1 Using Hyperterminal

1.1 Introduction

Hyperterminal is a terminal emulator program which we can use to send commands to the DAQ board. This is our way of interacting with the counters, and allows us to manipulate settings and to record the events we are detecting.

1.2 Installing Hyperterm

Hyperterm is sometimes installed as standard on windows PCs. If it is then it can be found under "Accessories", "Communications". If it is not already installed, then we have a copy at the University of Birmingham which we can install for you. There may be a shortcut on your desktop for it.

1.3 Opening Hyperterminal

		Connect To			? <u> </u>
		qnet			
		Enter details for	the phone nu	mber that you	want to dial:
		Country/region:	United King	dom (44)	Ψ.
		Area code:	0121		
		Phone number:			
Connect using the		Connect using:	COM10		•
highest ava	ilable port,			OK	Cancel
usually CON				Cancer	
_				_	
	M10 Properties			? ×	
F	Port Settings				
	Bits per secor	nd: 115200		•	
	Data b	its: 8		•	
	Par	ity: None		•	
	Stop bits:				
	Flow control	rol: Xon / Xoff		•	
		[Restore D	lefaults	
		ок с	ancel	Apply	

Open hyperterminal and type a name for the connection (for example 'qnet'). When asked to enter a phone number, change "Connect using" to the highest available port (usually COM10), and use the following settings:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: Xon/ Xoff

You can now send commands to the DAQ board to view and manipulate the settings of the counters.

1.4 Hyperterminal Commands

🔲 qnet - HyperTerminal
File Edit View Call Transfer Help
V1 Channels which are enabled able) Run Mode On Ch(s) Enabled (1,0) Ch(s) Enabled Off Veto Enable Off Veto Select Ch0 Coincidence 1-4 2-Fold Coincidence Level (bits 7.6) Pipe Line Dolay: St ns Chat Width 100 ns Cmd DC Reg C2=LowByte Reg C3=HighByte 10nS/cnt
Ch0 Threshold : 0.300 vlts Largest time between Ch1 Threshold : 0.300 vlts signals for a coincidence
Ch2 Threshold : 0.300 vlts Ch3 Threshold : 0.300 vlts Test Pulser Vlts 3.000 vlts Test Pulse Ena : Off
Example line for 1 of 4 channels. (Line Drawing, Not to Scale) Input Pulse edges (begin/end) set rising/falling tags bits.
IIICapture Window: 60nS
I Gate Width : 100nS
If 'RE', 'FE' are outside Capture Window, data tag bit(s) will be missing. CaptureWindow = GateWidth - PipeLineDelay The default Pipe Line Delay is 400S, default Gate Width is 100nS. Setup CMD sequence for Pipeline Delay. CD, WT 1 0, WT 2 nn (10nS/cnt) Setup CMD sequence for Gate Width. CD, WC 2 nn(10nS/cnt), WC 3 nn (2.56uS/cnt) -
Connected 00:01:15 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

You can use the commands V1 and V2 to view the current settings of the detector. This is useful to check whether the commands you used to change settings have had the desired effect.

💽 qnet - HyperTerminal			
File Edit View Call Transfer Help			
Tag Bits delayed by PipeLnDlyPipeLineDelay : 40nS			
Capture Window: 60nS			
I Gate Width : 100nS			
If 'RE','FE' are outside Capture Window, data tag bit(s) will be wissing. CaptureWindow = GateWidth - PipeLineDelay The default Pipe Line Delay is 40nS, default Gate Width is 100nS. Setup CMD sequence for Pipeline Delay. CD, WT 1 0, WT 2 nn (10nS/cnt) Setup CMD sequence for Gate Width. CD, WC 2 nn(10nS/cnt), WC 3 nn (2.56uS/cnt)			
DG DG Date:			
Latitude: Longitude: Altitude: m			
PPS delay: +0000 msec (CE=1 updates PPS,FPGA data)			
FPGA time: 442CF9D0 FPGA freq: 2 Hz (Cmd V3, freq history) ChkSumErr: 0			
Connected 00:02:59 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo			

Using the DG command will display the settings of the GPS unit. You shouldn't start taking data until PosFix# = 1. This means that the GPS module has managed to fix on to a satellite, and this is important to make sure that the data we are recording is valid.

Some useful commands are listed at the end of the sheet, and are also available by using the H1 and H2 commands.

1.5 Setting up the detector

The detector can be set up differently depending on the number of counters you are using, and the type of experiment you are doing. You can use Hyperterm to change the settings of the DAQ board to suit your experiment.

1.5.1 Channels and Coincidences

For example, if you are using only two counters, you can set up the board to only use the required channels. In order to detect muons, we want to look for a coincidence between the signals from the two counters, indicating that a particle travelled through them at almost the same time. So for this setup, we say you need a two-fold coincidence between channels 0 and 1. To do this you use the command WC 00 nm. 'n' sets up an n+1-fold coincidence, so for a two-fold coincidence we use n=1.

m is a hexadecimal number representing the channels which are enabled and disabled. The pattern of enabled channels form a 4-bit binary number, with a 1 representing an enabled channel and 0 a disabled channel. So to enable all 4 channels the binary number is 1111, which is 15 in decimal, or F in hexadecimal. To enable channels 0 and 1, the binary number is 0011, which is 3 in hexadecimal. So to set up a two-fold coincidence between channels 0 and 1, we use the command WC 00 13. You can check this has worked with the V1 command.

1.5.2 Threshold

You can also change the level of the threshold of the DAQ board. The DAQ board will only register signals with a voltage above a certain level, known as the threshold. By default this is set to 300mV, but it can be changed using the TL command. You can also change each channel individually. So TL n 300 set channel n to have a threshold of 300mV. Remember that the channels are labelled 0,1,2,3. Typing TL 4 300 will set the threshold of all 4 counters at once. Just typing TL will display the value of the threshold for each channel.

1.5.3 Gate Width

The gate width is the largest time between signals for it to still be considered a coincidence. By default, this is set to 100ns. To change it you need two commands WC 02 cd followed by WC 03 ab. The combination abcd is the number of clock ticks required for the gate width. 1 clock tick is 10ns, so that a 100ns gate width requires 10 clock ticks. In hexadecimal, 10 is 000A, so to set this gate width, you need to type the commands WC 02 00, WC 03 0A.

1.5.4 Save

To save the settings which you are using, typwe the command SA 1.

2 Recording Data

🗊 qnet - HyperTerminal			
File Edit View Call [Transfer] Help D B 33 HD 2 Send File			
Ch2 Thresho Capture Test Ch3 Thresho Send Test File Test Pulser Capture Relation			
Lest Pulse <u>Capture to Printer</u>			
Input Pulse edges (begin/end) set rising/falling tags bits.			
Delayed Rise Edge 'RE' Tag Bit Delayed Fall Edge 'RE' Tag Bit Tag Pita de Layed Fall Edge 'RE' Tag Bit			
PipeLineDelay : 40nS			
Capture Window: 60nS			
If 'RE', 'FE' are outside Capture Window, data tag bit(s) will be missing.			
CaptureWindow = GateWidth - PipeLineDelay The default Pipe Line Delay is 40nS, default Gate Width is 100nS. Setup CMD sequence for Pipeline Delay. CD, WT 1 0, WT 2 nn (10nS/cnt) Setup CMD sequence for Gate Width. CD, WC 2 nn(10nS/cnt), WC 3 nn (2.56uS/cnt)			
Creates a file of all incoming text			
I gret-HyperTerminal File Edit View Call Transfer Help D B 3 ■ 29 B			
Test Pulser VIt: 3,000 vits			
Example line for 1 of 4 channels. (Line Drawing, Not to Scale)			
Input Pulse edges (begin/end) set rising/falling tags bits.			
Capture Text Delayed Rise Edge KE lag Bit			
Folder: C:\Users\sysadmin\Desktop\example.TXT File: C:\Users\sysadmin\Desktop\example.TXT File: C:\Users\sysadmin\Desktop\example.TXT Select a file			
Stat Cancel name			
If 'RE', 'FE' are outside Capture Window, data tag bit(s) will be missing.			
CaptureWindow = GateWidth - PipeLineDelay The default Pipe Line Delay is 40nS, default Gate Width is 100nS. Setup CMD sequence for Pipeline Delay. CD, WI 1 0, WI 2 nn (10nS/cnt) Setup CMD sequence for Gate Width. CD, WC 2 nn(10nS/cnt), WC 3 nn (2.56uS/cnt)			
ST 1021 +212 +064 3315 102554 250711 V 01 BDR8409A 112 6441 00292500 000A7013 DS 00001DC3 00001AD0 00000000 00000000 000002C6			
Connected 00:04:49 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo			
File Edit View Call Transfer Help			
DG DG Date+Time: 25/07/11 10:30:20.031 Status: V (invalid) Posfix#: 0			
Latitude: 52:27.016426 N Longitude: 001:55.716801 W Altitude: 161.872m Sats used: 2			
PPS delay: +0064 msec (CE=1 updates PPS,FPGA data) FPGA time: 49C56CAB FPGA freq: 25000000 Hz (Cmd V3, freq history) ChkSumFr: 0			
IST 2 5 ST Enabled, with scalar data.			
UCE 52563102 AC 00 2B 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 53F63102 00 00 3D 38 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 53F63103 00 22 00 21 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 54332914 B1 00 38 00 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 54332915 00 00 00 24 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 54332915 00 2B 00 00 00 44 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 54332915 00 2B 00 00 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040 54332915 00 2B 00 00 00 00 00 00 52F8049A 103027.007 250711 V 02 0 +0040			
Connected WXW8:55 Auto detect 115200 8-N-1 SURVEL CAPS RUM Capture Print echo			

- 1. From the "Transfer" menu select "Capture Text"
- 2. Choose a file name ending with ".txt" and save your file somewhere memorable. Then select "Start"

- 3. Anything which now appears in the Hyperterminal window will also be written to the ".txt" file. Start by typing the commands V1, V2, DG, ST 2 5. This ensures your data file contains the necessary information about the detectors.
- 4. Type the command CE to enable the counters and start writing data to the ".txt" file. Leave this running for about 24 hours to collect enough data.Make sure that the computer you are using is set to never sleep, otherwise you will not continue to collect data.
- 5. Once you have collected enough data type the command CD to stop writing out data.
- 6. From the "Transfer" menu select "Capture Text" and "Stop".

Command	Description
H1, H2	Help commands
CD	Counters Disabled: Prevent event lines being written in hyperterm
DS	Display Scalers: shows the values of the scalers in a hexadecimal format
RB	Reset Board: resets the scalers
RE	Reset Everything: resets the whole board
TH	Shows values of the thermometer on the GPS module
BA	Read and adjust the baromoter on the GPS module
DG	Displays information about the GPS modue
V1, V2	View the registers
ST 3 5	Displays the staus line every 5 minutes with counts and resets the counts. Using ST
	2 5 doesn't reset the counters
SA 1	Save any changes to the settings.
WT 01 00	Sets the TMC delay, d: nm is the value entered in hexadecimal, and this will set
WT 02 nm	the value of d as nm in decimal. (d is actually the difference between register 01 and
	02)
WC 00 nm	Sets the coincidece level and enables the desired counters: n sets an n+1-
	fold coincidence (i.e. an event is recorded if there is a coincidence in signals between
	n+1 counters.) m is the hexadecimal number representing the channels on the DAQ
	board which are enabled. 1 represents an enabled counter and 0 represents a disabled
	counter. So to have all the channels enabled would be 1111_{bin} or F_{hex}
WC 02 cd	Sets the value of the gate width, w. abcd represents the number of clock ticks required
WC 03 ab	for the gate width (1 clock tick is 10ns). For example, a gate width of 100ns requires
	10 clock ticks, which is 000A in hexadecimal, so you would use the command WC 02
	00 followed by WC 03 0A.
TL n 300	Sets the threshold of channel n to 300 mV. Using n=4 changes the threshold of all 4
	channels at once.