PicoPak Software Overview

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Introduction

The PicoPak clock measurement module package includes several software applications that support its use. This document briefly describes those programs.

• PicoPak

The PicoPak program (PicoPak.exe) supports the operation of PicoPak clock measurement modules. The PicoPak main and configure screens are shown below:

COM2 115200,8,1,N Start FICD Ver LAR Nominal Frequency: 1.42 Press Start to capture data. Discription: Enter meas description Configure O Freq Adj Press Pactor: 1.0000000000e+07 Hz Help Press Start to capture data. Discription: Enter meas description Configure O Freq Adj Freq Data Scale Factor: 6.104 Ps Pinetags Avg Factor: 1 Data Tau: 1 s DDS Start Processing Database
Status: Image: Statu

PicoPak Main Screen at Startup

PicoPak Configure Screen with Typical Settings

• PicoSQL

The PicoSQL program (PicoSQL.exe) supports accessing clock data from an optional PicoPak PostgreSQL database. When the database is enabled, the PicoPak program main screen includes a DBase button that opens a database screen as shown below:

PicoPak Cloc	k Measur	ement Module	5/N= :	108			_ 🗆 🗙
COM2 💌] •	115200,8,1,N]	Start	:	PICO PAK	Ver
Filename:	C:\Users\	Bill\Documents\Vi		Close	e	Drees St	1.42
<u>N</u> ominal Frequency:	1.100000	0000e+07	Hz	Help		capture	data.
Description:	Enter mea	as description	DBa	ase O	Con	fig <u>u</u> re	O Freq Adj
Avg Factor:	1	Data Tau: 1	s	DDS Word:	15555	555	> <
Status: 🔿							1
Signal Frequency:		-					Hz
€ List C	<u>P</u> lot Phase	O Plot Ereq	#: [Stab	e32
Communicatie Reference ar Acquiring lock Measured sig Phase detect Ready to sta Connected to	ons with mo nd signal co k - please w nal frequer tor = 1650 r rt measure o PicoPak d	odule OK nnected vait ncy=10000000.00 nV (Locked) ments atabase) Hz				▲ ▼

Pic	oPak	Database (Name=	-ppd, Host=192.1(58.2.6, User=postgres)	×
			List of Sources in Pi	coPak Database	
	#	Name	Туре	Description	
	0	Clk	Any	Default Clock ID	
	1	Rb1	LPRO	Efratom LPRO-101 S/N 299	32
	2	Rb2	LPRO	Efratom LPRO-101 S/N 358	10
	3	GPS1	GPSDO	Trimble Thunderbolt	
	4	GPS2	GPSDO	Trimble Thunderbolt	
	5	X01	OCVCXO	HP 10811	
	6	X02	OCVCXO	HP 10811	
	7	X03	OCVCXO	MTI 574-0126A	
	8	DDS1	DDS	AD 9852 48-Bit DD S	
	- Choo	se Signal and Refere	nce Sources		
					Database
	Sigr	hal Source #: 2	Her So	ource #: 1	✓ Active
	Ente	r New Source			<u>o</u> k
	Nar	ne	Type:		
		1			<u>C</u> ancel
	Des	cription:		Enter	
		,			<u>H</u> elp

PicoPak Main Screen with Database Enabled

PicoPak Database Screen with Typical Settings

Clock data stored in a PicoPak PostgreSQL database can be accessed using the PicoSQL program, whose main screen is shown below:

S/N Sig 3 105 1	Ref Frequency					
S/N Sig 3 105 1	Bef Frequency					
3 105 1	rior rioquorioy	Description	Tau	Start	End	
	2 1.00000e+07	Another test	1.000000e+01	57302.960744	57302.961299	
4 105 1	2 1.00000e+07	Another test 2	1.000000e+00	57302.962436	57302.962978	
5 103 1	4 1.00000e+07	Rb1 Calibration vs GPS2	1.000000e+02	57303.531739	57303.531929	
5 103 1	4 1.000000e+07	Rb1 Calibration vs GPS2	1.000000e+02	57303.532779	57303.533990	
7 103 1	4 1.00000e+07	Rb1 Calibration vs GPS2	1.000000e+02	57303.536983		
3 105 1	1 1.00000e+07	Coherent Rb1 Test AF=10	1.000000e+01	57310.668411	57311.944144	
2 105 1	1 1.00000e+07	Database enable test	1.000000e+00	57320.863285	57320.863526	
7 108 1	1 1.00000e+07	Rb1 Coherent	1.00000e+00	57324.858557	57325.505980	
ead Times Mart: 2015-10-08 End: Run contini Span: 34d, 1h, 4n	UTC 3 12:53:15 uing m. 35s	MJD 57303.536983 Run continuing #: 29415	Tau Meas: AF:1 	1.000000e+02 desurer displayed. stat and e factor for data from 1.000000e+02 Stable321	nal source at top. ients for that source will be Select desired ent row. Then choose not times, and averaging data. Press Read to read database into file. Press o analyze it.	<u>R</u> ead Show <u>D</u> at <u>S</u> table32 <u>D</u> sql Close

PicoSQL Database Access Program Main Screen

• PicoMon

The PicoMon program (PicoMon.exe) supports the monitoring of PicoPak module clock measurements when a PicoPak PostgreSQL database is active. With it, a PicoPak measurement can be observed in quasi-real time and notes can be inserted as the run progresses. The PicoMon main screen is shown below:



PicoMon Main Screen

• PicoPak Web Monitor

The PicoPak Web Monitor a simple web-based server-side PHP script for monitoring active PicoPak and PicoScan clock measurements via an ordinary web browser. The script is typically installed on the same server as the PicoPak PostgreSQL database that supports its operation. The user is presented with a list of the active PicoPak and PicoScan modules, selects one along with the desired data type, and is shown a corresponding plot of the phase or frequency data, which is also written to a data file that can be accessed via ftp. Information is provided about the number of points, the run description, the signal and reference clocks, the measurement tau, the start and end (current) MJDs, and the time span of the run. The phase and frequency data are scaled to engineering units and the fractional frequency offset (based on either the phase slope or frequency average) and the Allan deviation at the measurement tau are shown as plot inserts. Examples of PicoPak Web Monitor screens are shown below.



PicoPak Web Monitor Phase Plot

PicoPak Web Monitor Frequency Plot

• Enumerate

The Enumerate (Enumerate.exe) program is a command-line utility to enumerate the PicoPak modules connected to a computer, as shown in the screen shot below:



Enumerate Command Screen

PPConsole

The PPConsole (PPConsole.exe) program is a command-line application to capture 10 ms data from one or two PicoPak modules, as shown in the screen shot below. This is particularly useful for making simultaneous two-channel measurements for a cross-correlation stability analysis.

PPConsole _ 🗆 🗵 PicoPak Clock Measurement Module Console Program Capture 10ms data stream from 1 or 2 modules Enter # of PicoPak modules (1 or 2) 2 PicoPak modules Enter 1st PicoPak COM port # Enter 2nd PicoPak COM port # COM1 & COM2 selected Enter # data points to collect 1000 # Data Points=1000 Enter averaging factor Averaging factor applies to stored data Averaging factor=1 # stored data points=1000 Enter signal frequency, Hz 10e6 Signal Frequency=1.000000e+07 Enter output filename out.dat Output filename=out.dat COM1 opened COM2 opened Communications with module #1 OK PicoPak Module #1 5/N=108 Communications with module #2 OK PicoPak Module #2 5/N=105 #1 Reference and signal connected #2 Reference and signal connected Vereine ence and signal connected Press any key to start measurement run Use CTRL-c to abort Measurement run started Measurement run complete 1000 data points received 1000 data points stored to disk Press any key to close program

PPConsole Command Screen

PicoSwitch

The PicoSwitch program (PicoSwitch.exe) supports the independent operation of a PicoScan quad RF switch module. With it, a PicoScan module can be used to select PicoPak signal or reference channels. For general use, the PicoSwitch program can read its DIP switch settings, clear all switches, select switches, go to the next or previous switch, or scan all or a selected set of switches. The PicoSwitch main screen is shown below:

PicoScan C	Quad RF	Switch (Control Pro	gram		x
COM3	¥	•	Iodule S/N:	100		
		Switche	es		<u>R</u> ead	
	Α	В	С	D	Class	
ſ	•	ō	a	•	<u>u</u> lear	
	Č	Ŭ	~	×	Next	
		- -			Brovious	
Classed		0			Previous	
Closed	•	0	•	•	<u>S</u> can	
Open	0	۲	0	0	2	
					Quit	
PicoSwitc One Picos COM3 Op	h Quad I Scan fou Dened	RF Switch Ind at COI	Control Pro M3	gram	PICO SW	
Switches	initialize	d			Ver. 1.0	0

PicoSwitch Main Screen

• PicoScan

The PicoScan program (PicoScan.exe) supports the operation of a PicoPak module clock measurement module along with a PicoScan quad RF switch. With them, 4-channel scanned clock measurements can be made. The PicoScan main screen is shown below:

PicoScan Clock Measurement System ↔ 🗕 🗖 🗙
PicoPak: ✓ S/N: Static ✓ Start Pico Start Pico Start 0.00 PicoScan: ✓ S/N: Static ✓ Close Configure 0.00 Nominal 1.000000000e+07 Hz Help system,Set sources and DDS Word: 0000001 Configure capture data.
Channel Status Source Set/Show Start/Stop Frequency, Hz
A 🔾 Static Set Start Frequency
B 🔾 Static Set Start Frequency
C O Static Set Start Frequency
D 🛇 Static Set Start Frequency
List O Plot Phase O Plot Freq #: Stable32
PicoPak Clock Measurement Module Program ^ No PicoPak modules found ^ Connect a PicoPak module and restart program

PicoScan Main Screen

File: PicoPak Software Overviews.doc W.J. Riley Hamilton Technical Services December 8, 2015 Rev A. March 17, 2016 Rev B. August 20, 2016