TPRO-cPCI, PMC/TSAT-cPCI, PMC
SYNCHRONIZABLE TIMECODE GENERATOR with cPCI BUS INTERFACE

LabView Driver
Application Programmer's Guide

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The GPS receiver is warranted for one year from date of shipment and subject to the exceptions listed above. The power adaptor, if supplied, is warranted for one year from date of shipment and subject to the exceptions listed above.

THE ANALOG CLOCKS ARE WARRANTED FOR ONE YEAR FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

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All other items and pieces of equipment not specified above, including the antenna unit, antenna surge suppressor and antenna pre-amplifier are warranted for 5 years, subject to the exceptions listed above.

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Extended warranties can be purchased for additional periods beyond the standard five-year warranty. Contact Spectracom no later than the last year of the standard five-year warranty for extended coverage.

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1 Overview

This document defines the system LabView Interface commands and example code employed to communicate with the TPRO/TSAT- cPCI Windows DM driver.

The TPRO-cPCI, PMC and TSAT-cPCI, PMC provide high-accuracy timing functions on a plug-in board for the CompactPCI® computer bus. The board has an on-board clock, which is kept in sync to either an external timecode input (TPRO-cPCI, PMC) or to time provided by the GPS satellites (TSAT-cPCI, PMC). Several timing functions are derived from the on-board clock, including a programmable periodic pulse rate output ("Heartbeat"), a programmable start/stop output ("Match"), a selectable frequency output ("Oscillator Out", 1 kHz, 1, 5, or 10 MHz), and a time-stamping input ("Time-Tag").

The TSAT-cPCI, PMC includes an externally mounted GPS antenna and a 100-foot cable to connect the antenna to the board. The GPS satellites provide continuous time and position information, available anywhere in the world. It automatically syncs its on-board clock to the time transmitted by the GPS satellites. The board outputs a timecode signal, in IRIG-B format, which conveys the day, hour, minute, and second, and also has a 1 kHz carrier referenced to the on-board oscillator.

The TPRO-cPCI, PMC is similar to the TSAT-cPCI, PMC, except it obtains time from an input timecode. The timecode can be in IRIG-A, IRIG-B or NASA36 format; the board automatically detects which format is being used. Timing accuracy is the same regardless of which format is being used. The timecode conveys the day, hour, minute, and second. The on-board 10 MHz oscillator is disciplined to maintain a 1 μs accuracy. An IRIG-B timecode output is provided, which is in-sync with the incoming timecode.

Either board may be used as a stand-alone timecode generator. The computer programs the day, hour, minute, and second. The board then continues to count from that time, using the on-board oscillator as the timebase reference. This is called "freewheeling."

The host computer communicates to either board through a set of memory-mapped registers. When the computer boots up, the board identifies itself to the CompactPCI® bus by specifying the unique Subsystem Vendor ID and Subsystem Device ID. The host computer can then read the instantaneous time, and command the board to set time, and/or to provide an interrupt at a periodic rate, at a specified time, and/or when a time-tag event occurs.

Front panel indicator lights indicate when the board is in the process of synchronizing ("acquiring") the GPS or timecode input signal, and when the board has established valid synchronization. The host computer can also interrogate the status register to determine these and other conditions.

2 Command Messages and Error Codes

2.1 The Command Message Catalog

A detailed description of the command messages follows. The description of each message is augmented with definitions of relevant data types and symbolic constants.

2.1.1 TPRO_Open

Field Name	Data Type	Description
Handle	INT*4	Pointer to handle. Defaults is 0.
Device Name	CHAR*10	Device name – trpopci0
Options	UINT*2	Pointer to options

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Options	
Error Code	Refer appendix

2.1.2 TPRO_Close

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.

Return:

Field Name	Description
Error Code	Refer appendix

2.1.3 TPRO_GetAltitude

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Meters	IEEE*4	Pointer to Meters

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Meters	
Error Code	Refer appendix

2.1.4 TPRO-GetDate

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Year	UINT*2	Pointer to Year
Month	UCHAR*1	Pointer to Month
Day	UCHAR*1	Pointer to Day

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Year	
Month	
Day	
Error Code	Refer appendix

2.1.5 TPRO_GetDriver

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Driver	CHAR*x	Driver Name
END OF MSG		

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.6 TPRO_GETFIRMWARE

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Firmware	CHAR*x	Firmware Name

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.7 TPRO_GETFPGA

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
FPGA	CHAR*x	FPGA Name

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.8 TPRO_GETLATITUDE

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Degrees	UINT*2	Pointer to Degrees
Minutes	IEEE*4	Pointer to Minutes.

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Degrees	
Minutes	
Error Code	Refer appendix

2.1.9 TPRO_GETLONGITUDE

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Degrees	UINT*2	Pointer to Degrees
Minutes	IEEE*4	Pointer to Minutes

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Degrees	
Minutes	
Error Code	Refer appendix

2.1.10 TPRO_GETSATINFO

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
SatsTracked	UCHAR*1	Pointer to SatsTracked
SatsView	UCHAR*1	Pointer to SatsView

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
SatsTracked	
SatsView	
Error Code	Refer appendix

2.1.11 TPRO_GETTIME

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Seconds	IEEE*8	Pointer to Seconds
Minutes	UCHAR*1	Pointer to Minutes
Hours	UCHAR*1	Pointer to Hours
Days	UCHAR*1	Pointer to Days

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Seconds	
Minutes	
Hours	
Days	
Error Code	Refer appendix

2.1.12 TPRO_RESETFIRMWARE

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.13 TPRO_SETHEARTBEAT

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Signal Type	UCHAR*1	Signal type value
Output Type	UCHAR*1	Output type value
ClockFreq	UCHAR*1	ClockFreq value
Frequency	IEEE*8	Frequency value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.14 TPRO_SETMATCHTIME

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Match Type	UCHAR*1	Match Type value
Seconds	IEEE*8	Seconds value
Minutes	UCHAR*1	Minutes value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.15 TPRO_SETOSCILLATOR

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Frequency	UCHAR*1	Pointer to Frequency

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Frequency	
Error Code	Refer appendix

2.1.16 TPRO_SETPROPDELAYCORR

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Us	INT*4	Pointer to Us

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Us	
Error Code	Refer appendix

2.1.17 TPRO_SETTIME

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Seconds	UCHAR*1	Seconds value
Minutes	UCHAR*1	Minutes Value
Hours	UCHAR*1	Hours Value
Days	UINT*2	Days Value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.18 TPRO_SETYEAR

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Year	UINT*2	Year value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.19 TPRO_SIMEVENT

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.20 TPRO_SYNCHCONTROL

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Enbp	UCHAR*1	Pointer to Enbp

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Enbp	
Error Code	Refer appendix

2.1.21 TPRO_SYNCHSTATUS

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Status	UCHAR*1	Pointer to Status

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Status	
Error Code	Refer appendix

2.1.22 TPRO_WAITEVENT

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Seconds	IEEE*8	Pointer to Seconds
Minutes	UCHAR*1	Pointer to Minutes
Hours	UCHAR*1	Pointer to Hours
Days	UINT*2	Pointer to Days
Year	UINT*2	Pointer to Year
Month	UCHAR*1	Pointer to Month
Day	UCHAR*1	Pointer to Day
Ticks	UINT*4	Ticks value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Seconds	
Minutes	
Hours	
Days	
Year	
Month	
Day	
Error Code	Refer appendix

2.1.23 TPRO_WAITHEARTBEAT

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Ticks	UINT*4	Ticks value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.1.24 TPRO_WAITMATCH

Field Name	Data Type	Description
Handle	INT*4	TPRO- PCI handle.
Ticks	UINT*4	Ticks value

Return:

Field Name	Description
Handle	Valid handle to TPRO –PCI card
Error Code	Refer appendix

2.2 Error Codes

Error Code	Error Description
1	Error creating handle to device
2	Error creating device object
3	Error closing device handle
4	Tpro device was not opened
5	Function is not available for board type
6	Invalid frequency
7	Invalid year parameter
8	Invalid day parameter
9	Invalid hour parameter
10	Invalid minute parameter
11	Invalid seconds parameter
12	Invalid delay factor
13	Device timed out
14	Error communicating with driver

REVISION HISTORY

Revision Level	*ECN Number*	*Description*
A	**2187**	First draft of Spectracom documentation for this product.

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