Magellan/SpaceMouse

Classic
Plus
Plus XT

User's Manual v.2.1

Windows 95/98/NT/2000
Driver Version 4.x

LogiCad3D
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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.

Contents

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 systems running Windows 95, 98, NT (3.51 or higher) or 2000, 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; and

- the product documentation.

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 (usually COM1 or COM2) of your PC/workstation. The Magellan/SPACE MOUSE cable plugs directly into the port at the back of the PC/workstation. Be sure to turn off the machine before connecting the Magellan/SPACE MOUSE. Once the connections have been made, you can restore power to the PC/workstation.

Supported Operating Systems

The Magellan/SPACE MOUSE driver is supported on the following operating systems:

- Win95/98/ NT/2000   *PC with Windows 95, 98, NT 3.51 (or higher) or 2000*

- DECNT   *Digital Equipment Corporation with Windows NT 3.51 or higher*

- MIPSNT   *MIPS with Windows NT 3.51 or higher*

The following pages of this manual list the applications that support Magellan/SPACE MOUSE. Locate your application in the list and note the important installation instructions. Then proceed to Driver Installation Procedure.

NOTE: 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. If the list indicates a file to copy, there is no installation tool program for your application. Instead you must manually copy the specified file to your system.

Application List & Driver Installation Instructions

Application	Operating System	Installation
3D Studio MAX (v.1.2, 2.0, 3.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
3D Studio VIZ (v.1.0, 2.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
3D View (v.3.5)	Win95/98/NT/2000	Run *setup.bat*
3D Webmaster	Win95/98/NT/2000	Driver included with application
3Space Assistant (v.2.5 or higher)	Win95/98/NT/2000	Driver included with application
Amapi 3D (v.4.0 or higher)	Win95/98/NT/2000	Driver included with application
Ansys (v.5.6)	Win95/98/NT/2000	Run *setup.bat*
ARCON (all current versions)	Win95/98/NT/2000	Copy *\win95nt\apps\arcon\ mglxzb.exe*
AutoCAD (v.13 or 14)	Win95/98/NT/2000	Run *setup.bat* and install *Accelview* from v.2.03 on
AutoCAD2000	Win95/98/NT/2000	Run *setup.bat*
Autodesk Inventor (v.1.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
blaxxun Products (all current versions)	Win95/98/NT/2000	Copy *\win95nt\apps\blaxxun\ mglblxxn.exe*
CADDS5 (v.5.2, 6 or higher)	Win95/98/NT/2000	Run *\win95nt\X11mgl\setup.exe*
CADENAS (all current versions)	Win95/98/NT/2000 DECNT MIPSNT	Driver included with application Driver included with application Driver included with application
CADKEY 97/98/99	Win95/98/NT/2000	Run *setup.bat*
CADRAworks (all current versions)	Win95/98/NT/2000	Driver included with application
CAMWorks from TEKSOFT	Win95/98/NT/2000	Driver included with application
CATIA (v.5.2 or higher)	Win95/98/NT/2000	Run *setup.bat*
CDK (all current versions)	Win95/98/NT/2000	Driver included with application
Cimatron (v.8.0 or higher)	Win95/98/NT/2000	Driver included with application
Cimatron IT (v.10.5 or higher)	Win95/98/NT/2000	Run *setup.bat*
Daimler Benz 3D View (all current versions)	Win95/98/NT/2000	Driver included with application
Division (all current versions)	Win95/98/NT/2000	Driver included with application
Do3D (all current versions)	Win95/98/NT/2000	Run *setup.bat*
FIDES (v.3.92 or higher)	Win95/98/NT/2000	Run *setup.bat*
Helix98/99 Modeling	Win95/98/NT/2000	Driver included with application
Helix2000 Modeling	Win95/98/NT/2000	Run *setup.bat*
HiCAD (all current versions)	Win95/98/NT/2000	Driver included with application
HP Shared 3D Viewer (all current versions)	Win95/98/NT/2000	Driver included with application
HyperMesh (v.3.1)	Win95/98/NT/2000	Run *setup.bat*
I-DEAS Artisan Series (v.3.0)	Win95/98/NT/2000	Driver included with application
I-DEAS Artisan Series (v.4.0)	Win95/98/NT/2000	Run *setup.bat*
I-DEAS Master Series (v.4, 5, 6, 7 or higher)	Win95/98/NT/2000	Run *setup.bat*
Java3D	Win95/98/NT/2000	Follow the instructions found at www.logicad3d.com/software/drivers/SUN-Java3D.html
LabVIEW (v.4.0 or higher)	Win95/98/NT/2000	Direct support by application (Do not install driver)

Application	Operating System	Installation
LOGOCAD TRIGA (v.3.01 or higher)	Win95/98/NT/2000	Run *setup.bat*
Master Cam (v.7.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
Maxon 3D Painter (latest version)	Win95/98/NT/2000	Driver included with application
Mechanical Desktop (v.1.2, 2.0 or 3.0)	Win95/98/NT/2000	Run *setup.bat* and install *Accelview* from v.2.03 on
Mechanical Desktop (v.4.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
MegaCAD	Win95/98/NT/2000	Run *setup.bat*
MegaStudio (all current versions)	Win95/98/NT/2000	Run *setup.bat*
Merlin VR (v.1.0)	Win98	Run *setup.bat*
Microstation (all current versions)	Win95/98/NT/2000	Run *setup.bat*
POMOS (POint-based MOdelling System)	Win95/98/NT/2000	Run *setup.bat*
Pro/ENGINEER (v.16 or higher)	Win95/98/NT/2000 DECNT MIPSNT	Run *setup.bat* Run *\decnt\wininst.exe* Copy *\win95nt\mips\mgldrv.exe*
PT/PRODUCTS (all current versions)	Win95/98/NT DECNT MIPSNT	Run *setup.bat* Run *\decnt\wininst.exe* Copy *\win95nt\mips\mgldrv.exe*
PYTHA RadioLab (v.16)	Win95/98/NT/2000	Run *setup.bat*
SaleCad	Win95/98/NT/2000	Run *setup.bat*
Softimage 3D (v.3.7 or higher)	Win95/98/NT/2000	Driver included with application
Solid Designer (v.6.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
Solid Edge (v.5.0 or 6.0)	Win95/98/NT/2000	Direct support by application (Do not install driver)
Solid Edge (v.7.0 or higher)	Win95/98/NT/2000	Run *setup.bat*
SolidWorks 97/98/Plus	Win95/98/NT/2000 DECNT	Run *setup.bat* Run *\decnt\wininst.exe*
SolidWorks 99/2000	Win95/98/NT/2000	Run *setup.bat*
SuperScape VRT/Viscape	Win95/98/NT/2000	Driver included with application
SURFCAM (v.7.1)	Win95/98/NT/2000	Run *setup.bat*
SURFCAM99	Win95/98/NT/2000	Run *setup.bat*
TEBIS (v.3.1 release 8)	Win95/98/NT/2000	Driver included with application
TEBIS (v.3.1 release 9)	Win95/98/NT/2000	Copy *\win95nt\tebis\mgldrvt.exe*
TGS OpenInventor (v.2.5 or higher)	Win95/98/NT/2000	Driver included with application
Think3	Win95/98/NT/2000	Driver included with application
Thinkdesign	Win95/98/NT/2000	Driver included with application
Thinkshape	Win95/98/NT/2000	Driver included with application
Top Solid	Win95/98/NT/2000	Run *setup.bat*
Unigraphics (v.14 or higher)	Win95/98/NT/2000 DECNT	Run *setup.bat* Run *\decnt\wininst.exe*
Viscape (v.2.0 or higher)	Win95/98/NT/2000	Driver included with application
VRT (v.5.0 or higher)	Win95/98/NT/2000	Driver included with application
Vuppet Master (all current versions)	Win95/98/NT/2000	Driver included with application
World Tool Kit (all current versions)	Win95/98/NT/2000	Driver included with application
World Up (all current versions)	Win95/98/NT/2000	Driver included with application

Driver Installation Procedure

If an appropriate driver has not been included with your application, follow the instructions below. For help see Troubleshooting.

1   Insert the CD-ROM into your CD-ROM drive.

2   The installation program *setup.bat* automatically begins (if auto-start is activated on your CD-ROM drive). Continue with this installation program only if *Run setup.bat* is listed for your application. (If *Run setup.bat* is not listed for your application, you should cancel the installation and follow the instructions given for your application. See Application List & Driver Installation Instructions.)

3   Select *Magellan/SPACE MOUSE* installation.

4   Follow the instructions onscreen. Make sure the destination folder is the one to which you want the driver to be copied.

5   Select the applications with which you wish to use the Magellan/SPACE MOUSE.

6   If you select *Start the driver now*, the Magellan/SPACE MOUSE should respond with two beeps indicating that it is receiving power and working properly. The driver icon appears at the lower-right corner of the Windows Taskbar.

7   Select *Start the 3D Cube Demo* to practice using the Magellan/SPACE MOUSE.

Startup Tips

In order to use the Magellan/SPACE MOUSE, you must start the driver (BEFORE starting your CAD application) each time you log on to the system. Alternatively, you can put the driver in the *Startup* folder, so that it starts automatically every time you log on. The Magellan/SPACE MOUSE driver icon will appear in the Taskbar if the driver has been initialized successfully.

Using Additional Applications

To install additional drivers for other applications, follow the instructions in the *Readme* files, which are located on the CD-ROM in subdirectories under the names of the appropriate applications.

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.

Standard Keyboard

Standard keyboard functions 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. However, many common applications install the set of default functions listed below. Note that not all buttons have default functions assigned. Note also that the functions of the standard keyboard may be customized by the user via the Magellan/SPACE MOUSE driver. See Keyboard Mapping.

1 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.

2 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.

3 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.

5 Gain Down
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.

6 Gain Up
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.

7 Gain Default
Returns the Magellan/SPACE MOUSE back to the standard sensitivity.

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. The second-level keyboard functions are predefined (i.e. are NOT application-dependent).

* 1 Translation ON/OFF
See description at left.

* 2 Rotation ON/OFF
See description at left.

* 3 Dominant Mode ON/OFF
See description at left.

* 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 translational 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 rotational 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 at right. 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.
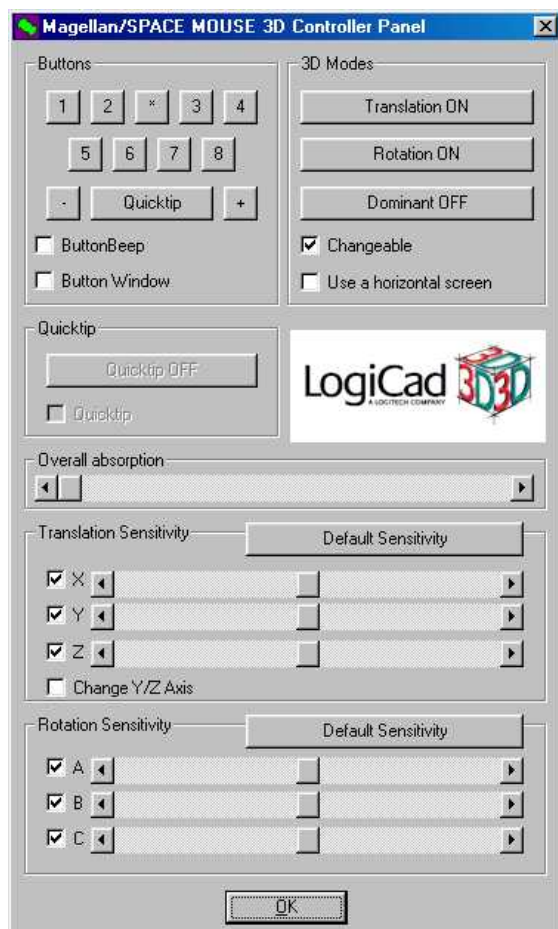
Magellan/SPACE MOUSE Driver

The Magellan/SPACE MOUSE driver can be used both to directly configure the hardware settings and to program the standard keyboard.

3D Controller Panel

Double-click on the Magellan/SPACE MOUSE driver icon in the Windows Taskbar to open the main window of the driver. From here click *Panel* to open the 3D Controller Panel window. Alternatively, simply right-click on the Magellan/SPACE MOUSE driver icon and select *Panel*.

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 Magellan/SPACE MOUSE Classic, the plus [+] and minus [-] buttons are present on the software keyboard but have no effect.)

Use the *ButtonBeep* tickbox to toggle on and off the "beep" sound made by the Magellan/SPACE MOUSE when hardware buttons are pressed. The *Button Window* tickbox opens a small window that displays the key sequence mapped to hardware buttons whenever they are pressed. For programming the buttons see Keyboard Mapping.

3D Modes
The *Translation* button turns the translational degrees of freedom (inputs X, Y and Z) on and off. Turning translation off fixes the "screen position" of the onscreen object. The default is ON. The *Rotation* button turns the rotational degrees of freedom (inputs A, B and C) on and off. Turning rotation off fixes the orientation of the onscreen object. The default is ON. The *Dominant* button turns the dominant mode on and 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. In some cases you may wish to use the *Use a horizontal screen* tickbox to swap the Y- and Z-inputs and the B- and C-inputs, e.g. when using the LCD display of a laptop computer horizontally.

Quicktip
Use the Quicktip software button to toggle the Quicktip function on and off. Untick the *Quicktip* tickbox to completely disable the function. Note that for the Magellan/SPACE MOUSE Classic and Plus models, the translation and rotation must be turned ON and dominant mode turned OFF for the Quicktip function to work.

Overall Absorption
Use this slider bar to adjust the minimum displacement of the cap necessary to cause movement of the onscreen object. Increasing the overall absorption may be helpful in work environments with vibrations (e.g. industrial environments), which may cause the Magellan/SPACE MOUSE to register unintentional movements.

Translation Sensitivity

Use the slider bars to individually adjust the sensitivities of each translational degree of freedom. As an example, it may be useful to have faster zoom response (Z-sensitivity) than pan response (X- and Y-sensitivity). As the sensitivity is increased, the same movements of the Magellan/SPACE MOUSE cap will generate quicker translations of the onscreen object. Use the tickboxes next to the adjustment bars to toggle on and off the individual degrees of freedom. Click *Default Sensitivity* to reset all three slider bars to their default settings. For some CAD applications it may be necessary to tick the *Change Y/Z Axis* tickbox, which swaps the Y- and Z-inputs.
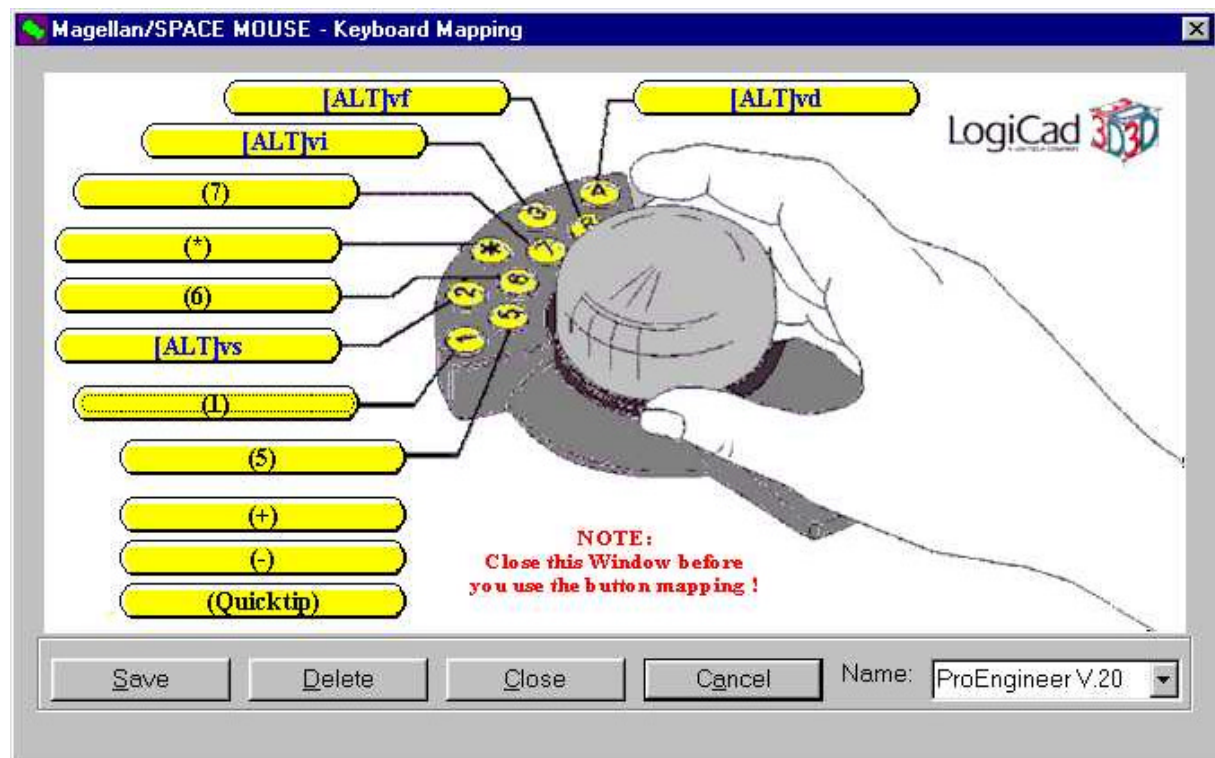
Rotation Sensitivity

Use the slider bars to individually adjust the sensitivities of each rotational degree of freedom. As the sensitivity is increased, the same movements of the Magellan/SPACE MOUSE cap will generate quicker rotations of the onscreen object. Use the tickboxes next to the adjustment bars to toggle on and off the individual degrees of freedom. Click *Default Sensitivity* to reset all three slider bars to their default settings.

Keyboard Mapping

From the main window of the driver, click *Keyboard* to open the Keyboard Mapping window. This window is used to assign or "map" arbitrary key sequences to the buttons of the Magellan/SPACE MOUSE. Click one of the twelve tabs to open a dialog box for mapping a key or sequence of keys to the corresponding button. (For Magellan/ SPACE MOUSE Classic, the plus [+] and minus [-] buttons are present in the Keyboard Mapping window but have no effect.) Any key sequence may be entered, including special keys such as Alt, Shift, Control and F1. Once a new key sequence has been entered in the dialog box, click *OK* to save the new settings. The new mapping becomes active once the changes are saved and the window is closed. Enter a name (e.g. a user name, an application name, etc.) in the *Name* pull-down menu, then click *Save* and *Close*. Click *Delete* to return to the *Empty* configuration. Note that the driver installs default keyboard mappings for the following applications:

- I-DEAS Master Series (v.5)
- Mechanical Desktop (v.2.0 and 3.0)
- Pro/ENGINEER (v.18 and 20)

Troubleshooting

Problem/Error	Possible Explanations	Recommended Actions
All COM ports are being used.	➢ The installation program cannot find an unused serial port.	✓ Check the system configuration to see if there is a conflict in the IRQ or base address between the serial ports and another device (e.g. a modem) using the control panel. Or use the Task Manager to see if there is a driver from another application and/or device running.
Cannot find a Magellan/ SPACE MOUSE 3D Controller.	➢ Magellan/SPACE MOUSE driver is not able to detect the hardware.	✓ Make sure that the Magellan/SPACE MOUSE is properly connected. If you use a 9-pin-to-25-pin adapter, make sure the connections are tight.
Magellan/ SPACE MOUSE driver is already active.	➢ The Magellan/SPACE MOUSE driver is already running in another task, probably because has been started automatically during the booting process.	✓ Remove the driver from the Startup folder or make sure you do not start it a second time.
The driver is up and running, but the object does not move.	➢ The application already contains a suitable driver and therefore does not need the Magellan/SPACE MOUSE driver running.	✓ Do not run the Magellan/ SPACE MOUSE driver.
	➢ The device is not configured correctly with the application.	✓ Check the configuration against the application vendor's documentation.
	➢ Both the translation and rotation are turned off.	✓ Activate the translation and/or rotation.
	➢ The sensitivity of the Magellan/ SPACE MOUSE has been turned down too low for visible motion to occur.	✓ Check to see that the sensitivity of the device is adjusted correctly.
	➢ The application is not in 3D mode.	✓ See the application vendor's documentation to make sure it is in 3D mode.
Cannot find (start) mgldrv.exe (or one of its components) during booting.	➢ The system is not able to detect the Magellan/SPACE MOUSE driver because the driver file *mgldrv.exe* has been deleted or moved to another file.	✓ Use the uninstall option of the installation tool to uninstall the driver, then run the installation again.
	➢ The registry-key was not removed properly due to incorrect uninstalling.	✓ Remove the contents of the following key using *regedit.exe*: /HEKY_CURRENT_USER/Software /Microsoft/WindowsNT/CurrentVe rsion/Windows/load

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.

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

If not, you must use an appropriate adapter cable to connect the Magellan/SPACE MOUSE wiring to that of your computer. 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.

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

Feature/Specification	Magellan/ SPACE MOUSE Classic	Magellan/ SPACE MOUSE Plus	Magellan/ SPACE MOUSE Plus XT
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
Dominant Mode	Yes	Yes	Yes
Supported systems	*UNIX:* DEC, HP, IBM, SGI, SUN *PC:* Win95/98, WinNT/2000, DECNT, MIPSNT	*UNIX:* DEC, HP, IBM, SGI, SUN *PC:* Win95/98, WinNT/2000, DECNT, MIPSNT	*UNIX:* DEC, HP, IBM, SGI, SUN *PC:* 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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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

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