# Setup Guide

Disclaimer: FastScan was developed and tested on an Agilent DSO5032A oscilloscope, and Keysight 81960A fast swept laser. It may work with other combinations of Agilent/Keysight scopes/lasers, but may not be completely compatible. Use at your own risk.

Prerequisites

I will assume you have a *GPIB controller* connected to your computer, that you are running Windows 7/10, and that you have a **MATLAB** installation (R2012a or later) that includes the *Instrument Control Toolbox*.

Hopefully, you will have also installed NI-VISA as well as the drivers for your particular GPIB controller.

Part 0 - Make the physical connections – GPIB/USB
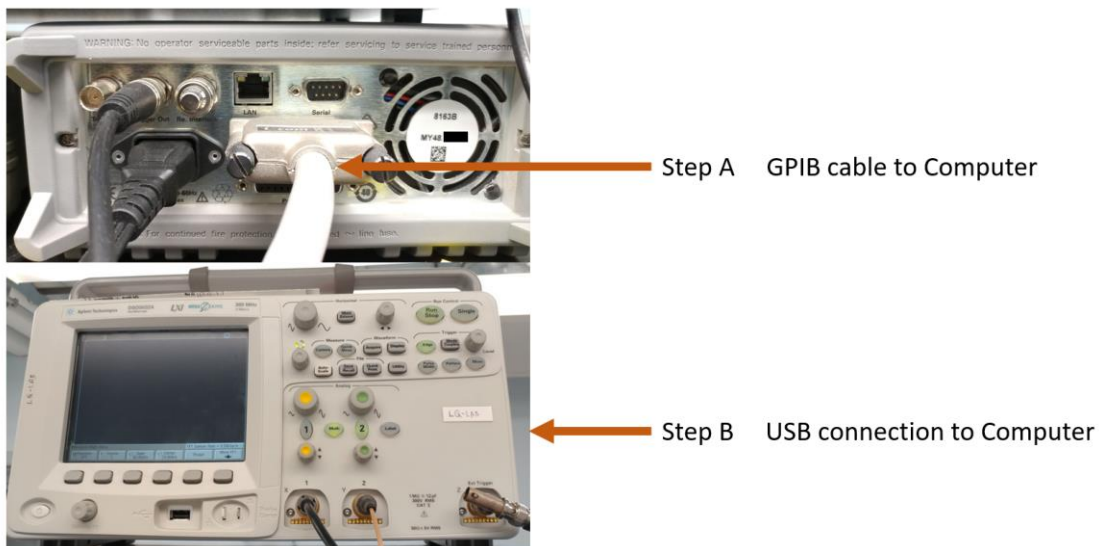
Step A – Connect the GPIB cable at the back of the tunable laser (TLS) to the computer's GPIB controller.

Step B – Connect the oscilloscope (scope) to your computer with a USB A to USB B cable. The USB B connector is at the back of the scope. This is what a USB B connector looks like (image source: Wikipedia):
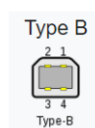
Part 1 - Make the physical connections – RF

Step A — Trigger Out to Scope

Step B — Connect to Fast Photodiode

Step A — External Trigger to TLS
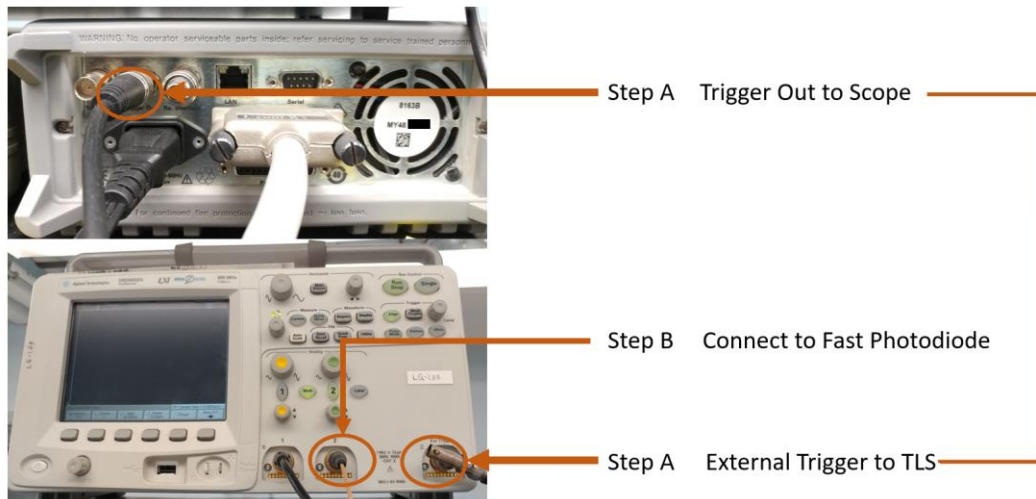
Step A - Connect the '*Trigger Output'* in the back panel of the TLS to the '*External Trigger'* of the scope with a BNC cable.

Step B - The RF output of your photodiode should also be connected to one of the input channels of the scope.

The two snippets of code (from the FastScan script) below show how we've configured the '*Trigger Output*' of the TLS (left) and '*External trigger'* of the scope (right) to behave.

```
285    %TLS will be  kept open;
286    %
287    fprintf('Set TLS RF Trigger Output: \n');
288    fprintf(TLS, 'trig:inp ign')        % ignore input
289    fprintf(TLS, 'trig:outp SWSTarted')   % output = sweep started
```

```
339    %
340    %set the trigger:
341    fprintf(AgScope, ':TRIGger:SWEep NORMAL');
342    fprintf(AgScope, ':TRIGger:HOLDOFF 6e-8');
343    fprintf(AgScope, ':TRIGger:EDGE:SOURce EXT');
344    fprintf(AgScope, ':TRIGger:EDGE:SLOPE POS');
345    fprintf(AgScope, ':TRIGger:EDGE:LEVEL 5e-1');
346    %
```

The TLS will send out a trigger pulse every time a sweep has started. The scope will trigger on the rising edge of that pulse.

Everyone's optical setup will be different, so I will assume the user has somehow coupled the laser light to their device under test, and out-coupled it into the photodiode.

## Part 2 – Find the USB-VISA address for your Agilent digital scope

Step A – `Utility` Button

Step B - `I/O` Soft-key

USB:
VISA address: USB0::2391::6003::MY████4::INSTR

Step C –USB VISA Address

```
37      global AgScope TLS;
38      AgScope = visa('agilent','USB0::0x0957::0x1773::MY████4::INSTR');
```

Step A – Press the Utility Button

Step B – Press the I/O soft key

Step C – Jot down the USB-VISA address and enter it into the appropriate line of the FastScan MATLAB script. I have blacked out the last few digits of the address (the serial no of the device). Note also that first part of the address in FastScan has been written in base-hexadecimal rather than base-10; they are identical otherwise.

Part 3 – Find the GPIB address of your laser
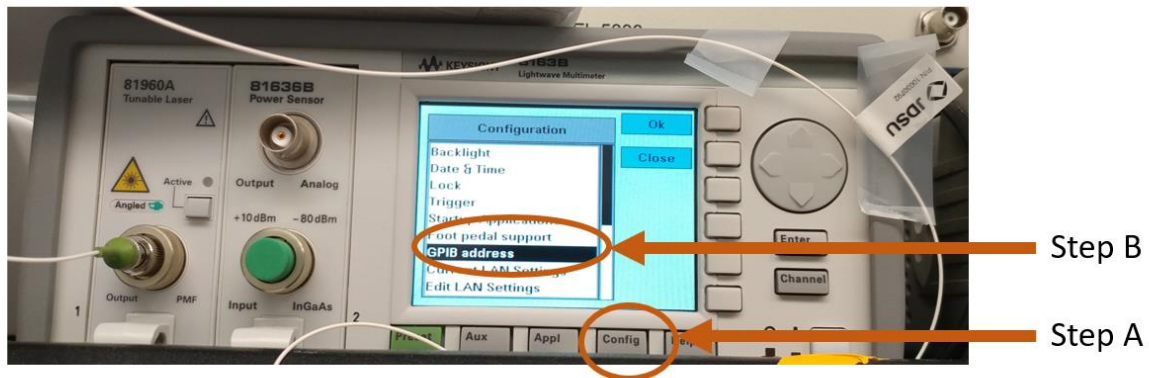
Step B

Step A

```
161
162    function LaserSource = OpenLaser()
163
164        LaserSource= gpib('agilent', 32, 20);          Step C
165        if  strcmp(LaserSource.Status, 'open')
166            fclose(LaserSource);
167        end
168        fopen(LaserSource);
169
170
```

Step A – Press the Config Key on the Mainframe

Step B – Scroll down to 'GPIB address' and press the 'Ok' soft key.

Step C – Write down the GPIB address and update the relevant line in the FastScan script.

Fire up MATLAB and you're ready to roll!