

SAVING AND PRINTING DATA FROM THE TDS OSCILLOSCOPES

This note explains how to capture, save, and print screen images and trace data from the Tektronix TDS 2012B, TDS 2012, and TDS 220 digital oscilloscopes found in room WSEC 323 and 310. These 'scopes were chosen for E.E. labs in part because of their ability to save information to either a USB drive plugged into the front panel (TDS 2012B), or directly to the bench PCs (TDS220, 2012). (The older TDS 210 oscilloscopes found in the labs DO NOT have any way to "talk" to the workbench PCs or save information. An instructor did e-mail me a camera-phone photo of a TDS210 screen that was quite usable, though.)

The 'scope functions described here are accessed by a combination of front panel buttons and "soft keys" along the right side of the screen that are used to select menu items that appear on the display. There are alternative procedures to do some of the things listed in this note, but this should get you started.

Please realize that these 'scopes are NOT set up to print **directly** to the lab's laser printer using the "Print" button on their front panel; and, strangely, the PC software that acquires screen shots and data forces the user to put the images into another program before it can be printed, complicating the process of printing screen shots. It is in fact easier to save the screens or information to a file for later use. Consider whether you require a paper printout immediately or if it might be a better idea to save an image file for printing or insertion into a report later.

FILE TYPES

The TDS2012B 'scopes can save:

- IMAGE files that are a bitmapped picture of what is on the screen. These may be in one of several file formats including .JPG, .BMP, and others.
- WAVEFORM or data files in .CSV text format - these contain the numeric value of all the data points in the trace, in a format that can be imported into spreadsheets, databases or similar programs. These can also be reloaded back into the 'scope for viewing.
- SETUP files (.SET) that hold all the 'scope settings in a text file. These can also be reloaded back into the 'scope to restore it to settings used for a previous measurement.

FLASH DRIVES

The TDS 2012B permits you to save screen images, trace data and 'scope settings onto any standard USB "thumb" or flash-memory drive. In fact, if you have an iPod or cell phone that can connect to USB and "look" like a USB drive, you may be able to save and view screen images on these devices.

After the 'scope has powered up, and you've cleared any start-up messages, plug your USB drive into the front-panel USB port right away, before you start taking measurements. It can take the 'scope the better part of a minute to read and check the file system, so connecting the drive first leaves it ready to use when you do see the information you want on the 'scope. The 'scope calls your drive "A:\", and there are a number of ways to manipulate files and folders on your drive by pushing the UTILITY key and selecting the "File Utilities" menu item.

The quickest way to be able to "grab" a trace is to set up the 'scope to save when the PRINT button on the front panel is pressed. To do this, press the SAVE/RECALL key on the 'scope. Now press the "Action" softkey until it displays "Save All". The softkey directly beneath it is now showing "PRINT Button" and can be used to select what you want the PRINT key to do when pressed. If you choose "Saves All to Files" it will save ALL THREE of the file formats mentioned earlier every time you hit the PRINT key. If you want just the image file, that is an option as well. (Pressing the "Action" softkey until it says "Save Image" produces other softkeys that let you select what kind of image format you

want to use.) You'll also see a softkey labeled "Select Folder" that lets you pick which folder on your USB drive to use; it is possible (although kind of laborious) to create a new folder as well.

Once you've set this up, any time you have a waveform you want to save you can push the 'scope's PRINT button to capture it. Sometimes it's a good idea to press the RUN/STOP key on the 'scope to "freeze" the trace you are observing, so you are sure about what waveform you are actually saving to the drive.

As mentioned earlier, you can retrieve waveforms and 'scope set-ups from your flash drive as well.

CAPTURING TO PC WITH OpenChoice Desktop: TDS 2012B

The TDS 2012B 'scopes are connected to the workbench computers with a USB cable via a second port on the back panel. Once you have logged into the computer (using your Blackboard username and your room access code as password), you can run the "OpenChoice Desktop" program you will see on the Windows desktop. In fact, when the computer "sees" the 'scope connected to the USB port, it may volunteer to run this program for you.

Before you can access the 'scope, you must have the program identify it. Click the button in the OpenChoice program that's labeled "Select Instrument". It will show a list of instruments and you should click on the one labeled "USB0:<several numbers>:INSTR". (It's probably the first in the list shown.) Click on the "OK" button, and underneath the "Select Instrument" button the program should display **TDS 2012B**. Now the program is ready to "talk" to the 'scope.

The OpenChoice program defaults to the tab where you can capture a screen shot - a bitmapped image - of what is on the oscilloscope screen. If all you want is a picture of what's on the screen, click on the control button that says "Get Screen". A progress bar will appear to show that the computer is downloading the screen image. Shortly, you'll see on the computer screen a picture of what appears on the 'scope.

Unfortunately, the OpenChoice cannot print this 'scope image once you've gotten it. You have to transfer the image into a different program to print it. You can do this a couple of ways, depending upon whether you just want a print-out of the trace right away, or if you want to save it for later to put into a report or document. If you want to save the picture as a graphic file to use later in a report, you can click on the program button that says "Save As..." to do this.

If you want to print it right away, you can do one of two things. The first is to save the image as a file, then use Windows Explorer to find and open the file with the computer's default graphics-viewing program. You should be able to print from that program. In the second printing method, click on the button that says "Copy to Clipboard". Then, go to the Windows "Start" menu and select "All Programs > Accessories > WordPad" to run the Microsoft Wordpad program. When it starts, either press "Ctl-V" or use the menus to select "Edit>Paste" to paste the Clipboard into a document. Wordpad will let you resize the screen shot and do a "Print Preview" to see how it will look. NOW you can do a "Print" from the File menu (or Ctl-P). For the largest possible printout, you can change to printing in "Landscape" mode but the screen shots are not very high resolution, so printing them large looks "chunky".

While the picture of the screen is useful, you may want to do more with the 'scope information. At the top of the OpenChoice program screen is a tab labeled "Waveform Data Capture". Using this is very similar to the screen capture procedure, but when you do a "Save As ..." it's going to save the DATA of the 'scope traces as numbers in a comma- or tab-delimited text file, which can be easily imported to a spreadsheet or other programs, for analysis or graphing.

OpenChoice also lets you save all the settings of the 'scope to a file so that you can reload them back into the 'scope later on.

If you are proficient with LabView, it is possible to control the TDS 'scopes or grab data from them using your own programs.

CAPTURING TO PC WITH OpenChoice Desktop: TDS 2012 and 220

The older TDS 2012 and 220 'scopes found in WSEC 310 can also use OpenChoice to capture information, but they use an RS-232 serial interface instead of USB. The procedures are the same described above, with the following differences:

- When you run OpenChoice desktop and need to identify the instrument, it will be called something like "ASRL:<numbers>:INSTR" . More than one "ASRL" instrument may appear. By clicking on one and then on "Identify", it will show you what 'scope, if any, is connected to that port. Once you've found your 'scope, you can click on "OK" to start using it.
- The serial interface is slower and less reliable than the USB interface found on the newer 'scopes. It is not unusual, when using OpenChoice with a serial connection, for the program to show an error message that says that an attempted transfer has failed. Simply repeat the attempted operation and it should work, given a couple of tries. Pressing the RUN/STOP button on the 'scope permits the 'scope to "pay more attention" to transmitting data than to taking and displaying new information, and may make your screen shots more reliable.