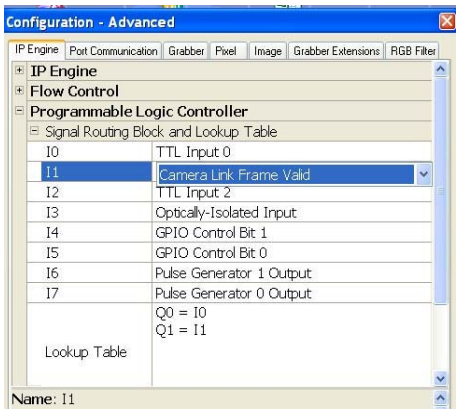
PLC Self-triggering and Strobe out

PLC programming for Strobe output

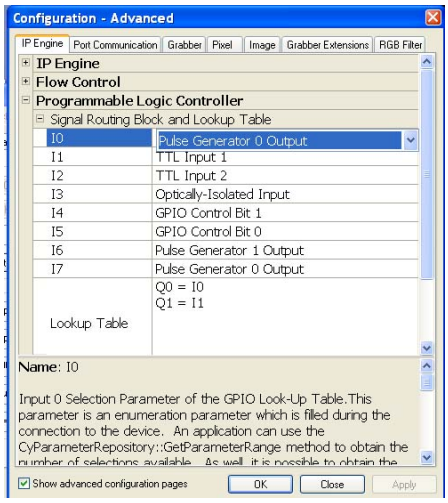
GEViCAM GigE cameras have GPIO pins to output the internal timing pulses which may be used for external strobe control. In the normal operation without external trigger, there is no output on Pin #3 of GPIO connector. With the evaluation power supply, a green wire is attached for pin #3 which can be monitored externally for trigger responses.
The simplest method to output internal pulses for synchronizing the external strobe is to use the FVAL (Frame Valid) signal in the iPort protocol version (Pleora protocol models).
After setting up camera connection with Coyote application, go to "Configure" and "IP Engine" and "Programmable Logic Controller"
Program the PLC to follow the LUT in Signal Routing and Lookup Table Block;



Q0 = I0
Q1 = I1
I1 = "Camera Link Frame Valid"
The camera configuration remains as factory default (continuous image output without external trigger).
When GPIO pin #3 (green wire) is monitored, you will see pulses. Use the negative going edge for strobe triggering point. The image will appear in the next FVAL-high period.

Internal Software Triggering

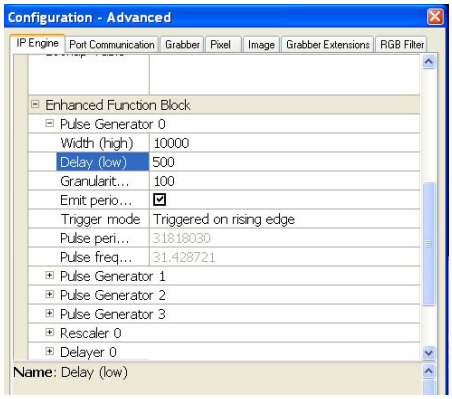
With the PLC function, we can control repetitive internal triggering for various camera modes.



One of the most versatile applications is using the pulse width control function.
To do this software triggering, we use pulse generator 0 of Enhanced Function block.
First, we set LUT as follows,
Q0 = I0
I0 = "Pulse generator 0"
Q1 = I1
I1 = "TTL Input 1"
The TTL Input 1 is connected to internal Strobe out signal and is also connected to GPIO Pin #3.
This is positive going pulse and indicating internal exposure period during the high state.
Strobe trigger can be driven with this pulse.

Pulse Generator 0

The pulse generator is controlled by selecting numbers for delay and width.
Open the Enhanced Function Block and select pulse generator 0. Mark "Emit Periodic Pulses" to supply continuous triggers. Select adequate numbers for granularity. 1 count is 3.03ns. So granularity 33 makes 1µs.



The delay is pulse state low and width is high.
For pulse width control the camera responds to low period as the exposure control and the total cycle as the trigger duration.
In the example, granularity is 3 µs and pulse low is 1.5ms, duration is 32ms.
Go to "Config" and select Port Communication to set up camera function in the Pulse Width Mode. In Hex commands, type 57 00 23 00 00 00 02 (remember to include spaces).
This will activate the camera mode in pulse width mode and you will see the TTL output from Pin #3. Change the delay number. You will see different exposure and pulse width of the high period.

Pulse Generator Controller

The pulse generator control is also done from the IP Engine tab of Coyote application. In the main dialog box (Menu), open "Pulse Generators".

You can use the slide bars or type to change the numbers.

Save Functions

These new PLC functions can be saved in XML. Go to file and use "Save As" to store the parameter. Then, you can open this file after power up.
Note: Camera control mode cannot be saved in the Config (XML) file. Contact GEViCAM for saving power up default.

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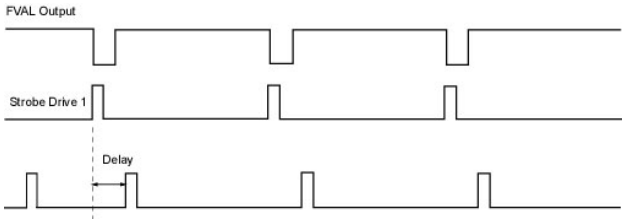
Delay Circuit

When the strobe output requires variable timing from the original pulse, GEViCAM PLC is also to move the pulse with programmed delays.
Let's change the original strobe out put of,

Q0 = I0
Q1 = I1
I1 = "Camera Link Frame Valid"

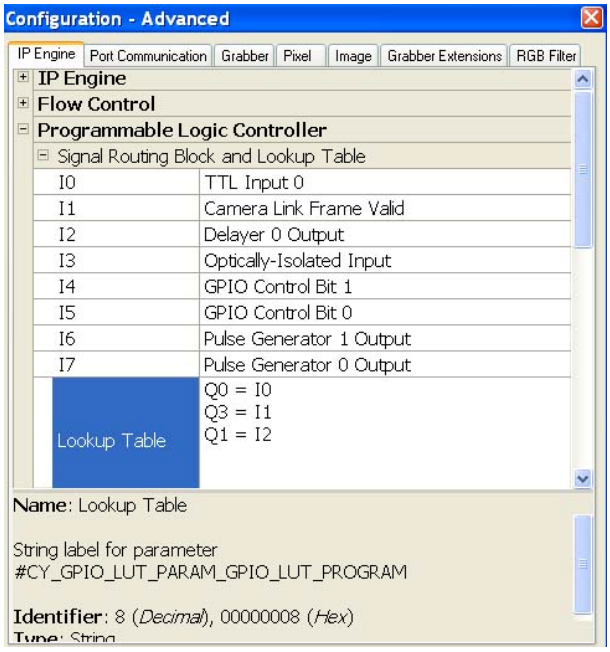


(Note: Strobe drive signal must be generated externally using falling edge of FVAL pulses.)

Now we want to delay the strobe drive timing by a certain amount.
In order to do this, we have to delay FVAL output from the camera.

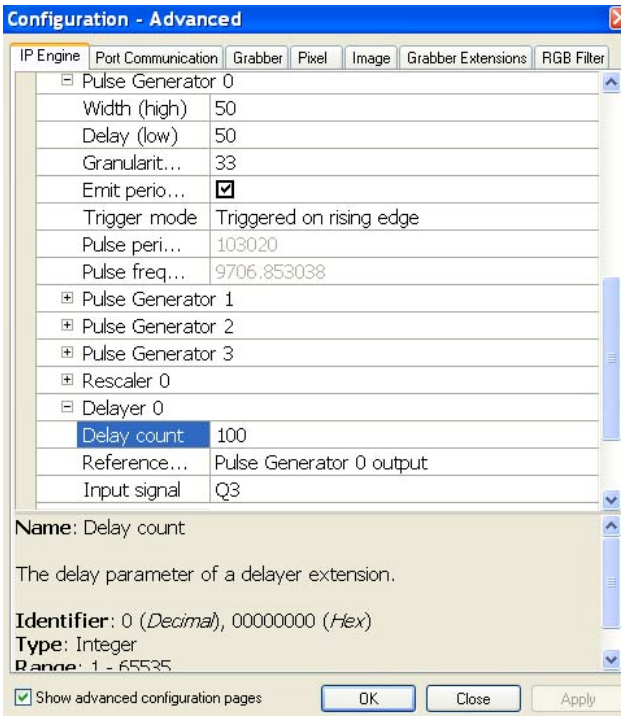
I1 of FVAL is connected to Delayer input Q3. In Enhanced Function Block, the delayer 0 input is assigned to Q3.

Q0 = I0 (default TTL 0)
Q3 = I1 (Delayer input signal)
I1 = Camera Link FVAL
Q1 = I2 (Delayer output)



Delayer Programming

The Delayer must have an internal clock. Here, let's use Pulse Generator 0 for the clock generator.
Click Reference in Delayer 0 and look for Pulse Generator 0 output.



Also in Pulse Generator 0, set periodic and clock frequency. In this example, we set granularity to 33 to make 1µs pulse duration at minimum and Width and Delay for 50 each making 1 cycle of 100 counts (=100 µs = 10KHz).
Then, Delayer generates delays of 100 µs per count. Above picture is set fort 100 delay counts (100x100µs= 10ms).

Note: If delay is used for continuous image output (normal mode), you cannot exceed the total delay of more than one frame.

Other signals to delay

By selecting Q3 input, this program can delay other signals. For example in Async mode (external trigger in),

Q0 = I0
Q3 = I1
I1 = TTL 1 (internal Strobe out signal)
Q1 = I2

The exposure and strobe output signal can be delayed.