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Find the *Wavecrest DTS-2075* at our website: *Click HERE*

CALIBRATION

Getting Started - VISI 6

NOTE: Always allow a 30 minute warm-up period prior to performing system calibrations

There are 4 distinct calibration modes:

1. Internal Calibration

This calibration mode affects all other calibrations and should be performed first. The internal calibration characterizes the internal ramps that provide the fine accuracy for time measurements. The calibration data is stored in the instrument and used each time a measurement is taken. This calibration should be performed whenever the DTS has been off for a long period of time or if it is moved to a significantly different operating environment (>5°C). Users should allow a for 30 minute warm-up period prior to performing any calibrations or testing.

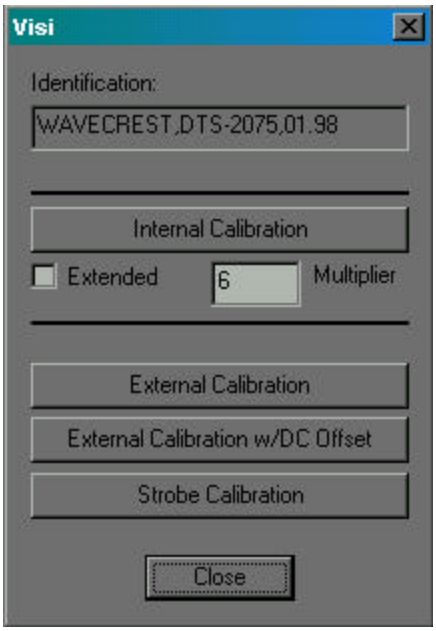


Figure 1. Calibration Menu

Instruments with firmware versions lower than 1.98 limit the length of the internal calibration to 5.5 minutes. Firmware versions 1.98 and higher allow the user to perform extended/longer internal calibrations. Longer calibrations will lower the noise floor of the DTS. The Multiplier will extend the calibration time in multiples of 5.5 minutes. To run extended calibrations, choose "extended" and a multiplier then choose "Internal Calibration". A multiplier of 6 equates to a 30 minute cal, which is typically sufficient.

There are two methods to determine the firmware version: it is momentarily displayed on the front panel as part of the power up sequence or it is displayed in the calibration menu box under Identification:.

2. External (AC) Calibration

Perform this calibration only after completion of an internal cal. This cal de-skews the cables or probes and should be performed when the measurement cables or probes are changed.

3. External Calibration with DC Offset

This calibration routine compensates for DC offsets and then automatically performs the above "External (AC) Calibration". The user should be mindful of DC offsets particularly when using active probes. "External (AC) Calibration" is then automatically performed.

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4. Strobe Calibration

Calibrates the Oscilloscope function (Strobing Voltmeter). If the Oscilloscope tool is not used to make accurate visual time measurements, then the strobe calibration is not necessary. It should be performed if discontinuities or notches, appear on the Oscilloscope plot: see Figure 2. The strobe calibration turns off the 200MHz oscillator in favor of the Strobe Calibration signal.
Run an External Calibration to turn the 200MHz Calibration outputs on after completion of a strobe calibration.

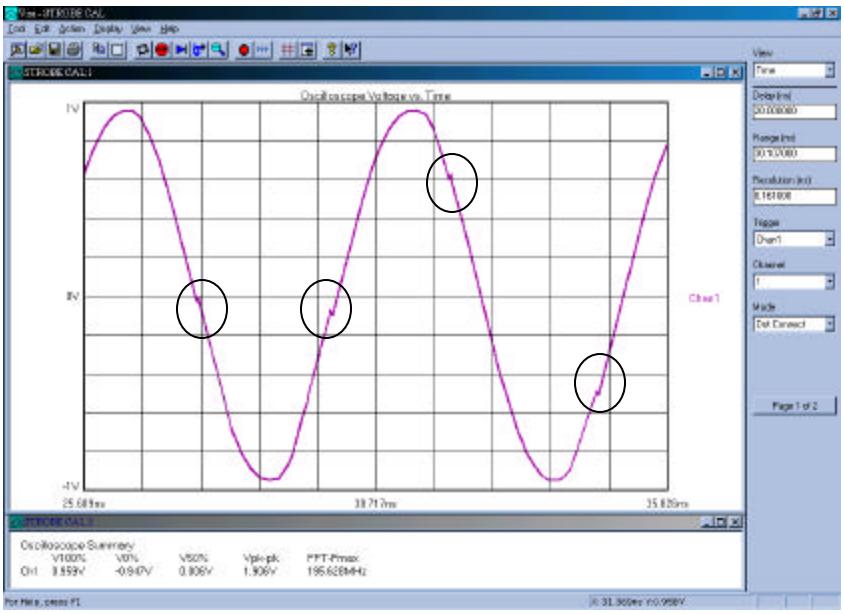


Figure 2. Example of discontinuities - Strobe cal is required

How to determine if Internal or External Calibrations are necessary—A quick test.

The VISI Histogram tool can be used to check the calibration:

- Connect CAL1 to CH1 and CAL2 to CH2 **(to look at the 200MHz cal source)**
- Open the Histogram tool. Press Pulse Find and GO
- Select Period Measurement
- The Histogram should be comparable to Figure 3.

<u>The internal cal is good if:</u>

- Pk-Pk is about 20 or less
- 1-sigma is about 3.

<u>The external cal is good if:</u>

- Mean of the period is 5000±10pS.

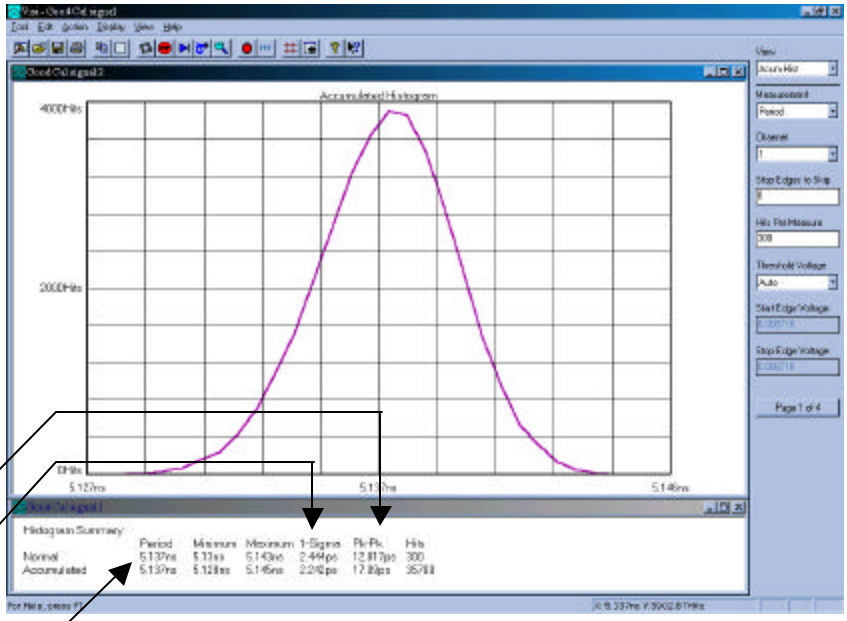


Figure 3. Good calibration

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If the histogram is not like Figure 3, but rather more like Figure 4, perform the internal and external calibrations.

Figure 4 shows a bimodal distribution. This means that there are two distinct periods. The 200MHz calibration output is a very stable filtered output oscillator which, when viewed with the Histogram tool, produces a single period distribution. A deviation from a clean, gaussian distribution indicates that the internal circuits have drifted and the calibration files no longer apply to the hardware conditions, indicating the need for Calibrations.

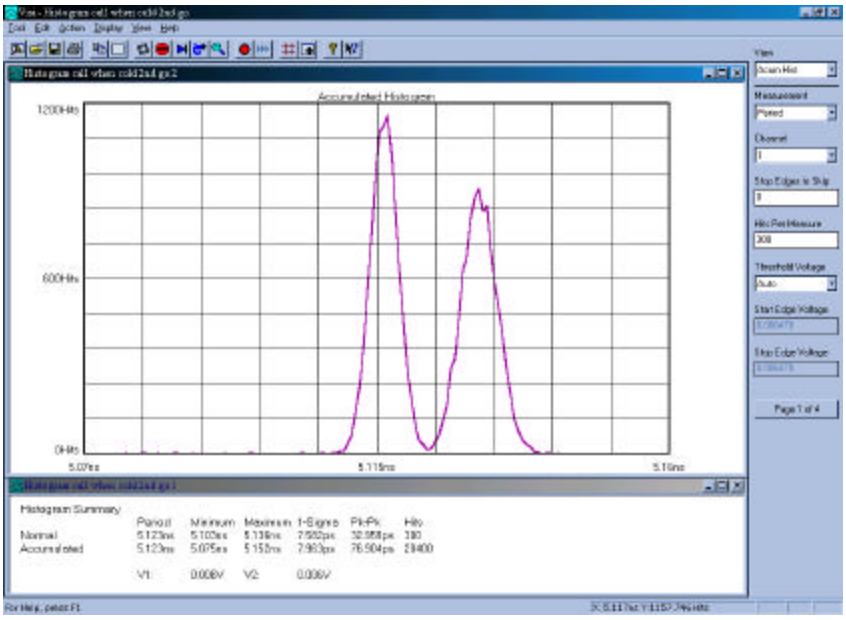


Figure 4. DTS in need of internal calibration

How to Determine if "External (AC) with DC Cal" is necessary:

- Connect Cal1 to CH1 and Cal2 to CH2.
- Select the Oscilloscope tool.
- In page 1 of the side Dialog bar, under Channel,select "Both".
- In the top toolbar press the Pulse Find button . Observe the Pulse Find Box (Figure 5). The Min, Max and Threshold voltage values will be displayed for the Channel / Trigger channels that the user has selected.
-



Figure 5. Pulse Find Box

"External with DC cal" is good if:

- The pk-pk voltage is about 2v
- The Minimum or Maximum does not exceed ±1.1v

Perform "External with DC cal" if:

- pk-pk voltage is less than approximately 1.80v
- Minimum and Maximum are not balanced around zero
- Minimum or Maximum is +1.1v or -1.1v

Calibration Quick Check is finished

The quick check verifies the period measurement function. For a complete cal check of all measurement functions refer to the calibration check card that is shipped with the DTS or refer to the user's manual.

Performing Internal Calibration

In the menus above the top toolbar, select Action followed by Calibration... Press "Internal Calibration" (Figure 1). To run an extended calibration, select Extended and choose a Multiplier from 1 (5.5 minutes) to 24 (2.5 hours). The default of 6 gives a 30 minute calibration for typical results. No front panel connections are necessary for the Internal Calibration. The time until completion is shown on the front panel display.

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Performing External calibration

Again go to Action, and select the Calibration... menu.

- Press External Calibration (see Figure 1).
- A dialog appears: “Confirm External Calibration”. Press Yes; follow software prompts.
- Connect CAL1 to CH1 and CAL2 to CH2. Press Continue.
- The following dialog box says “Cross Cable Connections at Cal Signal Connectors”; do this by swapping the cables at the CAL outputs (do not change the cables at the measurement channel inputs). Press Continue.
- The External Calibration Process is now complete.

Performing External Calibration with DC Offset

This Calibration performs a DC cal first and then performs the External Calibration as described above. The purpose of the DC Cal portion is to zero any DC offsets which may be caused by active probes or any sort of DC offset in the setup.

- Press External Calibration w/DC Offset (see Figure 1).
- A dialog appears: “Confirm External Calibration”. Press Yes; follow software prompts.
- Apply Shorting Caps to CH1 and CH2. These are SMA-type shorts (*Note: DO NOT short the CAL1 or CAL2 outputs*). Press continue.
- Remove Shorting Caps and press Continue.
- Ground all inputs. You may apply shorting caps to CH1, CH2, ARM1 and ARM2 (*Note: DO NOT short the CAL1 or CAL2 outputs*). If using active probes, ground them to the DUT ground instead of applying shorting caps to the measurement channel. Press Continue.

The DC portion is now complete and the software will immediately begin External Calibration (see Performing External Calibration above).

Performing Strobe Calibration

- Go to the Calibration... menu. Select Strobe Calibration; follow software prompts.
- Connect CAL1 to CH1 and CAL2 to ARM1. Press Continue.
- Move Cal2 from ARM1 to ARM2. Press Continue.
- Move CAL1 from CH1 to CH2. Press Continue.
- Strobe Calibration is now complete.

The DTS is now ready to make a time or voltage measurement on the input channels. Connect the de-skewed probes or cables to the circuit to be measured and refer to the DTS-2075/2077 User’s Guide for a description of the various time and voltage measurement features

Feel free to contact *WAVECREST* if you have any questions.

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Rev04.13.01arh

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