

VideoWorks™

Create, produce and direct your own animations, even if you can't sketch.



For the Apple Macintosh.™

Developed by MacroMind,™ Inc.

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*VideoWorks*TM

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HAYDEN SOFTWARE COMPANY, INC.

600 Suffolk Street
Lowell, MA 01854
1-800-343-1218
(in MA call 617-937-0200)



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INTRODUCTION

You no longer have to be a programmer to create high quality computer animation. With VideoWorks™, the first full-featured animation package for the Macintosh™, you can produce professional quality animation even if you don't know the difference between a sprite and a pixel. Just as the Macintosh has become "the computer for the rest of us", VideoWorks will become the animation package for the rest of us, making it easy and fun to create animations without any programming experience whatsoever.

With VideoWorks, you can create your own images for subsequent animation, or borrow ("grab") from a vast library of images created by a professional artist. Once you have created or chosen your images, VideoWorks gives you two ways to animate them: by real time recording of the mouse movement, or frame by frame shots of the image as they move or change.

VideoWorks' features include:

- * Two methods of animation: real time recording and frame by frame
- * As many as 24 different objects on the screen at the same time - all of which can be animated
- * A graphics tool for creating original artwork to include in animations
- * A Movies Disk packed with examples to show you what VideoWorks is capable of creating
- * An Art Disk full of predrawn images to incorporate in your own animations
- * Art Grabber™, a unique tool that allows you to move existing art from any MacPaint™ document onto your easel for subsequent animation
- * A sound generator to create a complete range of sound effects to add to your animations
- * Easily implemented special visual effects;
- * Simple to use editing systems
- * Speed adjustment even during playback

The first thing I noticed when I stepped out of the train was the cold. It was a sharp contrast to the warm, humid air of the South. I had heard that the weather in the North was harsh, but I didn't realize just how cold it could be. The wind was biting, and the snow was falling in soft, white flakes. I pulled my coat tighter around me and walked quickly towards the station. The people around me were all bundled up in heavy coats and hats, their faces red from the cold. I felt a little out of place, but I tried to keep my head down and focus on my destination.

As I walked, I noticed that the streets were very clean. There was no dirt or grime on the sidewalks, and the buildings looked well-maintained. I had heard that the North was a more orderly place, but I didn't realize just how clean and organized it was. The streets were wide and straight, and the buildings were tall and imposing. I felt a sense of awe as I walked through the city, and I knew that this was a very different place from the one I had left behind.

The first thing I noticed when I stepped out of the train was the cold.

Two weeks in the hospital, and I was feeling much better.

A year after the accident, I was back to work.

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How to Use This Manual

The VideoWorks manual is designed to let you dive right in without wading through a lot of animation principles. Such information is made available to the interested reader, however, in "Foreground", a kind of Foreword containing background material of a general and historical nature. Those anxious to get started may skip that section and go straight to "A Guided Tour", an introduction to VideoWorks through demonstrations and simple exercises. VideoWorks' advanced techniques are covered by a series of three tutorials ("Pharaoh's Plague", "Driven Around the Bend", and "The VideoWorks Process") designed to make you an expert animator. The remainder of the manual consists of "Hints, Tips and Caveats", "VideoWorks Reference" (a guide to all the menu options), a "Glossary" of animation terms, and a select "Bibliography" to further your study of computer animation. Finally, as a reference, all of the art contained on the Art Disk is reproduced in the back of the manual.

The Software

Your VideoWorks animation package consists of three disks: the main program disk, labeled **VideoWorks**, which contains everything you need to create your own animations; a demonstration disk, labeled **Movies**, with examples of the kinds of effects you will be able to create with just a little practice; and an artwork disk, labeled **Art Disk**, containing "canned" images that you can use in your own animations.

So that you may concentrate on learning how to create your own animations, VideoWorks has incorporated the standard *Macintosh User Interface*. The way you use your mouse, pull down menus, scroll bars and select are all just like MacWrite™ and MacPaint. VideoWorks even has **Cut, Copy and Paste**. If you need to refresh your memory on certain features and techniques, refer to *Macintosh*, your user's guide.

Hardware Requirements

To run VideoWorks, you will need a Macintosh with at least 128K. Although VideoWorks will work satisfactorily with just the Macintosh's internal drive, a second (external) drive will help avoid a lot of disk swapping, especially if you intend to use the canned artwork on the Art Disk. Nevertheless, for the purposes of this manual, we will assume that you are operating with the Macintosh's internal drive only, and will advise you accordingly. If you have an external drive, we assume that you already know how to use it.

Before You Begin

VideoWorks comes with one set of master disks. Make at least one copy of these disks. Save the originals in a safe place and use the copies. This protects against accidental damage to your master disks. If you are unsure of the procedures to make a disk copy, consult *Macintosh*, your user's guide.

When you start VideoWorks with a backup disk, you will be asked to insert your original master disk in the internal drive for verification. You can also put VideoWorks on a hard disk. You will be asked to insert your original master disk in the internal drive when you start VideoWorks.



Through the magic of animation, a series of discrete, static images appears alive and in motion. The physiological basis for this phenomenon, known as persistence of vision, was well known to the pioneers of animation, the creators of such devices as the zoetrope (literally, "towards life") and the phenakistoscope. These devices, which were little more than parlor toys when they were first introduced in the 1830's and 40's, made it possible to present a number of images to the eye in rapid succession without blurring the individual images. The zoetrope did this by means of vertical slits placed at regular intervals around a rotating drum. The viewer would be able to see the images through the slits as the drum rotated, a technique which "froze" each image long enough for it to register in the brain. The rest was up to the persistence of vision, which caused the images to merge together to create the illusion of continuous motion.

The phenakistoscope employed a similar technique, but used a rotating disk instead of a drum. The viewer could look through the slits in the disk at a mirror, which reflected the images on the backside of the disk. As with the slits in the zoetrope, the slits in the disks were a primitive form of shutter, effectively freezing the motion of the individual images.

Eadweard Muybridge - Reverse Animator

In late 1800's, Eadweard Muybridge produced thousands of still photographs depicting human and animal locomotion. In doing so, he made significant contributions to both cinematography and animation. That he has not always been recognized as a pioneer in those fields may be because his contribution was somehow backward: while others were trying to create the illusion of motion from static images, Muybridge was doing the exact opposite, creating static images of moving things. Thus, Muybridge might be regarded as a "reverse animator", something like a reverse engineer of locomotion.

Muybridge began his experiments under the patronage of Leland Stanford, Governor of California and wealthy breeder of racehorses. Stanford had commissioned Muybridge to photograph his horse Occident in motion, presumably to settle a dispute whether a trotting horse ever has all four feet off the ground at the same time. Muybridge took a number of still photographs, one of which showed Occident with all four feet off the ground, thus settling the long-standing controversy.



Stanford, however, was not to be satisfied with merely settling disputes. As a breeder of racehorses, he wanted to develop a theory of locomotion, so he could better select and train his animals. He proposed, therefore, that Muybridge take sequential photographs of horses in motion, a fraction of a second apart. Stanford was to provide financing, and Muybridge the knowhow for the project.

Cinematography - The Hard Way

The nonexistence of cinematographic equipment did not stop Muybridge, who used banks of still cameras placed 21 inches apart and triggered by trip wires. Using this technique, he could photograph a horse as it galloped past the cameras, capturing each moment of time onto a separate photographic plate.

Muybridge's experiments did not end with horses, however. Over the next twenty years, through the turn of the century, he photographed people, birds, dogs, cats and dozens of other animals in motion, using the same technique. To show his photographs, Muybridge developed a device he called the zoopraxiscope, a variation of the phenakistoscope which could project the images onto a wall. Thus Muybridge found a way of reviving the motion that he had previously stilled. Although cumbersome and limited in scope (compare his 24 large-format cameras with trip wires to today's portable movie cameras), Muybridge had nonetheless developed a working method of capturing, storing and replaying something as fleeting as motion.



Film Animation

While Muybridge was struggling under the weight of his 24 cameras and his zoopraxiscope, Thomas Edison and others were putting the finishing touches on various "motion picture devices", cameras capable of capturing a series of images on continuous strips of film instead of individual glass plates. George Eastman had already developed flexible celluloid film which could be wound onto spools in 50 foot lengths or more, and with Edison's claw escapement mechanism (which held the film still long enough to capture an image), the film industry was up and running. Interestingly, from the animator's point of view, the most important invention wasn't the movie camera with its ability to take a number of stills in rapid succession, but rather the development of flexible strip film and the projector for playing it back. In fact, early motion picture cameras were even detrimental to animation, since most were incapable of shooting one frame at a time, a necessary feature for animating artwork.

Fine Tuning

With flexible strip film and motion picture projectors, the film animation industry needed nothing but fine tuning and refinement. This it received in the hands of John Bray and Earl Hurd, who in 1913 were the first animators to use celluloid sheets, or "cels". Before Bray and Hurd, animation was a laborious process involving the creation of thousands of individual frames from scratch. Everything had to be drawn again and again, including parts of the image that didn't change from one frame to the next, such as the background scenery. With cel animation, each background scene needed to be drawn only once on plain opaque stock. The moving parts, on the other hand, were drawn on the transparent cels and overlayed on top of the background. The cels themselves could be overlayed on top of each other, so that different parts of the same character could be animated separately.

The savings in time and labor were significant, and Bray and Hurd's little studio on 42nd Street in New York flourished. Even so, however, the time and labor involved in creating a one-hour animation was still enormous. Considering that motion picture film was at that time projected at the rate of 18 frames per second, a one-hour animation would require as many as 64,800 individual frames, a monumental undertaking for even a small army of artists. And when the projection rate for motion picture film was subsequently standardized at 24 frames per second (to accommodate the sound track), the number of frames for a one-hour animation increased to 86,400, a change which most animators must have felt was in the wrong direction.



The Disney Era

By the time Walt Disney entered the picture in the 1920's, the basic techniques of animation had already been well established: all that was needed was fine tuning and polishing. This is not to say, however, that Disney's contributions to animation were in any way insignificant. On the contrary, Disney took a fledgling medium and developed it to a level still unexcelled today. His *Snow White and the Seven Dwarfs* (1937), for example, remains a standard, even as it approaches its 50th anniversary. Along the way, Disney introduced numerous technical refinements, such as multi-layered background cels which moved across the field of vision at different rates, and thereby heightened the illusion of depth. In addition, Disney provided greater realism in character movement by making use of scientific studies of human and animal locomotion. Indeed, Disney's main source of information about locomotion was none other than EadWeard Muybridge himself, the "reverse animator" who had taken motion and broken it down into static images.

The Computer Era

It was only a matter of time before the information stored on a strip of film could be broken down and stored as bits, the basic unit of information and the basis of all digital computing. A *bit* (for binary digit) is like an on-off switch, and provides information as to which of two possible states prevails. Any information, whether complex mathematical relationships or graphic images, can be expressed in bits and stored as binary code. In computer graphics (the precursor to computer animation), a screen image is composed of an array of binary dots (known as *pixels*, for picture elements), each of which resides at a specific location on the screen and is either on or off at any given moment. Because every pixel on the screen corresponds to a bit of information residing in the computer's memory, this screen image is known as a *bit map*.

Computer animation is simply computer graphics with the addition of the dimension of time. With animation, the bit map changes many times a second, in accordance with instructions residing in another part of the computer's memory. Obviously, then, the computer must be capable of handling a number of different tasks at the same time.

Until recently, computer animation was in the exclusive domain of the large, powerful and very costly mainframe computers, and was restricted to specialized situations, such as flight simulators. Even though traditional animation techniques were (and are) labor-intensive and hence costly, they were still cheaper than their computerized counterparts, some of which cost thousands of dollars a minute to operate.

A crossover of sorts occurred in the late 1970's. As the cost of computer time dropped, it became more feasible economically to have computers generate animated sequences than to produce them by hand. The result was animated sequences in films such as *Star Wars*, *TRON* and *Star Trek II - The Wrath of Khan*. Since then, computer animation has become the primary method of generating the graphics for television network logos, newscasts, sports results, and maps and graphs.

As computer memory continues to drop in price, and as software becomes more sophisticated, computers may well become the exclusive tools for creating animations, making the old hand-drawn methods as much a part of history as the zoopraxiscope. Today, with high speed and high resolution personal computers such as the Macintosh, and with sophisticated animation software such as VideoWorks, anyone who can click and drag a mouse can create professional quality animations in less time than it would take to draw a storyboard.





At the Movies

Before you set out to create your own animations, you will naturally want to see just what VideoWorks and your Macintosh can do. For this reason, we have included a demonstration disk with examples that you can sit back and watch, or use as a basis for your own creations. For the moment, let's sit back and watch the show. Just follow these simple steps:

- * Turn **On** your Macintosh.
- * When you see the disk icon with a flashing question mark, insert the disk labeled "VideoWorks".
- * The drive will whirl for a few moments and then stop. At this point, the Macintosh desk top will be displayed. If you are not using an external drive, select **Eject** from the **File** menu and then insert the disk labeled "Movies" into the internal drive.
- * When the drive stops whirring, double-click the file "Demo" to **Open**, or select the file and **Open** from the **File** menu.



- * Once the various VideoWorks windows have appeared, select **Demo** from the **File** menu. That's it! Now sit back and enjoy the show.

You can stop the animations anytime by moving the pointer to the top of the screen and holding the mouse button down. When you do that, you'll notice that the menu bar reappears (it had never really gone; it was just hiding behind the "Stage").

- * While holding the mouse button down, move the pointer to the **File** menu and then select **Quit**. In a few moments you will find yourself back at the desktop.
- * Pull down the **File** menu once more, **Eject** the "Movies" disk, and insert your "VideoWorks" disk. Now the stage is set for your creative endeavors.

Your Turn to Play

You've seen what VideoWorks is capable of doing on the Macintosh; now let's see what you can do.

- * If you haven't already done so, double-click the VideoWorks icon (the video camera), or select VideoWorks and **Open** from the **File** menu.



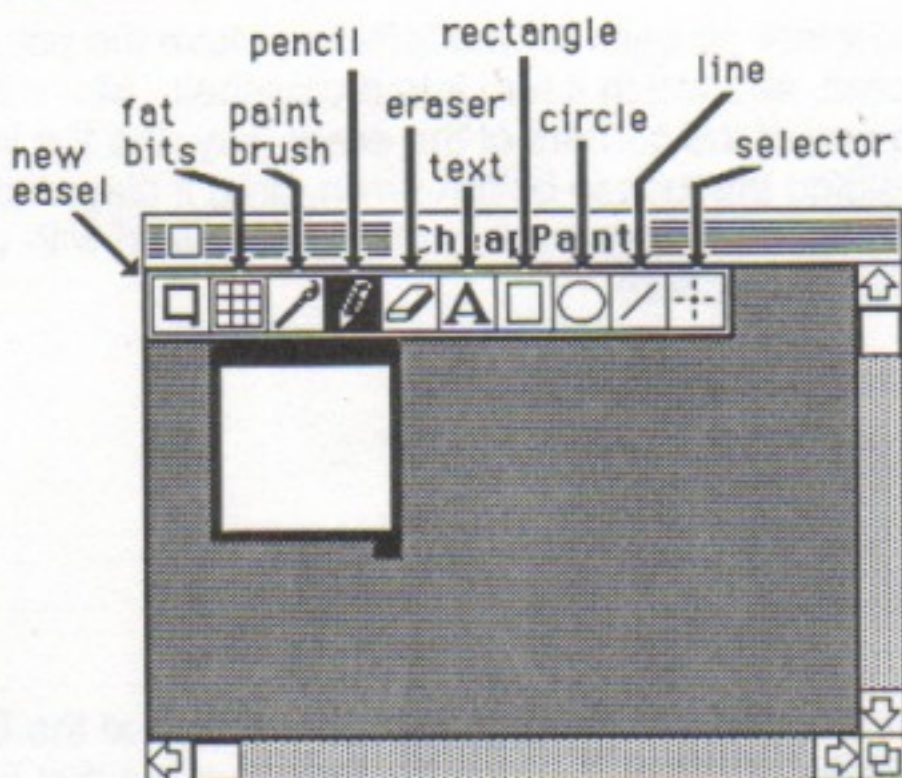
Wait a few seconds as the program loads into memory, and then take a close look at the screen. What you will see is the main VideoWorks screen, consisting of two windows: the **Cast** and the **Control Panel** (located at top right), as well as the menu bar along the top of the screen.

- * Pull down the **Windows** menu and select **CheapPaint**.

Briefly, the animation process follows this general procedure: each separate image (or "castmember") is created in a **CheapPaint** easel, and is then transferred to the **Cast** window (automatically, as you will see). Individual castmembers are then dragged out onto the **Stage**, where they are animated using either real time or frame-by-frame recording. Once the animation has been created, it can be played back, rewound, or advanced one frame at a time using the controls on the **Control Panel**.

Creating the First Castmember

At the top left corner of the CheapPaint window you will notice a small white square bounded by heavy black lines. This is your **easel** (or canvas), on which you will be creating your castmembers. Like the CheapPaint window itself, the easel is resizable: by pointing to the easel's "handle" at its bottom right and holding the mouse button down, you can make the easel as large or as small as you need it, just by dragging the handle diagonally up or down the screen.

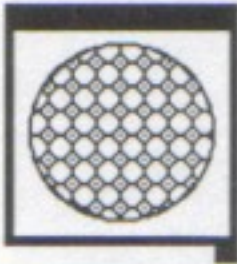


In addition, you can relocate the easel. By pointing to the heavy bar at the top of the easel and holding the mouse button down, you can drag it anywhere you wish within the confines of the CheapPaint window.

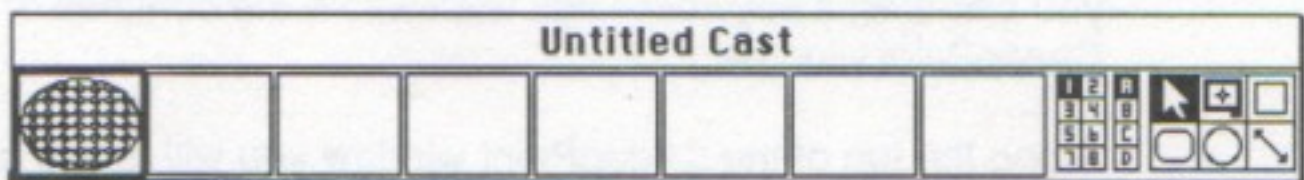
Along the top of the CheapPaint window you will notice a number of icons. These are the main graphics tools, similar to MacPaint but without the variety (hence "CheapPaint"). We will be using some of these tools to create our Castmembers.

- * Click the **circle**.
- * Before we draw any circles, however, let's select a fill pattern. Pull down the **Draw** menu and select a pattern by clicking one of the boxes (anything except black, because we will be using that later in this tour).

- Now let's go back to CheapPaint. Move the pointer into the easel, and watch it turn into a crosshair. Move the crosshair to one of the corners of the easel (say, the top left) and, holding the mouse button down, drag it diagonally towards the opposite corner. A circle is born, filled with your selected pattern.



- Before you do anything else, take a look at the Cast window at the bottom of the screen. Note that the first (leftmost) cell has a heavy black border around it, unlike the other cells in that window. This indicates that that cell is the one selected, and that when you have finished creating your image, that's where it will go.



Creating the Second Castmember

- When you are satisfied with the image you have created in the easel (for now let's pretend that the circle with the pattern fill is just what you wanted), click the first (leftmost) CheapPaint icon, the one that looks like a **miniature easel**. Note that when you did so, a new easel appeared. Note also that the black border that used to be around the first cell in the Cast window is now around the second cell, indicating that you are now working on the second castmember (or, as you will see later, that the second castmember is currently "active").
- Let's draw our second castmember. Pull down the **Draw** menu and select the black fill.

-
- * Go back to CheapPaint and click the **rectangle**. Before we put a black square into the new easel, however, let's make the easel a little bigger by dragging its handle diagonally down and across the screen until it's about two or three times as big as the first easel.
 - * Move the crosshair to a point near the top left-hand corner of the easel, and, holding the mouse button down, drag it diagonally toward the bottom right hand corner. As soon as you release the mouse button, you will see that you have created a black square, your second castmember.

Moving between Castmembers

If you need to go back to the first easel, just move the pointer to any part of it and click. This activates the easel as well as the corresponding cell in the Cast window. Even if you have the maximum 64 easels in the CheapPaint window (or 256 on a Macintosh with 512K), you can activate any one of them just by clicking it. And if the easel you want happens to be buried under other easels, just move them aside until you find it, or, if you know which Cast cell it's in, simply click that cell in the Cast window.

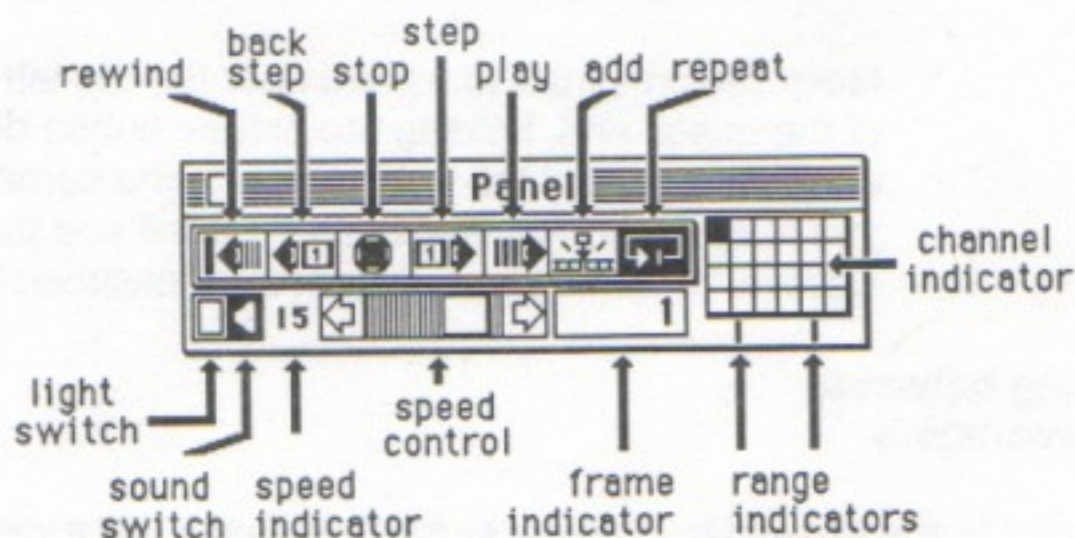
- * Try it now. First, activate the **Cast** window by clicking anywhere on it. Now click the first cell in the Cast window, and you'll see that the corresponding easel is simultaneously activated in CheapPaint. This is one of the ways that VideoWorks makes life easy for you, by coordinating the windows you are using.

Real Time Recording

Now, let's animate the circle using real time recording.

- * First, **Close** the **CheapPaint** window by clicking the **Close Box** at the top left (you may need to activate the CheapPaint window first by clicking anywhere in the CheapPaint window).
- * To record in real time, first select the castmember you wish to animate (the circle in this particular instance).

- * Click the **Play** button on the **Control Panel**.
- * While holding the mouse button down, move the pointer around the stage for a while, and then release.



You will find, first of all, that the circle (the selected castmember) appeared on the stage the moment you pressed the mouse button, and, secondly, that as soon as you released the button, the circle retraced the exact same path that you created when you dragged it around, in both space and time.

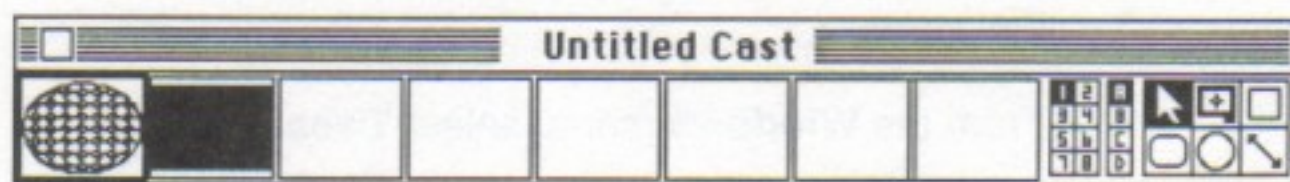
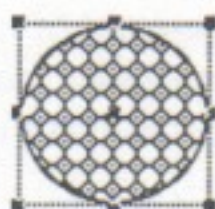
As you watch the circle moving around the screen, experiment with some of the options on the **Control Panel**.

- * Hit the **Stop** button and then the **Play** button.
- * Now hit the **Rewind** button to wind the film back to the beginning, and then the **Step** and **Back Step** buttons.
- * Hit **Play** again, but this time experiment with the **Speed Control** on the second row of the Control Panel, by moving the slide control.

Frame by Frame Animation

Now let's try a more traditional approach to animation.

- * From the **Options** menu, select **BurnScene**. This "burns" the current animation, while preserving the castmembers, so that you can create a new animation with the same cast.
- * Drag the circle out and place it near the left hand side of the screen.



This time, we will be shooting the animation one frame at a time, a process that involves "adding" or "inserting" a frame each time. There are three ways of doing this, each of which produces identical results. First, you can add or insert a frame by clicking the **Add** button on the **Control Panel**. Or, you can achieve the same result by pressing **Command A** (holding down the **Command** key and pressing the **A** key at the same time). Finally, you can add a frame by selecting **Add** from the **Options** menu. The choice is yours, and depends entirely on your particular application at the time. For example, you might find it more convenient to press **Command A** with your left hand while moving the mouse around with your right hand.

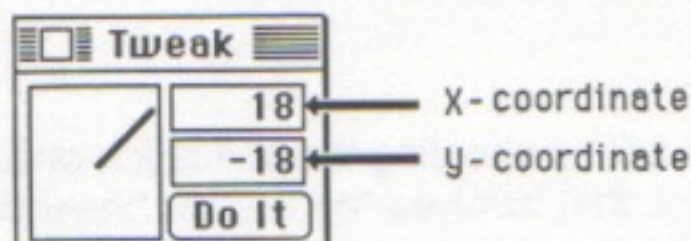
- * Let's assume you have decided on this last method for this exercise, so go ahead and press **Command A** now. You have just recorded the first frame of your new animation.

-
- * Pick up the circle and drag it to the right the distance of about one diameter, release it, and then press **Command A** again.
 - * Repeat this five or six times until you reach the middle of the screen.
 - * Now hit **Play**, and watch your circle move across the screen.

Tweak -- the Incremental Motion Generator

Now that we've almost decided to make a career out of moving circles around the screen, let's look at a more precise method of generating increments of motion, as opposed to the manual method we just used.

- * First, select **BurnScene** to get a fresh start.
- * Now drag the circle out again and place it on the left side of the screen.
- * From the **Windows** menu, select **Tweak**.



With Tweak you can specify both the direction and the number of units (measured in Pixels -- see Glossary) that your castmember will move from one frame to the next.

- * Move the pointer into the main box in the Tweak window (that's the large box on the left), and click anywhere inside it.

You will notice as you did so that a line appeared, running from the center of the box to your pointer. This line, which has both magnitude and direction, is known as a "vector", and defines both the distance and the direction that your castmember will move from one frame to the next. Notice the numbers in the boxes on the right. The top number refers to right and left motion, and the bottom number refers to up and down motion. To implement Tweak, simply click the **Do It** button each time you want to move your selected castmember, instead of dragging it as we did previously.

- * Select the magnitude and direction of motion, and then **Do It** repeatedly. Your castmember should move across the screen in the exact increments you specified. Note that **Do It** moves the castmember across the screen, but does not **Add** a frame to the animation.

Note also that your vector is not limited in magnitude to the confines of the Tweak box. So long as your initial click is within the Tweak box, you can drag the line to any point on the screen before releasing the button. And even though you may not be able to see the entire line, the upper right boxes in the Tweak window tell you the coordinates of the end point of the line.

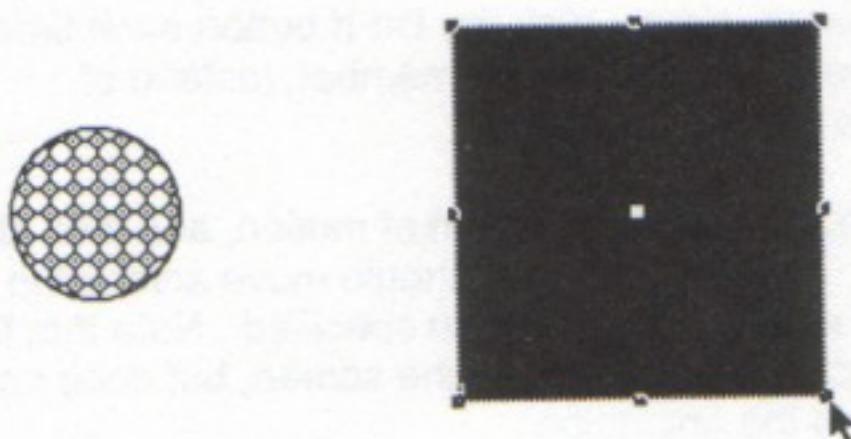
A Brief Introduction to Sprites

So far we have been animating one object at a time. VideoWorks is capable of animating 24 different objects on the screen at the same time and (this may surprise you) they don't all have to be circles. Each animated object, is known as a sprite, and operates in a single channel.

If you look at the right hand side of the Control Panel, you will notice a matrix of 24 squares. This is the **Channel Indicator**, and tells you which of the 24 channels is currently active.

- * **BurnScene.**
- * Drag out your first castmember, and it will be assigned to the first channel. Note that the first square (at top left of the Channel Indicator) is black, indicating that the first channel is currently active.

- * Now go back to the Cast window and activate your second castmember, the large black square, and then drag it out to about the middle of the screen. Alternatively, after activating your second castmember, you can position it anywhere on the Stage by selecting **Place** from the **Options** and clicking the mouse button at the desired location.



Note that the second square in the Channel Indicator is now black while the first square is gray. This means that the first channel is occupied, but not currently active, while the second channel is both occupied and active.

If you now drag a second black square out from the Cast window, you will find that the third square in the Channel Indicator becomes blackened, while the first two are gray. This also illustrates that it's possible for a single castmember to occupy more than one channel (or, to use alternative terminology, to be more than one sprite) at a time. Each of the two squares on the screen is now a separate sprite and can be animated independently of the other.

Who's On First? An Introduction to Foreground Prioritizing

When there is more than one sprite on the Stage, VideoWorks needs to know which one will be considered foreground and which one will be considered background. In other words, when two sprites cross on the screen, VideoWorks needs to know which one will move in front of the other. This is known as foreground prioritizing, and, although it is an important concept in animation, it is handled by VideoWorks with characteristic simplicity.

Here is the rule: Sprites in later channels (those toward the end of the alphabet) will pass in front of (i.e. have a higher priority than) sprites in earlier channels.

For example, a sprite in Channel B will pass in front of a sprite in Channel A, while a sprite in Channel C will pass in front of both A and B, and so on. And because channel letters are determined by the order in which castmembers are dragged out onto the Stage, it follows that the castmembers defining low-priority sprites (i.e., the background sprites) should be dragged out before those defining high-priority sprites. Let's try a few examples.

- * **BurnScene.**
- * Drag out the first castmember (the circle), and place it somewhere on the left hand side of the screen.

Notice that the **Channel Indicator** shows that the first channel is active. Note also that our circle has a border around it made up of small squares, indicating that it is the currently active (or selected) castmember.

-
- * Drag out the second castmember (the square) and put it in the middle of the screen.



Note that the border is now around the square, and that the Channel Indicator shows that the second channel is active. As you alternately click the circle and the square, you can see that the Channel Indicator is keeping pace, switching back and forth between the two occupied channels. This process also works in reverse: clicking the little squares in the Channel Indicator has the effect of activating the sprites on the screen.

- * Now, do a frame by frame animation of the circle so that it moves across the square to the other side of the Stage. You should know how to do this by now -- if not, go back and review the section called Frame by Frame Animation.

Did you see what happened when you hit **Play**? The circle moved behind the square, because it had lower priority.

Now try it the other way, by moving the square out first (after burning the scene to get a fresh start). This time, you should have seen the circle move in front of the square, because this time the square had lower priority.

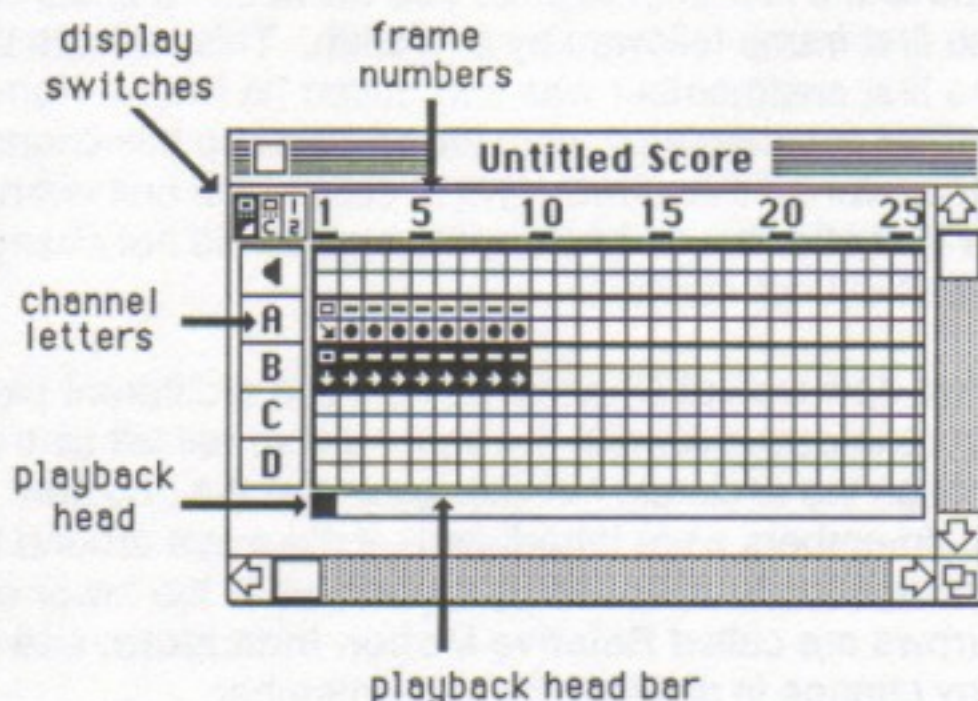
You might also have noticed that as the circle moved across the square, it seemed to have a square "frame" around it. In the next section you will learn how to eliminate this "frame" by using VideoWorks' matte feature.

What's the Score?

An Introduction to Editing

We have just seen how foreground-background priority is determined by the order in which castmembers are dragged out onto the Stage. Now let's look at a way of changing the current priority without burning the scene and starting from scratch. And we can do this even while the animation is still playing on the screen. Here's how:

- From the **Windows** menu, select the **Score** window, and take a moment to examine it.



Down the left hand side of the Score window you can see the letters A through X. You won't be able to see all of them at once, but like all good Macintosh windows, the Score window lets you scroll and resize, so you can focus in on just the part you need. The letters A through X refer to the 24 **Channels**, and the window should show that two of the channels are currently in use.

The numbers running across the top of the window are the **Frame Numbers**. Although you may only be able to see about 50 frames at the moment, additional frames will be added as needed.

If your last animation (the circle moving in front of the square) is still playing, you should be able to see a small black square scrolling along the bottom of the Score window. This is your **Playback Head**, and indicates your position on the animation.

Now let's take a close look at the two channels we are using. Because we dragged the square out first, it is occupying Channel A. Note the row of small octagons (like little stop signs) displayed on the lower row of Channel A. These indicate that there were no movements registered for the square, and that it was stationary for the entire sequence.

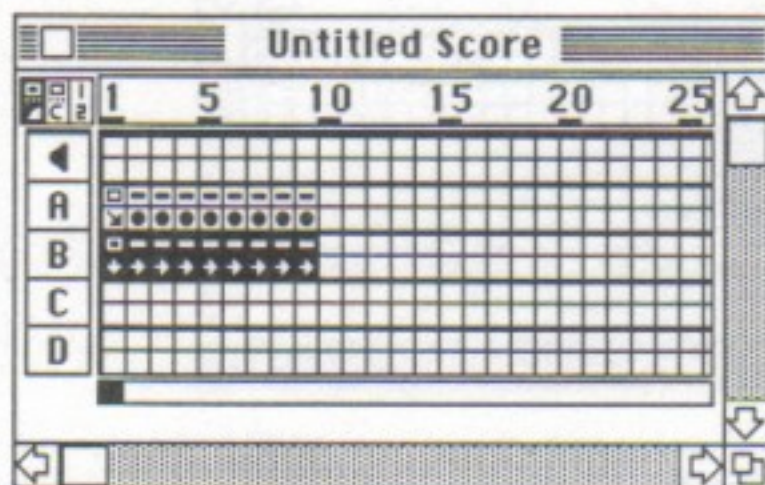
Above the row of octagons, you will notice a small square in the first frame followed by a hyphen. This indicates that after the first castmember was introduced (in Frame Number 1), no further castmembers were introduced into this channel. In other words, these two rows of cells in the first channel tell us that after the first frame, the square did not change shape, and it did not move.

If we now look at Channel B, we'll see a different picture: the two analogous rows in the second channel tell us that even though the circle did not change shape (i.e., no new castmembers were introduced), it did move around the screen. This motion is indicated by the arrows in the lower row. These arrows are called **Relative Motion Indicators**, and register any change in direction by a castmember.

Let's try some basic editing. First, let's eliminate the "frame" we noticed around the circle as it passed in front of the square.

- * First, position the pointer so that it rests on the first frame of the circle's channel (Channel B.)

- * Select the occupied frames by holding the mouse button down, and dragging the pointer along the channel until you reach the first free frame. If you drag too far, keep holding the mouse button down and back up. Release the button. The active frames of Channel B should now be blackened, indicating that these frames have been "selected".

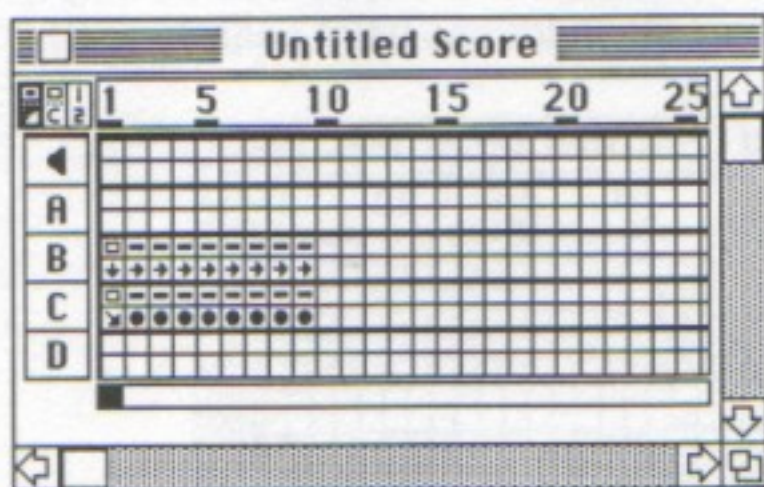


- * Pull down the **Efx** menu and select **Matte**. Notice that the "frame" disappears as the circle passes in front of the square. You will get a chance to experiment with the various **Efx** options later in the Guided Tour.

Now let's reverse the current foreground priority (so that the circle will move behind the square once more), and let's try to do this without even stopping the film. As we learned from the last exercise, for the circle to move behind the square, it will need to occupy an earlier (i.e., earlier-lettered) channel than the square. To do this, we need to move the square's sprite out of Channel A and into a later channel, say Channel C.

- * Select all of the frames in Channel A. All the occupied frames of Channel A should now be blackened indicating that these frames have been "selected".
- * Select **Cut** from the **Edit** menu, which should result in the disappearance of the selected frames (don't worry, they'll be back).
- * Move the pointer to the first frame of Channel C and click the mouse button. This last click tells VideoWorks that this is where we will be pasting the cut frames.

- * Select **Paste** from the **Edit** menu. The cut frames should now be visible on Channel C, and when you close the Score window, you should be able to see the circle moving behind the square.



This process of selecting a group of frames by dragging the pointer across them is the basis for most of the editing techniques that we'll be studying in the three tutorial sections. VideoWorks lets you select any number of frames in any number of channels with just a single sweep of the mouse. To select two channels, for example, drag the pointer across and down slightly, so that it enters the second channel. By dragging diagonally in this way, it is possible to select as many channels as you need with just a single movement.

It is possible to select all the channels with one single movement just by going to the top of the Score window and dragging the pointer across the frame numbers. In addition, you can select an entire channel by double clicking on the channel letter.

You can cancel any selection at any time by pointing anywhere else on the Score window and clicking.

Here's one final exercise for this section.

- * Select both channels (B and C) by dragging the pointer along both of them.
- * Close the Score window and pull down the **Efx** menu.

-
- * Work down the menu and choose each option in turn, and see what effect each one produces. There's no need to stop the animation -- just keep it running while you select one option after another. If you want to find out more about these special effects, look for the Efx menu in the Reference section.

Amaze Your Friends

Before we finish our guided tour with a demonstration of images that change shape as they move, here's some little tricks you can use to impress your friends.

- * **BurnScene.**
- * Animate the square using real time recording, keeping it within the confines of the right hand side of the screen.
- * While the square is still in motion on the screen, reopen the CheapPaint window and activate the easel containing the square.
- * Select the **Eraser** and erase part of the square.

Presto! Whatever you did to the square in the easel was mirrored exactly on the "performing" square, even while it was still in motion. This is another example of the way in which VideoWorks maintains direct links between inter-connected windows.

Here's one more trick.

- * **BurnScene**, close CheapPaint and select one of the castmembers from the Score.
- * Do a real time recording by hitting the **Play** button and dragging the pointer (and with it, the selected castmember) around the screen.
- * Open the Score and select a few frames in the topmost channel by dragging the pointer across it.

As you may have already guessed from the loudspeaker icon, this is the soundtrack channel, and lets you add sound to your animations.

- * Pull down the **Sfx** (for "sound effects") menu, select a submenu, and then select one of the sounds.

When you Play your animation, you will find that you have added sound to those selected frames. Go ahead and experiment with different sounds by making selections from the Sfx menu while those frames in the sound channel are still highlighted.

The Changing Sprite

In our last exercise before the tutorials we'll animate an object that changes shape as it moves. For this exercise, we will need to create some additional castmembers, so ...

- * Open a new file (select **New** from the **File** menu) and open the CheapPaint window.

Because we have become so proficient at drawing circles, let's draw some more.

- * First select your fill pattern, and then select the **Circle** within CheapPaint.
- * Go to the first easel, resize it to the smallest possible size, and draw a circle.
- * Click open a new easel, resize it until it is a little bigger than the last one, and put a slightly bigger circle in that one.
- * Keep doing this until you have five or six circles, each one bigger than the last.
- * Close CheapPaint, drag out the biggest circle from the Cast window, and place it in the center of the screen.
- * **Add** the frame (**Command A**, or the **Add** button).
- * Go back to the Cast window and click the second biggest circle. Don't drag it out -- just click it.

-
- * We now need to change to this second castmember, and we can do this in any of three ways: by double-clicking it, by pressing **Command E**, or by selecting **Switch** from the **Options** menu. As soon as you do that, you will find that the first castmember has been replaced by the second one.
 - * **Add** the second, and keep repeating this procedure until you have added the smallest circle.
 - * Now hit **Play...**

Before you fall asleep staring at the diminishing circles on the screen, you might want to experiment with some variations on the above theme. For example, try making the circle grow as it moves from left to right across the screen, and then shrink as it moves back. Or try to create the illusion of a ball following a trajectory as it recedes into the distance. If you have kept up this far, you should be ready to start on the advanced tutorials in the next section.

The law used to change at the end of the year, and we
can do this in any of these ways. As a result, the
company's earnings are not as high as they were in
the past. The law is not as strict as it used to be,
and the company's earnings are not as high as they were in
the past.

But the company has been successful in the past, and we
have been successful in the past.

What is the

the law is not as strict as it used to be, and we
can do this in any of these ways. As a result, the
company's earnings are not as high as they were in
the past. The law is not as strict as it used to be,
and the company's earnings are not as high as they were in
the past. The law is not as strict as it used to be,
and the company's earnings are not as high as they were in
the past. The law is not as strict as it used to be,
and the company's earnings are not as high as they were in
the past.

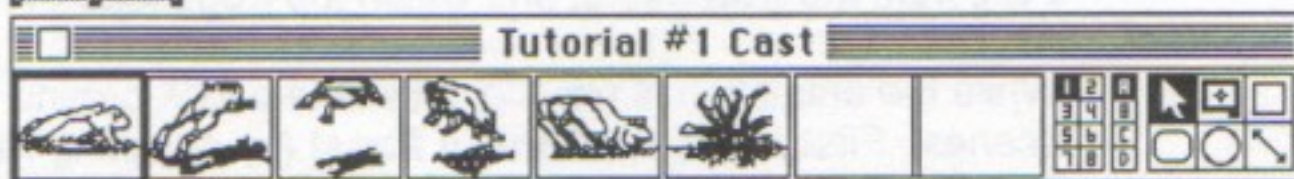


Now that we have gained a working familiarity with some of VideoWorks' features, let's explore some advanced animation techniques. Because VideoWorks contains a powerful animation editor, working through the following examples will help you develop editing skills that will actually save you time and effort. In this tutorial, we will cover some of the basic editing techniques, such as cutting, copying and pasting.

- * Select **Open** from the **File** menu, and then double-click **Tutorial #1**.
- * Once the various VideoWorks windows have appeared, select **Stage** from the **Windows** menu; this clears the screen of all the other windows, such as the **Cast** and the **Panel**, and gives you an uncluttered view of the action.
- * Start the animation by pressing **Command Q** or selecting **Play** from the **Edit** menu, and watch the frogs take over.
- * While the animation is playing, let's take a look behind the scenes. First, open the **Control Panel** (by selecting **Panel** from the **Windows** menu) and experiment with some of the controls. For example, click the **Stop** button, and note that the action freezes at that point.
- * Click the **Rewind** button (the one on the far left) and then step through the animation frame by frame, by clicking the **Step** button. Note as you do so that the animation is made up of discrete images, each one slightly different from the previous one. Note also that as you step through the animation the **Frame Indicator** in the Control Panel indicates where you are in the sequence.
- * Open the **Cast** window (from the **Windows** menu), and note that this entire sequence, which looks like a plague of frogs, is created with only six castmembers. In other words, by using VideoWorks' editing functions, it is possible to achieve this multiple frog effect without having to create additional artwork. Let's see how it's done.

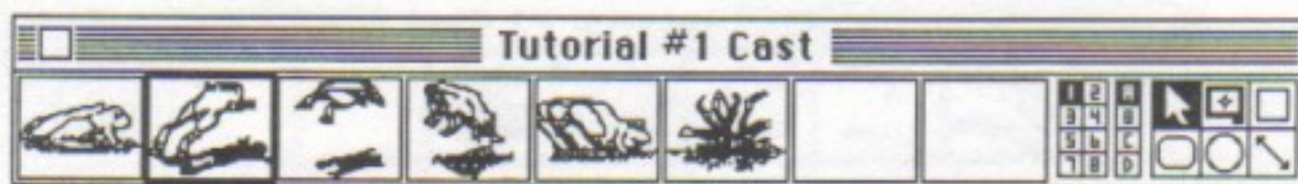
Bring On The Frogs

- * Select **BurnScene** from the **Options** menu.
- * It is a good idea to **Save** often as you progress through this tutorial. So **Save As...** now under a different name (such as "My Frogs"). If you do not **Save As...** now, then if you **Save** during the course of the tutorial, you will overwrite the original tutorial and it will no longer be available as a reference.
- * Select the first castmember, drag it out and place it on the Stage, somewhere above the Cast window and towards the left hand side of the screen.

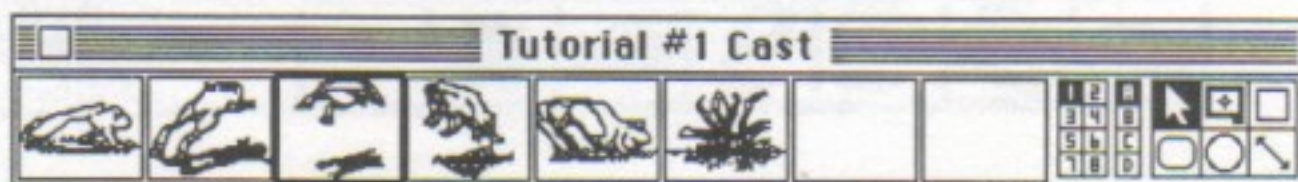


- * **Add** this frame by pressing **Command A** (or, if you recall from our Guided Tour, by clicking the **Add** button on the Control Panel, or selecting **Add** from the **Options** menu).
- * **Save.** If you want to Save this exercise, you should do so often. We won't be giving you any move **Save** reminders however.
- * Select (but do not drag it out) the second castmember by clicking the second box in the Cast window. Switch to this new castmember by pressing **Command E**, selecting **Switch** from the **Options** menu or double-clicking the second castmember. Once you have done this, you will notice that the first castmember has been replaced by the second one.

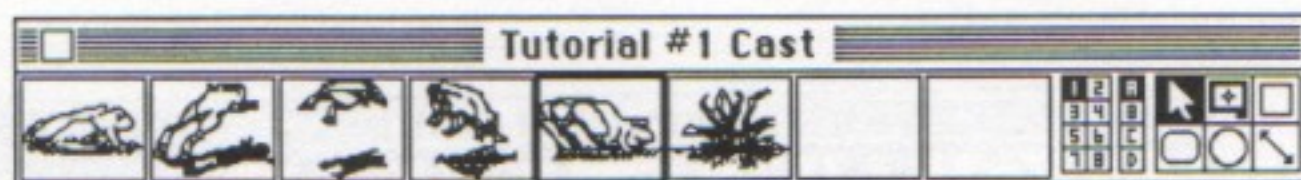
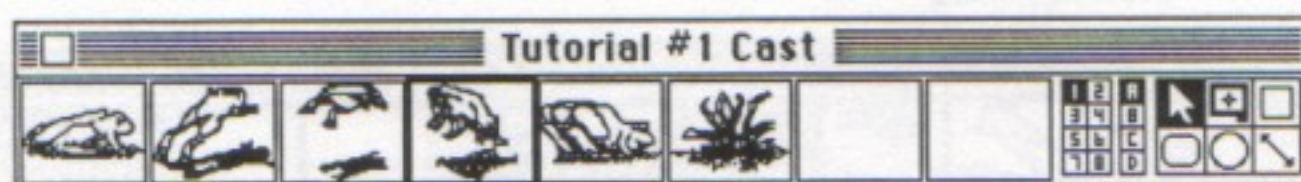
- Before we add a second frame to our movie, however, we will now need to drag the second castmember a short distance to create the illusion of movement across the screen. So drag the second castmember up and to the right, and then **Add** this frame.



- Repeat this procedure by selecting the third castmember, **Switching**, moving the castmember up and to the right, and **Adding** the frame.



- * Continue this process to **Add** the forth and fifth castmembers.



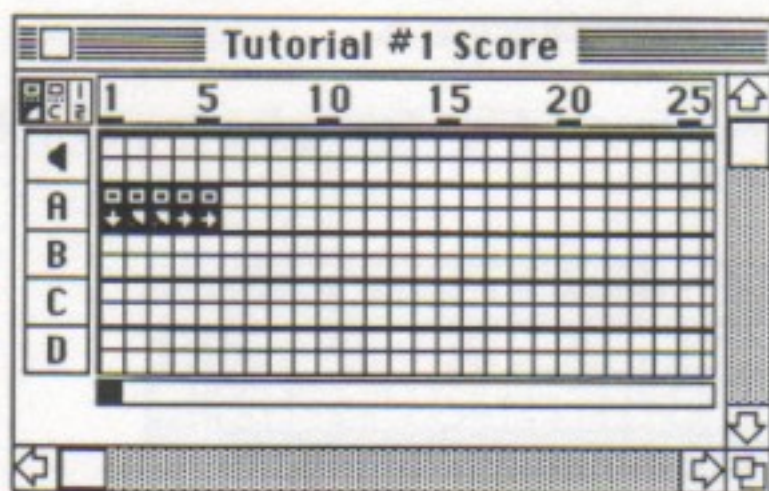
- * Hit the **Play** button, and watch the frog jump back and forth across the screen.

Go Forth and Multiply

We shall now see how to take this small animated sequence and, by using the Copy and Paste functions, turn it into a plague of Biblical proportions.

- * **Open** the **Score** window, and resize it so that it displays the first 25 frames and the first four channels (A-D).

- * Select Frames 1-5 in Channel A by dragging the pointer across them. Note that we can carry out any of our editing functions even while the animation is still running, so if you had stopped the action, go ahead and start it up again so you can watch your changes take immediate effect.

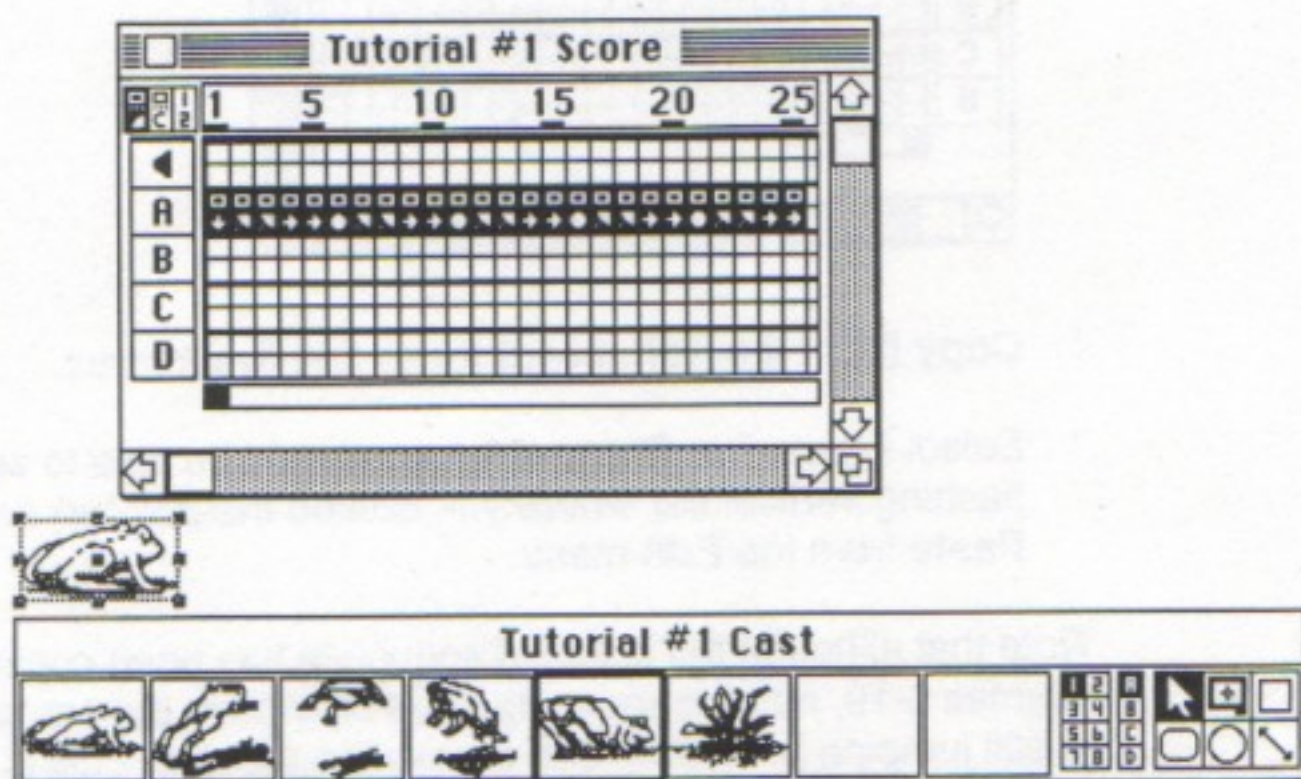


- * **Copy** (from the **Edit** menu) these first five frames.
- * Select Frame 6 in Channel A (you should be able to see a flashing vertical bar where you clicked the pointer) and **Paste** from the **Edit** menu.

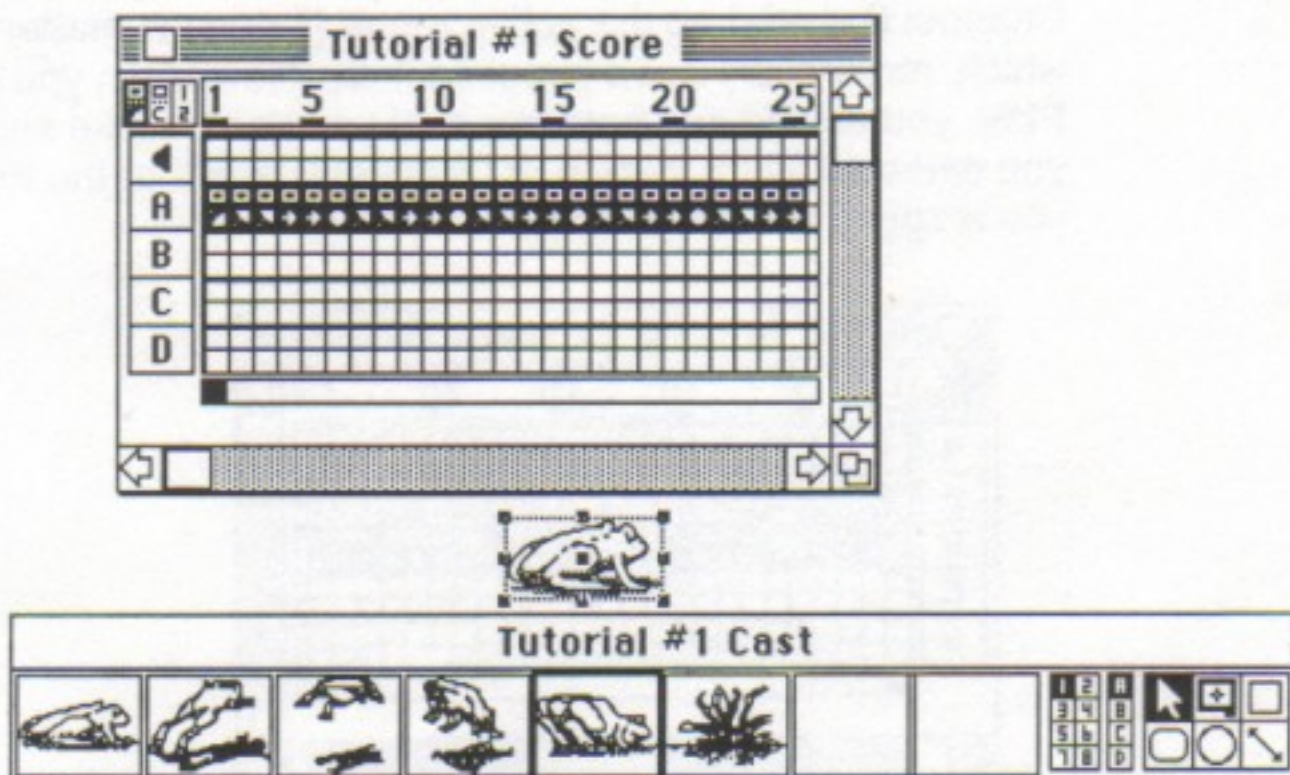
Note that although the selected sequence has been copied onto Frames 6-10, nothing seems to have changed: the same old frog is still jumping back and forth across the screen. This is because Frames 6-10 are the same as Frames 1-5 in every respect, including the frog's starting position. But what if we want Frames 6-10 to start where Frames 1-5 end, so that the frog takes two hops across the screen? We can do this by selecting **Chain** from the **Edit** menu before we paste the strip into Frames 6-10. Here's how:

- * Select Frames 6-10 and **Cut**.
- * Select **Chain** from the **Edit** menu, click Frame 6, and **Paste**. Aha! The frog now takes two hops before starting again. With **Chain** still selected (you will note that it now has a check mark next to it) **Paste** the sequence three more times until you have filled the first 25 frames of Channel A, and watch the frog jump all the way across the screen.

- * Now, let's edit the sequence so that the frog starts its journey nearer to the middle of the screen instead of its current starting position at the left edge. To do this, we will need to stop the action, so **Rewind** (which both stops the action and rewinds the film to the first frame) and then select the whole sequence of 25 frames by dragging the pointer along Channel A.
- * Activate Frame 1 by clicking the frog as it sits in its initial position,

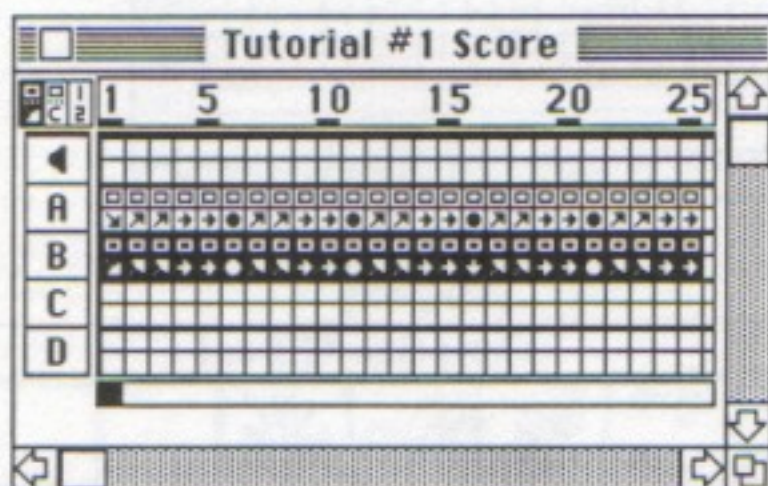


and then drag the frog towards the middle of the screen.



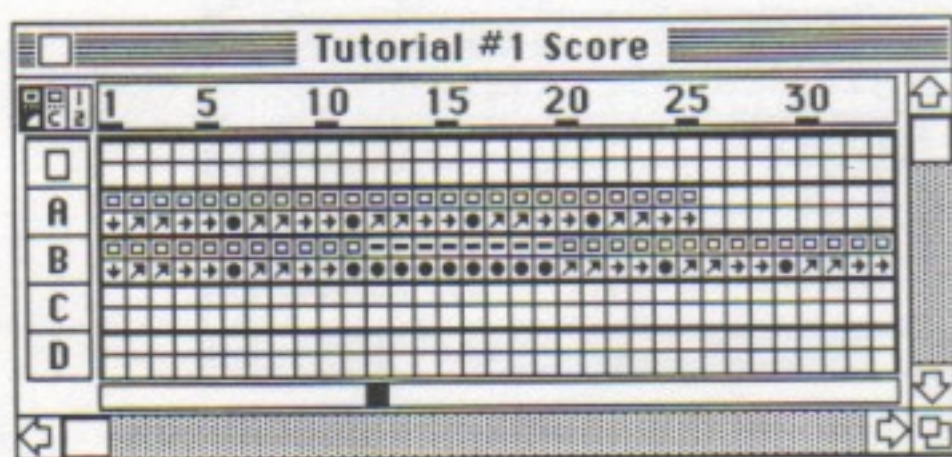
- * Hit **Play** and you will see that the entire sequence has been shifted right. Even though we effected the shift by dragging the first frog (i.e., the first castmember) toward the middle of the screen, it is important to realize that we could have done so by dragging any of the five castmembers the same distance, provided you had selected the entire channel within the Score.
- * Now let's increase the frog population by further copying and pasting. First, close the cast window to make more room on the Stage.
- * Select Frames 1-25 of Channel A, and **Copy**. You can check to see that the correct frames are selected by looking at the Range Indicator on the Control Panel.
- * Click the first frame of Channel B, and **Paste**. Note that although we now have two active sprites, it seems that our last copy and paste job produced no change whatsoever, since there is still just one frog hopping across the screen. In fact, there are two frogs hopping across the screen, but we can only see one because (and this is important) they are both occupying the same space (remember, these frogs are two-dimensional).

- * In order to see both frogs, we will need to move one onto a different path, so stop the action, select Frames 1-25 of Channel B, and drag the active frame (it doesn't matter which, remember) down about an inch. Now when you hit **Play**, you should see both frogs. If you don't, make sure that you selected all 25 frames of Channel B and that the frog you dragged down was active.



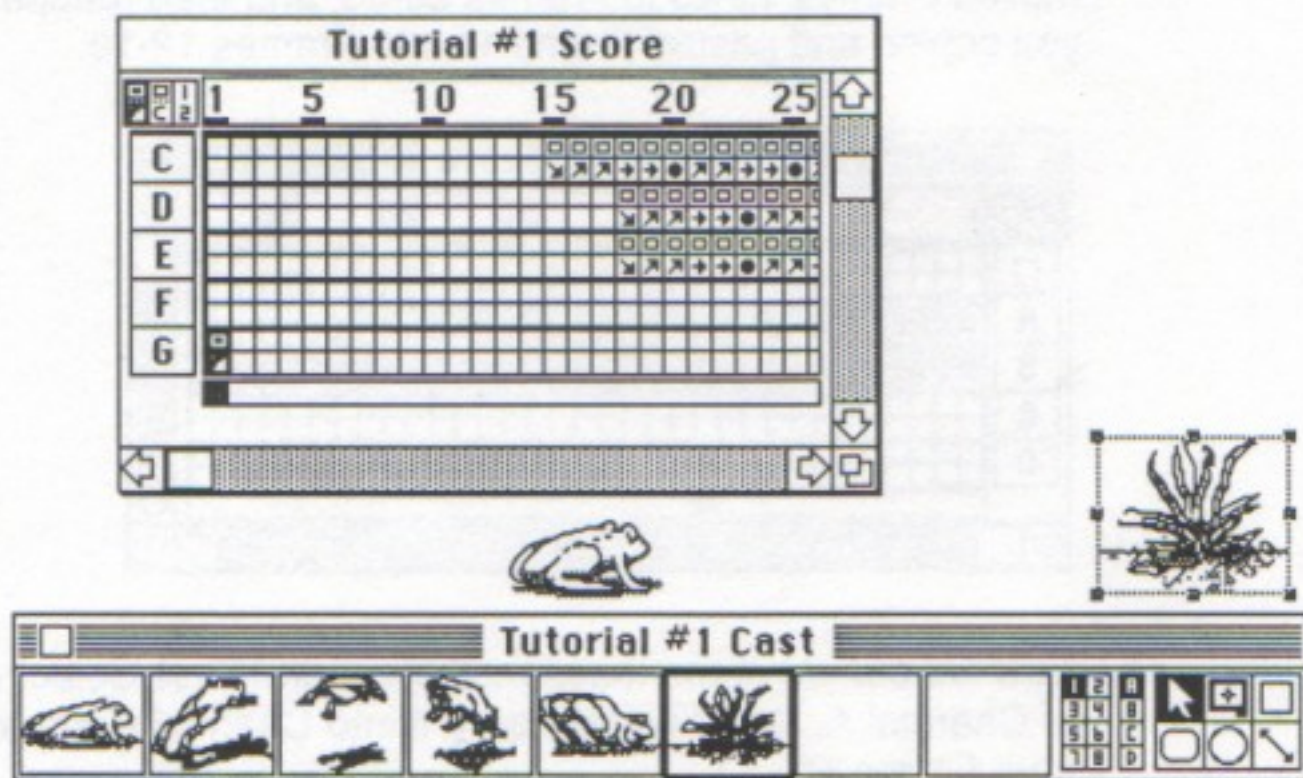
- * Let's inject a little realism into the animation by making the second frog rest a little between hops. Select Frames 12-25 of Channel B, **Cut**, and **Paste** the cut sequence starting at Frame 20.

- **Copy** Frame 11 and **Paste** it into the next eight frames (12-19). If you had let the animation run while you did this, you would have seen the second frog disappear when you moved Frames 12-25 to Frames 20-33, and then reappear as you copied and pasted Frame 11 into Frames 12-19.



- Now we can do some mass multiplication. First, select all of Channel A, **Copy** it and **Paste** it into Channel C starting from Frame 15.
- Select Frames 1-39 in all three channels by dragging the pointer diagonally across and down until all the occupied cells are highlighted.
- **Copy** and **Paste** the whole sequence into Channels D-F starting from Frame 18. You do this by selecting Frame 18 in Channels D-F before you **Paste**.
- Finally, let's bring some scenery onto the stage. First, **Rewind** the film and select the first frame of the first available channel (which should be Channel G) either by clicking that cell in the Score or by clicking the Channel G box (the seventh box) in the **Channel Indicator** in the control panel. Whichever method you choose, you should be rewarded with a blackening of the Channel G box in the Channel Indicator.

- * Reopen the **Cast** window, select the sixth castmember (the small bush), and drag it out onto the stage, placing it in the bottom right hand corner of the screen.

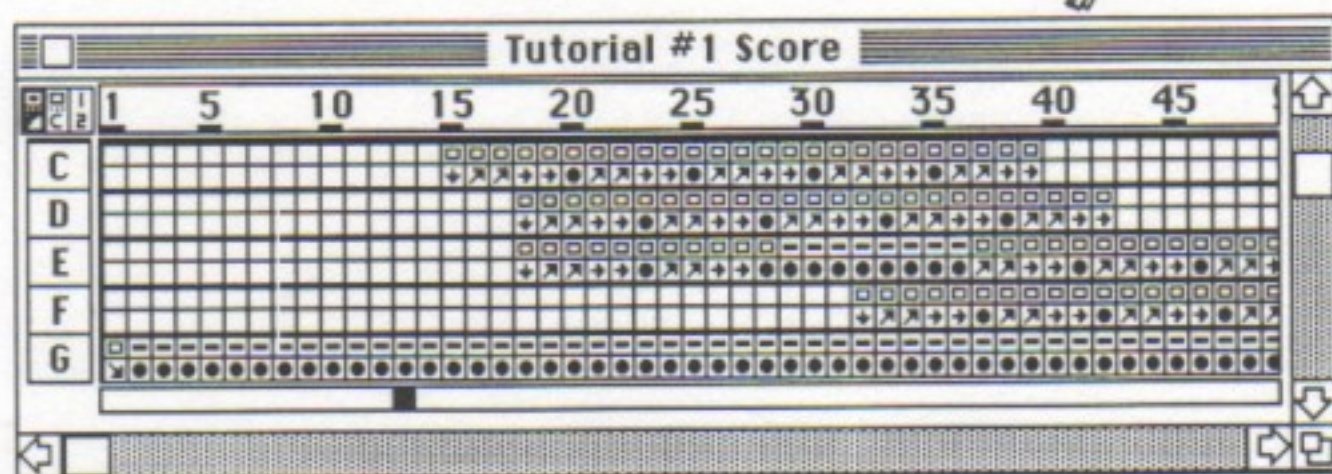


We want to overlay the bush onto the existing animation sequence, without otherwise affecting what we have already done. To do this, we need to **Step**, rather than **Add** the frames containing the bush. The reason is that the **Add** function works something like an insert function in a word processor -- it inserts the selected frames and pushes everything else to the right. So if we were to **Add** the sixth castmember, we would find that frames would be added to all the existing channels, which would have the effect of "freezing" the frogs while the bush was on the stage. In other words, what we would see would be the frog in a stationary position with the bush in the corner of the Stage. By **Stepping** the bush, however, we can put it into Channel G without affecting any of the other channels. The frog would then appear to be in motion.

There are several methods we can use to overlay the bush into the animation. One way is to **Step** the bush through the 39 frames by using the **Step** command in the **Options** menu (or **Command S**) 39 times. Obviously, the more frames we need to Step, the more tedious this method becomes. As an alternative, then, we can use the **InBetween** feature, which requires us to specify only the beginning and the end of a sequence, and leaves the rest up to VideoWorks. Here's how it works:

- After making sure that the bush is active on the Stage, **Step** it in once.
- Select the range of frames that will include the bush.
- Select **InBetween** from the **Options** menu (or **Command G**).

The **InBetween** function allows you to specify the starting and ending positions, and the number of frames, for a castmember's movement across the Stage, and fills in (or "in-betweens") the intervening frames.



- **Play.**

What you should end up with is a moving plague of frogs, with a standing bush in the corner.



DRIVEN AROUND THE BEND

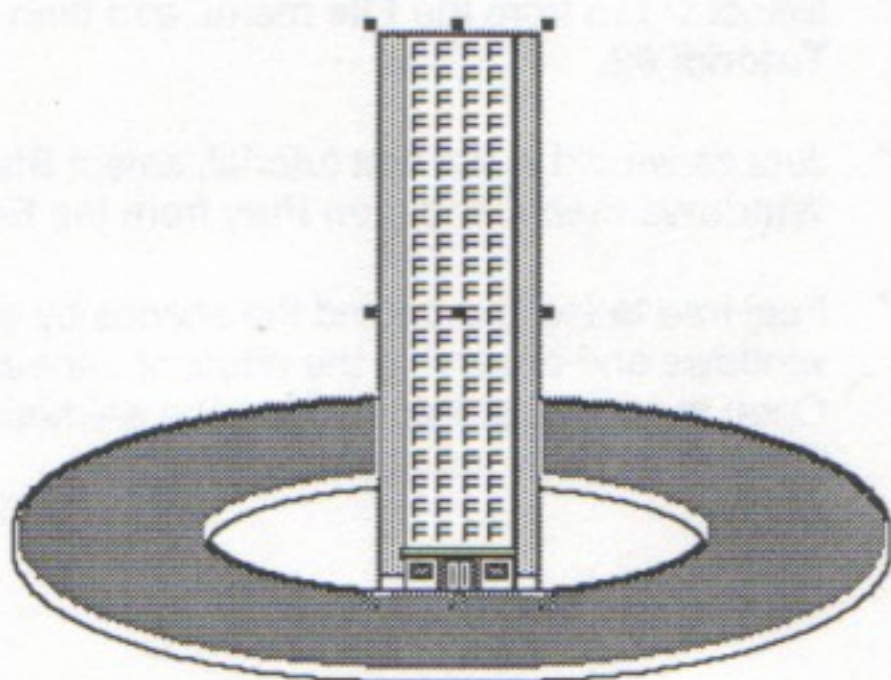
In this tutorial, we shall explore the use of mattes, foreground priority, and some advanced editing techniques.

- * Select **Open** from the **File** menu, and then double-click **Tutorial #2**.
- * Just as we did in the first tutorial, select **Stage** from the **Windows** menu, and then **Play** from the **Edit** menu.
- * Feel free to explore behind the scenes by opening the various windows and observing the effect of various commands. Open the **Control Panel**, **Stop** the animation and **Step** through it one frame at a time.

Around the Bend

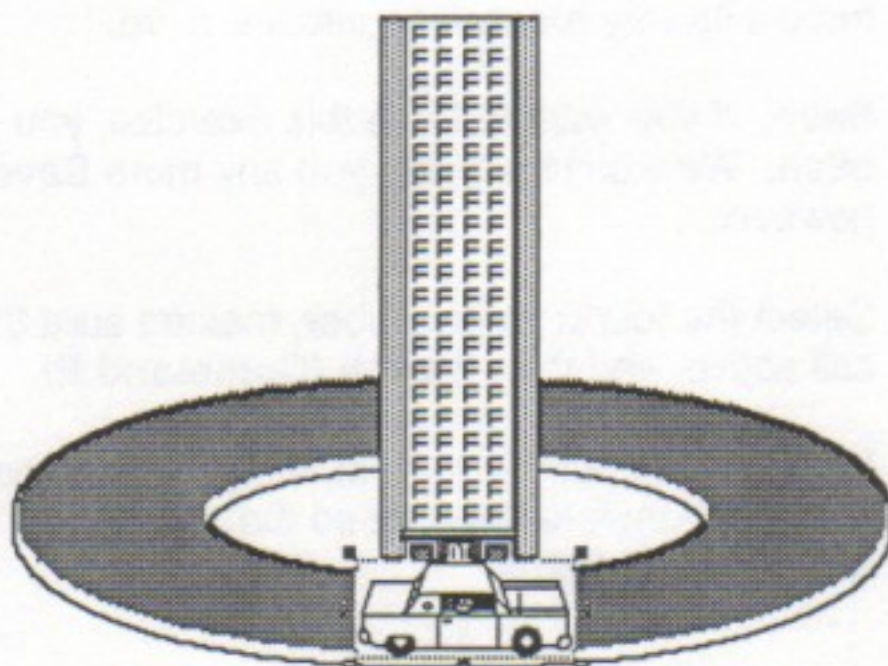
- * As soon as you are ready to go on, open the **Cast** window, and **BurnScene**. We shall now try to recreate this animation using the existing castmembers.
- * If you intend to Save your work as you progress, then **Save As...** now under a different name. If you do not **Save As...** now, then if you **Save** during the course of the tutorial, you will overwrite the original Tutorial.
- * Drag the Cast window to the top of the screen to make room. Select the first castmember, the circular drive, and place it in the center of the Stage, about 1/4 inch from the bottom of the screen.

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- Drag out the second castmember, the building, and place it in the center of the drive.

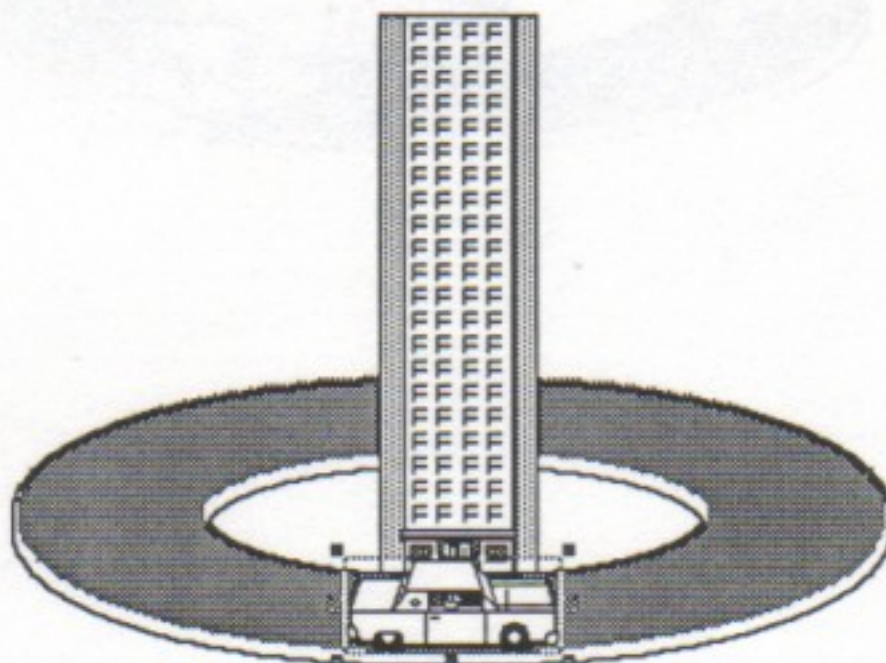


Remember that foreground priority is determined by channel number, which in turn is determined by the order in which castmembers are dragged out onto the stage. This means that the earlier sprites are more in the background than the later ones, so that in this case the circular drive will be behind everything else, the building will be behind everything except the drive, and so on.

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- * Now drag out the car (the third castmember). Notice that the car seems to be surrounded by a square, white "matte".

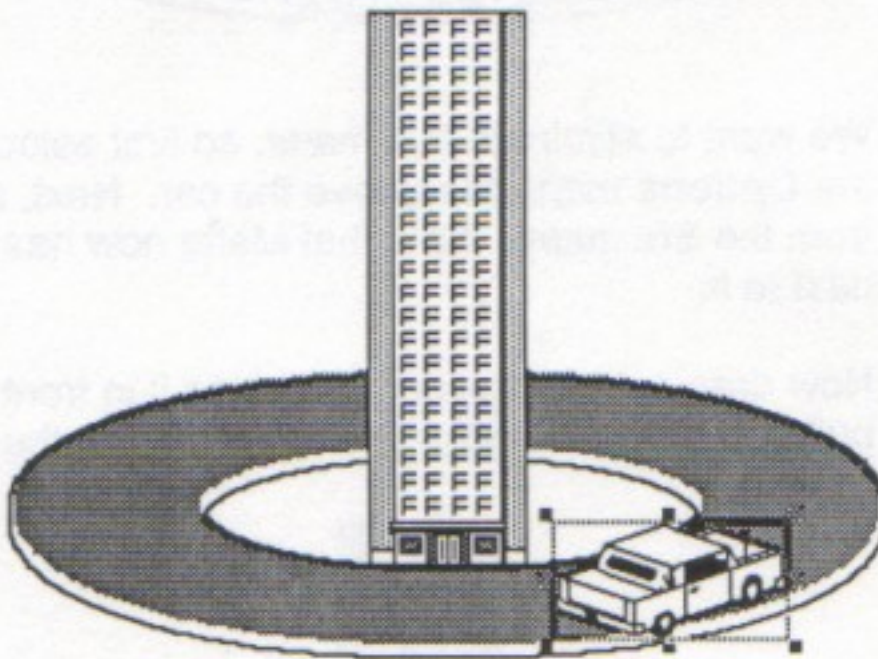


- * We want to eliminate this matte, so first select **Blank** from the **Options** menu to remove the car. Next, select **Matte** from the **Efx** menu. Note that Matte now has a check mark next to it.
- * Now drag out the first car and place it in front of the building, so that it looks like it is sitting on the road.

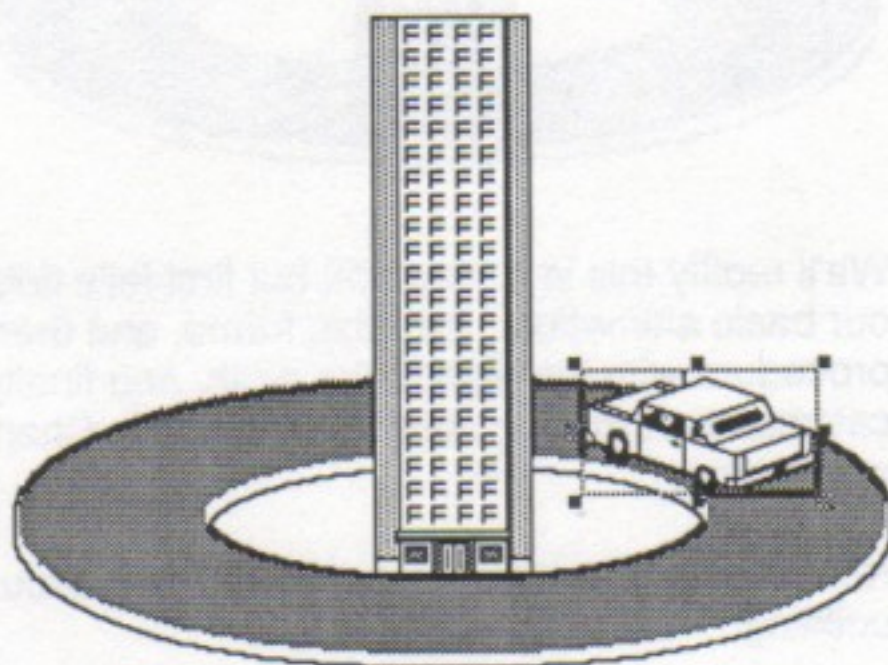
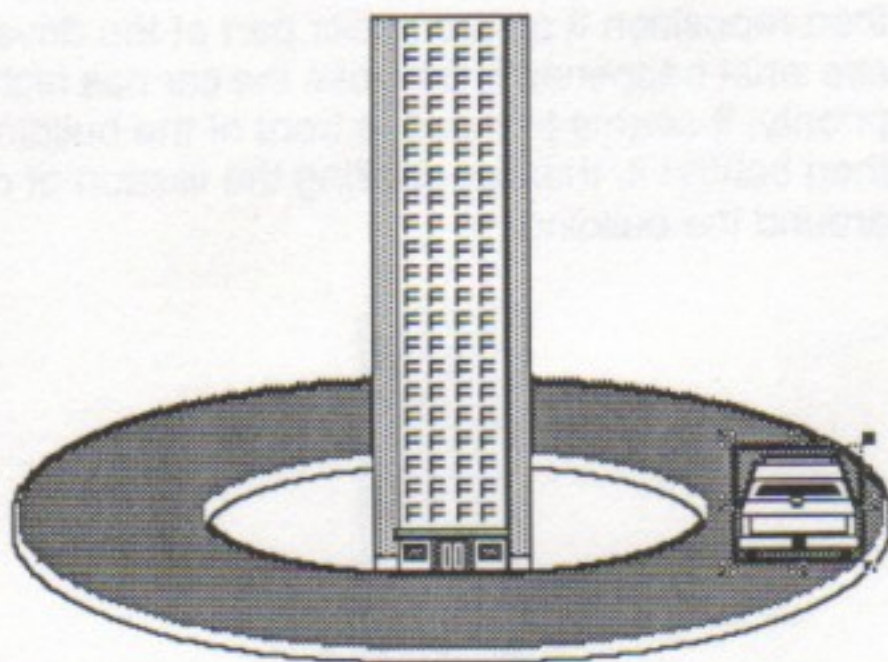


Notice that because of the matting process, we have true figure-ground separation.

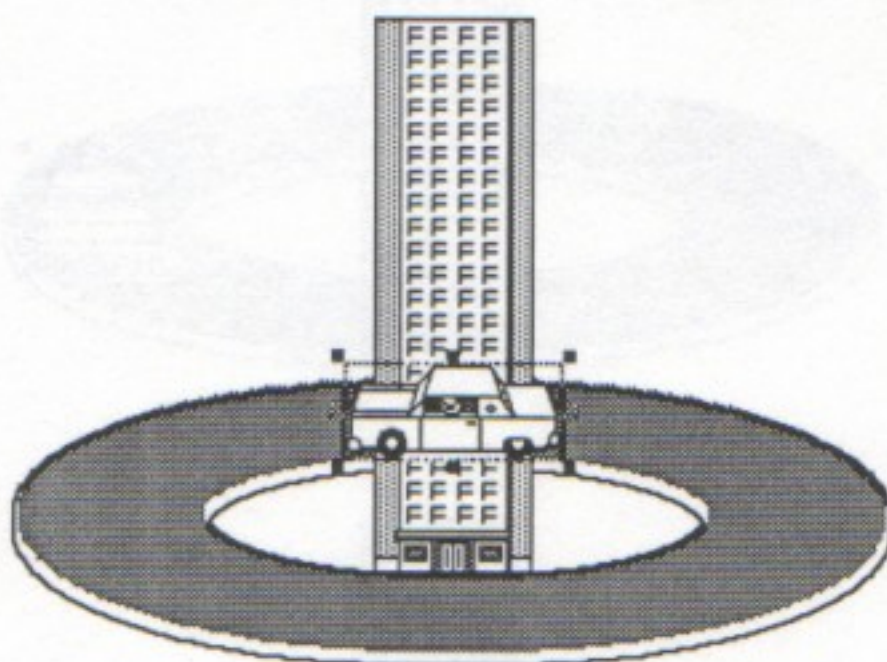
-
- * Now that we have everything the way we want it, let's record the image by **Adding (Command A)** five frames. This will make the car pause in front of the building as it makes its way around the circular drive.
 - * **Save.** If you want to Save this exercise, you should do so often. We won't be giving you any more **Save** reminders however.
 - * Select the fourth castmember, making sure that Channel C is still active, and then **Switch (Command E)**.
 - * Using your artistic judgment, drag this new castmember about one inch to the right so that the tires are on the road and **Add** that frame.



-
- Select the fifth castmember, **Switch**, and reposition it on the right hand side of the driveway and **Add** that frame. Repeat this process with the sixth castmember -- **Switch**, reposition , and **Add**.

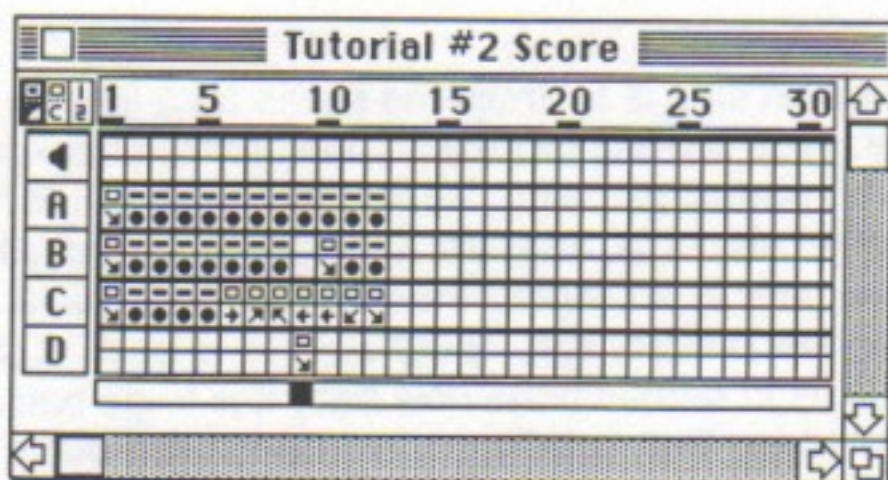


-
- * The next step may seem a little strange at first, but it provides an important lesson on editing, so try and follow it carefully. We want to bring out the seventh castmember and place it on the upper part of the driveway behind the building. So select the seventh castmember, **Switch**, and then reposition it on the upper part of the driveway. Did you see what happened? Because the car has higher foreground priority, it seems to move in front of the building rather than behind it, thereby spoiling the illusion of movement around the building.



- * We'll rectify this in a moment, but first let's finish creating our basic animation. **Add** this frame, and then repeat the procedure with the eighth, the ninth, and finally the tenth castmember, making sure that you are in Channel C the whole time.
- * Now **Play**, and watch the car go (almost) around the building.

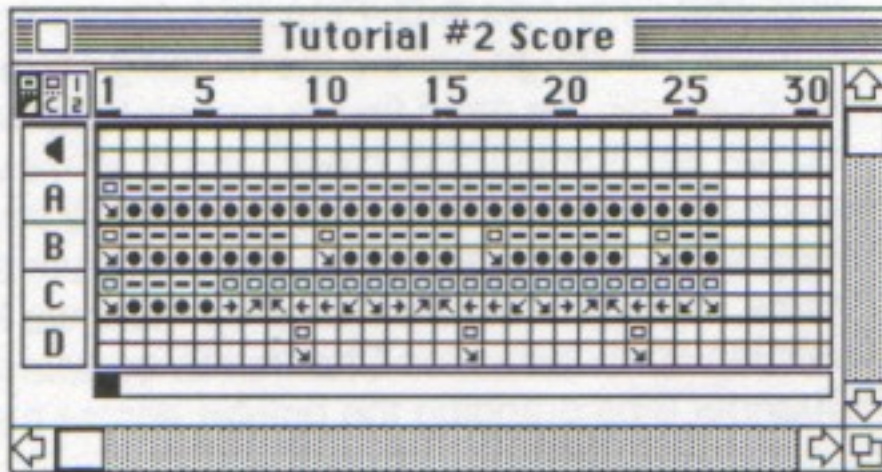
- * To rectify the foreground-background inconsistency between the car and the building, we need to do some minor patching in the Score, so select **Score** from the **Windows** menu. Note that Channels A-C, Frames 1-12 are occupied. In order to make the car go behind the building on the upper part of the driveway, we need first to pinpoint the frame in which the car and the building cross, and then move the building sprite for that frame into a higher lettered channel. So, **Step** through the animation until you reach the offending frame (which should be Frame 9). Now we know that the building sprite occupies Channel B, so select Frame 9 of Channel B by dragging the pointer across that cell, and **Cut**.
- * Note that the building disappears.
- * We need to paste that frame into the next available channel, so click frame 9 of Channel D, and **Paste**.



Presto! The building reappears. When you hit **Play**, you will find that the car now moves behind it.

- * Our next task is to make the car go around the building three times before it pauses in front of it; so from the Score select Frames 6-12, Channels A-D by dragging the pointer diagonally down and across until all those cells are highlighted. (Alternatively, you can select Frames 6-12 of all 24 channels by dragging the pointer across the frame numbers (6 through 12) at the top of the score.)
- * **Copy.**
- * Click Frame 13 at the frame number bar, which will produce a flashing bar all the way down the Score, and **Paste**.

- * Repeat this process by **Pasting** the same frames starting at Frame 20.



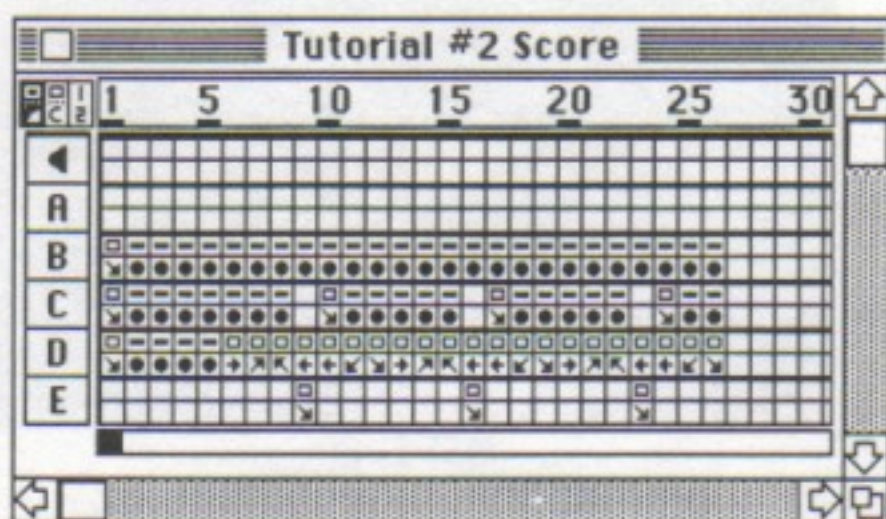
When you hit **Play** you should see the car go around the building three times before pausing in front of it.

The Sky's The Limit

Our next step is to dress the scene up a little by putting in the sky. Now the sky represents the ultimate background, and, given perfect planning, would have been put in first. But perfect planning, however, is a rare commodity in any field, especially in art, where the artist needs to make esthetic judgments every step of the way. The point of this exercise, then, is to demonstrate how easy it is to go back and add something that, ideally, should have been put in first.

First, we need to make room for the sky in the lowest priority channel, or Channel A - but Channel A is already occupied by the circular drive, and if we were to move the drive to another channel, we would be upsetting the relationship between it and the other sprites. The solution is to move all the existing sprites down one channel, thereby clearing Channel A for the sky.

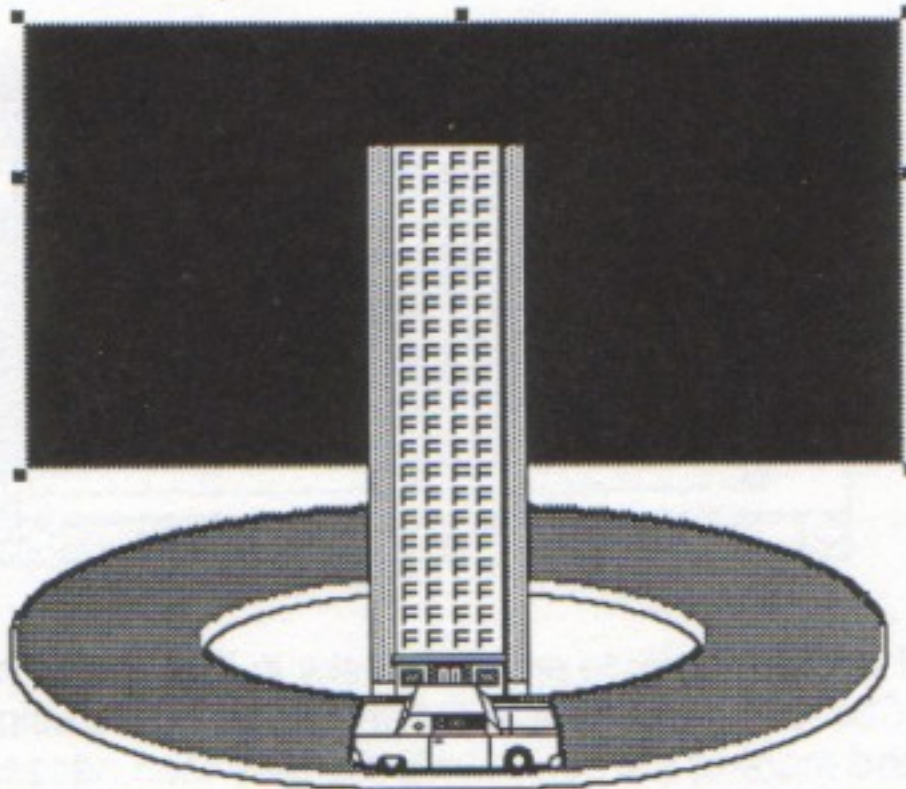
- Select Frames 1-26, Channels A-D, **Cut**, and, after selecting the first frame of Channels B-E, **Paste**. Note that we have now made room for a new background sprite without otherwise affecting the animation.



If we were now to create the sky in the normal manner (CheapPaint to Cast to Stage) we would be using up more time and more of the computer's memory than necessary. Instead, we will create the sky using the **Quick-Draw Primitives**, a small set of drawing functions that let you bypass the CheapPaint-Cast sequence so you can draw directly onto the Stage. To create the sky using the Quick-Draw Primitives:

- **Rewind** the film, select Frame 1, Channel A, and close the Score.
- Go to the Cast window, click the **rectangle**, and then select the **black fill** from the **Draw** menu.
- Select **Copy** from the **Efx** menu. We do this because VideoWorks draws images fastest in the **Copy** mode.

-
- * Starting in the upper left hand corner of the screen, hold the mouse button down, and drag across and down, so that the horizon line starts about 1/4 inch above the upper part of the driveway.



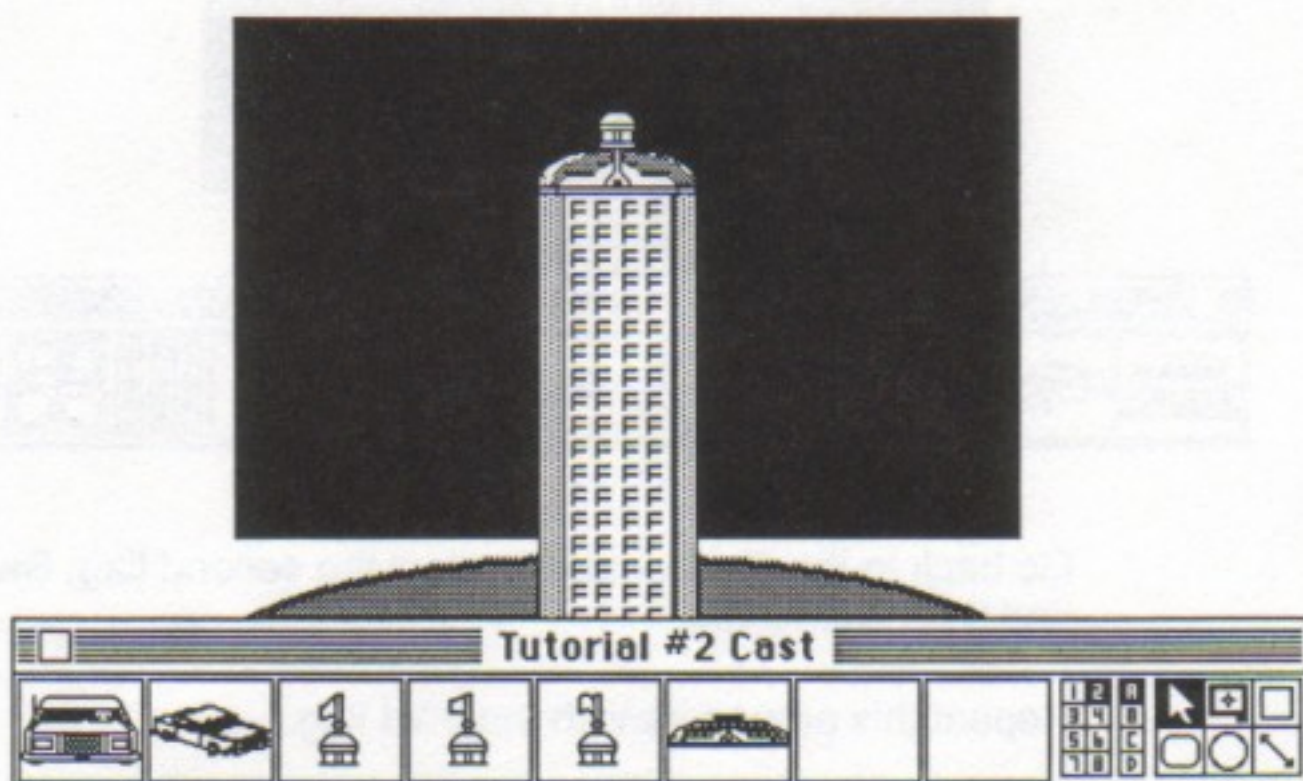
- * Because we want to overlay this image onto the filmstrip without affecting the other sprites, we need to **Step** this image through the 26 frames. We can do this by selecting **Step** from the **Options** menu (or **Command S**) 26 times (which is obviously tedious) or by **Stepping** in the first frame, selecting the next 25 frames on the **Score**, and selecting **InBetween** from the **Options** menu (or pressing **Command G**). You might recall that this was the technique we used in the first tutorial when we added the bush to the scene.

Raising the Roof

We now have a sky but no roof, so let's add a roof to the building and, as a crowning touch, let's put a flag on top of the roof.

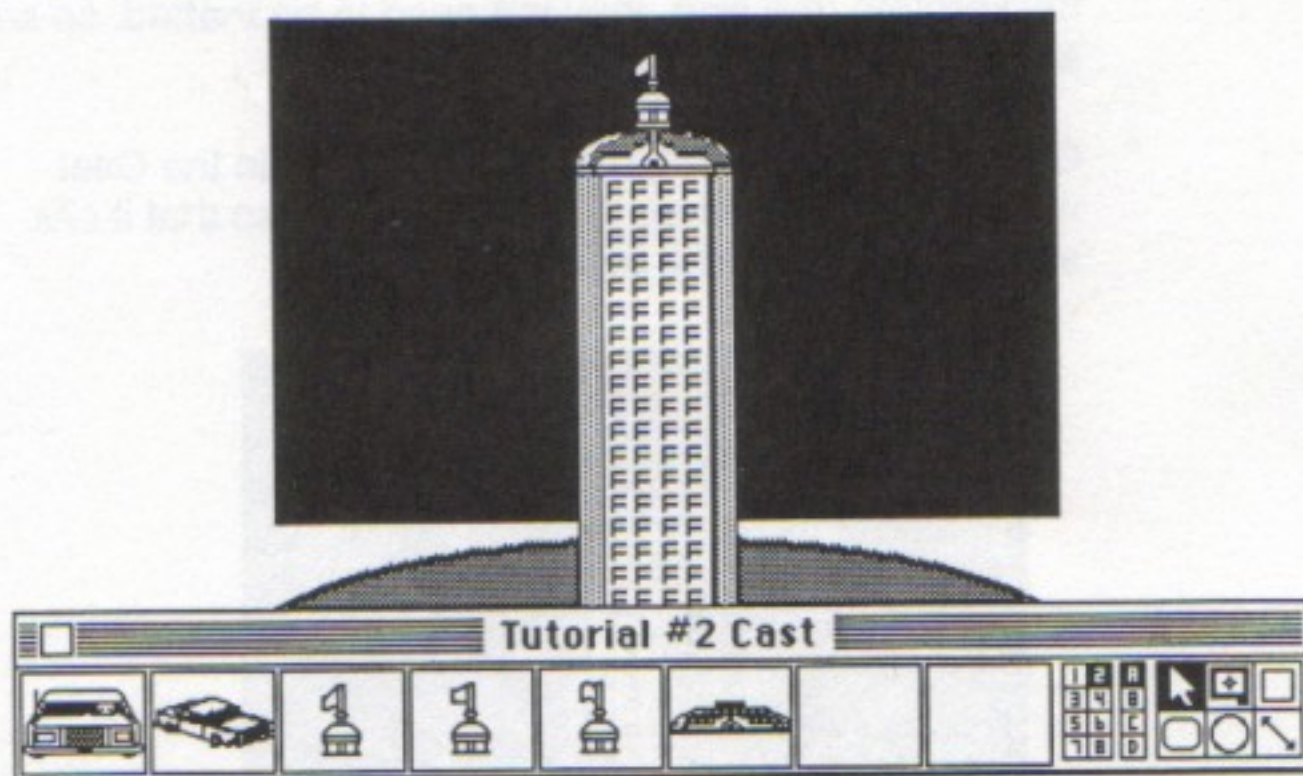
- * First, reposition the Cast window (if necessary) so you can see the top of the building.

-
- * **Rewind** the film and select Channel F by clicking the appropriate box in the **Channel Indicator** on the Control Panel.
 - * Because both the roof and the flag(s) will be against a dark background (the sky), they will need to be matted, so select **Matte** from the **Efx** menu.
 - * Go to the roof castmember (the last one in the Cast window), select it, drag it out and place it so that it sits squarely on top of the building.



- * Once you are satisfied with the placement of the roof, use the **InBetween** feature described earlier or **Step** it through the 26 frames.

- * Now let's add the flag to the roof. Rewind your film and select Channel G. Make sure that **Matte** is still selected, and drag the first flag out. Place it squarely on top of the roof, and **Step** once.



- * Go back to the Cast window, select the second flag, **Switch**, and **Step** once more.
- * Repeat this procedure with the third flag.
- * Your Score should now show that Frames 1-3 of Channel G are occupied. Now **Copy** and **Paste** those three frames until all 26 frames of Channel G are occupied.
- * As a final exercise, create some clouds using either CheapPaint or the Quick-draw Primitives and make them move across the sky behind the building, using the methods you learned in this tutorial.



In this tutorial, we will be taking a bare bones flow chart and spicing it up by using Art Grabber, the Quick-Draw Primitives and other polishing techniques.

- * **Open Tutorial #3.**
- * In order to carry out some of the later exercises in this tutorial, we will need to **Save** our work as we progress. Start by selecting **Save As...** from the **File** menu and choose a new name for the file created. Remember to **Save** often throughout the tutorial.
- * Select **Stage** from the **Windows** menu and **Play** from the **Edit** menu.

Notice that the animation is in the form of a process diagram which details the VideoWorks system. Note also that the diagram could use a little spicing up, to make it more interesting visually. Let's start by framing some of the elements using the Quick-Draw Primitives.

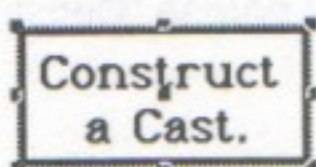
Quick on the Draw

Our first task will be to accent the phrase "Construct a Cast" by putting a border around it.

- * **Open the Panel.**
- * **Rewind the animation.**

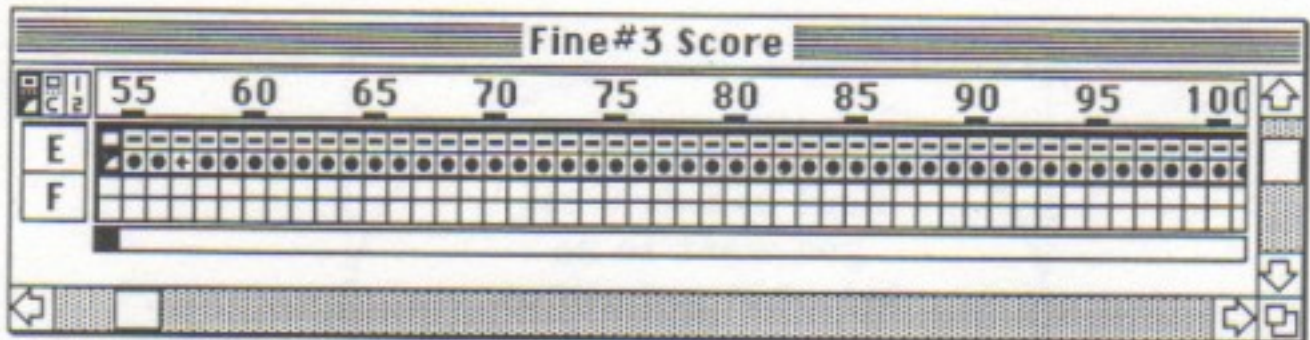
We now need to locate that frame where the phrase "Construct a Cast" first appears. VideoWorks provides you with several methods of locating a required frame. If the Score was open, for example, we could use the **Playback Head** as a "scratch bar", or we could click the **Playback Head Bar** at the required frame. But since the Panel is open, it's easier to use the pull-down number feature.

-
- * Move the pointer into the **Frame Indicator** box and drag your mouse down until the phrase "Construct a Cast" appears on the State. While still holding the mouse button down, move the pointer up and down until you reach the frame where the phrase first appears. This should be Frame 54.
 - * **Open** the **Score**, and resize it to display Channel E, Frames 54 through 100. Move the Score down a little so that "Construct a Cast" is clearly visible.
 - * Select Frame 54 in Channel E.
 - * **Open** the **Cast** window. Reposition the Cast so you can have access to the **Quick-Draw Primitives**, but without blocking your view of the phrase we are working on.
 - * Pull down the **Draw** menu and select the second thickest line, and **None** from the fill options.
 - * Select the **Rectangle** from the Quick-Draw Primitives.
 - * Draw a rectangle around "Construct a Cast", leaving a 1/4 inch border all the way around the text. Don't worry if it is not centered exactly at this point. We can fine tune it later.



- * Add the rectangle to Frame 54 through Frame 174 (which happens to be the point where "Construct a Cast" quits the scene) by using the **InBetween** function. First, select **Step** from the **Options** menu to add the rectangle to Frame 54.

- * Now select Frames 54 through 174, and then select **InBetween** from the **Options** menu.



If the rectangle needs to be repositioned and Frames 54 through 174 in Channel E are still selected, all we need to do is to drag on the "selection box" in the center of the rectangle. When you are satisfied with the placement of the rectangle, release the mouse button and deselect the rectangle sprite by clicking anywhere else on the Score.

Construct a Cast.

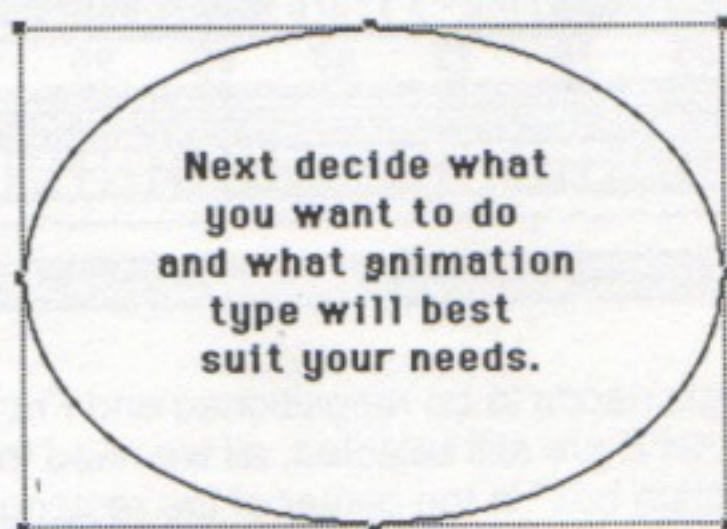
- * **Save.** If you want to Save this exercise, you should do so often. We won't be giving you any more Save reminders, however.

An Oval Border

Next, we will construct an oval frame around the phrase "Next decide what you want...", which is in Channel A, beginning at Frame 175.

- * Scroll the Score so that Channel A is visible and Frame 175 is at about the center of the window. Note the blank frame at Frame 174. As we noted in the **Hints, Tips and Caveats** section, this results in a cleaner segue.
- * Move the **Playback Head** to Frame 175 by dragging it or by clicking Frame 175 on the **Playback Head Bar**.
- * Select Channel B, Frame 175.
- * Select the **Circle** from the Quick-Draw Primitives.

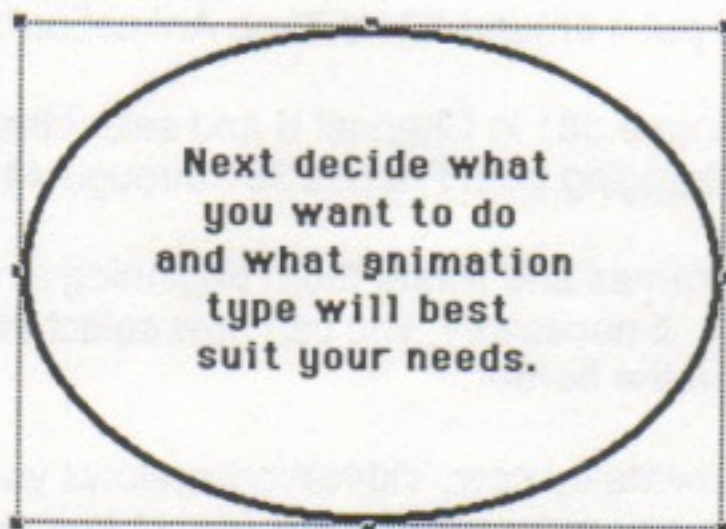
-
- * Drag the pointer from a point an inch above and about an inch and a half to the left of the phrase until you have an oval surrounding it.



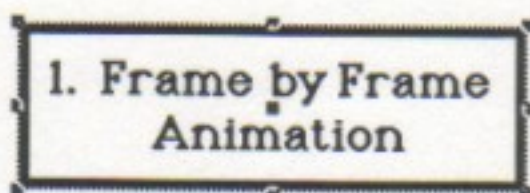
Now we need to **Step** this border into Channel B from Frame 175 through Frame 239. As we did before, we can use the **InBetween** function by **Stepping** the oval into Frame 175, selecting Frames 175 through 239, and then selecting **InBetween** from the **Options** menu. After the oval border has been overlaid onto those frames, you can go back and reposition it more finely, as we did with the rectangle before.

Let's now go back and make the oval frame a little thicker. As we pointed out in Tutorial #1, esthetic judgments are often made every step of the way when creating a work of art, and so it is sometimes necessary to go back and make minor modifications. VideoWorks' editing features make it easy to change line thickness, pattern fill and any other feature, even after the image has been introduced into the animation.

-
- * Make sure the oval sprite (Frames 175 through 239 in Channel B) is still selected, and select the thickest line from **Draw** menu. Presto! The line has been thickened. With this technique, you can make any changes you wish by selecting from the Draw menu.



- * **Rewind** and **Play** and watch your creation. Make sure you can still see the Score, Cast and Panel, and let's move on to the next embellishments.
- * Be sure Channel B is still visible and move the **Playback Head** to Frame 381. (You may need to move any windows that are in the way of the phrase "Frame by Frame Animation" at the top of the screen. Incidentally, the Panel is movable. By moving the pointer right up against the Menu Bar, you can drag the Panel and relocate it.
- * Select Frame 381, Channel B.
- * Select the **Rectangle** from the Quick-Draw Primitives, and construct a border around the phrase "Frame by Frame Animation".



- * Use the **Step** and **InBetween** functions to overlay the border in Channel B from Frame 381 through Frame 478. Adjust the placement of the border as necessary.

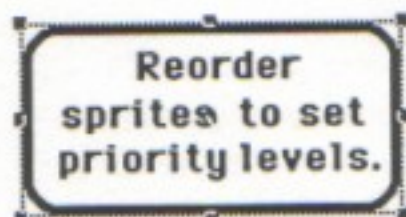
-
- * Move the **Playback Head** to Frame 523.

Note that the phrase "Real-Time Animation" is in the exact same position as the phrase "Frame by Frame Animation", and is roughly the same size. As a shortcut, therefore, we can **Copy** the border that is around the first phase ("Frame by Frame Animation") and put it around "Real-Time Animation".

- * Go back to Frame 381 in Channel B and select the 63 frames we need by dragging from Frames 381 through 444.
- * **Copy** those frames and **Paste** them beginning at Frame 523 in Channel D. If necessary, you can now select those frames and reposition the border.

As you may be aware by now, VideoWorks allows you to carry out operations in any order without any fear of animating yourself into a corner. We can highlight this ability by making a border move around from one phrase to another, by using the same Quick-Draw method we used before.

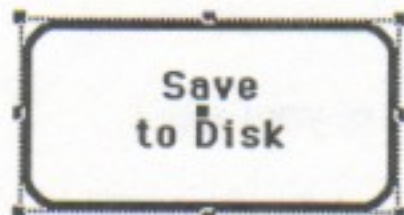
- * Move the **Playback Head** to Frame 864.
- * Reposition the windows so you can see the phrase "Reorder sprites to set priority levels" at the bottom of the stage.
- * Select Frame 864 in Channel J.
- * Select the **Rectangle with Rounded Corners** from the Quick-Draw Primitives.
- * Construct a border around the phrase "Reorder sprites...", leaving 1/8 inch border all the way around.



- * Using the **Step** and **InBetween** functions, overlay the border all the way through to the end of the animation, Frame 1023.

At this point, we have a border around the "Reorder sprites..." phrase from Frame 864 through the end of the animation. What we want to end up with, however, is that same border moving from phrase to phrase. To do this, we can move the same border from one phrase to another, thereby saving us the effort of constructing a new border each time. Let's now move the border at regular intervals of 20 frames.

- * Close the **Panel** and the **Cast**.
- * Select Frames 884 through 903 in Channel J.
- * Move the **Playback Head** to Frame 884 and resize the Score so that Channel J and Frames 865 through 910 are visible. You should be able to see the small "selection boxes" on the border of the "Reorder sprites..." phrase.
- * Drag the border from around the "Reorder sprites..." phrase and put it around the phrase "Save to Disk", centering it as we did before.



The border is now around "Save to Disk" from Frames 884 through 903. Remember that you can always **Play** your animation without affecting it, so if you want to take a look at your handiwork to this point, feel free to do so.

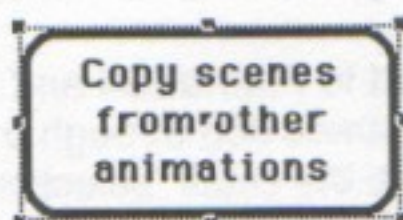
Our next task will be to move the same border to the next phrase -- "Copy scenes from other animations".

- * Scroll through the Score until you can see Frames 904 through 925.

-
- * Select Frames 904 through 923 and move the **Playback Head** to Frame 904.

Note that the border is currently around "Reorder sprites...". This is because when we moved the border around "Save to disk", we had selected only through Frame 903. Therefore, at 904, the border goes back to the "Reorder..." phrase.

- * Move the border from "Reorder..." to "Copy scenes from other animations".



- * Repeat this procedure, selecting 20 frames at a time in Channel J, moving the **Playback Head** and moving the border from one phrase to another until all have been highlighted. As you know by now, VideoWorks doesn't care what order you use.
- * **Play**, and taste the fruits of your labor.

Two Way Stretch

Let's spruce up the animation further by using VideoWorks' stretching function.

- * Scroll through the Score so you can see Channel A and Frames 478 through 495. Move the **Playback Head** to Frame 478.
- * Reposition the Score Window so you can see the phrase "Or Use...", which is in the middle of the Stage.

It looks small and lonely sitting all by itself in the middle of the Stage, so let's enlarge it. We can do this in one of two ways: by creating a new and bigger castmember, or by stretching the sprite on the Stage. Because the latter method achieves the same result with a savings in memory (and time), let's make the image bigger by stretching it.

-
- * Select Frames 478 through 495.
 - * Click and drag any of the four corner "size boxes" (or "selection boxes") until the dotted outline is about one inch square. By holding down the **Shift** key as you do so, the image will be constrained and will be stretched equally in all directions.



Grabbing with Art Grabber

Now let's add some artwork to the animation by "grabbing" images from the Art Disk.

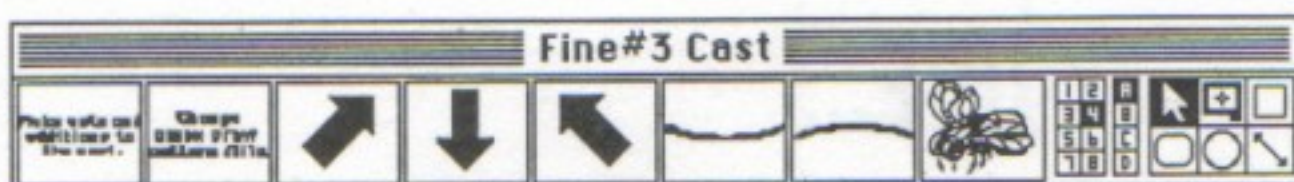
- * From the **Apple** menu, select **Art Grabber**.
- * Pull down the **Grabber** menu and select **Open**.
- * Select **Chart Kit**. If you are using only the Macintosh's internal drive, you will need to Eject the VideoWorks disk first and then insert the Art Disk. VideoWorks will prompt you when you need to swap disks.

We want to **Grab** the five arrows from **Chart Kit**, (at the bottom left hand corner of the page) and **Paste** them into available cast windows.



- * First, draw a selection rectangle around the first image you wish to grab (grab one arrow at a time) by dragging the crosshair selector across the image you want to grab while holding down the mouse button.

- * Next, select **Grab** from the **Grabber** menu, and **Close** the **Art Grabber Window**.
- * Open the **Cast**, select the first available cell, and **Paste**. The image will be pasted directly into the cast window. Repeat this process until each of the arrows is in the Cast.
- * Using the same technique, **Grab** a fly from the **Bugs** file, and **Paste** it into a cast cell.



- * Resize the **Score** so you can see Frames 139 through 173 in Channel G, and move it to the bottom of the screen.
- * Move the **Playback Head** to Frame 139.
- * Select Frame 139, Channel G.
- * Select the "down" arrow castmember, drag it onto the Stage and position it about 1/4 inch above the "Construct a Cast" box.

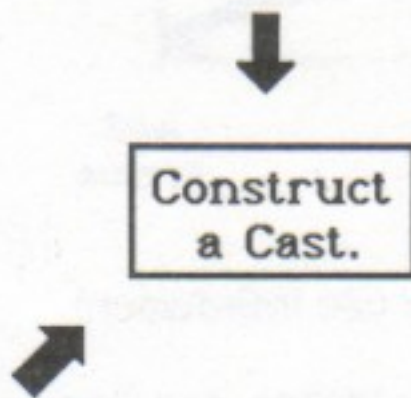


**Construct
a Cast.**

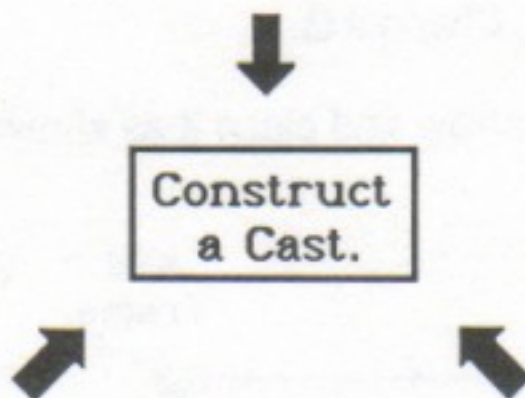
- * **Step** it in five times (or use **InBetween**).
- * Select Frames 139 through 143 (the five frames you just Stepped) in Channel G.
- * **Copy** the selected frames and **Paste** them beginning at Frame 149 in Channel G. Skip five frames, and **Paste** them again from Frame 159. Repeat this procedure, Pasting them again beginning at Frame 169. This staggered Pasting will yield a flashing arrow on the Stage.

Now we can repeat this procedure with the other two small (diagonal) arrows. Note that we can save effort by doing both at the same time.

- * Resize the **Score** so you can see Channels G, H and I, and move the **Playback Head** to Frame 139.
- * Select Frame 139 in Channel H.
- * Drag out the first arrow so that it points to the "Construct a Cast" box.



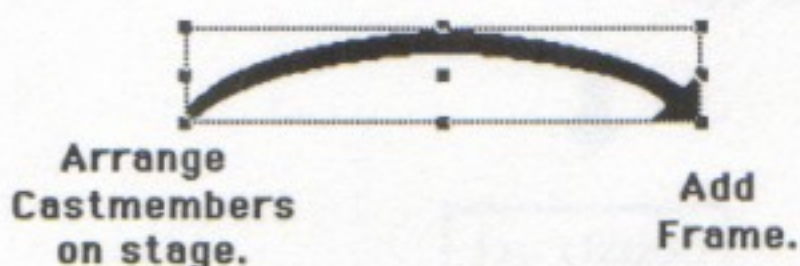
- * Select Frame 139 in Channel I, drag out the second arrow and place it on the other side of the box.



- * **Step** five times.
- * Select Frames 139 through 143 in Channels H and I, **Copy**, and **Paste** at Frames 149, 159 and 169.
- * **Play**. You should be able to see the three arrows flashing in unison.

Now, let's add some more arrows. This time, however, let's make them flash alternately.

- * Scroll the **Score** so you can see Frames 425 through 478 in Channels F and G.
- * Move the **Playback Head** to Frame 429.
- * Select Frame 429 in Channel F, drag out the arrow and place it as shown below.



- * **Step** it in eight times (or use **InBetween**).
- * Select those same eight frames, and **Copy** and **Paste** them beginning at Frames 445 and 461.
- * Move the **Playback Head** to Frame 437.
- * Select Frame 437, Channel G.
- * Drag out the last arrow and place it as shown below.



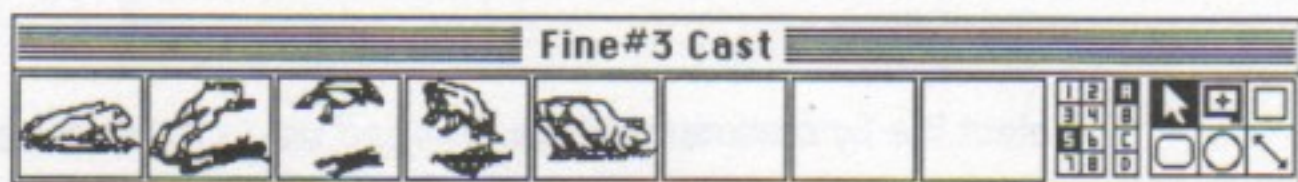
- * **Step** it in eight times.
- * **Copy** those last eight frames in Channel G, and **Paste** them beginning at Frames 453 and 469.
- * **Play.**

Stealing the Scene

Now that we have seen how to "borrow" still art for animating, let's see how to borrow artwork that is already animated, thereby saving even more time and effort. Let's put an example of frame by frame animation and of real-time animation into our diagram. First, let's do a frame by frame animation, and we'll start by stealing a frog from our first tutorial.

- * **Save and Open Tutorial #1.**
- * **Open the Score.**
- * Select Frames 14 through 19 in Channel A.
- * **Copy.**
- * **Open** the new file we have been working in.
- * **Open the Score** and make sure that Frames 310 to 360 in Channel E are visible.
- * Move the **Playback Head** and select Frame 318 in Channel E, and **Paste.**

The frog scene should now appear on the Stage and the five frog castmembers should appear in the Cast.

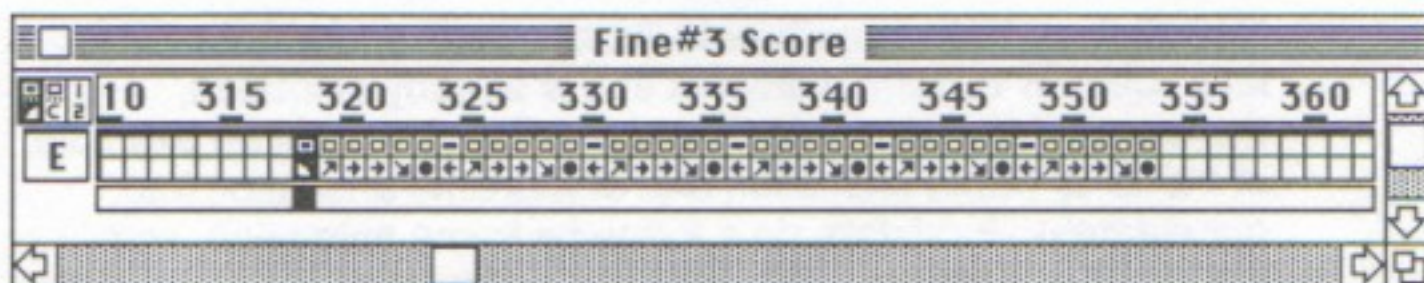


1. Frame by Frame Animation



2. Real-Time Animation

- * **Paste** the frog scene five more times so that it extends until Frame 353.



- * **Play.**

Because the frog is covering the text, let's move him, using the same technique we used with the Quick-Draw Primitives.

- * Select Frames 318 through 353, and drag the frog down the Stage below the text. **Step** through, and make sure that when the frog reaches its highest point, it doesn't obscure any of the text.

Real Time Animation

- * Scroll the **Score** so that Channels D, E and F and Frames 310 to 360 are visible.
- * Using the **Speed Control**, slow the animation down to its slowest speed. This makes it easier when adding real-time animation.
- * Select the fly castmember we grabbed using Art Grabber.
- * Select **Place** (or **Command T**).
- * Position the **Playback Head** at Frame 318 and select Channel F.

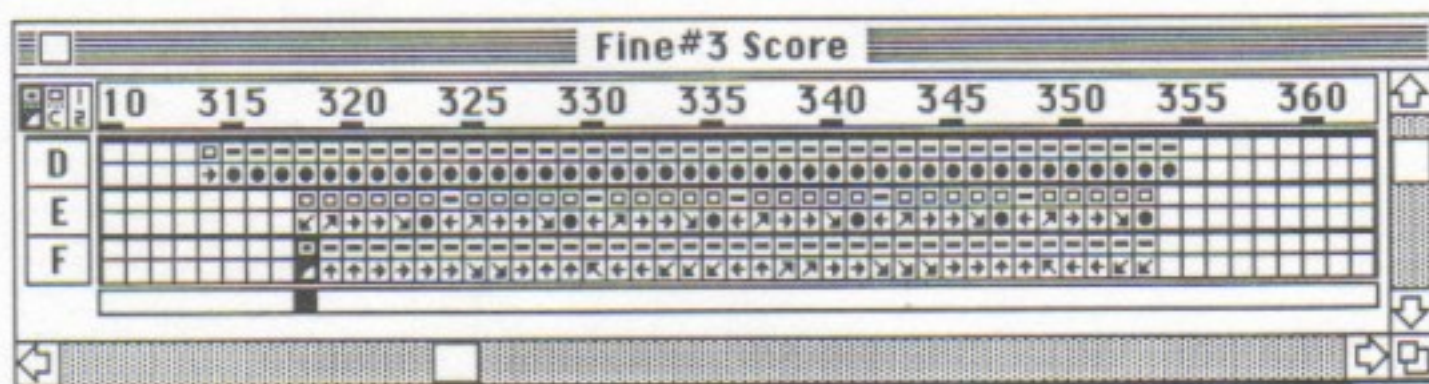
We are going to do this "on the fly", so watch carefully.

- * Place the pointer under "Real-Time Animation", and while holding down the **Option** key, hold down the mouse button and move the fly around until the **Playback Head** reaches Frame 355.
- * As soon as the **Playback Head** is at 355, release the mouse button and Stop the animation by pressing **Command W**.

2. Real-Time Animation



- * If the first frame of Channel F is not aligned with the first frame of Channel E, select the entire animation in Channel F, **Cut**, and **Paste** it beginning at Frame 318.
- * Trim off any excess frames beyond Frame 353 by **Cutting** or **Clearing**.



- * Increase the frame rate to 10, select **Stage**, and **Play**.

Watch the animation, and note whether the frame rate is appropriate to the information being displayed. If it is moving too fast, slow it down. Now when you **Save**, the frame rate will be saved along with the animation.

It is a good idea to have the first few days of the week free.

There is a great deal of work to be done in the morning, and the afternoon is the best time to do it. The morning is the best time to do it.

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1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156
157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192
193	194	195	196	197	198	199	200	201	202	203	204
205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300
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313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336
337	338	339	340	341	342	343	344	345	346	347	348
349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372
373	374	375	376	377	378	379	380	381	382	383	384
385	386	387	388	389	390	391	392	393	394	395	396
397	398	399	400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432
433	434	435	436	437	438	439	440	441	442	443	444
445	446	447	448	449	450	451	452	453	454	455	456
457	458	459	460	461	462	463	464	465	466	467	468
469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492
493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516
517	518	519	520	521	522	523	524	525	526	527	528
529	530	531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550	551	552
553	554	555	556	557	558	559	560	561	562	563	564
565	566	567	568	569	570	571	572	573	574	575	576
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589	590	591	592	593	594	595	596	597	598	599	600
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613	614	615	616	617	618	619	620	621	622	623	624
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649	650	651	652	653	654	655	656	657	658	659	660
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673	674	675	676	677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692	693	694	695	696
697	698	699	700	701	702	703	704	705	706	707	708
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721	722	723	724	725	726	727	728	729	730	731	732
733	734	735	736	737	738	739	740	741	742	743	744
745	746	747	748	749	750	751	752	753	754	755	756
757	758	759	760	761	762	763	764	765	766	767	768
769	770	771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790	791	792
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805	806	807	808	809	810	811	812	813	814	815	816
817	818	819	820	821	822	823	824	825	826	827	828
829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852
853	854	855	856	857	858	859	860	861	862	863	864
865	866	867	868	869	870	871	872	873	874	875	876
877	878	879	880	881	882	883	884	885	886	887	888
889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912
913	914	915	916	917	918	919	920	921	922	923	924
925	926	927	928	929	930	931	932	933	934	935	936
937	938	939	940	941	942	943	944	945	946	947	948
949	950	951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970	971	972
973	974	975	976	977	978	979	980	981	982	983	984
985	986	987	988	989	990	991	992	993	994	995	996
997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020
1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032
1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044
1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056
1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068
1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080
1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092
1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104
1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116
1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128
1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140
1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152
1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164
1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176
1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188
1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200
1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212
1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224
1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236
1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248
1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260
1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272
1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284
1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296
1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308
1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320
1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332
1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344
1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356
1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368
1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380
1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392



1. **When cutting from one scene to another** (i.e., to one with a new selection of sprites), **insert a blank frame down all 24 channels, to give the Macintosh a chance to "catch its breath"**. The result will be a cleaner segue.
2. **Be economical in your use of the special effects in the Efx menu.** With the exception of Copy, the Efx modes tend to use a lot of processing time, and could slow down your animations. In particular, use the Matte function only in those frames when one object passes in front of another.
3. **Animate only that part of the picture that has to move.** For example, if you want to create a face with only the lips moving, don't redraw the entire face for each frame. Rather, use the same face as the castmember, changing only the lips each time. By the same token, use smaller figures (castmembers) whenever possible, for "cleaner" animations -- the bigger the image, the more likely it is to "flash" from one frame to the next.
4. **Plan ahead.** Decide which images should have foreground priority and put them in later channels. Although VideoWorks lets you swap channels easily, it is better to do it right the first time.
5. **To achieve maximum smoothness in your animations** (for example, if you wish to make clouds move smoothly across the screen), **use the Tweak and/or the Constrain function.**
6. **You may find that using the Command key equivalents of the more common functions speeds up your work.** Also, when using the Command key equivalents, you can use both hands as you work.
7. **Save your work often.** There is nothing more discouraging than losing hours of work because of a disconnected plug. For similar reasons, you should keep backup copies of your favorite animations on separate disks.

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8. **Keep at least 70K available on your system disk at all times.** Once you have worked through the tutorials, it is a good idea to move them to a separate data disk, as you should with all your own creations.
 9. **When using text in your animations, make sure that the text remains on the screen long enough to be understood by the viewer.** You should consider, for example, that as the creator of the text, you will have read it many times and so may tend to underestimate the amount of time the viewer may need to read it. Consider also that if you have movement on the screen while the text is displayed, the movement may distract the viewer from reading the text.
 10. **Don't be afraid to look in your mirror or watch your friends to make your animations appear as real as possible.** Model your animations upon real life.
 11. **Do some "pencil testing" before creating your final castmembers** to see if you can get by with fewer castmembers for a given movement. Conversely, if your animation appears "choppy", then you may need to create additional castmembers.
 12. **Group castmembers together within the Cast so that they fall into "animation groups", making them easily accessible as you work.**
 13. **You can cut scenes or sequences from existing animations and store them in the Scrapbook for use in later animations.** This is particularly handy when using a 128K Macintosh since this eliminates repetitive opening and closing of files.
 14. **Realize that adding channels to an animation or increasing sprite size will slow down the processing time.** The Quick-Draw Primitives and the stretching feature will also slow down the processing time. Therefore, before starting your animation, try to anticipate any loss of speed that may result as you add channels.

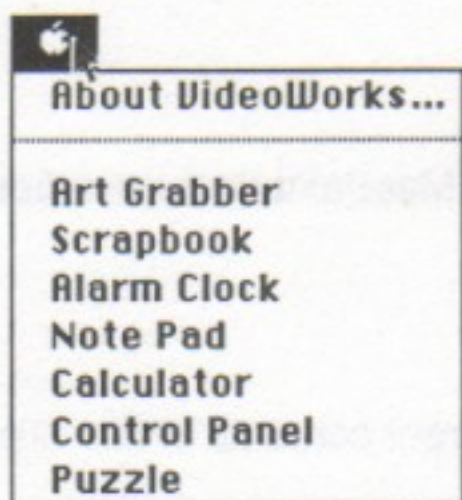
-
15. **Blanks in your cast window cannot be eliminated by direct cutting and pasting without affecting your animation.** However, such holes can be eliminated by cutting the entire score and pasting it into a New file. This process will eliminate all blanks in the cast window.
 16. **Use the Quick-Draw Primitives whenever possible to save memory.**
 17. **The Demo function in VideoWorks is an extremely powerful tool.** With it you can link film strips together, and cycle through them indefinitely. If you run out of room in one file, continue the animation in a second file and link them together using Demo List.... In-store advertising and point-of-purchase displays can be created and left running in a retail store.
 18. **Channels are automatically assigned when a cast member is dragged out onto the stage. However, in real-time animation, the channels are not automatically assigned.** You must explicitly select another channel if you do not want the existing animation in that channel erased.
 19. **VideoWorks deals with Fonts like any other Macintosh application.** If you have any Fonts you really like, you can add them to the system with the Font Mover or Resource Editor.
 20. **When using Sfx, synchronize your sounds with your animation for added effect.** If for instance, you go from a screen of graphs to a screen of charts; at exactly the frame that the screen changes, add a little musical ditty to enhance the transition.
 21. **Animate business presentations using charts and graphs from Ensemble™.** Anything that can be cut onto the Clipboard can be pasted into the VideoWorks Cast.
 22. **Use a digitizer to add real-world scenes into VideoWorks.** Once these images are in the Cast, you can animate or combine them with your own artwork.

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23. **Use the art from the Art disk** (or other art disks on the market such as Art Grabber with Body Shop™) **to create your own animations.** Animation sequences from the Movies disk can be combined with original animations by copying from one file to another.
 24. **The No Erase option in the Efx menu can be used to create a trailing effect on the Stage.** This is especially useful in making a point or grabbing someone's attention.
 25. **Short sound effects** (for example BDrum) **cannot be strung together in a contiguous stream.** You must put a blank frame between sounds to allow them to "retrigger."



VideoWorks has so many special features that it would be impossible to demonstrate each one through tutorials or guided tours. Consequently, we have included this handy reference section so that you can look up any VideoWorks feature to find out exactly what it does and how it works. Items in this reference section are classified by menu, moving along the menu bar left to right. To find more information about a particular feature, just determine which menu includes that feature and then look it up under that menu.

The APPLE Menu



About VideoWorks...

Introducing your VideoWorks program authors.

Desk Accessories

The standard Macintosh desk accessories are included with VideoWorks. Please refer to *Macintosh*, your user's guide for more information.

Art Grabber

As its name implies, Art Grabber lets you "grab" any image from any MacPaint document and transfer it to CheapPaint for modification, or straight to the Cast window for immediate animation.

To use Art Grabber select **Art Grabber** from the **Apple Menu**. A Grabber menu will appear on the right hand side of the menu bar.

The GRABBER Menu



Open

Open allows you to open a MacPaint document from disks in either disk drive.

ClipBoard

ClipBoard displays the current contents of the ClipBoard.

Grab

Grab instructs Art Grabber to copy the contents of the selection rectangle onto the ClipBoard. Alternatively, you can select **Copy** from the **Edit Menu** (see below). Grab can also be used to copy a selection from the ClipBoard itself. Once a selection has been grabbed it can be Pasted (see below) onto the selected window (such as CheapPaint or the Cast).

When you select the document from which you wish to grab an image (by double-clicking it), it appears on the Art Grabber window. Take the crosshair selector and drag it diagonally across the image you want while holding down the mouse button. As you do so, the selection rectangle (or the "marquee box") appears and surrounds the image. Finally, select **Grab** from the **Grabber Menu**. This stores the image onto the Clipboard, from which you can transfer it either to CheapPaint or straight to the Cast window.

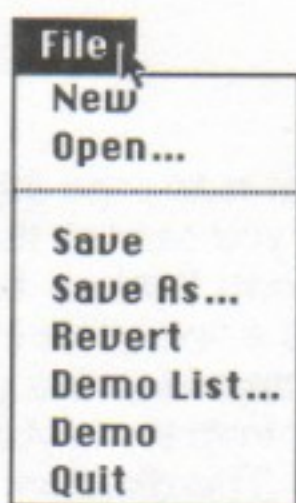
ReOpen

ReOpen opens the most recently opened MacPaint document.

Show Page

Show Page displays the entire page in reduced format, making it easy for you to choose the position of the viewing window.

The FILE Menu



New

New opens a new file and erases the one currently in memory.

Open...

Open... opens a file stored on a disk. A Dialog Box will appear with a list of all of the Files on the disk. Double-click the file you want to open or select the file and click Open.

Save

Save instructs VideoWorks to Save the file currently in memory. If an earlier version of the same file has already been saved, VideoWorks will overwrite the earlier version.

Save As...

Save As... is used for saving a new file for the first time or for saving the current version of an existing file under a different name. If you use **Save As...** to rename an existing file, you end up with two files -- the original version and the updated version.

Revert

Revert returns you to the last saved version of the current file.

Demo List...

Demo List... allows you to arrange or rearrange the playback order of your animation files, so that you can link them together in any order to create your own "feature length" movie. Selecting **Demo List** displays a text editor in the form of a dialog box. You can enter file names (up to a total maximum of 255 characters) directly from the keyboard or by selecting them from a disk directory. This directory is accessed by clicking the **Directory** button. As with any changes made to a VideoWorks file, you will need to **Save** the **Demo List** to retain a permanent record on the disk.

Demo

Demo plays the files in the current **Demo List**. To stop the demo, move the pointer to the top of the Stage, pull down the **File** menu and select **New, Open, or Quit**.

Quit

Quit tells VideoWorks to finish the current session and return to the Desktop. VideoWorks will ask you if you want to save the file currently in memory.

The **EDIT** Menu

Edit	
UnDo	⌘Z
Cut	⌘H
Copy	⌘C
Paste	⌘V
Clear Chain	
Play	⌘Q
Stop	⌘W

UnDo

UnDo lets you undo your last action. In CheapPaint, for example, the Undo command works just like it does in MacPaint. Also, if you are editing, UnDo will cancel your last command, such as Cut, Copy, Paste, etc., or if you should BurnScene inadvertently, UnDo will restore your animation. UnDo will also undo Adding, Stepping and real-time recording.

Command Key(s): **Command Z** and (in CheapPaint only) the ~/' key (next to the !/1 key.)

Cut

Cut removes the selected image or sequence of images from its current location and stores it in a temporary file on the Clipboard. The Cut sequence can then be Pasted into a new location (for Paste, see below).

Command Key: **Command X**

Copy

Copy makes a copy of whatever is selected and stores it in a temporary file on the Clipboard. Unlike the Cut command (see above), Copy does not remove the selected sequence from its original location. Copy is used when you want to reproduce, rather than move, an image.

Command Key: Command C

Paste

Paste puts whatever is on the Clipboard into a new location, specified by clicking with the pointer. When you select Paste, the sequence will begin at the selected cell.

Command Key: Command V

Clear

Clear removes the selected image or sequence altogether, without saving it on the Clipboard. Clear is used when you have no further use for a particular image or sequence or when you do not want to affect what is stored on the Clipboard.

Chain

Chain is used when you wish to link repeating sequences together to create one continuous motion across the screen. Normally, if you Copy and Paste a sequence so that it repeats, the copied sequence will be exactly the same as the original sequence in every respect, including its starting position. But if you select Chain before you Paste, the second sequence will begin at the point where the original sequence ends. Note that it makes a difference which frame you select to begin the copied sequence. For example, if you overlay the first frame of the copied sequence onto the last frame of the original sequence, then the copied sequence will begin at those x,y coordinates which mark the end of the original sequence. However, this has the added effect of replacing the last castmember of the first sequence with the first castmember of the copied sequence. If you wish to preserve the last castmember, then you should select the next empty cell to begin the copied sequence. This will have the effect of

preserving the last castmember, but will also have the effect of repeating the x,y coordinates from the end of the original sequence to the beginning of the copied sequence.

Play

Play starts an animation. Selecting Play has the same effect as clicking the Play button on the Control Panel (see below). In addition, when the Score is unoccupied, selecting Play is equivalent to "rolling the cameras" since it is the first step in producing a real time animation.

Command Key: Command Q

Stop

Stop stops the action. Selecting Stop has the same effect as clicking the Stop button on the Control Panel (see below).

Command Key: Command W

The OPTIONS Menu

Options	
BurnScene	
Place	%T
Step	%S
Add	%A
BackStep	%D
KillFrame	%F
Blank	%B
Rewind	%R
Switch	%E
InBetween	%G

BurnScene

BurnScene completely clears the Score, while preserving the Cast. Use BurnScene only if there is nothing in the current Score you wish to preserve.

Place

Place lets you position a castmember on the Stage without having to drag it out first. Selecting Place changes the pointer into a "modified crosshair." Clicking this crosshair anywhere on the Stage will cause the selected castmember to appear in that position. The castmember can be selected before or after Place is selected.

Command Key: Command T

Shortcut: Access the Place function from the Quick-Draw Primitives in the Cast window.

Step

Step has a dual function. First, when there is no selected castmember on the Stage, the Step command simply steps through the animation frame by frame, without otherwise affecting it. Second, if there is a selected castmember on the Stage, the Step command will overlay that castmember into the Score. For example, dragging a new castmember onto the Stage and Stepping will overlay that castmember onto the blank cells in the Score. But if you should arrive at an occupied cell (for example, if the blank frames were in the middle of a sequence), the original castmember in that channel will have precedence over the newly introduced castmember. You can override this precedence, however, by holding down the mouse button as you Step. Step can also be accessed via the Control Panel (see below). In addition, you can Step through a sequence (but without affecting the Score) by dragging the Playback head to the right in the Score (see below).

Command Key: Command S

Add

Add begins an animation or adds a frame to the Score by inserting it at the selected location, pushing the existing frames to the right like the insert function in a word processor. Unlike the Step command, which affects only the selected channel, Add inserts frames throughout the entire 24 channels. Therefore, if you wish to introduce a new castmember without affecting the existing animation, you should use the Step function (see above).

Command Key: Command A

BackStep

BackStep steps you through the animation backwards, one step at a time, without otherwise affecting it. Backstep can also be accessed via the Control Panel (see below) or by dragging the Playback head to the left in the Score (see below).

Command Key: Command D

KillFrame

KillFrame clears the selected frame. It does so throughout the 24 channels, like the Add function, so it should be used only if you need to remove frames across all 24 channels. KillFrame does not affect what is stored on the ClipBoard.

Command Key: Command F

Blank

Blank removes the selected castmember on the Stage or in the Score from the animation without affecting the Cast or the other frames or channels.

Command Key: Command B

Rewind

Rewind, which can also be accessed via the Control Panel (see below), rewinds the animation back to Frame 1, without otherwise affecting it.

Command Key: Command R

Switch

Switch changes the castmember selected on the Stage to the one selected in the Cast window. When Switching from one castmember to the next, VideoWorks keeps the images registered by using the center of the castmember as a "registration pin".

Command Key: Command E

InBetween

InBetween lets you specify the starting and ending position of a sequence and leaves it up to VideoWorks to fill in the intervening frames. If the castmember being included in the sequence is to remain stationary, then VideoWorks will simply overlay that castmember into the sequence just like a series of **Step** commands. If, on the other hand, the castmember's ending position in the sequence is different from its starting position, VideoWorks will calculate each increment of motion by dividing the total movement by the number of frames, and fill in the intervening frames accordingly.

Command Key: Command G.

The WINDOWS Menu

Windows	
Stage	%1
Panel	%2
Cast	%3
Score	%4
CheapPaint	%5
Tweak	%6
Monitor	%7

Stage

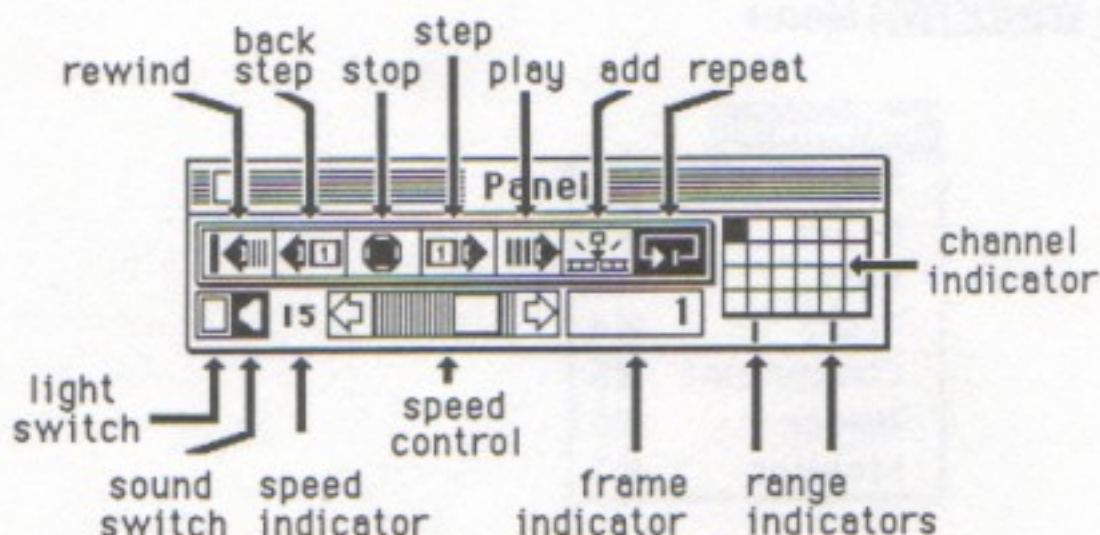
Stage clears the screen of all other windows to provide an uncluttered view of the action. After you have selected Stage, you can add any of the other windows simply by selecting them from the Windows Menu.

Command Key: Command 1

Panel

Panel is the main control console. The Panel is a "modeless" window, meaning that it does not have to be active for its functions to work. Most of the Panel's functions are also accessible through the Edit and Options menus and by command key equivalents. You should experiment with the various control methods to see which ones suit your particular purposes best.

Command Key: Command 2



The following is a description of the Panel's functions, taken from left to right:

Rewind winds the animation back to Frame 1, without otherwise affecting it. You can also rewind the animation by selecting **Rewind** from the **Options** Menu (see above), or by clicking the first frame in the playback head bar in the Score (see below).

Command Key: Command R

Backstep steps the animation backwards one frame at a time without otherwise affecting it. Backstep's function is identical to **Backstep** in the **Options** Menu (see above).

Command Key: Command D

Stop stops the action, and has the same effect as selecting **Stop** from the **Edit** Menu (see above).

Command Key: Command W

Step allows you to step through the animation one frame at a time, or to overlay a new sprite onto an existing animation without affecting the other channels. The Step function is described fully in the **Options** Menu (see above.) The Step function can also be accessed via the Options Menu.

Command Key: Command S

Play starts the animation from the current frame. It has the same effect as selecting **Play** from the **Edit Menu** (see above).

Command Key: Command Q

Add is equivalent to **Add** in the **Options Menu** (see above), and inserts the selected castmember into the animation at the selected location and pushes the existing frames to the right.

Command Key: Command A

Repeat -- when the Repeat button is highlighted (black), the animation forms an endless loop, so that the sequence is restarted from Frame 1 automatically. Repeat is a toggle, which means that clicking it alternately activates and deactivates the function.

Channel Indicator is the 24-grid matrix at the right-hand side of the Panel and indicates which channels are currently occupied and which of those is currently active. Channels which are currently occupied but inactive are indicated by gray squares, while the active channel is indicated by a black square. In addition, the Channel Indicator also doubles as a channel selector: by clicking any of the 24 squares you can select the corresponding channel. You can select more than one channel at a time by holding down the Shift key while clicking the squares.

The Light Switch on the lower row of the Panel toggles between a white and a black Stage.

The Sound Switch turns the sound on or off. When the speaker icon is white, the sound is on.

The Speed Indicator displays the frame rate, with a range of 3 frames/second to 60 frames/second.

The Speed Control controls the playback speed, and is operational even during playback. Dragging the elevator to the left slows down the animation, while dragging it to the right speeds it up.

The Frame Indicator shows, by frame number, your current position in the animation. In addition, you can access any point in the animation by using the "pull down number" function. This is done by moving the pointer into the Frame Indicator box and dragging the pointer. Dragging the pointer down and/or to the right increases the frame number, while dragging it up and/or to the left decreases the number. As with the Playback Head in the **Score** (see below) scrolling through the frame numbers also scrolls through the animation.

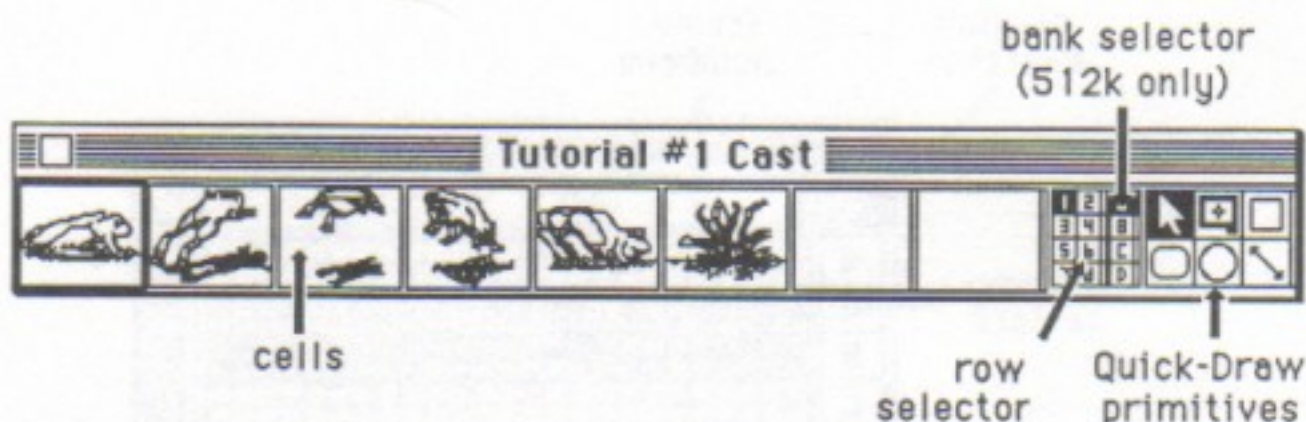
The Range Indicator shows the beginning and ending frame numbers of the selected animation sequence. The left number indicates the first frame while the right one indicates the last frame of the sequence. As with the Frame Indicator, you can define either number by using the pull down number function.

Cast

Cast is the repository (or dressing room) for castmembers awaiting animation. When the Cast window is active, clicking any castmember will select that castmember. Alternatively, any castmember can be selected by pressing the corresponding number key -- "1" for the first castmember in the selected row, "2" for the second castmember, etc. The selected castmember is indicated by a heavy border around it. Once selected, the castmember can be animated in real time, or dragged onto the stage for frame by frame animation.

Castmembers are either created in the CheapPaint window (see below), "grabbed" using Art Grabber (see above), or Pasted from the Scrapbook or from other animations. Once an image is created and a new easel is opened, VideoWorks automatically puts the new castmember into the Cast window. In fact, VideoWorks constantly updates the Cast window to reflect any changes that are made in CheapPaint, and it does so whenever a new (or another) easel is opened.

Command Key: Command 3

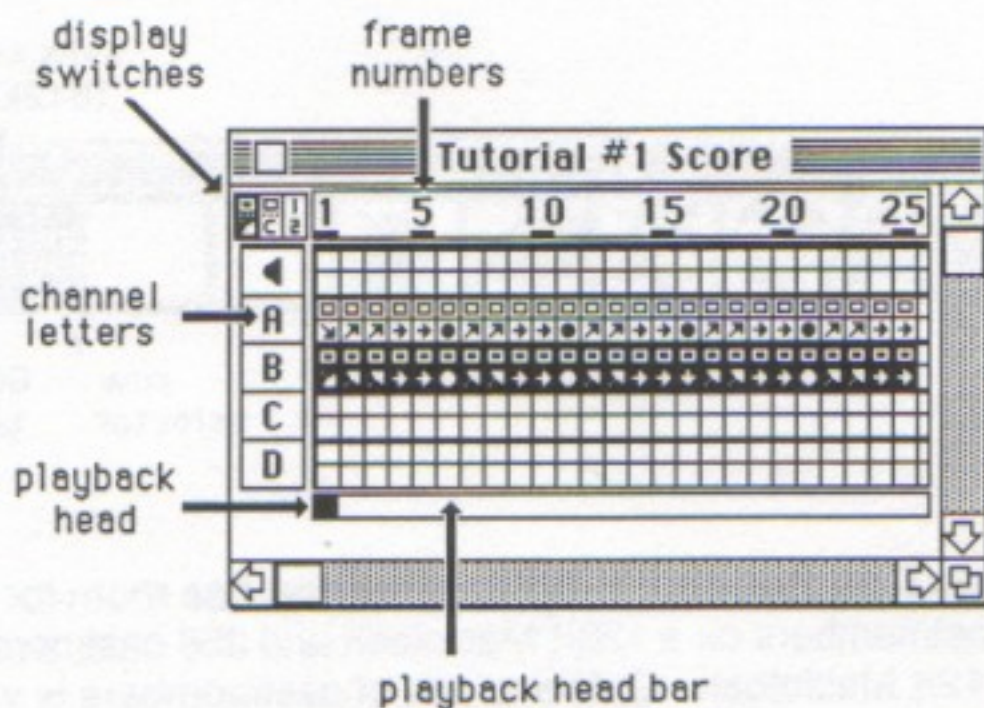


The Row Selector in the Cast window has room for 64 castmembers on a 128K Macintosh and 256 castmembers on a 512K Macintosh. Only one row of castmembers is visible at one time, but you can select any row by clicking the appropriate box in the row selector to the right of the castmembers. With the 512K Macintosh, an extra column of boxes is available to the right of the Row Selector. This column is the **Bank Selector**, and lets you select from four banks of 64 castmembers each.

The Quick-Draw Primitives on the right hand side of the Cast window is a set of five primary graphic tools and the default pointer. The Quick-draw primitives let you bypass the standard CheapPaint-Cast-Stage sequence by making it possible to place images directly onto the Stage (see Tutorial #2). This represents a savings in memory since VideoWorks does not have to keep track of easels and castmembers. The primitives are most useful for creating large background areas. The six functions provide, from top to bottom, left to right: the pointer; the Place function (see above); rectangles (or squares, when constrained - see above); rectangles with rounded corners; ovals (or circles when constrained); and straight lines.

Score

Score is VideoWorks' equivalent to a "dope sheet" or "cue" in film animation, and contains, in one convenient window, all the information you need to edit your animations. Each column represents one frame of the animation. VideoWorks has a maximum capacity of 25 channels, consisting of 24 video channels and one sound channel.



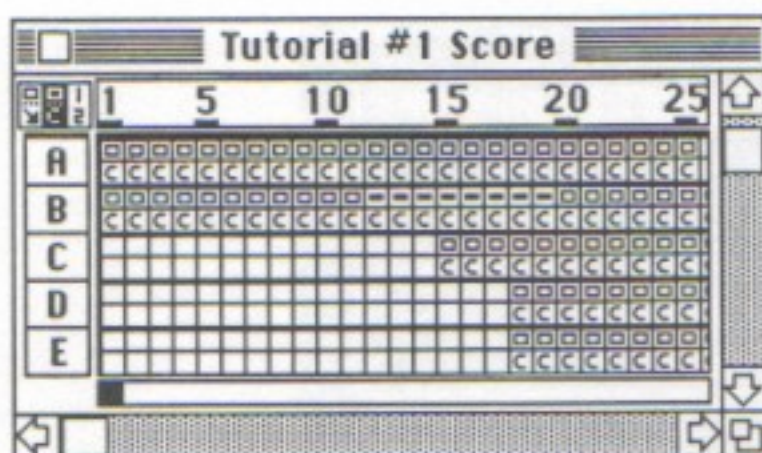
The sound channel is in the first (top) row of the Score and is represented by the loudspeaker icon. To add a soundtrack to your animation, first select the frames you will be adding the sound to (by dragging the pointer across them) and then select the appropriate sound from the **Sfx Menu** (see below). You can add as many different sounds as you wish by following the same procedure each time.

Each video channel is represented by a letter (A through X) and is further divided into two rows. Depending on which of the three **Display Switches** is currently on (by way of the three icons in the upper left hand corner), each of the two rows provides information about the castmembers and other aspects of the animation.

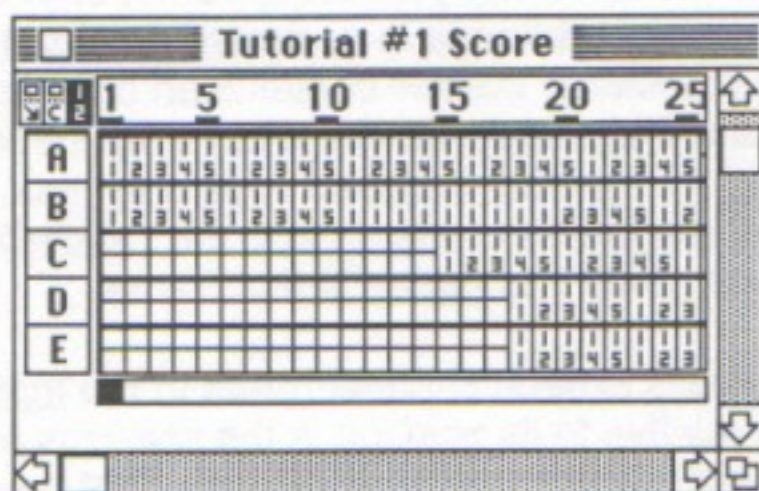
Tutorial #1 Score							
		1	5	10	15	20	25
A	+	+	+	+	+	+	+
B	+	+	+	+	+	+	+
C							
D							
E							

With the **leftmost** Switch selected, the upper row in each video channel refers to the identity of the castmember in each frame. Specifically, if a cell in the upper row contains a small hyphen-like symbol, this indicates that the castmember in that frame is the same (that is, has the same identity) as the castmember in the immediately preceding frame, or in other words, that there was no change in castmembers from the previous frame. If, instead, the cell contains an open square symbol, this means that a castmember was newly introduced in that frame. If the cell contains a closed square symbol, this indicates that the image was created using the Quick-Draw Primitives and was newly introduced in that frame.

The lower row of cells in each channel refers to the motion of the castmember relative to its position in the previous frame. If a cell in the lower row contains a small octagonal symbol (like a small stop sign) this means that the castmember in that frame occupies the same position (that is, has the same x,y coordinates) as the castmember in the immediately preceding frame. Any movement by a castmember relative to the previous frame is indicated by a small arrow. Because these arrows also indicate the direction of the movement, they are known as Relative Motion Indicators.



With the **middle** Switch on, the information in the top row is identical to that provided by the **leftmost** Switch. The bottom row tells you which **Efx** mode is presently selected. For example, if the letter "C" appears in this row, this indicates that the Copy mode was selected during that sequence.



When you select the **rightmost** Switch, you are provided with information about the castmember's origin. The top row indicates which of the eight rows of the Cast window the castmember came from, while the bottom row indicates the cell in that row.

Any frame in any channel (or any combination of frames and channels) can be selected by dragging the pointer across the corresponding cells in the Score. Frames can be selected across all 24 channels by dragging the pointer across the frame numbers at the top of the Score window. An entire block of frames and channels can be selected by dragging the pointer diagonally across the desired block. In addition, an entire channel can be selected by double clicking the channel letter. Once a block or group of frames is selected, it can be edited, by way of the **Cut**, **Copy**, **Paste** and **Clear** functions (see **Edit**

Menu, above), or varied by using the special effects from the **Efx Menu** (see below).

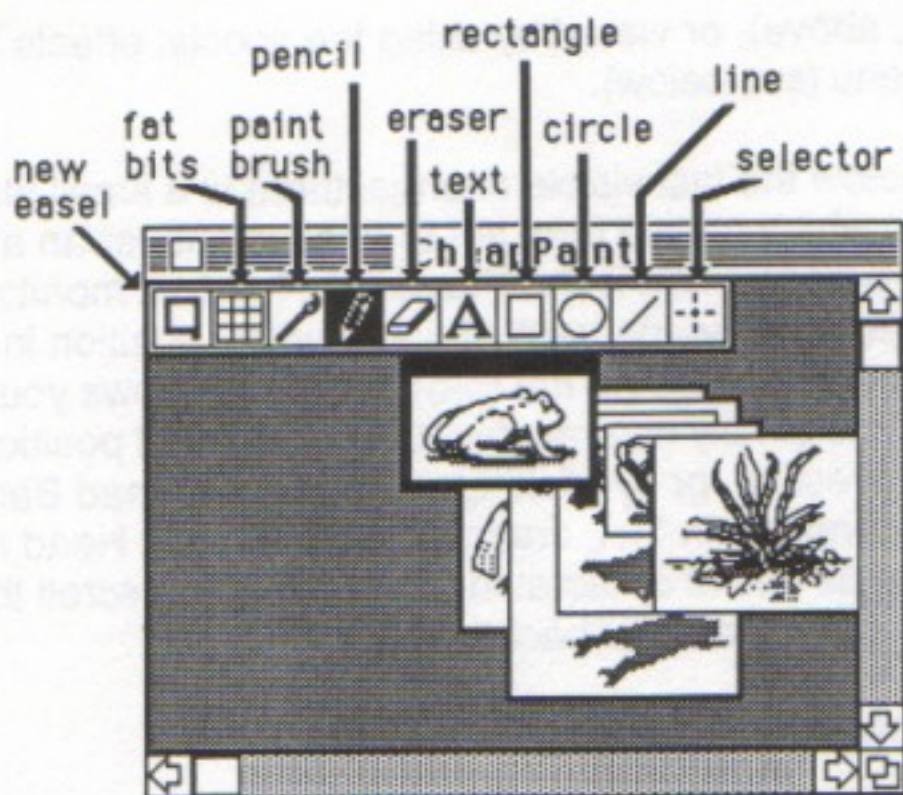
Just below the last visible channel there is a small black square which moves from left to right whenever an animation is in progress. This is the **Playback Head**. It monitors the animation and keeps track of your current position in the sequence. In addition, the Playback Head allows you to access any frame simply by dragging it to the desired position, in either direction, or by clicking the Playback Head Bar at the desired frame. In fact, dragging the Playback Head makes it operate as a kind of "scratch bar", letting you scroll through the animation forwards or backwards.

Command Key: Command 4

CheapPaint

CheapPaint is VideoWorks' main graphics tool, and usually provides the first step in creating an animated sequence. Although CheapPaint doesn't have all the capabilities of its big brother MacPaint, it does include some additional special features. For example, it is resizable and scrollable. CheapPaint's functions are accessed through the row of icons along the top of the window. These are described below.

Command Key: Command 5



New Easel causes a new easel to appear in the CheapPaint window, ready to accept a new image. The image created in the new easel is placed in the first available location in the Cast window. Easels can be resized by dragging on the handle on the lower right corner, and can be repositioned within the confines of the CheapPaint window by dragging the thick bar at the top.

FatBits magnifies the selected easel at the point last touched by the pencil or paintbrush (like FatBits in MacPaint) and allows modification of the image at the pixel level. Once in FatBits, clicking the icon (or the actual size box in the top, left corner) reverts the image to the original state. As a shortcut, while using the pencil, holding down the mouse button and the Command key at the same time places you in FatBits at that location in the image. All of the CheapPaint tools work in FatBits.

The PaintBrush is a drawing tool that allows you to select the size and shape of its lines from a special menu. This menu appears whenever you double click the PaintBrush icon and lets you choose from nine different shapes and sizes. The PaintBrush also draws with the selected fill pattern from the **Draw Menu** (see below).

The Pencil is identical to the Pencil in MacPaint and works the same way whether in standard mode or FatBits. The Pencil creates black lines on a white background, and white lines on a black background. Double clicking the Pencil immediately places you in FatBits. In addition, with Pencil selected, clicking the Option key turns the pointer into a Hand, letting you move the image around the window.

The Eraser is identical to the Eraser in MacPaint. You can erase any part of an image by dragging the eraser over it.

Text is similar to the MacPaint text mode and makes it possible to include text in your animations. Enter text by clicking the icon and then clicking on the easel where you wish the text to begin. Whatever you type will appear at the cursor. You can select the **Font** and **Style** from the appropriate menus (see below).

The Rectangle generates rectangles of any shape and size. By holding down the Shift key as you drag the pointer, you can "constrain" the rectangle into a perfect square. The resulting rectangle or square will be filled with the fill pattern selected from the **Draw** Menu (see below) and bounded by the line thickness from the same menu.

The Circle draws circles when constrained, and ovals when not. And just like the **Rectangle** (see above), the resulting ovals or circles will be filled with the selected fill pattern and bounded by the selected line thickness.

The Line draws straight lines. When constrained the Line Maker draws lines vertically, horizontally or at 45 degrees. The line width is determined by the selected line thickness from the Draw window.

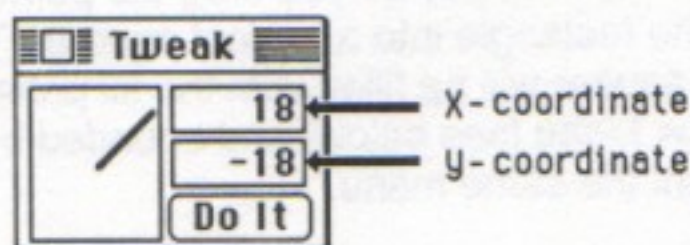
The Selector lets you encircle and drag any image (or part thereof) to any other part of the selected easel. To use the Selector, drag diagonally across the image you want to select. When you release the mouse button the image will be surrounded by the selection rectangle. You can now move the surrounded image anywhere within the same easel by moving the pointer into the selection rectangle and dragging. The Selector can also be used to **Cut**, **Copy** and **Paste** portions of selected images. When moving a Selected image, holding down

the Shift key will constrain the movement to the vertical or horizontal axis.

Tweak

Tweak is VideoWorks' Incremental Motion Generator, and is used to create precise increments of motion from one frame to the next. To use Tweak, click the pointer somewhere inside the large rectangle on the left hand side of the window and drag it in the same direction and for the same distance as you want the castmember to move. When the mouse button is released, the resultant vector is stored in memory, awaiting the command to implement it. To move the castmember, simply click the "Do It" button. The change from the x,y coordinates of the previous castmember is recorded in the two upper right hand boxes in the window. Note that Tweak works only on the selected castmember.

Command Key: Command 6

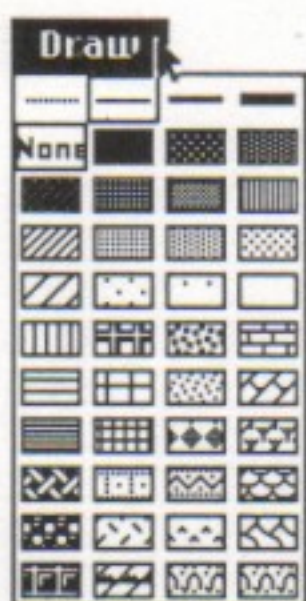


Monitor

Monitor is another way of looking at the Stage. It allows the Stage to be a resizable, scrollable and relocatable window.

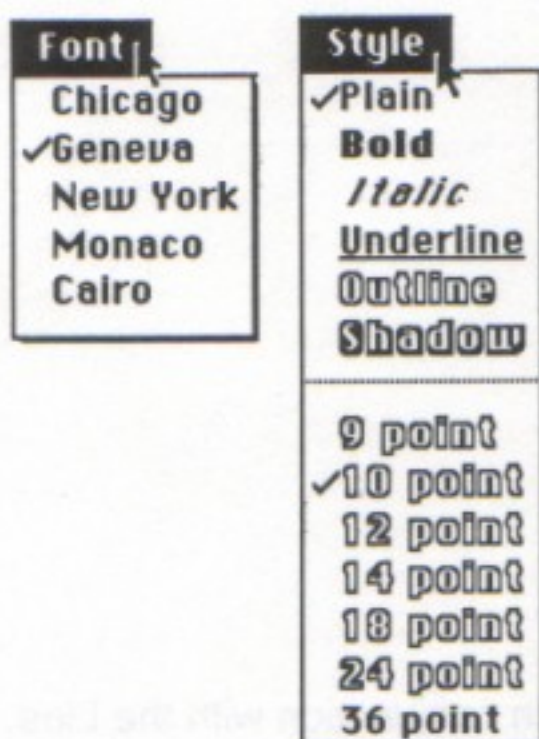
Command Key: Command 7

The DRAW Menu



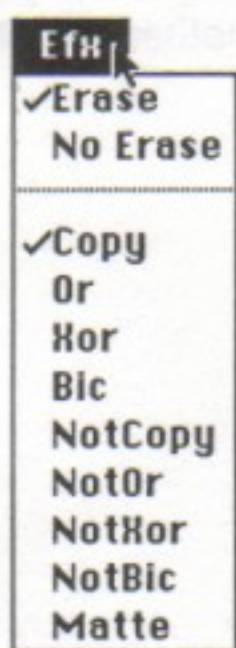
The **Draw** Menu is used in conjunction with the Line, Brush, Rectangle, and Circle in CheapPaint (see above) and the corresponding Quick-Draw Primitives in the Cast (see above.) The top part of the menu defines the thickness of the lines created by the Line Maker, while the bottom part of the menu defines the fill pattern for the Rectangle and Circle.

The FONT and The STYLE Menus



The **Font** and **Style** menus are used only in conjunction with **Text** in CheapPaint (see above) and define the fonts and other characteristics of the text. The Font and Style menus are identical to the corresponding menus in MacWrite and MacPaint.

The **EFX** Menu



The **Efx** (for "Special Effects") Menu covers all the ways two images can interact when their paths cross on the screen. In the Copy mode (the default mode), for example, the resulting image when a foreground (figure) sprite crosses in front of a background (ground) is that of the foreground sprite itself. Thus, if a black figure crosses in front of a white ground, the resulting image will be black, while if a white figure crosses in front of a black ground, the resulting image will be white, and so on. These possibilities are best described in terms of "truth tables", tables which set out every possible value for figure and ground with the corresponding result for each combination.

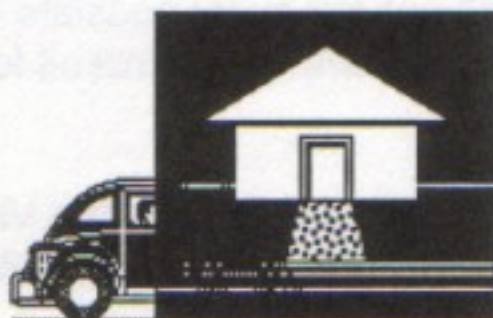
Run the **Efx Demo** in the Tutorial Folder on the VideoWorks disk for an animated demonstration of the truth tables.

Copy -- the resulting image has the same value as the foreground sprite itself. This corresponds to our perception of an opaque object passing in front of another object. Copy conforms to the following truth table:



<u>Back-Ground</u>	<u>Fore-Ground</u>	<u>Result</u>
Black	Black	Black
Black	White	White
White	Black	Black
White	White	White

Or -- if either the foreground or background is black, then the resulting image is black. In other words, the resulting image is white only if both figure and ground are white. Or conforms to the following truth table:



<u>Back-Ground</u>	<u>Fore-Ground</u>	<u>Result</u>
Black	Black	Black
Black	White	Black
White	Black	Black
White	White	White

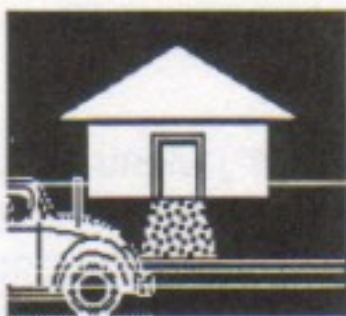
Xor -- the resulting image is white if foreground and background have the same value (i.e., both are black, or both are white), and black if figure and ground have different values. Xor conforms to the following truth table:



<u>Back-Ground</u>	<u>Fore-Ground</u>	<u>Result</u>
Black	Black	White
Black	White	Black
White	Black	Black
White	White	White

Bic -- the resulting image is white if foreground and background have the same value; if figure and ground are different, the resulting image has the same value as the ground. Bic stands for "black is clear". Bic conforms to the following truth table:

It's still there.



<u>Back-Ground</u>	<u>Fore-Ground</u>	<u>Result</u>
Black	Black	White
Black	White	Black
White	Black	White
White	White	White

NotCopy, NotOr, NotXor, NotBic are variations of the above in which the figure is inverted (i.e., black is shown as white, and white as black), similar to the Invert function in MacPaint. The "Not" modes are otherwise identical to the above modes, and the same truth table values apply.

No Erase leaves a trail of its previous locations as the image moves across the screen. No Erase can be selected in combination with the other Efx modes to create different types of trails.

Matte forms a matte around the image, so that as it passes in front of the background it is not bordered by a blank "frame". Because Matte will tend to slow down the animation, it is a good idea to use mattes sparingly, only in situations where one object is passing in front of another.

The **SFX** Menu



The **Sfx** (for "sound effects") Menu contains a selection of different sounds to add to your animations. Soundtracks are added by selecting the frames in the Sound Channel of the Score (see above) which will carry the sound (by dragging the pointer across them), and choosing the appropriate sound from the Sfx Menu. The Sfx Menu consists of a main menu made up of eight submenus. Selecting any of the main menu categories will display a menu of sounds within that category. Simply select the sound you wish to use from that submenu.

Sfx Top... Next...	Sfx Top... Next...	Sfx Top... Next...	Sfx Top... Next...
test Swoop-klunk Footstep Jump Thud Y-Synthesis YX-Synthesis Wolf Whistle Hey Cabby	Big explosion Med explosion Small explosion Rockslide Forest Fire Jet engine	Mgun Drop Bomb Shot Helicopter Idle Accelerating Decelerating	Bdrum Ltom Mtom Htom Wblock Cowbell Do Re Mi Fa So La Ti Do1

Sfx Top... Next...	Sfx Top... Next...	Sfx Top... Next...
Bird1 Bird2 Rivet Meow Bubble1 Bubble2	Alarm Mech Laser Fade In1 Fade In2 Control Room Electric Drone1 Drone2	Bach 1 Bach 2 Mozart Spring Pastoral Charmer

Sfx	Sfx
Top...	Top...
Next...	Next...
Shave	Intro1
Walk the Dog	Intro2
Ballgame	Intro3
Cartoon	I'm Here
Rock1	Mini Fanfare
Rock2	Bad Times
Boogie Woogie	Ending
Jazz	Transition 1
Funk1	Transition 2
Funk2	Transition 3
	Transition 4
	Transition 5
	Transition 6

There are 2 types of sound effects used in VideoWorks. The most common is a sound, like an explosion or melody line, that is started and continues on until it is over, whether it takes 1/2 second or 20 seconds. This type of sound needs to have at least as many frames assigned to it in the Score as it takes for the sound to play out. For a short sound this may be only 1 or 2 frames. But for a longer sound, like a melody, this may take 15, 20 or even 100 frames.

The second type of sound effect in VideoWorks connects animation with sound. This is called synergistic interfacing, in which the position of the sprite on the screen affects the pitch or tone quality of the sound.

To connect a moving sprite with a sound, **Copy** that animation sequence and **Paste** it into the sound channel at the same frame positions. Then select this same section and select **Y-Synthesis** from the **Basic** menu. As the sprite moves toward the top of the Stage, you'll hear the pitch increase along with it.

The **YX-Synthesis** changes the volume of the sound as the sprite moves along the horizontal axis. As the sprite moves toward the right of the Stage, the volume will increase with it.

In addition, all of the melody lines in the Old Music, New Music and Business submenus can be synergistically.

VIDEOWORKS MEMORY ALLOCATION

VideoWorks dynamically allocates the Macintosh's memory. If you have 10 large sprites on the Stage at once, then there is not as much room in memory for a very long animation as there would be for small to average sized sprites. There is a tradeoff. You can have 2 or 3 sprites go on for a very long time, or 24 sprites for not as long.

If you do run out of memory, VideoWorks let you know with a Dialog box. Generally speaking the change, or edit, that resulted in the Dialog box will not take affect and will not harm your animation.



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The first of these changes is the change of the
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the third of these changes is the change of the
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Activate

To specify which Window (or other item) will receive the next command or set of commands. (see also **Select**)

Animation

A series of static images which, when presented in rapid succession, create the illusion of movement. The images can be recorded in analog form on a filmstrip, or digitally on a floppy disk.

Castmember

A single image, one of the elements of a VideoWorks **Animation**. A series of different Castmembers presented in rapid succession can create the illusion of an image changing shape.

Channel

The residence of a single **Sprite** in the **Score**.

Computer Animation

A form of **Animation** which uses high-speed manipulation of binary information to create images on a cathode ray tube.

Foreground Prioritization

A method of defining which of two intersecting **Sprites** will pass in front of the other. VideoWorks uses rank in the **Score** to determine which **Sprite** will be foreground and which will be background.

InBetween

A feature of **Computer Animation** which simplifies the animator's task by filling in the **Frames** between the beginning point and the end point of an **Animation** sequence.

Pixel

Shorthand for Picture Element, a Pixel represents the smallest component part of a screen image.

Real-Time

A method of **Computer Animation** used by VideoWorks in which the animated sequence is recorded as it takes place, so that the original and the recorded sequences are the same, both temporally and spatially.

Score

A VideoWorks **Window** consisting of 24 video **Channels** and one soundtrack, and containing all the information about the current animation sequence in one convenient place.

Select

To specify which item on the screen will be subject to the next command. For example, a selected **Sprite**, **Castmember** or **Channel** is ready to receive the next command, such as Copy, Cut, Paste or Clear. (See also **Activate**)

Sprite

A series of **Castmembers** which have been linked together within a single **Channel** to produce an animated sequence.

Synergistic Interface

The connection between animation movement on the stage and the pitch of the sound.

Tweak

VideoWorks' Incremental Motion Generator, Tweak lets the user specify the distance (measured in **Pixels**) and the direction of movement of a **Castmember** from one **Frame** to another.

Vector

A quantity that has both direction and magnitude, usually represented by a straight line. VideoWorks' **Tweak** function defines the distance and direction of movement of a **Castmember** in terms of a Vector represented by a straight line.

The first of the two main divisions of the
 paper is devoted to a general survey of the
 state of the art in the field of the
 subject. The second part is devoted to a
 detailed study of the various aspects of the
 problem.

100



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If you wish to pursue your study of animation further, we recommend the following books:

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Heraldson, Donald. *Creators of Life - A History of Animation*. New York, NY: Drake Publishers, Inc., 1975.

Levitan, Eli L. *Electronic Imaging Techniques*. New York, NY: Van Nostrand Reinhold Company, 1977.

Muybridge's Complete Human and Animal Locomotion. New York, NY: Dover Publications, Inc. 1979.

Thomas, Frank and Johnston, Ollie. *Disney Animation - The Illusion of Life*. New York, NY: Abbeville Press. 1984.



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1. The first part of the report is devoted to a general survey of the situation in the country.

2. The second part of the report is devoted to a detailed study of the various aspects of the problem.

3. The third part of the report is devoted to a study of the various aspects of the problem.

4. The fourth part of the report is devoted to a study of the various aspects of the problem.

5. The fifth part of the report is devoted to a study of the various aspects of the problem.

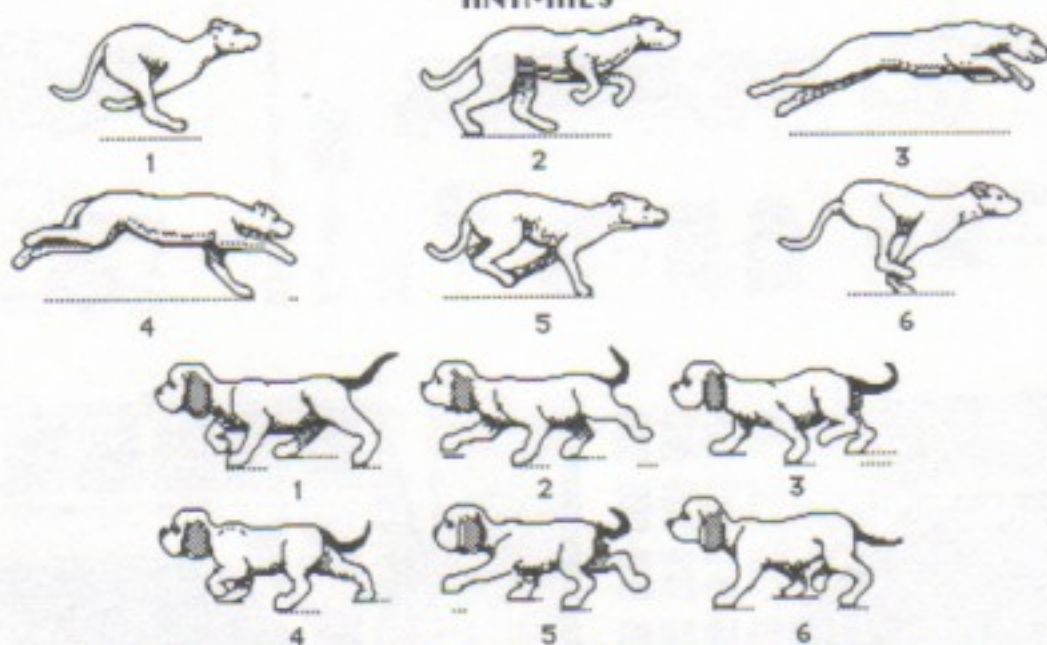
6. The sixth part of the report is devoted to a study of the various aspects of the problem.

7. The seventh part of the report is devoted to a study of the various aspects of the problem.

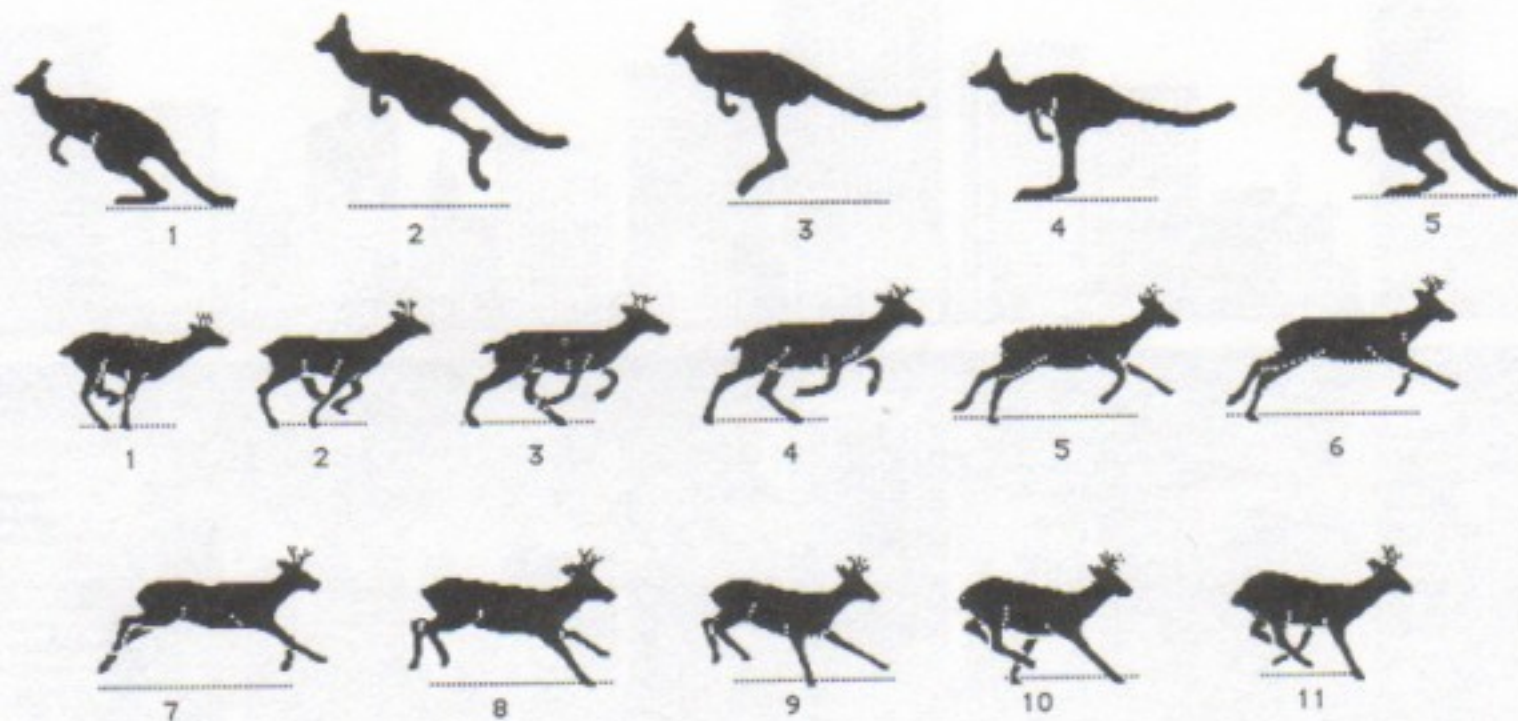
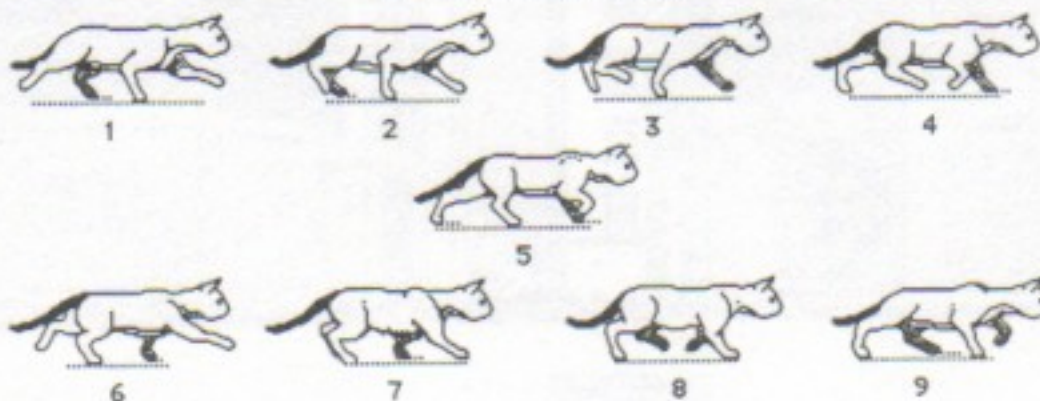
8. The eighth part of the report is devoted to a study of the various aspects of the problem.

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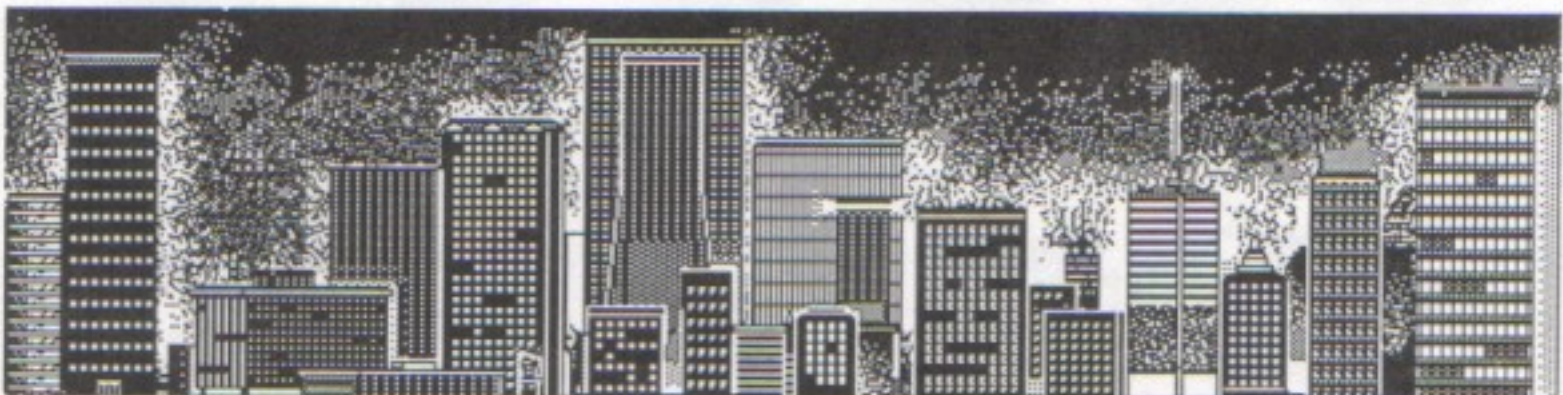
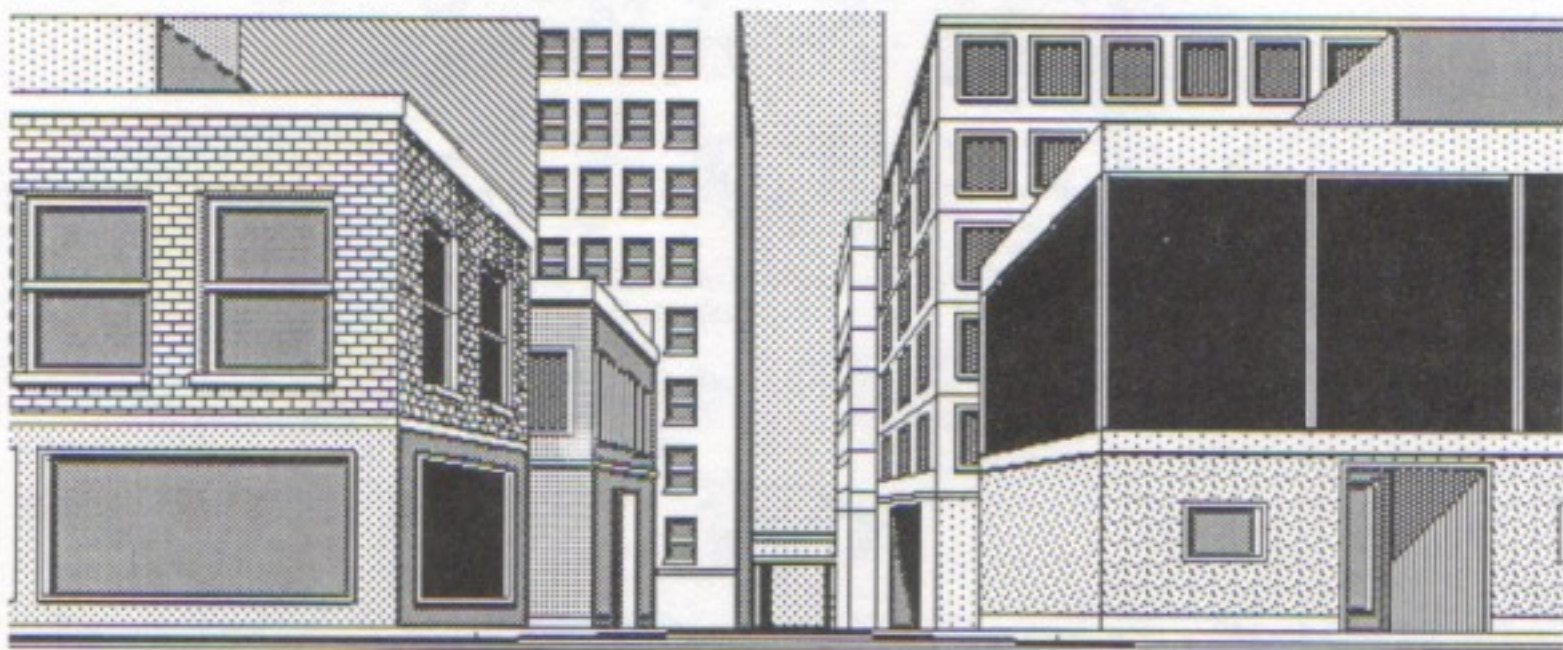
ANIMALS



It is essential to match feet between pattern switches in order to convey the illusion of locomotion.



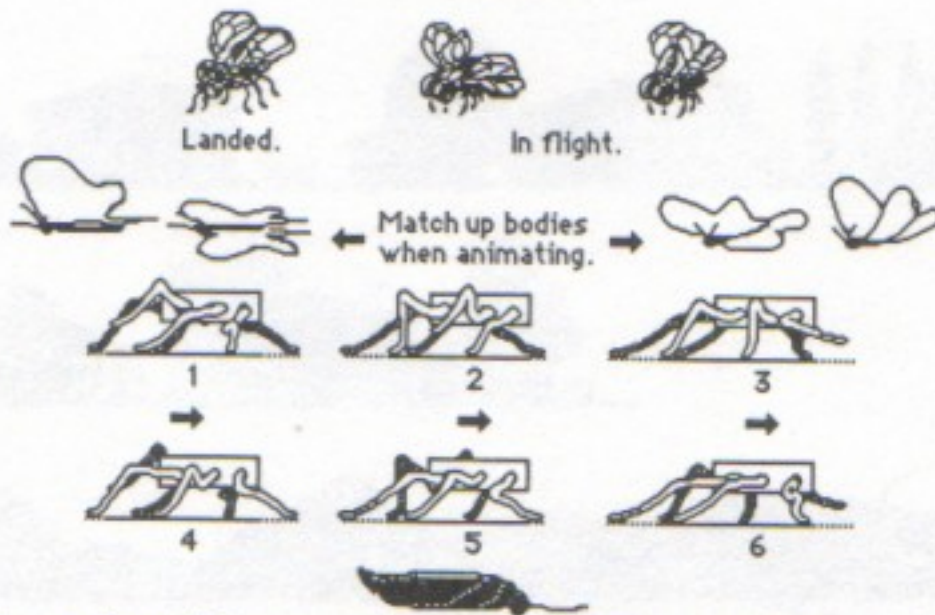
BACKGROUNDS 1



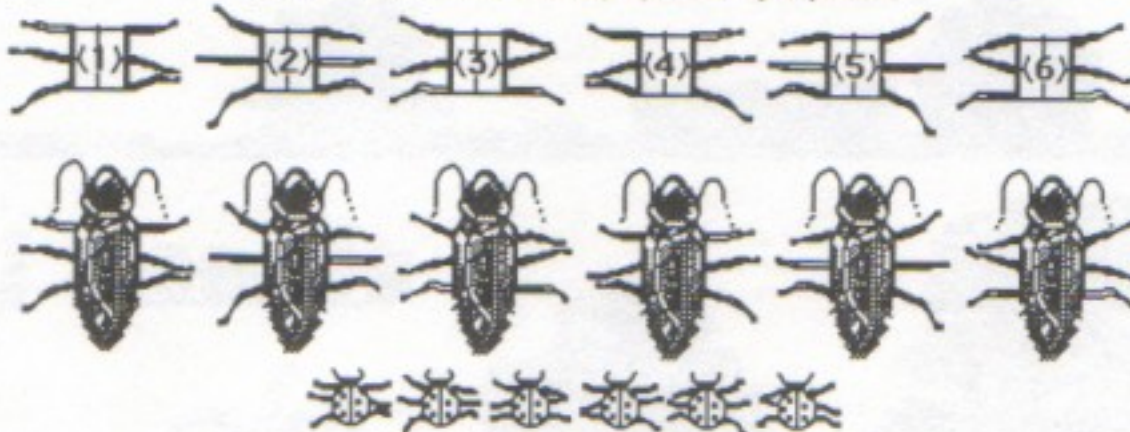
BACKGROUNDS 2



BUGS



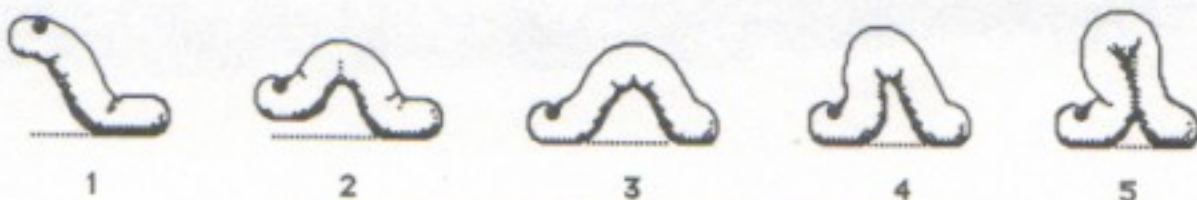
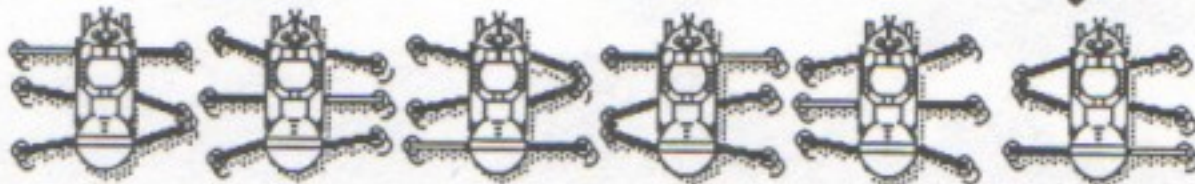
Put your favorite bug, or car body on legs. Tween side view by 7 pixels between pattern switches, top view by 6 pixels.



Rotate for different directions.

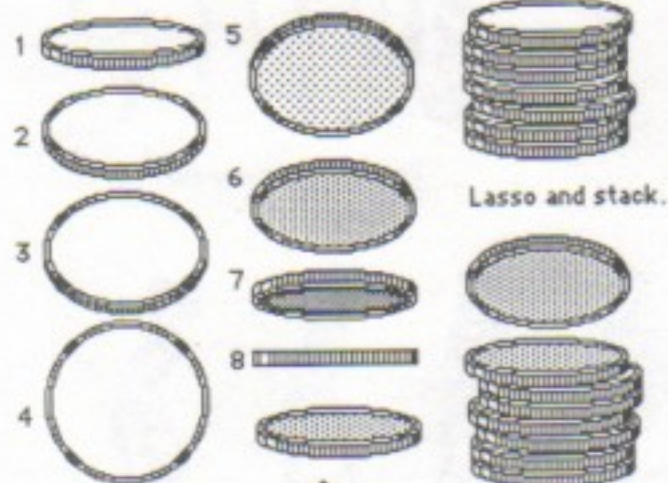
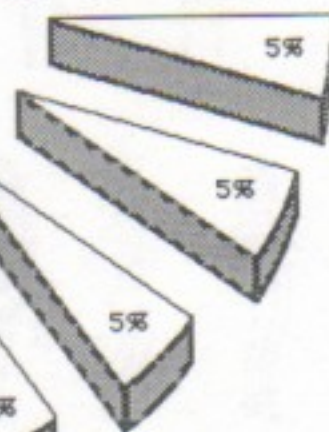
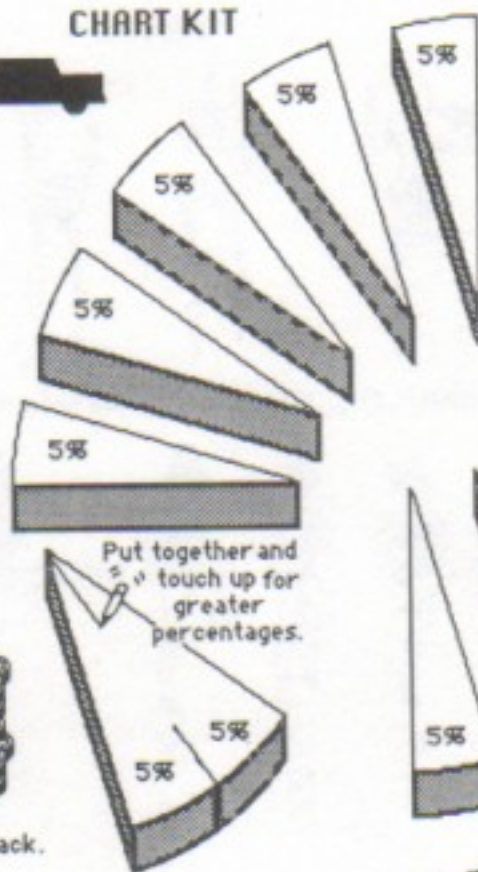
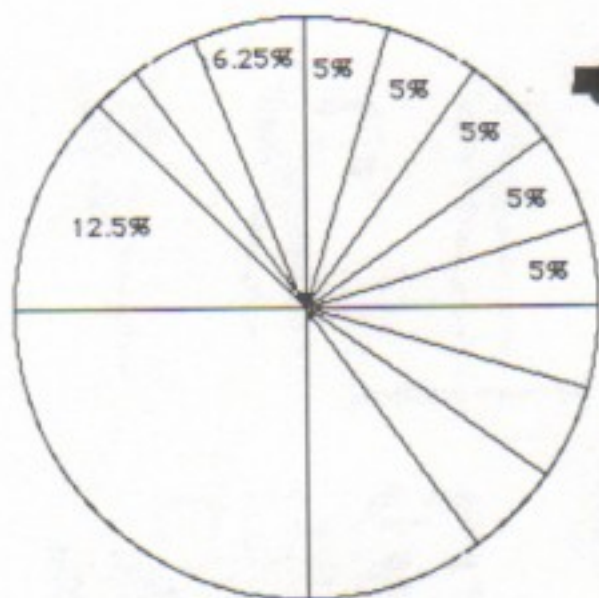


Shoot projectiles from forward artillery barrels.



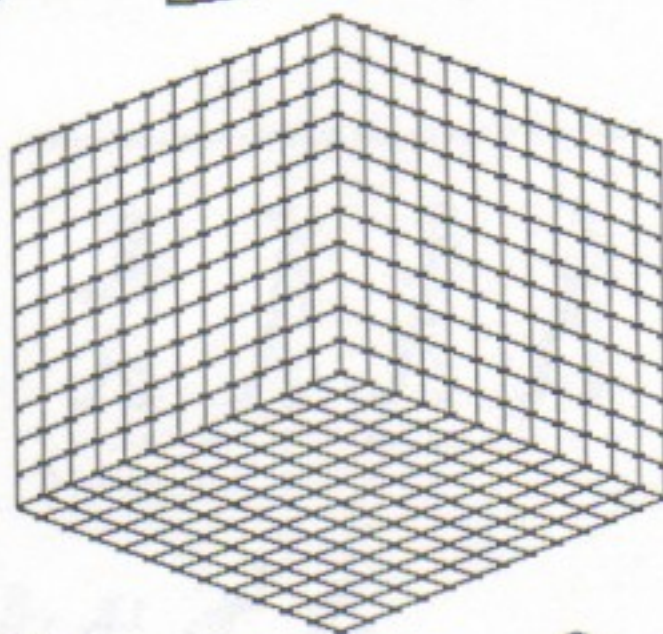
For the first 3 pattern switches match up the tail
Then match the head of the 4th and 5th to the location of the 3rd head.

CHART KIT



Lasso and stack.

When coin is landing on stack switch to shaded top coin (1) for depth.



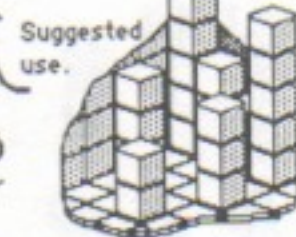
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC.



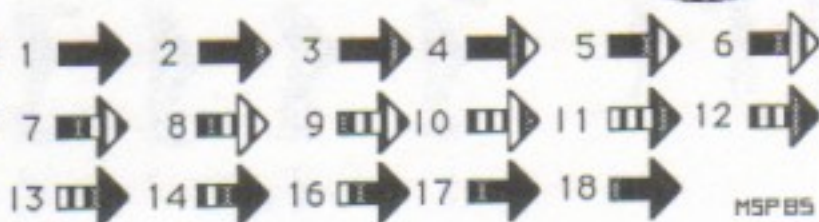
Shade Lasso and stack.



Lasso copy and paste to make your grid planes.



Suggested use.

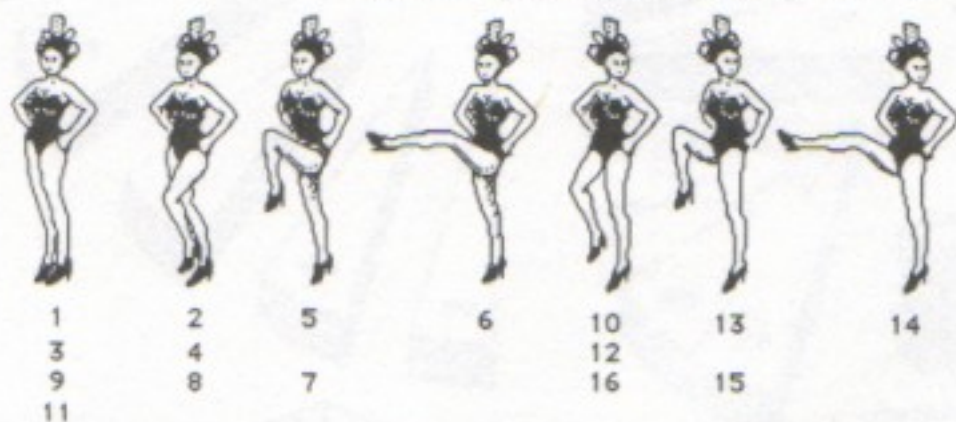


MSP85

DANCERS

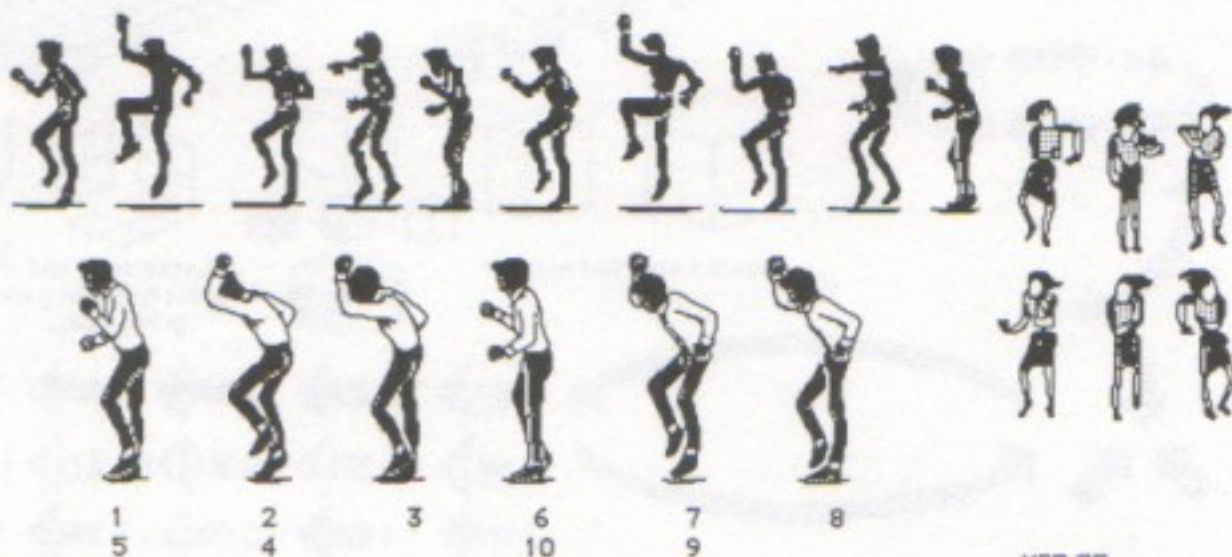
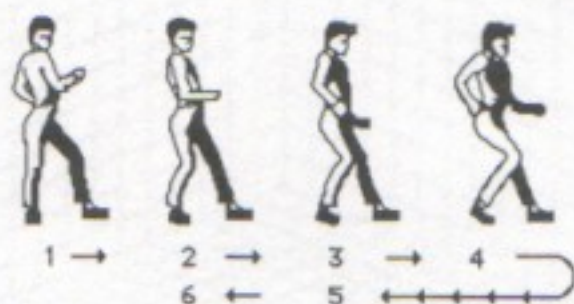


Mix, match, flip, flop, the tops and bottoms for more positions.



Try makin' your own. †

Make sure to line up feet from one frame to another.



HORSES



1



2



3



4



5



6



7



8



1



2



3



4



5



6



7



8



1



2



3



4



System



System



Buck the "System".



5



6



7



MSP 85

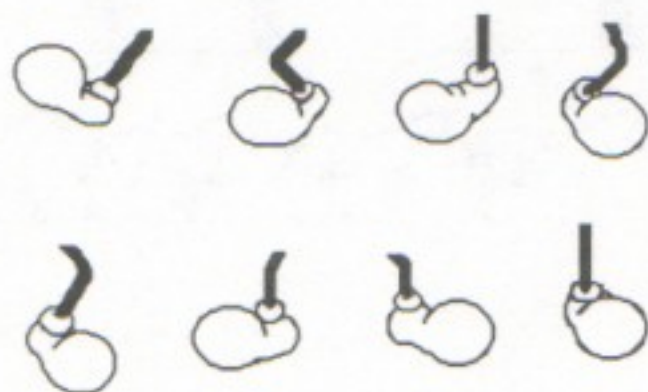
LIMBS



SNAP TO IT

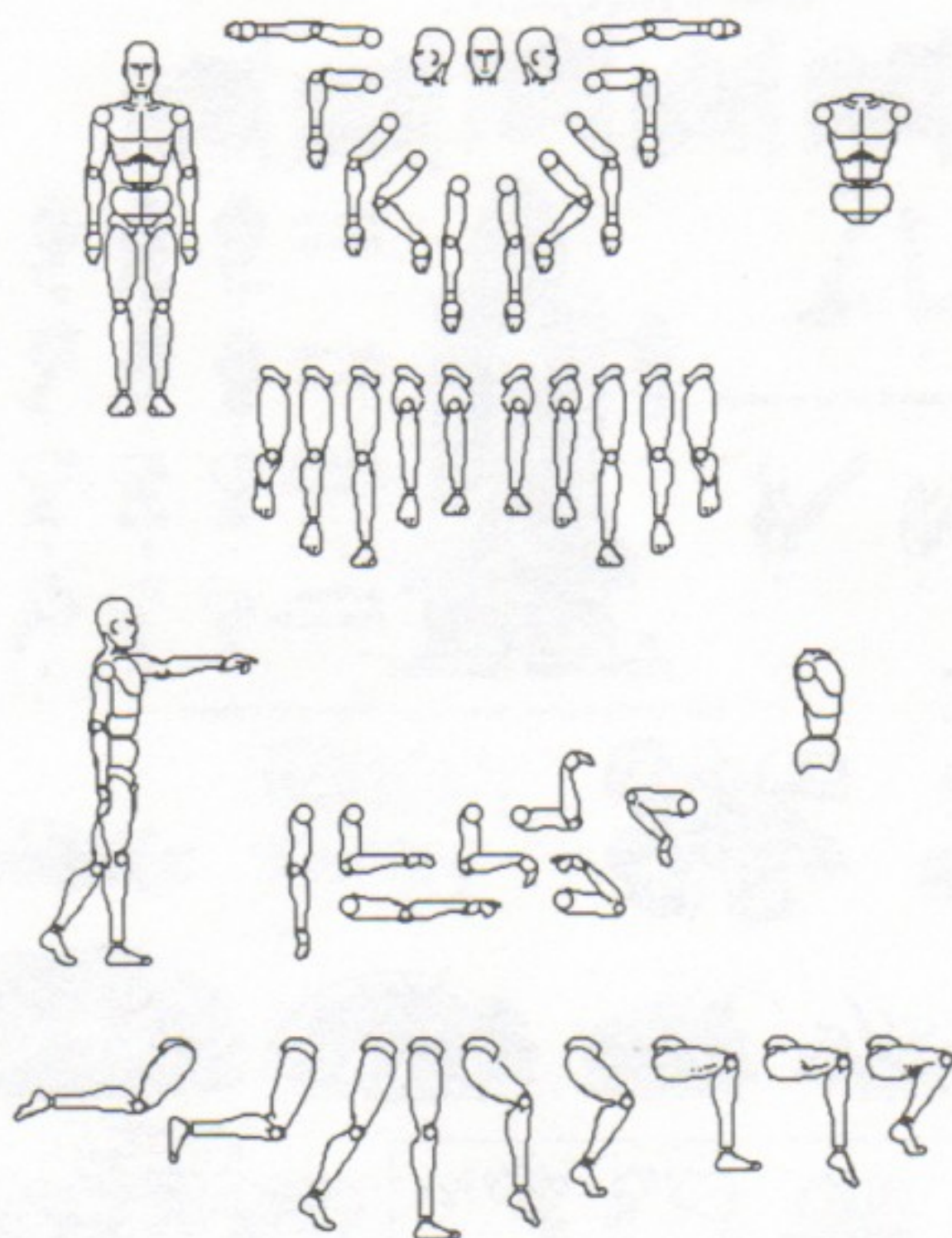


Flip, flop and switch parts for more variations



Example.

MARIONETTE

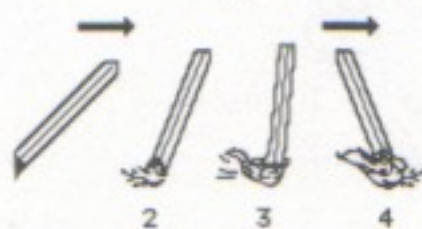


For more complex variations
of the human figure get
HAYDENS "ART GRABBER with
BODY SHOP" by MacroMind.

MISCELLANEOUS



Rotate and save each of the 4 rotated positions for a truly hypnotic effect!



Light the match. Cycle through 3 patterns below.



Light the fuse.



Then its firecracker, firecracker; BOOM BOOM BOOM!



OUT WEST



1



2



3



4



5



6

Match up back wheels and ground to animate in place.

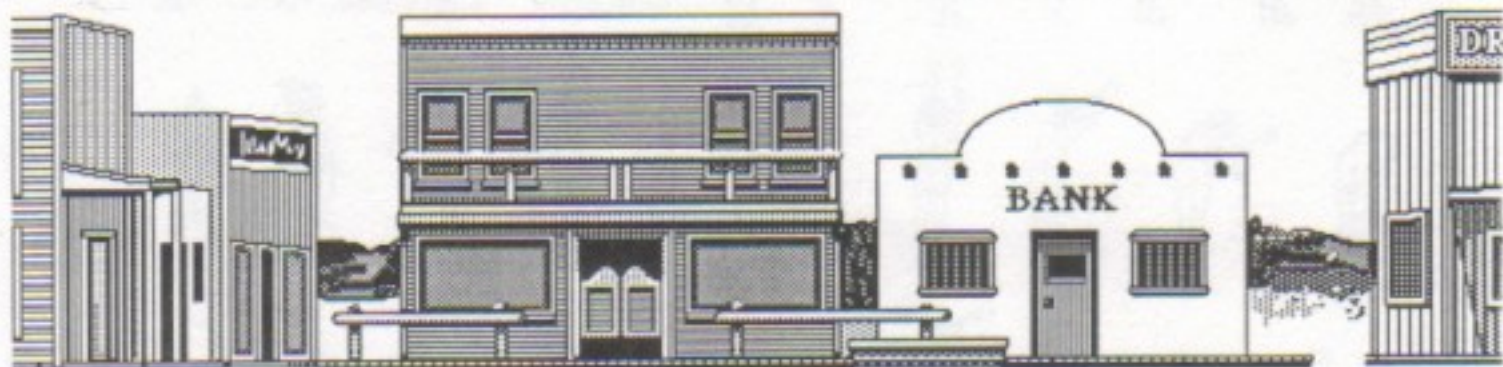


7



8

Increment by approx. 4 pixels per. pattern switch.



Make sure feet match up between frames

Arm moves up quickly on recoil.

Ready for more.



Ready on the draw,

but not quick enough.

Move body back a pixel per /frame on impact.

Pause and let gun fall.

On fall match up location of right foot.

MSP 85

PEOPLE



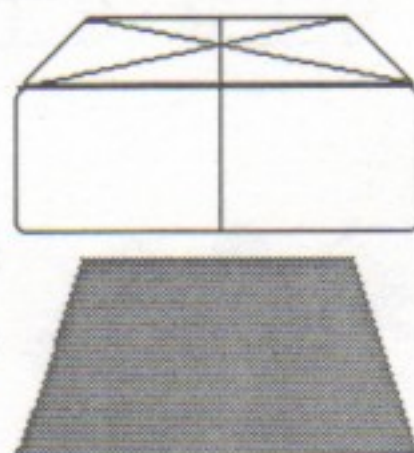
PERSPECTIVE

Add in details on largest "object" and then shrink them to fit each consecutive object. Animating through the sequence will give the illusion of the object moving towards and away from the viewer. Moving the shadow proportionately closer or farther from the object determines the distance between it and the ground. The crosshair under number represents vanishing point, and should not be saved off with the pattern but it should be used as a "registration pin" in order to yield smooth animation. The line below the object represents the bottom of the screen.

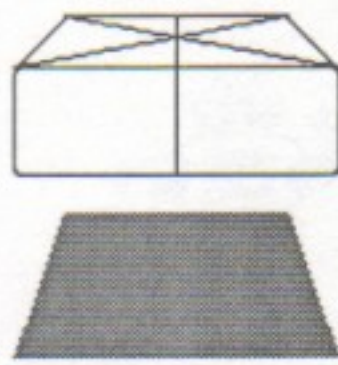
0
+



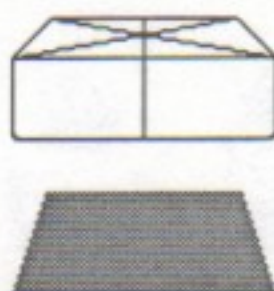
1
+



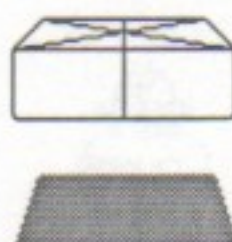
2
+



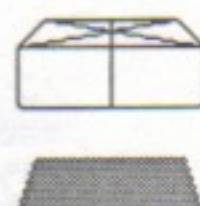
3
+



4
+



5
+



6
+



7
+



8
+



9
+



10
+



11
+



12
+



13
+



14
+



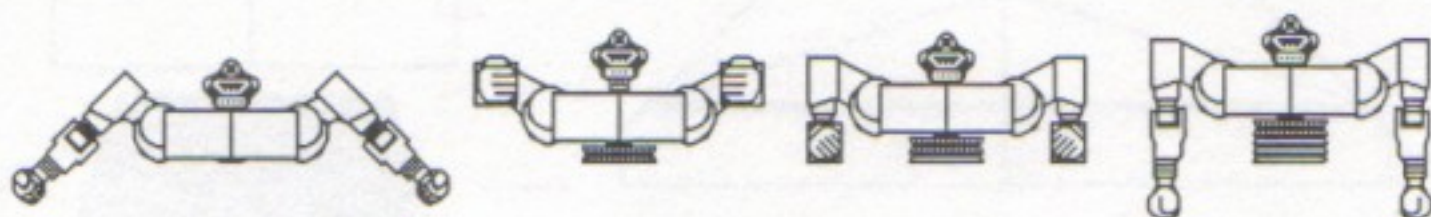
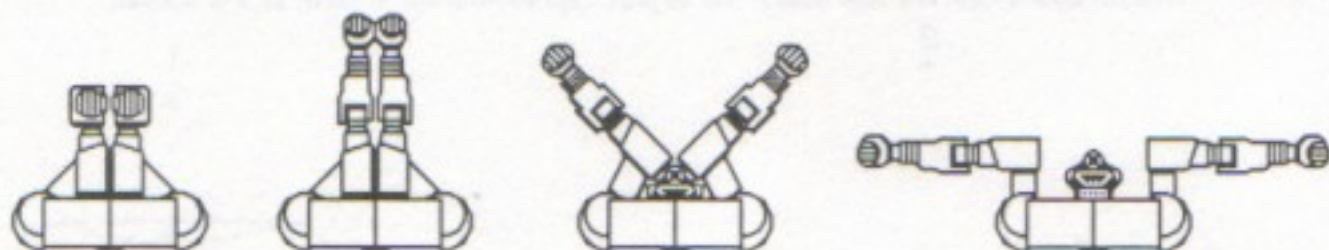
15
+



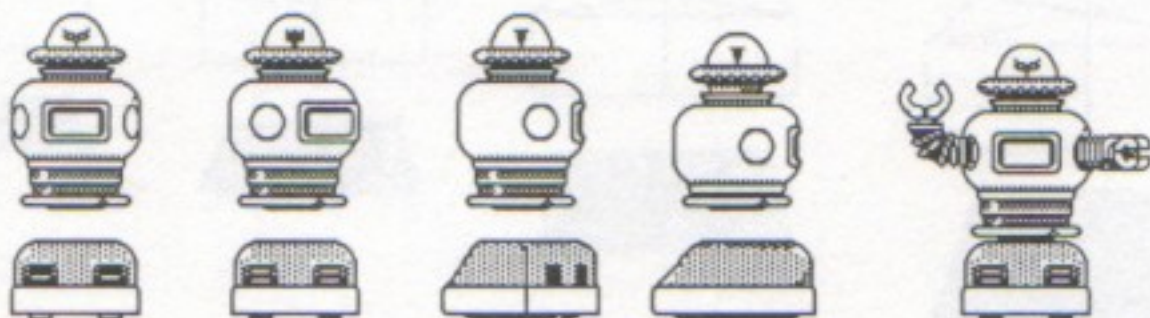
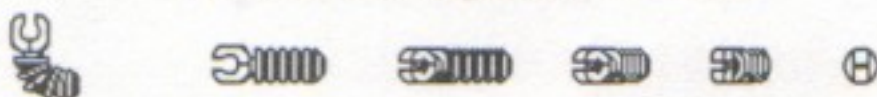
ROBOTS



Flip Horizontal - to make folding robot turn in opposite direction.



Matte arms over body while in Videoworks.



Use these 2 bottoms
to make the robot
appear to move.

Example.



Flip Horizontal - to make treads turn in opposite direction.



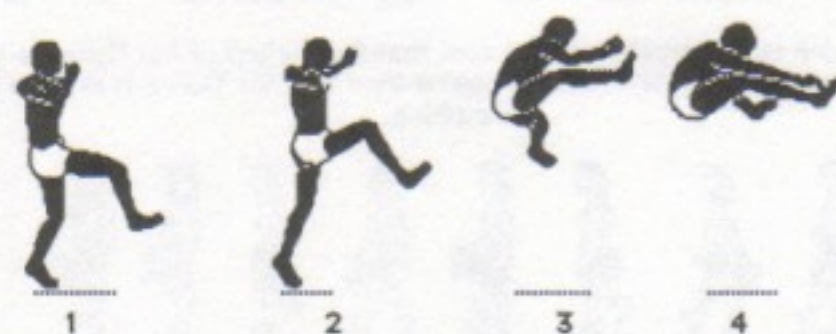
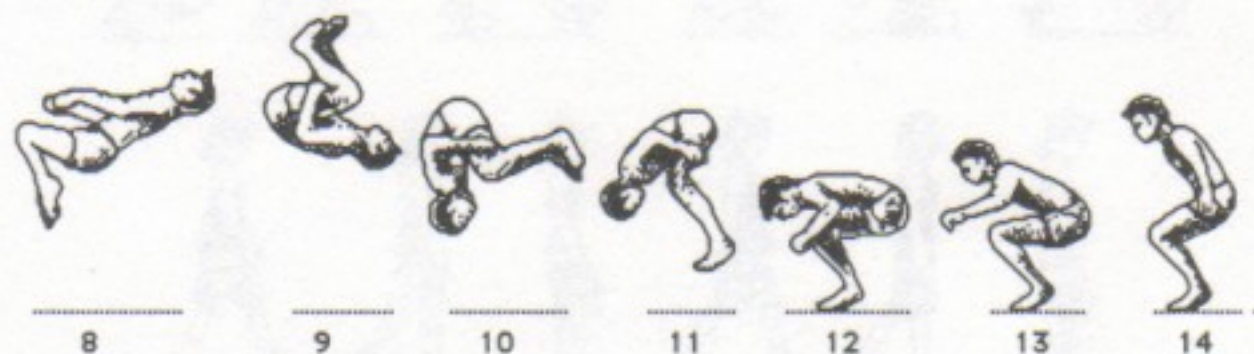
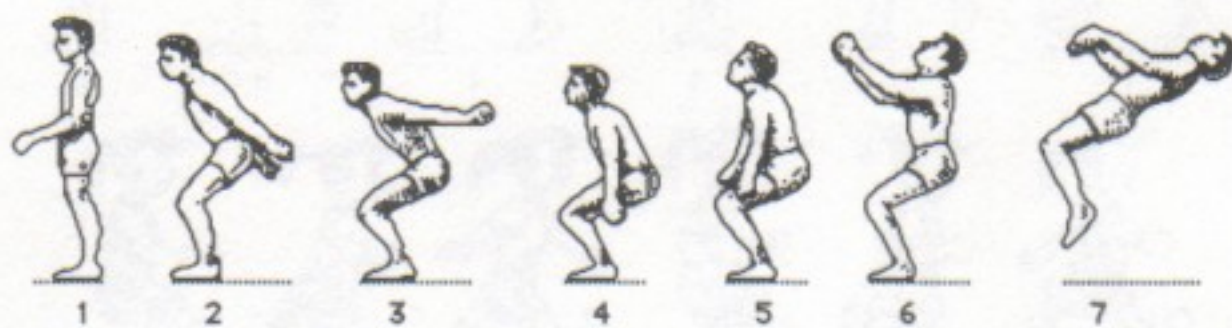
1

2

3

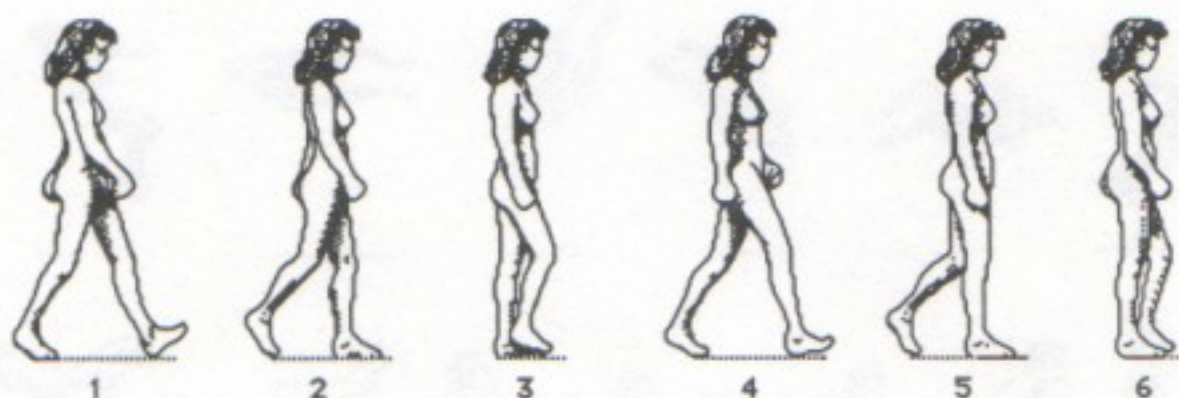
Cycle through 1, 2, 3 for forward motion. 3, 2, 1 for backward.

SPORTS



Fill in your own features.

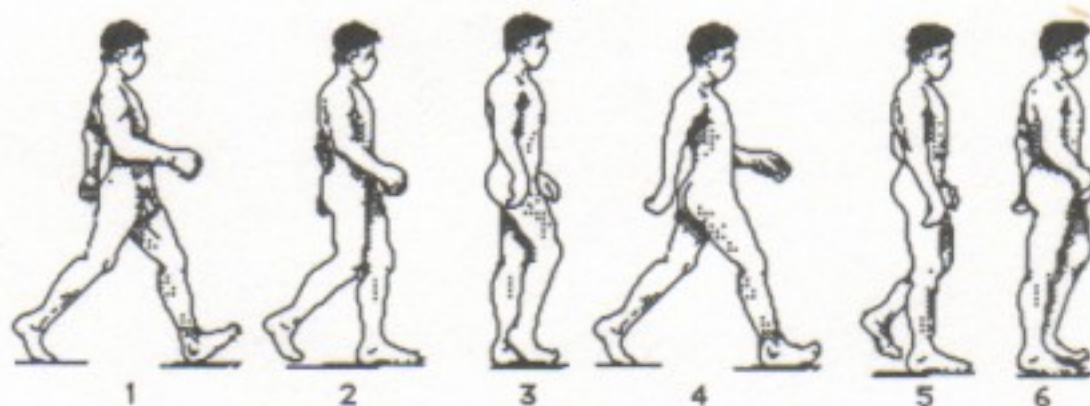
WALK, FEMALE



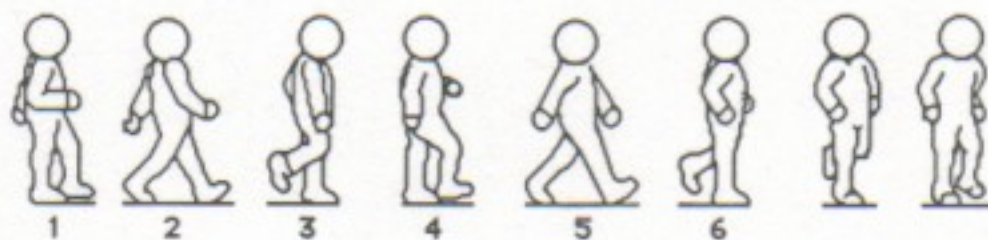
Be sure to match up the location of the foot that the weight of the figure is on between pattern switches in order to avoid the appearance that the figure is skating rather than walking.



WALK, MALE



Be sure to match up the location of the foot that the weight of the figure is on between pattern switches in order to avoid the appearance that the figure is skating rather than walking.

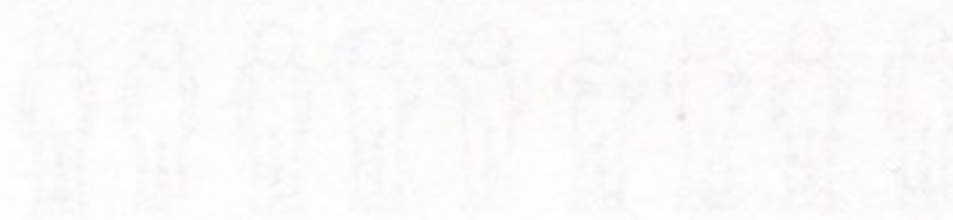


Fill in your own features.

1207, 2100



These figures are arranged in a row, possibly representing a sequence of movements or a dance.



These figures are arranged in a row, possibly representing a sequence of movements or a dance.



Marc Aaron Canter

Born on the South Side of Chicago in 1957, on the day that Humphrey Bogart died, Marc Aaron Canter has had extensive experience in performing, composing, fixing and selling. He drove a cab and waited on tables in New York while in college. With a name like Canter, it is not surprising that Marc has been singing since a young age. His strong voice is especially helpful at crowded trade shows, when he can float his baritone over the roar of the hardware and the hucksters.

Efforts to bring together visual and musical people has brought Marc back into the entertainment business. Hopes and dreams for the future involve creating a new type of art, that defies category and definition, but definitely "rocks the house!"

"There are many tools necessary for creating good art and animation. VideoWorks is the second, in a long line of products from MacroMind, that will help solve the artists dilemma of finding the right tools for the job."

Jay Fenton

Jay Fenton wrote his first game program, a roulette game, during algebra class in 1969. He has since firmly believed that computers are first and foremost toys. Jay produced his first animation program in 1971 on the DEC PDP 8 using an oscilloscope. College for Jay was a lengthy party interrupted by numerous A.I. and graphics projects.

After a stint working for the Wisconsin State Government, he entered the embryonic video game /pinball industry, and has been a kingpin in the numbers racket ever since.

Jay likes programming on the Mac, because he does not have to kill billions of aliens in order to show his audience a good time.

**Mark Stephen
Pierce**

As a child Mark drew, watched a lot of T.V. and got "D"s and "F"s in citizenship. For "higher" education he attended the School of the Art Institute of Chicago where he drew, did some performances with 100 T.V.s and 100 guitars, and got kicked out of electronic music class.

In 1981 during his last year of his B.F.A. and still in pursuit of the glowing essence of the C.R.T., Mark created his first digitally animated face and was subsequently pulled into the then pubescent video game/pinball industry. Last year he sold his T.V. and bought a Mac. In the past 14 months while drawing and animating on the Mac, Mark completely wore the feet off his mouse and created over 5 megabytes of MacPaint documents. During his career in the videogame industry he has come into contact with a number of animation tools and is currently convinced that VideoWorks is the best. Mark now draws every day, sits in front of his Mac and is still trying to improve his citizenship grades.

Dan Sadowski

Within his electronic cottage in Oak Park, on the western reaches of Chicago, Dan develops graphic software on the Macintosh for MacroMind, Inc. He didn't always do this. In fact, before MacroMind existed, when he was not transporting yachts up and down the eastern seaboard from Canada to the Caribbean, or along the Erie Canal, Dan was busy acquiring his B.S. and M.S. degrees at the University of Illinois - Chicago. Along the way, Dan married a fellow computer graphics addict, Patti Harrison, gave up the sea and has spent the last three years consulting in the computer graphics field. When not programming or bicycling, Dan and the little Ms. spend their time creating and maintaining the next generation of software engineers.



CREDITS

Program Design:	Marc Canter, Jay Fenton, and Mark Pierce
Programming:	Jay Fenton and Dan Sadowski
Art & Animation:	Mark Pierce (Apeing Around by Mike Saenz)
Sound:	David Theil and Marc Canter
Documentation:	Nicholas Lavroff
Tutorial Design:	Mark Pierce
Editing & Layout:	Alan Jacobs
Quick-Start Card:	Gail Rothenberg
Package Design:	Robert Fernandez and Joan Powers
Project Management:	Alan Jacobs and Gail Rothenberg

Nicholas Lavroff is a practicing attorney and writer in San Francisco. His work has appeared in various computer magazines, most notably Bay Area Computer Currents and MACWORLD, with whom he is a contributing editor.

MacroMind, Inc. is represented exclusively by the William Morris Agency and Ned Leavitt

Special thanks to:

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Look for other Hayden Software products by MacroMind:
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600 Suffolk St., Lowell, MA 01854
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