

# Running PicoPak Software Under Linux

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## • 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<sup>®</sup>. They are 32-bit applications, but can run on either 32-bit or 64-bit Intel Windows<sup>®</sup> operating systems. The Wine open source compatibility layer software allows many Windows<sup>®</sup> 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<sup>®</sup>, /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 apt-get 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<sup>®</sup> Explorer, which can be launched from Terminal with the command:

```
wine explorer
```

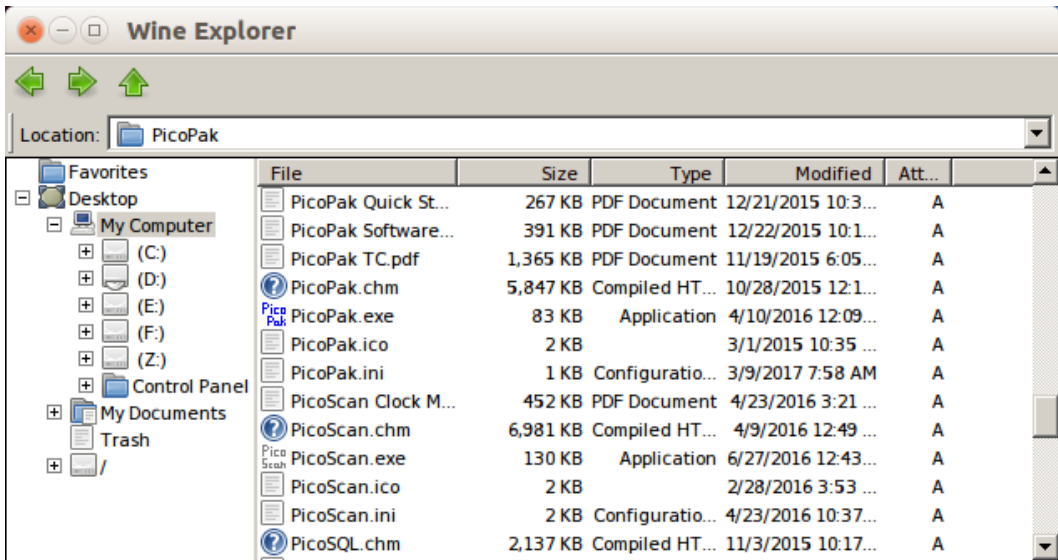


Figure 1. Wine Explorer Screen in Ubuntu Linux Showing PicoPak Folder

• **Installing the PicoPak Software**

Wine supports the installation of Windows<sup>®</sup> programs from a CD-ROM in essentially the same way that they are installed in Windows<sup>®</sup> 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.

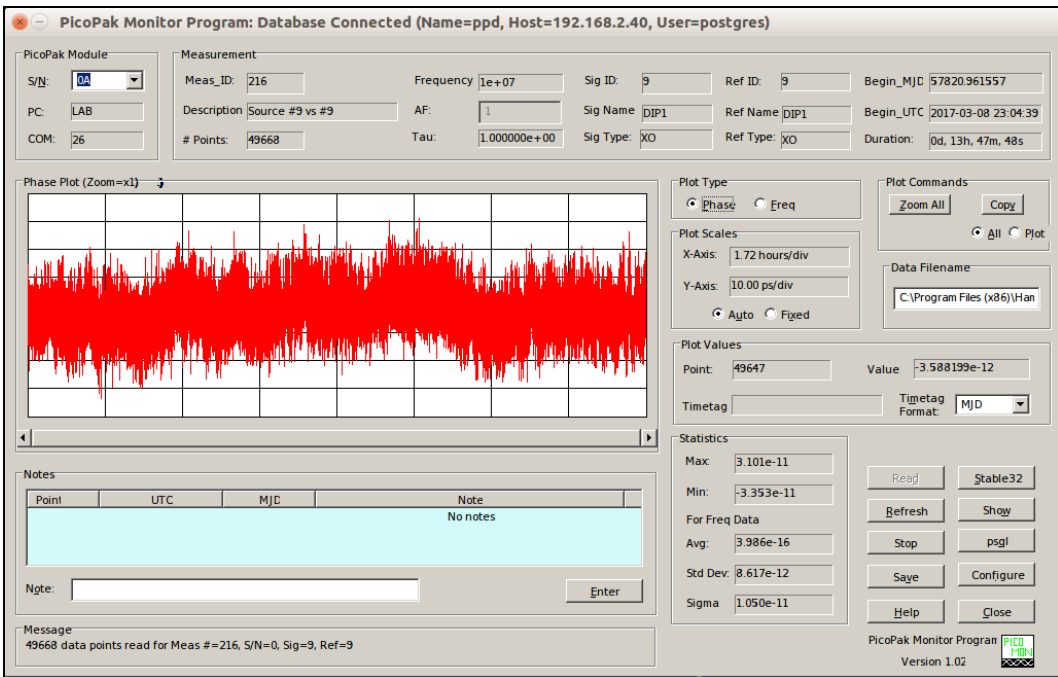


Figure 2. PicoMon Screen in Ubuntu Linux with Wine

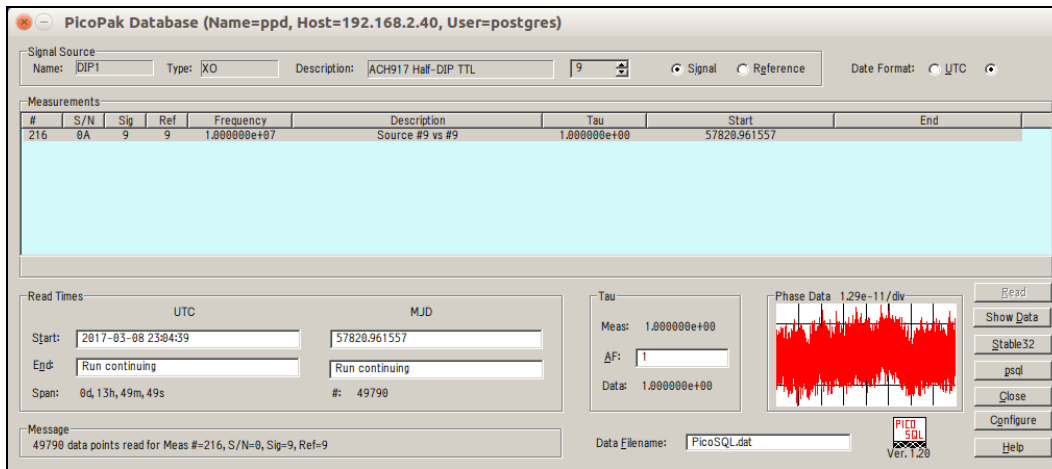


Figure 3. PicoSQL Screen in Ubuntu Linux with Wine

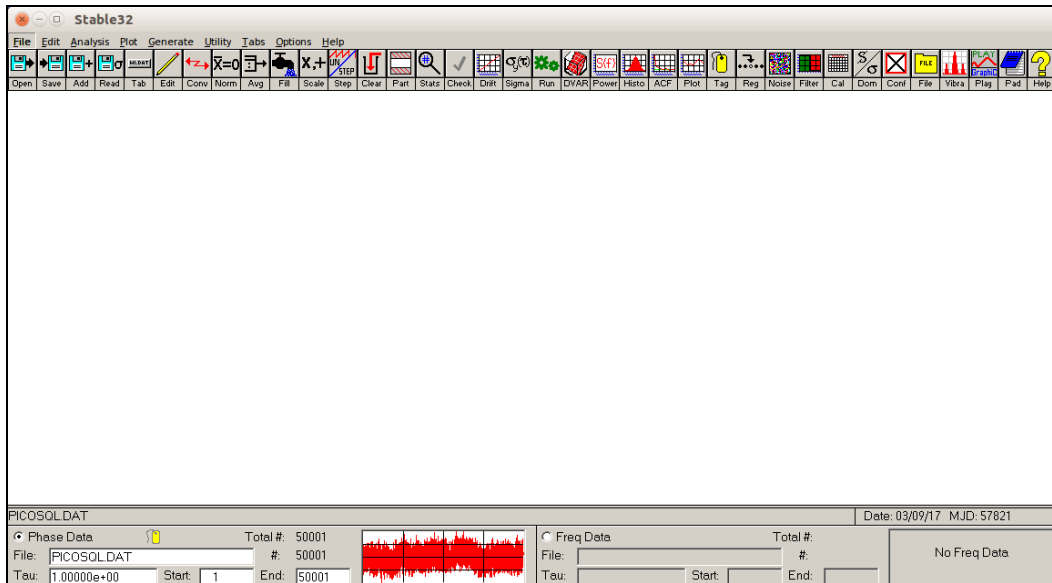


Figure 4. Stable32 Screen in Ubuntu Linux with Wine

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.

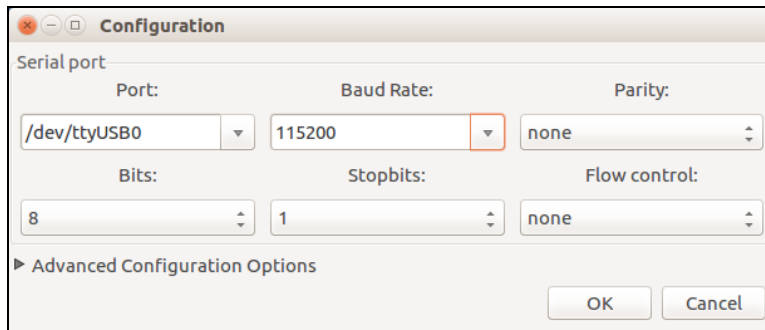


Figure 5 GktTerm Configuration Screen

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.

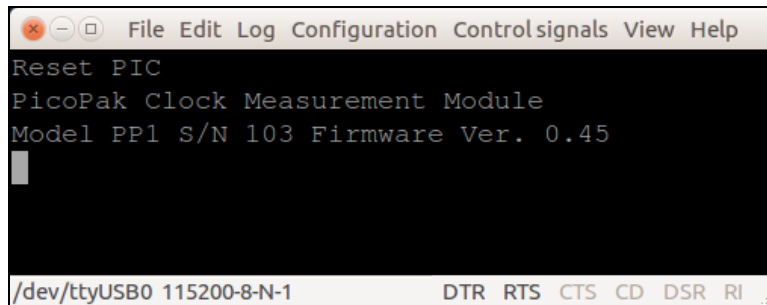


Figure 6. GktTerm Screen with PicoPak Reset Message

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.

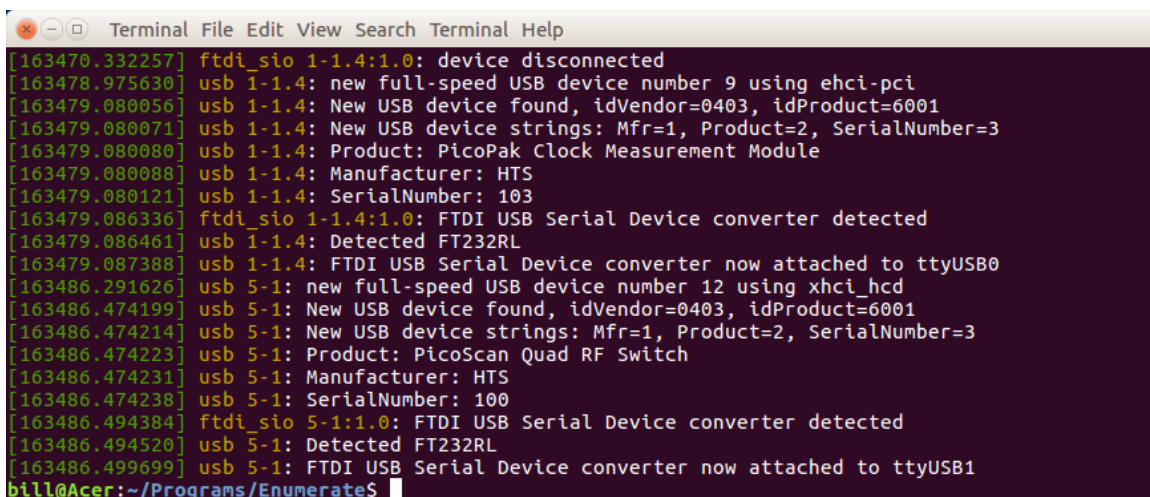


Figure 7. dmesg Screen Showing PicoPak and PicoSwitch Modules

- **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 ftd2xx-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 re-issued when a PicoPak USB-connected program is used thereafter.

- **Wine COM Port Handling**

Wine handles Windows<sup>®</sup> 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 subdirectory :

```
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<sup>®</sup>.

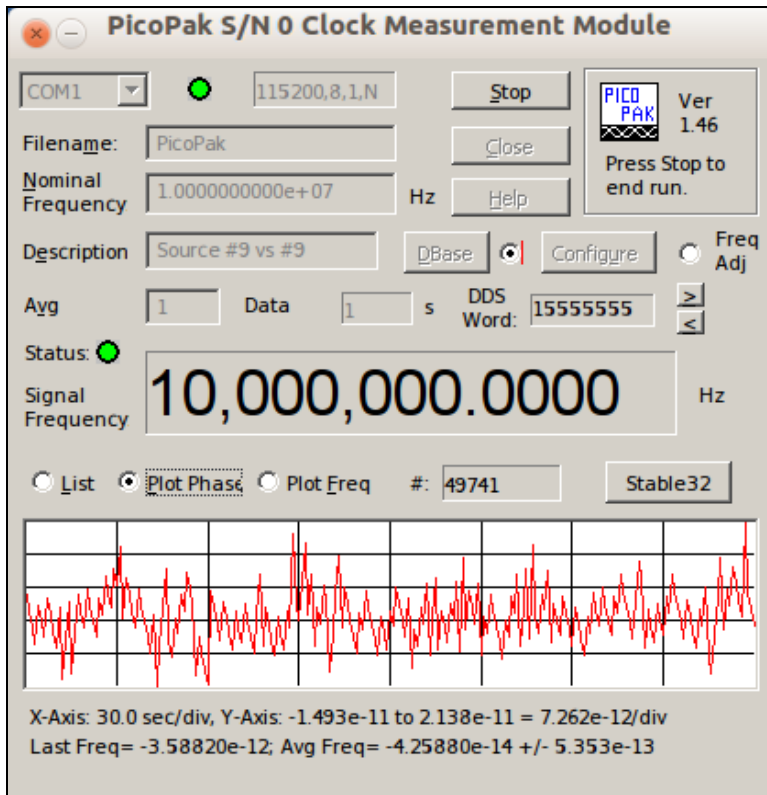


Figure 8. PicoPak Screen in Ubuntu Linux with Wine

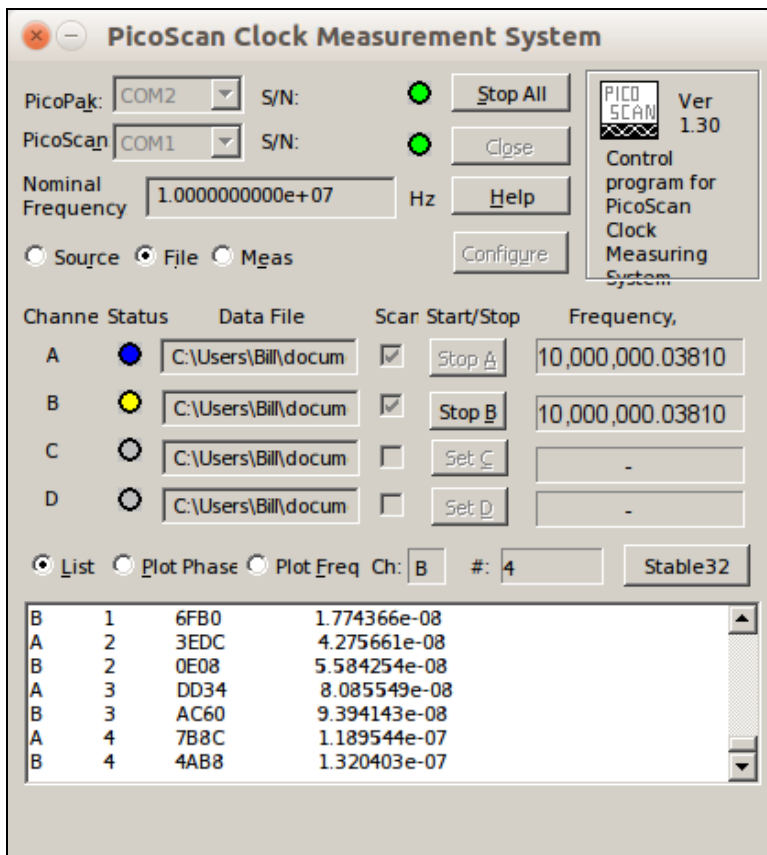


Figure 9. PicoScan Screen in Ubuntu Linux with Wine

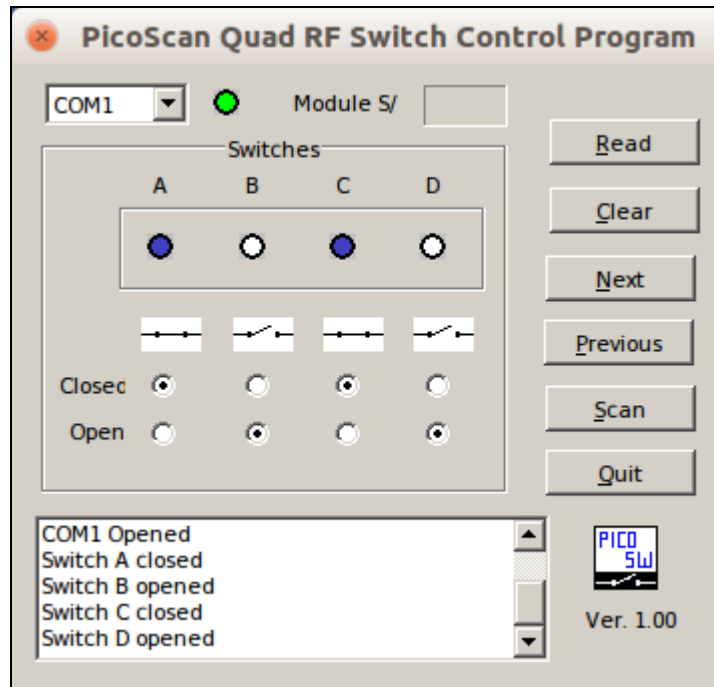


Figure 10. PicoSwitch Screen in Ubuntu Linux with Wine

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:

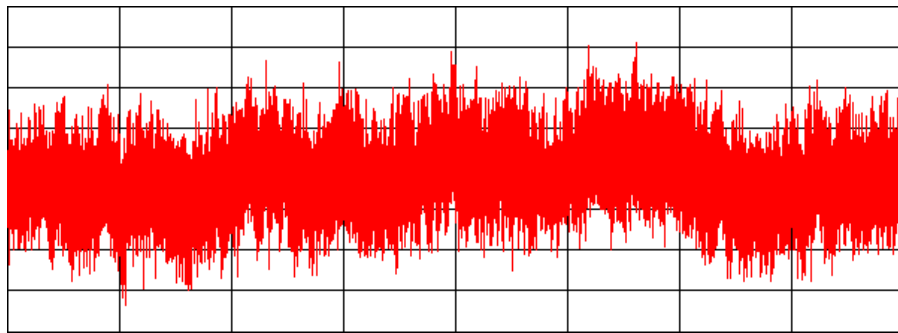
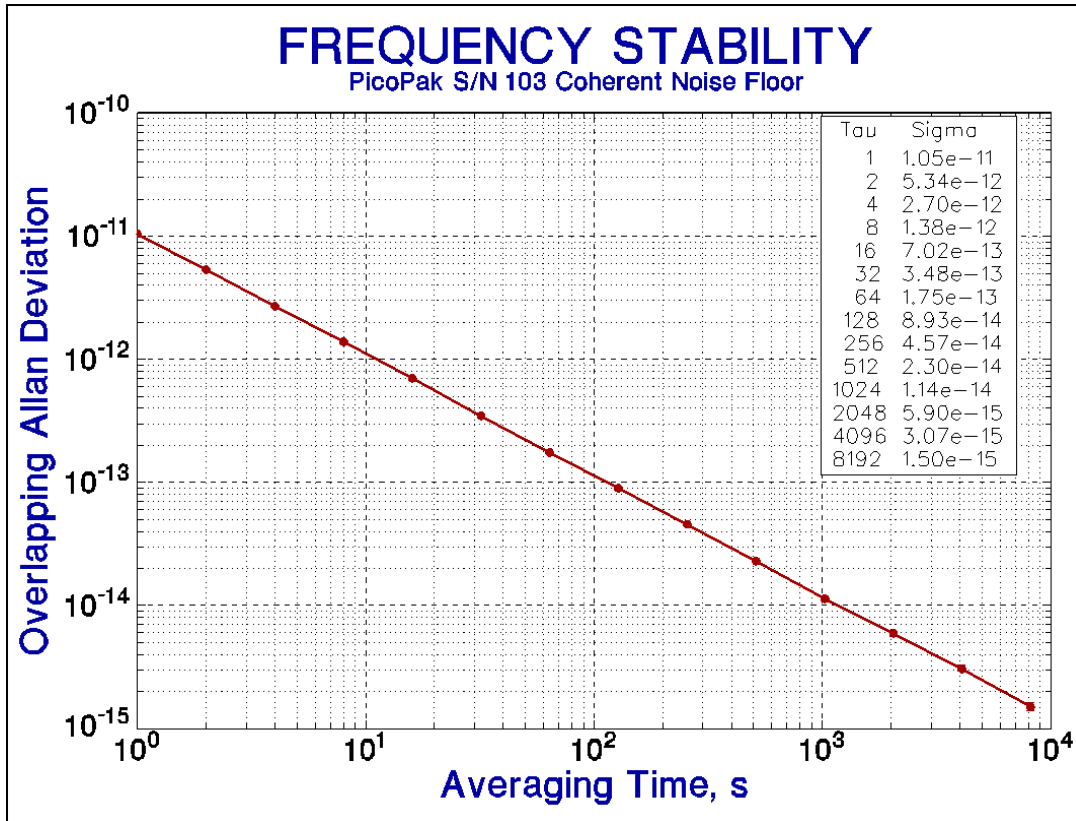
```
ln -s /dev/ttyUSB1 ~/.wine/dosdevices/com2
```

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.

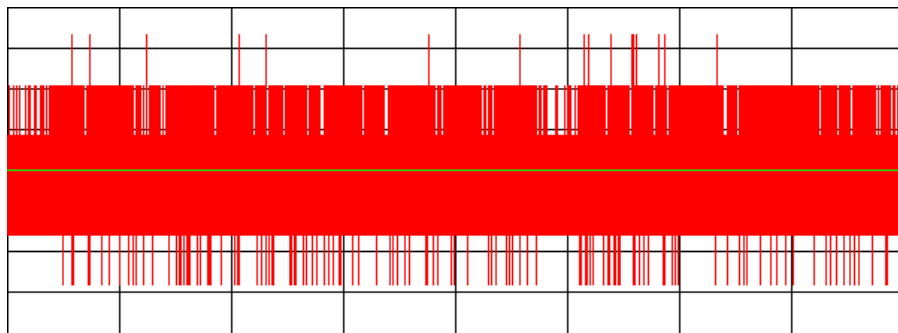
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# Appendix I

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



Phase Record: 12h 25m, 10 ps/div



Frequency Record 12h 25m, 1pp10<sup>11</sup>/div