

TDS5000 Auto Rearm and Save Files to Disk

This document will cover the use of the autoArmSave script controlling a TDS5000 series scope running on an EPICS IOC. This script is designed to configure a scope when enabled, set the scope for single seq mode, wait for a trigger event, once trigger is detected all selected channels are saved to their individual files. Once this is completed the script will rearm the scope for another single trigger event. This write up will explain what is required of the end-user to make this functional and will explain the limitation the scope presents to the programmer and user. The device support and medm displays have been updated to support these new function required for this script.

Device support improvements/additions

- Waveform record lengths have been changed from 10k to a max of 2M, (only 500k has been tested).
- Provide actual sample count in waveforms.
- Provide means to adjust record length remotely.
- Waveform files now have a time stamp appended to the filename.
- Auto adjusts to largest record length possible with current horizontal time setting.
- Created new medm display to monitor/control record lengths.

User setup required

The user of the scope needs to configure all the setting on the TDS5000 and then save these setting to Oscilloscope memory #1 (MEM1) before turning on the script. The script starts by recalling this memory setup before running and during operations. Some setting of interest might be vertical and horizontal scales, sampling modes, record length and any other setting of interest.

To use the scope medm displays with record lengths of 500k sample, the EPICS display environment variable needs to be increased to 2.5M. Before starting an medm session, set this variable as follows in an xterm window:

```
> export EPICS_CA_MAX_ARRAY_BYTES=2500000
```

then run medm:

```
> cd /home/helios/NPD/iocapps/R3.14.11/ioc/rfscopes/1/medm
```

```
> medm -x -macro "S:BM:los1:,oag=" tds5000_c.adl &
```

Once these display files have been tested and no further changes are needed, then they will be moved to the standard display folder for use by others.

The MEDM displays

It's important that the "Stop/Rd/Run" scan setting on the ACQUIRE page is set to passive mode while using this script and should not be change while the script is running. While on this page select the desired "Sampling Mode". Select TRIGGER and VERTICAL pages and make any necessary changes. Select the HORIZONTAL page and ensure that the "Scope Record Length" and "EPICS Record Length" agree with your needs.

The scope record length can be adjusted by changing the horizontal time scale which will have an effect on the waveform file size. The EPICS record length request value is the largest waveform that will be saved but it's the "Actual" value that will determine the waveform record size. The scope record length can be adjusted to match the EPICS record length by either typing in the new value and/or adjusting the horizontal time scale. Example: to get an EPICS record length of 500000 samples, first set the horizontal time scale to 40us and then enter 500000 in the "Scope Record Length" entry box. It is recommended to test this by triggering the scope once and then go to the ACQUIRE page and click on the "Stop/Rd/Run" button at least two times. Recheck the record length on the HORIZONTAL page to verify the record lengths has not changed.

At this point restore any settings that were changed during the test and then select the UTILITY page. Save the current configuration by clicking "Mem #1" on the SAVE row. Next click on "File Commands" and select "File Format Control". Only two sections are of interest here, the file format section and the bottom section with 105 character limit. The "Internal" option for the file format creates files in .wfm extension which is Tektronix binary waveform file format. The path and file name entry at the bottom have a 105 character limit were a time stamp is appended to the file name. The format is in DOS so <drive>:\<path>\<filename> needs to be defined if writing the files to a network file system. If only a file name is set, then this file will be written to c:\TekScope\waveforms directory. A file test can be performed at this time by typing in the filename and hit enter. This filename should be written to the location specified above with a time stamp appended to the end of the file name. The time stamp is in the form of <filename>YYYY-MM-DD_hh:mm:ss.<extension>. Once you have verified the file write operations are successful, enter a filename for all channels that will be used with the script.

Close this display and return to the UTILITY page. The ON/OFF control for this script is in the yellow box with the words "Auto save file..." next to it. Click ON once everything is configured and make sure the "Remote Ctrl:" button in the top center of the TDS5000 display is set to "Remote". Setting either remote control to LOCAL or auto save to OFF will abort the script, but the script will start up again once both are set to REMOTE and ON respectively.

Waveform files

Since the waveform files have a time stamp appended to its filename no user intervention is required to manage the save files from various trigger events while in operation. If the files are being stored locally on the scope then the user has to move them manually. It's recommend to configure a network drive to a file server for easy access.

Operation of the Auto/Save/File script

As briefly described above this script simply configures the scope to MEM1 settings, configure the scope for a single sequence trigger, wait for a trigger event, process the waveform data, write out the waveform data to the specified files, check for errors when writing the files and then rearm the scope for another trigger event.

Record Length issues

It's important to note that the scope record length can easily decrease in size by simply changing the horizontal time scale. The TDS5000 scope will not return on its own to the value you defined so an algorithm was created to try to set this to the largest EPICS record length that is defined as the "Requested" value. Depending on the horizontal time scale the scope record length could be larger than the EPICS record length resulting in some percentage at the end of the waveform not being recorded.

In another case the scope record length is smaller than the EPICS record length resulting in a waveform file smaller than expected. This is why the "Actual" record length is displayed on the HORIZONTAL page to alert you to this change.