Running PicoPak Software Under Linux

W.J. Riley Hamilton Technical Services Beaufort, SC 29907 USA bill@wriley.com

Introduction

It is possible to run the various PicoPak software applications under Linux using Wine, and use them to make measurements in that environment. The PicoMon and PicoSQL monitoring and data access programs operate normally (as does the Stable32 analysis program, which has been compatible with Wine for some time). The PicoPak/PicoPlus and PicoScan measurement user interfaces and the PicoSwitch control interface require USB connections, and while that involves somewhat more complexity, they also work fine. The PicoPak Web Monitor is already a (server-side) Linux program. Note that while this discussion is about Ubuntu, it should apply with only minor changes to other flavors of Linux.

Preliminaries

The PicoPak programs (except for the PicoPak Web Monitor) were developed using Microsoft Visual Studio C/C++ 2015 and intended to run under Microsoft Windows[®]. They are 32-bit applications, but can run on either 32-bit or 64-bit Intel Windows[®] operating systems. The Wine open source compatibility layer software allows many Windows[®] programs to run under Linux. In the case of the PicoPak programs, it is necessary to use a recent version of Wine (e.g., Version 2.3 Staging is used herein) that provides support for the Visual Studio 2015 run-time library. Some of the PicoPak programs (PicoPak, PicoScan and PicoSwitch) connect to hardware modules via USB virtual serial communications interfaces (COM ports in Windows[®], /dev/ttyUSB ports in Linux) using FTDI USB to serial converters. It is necessary to have the appropriate drivers to access their ports under Linux. Therefore we can divide the effort of running the PicoPak software under Linux into two major parts, (a) launching them under Wine, and (b) establishing USB connections for those applications that require them.

• Installing Wine

The easiest way to install Wine under Ubuntu Linux (or another Debian distribution) is via the usual aptget commands:

```
sudo add-apt repository ppa:ubuntu-wine/ppa
sudo apt-get update
sudo apt-get install wine#
```

where # is the version number (which should be at least 2.3). At the present time, that version is still in the staging process and requires the following commands:

```
sudo add-apt-repository ppa:wine/wine-builds
sudo apt-get update
sudo apt-get install -install-recommends wine-staging
sudo apt-get install winehq-staging
```

One should then follow the Wine documentation to verify and use the installation. Of particular interest is the Wine equivalent of Windows[®] Explorer, which can be launched from Terminal with the command:

wine explorer

🛞 🗇 💷 Wine Explorer						
< 🏟 🏠						
Location: PicoPak						-
Favorites	File	Size	Туре	Modified	Att	
🖃 🎑 Desktop	PicoPak Quick St	267 KB	PDF Document	12/21/2015 10:3	Α	
My Computer	PicoPak Software	391 KB	PDF Document	12/22/2015 10:1	Α	
± 🔤 (C:)	PicoPak TC.pdf	1,365 KB	PDF Document	11/19/2015 6:05	Α	
🛨 🥽 (D:)	PicoPak.chm	5,847 KB	Compiled HT	10/28/2015 12:1	Α	
11 (E:)	Pice PicoPak.exe	83 KB	Application	4/10/2016 12:09	Α	
± 🔤 (F:)	PicoPak.ico	2 KB		3/1/2015 10:35	Α	
± 🔤 (Z.)	PicoPak.ini	1 KB	Configuratio	3/9/2017 7:58 AM	Α	
	PicoScan Clock M	452 KB	PDF Document	4/23/2016 3:21	Α	
Trash	PicoScan.chm	6,981 KB	Compiled HT	4/9/2016 12:49	Α	
FT	Pico Scoh PicoScan.exe	130 KB	Application	6/27/2016 12:43	Α	
	PicoScan.ico	2 KB		2/28/2016 3:53	Α	
	PicoScan.ini	2 KB	Configuratio	4/23/2016 10:37	Α	
	PicoSQL.chm	2,137 KB	Compiled HT	11/3/2015 10:17	Α	-

Figure 1. Wine Explorer Screen in Ubuntu Linux Showing PicoPak Folder

• Installing the PicoPak Software

Wine supports the installation of Windows[®] programs from a CD-ROM in essentially the same way that they are installed in Windows[®] itself. Put the PicoPak installation CD-ROM into the computer's optical drive, click on the CD icon, launch setup.exe, and follow the normal installation instructions. Installation of the Visual Studio 2015 run-time library is ignored. After the PicoPak software is installed, click on one of the program icons or their .exe files in Wine Explorer to launch them. That process should be used to verify that the PicoPak, PicoMon, PicoSQL, PicoScan and PicoSwitch programs all open and run.

PicoMon and PicoSQL (along with Stable32, if available) will immediately be fully functional.



Figure 2. PicoMon Screen in Ubuntu Linux with Wine

Signal So Name:	PicoPak Data	base (Name=ppo Type: XO	d, Host=192.168.2.40, User=postg Description: ACH917 Half-DIP TTL	res)	Signal C Reference	Date Format: C UTC ©
#	S/N Sin R	ef Frequency	Description	Тац	Start	End
216	0A 9	9 1.000000e+07	Source #9 vs #9	1.000000e+00	57820.961557	end
						Parl
-Read Tim	ies.	UTC	DLM	Tau	Fnase Dat	Show Data
Start:	2017-03-08 23:	14:39	57820.961557	Meas: 1	.000000e+00	Stable 32
End	Run continuing		Run continuing	<u>A</u> F: 1		
Span:	0d, 13h, 49m, 49s		#: 49790	Data: 1.	000000e+00	
Message 49790 d	data points read for 1	Meas #=216, S/N=0, Sig=	-9, Ref=9	Data <u>F</u> ilena	me: PicoSQL.dat	Ver. 1.20



😸 - 🗉 Stable32		
File Edit Analysis Flot Generate Utility Tabs Options Help		
Image: Start Image: Start<	Tag Reg Noise Filter Cal Dom	Conf File Vibra Play Pad Help
HICOSQLDAT	Da	te: 03/09/17 MJD: 57821
C Phase Data	Total #:	No Frog Dete
File: File: File:	#:	No ried Data
Tau: 1.00000e+00 Start: 1 End: 50001 Control Control Tau: Start	t End:	

Figure 4. Stable32 Screen in Ubuntu Linux with Wine

The PicoPak, PicoScan and PicoSwitch user interfaces need to have their USB connections implemented before they can be used.

• Terminal USB Connections

A good way to begin is to verify a PicoPak family module's USB connection with the GtkTerm serial port terminal program that can be installed with the commands:

```
sudo apt-get update
sudo apt-get install gtkterm
```

When a PicoPak family module is connected via a USB connection and GtkTerm is launched, one can then go to the Port item in its Configuration menu and set up the serial port parameters. Select the USB port, (typically /dev/ttyUSB0 or another USB number), 115,200 Baud, 8 data bits, 1 stop bit, no parity and no flow control, and save this as the default configuration.

Solution Configuration					
Serial port Port:		Baud Rate:		P	arity:
/dev/ttyUSB0	▼ 1152	00	•	none	‡
Bits:		Stopbits:		Flow	control:
8	\$		÷	none	*
Advanced Configura	tion Options				
				ОК	Cancel

Figure 5 GktTerm Configuration Screen

Then, for a PicoPak, if the R (reset) command is sent to the module, it should respond with its name, S/N and firmware version.



Figure 6. GktTerm Screen with PicoPak Reset Message

Note that it may be necessary to obtain permission to access the USB ports with the command:

su usermod -a -G dialout username

where username is your user name.

• USB Connections

USB connections can be checked with the dmesg command, which, at the bottom of a long listing, shows information about the USB devices that have been connected or disconnected most recently.

×-0	Terminal	File Edit View Search Terminal Help
[163470.	332257]	ftdi_sio 1-1.4:1.0: device disconnected
[163478.	975630]	usb 1-1.4: new full-speed USB device number 9 using ehci-pci
[163479.	080056]	usb 1-1.4: New USB device found, idVendor=0403, idProduct=6001
[163479.	080071]	usb 1-1.4: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[163479.	080080]	usb 1-1.4: Product: PicoPak Clock Measurement Module
[163479.	080088]	usb 1-1.4: Manufacturer: HTS
[163479.	080121]	usb 1-1.4: SerialNumber: 103
[163479.	086336]	<pre>ftdi_sio 1-1.4:1.0: FTDI USB Serial Device converter detected</pre>
[163479.	086461]	usb 1-1.4: Detected FT232RL
[163479.	087388]	usb 1-1.4: FTDI USB Serial Device converter now attached to ttyUSB0
[163486.	291626]	usb 5-1: new full-speed USB device number 12 using xhci_hcd
[163486.	474199]	usb 5-1: New USB device found, idVendor=0403, idProduct=6001
[163486.	474214]	usb 5-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[163486.	474223]	usb 5-1: Product: PicoScan Quad RF Switch
[163486.	474231]	usb 5-1: Manufacturer: HTS
[163486.	474238]	usb 5-1: SerialNumber: 100
[163486.	494384]	ftdi_sio 5-1:1.0: FTDI USB Serial Device converter detected
[163486.	494520]	usb 5-1: Detected FT232RL
[163486.	499699]	usb 5-1: FTDI USB Serial Device converter now attached to ttyUSB1
DILL@Ace	r:~/Proc	irams/EnumerateS

Figure 7. dmesg Screen Showing PicoPak and PicoSwitch Modules

• FTDI USB Connections

FTDI USB connections using the ftd2xx library (as used in several of the PicoPak programs) are a bit more complicated under Linux. The GtkTerm connection was made with the default Linux VSP drivers, but fdt2xx-based applications must use the FDTI drivers. The first step in doing so is to remove the standard ones:

sudo rmmod ftdi_sio
sudo rmmod usbserial

Running a Linux application again may restore the normal drivers, so those commands may have to be reissued when a PicoPak USB-connected program is used thereafter.

• Wine COM Port Handling

Wine handles Windows[®] COM ports by using a link to the Linux device. For example, to associate /dev/ttyUSB0 with COM1, one would create a symbolic link for it in the wine/dosdevices subdiredctory :

ln -s /dev/ttyUSB0 ~/.wine/dosdevices/com1

If you execute dmesg in Terminal immediately after plugging in a PicoPak module, you will see at the bottom something like:

```
Product: PicoPak Clock Measurement Module
Manufacturer: HTS
SerialNumber: 103
FTDI USB Serial Device converter detected
Detected FT232RL
DTDI USB Serial Device converter now attached to ttyUSB0
```

The last line indicates what device port Linux has assigned to the PicoPak module, and what link is required to access it. You can list the symbolic links in the ~/.wine/dosdevices/ directory with the ls -la command. It is likely that, by default, there is already a link between COM1 and /dev/ttyS0. So, to establish one to /dev/ttyUSB0, you will need to first remove the default link with the rm com1 command.

Once the com1 to /dev/ttyUSB0 (or whatever its number) symbolic link is established, the PicoPak or PicoSwitch user interface program should connect to a PicoPak module with the appropriate COM number in the usual way. If the PicoPak program is relaunched, the COM port will probably need to be re-selected.

• PicoPak, PicoScan and PicoSwitch

The following screen shots show the PicoPak, PicoScan and PicoSwitch main screens under Ubuntu Linux. After configuring them as described above, these programs can be used with Wine in the same as under Windows[®].



Figure 8. PicoPak Screen in Ubuntu Linux with Wine



Figure 9. PicoScan Screen in Ubuntu Linux with Wine



Figure 10. PicoSwitch Screen in Ubuntu Linux with Wine

Note that PicoScan requires symbolic links to two USB ports to connect to both a PicoPak and a PicoSwitch module, so you will need to activate COM2 in Wine with the command:

ln -s /dev/ttyUSB1 ~/.wine/dosdevices/com2

Once the various setup steps are taken, the PicoPak family of programs should operate fine under Linux using Wine. An example of a coherent noise floor measurement for a PicoPak module running on a Ubuntu Linux computer is shown in Appendix I.

File: Running PicoPak Software Under Linux.doc W.J. Riley Hamilton Technical Services March 9, 2017 Rev A. March 10, 2017

UENCY STAB FRE Υ) PicoPak S/N 103 Coherent Noise Floor 10⁻¹⁰ Του Sigma 1.05e-11 1 5.34e-12 2.70e-12 2 4 **Overlapping Allan Deviation** 10⁻¹¹ 8 1.38e-12 16 32 -13 -13 02e 48e 64 13 -14 128 10⁻¹² 25F 14 512 30e 14 14 1024 14e 5.90e-15 2048 3.07e-15 4096 8192 1.50e-15 10⁻¹³ 10⁻¹⁴ 10⁻¹⁵ 10⁰ 10³ 10¹ 10² 10⁴ Averaging Time, s Phase Record: 12h 25m, 10 ps/div Frequency Record 12h 25m, 1pp10^11/div

Appendix I Coherent Noise Floor Run for PicoPak S/N 103 on Ubuntu Linux Computer