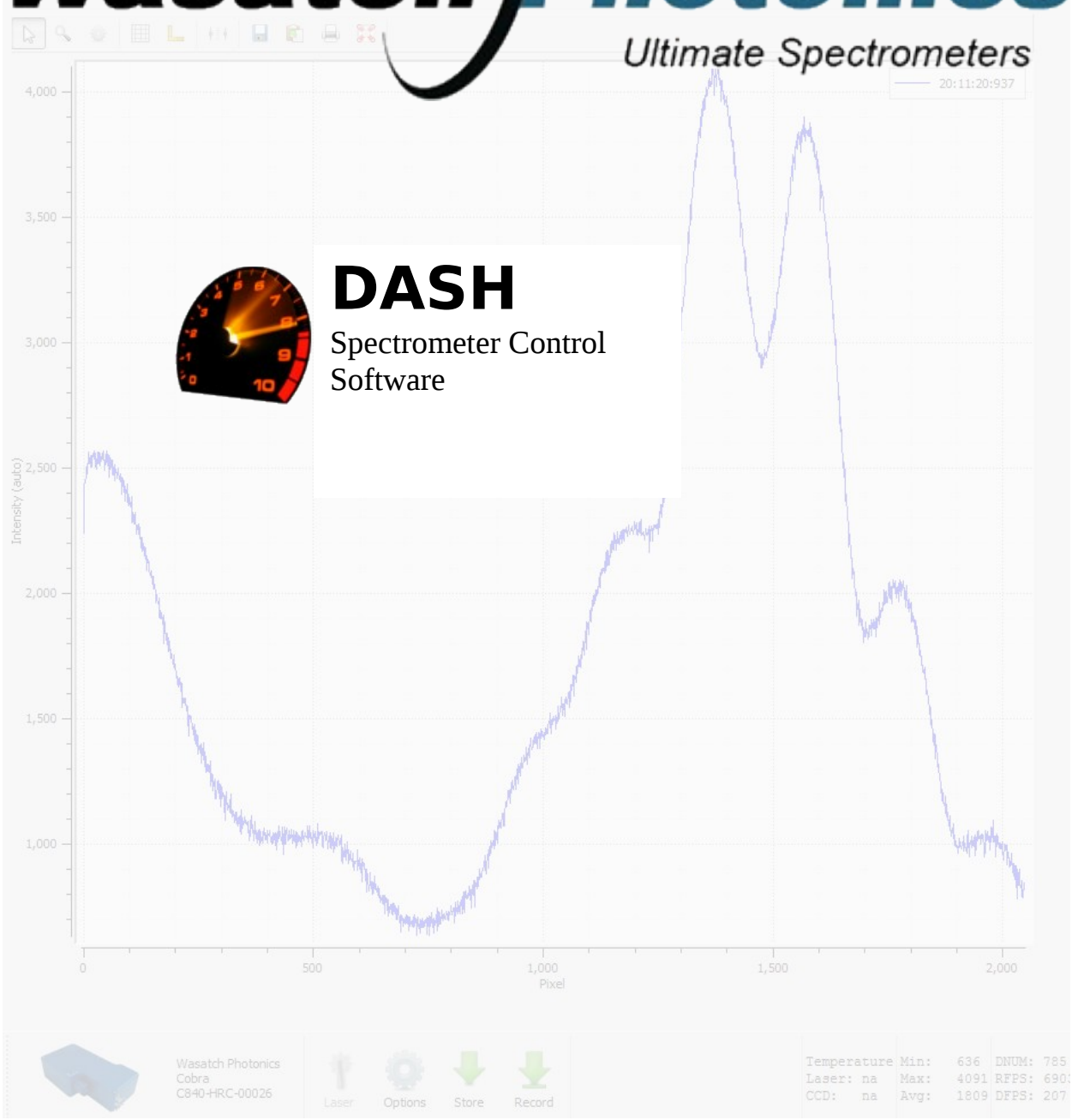
Wasatch Photonics

Ultimate Spectrometers



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About Wasatch Photonics

Wasatch Photonics specializes in high performance Volume Phase Holographic Gratings (VPHGs), Volume Phase Holographic Optical Elements (VHOEs), and systems based on these components. Systems include spectrometers for applications ranging from Raman spectroscopy to optical coherence tomography to hyper-spectral imaging for users including researchers, end users, and OEM's.

At Wasatch Photonics, we are committed to quality, innovation, and meeting the needs of our customers. With 130+ years of combined experience and 80+ patents in the design and manufacture of Volume Phase Holography and instruments, our skilled staff is unmatched in quality and know-how.

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1.1 Description of product

The Dash spectrometer control software (Dash) is designed to provide access to members of the Wasatch Photonics series of spectrometers. Specifically targeting the Stroker and Cobra product lines, the included software provides a user interface suitable for instrument checkout, basic spectroscopy, as well as a portable data extraction and review mechanism.

1.2 System Requirements

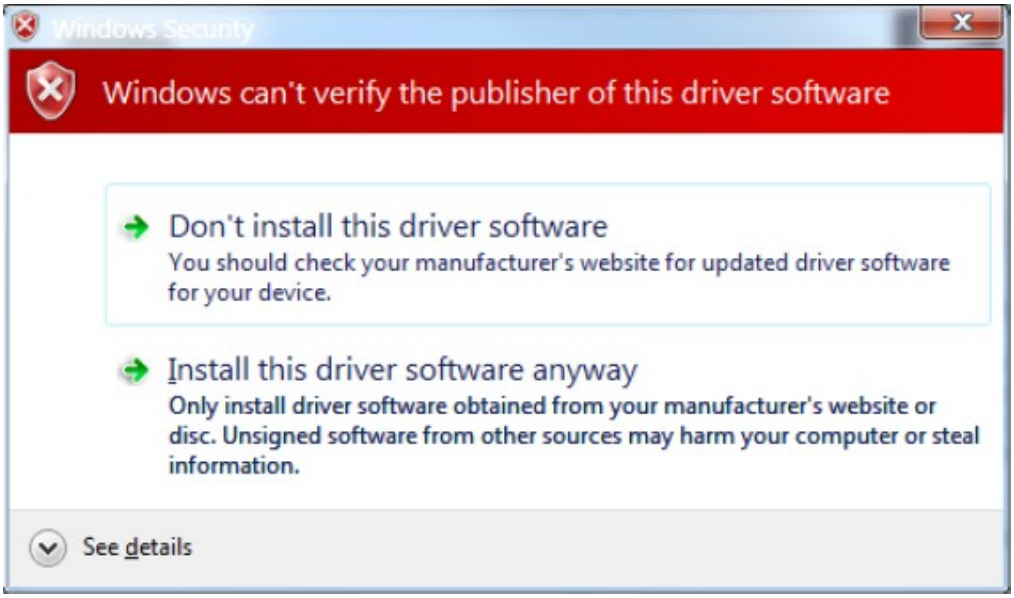
Dash has been tested on Windows 7, Vista, XP and to a limited extent, XP embedded. While Windows 7, Vista and XP Service Pack 2 provide all of the required libraries for Dash functionality, certain XP embedded installations will require the installation of MS Visual Studio 2008 runtimes and other libraries. Please consult your embedded system build documentation for details on how to install these libraries. The best user experience comes with a Windows 7 64bit system with an Intel i7 processor and at least 2GB of RAM.

1.3 Software Installation

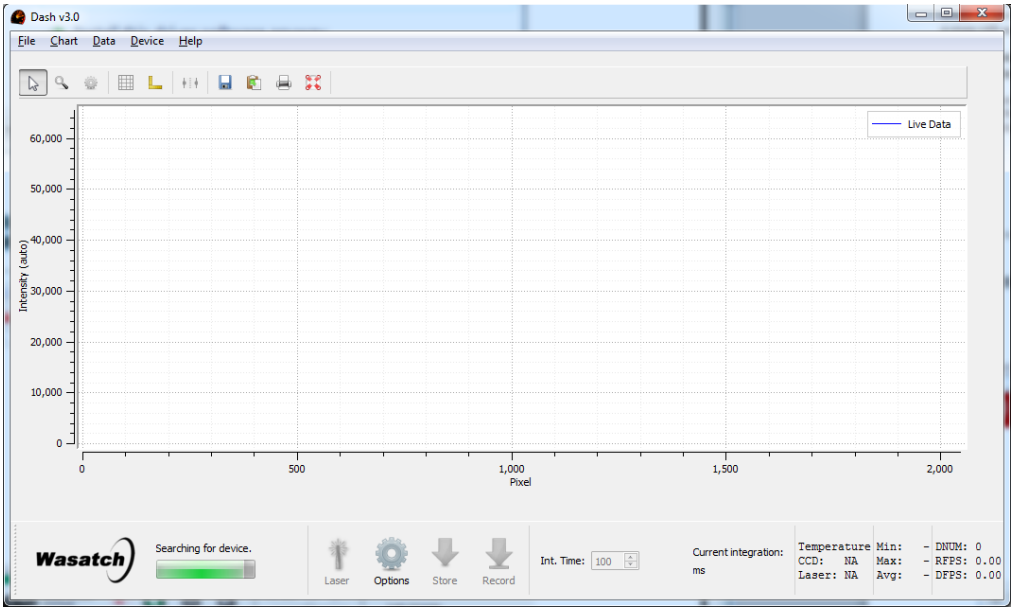
Dash installation (currently tested only on Win7 x32, Win7 x64, and XP x32 systems)

1) Ensure the spectrometer is **not** connected to the system.

2) Run the provided Dash-setup.exe file. Accept all of the defaults. During the installation process, click **Yes**, **Ok** or **Install** to any confirmation messages related to driver installation such as that shown below:



3) Click finish to launch the Dash application, and you should see a window like that shown below:



4) Plug in the Cobra Spectrometer to the Computer's usb port. The "Installing device driver software" wizard should appear in the system tray area. Wait for this process to finish with the message of "Device driver software installed successfully"

5) Restore the focus of the Dash program and you should see the spectral data from the instrument updating.

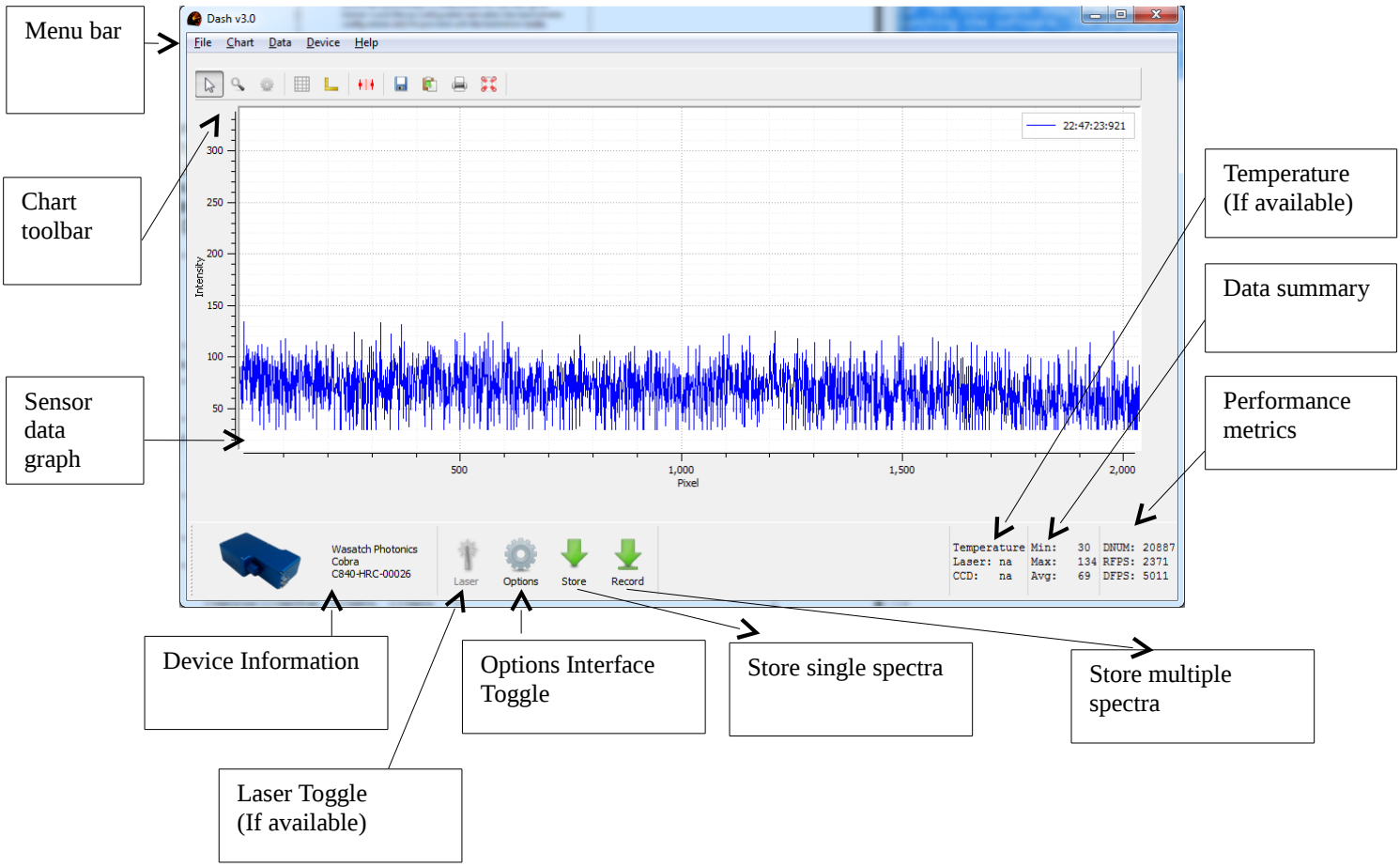
2 Software Interface

Dash is used to capture, view and save spectra from a Wasatch Stroker or Cobra spectrometer instrument. The software has the following basic features:

- USB communication with a Stroker or Cobra to acquire spectra
- History window – all spectra captured in a session are held in memory unless cleared or the program is closed
- Multiple x-axes available: pixel index, wavelength (nm) and wavenumber(cm-1)
- Saving of spectra graph imagery files
- Saving of all spectra data in current history window
- Loading spectra data into history (appending to current history)
- Capture of a user-defined number of spectra
- Capture of continuous spectra acquisitions
- Ability to average a user-defined number of spectra
- Ability to assign a baseline/blank spectra in history window such that all spectra *viewed* have that baseline/blank spectra subtracted
- Ability to clear individual or groups of spectra from the spectra frame history
- Ability for each capture frame to have its own unique calibration coefficients

2.1 Launching the Dash Software

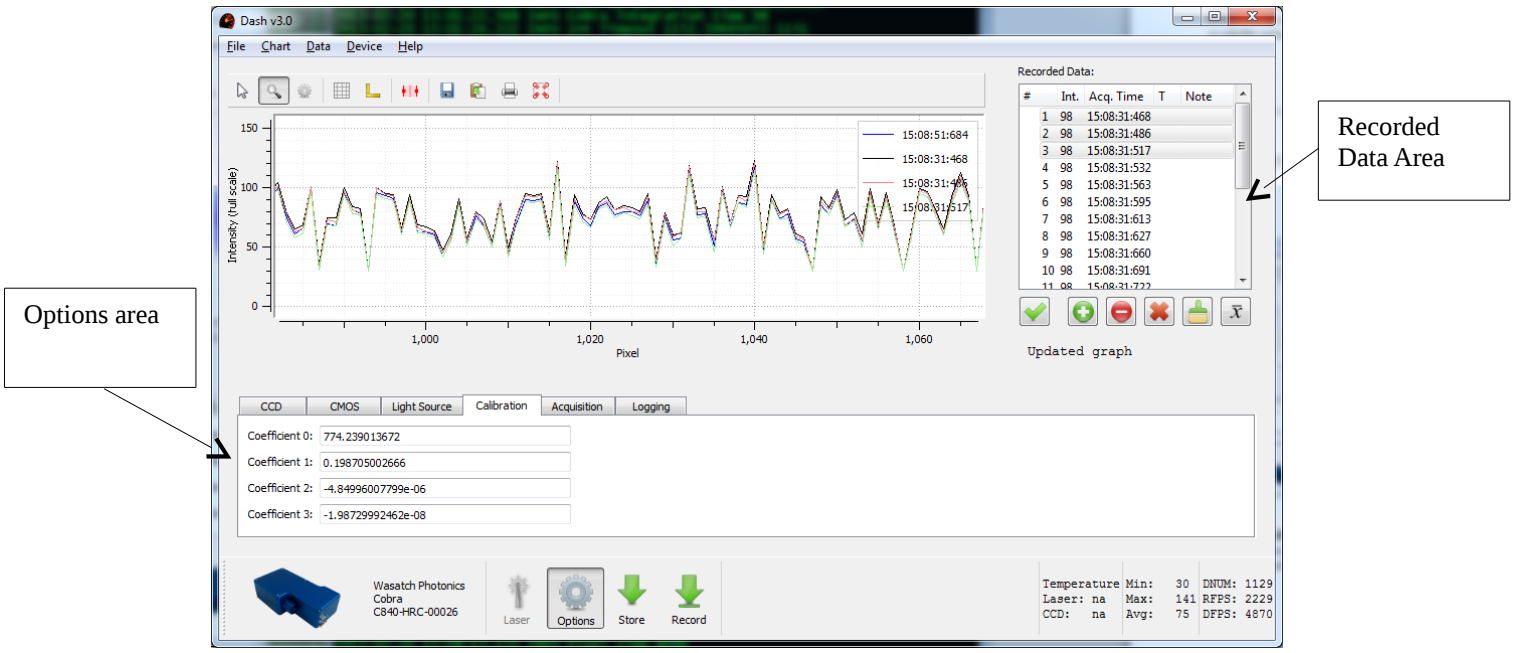
The instrument should be powered and connected to the computer through the USB cable before launching the software. The software is launched using the Dash shortcut in the Programs menu. At first startup, the user should expect to see an interface like that shown below. The user should familiarize themselves with these interface components to most effectively use the system.



- Menu Bar: Used to load and save data, as well as access chart viewing functions and Dash software information.
- Sensor Data: The currently extracted sensor data from the instrument.
- Options Interface Toggle: Show or hide the options tab area (shown below)
- Store and Record buttons for storing data from the instrument (shown below)
- Temperature, Data summary and performance metrics provide meta-data on the instrument and acquisition attributes.

2.2 Running the software

The typical order of operations upon launch of the software is to verify the configuration information, and modify the acquisition parameters. Click the **Options** toggle button to view the available options for your device as shown below:



Click the **Calibration** tab, and review the calibration coefficients for pixel to wavelength and wavenumber conversion. These calibration coefficients should match those provided in the Spectrometer Calibration report provided by Wasatch Photonics. Next, click the CMOS tab and review the settings for the CMOS sensor for that device.

2.2.1 CCD Options Tab

- **Integration Time:** Time in milliseconds to integrate during capture.
- **Offset:** Can range from 0 to 65533. Larger values move the spectrum towards the top of the range.
- **Gain:** Digital gain value is a floating point 0.0 to 10.0.
- **CCD Setpoint:** Where CCD cooling is available; specify the temperature in degrees Celsius for the TEC to maintain.
- **CCD Cooling:** Where CCD cooling is available; specify whether the cooling should be enabled or disabled.

- **CCD Test Pattern:** Return a ramping value from the spectrometer to verify data connectivity.

- **TEC Coefficients:** Where CCD cooling is available; specify the setpoint to temperature setpoint converstion coeffiicents.

- **Ext. Trigger:** Where the external IO board is available; specify the unit should trigger an integration upon receipt of an external trigger.

- **DAC Value:** Where the external IO board is available; specify the output analog voltage from the spectrometer.

2.2.2 CMOS Options Tab

- **Offset:** Can range from 0 to 255. Larger values will move the spectrum towards the bottom and smaller values will move it up toward the middle.

- **Gain:** Can range from 0 to 255. Values in the range of 180 to 210 are usually about right. Larger gain values will push the spectrum toward the bottom (since the magnitude of the entire spectrum is being amplified around the mid-point of the dynamic range).

- **Line Time:** Time in microseconds for a single capture of data from the camera.

- **Integration Time:** Time in microseconds to integrate during capture.

- **Trigger:** Check the External setting to use the external trigger cable to indicate the line time. The spectrometer will start the line read out at the low to high transition rate of the trigger source. Input trigger values should be 0 (low) to 3.3V(high).

- **Test Pattern:** Return a ramp of values across the range of pixels, starting at 32 and ending at 2079.

2.2.3 Light Source Options Tab

- **Source Wavelength:** Specify the source wavelength in nanometers for correct calibration in the Wavenumber view.

2.2.4 Calibration Options Tab

- Calibration coefficients should match those provided in the Spectrometer Calibration report provided by Wasatch Photonics.

2.2.5 Acquisition Options Tab

- **Record:** Specify the number of acquisitions to store when the Record button is clicked.

2.2.6 Logging Options Tab

- Show detailed information on the Dash spectrometer control software underlying processes not usually shown to the user.

2.2.7 Recorded Data Area

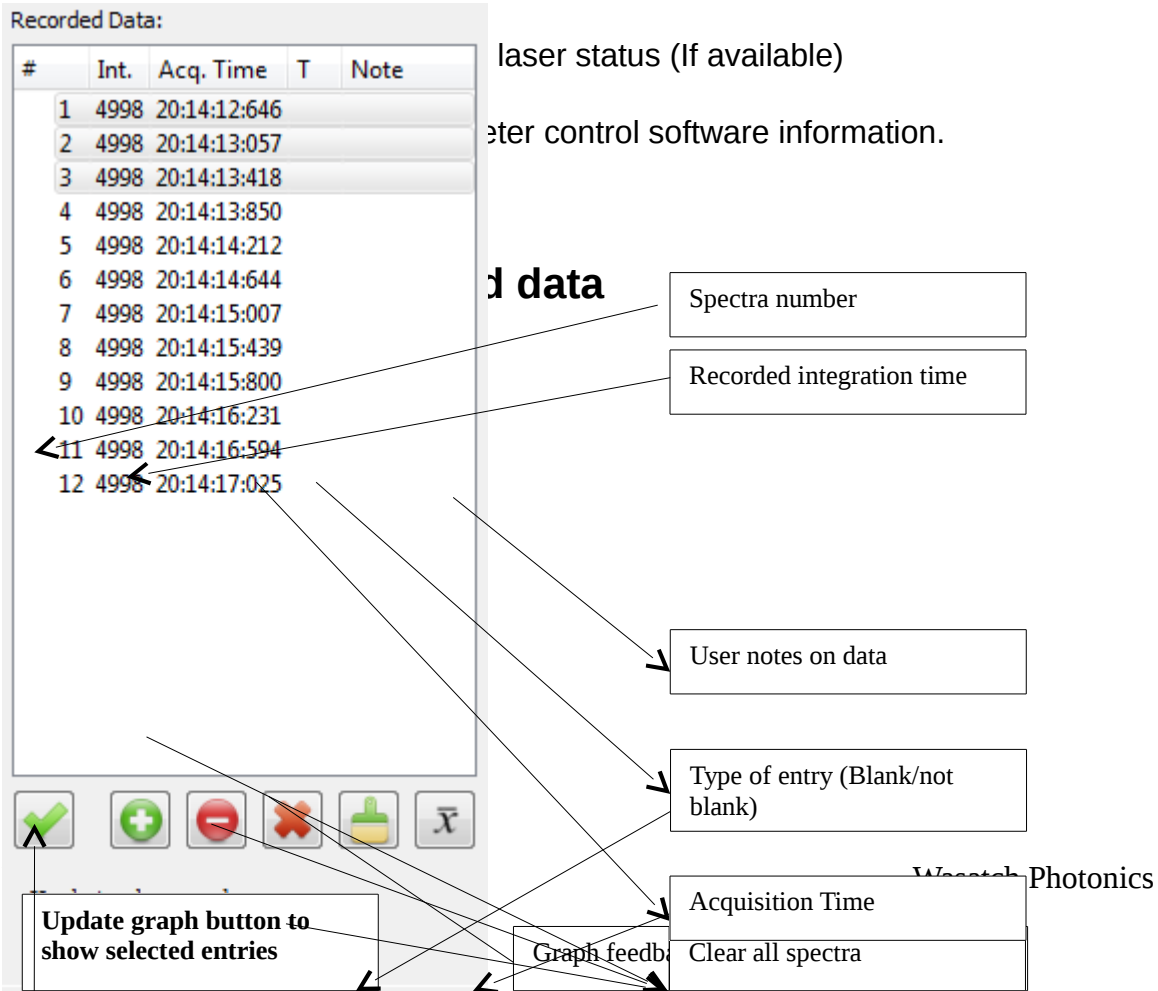
- Shows detailed information on recorded data. See below for more details.

2.2.8 Menu bar settings

- **File:** Exit the program, open and save recorded data.

- **Chart:** Toggle between automatic and fixed scaling of graph data. Show Pixel, Wavelength or Wavenumber view.

- **Data:** Store single, record multiple readings from the device. Set blank, unblank and work with stored data. See below for more detail.



laser status (If available)

eter control software information.

d data

3.1 Overlaying Spectra

After storing data using either the Store or Record mechanism, the stored data list will appear in the main interface. Select individual records by clicking on them, or use the shift and ctrl buttons to select groups of records. After selection, click the **Update Graph** green button to show the selected entries in the main graph area. Double click the note field to type in notes specific for a data entry.

3.2 Subtracting Blanks

The Make Blank button is used to assign a particular spectra from the history window as a “Blank spectra”. This means that any spectra viewed after assigning a blank has the blank spectra subtracted from it. To “unassign” a blank, choose the blank frame and hit the “make unblank” button. Note that if the spectra history is saved to file, only the raw data is saved, not the subtracted spectra. However, one can manually subtract spectra since all of the history, including annotations of which frame is the blank spectra frame, is saved to file.

3.3 Deleting Spectra

Use the Clear button to remove all spectra from the recorded data area, and the delete selected spectra button to remove individual entries.

3.4 Averaging spectra

Consider the following narrative to create an average of 10 spectra: Go to the Options->Acquisition tab, and set the record spectra control entry to 10. Position the sample as required, then click the Record button. Shift-click the first and last entries in the recorded spectra area, then click the Average button. The user will then see a new entry added in the recorded spectra area that comprises an average of the selected spectra, with an appropriate designation in the note field.

3.5 File Menu Operations

3.5.1 Saving/ Opening Spectra

File->Save saves all the data in the history window to a CSV file. On File->Open, data will be appended to the existing entries stored in the history window.

3.5.2 Chart viewing

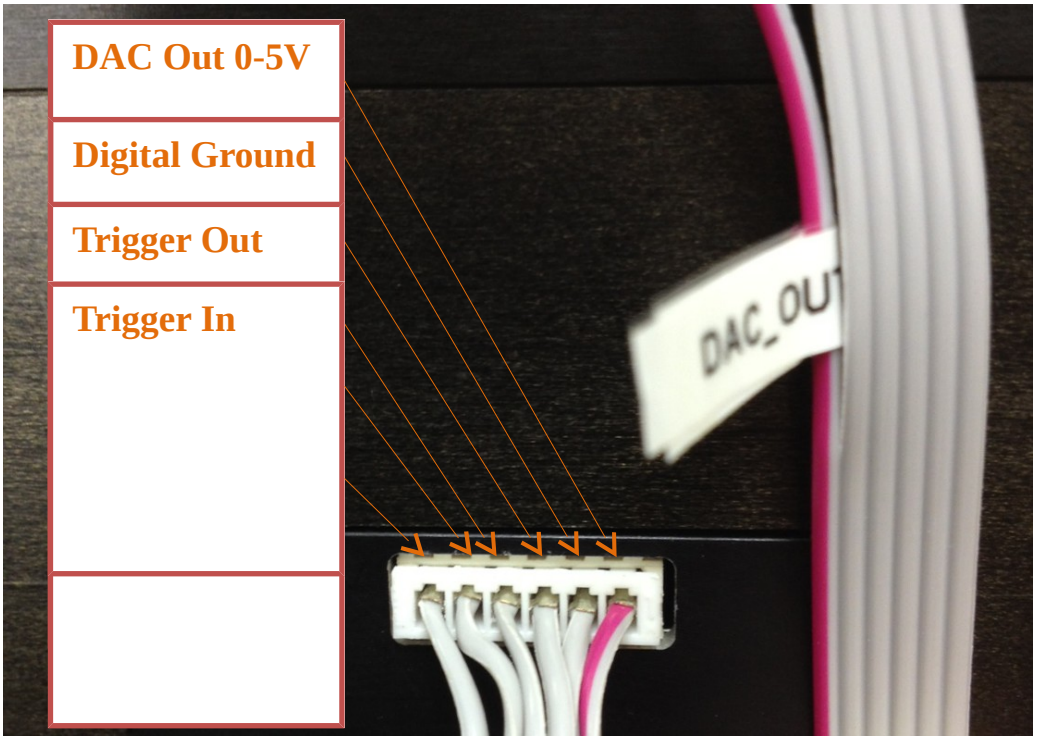
Use the Chart menu options to change the auto scaling of viewed sensor data. Choose between Pixel (default), wavelength and wavenumber views of the sensor data. If available, a strip chart will be shown of the spectrometer sensor temperature by toggling the temperature view.

3.6 Chart Toolbar Options

Use the chart toolbar buttons to work with the imagery of the graph, including save, copy to clipboard and print of the rendered graph. Right click the graph background and the line data of the graph for further customizable options of the data and the chart as a whole.

4 External Input/Output control

On certain systems equipped with the External I/O board, the connection is shown in detail below:



5 Troubleshooting

Please contact Wasatch Photonics in Durham, North Carolina with any troubleshooting questions.

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