

## Trackball feature support with Windows operating systems

The evolution of the Windows operating system over the last decade has led to a complex and often confusing situation where the resident drivers support differing pointing device features. This applications note addresses the differences between the operating systems and provides a reference source for systems integrators wishing to use Pretorian Technologies Trackballs. It is assumed throughout this document that the operating system is used with the resident drivers. If this is replaced with a third-party driver then please consult the provider for full information.

Table 1 lists some of the salient features associated with Trackballs, versus all major operating systems releases. It is important to note that these form a general guide and subtle differences between Service Packs is common. If in doubt, please consult the operating system provider, or contact us.

| Feature                      | 98 | NT4 | 2000 | ME | Vista | 7  |
|------------------------------|----|-----|------|----|-------|----|
| USB support                  | ✓  | ✗   | ✓    | ✓  | ✓     | ✓  |
| PS/2 support                 | ✓  | ✓   | ✓    | ✓  | ✓     | ✓  |
| Microsoft serial support     | ✓  | ✓   | ✓    | ✓  | ✓     | ✓  |
| Mouse Systems serial support | ✗  | ✗   | ✗    | ✗  | ✗     | ✗  |
| PS/2 Hot-Plug capable        | ✓  | ✓   | ✓    | ✓  | ✓     | ✓  |
| Wheel support                | ✓  | ✓   | ✓    | ✓  | ✓     | ✓  |
| Buttons                      | 3  | 3   | 3    | 5* | 5*    | 5* |

Table 1: Feature support in Windows Operating Systems

\* 3 buttons only in Microsoft serial protocol

### 1. PS/2 Hot Plugging

This is a feature which is specific to the PS/2 protocol. All PS/2 compatible Trackballs default to 'disabled' on power up. It is the responsibility of the host computer to enable the device, usually after a number of other commands have been sent to the Trackball. This process is well understood during power-up (cold boot) of the host computer and rarely leads to problems.

However, if the Trackball is 'hot-plugged', i.e. plugged into the PS/2 port whilst the host power is on, Windows 3.1 and Windows 95 are unable to recognise that a new device has been plugged in and therefore do not send the enable command. Consequently the pointing device will not operate under these conditions.

All other versions of Windows are able to recognise when a Trackball is plugged in and enable it in the correct manner. This is made possible since the Trackball sends a sign-in string (two bytes: AA 00) whenever it is first powered up. The latter versions of Windows are capable of recognising this incoming string and then initialise the Trackball as if the host were being cold booted.

It is important to note that it is not possible to simply hot plug a PS/2 pointing device into a PS/2 port at any time. The host must always be booted with a PS/2 pointing device present for it to enable the PS/2 port. Once this has taken place however, a pointing device may be unplugged and hot-plugged any number of times with the

indicated versions of Windows.

It should also be noted that the PS/2 specification dictates that the sign-in string must be sent no more than 500ms after the pointing device is first powered up. This is unfortunate since it means that the sign-in string can on occasion be transmitted whilst the contacts are still noisy due to the mechanical process of mating the connectors. Consequently the string can occasionally get lost in noise during hot plugging and the pointing device is therefore not enabled. It is for this reason that some software driver providers do not recommend hot plugging.

### 2. Wheel (Z-axis) support.

Again, Windows 3.1 and 95 do not support the wheel, or z-axis, function. Full support is provided in all the remaining operating systems, although it should be noted that not all *applications* support it. In general all up to date Microsoft applications do support this feature, plus many others.

All Pretorian Technologies Trackballs fully support a wheel function when used with an appropriate driver/operating system configuration. To make use of this feature it is necessary to plug a separate wheel assembly into the Trackball.

### 3. Button support.

Windows 3.1 supports only two buttons, although the underlying pointing device protocols support either two (early Microsoft serial protocol) or three (PS/2 and Mouse Systems protocols).

Windows ME, Vista and 7 operating systems support the full 5 buttons provided by means of extended PS/2 and USB protocols. Where this is required in other versions of Windows, it will be necessary to replace the resident driver with a third-party driver. (Note that such drivers may be subject to license restrictions even if posted on the provider's web sites).

It is not possible to provide 5-button support when connecting the pointing device via the serial (COM) port, since the Microsoft serial protocol does not itself support 5 buttons.

All Pretorian Technologies Trackballs support at least three buttons in all protocols. When operating in USB and PS/2 protocols, they can support up to five buttons where this is also supported by the driver/operating system configuration.

### 4. USB protocol support.

Windows 3.1 and Windows NT4 do not support USB under any circumstances. Later versions of Windows 95 allow USB support to be added, although it is not installed if using the default configuration. Ensure the correct flags are checked during the installation process so that the necessary files are loaded.

All other versions of Windows fully support the USB protocol using the default installation.

### 5. Mouse Systems protocol support

Mouse Systems support is provided only in the drivers of Windows 3.1. However, it is possible to request extended driver support from Microsoft for some other operating systems.

## 6. Known compatibility issues

Generally speaking, compatibility issues between drivers and pointing devices are confined to the PS/2 protocol due to poor documentation of, and ad hoc extensions to, the protocol over the years. As a result of the hot-plugging support described in Section 1, PS/2 drivers in some versions of Windows 98 and NT4 contain a bug where the 'AA 00' string can be recognised as a sign-in string even if it occurs in a normal data packet. This causes the driver to configure the pointing device afresh which results in a noticeable interruption in cursor movement extending to approximately two seconds.

Pretorian Technologies Trackballs contain a unique feature to counter this Windows driver bug such that a packet transmission containing AA 00 cannot occur.

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