Technical Bulletin

PDS2000
Terminal Commands Device description

Version 1.4

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Dated: 05-11-2014

Amendment Record Sheet

Rev.	Date	Reason for Modifications
1.4	05/11/2014	Section 3.1.1 ‘Preset’ text modified. (Frequency added) Section 4.4 ‘Alarm messages – alerts view’ added. Section 5.2 ‘Explanation’ added. Section 5.3 ‘Example’ text modified. (Frequency added)
1.3	01/10/2014	Section 5 ‘Auto start batch file’ added.
1.2	01/10/2014	Section 2.2: Figure 2-2 modified. Section 3.1: Checksums added at table. Section 3: Driver updated.(includes checksum)
1.1	23/05/2013	Text modified after review RGR.
1.0	22/05/2013	First version of this Technical Bulletin.

1 Introduction

From PDS2000 version 3.9.x.x the terminal commands device has been implemented. With terminal commands the user is able to control some functions of a RESON 7K sonar (as for instance a RESON 7128), and activate certain PDS2000 functions which are currently only available as icons or by the menu.

This technical bulletin describes:

- The command protocol;
- The used PDS2000 device;
- The Terminal command driver with its commands and defined preset value;
- Briefly the PDS2000 views;
- In Appendix A the checksum is described used by the command protocol.

2 General

By means of an interface console commands are generated. These commands could be received as RS232 or by network socket ports.. The commands are converted in PDS2000 to Sonar and PDS2000 control functions with their protocols. A Terminal command device is for this purpose in the PDS2000 project used.

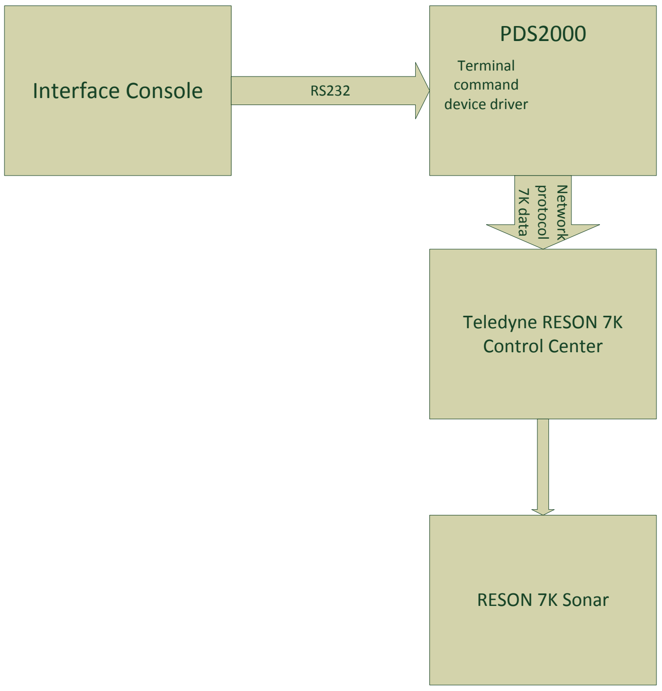


Figure 2-1 Flow diagram Interface console with the sonar.

2.1 Protocol description

The command protocol, as generated by the console, can be seen as a proprietary NMEA sentence.

$TERMCMD,command*CS<CR><LF>

Field	Format	Description
1	$TERMCMD	Sentence identifier.
2	command	Actual command which will be mapped to a sonar, PDS2000 or operating system command set. This command is a ‘single’ ASCII character. See section ‘Commands’ on page 7.
3	CS	Calculated checksum according to NMEA standard. Refer to Appendix A on page 19 for a description.
4	<CR><LF>	Terminator.

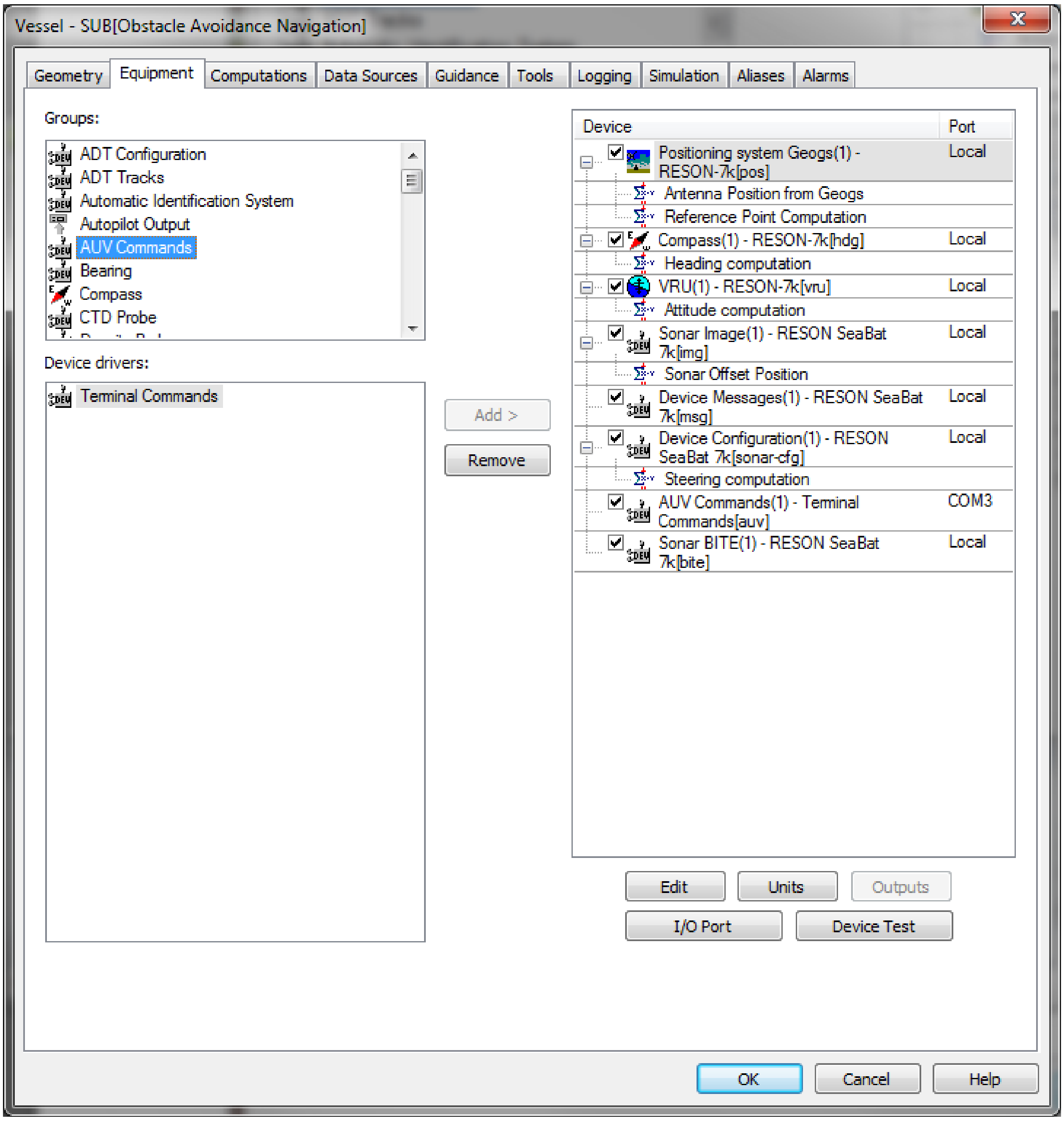
2.2 Device

Mapping of the received command to an external 7K, PDS2000 or operating system command ID can be done directly in a serial IO keyboard command driver.

For PDS2000 in the device group ‘AUV Commands’ the device ‘Terminal Commands’ could be selected.as the IO keyboard command driver.

The mapped command ID will be added and distributed with the AUV commands datablock.

Device selection is done in the vessel configuration’s equipment page.



Groups:

- ADT Configuration
- ADT Tracks
- Automatic Identification System
- Autopilot Output
- AUV Commands
- Bearing
- Compass
- CTD Probe

Device drivers:

- Terminal Commands

Device	Port
☑ Positioning system Geogs(1) - RESON-7k[pos]	Local
Antenna Position from Geogs	
Reference Point Computation	
☑ Compass(1) - RESON-7k[hdg]	Local
Heading computation	
☑ VRU(1) - RESON-7k[vru]	Local
Attitude computation	
☑ Sonar Image(1) - RESON SeaBat 7k[img]	Local
Sonar Offset Position	
☑ Device Messages(1) - RESON SeaBat 7k[msg]	Local
☑ Device Configuration(1) - RESON SeaBat 7k[sonar-cfg]	Local
Steering computation	
☑ AUV Commands(1) - Terminal Commands[auv]	COM3
☑ Sonar BITE(1) - RESON SeaBat 7k[bite]	Local

Figure 2-2 Terminal Command device selection

The Device driver could be modified for required attribute map changes. Refer to below section ‘Terminal command Driver’ for a description.

3 Terminal Command driver

Currently in PDS2000 the Terminal command driver is defined as.

Name: Terminal Commands[AUV].dev

```
[DefaultCom]
DefaultBaudrate = 9600
DefaultParity = 0
DefaultStopBits = 1
DefaultDataBits = 8

// -- string interface ---------------------------------

[General]
SyncMode = 0              // Sync on terminator
SyncCount = 1             // Sync length
SyncString = 10           // Sync character is linefeed
DataRate = 10             // Maximum expected data rate 10 Hz
TimeOut = 0               // Maximum time out is 5 seconds
NumberOfMessages = 1              // Number of messages defined in this file
AlwaysNotify = 1

//$TERMCMD,A*4F<cr><lf>
//   0   1
[Msg(0)]
NmeaChecksum = 1                  // Nmea Checksum must be valid
MsgMode = 0               // Input message
ID = $TERMCMD                     // Message ID $TERMCMD
IDStart = 0                       // start at char 0 ($TERMCMD)
IDLength = 8              // Id length 8 chacters
MessageType = 9                   // Formula
NewElement = 1                    // This message forwards the data block to the comps.

// command - internal number = function
// C      -       1 = stop sonar
// D      -       2 = shutdown computer
// J      -       3 = snapshot
// K      -       4 = show snapshot
// L      -       5 = gain
// M      -       6 = pulse length
// N      -       7 = range
// P      -       8 = power
// Q       -      9 = frequency
// R      -       10 = light mode

// A      -       20 = preset 1
// E      -       21 = preset 2
// F      -       22 = preset 3
// G      -       23 = preset 4
// H      -       24 = preset 5

// -      -       40 = previous value
// +      -       41 = next value

NumDataEntries = 1
NormData(0).Entry = 7
NormData(0).Formula = Value(Map("C,D,J,K,L,M,N,P,Q,R,A,E,F,G,H,-
,+","1,2,3,4,5,6,7,8,9,10,20,21,22,23,24,40,41",FindDel(",",1,FindDel("*",0,var0))))
```

```
[Attribs]
UserAttribs = 1
@tr.dev.LinkCompsFromDevice = 19, 1
LinkComps = 0

@tr.dev.preset.7kFrequency = 0x403, 1            // Frequency: 0 = 200 kHz, 1 = 400 kHz
@tr.dev.preset.7kRange = 0x403, 25               // Preset 1: Range 25 m
@tr.dev.preset.7kMaxPingRate = 0x403, 50                 // maximum Ping rate = 0 - 50 p/s
@tr.dev.preset.7kPower = 0x403, 170              // Power = 170 - 205 dB
@tr.dev.preset.7kGain = 0x403, 40                        // Gain = 0 - 83 dB
@tr.dev.preset.7kPulseLength = 0x403, 0.000033           // Pulse length = 0.000033 - 0.003 s
```

3.1 Commands

In the 'Terminal command' driver the following commands are defined with its checksum:

Command	Description	Checksum
C	Stop Sonar	2B
D	Shutdown the computer	2C
J	Take a snapshot	22
K	Show snapshot	23
L	Modify sonar Gain	24
M	Modify sonar pulse length	25
N	Modify sonar range	26
P	Modify sonar power	38
Q	Modify sonar frequency	39
R	Modify PDS2000 light mode	3A
A	Set sonar preset 1 values	29
E	Set sonar preset 2 values	2D
F	Set sonar preset 3 values	2E
G	Set sonar preset 4 values	2F
H	Set sonar preset 5 values	20
-	Decrement or previous value	45
+	Increment or next value	43

These commands must be received by the in section 2.1 defined protocol.

E.g. To stop the sonar the message $TERMCMD,C*2B<CR><LF> should be received. (With 'C' as the Stop Sonar command)

For the modes; show snapshot, gain, pulse length, range, power, frequency and light mode the setting could be changed after the mode is set with the '+' or '-' command. See section 'Operational example' for an example.

3.1.1 Preset

By above command (A, E,F,G or H) sonar preset values can be set. Sonar preset values are defined for:

- Frequency
- Range
- Ping rate
- Power
- Gain
- Pulse length

In the driver one preset values is defined. Up to five preset values could be added to the driver.

3.1.1.1 Adding Preset attribute values to driver

When additional to the defined preset 1 values, preset 2 values are required with for example a range of 50m and a ping rate of 40p/s this preset 2 values attributes are defined as below:

```
@tr.dev.preset(1).7kFrequency = 0x403, 1
@tr.dev.preset(1).7kRange = 0x403, 50            // Preset 2: Range 50 m
@tr.dev.preset(1).7kMaxPingRate = 0x403, 50
@tr.dev.preset(1).7kPower = 0x403, 175
@tr.dev.preset(1).7kGain = 0x403, 50
@tr.dev.preset(1).7kPulseLength = 0x403, 0.00006
```

These preset attribute values are attached to the driver below the preset 1 attribute values. Notice preset 1 values are listed in the driver as preset, preset 2 values as preset(1), preset 3 values as preset(2) etc.

With the command 'E' (as defined in the driver) the preset 2 values are set to the sonar.

```
$TERMCMD,E*2D<CR><LF>
```

3.1.2 Operational example

3.1.2.1 Gain

With the defined driver this means when for example the gain must be changed first the command 'L' must be send.

```
$TERMCMD, L*24<CR><LF>
```

When now command '+' is send the gain could be increased.

```
$TERMCMD,+*43<CR><LF>
```

With the '-' command the gain is decreased.

```
$TERMCMD,-*45<CR><LF>
```

4 PDS2000

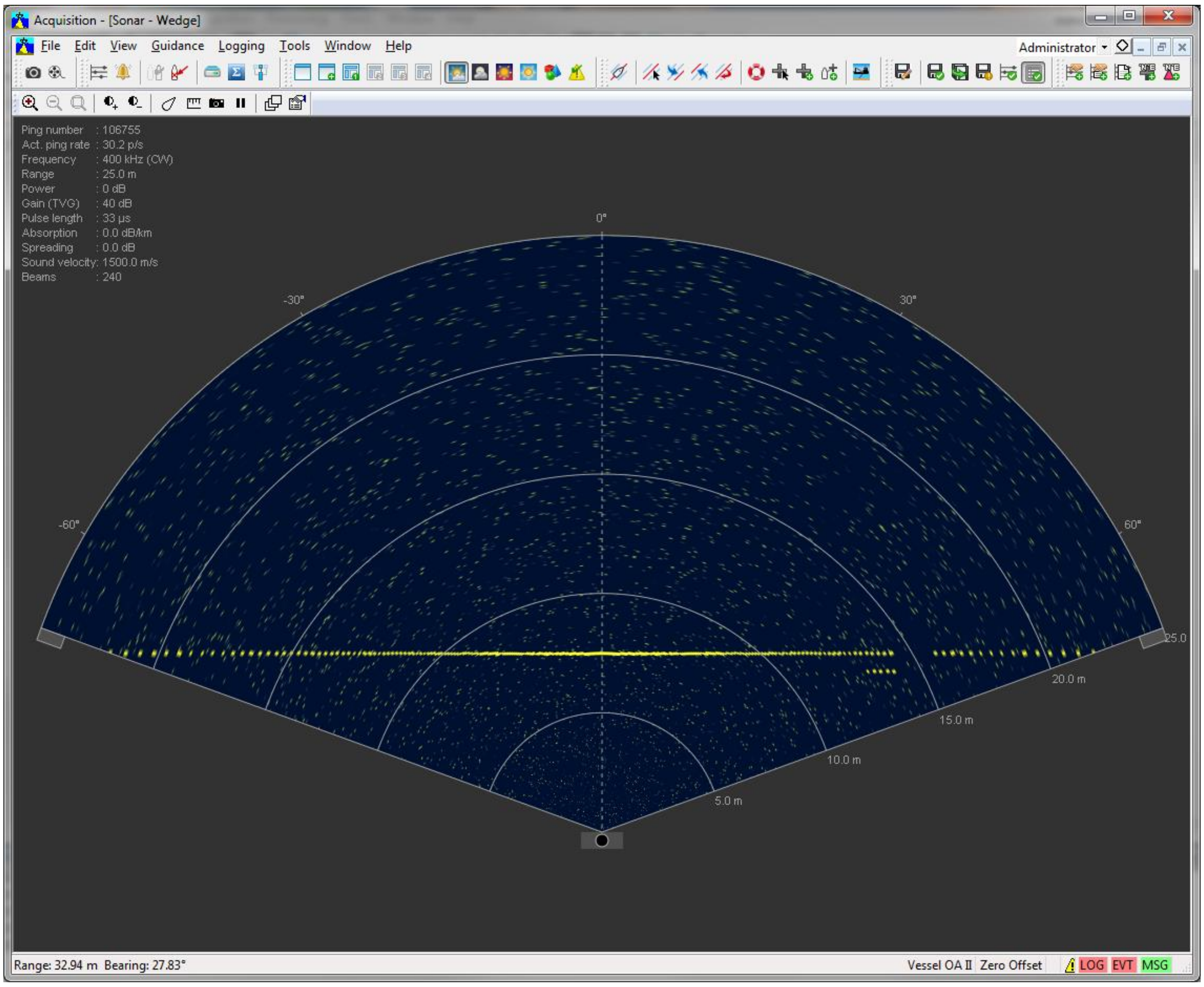
4.1 General

In PDS2000 a project should be defined, with the required devices such as the ‘Terminal commands’ device selected.

In the screen layout of this project the required views should be added as for example an Sonar Wedge view in case a forward looker sonar is used.

Refer to the PDS2000 user manual for full details.

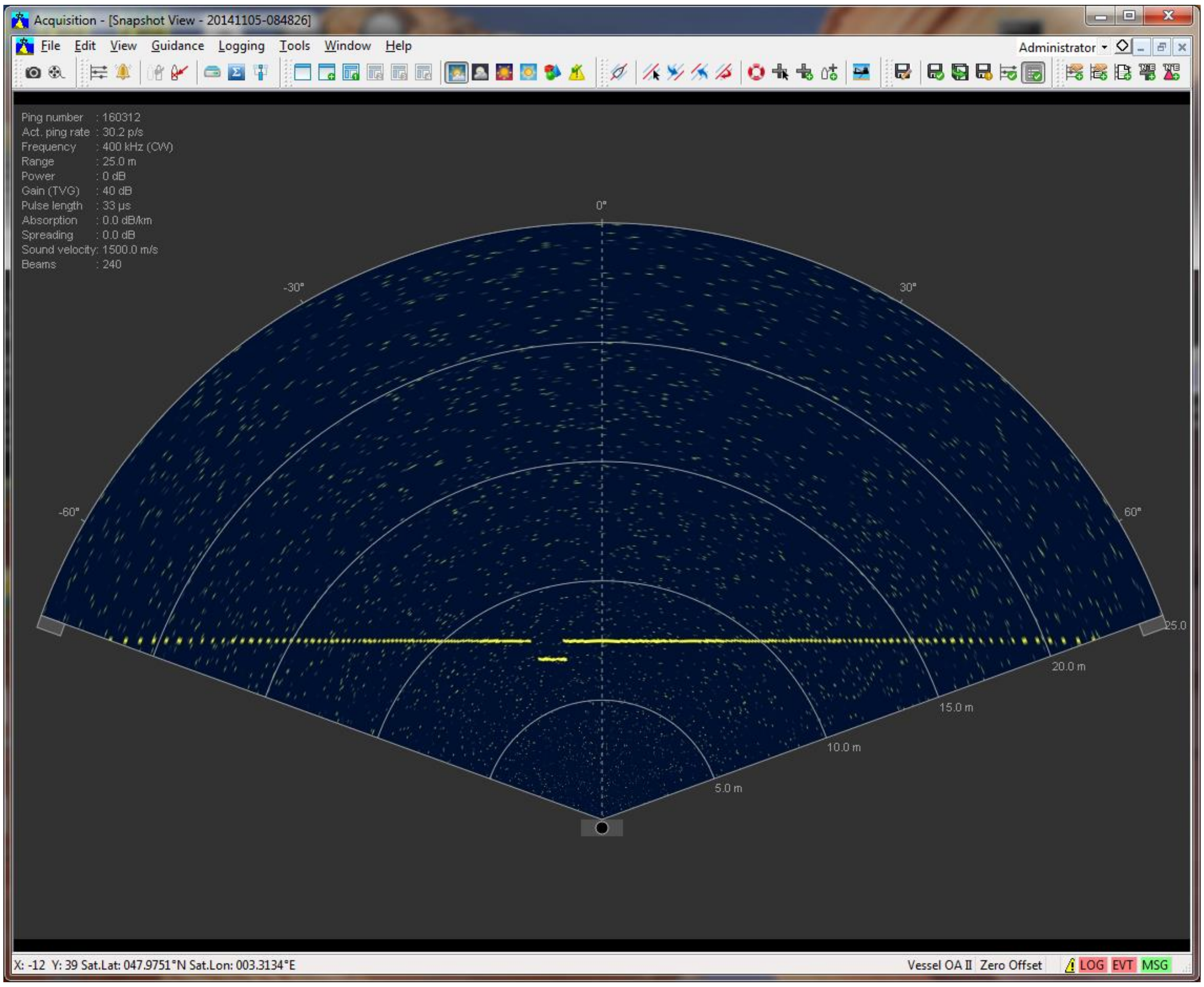
When the ‘Show snapshot’ command is received, automatically the snapshot view (maximized) is displayed in the Acquisition screen layout.



```
Ping number    : 106755
Act. ping rate : 30.2 p/s
Frequency      : 400 kHz (CW)
Range          : 25.0 m
Power          : 0 dB
Gain (TVG)     : 40 dB
Pulse length   : 33 µs
Absorption     : 0.0 dB/km
Spreading      : 0.0 dB
Sound velocity: 1500.0 m/s
Beams          : 240
```

Range: 32.94 m Bearing: 27.83°

Figure 4-1 PDS2000 Acquisition with Sonar Wedge view in normal operation mode


Acquisition - [Snapshot View - 20141105-084826]
File Edit View Guidance Logging Tools Window Help
Administrator
0°
-30°
30°
-60°
60°
25.0
20.0 m
15.0 m
10.0 m
5.0 m
X: -12 Y: 39 Sat.Lat: 047.9751°N Sat.Lon: 003.3134°E
Vessel OA II Zero Offset
LOG EVT MSG

```
Ping number   : 160312
Act. ping rate : 30.2 p/s
Frequency     : 400 kHz (CW)
Range         : 25.0 m
Power         : 0 dB
Gain (TVG)    : 40 dB
Pulse length  : 33 µs
Absorption    : 0.0 dB/km
Spreading     : 0.0 dB
Sound velocity: 1500.0 m/s
Beams         : 240
```

Figure 4-2 PDS2000 Acquisition switched to Snapshot view mode for showing all the snapshots

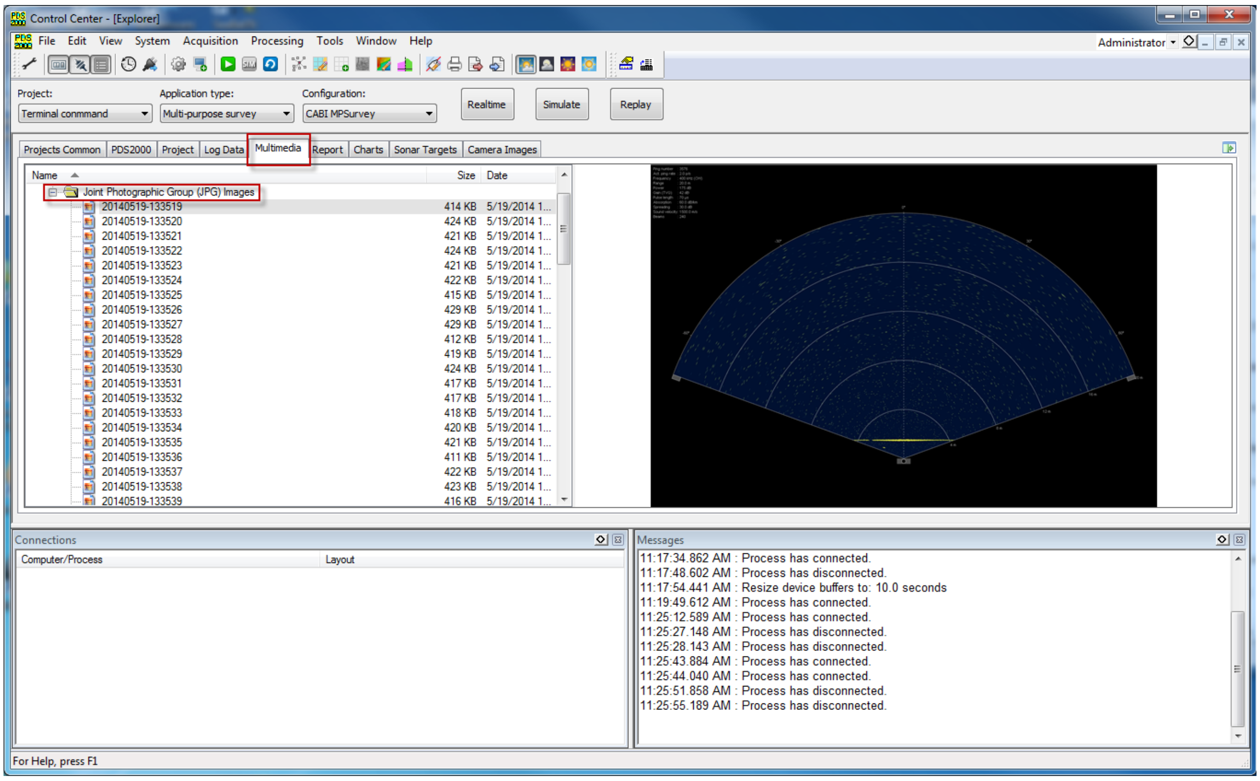
A subscription to the AUV datablocks is available and handled as attribute map changes as if they came from the R7K Sonar Configuration View sliders or remote from the Seabat User Interface (SUI).

When for example a sonar setting as power, range, gain etc. is received from the console the slider in the SUI or the Sonar configuration view also change.

4.2 Snapshots

With the ‘J’ command snapshots will be taken of the sonar view.

The snapshots are saved in the PDS2000 control center’s multimedia JPG Images folder.



Project: Terminal conmmand
Application type: Multi-purpose survey
Configuration: CABI MPSurvey

Name	Size	Date
Joint Photographic Group (JPG) Images		
20140519-133519	414 KB	5/19/2014 1...
20140519-133520	424 KB	5/19/2014 1...
20140519-133521	421 KB	5/19/2014 1...
20140519-133522	424 KB	5/19/2014 1...
20140519-133523	421 KB	5/19/2014 1...
20140519-133524	422 KB	5/19/2014 1...
20140519-133525	415 KB	5/19/2014 1...
20140519-133526	429 KB	5/19/2014 1...
20140519-133527	429 KB	5/19/2014 1...
20140519-133528	412 KB	5/19/2014 1...
20140519-133529	419 KB	5/19/2014 1...
20140519-133530	424 KB	5/19/2014 1...
20140519-133531	417 KB	5/19/2014 1...
20140519-133532	417 KB	5/19/2014 1...
20140519-133533	418 KB	5/19/2014 1...
20140519-133534	420 KB	5/19/2014 1...
20140519-133535	421 KB	5/19/2014 1...
20140519-133536	411 KB	5/19/2014 1...
20140519-133537	422 KB	5/19/2014 1...
20140519-133538	423 KB	5/19/2014 1...
20140519-133539	416 KB	5/19/2014 1...

Connections

Computer/Process	Layout

Messages

```
11:17:34.862 AM : Process has connected.
11:17:48.602 AM : Process has disconnected.
11:17:54.441 AM : Resize device buffers to: 10.0 seconds
11:19:49.612 AM : Process has connected.
11:25:12.589 AM : Process has connected.
11:25:27.148 AM : Process has disconnected.
11:25:28.143 AM : Process has disconnected.
11:25:43.884 AM : Process has connected.
11:25:44.040 AM : Process has connected.
11:25:51.858 AM : Process has disconnected.
11:25:55.189 AM : Process has disconnected.
```

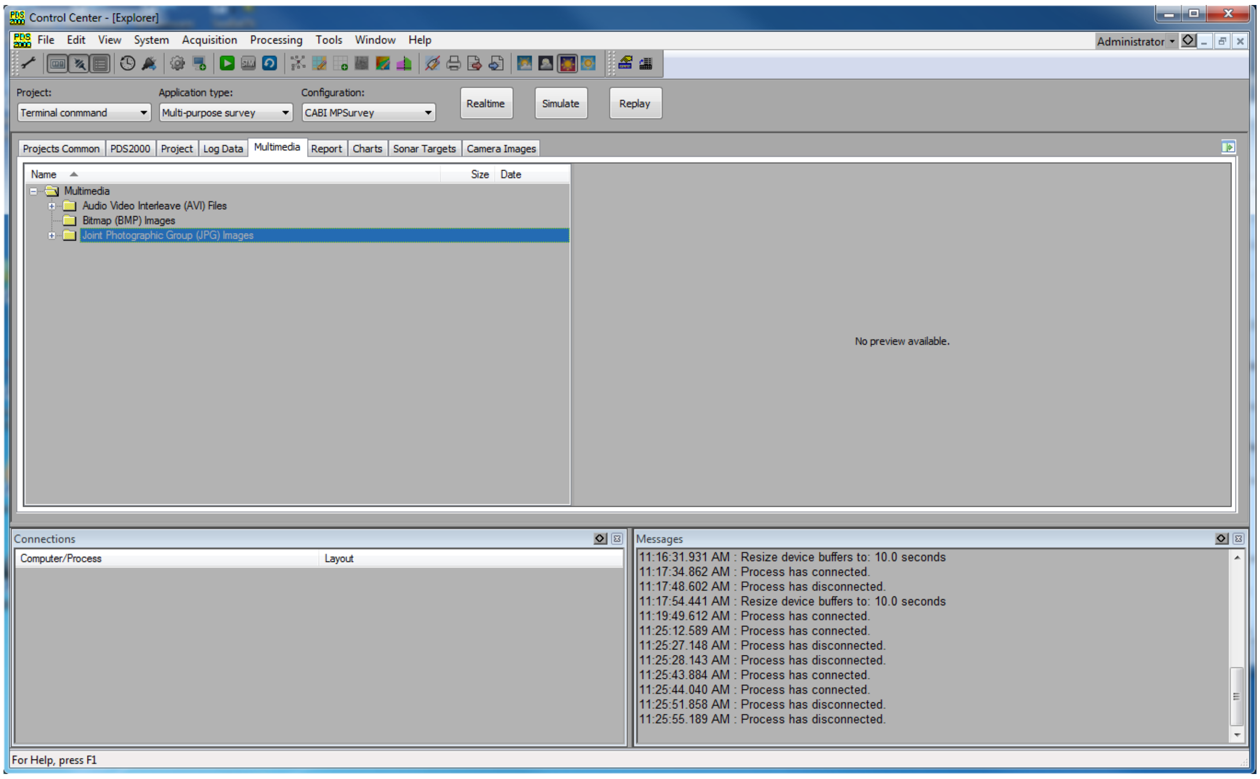
Figure 4-3 PDS2000 control Center with Multimedia tab and JPG folder.

When the ‘K’ command is received it is possible to display in the acquisition snapshot view the taken snapshots by the ‘+’ command (next snapshot) or the ‘-‘ command (previous snapshot).

4.3 Light mode

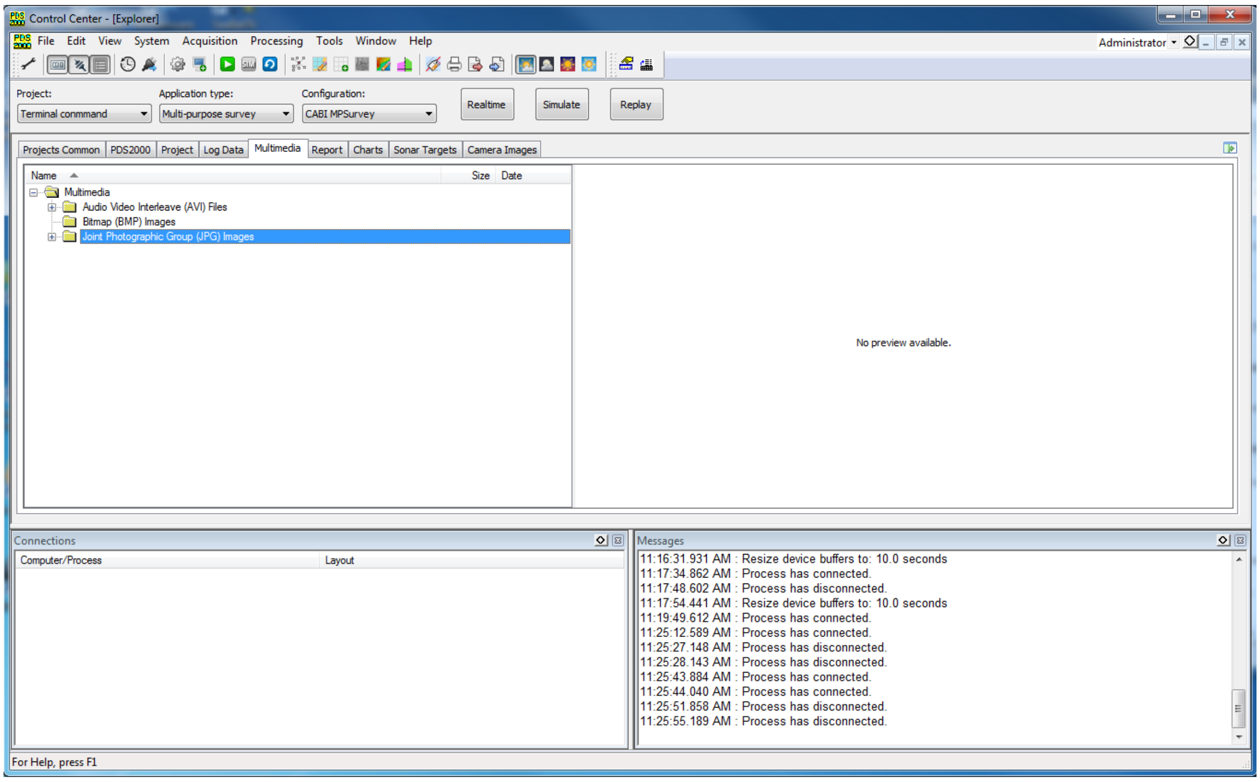
In the PDS2000 Control center four different light modes could be used.

- Normal
- Night
- Twilight
- Bright


Control Center - [Explorer]
File Edit View System Acquisition Processing Tools Window Help
Administrator
Project: Terminal command
Application type: Multi-purpose survey
Configuration: CABI MPSurvey
Realtime
Simulate
Replay
Projects Common PDS2000 Project Log Data Multimedia Report Charts Sonar Targets Camera Images
Name Size Date
Multimedia
Audio Video Interleave (AVI) Files
Bitmap (BMP) Images
Joint Photographic Group (JPG) Images
No preview available.
Connections
Computer/Process
Layout
Messages
For Help, press F1

```
11:16:31.931 AM : Resize device buffers to: 10.0 seconds
11:17:34.862 AM : Process has connected.
11:17:48.602 AM : Process has disconnected.
11:17:54.441 AM : Resize device buffers to: 10.0 seconds
11:19:49.612 AM : Process has connected.
11:25:12.589 AM : Process has connected.
11:25:27.148 AM : Process has disconnected.
11:25:28.143 AM : Process has disconnected.
11:25:43.884 AM : Process has connected.
11:25:44.040 AM : Process has connected.
11:25:51.858 AM : Process has disconnected.
11:25:55.189 AM : Process has disconnected.
```

Figure 4-4 PDS2000 control Center with light mode ‘ twilight’


Control Center - [Explorer]
File Edit View System Acquisition Processing Tools Window Help
Administrator
Project: Terminal command
Application type: Multi-purpose survey
Configuration: CABI MPSurvey
Realtime
Simulate
Replay
Projects Common PDS2000 Project Log Data Multimedia Report Charts Sonar Targets Camera Images
Name Size Date
Multimedia
Audio Video Interleave (AVI) Files
Bitmap (BMP) Images
Joint Photographic Group (JPG) Images
No preview available.
Connections
Computer/Process
Layout
Messages
For Help, press F1

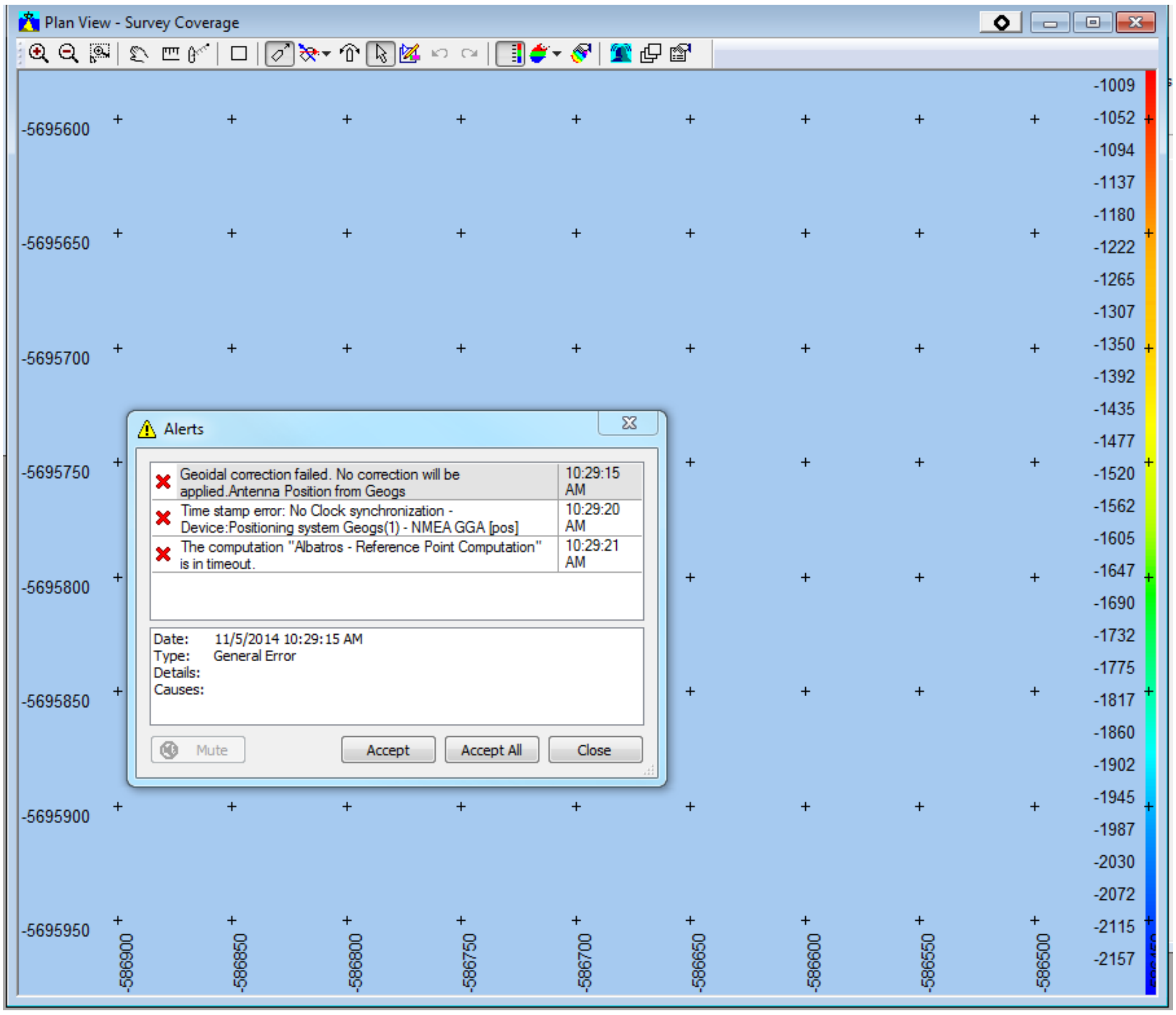
```
11:16:31.931 AM : Resize device buffers to: 10.0 seconds
11:17:34.862 AM : Process has connected.
11:17:48.602 AM : Process has disconnected.
11:17:54.441 AM : Resize device buffers to: 10.0 seconds
11:19:49.612 AM : Process has connected.
11:25:12.589 AM : Process has connected.
11:25:27.148 AM : Process has disconnected.
11:25:28.143 AM : Process has disconnected.
11:25:43.884 AM : Process has connected.
11:25:44.040 AM : Process has connected.
11:25:51.858 AM : Process has disconnected.
11:25:55.189 AM : Process has disconnected.
```

Figure 4-5 PDS2000 Control Center with light mode ‘normal’

The light mode could be changed by the terminal command ‘R’, followed by the ‘+’ (next) terminal command or the ‘-‘ command (previous)

4.4 Alarm messages – Alerts view

When an alarm condition occur, an alarm message is generated in a automatically popped up Alerts view. (For example when sensor data is not received)

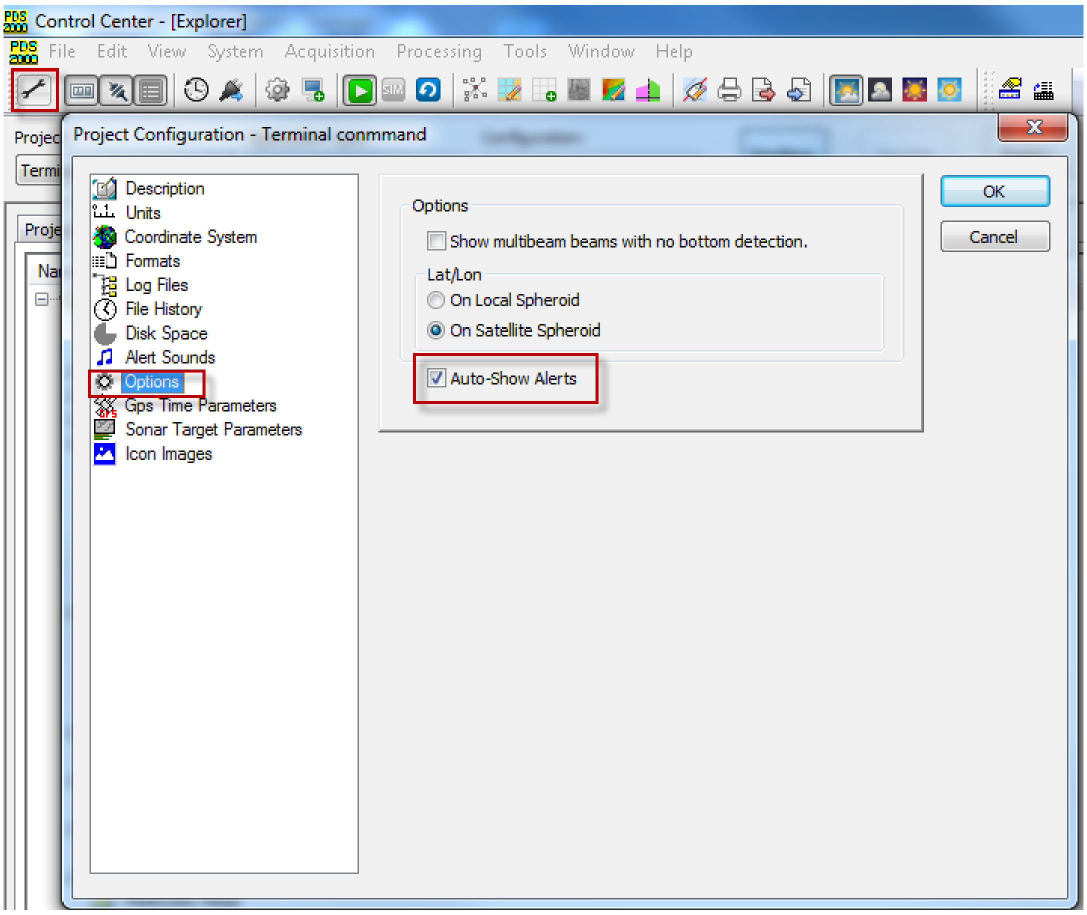


Geoidal correction failed. No correction will be applied.Antenna Position from Geogs	10:29:15 AM
Time stamp error: No Clock synchronization - Device:Positioning system Geogs(1) - NMEA GGA [pos]	10:29:20 AM
The computation "Albatros - Reference Point Computation" is in timeout.	10:29:21 AM

Date: 11/5/2014 10:29:15 AM
Type: General Error
Details:
Causes:

Figure 4-6 Alarm Message

The user could disable the auto alert view to be popped up automatically in the PDS2000 project configuration - options menu.



Options

[ ] Show multibeam beams with no bottom detection.

Lat/Lon
On Local Spheroid [✓ On Satellite Spheroid]

[✓] Auto-Show Alerts

Figure 4-7 Auto show alerts

5 Auto start batch file

By means of a defined batch file it is possible to start automatically the RESON 7KCenter, the 7K I/O module and PDS2000. Additionally a defined screen layout can be copied to a location and with the batch file loaded. PDS2000 will start in this case with this defined screen layout.

5.1 Definition batch file

```
Timeout /t 10
Start”7kCenter” /D ”XXXX” /MIN “XXXX\7kcenter.exe”
Timeout /t 5
Start “IOModule” /D “YYYY” /MIN “YYYY\7kIOModule.bat”
Copy /A “VVVV” “WWWW” /Y
Timeout /t 5
Start”Acquisition” /D “ZZZZ” /MIN “ZZZZ\Master.exe” -A
```

With:	VVVV the location of the screen layout file
	WWW project folder path with screen layout file
	XXXX the path of the installed 7K version.
	YYYY the path of the installed IOModule
	ZZZZ the path of the installed PDS2000 version

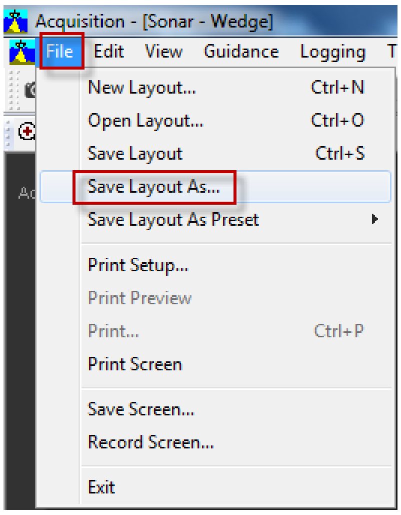
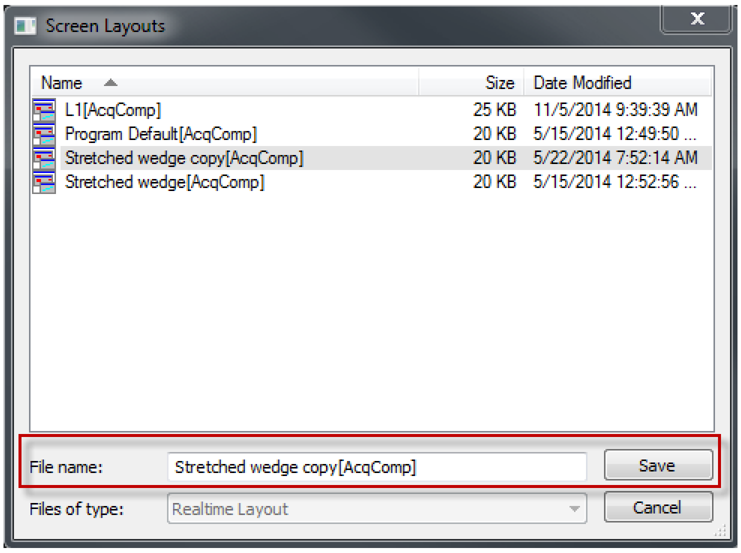
5.2 Explanation

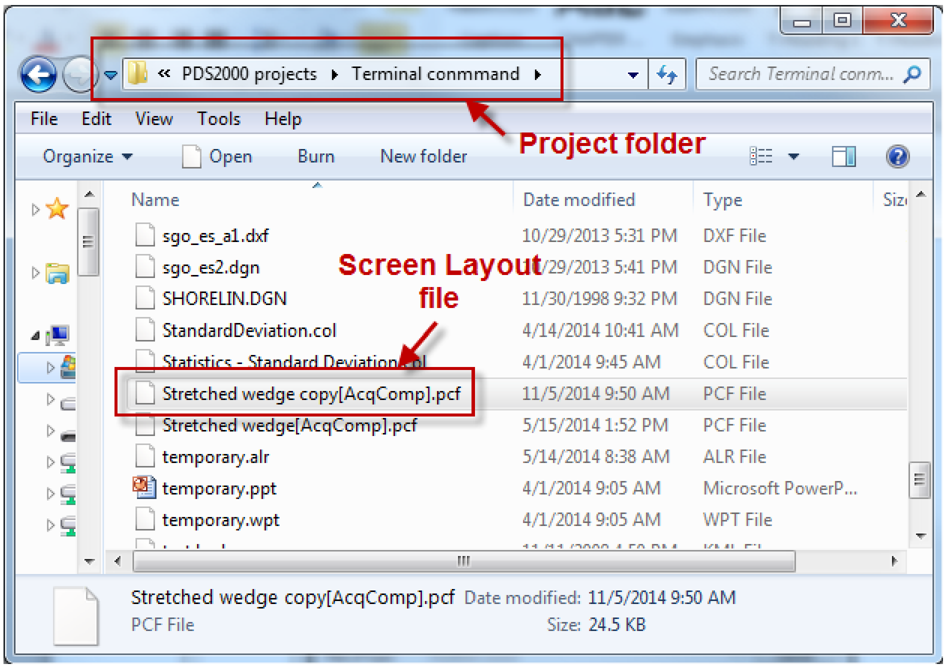
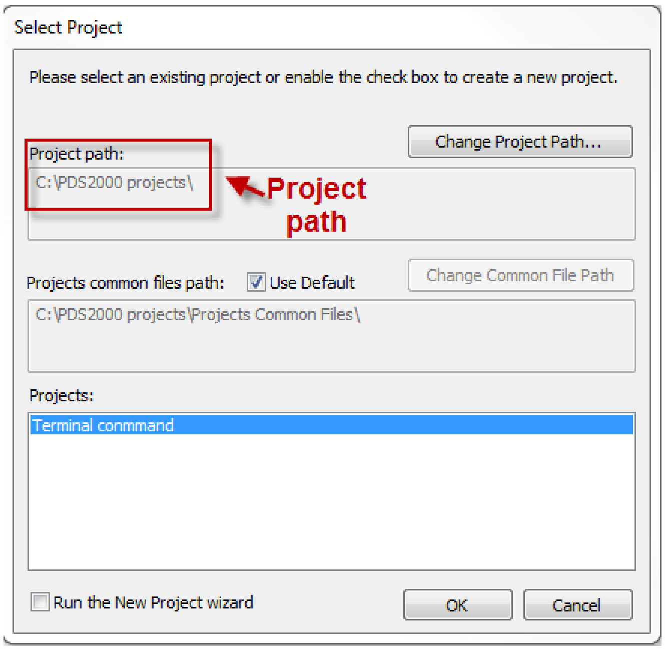
With the start commands: Start”7kCenter”, Start”IOModule” and Start”Acquisition” these applications are started. The path were the exe files or batch files are located needs to be specified in the batch file..

With the timeout command a time delay is introduced to avoid an application is started up while the other has not finished the startup sequence yet.

When the customer want to startup PDS2000 with a defined screen layout these screen layout needs to be copied in the project. The batch file ‘Copy’ command is used for this purpose and the location were this layout is saved and the current project folder needs to be specified.

The below table summarizes the procedure for creating a screen layout and to define this in the batch file.

Step	Action
1	Define a screen layout with the required views in the Acquisition. Click *File>Save Layout As…*  Acquisition - [Sonar - Wedge] File Edit View Guidance Logging T New Layout... Ctrl+N Open Layout... Ctrl+O Save Layout Ctrl+S Save Layout As... Save Layout As Preset Print Setup... Print Preview Print... Ctrl+P Print Screen Save Screen... Record Screen... Exit
2	Specify a name and click *Save*  Name / Size / Date Modified L1[AcqComp] 25 KB 11/5/2014 9:39:39 AM Program Default[AcqComp] 20 KB 5/15/2014 12:49:50 ... Stretched wedge copy[AcqComp] 20 KB 5/22/2014 7:52:14 AM Stretched wedge[AcqComp] 20 KB 5/15/2014 12:52:56 ... File name: Stretched wedge copy[AcqComp] Files of type: Realtime Layout

Step	Action
3	The file will have the extension “.pcf”. Locate this file in the used PDS2000 Project folder.  « PDS2000 projects ▸ Terminal conmmand ▸ Search Terminal conm... File Edit View Tools Help Organize ▾ Open Burn New folder Project folder Screen Layout file Name | Date modified | Type sgo_es_a1.dxf | 10/29/2013 5:31 PM | DXF File sgo_es2.dgn | 10/29/2013 5:41 PM | DGN File SHORELIN.DGN | 11/30/1998 9:32 PM | DGN File StandardDeviation.col | 4/14/2014 10:41 AM | COL File Statistics - Standard Deviation.col | 4/1/2014 9:45 AM | COL File Stretched wedge copy[AcqComp].pcf | 11/5/2014 9:50 AM | PCF File Stretched wedge[AcqComp].pcf | 5/15/2014 1:52 PM | PCF File temporary.alr | 5/14/2014 8:38 AM | ALR File temporary.ppt | 4/1/2014 9:05 AM | Microsoft PowerP... temporary.wpt | 4/1/2014 9:05 AM | WPT File Stretched wedge copy[AcqComp].pcf Date modified: 11/5/2014 9:50 AM PCF File Size: 24.5 KB
4	Copy this file to a required location. In the batch file the sentence: ‘Copy /A “VVVV” “WWWW” /Y’ is added Specify the screen layouts file location path in the batch file. (field VVVV) Click in the PDS2000 control Center File>Open project to have the current project path listed.  Select Project Please select an existing project or enable the check box to create a new project. Project path: C:\PDS2000 projects\ Projects common files path: ☑ Use Default C:\PDS2000 projects\Projects Common Files\ Projects: Terminal command ☐ Run the New Project wizard Specify also in the batch file the path of the current used PDS2000 project. (field WWWW)

5.3 EXAMPLE

A batch file could look like the example below. (Be aware the software path may be different)

```
rem adjust this timeout of 10 seconds to any delay
timeout /t 10

rem this should be modified to accommodate the latest installed version
start "7kCenter" /D "C:\PROGRAM FILES (x86)\RESON\7128(2013-11-08)" /MIN "C:\PROGRAM FILES (x86)\RESON\7128(2013-11-
08)\7kcenter.exe" -sim

timeout /t 5

rem this should be modified to accommodate the latest installed version
rem if the IO module is already in the startup menu either remove this part or remove from the startup menu
start "IOModule" /D "C:\Program Files (x86)\RESON\PDS2000 IO Module V3.7.0.14" /MIN "C:\Program Files (x86)\RESON\PDS2000 IO Module
V3.7.0.14\7kIOModule.bat"

rem this should be modified to accommodate the right place of the files
copy /A "C:\Users\erni\Desktop\L1[AcqComp].pcf" "D:\PDS2000 Projects\CABI\L1[AcqComp].pcf" /Y

timeout /t 5

rem this should be modified to accommodate the latest installed version (thus starting master.exe with the autostart option)
start "Acquisition" /D "C:\Program Files (x86)\RESON\PDS2000 V3.9.0.0" /MIN "C:\Program Files (x86)\RESON\PDS2000 V3.9.0.0\Master.exe" -A
```

Appendix A Checksum

Checksum is calculated by taking a logical exclusive-OR operation of the 8-bit message characters. Checksum excludes the leading ‘$’, checksum delimiter ‘*’ and the checksum itself.

The following C-language routine calculates the checksum. Parameters are:

char* sz pointer to the string containing the message (excluding checksum).

int nCount number of characters in message (including leading ‘$’)

```
unsigned char Calc_checksum(char* sz, int nCount)
{
        unsigned char cs; // Checksum
        // Omit the $-character
        for (i=1; i<Count; i++)
        {
        cs = cs ^((unsigned char)sz[i]);
        }
        return cs;
}
```

Notice that leading “$” is not included when calculating the checksum. Receiving application should calculate the checksum of the message and compare it to the received checksum.