

# StellarNet Application Note: TTL Triggers

Some StellarNet spectrometers can be configured with a TTL input (StellarNet Part # JACK-IN; \$100) or output (StellarNet Part # JACK-OUT; \$100) to enable the spectrometer to scan when triggered by an external light source (i.e. laser, flash lamp, etc.). These are the same that are used for our PORTA-LIBS systems for elemental analysis

For the Jack-in trigger option, the spectrometer **must** be upgraded to LT-12 electronics, if not already configured. This input is located on the back of the spectrometer and a TTL signal pulse is 0 to +5VDC and 1ms wide. When the trigger is at zero level no spectrometer scans are taken. During the rising edge of the pulse the spectrometer is requested to scan and occurs 500ns ( $500 \times 10^{-9}$  seconds) later. We are not able to detect jitter as it is virtually instantaneous.

When the Jack-in trigger is engaged it will be set to a low level which prevents the spectrometer from continuously returning spectra. To override the driver "time-out", set the SpectraWiz -> Setup -> External trigger capture = on (checked). Additionally, the detector integration time must be set to 30ms with XTIMING resolution control set to level 3 to capture at the highest resolution.

The external trigger has a fixed 500ns delay. If the spectrometer(s) is configured for our PORTA-LIBS system, it has an external delay gate that is controlled by a switch setting on the PORTA-LIBS electronics module. There is an optical trigger from the laser which performs a delay and then triggers the spectrometers (with our package this is adjustable from 2 to 105 microseconds). Also there is less than a 500 ns time delay between the rising pulse and when the unit starts the integration.

When testing, a TTL signal is not needed because the positive input is internally tied to the +5 level using a pull-up resistor and in this state the spectrometer runs normally. If both legs are shorted together then the spectrometer will appear to stop working and will return a "time-out". The setup menu selection for "external trigger" prevents a "time-out" message from being returned by the SWDLL.DLL driver. This is used for example by the PORTA-LIBS application when prompted to fire the laser after turning on the laser key to power the laser. This action holds the "positive" leg of the trigger in low until a pulse is developed by the 1064nm laser ignition developed by an InGaAs photo diode that watches the laser flash tube. The external trigger function is programmatically handled by the software so the user does not need to make this selection when running the Spectral-ID application in SpectraWiz.

Here's how to easily test the triggering function: Plug into trigger jack with cable and the 2 wires exposed. With spectrometer running short the 2 wires and the spectrometer stops updating spectra on the screen. Open the 2 wires and the spectra starts updating again.

For questions or more information, please contact us: [support@stellarnet.us](mailto:support@stellarnet.us).