



750 Naples Street • San Francisco, CA 94112 • (415) 584-6360 • http://www.pumpkininc.com

Installing USB Drivers for Pumpkin's CubeSat Kit

Introduction

The Pumpkin CubeSat Kit uses FTDI's (<u>http://www.ftdichip.com/</u>) FT232BM USB-to-serial converter. Pumpkin supplies custom USB drivers for connections Windows 98 / ME / NT / 2000 / XP and Mac OS X. This Application Note illustrates the step-by-step procedure drivers so as to be able to communicate via a simple terminal program to one or more CubeSat Kits.

Part 1: Windows 98 / ME / NT / 2000 / XP Installations

This section illustrates the step-by-step procedure for installing the Virtual COM Port (VCP) drivers on a Windows XP PC.

Placing the Driver Files on your PC

Obtain the Pumpkin CubeSat Kit PC USB drivers from <u>http://www.cubesatkit.com/</u>. Copy them to a temporary directory, e.g. c:\temp.

Installing the CubeSat Kit USB Drivers

Apply power to the CubeSat Kit, and connect a USB cable between your PC and the CubeSat Kit's USB connector. After a few seconds, the PC detects the new hardware and presents the following screen as part of the Found New Hardware Wizard:



Figure 1: The CubeSat Kit is Detected over USB

Select Install from a list or specific location (Advanced), and click on Next. The following screen will be presented:

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
✓ Include this location in the search:
C:\TEMP Browse
◯ Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
<back next=""> Cancel</back>

Figure 2: Including a Location in the Driver Search

Browse to the location of the Pumpkin CubeSat Kit drivers (from *Placing the Driver Files on your PC*, above) or enter it manually in the location field. Then click on Next. The Wizard will search for the appropriate drivers. You may be presented with the following screen:



Figure 3: Windows XP Compatibility Warning

This is an issue with the FTDI drivers upon which the Pumpkin CubeSat Kit drivers are based, and can be safely ignored. Click on Continue Anyway to continue. When the Wizard is finished, you will be presented with a screen like this:



Figure 4: Successful Installation of the Pumpkin CubeSat Kit USB Drivers

With this screen, the drivers for detecting and connecting to the Pumpkin CubeSat Kit via USB are now successfully installed on your PC. Click on Finish to end this part of the installation.

Installing the Virtual COM Port (VCP) Drivers

After the installation of the Pumpkin CubeSat Kit USB drivers is complete, the PC will auto-detect the USB Serial Port and you will be presented with another screen:



Figure 5: The USB Serial Port is Detected

Select Install from a list or specific location (Advanced), and click on Next. The following screen will be presented:

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
✓ Include this location in the search:
C\TEMP Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Figure 6: Including a Location in the Driver Search

Browse to the location of the Pumpkin CubeSat Kit drivers (from *Placing the Driver Files on your PC*, above) or enter it manually in the location field. Then click on Next. The Wizard will search for



the appropriate drivers. You may be presented with the following screen:



Figure 7: Windows XP Compatibility Warning

This is an issue with the FTDI drivers upon which the Pumpkin CubeSat Kit drivers are based, and can be safely ignored. Click on Continue Anyway to continue. When the Wizard is finished, you will be presented with a screen like this:



Figure 8: Successful Installation of the Pumpkin CubeSat Kit VCP Drivers

With this screen, the drivers for connecting to the Pumpkin CubeSat Kit via a Virtual COM Port are now successfully installed on your PC. Click on Finish to end the installation.

Verifying the Installation

The proper installation of the drivers can be verified through the Device Manager:



Figure 9: Verifying the Installation in the Device Manager

When the USB driver is properly installed, the Pumpkin[™] CubeSat Kit USB Interface entry will appear under the Universal Serial Bus controllers group. Similarly, when the VCP driver is properly installed, the Pumpkin[™] CubeSat Kit USB Interface (COMn) will appear under the Ports (COM & LPT) group.

Connecting to the CubeSat Kit over USB

Once the drivers are properly installed, you can connect to the CubeSat Kit over USB via a Virtual COM Port (VCP). A VCP mimics a traditional serial port, with configurable baud rate, handshaking, etc. Windows' built-in HyperTerminal program can be used with VCPs:

🆚 Direct COM3 (FTDI USB) - HyperTerminal	
File Edit View Call Transfer Help	
FM430-Tx1 0000072022 \$ Ambient temp: 21 C FM430-Tx1 0000072122 \$ Ambient temp: 21 C FM430-Tx1 0000072222 \$ Ambient temp: 21 C FM430-Tx1 0000072737 \$ Ambient temp: 21 C FM430-Tx1 0000072837 \$ Ambient temp: 21 C FM430-Tx1 0000072937 \$ Ambient temp: 21 C FM430-Tx1 0000073037 \$ Ambient temp: 21 C FM430-Tx1 0000073137 \$ Ambient temp: 21 C FM430-Tx1 0000073237 \$ Ambient temp: 21 C	
<u></u>	~
	>
Connected 0:02:02 VT100J 9600 8-N-1 SCROLL CAPS NUM	Capture Print

Figure 10: A CubeSat Kit Connected over USB via VCP COM3

Multiple VCPs

The VCP driver supports multiple VCPs. Therefore any number of CubeSat Kits can be connected to a single PC via USB. Each VCP will have its own COM port (e.g. COM3, COM4, ...). These will be reported in the Ports (COM & LPT) group of the Device Manager.

Removing the Drivers

To remove the drivers, use the Windows Add or Remove Programs Control Panel, and select the FTDI USB Serial Converter Drivers:

🐻 Add or Re	move Programs		
5	Currently installed programs:	<u>S</u> ort by: Name	*
C <u>h</u> ange or Remove Programs	侵 FTDI USB Serial Converter Drivers		^
Add <u>N</u> ew	To change this program or remove it from your computer, click Change/Remove.	Change/Rem	ove
Programs	🕼 Google Toolbar for IE		
6	🕼 HI-TECH 8051 Compiler ∨8.00	Size 7.7	8MB
ⅆ/Remove	🔀 HI-TECH PICC Compiler v8.01PL1	Size 16.1	6MB
Windows	🕼 HI-TECH PICC-18 Compiler v8.20PL2	Size 11.5	7MB
Components	遇 HydraVision	Size 1.9	8MR 🔽
			Cl <u>o</u> se

Figure 11: Removing the Drivers

Part 2: Mac OS X Installations

This section illustrates the step-by-step procedure for installing the FTDI drivers on a Mac G5 running OS X 10.3.

Placing the Driver Files on your Mac

Obtain the Pumpkin CubeSat Kit Mac USB drivers from <u>http://www.cubesatkit.com/</u>. The FTDI installer is provided in a self-extracting package (.pkg.sit) file. Some additional files are also provided. Copy all the files to a temporary location, e.g. the Users/Shared folder.

Running the Driver Installer

With your CubeSat Kit(s) *disconnected* from your Mac, launch the FTDI installer by double-clicking on it:



Figure 12: FTDI USB Serial Driver Kernel Extension Installer

Follow the on-screen instructions to install the driver onto your Mac.

Restart your Mac when finished.

Replacing the FTDIReEnumerate File

The CubeSat Kit-specific FTDIReEnumerate file that is supplied as part of the CubeSat Kit Mac OS X drivers enables the FTDI driver to recognize the unique vendorID and productID of the CubeSat Kit.

Log out of your Mac, and log back in as root.¹

Tip To enable root access under Mac OS X, run Applications/Utilities/NetInfo Manager, and select Security \rightarrow Enable Root User.

It is generally recommended that you leave root access disabled once you're finished with this procedure. Root access can be disabled by selecting Security \rightarrow Disable Root User.

Replace the existing FTDIReEnumerate file in the /Library/StartupItems/FTDIReEnumerate folder with the CubeSat Kit-specific file. Your FTDIReEnumerate /Library/StartupItems/FTDIReEnumerate folder will look something like this:

000		PTDRaffmumpiate.		
4.0 11 18 10	-0+		Q.)	
Dishtep	FTDBebarrente Adiumente Sanapherenders.ptd	Today, 12:33 AM Today, 12:33 AM Today, 12:51 AM New 4, 2002, 13:12 AM	412 1418 418 418	Senso Sense Exercutative File Unix Exercutative File OOPRstDacumentType
A Appendixes (+):	+C	e, 134 81 CK available		91

Figure 13: /Library/StarupItems/FTDIEnumerate Folder

Note You can open and thereby view the FTDIReEnumerate file by using a simple text editor like TextEdit. The entry for the CubeSat Kit lists a vendorID of 0403 and a productID of F020.

If these entries are not present, then you have not successfully copied the CubeSat Kit-specific FTDIReEnumerate file over the generic one installed by the FTDI installer.

Detecting and Configuring the Network Port

Connect the CubeSat Kit to your Mac via USB, and reboot the Mac. Select System Preferences \rightarrow Network and you should be presented with the following screen once the CubeSat Kit's USB interface is detected:

how All	Displays	Sound Netwo	rk Startup Disk	
		Location:	Location (2/24/04 12 41 PM)	•
		Show:	Network Status	(\$)
	Juilt-in Eth	ernet 1 b	alt-sy Different is currently active and has 82,108,5.22. Yes are connected to the be hereet.	i the IP address semet via Balt-in
• 1	nternal Mo	d	New Port Detected	
		ā 🧉	A new network port has been d	letected:
				ed correctly, then
			press Apply Now to activate it.	ОК
		(Ce	nfigure) (Connect)	(1

Figure 14: New Port Detected

Select OK. In the Show pull-down, select Network Port Configurations:

Location: Location (2/24/04	12:41 PM)
Show: Network Port Cont	figurations
On Port Configurations Usbcerial-PU2ESICA Internal Modern Built-in Ethernet	Edit Delete

Figure 15: USB Network Port, Inactive

Note The suffix after usbserial represents the device's unique serial number, in this case it's PU2ESICA. Every CubeSat Kit will have a unique serial number.

Click in the On box to make this particular network port active. Then, in the Show pull-down, select usbserial-XXXXXXX and select the modem tab:

000	Network	
Show All Displa	ys Sound Network Startup Disk	
	Location: Location (2/24/04 12:41 PM)	
	PPP TCP/IP Proxies Modem	
Mod	fem: Null Modem 9600	dem
Dia	ling: Tone OPulse	
50	und: • On Off	
	Show modern status in menu bar	(?)
Cick the la	ock to prevent further changes. Assist me	Apply Now

Figure 16: USB Network Port, Modem Attributes

In the Modem pull-down, select Null Modem 9600. Deselect Enable error correction and compression in modem and Wait for dial tone before dialing. Click on Apply Now to complete the configuration.

In the Show pull-down, select Network Status to confirm that the network port has been configured:



0.0.0		Network	14
Show All	Displays Sound Net	work Startup Disk	
	Location	Location (2/24/04 12:41 PM) Network Status	
•	luilt-in Ethernet	Built-in Elternet is cutrently active and itas the IP addres 197.188.3.27. You are connected to the internet via Built Elternet.	i Hin
• •	nbserial-PU2ESICA	ushserial-PU2ESICA is configured, but is not connected.	
• 1	nternal Modem	Internal Modern is not set up.	
	0	Configure Connect	1

Figure 17: USB Network Port, Configured

Verifying the Installation

The proper installation of the drivers can be verified through the System Profiler, available via About This Mac \rightarrow More Info ...:



Connecting to the CubeSat Kit over USB

Once the driver is properly installed, you can connect to the CubeSat Kit over USB via a network-port-aware terminal program like ZTerm:²

000	L	ocal	
FN438-T×1	8088174113 \$ Ambient temp:	26 C	4
FI1438-Tx1	8088174214 \$ Ambient temp:	26 C	
F#438-Tx1	8088174315 \$ Ambient temp:	26 C	
Ff1438-Tx1	8088174416 \$ Ambient temp:	26 C	
FI1438-Tx1	8088174517 \$ Ambient temp:	26 C	
F#438-Tx1	8088175882 \$ Ambient temp:	26 C	
FM438-Tx1	8088175183 \$ Ambient temp:	26 C	'n
FI1438-T×1	8088175284 \$ Ambient temp:	26 C	
F#438-Tx1	8008175385 \$ Ambient temp:	26 C	
			ĬŤ.
0;41 10	0x72 Ok 9600 N01		1
F	igure 19 [.] A CubeSat Kit	Connected over USB using	

Figure 19: A CubeSat Kit Connected over USB using Zterm

Note The terminal program's connection parameters (e.g. data rate, stop bits, parity, etc.) must be appropriately configured.

A network-port-aware terminal program will usually present the user with a choice of ports to connect to – in the case of the CubeSat Kit, the network port will be named usbserial-XXXXXXXX.

Tip In ZTerm, the modem port is selected via Settings \rightarrow Modem Preferences. You can select any modem network port that was already configured when Zterm was launched.

Multiple CubeSat Kits over USB

Any number of CubeSat Kits can be connected to a single Mac via USB. Each CubeSat Kit will have its own unique network port and serial number:

000	System Profile	
Greg		3/22/04 1:42 PM
Contents	USB Device Tree	
	USB Bus	
Memory	WUSB Bus	
PCI/AGP Cards	WHub in Apple Extended USB Keyboard	
ATA	Microsoft IntelliMouse/E Explorer	
SCSI	Apple Extended USB Keyboard	
US8	USB Bus	
FireWite	# USB High-Speed Bus	
AirPort Card	¥ US82.0 Hub Controller	
Moderns	CubeSat Kit /0000	
#Software	CubeSat Kit /0000	
Applications	IPSON Scanner	
Extensions	USB Bus	
Network		
Logs		
	Vendor Name: NEC Corporation Product ID: 88 (\$58) Speed: Up to 480 Mb/sec Bus Power (mA): 500 CubeSat Kit /0000: Vendor Name: Pumpkin Product ID: 61472 (\$f020) Speed: Up to 12 Mb/sec Serial Number: PU2ESIGR Bus Power (mA): 500 CubeSat Kit /0000: Vendor Name: Pumpkin Product ID: 61472 (\$f020) Speed: Up to 12 Mb/sec Serial Number: PU2ESICA	
	aus Power (mA): 500	
·()·		

Figure 20: Two CubeSat Kits Connected over USB

Removing the Drivers

Individual network port configurations can be deleted in the network control panel by listing the Network Port Configurations and using the Delete function:



8.00		10		Netwo	ork	_	_			0	
All All	Dentas	0	0	1	Contrast Charles						
how Ad	Check Drag conne	Loca 5 t a corr configs icting t Part (usbs Inter Built	how: how: figuration o a ne configu ental-fi nal Mc -in Eth	tion to sis into twork rations PU2ES adem hernet	artiap Osk tion (2/2 rork Port a make it a the orde	4/04 1 Config active er you	2:41 P	s try th	B em whe New. Edit Defete		
	L				_		_	e	Juplicat	Ð	0

Figure 21: Removing the Drivers

¹ Also called System Administrator. ² ZTerm is a shareware program. ht

ZTerm is a shareware program - http://homepage.mac.com/dalverson/zterm/