

Documenting Lab Results with WaveSurfer 4000HD Oscilloscopes

APPLICATION NOTE

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Summary

Different utilities built into WaveSurfer 4000HD allow you to capture and share waveform and measurement data to document your lab results. Our signature LabNotebook is an all-in-one solution that lets you capture, annotate and share setup and waveform data, then quickly restore it to the display of other Teledyne LeCroy MAUI oscilloscopes for further analysis.

Introduction

Like all MAUI oscilloscopes, WaveSurfer 4000HD oscilloscopes are equipped with numerous utilities that allow you to capture nearly any type of data that appears on the oscilloscope display in different formats for documenting your lab results.

Step-by-step procedures for using all these features can be found in the [WaveSurfer 4000HD Oscilloscopes Operator's Manual](#) on our website.

Save/Recall Setup and Waveform Files

Setup files comprise all the current settings that allow the oscilloscope to produce the results on screen when an equivalent signal is acquired. Simply choosing File > Save Setup from the menu bar creates a configuration file (*.lss) that can restore in seconds a test setup that took hours to tune. Setup files can be shared with colleagues and recalled to any other MAUI oscilloscope¹ to reproduce a test.

Likewise, trace (*.trc) files can be created simply by choosing File > Save Waveform. When recalled into MAUI oscilloscopes' internal memory, trace files reproduce the shape of an acquired waveform and can be analyzed or processed much like "live" inputs. But the Save Waveform function can also be used to save a timestamped list of waveform samples as simple ASCII text or other formats that would allow it to be easily imported into external programs for further processing. If you select All Displayed, all traces on the display will be saved to separate files.

```
|LECROYWS4104HD,17724,Waveform  
Segments,1,SegmentSize,125002  
Segment,TrigTime,TimeSinceSegment1  
#1,14-Feb-2020 02:43:20,0  
Time,Ampl  
-2.5000206e-005,0.0001  
-2.4999806e-005,1.76517091e-005  
-2.4999406e-005,1.76517091e-005  
-2.4999006e-005,5.88258545e-005  
-2.4998606e-005,-0.000111752748
```

.....

Figure 1: "Raw" waveform data saved as comma-delimited text.

¹ All recall/restore features are limited by the capabilities of the target oscilloscope. Settings that are not present in the target oscilloscope will be ignored, and acquisition records longer than the target memory will be truncated. Usually, this will be observed when recalling files from higher onto lower bandwidth oscilloscopes.

Save Screen Images

If you would like a picture of what is showing on the oscilloscope display either to share or to place into a report, screen captures can be taken by choosing File > Save and selecting Screen Image. The area of the screen that is captured and the image file format (*.bmp, *.jpg, *.png or *.tif) are determined by the Screen Image settings on the Save dialog.

Label Traces

Custom annotations calling out points of interest on the waveforms can be added to the display by selecting the Label button at the bottom of the Channel (Cn), Function (Fn) and Memory (Mn) dialogs. These labels are saved with the waveform when it is saved as a screen image or LabNotebook file.

Save Table Data

Measurements, serial data decodings and many other results appear on the oscilloscope in tabular form. This valuable data can be exported by choosing File > Save and selecting the Table option. File format may be ASCII *.txt or Excel *.csv. Unfortunately, table data cannot be restored by recalling the file. To save table data in a form that can be recalled to an oscilloscope display, create a LabNotebook.

The Auto Save feature allows you to save waveform and/or table data to file every time the oscilloscope is triggered. Choose File > Save and open the Auto Save dialog to make selections.

Save/Recall LabNotebooks

The LabNotebook utility is an all-in-one solution for capturing, annotating and sharing waveforms, setups and screen images. LabNotebook simplifies results recording by eliminating multi-step processes that often involve file transfers between several pieces of equipment. It can be thought of as "Save Job" or "Save Everything" into a single, composite file *.lnb file. Each *.lnb file contains:

- Separate *.trc files for all displayed waveforms
- An *.lss file of all the current oscilloscope setups, including data in memory (with some exceptions)
- An image file of the display at the moment of capture

LabNotebooks can be created by choosing File > Save LabNotebook from the menu bar. As shown in Figure 2, the Save dialog opens, with a field labelled LabNotebook Annotation where comments can be entered and a field labelled LabNotebook Entry for entering the path and file name. When your preferences are set, touch Save Now at far right of the dialog. Because LabNotebooks represent the oscilloscope at the moment of capture, it is best to Stop acquisition before taking them, or use Single trigger mode to acquire, so that the display is stable when you create the file.

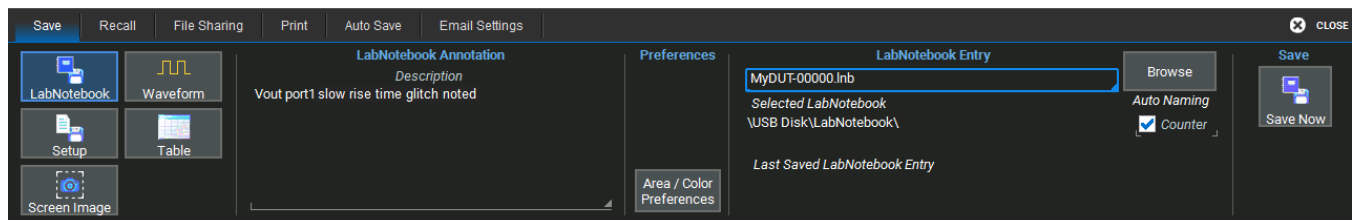


Figure 2: Within the LabNotebook dialog is an area for including descriptions and other comments.

LabNotebooks can be recalled on any Teledyne LeCroy MAUI oscilloscope (running firmware v.8.x.x.x or later) to allow further analysis and post-processing of the data as if it had just been acquired. Choose File > Recall LabNotebook, select the file and “FlashBack” to the oscilloscope state saved in the LabNotebook. Following Flashback, you can perform additional analysis on the stored signals, such as measuring with parameters or cursors.

While a LabNotebook is recalled, text can be added to the Description under Content Management, allowing you to exchange comments with a colleague via the LabNotebook file. However, because of the fast update display, WaveSurfer 4000HD oscilloscopes do not permit you to make freestyle annotations (“scribble”) on the screen image that is saved with the LabNotebook, as do some other MAUI oscilloscopes. If you wish to place annotations on the waveform, use the Label feature prior to saving the LabNotebook.

LabNotebooks can also be extracted into their component files. From the Recall LabNotebook dialog (Figure 3), select the file and choose Extract Files.

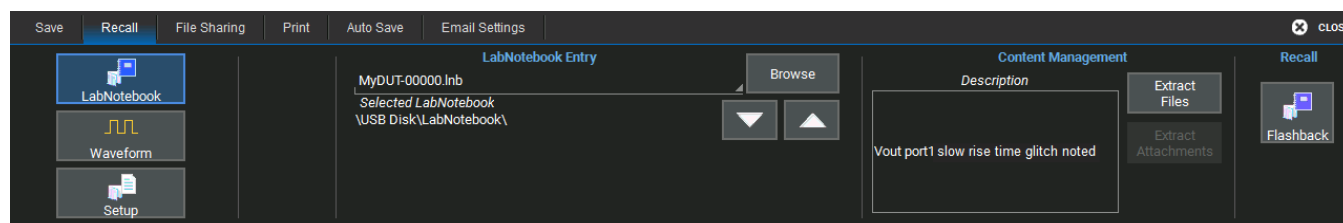


Figure 3: The Recall LabNotebook dialog; touch Flashback to restore the waveform and oscilloscope settings.

The User Button

The front panel User button can be configured to save a setup, trace, screen image or LabNotebook file when pressed, allowing you to quickly save data without opening menus. All files will be saved using the preferences you’ve set on the respective Save dialogs. Choose Utilities > Front Panel Setup to configure the button.

Conclusion

Teledyne LeCroy’s WaveSurfer 4000HD oscilloscopes are equipped with numerous tools for collecting configurations, waveform and table data, and screen images into files that can be shared with colleagues for collaborative work or used to create your lab reports.