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SpaceWare 9.2 for X Windows

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These help files require a browser that supports JavaScript
(Netscape 3.0 and later or Internet Explorer 4.0)

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Introduction

The Spaceball is a true 3D input device that detects the slightest fingertip pressure applied to it and resolves the pressure into X, Y, and Z translations and rotations, moving your 3D images instantaneously and simultaneously. 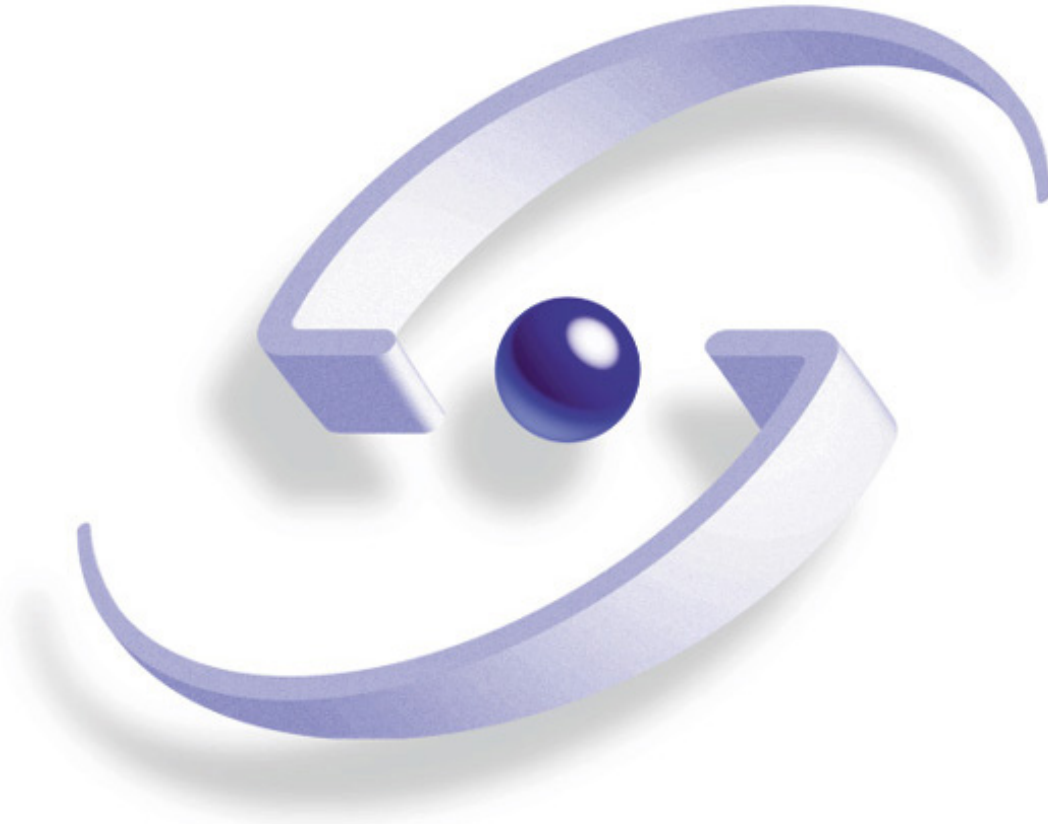This provides intuitive, interactive six degrees-of-freedom control of 3D graphical images and objects. The Spaceball's SpaceWare software is a valuable configuration utility for the Spaceball. The software supports three styles of Spaceballs each with a unique number series 4000, 3003 and 2003.

Spaceball Modes

Using the Spaceball 4000 FLX can be natural and intuitive. There are two basic ways to move objects with it:

- **Object mode**: Manipulate the Spaceball PowerSensor® ball as if you were holding the 3D model in your hand. Push left and the image moves left. Push right and it moves right. Lift up or push down and the image moves accordingly. Push the PowerSensor ball away from or toward you and the image responds similarly. Twist in any direction and the image rotates in that direction.

- **Eyepoint mode**: Manipulate the Spaceball PowerSensor ball as if it were your head or a camera. Push left and the scene moves to the right. Push right and the scene moves to the left. Lift up and the scene moves down. Push down and the scene moves up.

Note about Printing Help Files:
Because of a problem with "topic creep" when accessing sections of larger files, blank pages have been added at the end of some of the larger files. Before printing, check the number of pages containing text and print only those pages.

Spaceball 4000 Information
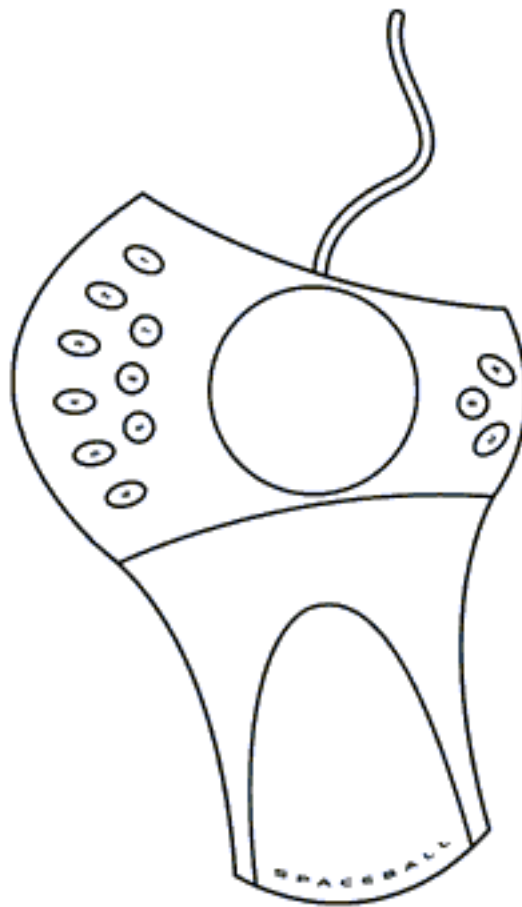
The Spaceball 4000 FLX

The Spaceball 4000 FLX is designed to be used with either your right hand or your left hand. The default setup is for the left hand. The nine buttons on the left are designed to be used with your fingers. The three buttons on the right are used by your thumb. To use it with your right hand, remove the palm rest and insert it on the other side of the ball platform so the buttons can still be used by the fingers and thumbs as designed.

The Spaceball 4000 FLX is adaptable to suit your dominant hand as described in the following section.

Changing the Spaceball 4000 FLX for Hand Preference
The Spaceball comes assembled for use with the left hand (for right-handed people). The palm rest, the extension on the lower right in the following graphic, can be detached and reattached to the other side of the core unit.

To change the Spaceball setup for use with the right hand, follow these steps:

1. Hold the PowerSensor® ball in your hand and turn the Spaceball device over so that you are looking at the bottom of it. Be careful not to drop it.
2. Gently lift up the palm rest to detach it.
3. Remove the Spaceball cable from its current path and change the direction so that it exits from the opposite side of the core unit.
4. Attach the palm rest to the other side of the core unit, turn the Spaceball device over, and place beside your computer.

Place your wrist on the palm rest with the thumb near the three button group. This placement leaves the other fingers available for buttons 1-9.

The buttons near your middle finger are buttons 1 and 2 and the ones near your little finger are 5 and 6. The three round buttons are buttons 7 - 9. This is true no matter whether you have the Spaceball set up for the left hand or the right. When you change the hand setup, SpaceWare detects the change and reorients the button numbering. The Spaceball Windows (the user interface) reflects the way you have the palm rest attached to the Spaceball. For more information, see The Spaceball Windows.

Spaceball 3003 Information
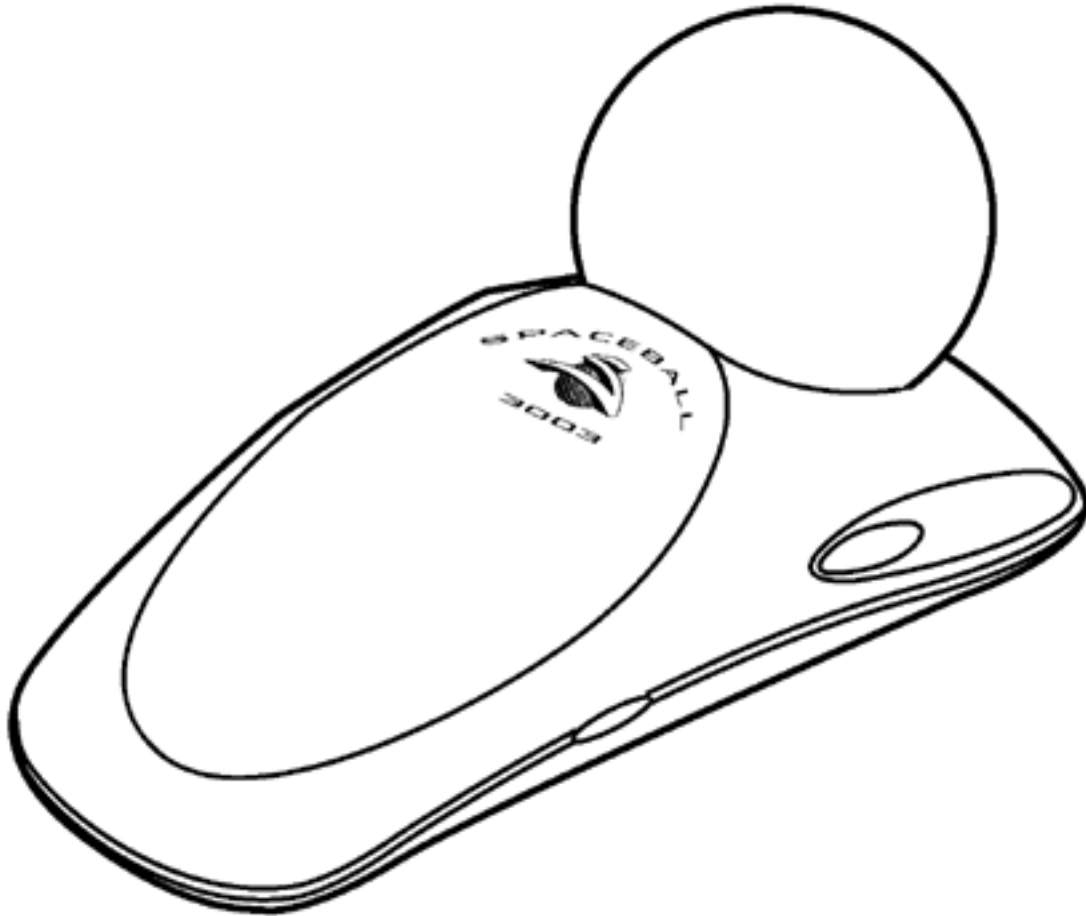
The Spaceball 3003 FLX

The Spaceball 3003 has two models a Spaceball 3003 and Spaceball 3003 FLX, with a stiff and soft PowerSensor respectively. Both Spaceball 3003's have two button to be used in applications and a Rezero button on the side of the device. If your image moves without applying pressure on the PowerSensor press the Rezero button on the side of the device to stop the movement.

The software will highlight the physical buttons of the device on the General Button Window. The left and right button are labeled Buttons 1 and 2 respectfully.

Spaceball 2003 Information
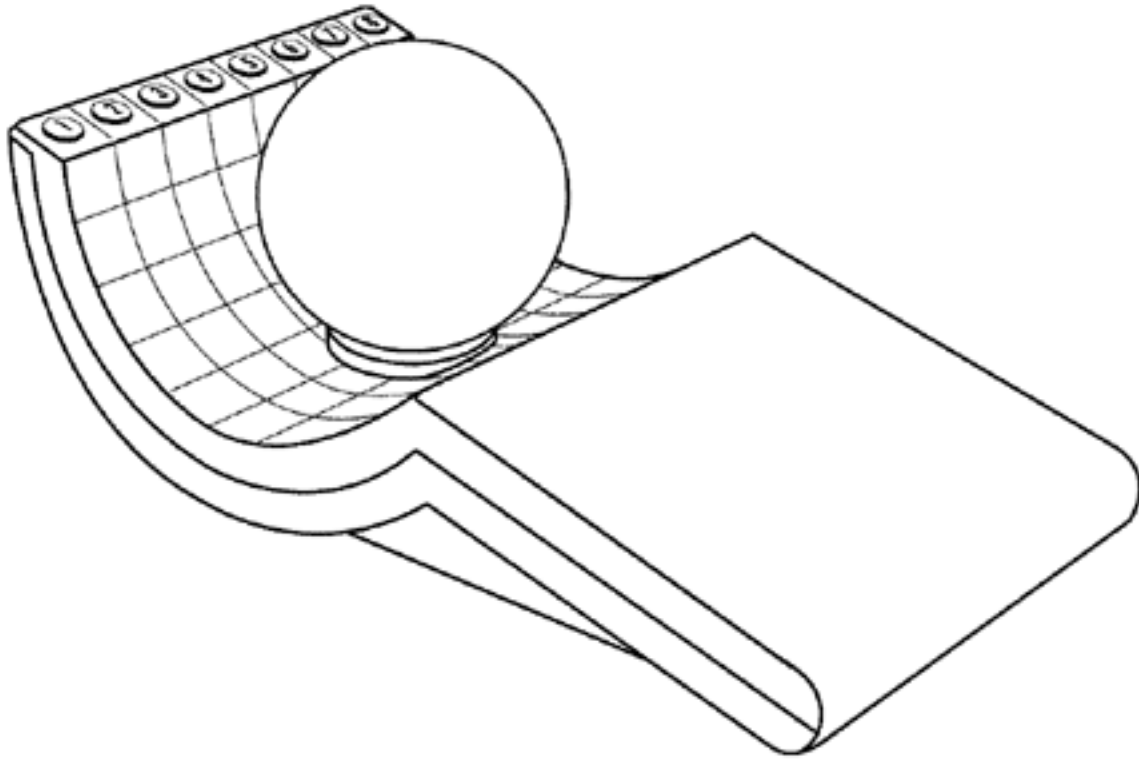
The Spaceball 2003 FLX

The Spaceball 2003 has three separate version designated by Spaceball 2003, Spaceball 2003B and Spaceball 2003 FLX. The difference between the Spaceball 2003 and Spaceball 2003B is the Spaceball 2003 requires an external power supply, while the Spaceball 2003B requires external power on only some systems. The Spaceball 2003 FLX has a soft PowerSensor compared to the Spaceball 2003 and Spaceball 2003B.

The software will highlight the physical buttons of the device on the General Button Window.

All three version have 8 buttons in front of the device. On the Spaceball 2003 FLX, the button to Rezero the ball is located on the right side of the device. For the Spaceball 2003 and 2003B the Rezero function is mapped with in the SpaceWare user interface. As a default press the #7 button followed by the #8 button to Rezero, the device.

If you have question on the requirement of a power supply check the Spacetec web site or contact Technical support.

<<   >>

Using This Help File

First, read Hardware Installation for instructions on how to connect the Spaceball to your computer system.

Install the software. See Software Installation for instructions for installing the software on supported operating systems. Software installation is specific to the CD-ROM. If your computer is not equipped with a CD-ROM drive, refer to Remote Installation for instructions for installing from a remote drive.

Refer to the topic for your application: The Spaceball and (your application name). Each topic includes button function descriptions specific to your application and other pertinent information.

Buttons to be pressed are in bold face type. Anything you need to type or enter is in a mono-spaced bold font.

File names and directory designations are in bold face type.

If you are not familiar with using the Spaceball, refer to Moving with the Spaceball for additional instructions.

If you encounter any problems during installation or with the Spaceball operation, refer to Troubleshooting. If that doesn't resolve your problem, contact Technical Support.

<< | >>

Systems Supported

The following operating systems are supported by the Spaceball:

- AIX 4.1, 4.2, and 4.3.1
- DigitalUNIX 3.2G and 4.0B
- HPUX 9.07 and 10.20
- IRIX 5.3, 6.2, and 6.4
- Solaris 2.5, 2.5.1, and 2.6

Hardware Installation

Follow the instructions and illustrations below to connect the Spaceball to your system:

1. The Spaceball has a Serial Interface Cable with a 9-pin female connector. The Spaceball Serial Port Cable may plug directly into the serial port of your system or it could require an adapter cable or a port adapter (which is included when specified by the customer at time of order). This is because serial interface connections differ among systems.
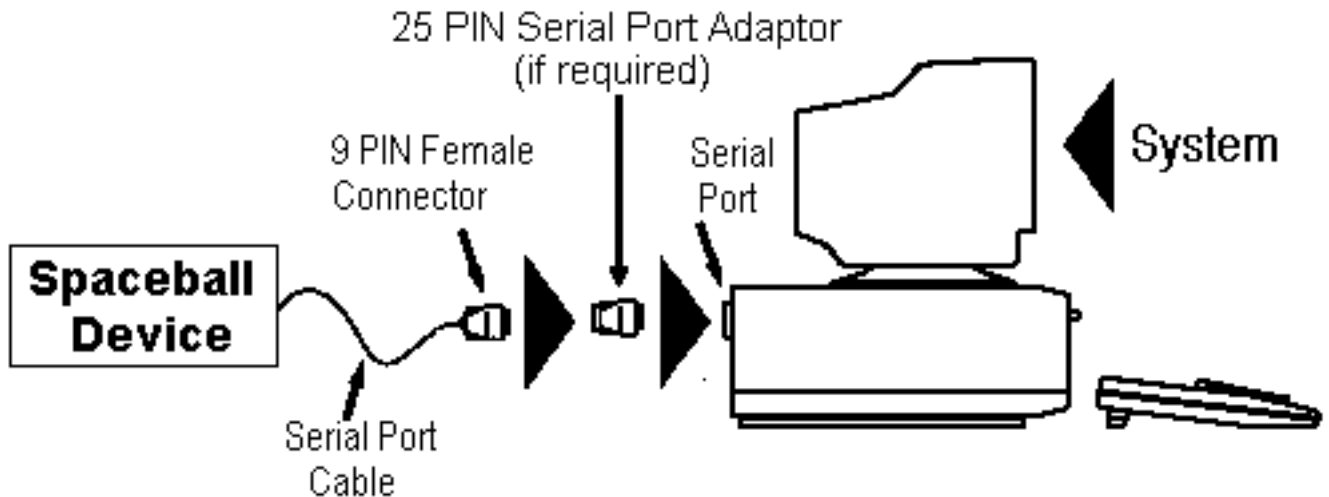
2. The Spaceball should respond with two beeps when you plug it in. This indicates it is receiving power and working properly.

Note:
If the Spaceball device does not beep at all, performs a modulating or "weak" sounding beep, or repeatedly beeps an SOS message in Morse code (dot-dot-dot, dash-dash-dash, dot-dot-dot), refer to the Troubleshooting topic.

After connecting the Spaceball to your system, refer to the section for your particular application for information on installing the SpaceWare software (if required) and using the Spaceball with your application.

Software Installation

If you are upgrading the SpaceWare software, the Installation program automatically overwrites previous versions (7.x and 9.0 versions only).

Before you install the SpaceWare software, you need the following:

- Name of the serial port to which the Spaceball is attached
- Name of the drive from which you will load SpaceWare software
- Superuser (root) password

> **CATIA 4**:
> If you are installing SpaceWare 9.0 on IBM workstations, follow the special instructions in The Spaceball and CATIA 4 instead of the steps listed below. For all other platforms, follow the steps given below.

Follow the instructions below to install the SpaceWare software:

1. Insert the SpaceWare software media into the CD-ROM drive.
2. Log in as root. You may need to enter your root password.
3. Load and run the SpaceWare software by entering the following for your system:

    DigitalUNIX:
    ```
    mount -rt cdfs /dev/rz6c /mnt
    cd /mnt
    ./INSTALL.SH\;1
    ```
    HP (HP-UX v9.07):
    ```
    mount -rt cdfs /dev/dsk/c201d2s0 /mnt
    cd /mnt
    ./INSTALL.SH\;1
    ```
    HP (HP-UX v10.20):
    ```
    mkdir -p /mnt
    /etc/mount -F cdfs /dev/dsk/c0t2d0 /mnt
    cd /mnt
    ./INSTALL.SH\;1
    ```
    IBM AIX:
    ```
    mount -o ro -vcdrfs /dev/cd0 /mnt
    cd /mnt
    ./install.sh
    ```
    SGI IRIX:
    ```
    cd /CDROM
    ./install.sh
    ```
    Sun Solaris:
    ```
    cd /cdrom/spaceware
    ./install.sh
    ```
4. To remove your CD-ROM from the drive, type the following for your system:

    DEC, HP, IBM:
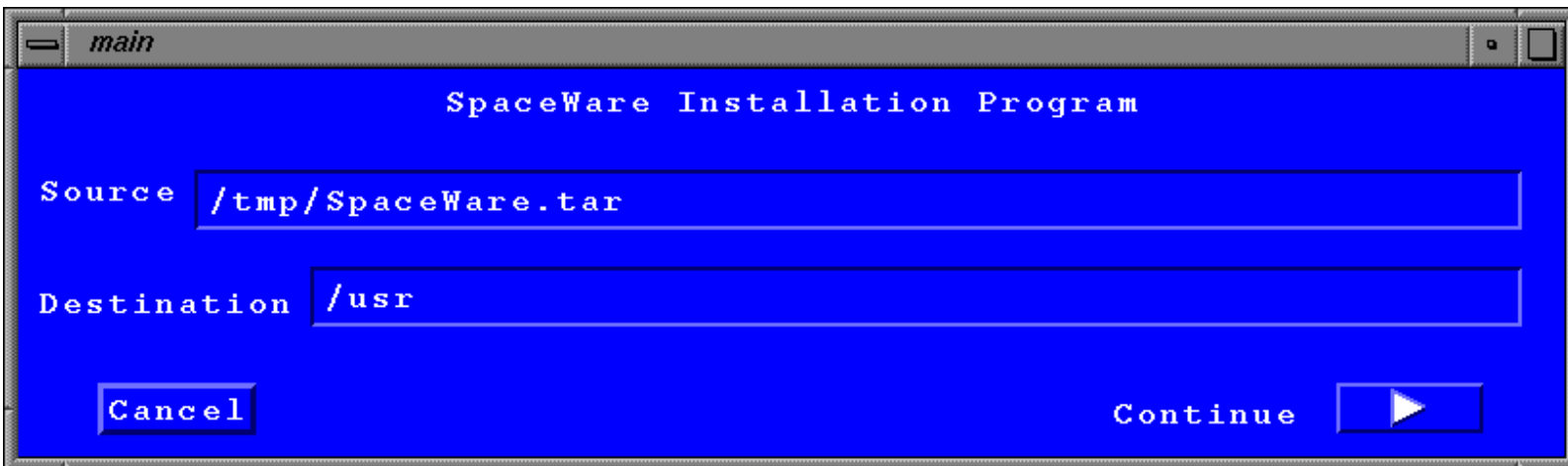   ```
    cd /
    umount /mnt
    ```
    **SGI IRIX, Sun Solaris**:
    ```
    cd /
    eject
    ```

**Installation program**
This program guides the installation process requiring the installation directory and source of SpaceWare files.
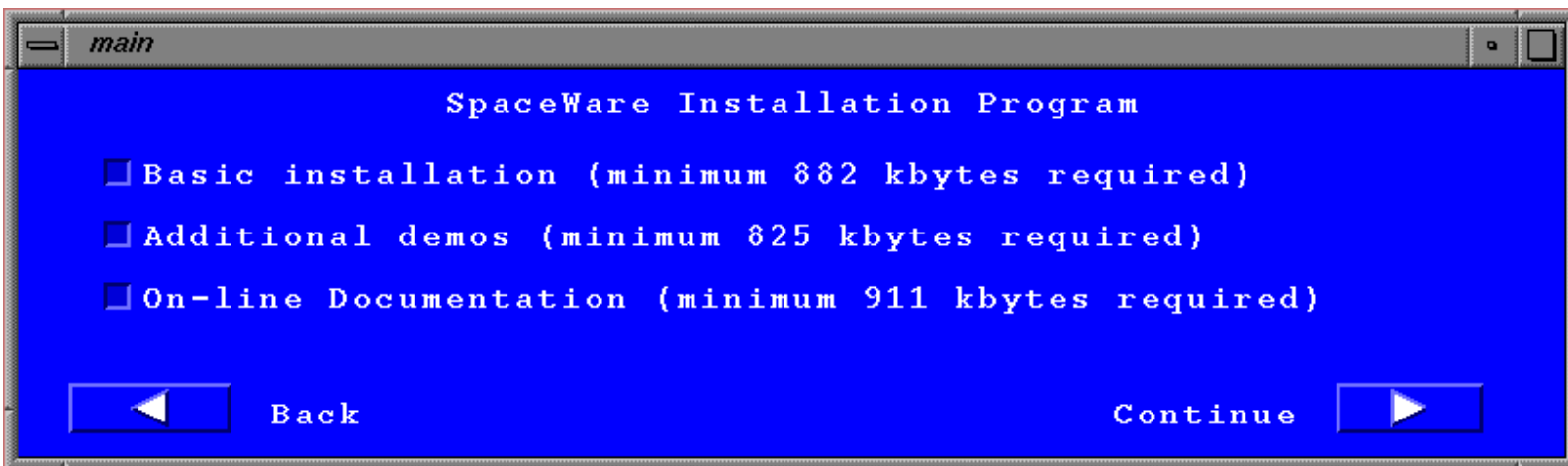
```
┌──┐
│ ▭ main   ▫ □ │
├──┤
│   │
│   SpaceWare Installation Program   │
│   │
│   Source ┌──┐ │
│   │ /tmp/SpaceWare.tar   │ │
│   └──┘ │
│   │
│   Destination ┌───┐ │
│   │ /usr   │ │
│   └───┘ │
│   │
│   ┌──────────┐   │
│   │ Cancel   │   Continue   ┌─────┐   │
│   └──────────┘   │ ▶ │   │
│   └─────┘   │
└──┘
```

**Source** is the directory of the SpaceWare.tar file that is being installed.

**Destination** is the directory where the SpaceWare files will be installed.

**Cancel** will exit the program and not install any files.

**Continue** moves to the next installation screen.

**Second Installation Window**

```
┌──────────────────────────────────────────────────────────────────────────┐
│ ▭  main                                                              ▫  □ │
├──────────────────────────────────────────────────────────────────────────┤
│                                                                            │
│              SpaceWare  Installation  Program                              │
│                                                                            │
│   ☐ Basic installation (minimum 882 kbytes required)                       │
│                                                                            │
│   ☐ Additional demos (minimum 825 kbytes required)                         │
│                                                                            │
│   ☐ On-line Documentation (minimum 911 kbytes required)                    │
│                                                                            │
│   ┌─────┐                                                       ┌─────┐    │
│   │  ◀  │   Back                                 Continue       │  ▶  │    │
│   └─────┘                                                       └─────┘    │
└──────────────────────────────────────────────────────────────────────────┘
```

Basic installation installs the driver, readme, configuration program, utilities and minimal demonstrations

Addition demos installs a suite of demonstrations

On-line Documentation installs the HTML documentation. Use the index.htm as the first file when opening the documentation.
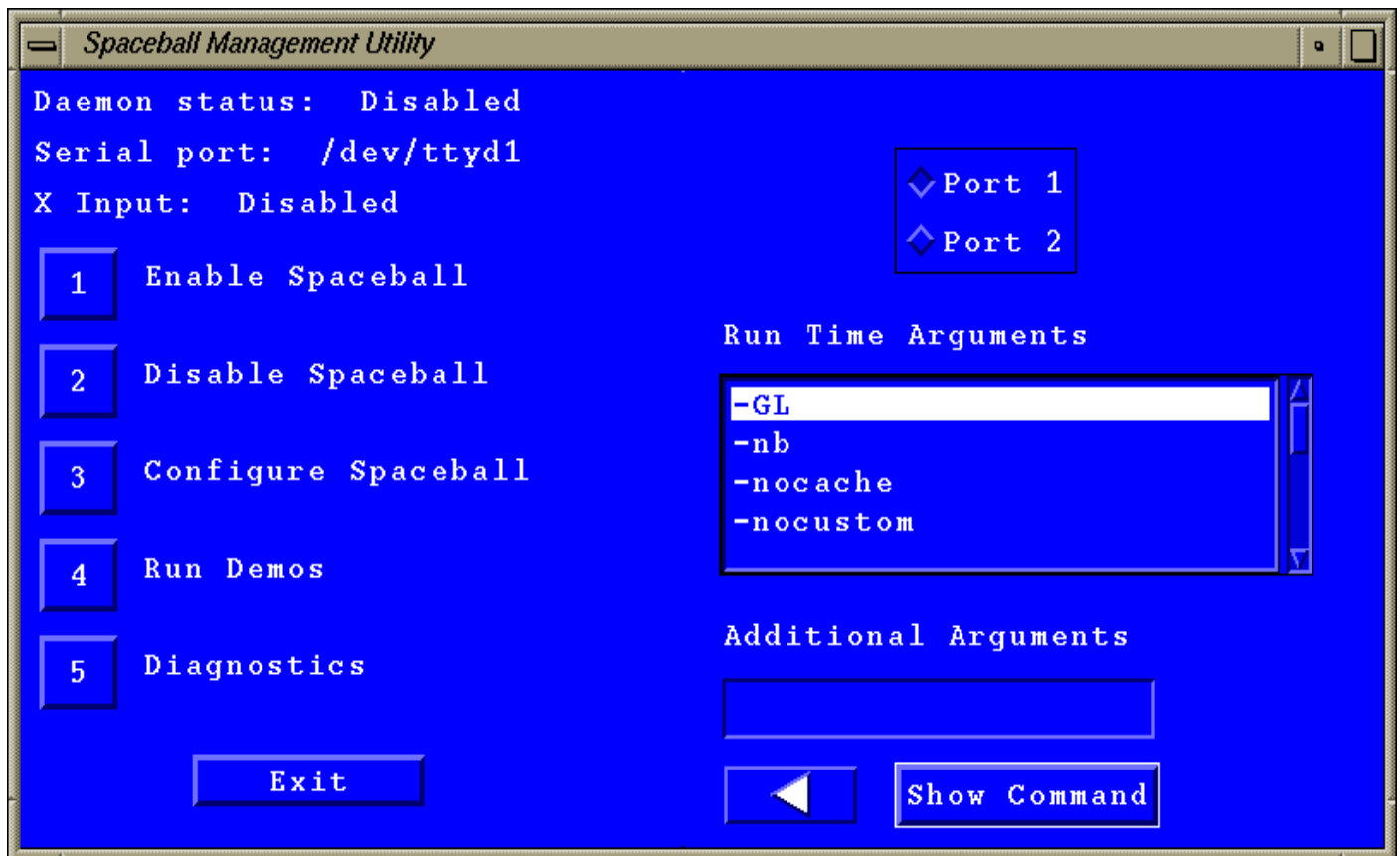
Spaceball Management Utility
The utility is used to enable/disable the Spaceball, configure the port and command line option, run the demonstrations and diagnostics.

Spaceball Management Utility Configuration Window
The window enables the selection of the port the Spaceball is running on and the command line options.

Port - Selects the port the Spaceball is running on.

RunTime Arguments lists the selectable command line arguments for the Spaceball. Use the mouse to select the options required for running the Spaceball. The command line options are list the Basic Driver Functionality.

Additional Arguments enables additional arguments to be added to the Spaceball Arguments list. For example -cf catia.scg.

The SpaceWare Tutorial

Congratulations on your purchase of a Spaceball. This device, developed by Spacetec IMC Corporation, is a true 3D input device that detects the slightest fingertip pressure applied to it and resolves the pressure into X, Y, and Z translations and rotations, moving your 3D images instantaneously and simultaneously. This provides intuitive, interactive six degrees-of-freedom control of 3D graphical images and objects.

This tutorial is designed to acquaint you with the Spaceball and provide examples of how to use it. Before you begin, make sure you have attached the Spaceball device to your computer and have installed the SpaceWare software. If you haven't, follow the instructions in Hardware Installation and Software Installation.

Getting Ready

Placing the Spaceball
For optimum efficiency, use the Spaceball device with another pointing device like a mouse or digitizer stylus. The Spaceball device is for 3D control; the pointing device is for normal pointing and menu selection. You will find it more productive and efficient to use both devices simultaneously - controlling your pointing device with the hand you normally use and the Spaceball device with the opposite hand.

If you are right-handed, set up your computer system with the Spaceball device to the left of your computer keyboard and the mouse to the right of your keyboard as shown in the diagram below.
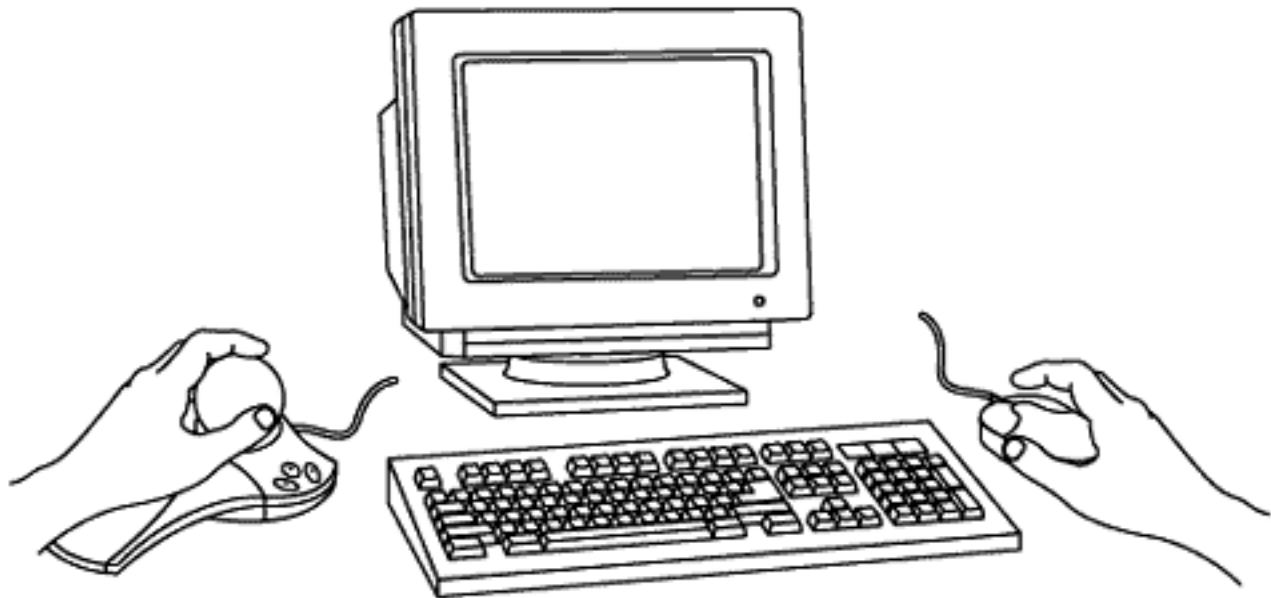

If you are left-handed, reverse the setup shown above so the mouse is on the left and the Spaceball device is on the right.
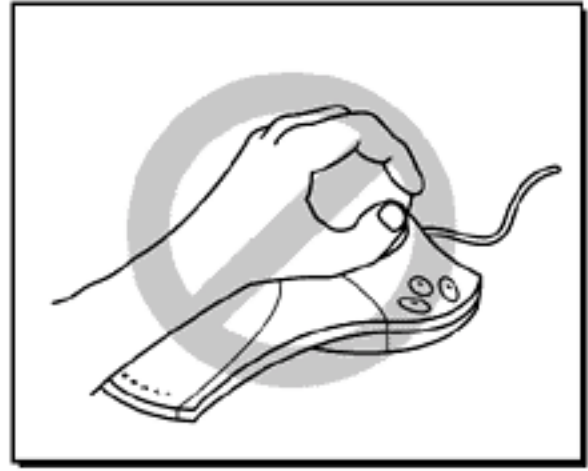
Placing the Hand for Optimal Ease of Use
The Spaceball is designed to be a comfortable fit for your hand and fingers. Lightly grasp the PowerSensor ball with the thumb and forefinger.

The graphic below shows proper placement of the hand on a Spaceball.
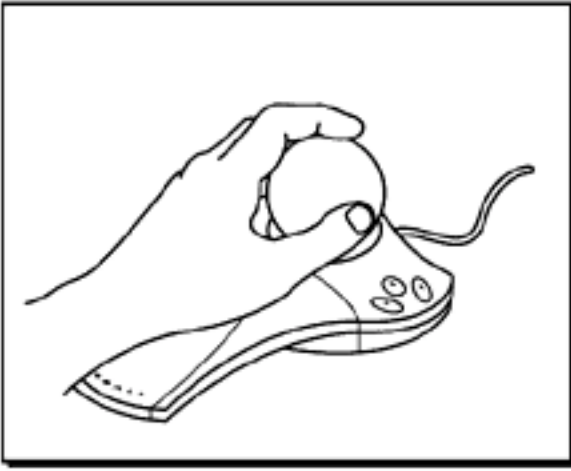
The Correct Way To Hold
The PowerSensor Ball

The Incorrect Way To Hold
The PowerSensor Ball

Practicing Basic Spaceball Movements

To begin getting a "feel" for the way the Spaceball moves 3D models on screen, open the **sbgldemo** file in **/etc/SpaceWare/demos/** directory. This opens as a small window in the top left of your screen containing three 3D models and the Small Spaceball Window. You can enlarge the demo window by clicking on the Maximize button in the upper right corner of the window but object movement will be slower. Make sure that SpaceWare has the SpaceWare Demos configuration selected.

The demo window contains three objects (a red cube, a yellow pyramid, and a purple "gem") enclosed in a bounding box marked by white corners. When you first open the demo, all objects are selected as a group.

Experience One - Movement in Object Mode

In Object mode, you manipulate the Spaceball PowerSensor ball as if you were holding the 3D model in your hand. Push left and the model moves left. Push right and it moves right. Lift up or push down and the image moves accordingly. Push the PowerSensor ball away from or toward you and the image responds similarly. Twist in any direction and the image rotates in that direction. To begin:

1. Open the **sbgldemo** file (**/etc/SpaceWare/demos/sbgldemo**).

2. Place your hand lightly on the PowerSensor ball, and push slowly to the right to move the screen object to the right. Push the PowerSensor ball to the left; pull up and push down gently. The object on screen moves in the same direction as you move the PowerSensor ball.

3. Twist the ball gently to the right and then to the left and the object rotates in the same direction as you twist the ball. If one or more of the models seem to go behind a black part of the background, it is moving behind the clipping box. Pull the ball toward you to bring the model forward and continue rotating and it will reappear.

4. Pull the PowerSensor ball toward you and the model zooms toward you; push it away from you and the object moves away from you.

If you feel that the model on screen moves faster or slower than you would like it to move, you can adjust the Spaceball sensitivity. You should need only a light pressure on the Spaceball to move the model. If you frequently loose the model off screen or you feel your hand or fingers straining, reduce the sensitivity of the Spaceball. See Adjusting the Spaceball Sensitivity for directions.

Experience Two - Movement in Eyepoint Mode

In Eyepoint (or Camera) mode, you manipulate the PowerSensor ball as if it were your head or a camera looking at a scene. Push left and the scene moves to the right. Push right and the scene moves to the left. Lift up and the scene moves down. Push down and the scene moves up.

To change the mode of the Spaceball, press **Button 4**. The white bounding corners disappear to indicate that you are in Eyepoint mode. (**Button 4** is a toggle switch that toggles between Object and Eyepoint mode.)

1. With very gentle motion on the PowerSensor ball, push forward and see the model move closer to you. It is as if you were a camera zooming in on a subject.

2. Push the ball to the left to see the model move to the right and then push to the right to have it move to the left.

3. Gently pull up on the ball and the model moves down as if you were raising your camera above the model.

4. Continue experimenting with movement in this mode.

If you find that you are loosing the model off the screen, decrease the sensitivity of the Spaceball. If you feel your hand or fingers straining or the model moves too slowly, increase the sensitivity. See Adjusting the Spaceball Sensitivity for directions.

Experience Three - Moving One Part of a Group

So far, the tutorial has moved all models on the screen as one unit. You can separate the parts of the model and move any one of them. Press **Button 5** to separate the group and select a single object. Each time you press the button, you move to another object in the group, beginning with the red cube. After you have cycled through the parts, the entire group is selected.

1. Press **Button 4** to put the Spaceball into Object Mode (**Button 4** is a toggle switch, toggling between Object and Eyepoint mode). You know you are in Object mode in this demo when you see the white bounding corners around the selected model.

2. Press **Button 5** to select the red cube.

3. With gentle pressure on the Spaceball, move the red cube so that it circles the yellow pyramid. Do this several times to perfect your control. Try to keep it from disappearing behind the clipping box.

4. Move the red cube to the lower left part of the window and rotate it so that it appears as a 2D red square sitting parallel to the sides of the window.

5. Press **Button 5** to select the purple "gem" and move it around the yellow pyramid. Move it to the lower left corner of the screen adjacent to the red cube. Rotate it until it appears as a 2D octagon with a light colored octagonal center.

6. Press **Button 5** again to select the yellow pyramid. Move it to the lower left corner of the window beside the purple "gem". Rotate it until it appears as a yellow triangle.

> **Note**:
> To gain more control as you rotate the red cube or any model, turn translations Off so that the model will only rotate. Pressing **Button 1** on the Spaceball or clicking on **Button 1** in the Spaceball window turns Translations Off. Turn Translations On again before going to the next step. (**Button 1** is a toggle switch, toggling between On and Off.)

Understanding the Axes

The Spaceball gives you six degrees-of-freedom movement. This is movement along or around the X, Y, and Z axes. Generally, the X axis goes left and right, the Y axis goes up and down, and the Z axis goes toward you and away from you. This is only generally true because it can vary in applications depending on the location of the model on the screen and other settings you may have chosen.

The help files contains two tables showing Spaceball axis directions and the resulting model movement when you move the ball in the direction indicated. The tables illustrate the movements for Object and Eyepoint mode using a teapot positioned between two posts. The first table shows the movements for translations and the second for rotations. The tables are in the Moving with the Spaceball topic.

Adjusting the Spaceball Sensitivity

There are several ways to adjust the sensitivity of the Spaceball:

1. Spaceball window provides a slider to adjust the sensitivity of the Spaceball. Normally application configurations enable the user to press either **Button 5** (Decrease Sensitivity) or **Button 6** (Increase Sensitivity) on the Spaceball to change the sensitivity of the Spaceball. Each press on **Button 5** decreases the sensitivity of the Spaceball by half, requiring more pressure on the Spaceball to move the model. Each press on **Button 6** doubles the sensitivity and requires less pressure on the Spaceball to move the model.

2. Move the slider in the Overall Sensitivity box in the lower right corner of the General Spaceball Window. This slider adjust the sensitivity for all Spaceball movements: panning, rotating, and zooming. Moving it to the left requires more pressure on the Spaceball to move the screen model.

3. Select the **Sensitivity and Filters** tab in the General Spaceball Window. In this window you can fine tune the Spaceball sensitivity for individual types of movements (panning, rotating, and zooming) by adjusting the slider for that type of movement. Slider movement toward **Min** decreases the sensitivity of the Spaceball.

Button Mapping for sbgldemo

Each demo shipped with SpaceWare and the applications supported by it come with a set of functions mapped to the buttons on the Spaceball. The functions mapped to the buttons for the Sbgldemo are shown in the following table. When you press **Button B**, the Spaceball enters Shift Mode in which Spaceball buttons 1-9, A, B, and C send values associated with the virtual buttons 13-24 to the application or demo. When the Spaceball is in Shift Mode, the button designations contain an Asterisk (for example, 9*). For more information, see Shift Mode.

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Mode Toggle -AP4**	Toggles between Object and Eyepoint mode.	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Select Object**	Cycles through the objects in the scene	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Toggles back face culling On/Off (requires Wire Frame)	6*	**Rz**	Toggles rotations On/Off on all axes except Z

7	**Wire Frame**	Toggles between wire frame and shaded models	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Toggles between the large and small windows	A*	**More/Less**	Toggles between the large and small windows
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Save**	Saves the current configuration

You can change the functions mapped to the buttons in any demo or application. See Button Mapping Window for more information.

Using the Spaceball Windows

When you first open the Sbgldemo, the Small Spaceball Window opens along with the demo window. The Small Spaceball Windows shows only labeled buttons. When you pass the mouse pointer over the function buttons (1-9, and A-C) a ToolTip displays the name of the function mapped to that button. The **More** button opens the next larger Spaceball Window - the General Spaceball Window.

The button layout in a Spaceball window reflects the way you attached the palm rest to the Spaceball.

The following sections are only brief descriptions of the Spaceball windows. Each section ends with a link to a more complete description of that window.

Global Window Controls
There are certain buttons and controls common to the larger Spaceball windows. They are described in Global Window Controls.

The Small Spaceball Window
This window is the smallest window. You access it by clicking on the **Less** button in the General Spaceball Window. This window contains function buttons with number and letter designations, a More button, two radio buttons, and a text box at the bottom of the window that displays the function of the most recently pressed button.

A more detailed description can be found in Small Spaceball Window.

The General Spaceball Window

You access the General Spaceball Window by clicking on the **More** button in the Small Spaceball Window. This window contains several sections:

- **Left Buttons**: buttons on the left side of the Spaceball (in either the left or right hand setup) with their button designation and assigned function
- **Right Buttons**: buttons on the right side of the Spaceball (in either the left or right hand setup) with their button designation and assigned function
- **Filters**: filters that determine how much of the data coming from the Spaceball is applied to the active model. These filters mirror the default functions assigned to buttons 1-3. The checkbox to the left of the filter name indicates its On/Off state.
- **Overall Sensitivity**: a slider you can use to increase/decrease the sensitivity of the Spaceball
- Global Controls: buttons at the bottom of the window that are common to all three large Spaceball windows: General, Sensitivity and Filters, and Button Mapping Windows.

You can find a more detailed description and a graphic in General Spaceball Window.

The Sensitivity and Filters Window

This window enables you to fine tune the Spaceball. It contains three sliders that adjust the sensitivity for panning, rotating and zooming. There are individual axis filters enabling you to determine which axis' data can affect the active model. A Miscellaneous Filter reverses the Y and Z translations.

You can find a more detailed description and a graphic in the Sensitivity and Filters Window.

The Button Mapping Window

This window contains a drop-down list box for each button (in both the shifted and unshifted state). When you click on the down arrow in any list box you see a list of functions you can map to that button. Choose the function you want to map to any button. Click on the **Save** button if you want to save the changes for future use, otherwise the changes only apply to the current work session.

You can find a more detailed description and a graphic in the Button Mapping Window.

Technical Support

Spacetec IMC provided technical support every week day (except major holidays) between the hours of 8:30 A.M. and 5:30 P.M. For more information, see Technical Support Services.

The Spaceball and CADDS5

The Spaceball is supported with CADDS5 (release 5 and later) on Digital Equipment (DEC), Hewlett-Packard (HP) host, IBM, Silicon Graphics (SGI), and Sun Microsystems (Sun) Solaris platforms. On Windows NT platforms, use the Windows Spaceball driver with the Exceed X11option.

Using the Spaceball with CADDS5

The Spaceball is only active in CADDS5 when you activate a 3D model, then activate a drawing, and then attach dynamics to a viewport. To do this in either Parametric or Explicit modes:

| Parametric | Enable Dynamics by clicking the middle mouse button in the main drawing area. |
| Explicit | Use ATTach DYNamics command and then digitize a viewport and press **ENTER**. |

Refer to your CADDS5 documentation for additional instructions. Also, revisions 5.0 and 5.1 require the use of accelerated graphics in Explicit mode. This is set in the **.caddsrc-local** file.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for CADDS5
The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with CADDS5

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with CADDS5

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X

R	**Reset View**	Resets Current view to the original view	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	**7***	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	**B***	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

Spaceball 2003 buttons with CADDS5

Primary Mapping	Shifted Mapping

Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window

B	Translations	Toggles Translations On/Off	B*	Restore Defaults	Returns all settings to the originally installed settings
C	Zoom Only	Limits movement to Z axis	C*	Save	Opens the Save dialog

<< >>

The Spaceball and CAMAND

The Spaceball is supported with CAMAND (revision 10.0 or later) on Hewlett-Packard (HP) host, IBM, Silicon Graphics (SGI), and Sun Microsystems (Sun) Solaris platforms.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for CAMAND

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with CAMAND

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	**1***	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8 *	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with CAMAND

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with CAMAND

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	**7***	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	**B***	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

The Spaceball and CATIA 4

The Spaceball is supported with CATIA (version 4 or later) on IBM RS/6000, Hewlett-Packard (HP) host, Silicon Graphics (SGI), and Sun Microsystems (Sun) Solaris platforms.

Before you install the SpaceWare software, you need the following:

- Name of the serial port to which Spaceball is attached
- Name of the drive from which you will load SpaceWare software
- Superuser (root) password

IBM Workstations

If your serial port has been previously configured for LPFKs or dials, refer to Configuring IBM Serial Ports before continuing with the installation.

Follow the instructions below to install the SpaceWare software:

1. Insert the SpaceWare software media into the CD-ROM drive.
2. Log in as root. You may need to enter your root password.
3. Load and run the SpaceWare software by entering the following:
   ```
   mount -o ro -vcdrfs /dev/cd0 /mnt
   cd /mnt
   ./install.sh
   ```
4. Answer the on-screen prompts.
5. From the SMIT menu select **Enable Spaceball**.
6. Select **Application requiring X Client Message Daemon and LPFK Emulation**.
7. From SMIT, select the serial port to which the Spaceball 4000 FLX is attached. If the "Port Spaceball is Attached to" edit box is correct, click on **OK**. If the Spaceball 4000 FLX is connected to a serial port other than one shown, select **LIST** and choose the correct serial port.
8. In the Enable Spaceball LPFK Window, select **Done**.
9. In the following Enable Spaceball LPFK Window, select **Cancel**.
10. In the SMIT Window, choose **Cancel**.
11. In the second SMIT Window, choose **Done**.

CATIA version 4.0 supports the Spaceball 4000 FLX directly as a Spaceball (not a dial box), in that the system looks for a Spaceball 4000 FLX device on the serial port.

To disable the Spaceball 4000 FLX at a later time, run the Spaceball Demos, or run Spaceball Diagnostics, type: `smit spaceball` and select the appropriate option from the list that appears.

AIX LPFK Functions and the Spaceball

If your system is configured for LPFKs, you can access the LPFK functions with the Spaceball device. Press Button **C** on the Spaceball device to bring up the Small Spaceball Window. Clicking on the **LPFK** radio button puts the Spaceball device in LPFK Mode and opens the Small LPFK Window. This window has 32 buttons you can use to access the LPFK functions. For more information on using the Spaceball device and LPFKs see:

Problems Activating Custom Functions

If you close either the Prism or the Manage dialog box, you may find that custom functions do not work. This includes "Rotate about a Line Segment" (a custom function created by Spacetec) and any custom functions you created. To remedy this problem, click anywhere on the 3D model or on a menu item and then activate the custom function.

Reference links for Spaceball windows

Button Mappings for CATIA

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in [Shift Mode](#). Each device's button mapping is listed separately under [4000 FLX](#), [3003](#), and [2003](#).

Examples of CATIA custom function are described in the Custom Function Window under [Examples of Programmable Functions for CATIA](#).

Spaceball 4000 FLX buttons with CATIA4

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles translations On/Off	**1***	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Display Axis Center -AP4**	Displays rotation axis and center point	**4***	**Rx**	Toggles rotations On/Off on all axes except X

5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Yes**	Provides a CATIA Yes Response	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**No**	Provides a CATIA No Response	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with CATIA4

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y

3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Display Axis Center -AP4**	Displays rotation axis and center point	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Yes**	Provides a CATIA Yes Response	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**No**	Provides a CATIA No Response	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with CATIA4

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**

1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	**1***	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Display Axis Center -AP4**	Displays rotation axis and center point	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	**7***	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Yes**	Provides a CATIA Yes Response	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	**B***	**Restore Defaults**	Returns all settings to the originally installed settings
C	**No**	Provides a CATIA No Response	**C***	**Save**	Opens the Save dialog

The Spaceball and CGS

The Spaceball is supported with CGS (version 4.3.2 or later) on Hewlett-Packard (HP) host, IBM AIX (version 4.4.1 or later), and Sun Microsystems (Sun) Solaris platforms.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for CGS

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with CGS

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Clipping/Axis of Rot -AP4**	Enables/Disables Z-clipping and Axis of Rotation modes	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with CGS

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

Button	Function	3D Control Function	Button	Function	3D Control Function
4	**Clipping/Axis of Rot -AP4**	Enables/Disables Z-clipping and Axis of Rotation modes	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with CGS

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	**1***	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Clipping/Axis of Rot -AP4**	Enables/Disables Z-clipping and Axis of Rotation modes	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	**7***	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	**B***	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

The Spaceball and Euclid3

The Spaceball is supported with Euclid3 (version 1.2 or later) on Digital Equipment (DEC) Digital UNIX, Hewlett-Packard (HP) host, Silicon Graphics (SGI) , and Sun Microsystems (Sun) Solaris platforms.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for Euclid3

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with Euclid3

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Fit All -AP4**	Resizes the model to full screen	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Euclid3

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	Fit All -AP4	Resizes the model to full screen	4*	Rx	Toggles rotations On/Off on all axes except X
5	Decrease Sensitivity	Halves sensitivity with each consecutive button press	5*	Ry	Toggles rotations On/Off on all axes except Y
6	Increase Sensitivity	Doubles sensitivity with each consecutive button press	6*	Rz	Toggles rotations On/Off on all axes except Z
7	Translations	Toggles Translations On/Off	7*	Restore Defaults	Returns all settings to the originally installed settings
8	Rotations	Toggles Rotations On/Off	8*	Rezero Spaceball	Instructs the Spaceball to assume a rest position in case of image drift
9	Pan Only	Limits translations to X and Y axes	9*	Keep On Top	Keeps the current button window on top of all open windows
A	More/Less	Switches between Small Spaceball Window and General Window	A*	More/Less	Switches between Small Spaceball Window and General Window
B	Shift	Switches the Spaceball into Shifted Mode	B*	Shift	Switches the Spaceball into Shift Lock Mode
C	Zoom Only	Limits movement to Z axis	C*	Save	Opens the Save dialog

Spaceball 2003 buttons with Euclid3

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	Menu Toggle	Toggles Small Spaceball Window Open/Closed	1*	Tx	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Fit All -AP4**	Resizes the model to full screen	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	B*	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

The Spaceball and I-DEAS Master Series

The Spaceball is supported with I-DEAS Master Series on Digital Equipment (DEC), Alpha Digital UNIX, Hewlett-Packard (HP-UX) host, IBM RS/6000, Silicon Graphics (SGI) IRIX, and Sun Microsystems (Sun) Solaris. On Windows NT platforms, use the Windows Spaceball driver with the Exceed X11option.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for I-DEAS Master Series

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with I-DEAS Master Series

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	**1***	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep On Top**	Keeps the current button window on top of all open windows	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with I-DEAS Master Series

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with I-DEAS Master Series

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	B*	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

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The Spaceball and Patran3

The Spaceball is supported with Patran3 (version 5 or later) on Digital Equipment (DEC), Hewlett-Packard (HP), IBM RS/6000 (IBM), Silicon Graphics (SGI), and Sun Microsystems (Sun) Solaris platforms.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for Patran3

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with Patran3

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	**1***	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Patran3

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	**7***	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	**B***	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

Spaceball 2003 buttons with Patran3

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	**1***	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Model Space Filter -AP4**	Toggles Model Space Filter On/Off	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	**7***	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	**B***	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

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The Spaceball and Pro/ENGINEER

The Spaceball is supported with Pro/ENGINEER (revision 10.0 or later), Pro/JR. (revision 1.1 or later), and PT/Products on Digital Equipment (DEC), Alpha Digital UNIX, Hewlett-Packard (HP-UX) host, IBM RS/6000, Silicon Graphics (SGI) IRIX (revisions 16 9612, 17 9633, or later), and Sun Microsystems (Sun) Solaris systems.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for Pro/ENGINEER

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Special Custom Functions for Pro/ENGINEER

In order to set up Rest View in the Pro/ENGINEER application the following line (entered exactly as shown) must be added to the user's config.pro file:

```
mapkey spwreset #VIEW;#DEFAULT;#DONE-RETURN
```

Other examples of Pro/ENGINEER custom function are described in the Custom Function Window under Examples for Pro/ENGINEER.

Spaceball 4000 FLX buttons with Pro/ENGINEER

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	Translations	Toggles Translations On/Off	1*	Tx	Toggles translations On/Off on all axes except X
2	Rotations	Toggles Rotations On/Off	2*	Ty	Toggles translations On/Off on all axes except Y
3	Dominant Axis Filter	Toggles Dominant Axis Filter On/Off	3*	Tz	Toggles translations On/Off on all axes except Z

4	**Keep On Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View - AP9**	Resets current view to the original view. See above for configuration	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Pro/ENGINEER

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X

R	**Reset View -AP9**	Resets Current view to the original view. See above for configuration	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with Pro/ENGINEER

Primary Mapping		Shifted Mapping	

Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view. See above for configuration	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view. See above for configuration.	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	B*	**Restore Defaults**	Returns all settings to the originally installed settings

C	Zoom Only	Limits movement to Z axis	C*	Save	Opens the Save dialog

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The Spaceball and SolidDesigner

The Spaceball 4000 FLX is supported with SolidDesigner on Hewlett-Packard (HP) (version 2.15 or later) and SGI systems (version 3.05 or later).

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for SolidDesigner

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with SolidDesigner

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep On Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with SolidDesigner

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with SolidDesigner

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	B*	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

The Spaceball and Strim

The Spaceball is supported with Strim (version 6.1.3 or later) on Digital Equipment (DEC) Alpha Digital UNIX, Hewlett-Packard (HP) host, and Silicon Graphics (SGI) platforms.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for STRIM

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with Strim

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	Translations	Toggles Translations On/Off	1*	Tx	Toggles translations On/Off on all axes except X
2	Rotations	Toggles Rotations On/Off	2*	Ty	Toggles translations On/Off on all axes except Y
3	Dominant Axis Filter	Toggles Dominant Axis Filter On/Off	3*	Tz	Toggles translations On/Off on all axes except Z
4	AutoRaise -AP4	Enables/disables AutoRaise	4*	Rx	Toggles rotations On/Off on all axes except X
5	Decrease Sensitivity	Halves sensitivity with each consecutive button press	5*	Ry	Toggles rotations On/Off on all axes except Y

6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Pan Only**	Limits translations to X and Y axes	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Zoom Only**	Limits movement to Z axis	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Strim

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
R	**Reset View -AP9**	Resets Current view to the original view. See above for configuration	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z

4	**Auto Raise -AP4**	Enables/disables AutoRaise	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	**7***	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	**B***	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

Spaceball 2003 buttons with Strim

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	**1***	**Tx**	Toggles translations On/Off on all axes except X

2	**Rotations**	Toggles Rotations On/Off	**2***	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	**3***	**Tz**	Toggles translations On/Off on all axes except Z
4	**Auto Raise - AP4**	Enables/disables AutoRaise	**4***	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	**5***	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	**6***	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	**7***	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view. See above for configuration	**8***	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view. See above for configuration.	**9***	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	**A***	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	**B***	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	**C***	**Save**	Opens the Save dialog

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The Spaceball and Unigraphics

The Spaceball is supported with Unigraphics (version 9.l and later) on Digital Equipment (DEC) Digital UNIX, Hewlett-Packard (HP) host, IBM RS/6000, Silicon Graphics (SGI), and Sun Microsystems (Sun) Solaris. On Windows NT platforms, use the Windows Spaceball driver with the Exceed X11option.

> **Note**:
> The Spaceball 4000 FLX interactive 3D Control functionality is only applicable in the 3D Work View mode in Unigraphics. If necessary, use the Unigraphics select function **Edit Work View** to set your application in this mode.

If you previously used Unigraphics version 9 (or earlier), type `/etc/SpaceWare/spaceball` and select **Turn Spaceball Off** from the menu.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window
Remove User Configurations

Button Mappings for Unigraphics
The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Examples of Unigraphics custom function are described in the Custom Function Window under Examples and Programmable functions for Unigraphics.

Spaceball 4000 FLX buttons with Unigraphics

| Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y

3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep In View -AP4**	Enables/Disables Keep In View	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Set Attention Point**	Sets the Attention Point for object manipulation	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Pan Only**	Limits translations to X and Y axes	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Reset View -AP9**	Resets current view to the original view	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	C*	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Unigraphics

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**

L	**Toggle Menu**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X	
R	**Reset View -AP9**	Resets Current view to the original view	2*	**Ty**	Toggles translations On/Off on all axes except Y	
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z	
4	**Keep in View -AP4**	Enables/Disables Keep In View	4*	**Rx**	Toggles rotations On/Off on all axes except X	
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y	
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z	
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings	
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift	
9	**Set Attention Point**	Sets the Attention Point for object manipulation	9*	**Keep On Top**	Keeps the current button window on top of all open windows	
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window	
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode	
C	**Pan Only**	Limits movement to X and Y axes	C*	**Save**	Opens the Save dialog	

Spaceball 2003 buttons with Unigraphics

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep in View -AP4**	Enables/Disables Keep In View	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**Reset View -AP9**	Resets current view to the original view	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Set Attention Point**	Sets the Attention Point for object manipulation	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window

B	Translations	Toggles Translations On/Off	B*	Restore Defaults	Returns all settings to the originally installed settings
C	Pan Only	Limits movement to X and Y axes	C*	Save	Opens the Save dialog

The Spaceball and Other Applications

If you are using an application not specifically listed in these help files, there is a default configuration file you can use.

Reference links for Spaceball windows

Small Spaceball Window
General Spaceball Window
Button Mapping Window
Sensitivity and Filters Window
Custom Function Window

Button Mappings for Other Applications

The following table shows the functions mapped to the buttons on the Spaceball. The button designations followed by an Asterisk (*) are buttons in Shift Mode. Each device's button mapping is listed separately under 4000 FLX, 3003, and 2003.

Spaceball 4000 FLX buttons with Any Application

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Translations**	Toggles Translations On/Off	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y
3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep On Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z

7	Pan Only	Limits translations to X and Y axes	7*	Restore Defaults	Returns all settings to the originally installed settings
8	Zoom Only	Limits movement to Z axis	8*	Rezero Spaceball	Instructs the Spaceball to assume a rest position in case of image drift
9	Restore Defaults	Returns all settings to the originally installed settings	9*	Keep On Top	Keeps the current button window on top of all open windows
A	More/Less	Switches between Small Spaceball Window and General Window	A*	More/Less	Switches between Small Spaceball Window and General Window
B	Shift	Switches the Spaceball into Shifted Mode	B*	Shift	Switches the Spaceball into Shift Lock Mode
C	Menu Toggle	Toggles Small Spaceball Window Open/Closed	C*	Menu Toggle	Toggles Small Spaceball Window Open/Closed

Spaceball 3003 buttons with Any Application

Primary Mapping			Shifted Mapping		
Button	Function	3D Control Function	Button	Function	3D Control Function
L	Toggle Menu	Toggles Small Spaceball Window Open/Closed	1*	Tx	Toggles translations On/Off on all axes except X
R	More/Less	Switches between Small Spaceball Window and General Window	2*	Ty	Toggles translations On/Off on all axes except Y
3	Dominant Axis Filter	Toggles Dominant Axis Filter On/Off	3*	Tz	Toggles translations On/Off on all axes except Z
4	Keep on Top	Keeps the current button window on top of all open windows	4*	Rx	Toggles rotations On/Off on all axes except X

5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Translations**	Toggles Translations On/Off	7*	**Restore Defaults**	Returns all settings to the originally installed settings
8	**Rotations**	Toggles Rotations On/Off	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**Pan Only**	Limits translations to X and Y axes	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Shift**	Switches the Spaceball into Shifted Mode	B*	**Shift**	Switches the Spaceball into Shift Lock Mode
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Spaceball 2003 buttons with Any Application

Primary Mapping			Shifted Mapping		
Button	**Function**	**3D Control Function**	**Button**	**Function**	**3D Control Function**
1	**Menu Toggle**	Toggles Small Spaceball Window Open/Closed	1*	**Tx**	Toggles translations On/Off on all axes except X
2	**Rotations**	Toggles Rotations On/Off	2*	**Ty**	Toggles translations On/Off on all axes except Y

3	**Dominant Axis Filter**	Toggles Dominant Axis Filter On/Off	3*	**Tz**	Toggles translations On/Off on all axes except Z
4	**Keep on Top**	Keeps the current button window on top of all open windows	4*	**Rx**	Toggles rotations On/Off on all axes except X
5	**Decrease Sensitivity**	Halves sensitivity with each consecutive button press	5*	**Ry**	Toggles rotations On/Off on all axes except Y
6	**Increase Sensitivity**	Doubles sensitivity with each consecutive button press	6*	**Rz**	Toggles rotations On/Off on all axes except Z
7	**Shift**	Switches the Spaceball into Shifted Mode	7*	**Shift**	Switches the Spaceball into Shifted Mode
8	**More/Less**	Switches between Small Spaceball Window and General Window	8*	**Rezero Spaceball**	Instructs the Spaceball to assume a rest position in case of image drift
9	**More/Less**	Switches between Small Spaceball Window and General Window	9*	**Keep On Top**	Keeps the current button window on top of all open windows
A	**More/Less**	Switches between Small Spaceball Window and General Window	A*	**More/Less**	Switches between Small Spaceball Window and General Window
B	**Translations**	Toggles Translations On/Off	B*	**Restore Defaults**	Returns all settings to the originally installed settings
C	**Zoom Only**	Limits movement to Z axis	C*	**Save**	Opens the Save dialog

Moving With the Spaceball
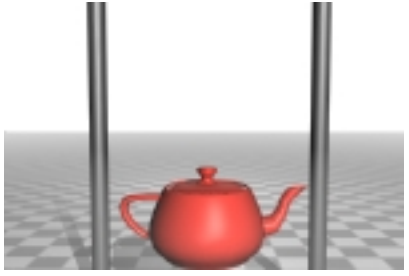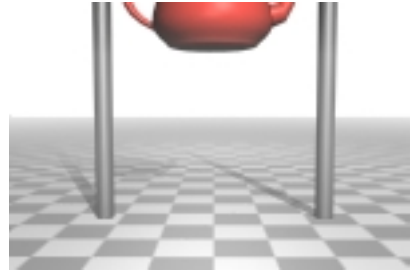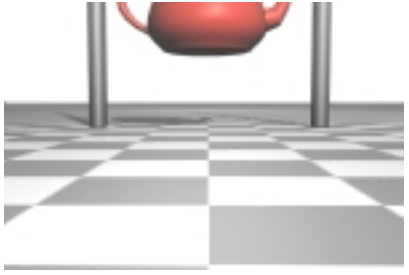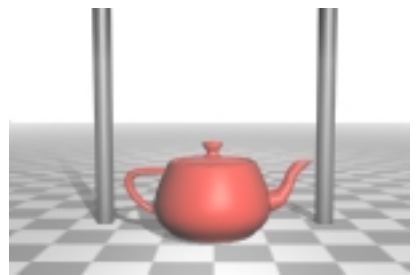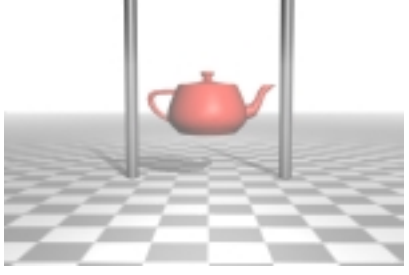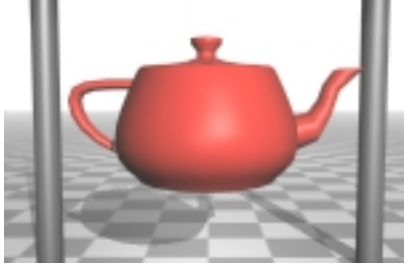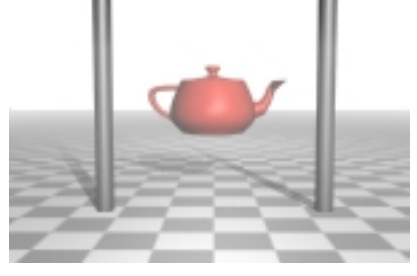
When you work with the Spaceball device, the active image responds to the movement you make with the PowerSensor ball. The following two tables illustrate the kind of object movement that results from movements to the PowerSensor ball.

Note:
The home position for the device is with the negative Z-axis pointing towards the screen. The teapot in these illustrations, when at home or rest, is between the two posts, slightly above the surface with the spout pointing to the right as shown in the graphic below.
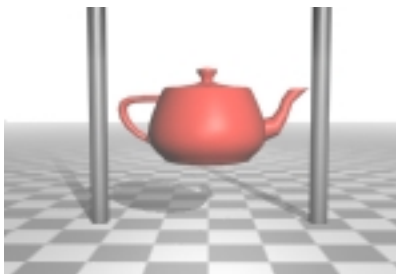
Teapot at Rest

Spaceball Axis Value	Camera Control	Object Control
Translate X-axis (+)	Right	Right
Translate X-Axis (-)	Left	Left
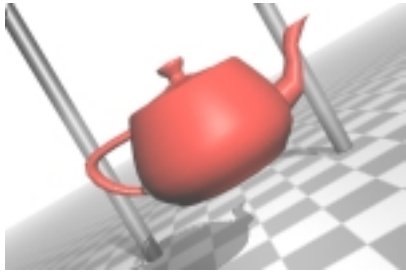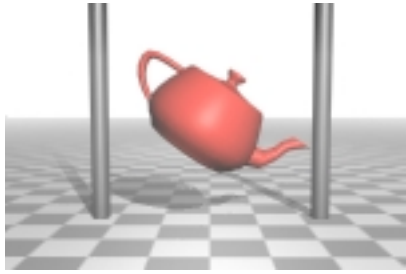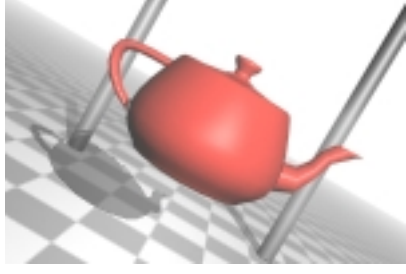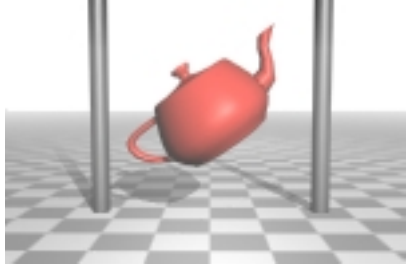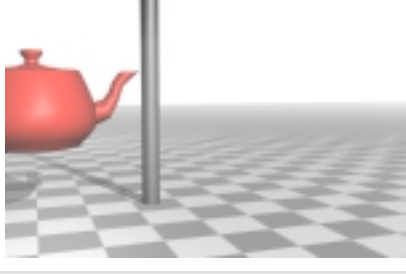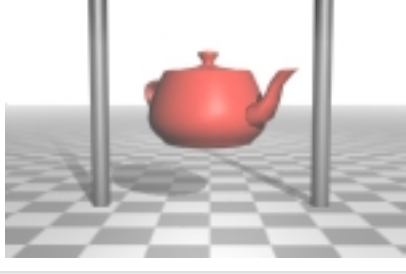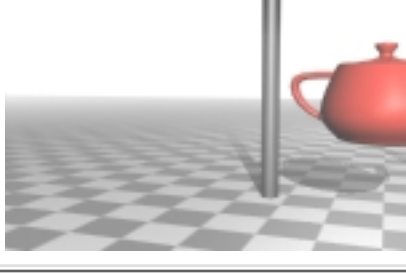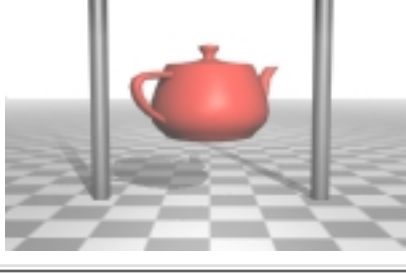
Translate Y-axis (+)	Up or Jump	Move Up
Translate Y-axis (-)	Down or Crouch	Move Down
Positive Translate Z-axis	Zoom Out	Forward
Negative Translate Z-axis	Zoom In	Backward

X, Y, and Z Rotation		
Axis Movement	**Eyepoint Control**	**Object Movement**

Rotate Z-axis	Right Cartwheel or Barrel Roll	Spins Clockwise
Rotate Z-axis	Left Cartwheel or Barrel Roll	Spins Counterclockwise
Rotate Y-axis	Spin Counterclockwise	Spins Clockwise
Rotate Y-axis	Spin Clockwise	Spins Counterclockwise
Rotate X-axis	Pitch Up or Look Up	Top of the object spins towards you

Rotate X-axis	Pitch Down or Look Down	Bottom of the object spins towards you
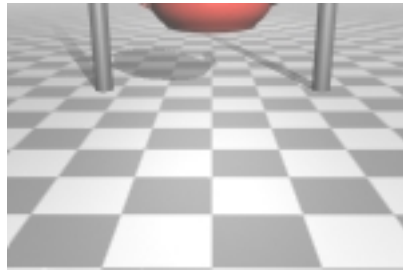
<< >>
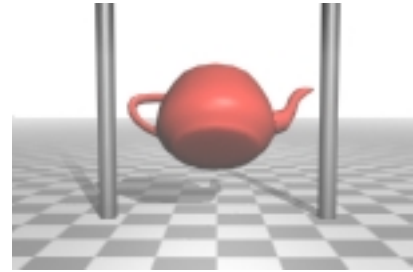
SpaceWare - the Basics

Basic Driver Functionality

The SpaceWare daemon runs from either the inittab or the command line. It includes the ability to detect which user is logged in and to change ownership of the daemon to match the user's ID and run in that user's environment. The daemon must be running before you load any application that uses the Spaceball.

The daemon routes Spaceball data (button and motion) from the Spaceball to the appropriate application window using the X Client Message protocol.

The daemon checks to see if any other Spaceball daemon is running and exits if that is the case.

The daemon supports the following command line arguments:

Command	Function
-cf	Specifies the location of the configuration file
-CATIA	Enables all the CATIA-specific menu items
-d	Defines the serial port to which the Spaceball is attached
-e	Sends all error and data to *stderr*
-GL	Provides an alternate method to send Spaceball data to the correct window.
-nb	Disables all button windows
-nocache	Disables window caching
-nocustom	Disables the Custom Functions Window
-V5	Specifies that the daemon use the older version 5.x atoms (used by Optegra Visualizer)
-version	Prints the release version and build number of the daemon
-local	Option to be used when running the Spaceball daemon from a user's login script. The option alters the start of the Spaceball to only look for the user running the Spaceball. This option will be ignored if run from the Inittab and can not be configured from the user install.

Spaceball Test Programs

SpaceWare includes two test programs: **sbtest** and **sbping**.

sbping tests the functionality of the Spaceball. It includes the following features:

- Functions on any serial port defined in the command line arguments
- Tests to determine if a Spaceball is attached to the serial port
- Determines the type of Spaceball attached to the serial port
- Supports the following command line arguments:
  -v version mode - displays the device type of the Spaceball

-q quiet mode - does not print any output to stdout or stderr
-d change serial device - identifies the serial port to which the Spaceball is attached

sbtest tests the functionality of the Spaceball device driver. It includes these features:

- Checks to confirm that the Spaceball performs translations and rotations along all three axes
- Checks to confirm that all Spaceball buttons are working

`<<` `>>`

The Spaceball Windows

On each of the large windows (General Spaceball Window, Button Mapping Window, Custom Function Window, and the Sensitivity and Filters Window) there are controls that are common to each of them.

The pull-down menu under **SpaceWare 9.2 for** lets you choose the application to use with the Spaceball. Making a choice here does not start the application, it loads the SpaceWare configuration file for that application. The name of the latest active configuration is kept in your home directory in a file called **.spwrc** so it can be reopened the next time you log in. If there is no file by that name, the driver looks for the file **/etc/SpaceWare/.spwrc** to determine the configuration to use.

Global Controls

The following buttons are available to all of the large windows:

- The **Mode** radio button at the top of the window lets you choose to operate in either Spaceball or LPFK mode. The LPFK option is active only if your application is CATIA on AIX systems.
- The radio buttons (**General**, **Sensitivity and Filters**, **Button Mapping**, and **Custom Functions**) are a means of switching to another window. Check the one you want.
- The **Help** button opens the online Help Window. This is a scrolled text window displaying the ASCII text SpaceWare Readme.txt file. The window contains a **Dismiss** button to close the window.
- The **Less** button returns you to the Small Spaceball Window.
- **Keep On Top** puts the Spaceball window in a mode so it will always rise to the surface if obscured by another window.
- The **Restore Defaults** returns the button mappings and sensitivity settings to the originally installed settings for the selected application.
- The **Reload** button will restore the settings to the last saved version of the configuration file.
- The **Save** button saves the change you made in this window to a configuration file. A dialog prompts you for a file name.

When you choose any of the radio buttons to open a window (**General**, **Sensitivity and Filters**, **Button Mapping**, and **Custom Functions**), these options are always available.

Shift Mode

SpaceWare 9.0 provides a Shift Mode in which Spaceball buttons 1-9, A, B, and C send values associated with the virtual buttons 13-24 to the application.

These virtual buttons appear in the Button Mapping Window, Small Spaceball Window (Shifted), Tiny Window, and the General Spaceball Window (Shifted) as 1* through C*. To access the Shift Mode and these virtual buttons, you must map one of the buttons (1-9, A, B, or C) to the Shift function. **B** and **B*** are the default mappings for the Shift function.

If you are in LPFK Mode (CATIA only), only buttons 7-9 can be used in Shift Mode. Buttons 1-6 are always mapped to the CATIA LPFK buttons. Button **A** moves the highlighted bar up a row, and Button **C** moves it down a row. **B** and **B*** are the default mappings for the Shift function. These virtual buttons appear in the LPFK Button Mapping Window, Small LPFK Window (Shifted), and the LPFK General Window (Shifted) as 7* through 9*.

The **Shift Lock** toggle button, when checked, locks the driver into Shift Mode and, when you press a button, sends the function mapped to that virtual button to the application. To exit Shift Mode you can either uncheck the **Shift Lock** toggle or press the button mapped to the Shift function.

When you click on the button mapped to the Shift function (in a non-shifted state), the driver enters the Shift Mode only for the next button press. After that, it reverts to the unshifted mode. If you press the **Shift** button while in Shift Mode, the driver becomes locked in the Shift Mode the same as if you press the **Shift Lock** toggle.
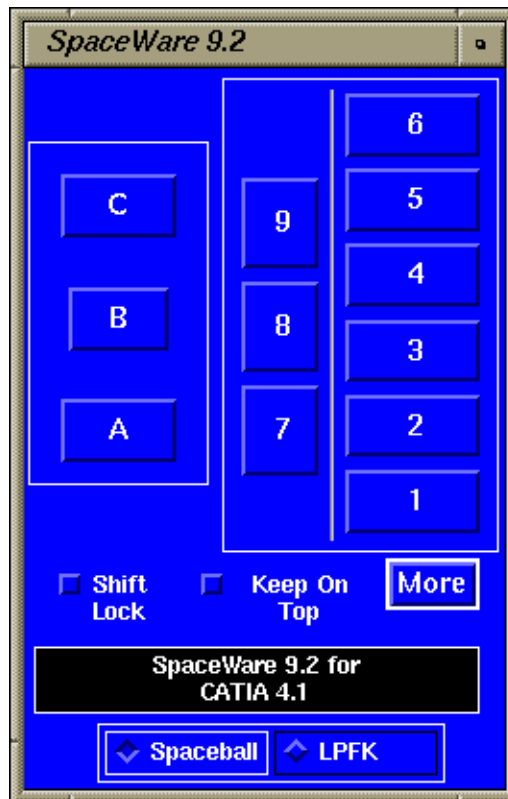
To exit Shift Mode, click on the **Shift Lock** toggle or the button mapped to the Shift function.

Small Spaceball Window

You access the Small Spaceball Window by pressing the Spaceball 4000 FLX button mapped to Menu Toggle. By default, this is Button **C**. This window is resizeable.

The Spaceball Windows
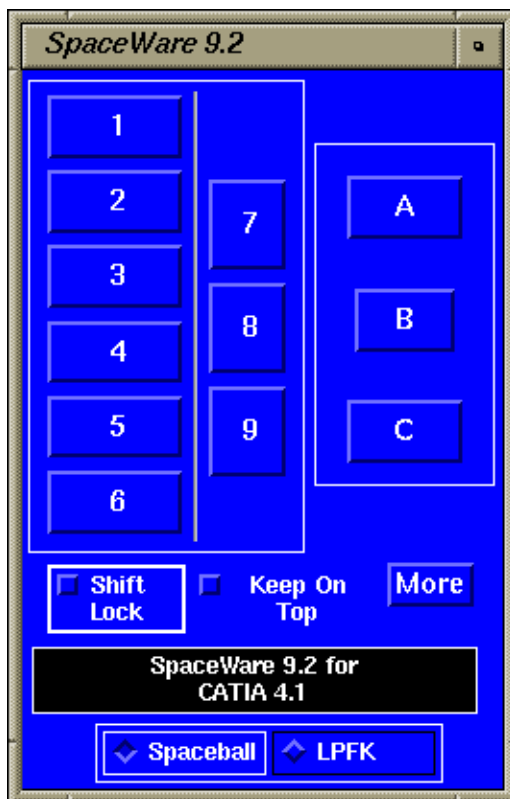
Left Hand Setup   **Right Hand Setup**

Buttons 1-9, A, B, and C can be activated from this window by clicking on them with the mouse or by pressing the appropriate button on the Spaceball 4000 FLX. If you are in Shift Mode, the button designations contain an asterisk (*).

The **More** button opens the General Spaceball Window.

The **Keep On Top** button puts the Spaceball window in a mode so it will always rise to the surface if obscured by another window.

The **Shift Lock** button, when checked, puts the driver into Shift Mode. Removing the check returns it to the unshifted state.

When the window is first opened, the **ToolTips** box displays the name of the currently open application. As the cursor tracks over the buttons, the label changes to show the function name for that button.

The **Spaceball/LPFK** buttons toggle between the Spaceball and LPFK interface. The LPFK option is available only if your application is CATIA on AIX systems.

General Spaceball Window
Accessed by clicking on the **More** button, the General Spaceball Window is an expanded version of the Small Spaceball Window. The General Spaceball Window will display with the buttons on the opposite side when a Spaceball 4000 FLX is configured for the right hand.
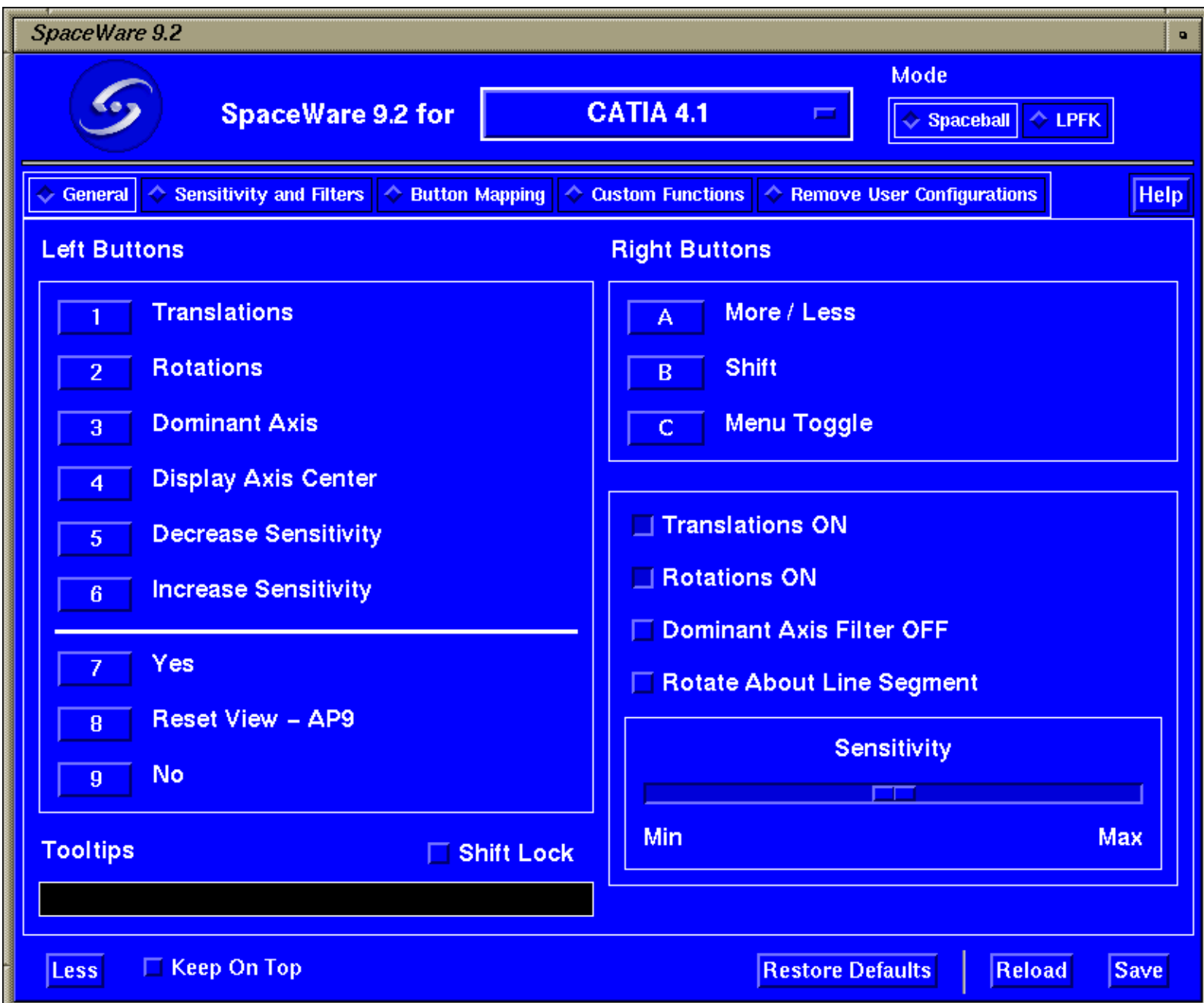
To the right of each button is the label for the function assigned to that button.

In addition to the numbered and lettered buttons and their labels, one section of this window gives you control over the sensitivity of the Spaceball and certain standard data filters. Checking the radio button to the left of the filters toggles that filter On/Off. Translations and Rotations are both enabled by default. They cannot both be disabled at the same time.

The **Dominant Axis Filter** restricts motion to a pure X, Y, or Z axis for finer control. On restricts object movement to the single largest piece of data coming from the Spaceball. Off provides full, simultaneous control of all six axes. Default is Off.

The Sensitivity slider lets you adjust the amount of force needed for the Spaceball to move the active object. Moving the slider toward **Min** makes the Spaceball less sensitive to your touch, requiring more force to move the active object. Moving the slider toward **Max** makes the Spaceball more sensitive to your touch.

The **ToolTips** box displays the label for the currently selected button.

Shift Lock locks the driver into Shift Mode so you can use the functions assigned to virtual buttons 13-24.

Sensitivity and Filters Window
This window is used for adjusting the sensitivity of the Spaceball and selecting filters.
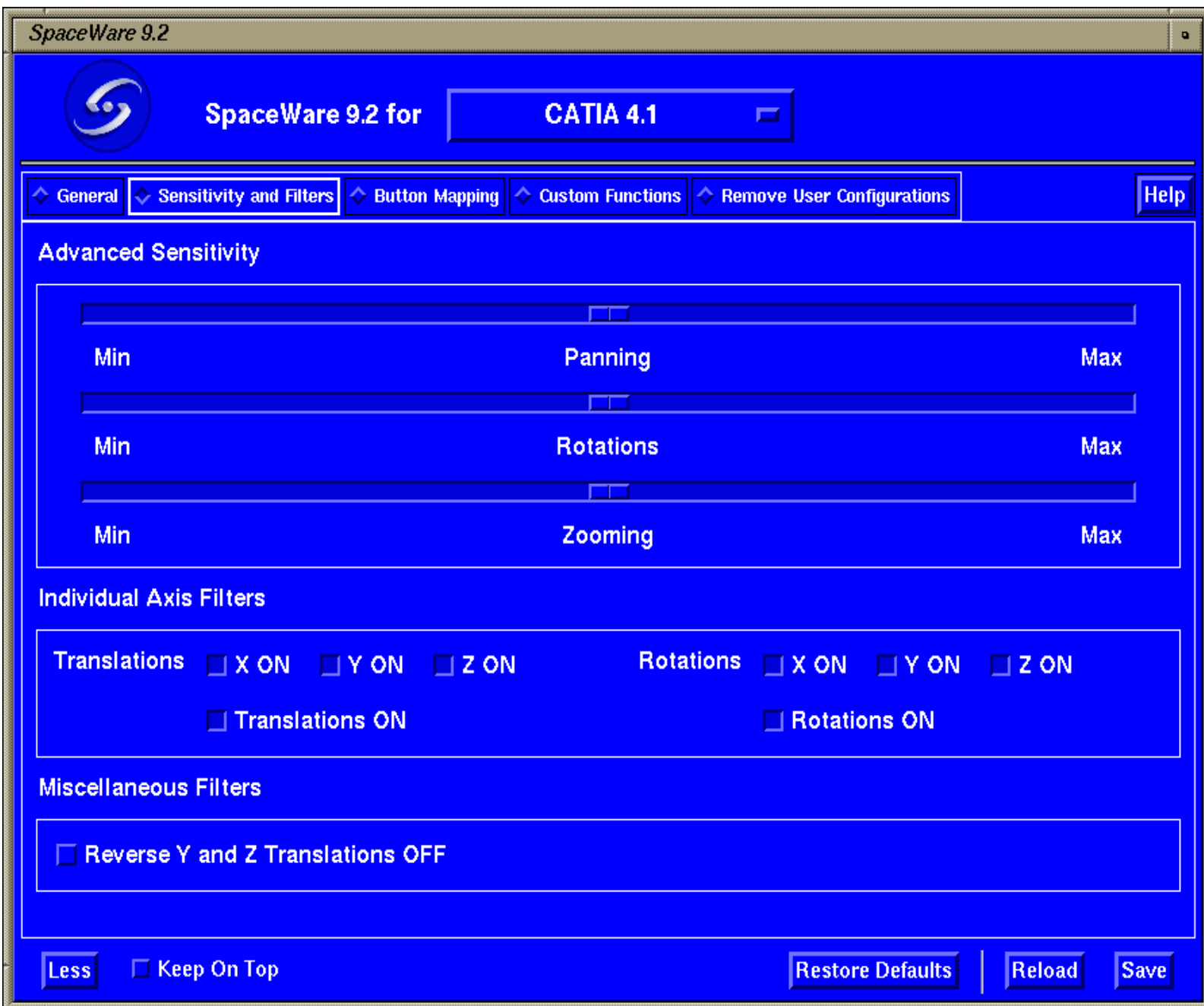
The **Advanced Sensitivity** sliders allow you to adjust the amount of force required on the Spaceball to produce a certain rate of movement for panning, rotating, and zooming. There is a range of one to eleven. One makes the Spaceball the least sensitive to your touch and eleven makes it the most sensitive. Moving the **Panning** slider adjusts translation along the X and Y axes. The **Rotations** slider controls rotations about the X, Y, and Z axes. The **Zooming** slider controls zooming along the Z axis. If you select the **Reverse Y/Z Axes Filter**, panning will be along the X and Z axes and zooming along the Y axis.

The **Individual Axis Filters** control which Spaceball axis can send data to an application. The **Translations On/Off** and **Rotations On/Off** toggles mirror the states of those toggles on the General Spaceball Window (either On or Off). In this window, you can toggle the state of individual axes. A check beside the axis name indicates that it is On.

For example, if you have turned Off translations on the Y axis in this window, have a button set to **Pan Only** (by definition: movement along the X and Y axes), and press the **Pan Only** button, the resulting object movement will be along both the X and Y axes. When you press the **Pan Only** button a second time, the axis settings revert to your choices in the Sensitivity and Filters Window. The same thing is true for the Z axis. Zooming is by definition along the Z axis. If you have turned Off translations along the Z axis and press the **Zoom Only** button, the object will zoom along the Z axis. Pressing the **Zoom Only** button a second time will revert to the settings in the Sensitivity and Filters Window. This explanation assumes that you have not selected the **Reverse Y/Z Axes** filter.

Button Mapping Window
This window makes it possible to change the functions mapped to any Spaceball button. The Button Mapping Window will display with the buttons on the opposite side when a Spaceball 4000 FLX is configured for the right hand.

SpaceWare 9.2

SpaceWare 9.2 for | CATIA 4.1

◇ General   ◇ Sensitivity and Filters   ◇ Button Mapping   ◇ Custom Functions   ◇ Remove User Configurations | Help |

Primary Mapping

1	Translations
2	Rotations		7	Yes		A	More / Less
3	Dominant Axis		8	Reset View – AP9		B	Shift
4	Display Axis Center		9	No		C	Menu Toggle
5	Decrease Sensitivity
6	Increase Sensitivity

Left Buttons   Right Buttons

Shifted Mapping

1ˣ	TX Only
2ˣ	TY Only		7ˣ	Restore Defaults		Aˣ	More / Less
3ˣ	TZ Only		8ˣ	Rezero Spaceball		Bˣ	Shift
4ˣ	RX Only		9ˣ	Keep On Top		Cˣ	Menu Toggle
5ˣ	RY Only
6ˣ	RZ Only

Left Buttons   Right Buttons

| Less | ☐ Keep On Top | Restore Defaults | | Reload | | Save |

When you click on the box to the right of any button label you see a pull-down list of the functions you can map to that button. When you change a button mapping, fonts in that pull-down menu change to Italics to indicate that you have changed the mapping. The Shifted mapping pull-down menus are active only if one of the buttons (1-9, A, B, or C) is mapped to **Shift**. When the Shift function is mapped to one of the buttons in the Primary mapping list, it is mapped to the corresponding button in the Shifted mapping and grayed out. Changes you make take effect immediately.

Custom Function Window
This window allows you to define a sequence of up to twenty keystrokes as a function you can map to a Spaceball button.
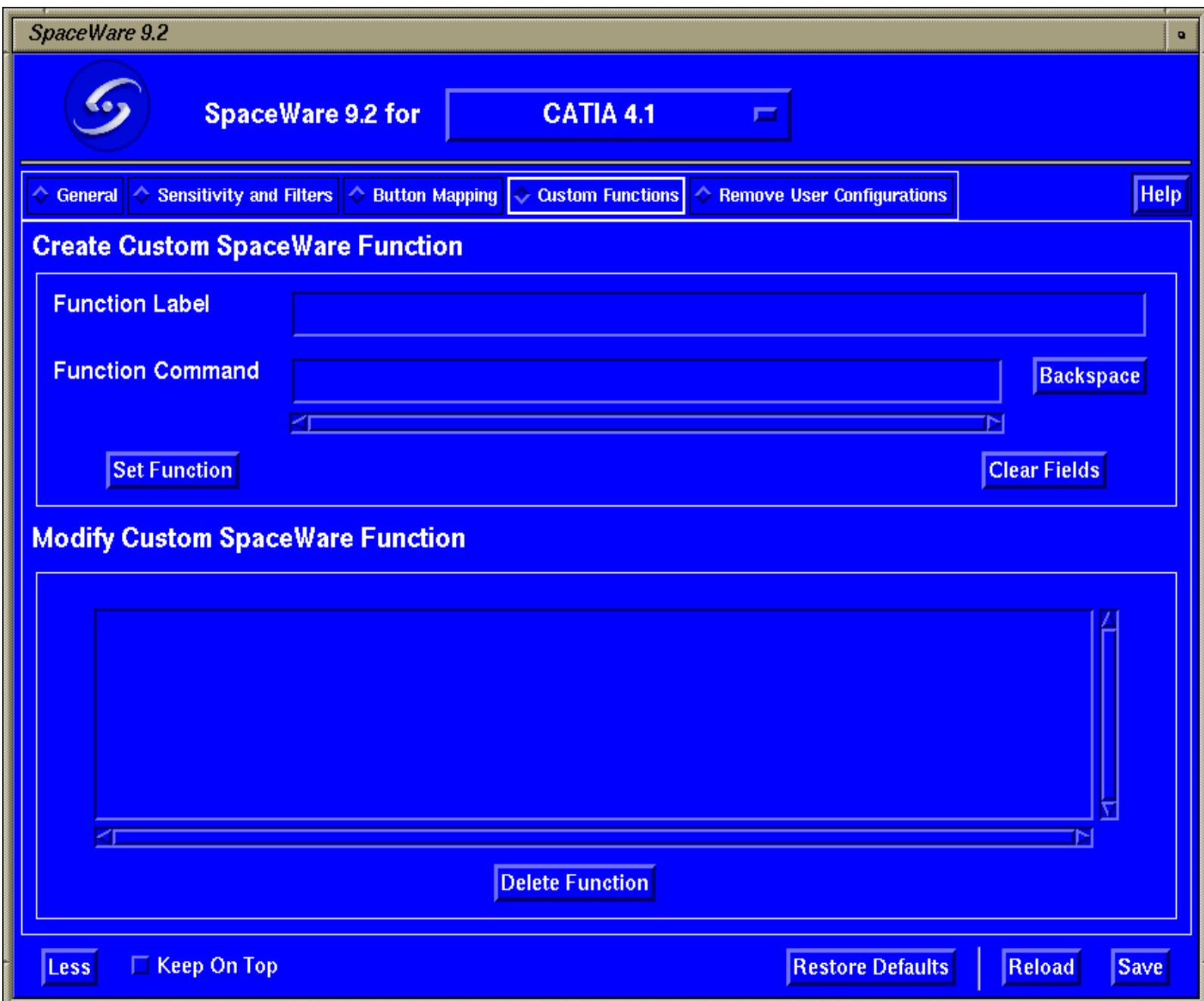
When you create a custom function, you need to enter a label for the function. This label appears in the list of functions in the Button Mapping Window that can be mapped to a button. When entering the keyboard sequence for the function, enter the keys normally. If a key needs a bracket, SpaceWare adds it automatically. If you need to edit the function, use the **Backspace** button to remove the last keystroke. The keyboard Backspace key is a programmable key and cannot be used for editing.

When you have completed the function and its label, click on the **Set Function** button to add the function name to the list in the lower portion of the window.

To edit an existing function, select the function label in the list to make the command and its label appear in the text fields above the list. You cannot edit a function label if that function is mapped to a button but you can edit the function command. Make the changes you want and click on the **Set Function** button to put it back into the list. If you want to change the label of a mapped function, unmap the function and then change its label.

The **Clear Fields** button clears the contents of the Function Label and Function Command edit boxes. If the function is mapped to a button the Function Label field will not clear. Use this button if you are working with a function and want to start over.

To delete a function from the list, highlight it in the list and click on the **Delete Function** button. You cannot delete a mapped function.

When you complete the functions, use the **Save** button to save it and make it available to the Button Mapping Window. A dialog prompts you for a file name.

For more information about creating custom functions, see Creating Custom Functions.

Remove User Configurations Window
Use this window to remove a specific user configurations created with the SpaceWare 9.1 software.

SpaceWare 9.2

SpaceWare 9.2 for | **CADDS5** |

◇ General | ◇ Sensitivity and Filters | ◇ Button Mapping | ◇ Custom Functions | ◆ Remove User Configurations | Help

Delete Custom SpaceWare Configurations

```
Custom Explicit C5
Custom Explicit Fillet C5
EXP Cadds5
custom_explicit_c5
```

Delete Configuration

Less | ☐ Keep On Top | Restore Defaults | Reload | Save
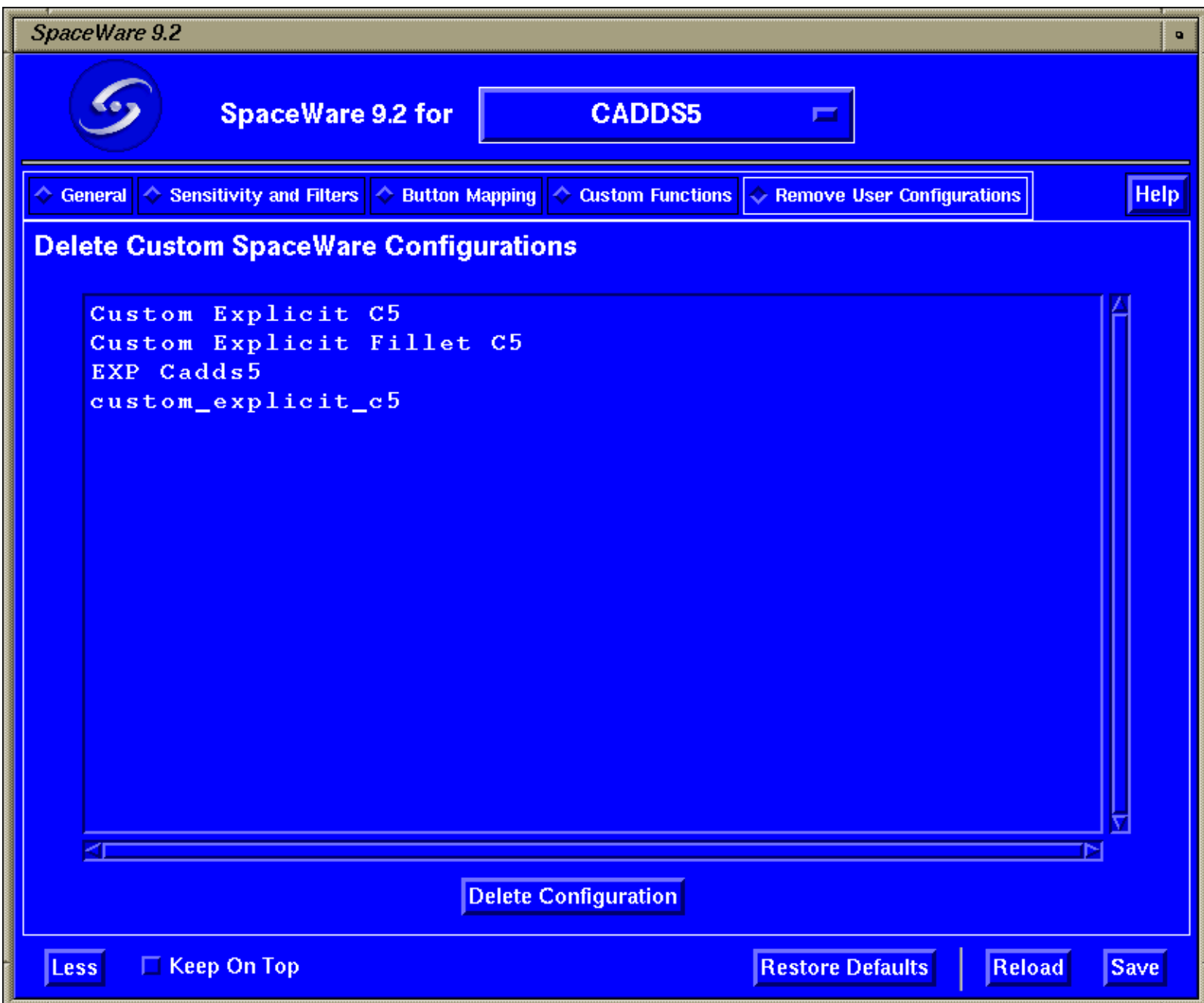
Select the configuration to remove and then select the **Delete Configuration** button to remove a configuration from the list of possible configurations.

LPFK Windows

If you are using CATIA (version 4.0 and later) on AIX, you have access to the LPFK buttons. The SpaceWare 9.0 windows incorporate the LPFK buttons to give you access to the functions assigned to the LPFK buttons and the advantages of the Spaceball for 3D movement.

Global Controls

On each of the large windows (General LPFK Window, LPFK Button Mapping Window, LPFK Custom Functions Window, and the LPFK Sensitivity and Filters Window) there are controls that are common to each of them.

The pull-down menu under **SpaceWare** lets you choose the application to use with the Spaceball. Making a choice here does not start the application, it loads the SpaceWare configuration file for that application. The name of the latest active configuration is kept in your home directory in a file called **.spwrc** so it can be reopened the next time you log in. If there is no file by that name, the driver looks for the file **/etc/SpaceWare/.spwrc** to determine the configuration to use.

The **Mode** radio buttons at the top of the window lets you choose to operate in either Spaceball or LPFK mode. The LPFK option is active only if your application is CATIA on AIX systems.

The row of radio buttons (**General**, **Sensitivity and Filters**, **Button Mapping,** and **Custom Functions**) are a means of switching to another window. Check the one you want.

The **Help** button opens the online Help Window. This is a scrolled text window displaying the ASCII text SpaceWare Readme.txt file. The window contains a **Dismiss** button to close the window.

The **Less** button returns you to the Small LPFK Window.

Keep On Top puts the Spaceball window in a mode so it will always rise to the surface if obscured by another window.

The **Restore Defaults** returns the button mappings and sensitivity settings to the originally installed settings for the selected application.

The **Reload** button will restore the settings to the last saved version of the configuration file.

The **Save** button saves the change you made in this window to a configuration file. A dialog prompts you for a file name.

When you choose any of the radio buttons to open a window (**General**, **Sensitivity and Filters**, **Button Mapping,** and **Custom Functions**), these options are always available.

Small LPFK Window

To access the LPFK Windows

1. Change your application to CATIA.
2. Press **Button C** on the Spaceball to bring up the Small Spaceball Window.
3. Check the LPFK radio button at the bottom of the window.
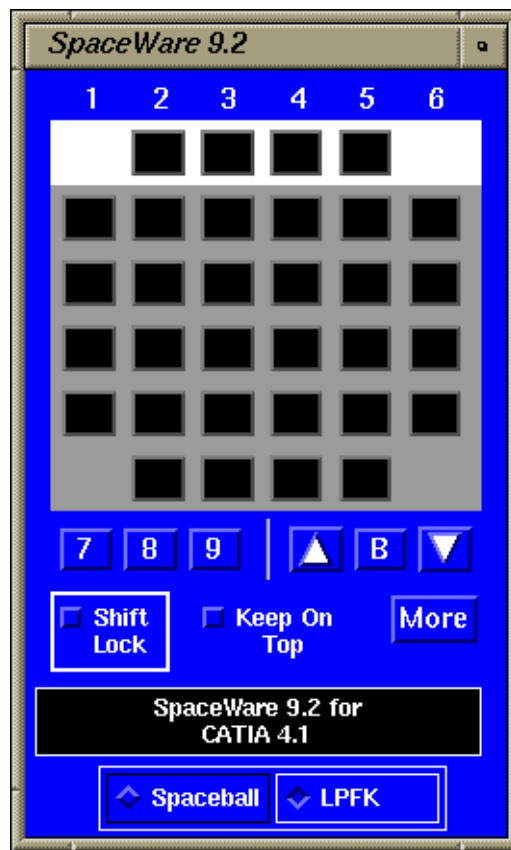
LPFK Windows

In LPFK Mode, the Spaceball buttons 1-6 respond as keys on an LPFK device. Buttons 1-6 map to some row of buttons on the LPFK as shown by the highlight bar. The bar can be moved up or down using **Buttons A** or **C** shown in the LPFK windows as up and down arrows. **Button A** moves the bar up and **Button C** moves it down. The location of the highlight bar is echoed in the LPFK General Window. Buttons 7-9 and B function as normal. In the highlighted row, pressing any button 1-6 sends the function assigned to that button in that row to CATIA. In addition to using a button press to select any button in the highlighted row, you can use the mouse to select any LPFK button. Clicking on a button in an unhighlighted row sends the function assigned to that button to CATIA but does not move the highlight bar. The highlighted bar stays in position ready for you to continue sending CATIA commands with a button press.

The **More** button opens the LPFK General Window.

The **Keep On Top** button puts the Spaceball window in a mode so it will always rise to the surface if obscured by another window.

The **Shift Lock** button, when checked, puts the driver into Shifted Mode. Removing the check returns it to the unshifted mode.

When you first open the window, the **Tooltips** box displays the name of the currently open application. As the cursor tracks over the buttons, the label changes to show the function name for that button.

The **Spaceball/LPFK** toggles are a radio box in which only one can be selected at a time. The LPFK option is available only if your application is CATIA on AIX.

LPFK General Window
Accessed by clicking on the **More** button in the Small LPFK Window, the LPFK General Window is an expanded version of the Small LPFK Window. The following graphic shows the window as set up for use with the left hand. If you are using it with the right hand, the placement of the button groupings varies.
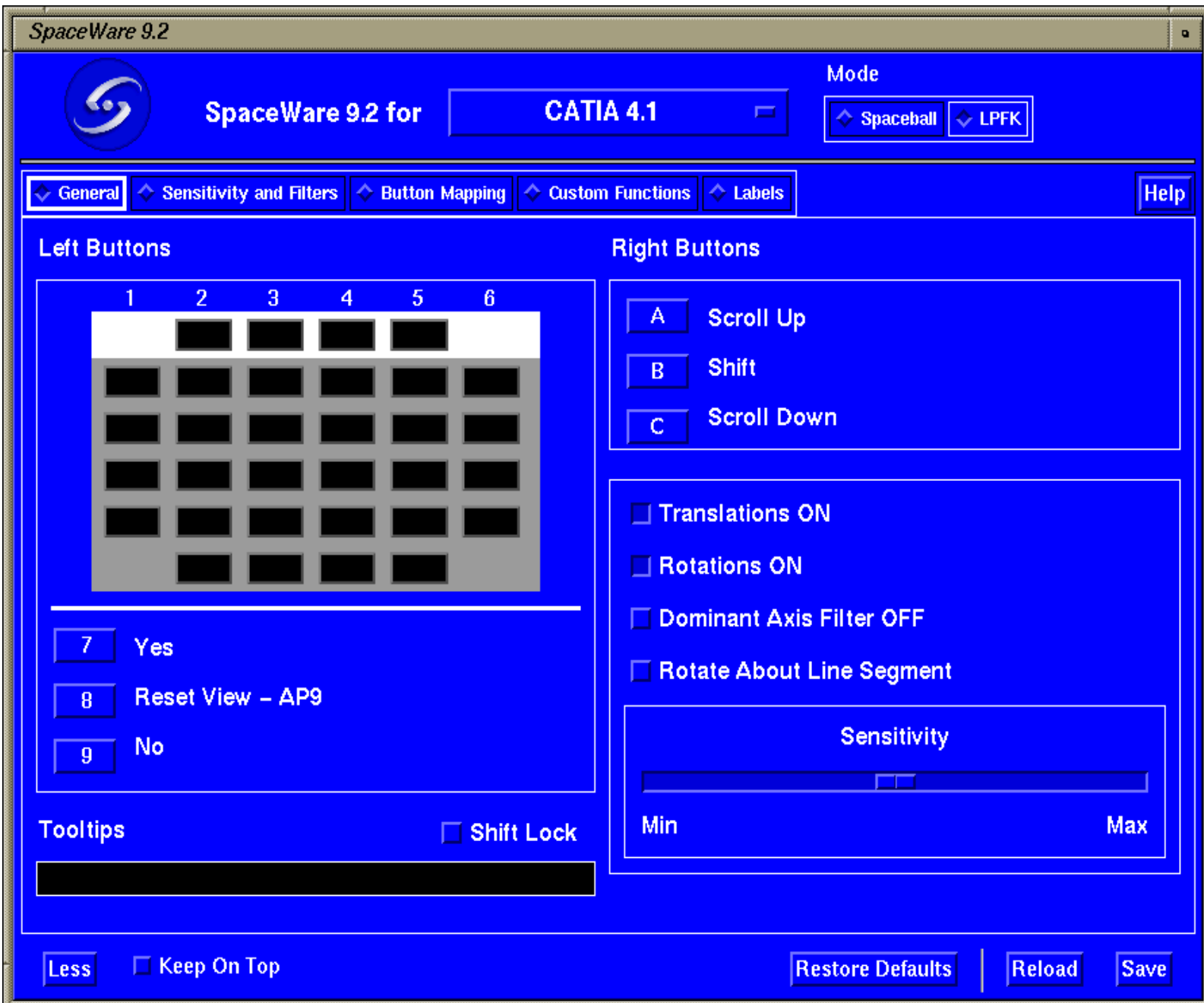
The LPFK buttons function in this window just as they do in the Small LPFK Window. The Spaceball buttons 1-6 respond as keys on an LPFK device. Buttons 1-6 map to some row of buttons on the LPFK as shown by the highlight bar. The bar can be moved up or down using **Buttons A** or **C** shown in this window as up and down arrows. **Button A** moves the bar up and **Button C** moves it down. The location of the highlight bar is echoed in the Small LPFK Window and the LPFK Button Mapping Window. Buttons 7-9 and B function as normal. In the highlighted row, pressing any button 1-6 sends the function assigned to that button in that row to CATIA. In addition to using a button press to select any button in the highlighted row, you can use the mouse to select any button. Clicking on a button in an unhighlighted row sends the function assigned to that button to CATIA but does not move the highlight bar. The highlighted bar stays in position ready for you to continue sending CATIA commands from that row with a button press.

In addition to the LPFK diagram, the numbered and lettered buttons and their labels, one section of this window gives you control over the sensitivity of the Spaceball and certain standard data filters. Checking the radio button to the left of the filters toggles that filter On/Off. Translations and Rotations are both enabled by default. They cannot both be disabled at the same time. The **Dominant Axis Filter** restricts motion to a pure X, Y, or Z axis for finer control. On restricts object movement to the single largest piece of data coming from the Spaceball. Off provides full, simultaneous control of all six axes. Default is Off. The **Rotate About Line Segment** toggle turns that function On/Off. Rotation is only at one speed, but can be in either direction.

The Sensitivity slider lets you adjust the amount of force used on the Spaceball to make the active object move. Moving the slider toward **Min** makes the Spaceball less sensitive to your touch, requiring more force on the Spaceball to make the active object move. Moving the slider toward **Max** makes the Spaceball more sensitive.

The **Tooltips** box displays the label for the currently selected button.

Shift Lock locks the driver into Shifted Mode so you can use the functions assigned to virtual buttons 19-21 (7*, 8*, and 9*).

LPFK Sensitivity and Filters Window
This window is for adjusting the sensitivity of the Spaceball and selecting filters.
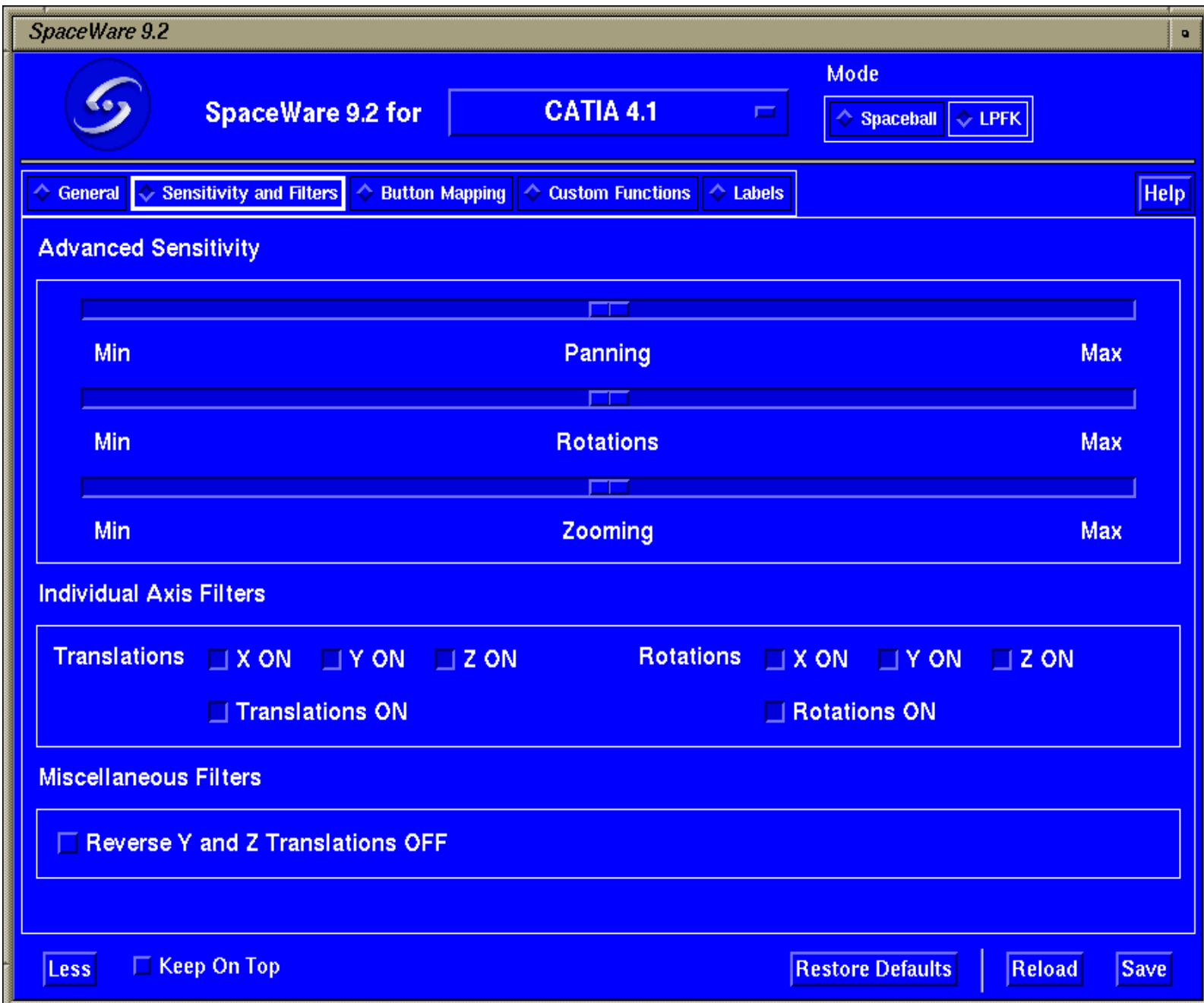
The Advanced Sensitivity sliders allow you to adjust how much force is required on the Spaceball to produce a certain rate of movement for panning, rotating, and zooming. There is a range of one to eleven. One makes the Spaceball the least sensitive to your touch and eleven makes it the most sensitive. Moving the **Panning** slider adjusts translation along the X and Y axes. The **Rotations** slider controls rotations about the X, Y, and Z axes. The **Zooming** slider controls zooming along the Z axis. If you select the **Reverse Y/Z Axes Filter**, panning will be along the X and Z axes and zooming along the Y axis.

The Individual Axis Filters control which Spaceball axis can send data to an application. The Translations On/Off and Rotations On/Off toggles mirror the states of those toggles on the LPFK General Window (either On or Off). In this window, you can toggle the state of individual axes. A check beside the axis name indicates that it is On.

For example, if you have turned Off translations on the Y axis in this window, have a button set to **Pan Only** (by definition: movement along the X and Y axes) and press the **Pan Only** button, the resulting object movement will be along both the X and Y axes. When you press the **Pan Only** button a second time, the axis settings revert to your choices in the Sensitivity and Filters Window. The same thing is true for the Z axis. Zooming is by definition along the Z axis. If you have turned Off translations along the Z axis and press the **Zoom Only** button, the object will zoom along the Z axis. Pressing the **Zoom Only** button a second time will revert to the settings in the Sensitivity and Filters Window. This explanation assumes that you have NOT selected the **Reverse Y/Z Axes** filter.
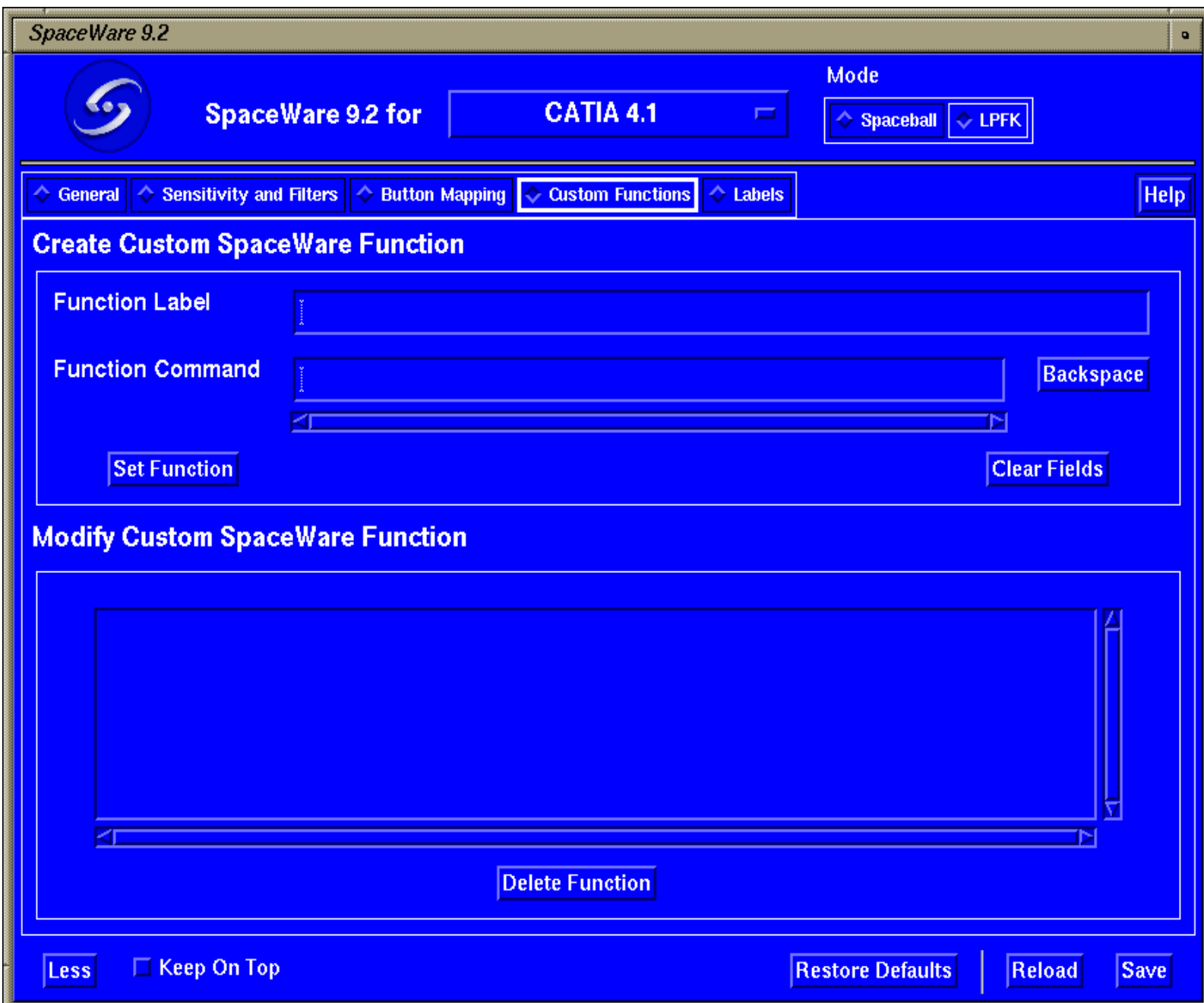
LPFK Button Mapping Window
The LPFK Button Mapping Window allows you to change the default button mappings for some of the Spaceball buttons.
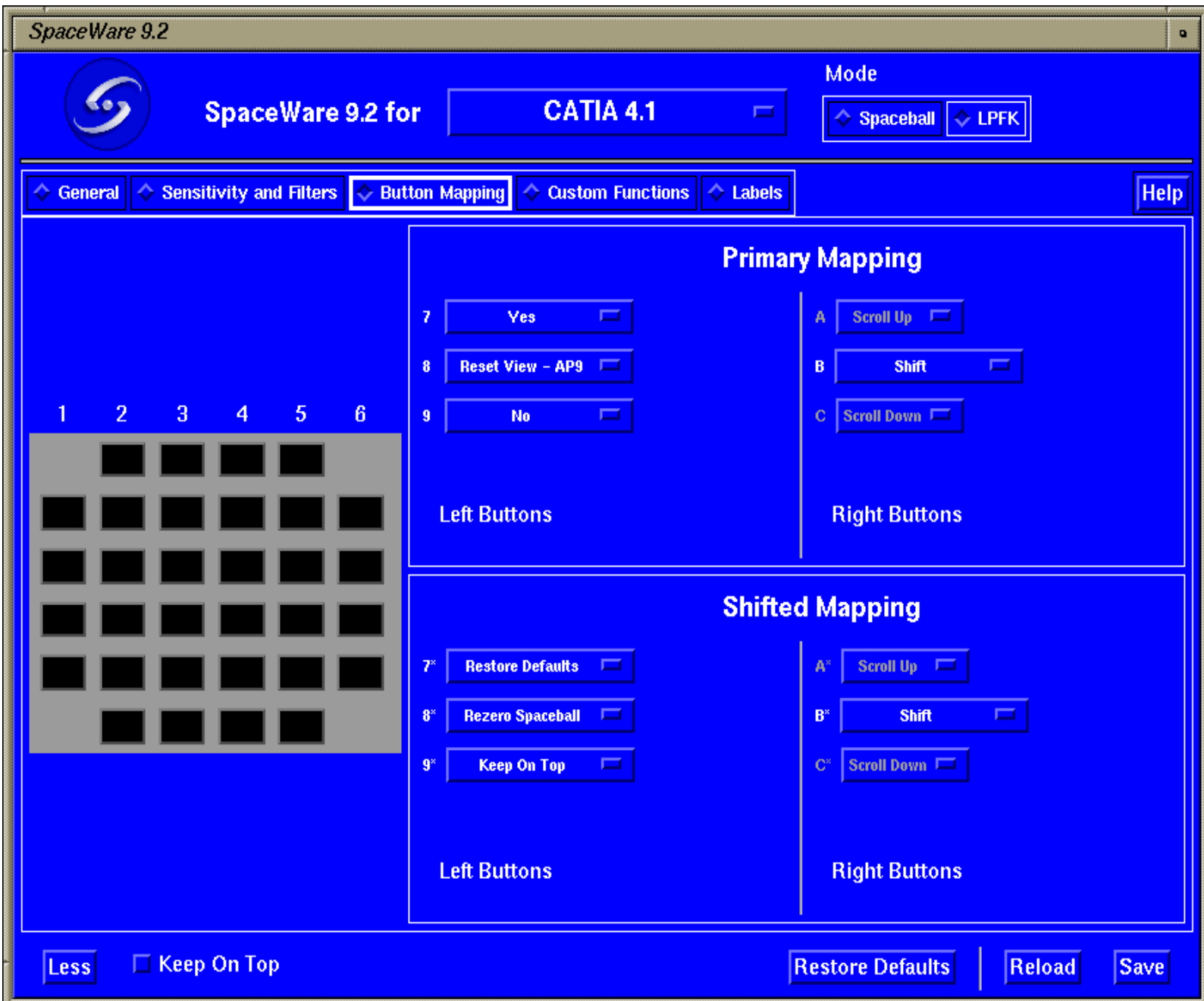
Buttons 1-6, A, and C are unavailable for re-mapping. Buttons 1-6 are reserved for the LPFK buttons and A and C always show "Scroll Up" and "Scroll Down" in both Shifted Mapping and Primary Mapping. In order to use the Shift Mode, button B must be mapped to the shift function, making it unavailable for remapping.

LPFK Custom Function Window
This window allows you to define a sequence of up to twenty keystrokes as a function that you can map to a Spaceball button.

When you create a custom function, you need to enter a label for the function. This label will appear in the list of functions in the LPFK Button Mapping Window that can be mapped to a button. When entering the keyboard sequence for the function, enter the keys normally. If a key needs a bracket, SpaceWare adds it automatically. If you need to edit the function, use the **Backspace** button to remove the last keystroke. The keyboard Backspace key is a programmable key and cannot be used for editing.

When you have completed the function and its label, click on the **Set Function** button to add the function name to the list in the lower portion of the window.

To edit an existing function, select the function label in the list to make the command and its label appear in the text fields above the list. You cannot edit a function label if that function is mapped to a button but you can edit the function command. Make the changes you want and click on the **Set Function** button to put it back into the list. If you want to change the label of a mapped function, unmap the function and then change its label.

The **Clear Fields** button clears the contents of the Function Label and Function Command boxes if you have not used the **Set Function** button. After you have set the function you use the **Delete Function** button to remove it.

To delete a function from the list, highlight it in the list and click on the **Delete Function** button. You cannot delete a mapped function.

When you complete the function, use the **Save** button to save it and make it available to the LPFK Button Mapping Window. A dialog prompts you for a file name.

For more information about creating custom functions, see Creating Custom Functions.

LPFK Labels Window
The LPFK Labels Window allows you to change the text string displayed in the ToolTips label to reflect the settings found in CATIA. This affects only the label string used for the ToolTip; the actual functionality in CATIA is unaffected by the settings made on this screen.
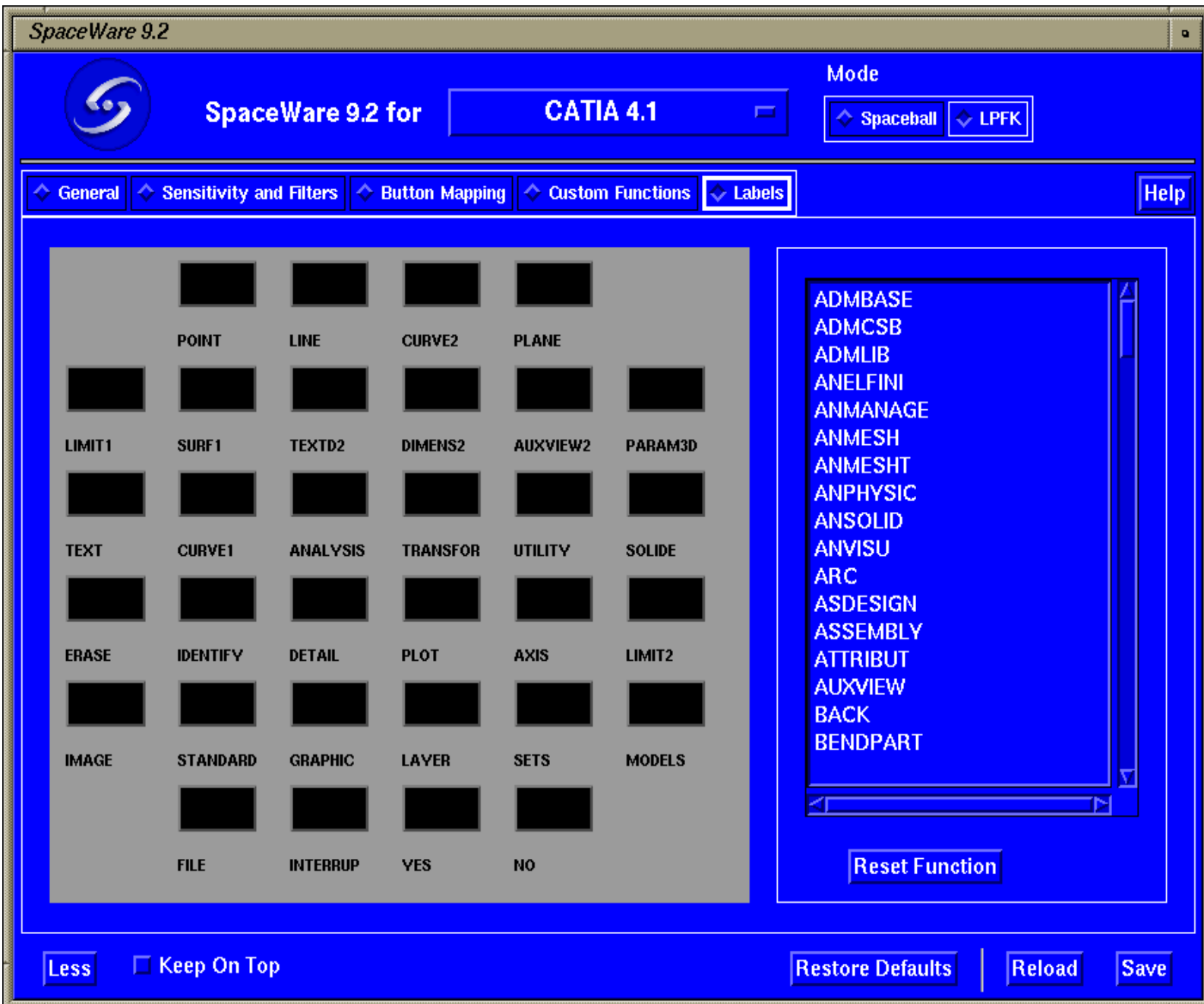
To change the ToolTip label:

1. Select the LPFK button whose label you want to change.
2. Select the name to use from the scrollable list at the right.
3. Click on the **Reset Function** button.
4. Click on the **Save** button to apply the changes and bring up the Save dialog box for you to name and save the configuration.
5. Click on **OK** to complete the save or **Cancel** if you decide to discard the changes.

<< >>

Creating Custom Functions

SpaceWare makes it possible for you to define a sequence of up to twenty keystrokes as a function that you can map to a Spaceball button. Follow these steps to create a custom function:

1. Press Button Toggle Menu on the Spaceball. This opens the Small Spaceball Window. or the Small LPFK Window if you are in LPFK mode.

2. Click on the **More** button to get to the General Spaceball Window or the LPFK General Window if you are in LPFK mode.

3. From the row of radio buttons near the top of the window, choose **Custom Function** to open the Custom Function Window.

4. Enter a label for the function in the Function Label edit box. Labels can contain only lowercase alphanumeric characters, underscores, and dashes.

5. Enter the keyboard sequence in the Function Command edit box by pressing the keys in the proper order for the function. If you need to edit the function, use the **Backspace** button to remove the last keystroke. The keyboard Backspace key is a programmable key and cannot be used for editing. See Programmable CATIA Commands for examples of what you enter on the keyboard and what you see in the Custom Function edit box.

> **Note**:
> Pro/ENGINEER requires that you create a Mapkey macro first and then enter the macro name in the Function Command edit box.

6. When you have completed the keyboard sequence for the function, click on the **Set Function** button to add the function name to the list in the lower portion of the window.

7. Use the **Save** button to make the function accessible to the Button Mapping Window (or the LPFK Button Mapping Window if you are in LPFK mode) and save it to a configuration file. A dialog prompts you for a file name.

8. Click on the **Button Mapping** radio button near the top of the page to return to the Button Mapping Window to map your custom function to a button.

To edit an existing function, go to the Custom Function Window, select the function label in the list to display the command and its label in the text fields above the list. You cannot edit a function label if that function is mapped to a button but you can edit the function command. Make the changes you want and click on the **Set Function** button to put it back into the list. If you want to change the label of a mapped function, unmap the function and then change its label.

Examples and Programmable Functions for CATIA

If you want to create the "reframe" custom function, enter the function name, and then the function (press the slash key, type "reframe", and press **ENTER**) and in the edit boxes you see:

Function Label:	my_function
Function Command:	<slash>reframe<Return>

Programmable CATIA Commands

Draw Mode Only, 2D Analysis

CATIA Function	You Enter:	You See:
analyze point	/m andpt	**<slash>m<space>andpt<Return>**
analyze line	/m andln	**<slash>m<space>andln<Return>**
analyze circle	/m andcir	**<slash>m<space>andcir<Return>**
analyze curve	/m andcrv	**<slash>m<space>andcrv<Return>**
relative distance, 2 lines	/m and2ln	**<slash>m<space>and2ln<Return>**
relative distance, 2 points	/m and2pt	**<slash>m<space>and2pt<Return>**
relative distance, point and line	/m andpl	**<slash>m<space>andpl<Return>**

Space Mode Only, 3D Analysis

CATIA Function	You Enter:	You See:
analyze point	/m anpt	**<slash>m<space>anpt<Return>**
analyze line	/m anln	**<slash>m<space>anln<Return>**
analyze circle	/m ancir	**<slash>m<space>ancir<Return>**
analyze curve	/m ancrv	**<slash>m<space>ancrv<Return>**
analyze solid	/m ansol	**<slash>m<space>ansol<Return>**

Space Mode Only, Space Mode Functions

CATIA Function	You Enter:	You See:
sketcher	/sketcher	**<slash>sketcher<Return>**
reframe window	/reframe	**<slash>reframe<Return>**
noshow elements	/show	**<slash>show<Return>**
stretch elements	/stretch	**<slash>stretch<Return>**
clean up model	/cln	**<slash>cln<Return>**
change element color	/m gmcol	**<slash>m<space>gmcol<Return>**
change space background color	/m gsscol	**<slash>m<space>gsscol<Return>**
element thickness	/m gmthk	**<slash>m<space>gmthk<Return>**

function help	/m help	`<slash>m<space>help<Return>`
create parallel line	/m lnlps	`<slash>m<space>lnlps<Return>`
line through two points	/m ln2ps	`<slash>m<space>ln2ps<Return>`
plane, through points	/m plnap	`<slash>m<space>plnap<Return>`
plane, through curve	/m plncrv	`<slash>m<space>plncrv<Return>`
plane, through point and line	/m plnpl	`<slash>m<space>plnpl<Return>`
plane, through 3 points	/m pln3p	`<slash>m<space>pln3p<Return>`
plane, parallel through points	/m plnlpln	`<slash>m<space>plnlpln<Return>`
points, ends_line-curve-conic	/m ptec	`<slash>m<space>ptec<Return>`

Examples for Pro/ENGINEER

Pro/Engineer is different from other CAD systems since it does not use keyboard accelerators. However, it does allow users to map functions to keyboard keys. Users can create their own accelerators. For example, the steps for mapping the shade function to a key string in Pro/ENGINEER are:

1. From the Main menu of Menu Manager, select **Misc > Mapkey > Define**.
2. At the text prompt at the bottom of the page, type `shd` and press the **ENTER** key.
3. From the Main Menu, choose **View > Cosmetic > Shade**.
4. In the View menu, choose **Done - Return**.
5. In the Mapkey dialog box, select **Done**.
6. Press the **ENTER** key twice.

Once the key string has been associated with a mapkey macro, the user can create a custom function in the Custom Function Window by entering:

Function Label:	my_function
Function Command:	shd

Examples and Programmable Functions for Unigraphics

Unigraphics cascading menu accelerators do not work unless the mouse is in the top menu. For that reason, they are rarely used. Cascading menu accelerators are menu commands that you reach by activating the cascade of menus from the top menu options. For example, the cascading menu accelerator for **File > Open** would be Alt f o. To enter the function in the Function Command edit box, you would press the Alt key, the "f" key, and the "o" key and you would see <Alt_L>fo.

Although cascading menu accelerators do not work well in Unigraphics, direct accelerators are no problem. A direct accelerator accesses a command instantaneously without cascading through the hierarchy of menus. For example, the direct accelerator for **File > Open** is **Ctrl o**. To enter the function in the Function Command edit box, you would press the Ctrl key and the "o" key. In the edit box, you would see <Control_L>o.

To create an "undo" custom function in Unigraphics, enter the Function Label and the Function Command (press the Ctrl key and the "z" key) and you will see:

Function Label:	my_function

Function Command:	<Control_L>z

Programmable Unigraphics Commands

Part Functions

Unigraphics Function	You Enter:	You See:
New Part	Ctrl+N	`<Control_L>n`
Open Part	Ctrl+O	`<Control_L>o`
Save Part	Ctrl+S	`<Control_L>s`
Save Part As	Ctrl+Shift+A	`<Control_L><Shift_L>a`
Close Selected Parts	Ctrl+C	`<Control_L>c`
Import Part	Ctrl+Shift+I	`<Control_L><Shift_L>i`
Export Part	Ctrl+Shift+E	`<Control_L><Shift_L>e`
Plot	Ctrl+P	`<Control_L>p`
Change Displayed Part	Ctrl+Shift+D	`<Control_L><Shift_L>d`
Quit UG	Ctrl+Q	`<Control_L>q`

View and Layout Functions

Unigraphics Function	You Enter:	You See:
Window Zoom	F6	`<F6>`
Zoom	Ctrl+Shift+Z	`<Control_L><Shift_L>z`
New Layout	Ctrl+Shift+N	`<Control_L><Shift_L>n`
Open Layout	Ctrl+Shift+O	`<Control_L><Shift_L>o`
Fit All Views	Ctrl+Shift+F	`<Control_L><Shift_L>f`
Refresh View	F5	`<F5>`
Fit View	Ctrl+F	`<Control_L>f`
Rotate a View	Ctrl+R	`<Control_L>r`
Create Quick Image	Ctrl+Shift+Q	`<Control_L><Shift_L>q`
Create High Image	Ctrl+Shift+H	`<Control_L><Shift_L>h`

Edit Functions

Unigraphics Function	You Enter:	You See:
Undo	Ctrl+Z	`<Control_L>z`
Delete	Ctrl+D	`<Control_L>d`
Edit Object	Ctrl+J	`<Control_L>j`
Blank Object	Ctrl+B	`<Control_L>b`
Reverse Blank All	Ctrl+Shift+B	`<Control_L><Shift_L>b`
Unblank Selected Object	Ctrl+Shift+K	`<Control_L><Shift_L>k`
Unblank All of Part	Ctrl+Shift+U	`<Control_L><Shift_L>u`
Transform	Ctrl+T	`<Control_L>t`

Program, Macro, User Tool Functions

Unigraphics Function	You Enter:	You See:
Execute Grip Program	Ctrl+G	`<Control_L>g`
Debug Grip program	Ctrl+Shift+G	`<Control_L><Shift_L>g`
Execute User Function Program	Ctrl+U	`<Control_L>u`
Record Macro	Ctrl+Shift+R	`<Control_L><Shift_L>r`
Playback Macro	Ctrl+Shift+P	`<Control_L><Shift_L>p`
Hide Current User Tool	F3	`<F3>`

Other Functions

Unigraphics Function	You Enter:	You See:
Expressions	Ctrl+E	`<Control_L>e`
Object Information	Ctrl+I	`<Control_L>i`
Layer Settings	Ctrl+L	`<Control_L>l`
Layer Visible in View	Ctrl+Shift+V	`<Control_L><Shift_L>v`
Rotate WCS	Ctrl+Shift+W	`<Control_L><Shift_L>w`
Assembly Navigation Tool	Ctrl+A	`<Control_L>a`

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Dial Box Emulation

DIAL EMULATION SUPPORT FOR SOFT5080 APPLICATIONS

SpaceWare provides "dial emulation" functionality to support applications running under soft5080. A SpaceWare dial emulation configuration file is required to specify the mapping of Spaceball axes to dials. Only CATIA 3.25 is supported with Dial Emulation in SpaceWare for X Windows. Check http://www.spacetec.com/SUPPORT/dial.htm for the latest information. Refer to CATIA 3.25 documentation for configuration instructions.

The configuration file **/etc/SpaceWare/spwdial.cfg** is used to specify the mappings and default sensitivities of the emulated dials. When you change the dial emulation configuration this file is overwritten with the appropriate configuration file and the SpaceWare daemon restarted.

To configure SpaceWare for CATIA 3.25, follow these steps:

1. At the command line, type: `smit spaceball`
2. Select **Enable Spaceball**
3. Select **Catia 3.2.5**
4. Select **Serial Port**

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Spaceball Demos

To become accustomed to using the Spaceball device, use the demos included with SpaceWare. If your operating system is Windows NT, Jet is the only demo that will work with NTXCM.

Each demo has a SpaceWare settings dialog box in which you can set axis constraints, change the sensitivity setting of the PowerSensor ball, or return to original settings:

- Axis Constraints: Restricts movement to translations or rotations. If you select **Single Axis Filter** movement is restricted to the single most dominant piece of data coming from the PowerSensor ball.

- Sensitivity Settings: Increase or decrease the sensitivity of the PowerSensor ball. A higher sensitivity setting requires less force on the PowerSensor ball to manipulate the object.

- Return to original settings:
  - Restore Defaults: Restores the original settings for the Demo.
  - Reset View: Returns to the original view.
  - Rezero Device: Stops drift (movement of the selected object independent of any pressure on the PowerSensor ball) or sets up a constant motion.

There are other options in some of the dialog boxes. Consult the demo help files for information about them.

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Reinitializing the Spaceball

To reinitialize the Spaceball on IBM workstations, type:

        smit spaceball

If your problem persists, run Diagnostics to verify that the Spaceball is operating properly.

Check that your application is properly configured to operate with the Spaceball.

If the Spaceball repeatedly "beeps" an SOS message in Morse Code (dot-dot-dot, dash-dash-dash, dot-dot-dot), there is an internal device fault. To stop this continuous beeping, press any function button. If a Spaceball 4000 FLX beeps three times there is an internal device fault, press any function button.

If none of the above solves your problem, contact Spacetec's Technical Support Services.

Troubleshooting

Error Messages

Create Function Error: duplicate function label. OK

You are in the Custom Function Window and have entered a label that is already in use by another function.

Create Function Error: empty definition. OK

You are in the Custom Function Window and are trying to save a custom function with an empty field.

Create Function Error: the maximum number of custom functions has been exceeded. Function not created. OK

You can create only twenty-four custom functions and the current one would exceed that limit.

Custom configuration not saved. Check the permissions on your .spcware directory. OK

You do not have permission to save files. Check with your system administrator.

Delete Function Error: attempt to delete a function currently mapped to a button. Please unmap the function first. OK

As a safeguard, SpaceWare will not allow the user to delete a function that is currently mapped to a button.

Do you wish to overwrite the existing configuration with this name? YES   NO

You are trying to save a configuration change to an existing file. This is a safety check to make sure it is what you want to do.

File not saved: no non-alphanumeric characters allowed in the name. Do you wish to enter a new name? YES   NO

You have entered an illegal file name in the Save Dialog. You can only use lower case letters, numbers, an underscore, a dash, and a period. File names can contain twenty-four characters or less.

Invalid device on serial port `/dev/tty01` (where `tty01` is the serial port to which the device is attached).

The SpaceWare supports only the Spaceball and the driver has found another device attached to the port listed in the error message.

You have modified your configuration. If you continue, you will lose your changes. Do you wish to continue? YES   NO

You are attempting to change applications after you have made a change to the current configuration but have not saved it.

Other Problems

The Spaceball does not work.

If the Spaceball does not work at any time, the most common problem is a loose cable connection. Fasten all connections securely including the cable connections and the power adapter. When the unit is plugged in, it beeps to indicate it is receiving power.

If the Spaceball is plugged in correctly and still does not respond, log out and log back to complete its initialization.

The image is moving without your touching the PowerSensor ball.

If your image drifts, press the button mapped to the **Rezero** function. This stops drifting in most applications. Refer to your application's topic in The Spaceball and Your Application group to verify that this function is available for your application and to find the button to which it is mapped.

SpaceWare is not working.

If you log on and log out within 7 seconds and another user logs on immediately after, SpaceWare 9.0 will not work for three minutes at which time the daemon restarts itself.

The Spaceball beeps but does not operate correctly.

Check the current status of the Spaceball on IBM machines by typing:

```
smit spaceball
```

You may need to reinitialize the Spaceball, type:

```
smit spaceball
```

On machines other than IBM type:

```
spaceball
```

If your problem persists, run Diagnostics to verify that the Spaceball is operating properly.

Check that your application is properly configured to operate with the Spaceball device.

The daemon does not recognize the current user.

If one user logs on and then logs out within 7 seconds and a second user immediately logs on, the daemon started for the first user will still be running and will not recognize the second user. The daemon resets itself after three minutes and will then recognize the second user. To avoid this problem, do not log on and log out quickly, or wait three minutes for the daemon to reset itself.

The Spaceball beeps an SOS message.

If the Spaceball repeatedly "beeps" an SOS message in Morse Code (dot-dot-dot dash-dash-dash dot-dot-dot), there is an internal device fault. Contact your supplier. To stop this continuous beeping, press any function button.

 Image movement is very slow.

The Spaceball device does not accelerate performance on your PC. You can improve image movement dynamics by reducing the number of entities displayed during movement.

There is a lapse of time between when you touch the Spaceball device and when the 3D model is redrawn.

Your 3D model could be too large for real-time movement. You can improve image movement dynamics by reducing the number of entities displayed during movement.

You frequently lose the 3D model off the screen.

Decrease the sensitivity settings for the Spaceball device or select **Keep in View** if that option is available for your application.

The Spaceball device is hard to push or the platform base moves when you are pushing it.

Increase the PowerSensor ball sensitivity.

Custom functions do not work in CATIA.

If you close either the Prism or the Manage dialog box, you may find that custom functions do not work. This includes "Rotate about a Line Segment" (a custom function created by Spacetec) and any custom functions you created. To remedy this problem, click anywhere on the 3D model or on a menu item and then activate the custom function.

Custom functions do not work in the application.

Check the keyboard macro within the application. Some applications require specific focus to enable the keyboard macro. On IRIX 6.4 the enter key of the key pad must be used as opposed to the enter key near the letters. Retype the custom function using the enter key on the keypad. Some application interpret menu accelerated keys differently depending on the specific key sequence. It may be necessary to use a different sequence to ensure the functionality of the macro. For example Alt F - H in Unigraphics will bring the help menu to the foreground as opposed to Change Displayed Part. To perform the Change Displayed Part function, program the Spaceball button to Crtl Shift D.

The name assigned to a custom function is truncated on the button.

If your function name includes several "M"s or "W"s (or other wide letters), you may need to use less than 24 characters in the custom function name in order for it to appear within the area allotted to the button.

Maintenance

The Spaceball device does not require any specific maintenance. Reasonable care will, however, extend its operational life. The following preventive and periodic measures are recommended:

Precautions

Do not apply unnecessary force to the PowerSensor ball. This stresses the sensors and can cause mechanical damage. Light fingertip pressure is all you need to achieve complete interactive control.

Keep all liquids away from the Spaceball device. Accidental spillage of corrosive liquids will cause severe damage.

Do not drop or knock the Spaceball device. Severe shock to the device will damage it.

Periodic Care

Clean the plastic housing and PowerSensor ball with a slightly damp cloth. Be sure to disconnect any power to the unit before cleaning.

Configuring IBM Serial Ports

For IBM RS/6000 Systems Only

If the serial ports on your IBM RS/6000 system were previously configured for Dials or LPFKs, you should not install the Spaceball until the ports are redefined or reconfigured. To reconfigure the ports follow these instructions:

1. Log in as superuser:

2. Enter root password, if required.

3. To start SMIT type: `smit`.

4. Remove the serial port definition by selecting the following from the System Management Interface Tool (SMIT)Menus:
   Devices
   Graphic Input Devices
   Dials/LPFK Keys
   Remove Dials/LPFK Keys

5. Select either **S1** or **S2** for the Dials/LPFK you are removing and then select:
   Do
   Done
   OK

6. Add a TTY definition for the Spaceball 4000 FLX by selecting the following in the order shown:
   Devices
   TTY
   Add a TTY

7. Choose the **RS-232** option and then select either **S1** or **S2**.

8. Another window appears from which you can choose the various options for your TTY (only options that are applicable are listed):

TTY type	tty
TTY interface	RS-232
Description	Asynchronous Terminal
Parent Adapter	sa0
Port number	s1 (or s2)
Enable LOGIN	disable
BAUD rate	9600
PARITY	none
BITS per character	8
Number of STOP BITS	1

TERMINAL type	dumb
STATE to be configured at boot time	available
Name of initial program to run	(delete entry)
Enable program?	Off
Run Level	2

9. Select the following to return to the TTY menu:
   OK
   Done
   Cancel

10. Select the following to check that the serial port is properly configured:
    Devices
    TTY
    List all defined TTYs

A typical Spaceball -compatible serial port lists as one of the following:

   TTY0 Available 00-00-S1-00 Asynchronous
   TTY1 Available 00-00-S2-00 Asynchronous

Refer to the topic for your application (The Spaceball and [your application name]) to complete your SpaceWare installation.

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Restarting the XServer

To restart your system, follow the steps for your type of server:

Common Desktop Environment (CDE) Systems

1. Log out.
2. Select: **Options > Reset login** screen.
3. Log back in.

Other XWindows Systems

1. With the right mouse button:
   > Click on **End Session** in the menu
   > Choose **Qui**t from the menu
   > Click on **OK** in the dialog box that appears

2. Run one of the following to restart your computer:
   > **/usr/bin/X11/startx**
   > **/usr/bin/X11/xinit**

If neither of the above work, consult your system administrator.

Downloading Files

Spacetec IMC Corporation maintains a web site with SpaceWare software releases, updates, and patches. To down load files, follow these steps:

1. Open your Internet browser and enter **http://www.spacetec.com/** in the location field.

2. From the opening screen, choose **Support**.

3. From the Support listings, choose either **Software** or **FTP** to down load from the FTP site.

If you choose Software, from the listings under Support - Software, choose your operating system. Continue making choices until you reach the driver that you want to download. Click on the item you want and a standard File Save As dialog appears. Make the appropriate responses and the file will download to your system. Be sure to read the Readme file for installation instructions and other information about the driver.

If you choose FTP, this puts you in the /pub directory. Continue making choices until you reach the driver you want to download. Click on the item you want and a standard File Save As dialog appears. Make the appropriate responses and the file will download to your system. Be sure to download the .txt file with the same name as the driver. Read it before you install the driver.

Web sites change frequently and it is possible that the Spacetec web site you see may not match the description given above. However, somewhere on the opening page there will be a way to get to the software, support, and FTP pages. Explore the Spacetec pages and you will find access to the drivers that you can download. If you are unable to locate the drivers that you can download, call Technical Support for information.

Remote Installation

You can install the SpaceWare software remotely if your system is not configured with a storage device.

Before you install the SpaceWare software, you need the following:

- The name of the drive from which you are installing the SpaceWare software
- The root passwords for the stations you are installing from and to

> **Note**:
> Make sure the Spaceball device is connected to a serial port on the target workstation. Make note of the port number, as you will need this information later.

Follow these steps:

1. Locate a server or workstation with a media drive to initiate the remote installation.
2. Insert the SpaceWare software media into the CD-ROM drive.
3. Log in as root. You may need to enter a password.
4. Load the SpaceWare software by entering the following for your system, where *hostname* is the name of the target workstation:

    DigitalUNIX:
    ```
    mount -rt cdfs /dev/rz6c /mnt
    cd /mnt/UNIX/DECUNIX
    rcp APP.TAR\;1 hostname:/tmp/SpaceWare.tar
    ```
    HP (HP-UX v9):
    ```
    mount -rt cdfs /dev/dsk/c201d2s0 /mnt
    cd /mnt/UNIX/HPUX
    rcp APP.TAR\;1 hostname:/tmp/SpaceWare.tar
    ```
    HP (HP-UX v10):
    ```
    mkdir -p /mnt
    /etc/mount -F cdfs /dev/dsk/c0t2d0 /mnt
    cd /mnt/UNIX/HPUX
    rcp APP.TAR\;1 hostname:/tmp/SpaceWare.tar
    ```
    IBM AIX:
    ```
    mount -o ro -vcdrfs /dev/cd0 /mnt
    cd /mnt/unix/aix
    rcp app.tar hostname:/tmp/SpaceWare.tar
    ```
    SGI IRIX:
    ```
    cd /CDROM/irix
    rcp app.tar hostname:/tmp/SpaceWare.tar
    ```
    Sun (Solaris):
    ```
    cd /cdrom/spaceware/unix/solaris
    rcp app.tar hostname:/tmp/SpaceWare.tar
    ```

    If rcp does not work on your network use ftp (binary mode) or uucp to transfer the file.
5. Log in as root from the target workstation. You may need to enter a password.

6. Load and run the SpaceWare software file on the target workstation by typing:
   ```
   cd /tmp; tar xf SpaceWare.tar install;
   cd install; ./sbinstall
   ```

7. The Installation program will ask if you are installing on this machine. Type **y** to indicate that you are installing on this machine.

8. Type **/tmp/SpaceWare.tar** as the file from which SpaceWare will be loaded.

Proceed with the normal installation procedure from here.

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Technical Support Services

Labtec formerly Spacetec IMC Corporation provides telephone technical support Monday through Friday, 8:00 A.M. to 5:00 P.M. Pacific Standard Time, except major US holidays.

You can contact technical support services by:

- TEL: (360) 896-2000
- FAX: (360) 896-2020 , Attn: Feeback
- Email: spaceball@labtec.com

When you call Technical Support, please be at your computer. If you think you're dealing with a software bug, try to duplicate the problem and make note of the steps involved.

Please have the following information available when you call:

- Your name, company name, and telephone number
- Product name and version number
- Where you purchased the product
- Your computer configuration: CPU type, speed, memory, pointing device, video card (its memory and resolution)
- The platform and operating system you are running
- Your application name and version
- The SpaceWare driver you are using (if you are using one)

You can also send email or a detailed fax. Clearly state your problem and include the information listed above .

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Copyright

Spacetec IMC Corporation
The Boott Mills
100 Foot of John Street
Lowell, MA 01852-1126, USA
TEL (978) 275-6100 - FAX (978) 275-6200

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. This device requires shielded interface cables to ensure compliance. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. There is, however, no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

German Notice

Hiermit wird bescheinigt, dass der Spaceball Model SpaceController, der Spaceball Model 2003B, der Spaceball Model 2003 FLX, der Spaceball Model 3003, und der Spaceball Model 4000 FLX sind in Ubereinstimmung mit die Bestimmungen der Vfg 1046/1984 Funkentstort. Der Deutschen Bundespost wurde das Inverkehrbringen diese Gerates angezeigt und die Berechtigung zur Uberprufung der Serie auf Einhaltung der Bestimmungen eingeraumt.

Hardware Warranty

The Spaceball® Hardware Warranty

Spacetec IMC Corporation warrants that the Spaceball hardware is free from defective material and workmanship and agrees to repair or replace any part of the enclosed hardware which proves to be defective by reason of improper workmanship or materials for a period of three (3) years from the date of purchase, without charge for parts and labor, subject to the following conditions:

- The attached Warranty Registration Card shall have been mailed to Spacetec IMC Corporation, The Boott Mills, 100 Foot of John Street, Lowell, MA 01852, USA, within 30 days of receipt of hardware.

- This warranty is limited to the original purchaser of the product and is not transferable.

- The product was purchased from a dealer or distributor or other reseller authorized to resell this product.

- The product shall not have been altered, subject to accident, misuse, or abuse, or operated contrary to the instructions contained in the accompanying manual(s).

- The product shall be shipped, freight paid, in either the original package or a similar package affording suitable protection to Spacetec IMC Corporation, The Boott Mills, 100 Foot of John Street, Lowell, MA 01852, USA, to provide the services referred to herein.

Spacetec IMC Corporation shall not be liable for direct, indirect, incidental, consequential, or other types of damages resulting from the use of this product, other than the liability stated herein. These warranties are in lieu of all other warranties, express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose.

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Limited Software Media Warranty

Spacetec IMC Corporation warrants the SpaceWare software media provided by Spacetec IMC Corporation to you and only you, the original end-user purchaser, against physical defects for a ninety (90) day period from the date of receipt by the original end-user from the seller. Spacetec IMC Corporation will replace defective media at no charge to you, provided it is returned postage prepaid to Spacetec IMC Corporation at the address shown below within the warranty period. This shall be your exclusive remedy and Spacetec IMC Corporation's sole obligation and liability for defective media.

This limited media warranty covers normal use. It does not apply if the media has been damaged by accident, abuse, misuse, or misapplication, or if you or any other party have modified the media.

The above limited media warranty is in lieu of all other warranties, express or implied, including, but not limited to, any warranty against infringement and the implied warranties of merchantability and fitness for a particular purpose. The remedies provided under this limited software media warranty are your sole and exclusive remedies. Spacetec IMC Corporation, its dealers, and its distributors are not responsible or liable for any special, incidental, or consequential damage, including, but not limited to, lost profits, downtime, or damages to property resulting from the use of this software.

No dealer, agent, reseller, or OEM is authorized to make any modification or addition to this warranty.

In the event of a defect or malfunction within the warranty period, you may contact the Customer Service Department:

Spacetec IMC Corporation
The Boott Mills
100 Foot of John Street
Lowell, MA 01852 USA
TEL (978) 275-6100 - FAX (978) 275-6200
E-mail: support@spacetec.com

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SpaceWare Software License Agreement

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You may not transfer, disclose, or otherwise make available the software or any portion of it to a third party for any reason without the written permission of Spacetec IMC Corporation. You may not reverse compile or disassemble the software.

This software is licensed solely for use with the Spaceball hardware supplied and the supported system software referenced in the documentation. Spacetec IMC Corporation does not give any assurance that the software will work other than with the stated hardware and system software.

Spacetec IMC Corporation may terminate or cancel this license upon your failure to comply with any terms or conditions of this agreement.

General

This agreement is the complete and exclusive statement of terms and conditions between you and Spacetec IMC Corporation.

This agreement shall be governed by the substantive laws of the Commonwealth of Massachusetts, USA.