Chapter 5

Evaluating Graphics Creation Tools

In this chapter, you'll learn about:

- ◆ **Graphics creation tool categories**
- ◆ **Evaluating painting programs**
- ◆ **Evaluating capture utilities**
- ◆ **Evaluating viewers/converters**
- ◆ **Evaluating palette tools**

Graphics programs can provide the arcade game graphics artist with a variety of powerful, creative tools. It's no secret that having access to the right tools can save you time, make you more productive, and improve the overall quality of your artwork.

In order to find the right tool, you first need to know what features are the most important. And that's exactly what you can expect to learn in this chapter.

Graphics Creation Tool Categories

There are really four types of graphics programs that are useful for designing artwork and animation for arcade-style games. These categories include:

- Painting programs
- Screen capture utilities
- Image viewers/converters
- Palette tools

Painting Programs

Painting programs are akin to word processors for graphic images. They are programs that enable you to create graphics from scratch or manipulate pre-existing images. All painting programs provide a basic set of tools to draw shapes such as lines, rectangles, and ellipses. In addition to these tools, they also provide the ability to add text, change color definitions, and perform various other enhancements to images.

Painting programs are the primary tools for the arcade game graphics artist. The more sophisticated painting programs are known as *image editors*. The difference between image editors and painting programs isn't always that clear cut, but in general, image editors are more specialized at working with high-resolution images, such as scanned photographs, whereas painting programs are more specialized at creating original artwork.

There are essentially two types of painting programs available: *palette based* (8-bit) and *true color* (24-bit).

Although both types of programs are largely similar to each other in terms of operation and general feature sets, there are some important differences worth mentioning:

- **Color support**—True color painting programs typically offer much better color support than palette-based programs. Palette-based painting programs are limited to working with images that contain a maximum of 256 colors, while true color painting programs can work with images that can contain up to 16.7 million colors.

■ **Special effects**—True color painting programs tend to offer a greater variety of special effects and image processing functions than most palette-based painting programs offer. Furthermore, certain special effects can only be applied in high color display modes that most palette-based painting programs can't normally support.

■ **Layers**—Because they can work in high color depth display modes, true color painting programs often support what are known as *layers*, or virtual acetate sheets that allow you to create certain visual effects. Among other things, layers allow you to stack images on top of each other and arrange them in various ways. Unfortunately, palette-based painting programs do not support layers.

In terms of game artwork, each type of program also has its place. Generally speaking, you'll find these observations to be true:

TABLE 5-1: Game Artwork Recommendations for Painting Program Types

Game Artwork Type	Palette-Based Painting Program	True Color Painting Program
Title Screens	Recommended.	Highly recommended.
	Better for screens that use up to 256 or fewer colors or that contain large areas of flat color.	Better for screens that use more than 256 colors, contain photo-realistic artwork, or use subtle shading and blending effects.
Menu Screens	Recommended.	Recommended.
	Better for screens that use up to 256 or fewer colors or that contain large areas of flat color.	Better for screens that use more than 256 colors, contain photo-realistic artwork, subtle shading and blending effects, or incorporate transparent/trans-lucent effects.
Background Screens	Recommended.	Highly recommended.
	Better for screens that use up to 256 or fewer colors and that don't require much color fidelity.	Better for screens that require lots of color fidelity, contain photo-realistic artwork, or use subtle shading and blending effects.
Background Objects	Highly recommended.	Not recommended.
	Well suited for this type of artwork.	Not particularly well suited for this type of artwork.
Sprites	Highly recommended.	Not recommended.
	Well suited for this type of artwork.	Not particularly well suited for this type of artwork.

Examples of painting programs include *GrafX2* (palette based) and *Paint Shop Pro* (true color).

NOTE: There also exists a subclass of palette-based painting programs called *sprite editors*. Sprite editors are specially optimized for creating and animating game sprites. However, because traditional painting programs offer most of the same functionality, they have largely fallen out of favor with game developers. The few times you do see them still being used are as part of programming or multimedia-authoring environments.

Screen Capture Utilities

Screen capture utilities are programs that allow you to take "snapshots" of whatever is currently displayed on the screen. You can use such programs to capture the contents of the entire screen, specific windows, or just certain portions. Some of them will even let you capture sequences of events such as moving your mouse across the screen.

Screen capture utilities can really come in handy when you need to "borrow" certain elements from your favorite arcade game in order to see how something was drawn.

Examples of screen capture utilities include such programs as *HyperSnapDX* and *SnagIt*.

Image Viewers/Converters

Image viewers/converters are a class of programs that allow you to view and convert graphic images from one file format to another. With them, you can convert even the most obscure graphic file formats into something your painting program can use. This is especially important since most painting programs aren't capable of reading or writing every file format you're likely to encounter.

In addition to converting between different file formats, most image viewers/converters also allow you to apply special effects to images including resolution changes and color depth reductions.

Examples of image viewers/converters include such programs as *SEA* and *XNView*.

Palette Tools

Palette tools are special programs that allow you to construct and modify custom color palettes for use with your game artwork. Among other things, these

programs can be used to build cross-platform color palettes and extract color palette definitions from existing images.

And, although palette tools aren't really needed if your painting program has all of the necessary color tools, they are useful for certain situations and are worth keeping around.

Examples of palette utilities are programs like *Opal* and *PalMerge*.

Evaluating Graphics Tools and Essential Features

Graphics programs are only as good as the tools they offer. As such, this section examines the most important tools needed for game graphics creation.

For your convenience, I have taken the liberty of organizing these according to their function, and where applicable I have made specific recommendations on what features a given tool should support.

Essential Painting Program Features

Painting programs offer designers a wealth of interesting and powerful tools with which to create their artwork. However, it is important to point out that only a few of them are actually useful to game graphics designers. Designing arcade game artwork is a very specialized skill and so are the tools we require.

This being said, it is the purpose of this section to identify and discuss which tools you should be concerned with when considering whether or not to use a particular painting program.

The tools to be discussed fall into several categories and include:
- Brush tools
- Shape tools
- Block tools
- Navigation tools
- Color tools
- Image processing tools
- Special effects tools
- Other tools

NOTE: This section comprises the largest part of the chapter for the simple reason that painting programs are your primary graphics creation tools.

Brush Tools

This group of tools is responsible for drawing/painting pixels with variable degrees of precision. They include:

- The Pencil tool
- The Brush tool
- The Airbrush tool

The Pencil Tool

The Pencil tool lets you paint pixels in freehand fashion. This tool usually draws dots or lines in a single color using a fixed width and style. It is the default drawing tool in most programs.

The Pencil tool is used to drawing all sorts of freehand shapes. It's also great for situations that require precise control over pixels, such as doing close-in, pixel-by-pixel editing with the Zoom tool.

Feature Watch:

- Look for a program that allows you to set the spacing between pixels as they're painted. Such a feature can provide you with a higher degree of control over the shapes you draw with this tool.

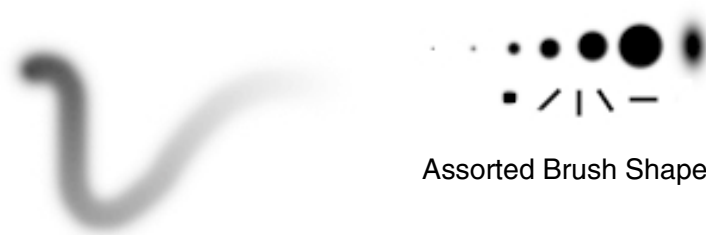**Example:**

FIGURE 5-1:
Pencil Tool Example

The Brush Tool (a.k.a. Paintbrush)

The Brush tool lets you paint pixels in soft strokes of color. It works just like a traditional painter's brush except that this one paints with pixels, not with pigment. Most programs allow you to choose from several different brush shapes and styles. Some programs even let you define your own brushes by allowing you to paint with screen blocks captured by the Selection tool.

The Brush tool is used to paint large areas of the screen with swaths of color. Unlike the Pencil tool, it's ideal for any situation that doesn't require a high degree of precision or when you just want to cover wide areas of the screen with color quickly.

Feature Watch:

- Look for a program that lets you choose from several different brush shapes. This gives you more control over the pixels you paint.

- Look for a program that lets you define any screen block and use it as a brush. This effectively allows you to define your own brush shapes to suit any purpose.

- Look for a program that allows brush shapes to be anti-aliased. This feature will allow you to draw shapes using smoother brush strokes than is normally possible.

Examples:

Assorted Brush Shapes

FIGURE 5-2: Brush Tool and Brush Shapes Example

NOTE: If you're looking for a true color painting program, make sure it supports variable brush stroke pressure for this tool. This allows you to paint objects in a manner similar to a natural media painting, like watercolors, and can be used to create many interesting effects.

The Airbrush Tool (a.k.a. Spray Can)

The Airbrush tool allows you to paint pixels on the screen as if you were using a can of spray paint. Because of this, some programs refer to this tool as "the spray can." With this tool, spraying in one spot of the screen will eventually fill that area with solid color.

The Airbrush tool is useful for shading and accenting objects and for covering large areas with color very quickly.

Feature Watch:

- Look for a program that allows you to adjust the width and flow of the pixel spray and, if possible, allows you to spray with patterns in addition to solid colors.

Example:

FIGURE 5-3: Airbrush Example

Shape Tools

This group of tools is responsible for drawing different types of basic geometric shapes from lines to rectangles. They include:

- The Line tool
- The Curve tool
- The Rectangle tool
- The Ellipse tool
- The Polygon tool
- The Fill tool

The Line Tool

The Line tool is used to draw straight lines at any angle. This tool usually draws lines in a single color using a variable width and style.

Both straight and diagonal lines are useful for creating objects with precise surfaces.

Feature Watch:

- Look for a program that allows you to draw connected lines with this tool. Sometimes this functionality is provided as a separate tool and sometimes it's included as part of the basic Line tool feature set.
- Virtually all lines created with this tool have square ends. If possible, look for a program that allows you to select rounded or arrow line ends in addition to square ends. This allows you to use this tool to label objects, etc.
- Look for programs that allow any lines you draw to be anti-aliased. This feature will allow you to draw smoother lines, which is especially useful for diagonal lines.

Example:

FIGURE 5-4: Line Example

The Curve Tool (a.k.a. Bezier Tool or Spline Tool)

The Curve tool is used to draw simple curves. The simplest implementations of this tool work with just two endpoints while the more advanced implementations allow you to draw curves with multiple endpoints. Like the Line tool, this option usually draws curves in a single color and using a variable width and style.

Curves are useful for rounding off the sharp edges on objects.

Feature Watch:

■ Look for a program that allows you to manipulate the end-points of the curve before you commit to drawing the curve. This feature is often called a *Spline* or *Bezier* tool and makes the process of drawing curves much easier and more precise.

Example:

FIGURE 5-5:
Curve Example

The Rectangle Tool (a.k.a. Box Tool)

The Rectangle tool lets you paint either filled or unfilled rectangles. This tool usually allows you to draw unfilled rectangles with variable line thicknesses. Some programs will also let you draw perfect squares using this tool.

Rectangles and squares are useful for creating all types of rectangular shapes.

Feature Watch:

■ Look for a program that also lets you create filled or unfilled squares using this option.
■ Look for a program that lets you draw rectangles with rounded edges.
■ Look for a program that lets you draw filled or unfilled rectangles and squares using solid colors, patterns, and colored gradients.

Examples:
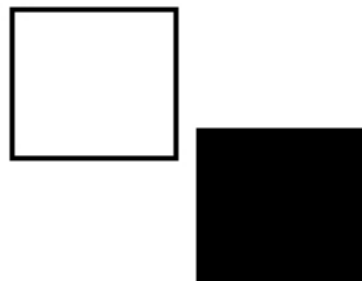
FIGURE 5-6: Filled and Unfilled Rectangle Example   FIGURE 5-7: Filled and Unfilled Square Example

The Ellipse Tool (a.k.a. Circle Tool)

The Ellipse tool allows you to draw filled or unfilled circles and ellipses. Some programs also allow you to create rotated ellipses. This tool usually allows you to draw unfilled ellipses and circles with variable line thicknesses.

Ellipses and circles are useful for creating all types of round objects.

Feature Watch:

- Look for a program that lets you create filled circles and ellipses with solid colors, patterns, and colored gradients.
- Look for programs that allow any ellipses you draw to be anti-aliased. This feature will smooth out the edges of these shapes.
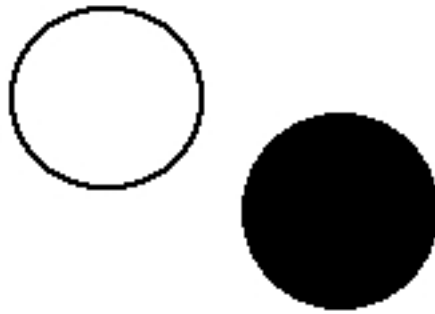
Examples:

FIGURE 5-8: Filled and Unfilled Circle Example

FIGURE 5-9: Filled and Unfilled Ellipse Example

FIGURE 5-10: Filled and Unfilled Rotated Ellipse Example

The Polygon Tool

The Polygon tool lets you draw various types of filled and unfilled irregular shapes. Virtually all programs that provide this option will automatically complete the shape for you, even if you leave out the final connecting line. For example, if you draw three sides of a figure, the program will generate the fourth for you and complete the shape.

Polygons are useful for creating any object that has an irregular shape.

Feature Watch:

■ Look for a program that lets you draw filled or unfilled rectangles and squares using solid colors, patterns, and colored gradients.

■ Look for programs that allow any polygons you draw to be anti-aliased. This feature will allow you to smooth out the edges of irregular polygon shapes.
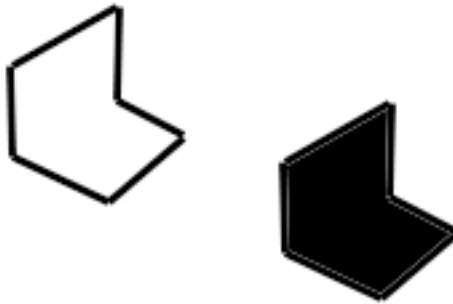
Examples:

FIGURE 5-11: Filled and Unfilled Polygon Example

The Fill Tool (a.k.a. Paint Bucket)

The Fill tool is used for filling enclosed shapes with solid colors, patterns, or colored gradients. If a shape isn't completely closed, the contents of the area being filled can "leak out" into the surrounding areas. This also tends to happen if the boundary of the shape being filled is the same color as the color of the fill itself.

The Fill tool is extremely useful for filling in large areas of the screen with color very quickly.

Feature Watch:

■ Look for a program that offers you a choice of solid and pattern fills. The program should allow you to select from these types of pattern fills:

- **Dithered patterns**—These are patterns of closely grouped dots. In display modes with few colors available, using dithered patterns can simulate the presence of additional colors.
- **Crosshatched patterns**—These are patterns formed by using various combinations of horizontal, vertical, and diagonal lines.
- **Textured patterns**—These are patterns formed by using various textures or full-color image clippings. Textures can come from virtually any graphic source including photo-realistic images and line drawings.

NOTE: Most programs will let you edit existing fill patterns as well as let you create your own from scratch.

- Look for a program that also supports *color gradient* fills. A color gradient is a series of colors that gradually fade from light to dark. When evaluating this feature in a painting program be sure to look for these gradient fill options:
  - **Linear fills**—Fills in an area using a linear color gradient. Straight fills may be vertically, horizontally, or diagonally oriented. Many programs allow you to control the exact angle of the fill while others predefine them for you.
  - **Radial fills**—Fills in an area using a circular color gradient. These fills produce a pronounced and rounded, 3D-like effect. To further enhance this feature, many programs allow you to control the exact angle of how the fill is applied.
  - **Contoured fills**—Works in a similar fashion to the Radial fill effect; however, contoured fills take into account the actual shape of the object being filled. Contoured fills tend to produce beveled 3D-like effects. To further enhance this feature, many programs allow you to control the exact angle of how the fill is applied.

NOTE: Some programs offer the ability to roughen the quality of the fill. This is useful for certain types of visual effects such as creating textures.

NOTE: Gradient fills are very useful for creating many types of special graphic effects. If a particular program doesn't provide a gradient fill option, find another that does.
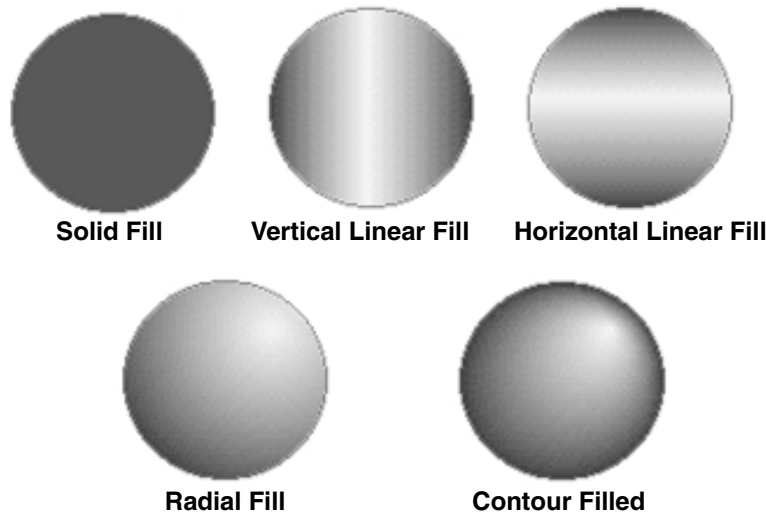
Examples:

Solid Fill **Vertical Linear Fill** **Horizontal Linear Fill**

Radial Fill **Contour Filled**

FIGURE 5-12: Fill Examples

Block Tools

This group of tools is responsible for selecting and manipulating various sections of your image. They include:

- The Selection tool
- The Lasso tool

The Selection Tool (a.k.a. Brush Capture)

The Selection tool allows you to select a rectangular portion of an image and temporarily store it for further manipulation. This rectangular selection is called a *block*. All painting programs automatically copy the captured screen region into a hidden memory buffer. In a Windows program, the block is usually copied over to the Windows Clipboard.

The Selection tool is useful for grabbing rectangular sections of the screen where they can be used as custom brushes and for producing special effects. However, the most common use of the Selection tool is for making copies of objects.

Feature Watch:
- Look for a program that provides these features and transformations after you make a selection:
    - **Cut**—Cuts or removes a block from the visible screen. In most programs, the block isn't actually removed but rather stashed to a temporary memory buffer. In Windows programs, a cut block is copied to the Clipboard

where it can usually be pasted back on the screen. The contents of the buffer or Clipboard are replaced with new image data each time you cut a new selection.

■ **Copy**—Copies or duplicates a block to the visible screen. Many programs will move the copied block to a temporary buffer while Windows programs will copy the block to the Clipboard. Once a block has been copied, it can usually be pasted back on the screen. The contents of the buffer or Clipboard are replaced with new image data each time you copy a new selection.

■ **Paste**—Pastes a block that has been previously cut or copied to a buffer or the Clipboard back on the screen. Since the contents of the buffer or the Clipboard aren't erased until a new selection has been cut or copied, you may paste blocks to your heart's content. Some programs allow you to control how a block is pasted back on the screen. There are several options available but look specifically for a program that allows you to paste blocks *opaquely* and *transparently*. Blocks pasted opaquely will overwrite the background image with their contents. Meanwhile, blocks pasted transparently will allow the background image to show through certain parts of the block.

NOTE: Cut, Copy, and Paste functions are considered to be standard features in any painting program and are indispensable to the graphics artist. Don't use a program if it doesn't support at least some of these features.

■ **Resize**—Resizes (stretches or shrinks) a block. Many programs allow you to interactively control the size of the block with the mouse while others force you to manually type values into a dialog box to resize the block. Some programs also break out these options into separate Stretch and Shrink operations.

■ **Rotate**—Rotates a block along a given axis. Some programs allow you to interactively rotate a block through all 360 degrees using the mouse while other programs only allow blocks to be rotated at 90-degree intervals using menu commands.

■ **Bend**—Bends a block from its center to the left, right, top, or bottom. Most of the programs that provide this feature will allow you to interactively control the bending with the mouse.

■ **Shear**—Skews or stretches a block from a specified anchor point. Many of the programs that offer this feature will allow blocks to be interactively sheared to the left, right, top, and bottom using the mouse.

■ **Half**—Reduces a block by half along its horizontal and vertical axes. This is similar to the Resize option except the block reduction is done

proportionally. For example, a block that is 32x32 pixels in size will be 16x16 pixels after it is halved.

■ **Double**—Enlarges a block by two times its size along its horizontal and vertical axes. This is similar to the Resize option except the enlargement is done proportionally. For example, a block that is 32x32 pixels in size will be 64x64 pixels after it is doubled. Look for a program that allows you to perform this operation interactively using the mouse.

■ **Flip**—Flips a block along its axis in mirror image fashion. Most programs allow you to choose whether a block is flipped horizontally, from left to right or right to left, and vertically, top to bottom or bottom to top.

■ **Single color**—Discards all the color information contained in a block and fills in the block area with the current drawing color. This feature is usually used to make large drawing brushes.

■ **Load block**—Retrieves a block from disk and places it into the copy buffer or Clipboard for further use and manipulation.

■ **Save block**—Saves a block to disk for future use. Most programs save blocks in proprietary file formats but will occasionally use standard file formats to save their block data.
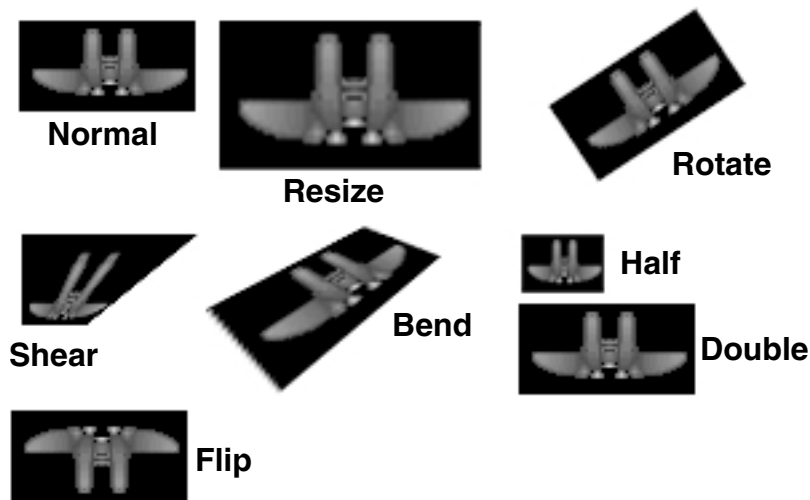
Examples:

FIGURE 5-13: Resize, Rotate, Bend, Shear, Half, Double, and Flip Examples

NOTE: There's one major difference between how the Selection tool works in DOS and Windows painting programs. Windows programs typically support what are known as *active* selection tools. This means that once you make a selection, the selection is preserved until it's manually deselected or disabled by another program operation. DOS-based painting programs typically don't offer this capability. Active selections are far more flexible for manipulating image blocks as they allow for you to perform successive manipulations without having to continually reselect it.

The Lasso Tool (a.k.a. Block Carve or Freehand Selection Tool)

The Lasso tool allows you to select an irregular portion of an image and temporarily store it for further manipulation. Despite the fact that the selection appears to be non-rectangular, it is still referred to as a *block*. All painting programs automatically copy the captured screen region into a hidden memory buffer. In a Windows program, the block is usually copied to the Clipboard.

The Lasso tool is useful for grabbing non-rectangular sections of the screen. For example, you can use this tool to trace the outline of a circle or another complex shape and then copy it, cut it, paste it, or even paint with it.

Feature Watch:

- All programs that support the Lasso tool can usually apply the same block transformations supported by the Selection tool.
- Make sure the program supports a Lasso tool that can make *transparent* image selections. These are selections where the background shows through the foreground. It can enable you to produce some interesting visual effects as well as give you more control over the items you are selecting and manipulating.

NOTE: Lasso tools under Windows are often active as defined under the Selection tool description.

Navigation Tools

This group of tools lets you easily navigate across different sections of your image. They include:

- The Zoom tool
- The Navigator tool

The Zoom Tool (a.k.a. Magnifying Glass or Fatbits)

The Zoom tool lets you magnify any area of an image.

The Zoom tool is useful for doing close-in, pixel-by-pixel editing of images. When working with this tool, you have full and precise control over every pixel in the portion of the image area being magnified. Because of this, it's probably the single most important tool in your graphics toolbox.

Feature Watch:

■ Look for a program that supports multiple levels of magnification, i.e., 2, 3, 4, 6, and 8 times the original size of the image. In practice, a magnification level between 4 and 8 times is the most useful. Most programs tend to only offer one or two levels of magnification, however.

■ Make sure the program you'd like to use allows you to use all of the available painting tools while working with the magnification tool. Without this ability, you'll need to constantly switch back and forth between tools, thus wasting time and severely affecting your overall productivity.

■ Look for a program that lets you see the magnified version of an image alongside the actual sized view (as in Figure 5-14). This way you can visualize the changes you make as they happen.

■ Look for a program that allows you to toggle the *magnification grid* on and off. The magnification grid inserts grid lines between magnified pixels to help you see distinctions between pixels of the same color. While this feature is often helpful, it can also become distracting; thus, you should have the ability to turn it off.

■ Look for a program that allows you to use both the mouse and arrow keys to move through a magnified image. This saves time since the keyboard can often be faster for scrolling operations.
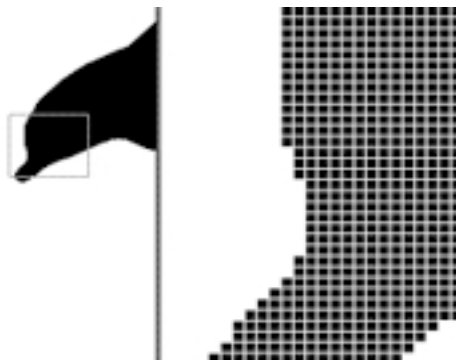
Example:

FIGURE 5-14: Zoom Tool Example

The Navigator Tool (a.k.a. Grabbing Hand Tool)

The Navigator tool lets you access different sections of the image you're currently working on. This tool is useful for moving around and viewing different sections of an image while drawing.

Feature Watch:

■ Look for a program that allows you to visually select the area you want to access. Typically, most programs can show a small preview of the entire screen and then use a small, movable window to zero in on the area of the screen that you want to see.

Color Tools

This group of tools lets you control, define, and modify the color information contained in your image. They include:

■ The Eye Dropper tool
■ The Palette Selector tool

The Eye Dropper Tool (a.k.a. Pipette Tool)

The Eye Dropper tool allows you to obtain color information from any pixel within an image.

The Eye Dropper tool can be used to quickly change the current painting color by simply clicking on any pixel within an image. For example, if the current drawing color is set to red, you can move the Eye Dropper tool over to a part of the image that contains green and then change the painting color to green.

The main use of the Eye Dropper is to quickly swap drawing colors without forcing you to fumble around your painting program's color palette.

Feature Watch:

■ None. The Eye Dropper tool functions the same in almost every painting program available.

NOTE: Since this tool is such a time saver, don't consider using any painting program that doesn't include one.

The Palette Selector tool (a.k.a. Palette Tool)

The Palette Selector tool allows you to create and modify color combinations for use in your color palette. The number of colors available to you will depend on your current display mode settings and the capabilities of your system. Most programs will allow you to specify color selections using either the RGB (red-green-blue) color model or the HSV (hue-saturation-value) color model.

The Palette Selector tool gives you full control over the colors used in your images. With this tool you can define and redefine both color palettes and color gradients.

> **NOTE:** There is a major difference between how color values are specified between DOS and Windows systems. See Chapter 8 for more information on these differences.

Feature Watch:

- Look for a program that supports these features:
  - **Spread**—Creates a gradient, or a color spread, between two different colors in the current color palette. Most programs let you define a starting color and an ending color for the gradient. The Spread function will then generate all of the color shades that fit between these two colors. For example, to create a gradient that contains only grays, you would make the starting color black and the ending color white or vice versa. The Spread function would then compute all of the intermediate shades of gray that fit between black and white. The smoothness of the transition between the colors depends on the number of color entries that separate the start and ending colors you select. More colors between them produce smoother gradients while fewer colors produce coarser gradients. This function is also sometimes referred to as a *color ramp*. This function is primarily used for grouping colors with similar shades together in the color palette.
  - **Copy**—Copies the value of one color in your color palette to another position in the color palette. This function is useful for making quick adjustments to your palette.
  - **Swap**—Swaps, or exchanges, the positions of two different colors in your palette. This function is useful for rearranging individual colors in your color palette.
  - **Gradient**—Works much like the Swap function but is specifically used to create and manage color gradients used by the Fill tool described earlier in this chapter. Some programs will limit you to gradients of only 16 shades while others will let you use the entire palette for a gradient.
  - **Load**—Retrieves a saved color palette from disk. Look for a program that lets you load color palettes saved in the Microsoft Palette (.PAL) format.
  - **Save**—Saves the contents of the current color palette to disk for later use. Look for a program that lets you save your palette data in the Microsoft Palette (.PAL) format, as this will make your color palette definitions compatible with many other programs.
  - **Undo**—Erases any changes or additions you might have made to the current color palette.

■ **Restore**—Restores the current palette to its original, unmodified state. Many programs predefine the color palette with their own definitions. This function returns the color palette to the program's default palette.

Image Processing Tools

This group of tools allows you to apply different types of color enhancements to your image. They include:

■ The Brighten tool
■ The Darken tool
■ The Smooth tool
■ The Smear tool
■ The Translucency tool

The Brighten Tool (a.k.a. Dodge Tool)

The Brighten tool lets you brighten the colors contained in an image. The Brighten tool is useful for increasing the color intensity of an image or image area. For example, using this tool on an area that contains dark gray will produce light gray. This tool is very useful for adding highlights to objects.

Feature Watch:

■ Look for a program that allows you to brighten up selections as well as the entire image.

The Darken Tool (a.k.a. Burn Tool)

The Darken tool lets you darken the colors contained in an image.

The Darken tool is useful for reducing the color intensity of an image or image area. It's the exact opposite of the Brighten tool. For example, using this tool on an area that contains light red will produce dark red.

This tool is very useful for adding dark accents to objects.

Feature Watch:

■ Look for a program that allows you to darken selections as well as the entire image.

The Smooth Tool (a.k.a. Average)

The Smooth tool lets you soften hard lines by reducing the amount of contrast between two adjoining colors. This tool works best on images with large gradients defined in the color palette as they enhance the smoothing effect. The Smooth tool is very useful for removing rough edges from the surfaces of various objects.

Feature Watch:

■   Look for a program that allows you to use all drawing tools (i.e., brush, rectangles, block, etc.) with this feature.

Example:

FIGURE 5-15: Smooth Tool Example

The Smear Tool (a.k.a. Smudge or Blend Tool)

The Smear tool smears the colors of an object as you paint over them. The effect it produces is similar to smearing paint with your fingers. The Smear tool is useful for creating certain types of shading and blending effects.

Feature Watch:

■   Look for a program that allows you to use all drawing tools (i.e., brush, rectangles, block, etc.) with this feature.

Example:

FIGURE 5-16: Smear Tool Example

The Translucency Tool

The Translucency tool operates as a toggle. It produces a transparent effect as you draw, allowing the background of the image to show through to varying degrees. Most programs let you adjust the transparency level, usually by specifying a percentage ranging from 0% (opaque) to 100% (completely transparent). For example, say you were drawing with white over a brown object while the Translucency tool was active. If the transparency level were set to 75%, the resulting color would be equal to 75% of the drawing color, or equivalent to the color beige.

The Translucency tool is useful for created muted color effects for when you want to render an object visible but not necessarily make it the main focus of the image.

NOTE: The concept of translucency is explained in greater detail in Chapter 7.

Feature Watch:

- Look for a program that allows you to use all drawing tools (i.e., brush, rectangles, block, etc.) with this tool.
- Look for a program that allows you full control over the transparency level setting.
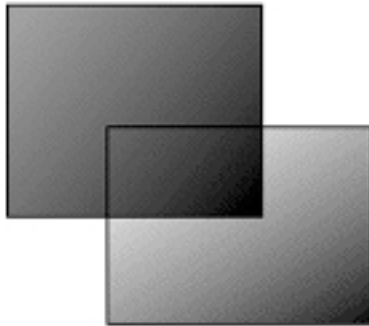
Example:

FIGURE 5-17: Translucency Tool Example

NOTE: General-purpose image processing is one area where true color painting programs have the advantage over palette-based painting programs. Many of these programs will offer more tools than those mentioned here.

Special Effects Tools

This group of tools allows you to apply different types of special effects to your image. They include:

- The Stencil tool
- The Anti-alias tool
- The Colorize tool
- The Shade tool

The Stencil Tool (a.k.a. Screen Mask)

The Stencil tool lets you create *stencils*, or protected areas of color within the current image. Stencils work like masking tape, that is, any area that contains colors that are stenciled can't be painted over with other drawing colors.

Stencils are extremely useful for experimenting with different effects on an image without having to worry about ruining its contents.

Feature Watch:

- Look for a program that allows you to specify the individual colors to stencil and that provides options to save and load the stencils you create for future use.

NOTE: Stencils are largely palette independent. For example, if you stenciled a particular shade of blue in one palette, it will remain stenciled in another image as long as that same shade of blue exists in the new image's color palette.

Example:

FIGURE 5-18: Stencil Example

The Anti-alias Tool

The Anti-alias tool operates as a toggle. It minimizes the impact of screen aliasing by reducing the amount of contrast between two adjoining colors. Essentially, it's analogous to a version of the Smooth tool that works with specific drawing functions. Like the Smooth tool, the more colors present in the palette, the better the resulting anti-aliasing effect is.

The Anti-alias tool is useful for removing rough edges from the surfaces of different objects and particularly effective for text, especially at low screen resolutions.

Feature Watch:

- Look for a program that offers more than one anti-aliasing algorithm. Some algorithms produce better results on certain types of objects than others.
- Make sure the program allows you to apply anti-aliasing to every drawing tool available. This gives you maximum flexibility.
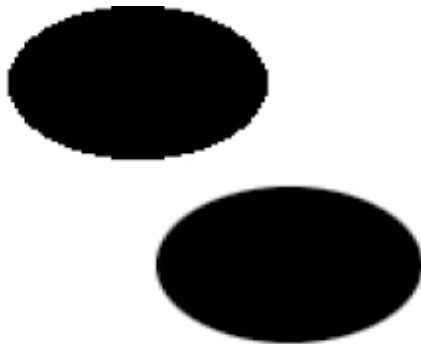
Examples:

FIGURE 5-19: Normal Ellipse (aliased) vs. Anti-aliased Ellipse

FIGURE 5-20: Normal Text (aliased) vs. Anti-aliased Text

The Colorize Tool (a.k.a. Tint)

The Colorize tool adds the current painting color to the current image while preserving the value (or intensity) of the original image color.

The Colorize tool is useful for adding color to monochrome (black and white) and gray scale images. It's also useful for replacing ranges of similar colors with ranges of a different color while maintaining the original color intensity of the object. For example, you can use this tool to replace a gradient of 16 grays with 16 reds, provided both sets of colors have the same level of color intensity. The new colors in the gradient will still retain their original brightness.

NOTE: For more information on color intensity, see Chapter 7.

NOTE: This tool can be a real time saver when it comes to recoloring objects very quickly. For example, with this tool, you can change the green color scheme of a tank object to brown without affecting the object's overall appearance.

Feature Watch:
- Look for a program that allows you to colorize image blocks as well as the whole image.
- Look for a program that allows you to use all drawing tools (i.e., brush, rectangles, block, etc.) with this feature.

The Shade Tool

The Shade tool is used to create subtle shading effects within your images. It works by progressively sampling and darkening the current color. The Shade tool is especially useful for adding shading to large screen objects such as title screen logos or background scenery.

Feature Watch:
- Look for a program that allows you to use the Shade tool with any size brush for maximum control.

NOTE: The Shade tool works best when there are many similar colors defined in your palette; otherwise, the impact of the shading effect is lost. Some programs also only support shading effects when gray or white is selected as the current painting color.

Other Tools

This group of tools enables you to correct mistakes, erase entire images, create precise drawings, and easily apply text to your image. They include:
- The Grid tool
- The Eraser tool
- The Clear tool
- The Undo tool
- The Text tool

The Grid Tool

The Grid tool modifies the behavior of the different drawing tools. When activated, the Grid tool applies an invisible grid to the image area. All tools are then constrained to draw only within the coordinates specified by the grid.

The Grid tool is very useful for producing precise drawings and is essential for creating the constraining grid boxes needed by sprites and background objects.

Feature Watch:

■ Look for a program that allows you to adjust the grid spacing by both horizontal and vertical pixel values.

■ Look for a program that allows you to use all drawing tools (i.e., brush, rectangles, block, etc.) with this feature.
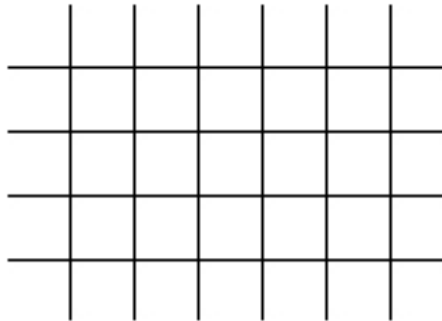
Example:

FIGURE 5-21: Grid Example

The Eraser Tool

The Eraser tool allows you to selectively erase areas of the screen. It replaces the contents of the foreground with the currently selected background color. Essentially, it works like the Brush tool with a fixed brush width that only paints with the background color.

Example:

FIGURE 5-22: Eraser Example

`[LR` **The Clear Tool (a.k.a. Erase)**

The Clear tool allows you to erase the contents of the entire screen. It usually replaces what's on the screen with the current background color.

The Clear tool comes in handy when you want to erase the contents of a screen and completely start your drawing over from scratch.

Feature Watch:

- Look for a program that prompts you to confirm this operation before it erases the contents of the screen. After all, there's nothing worse than activating this tool by accident and losing your masterpiece forever!

`UN DO` **The Undo Tool**

The Undo tool allows you to undo your last painting action. Because of this, it'll quickly prove to be one of the most useful tools you have at your disposal.

The Undo tool is extremely useful for correcting mistakes that you make. If you activate it, the contents of the screen will be fully restored to the exact state it was in prior to your last change/mistake. For example, say you draw a circle in the wrong place on the screen and accidentally ruin your image. With the Undo tool, you can restore your image back to how it looked before you added the circle.

Feature Watch:

- Look for a program that has what's called an "undoable," or reversible, undo tool. This feature lets you undo the undo operation! For example, say you draw a red rectangle and then decide to undo it. With a Reversible Undo tool, you can bring back the red rectangle. This feature can also prove very useful when it comes to testing how different sprite cells will look when animated.

NOTE: A painting program without an Undo function is totally useless. No matter how good or experienced you are, you will make plenty of mistakes when drawing arcade game graphics. An Undo tool can help minimize the impact of most of them.

NOTE: Some programs also have a feature called an *undo history*. This feature allows you to repeat or undo certain operations that were made several operations in the past. So, in effect, you could reproduce certain changes you made to an image in the past.

Example:

Before Undo

After Undo

FIGURE 5-23: Undo Example

T | The Text Tool

The Text tool lets you add and edit text lines or entire blocks of text in a variety of *fonts*, or type styles, to an image. In most programs, this tool will render text in the current painting color. The Text tool is useful for adding text for image captions, screen menus, and game status indicators.

Feature Watch:

- Make sure a program has a Text tool that supports multiple sizes. Windows programs usually let you use any installed Windows TrueType font in any size supported by the system. However, DOS programs usually restrict you to only a few predetermined point sizes. If using a DOS painting program, be sure to

look for a program that allows you to select text from 8-point, 16-point, 24-point, 36-point, and 48-point, if possible.

- If using a DOS painting program, make sure it supports GEM or ZSoft font formats as there are large numbers of these fonts available.

- Look for a Text tool that supports **bold**, *italic*, and <u>underline</u> styled text in addition to normal text.

- If possible, look for a program that allows you to control or adjust text attributes such as:

  - **Leading**—*Leading* is a measurement of the vertical space between lines of characters. Leading can be used to adjust the balance and legibility of text on the screen. Lines with too little leading can seem cramped and crowded, while lines with too much leading can seem too open. Many game designers fail to take leading into account when they place text on the screen. Poor leading can make information difficult to read and find.

  - **Kerning**—*Kerning* is a method of reducing the space allotted to one or both sides of a character to make it fit more comfortably between its neighbors. Kerning is frequently used to improve the legibility of text.

  - **Tracking**—*Tracking* is a measurement of the overall letter spacing over a line. Adjusting the tracking of a line can also improve its legibility.

  - **Weight**—A font's *weight* is a measurement of the vertical thickness of the individual characters in a font. Font weight is specified according to several grades: *extra-light*, *light*, *book*, *medium*, *bold*, *extra bold*, and *black*. Fonts get darker and heavier in appearance as their weight increases. Be aware that not all fonts support all of these weights.

- Look for a Text tool that lets you place text anywhere on the screen and doesn't restrict you to character boundaries. Some older software, especially DOS programs, tend to do this.

- Look for a Text tool that supports both *proportional* and *monospaced* fonts. In fonts that are proportional, each character is given only as much horizontal space as it needs. For example, in a proportional font the letter "I" doesn't take up as much spaces as the letter "W." Proportional fonts are very popular for text-heavy applications because their characters are easy to distinguish from each other. Meanwhile, monospaced fonts are commonly used for displaying information that must line up on-screen in a particular way, such as source code or a game's high score table. However, they are not very good for displaying large amounts of connected text, which is commonly found in game help screens and on-screen instructions. This is because each character in a monospaced font is surrounded by a fixed amount of white space which makes their appearance seem uneven.

NOTE: Most DOS fonts are of the monospaced variety, whereas TrueType fonts tend to be both.

- Look for a Text tool that gives you basic text editing features such as back-spacing, forward deletion of characters, cursor key movement, and mouse con-trolled text insertion.
- Look for a Text tool that supports left, right, and centered text alignment.
- Look for a Text tool that supports anti-aliasing as this produces smoother looking text, especially at lower screen resolutions. Just be careful when using this feature.

Examples:

FIGURE 5-24: Text Tool Example

Miscellaneous Features

These are features that every painting program should provide. They include:

- Standard file formats
- Multiple display mode support
- Multiple work screen support
- Keyboard shortcuts
- Coordinate tracking

Standard File Formats

Any painting program you use should be fully compatible with all industry standard file formats, especially if you plan to exchange your graphics with different programs, systems, or development tools. A word of warning: not all programs will both load and save every possible file format. This shouldn't pose a problem, however, as long as the program you're considering using is compatible with one or more of the formats described in Table 5-2.

TABLE 5-2: Industry Standard File Format Support

Graphics File Format	Comments
IFF/LBM	The program should be able to load and save this format because it's a well-established PC graphics format (*Deluxe Paint IIe*).
GIF 87a	The program should at least be able to load and save files in this format, as it's practically a universal graphics standard. Support for the GIF 87a is essential since it ensures full backward compatibility with older graphics applications.
GIF 89a	The program should be able to load and save this format, as it's a universal graphics standard.
Macintosh PICT	It would be nice for a program to at least be able to load files in this format, but it isn't essential.
PC Paintbrush PCX	The program should be able to load and save this format, especially if you develop games for DOS because it's the standard graphics format on that platform.
PNG	It would be nice for a program to at least be able to load and save files in this format, but it isn't essential to do so at this point in time.
Targa TGA	Not a common graphics format so its support isn't required or expected.
Windows RGB BMP	The program must be able to load and save this format because it's the standard Windows graphics format.
Windows RLE BMP	The program must be able to load and save this format because it's the standard Windows graphics format.

NOTE: For more information on each of these graphic file formats, please refer to Chapter 3.

Multiple Display Mode Support

You should look for a program that supports all industry standard screen resolutions (i.e., 320x200, 640x480, and 800x600) and color depths (i.e., 8 bit, 16 bit, and 24 bits). This mainly affects DOS-based graphics software since historically DOS programs have required a separate video driver for each type of graphics card and for each display mode.

Table 5-3 summarizes which display modes to look for when evaluating a DOS-based painting program.

Most Windows programs, on the other hand, don't have to worry too much about this issue. That's because Windows will automatically work with whatever display modes your video hardware supports. The only exception to this rule occurs when a particular program isn't designed to take advantage of certain display modes, i.e., a program that limits itself to 8-bit color palette, etc. The program's documentation will tell you if this is the case.

> **NOTE:** Please be aware that 16-bit and 24-bit color depths aren't typically supported by most DOS painting programs since these display modes weren't common when most of these programs were originally written.

TABLE 5-3: Essential Display Modes (DOS)

Screen Resolution	Color Depth	Comments
320x200	8 bits/256 colors	Assume every DOS-based painting program is compatible with this display mode.
320x200	24 bits/16.7 million colors	Only a handful of DOS-based painting programs support this mode and only when using a third-party VESA driver on compliant SVGA video hardware.
320x240 and other Mode X progeny	8 bits/256 colors	It's important to understand that only a handful of DOS-based painting programs actually support these display modes and then usually only when patches or other modifications are applied to them. Access to these display modes isn't essential but can be helpful, especially when trying to match your artwork's aspect ratio with that of the target display mode.
640x480	8 bits/256 colors	Most DOS-based painting programs are compatible with this display mode. However, their video drivers might not work with your particular graphics hardware. If this is the case, a program such as SciTech's *Screen Display Doctor* utility can ensure compatibility with this display mode.
640x480	24 bits/16.7 million colors	Only a handful of DOS-based painting programs support this mode and only when using a third-party VESA driver on compliant SVGA video hardware.
800x600	8 bits/256 colors	Most DOS-based painting programs are compatible with this display mode. However, their video card drivers might not work with your particular graphics hardware. If this is the case, a program such as SciTech's *Screen Display Doctor* utility can ensure compatibility with this display mode.

Screen Resolution	Color Depth	Comments
800x600		Only a handful of DOS-based painting programs support this mode and only when using a third-party VESA driver on compliant SVGA video hardware.

NOTE: Some programs, particularly those available for Windows, allow you to define screen windows of various sizes, but all programs are still restricted to working within one of the screen resolutions referred to in this table.

Multiple Work Screen Support

The best painting programs provide spare screens for you to work with. For example, you can use one screen to experiment with different types of effects and the other to actually hold the final results. Or imagine how useful it would be to have multiple screens available to store different images and copy objects between them. In such cases, having access to work with multiple screens can really be useful.

Windows-based painting programs usually let you open as many new screen windows as free memory will allow. However, because DOS is particularly bad at managing memory, this feature is far less common under DOS than it is under Windows. In fact, you'll be lucky to find a DOS painting program that lets you access more than two screens at a time. These programs do exist, but they're very rare. In any case, make sure that any painting program you're considering, whether it runs under DOS or Windows, allows you to open up multiple work screens.

Keyboard Shortcuts

In any program, keyboard shortcuts are likely to save you time, especially when dealing with repetitive tasks. Well, painting programs can benefit from keyboard shortcuts as much as any application, if not more. Therefore, make sure that any program you're considering, whether it runs under DOS or Windows, offers plenty of keyboard shortcuts.

Table 5-4 lists all of the common operations that should have keyboard shortcuts associated with them. Look for these in any program that you evaluate.

TABLE 5-4: Suggested Keyboard Shortcuts for Common Painting Program Operations

Program Operation	Comments
Block copying	Occurs very frequently while designing arcade game graphics so look for a keyboard shortcut that's convenient to access and an established application standard, i.e., Ctrl+C or Shift+C.
Block pasting	Occurs even more frequently than block copying when designing arcade game graphics so look for a keyboard shortcut that's convenient to access and an established application standard, i.e., Ctrl+V or Shift+V.
Block cutting	Occurs quite often when designing arcade game graphics. Typically, block cutting is used to swap the location of objects on the screen. Therefore, it's important for the painting program to support an established application standard, i.e., Ctrl+X or Shift+X.
Loading images	If you're working with many different images, having access to a keyboard shortcut for this function will save you lots of time.
	Look for a logical shortcut like Alt+L or F9.
Saving images	One of the cardinal rules of working with computers is to save your work frequently. Power fails and systems die. So, if you're working on your next masterpiece, having access to a keyboard shortcut for this function will save you lots of time and worry.
	Look for a logical shortcut like Alt+S or F10.
Scrolling	When you work with high-resolution images, you'll notice that most programs don't let you see the whole image at once.
	Therefore, you'll need to scroll in order to view different sections of it. And if you spend any time editing your image with the Zoom tool, you'll find that scrolling with the mouse isn't all that fast or practical. Also, look for keyboard shortcuts that let you use the arrow keys to navigate the screen in fine pixel increments or the PgUp and PgDn keys to scroll the screen up or down, respectively.
Toggling anti-aliasing	Anti-aliasing improves the appearance of many drawing tools.
	Make sure any program you evaluate provides a keyboard shortcut to toggle it on and off as needed, i.e., Alt+A.
Toggling colorizing	Colorizing can help you to create some very interesting effects. Because this feature can get in the way at times, you'll also want the ability to toggle this feature on and off as needed.
	Look for a logical keyboard shortcut that allows you to do this easily, i.e., Alt+T.
Toggling the grid	Grids are useful for creating precise drawings and you'll use this tool often. Because this feature can get in the way at times, you'll also want the ability to toggle this feature on and off as needed.
	Look for a keyboard shortcut that allows you to do this, i.e., Alt+G.

Program Operation	*Comments*
Toggling the stencil	The ability to "mask off" different areas or colors on the screen can prove to be invaluable, especially when you want to experiment without risking your work. Because this feature can get in the way at times, you'll also want the ability to toggle this feature on and off as needed. Look for a keyboard shortcut that allows you to do this, i.e., Alt+M.
Undoing	The Undo tool is probably your single most powerful drawing tool and you'll wind up using it quite a bit.
	Therefore, look for a logical keyboard shortcut for this tool such as Ctrl+Z or Alt+U.
Zooming	Once you get serious about creating arcade game graphics, you'll spend most of your time editing images using the Zoom tool. As a result, you'll definitely want the ability to quickly access this tool. You'll also want a program to allow you to scroll while "zoomed."
	Look for simple and logical keyboard shortcuts like Alt+Z or Z to activate your painting program's Zoom Tool.

Coordinate Tracking

When activated, this option displays the X and Y coordinates for any pixel on the screen. This feature is useful for recording the starting and ending points of graphic objects and comes in handy when you need to measure the horizontal and vertical dimensions of a particular object.

NOTE: This option is not the same as a ruler and shouldn't be used as or confused with one.
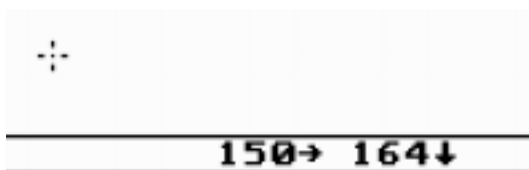
Example:

FIGURE 5-25: Coordinate Tracking

NOTE: Be sure to look closely at Chapter 6 for specific reviews and recommendations of painting programs that support most if not all of the features and tools described here.

Essential Screen Capture Utility Features

All screen capture programs are not alike. However, all of these programs share a common set of core features. This section of the chapter examines the features that a screen capture utility must have to be useful:

- Capture flexibility
- Common file format support
- Ease of use

Capture Flexibility

Any screen capture utility needs to offer several methods for capturing a given screen. Years ago, Windows wasn't very popular and it was sufficient for such programs just to capture the entire contents of the screen. However, this is no longer the case. Today's screen capture utilities now have to be more flexible in order to work effectively with today's DOS and Windows systems. Therefore, any screen capture utility worth its salt should support the following image capture features:

- Full screen capture
- Active window capture
- Region capture
- DOS screen capture
- DirectX capture

Full Screen Capture

This feature allows you to capture or save the contents of the entire display screen regardless of the current color depth or screen resolution.

Active Window Capture

This feature allows you to capture the contents of the currently active window while ignoring the contents of the rest of the display screen. It should be able to capture the contents of the active windows regardless of color depth or resolution.

This is probably the single most important screen capture option, since most Windows-based games run within a single screen window.

Region Capture

This feature allows you to capture any user-defined screen region and isn't specifically limited to capturing certain windows or predefined areas of the current screen. When this feature is available, the screen capture utility usually provides some sort of mechanism for selecting the region to be captured.

This feature can be a time saver, particularly when you're interested in capturing a specific portion of a screen and don't want to take the extra step of capturing a screen and editing it in another program.

DOS Screen Capture

This feature allows you to capture the contents of a DOS screen or console window and is extremely useful for capturing old DOS game and application screens.

> **NOTE:** Not all programs provide this feature and even those that do aren't always able to capture every DOS game screen due to various technical issues.

DirectX Capture

This feature allows you to capture the screens of games that use Windows' DirectX technology. Because DirectX uses special tricks, most ordinary screen capture programs will fail when attempting to capture such screens. This feature is extremely important given the fact that most new Windows games use DirectX and their screens are difficult, if not impossible, to accurately capture otherwise.

Common File Format Support

As you'll often need to manipulate the images you capture, it's imperative that the screen capture utility allows you to save captures in one or more industry standard file formats. Refer to Table 5-2 and Chapter 3 for more information on these file formats.

Ease of Use

Like any good graphics tool, a screen capture utility should be easy to use. Ease of use is important to consider since the last thing you want is a tool that is difficult to use and wastes your time rather than saves it. Therefore, make sure to look for a screen capture utility that supports such features as:

- Keyboard shortcuts
- Capture undo
- Automatic color palette correction
- Clipboard access
- Crop feature

Keyboard Shortcuts

Keyboard shortcuts are essential for capturing fast-action game screens or for capturing the screens of programs that don't rely on the mouse for input (i.e., DOS or joystick-driven games).

Make sure that the screen capture utility provides this option and allows you to redefine the shortcut keys for maximum flexibility.

Capture Undo

This feature allows you to undo the most recent screen capture. As the process of making screen captures is highly error prone, make sure this particular feature is available.

Automatic Color Palette Correction

This feature automatically accounts for and corrects any color palette "flashing" that might occur when many different programs are running at once in an 8-bit display mode.

This feature is needed because in display modes with 256 colors or less, Windows dynamically shifts the palette to whatever values are defined by the currently active window. Occasionally, this activity can introduce some unwanted color distortion into the captured screen, i.e., colors are jumbled.

Clipboard Access

This feature enables the program to directly copy the captured screen over to the Clipboard.

This makes it possible to access the screen capture in other Windows software without having to save it to disk first. It also makes it possible to import screen captures into software that may have no direct file import support.

Crop Feature

This means that the screen capture utility provides an option to *crop*, or trim, the captured image.

Cropping can be useful for cutting out extraneous portions from a capture before you save it to disk. Most screen capture utilities offer this feature, but some don't, so be aware of this.

> **NOTE:** Be sure to look closely at Chapter 6 for specific reviews and recommendations of screen capture utilities that support most if not all of the features and tools described here.

Essential Image Viewer/Converter Features

To be useful, an image viewer/converter program needs to be able to read and write many different graphics formats and support many different display modes. Therefore, you should look for a program with features such as:

- Extensive graphic file format support
- Good interface
- Batch conversions
- Image catalogs
- Special operations

Extensive Graphic File Format Support

A good image viewer/converter program acts as a translator between many disparate graphic file formats. The best programs will support as many as 120 file formats. At the very least, it should support the file formats described in Table 5-2 and in Chapter 3. Make sure any software you evaluate does support these. If not, consider using another program as there are many from which to choose.

Good Interface

In order to be effective, an image viewer/conversion utility needs to have a good interface. This means that its commands and options should be visible and intuitive to use. Your time is precious and the last thing you want to do is waste it trying to figure out how to use a program.

Batch Conversions

One of the most important features of any image viewer/converter is its ability to convert large batches of files from one format to another at one time. For example, using the image viewer/converter program's batch conversion feature you can perform operations such as automatically converting all of your PCX format images to the Windows BMP RLE format in one fell swoop.

In any case, make sure that any image viewer/converter program you're looking at can do these kinds of file operations because sooner or later you'll have a need for something like this. When evaluating this feature, consider the program's speed. Programs that can process files faster are at an obvious advantage over slower programs, especially when you're dealing with dozens or even hundreds of files at once.

Image Catalogs

Many image viewer/converter programs are capable of generating mini-catalogs of your images. These catalogs usually contain small graphic thumbnails of your images, which can make it easier for you to manage and maintain your image collection. Therefore, look for a program that provides such a feature.

Special Operations

Image viewer/converter programs are also capable of performing a number of special and unusual operations on your graphics files including:

- Color reduction
- Color promotion
- Image scaling

Color Reduction

Color reduction is a process used to compress the size of image files by removing certain amounts of color information from an image. Typically, color reduction involves reducing 24-bit images down to 8-bit images or 8-bit images down to 64, 32, or 16 colors, etc. A number of image viewer/converter programs are capable of performing color reduction operations.

Whenever possible, look for color reduction that supports:

- **Palette remapping**—This is the ability to map a specific color palette to an image. This feature is important because different palettes can provide better color reduction results.
- **Dithering**—Dithering is a process that allows images to simulate the presence of colors that don't actually exist in an image. Clever dithering can make a color reduced image almost indistinguishable from the original source image. Therefore, make sure this option is provided.

Image viewer/converters vary wildly in their ability to perform color reduction. Some do exceptional jobs on most types of images while some don't. Because this class of programs does so many different things, it's important that you don't judge a program solely by how well it performs this particular function.

Most image viewer/converter programs can perform this operation on individual images as well as in batch.

Color Promotion

Color promotion is the opposite of color reduction. It enables you to promote, or convert an image from a lower color depth to a higher color depth. For example, using color promotion, you could bring a 16-color image up to 256 colors or an 8-bit image to 24-bit.

Most image viewer/converter programs can perform this operation on individual images as well as in batch.

Image Scaling

This function allows you to scale an image from one size to another. For example, you can reduce the size of an image from 640x480 down to 320x240 or scale it upward.

Most image viewer/converter programs can perform this operation on individual images as well as in batch.

Essential Palette Tool Features

A good palette tool will provide such features as:

- Color palette editing
- Color palette extraction from bitmaps
- Palette construction from input files
- Common file format support

Color Palette Editing

This tool allows you to create and edit color palettes in much the same way you would when using a painting program.

In addition to providing the usual functions to copy colors and create color gradients, this tool should allow you to load and save color palettes. There are two common palette file standards: Jasc PAL and Microsoft PAL. Both are well supported by painting programs. However, if you have a choice in the matter, you're better off using the Microsoft format as it's slightly more popular than the Jasc variety.

NOTE: All of the palette tools I've seen are for Windows only; therefore, this function only supports the RGB 0-255 color range.

Color Palette Extraction from Bitmaps

This tool allows you to generate color palettes from individual image files. For example, you can extract the color palette used by a screen capture from your favorite game and then edit it.

Most programs that offer this function allow you to extract color palettes from Windows BMP files. However, some will also support other file formats such as .PCX and .GIF, thus saving you the extra step of converting images to the BMP format.

Palette Construction from Input Files

This tool allows you to build color palettes by incorporating colors from one or more images. For example, you can create custom color palettes by using colors from three of your favorite game screens with this tool.

Common File Format Support

Make sure the palette tool can import files using one or more of the industry standard file formats. Refer to both Table 5-2 and Chapter 3 for more information on these file formats.