

# Using Tekread.m to Load Tektronix Oscilloscope Data into MATLAB

Thomas Juliano

15 January 2008

Modern oscilloscopes offer many excellent tools for data analysis. However, it is often useful to have greater control of data analysis and presentation by using computer software such as MATLAB. This document is intended as a brief set of instructions for reading Tektronix oscilloscope data with MATLAB. Similar methods would be employed to save data from other oscilloscopes (such LeCroys) or read into other analysis software (e.g., Excel or Fortran).

Some of the reasons to analyze the oscilloscope data in MATLAB include:

- Plotting traces from different flow conditions on the same set of axes
- Making clear, well organized plots
- Using MATLAB functions for data analysis, such as `pwelch` for power spectra
- Calculating other quantities based on the data recorded on the scope

## 1 Saving Oscilloscope Data

Several different sorts of oscilloscope data can be saved. For instance, a screen shot can be captured for use in instructions such as the AAE333L lab manual. The oscilloscopes settings can be saved for easy recall at a later time. In this case, the data from an oscilloscope channel will be saved.

First, stop the oscilloscope when the desired data is on the screen. This is the state of the oscilloscope after a single triggered sample. If the oscilloscope is running continuously, push the 'Run/Stop' button to stop the oscilloscope from collecting data.

Select 'File → Save As...'.

In the left column, select 'Waveform' if it is not already active.

From the top drop-down menu, select the trace you wish to save (e.g., Channel 1).

Select the location to save the file (e.g., `c:\yourname\date\run#`).

Select a descriptive file name (e.g., `hwac` to signify hotwire AC-coupled).

Save the data as a `*.wfm` file. Newer oscilloscopes, such as the Tektronix 7000-series models, can save directly to MATLAB-compatible files (`*.dat`). These files are larger for the same amount of data than the `*.wfm` files. The TDS5034B used in AAE 520 does not have this option.

Copy the waveform file to the computer on which you will run MATLAB. In most cases, the easiest way to do this is by copying the file onto a USB hard drive. If the computer is connected to the network, the file can be transferred via ftp or e-mail.

## 2 Loading Data into MATLAB

The code `tekread.m` was written to read the waveform file into MATLAB. Both it and the waveform file must be in the MATLAB working directory or in a directory identified by `addpath`. For example, `addpath(['c:\yourname\' ,date, '\',run])`.

`tekread.m` is written with MATLAB's `function` command. It has two outputs (the oscilloscope data's dependent and independent variables) and one input, the waveform file name, which must be a string. For example, if the oscilloscope file named `hwac.wfm` contains hot-wire AC voltage as a function of time, the command `[hwac,t]=tekread('hwac.wfm');` would load two new variables into the MATLAB workspace: `hwac` and `t`. They are each `n-by-1` vectors, where `n` is the length of the data file. These variables can then be used like any other MATLAB data.