

Using NIS Elements to control TTL Devices

If you have a current copy of NIS Elements, advanced interpreter and a PC with a parallel (LPT) port, you can use Elements to drive a large variety of triggered devices. Some examples of devices you can control:

- Shutters which accept 5v TTL inputs (Uniblitz, Sutter etc)
- AOTF Units (On/Off for specific wavelengths using NEOS)
- Flash lamps
- Profusion Pumps
- Other software applications (i.e. patching systems)
- Many other hardware/software devices

What you will need to enable control of a device:

1. NIS Elements BR with Advanced Interpreter or AR
2. 2 Zip files from Nikon: *PIOSetup.zip* and *Parallel_Port.zip* (should be included with this how-to).
3. A PC with a true EPP bi-directional parallel port

***USB –Based PCI cards WILL NOT WORK. If you need to add a card you MUST get one from LAVA. I have confirmed these boards work.

<http://www.lavalink.com/index.php?id=151>

4. An appropriate DB-25 Connector with breakout cables or a make-it-yourself kit.
5. A multi-meter for testing your cable and connection (Needs to read Ohms and DC Volts)
6. Using a DB-25 breakout box is a handy thing – if you don't have access to one you can get by using *parmon.zip*, included with this document.

Installing the drivers and Macros:

Before Building the cable the software should be loaded and confirmed operational. Follow the steps below to accomplish this:

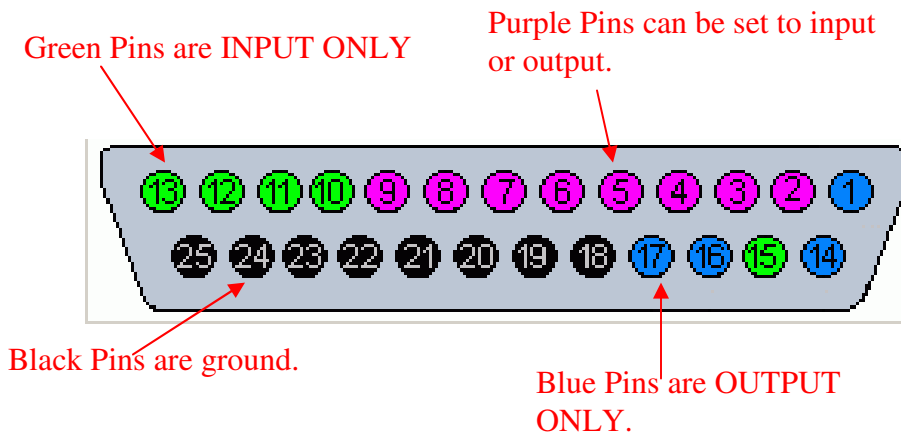
1. Unzip the contents of the ZIP file named *PIOSetup.zip* into the C:\Program Files\NIS Elements folder (or wherever you have elements installed).
2. Unzip the contents of the *Parallel_Port.zip* file into your macros folder.
3. Open *Parmon.zip* and extract the .exe file onto your desktop.

4. Run Parmon.exe. This program will show the current state of each of the parallel port pins. It also allows you to control the pins but we only want to use it as a diagnostic tool.
5. Start (or restart) Elements. Open the Macro named "Shutter Toggle.mac". This macro will flash Pin 14 high and low. Press F-4 a few times while watching Parmon to confirm that elements is controlling the parallel port. If successful continue, if not check your directory locations, or set the line in the macro named "fnLucia_setParallelPort(1);" to "fnLucia_setParallelPort(0);" and try again.
6. From here you can program any of your lines and the state they use from the macro. You can make a series of macros to set various lines to any state you wish. Remember you can make buttons for the macros as well as run the macros within an ND Experiment.

Building the Cable

The cable can be built to at least 8 control lines. I haven't tried more but it is theoretically possible.

1. The DB-25 connector has a series of pins numbered 1-25. Some of these pins are used to provide input, others output, others are ground pins and still others can operate in both directions. For our application we are concerned with using the output pins and the ground pins.



2. Most device controllers will accept a TTL signal via a BNC connector. The BNC connector uses a center pin for positive signal and an outer sheath for ground. Make sure to run your signal line from the back of the LPT port to the inner side of your BNC connector.
3. For each signal you want to issue from the LPT port you'll need to access 2 pins on the parallel port. In my case I pinned the connector from the top-right to access my signal pins and from the bottom-left to access my grounding pins. See example Below:

Note the LPT extension cable – the other end is attached to the computer. This makes testing my connections as I add them easy and fast.

This is the New Connector (male) which I am in the process of pinning. You can see the positive and ground cables connected for the control of one line.



4. After connecting the high and low side lines for your connector it's a good idea to test the connector with the software to make sure everything is working correctly. When doing this you should see 0 volts when the pin is set low and somewhere above 3.0 volts when the pin is set to high. Here is an example of my first pin connection set to High:



5. Make sure to label each of your connectors as to what pin it's using, otherwise you'll be playing musical connectors and re-testing the connector when you install it. Here's an example of my cable build from a variety of cables. Note the labels on each connector. Not particularly attractive but it works:

Completed Connector with 16 total pins used:



Completed Cable:



In my case this cable controlled 8 lines from a perfusion pump. When on-Site I had some install issues, and my breakout box came in handy. This box lights up on specified pins. Here's an example:



All 8 lines connected and working:



That's it! For questions or comments please contact:

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