



Stability Logging Script Notes

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Introduction

These notes are to accompany the script "Stability Logging.dss" – a dScope Series III automation script for monitoring a signal over a period of time. The script tracks four measurement parameters while plotting the average, minimum and maximum levels of each. It can also accept limits which are used to check the readings and to trigger the capture of a waveform when the limits are exceeded.

Installation

There are three files needed for this test which are as follows:

File Name	Description	Location (relative to dScope folder)
Stability logging.dss	Main dScope automation script	\scripts\automation
Stability logging.dsc	Main dScope configuration	\configurations
Stability logging script notes.pdf	This document	\scripts\automation

The files should be copied to the folder indicated. In a default installation the dScope folder is c:\Program Files\Prism Sound\dScope Series III\.

Running the Script

Running the script consists of either using the "Run Script" button on the dScope toolbar or selecting "Run Script" from the "Automation" menu and then selecting the script "stability logging.dss" from the file list. The script will load the dScope configuration if it is not already open and then create the user interface. At this point you can change the configuration to measure the parameters you want. When ready, press "Run" on the user interface to start logging. You can always press it again to pause the script and make more changes.

Note that because the script will not re-load the configuration if it is already loaded, any changes you make to the configuration will not be overwritten by re-starting the script (unless a different configuration is loaded in the intervening time). To re-load the configuration, go to the "File" menu and select "stability logging.dsc" from the list of recent configurations.

How it works

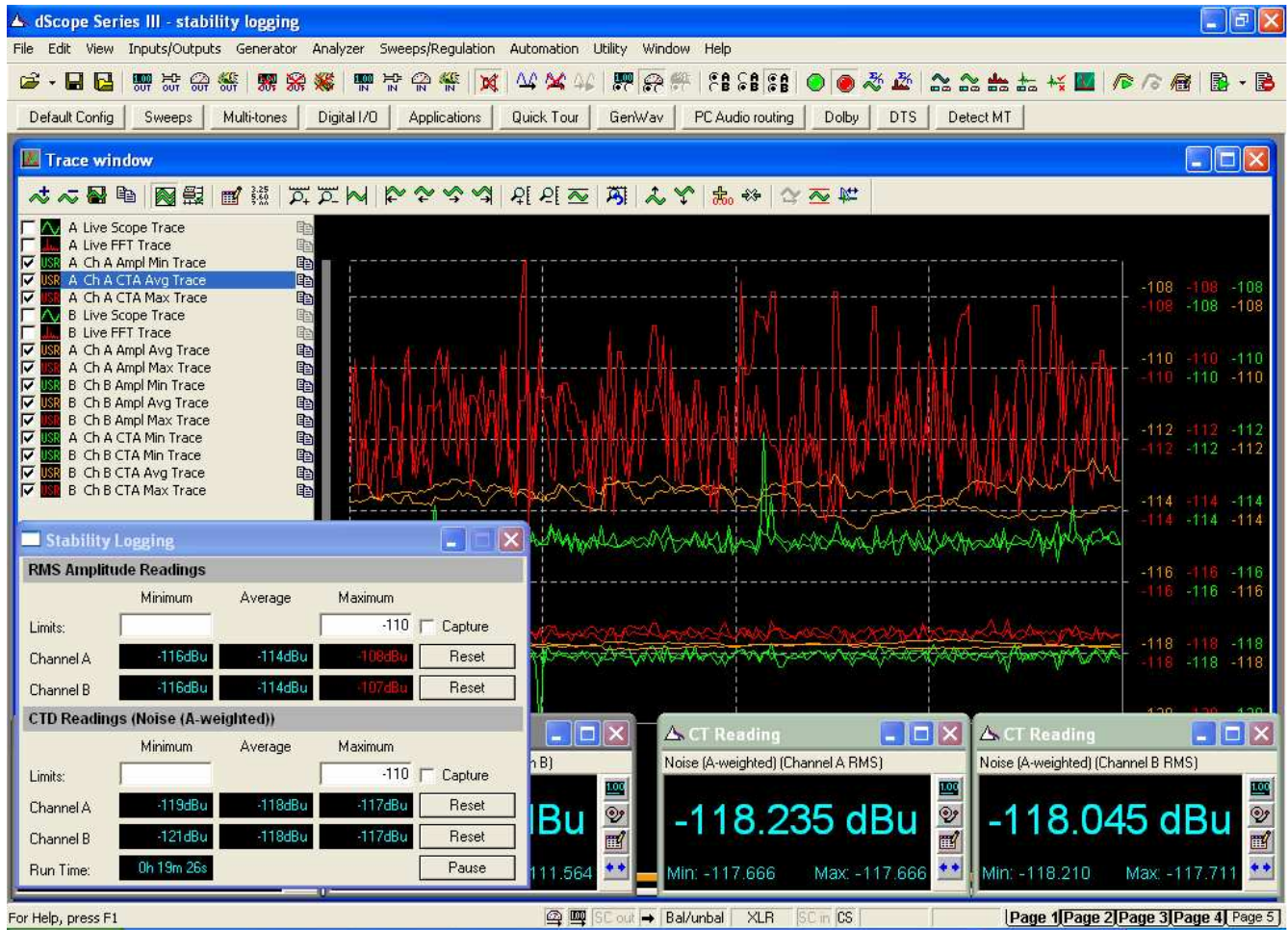
The script works by repeatedly getting measurements from dScope Readings. A Reading in this instance (with a capital R) is a separate panel in the dScope application containing a single reading from one of the dScope instruments. In this case the script uses the Continuous Time Analyzer (CTA) and the Signal Analyzer (SA). The Readings themselves are set to keep track of minimum and maximum values of the parameter they are measuring. In this way it is possible to keep track of the peak sample values, the maximum or minimum THD+N or RMS amplitude to name but a few. The script takes these data, and processes them. The current value from each Reading is used to generate a running average (by default set to 20 points, but configurable in the script). The minimum and maximum values are read from the Reading and then reset. This means that the max and min values on the dScope Readings only show the short term minimum and maximum measured since the last time they were reset by the script (typically every 300ms). The script, meanwhile, keeps track of the long term minima and maxima. The short term minima and maxima are then plotted on the trace window along with the average values.

Changing the CTA function and units

The script doesn't restrict the setting of CTA function, filters etc, or the selection of units on either the SA or CTA and uses what-ever units you select in the dScope. Note however that the traces are drawn without units shown (the units will be the same as the instruments from which they are derived) and the range available is +/-200 units. When changing units or CTA function, the script may take a little while before it updates its units and the results settle. This is because it is working on a cycle for its averaging process (by default 20 measurements) and only updates the units and CTA function once every 20 measurements (or however many points are set in the script). Also, the averaging will take this number of measurements before it has settled to the new units.



A screen shot of the script in use is shown below:



In the screen shot above, you can see noise levels being monitored with and without A-weighting. The script interface is in the lower left corner. In the Trace Window, the top set of lines is derived from the unweighted RMS level for both channels. The orange lines show the running average levels (20 point average), the red lines show the short term maximum levels and the green lines the short term minimum levels. Below those lines are the A-weighted equivalents for the same signal. Along the bottom of the screen are the Readings from which the traces are derived.

The traces are continuously updated. In the screen shot above, the trace has 200 points and they are continuously overwritten from left to right over a period of a little over a minute.



User Interface

The user interface is shown below:

RMS Amplitude Readings				
	Minimum	Average	Maximum	
Limits:	<input type="text"/>		<input type="text"/>	<input type="checkbox"/> Capture
Channel A	-10.00dBu	-10.00dBu	-10.00dBu	Reset
Channel B	-10.00dBu	-10.00dBu	-10.00dBu	Reset

CTD Readings (Noise (A-weighted))				
	Minimum	Average	Maximum	
Limits:	<input type="text"/>		-9	<input type="checkbox"/> Capture
Channel A	-9.95dBu	-9.95dBu	-9.95dBu	Reset
Channel B	-9.95dBu	-9.95dBu	-9.95dBu	Reset
Run Time:	0h 00m 33s	<input checked="" type="checkbox"/> Autorange inputs	Auto On	Pause

Readings

For each of the four measured values (Signal Analyzer channel A and B RMS amplitudes, and Continuous Time Detector channel A and B readings) there are three readings. These are the long term minimum and maximum, and the running average. The current reading and the short term minimum and maximum readings are not repeated here as they are shown on the dScope Readings.

Limits

You can set minimum or maximum limits for the readings – these have two main functions. If any of the displayed values is less than the minimum limit or greater than the maximum limit, it will be displayed in red. Also, the minimum and maximum limit levels can be used as trigger points. See capturing events below

Capturing events

If the “capture” checkbox is checked, the script can capture the waveform in order to be able to view the scope trace of the signal at a certain point in time. This is intended to be used to capture drop-outs or spikes in the waveform that are otherwise difficult to view. It uses the minimum and maximum limits as trigger points for this. If the short term minimum level is less than the minimum limit or the short term maximum level is greater than the maximum limit, the script will turn on the FFT detector trigger. There are two capture checkboxes, one for the RMS level and one for the CTD readings.

The script is set up by default with 48kHz sampling and a 32k point FFT buffer giving 680ms of sample data. This can be changed in the configuration. The FFT trigger point is also set to the end of the buffer so that the trace window will display the last 680ms of data before it was triggered. This should be long enough to contain any disturbance that caused the limits to be exceeded, even though it is now in the past. The captured data is not exported or stored so if the limits are exceeded again, the trigger will be re-started and the initial capture will be overwritten by the last triggered event. This can be prevented by un-checking the capture checkbox as soon as an event is captured. Otherwise the FFT buffer will contain the most recently captured event. See also the notes on Options configurable in the script for information on how to change this behaviour.



Resetting the maximum and minimum readings

There are four separate reset buttons to allow the separate readings to be reset independently. Resetting the readings has no effect other than to re-set the values of the long term maximum and minimum readings. It doesn't reset the run-time data or change the way the traces are plotted.

Run Time meter

To the bottom left of the user interface is the "Run Time" read-out. This displays the amount of time that has elapsed in hours, minutes and seconds since the "Run" button was last pressed. Resetting the limits or changing the CTA functions or units doesn't change this reading, but pausing the script will reset it to zero.

Run/Pause button

The "Run / Pause" button at the bottom right of the user interface is a toggle switch for starting and pausing the logging. You may wish to pause the logging while changing CTA functions or units so that it starts again with new data. If you are attempting data capture and have the autoranging turned off, you will need to pause and re-start the script if you change the level of the signal. See below.

Analogue input Auto-ranging and Data Capture

When dScope captures a buffer of audio data, if a range change occurs in that buffer, it is rejected because it will contain corrupted data from when the range setting relays change over. It then resets the trigger and a new buffer of data is acquired. In this application we may be specifically looking for changes in level and want to see the waveform when this happens without it being corrupted and rejected by a range change. In order to be able to do this, we must fix the dScope's auto-ranging so that it doesn't attempt to change if, for example, the audio drops out. (Does not apply to digital inputs)

The "Auto-range" checkbox determines what action the script takes when the "Run" button is pressed. If the box is checked, the auto-ranging will be set to "auto". If it is left unchecked, the dScope will measure the level on the analogue input, turn off auto-ranging and then fix the range setting so that there is about of 6dB of headroom above the current level.

Because the range setting is done once when the "Run" button is pressed, the auto-ranging checkbox is disabled while the logging is running and can only be changed when the script is paused. When the script is running it will have a message next to it which will either say "Auto On" or "Fixed" in green. If either of the "capture" checkboxes are then checked when the auto-ranging is on, the "Auto On" will show in red to indicate that there is a potential problem with being able to capture data in this way.



Options configurable in the script

The script has several variables that are set near the start of the script that are used to determine its behaviour. Edit the script in a text editor or in the dScope edit window to make changes. The available options are:

Change the configuration loaded: this is changed by editing the line:

```
strconfig      = "stability logging.dsc"
```

If no path is included, the dScope will try and load the configuration from the "configurations" folder. If the configuration is anywhere else, you will need to specify the full path.

Change the number of averages the running average performs. This is set by the line:

```
iAvg          = 20
```

While it may be possible to use very large numbers here, it will slow down the operation of the script. It is best to limit this value to under 100 although many thousands should work.

Change the number of significant figures or decimal places. This is used for changing how the readings are displayed in the script user interface. By default the script displays the numbers to 3 significant figures. This setting determines the number of significant figures or decimal places.

```
iPlaces       = 3
```

Change the name text that appears in the title bar of the user interface and message boxes. This is changed by changing the line:

```
strTitle      = "Stability Logging"
```

Set whether the script rounds to a number of significant figures or decimal places (true = significant figures, false = decimal places)

```
bSigFig       = true
```

Change the number of points in the trace window that show the history of the signal. Default is 200; the script generates a new point approximately 3 times a second. The more points, the longer the duration of the trace.

```
iTraceSteps   = 200
```

Control how the trace capture works: If this is set to true, the "capture" checkbox is turned off as soon as the capture has been triggered so that the script will only capture once and then need to be reset to capture again. By default this is off so that the script will continue to set the trigger every time the limits are exceeded – in this way the sample buffer will contain the last triggered event. With this set to true, it will contain the first event that triggers the FFT capture.

```
bCaptureOnce  = false
```

Contact information:

Any problems or comments about this script, please contact: scripting@prismsound.com