

3D Motion Controller User's Manual

3DxWare

Windows 98, Me, NT, 2000, XP



control



create


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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 3DxWare driver CD-ROM or at www.adobe.com/acrobat.

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Introduction to 3D Motion Controllers

This document is describing 3Dconnexion's 3D input devices, the 3D motion controllers, designed for moving objects or viewpoint in the virtual space.

True 3D Input for Intuitive Control

A 3D Motion Controller is a true three-dimensional input device that translates the slightest fingertip pressure into X, Y, and Z translations and rotations, moving 3D images instantaneously and simultaneously. This provides intuitive, interactive six degrees-of-freedom control of graphical models.

Flexible Software Interface

3DxWare, the 3D Motion Controller's driver software is a configuration utility for the device. Applications are supported by three methods:

- a plug-in for the application, requiring the installation of the complete driver software.
- a native integration within the application itself, requiring only that the standard driver be installed.
- no driver software when an application reads the serial port directly. The users of this kind of an application are not able to use the driver software since the serial port is "owned" already by the application.

Two World-Class Technologies

3Dconnexion have two product lines, based on different technologies:

- **SpaceBall**
- **SpaceMouse**

The different models within each product line represent our offering of 3D Motion Controllers.

How the 3D Motion Controllers Control Six Degrees of Freedom

Moving the onscreen object is as easy as moving the 3D Motion Controllers handle. Shift the handle right or left to move the onscreen

object horizontally through space. Pull the handle up or press it down to move the object vertically through space. Pull the handle toward the user or press it away to zoom in and out. Rotate the handle about the desired axis to rotate the onscreen object.



Note that the values input by the 3D Motion Controllers are not interpreted as absolute position commands but as velocity commands. When the handle 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 handle's displacement determines the magnitude of the onscreen object's velocity.

Two Hands for Intuitive Control

3D Motion Controllers allow 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.

Installation

To install the 3D Motion Controller device and 3DxWare driver software on systems running Windows 98, ME, NT 4.0, 2000 or XP, see the information below. For help with installation problems see [Troubleshooting](#).

Hardware Installation

3D Motion Controller's are equipped with either a 9-pin female serial connector or a USB connector. Installation of each connection type is described below.

Serial Connection

Turn off the machine before connecting the 3D Motion Controller. Plug the cable directly into the appropriate port (usually COM1 or COM2) at the back of the machine. Once the connection has been made, you can restore power to the machine.



USB Connection

Plug the cable directly into the appropriate port at the back of the machine. Do not insert the 3DxWare CD-ROM. The Windows Hardware Assistant will automatically recognize the new device and begin the hardware installation program that is included in Windows. Follow the instructions onscreen. For most users it is recommendable to let the Hardware Assistant find the best driver for the device.

Software Installation

CD Auto-Install

Insert the 3DxWare CD into the CD-ROM drive, the installation will automatically start.

Install

Run Setup.exe from your CD-ROM drive.

From Website

Visit <http://www.3dconnexion.com/software> to download the driver.

Installed Folder

The installation creates a folder under the directory specified at the time of installation. The default directory is **Program Files\3Dconnexion\3DxWare**.

Supported Operating Systems

The 3DxWare driver is supported on the following operating systems:

- PC with Windows 98, ME, NT 4.0, 2000 & XP

Application List & Driver Installation Instructions

Locate your application in the Application List and note the important installation instructions. Then proceed to Driver Installation Procedure. A complete list of all supported applications and installation instructions for 3Dconnexion's 3D Motion Controller's can be found on our website.

Visit [www.3dconnexion.com /software/drivers](http://www.3dconnexion.com/software/drivers) for the most current information.

NOTE: If the list indicates that an appropriate driver is included with your application, you should consult the application manual for the appropriate 3D Motion Controller 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.

Installation

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.exe* automatically begins (if auto-start is activated on your CD-ROM drive). Continue with this installation program only if *Run Setup.exe* is listed for your application. (If *Run Setup.exe* 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 the add-ins and choose the driver you wish to use with the 3D Motion Controller.
- 4 Follow the instructions onscreen. Make sure the destination folder is the one to which you want the driver to be copied.
- 5 After installation is complete the 3DxWare driver starts automatically and the 3D Motion Controller 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.

Startup Tips

In order to use a 3D Motion Controller, 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 3DxWare driver icon will appear in the Taskbar if the driver has been initialized successfully.

Quicktip (SpaceMouse and CadMan Only)

A Quicktip is executed by pressing downward on the handle of SpaceMouse with a quick tipping motion of your finger. The Quicktip function is a "virtual" button that may be



programmed just like the normal hardware buttons. The default function assigned to Quicktip toggles the driver window. Note that for the SpaceMouse Classic and some of the Plus, the translation and rotation must be turned ON and the dominant mode turned OFF for the Quicktip function to work.

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.

3DxWare Driver

The 3DxWare driver establishes communication between the device and application, searches and recognizes attached devices and changes configuration files dependent on which application is in focus.

The Driver User Interface gives access to the functions mapped to the buttons, provides the capacity to remap button functions and makes it possible to adjust the sensitivity of the 3D Motion Controller and select various filters.

Starting the Driver

The driver can be started in three ways:

- Automatic Start-up
- Windows Start Menu
- Console Command Line

Automatic Start-up

The driver will start automatically when a user logs in if you selected that option during installation.

Windows Start Menu

If you did not choose the automatic start-up option, you can start the driver by choosing Start > Programs > 3Dconnexion > 3DxWare > Start 3DxWare.

Console Command Line

The driver can also be invoked by a console command line from the directory the driver had been installed on (default is: C:/Programs Files/3Dconnexion/3DxWare), by typing the following:

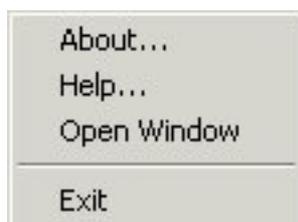
3DxSrv	Starts the driver
3DxSrv -quiet	Starts the driver without warnings or error messages
3DxSrv -shutdown	Closes all running drivers

System Tray Menu

To open the 3DxWare System Tray,



right click on the icon in the system tray.



About... displays version number, web-site address

Help... brings up online documentation

Open Window opens or closes the user interface

Exit shuts down the driver

Device Configuration Files

The configuration file contains information about the button mappings and sensitivity of the 3D Motion Controller. This file can be modified by each user to create custom sensitivities and button maps that satisfy your personal preferences.

Application and Model Specific

Every supported application has a separate configuration file. The driver automatically switches to the configuration file for the application running or in focus. The "any application" configuration file will run for applications that do not have a specific configuration file. Additionally each configuration file has unique button mappings for each device model. The driver automatically loads the configuration file for the attached model of 3D Motion Controller.

Customize Your User Profile

You can create your own user profile for the device. If you made changes on the user interface and saved them to a custom configuration file by clicking on the Save button, the custom configuration file will be then available to you at later sessions. The custom configuration will be a new option of the 3DxWare for drop-down list on the user interface.

Saved Configuration Files

The device configuration is saved in a configuration file that is part of the driver software. This file is a Windows platform specific file an ASCII text file (.scg). The configuration file is read by the driver software before opening the user interface, initializing it accordingly.

Driver User Interface

By accessing the User Interface you can manipulate the function buttons, adjust sensitivity and create a custom interface ideal for you use.

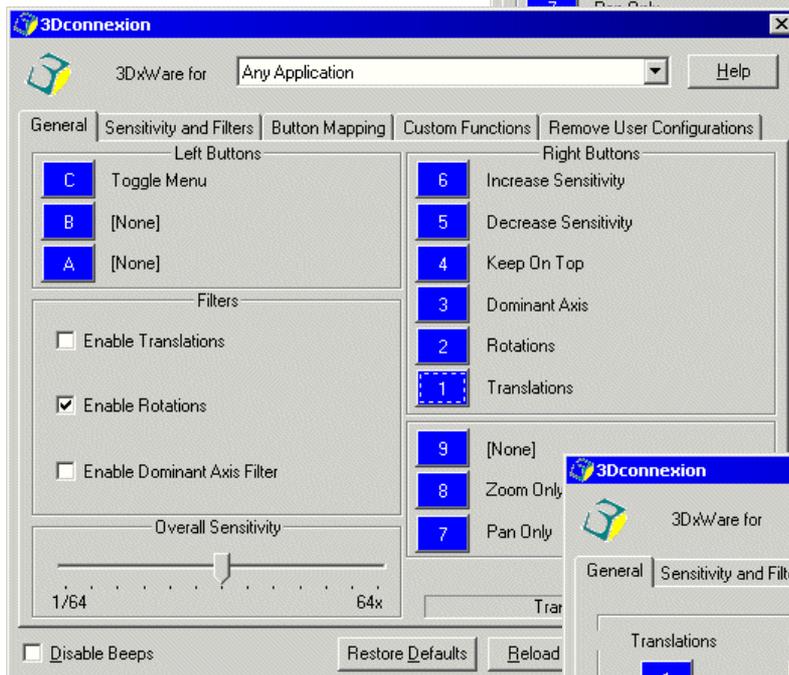
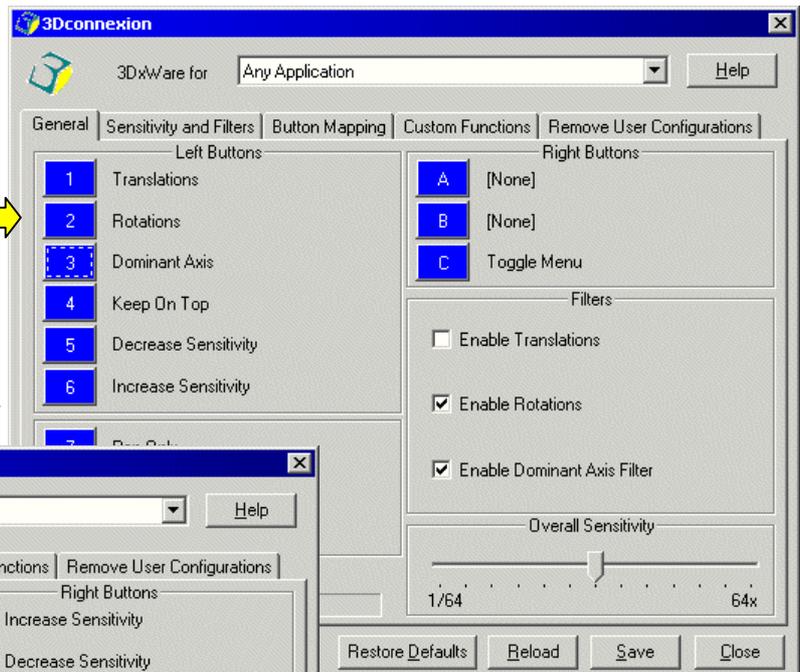
Model Specific Interface Views

The driver's user interface has a self-adjusting layout, so the user interface will always visually reflect the physical appearance of the specific 3D Motion Controller being used.

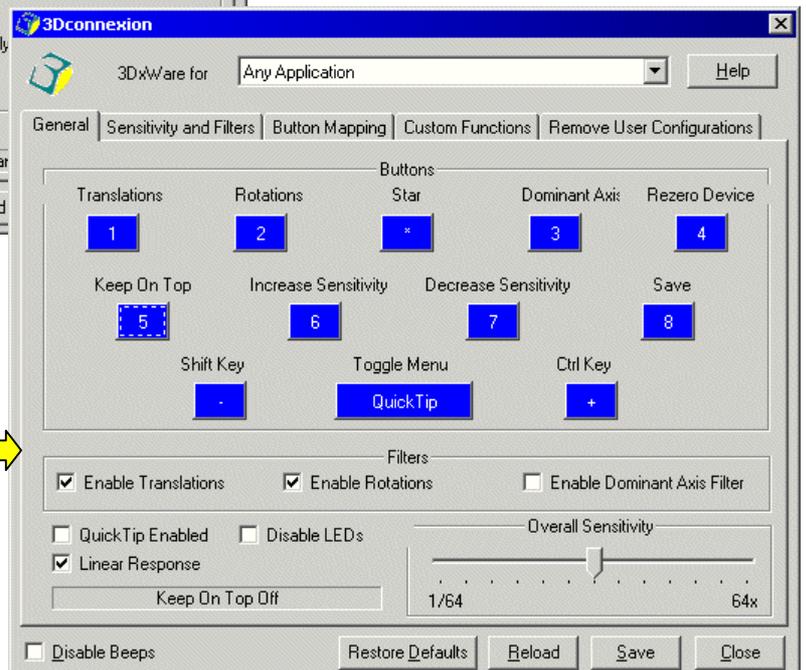
For example the SpaceBall 4000 FLX has a left and right hand configuration.

This view shows the interface window of the left hand oriented SpaceBall.

This view shows the interface window of the right hand oriented SpaceBall.



The SpaceMouse interface shows the appropriate buttons. This window shows the SpaceMouse Plus or Plus XT model.



Driver User Interface

The General Driver Tab shows the mapping of all the 3D motion controller buttons, provides control over the sensitivity of the device, and lets you choose certain standard data filters. All the filters are applied to the data immediately upon selecting them or adjusting the sensitivity slider.

General Tab

Global Controls, the top and bottom of this window has controls common to all tab windows.

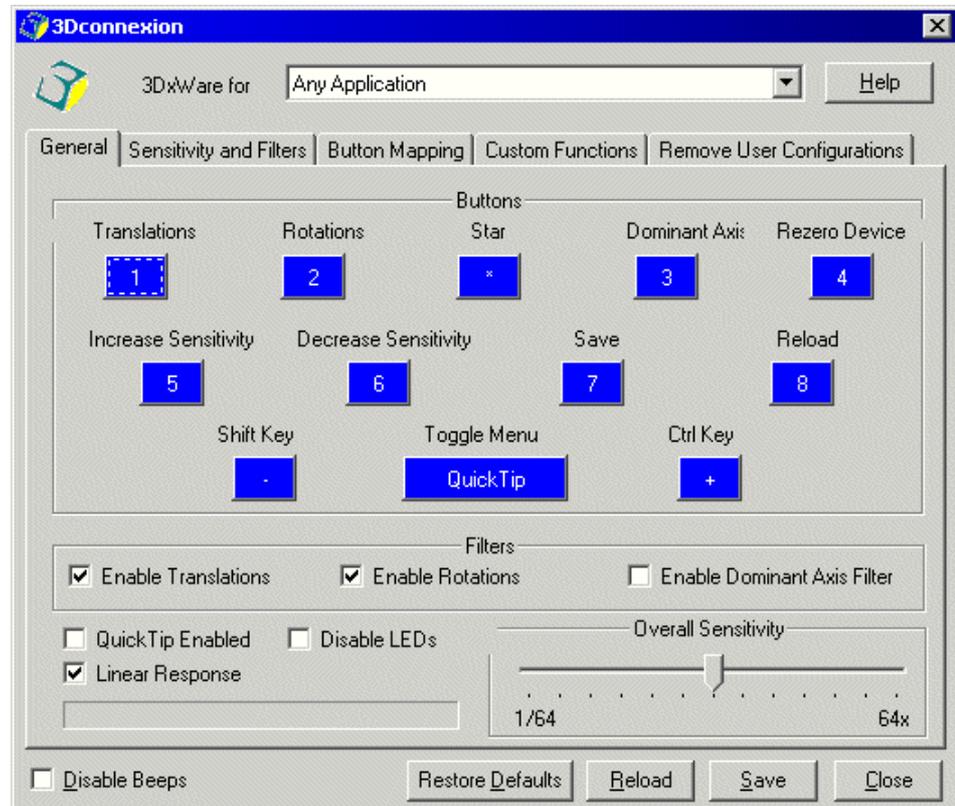
The Buttons, perform the same function as the buttons on the device. The text labels next to the buttons reflect the current function mapped to the button.

Enable Translations, toggles the translation filters applied to the 3D motion controller motion data On/Off. When enabled all three translations (Tx, Ty and Tz) are passed on to the application. If this toggle is disabled, none of the translations are passed on to the application.

Enable Rotations, toggles the rotation filters applied to the 3D controller's motion data On/Off. When enabled all three rotations (Rx, Ry and Rz) are passed on to the application. If this toggle is disabled, none of the rotations are passed on to the application.

Enable Dominant Axis, if enabled, the driver restricts rotations and translations along or around a single axis. Only the largest piece of data coming from the device is passed along to the application. This checkbox is disabled by default.

Overall Sensitivity, controls a scalar value that is applied to all 3D controller's motion data before it is sent to an application, effectively changing the amount of force or torque that needs to be applied to the handle



to move a model or scene in an application. The slider starts in the middle and has six positions to the left and right of its starting position. Each position to the right doubles the sensitivity. Each position to the left halves the sensitivity. This gives the user a multiplier of 1/64 to 64 of the original starting data.

QuickTip Enabled, controls whether the QuickTip functionality of the cap is on or off. NOTE: SpaceMouse Plus/XT, Classic, CadMan, PuckMan models only.

Linear Response, controls whether the amount of force applied to the cap is applied linearly or with a non-linear curve to the motion over the mobility range of the cap. NOTE: SpaceMouse, CadMan, PuckMan models only.

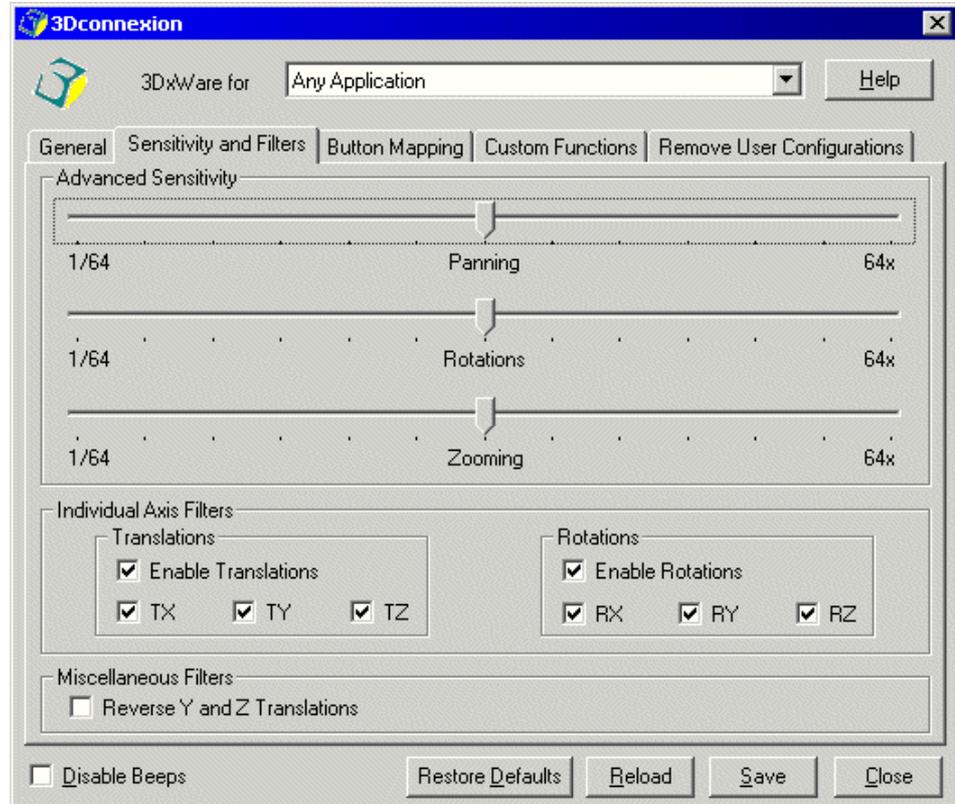
Status Bar, displays the function name of the pressed button.

Driver User Interface

This window gives the user access to more advanced filters for fine control of the 3D motion controller.

Sensitivity Tab

Global Controls, the top and bottom of this window has controls common to all tab windows.



Advanced Sensitivity Sliders, change sensitivity in addition to the Sensitivity on the General Driver Tab. The sliders start in the middle and have six positions to the left and right of its starting position. Each position to the right increases the sensitivity. Each position to the left decreases the sensitivity. This gives the user a multiplier of 1/64 to 64 of the original starting data.

Panning, controls the sensitivity for the translations along the X and Y axes which is the amount of force needed to move a 3D model.

Rotations, controls the sensitivity for all three rotations axes (Rx, Ry and Rz), which is the amount of torque need to rotate the 3D model.

Zooming, controls the translation sensitivity along the Z axis which is the amount of force required to move.

Individual Axis Filters, toggles control which of the axis of the 3D motion controller can send data to an application. It is not possible to have all individual axes turned off at the same time. If the user attempts to do this, the toggle will not work and an Error Dialog appears on screen.

Enable Translations, toggles the state of all translations along the X, Y and Z axis

Enable Rotations, toggles the state of all rotations around the X, Y and Z axis

Miscellaneous Filters

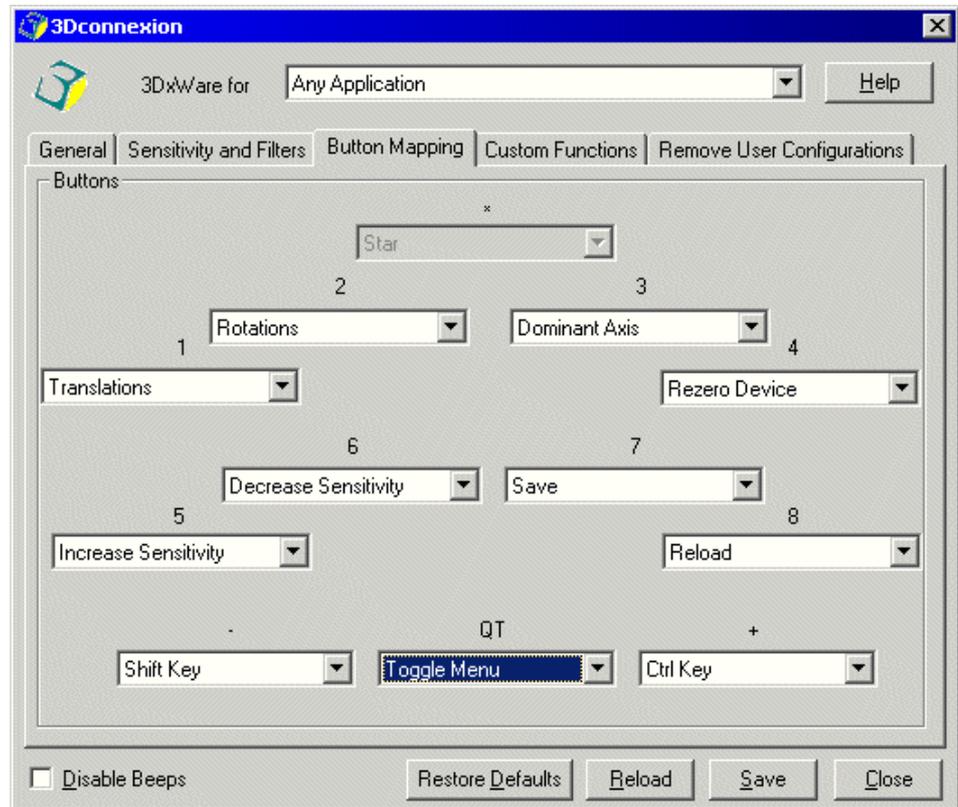
Reverse Y/Z Translations, swaps the translations of the Y and Z axes when enabled. This toggle is disabled by default.

Driver User Interface

Use this window to change the functions mapped to any of the 3D motion controller's buttons. A button can be mapped to any pre-defined function except the Star button of the SpaceMouse models. The Star button is reserved to access firmware filters.

Button Mapping Tool

Global Controls, the top and bottom of this window has controls common to all tab windows.



The drop-down lists, labeled as the buttons, contain the possible mappings for the selected location. Initially, each list shows the current mappings for the buttons. The user can select a new function or an alternative number for a button by choosing it from the drop-down list. The selection takes place immediately.

Driver User Interface

Use this window to configure custom functions. The functions consist of recorded keyboard macros that can be played back within an application.

Custom Functions Tab

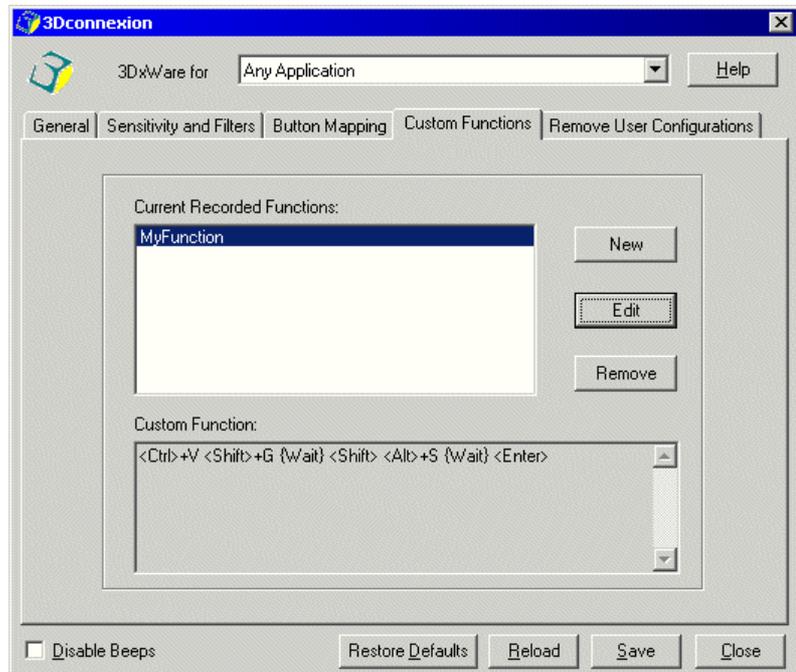
Global Controls, the top and bottom of this window has controls common to all tab windows.

Current Recorded Functions, lists the names of the functions created within the configuration. The names listed within this box can be placed on individual buttons using the Button Mapping Window.

Custom Function, lists the keyboard macro that will execute when the button is pressed. This text control is not editable.

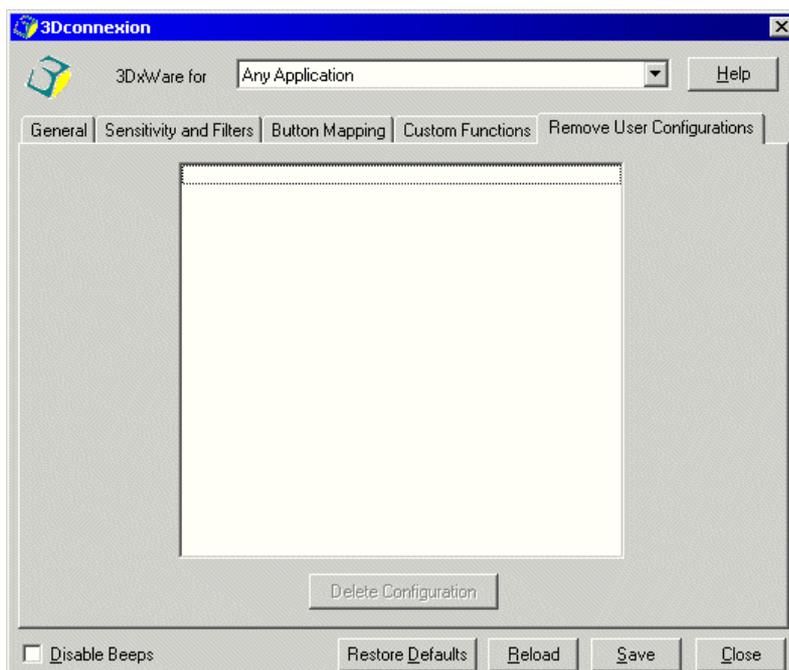
New, if pressed, the user can create new keyboard macros. See the Custom Function Editor for more details.

Edit, will open the Custom Function Editor Window exposing the custom function for modifications.



Remove, erases the highlighted custom function from the functions list.

Remove User Config Tab



Use this window to remove specific user configurations created with the driver.

Delete Configuration, removes a configuration from the list of possible configurations. The button will remain grayed out until a configuration is selected.

Troubleshooting

<i>Problem/Error</i>	<i>Possible Explanations</i>	<i>Recommended Actions</i>
<i>The 3D motion controller does not beep twice when plugged.</i>	➤ No beep may indicate an error in the installation.	✓ Check at http://www.3Dconnexion.com to confirm that you have the correct driver and plug-in
	➤ No beep may indicate a failing communication port	✓ Check power and cables.
	➤ No beep may indicate that another device has control of the serial port.	✓ The driver requires your serial port to be free of other devices and shared IRQs. Another device such as a modem, tablet or mouse can block/control the serial port and prevent the driver from linking with the 3D motion controller. The most common issue is a serial mouse. The 3D motion controller may be left disconnected while the machine reboots causing the serial mouse drivers to fail. Once the machine is running, the 3D motion controller can be re-attached and the driver can be started from the "Start" menu. This confirms a driver issue.
<i>Do the demos work along all axes?</i>	➤ Demos	✓ Click Start > Program Files > 3Dconnexion > 3DxWare > Start 3DxWare and open any of the demos, for example the Jet demo. The driver and the device operation is confirmed if the demos work properly. If the demos work but the application does not, it is often related to the system setup or the application installation. Verify the application and its version are supported by the driver.
	➤ Many applications that use a plug-in (add-in) also require the user to enable the device within the application after the add-in is installed	✓ There is a control to enable the device usually located within a Tools or Utility menu in the application. SolidWorks, Solid Edge, 3d Studio Max, 3d Studio Viz are examples of applications that require this process. The enable process for some of these applications is outlined in our manual. For more information, visit http://www.3Dconnexion.com
<i>Does your application use add-ins?</i>		

WARNING MESSAGE: All COM ports are being used.

WARNING MESSAGE: No 3D motion controller found

WARNING MESSAGE: 3D motion controller driver is already active. The driver is up and running, but the 3D model does not move.

Cannot find (or start) the driver or one of its components during booting.

- 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.
- 3D motion controller driver is not able to detect the hardware.
 - ✓ Make sure that the 3D motion controller is properly connected. If you use a 9-pin-to-25-pin adapter, make sure the connections are tight.
- The 3D motion controller driver is already running in another task, probably because it had 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 application already contains a suitable driver and therefore does not need the 3D motion controller driver running.
 - ✓ Use the application's driver, not that of the 3D motion controller's 3DxWare.
- The application has the rotation and translation filters turned on, however they were turned off later by the driver.
 - ✓ Turn on translation and rotation at driver level then also at the application level.
 - ✓ NOTE: In case you have a SpaceMouse model, also check the translation and rotation filters on firmware level. You can toggle them with *+1, *+2.
- 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 3D motion controller had 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.
- The system is not able to detect the 3D motion controller driver because the driver file 3dxsrv.exe has been deleted or moved to another directory.
 - ✓ 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 uninstall.
 - ✓ Please call [Technical Support](#).

3Dconnexion Support

If you have any questions or comments about your 3D Motion Controller, please contact the appropriate regional support center listed for your area.

When you call technical support, please be at your computer so that we can assist you. Please have the following information available when you call:

- Your name, company name, and telephone number
- Product name and version number
- Your computer configuration: CPU type, speed, memory, pointing device, video card (its memory and resolution)
- The platform and operating system you are running
- Your application name and version
- The version of 3d motion controller driver you are using

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Online Support
www.3Dconnexion.com/support/

Technical Support Hotline
+1 (888) 247 9545
(English Only)

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

Various information about 3Dconnexion's 3D Motion Controllers, including the latest driver versions, can be found at:
<http://3Dconnexion.com>

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3Dconnexion Services

Please visit our website www.3Dconnexion.com for any of the following services.

New Integration

To find out details about integrating 3D motion controllers into your application you can contact one of the offices listed on the website.

Software Development Kit (SDK)

Is a documented C-based library available online for add-in development. Please visit our website for the latest information on our SDK at: <http://www.3Dconnexion.com/software/sdk>

Implementation support

To get help in your implementation efforts you can find support information on the website.

Application Support

At www.3Dconnexion.com/software/drivers/ there is list of applications supported.

If a particular application is not on the list, please contact the software company producing that application to find out more about 3D motion controller support.

Appendices

Connecting to the Serial Port

The 3D Motion Controller 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 3D Motion Controller with other computers, check the pin functions against the list shown below and verify whether the 3D Motion Controller connector wiring matches your system.

<i>Pin</i>	<i>Meaning</i>	<i>Connection to Computer</i>
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 3D Motion Controller 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 3D Motion Controller. 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 3D Motion Controller, 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 3D Motion Controller, these signals should have a positive (active) level.

Appendices

Product Specifications

Feature/Specification	SpaceMouse Classic	SpaceMouse Plus & Plus XT	CadMan	SpaceBall 4000FLX
Number of freely programmable buttons	9	11	4	12
Software-controllable keyboard LEDs	No	Yes (2 yellow, 1 red) XT Only	No	No
Quicktip virtual button	Yes	Yes	Yes	No
Device weight (for stability)	0.660 kg	0.680 kg	0.680 kg	0.650 kg
Human Interface Form-Factor	Round Puck	Ergonomic Puck	Geometric Puck	Soft Touch Ball
Operating humidity (non-condensing)	10 to 98% RH			
Operating temperature	+5 to +60 °C	+5 to +60 °C	+5 to +60 °C	+10 to +40 °C
Storage humidity	10 to 98% RH			
Storage temperature	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	+6 to +60 °C
Supported systems	<i>UNIX:</i> DEC, HP, IBM, SGI, SUN <i>PC:</i> Win98, ME, WinNT, 2000, XP	<i>UNIX:</i> DEC, HP, IBM, SGI, SUN <i>PC:</i> Win98, ME, WinNT, 2000, XP	<i>UNIX:</i> DEC, HP, IBM, SGI, SUN <i>PC:</i> Win98, ME, WinNT, 2000, XP	<i>UNIX:</i> DEC, HP, IBM, SGI, SUN <i>PC:</i> Win98, ME, WinNT, 2000, XP
Power source	5V / 9mA	5V / 9mA	5V / 9mA	5V / 10mA
Connector	Serial or USB	Serial or USB	Serial or USB	Serial or USB
Baud Rate	9600 Baud	9600 Baud	9600 Baud	9600 Baud
Standard Data Rate	40 ms	40 ms	40 ms	50 ms
Compact Size L x W x H (mm)	165 x 112 x 40	188 x 129 x 44	175 x 122 x 43	213 x 152 x 76
Converter-adapters available for the following 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	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
FCC, TUV/GS, VCCI, CSA or UL, & CE - Approved	Yes	Yes	Yes	Yes
Length of manufacturer's warranty	3 years	3 years	3 years	3 years
Standard driver source freely available	Yes	Yes	Yes	Yes
<u>Unix Specific Features</u>				
Dialbox Simulation	Yes	Yes	Yes	Yes
LPFK Simulation	Yes	Yes	Yes	Yes
Dominant Mode	Yes	Yes	Yes	Yes

Product Specifications

Please visit our website to see additional information on our complete line of 3D Motion Controllers at:

<http://www.3Dconnexion.com/products>.

Warranty Information

3Dconnexion's Limited Lifetime Product Warranty

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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.

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

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