

PINNACLE VIDEO WORKSTATION™
Series

PRIZM™ Option

OPERATOR'S MANUAL

Pinnacle Systems, Inc.

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WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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SECTION 1

HOW TO USE THIS MANUAL

Thank you for purchasing and using the Pinnacle PRIZM option. If you are not already familiar with them, we welcome you to the family of Pinnacle products. Before proceeding with this manual, please take some time to familiarize yourself with the 2000/3000 Series Operators and Installation manuals. If you already have a Series 2000/3000 Video WorkStation™ and are now installing a PRIZM option, read the PRIZM Installation Manual before continuing with this document. If the Series 2000/3000 Series Video WorkStation has been purchased with the PRIZM option already installed, continue with this Operator's Manual.

The operational information in this manual complements the Series 2000/3000 Series Operator's Manual. In certain cases, this manual updates operational features described in the Series 2000/3000 Series Operator's Manuals. Certain keycaps and keycap locations on the Control Panel are changed, as well as menus. Menu and keycap enhancements are described in the Description Of Menus section of this manual.

This Operator's Manual is divided into several sections:

PRIZM Overview	Gives an overall idea of the features and capabilities of the PRIZM 3-D Image Manipulator system.
Concepts of Three-Dimensional Manipulation	Provides important information about manipulating objects in three-dimensional space. The section describes how three-dimensional concepts are implemented in the Pinnacle PRIZM 3-D Image Manipulator.
Description of Menus	Covers how to gain access to and interpret menus and control panel keys to use the PRIZM option.

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Basic Operation

Describes how to perform basic operations, such as how to place, rotate, and add effects to an image.

Sequencing Operation

Explains how to create and edit sequences using the PRIZM 3-D Image Manipulator. This section also covers the basic theory of sequencing and how sequencing concepts are implemented in the Pinnacle PRIZM 3-D Image Manipulator.

SECTION 2

PRIZM™ OVERVIEW

PRIZM is an add-on option and upgrade to the Pinnacle 2000 and 3000 series Video WorkStations. It incorporates sophisticated three-dimensional image manipulation features and connects to the 2000/3000 Series WorkStations through cables. Installation instructions and packaging information for PRIZM are described in the PRIZM Installation Manual. PRIZM provides a range of effects to augment the standard two-dimensional effects of the 2000/3000 Series WorkStations, and includes rotations, and true perspectives. Additionally, curved effects are also available with the Curved Effects Option.

PRIZM features true three-dimensional perspective, rotation about the X, Y, and Z axes, and object placement in three-dimensional space. PRIZM can also manipulate live or frozen video images in three-dimensional space and create sophisticated still images in conjunction with the 2000/3000 Series Montage Buffer. Using the FreezeFile™ option, a still created through a combination of two- and three-dimensional effects can be stored and later retrieved for further manipulation. PRIZM also features a sophisticated three level image hierarchy for image manipulations.

After PRIZM is installed, the features of the 2000/3000 Series WorkStations are still available. A user can perform pushes, wipes, and other transitions, as well as other two-dimensional 2000/3000 Series effects, within an image positioned and rotated in three-dimensional perspective (or warped with the Curved Effects Option).

The sequencing features of the 2000 and 3000 Series digital effects package are extended to the three-dimensional space with the PRIZM option. This allows all three-dimensional placements, rotations, and perspectives to be preprogrammed in a sequence for playback. Additionally, four smooth path parameters have been added to allow users to create sophisticated sequences. These parameters are tension, continuity, weight, and bias. The Z-axis manipulations provided by the PRIZM allows for complex motion paths using the three level image manipulation hierarchy.

Sequences that have been created with 2000/3000 Series WorkStations will run with the PRIZM option. When they are loaded, they will run exactly as before. When these sequences are edited, PRIZM will update and correct a copy of the original sequence in memory. The user is given the opportunity to save a PRIZM version of the changed file at the end of the editing session. However, the original sequence created with the 2000/3000 Series WorkStations will not be altered. Because the algorithms used to produce sequences for the PRIZM option are superior to the 2000/3000 Series WorkStations, sequences created with previous systems will look better when they are run with the PRIZM option.

SECTION 3

CONCEPTS OF THREE-DIMENSIONAL IMAGE MANIPULATION

This section describes the basic concepts used in the Pinnacle PRIZM Three-Dimensional Image Manipulator. The image that the user sees on the video monitor screen depends on manipulations of a source image and an "eye point" in an imaginary three-dimensional space. The "eye point" (perspective point) maps the manipulated source image onto the two-dimensional screen of the video monitor. Figure 1 shows the mapping of a three dimensional image onto a two-dimensional screen.

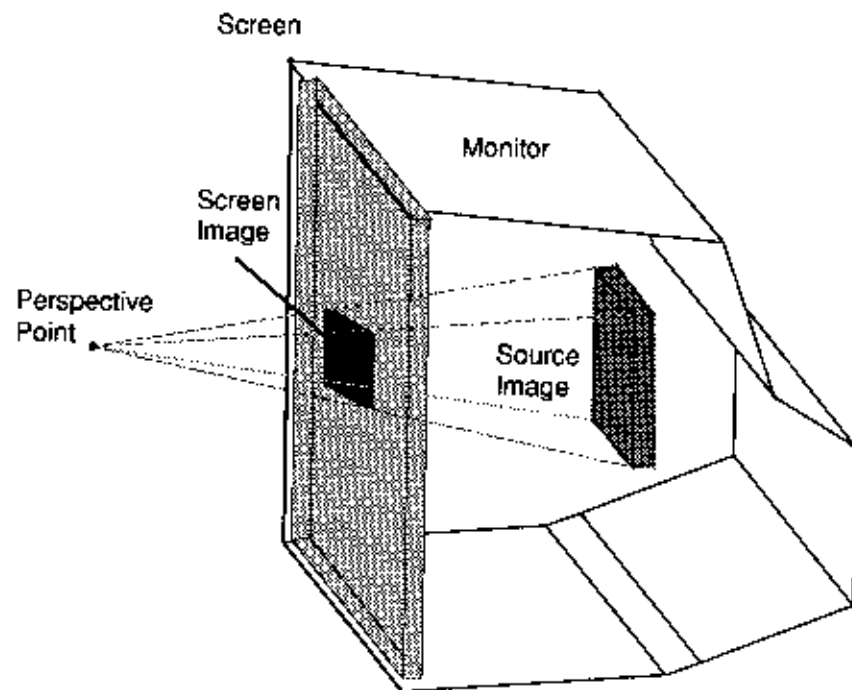


Figure 1. Mapping of a 3-D Image on a 2-D Screen

The labels used in Figure 1 are described below:

Perspective Point. An imaginary point in three-dimensional space from which the source image is viewed. The Perspective Point is typically referred to as the "Eye Point".

Screen. A flat planar surface that records an image or an object. The screen corresponds to the physical screen of the video monitor.

Source Image. A flat video image manipulated in a three-dimensional space. It is projected onto a two-dimensional screen.

Screen Image. A two-dimensional mapping of the source image onto the screen. This final image depends on the position of the perspective point and the position and orientation of the source image. The locations of the perspective point and the source image are always relative to the center of the video screen.

When operating the PRIZM, all image manipulation is done in a three-dimensional space which is defined by "X", "Y" and "Z" coordinates. The user alters the rotation, placement, and size of the image, and the placement of the perspective point. The image on the video screen depends on the placement of the perspective point and on the final position, rotation, and shape of the original video image.

Concepts which are central to an understanding of PRIZM three-dimensional manipulation are coordinates, rotation, placement, rotational axes, axis-relative placement, image hierarchy, and the perspective point. The paragraphs that follow describe each of these concepts.

Coordinates

The coordinate system used in the three-dimension environment is "X,Y,Z" where: X refers to the left-right, Y refers to up-down, and Z refers to the forwards-backwards direction. Figure 2 shows the coordinate system.

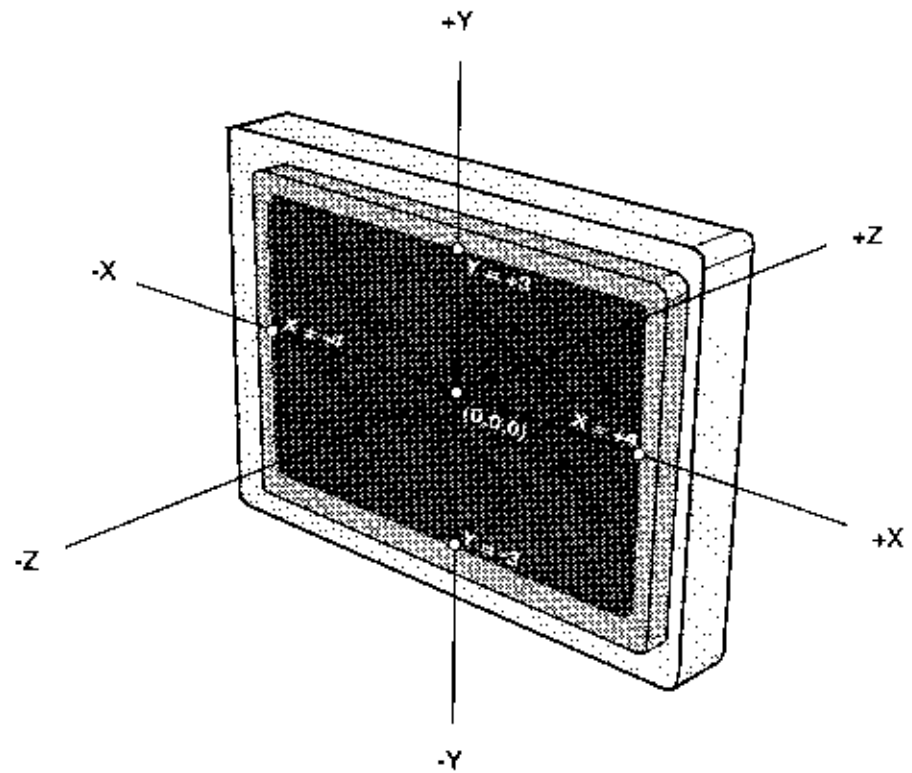


Figure 2. Coordinate System

An object can move closer to the viewer or farther away along the Z axis, up or down along the Y axis, and to the left or right along the X axis. The object can be rotated, and placed relative to any or all three rotational axes. Placements are named for the axis the image is moving *along*. Thus, an "X" placement moves the image right or left. Rotations are named for the axis the image is rotated *around*. Consequently, a "Y" rotation causes one side of the image to move "forward" and the other side to move "backward".

Rotation

Figure 3 shows the Joystick assignments to rotation. The controls are somewhat like those of an airplane with up-down (X-axis), turn (Y-axis), and bank (Z-axis) describing movement *around* the three axis. The point where the three axes intersect is called the point of rotation. By default, the axes meet at the center of the source image. The point of rotation is therefore at the center of the image. The Joystick is allocated to rotation when the LED on the ROTATE key is lit and the LED on the PLACE key is out.

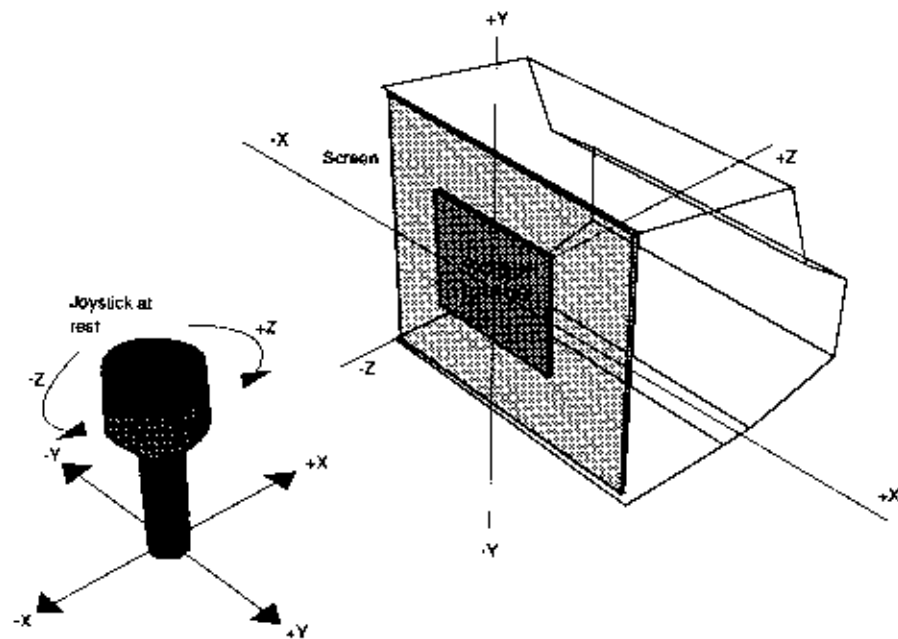
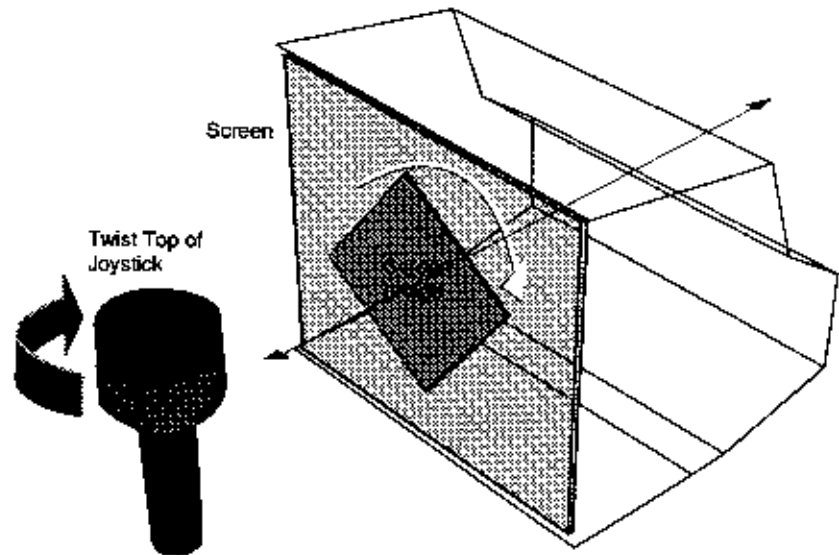


Figure 3. Joystick Assignments to Rotation

The top knob of the Joystick controls rotation around the Z rotational axis, as illustrated in Figure 4. When the top knob is rotated to the right, the image is rotated to the right and when it is rotated to the left, the image rotates to the left about the Z axis. Press the CENTER key while ROTATE is selected to center the rotation.



X	0.0
Y	0.0
Z	+30.0

Figure 4. Rotation About The Z-Axis

Moving the Joystick forwards and backwards controls rotation around the X axis, as illustrated in Figure 5. When the Joystick is moved towards the user, the top of the image comes forward, and when it is moved away, the top of the image moves back, as the image rotates about the X axis. Image rotation about the X axis puts the image in perspective.

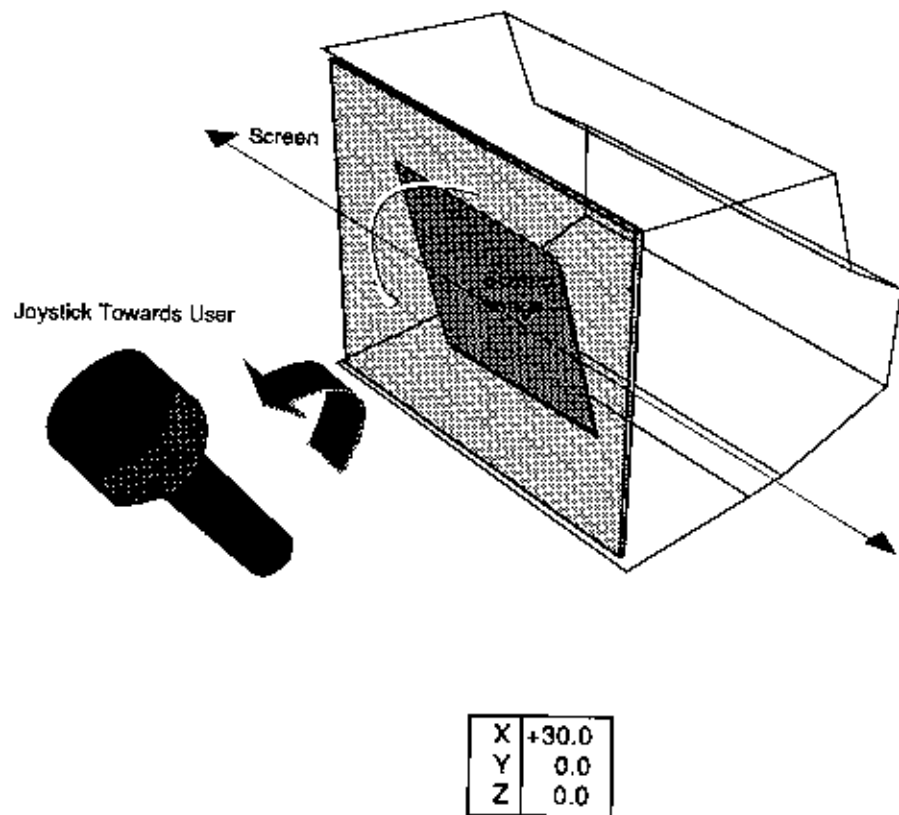


Figure 5. Rotation About The X-Axis

Figure 6 shows the Y-axis control of the Joystick. Moving the Joystick left and right controls movement around the Y axis, as illustrated. When the Joystick is moved to the left, the left edge of the image moves away, and when it is moved to the right, the right edge of the image moves away, as the image rotates about the Y axis. Image rotation about the Y axis puts the image in perspective.

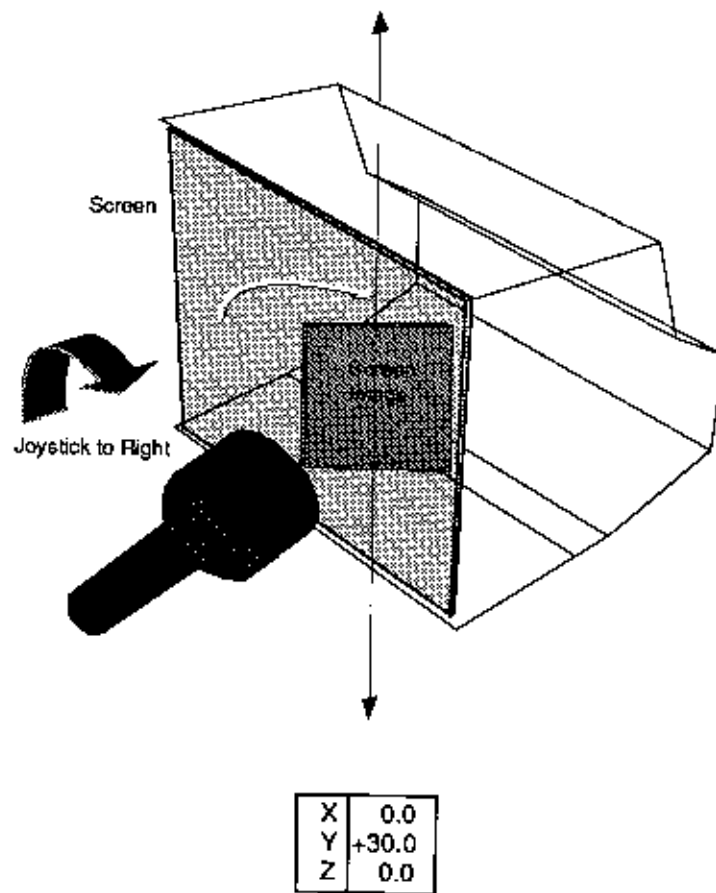


Figure 6. Rotation About The Y-Axis

Placement

Placement of the source image occurs when it is moved from one place to another in the three-dimensional space. By default, the point of rotation is set to the center of the source image, and moves when the source image is moved. Figure 7 shows the Joystick assignments for placement.

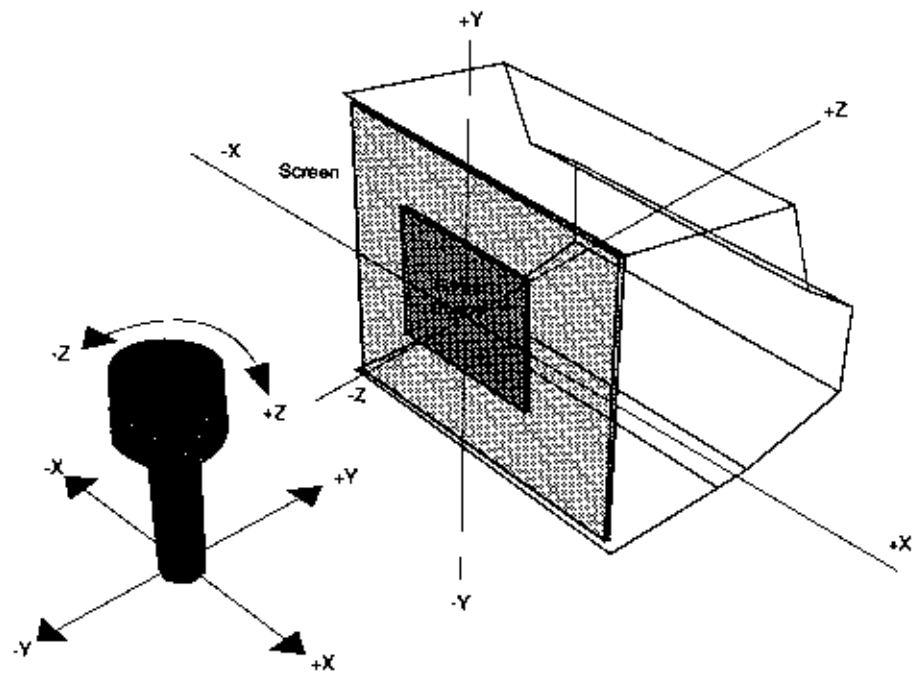


Figure 7. Joystick Assignments to Placement

Axis-Relative Placement

The source image can be moved relative to the point of rotation. The difference in position between the source image and point of rotation positions is referred to as the axis-relative placement. This means that the point of rotation can be placed independently of the image, including outside of the image. This allows for the rotation of an image around any point - not only its own center. For example, an image can be moved to the right until the point of rotation lies on its left edge.

The joystick assignments for axis-relative placement are the same as for placement, as shown in Figure 7. To reiterate: "Placement" moves the image *and* the point of rotation, and "Axis-relative Placement" moves the image while the point of rotation remains stationary. Axis-Placement moves the point of rotation while the image remains stationary.

Using axis-relative placement can cause interesting results, such as the image appearing to be translated in three-dimensional space. This can also result in unexpected actions, such as the image suddenly disappearing from view. Figure 8 shows both cases, where the source image at the top angle will appear to be translated and the bottom angle will drop from view.

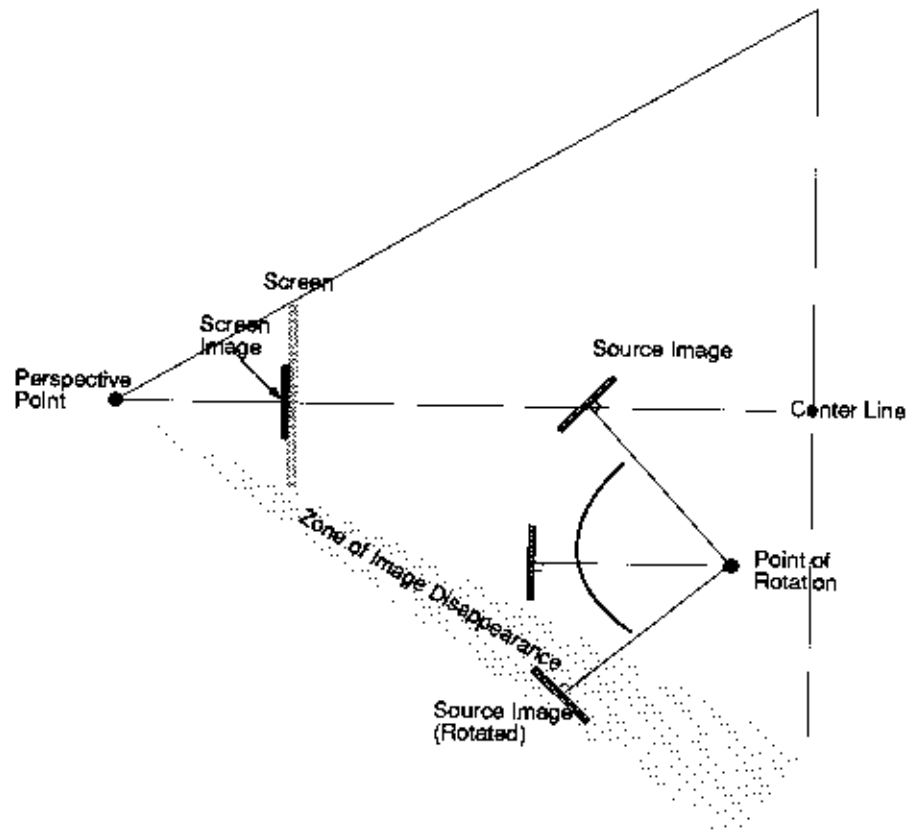


Figure 8. Results of Rotation Point Placement

Figure 9 shows the default settings for the point of perspective projection, video screen, and the source object location.

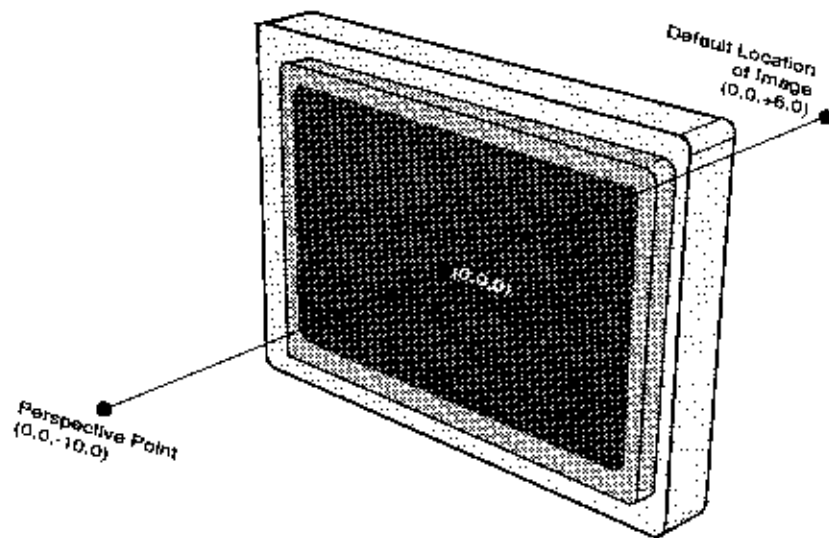


Figure 9. Default Settings for Display

Image Hierarchy

The discussion so far has been about rotation, two types of placement, and scaling. The combination of these actions can be thought of as a single "level" of image manipulations. The three-dimensional model of the PRIZM 3-D Image Manipulator employs three levels of image manipulation which are called source, object, and global. The image hierarchy will be used when creating sequences. For most manipulations, a single level will be adequate. However, when complex motions are needed, such as rotation around several different points of rotation, the three-level hierarchy is most useful. The three levels of manipulation effect the original video system in the manner shown in Figure 10.

Because the PRIZM is an option to the 2000/3000 Series, a unique feature is that three-dimensional manipulation is done "down stream" to the two-dimensional control. This means that all 2000/3000 Series two-dimensional effects are available to the user, and operate within the source image. In essence, the levels of source, object, and global occur after another "level" which allows for control of the source image size, cropping, and placement in two-dimensional space.

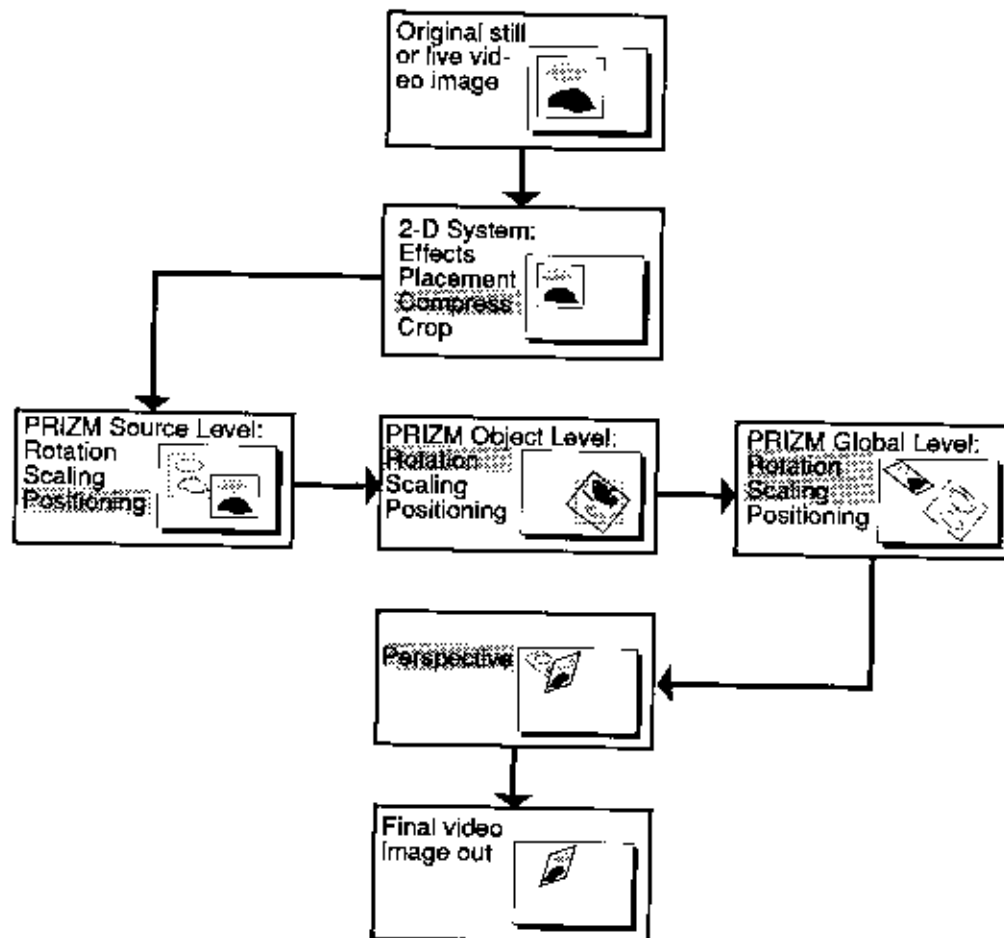


Figure 10. Image Manipulation Levels

As can be seen in Figure 10, the output of each level is the input to the next level down stream. The solid arrow lines show the direction of level interaction: the original source image goes first to the two-dimensional manipulations (and effects), second to the 3-D manipulations, third to perspective, which maps it onto the screen. As indicated in Figure 10, the direction of image manipulation for the three-dimensional manipulations is from source, to object, then to global levels.

The direction arrows in Figure 10 show the level manipulations for a representative source image. The source image enters the two-dimensional system to be compressed. It then is positioned in the PRIZM source level, rotated in the object level, and rotated and scaled in the global level. Then the image is projected onto the video screen.

Extremely complex sequences can be produced because the motions can be defined at the source image level, and object level and the global level. Imagine, for example, that an image should start out positioned on the left side of the screen, rotating around its own center. This manipulation can be performed at the source level. Then, while the picture continues to rotate around its center, it then begins to rotate about the center of the screen. This manipulation could be performed at the object level.

The Perspective Point (Eye Point)

The three levels of PRIZM image manipulation place and orient an image in an imaginary three-dimensional space. The perspective point then maps the image into the real world of the flat video screen. By default, the perspective point is positioned on the user's side of the video screen, at the center of the screen. The perspective point is a little farther away than the width of the video screen. (The screen width = "8.0" and the perspective point = "10.0").

The mapping of the imaginary image onto the video screen is changed by manipulating the position of the perspective point in the X, Y, and Z axes. Figure 11A shows an example of an extreme case, where an image is rotated 45 degrees about the X axis. It will map onto the video screen so that it appears to be turning away from the user. If the perspective point is moved down along the Y axis, the screen image will become shorter. It will eventually appear as a single line, as shown in Figure 11B. Moving the perspective point in Figure 11B causes changes in the size of the screen image.

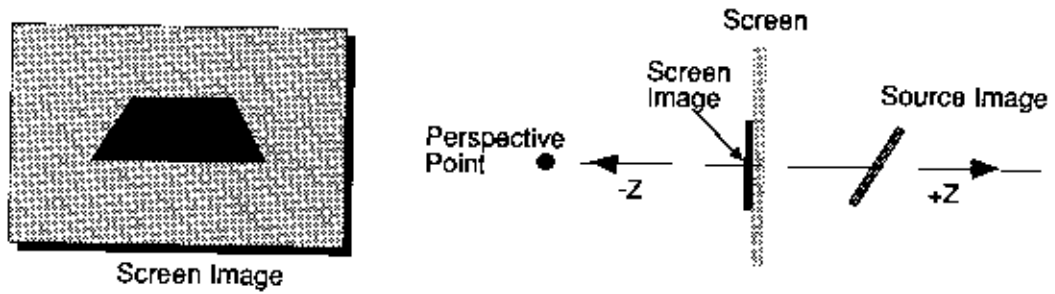


Figure 11A. Rotation of Image About the X Axis

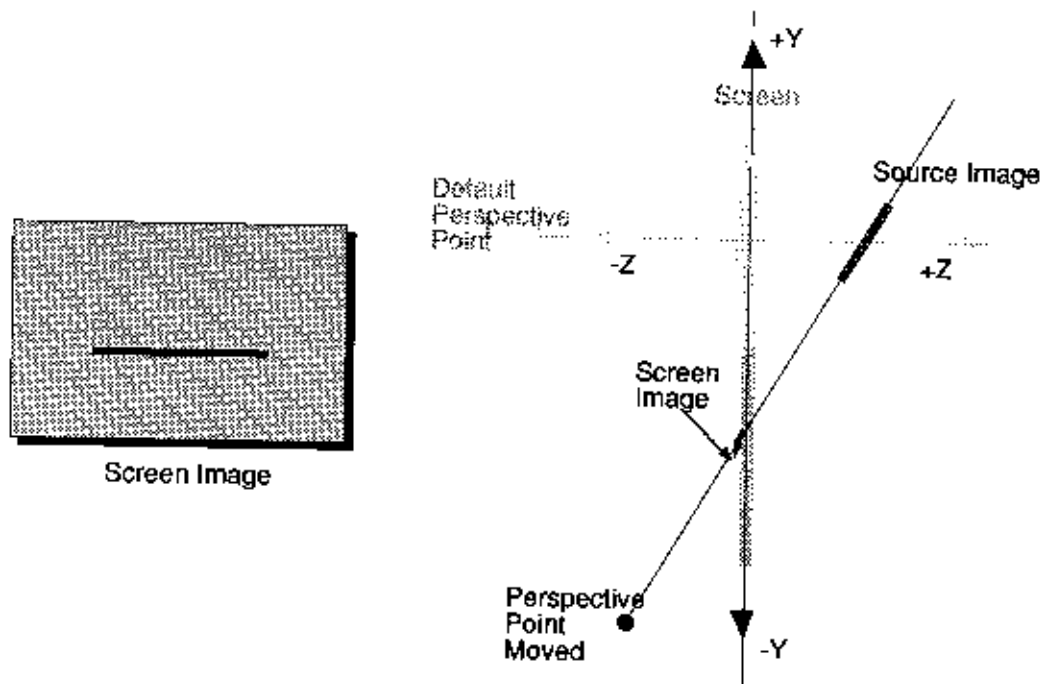


Figure 11B. Changing Perspective of a Rotated Image

Starting from the default position, as the perspective point is moved, along the z axis further from the screen, the "amount" of perspective is reduced. Another way to think of it is that the apparent change in size from the "front" of a rotated image to the "back" of it will be less, as shown in Figure 12. The source image must be moved away from the screen at the same rate the point of perspective moves. Otherwise, moving the point of perspective will result in both reduced perspective and an increase in size.

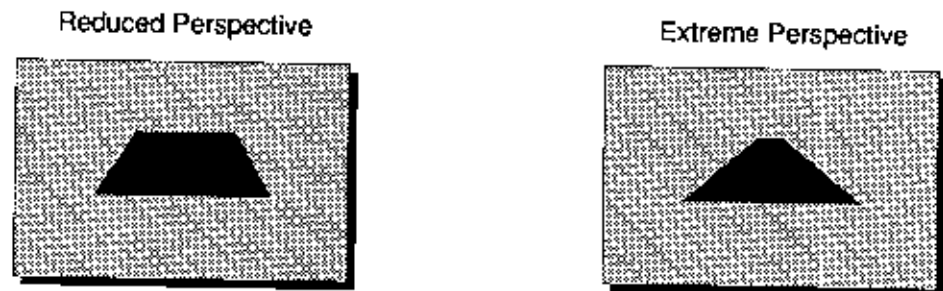


Figure 12. Change In Amount Of Perspective

As the perspective point approaches infinity along the Z axis, a "parallel projection" effect is achieved. In this case the "amount" of perspective is reduced to nothing, and the size of the screen image approaches that of the source image. The PRIZM system allows the user to toggle back and forth between parallel and perspective projection.

The following paragraphs describe other effects that occur when the relationships between the image source and the point of perspective are manipulated. The figures accompanying the paragraphs below illustrate how the final image will appear on the video screen.

As shown in Figure 13, when the screen is between a source image and the perspective point, the screen image is always reduced in size.

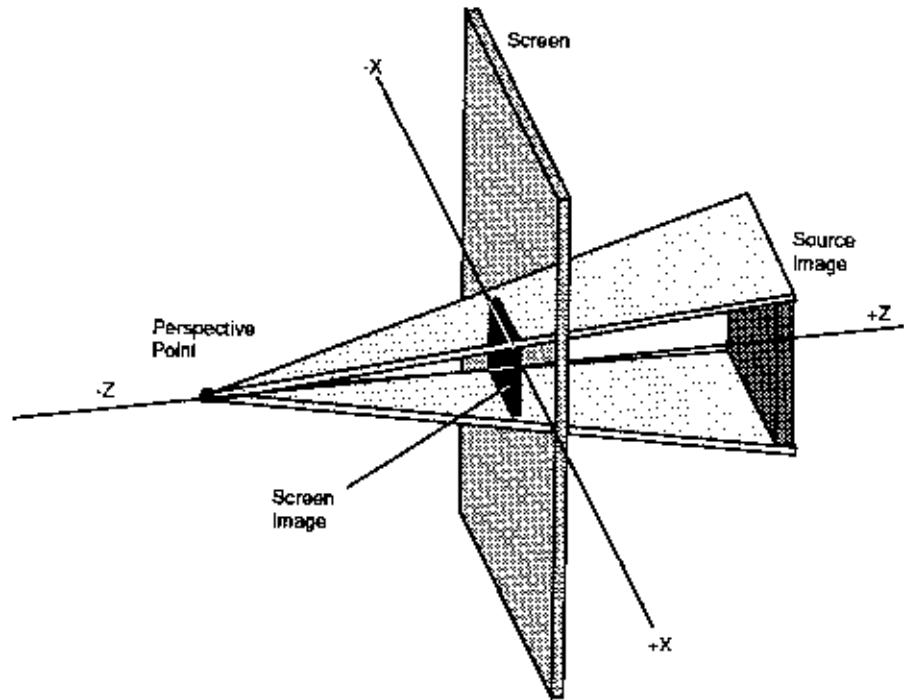


Figure 13. Perspective Point Movement-Image Reduction

Figure 14 illustrates how the screen image is increased in size when the source image lies between the screen and the perspective point.

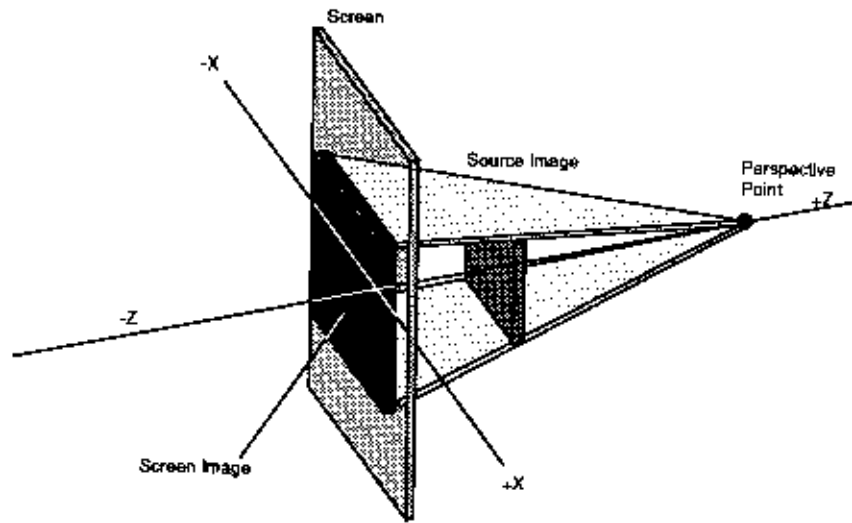


Figure 14. Perspective Point Movement-Image Enlargement

Figure 15 illustrates the fact that the screen image is inverted horizontally when the perspective point is between the source image and the screen.

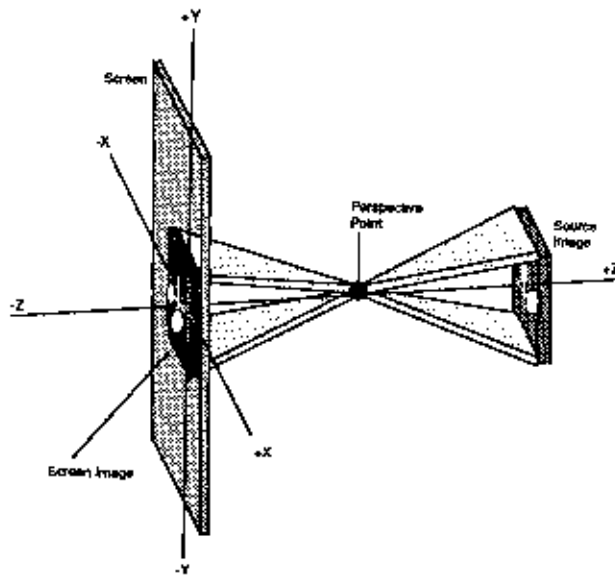


Figure 15. Perspective Point Movement-Image Inversion

Figure 16 illustrates how moving the perspective point closer to the screen causes the reduction or expansion of the screen image to be more extreme.

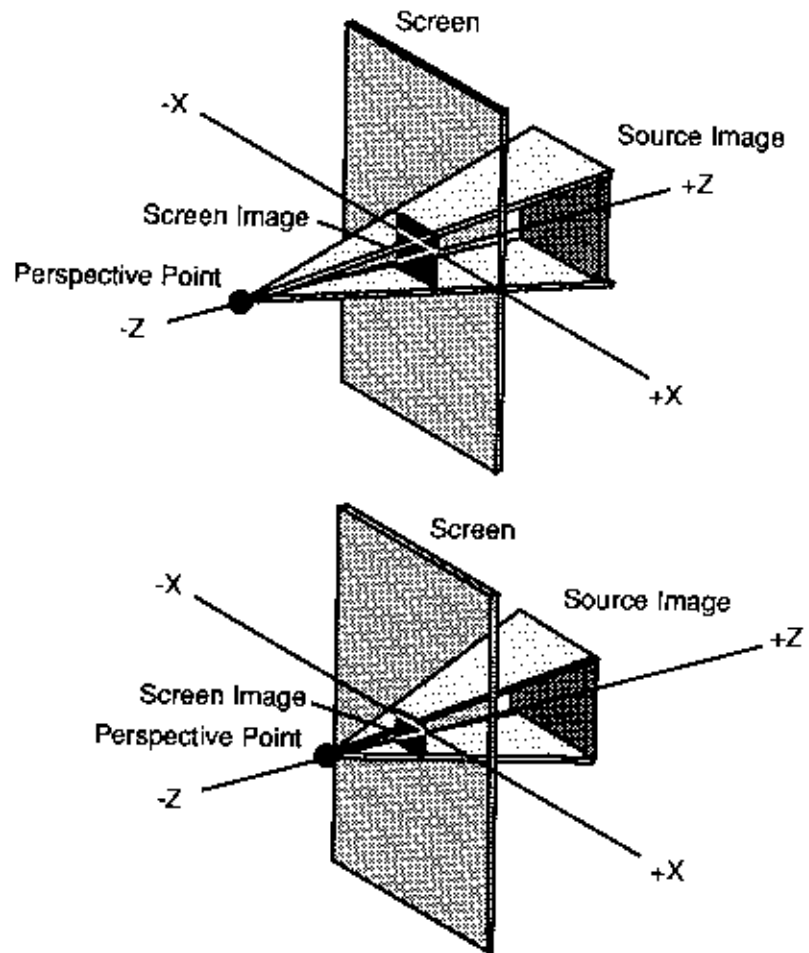


Figure 16. Perspective Point Movement-Reduction/Expansion Levels

SECTION 4

DESCRIPTION OF MENUS

The PRIZM option presents an operating environment that is consistent with the 2000/3000 Series operations. Menus are accessed from the Control Panel by pressing the key that corresponds to the menu. Figure 17 shows the arrangement of the keyboard and keys that access all menus in the PRIZM option. Figure 17 also shows which keys have been added or changed to the 2000/3000 Video WorkStations, and which ones have been moved.

The DUR (Duration) and LIMIT keys have been removed from the Control Panel for the PRIZM option. The Duration and Path menus have been combined into a single Path Menu. The Limit function is not needed in the PRIZM option.

When the PRIZM option is installed, all 2000/3000 menus operate in the same way as they do without the PRIZM option, with the exception of the following menus:

- Setup
- Information
- Status
- Sequence
- Duration/Path Menu
- PRIZM Effects

These menus are changed to accommodate the PRIZM three-dimensional features. Note that a "PRIZM Effects" menu has been added. Please refer to the 2000/3000 Series Operator's Manuals for more details concerning other menus. For information on the Setup menu refer to the PRIZM Installation Manual.

Information Menu

The Information Menu is automatically shown when the system is first turned on, and is displayed at the bottom of the screen. It shows the current allocation of the Joystick and the TAKE key, as well as some information on the position of the video image. Figure 18 is an illustration of the Information Menu. Table 1 describes items in the Information Menu.

MODE	SOURCE	OBJECT	X	Y	Z	TAKE	PLATE	SCALE
NORMAL	PLAGE	None	0.000	0.000	0.000	0.000	0.000	1.000
			0.000	0.000	0.000	0.000	0.000	1.000
			0.000	0.000	0.000	0.000	0.000	1.000

Figure 18. Information Menu

Label	Description
Panel	Shows the panel allocation to normal, sequence-edit, or sequence-run.
Joystick	Indicates the allocation of the Joystick. The top line indicates whether 2-D mode or one of the following 3-D hierarchy levels is active: <ul style="list-style-type: none"> • Source • Object • Global

Table 1. Information Menu

Label	Description
Joystick	<p>The second line shows parameters controlled by the Joystick.</p> <p>For 2-D manipulations these are:</p> <ul style="list-style-type: none"> • Place • Compress • Crop • Place-Compress • Place-Crop <p>For 3-D manipulations these are:</p> <ul style="list-style-type: none"> • Place • Compress • Crop • Axis Rel • Rotate • Place-Compress • Place-Rotate • Place-Crop • Place-Axis <p>The third line indicates whether the FINE-ADJUST function is on.</p>
Take Key	<p>Toggles between TAKE and Fader Bar with the AUTO MODE key. Indicates the functions activated by the TAKE key: a standard transition, or the name of a sequence. The percent sign indicates how far the transition/sequence has progressed.</p> <p>When allocated to the Fader Bar, this menu field shows the transition name and the percent sign indicates the Fader Bar position.</p>

Table 1. Information Menu (Continued)

Label	Description
Axis	Indicates the offset of the center of the image from the rotational axis.
Rotate	Indicates the rotation of an image around the X,Y, and Z axes.
Placement	Indicates the placement of the rotational axis, relative to the center of the screen.
Size	Indicates the size of the screen image.

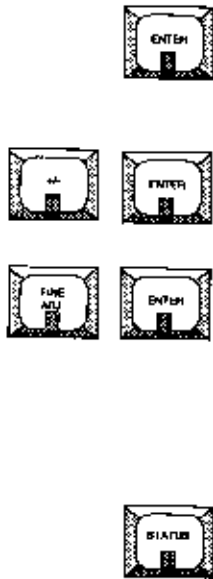
Table 1. Information Menu

Status Menu

The Status Menu shows the state of the entire PRIZM system on two sheets, and is nearly identical to sheets 1 and 5 of the Sequence Menu. Pressing the STATUS key once displays the first sheet of the Status Menu, and pressing it twice displays the second sheet of the Status Menu. The information displayed on the first Status Menu sheet includes: the orientation and size of an image in three-dimensional space, which effects are active, and the two-dimensional image position, size, and cropping. The second Status Menu sheet displays all levels - source, object, and global of the current keyframe.

Several ways of controlling Status Menu field items provide the user with an intuitive means of accessing and controlling the various functions and the effects it shows. Although specific exceptions apply, the general methods for controlling the Status Menu functions are described below:

- The user can position the cursor in the Status Menu, and change any values by using the Numeric Keypad.



- Non-numeric menu fields can be enabled and disabled by pressing the ENTER key. The ENTER key is used on most fields to increment through choices or numbers.
- When the NEGATIVE (-) key is lit, the ENTER key decrements through choices or numbers.
- The FINE ADJUST key affects the scale of the increment/decrement function of the ENTER key.
- Moving the Joystick will change the values in the fields to which the Joystick is assigned.
- Pressing the STATUS key when the Status Menu is displayed will show Sheet 2 of the Status Menu. Press the STATUS key again to display the first sheet of the Status Menu.

Figure 19 illustrates Sheet 1 of the Status Menu. Press the STATUS key to access the Status Menu.

Sheet 1 of the Status Menu is divided into four sections, as described in the paragraphs below:

Section 1 Provides 3D Axis and image placement information about an image for all three hierarchy levels - source, object, and global. The position relative to the rotational axis is given. This section also provides image size information for all three levels. To manipulate sizing in the different hierarchy levels, press the SOURCE/OBJECT/GLOBAL key to access the desired level.

Section 2 Provides image cropping information on the source level. This section also provides information on the type of PRIZM transition being used, PRIZM effects (such as Perspective), and

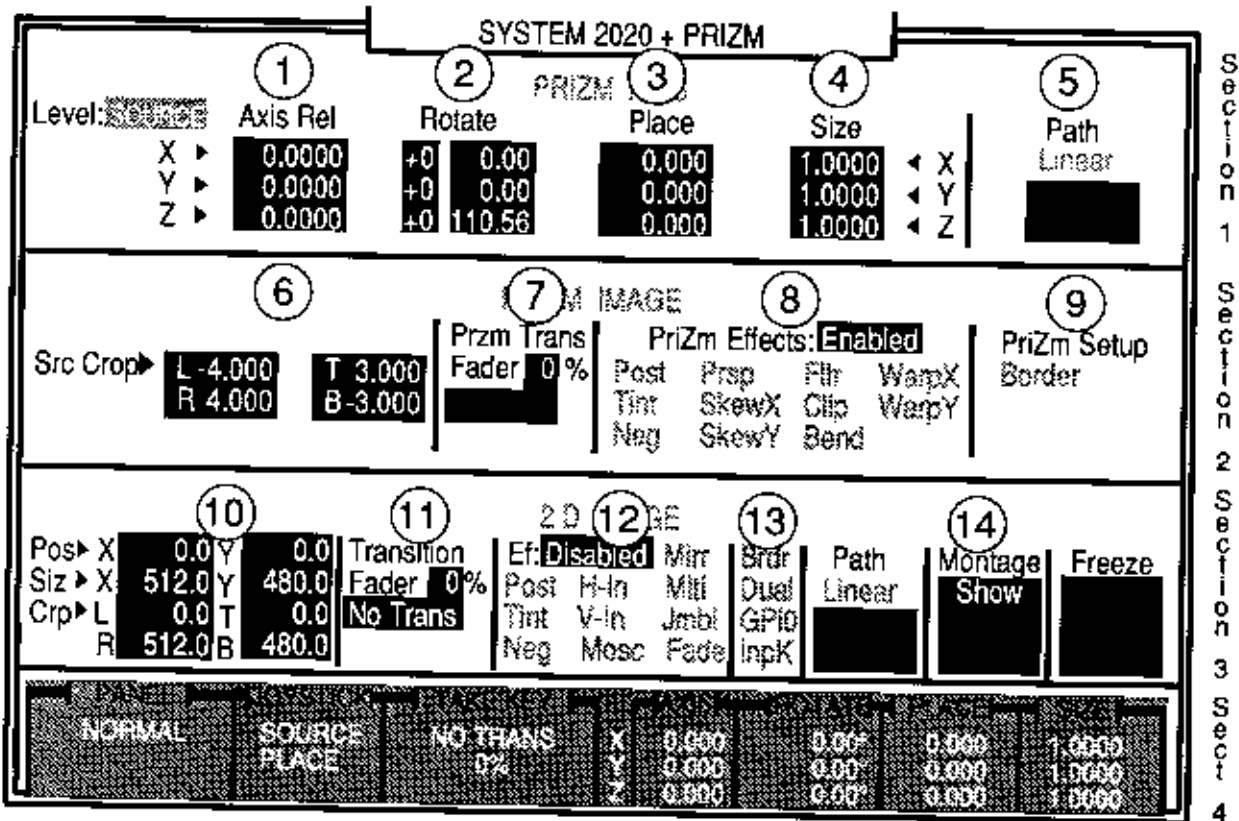


Figure 19. Status Menu

3D system information (such as Border). Section 2 provides several pop-up menus that are associated with the Border, Skew, and Perspective functions.

Section 3 Provides 2D image position, size, and crop information about the image. Also provided are 2D image attributes, 2D transition type, effects, and 2D system information. Section 3 provides several pop-up menus that are associated with the various effects, transition types, and 2D system information.

Section 4 Displays the Information Menu. See the description on the Information Menu in Table 1 above for details.

Table 2 describes items of each section in the Status Menu.

Location	Label	Description
1	Axis Rel	Indicates the Axis-Relative placement of an image for all three hierarchy levels - source, object, and global. All axes are indicated: the range is from -30.000 to +30.000 in Y and -40.000 to +40.000 in X and Z.
2	Rotate	Indicates the three-dimensional rotation status for all three hierarchy levels. The angles vary from 0 to 359.00 degrees.

Table 2. Status Menu

Location	Label	Description
3	Place	Indicates the placement of an image for all three hierarchy levels - source, object, and global. All axes are indicated; the range is from -30 to 30 in Y and -40 to +40 in X and Z.
4	Size	Indicates the size information of a three-dimensional image. The range in size in X and Y is from 0 to 9.9900.
5	Path	Indicates the status of the Path menu. See the description of how to operate this menu field in the Edit Sequence Operation section of this manual.
6	Crop	Indicates the cropping information of a three-dimensional image. The cropping range for Left, Right, Top, and Bottom of an image is 0.0 to 1.0.
7	Przm Trans	Indicates the amount of PRIZM transition applied to an image. Allows the user to specify the percentage of the way through a PRIZM transition by moving the Fader Bar.

Table 2. Status Menu (Continued)

Location	Label	Description
8	Przm Effs	Enables/disables PRIZM effects applied to an image. Move the cursor to the effect desired and press the ENTER key to toggle it. These effects can also be accessed by pressing the PRIZM EFFECTS key to show the Prizm Effects Menu.
9	Przm Brdr	Enables/disables the PRIZM Border. Move the cursor to the effect desired and press the ENTER key to activate it.
10		Indicates position, size, and cropping information about a two-dimensional image. The range for size is from 0 to 512 in the X axis, and from 0 to 480 in the Y axis. Cropping is from 0 to 1.
11	Trans Fader	Indicates the amount of two-dimensional transition applied to an image. Allows the user to specify the percentage of the way through a transition by moving the Fader Bar. The Fader Bar menu field can be changed at any time.

Table 2. Status Menu (Continued)

Location	Label	Description
12	Effts (2D)	Enables/disables two-dimensional effects applied to an image. Move the cursor to the effect desired and press the ENTER key to toggle it. These effects can also be accessed by pressing the EFFECTS MENU key to show the Two-Dimensional Effects Menu.
13		Enables/disables the Border, Dual, GPI Out, and Input Key system functions. Move the cursor to the function desired and press the ENTER key to toggle it.
14	Path Montage Freeze	Indicates the status of the Path, Montage, and Freeze Menus. See the description of how to operate these menu fields in the Edit Sequence Operation section of this manual.

Table 2. Status Menu

Sequence Menu

The Sequence Menu allows for the creation, editing, and saving sequences of one or more keyframes. The Sequence Menu, as shown in Figure 20, is similar to the one described in the 2000 and 3000 Series Operator's Manual (Sequence Menu Section). Once the sequence name has been selected (or created) and entered, the Edit Sequence menu is differentiated from the 2000 and 3000 Series Sequence Menu by the inclusion of three-dimension effects.

The sequence edit functions have been enhanced with the PRIZM option to provide a greater degree of control and flexibility in the creation of sequences.

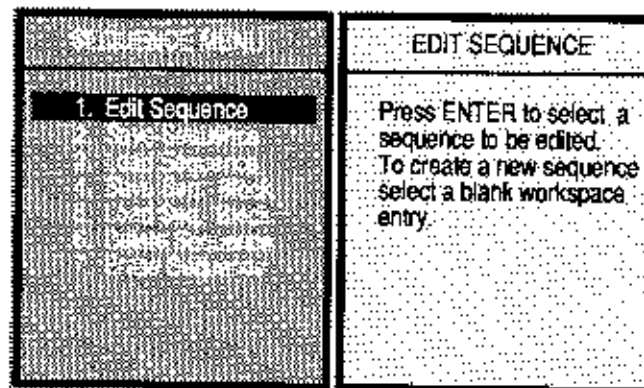


Figure 20. Sequence Menu

Sequence Menu Options

The Sequence Menu allows a user to create, edit and save sequences of one or more keyframes internally and/or on diskettes. Keyframes may be allocated arbitrarily to sequences, including all keyframes to one sequence or many sequences with one keyframe each. The Sequence Menu provides access to seven major functions:

Edit Sequence	Either a new sequence can be created in a temporary internal workspace memory, or an existing sequence can be edited.
Save Sequence	Stores a sequence on a data diskette (or the hard disk). The sequence can be recalled later and executed or edited.
Save Sequence Block	Stores a block of sequences on a data diskette (or the hard disk). The sequence can be recalled later and executed or edited.
Load Sequence	Recalls a sequence on a data diskette (or the hard disk) and loads it into the internal workspace, where it may be executed or edited.
Load Sequence Block	Used to recall a block of sequences on a data diskette (or the hard disk) and load it into the internal workspace, where it may be executed or edited.
Delete Sequence	Used to delete a selected sequence from the workspace.
Erase Sequence	Deletes a selected sequence from the data diskette (or the hard disk).

Operating procedures for saving, loading, deleting, and erasing sequences using the PRIZM 3-D Image Manipulator are similar to those for the Series 2000 and 3000 systems. Refer to the 2000/3000 Series Operator's Manuals of those systems for details on saving, loading, deleting, and erasing sequences.

Duration/Path Menu

The Duration/Path Menu is the 2000/3000 Series Duration Menu and Path Menu, merged into one menu for the PRIZM option. The Duration/Path Menu is shown in Figure 21. The top part of the menu, selection numbers 1 and 2, are used to change the duration and rate of acceleration of a transition or sequence. Selection numbers 3 through 7 are used to set the motion variables that will occur between keyframes in a sequence. Refer to the 2000/3000 Series Operator's Manuals of those systems for details on the Duration Menu and Path Menu operation. Also see the Sequence Operation part of this manual.

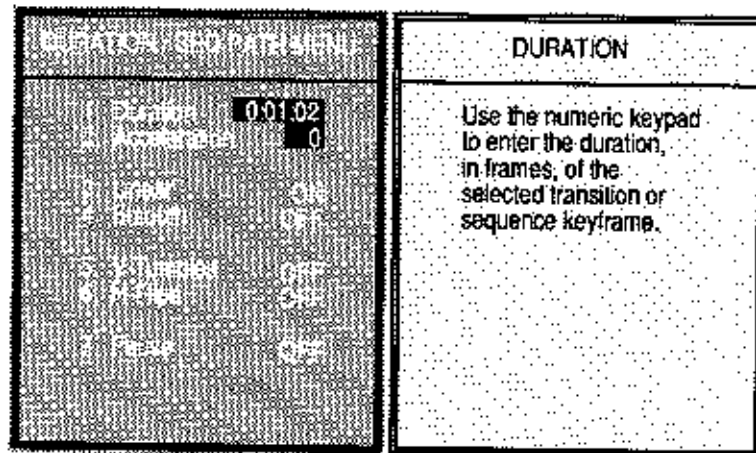


Figure 21. Duration/Path Menu

PRIZM Effects Menu

The PRIZM Three-Dimensional Image Manipulator offers several special three-dimensional effects that are used to extend the wide range of effects available in the 2000 and 3000 Series two-dimensional systems. The PRIZM Effects menu is shown in Figure 22.

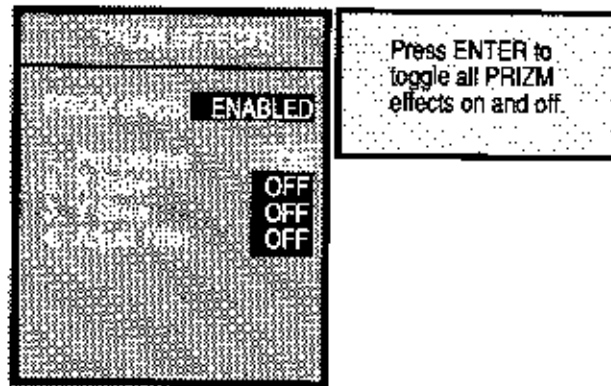


Figure 22. PRIZM Effects Menu



SECTION 5

BASIC OPERATION

The PRIZM Three-Dimensional Image Manipulator operates in much the same way as the Series 2000/3000 systems. Familiarity with Pinnacle Series 2000 or 3000 two-dimensional systems is recommended before operating the PRIZM Image Manipulator. Refer to the 2000 and 3000 Series Production WorkStation™ Operator's Manual for details on how to use the two-dimensional system. The menu-driven interface, Control Panel operation, and interaction with main menus is similar.

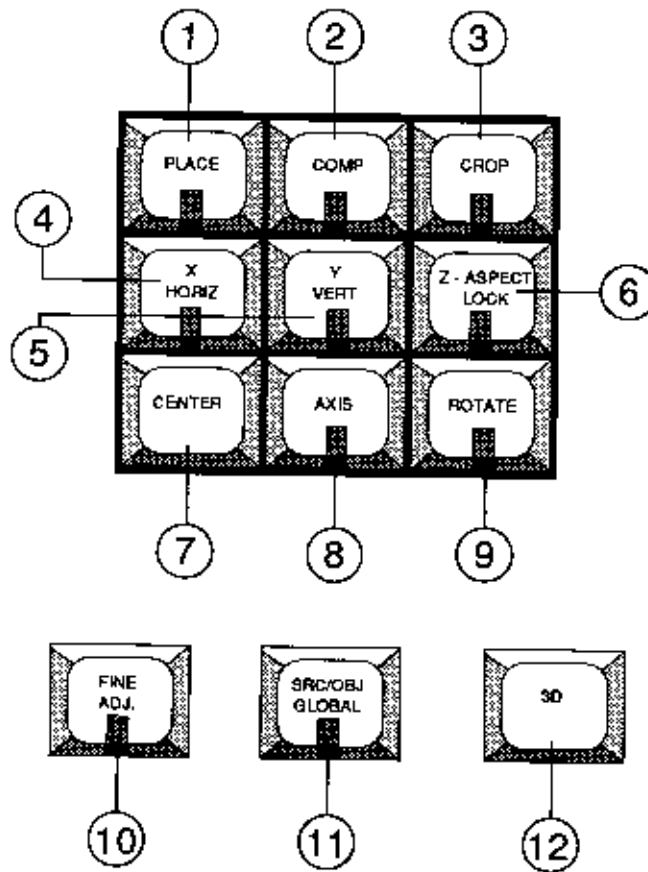


Toggle the Joystick allocation between two-dimensional and three-dimensional manipulations by pressing the 3D key on the Keypad.

Information on the operation of three-dimension features are followed by procedures (when applicable) which explain how to perform a particular action in the paragraphs that follow.

Three-Dimensional Manipulations

Most three-dimensional manipulations of an image are related to placement and rotation. The Joystick controls are used to manipulate the parameters of a three-dimensional image. The Joystick Control keys are located directly below the Joystick on the lower right side of the control panel. Figure 23 shows the Joystick control keys. Table 3 describes the operation of the Joystick Control keys.



3D Assignments	
Single Functions	PLACE COMP CROP AXIS REL ROTATE
Combined Functions	PLACE-COMP (placement + aspect locked compression) PLACE-CROP (placement of crop window) PLACE-ROTATE (placement + Z-Rotate) PLACE-AXIS (place + Axis-Rel)

2D Assignments	
Single Functions	PLACE COMP CROP
Combined Functions	PLACE-COMP (placement + aspect locked compression) PLACE-CROP (placement of crop window)

Figure 23. Joystick Control Keys

Location	Label	Description
1	Place	Enables the Joystick to position a full screen or compressed image, or position a cropping window. The image along with its rotational axes can be moved to different places on the screen.
2	Compress	Enables compression of an image with the Joystick knob. Compression can be either in the horizontal or vertical direction, or aspect-locked compression with any aspect ratio.
3	Crop	Enables the Joystick to create a cropping "window". This window can then be moved around the underlying full-screen image when PLACE-CROP is enabled. Cropping can be done in the horizontal or vertical direction, or aspect-locked cropping with any aspect ratio.
4	X Horizontal	A toggle key which enables the X axis for three-dimensional image placement when PLACE-AXIS, PLACE or PLACE-ROTATE is enabled. This key enables the X axis rotation when ROTATE is enabled. When COMPRESS or CROP is enabled, this key allows an image to be compressed or cropped horizontally.
5	Y Vertical	A toggle key which enables the Y axis for three-dimensional image placement when PLACE-AXIS, PLACE or PLACE-ROTATE is enabled. This key enables the Y axis rotation when ROTATE is enabled. When COMPRESS or CROP is enabled, this key allows an image to be compressed or cropped vertically.

Table 3. Joystick Control Keys

Location	Label	Description
6	Z Aspect Lock	A toggle key which enables the Z axis for three-dimensional image placement when PLACE, ROTATE or AXIS is enabled. This key enables the Z axis rotation when ROTATE key is enabled. If compress is enabled with this key, the system maintains the current aspect ratio of an image when it is compressed or cropped.
7	Center	Centering returns the Joystick parameters to their default levels. Press CENTER once to affect the hierarchy level presently allocated to the Joystick. Double click on CENTER (press twice within a half of a second) to affect all hierarchy levels.
8	Axis	Allows an image to be placed relative to the source, object, or global axes (whichever level is enabled). If previous rotations have been applied to the image, axis (relative placement) will move the image along the rotated axis, and relative to the point of rotation.
9	Rotate	Enables rotation of an image.

Table 3. Joystick Control Keys (Continued)

Location	Label	Description
10	Fine Adjust	<p>Slows the Joystick movement to allow fine positioning/sizing of an image on all axes. This key may be used with any of the image parameters including placement, compress, cropping, and rotation.</p> <p>In addition to its main function, the Fine Adjust is used during the Sequence Run mode in two ways:</p> <ul style="list-style-type: none"> <input type="checkbox"/> with the ENTER key to advance the running of a sequence frame-by-frame (instead of second by second) <input type="checkbox"/> with the PAGE UP or PAGE DOWN keys to actually play a sequence to the next keyframe or previous keyframe, respectively.
11	Src/Obj Global	Chooses between Source, Object, and Global image parameters for the Joystick allocation and Info Menu display.
12	3D	Toggles between three-dimensional and two-dimensional Joystick functions.

Table 3. Joystick Control Keys (Continued)

Image Placement



The source image can be placed anywhere on the screen. This is done by pressing the **PLACE** key, then moving the image with the Joystick. The LED on the **PLACE** key will be lit and the image can then be moved to a desired location. Pressing the **PLACE** key again will cause the LED on the **PLACE** key to be off, and the Joystick movement of the image will be disabled.

Image Placement Procedure. Figure 24 illustrates how to place an image on the monitor screen. An image can be placed after it has been cropped, rotated, resized, or otherwise manipulated.

Figure 24. Placing An Image

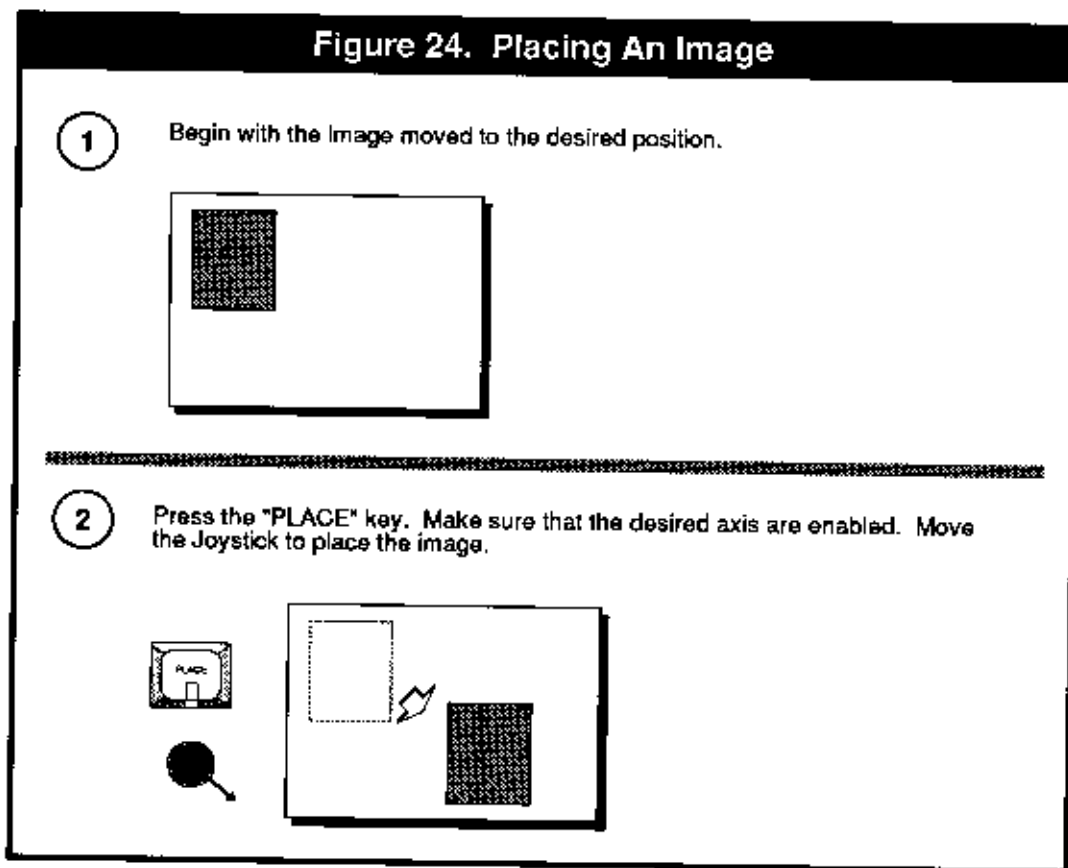




Image Rotation

Rotation of an image can occur on any level - source, object, or global. On system startup, all three sets of the axes are positioned at the center of the video screen. However, the rotational axes can be placed anywhere on the screen. The source image can be positioned relative to any axis by offsetting it from the rotation point with the **AXIS** key. The order of rotation is as follows:

- X axis is linked to the screen
- Orientation of the Y axis depends on the X rotation
- Z orientation depends on Y and X rotation

Image Rotation Procedure. Figure 25 shows a simple rotation. Figure 26 illustrates the axis-placement feature where an image can be rotated around its left edge.

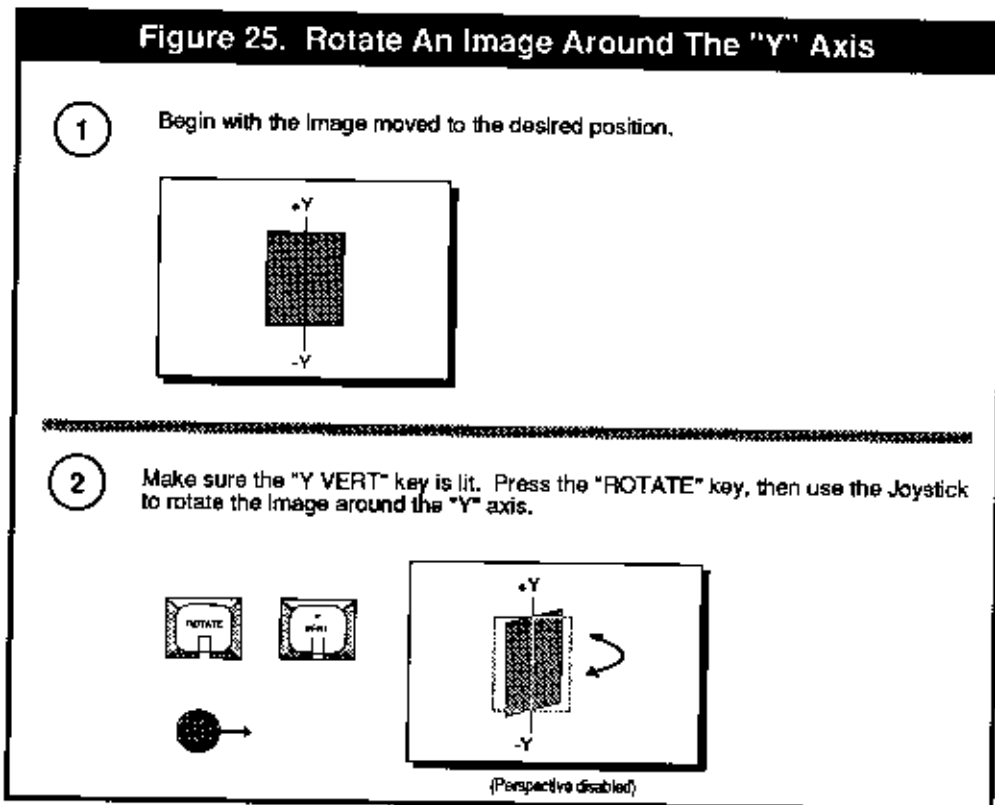
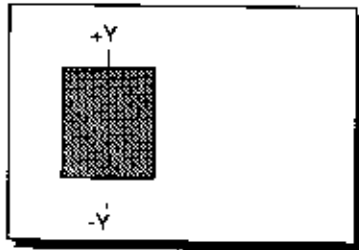
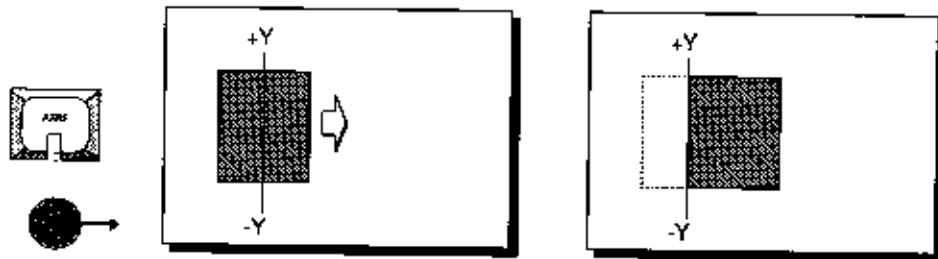


Figure 26. Axis Placement And Rotation

- 1 Begin with the image moved to the desired position.

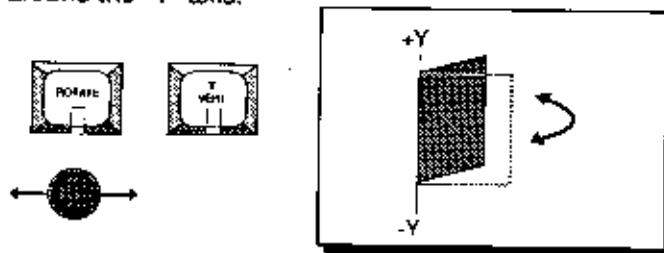


- 2 Press the "AXIS" key and move the screen image to the right, until it is lined up with the rotational axis on the left edge of the image.



NOTE: Moving Joystick along X axis.

- 3 Press the "ROTATE" key. Make sure that the "Y" key is lit. Rotate the image around the "Y" axis.





Three-Dimensional Effects

The PRIZM Three-Dimensional Image Manipulator offers several special three-dimensional effects that are used to extend the wide range of effects available in the 2000 and 3000 Series two-dimensional systems. These effects are accessed by pressing the PRIZM EFFECTS key. The PRIZM Effects menu is shown in Figure 27. To use an effect, simply activate it on the menu, and then change its parameters. A brief description of each effect is provided in the paragraphs below:

Perspective	Toggles perspective on and off.
X Skew	Allows the image to be skewed in the X direction.
Y Skew	Allows the image to be skewed in the Y direction.
Adjust Filter	Allows the image to be appear shaper or more smooth

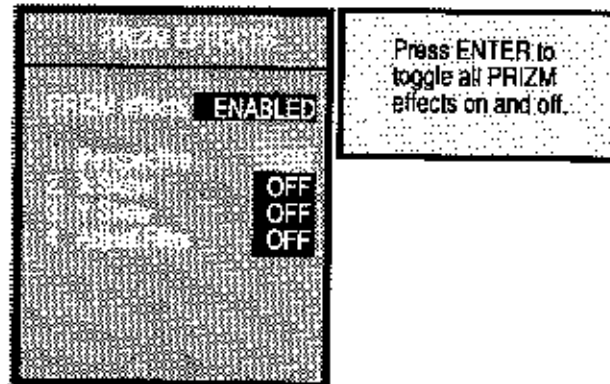


Figure 27. PRIZM Effects Menu

The Perspective Point

Perspective is enabled by default. To toggle the perspective function, press the PRIZMEFFECTS key. Select Perspective from the PRIZM Effects Menu by moving the cursor keys to the "Perspective" menu field. Then press the ENTER key. The default setting for perspective is a source image that is larger than the screen. This allows a full size screen image to appear. The default screen image setting is -10.0 "Z" (theoretically *outside* the monitor) and the source image is set at +6.0 "Z" (theoretically *inside* the monitor). When perspective is disabled, the image reverts to a parallel projection mode.

Note:

When the perspective point ("eye point") is at other than the default value, the screen image will change size.

A red parameter menu appears when the perspective is moved. The parameter field displays the current perspective parameters for the X, Y, and Z axes. Joystick movement will be reflected in the numerical values of the pop-up menu field.

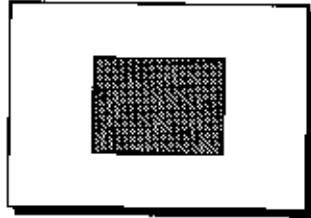
Perspective applies to the final placement and orientatoin of the video image, which can be especially seen when is is rotated around the X or Y axis. Perspective rotation provides a "real world geometry" view of the rotating image.

Moving the perspective point can result in unusual views of the screen image. Refer to the "The Perspective Point" paragraphs in the "Concepts of Three-dimensional Manipulations" section of this manual for details.

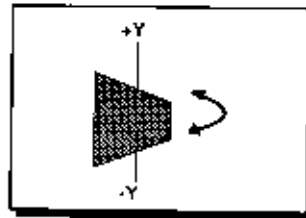
Perspective Point Procedure. Figure 28 illustrates how to move the perspective point of an image.

Figure 28. Changing Perspective Point Location

- 1 Begin with the image moved to the desired position.



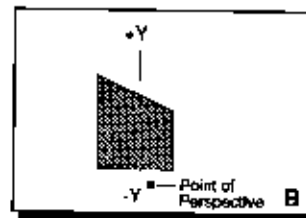
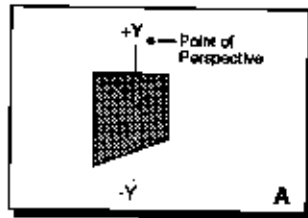
- 2 Make sure the "Y VERT" key is lit. Press the "ROTATE" key, then use the Joystick to rotate the image around the "Y" axis to +40.



- 3 Press the "PRIZM EFFECTS" key. Use the cursor keys to select the "Perspective" option from the menu. Then press the "PARAM" key.



- 4 Move the Joystick up and down. Note how the perspective changes.



- 5 Press the "PARAM" key again to exit the parameter menu.



X and Y Skew

X and Y skew allows an image to be skewed along either the X or Y axis. This gives the effect of the image being "tilted" in the up and down, or right and left directions. Follow the steps below to operate the X skew (Y skew operation is exactly the same):



Step 1 Press the PRIZM EFFECTS key when the 3D key is lit. Move to the PRIZM Effects field with the UP or DOWN arrow key, then press the ENTER key to enable the PRIZM effects.



Step 2 Move to the X Skew command with the DOWN arrow.



Step 3 Press the ENTER key to toggle the X Skew command on.

Step 4 Press the PARAM key once to move the cursor to the "Pt." heading (This is where the origin point of the skew can be selected. It will be left at the default "Mid" for now.).

Step 5 Press the RIGHT arrow key to move the cursor to the "Distance" heading. Use the UP and DOWN arrow keys to select the image levels to be skewed.



Step 6 Use the Joystick to change values, or enter new values in the "Distance" field with the numeric keypad. Press the CANCEL key or the CENTER key to set the field to "0.000".



Step 7 Press the PARAM key again to exit from the X Skew effect.

Adjust Filter

**** Text here to describe the Adjust Filter operation **.**

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