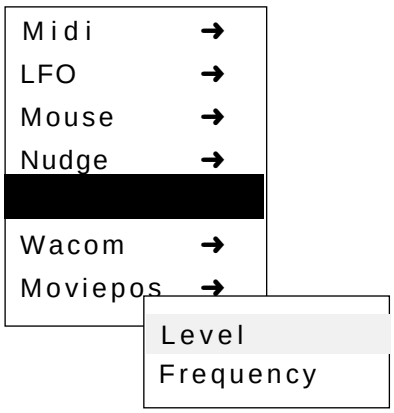
p2 *Note+/Key+* nudge up key or note number
If ***Note+*** is set to 0 (zero) then **all** notes below or equal to(<=*Note-*) ***Note-*** will nudge down and **all** notes higher than (>*Note-*) ***Note-*** will nudge up.

p3 *scale* is the time base measured in milliseconds keeping the nudge key active for this amount of time will cause the parameter to move across the whole range (0.000-100.000 units). Fractions of this time move the parameter fractions of the range.

p4: *mode:*
0 = normal - up moves up and stops at maximum

1 = wrap - up goes up and wraps back to zero at the top

2 = bounce - up goes up, then, at the top it 'bounces' off max and moves down again.



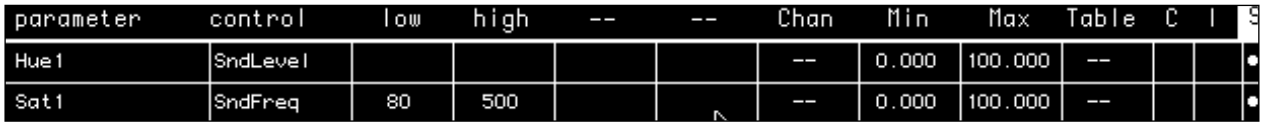
Sound

Image/ine can also use incoming audio as a controller. The source of the audio can be, for instance your internal CD-ROM player or an external mixer. If you're using an AV Mac you can input the audio directly to the RCA Audio IN jack. Otherwise , use the built-in audio In mini jack. You'll first need to alert your system to your input choice:

1. Go to the Control Panel and select Monitors & Sound

2. Click on the Sound icon

3. From the pulldown menu select the input you'll be using

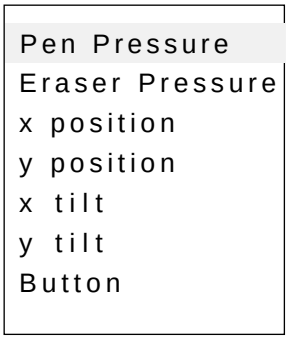


parameter	control	low	high	--	--	Chan	Min	Max	Table	C	I
Hue1	SndLevel					--	0.000	100.000	--		
Sat1	SndFreq	80	500			--	0.000	100.000	--		

Mapping Window
This is how the selection of **Sound/Level** would appear in the Mapping Window if selected to control **Hue1** and **Sound/Frequency** set to control **Sat1.** It has two parameter assignments, **low and high** which set the limits of the frequency range .

Image/ine reads two attributes of the incoming signal or complex waveform:

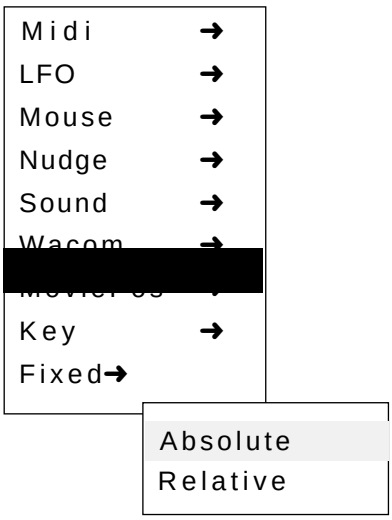
Level	The amplitude of the incoming audio signal
Frequency	Number of cycles per second
p1	*low - minimum freq* - frequencies lower than this and over the threshold set the parameter to 0.000.
p2	*high - maximum freq* - frequencies higher than this and over the threshold set the parameter to 100.000.



Wacom

Image/ine can also be driven by commands on a drawing tablet. Strokes function as continuous controllers, clicks like triggers. You'll need a Wacom drawing tablet to use it.

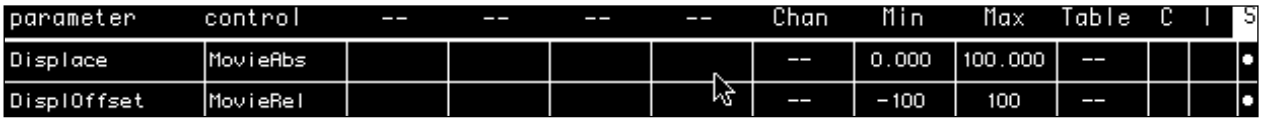
Pen Pressure	Usesthe amount of pressure applied to the pen point
Eraser Pressure	Uses the amount of pressure applied to the eraser of the pen
x position	The current position of the pen point on the horizontal axis of the tablet
y position	The current position of the pen point on the vertical axis of the tablet
x tilt	The angle of the pen point and its current location on the x axis of the tablet
y tilt	The angle of the pen point and its current location on the x axis of the tablet
Button	The button on the pen that functions like a mouse button trigger



MoviePos

This control lets you map a parameter to be modulated by the frame position of the active QT movie. The updating numericals are viewable from the main screen in the **MoviePos** parameter setting. So for example, if you were to map **Hue1** to **Moviepos** absolute, you'd cycle through the colors corresponding to the equivalent value of the Feedback Indicator. Setting the value to **realative** maps the whole range of values to the set in and out points of the loop.

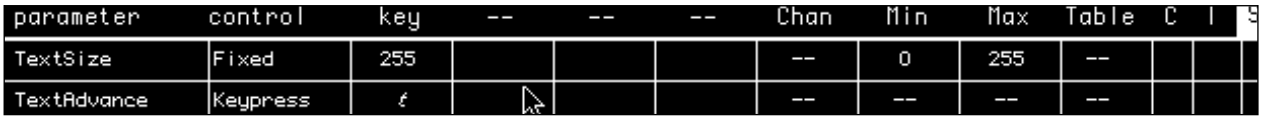
Abs**olute**	absolute movie position, relative to the length of the whole QuickTime clip.
Relative	relative movie position, relative to the start and end points of the QuickTime clip.



parameter	control	--	--	--	--	Chan	Min	Max	Table	C	I	S
Displace	MovieAbs					--	0.000	100.000	--			●
DisplOffset	MovieRel					--	-100	100	--			●

Key

The Key controller allows you to assign a computer keyboard command as a toggle or switch. The commands are case sensitive so Caps are distinguished from lower case. In the Mapping example below from the default Preset, the Text advance parameter is assigned to the 't' key of the keyboard. Every time the 't' is depressed in performance mode (with a text file loaded into the Preset) the next word in the document will be displayed.



parameter	control	key	--	--	--	Chan	Min	Max	Table	C	I	S
TextSize	Fixed	255				--	0	255	--			
TextAdvance	Keypress	t				--	--	--	--			

Fixed

Sets a stable, non-variable value which can effectively disable a parameter or set it to a fixed condition. The range of available values will differ between parameters. In this example, the text file that is advanced by the 't' keystroke will always be displayed at its maximum size, as 255 is the Maximum value for this parameter.

parameter	control	value	--	--	--	Chan	Min	Max	Table	C	I	S
TextSize	Fixed	255				--	0	255	--			
TextAdvance	Keypress	t				--	--	--	--			

Random

Sets a parameter to a random value.

p1 *Frequency* controls the frequency of the update. Min/Max values control the range in which the random numbers will fall.

Displace	Random	0.146				--	12.000	43.002	--			●
DisplOffset	Fixed	0				--	-100	100	--			●

An example of **Random** with the **Displace** parameter. The frequency of displace randomness is set to a frequency of 0.146 within a range of 12.000 to 43.002.

Chapter Five: The Stills Buffer

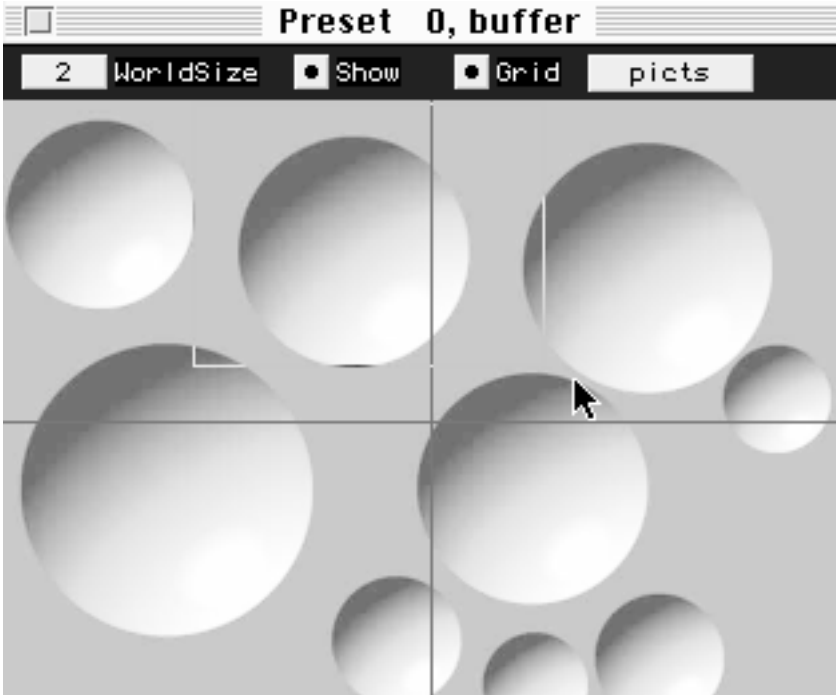
As described in *Chapter Three: Basic Concepts*, the Stills Buffer is an exciting aspect of Image/ine. It is one of the Input sources or layers in the program and is multi purpose. You can import one or more images into the buffer and pan and scale across these images in numerous ways. The output of the current composited performance can be captured at assignable intervals and subsequently panned and scaled. You can schedule a rate at which images in the buffer grid will be selected and displayed in an assigned layer. Live video can be panned and scaled and combined with the original signal to create temporal displacement effects. There are also built-in noise sources for extra textural effects. You need to experiment with this feature to grasp the depth of its possibility. Let's take a look at the Stills Buffer window.

The Grid

When you start the program the default window will be two screens wide by two screens high. The grid size is variable and can be changed by scrolling in the upper left hand corner box with the 2 in it. It will always be **n by n** screens, the maximum of **n** depending on memory, resolution and pixel depth of your setup (20x20 max with 80 MB, 320x240, 16 bit). Each screen in the grid corresponds to a 320x240 image (if Image/ine is set to this default window size). This means that a 2x2 grid is actually four 320x240 screens or one 640x480 screen. A 3x3 grid has nine 320x240 screens or one 960x720 screen (see chart).

WorldSize Grid	Image Dimensions
2X2	640x480
3x3	960x720
4x4	1280x960
5x5	1600x1200
6x6	1920x1440
7x7	2240x1680
8x8	2560x1920

Grid equivalents
With the Image/ine window size set to 320x240 in the Preferences menu the chart above indicates the relationship between the number of cells in a grid and the full dimensions of the Buffer



Right
This is a 2x2 WorldSize Buffer with the grid divisions and current panning position showing.

There are two other buttons marked *Show* and *Grid*. You have the option of toggling these OFF and ON.

Show	displays the outline of the current **PanX, PanY,** and **Scale** areas of activity
Grid	displays the actual cell divisions. Pictures can be snapped directly to a grid position.

Importing Files

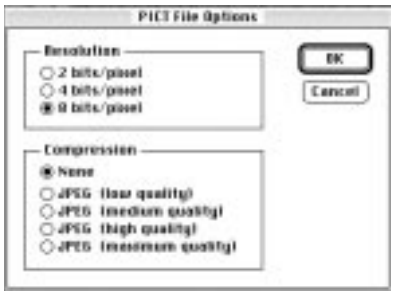
First we'll discuss 'manually' importing images from outside of the program.

Picture Preparation

JPEG format
Since Image/ine is QuickTime based it supports the JPEG file format. The JPEG file format does **not** support alpha channels however.

If you want to import still images from other sources you need to make sure they're in the proper format. If you're using scanned images, it's necessary that they be saved in the Pict file or JPEG formats in an image processing application like Photoshop. Image/ine can accept these files in low and high resolution. Your choice will be dependent on usage and as always there are trade-offs.

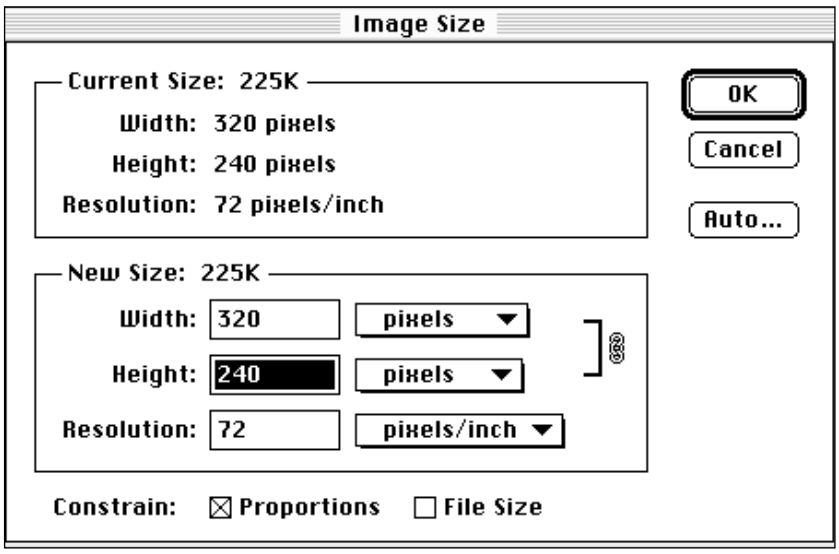
Speed and Image Quality



Photoshop Save File Window
When you save a file as a Pict or JPEG you'll have a choice of resolution and compression settings.For Image/ine, 8 bit res and No compression are recommended.

There are compromises to be made as you prepare a file for export to Image/ine. As we've already determined with the discussion on monitor resolution and program speed - **lower resolution = better performance.** With imported Pict files this is also true in that larger file sizes will take a longer time to import. This can have an affect on your performance if you have large pict files imported into several Presets and want to toggle between them in real time. There may be some lag time while the file loads, slowing down your performance. On the other hand, if you require the best possible image quality and intend to resize your pictures in the Buffer window (make them bigger), you'll probably want to save them in a larger size. First, let's look at resolution types in Photoshop.

Bit resolution	ranging from 1 bit to 32 bits of information per pixel
Image resolution	ppi (pixels per inch) the density of information in the file. The greater the value, the better the image quality
Dimensions	based in pixels for Image/ine; 320x240 and 640x480 are example dimensions in a 4:3 aspect ratio which is the common ratio of video and computer monitors



Photoshop Image Size Window
The dialog box in Photoshop where you'll set the dimensions and resolution of your Pict file. 72ppi is sufficient for any image file. Remember that resizing an image to a larger dimension (for instance from a 320x240 image to a 640x480) will decrease your image quality unless you're resizing from a greater ppi value.

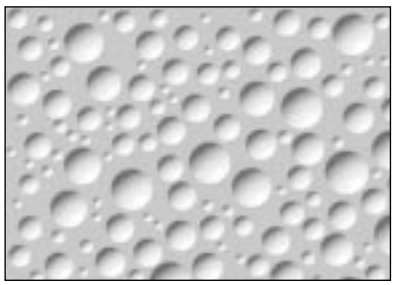
When you set a pictures size in Photoshop in the Image Size dialog box you'll set the dimensions, image resolution and file size. The relationship between the resolution and the dimensions of an image determine its file size. Resizing an image's dimensions DOWN produces little change in image quality but resizing UP can greatly diminish the quality.

What's important to realize, regarding image importation in Image/ine is this:

If you intend to import images as single 320x240 frames (just as Image/ine captures video, screen and movie frames) a resolution setting of 72 ppi is sufficient. If you want this image to fill the entire grid without resizing (which decreases image quality), save the file to the whole grid dimensions. The chart on page 59 which will help you quickly determine these sizes. If you intend to do any magnification scaling (zooming in) it's a good idea to increase your image size. You'll have to experiment with this to get the results you want. This is one method of importing an image without sacrificing quality.

So, the lower the image resolution and the smaller the size, the smaller the file. The smaller the file the better the program performance. Larger files take longer to download (this is a factor when switching from Preset to Preset with different import ed images). It also means the image itself will be much larger, requiring a bigger Buffer grid. The bigger the image dimensions, the better the image quality when zooming in and magnifying an image but it loads much slower. That's the trade-off.

If you want them to fit the grid screen size they should be in 4:3 aspect ratio (320x240, 160x120, etc.) but, that's not a requirement. If you're using Photoshop for image manipulation you can also embed an alpha channel into the image which acts as a very accurate mask - a great keying technique. Once you've prepared some images for import you're ready to load them into the Buffer. *For more info on alpha channels see Chapter Seven.*



Above
A greyscale Pict file with 640x480 dimensions.

Right and opposite page
Imported into a 2x2 WorldSize Buffer it fills the entire 640x480 area.

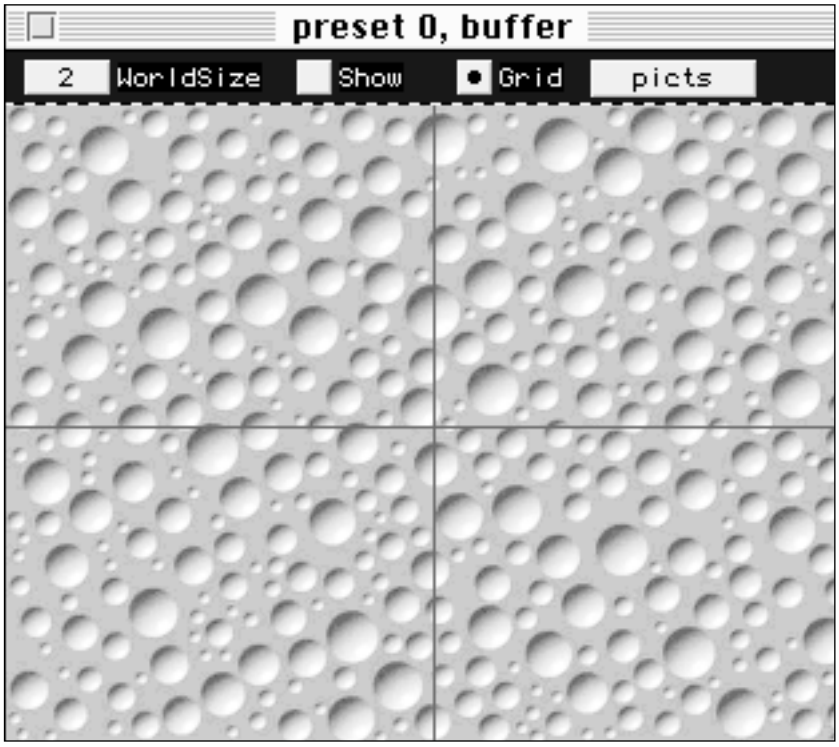
Loading Pictures to the Buffer:

1. Go to the Edit pulldown menu and select **Load Picture**

2. A Finder window asks you open the picture file you want to import

3. Go to the Tutorial Folder and select *babyBubbles*. Double- click on it.

4. This image is loaded into the full grid screen.



Key Commands:

Snapping an image to position
Depressing the ⌘ -\ key combination with an image selected will automatically snap the picture to a 320x240 screen size. The ⌘-= combination will load the pict files in sequential order.

Snapping an image to position while dragging
Holding the Shift key while dragging an image to a location, snaps the image to the grid.

Resize with same aspect ratio
Holding down the Shift key while resizing frees the image from its original aspect ratio.

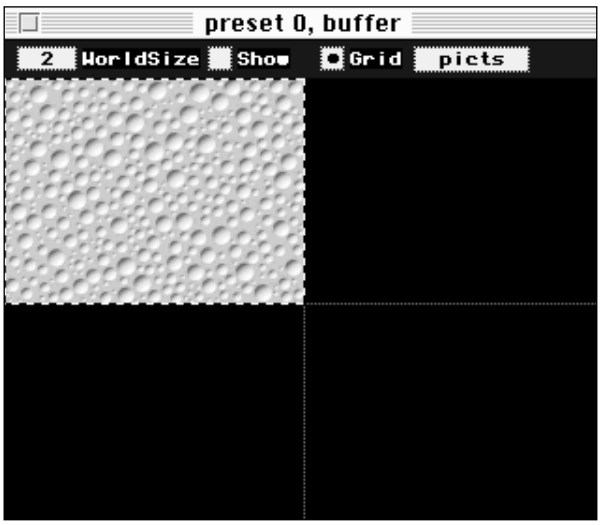
With one imported image in the grid, we can look at the resizing option. As images don't need to conform to the grid ratio, resizing is a nifty option. As mentioned earlier however, resizing will noticeably decrease your image resolution, depending on the ppi size of the file.

Resizing an image

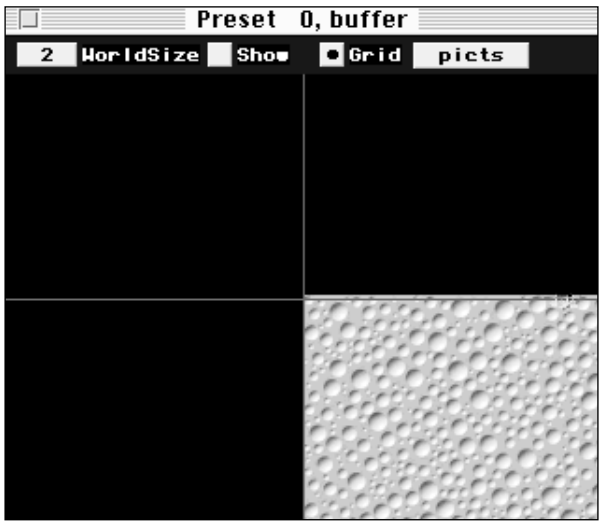
1. If the image isn't already highlighted click on it or hit the TAB key to select it.

2a. Grab the bottom right hand corner of the image and pull the left and up. This is the drag and pull method.

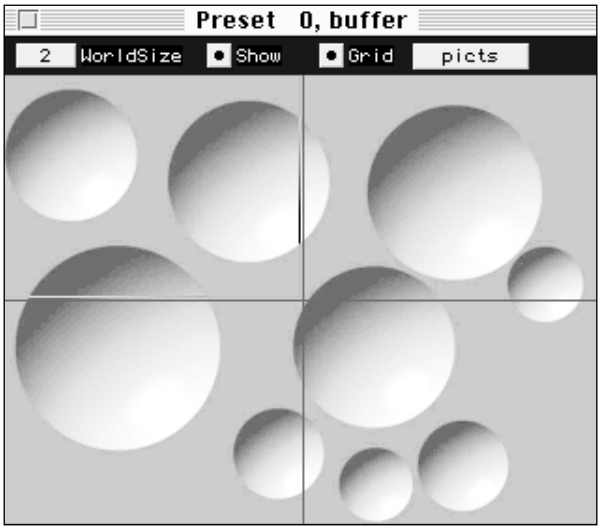
2b. Alternatively, you can Go to the Edit menu and select Size to 320x240 (⌘ -\) to automatically snap the image to cell size. The image will jump to the topleft corner grid division. Note: If your using an alternate screen size (160x120 or 640x480), the menu will reflect this choice.



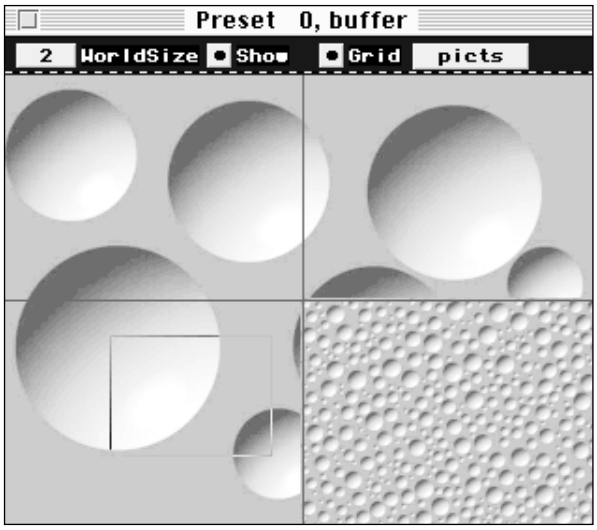
3. Resize image to 320x240 by dragging the bottom right hand corner.



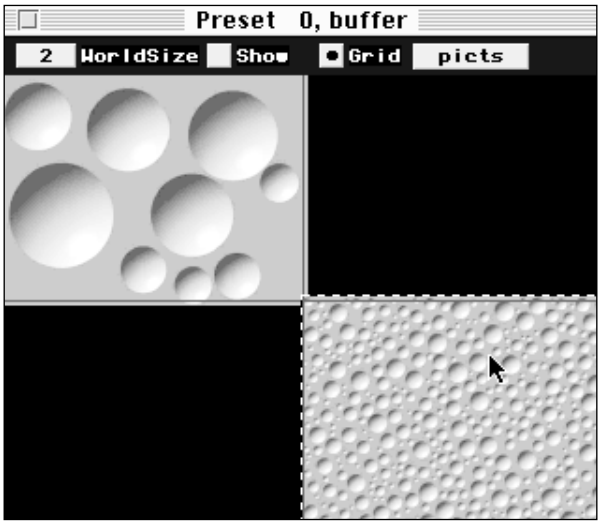
4. Move image to lower right quadrant. Holding the Shift key will snap it to position.



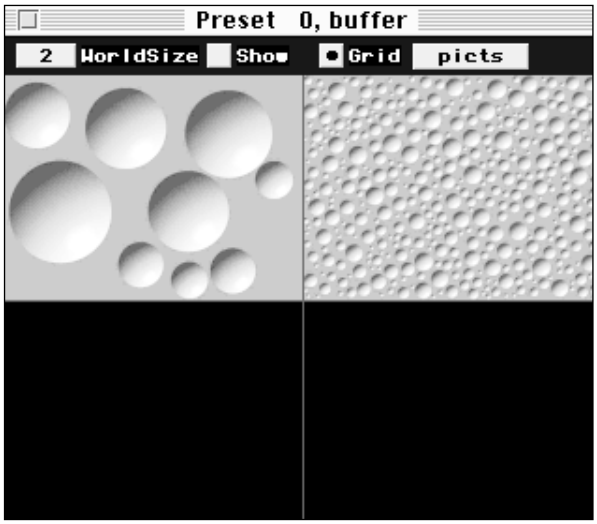
5. Load BigBubbles



6. Move BigBubbles to Back (⌘-[ )



7. Resize BigBubbles to 320x240 by selecting the image and choosing **Size to 320x240** (or whichever setting you're using) from the Edit menu.(⌘-\).



8. Move baby bubbles to the upper right quadrant with the mouse or selecting **Rearrange All** (⌘-=) from the Edit menu.

Insert Video

Another method of manual importation involves the insertion of the live video signal into this buffer. You can insert one or more live video captures into the Buffer. This is pannable and scalable and resizable whereas the video and movie layers are not.

1. Open the Buffer window from the Windows pulldown menu or hit (⌘-2)

2. Go to the Edit pulldown menu and select Insert Video

3. The current video output from your video input source will be placed in a screen section of the Buffer grid (320x240 default).

4. As with the Pict files, it's resizable. Hold down the Shift key while resizing to release the 4:3 aspect ratio if desirable.

Insert video
The incoming video signal is loaded into the Buffer as a 320x240 screen. Like all other imported images it's resizable as shown above. In the example on the right, the inserted video input is displayed in the first frame while the three other frames contain loaded still images captured from the program.

Right
Sample Buffer with live insert video and loaded pict images.

Performance Issues
Using live video has a big impact on the program's speed, but it can be very powerful.

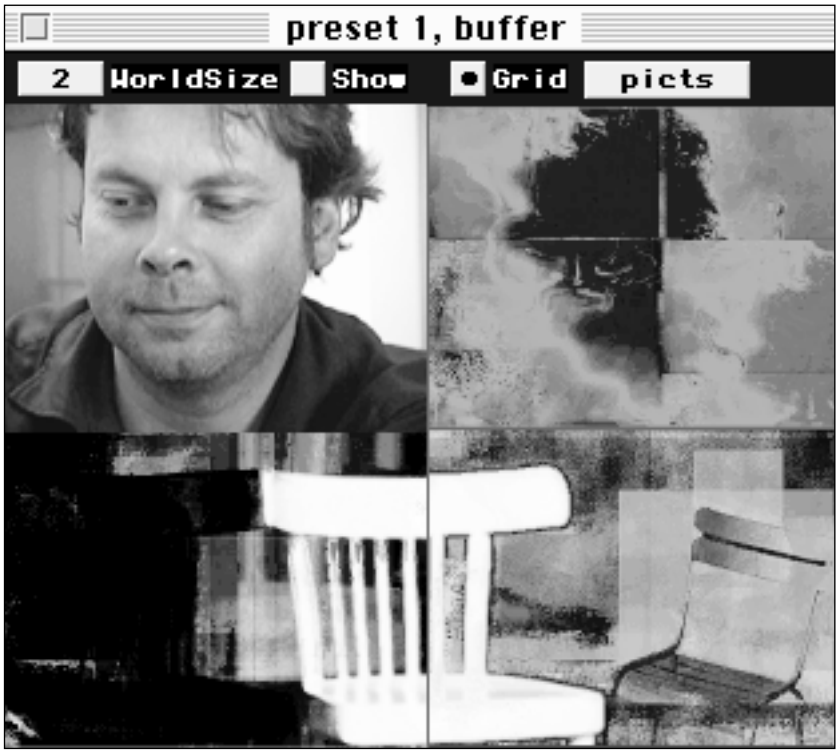


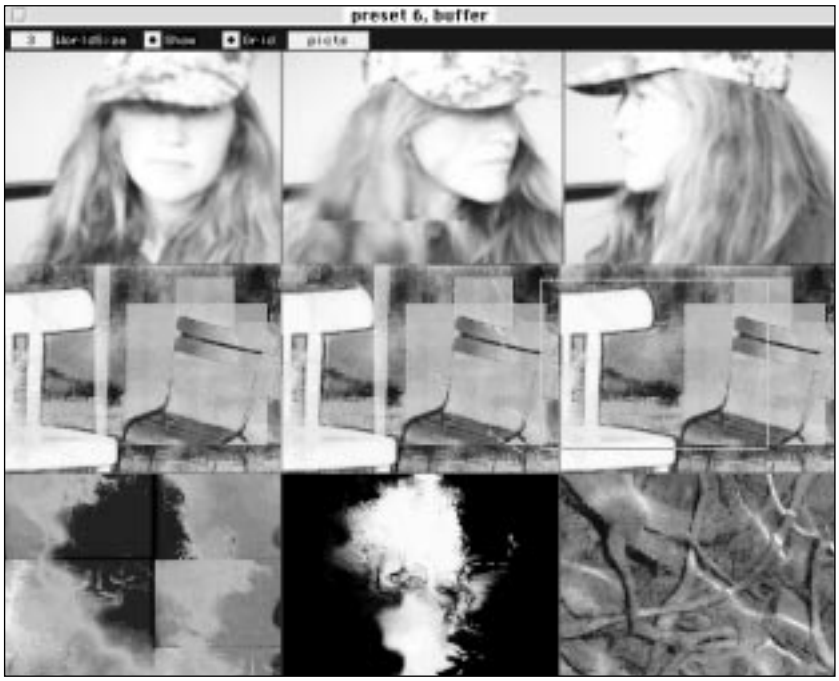
Image Input Capture

Screen/Video/Movie capture to buffer

From within Image/ine it's possible to capture single video and movie frames as well as screen frames from the composited performance. These functions are parameters in the program so you can map the capturing process in a number of ways. You can manually trigger a frame grab from all three of these parameters by mapping a keystroke, for instance, to the capture. You can also map the capture process to an LFO waveform which automatically triggers repeated captures at scheduled intervals (*see LFO's page 52*). These intervals are determined by the frequency setting. The higher the frequency, the more rapid the capture rate.The parameters that capture single frames are:

Screen->Buffer
Video->Buffer
Movie->Buffer

The Min/Max values for these parameters are linked to the WorldSize of the Buffer. Captures can be loaded to assigned areas of the Buffer grid. Together with the **FrameSelect** parameters, these areas can be independently displayed in any of the three layers.



Single frame captures
Row One is buffering images captured from **Video->Buffer**. Row Two is buffering **Screen->Buffer** captures. Row Three is buffering **Movie->Buffer** captures from a movie clip captured from the Buffer with **CaptBuffer**.

Manipulating the Buffer

There are two methods for moving across and around the image or images in the Buffer - **FrameSelect1,2,3** and **PanX/PanY/Scale.** The **FrameSelect1,2,3** parameters are also Input Sources to the **Foreground, Background** and **Displacesrc** channels. Buffer is another Input Source and the **PanX/PanY/Scale** parameters are only enabled here.

FrameSelect1, 2, 3

The **FrameSelect** parameters can be assigned to display entire individual images (320x240 pixels) in varying sequence orders. **FrameSelect** is preferable over panning if you require whole frames or images to be displayed in the Buffer layer.

There are three discreet **FrameSelect** parameters. Each parameter can be assigned a portion of the Buffer. Each assignment functions independently of the others. It's possible to map three different controllers to three different portions of the Buffer which can be displayed in either of the three channel layers, **Foreground, Background and DisplaceSrc**. The 4x4 grid example below is a hybrid mix of loaded picts and captured frames.

The first row of loaded pict images (0-3) is assigned to **Frame1Select** with a **Sawtooth LFO** as the controller at a frequency of 0.311. The next three rows (7-15) are assigned to **Frame2Select** and controlled by another **Sawtooth LFO** with the same frequency as **Frame1Select,** set 90^0 out of phase. **Frame3Select** is disabled by its 0.000 value.

FrameSelect w/ PanX/Y enabled
The Mapping window selection on the next page shows the settings for the **FrameSelect, 2, 3** parameters and the image capture settings in **Video->Buffer, Movie->Buffe**r and **Screen->Buffer**. There are four loaded images as well, occupying frames 0-6 in the grid. Their positions are protected from being overwritten by frame captures.

In this example, **Screen->Buffer** captures have been assigned to frames 7-10. **Movie->Buffer** captures to frames 11- 13 and **Video->Buffer** captures to frames 14-15. Notice that the panning frame is functioning (over frames 10 and 14).

preset 4, mappings

Text... none Movie... fireworks/warp

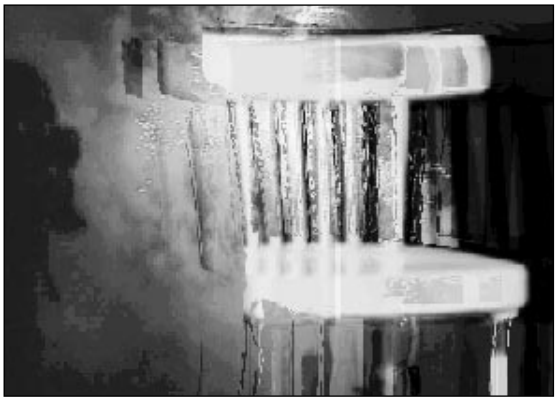
parameter	control	--	--	--	--	Chan	Min	Max	Table	C	I
Pan X	Sine	0.098	0	norm		--	0.000	100.000	--		
Pan Y	Sine	0.574	0	norm		--	0.000	100.000	--		
Scale	mouse X	--c-d				--	0.000	4.000	--		
Frame1Select	Saw	0.311	0	norm		--	0	3	--		
Frame2Select	Saw	0.311	91	norm		--	7	15	--		
Frame3Select	Saw	0.000	0	norm		--	0	3	--		
Screen->Buffer	Triangle	0.275	0	norm		--	7	10	--		
Video->Buffer	Keypress	p				--	14	15	--		
Movie->Buffer	Sine	0.714	0	norm		--	11	13	--		

FrameSelect w/ PanX/Y enabled
In this example Buffer and Mapping window, you'll notice that **Movie->Buffer and Screen->Buffer** captures are triggered by LFOs and **Video->Buffer** captures are triggered by the '**p**' key on the keyboard.

The Buffer grid can be divided in any sequential way. For example, in this 4x4 Buffer, the first four grid cells (0-3 in the Min/Max columns) contain loaded images and **Frame1Select** is enabled to display these frames. A 640x480 pict image of a chair is positioned in frames 0, 1, 4 and 5. Frames 7-10 contain **Screen->Buffer** captures triggered by an LFO at a frequency of 0.275 and are displayed by **Frame2Select** which displays frames 7-15. Frames 11-13 contain **Movie->Buffer** captures at a frequency of 0.714 from an LFO. Frames 14-15 contain **Video->Buffer** captures triggered by a Keypress command.

Depending on your memory capacity, your Buffers can be quite large. As mentioned earlier in this chapter, the **Size to 320x240** and **Rearrange All** options in the Edit menu can be very handy for efficient loading of multiple images. As **FrameSelect** parameters are not scalable, the images will always be displayed in full frame size.

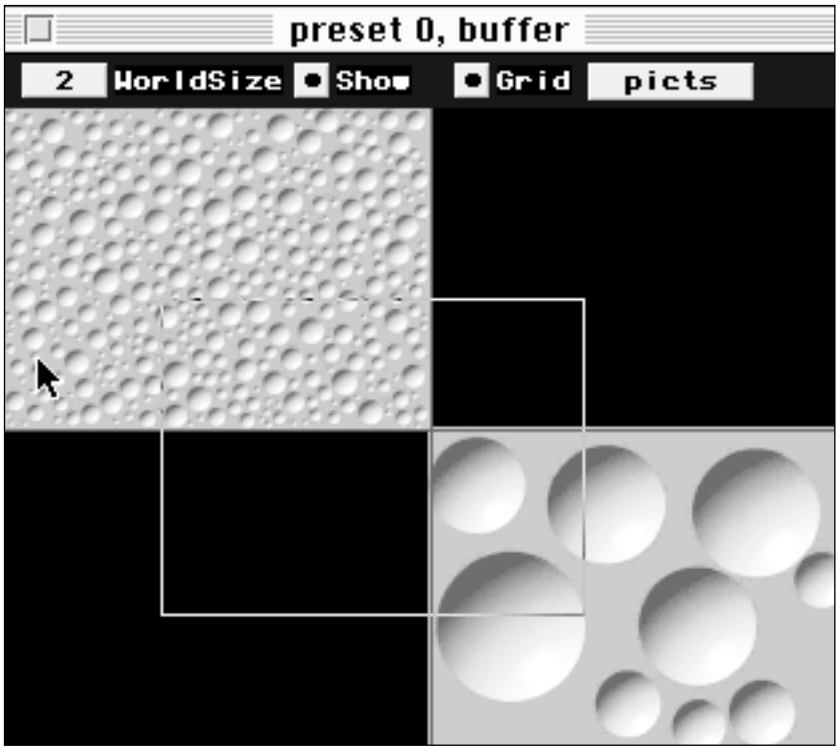
Experiment with the LFO controls to automate this function. The waveforms will produce different sequence orders.



Sample Performance frames
Two single frames from the performance utilizing the example Buffer setup. **KeyAndDisplace, Displace, Displace Offset** are some of the enabled parameters.

Panning

Panning is the process of horizontally and vertically tracking the buffer landscape. When panning, you don't jump to a full frame image as with **FrameSelect.** You pan across and up and down the whole Buffer, whether that be one image or twenty-five images. The speed and smoothness of the panning motion are dependent on your choice of controller and its value. The mouse or a midi slider give you manual control, the LFO's will automate that control for you. As with **FrameSelect**, the waveforms have a signature motion sequence



The X and Y axis coordinates are independently mapped so it's possible to assign different controllers to horizontal and vertical movement. You can also choose to assign the same controller and map them together. The default Mapping structure assigns the mouse to both **PanX** and **PanY.** The panning process is viewable in the buffer window. *See* **Pan X/Y** *in Chapter Four.*

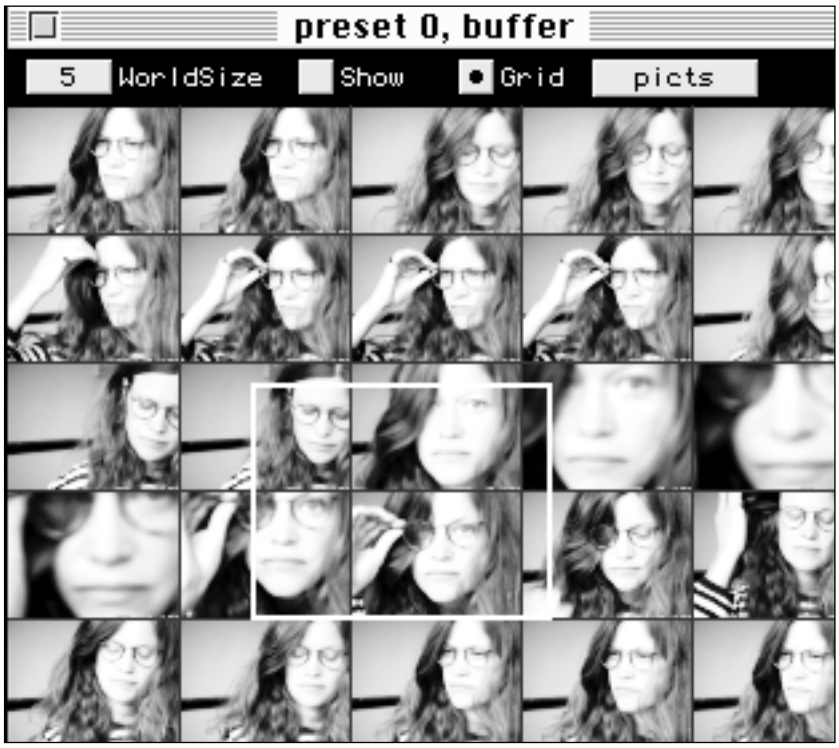
Triangle and Sine waves move in a smooth left to right, right to left horizontal motion in **PanX**. From top to bottom, bottom to top in **PanY**. With values of both parameters set to the same value a smooth circular motion can be attained, though this is dependent on the current phase relationship and therefore not always reliably achieved.

Scaling

Scaling or zooming in and out of the still image Buffer is a powerful feature of this layer since it's the one image area where you can play with the size of the image in real time. As with all the parameters, scaling can be automated or scheduled as well as manipulated manually with the mouse, a slider, keypresses on the computer keyboard, synthesizer keyboard, sound input drawing tablet, etc. If **Scale** is set to a manual controller, it is sometimes necessary to enable the stills Buffer by tweaking the function. The scaling process is also viewable in the Buffer window. *See **Scale** in Chapter Four.*

Scaling Tip
As an image is zoomed in to its maximum value, the pixelation in the image is obvious. If this blocky texture is undesirable, it's possible to soften the hard edge effect with **Interpolation.** As stated, this costs in speed (frame rate) but adds a painterly effect to the magnified image.

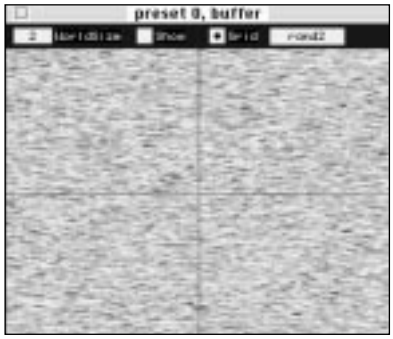
Note: **VideoOneFrame, ScrBG1 and ScrBG2** *are also single frame capture triggers but these save the image to the video layer, Background 1 layer and Background 2 (Displacescr) layer respectively. See Chapter Four.*



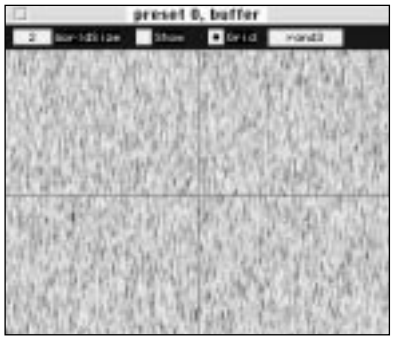
Scaling Sizes
In a 4x4 Buffer with **Movie->Buffer** importing frames, the top example of the performance display has a **Scale** value of **0.50.** The middle example has a **Scale** value of **1.00** and the bottom example **4.00** which shows the entire Buffer window. A **Scale** value of **0.0**0 would display a single pixel color.In the 5x5 Buffer to the right the **Scale** value is **1.80.**

Random Options

Rand1 Buffer screen



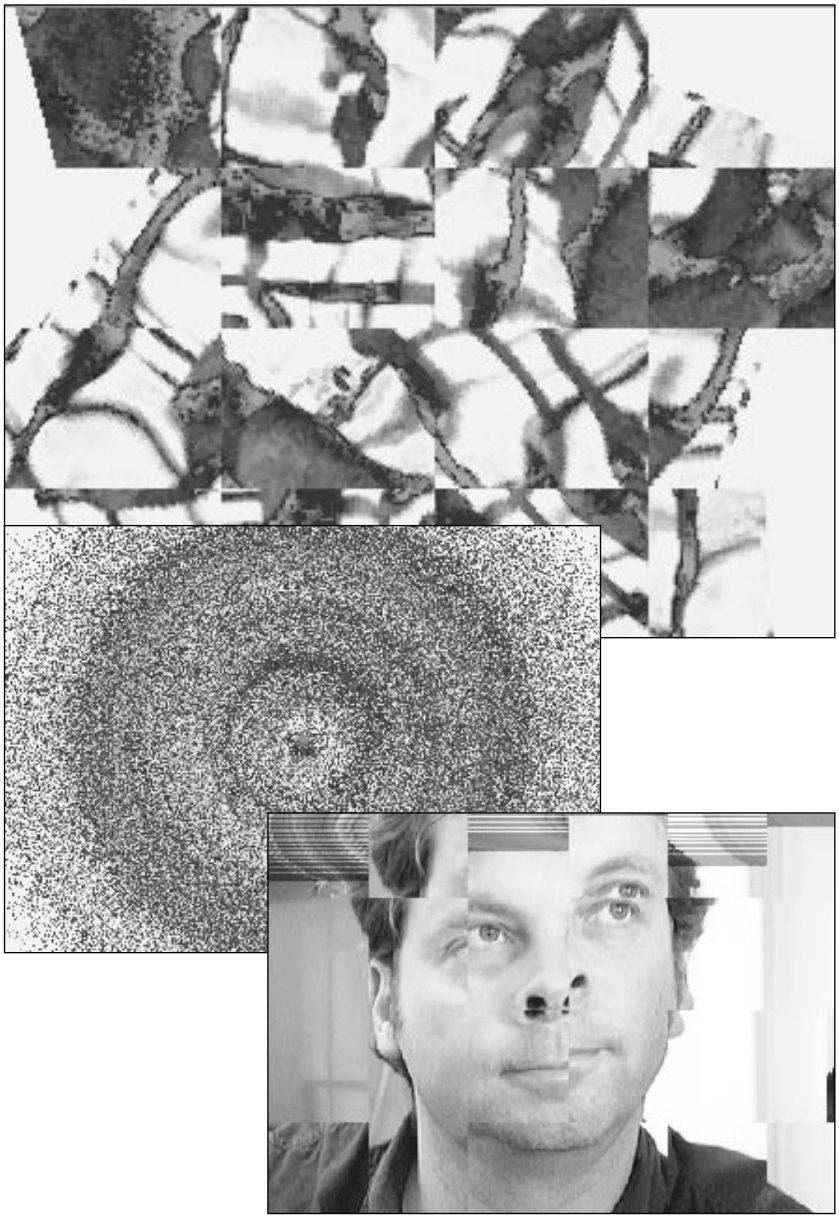
Rand2 Buffer screen



Rand3 Buffer screen

The Buffer has an added feature which may seem a bit obscure at first glance. There are three built-in noise screens:

rand1	**single pixel**
rand2	**horizontal**
rand3	**vertical**



They can be useful with the **Pan** and **Scale** parameters when used in the **DisplaceSrc** channel, creating a mosaic or fragmented effect. Above are two examples using rand1 in **DisplaceSrc** and a movie clip in the **Foreground** channel. A combination of parameters, including **Rotate** ON and **Displace and DisplaceAngle** are set to maximum values. In the first example **Scale** is set to a zoomed in value of 0.02. The single pixels are enlarged and tilelike. In the circular example below the settings remain the same except **Scale** is zoomed out to 1.12, creating an entirely different effect. The last head shot example demonstrates the effect with a video capture.

Buffer Capture

Capturing the Buffer as a movie file

Captures a movie of the current buffer state relative to the **FrameSelect** position and Buffer size. It is automatically loaded into the current Preset as the Movie source. It is also importable as a movie file.

1. If you have images currently located in the Buffer and have initiated **FrameSelect1,2,3, PanX and PanY** or combinations of these parameters, it's possible to capture these frames as a time-based movie sequence.

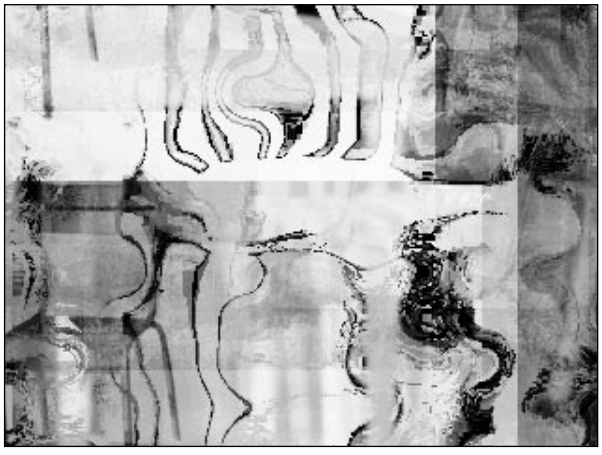
Capture Buffer
In this example, if the **CaptBuffer** parameter were triggered (default setting '**c**' on the keyboard) a 16 frame movie would loaded into your currently open Preset. It would override any movie previously loaded. It retains all the characteristics of an imported movie. It is saved automatically to the DeskTop and is named **myFile 0**. Thereafter, every captured Buffer movie will be called myFile1, myFile 2, etc.

2. Check your Mapping window to determine the control trigger for the **CaptBuffer** parameter. The default setting is 'c'.
Trigger the command.

3. The Compression window from Video Setup will open and ask you to select a compression type. Try using Cinepak at 15 fps. Click OK. The frame sequence is captured and automatically loaded into the Preset as a movie file.

Above
The **cFrame** Indicator which displays the currently compiling frame in the Buffer.

Right
A single frame from the captured movie.



4. The first capture file appears on your desktop as myFile 0.

Performance Output Capture

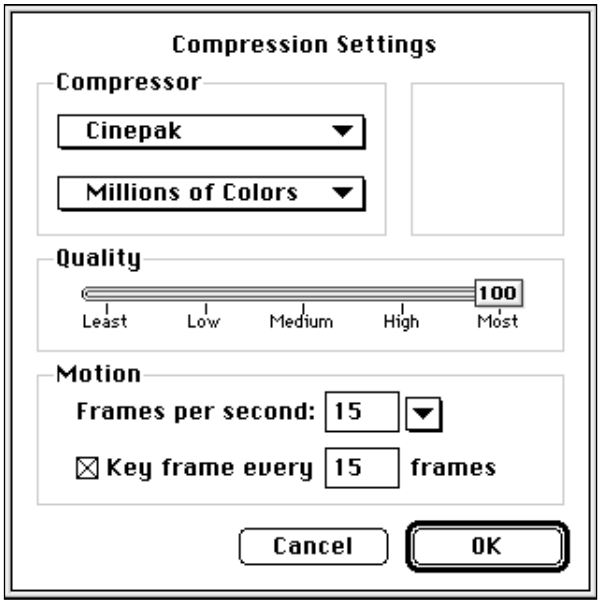
Capture Output/Record

Captures the real time output of the performance as a movie file. This file is of course importable in the Mapping window as a new movie to the Preset of choice. It is QuickTime format so it's also possible to edit it in a digital video editing program such as Premiere.

1. Go to the Action Pulldown Menu and select Capture Output or hit ⌘-M.

2. The Compression window appears. Set the codec best suited to your capture needs. Try **Cinepak** at these settings if you can afford a longer compression time.This codec is especially useful when capturing at non-real time rates.

For shear speed of capture, but with a slower playback speed than Cinepak, try the **Video** codec. Boost the slider to Most if you need the extra image quality, but it will slow you down.



3. A *Save movie as* window appears and asks you to name the file.

4. After naming and saving, go to the Record (⌘-R) function in the Action Window. This begins the recording process.

5. Hitting ⌘-R again stops the recording and hitting ⌘-M again completes the process

Chapter Six: Presets, Display States and Tables

For Image/ine to be an effective real time instrument, it's necessary to have a convenient method of accessing previously mapped performance parameters. As with most applications that involve considerable variability, it's useful to have a method of preserving event sequences and effects combinations. Image/ine uses Presets and Display States (DispStates) in a kind of parent/child relationship. Whereas a Preset stores the state of the parameter assignments and imported Text and Movie files in the Mapping window, DisplStates are snapshots of all the current values of the performance.

A Preset may contain the information that **PanX** is set to a Sine wave controller at a frequency of .0065. The DisplState will contain the exact location of **PanX** at the moment it was saved. With these functions it's possible to design an entire performance and in effect, replay it by addressing DisplStates in their Presets. Both are accessible via computer keyboard commands, mouse clicks and midi program change control.

Presets

Presets are much bigger than display states. They incorporate:

126 possible display states

Reference to the selected QuickTime clip

Reference to the selected Text file

All parameter control settings

All still pictures loaded into the buffer

Changing a Preset will probably change the way in which you control one or more of the parameters. For instance you may change movie speed from Midi controller 7 to mouse x. You may also change your imported movie and Text files so a QuickTime clip may be loaded, several big pictures may be loaded into ram and/or a new text script loaded. This may (or may not depending on the size of the files and computer speed) take considerable time.

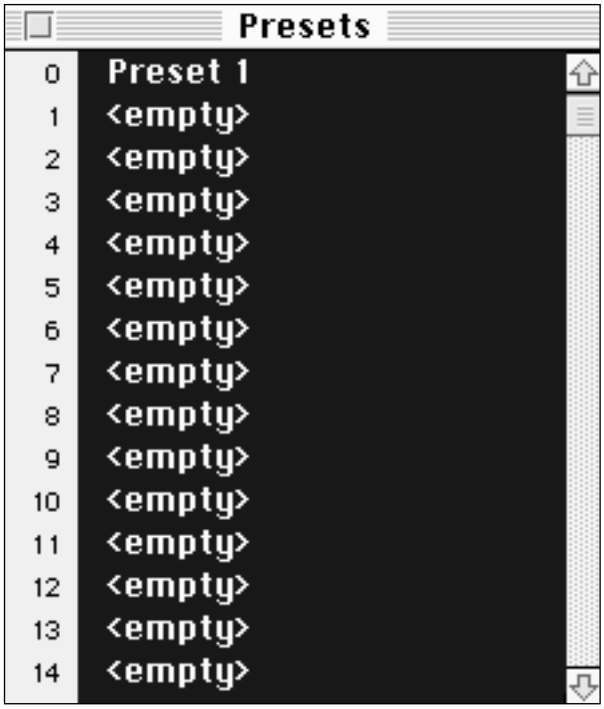
Note: Presets are currently not directly accessible, you have to cycle through them. You can go through the presets by using the keypad '-' and '+' keys. Midi program change 126 (go to previous preset) or Midi program change 127 (next preset) have the same effect.

When you edit the Mapping window, or manipulate pictures in the stills Buffer you are always changing a Preset. On starting the program, the default Preset 0 will be active (these default mappings are shown in Chapter Four). If you change a setting in the Mapping window, it will be saved with the file. If you wanted to preserve these mapping, you could change the settings and save them to another Preset. To begin working in a different Preset :

1.Go to the Window pulldown menu and select Presets, this opens the Preset window (⌘-3)

2. Double click on Preset 1 in the Preset window - the Mapping window will then reflect in its title. Alternatively you can select Preset 1 with the mouse and rename it

Presets need not be explicitly stored, you are always working in a Preset, no matter what.



Through Midi program change one can select different DisplStates of a Preset. To take such a snapshot press the keypad asterisk key, and then send a Midi program change message with the value under which you want to store the state. There are 126 available DisplStates for every Preset.

If you double click an empty preset a new preset will be created with exactly the same content as the one you were just editing, ready for you to change.

Display States

A DisplState is the set of parameter values at any particular moment. A snapshot of the actual state of the program. 126 of these snapshots can be saved per Preset.

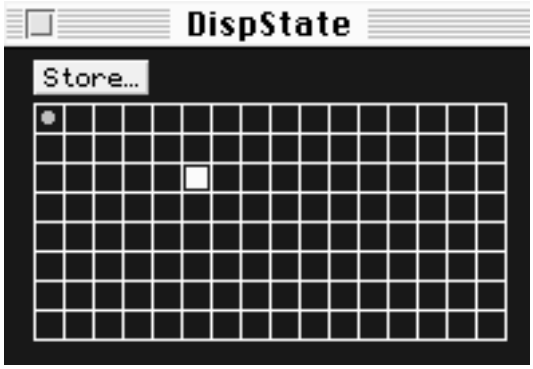
There are several ways to store a DisplState. The most common method is:

1. Go to the Windows pulldown menu and select Display States (⌘-4)

2. A small gridlike window appears

3. Click on the Store button in the window and select a storage location by clicking in a space in the grid. A red circle appears to indicate the state is stored

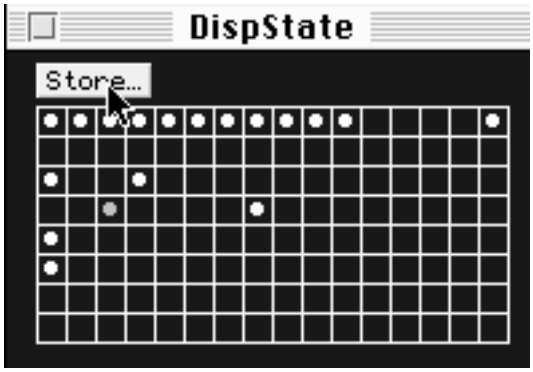
Display State window
A red bullet in the first Recall cell of the grid suggests the active state of the current Preset. Cell divisions can be accessed with the mouse or with the arrow keys. When traversing this grid with the arrow keys, the cell is highlighted with a white square. In this example Recall state 0 is active and Recall state 69 is selected for storing.



The first location is always the start-up state for any previously defined Preset. DisplStates need not be stored in sequential order and can be written over by a new saved state.

DisplStates are also accessible through the numeric keypad, both for storing and recalling the first ten states you can use the number keys on the keypad, 0-9 as if they were program change commands.

Storing a Display State
When storing a DisplState, click on the Store button. As your cursor settles in a cell of the grid the the display will show you the number of the DisplState such as Store: 11. A red bullet in a grid division indicates the **active** DisplState.When you click in the cell a red bullet will appear indicating the state has been successfully stored and is now the **active** state.



Tables

Mouse Techniques for the Presets and Table windows:

Single short click
Selects an entry for Cut & Paste options

Single long click (holding down the mouse button)
Selects an entry for name editing

Click & drag
Rearranges entries by dragging

Double-click
Opens a Preset or Table

Tables provide yet another option for editing parameter values. With a table you can route the output of your current parameter values to a map that lets you, for instance, create logarithmic curves or line segments. Tables provide a way to apply subtle distinctions to similar controller settings. Since Image/ine works with 14 bit numbers everywhere, the table resolution is 16384 entries long. The coordinate values in the tables, however, run from 0.000 through 100.000, as do all the mappable values in the program.

To keep editing manageable in tables of this size, you can choose a working resolution with the '+' and '-' buttons on the lower left side of the window. All the numericals in the center of the window are controlling the next ***n*** entries in the table, ***n*** being the number in red left of the plus and minus buttons that switch the edit resolution.

When editing line, random, exp(onential) or log(arithmic) segments you're always working in full resolution.

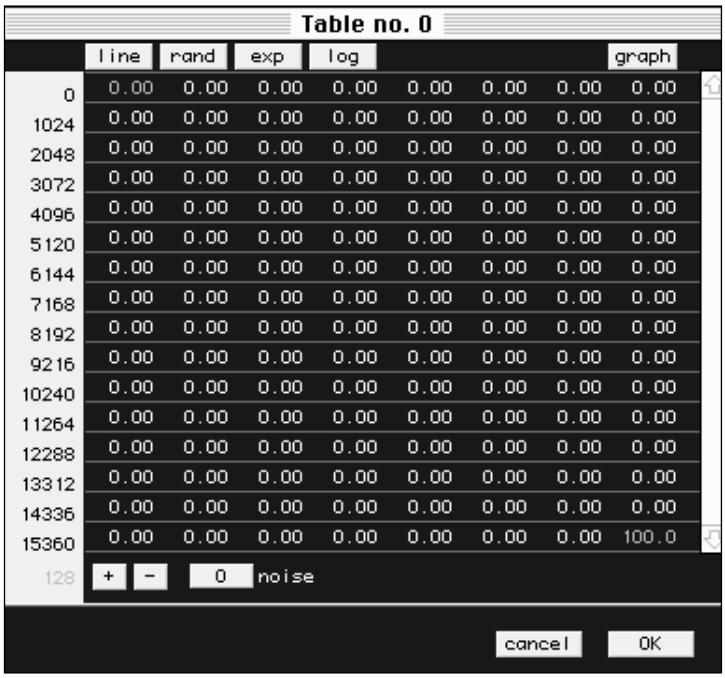
1. Go to the Windows pulldown menu and select Table

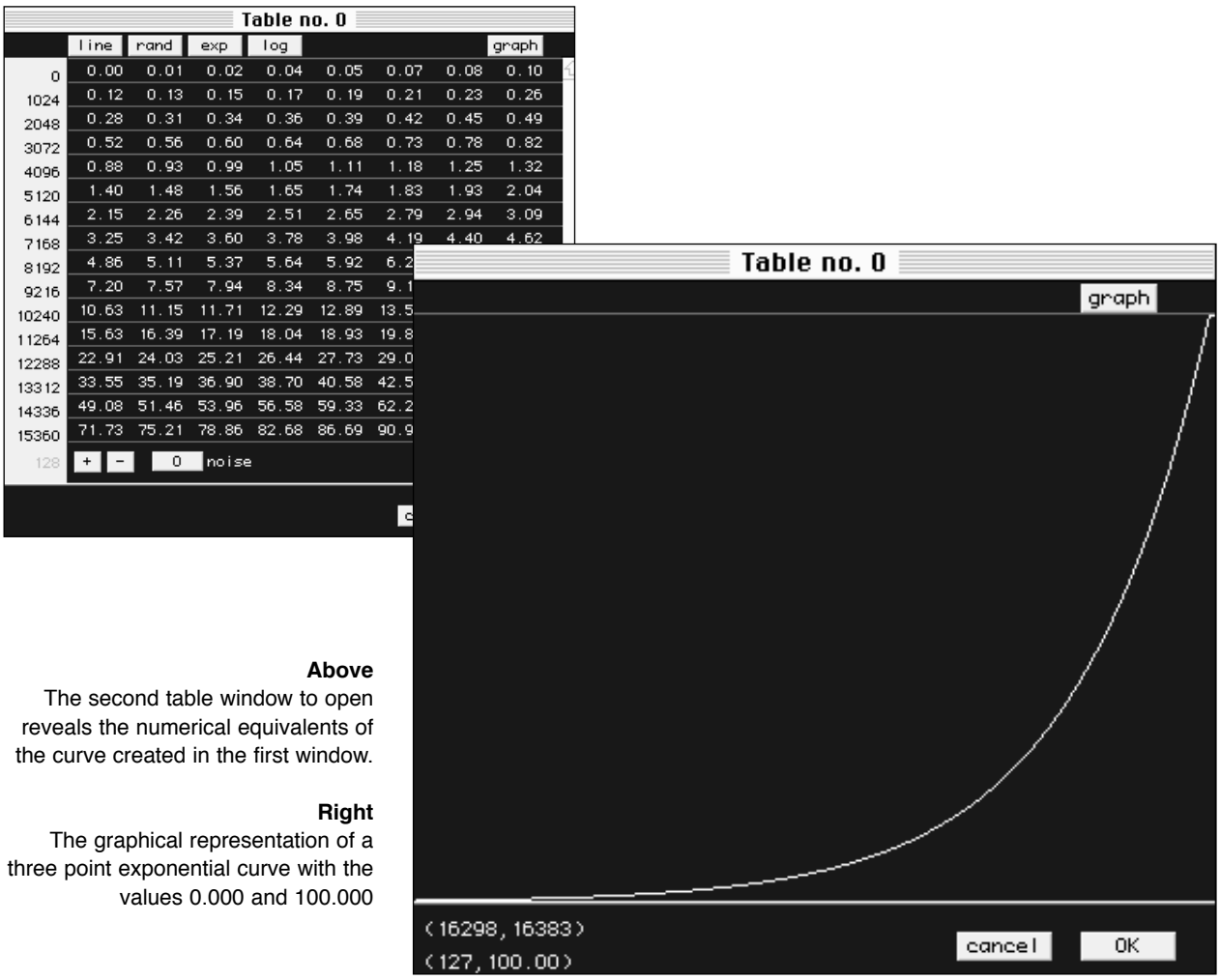
2. The Table Library window appears

3. Double-click on the first entry and the editing window pops up

4. The default resolution setting is a workable 128

3. Try switching between resolution settings to get a feel for the Table resolutions





Above
The second table window to open reveals the numerical equivalents of the curve created in the first window.

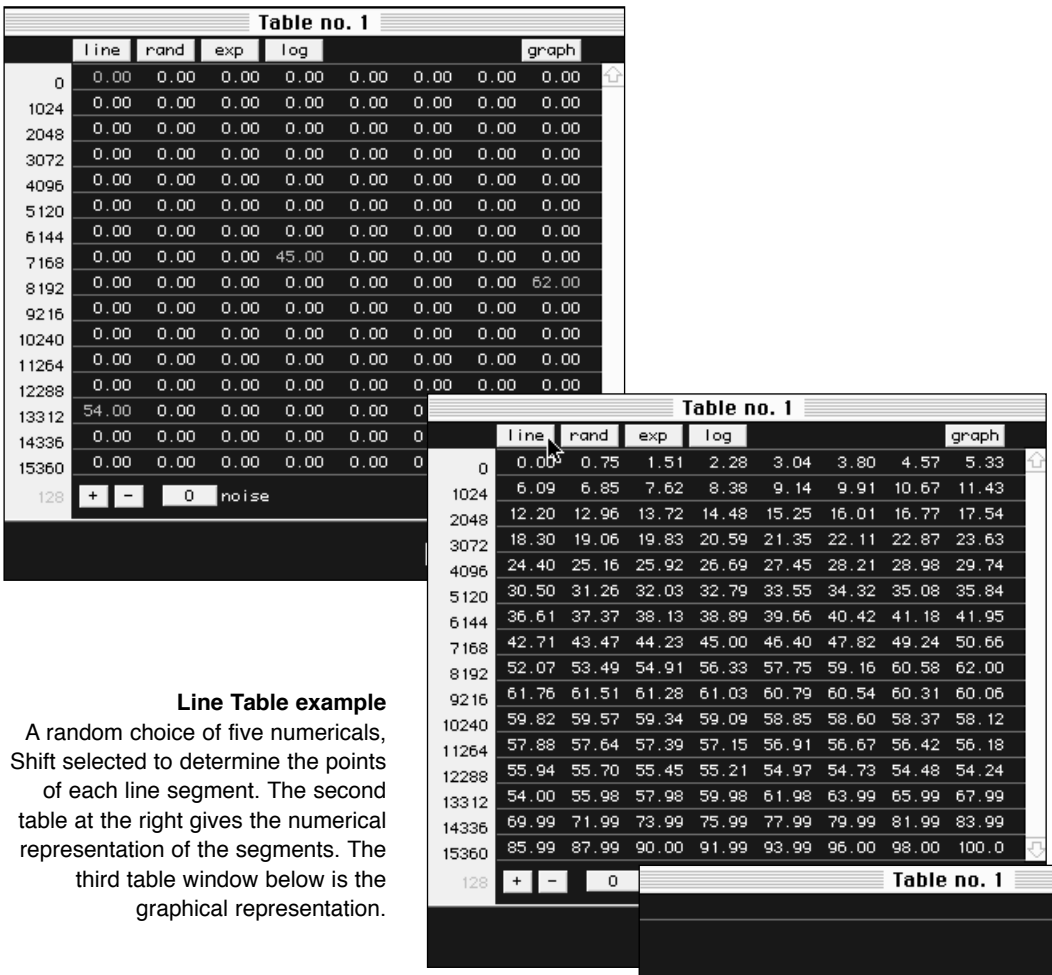
Right
The graphical representation of a three point exponential curve with the values 0.000 and 100.000

Activating a numerical

Numerical values in the Table can be scrolled or typed in. Shift clicking a numerical turns it ***red,*** and when you have selected ***two or more*** numericals in this way, you'll access the segment commands which are:

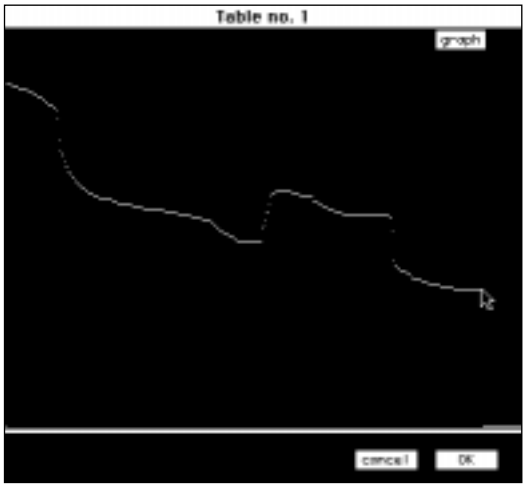
line	creates linear line segments
random	creates random values between the start and end numericals of the particular segment
exp	creates an exponential curve
log	creates logarithmic segments
noise	can be added to the table by manipulating the noise numerical

The graph button in the upper right hand corner will show you a graphical representation of the curve you've created with your value selections.



Line Table example
A random choice of five numericals, Shift selected to determine the points of each line segment. The second table at the right gives the numerical representation of the segments. The third table window below is the graphical representation.

Coordinates
The bottom left hand corner of this table view displays the x/y coordinates in two ranges. The first tracks the values from 0-16383 which are the internal program coordinates. The second tracks in standard Midi coordinates, 0-127.



Draw example
It's also possible to draw a curve directly in the graph window with the mouse.

Chapter Seven: Alpha Channels, Text Files and Movie Files

In this chapter we'll look at some of the importable formats in Image/ine. In Chapter Five we discussed preparing image files in Photoshop for importation to Image/ine. We'll elaborate on that with a description of adding an alpha channel to an image to create an accurate transparent mask. We'll also look at the preparation of Text files and the simple scripting language that adds functionality to their performance characteristics. QuickTime movie files can also be prepared in video editing programs and imported directly into Image/ine.

Alpha Channels

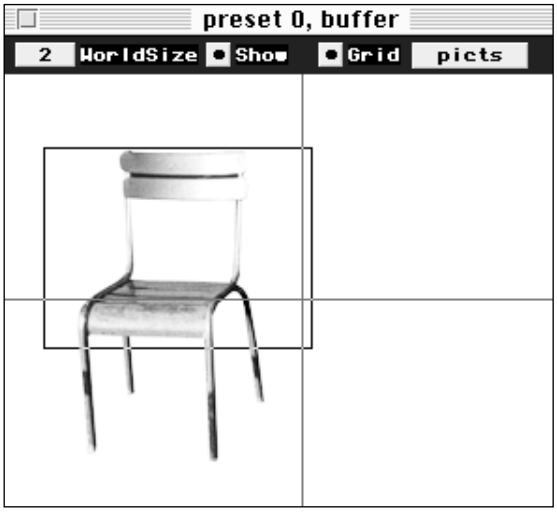
Adding an alpha channel to a still image

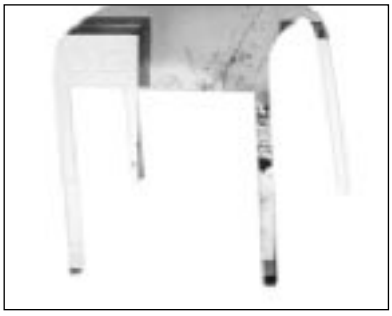
An alpha channel is an additional fourth channel to the Red, Green and Blue (RGB) channels in a color image. It's a special 8 bit greyscale channel for isolating part of an image and storing a mask. This alpha channel image could be a selected portion of the image, isolated to become transparent in Image/ine, or perhaps a pattern or graphic created with the painting tools to establish areas of transparency in the image. In this masking channel, black areas are transparent, white areas will allow the primary image pixels to show through. Grey areas represent variable transparency. This fourth greyscale channel is saved with the Pict file as a Video Alpha channel.

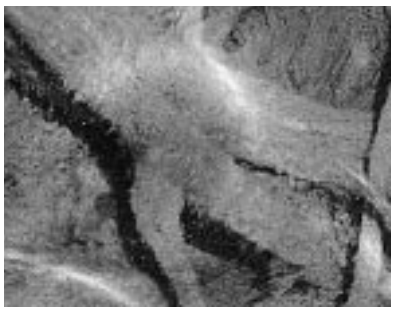
Below
The Buffer window with loaded image of a chair with an alpha channel. The rectangular outline is the current scaling position.

Right
The performance display with a movie in the **Background** layer and the **Alpha** parameter ON.

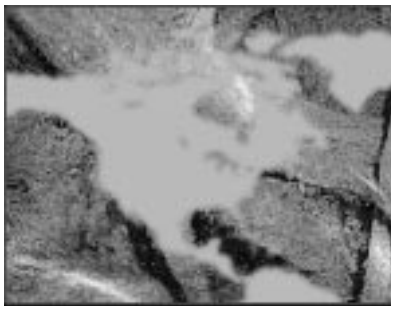
Bottom
Same settings with **Alpha Invert** enabled.





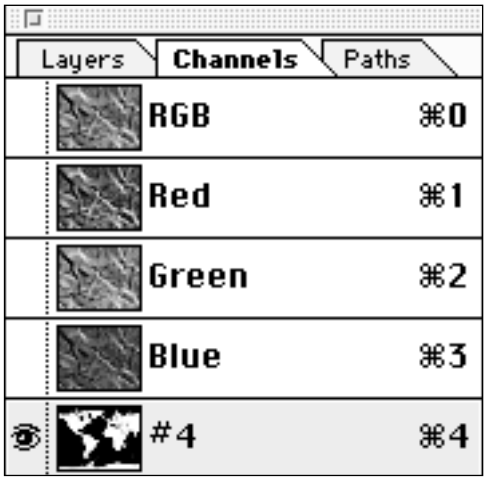


The top image is a highly textured photo of the bottom of a lake. An inverted b/w map of the world was added to channel #4 in Photoshop and saved as an alpha channel. When loaded into the Buffer in Image/ine with Alpha enabled and PanX and Y tracking the Buffer, the map moves with the Pan. The image is of the same color and texture as the photo and only visible while moving. The image below uses the **ExtKey** function with a color to make the map image visible when captured as a still.



When loaded into Image/ine's stills Buffer, the alpha channel can be toggled ON and OFF with the **Alpha** parameter trigger or inverted with the **Alpha Invert** command. What you'll see when you view the Buffer in the **Foreground** layer is an accurate representation of the designated transparent areas (the **Background** layer will be visible through these areas). This is quite a powerful function for superimposing. Whereas keying reads all the pixels in the image for luminance levels and makes the pixels that fall within a specified range transparent, an alpha channel isolates specific areas of transparency for greater control. Refer to your imaging program for step by step information on creating an alpha channel.

Image/ine's color depth must be set to 24 bit/Millions (Preferences window) for the alpha channel to be functional with the **Foreground** channel.



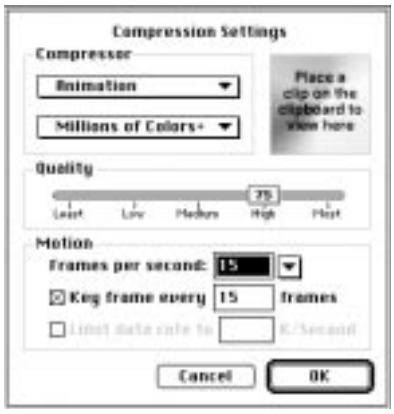
Adding an alpha channel to a QuickTime movie

In Adobe Premiere, it's possible to add an alpha channel to a movie clip. The steps here are more complicated as you must choose the best method for your material. There are two techniques:

creating an alpha channel with the Channel Map Transition filter

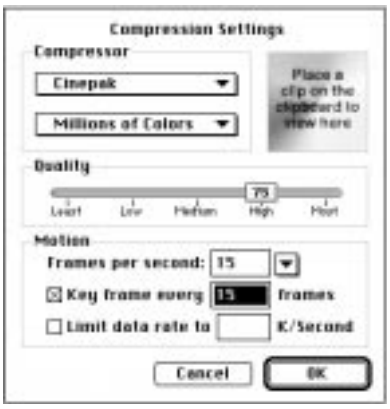
creating an alpha channel with the Tracking matte filter

Again, refer to your Premiere documentation for the steps to take to create the channel. Once made, the other important thing to remember is that the movie must be saved in a codec that supports 32+ bit color depth. As of this writing, only the Animation, Planar RGB and None compression methods support alpha channels and they are notoriously slow. For use with Image/ine try Animation.



In Premiere's Compression Output Dialog Box you can choose the Animation or Planar RGB methods. Select Millions of Colors+(32 bit).

Movie Files



In Premiere's Compression Output Dialog Box choose the Cinepak or Indeo method of compilation. These will give optimal performance in Image/ine .

Importing QuickTime clips into Image/ine is an indispensable feature (particularly if you're not using live video). As we've seen, it's possible to capture sequences of the Image/ine performance on-the-fly in the QuickTime format and import these back into the program. If, however, you want to create autonomous edited clips, you'll do that in a video editing application such as Premiere. Digital video editing techniques are beyond the scope of this manual but what's important to discuss are the compression choices for compiling the movie.

If you have a library of clips, you can import them into Image/ine and check their performance (fluctuating frame rate). Try running the clips in Solo mode and then adding layered effects. Image/ine seems to run best with movies compiled with the Cinepak or Indeo codec. In the output dialog box of Premiere:

Select Cinepak
Choose 15 - 18 frames per second
Select one key frame per second

The Cinepak codec is especially good for movies with 16 and 24 bit color depth. It retains an excellent image quality after compression. It has one big drawback - it takes a long time to compile. *See Appendix C for more info on Compression.*

Text Files

Text files can also be imported into Image/ine. They can be prepared in SimpleText or a standard word processing program. A few commands from a simple scripting language provides limited control over:

Text position
Font type
Font size
Color

It's most useful to prepare your text file with a single font in one size. Although it's possible to import a file without embedded commands, there is no control over font type and size, color, and position.

A file prepared with these five commands looks something this:

```
{pos 0} {fcolor r} {font helvetica} {bcolor 0,0,0}
{clear}
{fcolor 64,128,255} {size 255}
{pos 1}There are unconscious birds in breathing
{clear}{pos 2}{fcolor r}{font minion}Every owl sounds
like a stone {clear}{pos 3}{fcolor 24,56,176}
{font gill sans}Each stone looks like a picture
{clear}{pos 2}{font ransom note}{fcolor 98,123,62}
Each picture tastes like a mirror{clear}
```

Scripting commands

{pos 0}
{pos 1}
{pos 2}
{pos 3}

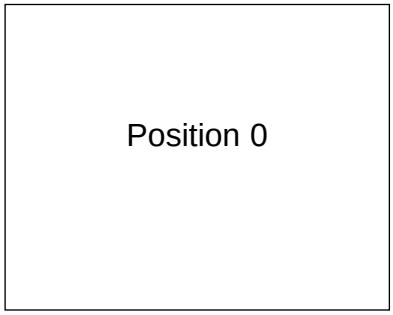
{font helvetica}

{clear}

{fcolor 64,128,255}
{fcolor r}
{bcolor 0,0,0}
{bcolor r}

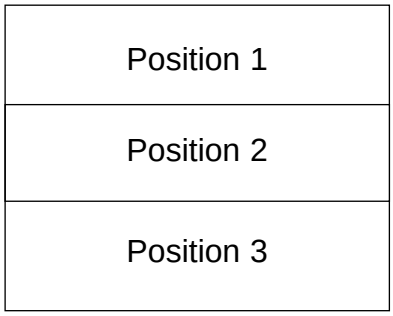
{size 255}

Option/space between two words creates a 'hard space' so the words stay linked in the display frame.



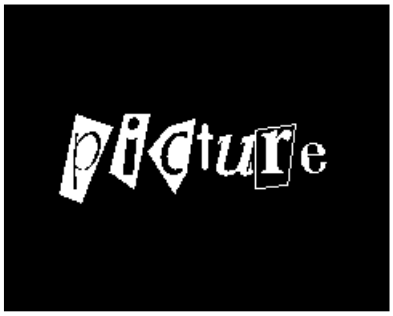
{size 255}{pos 1}
{fcolor 64,128,255}
{font helvetica}

{size 255}{pos 2}
{fcolor 64,128,255}
{font minion}



Display positions

{size 255}{pos 3}
{fcolor 24,56,176}
{font minion}



{size 255}{pos 2},
{fcolor 255,255,255} {bcolor 0,0,0}
{font ransom note}

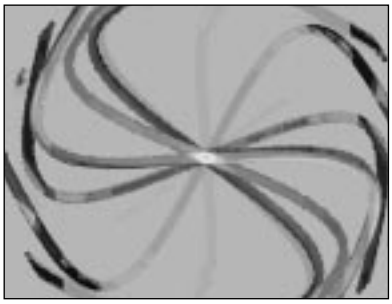
Movie file in the **Background** channel with text {pos 2} in the **Foreground.**

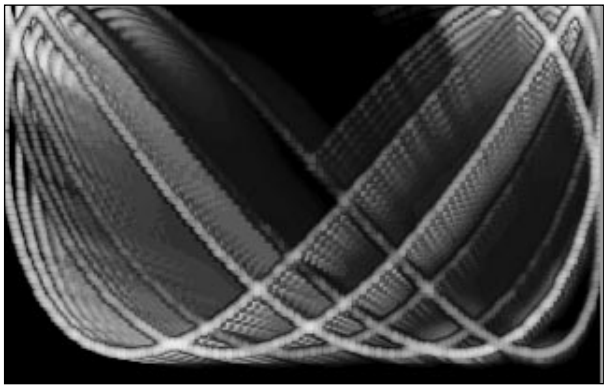
Chapter Eight: Draw and Warp Mode

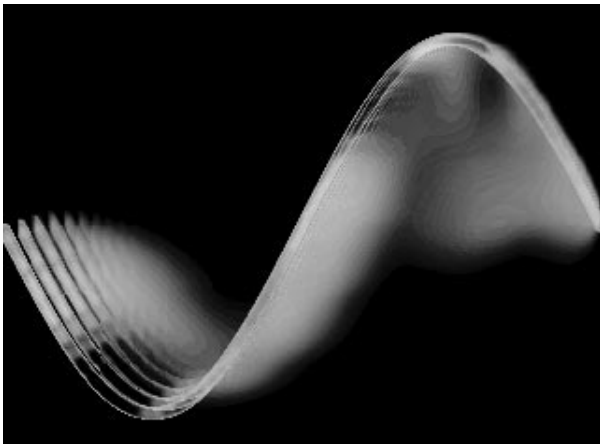
Draw Parameter

Two parameters in Image/ine warrant a bit of elucidation. The five **Draw** parameters function in a logical way. You can select a pen size by pixel number (width of the stroke) with **DrawPenSize** and use the mouse or a Wacom tablet to draw directly to the **Foreground** layer. The LFOs, when selected, will also draw their waveforms as mapped by the pen size and area. A variety of patterns can be generated using this technique.

DrawX	Saw	0.250	0	norm		--	0	319	--			
DrawY	Saw	0.250	180	norm		--	20	219	--			
DrawPenSize	Fixed	20				--	0	63	--			
HorFeedbackOffs	Sine	0.354	0	norm		--	-100.00	99.99	--			●
VerFeedbackOffs	Sine	0.659	90	norm		--	-100.00	99.99	--			●
FeedbackScale	mouse X	-sc--				--	-100.00	99.99	--			●





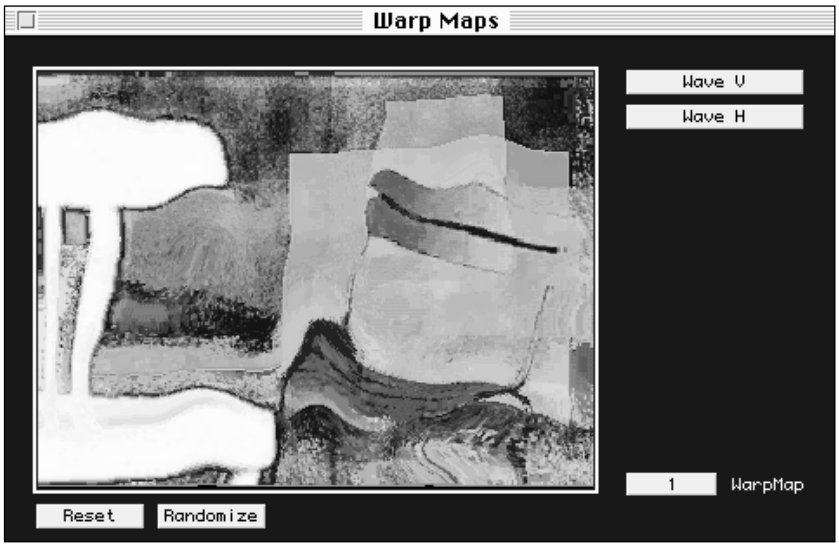


Above
Examples of the **Draw** parameters with the LFO settings in the Mapping window above. The **Rotate** parameter is also enabled.

Right
Two examples of Sine waveforms in the **Draw** parameters with **HorFeedbackOffs** and **VerFeedbackOffs** enabled. Output is assigned to the **Background** channel.

Warp Mode

A special displace parameter is accessible by hitting ⌘-7. The **Warp** window is enabled when the **Displace** value is set to a non-zero value. The Input Source material in the **Foreground** channel will be displayed in the Warp window. Pushing and pulling with the cursor creates a distortion map that will continue to affect the **Foreground** image as long as this mode is enabled. That is accomplished by selecting a WarpMap number for the distortion field (you can store 32 different settings) and selecting its value in the Mapping window.



Mapping window shows the selection of the '1' WarpMap in the Min/Max values of the Warp parameter. The Warp window above displays this numerical.

parameter	control	Hz	Phase	Mode	--	Chan	Min	Max	Table	C	I	S
Warp	Triangle	2.765	90	norm		--	1	1	--			•
GreyRotate	Keypress	⁄				--	--	--	--	•		•

Above
Example of a warp using the **WaveH** function with a **Displace** value of 20.
Below
Using **WaveV** with a **Displace** value of 20.

There are three effects modes:

Wave V	Allows a vertical wave distortion warping of the image
Wave H	Allows a horizontal wave distortion warping of the image
Randomize	Global randomization of warping over the entire image
Reset	Re-establishes the original image before warping effects were enabled
WarpMap	Selects the map your editing

Note: To use the the Wave V and H functions, drag the mouse when selecting the button.

Appendix A

MIDI Controllers

Commonly used Midi Controller Numbers

Controller Number	Controller Type
01	Modulation Wheel
02	Breath Controller
04	Foot Controller
05	Portamento Time
06	Data Entry Slider/Knob
07	Volume
08	Balance
10	Pan
11	Expression Controller
16-19	General Purpose Controllers 1-4
64	Sustain (damper pedal) ON/OFF
65	Portamento ON/OFF
66	Sostenuto ON/OFF
67	Soft ON/OFF
80-83	General Purpose Controllers 5-8
92	Tremelo Depth
93	Chorus Depth
94	Detune Depth
95	Phaser Depth (phase shifter)
96	Data Increment
97	Data Decrement
124	Omni OFF
125	Omni ON
126	Mono ON
127	Poly ON

Appendix B

Frame Rate Examples

Sample System Setup

System:
UMAX Pulsar S900/200 • 512 cache • ATI Xclaim VR

Monitor setup:
ouput window 320x240 • 16 bit color

with a QTclip compressed at:
15 fps Cinepak 320x240

Preferences:
Sync video OFF

	FPS
Video solo(movie OFF)	55
QuickTime solo (video OFF)	125.0
Buffer solo (movie and video OFF)	66.6
Video Foreground	
key to image	23.5
key to QT	19.3
displace w/ image	22.6
displace w/image and key to image	14.2
displace w/image and key to QT	12.2
displace w/ QT	17.5
displace angle w/ QT	11.7
displace angle w/ image	14.3
displace angle w/ image and key QT	9.0
displace angle w/image and key to image	10.1
Buffer Foreground	
key to image (video and movie OFF)	35.1
key to QT (video OFF)	27.1
key to video (movie OFF)	23.3
displace w/video	21.8
displace angle w/ video	14.0
rotate w/video	10.4
displace w/image	32.4
displace angle w/ image	17.5

Appendix C

QuickTime Codecs

Compression/Decompression Algorithms

Animation	Best for clips generated from the computer and not from analog video. One of the available codecs for adding an alpha channel to a QT clip in an editing program. Good image quality but very slow compile time.
Cinepak	Best for compiling clips from and editing program like Premiere for use in Image/ine. The image quality is very good and the playback speed is very fast. An impossibly slow method for capturing clips however. Cinepak is recommended for compiling your clips for Image/ine - 15 -18 fps, high quality, key frame every 15 frames..
Component Video	Good choice for video capture as it can improve frame rates.
Graphics	Fairly useless due to it's slow playback speed. Intended for use with 8 bit screen displays of 2-D animation.
Intel Indeo® Video R3.2	Similar to Cinepak but slightly faster at compression. Sharper, more accurate color with low motion video. Cinepak better for high motion clips. Choose Indeo for talking heads or moderate motion clips.
Motion JPEG A	Optimal image quality when set to 100% but requires lots of CPU power. Primarily used for video capture.
Motion JPEG B	N/A
None	Produces huge high quality files. Useful for making intermediate clips with fully-preserved image quality. Not useful in Image/ine.
Photo JPEG	Excellent image quality and file size,especially for natural (no hard edges) images, but far too slow playback to be useful in Image/ine. Intended for 16 and 24 bit source clips in 'slide show' type movies.
Planar RGB	One of the available codecs for adding an alpha channel to a QT clip.
Video	Similar to the Apple's Animation Codec but much better for natural images. It's the best all-purpose codec. Image quality is good at a high quality setting. It'sreasonably fast at compression and playback. This is the default setting in Image/ine.

esc	F1 Video	F2 Movie	F3 Stills	F4 Text	F5 Frame1 Select	F6 Frame2 Select	F7 Frame3 Select	F8 Draw Output	F9 Color	F10 Sound

`	`	1 ScrBG1	2 ScrBG2	3	4	5	6	⌘-7 Warp	8 Mirr Vid	9 Mirr Movie	0 Mirr Buffer	-	⌘-= Size to 320x240	delete

tab Select frame in Buffer	q	w	e	r grey rotate	t	y	u	i Interpol	o	p	⌘-[Move to Front	⌘-] Move to Back	⌘-\ Rearrange All

caps Keying	a alpha INVERT	s Solo	d	f Foregrd	g Backgrd	h DisplScr	j	k Key/Disp	l	;	‘	return

shift Backround	z Trans mode	x Ext Key	c Capture buffer	v Vid on	b Blend	n	m Movie on	,	.	/	shift

control Displace	option	command	spacebar Fade release	command	option	control

Go back one Preset -

Advance one Preset +

Store DisplStates with the 0 - 9 keys *

CapsLock = l
Shift = s
Control = c
Option = o
Command = d

Preset Name

Simple combinations

-s---	mouse___ / ___
--c--	mouse___ / ___
-sc-	mouse___ / ___
---o-	mouse___ / ___
-s-o-	mouse___ / ___
--co-	mouse___ / ___
-sco-	mouse___ / ___
----d	mouse___ / ___
-s--d	mouse___ / ___
--c-d	mouse___ / ___
-sc-d	mouse___ / ___
---od	mouse___ / ___
-s-od	mouse___ / ___
--cod	mouse___ / ___
-scod	mouse___ / ___

Combinations requiring the CapsLock Key

l----	mouse___ / ___
ls---	mouse___ / ___
l-c--	mouse___ / ___
lsc--	mouse___ / ___
l--o--	mouse___ / ___
ls--o-	mouse___ / ___
l-co-)	mouse___ / ___
lsco-	mouse___ / ___
l---d	mouse___ / ___
ls---d	mouse___ / ___
l-c--d	mouse___ / ___
lsc-d	mouse___ / ___
l--od	mouse___ / ___
ls-od	mouse___ / ___
l-cod)	mouse___ / ___
lscod	mouse___ / ___

Glossary of Terms

A/D converter
converting analog data (tape, radio, etc.) into a digital signal (CD, DCC, DAT, hard disk). See also D/A converting.

aftertouch
Pressure applied to a synthesizer keyboard after the key is depressed.

algorithm
A mathematical step-by-step procedure for problem-solving.

aliasing
Jaggy appearance of unfiltered angled lines. Aliasing is caused by sampling frequencies being too low to faithfully reproduce an image. There are several types of aliasing that can affect a video image which include temporal aliasing (e.g. wagon wheel spokes apparently reversing) and raster scan aliasing (e.g. flickering effects on sharp horizontal lines).

alpha channel
A function in image processing that adds an extra 8bit grayscale channel to the RGB channels. This separate channel acts as a masking channel for creating accurate areas of transparency. In ***Image/ine*** it is operable in the Buffer.

amplifier
A device which increases the magnitude of a voltage of current with out distorting the wave form of the signal. It takes a weak signal from a line level or mic level source and provides the necessary power level to operate loudspeakers.

analog video
Between given video levels, a video signal that represents an infinite number of smooth gradations. Alternatively, a digital video signal assigns a number for each level. The Macintosh converts digitally created video to an analog signal for output to a monitor.

anti-aliasing
Making the edges of an graphic image appear smoother. Magnifying these images, they appear blurred. At a 1:1 resolution they appear normal. Anti-aliasing is useful when preparing with high quality graphics for video. See aliasing.

aspect ratio
The ratio of an image's width to its height. A standard video display has an aspect ratio of 4:3 which in pixel terms can mean 640x420, 320x240, 160x120, etc.

bandwidth
The frequency range of a video signal, measured in MHz. The bandwidth is directly related to horizontal resolution. The greater the number of pixels defined, the higher the frequency required. Bandwidth describes just 'how much' information is being transferred.

black level
Minimum luminance or 7.5 IRE also called the pedestal or setup level.

attack
The beginning of a note. Release being the opposite.

audio
The transmission and reproduction of sound.

blanking
The portion of the video signal that is off, or black, during the retrace interval of the scan. Between each horizontal line and during the vertical retrace between each field, blanking occurs. There are strict broadcast rules defining the blanking periods. Not all video products for the Macintosh conform to this aspect of the NTSC, PAL and SECAM broadcast standards.

blanking level
A video signal level that separates the range containing the picture information from the range containing the synchronizing information.

BNC connector
Typical connector used with professional video hardware for connecting cables that carry the video signal. Compare RCA connector and XLR connector.

Brightness
The luminance of the video signal, or the level of brightness on the scale from black to maximum white. The color of an image is determined by hue, saturation, and luminance. Only brightness affects a monochrome image.

Broadcast quality
An NTSC composite video signal which conforms to FCC regulations regarding signal properties such as timing, video and sync levels and blanking. NTSC

supported devices do not necessarily meet FCC broadcast standards.

Buffer
A temporary storage area in memory. In ***Image/ine***, images and live video can be stored in the stills Buffer, which has panning and scaling capability.

CAV
Component Analog Video acronym.

center detent
A notched resting place in the center of a modulation or pitch bend wheel that is neutral or OFF.

channel
A path for passing data. In MIDI, channels are used to separate different voices as they play together. Each channel is assigned to a single instrument in any particular instant of time. In ***Image/ine*** a channel is one of the screen layers that accepts an input source, i.e. Foreground, Background and Displacsrc.

chroma
The color information in a video signal. This consists of hue (phase angle) and saturation (amplitude of the color subcarrier).

chroma keying
With a chroma key, the areas of overlay are defined by a specific range of chrominance when one video signal overlays another. This process does not work unless the chrominance has sufficient resolution, or bandwidth. There isn't sufficient bandwidth in composite video for quality chroma keying, therefore ***Image/ine*** relies on luminance keying.

chrominance
Any colored signal has both chrominance and luminance. The color portion of a signal, relating to the hue and saturation but not to the luminance (brightness) of the signal.

clipping
The process of cutting off the peaks of either the white or the black portions of a video signal.

codecs
Methods of compression and decompression used in digitizing an analog video signal. They compress the data as the video signal is 'captured' and decompress it during playback. There are two types: hardware and software based. ***Image/ine*** uses the QuickTime software codecs.

colorburst
The color sync signal which translates the proper hue to the video monitor.

color subcarrier
The 3. 58 MHz signal which carries color information. This signal is superimposed on the luminance level. Saturation is represented by the amplitude of the chrominace subcarrier and hue is represented by the phase angle.

component video
A recording system that routes the luminance and chrominance signals separately with no bandwidth reduction or compromise of the RGB components. The results yield images of higher resolution and better color quality than composite video. Designed for high end television production, similar recording methods are available to the consumer market. See S-VHS and Hi8. Compare composite video.

composite video
A composite video signal is one in which the chrominance, luminance and sync information are combined into a single signal. This signal uses one of the coding standards: NTSC, PAL, SECAM, etc. The signal must take this form before it can be broadcast or recorded. Until recently, most monitors and projectors have accepted only composite video signals. A growing number now available accept RGB. See NTSC. Compare component video.

compositing
The process of combining two or more input signals into one frame or display.

compression
See codecs.

controller
MIDI data type that sends performance information. Volume, vibrato, sustain, panning and a variety of other musical attributes can be assigned as controllers. Keyboards and envelope generators are typical controller devices. The Midi specification allows a value range between 0 and 16,383. Though most manufactures utilize the range from 0 (minimum) to 127 (maximum), ***Image/ine*** uses the former, larger range. Each controller is assigned a number in the MIDI system. *See the chart in Appendix A.*

D/A converting
The conversion of a digital signal to an analog signal, see also A/D converting.

dB
Abbreviation for decibel. A unit used for measuring two voltages, currents or powers. A measurement of soundpressure level (relative loudness).

default
The set of conditions (parameters) with which a computing device or application starts out when first turned on or booted up. It applies both to software and hardware, musical and non-musical conditions.

digital video
A video signal composed of binary numbers that describes a finite set of luminance and color levels. Conversion from analog to digital suffers virtually no loss. Digital video requires more bandwidth than analog video to produce the same results, unless sophisticated compression techniques are used. Digital video is likely to surmount analog video as memory capacity and processing speeds become more economical. Digital video standards such as QuickTime, DVI, MPEG, and JPEG for video make digital manipulation of video information possible on today's personal computers.

enable-disable
meaning to turn on (enable) or turn off (disable). Image/ine continually requires this function.

envelope
The changes of a tone including attack, sustain, decay and release.

equalization
Denotes the changing of the relative amplitudes of different frequencies.

event
In MIDI, the signal that is transmitted such as note on, note off, program change, control change, etc.

exponential
The relationship between two quantities such that a change in the value of one quantity is associated with a change in ratio of the other.

field
One complete vertical scan of the picture display on a monitor, containing 262.5 lines (NTSC) or 312.5 (PAL, SECAM). Two fields make up a complete frame. The lines of field 1 are vertically interlaced with field 2 for 525 lines of resolution in the NTSC standard (625 for PAL and SECAM). It easier to conceptualize a video signal as 60 (or 50) separate images per second. Each field represents an independent sample of time. When viewing a still framed video signal, the image may have a visible flutter. This represents two different images shot 1/60 of a second apart from each other on the same screen.

filter
A electronic device that permits certain selectable frequencies to pass while cutting others.

frame grabber
A device, usually a video capture board installed in a computer, that allows the real time capture of a single frame of video and stores it in a temporary buffer where it can be manipulated or converted to a computer file format. Buffer sizes vary. Some can capture several continuous frames. A digitizer captures a sequence of complete frames, employing some form of compression and/or acceleration in order to operate in real-time.

frames
NTSC video plays at 30 frames per second, PAL and SECAM at 25 frames per second. Each video frame consists of two half-frames called fields. A field consists of every other horizontal line, either even or odd. On a video monitor, a small dot of light first scans across the topmost horizontal line, line 1, and then skips to scan line 3, then line 5, and so on. At the bottom of the screen (in half of the 1/30 second frame time), it begins at the top again but on line 2, then line 4, and so on. This interlacing technique was invented to avoid a visible flicker when sequentially scanned.

frequency
The number of complete cycles transmitted per second. Frequency is usually expressed in hertz (cycles per second), kilohertz (kilocycles per second), or megahertz (megacycles per second). In acoustics, frequency of vibration determines musical pitch.

gain
An increase in strength or amplitude of a signal.

General MIDI Mode
A mass delivery convention that defines specific and predictable sounds for 128 program locations. Program #1 will always contain an Acoustic Piano, #22 an Accordion and so forth.

Global Editing
Affecting an entire file or program. In *Image/ine* the external mapping window is global.

GUI
Graphical User Interface. A display that permits a user to select commands, menu items with a mouse.

Hardware
Computing devices and peripherals.

hertz (Hz)
The unit of frequency of vibration or oscillation, defined as the number of cycles per second. Named for the physicist Heinrich Hertz.

Hi-8
A component format introduced in 1989 by Sony in which the luminance carrier frequency is boosted above the range of 8mm producing better resolution and color.

horizontal resolution
Measured in frequency or lines, it's the smallest increment of a video picture that can be discerned in the horizontal plane. This increment is dependent upon the video bandwidth.

horizontal scan frequency
The frequency at which horizontal sync pulses start the horizontal retrace for each line. Non-interlaced scans require a higher frequency. A color Macintosh with a 13" RGB display has a horizontal sync frequency of 35 kHz, while the NTSC frequency is 15.75 kHz. Projection of high resolution non-interlaced Macintosh color video requires projectors capable of 35 KHz horizontal sync frequency.

hue
The spectral colors ranging from red through yellow, green, blue purple and back to red. White, black, and grey are not considered hues. Hue, saturation and luminance make up the color of an analog video signal. In a composite video, hue is determined by the phase relationship to the colorburst. In ***Image/ine*** **Hue** is a controllable parameter.

icons
Term used for the images used in a graphical computer user interface.

interface
A connection or point of interaction between a computer and a user. A MIDI interface connects the computer and MIDI instruments.

interlaced
Used to reduce the flickering apparent with 25 or 30 frames per second. Depending on format (NTSC, PAL, SECAM), the number of lines per frame which are separated into two sequential fields or scans. In NTSC a 525 line frame is really two scans of 262.5 lines. In PAL 625 The first field scans the odd numbered lines, the second field scans the even number lines. This produces 60 fields per second of interlaced images. ***Image/ine*** incorporates an **Interlace** parameter which determines the number of fields per frame. See frames

keying
The process of selectively replacing or merging part of one video image with video from another image. ***Image/ine*** utilizes luminance keying. See luminance keying.

keypressure
Pressure sensor for each key on a midi synthesizer.

kilohertz (KHz)
One thousand hertz, or cycles per second. See Hertz.

LFO
Low Frequency Oscillator. Used in the sub-audio range for producing automatically repeating triggers. ***Image/ine*** uses sine, sawtooth ,triangle and square waveforms as triggers.

linear
The relationship between two quantities such that a change in the value of one quantity causes an equivalent change in the other.

logarithmic
The power to which a base, usually 10, must be raised to produce a given number. If nx = a, the logarithm of a, with n as the base, is x; symbolically, $\log^n a = x$. For example, $10^2 = 100$; therefore, $\log^{10} 100 = 2$.

luminance keying
Uses brightness values of the pixels - the grey values - to determine what will be transparent or 'keyed' out." The key level determines the luminance threshold, above which everything will be solid and below which everything will be transparent to the second video source. ***Image/ine*** uses this type of keying in the Foreground channel. An external (luminance) key source is provided in ***Image/ine's*** Displacesrc channel.

Macintosh video
Refers to the signal produced by Macintosh built-in video. Several scan rates and resolutions are supported. When connected to a 13" RGB monitor, for instance, the display resolution is 640 x 480 pixels. The scan rate is 67.7 Hz.

mapping
The correspondence of one or more elements in one set to one or more elements in the same set or another set. Creates an integral, dynamic relation-

ship. This relationship is clarified in ***Image/ine's*** Mapping window.

matte
(1) a keyed effect, an insert of video signal information keyed from one source into a second video signal. (2) an opaque portion of an image that leaves a selected area transparent. Also referred to as a mask. See alpha channel.

megahertz (mHz)
One million hertz, or cycles per second.

MIDI Note Numbers
numerical values (0-127) assigned to musical notes in the MIDI system.

mixer
A device for combining, controlling and routing audio signals.

modifier
A device or signal which acts on another signal to alter it.

modulate
To modify or alter a signal so as to transmit information. To vary the frequency, amplitude or other characteristics of a waveform.

monitor
Computer display or type of television that receives a composite and/or component video signal (as opposed to an RF signal) directly from a VCR, camera, or separate TV tuner for high quality picture reproduction. See video monitor.

multimedia
The mixing of text, graphics, sound and motion (animated and video) in a computer system.

multi-timbral
Capable of producing more than one type of tone-color or instrument sound at the same time.

multisync monitors (and projectors)
Video displays which accept a wide variety of horizontal and vertical timings, from NTSC, PAL etc., to computer video signals. Multisync monitors often automatically adjust to the appropriate timing. Horizontal frequency range varies among different models of monitors so product specifications should be checked to assure it will support the Macintosh connected to it.

neutral colors
The range of grey levels, from black to white, but without color. The RGB signals are all equal for the neutral portions in the image.

NTSC composite
One of the three main video signal standards. The signal is a composite video signal of 525 lines, interlaced, 60 fields per second (30 frames per second), with a limited bandwidth of 4 MHz. The U.S. and Japan use this standard. Using an encoder or scan converter, Macintosh video converts to NTSC composite with an unavoidable reduction in image quality. Because the NTSC signal is interlaced, single pixel lines, will flicker (unless the video card supports convolution).

NTSC RGB
Interlaced red, green, and blue video signals timed to NTSC standards. This format provides a superior signal format compared to composite video. Component video signals consist of Y, R-Y, and B-Y signals, differing from the NTSC RGB format.

omni mode
Refers to what MIDI channels your Slave is listening to. With Omni mode on, it will listen and respond to messages on all 16 channels. With Omni mode off, it listens only to one selected MIDI channel.

oscillator
Creates a repeating electrical wave.

overscan
A display method where the video signal is scanned beyond the viewing area of the monitor. Consumer video monitors are overscanned.

PAL
Phase Alternative Line system. The television broadcast standard for most of western Europe. Based on the 50 Hz power system, it displays 625 lines interlaced at 50 fields per second (25 frames per second). The PAL standard reverses the relative phase of the color signal components on alternate scanning lines, avoiding the color distortion that appears in NTSC reception.

pan
Panning is a term used in sound production which means to move the sound between full left and full right in a stereo field. The panpot is a MIDI controller.

Parameters
Conditions, guidelines, settings. In ***Image/ine***, the 63 controllable functions including Pan X and Y, Hue, Saturation, Feedback Offset, Displace, etc.

period
The time elapsed during one complete cycle of a wave.

phase
A portion of a periodic cyclic process. Also the relationship between two periodic signals or the amount by which the cycles of one wave precede or follow the cycles of another wave of the same frequency.

pixel
The smallest unit of an digital image display containing color and brightness values.

Pitchbend
A synthesizer performance technique that involves sliding the pitch of a sound up or down by means of a controller.

Poly
One of the three basic Midi modes (omni, mono) where an instrument responds to data on the specific channel it's assigned to.

Polypressure (see Keypressure)

Pressure
Touch sensitivity control on a Midi instrument measuring how hard a key is depressed after the key is resting in it's keybed. Compare with Velocity.

primary colors (video)
Additive mixtures of red, green and blue from a direct light source, such as a video monitor result in a full range of color. in All non-primary colors are mixtures of two or more of the primary colors.

pulse
A current or voltage which changes abruptly from one value to another and back to the original value in a finite length of time. Used to describe one particular variation in a series of wave motions.

RAM
Random Access Memory. Memory used when manipulating data. The CPU can directly store and retrieve data from this memory.

RCA connector
A common connector typically used for audio and video signals, with some professional equipment and most consumer equipment. Compare BNC and XLR connector.

resolution
A measure for image quality on a monitor. Often called horizontal resolution when referring to a video image. The broader the frequency band of the video signal the higher the resolution. Macintosh video has a bandwidth of 30 mHz, resolving color images at 640 pixels by 480 pixels. This exceeds the capabilities of an NTSC composite signal.

RGB
Red, Green, Blue. The three monochrome signals representing the primary colors of the image. RGB signals have individual outputs with composite sync available either on a fourth output or combined with the green signal. RGB signals can be interlaced (timed to NTSC standards) or non interlaced (at higher sync frequencies) such as on a computer.

RGB monitor
A type of color monitor that receives separate signals for each color (red, green, and blue). See also composite video.

ROM
Read Only Memory. Refers to information stored permanently in a computing device. It cannot be manipulated.

S-video
Used primarily with Hi8 and S-VHS equipment, S-video is a consumer form of component video (Y/C) .

S-VHS
An improvement to the VHS format introduced in 1987 by JVC. The luminance and chrominace signals are separately processed as Y/C signals. Luminance resolution - 400 lines.

sampler
A device that digitally records sounds for later manipulation for performance.

Sawtooth waveform
An oscillator output signal in which the voltage rises smoothly from a lower value to a higher value (positive ramp) and then abruptly drops back to its starting position. Can also be reversed, higher to lower (negative ramp). In the audio range it contains all the harmonics.

scan converter
Converts the scan rate of a video signal from non-

interlaced to interlaced so computer images can be displayed on a video monitor. See encoder.

scan rate
The time it takes the electron gun to move across one line of the display screen (horizontal scan rate) or repeat one entire screen (vertical scan rate). The number of times a screen is redrawn each second. Computer display scan rates differ from standard videoscan rates.

SECAM
Systeme Couleur Avec Memoire. The television broadcast standard for France, the USSR and various eastern European countries. Similar to PAL, it's based on a 50 Hz power system, although it utilizes a different encoding process. It displays 819 lines interlaced at 50 fields per second.

Signal-to-noise ratio (S/N)
An S/N ratio can be given for video chrominance and luminance signals and audio signals. S/N ratio is the ratio of noise to actual total signal, and rates how much higher the signal level is than the level of noise. It is expressed in decibels (dB), and the larger the value, the more crisp and clear the picture and sound will be during playback.

subcarrier
A 3.58 MHz chrominance signal modulated and combined with the luminance signal to produce an NTSC composite video signal.

sync
Short for synchronous. In video it refers to signals used to synchronize the horizontal and vertical scans of a signal. This signal is derived from a combination of horizontal and vertical drives, with some slightly narrowed and delayed pulses as well as the addition of equalizing pulses. When used, is usually accompanied by a subcarrier.

synchronous
Able to perform two or more processes at the same time, such as sending and receiving data, by means of a mutual timing signal or clock.

Sine waveform
Output signal from an oscillator that rises and falls smoothly. In the audio range it's muted because there are no overtones.

Square waveform
An oscillator output signal in which a pulse wave is produced - a higher steady-state voltage alternates with a lower steady-state voltage. In the audio range it contains odd-numbered harmonics.

sound module
A device that does not have an integral controller (no keyboard) and must be controlled remotely using a MIDI cable connection.

synthesizer
A programmable musical instrument capable of producing sound and often Midi compatible.

Triangle waveform
Output signal from an oscillator in which the voltage rises smoothly and then falls smoothly. Unlike the sine wave, it has a sharp corner where the positive and negative ramps meet. In the audio range, like the sine wave, it's muted with a few, weak overtones.

underscan
A display method on professional video monitors where the image area (raster) is decreased so all four edges are viewable. Useful for checking skew and tracking. Computer monitors are also underscanned (a black border surrounds the image display).

Valid signal
A video signal which will remain legal when transcoded to any other format. Invalid signals can be processed problem-free in their current format, but when the signal is transcoded to a different format problems may arise. On the Macintosh, for example, you can generate highly saturated colors which are legal in the RGB domain. When converted to composite video however, these signals will exceed broadcast specifications. A valid signal is always legal, but a legal signal is not necessarily valid.

VCR
Video Cassette Recorder

velocity
In MIDI, velocity is determined by how hard a note is pressed on the keyboard controller.

vertical blanking interval
The period of time it takes the scan to retrace from the bottom to the top of the screen display. The display image is blanked during this period. A syncing preference in ***Image/ine.***

vertical retrace
The electron beam returns to the top of the monitor display at the completion of a field scan.

vertical scan frequency
The frequency of the vertical sync pulses. NTSC vertical scan frequency is 59.9 Hz. Mac video vertical scan frequency is 67.7 Hz.

vertical sync
A pulse that triggers the vertical retrace of a scanning electron gun from the bottom of a frame back to the top.

VHS
Mass distribution format introduced in the mid-80's. Luminance resolution - 240 lines.

Video
A technical means for reproducing moving visual images by representing them with an analog electronic signal. These images are translated into a series of horizontal scan lines; stored, transmitted and reproduced. There are various standards which define this signal including NTSC, PAL, SECAM, RGB, and CAV.

video board
Peripheral hardware, installed in the PCI bus slot of a Macintosh PPC. Provides video Input and Output. Boards from different manufacturers will vary in their compression methods and therefore price. Current high end boards with built-in compression can output broadcast quality at full frame, full speed. Inexpensive boards may not have built-in compression methods.

video format
A standard determining how a video signal is recorded onto videotape. These include 1-inch Type C, 3/4" U Matic, 3/4" U-Matic SP, Betacam, Betacam SP, M-II, D-1, D-2, D-3, VHS, Hi8, Video 8, Beta, and S-VHS and DVD.

video monitor
A display device that can receive video signals by direct connection only and cannot receive broadcast signals such as commercial television. Video monitors can be directly connected to the computer.

video signal
A dynamic signal representing the varying levels of a video image without the sync pulses necessary for its display. Combining the video signal with sync pulses produces a composite signal.

video waveform
The pictorial display on a waveform monitor of the various components of the video signal. Used in professional video production to check the integrity of the signal and its components.

volatile memory
Memory type where the contents can disappear irretrievably.

wave
A cyclic energy exchange from a passive (potential energy) state to an active (dynamic energy) state and back again.

waveform
The shape or form of a wave (a graph of a waves amplitude over time).

wavelength
The distance between analogous points in a wave from one cycle the next.

white level
Maximum luminance or 100 IRE.

XLR connector
Used in professional audio applications, this connector has three conductors and is typically used with a balanced signal. Compare RCA and BNC connector.

Y, C1, C2
A generalized set of Component Analog Video (CAV) signals where Y is the luminance signal, C1 is the 1st color difference signal and C2 is the 2nd color difference signal.

Y, I, Q
The set of CAV signals specified for the NTSC system where Y is the luminance signal, I is the 1st color difference signal and Q is the 2nd color difference signal.

Y, R-Y, B-Y
The general set of CAV signals used in the PAL system as well as for some encoder and most decoder applications in NTSC systems where Y is the luminance signal, R-Y is the 1st color difference signal and B-Y is the 2nd color difference signal. Also called Y, U, V.

zoom in
To magnify the image on a monitor display. The Scale parameter in ***Image/ine***.

zoom out
To decrease the image size on a monitor display. The Scale parameter in ***Image/ine***.

Index

N

O

P

Q

R

S

T

U

V

W

X

Y