

Pre, Post and About Triggering

Preface

This note is intended to clarify some of the issues when using a digital trigger. Even though the discussion here is intended for Keithley KPCI-3100 family (KPCI-3101/02/03/04 or KPCI-3110/16 series) boards, most of the considerations are generally applicable to all plug-in board products.

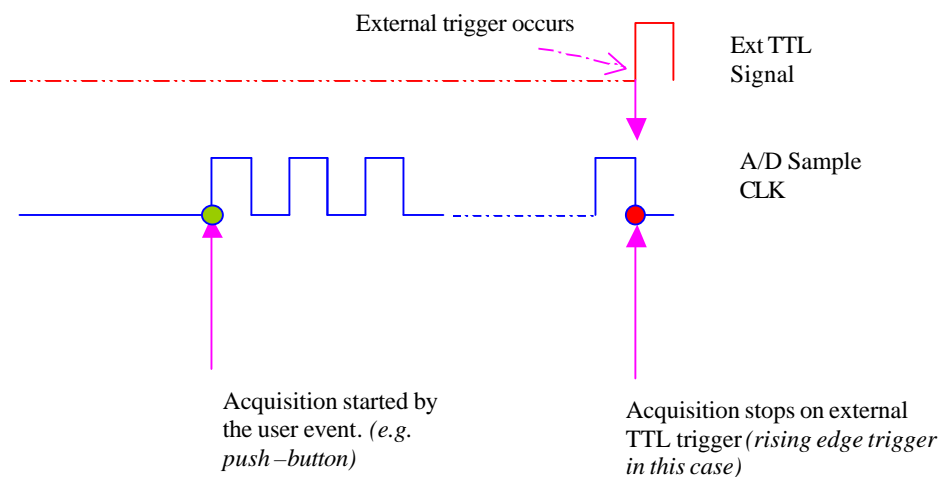
Note:

- *The example Visual Basic 6.0 code provided here is written for KPCI-3110. If you are using a different board please reference the corresponding DriverLINX manual, as some service request parameters may be different.*

External Triggers

There are generally three types of external triggers: Pre, Post and About Triggers. Some boards such as the KPCI-3116, KPCI-3110 or KPCI-3108 support the use of analog or digital triggers. This note will only discuss digital triggers. Please consult the corresponding DriverLINX manual for more information on analog triggers.

Pre-trigger You can think of pre-trigger acquisition as a stop-on trigger situation. The task will acquire data until the trigger occurs.



Pre-trigger Acquisition.

The code snippets herein assume the driver has already been loaded and the hardware initialized. It does not show processing of the data in the BufferFilled event nor use of StartEvent or StopEvent messages that occur when the triggers occur. See the DriverLINX Tutorial Manual (web site document center) for a

Pre, Post and About Triggering

more complete coding discussion in both VC++ and VB, or check the download center of the web site for available example programs.

*VB Example for rising edge **Pre Trigger** Acquisition with external TTL signal (Written for KPCI-3110)*

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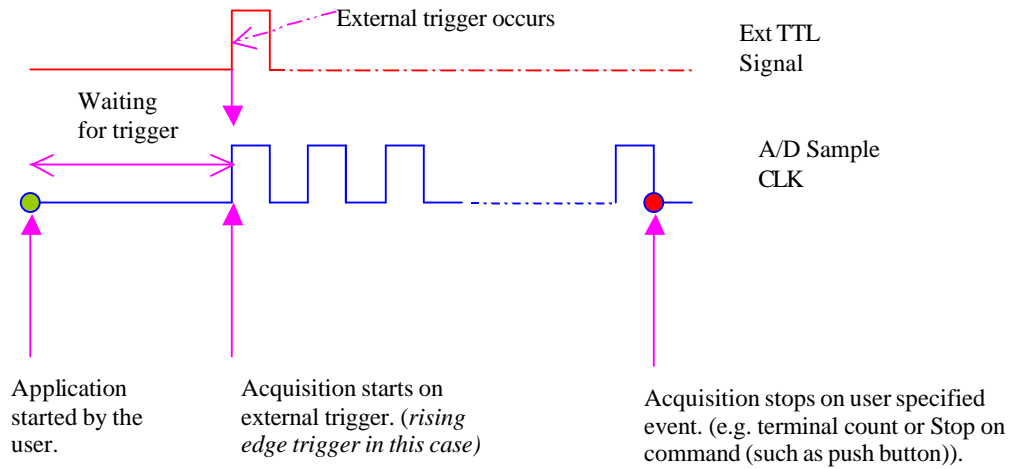
With SR_AI
.Req_subsystem = DL_AI
.Req_mode = DL_DMA
.Req_op = DL_START
.Evt_Str_type = DL_COMMAND

'set up the stop event on external digital trigger
'connect the external trigger signal to AD TTL trigger line (pin 77 of STP-3110)
.Evt_Stp_type = DL_DIEVENT
.Evt_Stp_delay = 0 '0= pre-trigger (after current scan), 1=immediate stop
.Evt_Stp_diChannel = 3 'use 3 for KPCI-3110/16 & 4 for KPCI-3101/02/03/04
.Evt_Stp_diMask = 1
.Evt_Stp_diMatch = DL_NotEquals
.Evt_Stp_diPattern = 0 '0=rising edge, 1=falling edge
'-----
'SR set up for Paced Mode Acquisition with 4 channels
.Evt_Tim_type = DL_RATEEVENT
.Evt_Tim_rateMode = DL_RATEGEN
.Evt_Tim_rateChannel = DL_DEFAULTTIMER
.Evt_Tim_rateClock = DL_INTERNAL1
.Evt_Tim_ratePeriod = .DLSecs2Tics(DL_DEFAULTTIMER, 1/100) '100 Hz sample rate
.Evt_Tim_rateGate = DL_DISABLED
.Sel_chan_format = DL_tNATIVE
.Sel_chan_N = 2 'will have start and stop channels, NOT 2 channels
.Sel_chan_start = 0 'start channel
.Sel_chan_startGainCode = .DLGain2Code(-1) '-1 means bipolar input, unity gain
.Sel_chan_stop = 3 'stop channel; 4 channels total (0,1,2,3)
.Sel_chan_stopGainCode = .DLGain2Code(-1)
.Sel_buf_N = 3 '# of buffers
.Sel_buf_samples = 40 '# samples per buffer
.Sel_buf_notify = DL_NOTIFY
.Res_Sta_typeStatus = DL_IOSTATUS ' status about the operation
.Refresh
End With

```

Pre, Post and About Triggering

Post Trigger is the most common type of triggering. It is used to coordinate the start of an acquisition with the occurrence of an external trigger event but generally, no further external synchronization is needed once the acquisition is started.

**Post-Trigger Acquisition.**

Pre, Post and About Triggering

*VB Example for rising edge **Post Trigger** Acquisition with external TTL signal (Written for KPCI-3110)*

With SR_AI

.Req_subsystem = DL_AI

.Req_mode = DL_DMA

.Req_op = DL_START

'Set up the digital trigger. Acquisition starts on the rising edge of external TTL signal

'Connect the trigger signal on AD TTL Trigger line (Pin 77 of STP-3110)

.Evt_Str_type = DL_DIEVENT

.Evt_Str_diChannel = 3 'use 3 for KPCI-3110/16 & 4 for KPCI-3101/02/03/04

.Evt_Str_diMask = 1

.Evt_Str_diMatch = DL_NotEquals

.Evt_Str_diPattern = 0 '0 = rising edge, 1 = falling edge

'-----

'SR set up for Paced Mode Acquisition with 4 channels

.Evt_Stp_type = DL_TCEVENT

.Evt_Tim_type = DL_RATEEVENT

.Evt_Tim_rateMode = DL_RATEGEN

'Paced Mode

.Evt_Tim_rateChannel = DL_DEFAULTTIMER

.Evt_Tim_rateClock = DL_INTERNAL1

'use internal clock

.Evt_Tim_ratePeriod = .DLSecs2Tics(DL_DEFAULTTIMER, 1/200) ' a 200 Hz sample rate

.Evt_Tim_rateGate = DL_DISABLED

.Sel_chan_format = DL_tNATIVE

.Sel_chan_N = 2 'means it will have start and stop channels, does NOT mean 2 channels

.Sel_chan_start = 0 'start channel

.Sel_chan_startGainCode = .DLGain2Code(-1) '-1 means bipolar input, unity gain

.Sel_chan_stop = 3 'stop channel; 4 channels total (0, 1, 2, 3)

.Sel_chan_stopGainCode = .DLGain2Code(-1)

.Sel_buf_N = 2 '# of buffers

.Sel_buf_samples = 32 '# samples per buffer; 4 channels x 8 scans = 32 samples in buffer

.Sel_buf_notify = DL_NOTIFY

.Res_Sta_typeStatus = DL_IOSTATUS ' status about the operation

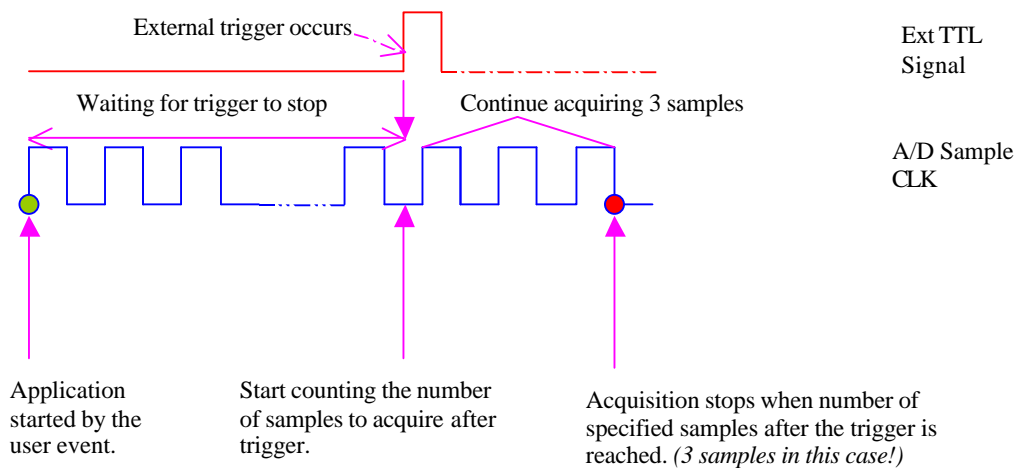
.Refresh

End With

Pre, Post and About Triggering

About Trigger can be considered as a combination of pre and post trigger. About trigger acquires data before the external trigger event and continues to acquire a specified number of samples after the external event. It is programmed as a stop on digital trigger but with a delay.

About trigger can be useful when you want to gather data before and after the external event occurs such as is common in transient analysis.

**About-Trigger Acquisition**

Note: Service Request set-ups for the About Trigger and Pre-trigger are the same except for 'Evt_Stp_delay' property, where you give it 0 for Pre-trigger or positive integer for number of samples to acquire after the trigger (About trigger).

Pre, Post and About Triggering

*VB Example for rising edge **About Trigger** Acquisition with external TTL signal (Written for KPCI-3110)*

```

With SR_AI
.Req_subsystem = DL_AI
.Req_mode = DL_DMA
.Req_op = DL_START
.Evt_Str_type = DL_COMMAND

'set up the stop event on external digital trigger
'connect the external trigger signal to AD TTL trigger line (pin 77 of STP-3110)
.Evt_Stp_type = DL_DIEVENT
.Evt_Stp_delay = 4000 'acquire 4000 samples after the trigger and then stop
.Evt_Stp_diChannel = 3 'use 3 for KPCI-3110/16 & 4 for KPCI-3101/02/03/04
.Evt_Stp_diMask = 1
.Evt_Stp_diMatch = DL_NotEquals
.Evt_Stp_diPattern = 0 '0=rising edge, 1=falling edge
'-----
'SR set up for Paced Mode Acquisition with 4 channels
.Evt_Tim_type = DL_RATEEVENT
.Evt_Tim_rateMode = DL_RATEGEN
.Evt_Tim_rateChannel = DL_DEFAULTTIMER
.Evt_Tim_rateClock = DL_INTERNAL1
.Evt_Tim_ratePeriod = .DLSecs2Tics(DL_DEFAULTTIMER, 1/100) 'a 100 Hz sample rate
.Evt_Tim_rateGate = DL_DISABLED
.Sel_chan_format = DL_tNATIVE
.Sel_chan_N = 2 'will have start and stop channels NOT two channels
.Sel_chan_start = 0 'start channel
.Sel_chan_startGainCode = .DLGain2Code(-1) '-1 means bipolar input, unity gain
.Sel_chan_stop = 3 'stop channel; 4 channels total (0,1,2,3)
.Sel_chan_stopGainCode = .DLGain2Code(-1)
.Sel_buf_N = 3 '# of buffers
.Sel_buf_samples = 40 '# samples per buffer; 4 channels x 10 scans = 40 samples in buffer
.Sel_buf_notify = DL_NOTIFY
.Res_Sta_typeStatus = DL_IOSTATUS ' status about the operation
.Refresh
End With

```