

# **TUTORIAL N° 4**

### **BECKER & HICKL TUTORIAL**



# PIEZOCONCEPT

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This guide will take you through the steps of setting up your PIEZOCONCEPT device with photon counting module from Becker & Hickl. The interfacing with Picoquant device is pretty much the same.

#### A. Hardware setting

At the back of the controller, you have 4 TTL outputs, numbered from 1 to 4. The Becker and Hickl device requires at least 2 (eventually 3) TTL connection: One TTL for the pixel clock, One TTL for the line clock and eventually One TTL for the image clock.

In term of hardware, we can state the following simple rule (but you may define different rules of course) :

- The TTL 1 output of the PIEZOCONCEPT controller will be in charge of the Pixel Clock
- The TTL 2 output of the PIEZOCONCEPT controller will be in charge of the Line Clock
- The TTL 3 output of the PIEZOCONCEPT controller will be in charge of the Image Clock.

As a consequence, the TTL output of the PIEZOCONCEPT controller should be connected accordingly to the Becker and Hickl controller by using 3 BNC cables (not provided).

#### **B.** Programming

For sending the TTL, you have the choice between different softwares : Termite, Labview, Micromanager...

#### a. Programming with Termite

Termite is a very simple Hyperterminal program to use (See Tutorial  $N^{\circ}1$  for more information).

Let's imagine that you would like to realize a 100X100 pixels scan with X between 0 and  $30\mu m$  and Y between 0 and  $30\mu m$ .

The command to be sent are the following ones (in blue) :

SWF\_X 100 0u 30u (that means : I set a waveform with 100 points in X between 0 and 30µm) NumPoints: 100, Start: 0.0, End: 19660.0 Ok



SWF Y 100 0u 30u (that means : I set a waveform with 100 points in Y between 0 and 30µm) NumPoints: 100, Start: 0.0, End: 19660.0 Ok STIME 10m (that means : I would like the time between points to be 10ms) Ok CHAIO 1o1s (that means : I set up TTL pulse from port 1 for axis 1 at start of motion) TTL1 output set up TTL pulse from port 1 for axis 1 at start of motion Ok CHAIO 202s (that means : I set up TTL pulse from port 2 for axis 2 at start of motion) set up TTL pulse from port 2 for axis 2 at start of motion Ok CHAIO 3o2n1 I set up TTL pulse from port 3 for axis 2 on step number 1 (which is start of the image) set up TTL pulse from port 3 for axis 2 on step number 1 Ok RUNWF (that means : I run the waveform) Ok 100.00 100.00 0.00 Scan completed

The XY scan will be done only once.

### b. Programming with Labview

1°) The first thing to do is to run the initialization.vi. You can run it automatically (if you don't know the COM port to be used) or eventually manually (but you need the COM port used by the controller)

2°) Then run the VI called Scan XY B&H : the window below will appear

3°) Select the good COM port (the one you got with initialization.vi)

4°) Enter the appropriate scanning parameter (see the screenshot) and CHAIO command



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enor in (no enor)	Number of steps X axis	Number of steps Y axis	Time between p	oints	First CHAIO command	Second CHAIO command	Third CHAIO command	
	100	100	10		lols	2o2s	3o2n1	
source								
A	Initial position (X axis)	Initial position (Y axis)	Unit					
	0	0	ms					
	Final porition (V avir)	Final norition (V min						
VISA resource name 2	30	30						
%COM37 ▼								
	SWF_X1	SWF_Y1	STIME		CHAIO 1 - Line 1		CHAIO 1 - Line 2	
COM port								
6					CHAIO 2 - Line		CHAIO 2 - Line 2	
error out	SWF_X 2	SWF_Y 2						
status code					CHAIO 3 - Line 1		CHAIO 3 - Line 2	
<b>d</b> 0	2							
source								
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If you press the RUN button, all the commands will be sent, the buffer will be read. The scan will start and the TTL will be sent when they need to be. Please note that in that case, the XY scan will be done only once.

File Edit Work Projet Operate Toris Window Help     Image: Second CH4DD command     Image: Seco	SCAN_XY_B&H.vi						- 0 <b>x</b>
Image: Second CHAD command   Third CHAD command     Image: Second CHAD c	File Edit View Project Operate Tools Window Help						
COM port SVF.X1 SVF.Y1 STME CH4001-Line1 CH4001-Line2   Immovints: 100, Start: 0.0, End: 196600 MmPoints: 100, Start: 0.0, End: 196600 MmPoints: 100, Start: 0.0, End: 196600 MmPoints: 100, Start: 0.0, End: 196600 CH4002-Line2   error out SVF_X2 SVF_Y2 SVF_Y2 CH4003-Line1 CH4003-Line1 CH4003-Line2   issue Intrastic of motions Ok Start: 00 port 2 for axis 2 at start of motions CH4003-Line2   Start: Start: Ok Start: Start: 00 port 3 for axis 2 on step number1 CH4003-Line 2   Start: Start: Start: Start: Start: CH4003-Line2 CH4003-Line2   Start: Start: Ok Start: Start: CH4003-Line2 CH4003-Line2   Start: Start: Ok Start: Start: CH4003-Line2 CH4003-Line2   Start: Start: Ok Start: CH4003-Line2 CH4003-Line2   Start: Start: Start: Start: CH4003-Line2 CH4003-Line2   Start: Start: Start: Start: CH4003-Line2 CH4003-Line2	error in (no error) status code Jource VISA resource name 2 \$COM37 •	Number of steps Y axis 100 Initial position (Y axis) 0 Final position (Y axis 30	Time between points Ju Unit ms 🛛 🔊	First CHAIO command Tots	Second CHAO command	Third CHAIO command 3o2n1	
LabVIEW*Evaluation Software	COM port COM 57 error out status code USA Read in SCAN, XY, BBH wi	SWF_Y1 NumPoints: 100, Start: 0.0, End: 19660.0 SWF_Y2 Ok	STIME Ok	CHADO 1 - Line 1 set up TTL puble from port 1 CHADO 2 - Line set up TTL puble from port 2 CHADO 3 - Line 1 set up TTL puble from port 3	for axis 1 at start of motion for axis 2 at start of motion for axis 2 on step number 1	CHAIO 1 - Line 2 Ok CHAIO 2 - Line 2 Ok CHAIO 3 - Line 2 Ok Ok CHAIO 3 - Line 2 Ok	; n Software
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If you press the "RUN CONTINUOUSLY" button, the XY scan will be done again and again until you press the "STOP" button.

It is easy to do a XYZ scanning by using the same principle



<u>Synchronizing the movement of PIEZOCONCEPT piezostage with the TCSPC device</u> <u>from Picoquant :</u> the hardware from Picoquant needs TTL at the start of each line (sent for example on TTL1), at the end of each lines (sent for example on TTL2), , and at the beginning of each image (sent for example on TTL3).

The CHAIO command to be sent are consequently the following ones :

- First CHAIO command : CHAIO 1o2s (set up TTL pulse from port 1 for axis 2 at start of motion)

- Second CHAIO command: CHAIO 202e (set up TTL pulse from port 2 for axis 2 at end of motion)

- Third CHAIO command: CHAIO 302n1 (set up TTL pulse from port 3 for axis 2 at start of position N°1 : Indeed, the beginning of the first line is also the beginning of the image !)