

Downloading and Executing Packaged Programs and Source Code from the Syscomp Web Site and Sourceforge

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1 Introduction

Syscomp provides the software for its instruments in *open source* format. That is, anyone may download and use the programs. In this note we describe how to download and run the software.

Why would you want to do this?

- You want to run the software on a Mac. You are required to execute the source code, Syscomp does not provide an executable format for the Mac¹.
- You are curious and want to see what the software looks like when it runs on your computer.
- You purchased the hardware and the version of the software you received on the CDROM is older than that on the web page. You'd like to take advantage of new features in the software.
- You purchased the hardware and would like to modify the appearance or add features. You need the source code to do so.
- You have a particular specialized application for which you think the code might be useful. You want to obtain the source and use sections of it for your application. (See the *License* section below.)

The software has been designed to run without change under the Windows, Linux and Macintosh operating systems. Thus there is only one version of the software source code. That makes it easy for us to maintain and easy for you to find the right version.

The software is provided in two main formats: *Packaged Executable* and *Source Code*. Now we describe each and how to obtain it.

2 Packaged Executable

Each instrument program consists of a number of files. Some of these files are text that comprises the tcl source code. Other files are icon images, binaries of various kinds, and drivers.

For convenience, the final release of a particular version of the software bundles all these files into one package that can be 'clicked on' to run. This package must be platform specific, so there are different versions for each of the operating systems. This we refer to as a packaged executable.

For all platforms, packaged executables are provided on the CDROM that is shipped with the hardware. They are also provided on the Downloads page of the Syscomp web site. The final versions have numbers like Version 1.6.

These are versions of the program that are thought to be stable and bug-free. The version on the web page may be later than the version provided on CDROM with the hardware.

2.1 Drivers

The OIP software uses a *pseudo-serial port* approach to talk to the hardware. The Tcl/Tk software talks to a serial port. This serial port does not actually exist, it's a stand-in for a USB port. The commands are transmitted to the hardware over a USB connection using the USB protocol. Then an IC in the hardware converts the data back to asynchronous serial format and passes it to a microprocessor.

The net effect is to be able to use a USB connection, with its various advantages, while avoiding the complexities of the USB protocol.

¹The *freewrap* program, which we used to create a Tcl/Tk executable, is not available for the Mac. If that changes, or if some equivalent program is brought to our attention, we'll reconsider.

The Windows operating system does not automatically include the necessary driver, so it is included as part of a Syscomp code package. The driver software is installed as part of the installation procedure.

The Linux operating system kernel includes the necessary FTDI driver, so installing a Linux code package is much simpler. The downloaded package is a *binary* file. No installation is necessary, it can be executed directly.

The Mac installation may require downloading and installing the drivers from the FTDI website. (See section 3.3 on page 5).

2.2 Downloading a Packaged Executable Under Windows

1. Click on the Windows download command on the Syscomp web page.
2. A file with a name like DS0101V106.exe is offered.
3. Download this file to your desktop.
4. Execute the file and it will run the install procedure for your machine.
5. The install procedure puts an icon for that program on the desktop. Double-click on the icon to start the program.

2.3 Downloading a Packaged Executable Under Linux

1. Download the Linux binary.
2. Move it to a suitable directory
3. Execute the binary. Notice that the location of the binary must be on the PATH. If the file location is not included in the PATH, then you can
 - Execute the file name by typing in the full path name to that directory, or
 - Add that directory to the PATH specification (see the manual for your shell), or
 - Specify the current directory, as in `./filename`. Notice the dot, which indicates the current directory; `filename` is the name of the linux executable

By default, the usb-serial ports (`ttyUSB0` etc) are set up for root access only. There are various strategies for dealing with this, they are described in the manual for the equipment.

3 Source Code

The *source code* is the original program text. With source code, you can read how the code operates and modify the code to suit your own purposes². Source code is provided via the *Sourceforge* web site: <http://sourceforge.net/>.

Search for `oip` and choose the `Open Instrumentation Project`.

The source code has a number like `Version 1p7b7`, that is, version 1.7 beta 7.

The source code is provided as a zip archive. That is, the multiple files are contained and compressed into one file.

Notice that there is only one source code zip archive: the same one serves for Windows, Linux and Macintosh machines.

²At the time of writing, Syscomp was the only oscilloscope and waveform generator company providing source code for its products.

3.1 Downloading and Executing Source Code, Under Windows

3.1.1 Download and Install the Tcl Interpreter

To run the program, you need the Tcl interpreter installed on your Windows machine.

The Tcl/Tk language is not part of the Windows operating system, so it must be downloaded and installed. Fortunately, that is straightforward.

Download and install Tcl/Tk for windows from the ActiveState web site:

`www.activestate.com/Products/ActiveTcl`

Follow the installation instructions. At the conclusion of the installation procedure, you should have the Tcl/Tk programming language installed and it will be visible as a new desktop icon such as WISH84.

This only need be done once.

3.1.2 Download the code

1. Click on the download command on the web page.
2. A file with a name like DS0101V1p7b7.zip is offered.
3. Download this file to your desktop, where it appears as an icon.
4. Using Windows Explorer, create a directory where these files can reside: for example:
`C:\Documents and Settings\Peter\eelab-test`
5. Double-click on the desktop zip archive icon. It opens, showing all the files in the archive.
6. Copy all these files to the new directory you created. (Click on the top file in the list. Shift-Click on the last file in the list. The list highlights. Drag it to the destination directory and drop it there.)

3.1.3 Set up the file association

It is convenient that the system understand that files with the suffix `.tcl` should be executed by the WISH interpreter. That requires that Windows have a file association between the two.

In our case, the file to be executed is `main.tcl`.

1. Find that file in the directory where you put the downloaded material.
2. Right-click on `main.tcl`
3. Check that Opens With shows WISH84 (or whatever your WISH interpreter is named). If this is not the case, then:
4. Select Change. This brings up the Open With... dialogue.
5. Select Browse. This brings up a file selector dialogue.
6. Now find the WISH84 icon on your desktop. Right click on the WISH84 icon, select Properties to determine the location of the WISH84 program.
7. Copy that location into the previous Browse dialogue.

Now double-clicking on any file with the `.tcl` suffix will cause it to be executed by WISH.

3.2 Downloading and Executing Source Code, Under Linux

3.2.1 Check that wish is installed

The wish interpreter is included in most (if not all) Linux distributions, so it should be available on your system, it should not be necessary to download. To check, execute the command:

```
which wish
```

If wish is present, this command will indicate where it is located. For example, it might be located in:

```
/usr/bin/wish
```

If you examine that file with a long listing, it will be seen pointing to the actual wish executable, such as wish8.4.

3.2.2 Download the code

1. Click on the download command on the web page.
2. A file with a name like DS0101V1p7b7.zip is offered.
3. Download this file to your root directory.
4. Create a directory for the code, and move the zip file there.
5. Use the unzip command to open the archive, for example:

```
unzip DS0101V1p7b7.zip.
```

6. A group of files should appear. One of these files should be named main.tcl. This is the (wait for it!) main file of the group and will call in the other files as needed.
7. Use the Tcl/Tk interpreter wish to execute main.tcl, for example:

```
wish main.tcl &
```

The program should run and the instrument GUI appear. Now you can use any editor to modify the code, and then run the modified code to test it.

3.3 Downloading and Executing Source Code, Under Macintosh

1. Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the Mac. Application software can then access the USB device in the same way as it would access a standard COM port.

You need to download and install the Virtual COM port drivers for OSX from FTDI.

The instructions for installing FTDI drivers are here:

http://www.ftdichip.com/Documents/InstallGuides/Mac_OS_X_Installation_Guide.pdf

The FTDI drivers page is at: <http://www.ftdichip.com/Drivers/VCP.htm>

The device used in Syscomp instruments is the FT232B (or equivalent). FTDI Drivers are available for that device, for Mac operating systems OS X, and OS X (Intel processor). (Syscomp software does not operate on Mac operating systems prior to OS X.) Choose the appropriate driver from the FTDI drivers page at the URL given above. Download that and install it on the Mac.

2. The Active Tcl/Tk interpreter executes and provides the libraries for the Tcl/Tk program running on the host computer.

Download and install Active Tcl/Tk (version 8.4) for OSX from Activestate as follows:

- (a) Go to the Activestate Mac downloads page:

```
http://downloads.activestate.com/ActiveTcl/MacOSX
```

- (b) At the present time (February 13, 2012), the most suitable version is release 8.4.14. Change to that directory and download that release:

```
ActiveTcl8.4.14.0.272572-macosx-universal-threaded.dmg
```

- (c) Install that file, and the Tcl/Tk language is then operational on your computer.

3. The host program that provides the Syscomp oscilloscope and waveform generator graphical user interface is written in the Tcl/Tk language. You must download the source code (which is a series of text-readable files), place them in a suitable directory, and cause the `main.tcl` file to be executed from the Tcl/Tk interpreter (`wish`).

We provide the source code through the public-accessible Sourceforge site.

- (a) Go to the Open Instrumentation Project, which is hosted on Sourceforge at the URL:

```
http://sourceforge.net/projects/oip
```

- (b) Click on Download Open Instrumentation Project

- (c) Download the appropriate code: CGR-101 for the CircuitGear instrument.

- (d) Create a new folder on your hard drive for the source code. Unzip the source code archive and copy all of the files into a that folder.

An equipment manual `.pdf` file is included with the source code. You can examine that for information about installing the equipment.

- (e) Open a terminal window and navigate into the folder where you unzipped the source code.

- (f) Plug in the hardware device: oscilloscope or waveform generator.

- (g) Type the following command to start the GUI: `wish main.tcl`.

- (h) The equipment should start up. If it does not indicate `Connect`, consult the user manual on connecting to the appropriate serial port.

4 Modifying the Software

The Syscomp website paper *Hello Button: An Introduction to Tcl/Tk* is a useful overview of programming in the Tcl/Tk language.

The *References* section of this paper lists relevant textbooks.

If you do modify the software and you think the modifications might be of interest to others, please send us a copy and we'll incorporate it into the distribution.

The software is provided under the Gnu Public License (GPL). Under this license, anyone may use, modify distribute the source code for their own purposes.

1. Modifications to the source code must be provided back to the originator of the programs (Syscomp)
2. The GPL must accompany any new version of the program, that is, the new versions must also be provided under the terms of the GPL.

5 Contents of the File Package

The following are files and their functions in a typical distribution of the oscilloscope software. This same group of files functions for a Windows installation and a Linux installation³.

Archive

`DSO101v1p7b6.zip`

This is the original archive, which contains all other files and is opened with the `unzip` command.

Tcl/Tk Source Files

Here's a list of some of the files that are in the archive. The list will change as the software develops.

```
automeasure.tcl
calibration.tcl
capture.tcl
cursors.tcl
global.tcl
hi-res.tcl
histogram.tcl
main.tcl
tooltips.tcl
usb_serial.tcl
```

These files contain various sections of the oscilloscope code. The principal routine is `main.tcl`, which starts the program and calls the other routines. All `.tcl` routines can be read and modified in a text editor.

Document Files

`Changes.txt` Documents the changes that took place in different versions of the code.

`COPYING` The licensing provisions for the code. (The GPL, Gnu Public License.)

`manual.pdf` The oscilloscope technical manual in pdf format.

Libraries

```
Img13Lin
Img13Win
```

These directories contain routines that are called by the Tcl/Tk program during its operation. They are machine specific, one set for Linux, one for Windows.

³And Macintosh, when we verify that port.

Graphic Images

Images

This directory contains graphic images that are used in the construction of the graphic user interface.

Freewrap Files

```
images.txt  
includes_lin.txt  
includes_win.txt
```

These files are lists of the files in various directories. They are only used by the `Freewrap` program to produce a *wrapped* executable. (More on that below.) They are not used for the execution of the program.

Miscellaneous

`scope.ico` Desktop icon for the oscilloscope
`scopeport.cfg` Oscilloscope configuration text file. Contains the current USB port number.
`ShelExec.exe` This is a windows executable program which can be passed a command parameter. It is used in the Windows environment to call up the display of the technical manual.

6 Using Freewrap

A friend of mine has memo paper with the heading 'I've got a good idea, you do something instead of me.' In the same spirit, we provide here some directions for using freewrap to create an executable from the source files. This might be useful if you want to create an executable from one of the recent beta versions that are only provided as a source-code archive of files.

The Freewrap program combines a group of files into one Tcl executable. This executable may then be run as any other program.

Freewrap is available at <http://freewrap.sourceforge.net>. From the freewrap web site:

The freewrap program turns TCL/TK scripts into single-file binary executable programs.

The resulting program can be distributed to machines that do not have TCL/TK installed. The executable will also work on machines that have TCL/TK installed but will use its own TCL/TK "image". freeWrap itself does not need TCL/TK installed to run.

To Wrap the software:

1. Download the latest source files from sourceforge and unzip them into a folder called scopewrap in the root of the hard drive.

In Windows, this directory will be `C:\scopewrap`.

In Linux, this directory will be `/scopewrap`. Change the mode of the directory so that it is world writeable.

2. Download the latest version of freewrap from the freewrap web site. You may have to check the suffix of the file to determine whether it is a Windows (`.zip`) or Linux (`.tar.gz`) file. Currently, freewrap is at version 62 but that number may change.

For Windows, the download file is `freewrap62.zip`. When it is unzipped the Windows executeable is called `freewrap.exe`.

For Linux, the download is the file `freewrap62.tar.gz`. It must be uncompressed using the command `gunzip freewrap62.tar.gz`. This produces `freewrap62.tar`. Then the archive must be extracted using the command `tar xvf freewrap62.tar`. The Linux executeable is called `freewrap`. You can do this in your home directory and then copy the files to the `scopewrap` directory. If you do the uncompressing and untarring in the `scopewrap` directory, you'll need to use the `sudo` command to ensure that the directories are created correctly.

3. Copy `freewrap.exe` or `freewrap` into the `scopewrap` folder.

4. Edit the file `main.tcl` and change the line which reads:

```
set include ./ to read set include /scopewrap.
```

It may be necessary to uncomment the line. (In Tcl/Tk, a line is a comment if it starts with the `#` symbol).

If it exists, comment out the line which reads: `set include [pwd]`

5. Save the file to the `scopewrap` directory.

6. In Windows: execute the following from a command line in a DOS box:

```
C:\scopewrap\freewrap main.tcl -f includes_win.txt -f images.txt
```

7. In Linux: execute the following from a command line in a terminal window:

```
/scopewrap/freewrap main.tcl -f includes_lin.txt -f images.txt
```

This will produce a file named `main.exe` (Windows) or `main` (Linux). This is the wrapped executable.

8. To test the newly wrapped software, delete or move all of the source files in the scopewrap directory. This is important because the wrapped program will look in the scopewrap directory if it cannot find the files in its own wrapped archive, so it may appear that the program is working even if files are missing from the wrapped archive.
9. Now you should be able to run the executable.

References

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