

Magellan/SpaceMouse

Classic Plus Plus XT

User's Manual

v.2.2

UNIX Systems
X-Window Driver Version 4.xx



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NOTE: For optimal viewing of this document, it is recommended to use the latest version of Adobe Acrobat Reader, available on the Magellan/SPACE MOUSE driver CD-ROM or at www.adobe.com/acrobat.

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Introduction to Magellan/SPACE MOUSE

Magellan/SPACE MOUSE is a 3D input device that is used to control the position and orientation of 3D graphical objects in virtual space. The device controls three translational degrees of freedom (X, Y and Z) and three rotational degrees of freedom (A, B and C).

How Magellan/SPACE MOUSE Controls Six Degrees of Freedom

Moving the onscreen object is as easy as moving the Magellan/SPACE MOUSE cap. Shift the cap right or left to move the onscreen object horizontally through space. Pull the cap up or press it down to move the object vertically through space. Pull the cap toward the user or press it away to zoom in and out. Rotate the cap about the desired axis to rotate the onscreen object.



Note that the values input by Magellan/SPACE MOUSE are not interpreted as absolute position commands but as velocity commands. When the cap is displaced translationally or rotationally by a constant amount (a distance measurement), the graphical object is assigned a continuous speed in the same direction (a velocity measurement). The magnitude of the cap's displacement determines the magnitude of the onscreen object's velocity.

Two Hands for Intuitive Control

Magellan/SPACE MOUSE allows for simultaneous control of six degrees of freedom with only one hand. When used in conjunction

with a 3D CAD application, it takes over the functions of the viewing and supply hand (e.g. for a right-handed person this is the left hand). The working hand (e.g. the right hand) operates the conventional 2D mouse. This corresponds to the natural way of working with real objects and therefore supports intuitive creativity when generating and manipulating 3D objects in a CAD application.

How to Optimally Handle Magellan/SPACE MOUSE

Spread three or four fingertips around the cap and gently shift and twist it. Apply only light fingertip pressure to the cap. DO NOT grasp the entire cap in your hand. It does not matter whether the right or left hand is used. No shoulder or wrist movement is necessary. The



ergonomic design allows the hand to rest on the device without fatigue.

Displacement Range

The cap may be shifted up to ± 1.5 mm in the translational directions. The cap may be rotated up to ± 4 degrees about the rotational axes.

Magellan/SPACE MOUSE Measurement System

The cap movements are measured inside the cap by a worldwide-patented, optoelectronic measuring system. The cap is suspended by springs and always returns to its initial position.

Installation

To install the Magellan/SPACE MOUSE device and driver software on UNIX systems, see the information below. For help with installation problems see [Troubleshooting](#).

Package Contents

The product package contains:

- a 3D input device (Magellan/SPACE MOUSE Classic, Plus or Plus XT);
- a CD-ROM containing the driver software;
- the product documentation; and
- a serial port adapter (if required for the system specified at the time of order).

Hardware Installation

The Magellan/SPACE MOUSE has a serial interface cable with a 9-pin female connector, which must be connected to the proper serial port (RS232 or V24) of your UNIX workstation. The Magellan/SPACE MOUSE cable either plugs directly into the serial port at the back of the workstation or may require a separate adapter cable, which has been included if required. TURN OFF the workstation before connecting the Magellan/SPACE MOUSE. Once the connections have been made, you can restore power to the workstation. For further information see the related appendices listed below.

Related Sections

- [Connecting to the RS232 Serial Port](#)
- [Connecting to IBM RS6000 Workstations](#)
- [Connecting to SGI Workstations](#)
- [Connecting to SUN Workstations](#)

Supported Platforms

The Magellan/SPACE MOUSE X-Window driver is supported on the following platforms:

- | | |
|-------------|--|
| ▪ DEC | <i>Digital Equipment Corporation with OSF1</i> |
| ▪ HP | <i>Hewlett-Packard Company with HP-UX</i> |
| ▪ IBM | <i>International Business Machines Corporation with AIX</i> |
| ▪ SGI 53 | <i>Silicon Graphics Inc. with IRIX 5.3</i> |
| ▪ SGI 62/32 | <i>Silicon Graphics Inc. with IRIX 6.2/32 bit (R4000, R5000, ...)</i> |
| ▪ SGI 62/64 | <i>Silicon Graphics Inc. with IRIX 6.2/64 bit (R10000, ...)</i> |
| ▪ SGI 63/32 | <i>Silicon Graphics Inc. with IRIX 6.3/32 bit (R10000, ...)</i> |
| ▪ SGI 64/64 | <i>Silicon Graphics Inc. with IRIX 6.4/64 bit (R10000, ...)</i> |
| ▪ SGI 65/64 | <i>Silicon Graphics Inc. with IRIX 6.5/64 bit (R10000, ...)</i> |
| ▪ SUN | <i>Sun Microsystems with Solaris</i> |

Locate your application in the following pages of this manual. The appropriate global installation commands and other important installation instructions are listed for each supported platform.

NOTE: This list was last updated 10/2000. (For the most current application list, please see www.logicad3d.com/software/drivers.) If the list indicates that an appropriate driver is included with your application, you should consult the application manual for the appropriate Magellan/SPACE MOUSE installation procedure.

Application List & Driver Installation Commands

Application	Platform	Installation Command/Note
4D Navigator (v.4.20 or higher)	HP, IBM, SGI (all), SUN	./xinstall
Alias / Wavefront (all current versions)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst first permanent ./sgi/mglin32 third ./sgi/mglin64 third ./sgi/mgl6332 third ./sgi/mgl6464 third
ANSA (up to v.9.5)	IBM	./xinstall (<i>install X-Window driver v.2.0/3.0</i>)
	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst first permanent ./sgi/mglin32 first permanent ./sgi/mglin64 first permanent ./sgi/mgl6332 first permanent ./sgi/mgl6464 first permanent
ANSA (v.9.5)	HP, SGI (all), SUN	./xinstall
Ansys (v.5.6)	DEC, HP, IBM, SGI (all), SUN	<i>Driver included with application</i>
CADDSS5 (v.5.2 or higher)	HP, IBM, SGI (all), SUN	./xinstall
CADENAS (all current versions)	DEC, HP, IBM, SGI (all), SUN	<i>Driver included with application</i>
Camand (Camax) (all current versions)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst second permanent ./sgi/mglin32 second permanent ./sgi/mglin64 second permanent ./sgi/mgl6332 second permanent ./sgi/mgl6464 second permanent
CATIA (v.4.0 or higher)	HP, IBM, SGI (all), SUN	./xinstall
CDRS (v.6.0 or higher)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/dialinst cdrs ./sgi/dalin32 cdrs ./sgi/dalin64 cdrs ./sgi/dial6332 cdrs ./sgi/dial6464 cdrs
Clovis (v.3.0, A36 or higher)	SGI (all)	<i>Driver included with application</i>
Covise (all current versions)	SGI (all)	<i>Driver included with application</i>
Division (all current versions)	HP, SGI (all)	<i>Driver included with application</i>
EUCLID (up to v.2.3)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst second permanent ./sgi/mglin32 second permanent ./sgi/mglin64 second permanent ./sgi/mgl6332 second permanent ./sgi/mgl6464 second permanent
FIDES (v.3.92 or higher)	HP, IBM, SGI (all), SUN	./xinstall
HP Shared 3D Viewer (all current versions)	SGI (all)	<i>Driver included with application</i>
HyperMesh (v.3.1)	DEC, HP, IBM, SGI (all), SUN	./xinstall
I-DEAS Master Series (v.4, 5, 6, 7 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
ICEM SURF (up to v.3.0)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst first permanent ./sgi/mglin32 first permanent ./sgi/mglin64 first permanent ./sgi/mgl6332 first permanent ./sgi/mgl6464 first permanent

Application	Platform	Installation Command/Note
ICEM SURF (v.3.0 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
IGRIP (all current versions)	SGI (all)	./xinstall
Java3D (all current versions)	SUN	Follow the instructions found at www.logicad3d.com/software/drivers/SUN-Java3D.html
KISMET (all current versions)	IBM	./xinstall (install X-Window driver v.2.0/3.0) ./sgi/mglinst first permanent ./sgi/mglin32 first permanent ./sgi/mglin64 first permanent ./sgi/mgl6332 first permanent ./sgi/mgl6464 first permanent
MADYMO (v.5.1 or higher)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/dialinst madymo ./sgi/dalin32 madymo ./sgi/dalin64 madymo ./sgi/dial6332 madymo ./sgi/dial6464 madymo
Medina - Pre/Post- Processor for FEM (all current versions)	HP, IBM, SGI (all), SUN	./xinstall
Pam System Internat for VT CRASH (all current versions)	SGI (all)	Driver included with application
Patran (v.2.x, 3.x up to 8.x)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/dialinst patran permanent ./sgi/dalin32 patran permanent ./sgi/dalin64 patran permanent ./sgi/dial6332 patran permanent ./sgi/dial6464 patran permanent
Patran (v.9.0 or higher)	SGI (all)	Driver included with application
Pro/ENGINEER (v.17 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
Prosylvia Clarus (all current versions)	SGI (all)	Driver included with application
Prosylvia Oxygen (all current versions)	SGI (all)	Driver included with application
PT/PRODUCTS (all current versions)	DEC, HP, IBM, SGI (all), SUN	./xinstall
ROBCAD (v.3.6 or higher)	HP, IBM, SGI (all), SUN	Driver included with application
Silma (all current versions)	HP, IBM, SGI (all), SUN	Driver included with application
SIMPACK (all current versions)	HP, IBM, SGI (all), SUN	./xinstall
Softimage 3D (v.3.7 or higher)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst first permanent ./sgi/mglin32 first permanent ./sgi/mglin64 first permanent ./sgi/mgl6332 first permanent ./sgi/mgl6464 first permanent
Solid Designer (prior to v.6.0)	DEC, HP, IBM, SUN SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./xinstall ./sgi/mglinst second permanent ./sgi/mglin32 second permanent ./sgi/mglin64 second permanent ./sgi/mgl6332 second permanent ./sgi/mgl6464 second permanent

Application	Platform	Installation Command/Note
Solid Designer (v.6.0 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
SIMPACK (all current versions)	HP, IBM, SGI (all), SUN	./xinstall
Softimage 3D (v.3.7 or higher)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst first permanent ./sgi/mglin32 first permanent ./sgi/mglin64 first permanent ./sgi/mgl6332 first permanent ./sgi/mgl6464 first permanent
Solid Designer (prior to v.6.0)	DEC, HP, IBM, SUN SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./xinstall ./sgi/mglinst second permanent ./sgi/mglin32 second permanent ./sgi/mglin64 second permanent ./sgi/mgl6332 second permanent ./sgi/mgl6464 second permanent
Solid Designer (v.6.0 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
Strim (prior to v.3.0)	SGI 53 SGI 62/32 SGI 62/64 SGI 63/32 SGI 64/64, SGI 65/64	./sgi/mglinst strim 100 permanent ./sgi/mglin32 strim 100 permanent ./sgi/mglin64 strim 100 permanent ./sgi/mgl6332 strim 100 permanent ./sgi/mgl6464 strim 100 permanent
Strim (v.3.0 or higher)	SGI (all)	./xinstall
SuperScape VRT/ Viscape (all current versions)	SGI 53, SGI62/64	Driver included with application
TEBIS (v.3.1 Release 8)	HP, SGI (all)	./xinstall (install X-Window driver v.2.0/3.0)
TEBIS (v.3.1 Release 9)	HP, SGI (all)	./xinstall
TECOPLAN (all current versions)	HP, IBM, SGI (all), SUN	Driver included with application
TGS OpenInventor (v.2.5 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
Unigraphics (v.11 or higher)	DEC, HP, IBM, SGI (all), SUN	./xinstall
VEGA (v.3.0 or higher)	SGI (all)	Driver included with application
Virtual Design 2 (all current versions)	SGI (all), SUN	./xinstall (install X-Window driver v.2.0/3.0)
VisFly (v.1.1 or higher)	HP, IBM, SGI (all), SUN	./xinstall
VisMockUp (v.1.1 or higher)	HP, IBM, SGI (all), SUN	./xinstall
Vuppet Master (all current versions)	SGI (all)	Driver included with application
World Tool Kit (all current versions)	SGI (all)	Driver included with application
World Up (all current versions)	SGI (all)	Driver included with application

Driver Installation Procedures

Follow the instructions below for either global installation (with "root" privileges) or local installation (without "root" privileges).

Related Sections

[Troubleshooting](#)

[SGI Workstations With IRIX 6.2 or Higher](#)

[Additional Command Line Options](#)

Global Installation

- 1 Mount the CD-ROM (replace the # symbol with the number of your CD-ROM drive).

DEC: mkdir /CDROM
mount -rt cdfs -o noversion /dev/rz#
/CDROM
cd /CDROM

HP: mkdir /CDROM
mount -F cdfs -o ro,cdcase
/dev/dsk/c0t#d0 /CDROM
cd /CDROM

IBM: mkdir /cdrom
mount -v cdrfs -r /dev/cd0 /cdrom
cd /cdrom

SGI: mkdir /CDROM
mount -rt iso9660 /dev/scsi/sc0d#10
/CDROM
cd /CDROM

SUN: mkdir /cdrom
mount -F hsfs -r /dev/dsk/c0c6d#s0
/cdrom
cd /cdrom/cdrom0

- 2 Install and configure the driver. (Note that your system may require a different command line. Refer to the application list on pages 7-9.)

./xinstall

Select your application and the serial port to which the Magellan/SPACE MOUSE is connected. Press *Install* and *Exit*.

- 3 (OPTIONAL) Set the user-defined configurations. Create a link from */usr/magellan/home* to the home directory of all users, e.g.:

In -s /hom /usr/magellan/home

Copy (once) the global configuration file to the user home directory.

cp /usr/magellan/xdriver.ini
/home/<username>/xdriver.ini

Local Installation

- 1 Create a subdirectory for the Magellan/SPACE MOUSE driver.

mkdir ./magellan
chmod 777 ./magellan
cd ./magellan

- 2 Copy the driver from the CD-ROM (replace the # symbol with the number of your CD-ROM drive).

DEC: mkdir /CDROM
mount -rt cdfs -o noversion /dev/rz#
/CDROM
cp /CDROM/dec/xdriver xdriver

HP: mkdir /CDROM
mount -F cdfs -o ro,cdcase
/dev/dsk/c0t#d0 /CDROM
cp /CDROM/hp/xdriver xdriver

IBM: mkdir /cdrom
mount -v cdrfs -r /dev/cd0 /cdrom
cp /cdrom/ibm/xdriver xdriver

SGI: mkdir /CDROM
mount -rt iso9660 /dev/scsi/sc0d#10
/CDROM
cp /CDROM/sgi/xdriver xdriver

SUN: mkdir /cdrom
mount -F hsfs -r /dev/dsk/c0t6d#s0
/cdrom
cp /cdrom/cdrom0/sun/xdriver xdriver

- 3 Install and configure the driver.
chmod 555 xdriver
.xdriver -new
Select your application and the serial port to which the Magellan/SPACE MOUSE is connected. Press *Install* and *Exit*.
- 4 The driver must be active before you launch your application. This can be achieved in several ways, e.g. enter the call of the xdriver in the application startup file, in a login startup file (.cshrc) or in the Xstartup file (as root). The call of the xdriver is:
<path>/xdriver &

Starting the Driver for the First Time

After the system has copied the X-Window driver, the driver must be started for the first time and configured. The driver demands sequential information in procedure, which it then stores in a fixed configuration table. The file name of the configuration table is *xdriver.ini*. It is saved in the directory */usr/magellan* (the same directory in which the X-Window driver is installed). While activating the X-Window driver, it searches for the configuration table and uses the information stored there.

Uninstalling the X-Window Driver

To uninstall a global installation, use the following command:

/usr/magellan/xdriver --disableinit

To uninstall a local installation, simply remove the *xdriver* entry from the start-up file.

Magellan/SPACE MOUSE Keyboard

The keyboard of the Magellan/SPACE MOUSE operates on two levels: the so-called "standard" or top-level keyboard and the second-level keyboard.

Common Functions

Several functions that are common to these two levels are described below.

Translation ON/OFF

Turns the translational degrees of freedom (inputs X, Y and Z) on or off. Turning translation off fixes the "screen position" of the onscreen object. The default is ON.

Rotation ON/OFF

Turns the rotational degrees of freedom (inputs A, B and C) on or off. Turning rotation off fixes the orientation of the onscreen object. The default is ON.

Dominant Mode ON/OFF;

When dominant mode is on, only the input of the greatest magnitude is registered, i.e. the onscreen object moves in only one direction at a time. This can be a translational or rotational direction. Dominant mode is especially helpful when learning how to use the Magellan/SPACE MOUSE. The default is OFF.

Gain Down; Decrease Sensitivity

Decreases the sensitivity of the Magellan/SPACE MOUSE. The same movements of the cap will produce a slower movement of the object. Each time the key is pressed, the sensitivity decreases by one half.

Gain Up; Increase Sensitivity

Increases the sensitivity of the Magellan/SPACE MOUSE. The same movements of the cap will produce a faster movement of the object. Each time the key is pressed, the sensitivity doubles.

Gain Default; Default Sensitivity

Returns the Magellan/SPACE MOUSE back to the standard sensitivity.

Standard Keyboards of Common Applications

Functions of the standard keyboard are executed simply by pressing and releasing any one of the nine buttons of the Magellan/SPACE

MOUSE Classic or the eleven buttons of the Magellan/SPACE MOUSE Plus and Plus XT. The default function assigned to each button varies with the application used. Standard keyboards for some common CAD applications are listed below. Note that the functions of the standard keyboard may be customized by the user via the Magellan/SPACE MOUSE driver. See [Button Mapping Window](#).

CADD5 (v.8.3 or higher)

- 1 Translation ON/OFF
- 2 Rotation ON/OFF
- 3 Dominant Mode ON/OFF
- 4 Model Space Filter ON/OFF. Toggles the CADD5 Model Space Filter.
- 5 Decrease Sensitivity
- 6 Increase Sensitivity
- 7 Default Sensitivity

NOTE: See also the CADD5 user's manual under the cross reference *Working With DynamicView* or *Using Dynamics Manipulation on the View Display*.

CATIA (v.4)

- 1 Movement About Rotation Axis. *With animation turned off in CATIA's 3D menu, the object onscreen performs a rotation about the selected axis (the angle through which it rotates can be changed with the sensitivity adjustment in the 3D menu). When animation is on, the object rotates at a constant speed about the selected axis. The rotation speed doubles each time the key is pressed. Pressing the Magellan/SPACE MOUSE star key stops the rotation and resets the screen.*
- 2 Translation ON/OFF
- 3 Rotation ON/OFF
- 4 Select Rotation Axis. *Pressing and holding this key displays the current rotation axis. While still holding the button, a new rotation axis may be selected with the 2D computer mouse.*
- 5 Dominant Mode ON/OFF
- 6/+ Yes. *Activates the Yes button.*
- 7/- No. *Activates the No button.*
- 8 Dialmode. *Toggles between standard mode and dialmode (when Enable is checked in the Single Axis Dial section of the Magellan Motion Control Center main window). The default is STANDARD mode. See [Dialmode Keyboard](#).*
- * Reset Screen. *Resets the onscreen object to its stored starting position.*

CATIA (v.5)

- 2 Translation ON/OFF
- 3 Rotation ON/OFF
- 5 Dominant Mode ON/OFF
- 6 Increase Sensitivity
- 7 Default Sensitivity

Pro/ENGINEER (v.17 through 19)

- 1 Repaint. Repaints the current screen.
- 2 Shade. The object onscreen is shaded.
- 3 Display Datum. Toggles the display of the datum planes.
- 4 Model Spin Center. The model will spin about the spin center axis.
- 5 Decrease Sensitivity
- 6 Increase Sensitivity
- 7 Default Sensitivity
- 8 Default View. Resets the object to the default view.

NOTE: See also the Pro/ENGINEER user's manual under the cross reference *View Point Function* or *Spaceball*.

Pro/ENGINEER (v.20 or higher)

- 1 Repaint. Repaints the current screen.
- 2 Shade. The object onscreen is shaded.
- 3 Previous View. Resets the object to the previous view.
- 4 Default View. Resets the object to the default view.
- 5 Gain Up
- 6 Gain Down
- 7 Gain Default
- 8 Refit. Resizes the view of the object while maintaining the current orientation.

NOTE: See also the Pro/ENGINEER user's manual under the cross reference *View Point Function* or *Spaceball*.

Unigraphics (v.11 or higher)

- 1 Translation ON/OFF
- 2 Rotation ON/OFF
- 3 Dominant Mode ON/OFF
- 4 Keep In View. Pressing this key makes it impossible to lose the graphical object outside the bounds of the screen. The default is OFF.
- 5 Gain Down
- 6 Gain Up

- 7 New Rotation Center. Sets the new rotation center at the center of the current screen.

- 8 Menu. Brings up the Unigraphics menu.

NOTE: See also the Unigraphics user's manual under the cross reference *View Point Function* or *Magellan*.

Second-Level Keyboard

Functions of the second-level keyboard are executed by pressing any one of the eight numerical keys in combination with the star key. The keys must be pressed *simultaneously*. Press and hold the star key followed by the desired numerical key. Note that second-level keyboard functions are not application-dependent.

- * 1 Translation ON/OFF
- * 2 Rotation ON/OFF
- * 3 Dominant Mode ON/OFF
- * 4 Zeroing. The Magellan/SPACE MOUSE is zeroed at the current position of the cap. All subsequent inputs are relative to this position.
- * 5 Translation Sensitivity. The translational sensitivity is increased incrementally on a scale from zero (the default) to 7. Activating this key sequence the eighth time resets the sensitivity to zero.
- * 6 Rotation Sensitivity. The rotational sensitivity is increased incrementally on a scale from zero (the default) to 7. Activating this key sequence the eighth time resets the sensitivity to zero.
- * 7 Zero Radius. The minimum displacement of the cap required to cause movement is increased incrementally on a scale from zero to 15 (the default). After 15 the setting is reset to zero. A high zero radius setting is helpful if slight vibrations exist in the work environment.
- * 8 Default Sensitivity. Returns the translational and rotational sensitivities and the zero radius to the default settings.

Quicktip

A Quicktip is executed by pressing downward on the cap with a quick tipping motion of your finger, as shown below. The Quicktip function



is an extra "virtual" button that may be programmed just like the normal hardware buttons. The default function assigned to Quicktip toggles the driver window between the foreground and background. Note that for the Magellan/SPACE MOUSE Classic and Plus, the translation and rotation must be turned ON and the dominant mode turned OFF for the Quicktip function to work.

Dialmode Keyboard

Dialmode functions like a manual dialbox. Press one of the keys listed below to select one of

the six degrees of freedom. Twist the cap about the Y-axis (i.e. in the horizontal plane of the base of the Magellan/SPACE MOUSE) to move the onscreen object in the selected direction. See also [Single Axis Dial](#).

-
- | | |
|--|---|
| | 1 Input X. <i>Twist the cap for horizontal translation.</i> |
| | 2 Input Y. <i>Twist the cap for vertical translation.</i> |
| | 3 Input Z. <i>Twist the cap to zoom in or out.</i> |
| | 5 Input A. <i>Twist the cap to rotate about the x-axis.</i> |
| | 6 Input B. <i>Twist the cap to rotate about the y-axis.</i> |
| | 7 Input C. <i>Twist the cap to rotate about the z-axis.</i> |
-

Magellan/SPACE MOUSE Motion Control Center

The Magellan/SPACE MOUSE Motion Control Center (MCC) can be used both to directly configure the hardware settings and to program the standard keyboard.

Motion Control Center Main Window

The main window of the MCC, shown below, contains basic features for configuring the Magellan/SPACE MOUSE.

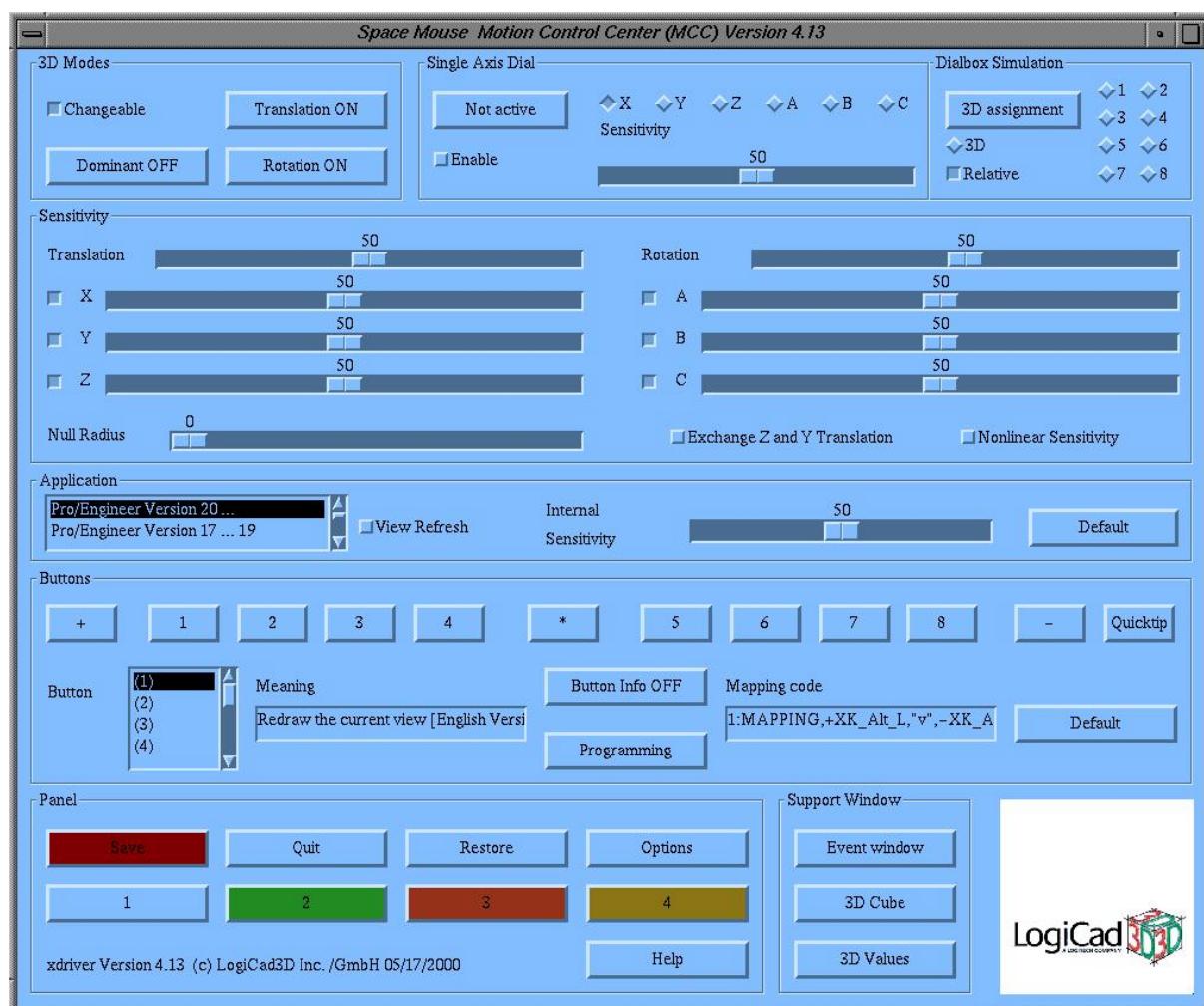
3D Modes

Translation ON/OFF turns the translational degrees of freedom (inputs X, Y and Z) on or off. Turning translation off fixes the "screen position" of the onscreen object. The default is ON. *Rotation ON/OFF* turns the rotational degrees of freedom (inputs A, B and C) on or off. Turning rotation off fixes the orientation of the onscreen object. The default is ON. *Dominant ON/OFF* turns dominant mode on or

off. When dominant mode is on, only the input of the greatest magnitude is registered, i.e. the onscreen object moves in only one direction at a time. This can be a translational or rotational direction. Dominant mode is especially helpful when learning how to use the Magellan/SPACE MOUSE. The default is OFF. Use the *Changeable* tickbox to fix and unfix the current translation, rotation and dominant mode settings.

Sensitivity

Use these slider bars to adjust various sensitivities of the Magellan/SPACE MOUSE. As an example, it may be useful to have faster zoom response (Z-sensitivity) than pan response (X- and Y-sensitivity). The bars labeled *Translation* and *Rotation* adjust the collective sensitivities, while the six bars labeled with the individual degrees of freedom



are for individual adjustment. When a sensitivity is increased, the same movements of the Magellan/SPACE MOUSE cap generate quicker movements of the onscreen object. Untick the boxes next to the individual adjustment bars to turn off the corresponding degrees of freedom. The *Null Radius* slider bar is used to control the minimum displacement of the cap necessary to cause movement of the onscreen object. Increasing the null radius may be helpful in work environments prone to vibrations (e.g. industrial environments), which may cause the Magellan/SPACE MOUSE to register unintentional movements. With some applications it may be necessary to tick *Exchange Y and Z Translation*. For nonlinear sensitivity see [Options Window](#).

Application

The application selected during installation is highlighted in the scroll bar menu. If you wish to use the Magellan/SPACE MOUSE with a different application, select the new application from the scroll bar menu and click *Save* in the *Panel* section of the MCC window. If you wish to use the Magellan/SPACE MOUSE with more than one application, select a different panel in the *Panel* section before choosing the application and clicking *Save*. The MCC automatically switches to the panel settings of the active application. Customized MCC settings may be saved for up to four different applications; see [Panel](#). Click *Default* to return the settings in the *3D Modes*, *Sensitivity* and *Single Axis Dial* sections of the MCC main window to their defaults. For several common applications an *Internal Sensitivity* slider bar is also present, which is used to adjust the overall sensitivity of the Magellan/SPACE MOUSE.

Buttons

As an alternative to manually pressing the buttons on the Magellan/SPACE MOUSE, these software buttons may be clicked with the 2D mouse cursor to execute the default functions assigned to the corresponding hardware buttons. (For the Magellan/SPACE MOUSE Classic, the plus [+] and minus [-] buttons are present on the software keyboard but have no effect.) Holding the 2D mouse cursor over one of these software buttons displays two lines of information text. The first line shows the function mapped to the corresponding hardware button. The second line shows the function that is executed by pressing the software button itself.

The *Buttons* section is also used to map arbitrary key sequences as commands onto any of the Magellan/SPACE MOUSE hardware buttons. To map a new command onto a button, select the button number from the scroll bar menu. The current function and mapping code of the selected button are displayed in the fields *Meaning* and *Mapping Code*. Click *Programming* to open the [Button Mapping Window](#). After remapping a button, the user should enter a new description in the *Meaning* field.

Button Info opens a small window that displays the key sequence mapped to the hardware buttons whenever they are pressed. *Default* resets all button mappings to their defaults.

Panel

Click *Save* to save the current MCC configuration. Click *Quit* to quit the MCC (note that quitting the MCC does NOT stop the X-Window driver). Anytime changes are made anywhere in the MCC window, the *Save* button is highlighted red, indicating that the current changes have not been saved. *Restore* appears when unsaved changes have been made, which can be used to undo any unwanted changes. The four colored buttons numbered 1 through 4 can be used to save up to four independent configurations. The configurations can be for different settings within the same CAD application or they can be associated with different applications (see also [Application](#)). The background color of the MCC window changes to match the color of the numbered button of the active panel. *Help* opens a small window for launching the *xdriver.htm* help file. Click *Options* to open the [Options Window](#).

Support Window

The configuration settings can be interactively tested with a 3D cube demo program by clicking *3D Cube*. Note that it is not possible to test the default functions of the standard keyboard with the 3D Cube demo program. Alternatively, click *3D Values* to open a small window that displays both the analog values of all six degree-of-freedom inputs as well as the events corresponding to each pressed key. By clicking *Event Window* and then clicking into the window of the target application, all events generated by the Magellan/SPACE MOUSE are sent to this application, no matter which application is active.

Single Axis Dial

Tick *Enable* to map the Dialbox Mode ON/OFF function onto Magellan/SPACE MOUSE button 8. Press button 8 to activate the dialbox mode. When dialbox mode is active, the hardware buttons 1, 2, 3, 5, 6 and 7 are used to select the inputs X, Y, Z, A, B and C, respectively. Select a degree of freedom by pressing one of these hardware buttons, then twist the cap about the Y-axis (i.e. in the horizontal plane of the base of the Magellan/SPACE MOUSE) to move the onscreen object in the selected direction. Alternatively, click *Active/Not Active* to activate the dialbox mode, and select the active degree of freedom in this section of the MCC window. Use the slider bar to change the sensitivity of the single axis dial.

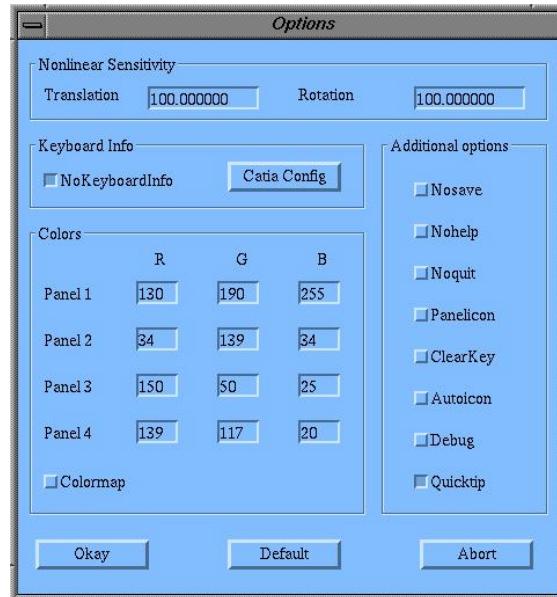
Dialbox Simulation

Unlike the single axis dial feature, a real dialbox is simulated using the dialbox simulation mode. This is only necessary for some applications that do not support Magellan/SPACE MOUSE but that do support dialboxes. The functions of the tickboxes numbered 1 through 8 correspond to the default functions that your CAD application would normally assign the eight wheels of a dialbox. Select a degree of freedom by ticking one of the eight tickboxes or by pressing the corresponding hardware button. Twist the cap about the Y-axis (i.e. in the plane of the base of the Magellan/SPACE MOUSE). This executes the same motion as that obtained by turning the corresponding wheel on a real dialbox. Selecting *3D* makes it possible to move the onscreen object in more than one degree of freedom at a time. The cap must then be moved and twisted in the normal, intuitive directions (i.e. not only about the Y-axis). Click *3D Assignment* to open a small window for reassigning the six degrees of freedom to the wheels of the dialbox. By correctly assigning the six inputs, Magellan/SPACE MOUSE can be used as normal with applications that do not support its use. Selecting *Relative* causes all values generated by Magellan/SPACE MOUSE to be interpreted by the application as relative values. Note that some IBM and SGI systems may require a separate installation procedure to activate the dialbox simulation mode. See [LPFK and Dialbox Driver Installation](#).

Options Window

Click *Options* in the *Panel* section of the MCC main window to open the Options window, shown at right. This window contains

additional features for controlling various functions and appearances of the MCC.



Nonlinear Sensitivity

These values determine the nonlinear behavior of the translational and rotational sensitivity. Nonlinear sensitivity is characterized by increasing sensitivity with increasingly large deflections of the Magellan/SPACE MOUSE cap. Values of 0 or higher may be entered, with 0 having no effect and higher values giving stronger nonlinear behavior. The default for both parameters is 100. Note that *Nonlinear Sensitivity* must be ticked in the *Sensitivity* section of the MCC main window for these values to take affect.

Keyboard Info

Use *No Keyboard Info* to toggle on and off the [Button Info Window](#). For CATIA users, the *Catia Config* button is used to import the configuration information for the function buttons at the bottom of the CATIA window.

Colors

Used to change the color of each MCC panel. Values from 0 to 255 may be entered. Ticking *Colormap* keeps the X-Window driver from creating new colors within the colormap.

Additional Options

Ticking *No Save*, *No Help* or *No Quit* hides the corresponding buttons in the *Panel* section of the MCC main window. When *Panel Icon* is ticked, a small colored dot corresponding to the color of the active MCC panel appears in the desktop icon of the minimized MCC

window. Ticking *Clear Key* ensures that all keys pressed in the button mapping codes are released after the mapping is executed. Ticking *Auto Icon* causes the Magellan desktop icon to always appear in front of other open windows. *Debug* reports debug information. The Quicktip function may be toggled on and off with the *Quicktip* tickbox.

Button Mapping Window

To program or "map" a new command onto a Magellan/SPACE MOUSE button, select the button number from the scroll bar menu in the *Buttons* section of the MCC main window. Then click *Programming*, which opens the Button Mapping window, shown below. Click the buttons in this window to add commands to the mapping code of the selected Magellan/SPACE MOUSE button. The functions of the buttons are described below. Changes made to the mapping code are displayed at the bottom of the window in the *Mapping Code* field. Click *Okay* to save the current changes or *Abort* to cancel.

Press a Key

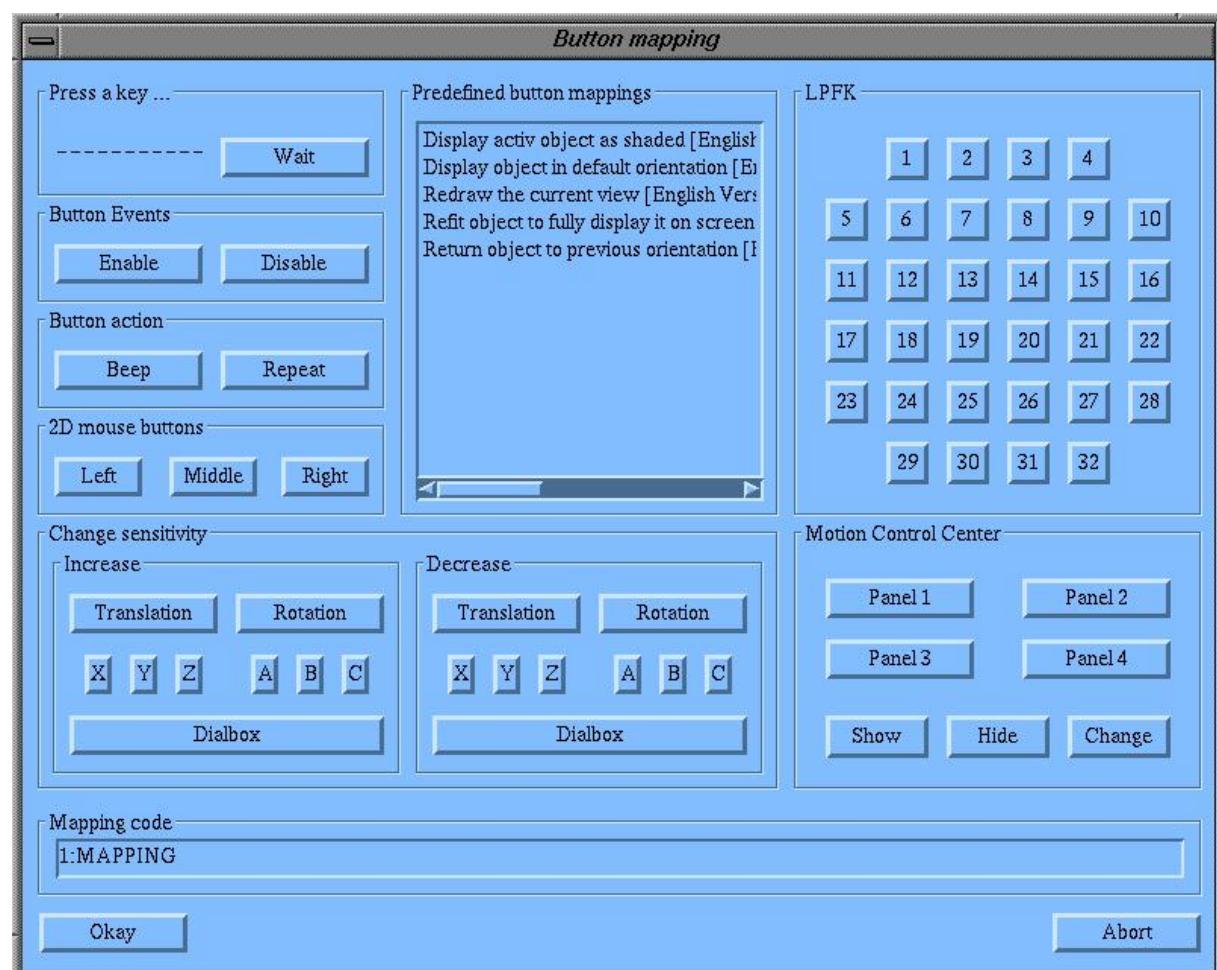
Single keys entered in a button's mapping sequence are displayed and stored here. *Wait* should be entered in mapping sequences that require a window to be opened or a menu to be pulled down.

Button Events

Enable causes the application's default command to be executed whenever the selected button is pressed, regardless of other commands included in the button mapping. For example, if *Enable* is entered and the mapping code for an additional function is included in the button mapping, the default function and the additional function are simultaneously executed. *Disable* prevents the default command from being sent.

Button Action

Beep causes a single beep to sound. *Repeat* causes the mapped command to be repeatedly executed as long as the button is held down. Note that the beep command cannot be repeated.



2D Mouse Buttons

Use these buttons to map the functions of the three 2D mouse buttons.

Change Sensitivity

These buttons maps the Increase/Decrease Sensitivity functions, either for collective (translation or rotation) or individual (X, Y, Z, A, B or C) degrees of freedom. The dialbox buttons are used to map the sensitivity control of the dialbox mode.

Predefined Button Mappings

A list of the predefined mapping codes available for the current application is displayed here. Click a mapping code to map the function to the selected Magellan/SPACE MOUSE button.

Motion Control Center

Show causes the MCC window to be brought to the front of the screen. *Hide* sends the MCC window to the back and *Change* toggles between front and back. Mapping one of the Panel buttons numbered 1 through 4 switches the MCC to that panel number.

LPFK

The functions of the 32 buttons correspond to the default functions that your CAD application normally assigns the buttons of an LPFK. Use these buttons to map the corresponding LPFK functions. Note that some IBM and SGI systems may require a separate installation procedure to activate the LPFK simulation mode. See [LPFK and Dialbox Driver Installation](#).

Troubleshooting

Problem/Error	Possible Explanations	Recommended Actions
Magellan/SPACE MOUSE not found on TTY.	<ul style="list-style-type: none"> ➤ Access rights on TTY ports are wrong. ➤ The correct adapter might not be being used. ➤ There may be another driver running on the TTY port (e.g. Spaceball or Getty). 	<ul style="list-style-type: none"> ✓ Check access rights on the TTY ports and change if necessary. ✓ Make sure you use the correct adapter. ✓ Verify that the port is available and not in use by another device or driver.
Xdriver already running. You must kill (XXXX) PID and restart xdriver using xdriver –new.	<ul style="list-style-type: none"> ➤ There are many reasons for this message. The user may have quit the MCC and tried to restart the X-Window driver without first stopping the X-Window driver processes from running. 	<ul style="list-style-type: none"> ✓ Kill the running X-Window driver process ID and restart the X-Window driver, unless the driver was installed globally, in which case it will automatically be relaunched a few seconds after being killed.
Cannot copy xdriver.	<ul style="list-style-type: none"> ➤ Access rights incorrect or not logged on as ROOT. 	<ul style="list-style-type: none"> ✓ Try copying the files manually.
Dialbox installation failed.	<ul style="list-style-type: none"> ➤ Some of the system files that support LPFK and Dialbox may not be installed on the system. 	<ul style="list-style-type: none"> ✓ Contact your system administrator (see also comments below).
MCC does not start.	<ul style="list-style-type: none"> ➤ Access rights to Xserver are incorrect. 	<ul style="list-style-type: none"> ✓ Use xhost + localhost.

NOTE: Troubleshooting on UNIX requires editing of critical startup files and therefore some knowledge of UNIX commands. Your system administrator should help you with it. If the X-Window driver installation fails, an email message is automatically generated, saved in the `/tmp` directory and (if the workstation is

connected to the internet) sent to our technical support at help@logicad3d.com. We send responses to these emails with suggestions on how to resolve the problem. You can also contact our technical support by phone. Please call the numbers listed for your area (see [LogiCad3D Support](#)).

LogiCad3D Support

If you have any questions or comments about the Magellan/SPACE MOUSE product, please contact the persons or organizations listed for your area. Various information about the Magellan/SPACE MOUSE, including the latest driver versions, can be found at the web sites.

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Appendices

Connecting to the RS232 Serial Port

The Magellan/SPACE MOUSE is equipped with a 9-pin D-Sub female connector. The wiring of this connector matches any IBM-compatible PC with a 9-pin serial connector. To use the Magellan/SPACE MOUSE with other computers, check the pin functions against the list shown below and verify whether the Magellan/SPACE MOUSE connector wiring matches your system. If not, you must use an appropriate adapter cable to connect the Magellan/SPACE MOUSE wiring to that of your computer.

Pin	Meaning	Connection to Computer
Case	Shield	Case
2	TxD	RxD
3	RxD	TxD
4	Supply	DTR
5	GND	GND
7	CTS	RTS
8	RTS	CTS

The use of the handshake signals (CTS, DTR and RTS) is absolutely necessary for the safe operation of the Magellan/ SPACE MOUSE. Without these handshake signals, loss of data will occur. Additionally, the signal lines (DTR and RTS) are used to supply power to the Magellan/SPACE MOUSE. Thus no external power supply is required. The minimum output voltage has to be 5 V, providing a output current of 9 mA on both signal lines.

Communication via the serial port using the XON/XOFF protocol is supported by the Magellan/SPACE MOUSE, but the handshake signals (CTS, DTR and RTS) are needed for safe operation. Thus the status of the handshake signals has to be carefully checked and treated by the computer. To activate the Magellan/SPACE MOUSE, these signals should have a positive (active) level.

Connecting to IBM RS6000 Workstations

The IBM-Magellan/SPACE MOUSE adapters for 25-pin and 9-pin D-Sub male RS232 ports use the wiring schemes shown in the following diagrams.

Pin No. 25-p. D-Sub f.	Pin No. 9-p. D-Sub m.
connector	connector
shield	shield
2	TxD
3	RxD
4	RTS
5	CTS
7	GND
20	DTR
6	DSR
8	DCD
(to RS232)	
(to Mag./S.M.)	

Pin No. 9-p. D-Sub f.	Pin No. 9-p. D-Sub m.
connector	connector
shield	shield
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
(to RS232)	
(to Mag./S.M.)	

Connecting to SGI Workstations

If the 8-pin mini-DIN female RS232 connector on an SGI workstation is used, the converter-adapter cable shown in the following diagram is required. The cable changes the mini-DIN connector to that of the Magellan/SPACE MOUSE and converts, if necessary, the 4 V

Pin No. 8-p. mini-DIN m.	Pin No. 9-p. D-Sub m.
1	DTR (4V conv. 7V)
2	CTS not used
3	TxD
4	GND
5	RxD
6	RTS
7	DCD not used
8	GND
connector	connector
shield	shield
(to RS232)	
(to Mag./S.M.)	

output voltage of the SGI port handshake signals to 5 V and 10 mA to supply the Magellan/SPACE MOUSE. The input handshake signals CTS and DCD of the workstation are not connected in order to save some current taken from the workstation's output handshake signals DTR and RTS.

Different SGI workstations—despite somewhat similar connector types—show different voltage and current conditions at the serial RS232 port. One example is a Personal IRIX workstation, which offers such a low current (and voltage) handshake signal that the Magellan/SPACE MOUSE (as well as any standard mouse) is not able to operate due to a lack of current. In such cases, only an external power supply (min. 5.0 V, max. 11.0 V, 9 mA DC) into the DTR pin of the Magellan/SPACE MOUSE will solve the problem. An appropriate adapter cable with external power supply has been included in the product package based on the system specified at the time of order. However, if an adapter with the external power supply feature has not been included with your Magellan/SPACE MOUSE or should you discover after ordering that your SGI machine requires an external power supply, please contact the [LogiCad3D Support](#) Center listed for your area.

Connecting to SUN Workstations

To install the Magellan/SPACE MOUSE on SUN workstations, make sure that the hardware configuration of the serial port to which you want to connect the Magellan/SPACE MOUSE is set to RS232. *The default is RS422!* The RS232 configuration is required in order to supply control voltages to the Magellan/SPACE MOUSE through the handshake signal lines. To configure the port to RS232, follow the steps in your SUN user handbook. The wiring scheme of the SUN-Magellan/SPACE MOUSE adapter is shown below.

Pin No. 25-p. D-Sub f.	Pin No. 9-p. D-Sub m.
connector	connector
shield	shield
2 _____ TxD _____ 3	
3 _____ RxD _____ 2	
4 _____ RTS _____ 7	
5 _____ CTS _____ 8	
7 _____ GND _____ 5	
20 _____ DTR _____ 4	
(to RS232)	(to Mag./S.M.)

SGI Workstations With IRIX 6.2 or Higher

Some applications support the driver for the Magellan/SPACE MOUSE that is integrated in SGI systems with IRIX version 6.2 or higher. At present, the following applications support this driver:

- Alias
- Open Inventor

Follow the procedure below to install the X-Window driver with these applications.

- 1 Login as *root* and launch the *inst* program.
- 2 Select the CD-ROM as the source drive (the Magellan/SPACE MOUSE driver is located on the IRIX 6.2 System CD-ROM 1 of 2).
- 3 Select the step installation menu with the following commands:

```
inst
install oe.sw.optinput
go
quit
```
- 4 Exit the *inst* program.
- 5 Using the System Manager Tools, configure the Serial Port Setup to which the Magellan/SPACE MOUSE is connected (Port 2) as *Magellan*. Test the installation with *Run Confidence Test*.
- 6 For older applications that use the old name (e.g. IRIX Inventor) you must create the file */usr/lib/X11/input/config/magellan* with following contents:

```
x_init {
    name "spaceball"
}
```

After creating the file, reboot the system for the new configuration to take effect.

NOTE: Install either the xdriver or the IRIX kernel driver. *Do not install both!* For older R3000 workstations, please contact the [LogiCad3D Support](#) Center listed for your area and ask if a driver is available. You can also check our homepage at www.logicad3d.com.

Additional Command Line Options

The X-Window driver may be launched with the following command line attachments.

- class** Class information of all active windows is shown.
- debug** Reports debug information.
- dialsingle** Sends all LPFK and Dialbox events separately.
- disableinit** Turns off the X-Window driver in the */etc/inittab* file. An X-Window driver launched from */etc/inittab* is terminated immediately.
- enableinit** Relaunches the X-Window driver from the */etc/inittab* file.
- fastinit** Causes the X-Window driver to initialize faster. Use of this option is NOT recommended because the view of the panel can be changed.
- graphics** Opens a demo window in which a 3D cube can be moved in six degrees of freedom.
- grab** The 2D mouse cursor is blocked if the Magellan/SPACE MOUSE is active.
- hidemcc** Hides the MCC so that it is no longer usable. (The *Quit* button in the MCC and the *-nomcc* option have the same effect.)
- inittab** Informs the X-Window driver that it was started from the */etc/inittab*.
- installlpfk** Installs the driver necessary for the LPFK simulation.
- installmgl** Installs the Magellan XIE driver. (Only for SGI systems with IRIX 6.2 or higher.)
- irixmgl** Activates the Magellan XIE driver and functions within the MCC. (Only for SGI systems with IRIX 6.2 or higher.)
- new** Set up new local configuration. The configuration file **.ini* is deleted and a new configuration of the driver is asked for.
- new -global** Set up new global configuration.
- nohelp or -nohtml** Suppresses the creation of the X-Window HTML files and disables the *Help* button in the MCC.
- nomcc or -nomotif** No MCC window comes up with the X-Window driver.
- noquit** Ensure that the MCC will never be turned off.
- showmcc** Causes the MCC to reappear (after it has been hidden, e.g. with the *-hidemcc* or *-nomcc* commands).

-test Test the driver. Opens a window and shows all X-Window driver data received.

-texte Text output. The texts used in the X-Window driver are output in all used languages.

-tty <serial port> Connect information about the Magellan/MOUSE at the defined serial port with YES or NO.

-turbo The Turbo Magellan/SPACE MOUSE (18ms data rate) is supported.

-ungrab or -nograb Ensures that the 2D mouse cursor remains unblocked.

-uninstalllpfk Uninstalls the LPFK simulation driver.

-uninstallmgl Uninstalls the Magellan XIE driver. (Only for SGI systems with IRIX 6.2 or higher.)

-user All logged-in users are shown.

-userdir or -userid Creates an *xdriver.ini* file from the user's home directory (so that the configuration file is user-dependent) and saves the configuration file **.ini* with the user-ID and group-ID of the current user. For global installation, the X-Window driver uses the */usr/magellan/xdriver.ini* configuration file as the default. Note that this option will work only if the X-Window driver has been launched using *-inittab*.

-xstartup Informs the X-Window driver that it was started from the Xstartup.

LPFK and Dialbox Driver Installation

In order to use the LPFK and dialbox simulation modes, it may be necessary to install additional operating system files. The following systems normally require additional files:

- SGI (IRIX 5.3 or higher)
- IBM (AIX 4.14 or higher)

For IBM systems, consult your AIX user's manual. For SGI systems, follow the installation procedure outlined below. Note that LPFK and dialbox simulation modes are not available on SUN.

- 1 Insert the IRIX 6.2 System CD-ROM 1 of 2.
- 2 Start the Software Manager. From the *System* menu select *Software Manager* or double-click on the CD-ROM icon on your desktop.

- 3 Select the input directory next to the *Available Software* window.
 /CDROM/dist
 If you install the operating system from a location other than the CD-ROM drive, change this accordingly.
- 4 Click *Customize Installation*.
- 5 A list of all installed and available OS modules appears. Scroll down to *IRIX 6.2 Execution Environment* and expand the folder.
- 6 Scroll down to *Optional Input Devices*, highlight the entry and click *Start*.
- 7 This starts the installation process whereby the following file is installed:
 /usr/lib/X11/input/dial.o
- 8 After rebooting, reinstall the X-Window driver, this time using the *-installlpfk* command.
 ./xdriver -new -global -installlpfk
- 9 To test the installation, start the X-Window driver and from the *System* menu select *Run Confidence Test*. Click on *Dials and Buttons*. You should now be able to manipulate the dials and the buttons with the Magellan/SPACE MOUSE device.

Product Specifications

Feature/Specification	Magellan/ SPACE MOUSE Classic	Magellan/ SPACE MOUSE Plus	Magellan/ SPACE MOUSE Plus XT
Contactless, wearless, high-linear measuring system	Yes	Yes	Yes
Operating speed levels (increments of resolution)	600	600	600
Number of freely programmable buttons	9	11	11
Software-controllable keyboard LEDs	No	No	Yes (2 yellow, 1 red)
Quicktip virtual button	Yes	Yes	Yes
Device weight (for stability)	0.665 kg	0.680 kg	0.680 kg
Min. releasing force of the measuring system	0.2 N	0.2 N	0.2 N
Max. user force of the measuring system	4.4 N	4.4 N	4.4 N
Ratio of device weight to min. releasing force	33.2	33.2	33.2
Ratio of device weight to max. user force	1.5	1.5	1.5
Device weight deficit w.r.t. max. user force	0 %	0 %	0 %
Counter force to compensate max. user force	0 N	0 N	0 N
Min. releasing torque of the device	4 N mm	4 N mm	4 N mm
Max. user torque of the device	100 N mm	100 N mm	100 N mm
Customization of user force	Possible	Possible	Possible
Customizable keyboard template	Yes	Yes	Yes
Operating humidity (non-condensing)	10 to 98% RH	10 to 98% RH	10 to 98% RH
Operating temperature	+5 to +60 °C	+5 to +60 °C	+5 to +60 °C
Storage humidity	10 to 98% RH	10 to 98% RH	10 to 98% RH
Storage temperature	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Gravity height of work center	25 mm	26 mm	26 mm
Dialbox simulation	Yes 100%	Yes 100%	Yes 100%
LPFK simulation	Yes 100%	Yes 100 %	Yes 100 %
Dominant Mode	Yes	Yes	Yes

Feature/Specification	Magellan/ SPACE MOUSE Classic	Magellan/ SPACE MOUSE Plus	Magellan/ SPACE MOUSE Plus XT
Supported systems	<i>UNIX</i> : DEC, HP, IBM, SGI, SUN <i>PC</i> : Win95/98, WinNT/2000, DECNT, MIPSNT	<i>UNIX</i> : DEC, HP, IBM, SGI, SUN <i>PC</i> : Win95/98, WinNT/2000, DECNT, MIPSNT	<i>UNIX</i> : DEC, HP, IBM, SGI, SUN <i>PC</i> : Win95/98, WinNT/2000, DECNT, MIPSNT
Power source	5V / 9mA	5V / 9mA	5V / 9mA
Interface type	RS232, 9600 Baud	RS232, 9600 Baud (opt. 19k Baud)	RS232, 9600 Baud (opt. 19k Baud)
Internal resolution	8 bit	8 bit	8 bit
Cable length	2 m	2 m (optional 3m)	2 m (optional 3m)
Converter-adapters available for the following RS232 serial port connections	IBM 25-p D-Sub m IBM 9-p D-Sub m SGI 8-p mini-DIN f SGI 8-p DIN f SGI 9-p D-Sub f SUN 25-p D-Sub f	IBM 25-p D-Sub m IBM 9-p D-Sub m SGI 8-p mini-DIN f SGI 8-p DIN f SGI 9-p D-Sub f SUN 25-p D-Sub f	IBM 25-p D-Sub m IBM 9-p D-Sub m SGI 8-p mini-DIN f SGI 8-p DIN f SGI 9-p D-Sub f SUN 25-p D-Sub f
Connector	9-pin D-Sub fem	9-pin D-Sub fem	9-pin D-Sub fem
Drift-free with temperature change	Yes	Yes	Yes
Resistant to aging effects (constant values measured)	Yes	Yes	Yes
Standard data rate	40 ms	40 ms (opt. 18 ms)	40 ms (opt. 18 ms)
Dust and water splash protection	Possible	Possible	Possible
FCC, TUV/GS, UL/UR, CE-Approved	Yes	Yes	Yes
Length of manufacturer's warranty	3 years	3 years	3 years
Standard driver source freely available	Yes	Yes	Yes
Compact size L x W x H (mm)	165 x 112 x 40	188 x 120 x 44	188 x 120 x 44

Warranty Information

LogiCad3D's Limited Lifetime Hardware Warranty

LogiCad3D warrants that Magellan/SPACE MOUSE is free from significant defects in materials and workmanship under normal use for as long as the device is owned. During the first three years of ownership, LogiCad3D will at its sole option, replace or repair at no charge the product, which in its opinion is defective.

During the remaining years of the warranty, LogiCad3D will, at its sole option, replace or repair the defective product. LogiCad3D will charge a fixed fee to cover handling and service costs based on LogiCad3D's then current price schedules. LogiCad3D at its sole option, may replace or repair the defective product with a then current product having similar features and functionality as determined by LogiCad3D.

Damages or defects to the product caused by improper installation, modification, misuse or abuse are not, of course, covered by this warranty. Additionally, the warranty service offered above is nontransferable, which means that the particular warranty service described above is available only to the original purchaser of the product(s). If LogiCad3D determines that the product is not defective or was not under warranty, it will return the product(s) to you, freight collect.

To obtain warranty service, you must either (a) have a completed warranty registration card on file at LogiCad3D, or (b) submit acceptable proof of purchase (for instance, a copy of your sales receipt indicating date and place of purchase) to LogiCad3D's Customer Service Department. You will need to pack the product to be returned properly for shipment and pay any applicable shipping charges. LogiCad3D will send you the repaired or replaced product at its own expense.

LOGICAD3D DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH REGARD TO THE PRODUCT. IN NO EVENT SHALL LOGICAD3D OR ITS SUPPLIERS BE HELD LIABLE FOR ANY DIRECT, INDIRECT,

CONSEQUENTIAL OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE THE PRODUCT, EVEN IF LOGICAD3D HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Declaration of Conformance

Trade Name: Silicon Graphics, Inc.

Product: Computer Graphics Workstation

Model Number: CMNBO15B

Date of Conformance: 1/97

Responsible Party: Silicon Graphics, Inc.

Address: 2011 North Shoreline Boulevard
Mountain View, CA 94043-1389
U.S.A.

Tel: 650 933-1071

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: 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. 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 in accordance with the instructions, may cause harmful interference to radio communications. However, there is 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 into 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: The user is cautioned that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

European Economic Community Declaration of Conformance (CE)

The Magellan/SPACE MOUSE is attested to meet the essential protection requirements against electromagnetic emission, which are established in the regulations of the council for assimilating the rules and regulations of the member states about electromagnetic compatibility 89/336/EEC and changed by regulation 92/31 EEC. This declaration is valid for all samples produced according to the enclosed production drawings, which are part of this declaration. The following standards were used for judging the product concerning electromagnetic capability:

- For trouble emission: EN55022
edition: 05/95
- For trouble security: EN50082-1
edition: 03/93

VCCI Class B Declaration

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Korea Class B Declaration

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LogiCad3D warrants that (a) the Software will perform substantially in accordance with the accompanying written materials for a period of (90) days from the date of receipt and (b) any hardware accompanying the Software will be free from defects in materials and workmanship under normal use and service for a period of three years from the date of receipt. Any implied warranties on the Software and hardware are limited to 90 days and three (3) years, respectively. Some states do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you.

End User Remedies

LogiCad3D's entire liability and your exclusive remedy shall be for any breach of warranty, at LogiCad3D's option, either (a) return of the

price paid or (b) repair or replacement of the Software or hardware that does not meet LogiCad3D's Limited Warranty; provided that the Software and hardware must be returned either to LogiCad3D or to the point of purchase with a copy of your receipt. This Limited Warranty is void if failure of the Software and or hardware has resulted from accident, abuse or misapplication. Any replacement Software or hardware will be warranted for the remainder of the original warranty period or 30 days, whichever is longer.

No Other Warranties

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General

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