3Dconnexion SpaceNavigator Plug-in for ArcGIS 9.2
User Guide

Version: Beta 1 Release
Created: June 18, 2007
Last updated: August 17, 2007
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Introduction

The SpaceNavigator plug-in for ArcGIS 9.2 SP3 and later (9.x) allows the 3Dconnexion SpaceNavigator (Profession Editon (PE)/Standard Edition (SE)) device (see figure 1) to be used with ArcMap, ArcMap with Dynamic Map Display, ArcScene, and ArcGlobe. The device is a new generation 3D navigation device that is very affordable and is capable of controlling movement in 6 degrees of freedom (translation in x, y, z, and rotation in x, y, z).

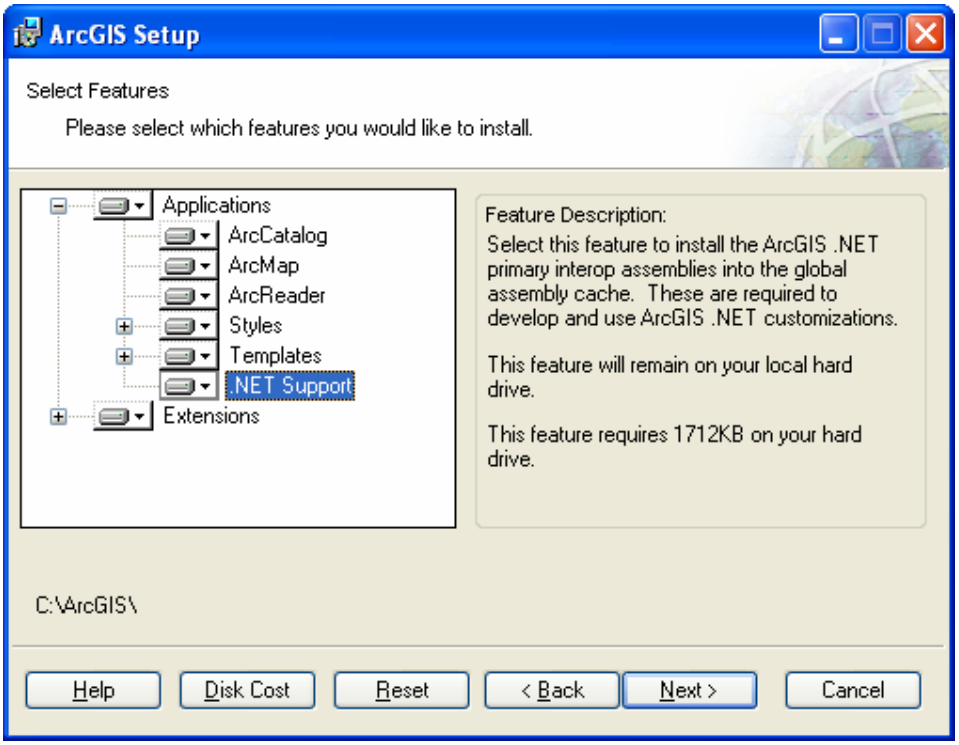
Figure 1: The 3Dconnexion SpaceNavigator device

System Requirements

- Windows XP SP2 32-bit or 64-bit operating system
- ArcGIS 9.2 with Service Pack 3
- ArcGIS 9.2 .NET Support
- SpaceNavigator device SE or PE series
- 3Dconnexion SpaceNavigator device driver version 3.3.6 or later

Installing the Necessary Driver and Plug-in

Verify that the ArcGIS 9.2 .NET Support was installed. This can be done via Windows Control Panel/Add-Remove Program/ArcGIS Desktop and click on the “Change” button (see the figure 2 on the next page). Verify that the .NET Support has been installed on the local hard drive. If it has not been installed, select the “Entire feature will be installed on local hard drive” and click “Next” to install it.



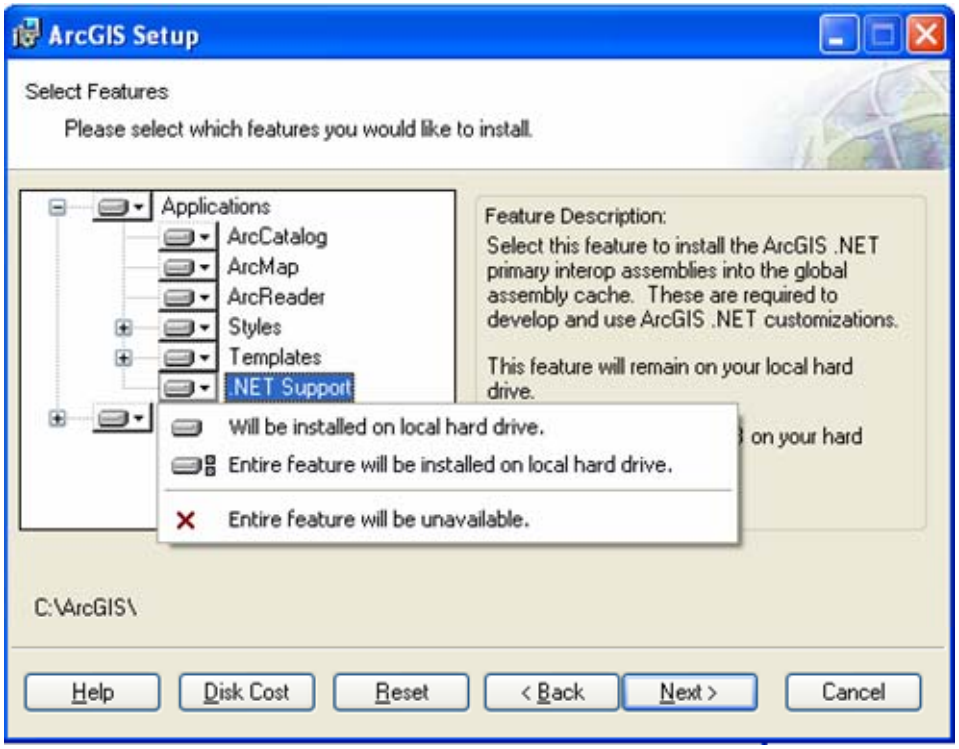


Figure 2: ArcGIS Desktop Setup Dialog

Download the SpaceNavigator SE/PE driver for Windows XP from 3DConnexion website (http://www.3dconnexion.com/support/4a1.php) and install it on your computer. Verify that the driver has been properly installed by using the tool coming with the driver during the post installation process. The current driver version is 3DxSoftware_v3-3-6.exe date 05/25/2007 (http://216.110.190.130/support/drivers/70/3DxSoftware_v3-3-6.exe).

The ArcGIS plug-in was built based on the ArcGIS 9.2 SP3 (build 1380) to ensure that the SpaceNavigator device will perform well with the Dynamic Map Display. The ArcGIS 9.2 Service Pack 3 provides significant performance improvement on Dynamic Map Display. This ArcGIS 9.2 SP3 can be obtained by downloading from ESRI Website using the URL: (http://support.esri.com/index.cfm?fa=downloads.patchesServicePacks.viewPatch&PID=43&MetaID=1315).

Using the Device

After installing the driver for SpaceNavigation and the plug-in for ArcGIS 9.2, make sure the SpaceNavigator device is plugged into one of the USB ports. Run ArcMap, ArcScene, or ArcGlobe the Space Device Control toolbar will be added to the running application automatically to activate the device. Notice that the blue light around the based of the device will lit up showing the device has been activated.

Figure 3: Space Control Toolbar

Navigating with the Device

There are three modes of navigation:
- Global mode
- Surface mode (Local mode)
- Free Navigation mode

Figure 4: Global Navigation mode in ArcGlobe

Figure 5: Surface Navigation mode in ArcGlobe

The global mode and surface mode depend on the globe Navigation mode command (see figure 4 and 5 above). The Free Navigation mode and be activated by click on a button command with space shuttle icon on the Space Device Control toolbar (this button is not included on the toolbar in Beta 1 Release).

Here are the behaviors of each mode when applying the force on the knob of the device:

Global Mode
- Forward/Backward (device +tz/-tz) = Moving observer up/down (changing the latitude)
- Left/Right (device +tx/-tx) = Moving observer east/west (changing the longitude)
- Up/Down (device +ty/-ty) = Moving observer toward/away from the earth (changing the altitude)
- Rotation elements are not active

Surface Mode (behaves similar to Google Earth and Virtual Earth)
- Forward/Backward (device +tz/-tz) = Moving observer forward/backward along the (horizontal) line of sight or viewing direction (observer and target altitudes remain constant)
- Left/Right (device +tx/-tx) = Moving observer left/right along the line perpendicular to the (horizontal) viewing direction (observer and target altitudes remain constant)
- Up/Down (device +ty/-ty) = Moving observer and target toward/away from the earth (changing the altitude of both the observer and target)
- Twisting the knob around (device +ry/-ry) = Rotating the observer (i.e. the line of sight) around the earth center-observer vector (observer and target altitudes remain constant)
- Tilting the knob forward/backward (device +rx/-rx) = Tilting the observer line of sight up and down (changing the target).
- Tilting the knob left/right (device +rz/-rz) = Does nothing in Beta 1.

Free Navigation Mode (Disabled in Beta 1)
- Forward/Backward (device +tz/-tz) = Moving observer forward/backward along the line of sight or viewing direction (observer and target altitudes changed)
- Left/Right (device +tx/-tx) = Moving observer left/right along the line perpendicular to the viewing direction (observer and target altitudes changed)
- Up/Down (device +ty/-ty) = Moving observer and target toward/away from the earth (changing the altitude of both the observer and target)
- Twisting the knob around (device +ry/-ry) = Rotating the target around the observer up direction
- Tilting the knob forward/backward (device +rx/-rx) = Tilting the observer line of sight up and down
- Tilting the knob left/right (device +rz/-rz) = Roll the camera (change the camera up direction).

Adjusting the Device Sensitivity

3DConnexion driver provide the dialog with various tabs to control the overall sensitivity as well as for each transformation element. This dialog can be opened by double clicking on the 3DConnexion icon on the Windows System Tray.

Figure 6: 3Dconnexion icon on the Windows System Tray

It is suggested for the new user to start with very low sensitivity settings. Each element can also be enable/disable independently. Dominant element (axis) can also be enabled to allow focusing the movement in just one direction.

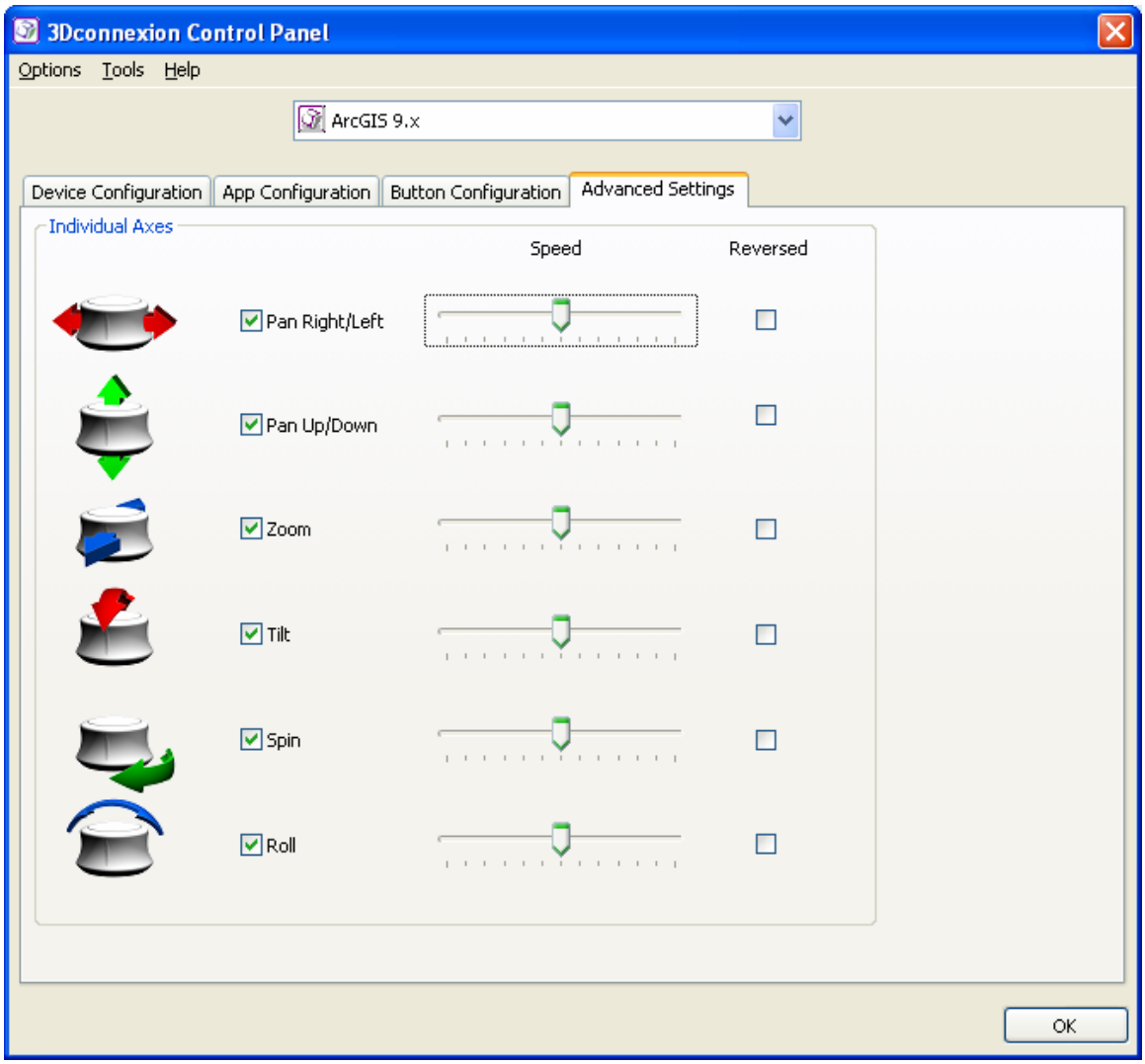


Figure 7: 3Dconnexion Control Panel. Each motion element can be controlled separately.

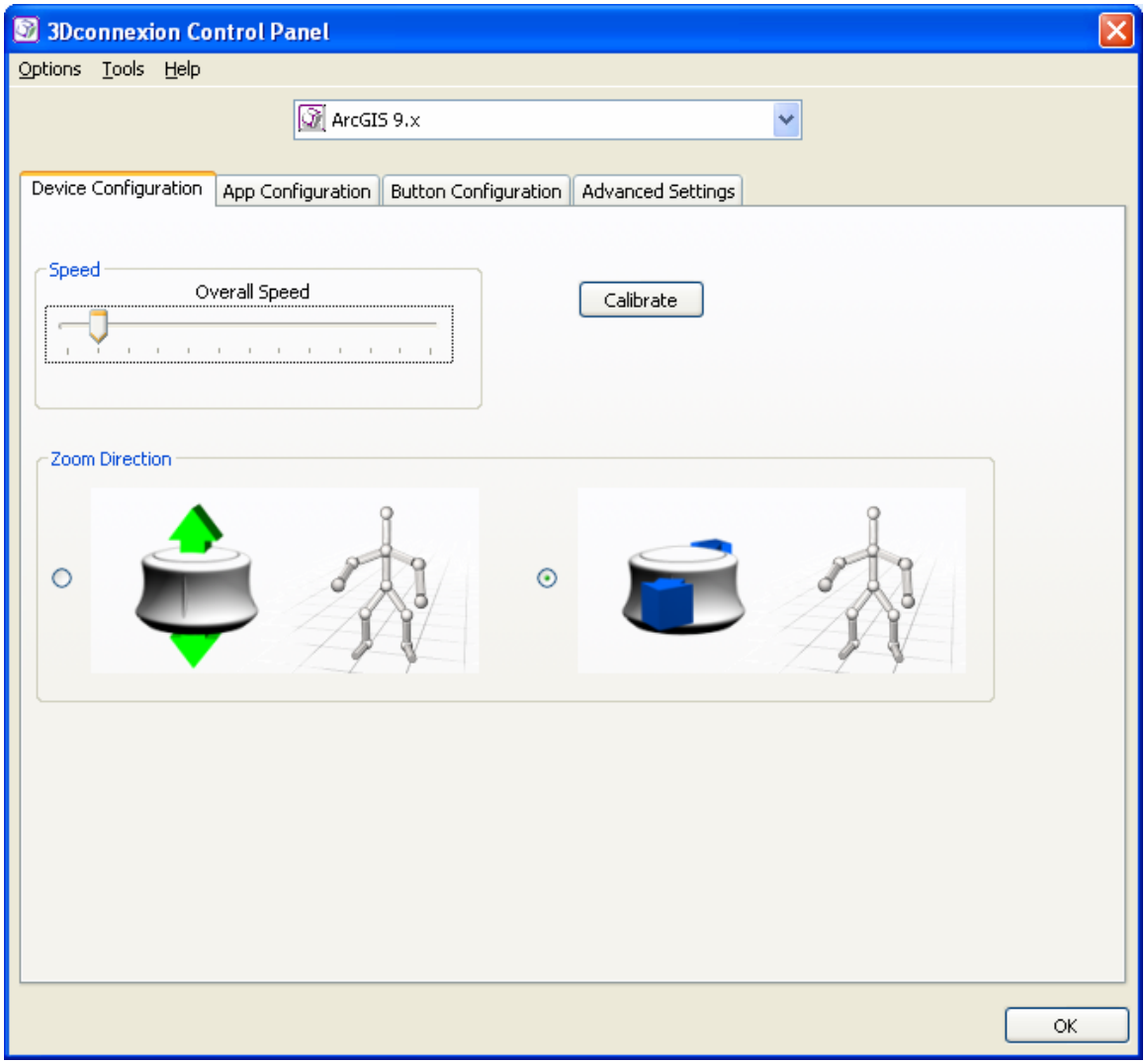


Figure 8: The SpaceNavigator Device Configuration tab. Low sensitivity can be set by moving Overall Speed slider to the left.

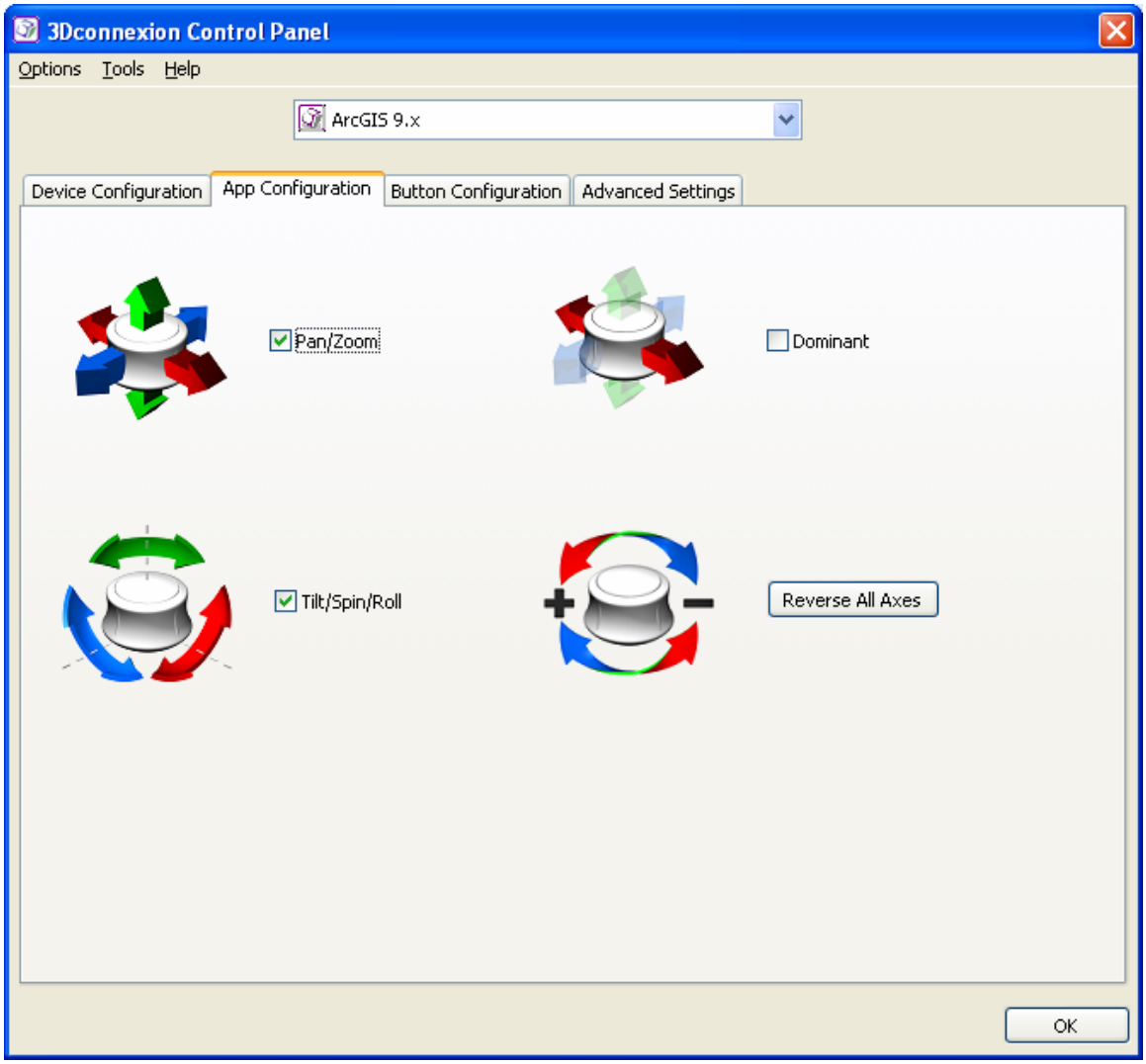


Figure 9: The SpaceNavigator App Configuration tab.

Mapping the Device Button to ArcGIS Command and Tool

By default the left button of device has been mapped to fit the extent of the data to the display. For ArcMap the right button has been mapped to button 2 which is for toggle between regular and Dynamic Map Display mode. For ArcGlobe this button is for toggle between the Global and Surface mode. The left and right button on the base of the SpaceNavigator device can also be mapped to any ArcGIS command. For example, to map the device right button to activate the Look North command of the Globe command category follow the steps below:

- In ArcGlobe open the Customize dialogue

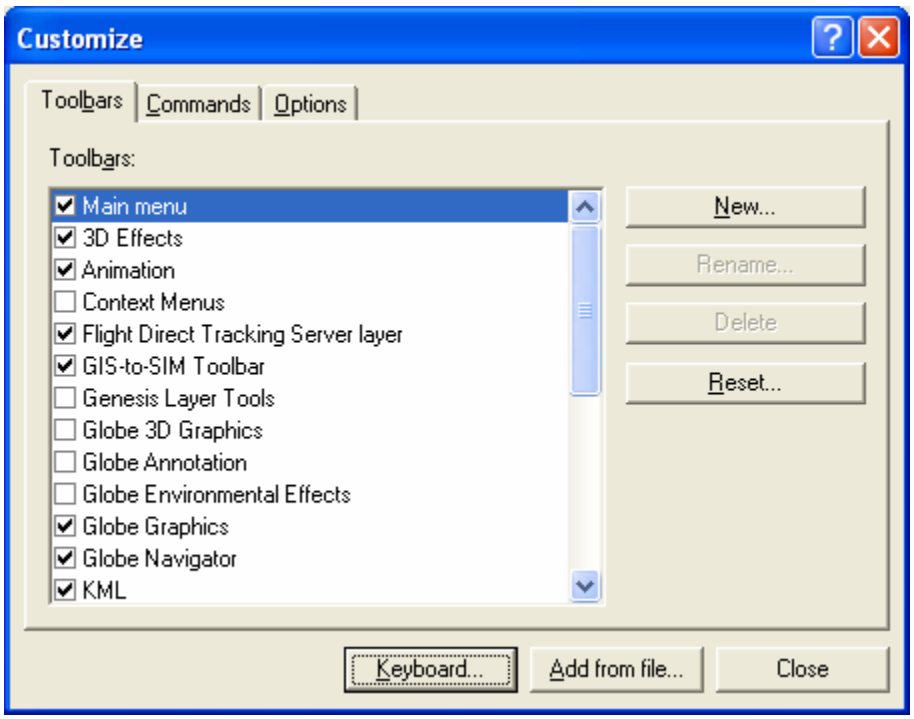


Figure 10: The ArcGlobe Customize dialog

- Click on the Keyboard button to open the Customize Keyboard dialogue
- On the left (Categories:) pane select Globe
- On the right (Command:) pane select Look North
- Click in the edit box under “Press new shortcut key:” and hit Ctrl-N. This is the keyboard combination to be assigned to the Look North command

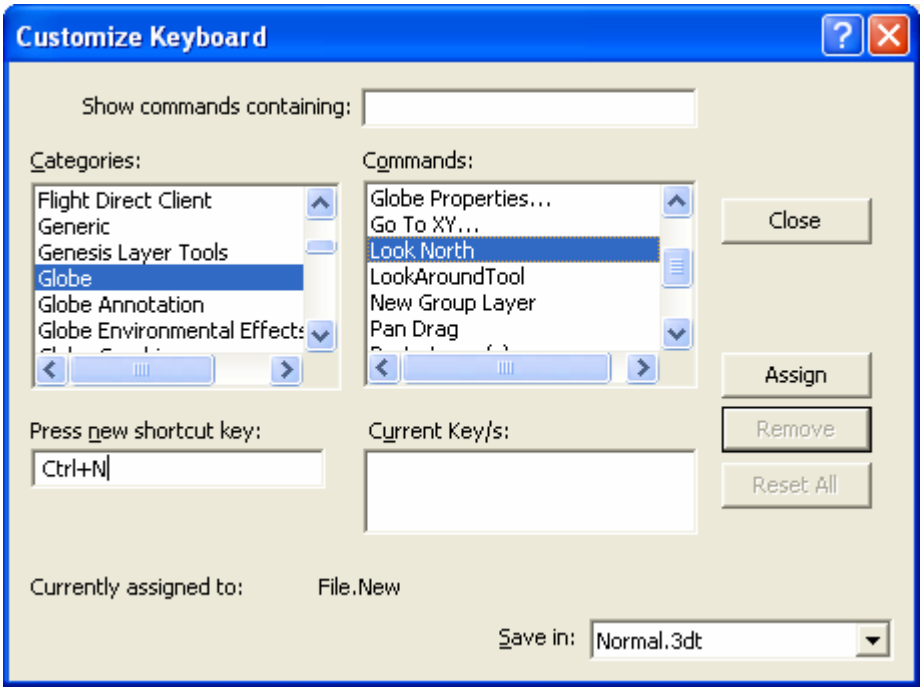


Figure 11: The ArcGlobe Customize Keyboard dialog

- Click the Assign button

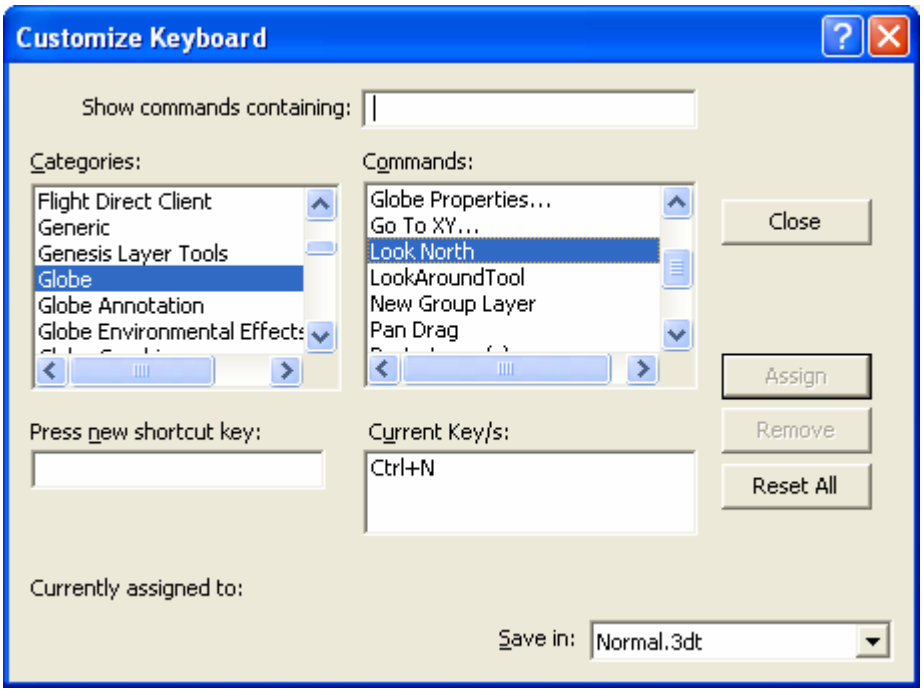


Figure 12: The Customize Keyboard dialog after assigned the shortcut key.

- Dismiss all the ArcGlobe Customize dialogs

- Double-click on the 3DConnexion Icon on the System Tray to open the 3Dconnexion Control Panel
- Click on the Button Configuration tab

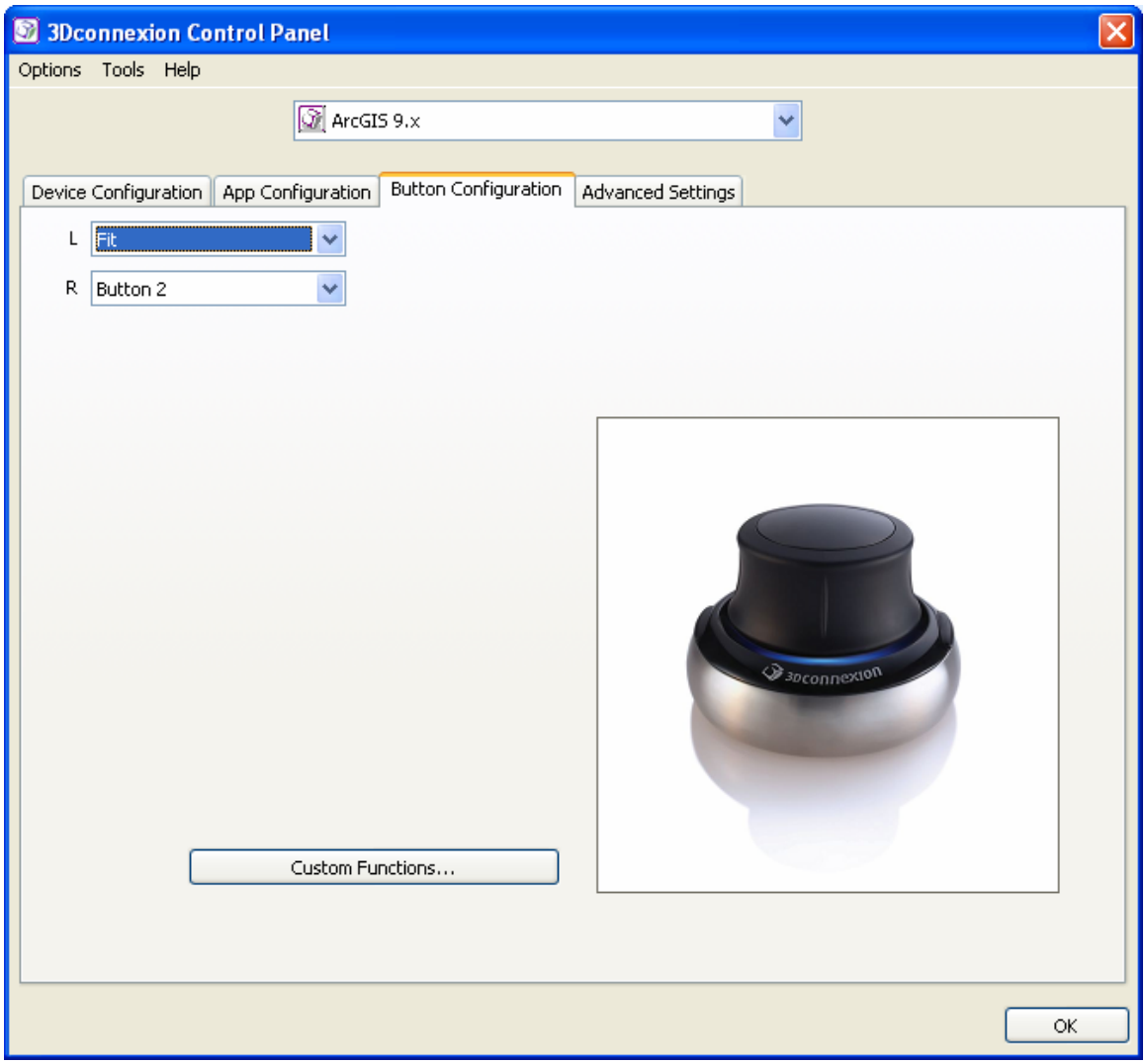


Figure 13: The 3Dconnexion Control Panel Button Configuration tab.

- Click the 'Custom Functions...' button to open its dialogue
- Click on the 'New' button to open the User Macro Editor

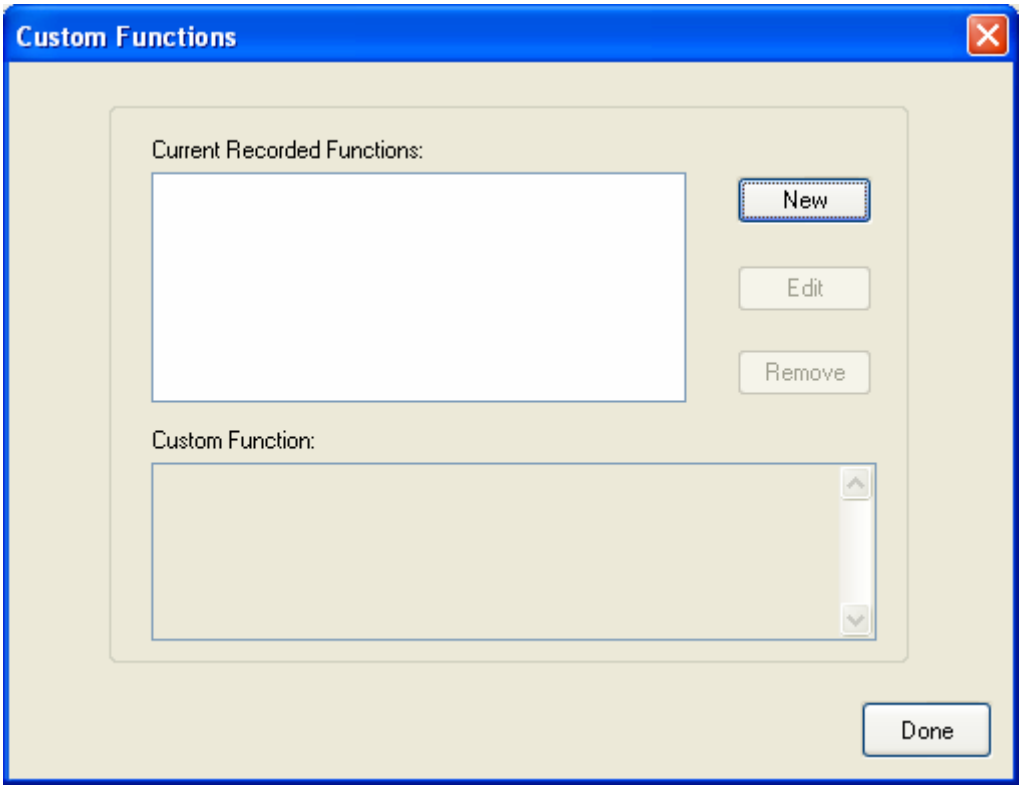


Figure 14: The 3Dconnexion Custom Functions dialog.

- In the 'Macro Name:' edit box type "Look North" to assign the name
- Click in the box under the 'User Macro:' label and hit Ctrl-N. This will assign a similar keyboard combination to the command.

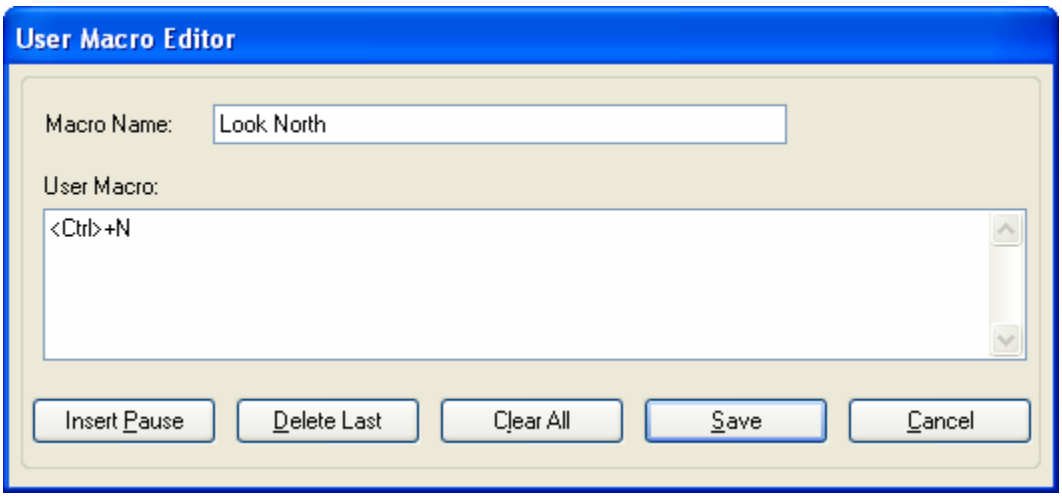


Figure 15: The 3Dconnexion User Macro Editor dialog.

- Click on the 'Save' button

- Click ‘Done’ to dismiss the dialogue
- Click on the drop-down combo next the ‘R’ and scroll down to select the ‘Look North’

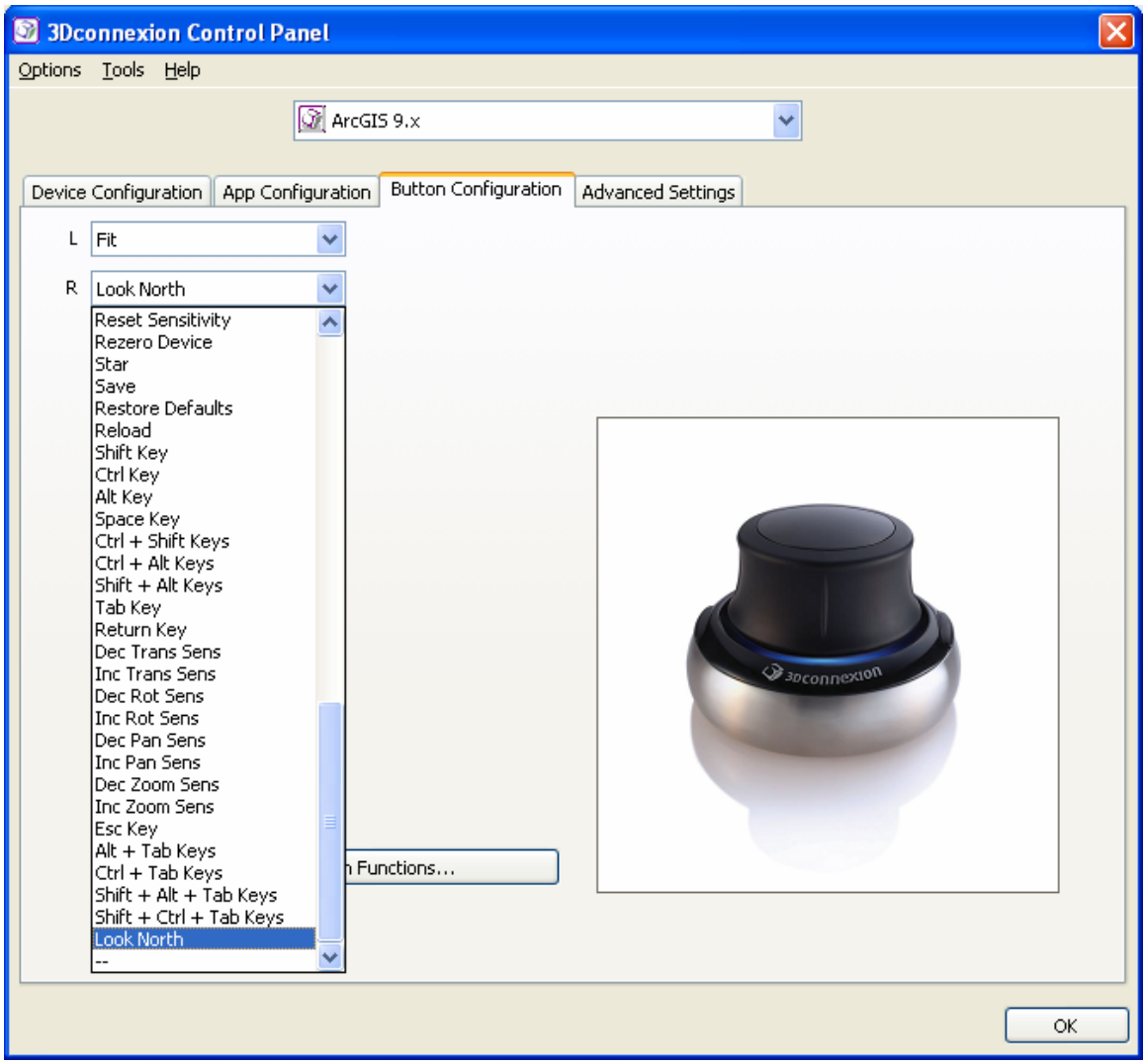


Figure 16: Assigning the new User Functions to the device right button click action.

- Click on the OK button to dismiss the 3Dconnexion Control Panel.

Now pushing the device right button will execute the ‘Look North’ command of ArcGlobe. Please note that by default in ArcGlobe, pushing the left button on the device will zoom to the full extent and the right button will switch between local and global navigation mode.