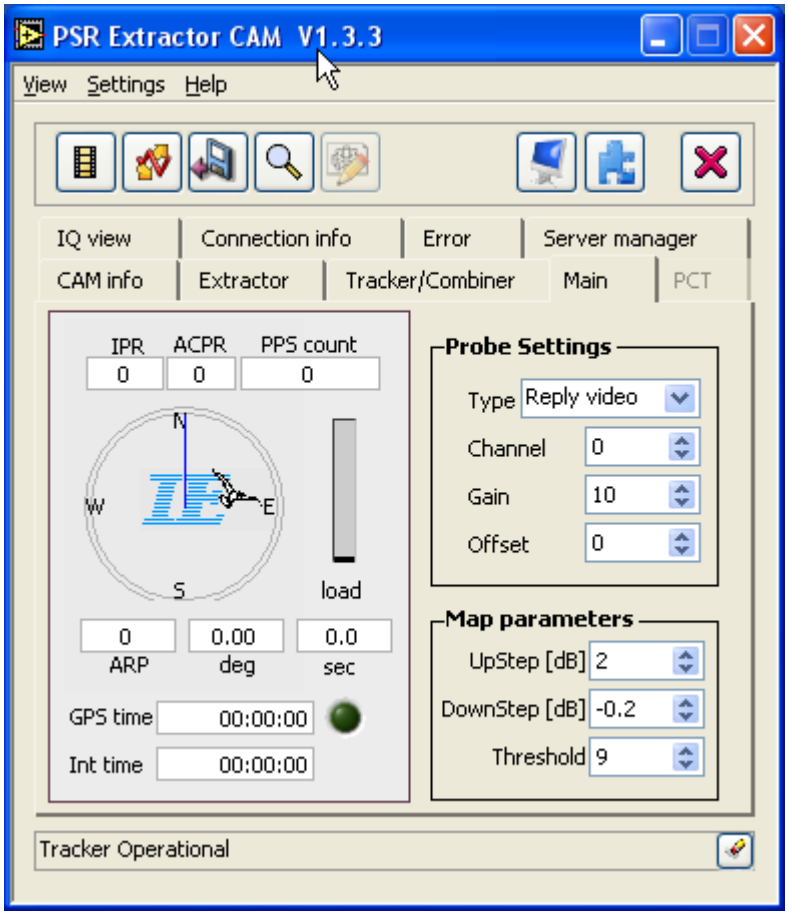
Primary Surveillance Radar Extractor



Control And Monitor –CAM– User Manual

INTERSOFT ELECTRONICS

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Abstract

This manual focuses on the control and monitoring software interface of the Primary Radar Extractor. This contains the following parts:

- General overviwe of the hardware PRE790 and PCT791.
- Description of the software.

All the configurations, settings and block diagrams are described in this manual.

In this manual, it is assumed that the output of the PRE790 is connected to INTERSOFT ELECTRONICS Multi Radar Display 3.

Keywords
Primary Radar Extractor Tracker Combiner Multi Radar Display

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ELECTRONIC BACKUP

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HOST SYSTEM	**MEDIA**	**SOFTWARE(S)**
Dell Dimension 9200	Type : Hard disk	Word 2003
Windows XP Pro	Media Identification :	

DOCUMENT APPROVAL

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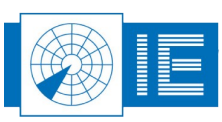

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ACRONYMS

PSR	primary radar extractor
SSR	secondary radar extractor
PRE	primary radar extractor
PCT	PSR Controlled Timing Unit
MRD	Multi Radar Display (refer to the manual of the MRD)
DHM	Data Handler Module (refer to the manual of the DHM)
HDMI	High Definition Multimedia Interface
CAM	Control And Monitoring
COTS	Commercial Of-The-Shelf
ATC	Air Traffic Control
ACPR	Azimuth Change Pulse Rate
ARP	Azimuth Reset Pulse
STC	Sensitivity Time Control
PRF	Pulse Repetition Frequency
DRAC	Dell Remote Access Controller

CONVENTIONS USED IN THIS MANUAL

The following conventions are used in this manual:

Note: This icon to the left of bold italicized text denotes a note, which alerts you to important information.

Caution: This icon to the left of bold italicized text denotes a caution, which alerts you to the possibility of data loss or a system crash.

Warning: This icon to the left of bold italicized text denotes a warning, which alerts you to the possibility of damage to you or your equipment

1. Introduction

The **Primary Radar Extractor** or PRE790 is developed to **extend the life span** of airport approach primary radar systems and to **improve** their **performance**. Although originally developed for the Thomson TA10M, the system can easily be adapted for usage on other radars (e.g. Watchman AR51). The main step in the radar upgrade is the replacement of the full receiver processing unit, resulting in an immediate improvement by use of state of the art radar processing techniques; for example:

- **Synchronous sampling** of analog signal providing I and Q digital signals
- Full **Doppler processing** instead of MTI processing
- 16 bin FFT processing with **Adaptive Clutter** map for each of the 16 bins
- Constant false alarm rate filter (**CFAR**)
- Improved Pd

Figure 1-1: PRE790

The PRE790 has two main units: a video processing unit and a data processing unit.

The **video processing unit** samples the analog I/Q video (ADC). This digitized video signal is fed to an internal digital signal processor for further preprocessing and data reduction (filtering). The video data is aligned with the timing signals (ACP, ARP and trigger) and UTC time stamps are added by means of Intersoft Electronics' GPS450.

The **data processing unit** contains 4 serial ports for input and/or output. It can receive SSR targets form the existing co-located SSR extractor on its serial input lines. The video and data processing units are connected over a separate USB-interface to a dedicated processing server.

Additional to the PRE790, a programmable **PSR Controlled Timing Unit** is installed (PCT791). This unit typically converts the timing signal outputs of the radar into PRE790 acceptable levels. Because the timing signals of the radar are manufacturer dependent, this interface unit needs to be designed specifically for every radar type.

Figure 1-2: PCT791

The PRE790 is completely controlled by the following software modules (installed on the processing server):

- **Extractor** function: Doppler processing and PSR plot extraction on the digitized video data.
- **Combiner/Tracker** function: combining the extracted PSR plots with the SSR target data and making tracks.
- RASS-R **Data Handling Module** software (DHM): possibility to output the different data on LAN or on serial lines using the data processing unit in the PRE790. Also, the DHM can send the video data over LAN to ATC centres or other clients.

The **processing computer** is a 19inch rack server with no screen nor keyboard attached. It can be accessed using Windows Remote Desktop from the management console. Starting up/shutting down can be remote controlled using the web application of the Remote Access Controller (DRAC) interface.

Figure 1-3:processing server

The Control And Monitoring (CAM) software, serves as Human Machine Interface and controls the PRE790. The software runs on a remote monitoring station that acts as management console. As an asset, Intersoft Electronics' Multi Radar Display 3 or Technical Maintenance Display 3 can be installed on the management console, displaying the plot and video data in PPI style.

This manual explains the use of the Control And Monitoring software, or ‘PSR Extractor CAM’. For detailed explanation about the extractor and the complete software and hardware design, we refer to the technical manual “*IE-PSR-Extractor-TM-vxx.pdf*”.

Other names used for the management console are: management pc/station, monitor pc/station.

2. RASS-R toolbox

The PSR Extractor setup makes use of the Data Handling Module software and the Multi Radar Display, which are both part of the RASS-R toolbox.

The RASS-R toolbox is installed on your pc and has a shortcut on the desktop. It can also be accessed using the Windows Start-menu. The toolbox is displayed in Figure 2-4: RASS-R toolbox. The current version of the RASS-R toolbox is displayed in the right upper corner. The DHM and MRD3 are part of this RASS-R toolbox and can be opened using the appropriate icons and . On the other hand, also the PSR Extractor CAM has direct shortcuts to these software modules (see 4.2 Main toolbar)

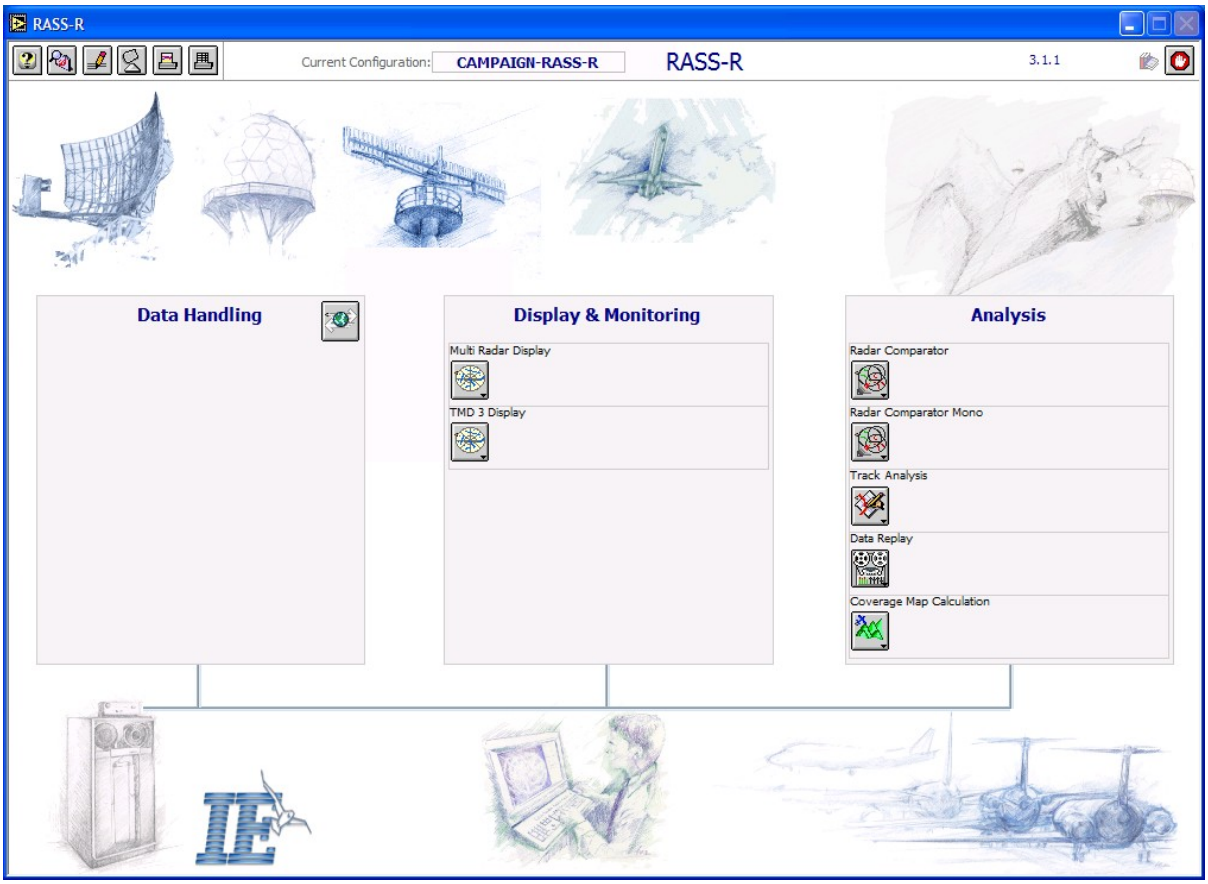


Figure 2-4: RASS-R toolbox

For details about the DHM and MRD3 software we refer to their respective user manuals "*IE-UM-00025-0xx DHM.pdf****" and "****IE-UM-00027-0xx MRD3.pdf****".***

The menu bar contains the following items:

Table 2-1: RASS-R menu bar

Button	Usage
Help window	When this button is clicked, the Help window will appear and show help information whenever you point over a button.
Campaign change	Click this to make an appropriate campaign structure (see further)
Change settings	Under development
Site file	Under development
Print graphs	Under development
Print tables	Under development
Exit	Quit the application

When you click the button, it will ask you where you want to create your RASS-R campaign folder. Select the correct path. Upon completion, you should have the following directory structure created as in Figure 2-5: Campaign directory structure.

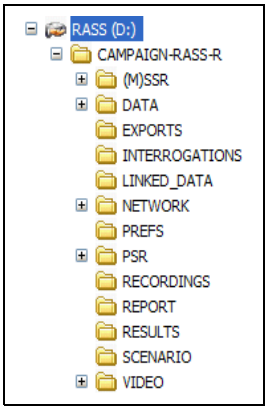


Figure 2-5: Campaign directory structure

When you make a campaign folder with the RASS-R toolbox, it is suggested to create it on a separate drive rather than the drive where your operation system is on. For example, as in the figure above, a structure named "CAMPAIGN-RASS-R" is created on the D-drive.

3. Different modules

This chapter gives an overview of the hardware and software (in block diagram and user interfaces). It will help the reader to better understand the 'Control And Monitor' software which is explained in the next chapter.

3.1 Hardware/software overview

A standard configuration, running different software components, is presented in the figure below. We can see the following parts:

- **PRE790:** installed in a (existing) 19" rack connected with the GPS450, the PCT791 and the processing server. The PRE790 processes the I/Q video signals coming from the PSR.
- **PSR Controlled Timing Unit**: interface for timing signals between the radar and PRE790. It is connected by a HDMI[1]-cable. The PCT791 is radar specific!
- **Processing server**: the server is connected to the PRE790. It is equipped with sufficient processing power (CPU), Memory (e.g. 4GB), recording facilities (1TB harddisk, RAID configuration), DRAC-interface, ... and performs the following tasks:
    - **Extractor server**: Extraction of primary plots using the video data
    - **Tracker/combiner-server**: tracking and combining of PSR and SSR plots
    - **Data Handling Module**:
        - data acquisition of any common radar format (ASTERIX, Aircat, EV760 etc.)
        - protocol convert into our proprietary D6 format (required for further processing with any IE software) and/or convert into common used radar formats (ASTERIX, RDIF, …)
        - data recording and/or replay
        - distribute the data over various networks (LAN, WAN, Serial, …)
- **Monitoring station**: the monitoring station is a desktop computer, installed in the radar shelter. It is used to monitor the processing server and fulfils the following tasks:
    - **Extractor CAM:** user interface to configure the extractor server and the tracker/combiner server software that are running on the processing server.
    - **DHM Configuration manager:** user interface to configure and control the different DHM sessions running on the processing server.
    - **MRD3**: visualizes the SSR targets, PSR targets, combined targets, tracks and video.
    - The monitoring station can also be used to access the processing server using **Windows Remote Desktop**. If the processing server is equipped with a DRAC-interface, its functionalities can be accessed by typing in the processing server's DRAC IP-address in a browser on the monitoring station.

[1] The HDMI cable is only used for its cable specifications. The HDMI standard is not followed at all.

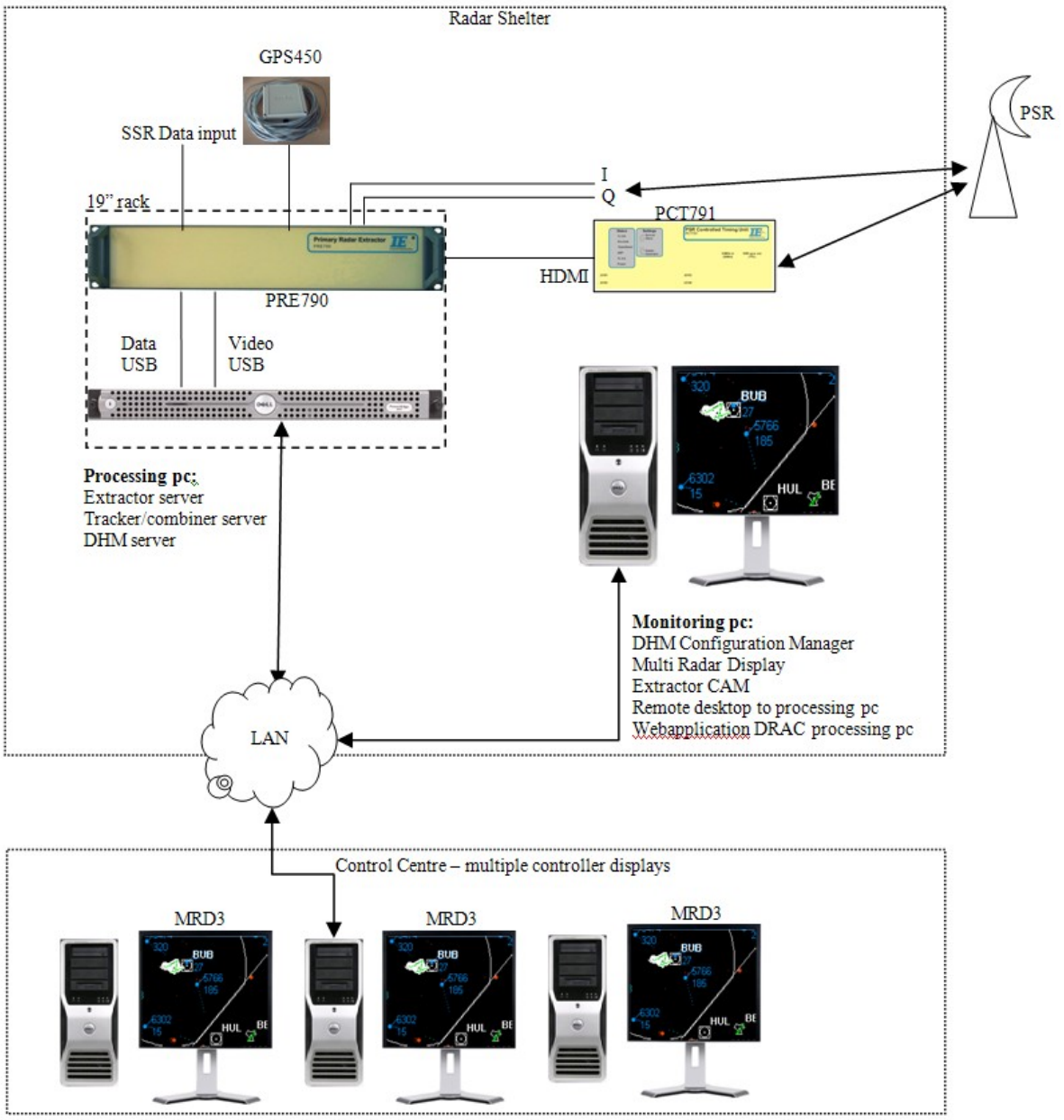


Figure 3-6: Example of hardware configuration

3.2 User interfaces overview

In the previous chapter, we have seen that different software modules communicate with different hardware modules, installed on multiple computers. The link between all computers is the **local area network** (LAN). The different software modules talk with each other using different **socket-connections** over UDP/IP and TCP/IP (both internal and external between 2 computers). In the figure below, all coloured arrows represent a different socket connection.

On the processing server, the PSR extractor server and the PSR Tracker server are running as a **windows service**. Both functions use 2 different sockets to communicate with the PSR Extractor CAM, which is installed on the monitoring station. Remember that, if the processing server is not equipped with a keyboard or screen, you can use Windows Remote Desktop on the monitoring station to access the processing server.

On the monitoring station, there are the following user interfaces:

- The **PSR Extractor CAM** to configure and monitor the PSR Extractor server, the PSR Tracker/Combiner, the PCT791
- The **DHM Configuration Manager**, to configure and monitor the DHM server on the processing server, with connection to the PRE790
- The **MRD3**, displaying information configured in DHM sessions on the processing server.

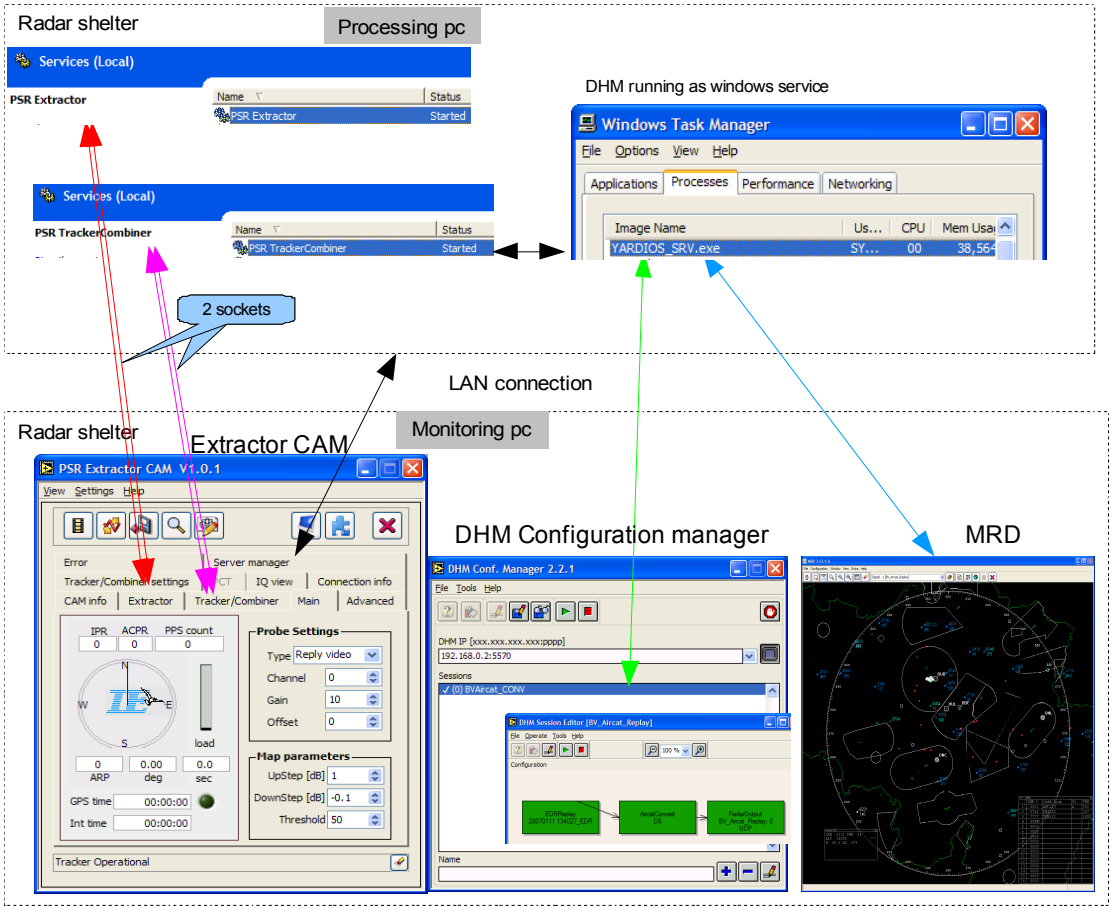


Figure 3-7: User interfaces overview

Setting up the PSR extractor requires good knowledge of networking. All the settings must be made in the appropriate ini-files (refer to the technical manual).

4. PSR Extractor CAM

The **PSR Extractor Control And Monitoring** user interface runs on the monitoring station. It is used for remote controlling and monitoring the **extractor server** and the **tracker/combiner server**. It is also used to program and monitor the **PCT791**.
Directly from this user interface, you can also start/stop the DHM server running on the processing server, restart the processing server, open the DHM Configuration Manager or the Multi Radar Display.

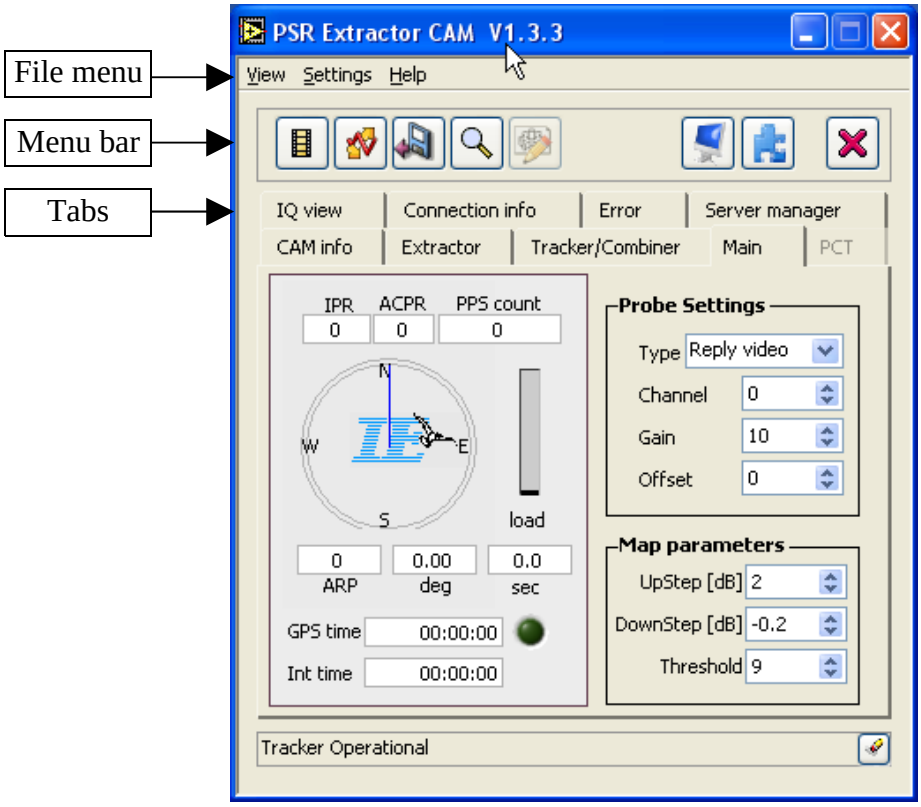


Figure 4-8: CAM User Interface

It is very important to remember that the PSR Extractor CAM runs on the monitoring station.

4.1 File menu

An overview of all the available menu items is given in Table 4-2.

Table 4-2: Menu bar

Menu	Usage
View	
↳ View Eventlog	Opens the Info/Warning/Error Viewer window
↳ Recorder	Opens the File Recorder Window
↳ System Load	Opens the System Load Display Window
Settings	
↳ Probe Settings	Opens the Probe Setting Editor
↳ STC Fixed Att.	To load the STC settings (only active when the PCT791 is
↳ Advanced settings	To load the Advanced settings editor
↳ Map editor	To load the Map editor
↳ PCT Flash	To load the PCT Flash Programmer
↳ PCT Flash Editor	To load the PCT Flash Editor
Help	
↳ About	Application Summary dialog

The different menu items will be explained in further detail in the next paragraphs.

4.1.1 View EventLog

When you click "View ↳ EventLog", the "Info/Warning/Error Viewer" will be opened.
(Figure 4-9: Info/Warning/Error Viewer)
This list **logs** all Info, Warnings and Errors **events** that happen in the software.
You can select whether you want to see the errors, warnings, or info events using the drop down menu. If you click Save, a window will prompt that asks you to **save** the current information in a .log-file.

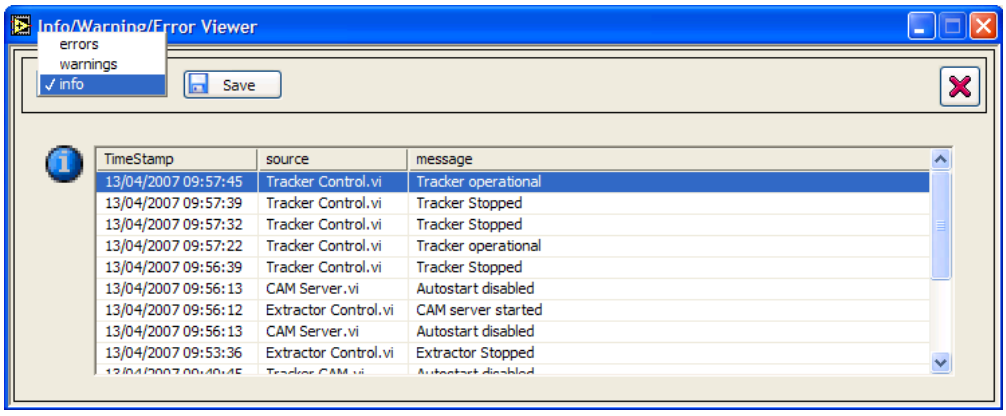


Figure 4-9: Info/Warning/Error Viewer

This information is very useful when troubleshooting your system, since all steps are logged here.

4.1.2 File recorder

By clicking “View ↳ Recorder” or by pressing  (see 4.1.5), the following window will prompt:

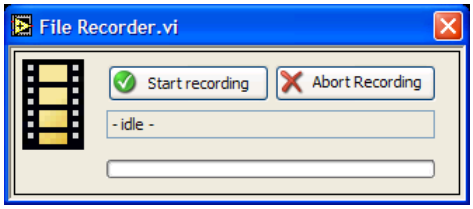


Figure 4-10: Recorder window

If you click to start the recording, the software will **record the sampled I/Q video**. This data will be saved in a .2MHz file. The path of this recording is set in the default.ini-file in the Extractor Server folder. Similar to the recording path, the file size can be set in the default.ini-file (see technical manual *IE-PSR-Extractor-TM-vxx.pdf*). When the maximum file size is reached, the recording **automatically stops**. Then, a new ‘Start’ is necessary for a next recording.

Note that this recording only records I/Q video before plot extraction. The PSR extracted plots and/or SSR data can be recorded with the DHM.

Replaying files that you recorded yourself, is not possible in this software version. It is necessary to synchronize the PSR video and SSR data in a separate software tool that is not part of this CAM software.

4.1.3 System Load Display

By clicking “View ↳ System Load Display, the following window will prompt:

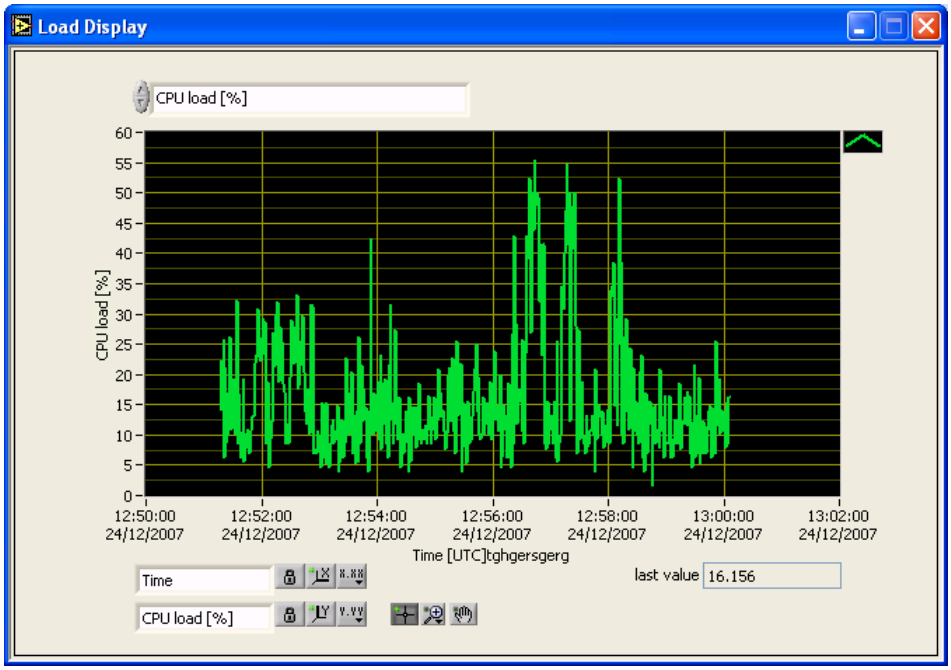


Figure 4-11: System Load Display

When you click in the upper selection field, the following list of display options appears:

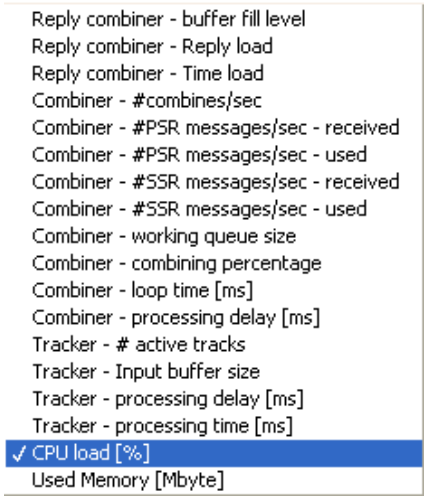


Figure 4-12 System Load Display - fields

When you select an option the **last hour history** for the selected parameter is displayed. Further explanation of the meaning of the options will be given in the next paragraphs.

4.1.3.1 Reply combiner – buffer fill level

This item shows the buffer fill level of the reply combiner engine. This buffer stores the reply video coming from the device for further processing. The fill level is shown in **%**.
[#replies/buffer size * 100]

4.1.3.2 Reply combiner – Reply load

The reply combiner engine is allowed to processes a maximum number of replies per processing cycle. This parameter shows the actual used percentage of this maximum.
{#replies/reply limit * 100}.

4.1.3.3 Reply combiner – Time load

The reply combiner engine has a maximum loop time. The loop time is the time needed to do one processing cycle. This parameter shows how much time is used compared to the maximum loop time in **%**. {loop time/max loop time * 100}

4.1.3.4 Combiner - #combines/sec

The combiner combines primary plots with secondary plots. This value shows how much combines are completed per second (CS). The calculated value is a **sliding average** over 20 seconds.

4.1.3.5 Combiner - #PSR messages/sec – received

Shows the number of primary messages received, **including** sector messages.

4.1.3.6 Combiner - #PSR messages/sec – used

Shows the number of primary messages used, sector messages **excluded**.

4.1.3.7 Combiner - #SSR messages/sec – received

Shows the number of secondary messages received, **including** sector messages.

4.1.3.8 Combiner - #SSR messages/sec – used

Shows the number of secondary messages used, sector messages **excluded**.

4.1.3.9 Combiner – working queue size

When you select this field you can see the number of plots in memory where the combiner engine can work with. If this value is too small, the combiner has not much possibilities of combining. If this value is too large it takes more time to compare all probabilities.

4.1.3.10 Combiner – combining percentage

The combining percentage (CB) gives an indication of how much matches there are made between PSR and SSR plots. In an ideal situation there is for each primary plot a matching secondary plot, so the combining percentage will be 100% in that situation. An example:

#PSR messages/sec–used = 30
SSR messages/sec–used = 20
#combines/sec = 17
=> CB= 17 / [(30+20)/2] *100 = 68%

So the combining percentage is calculated by summing the number of primary plots and the number of secondary plots, this sum is divided by 2. Then divide the #combines/sec by the previous result. {CB = CS/[(#PSR+#SSR)/2] * 100}.

4.1.3.11 Combiner – loop time [ms]

Shows the loop time of the combiner engine in ms.

4.1.3.12 Combiner – processing delay [ms]

Shows the processing delay of the combiner engine in ms. The processing delay is needed to give the system time to receive the incoming PSR and SSR data. This delay is also used to compensate for different delays in the both PSR and SSR systems.

4.1.3.13 Tracker - # active tracks

Shows how much tracks are active in the tracker engine.

4.1.3.14 Tracker – input buffer size

When you select this field you can see the number of plots in memory where the tracker engine can work with. If the tracker treads a track he will search in this buffer for the best matching plot for that track.

4.1.3.15 Tracker – processing delay [ms]

This value shows the processing delay of the tracker engine. This means the delay between the target detection and when the track update leaves the tracker engine.

4.1.3.16 Tracker – processing time [ms]

Shows the loop time of the tracker engine in ms.

4.1.3.17 CPU load [%]

Shows the processor load of the processing server.

4.1.3.18 Used memory [Mbyte]

Shows the used physical memory of the processing server.

This information is very useful when troubleshooting your system. This info is stored on disk of the monitor pc for the last 100 days. You can find these loggings in the following folder: C:\Program Files\Intersoft Electronics\PSR Extractor\Extractor CAM\logs.

4.1.4 Probe Settings

By clicking “Settings ↳ Probe Settings”, you can edit the Gain and Offset applied by selecting that probe in the “Main tab” of the CAM. The default values are stored in the CAM configuration ini-file.

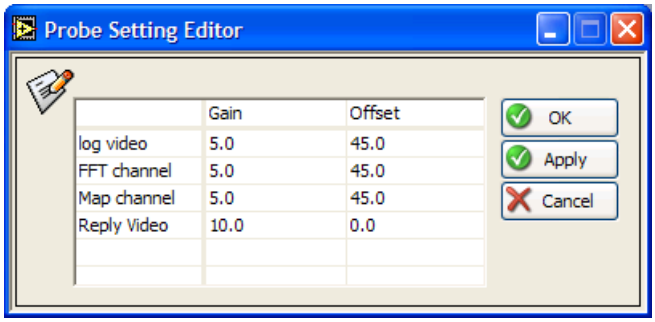


Figure 4-13: Probe Setting Editor

4.1.5 STC Fixed attenuation settings

See 4.3.2 PCT tab

4.1.6 Advanced settings editor

By clicking "Settings ↳ Advanced Settings Editor", a windows as in Figure 4-14 will prompt. The parameters that can be changed in this screen are used for **fine tuning** of the different software processes: the extractor, the combining and the tracker functions. These parameters are loaded from several .ini-files. Changes to the parameters are not saved and are thus only applicable as long as the services are not restarted. A detailed description of each parameter can be found in the Technical Manual "*IE-PSR-Extractor-TM-vxx.pdf* ".

These parameters may only be changed by personnel having sufficient knowledge about its use.

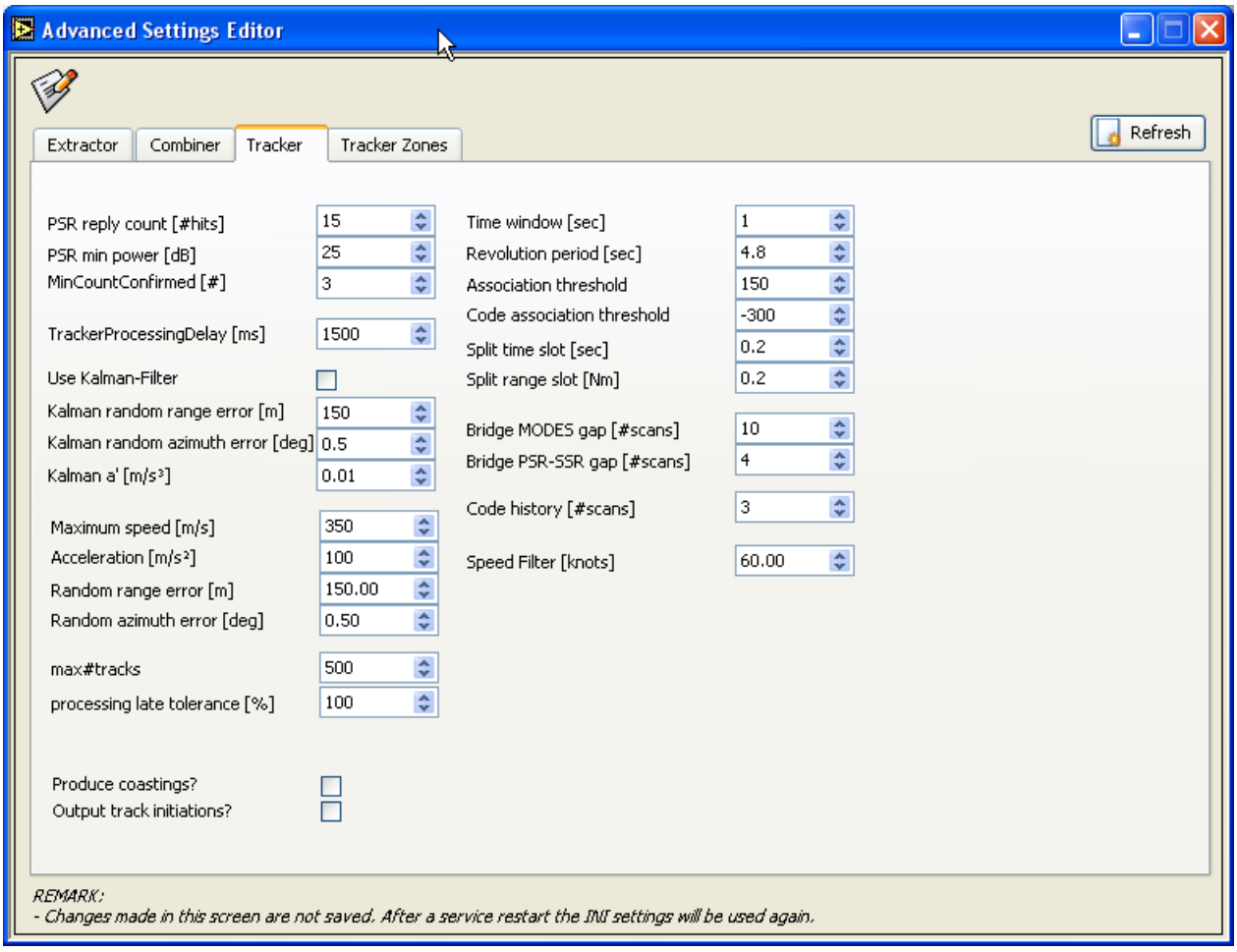


Figure 4-14: Advanced Settings Editor – Tracker

4.1.7 Map Editor

By clicking “Settings ↳ Map editor”, the map editor will load.

With this editor you can create or change the **Threshold Map** and **Power Threshold Map**. The maps are stored on the processing server in the folder “*c:\Program Files\Intersoft Electronics\PSR Extractor\Extractor Server\UserPrefs*”

A map can be loaded from file with the load button  and saved with the save button  . Each map is build by connecting a sequence of points. You can run through the points with the next  and previous  button. A point can be removed with the clear button  .

The **Threshold Map** is variable in range. The threshold is relative and added to the overall threshold that can be changed in the Main tab of the CAM User Interface (see 4.3.1).
Only video received with a power bigger than the sum of the clutter power and threshold is applicable to become reply video. We refer to the technical manual for a detailed explanation.

Figure 4-15 shows a Threshold map created by connection following points:

Start Range [Nm]	Start Threshold [dB]	Stop Range [Nm]	Stop Threshold [dB]
0	3	18	3
18	3	55	0
55	50	70	50

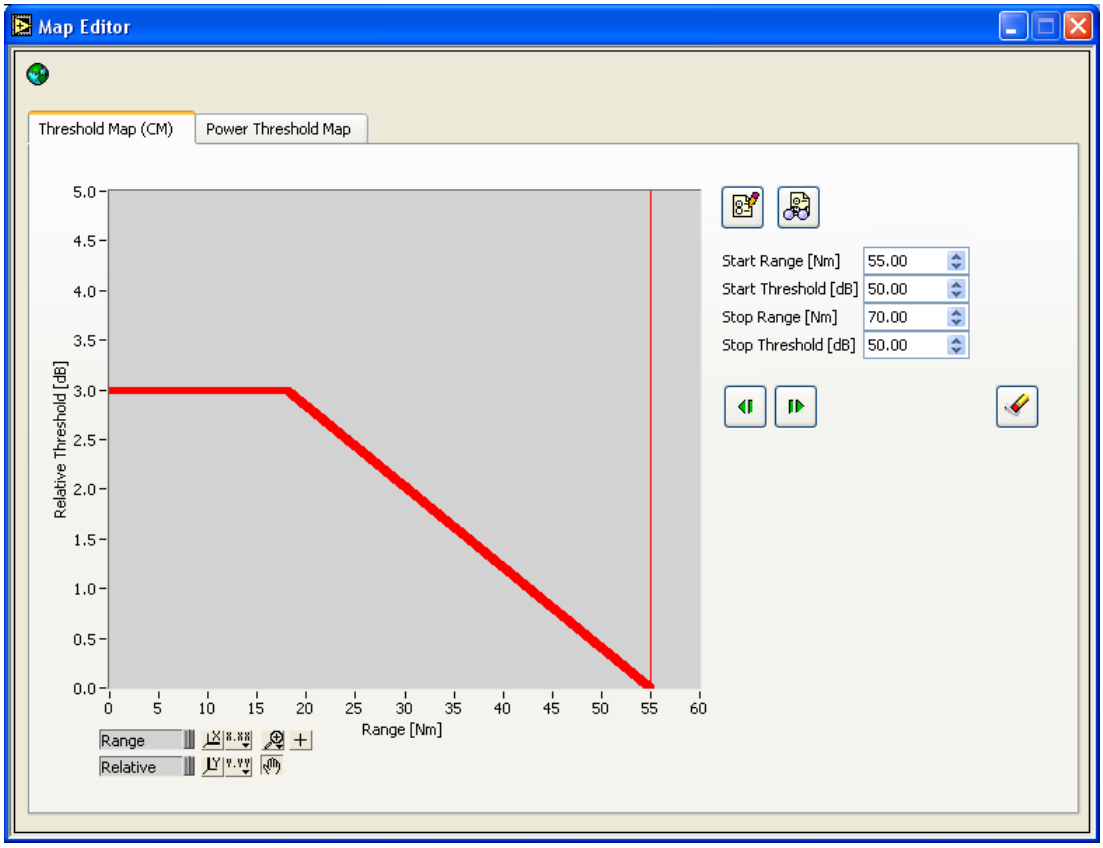


Figure 4-15: Map editor - Threshold map

The **Power Threshold Map** is variable both in range and azimuth. The applied power threshold is relative and combined with the power threshold as set in the Extractor server user preferences (see Technical Manual "*IE-PSR-Extractor-TM-vxx.pdf* ").
PSR plots with a power, after pathloss and STC compensation, below the power threshold are not outputted by the reply combiner function of the PSR extractor.

Figure 4-16 shows a Power Threshold Map created by connection following points:

Start Range [Nm]	Stop Range [Nm]	Start Azimuth [deg]	Stop Azimuth [deg]	Start Threshold [dB]	Stop Threshold [dB]
0	18	0	360	-5	-5
18	22	0	360	-5	0
22	55	0	360	0	5

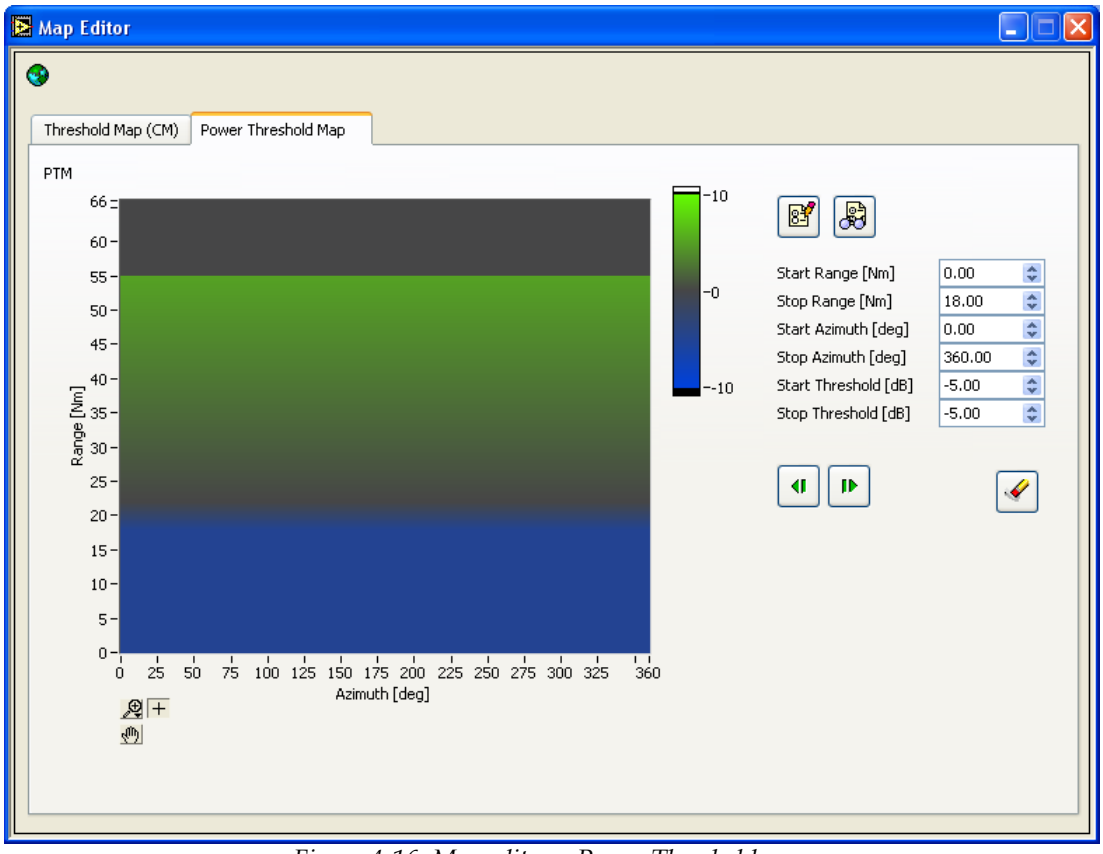


Figure 4-16: Map editor – Power Threshold map

4.1.8 PCT Flash Programmer

By clicking “Settings ↳ PCT Flash Programmer”, a windows as in Figure 4-17 will load.

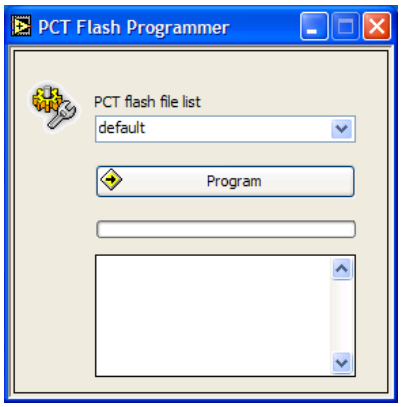


Figure 4-17: PCT Flash programmer

This dialog is used in combination with the PCT flash editor and is used to **program the PCT791** (see next paragraph).
When the STC- and Beam Switching-tables are saved to file using the PCT flash editor, the file content can be loaded to the PCT791 flash memory by pressing “Program”. A progress bar will start, do not close the programmer until the process is finished.

Note that this menu item is only available when the extractor is stopped. The Flash content of the PCT791 unit can not be programmed when the extractor is running.

4.1.9 PCT Flash Editor

By clicking “Settings ↳ PCT Flash Editor”, the following window will prompt:

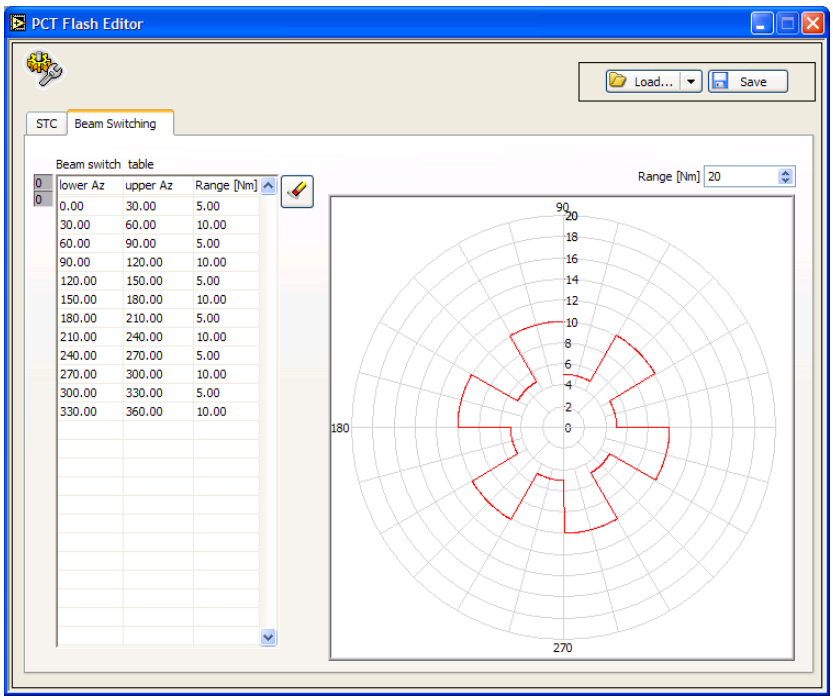


Figure 4-18: PCT Flash Editor – Beam switching table

In the **beam switching table** , you can fill in the beam switch table that can be loaded into the PCT791 flash memory. Click Load... to load a correct flash file, click Save to save and to erase the current table contents. The flash files are stored on the **processing server** at the following location: *C:\Program Files\Intersoft Electronics\PSR Extractor\Extractor Server\FlashContent*

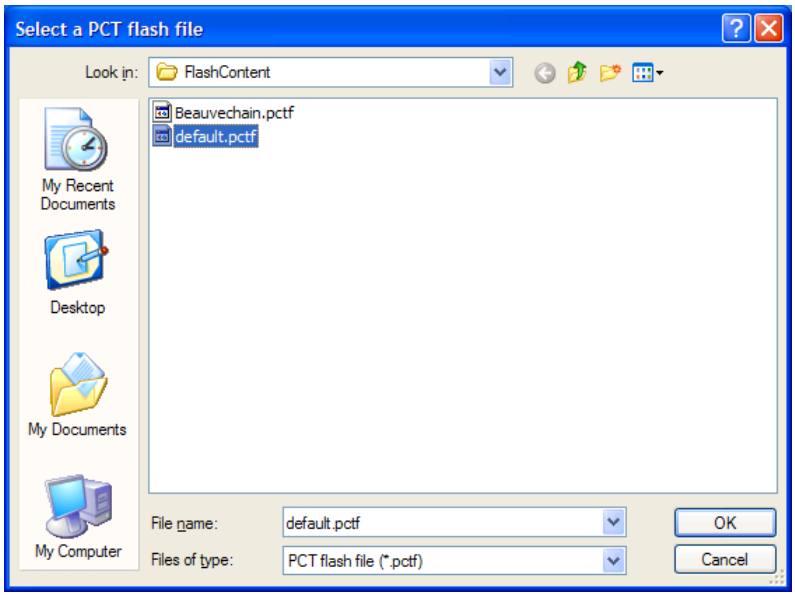
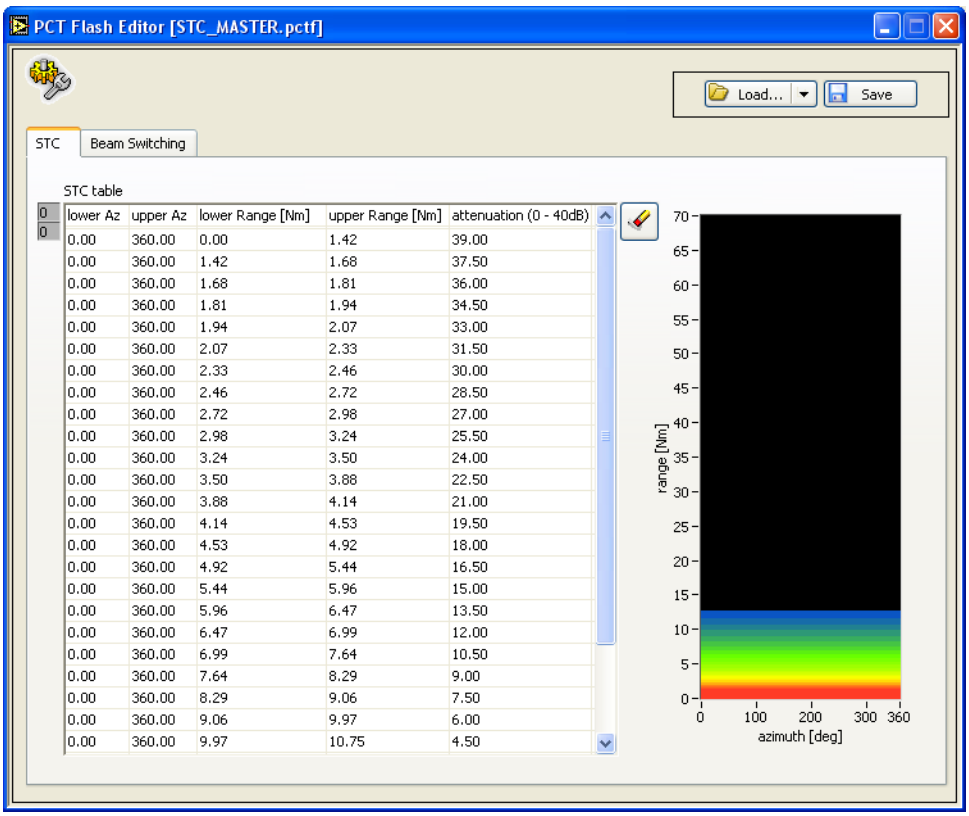


Figure 4-19: Select PCT flash file

When you click the STC map, the following window will open. Similar to the Beam switching table, you can load a file or manually fill in the table.



	lower Az	upper Az	lower Range [Nm]	upper Range [Nm]	attenuation (0 - 40dB)
0	0.00	360.00	0.00	1.42	39.00
0	0.00	360.00	1.42	1.68	37.50
	0.00	360.00	1.68	1.81	36.00
	0.00	360.00	1.81	1.94	34.50
	0.00	360.00	1.94	2.07	33.00
	0.00	360.00	2.07	2.33	31.50
	0.00	360.00	2.33	2.46	30.00
	0.00	360.00	2.46	2.72	28.50
	0.00	360.00	2.72	2.98	27.00
	0.00	360.00	2.98	3.24	25.50
	0.00	360.00	3.24	3.50	24.00
	0.00	360.00	3.50	3.88	22.50
	0.00	360.00	3.88	4.14	21.00
	0.00	360.00	4.14	4.53	19.50
	0.00	360.00	4.53	4.92	18.00
	0.00	360.00	4.92	5.44	16.50
	0.00	360.00	5.44	5.96	15.00
	0.00	360.00	5.96	6.47	13.50
	0.00	360.00	6.47	6.99	12.00
	0.00	360.00	6.99	7.64	10.50
	0.00	360.00	7.64	8.29	9.00
	0.00	360.00	8.29	9.06	7.50
	0.00	360.00	9.06	9.97	6.00
	0.00	360.00	9.97	10.75	4.50

Figure 4-20: PCT Flash Editor – STC table

4.1.10 About

By clicking “Help ↳ About”, the “About PSR Extractor” window will prompt:

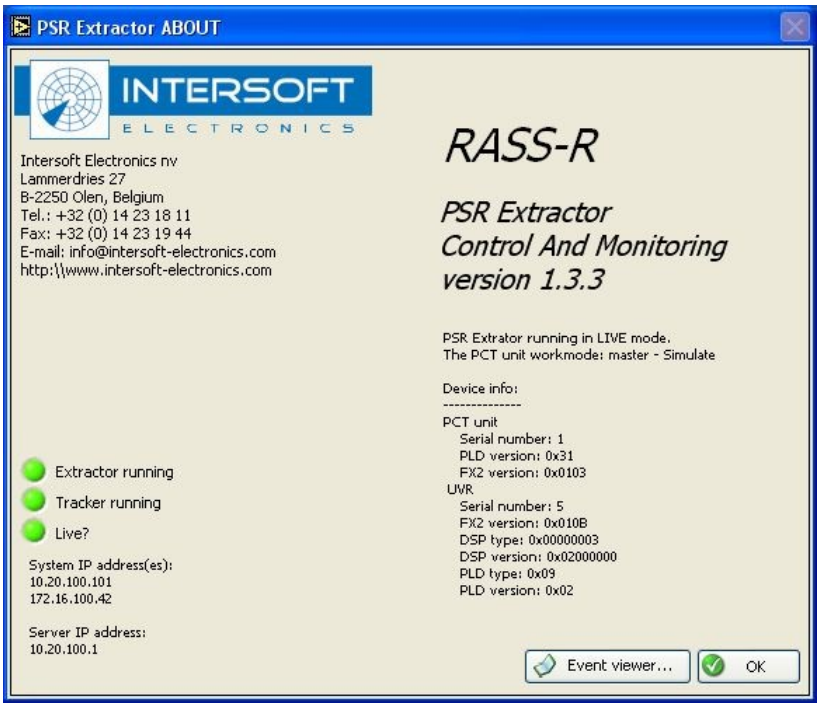


Figure 4-21: About PSR Extractor

In the top left corner you see the **contact information**.
The **green LED's** in the left bottom corner indicate whether the Extractor is running, the Tracker is running and the system is in live or replay mode.
On the right side you get CAM version, PSR extractor and PCT status and device information.

With the **Event Viewe**r button you can open the Windows Event viewer to read all reported error, warning and information events logged in the RASS-R event log.

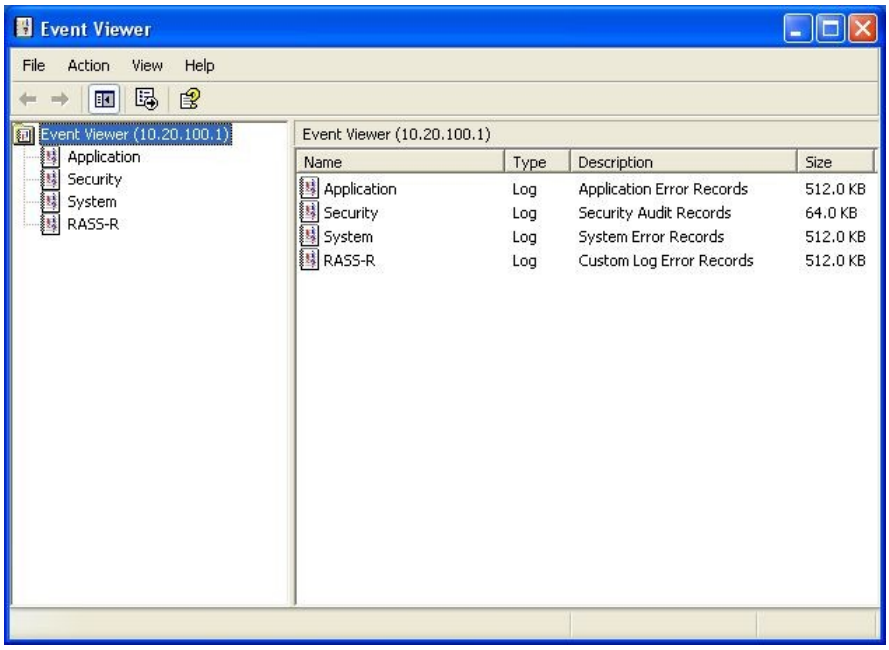


Figure 4-22: Event Viewer

4.2 Main toolbar

The main toolbar is displayed in the following figure:

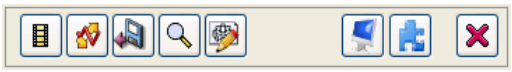


Figure 4-23: Main toolbar

Table 4-3 is an overview of the buttons of main toolbar.

Table 4-3: Main toolbar

Button	Usage
Recording display	Open the Recording Display. This does the same as choosing "View ↳ Recorder" in the Menu bar.
	Triggers manual offset compensation
	Save clutter map
	Opens the IQ tab (see 4.3.8 I/Q view tab)
	Load PCT791 Time Settings
MRD3	Launch the MRD3 (Refer to the manual about the Multi Radar Display) The MRD3 can also be launched in the RASS-R toolbox.
DHM	Launch the DHM configuration manager (Refer to the manual about the Data Handler Module) The DHM can also be lauched in the RASS-R toolbox.
Exit	Quit the application

4.2.1 Manual offset compensation

When you click the manual offset compensation button the system will search for a minimal **video offset** setting for both I and Q channel. Should you notice a video offset by using the IQ view you can use this button to minimize this offset. Offset compensation is automatically executed by every start of the extractor.

4.2.2 Clutter Map

When you click the “save clutter map button”  , the following dialog will open:

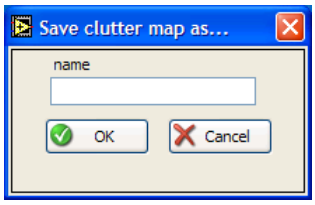


Figure 4-24: Clutter Map

A **clutter map** contains the static objects seen by a radar: for example mountain reflections, obstacles or other not moving parts. On the other hand, also dynamic objects like weather can be stored in the clutter map. This means that the clutter map is continuously changing while the Extractor is running.
The clutter map file is split up in 16 clutter maps, one for each Doppler bin. The size of one map is 1024x1024 cells. Each cell contains an 8 byte value.

With this window, you can give the current clutter map a name and save it to file. It will be saved in the folder *C:\Program Files\Intersoft Electronics\PSR Extractor\Extractor Server\ClutterMaps.* (.clmp-file)
When the name already exists, it will overwrite the old map.

4.2.3 PCT ini-file

When you click the “PCT791 button”  , the following dialog will open:

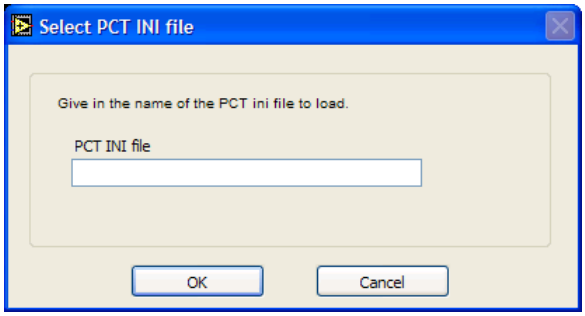


Figure 4-25: PCT INI file

This window is used to load the **time settings** into the PCT791 unit. Therefore, it is only enabled in live mode. The directory with the PCT791 ini-files is: *C:\Program Files\Intersoft Electronics\PSR Extractor\Extractor Server\TimingPrefs* on the **processing server**. For detailed description of this ini-file, consult the Technical Manual.

4.3 Different tabs

In the next paragraphs, the different tabs of the PSR Extractor CAM are explained.

4.3.1 Main tab

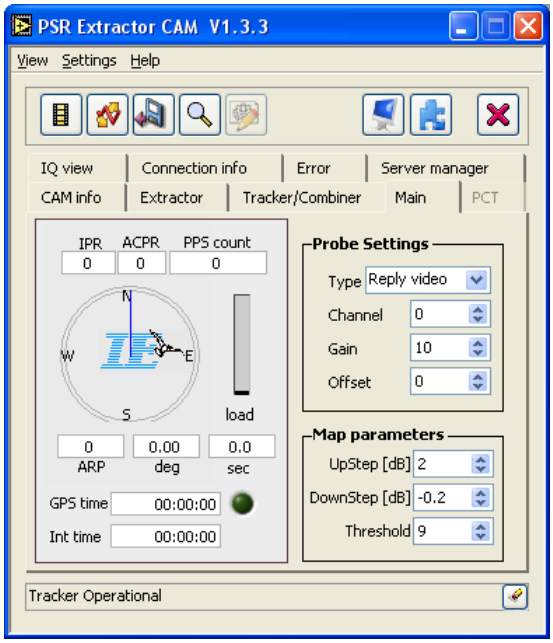


Figure 4-26: Main tab

The "**Main tab**" has the following items:

General window

- **IPR**: Interrogations Per Rotation. This value depends on the PRF and the radar rotation time.
- **ACPR**: Azimuth Change Pulse Rate, i.e. 4096 pulses per cycle
- **PPS Count**: Pulses Per Second (GPS seconds counter when GPS450 connected)
- **ARP**: Azimuth Reset Pulse, increments during live or replay mode
- **Deg**: displays the bearing of the radar in degrees
- **Sec**: displays the revolution time of the radar
- **GPS Time**:the GPS450 time will be displayed here (format: time of week)
- **Int Time**: [UTC] time at the moment of interrogation. (format: time of day [TOD])

Probe Settings

- **Type**: select how the video will be displayed to the MRD3. The parameters will change according to the "probe settings editor" values.
  - **Log video**: represents the result of the next formula of the I and Q video signal: 20.log(sqrt(I^2+Q^2))
  - **FFT channel**: output of the selected Doppler filter. [dB]
  - **Map channel**: output of the selected clutter map. [dB]
  - **Reply Video**: displays the video above the clutter map + threshold for all 16 output bins. The amplitude is the signal above the clutter map. [dB]
- **Channel**: this is only used on FFT and Map Channel probe. It selects the appropriate bin out of 16.
- **Gain**: controls the gain of the video on the MRD
- **Offset**: this value can be used to compensate DC offsets.

Map Parameters:

- **Upstep**: defines the value that has to be added to the clutter map cell if the new cell value is greater than the old cell value
- **Downstep**: defines the value that has to be substracted to the clutter map cell if the new cell value is lower than the old cell value
- **Threshold**: The FFT result has to be greater than the clutter map cell value + threshold + threshold map to output the result.

4.3.2 PCT tab

The "**PCT tab**" only becomes active when the PCT791 is connected to the system.

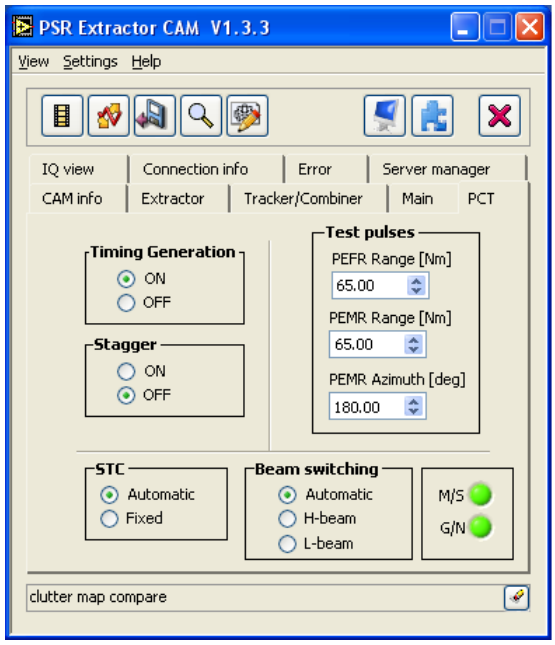


Figure 4-27: PCT tab

The following settings can be made:

- **Transmitter**: you can switch the timing generation of the PCT unit On/Off with this control.
- **Stagger**: turn the stagger On or Off
- **STC**: you can select the automatic STC generation or fixed. When the automatic mode is selected the content of the flash in the PCT unit will be used as STC. If you select the fixed mode, the values given in the setting window are used (see Figure 4-28). You can find these settings in the menu under Settings ↳ STC fixed attenuation settings

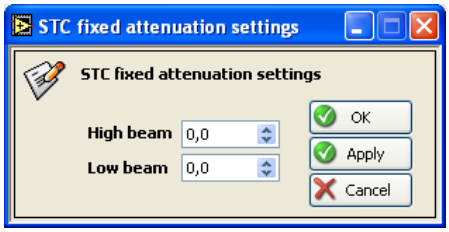


Figure 4-28: STC fixed attenuation settings

- **Test pulses:**
  - **PERF Range**: this value controls at what range the fixed test pulse is placed. The fixed test pulse will appear for al azimuths.
  - **PEMR Range**: this value controls at what range the moving test pulse is placed.
  - **PEMR Azimuth**: this value chooses at what azimuth the moving test pulse is generated. The test pulse will start at the value given and lasts for 15 ACP's.
- **Beam switching**: you can choose between 3 modes
  - **Automatic**: the content in the flash of the PCT791 unit will be used for beam switching.
  - **H-beam**: the high beam is selected. The content of the flash is overridden.
  - **L-beam**: the low beam is selected. The content of the flash is overridden.
- **LED's**:
  - **M/S**: Master / Slave: corresponds to a PCT791 setting
  - **G/N**: Generator / Normal: corresponds to a PCT791 setting

4.3.3 CAM info tab

In the "**CAM info tab**" we can distinguish 4 sections:

- **General Info**:
  - Engine state: displays when the engine is operational or not
  - Loop time: CAM engine loop time, for debug purposes

- **Autostart**: if there's no CAM connection, the extractor and tracker will auto start after a certain time (in configuration files). If there is a CAM connection this auto start decision depends on this setting.

- **Event Filter List**:
  - Sector Messages UDP: if ON, sector messages will be send over UDP (in track and plot output streams). It is strongly recommend to leave this ON.
  - Sector messages CAM: if ON, the PPI on the main tab will follow the antenna rotation.

- **SubEngine Status**: displays the status of the .vi sub-engines

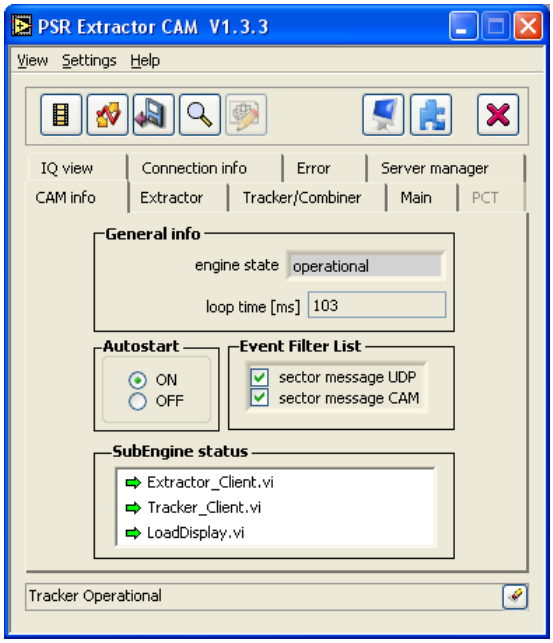


Figure 4-29: CAM info tab

4.3.4 Extractor tab

The "**Extractor tab**" shows the information about the extractor modules running on the processing server. The Extractor itself is running in the background on the processing server as a Windows service. By clicking Start Extractor or Stop Extractor, you actually start or stop the Extractor service. The meaning of the LED's is as follows:

- **Live?:** green if live mode is selected
- **Extractor Error**: if there is an error, it will be displayed in the text bar below or in the "Error tab".
- **Extractor running**: if the VI's are loaded and the Extractor is running. (By clicking Start or Stop) In the right figure below, the CAM is connected and the Extractor is running.
- **CAM connection:** if the connection with the Extractor is made, but not started yet. (the VI's are not running – yellow color) In the left figure below, the CAM is connected to the Extractor but the Extractor is not running.

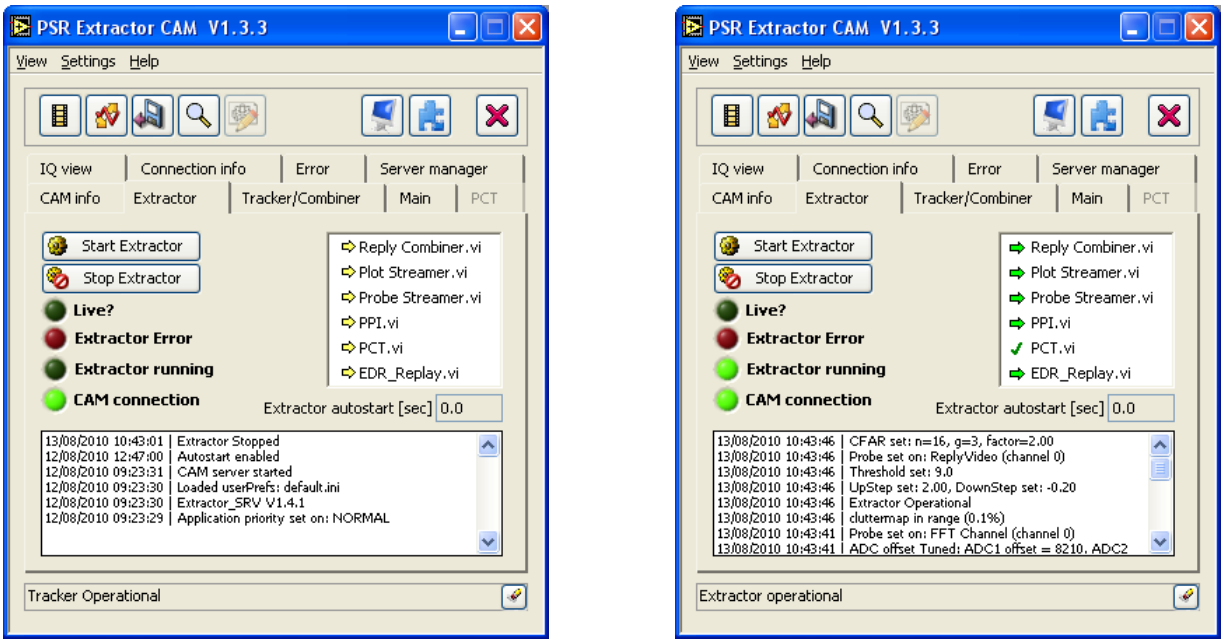
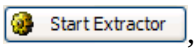


Figure 4-30: Extractor tab Connected Running

The PCT.vi is only running when programming the PCT791 flash memory.
The EDR_Replay.vi is only running when the extractor is in replay mode.

When you click 

, it will prompt the following window:

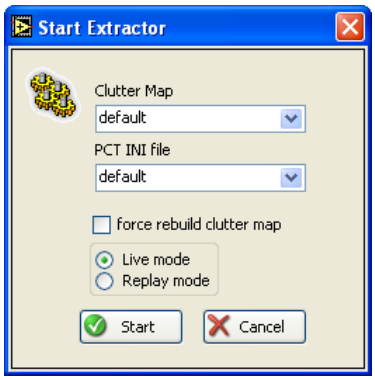


Figure 4-31: Start Extractor

The following settings can be made:

- **Clutter map**: select which clutter map must be used. This can be overruled by clicking the button in “force rebuild clutter map”.
- **PCT file**: select the PCT file to be used
- **Live mode**: the Extractor then works on real live data.
- **Replay mode**: the Extractor works on data that is recorded on disk. When this option is chosen, *Figure 4-32: Replay File Select* prompts. You can choose between the available recordings made. Also some comment will be shown.

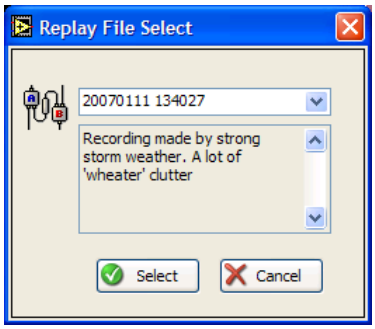


Figure 4-32: Replay File Select

4.3.5 Tracker/Combiner

The "**Tracker/Combiner tab**" shows the information about the Tracker/Combiner that is running on the processing server. The Tracker/Combiner itself is running in the background on the processing server as a Windows service. By clicking Start Tracker/Combiner or Stop Tracker/Combiner, you actually start or stop the Tracker/Combiner service. The meaning of the LED's are as follows:

- **Tracker Error**: if there is an error, it will be displayed in the text bar below or in the "Error tab".
- **Tracker running**: if the VI's are loaded and the Tracker/Combiner is running. (By clicking Start or Stop) In the right figure below, the CAM is connected and the Tracker/Combiner is running.
- **CAM connection:** if the connection with the Tracker/Combiner is made, but not started yet. (the VI's are not running – yellow color) In the left figure below, the CAM is connected to the Tracker/Combiner but the Tracker/Combiner is not running.

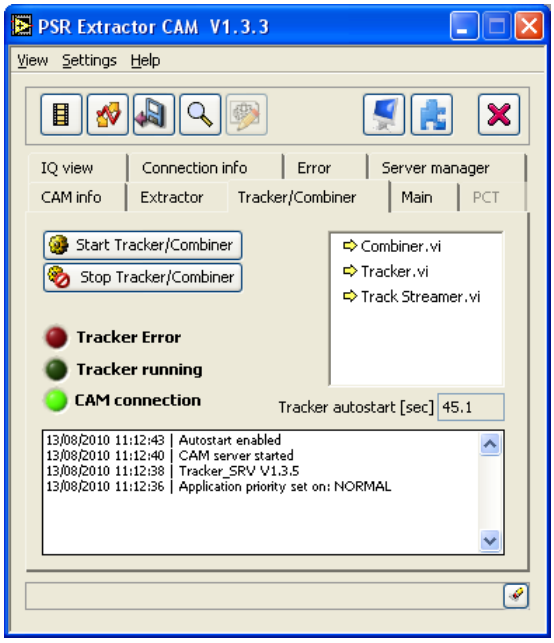
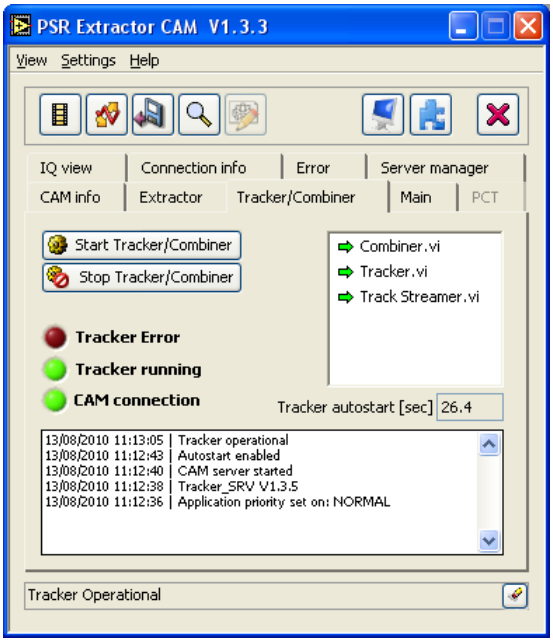


Figure 4-33: Tracker/Combiner tab Connected



Running

4.3.6 Connection info tab

The "**Connection Info Tab**" shows info about the Extractor and the Tracker/Combiner.
As you can see in Figure 4-34, the CAM has 2 socket connections per module. If those socket connections are established between the CAM and the Extractor or Tracker/Combiner module on the processing server, the status will be "connected". If the socket connection is not established, the status will be "Initiating". (Those socket connections are graphically represented in Figure 3-7: User interfaces overview)

The LED's show what kind of information is sent between the CAM and the modules:

- **Command:** in case a command or inquiry is sent (client initiated).
- **Reply:** in case a reply is received.
- **Event:** in case an event occurs (Server initiated). The explanation of the event may appear in the text field below. (Figure 4-35)

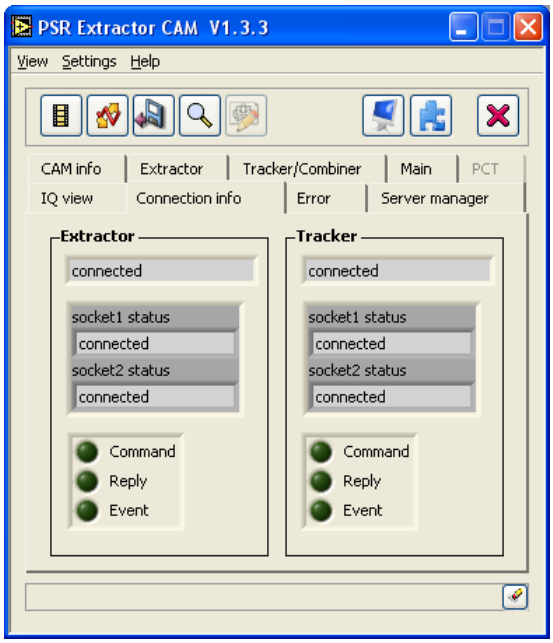


Figure 4-34: Connection Info tab

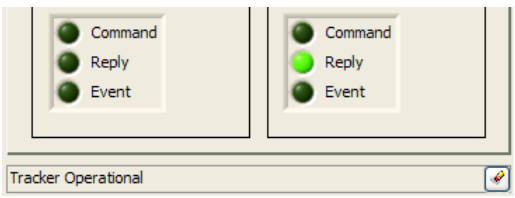
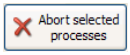


Figure 4-35: Example of event

4.3.7 Server Manager tab

The "**Server Manager Tab**" has the following functions:

- **DHM-service**: You can Start or Stop the DHM server that is running as a Windows service on the processing server. You see also the current status, in the figure below this is 'running'.
- **Restart server**: if you want for some reason to restart the complete processing server without accessing it, you can use this button to do a remote restart. (A complete restart, together with other functions can also be performed with the DRAC web-interface when applicable.)
- **DHM process**: You can see which DHM sessions are running on the DHM on the processing server. If you also connect to the DHM server by clicking  , the sessions become active and you can choose the 

button. (see figure Figure 4-37)

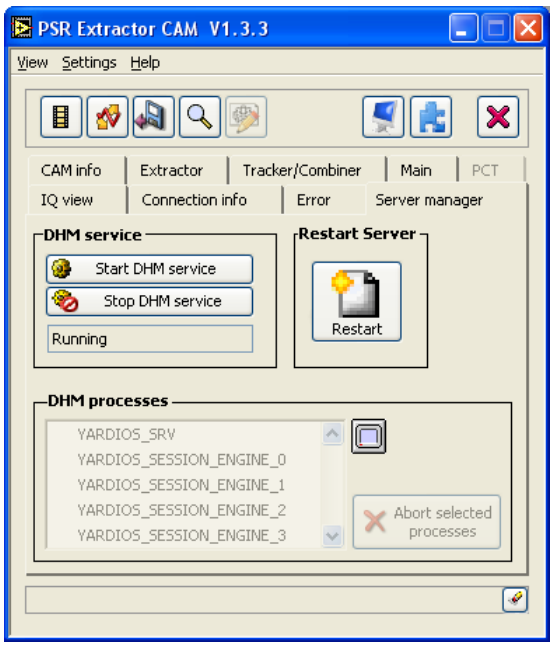


Figure 4-36: Server Manager tab

The info in the text field is also saved in the "Info/Warning/Error Viewer", section "Info".

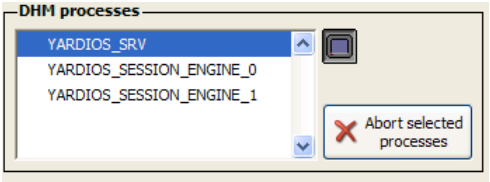


Figure 4-37: Abort DHM sessions

4.3.8 I/Q view tab

When you click the  button and open the "**IQ view tab"**, a snapshot of that moment from the raw IQ video will be taken and displayed. The graph will display all video data that was received at that moment. Closer to the radar (a few µsec on the X-axis), the amplitude will be higher than further away from the radar. The white graph is the I-signal, the red is the Q-signal.

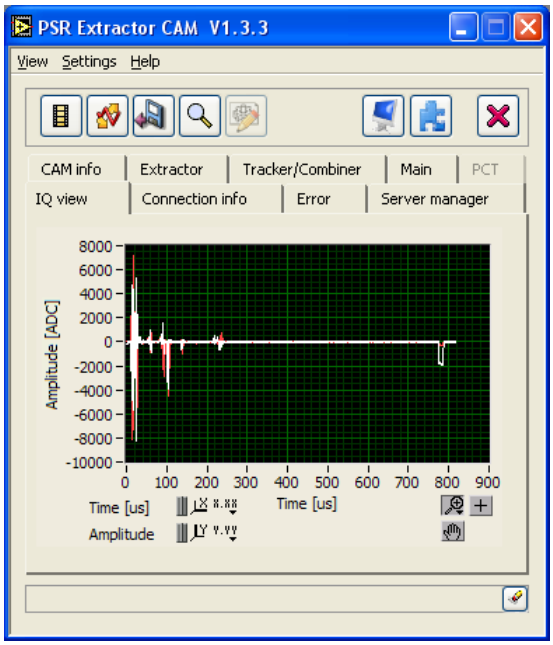


Figure 4-38: IQ view tab

Using the standard Labview buttons for graphs, we can easily zoom on the graph. Two examples are displayed below.

Example 1: You see the I/Q view of a test pulse. The figure below show the log-video of the test pulse. (20.log(sqrt(I^2+Q^2)))

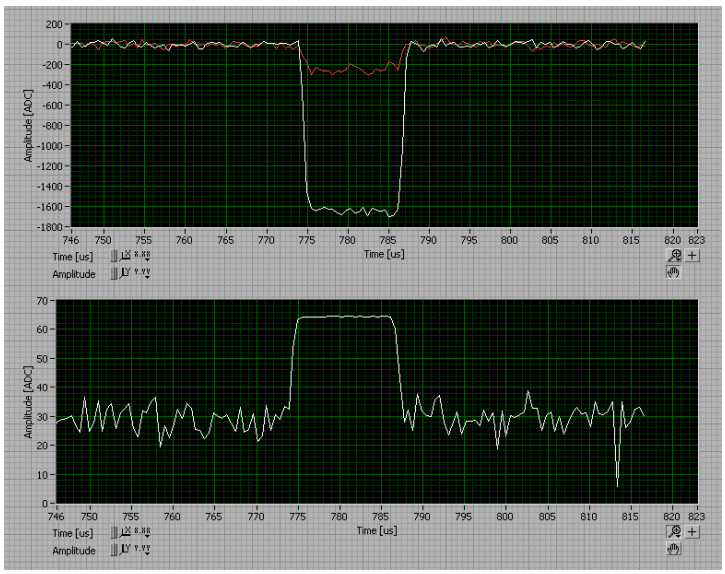


Figure 4-39: Detailed IQ view of a test pulse

Example 2: displays first the IQ view of a possible target. The graph below is the log-video signal. (20.log(sqrt(I^2+Q^2)))

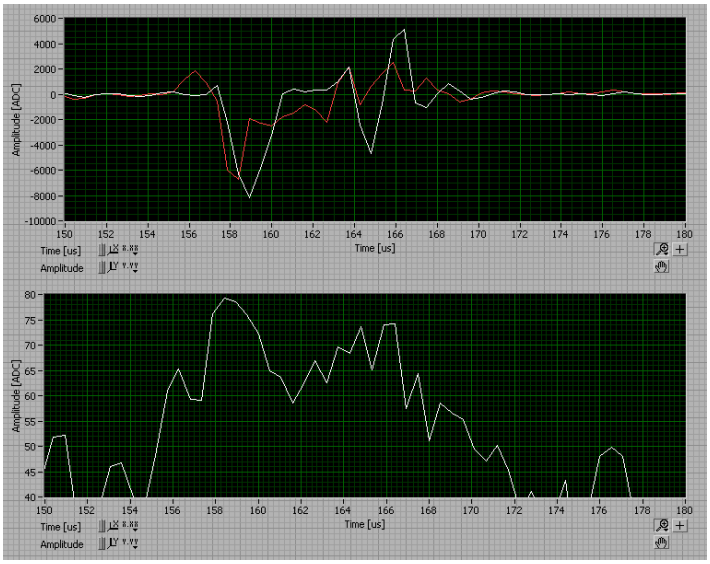


Figure 4-40: Detailed IQ view of a possible target

4.3.9 Error tab

All errors that occur are displayed in the "**Error tab**" as in Figure 4-41: Error tab. For each error, the following information is shown:

- **Timestamp**: the time that the Error occurred.
- **Source**: the particular .vi that generates the error.
- **Code**: for internal use
- **Description**: describes the error

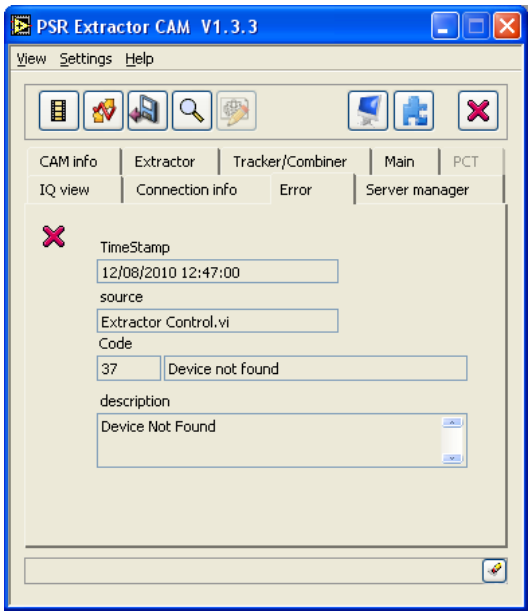


Figure 4-41: Error tab

All these errors are also saved in the Info/Warning/Error viewer –window, section errors. (See 4.1.1)

5. Troubleshooting

Next paragraphs gives a few suggestions that can be used to troubleshoot the system.

5.1 Network testing

To test if the monitoring station has a proper network connection with the processing server, you can use the **ping command** on the monitoring station. Follow the next steps:

Open the DOS-prompt using the run-window.

Figure 5-42: Run dialog

Suppose that the IP address of the processing server is 192.168.0.92. In the figure below, the ping command is successful, which means good connectivity.

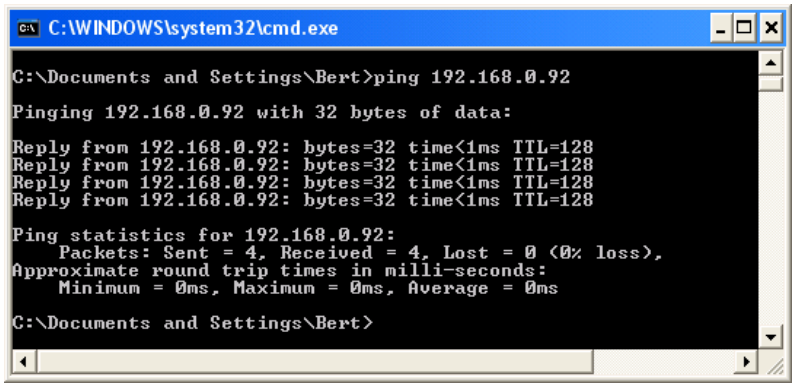


Figure 5-43: Ping command

To check the ip-address of the local computer, you can type "**ipconfig**":

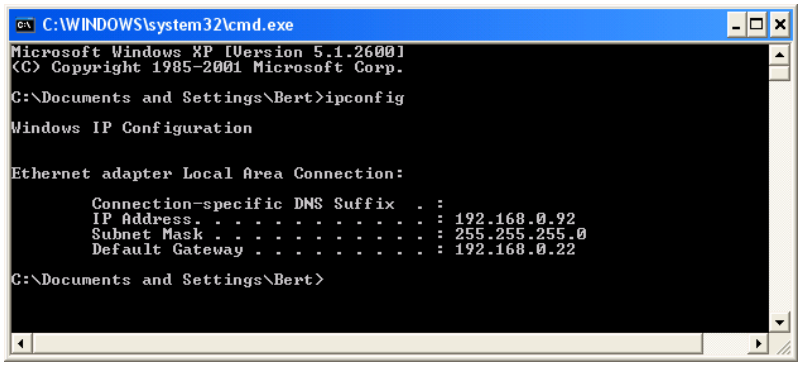


Figure 5-44: Ipconfig command

5.2 Problems with connection to Extractor or Tracker/Combiner server

Suppose you see no information at all in the Extractor tab.

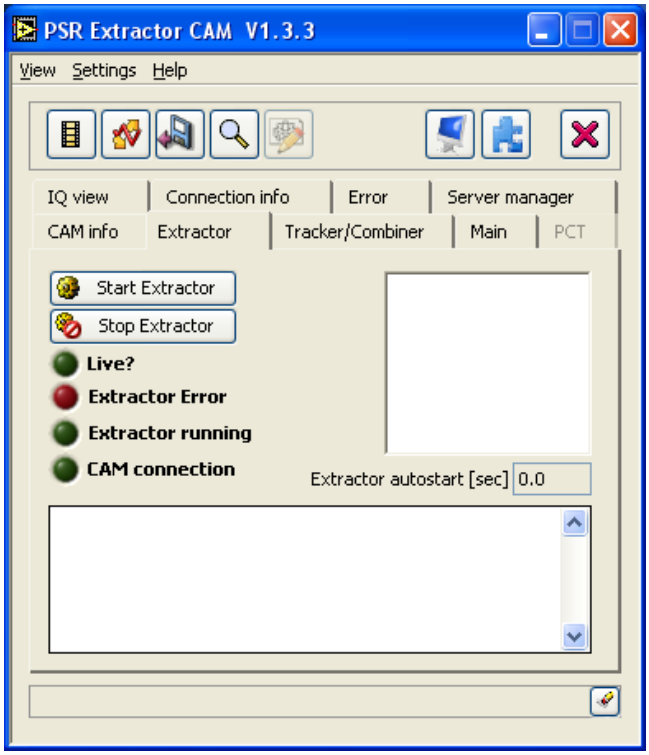


Figure 5-45: Communication problem

This means that a socket connection between the PSR Extractor CAM and the Extractor server cannot be made.
This can be caused by networking problems or wrong settings in the different ini-files (refer to the technical manual IE-PSR-Extractor-TM-vxx.pdf)

This does not mean that the Extractor server itself is not running! This gives only an indication about the fact that no communication to the extractor server can be established.

A similar explanation is true for the tracker/combiner server.

5.3 How to check if a Windows service is running?

The following process run as Windows services and are only visible as an executable in the **Windows Task Manager**:

- Extractor server.exe (on processing server)
- Tracker server.exe (on processing server)
- YARDIOS_SRV.exe (DHM-server on processing server and monitoring station)

So, use the Windows Task Manager to see whether the executables are running or not.
Those three services should automatically start when the computer boots. If not, check the launch settings of the services (see 5.4)

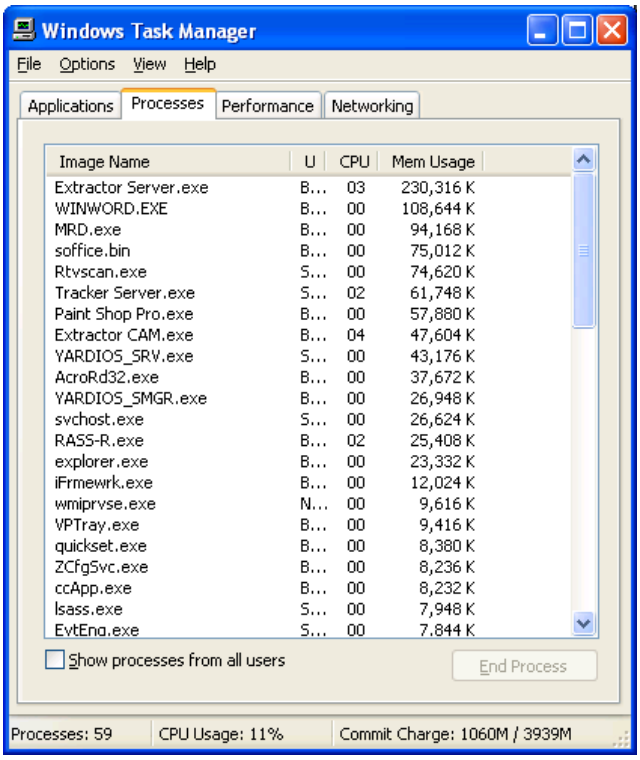


Figure 5-46: Taskmanager

5.4 How to restart a Windows service

The **Windows Service** dialog can easily be started by typing the following run command:

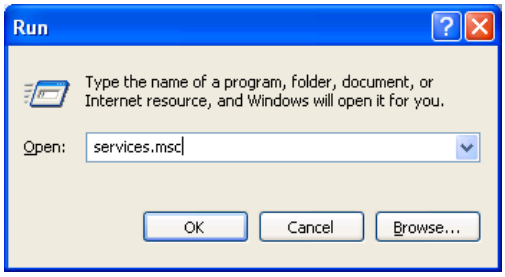


Figure 5-47: Run command

In the services window, you can use the buttons or a right click on the appropriate services for a start-, stop- or restart-action.

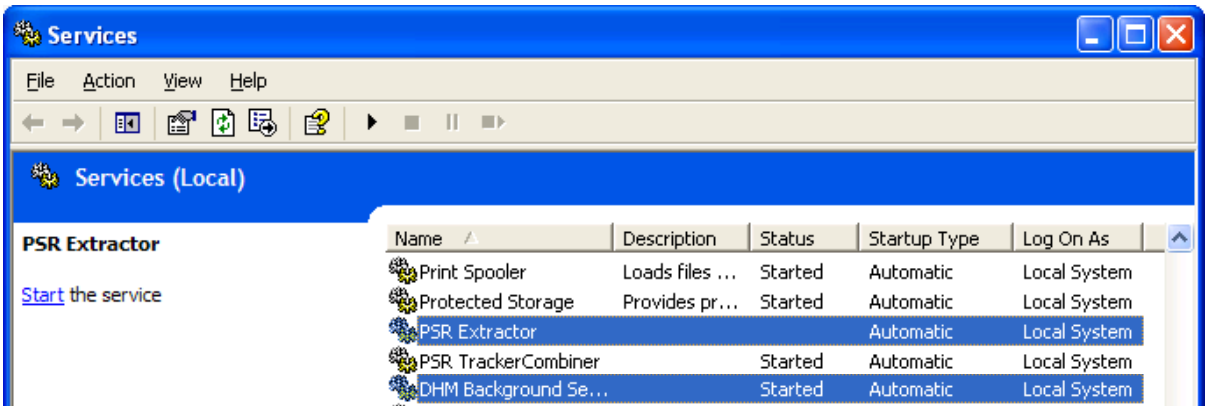


Figure 5-48: Windows services

By right-clicking the services advanced settings such ad Start-up Type can be configured.

6. Appendix: how-to-do

6.1 How to select a file on an other computer

Open the run dialog:

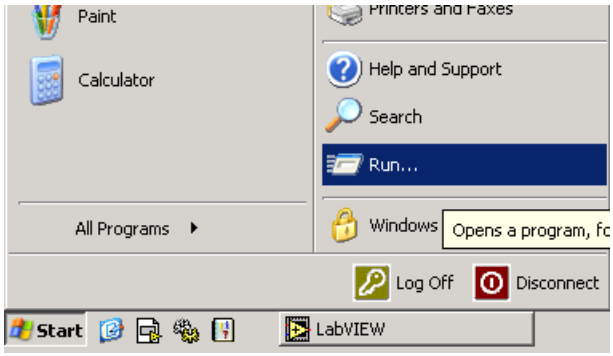


Figure 6-49: Run select

Type in the following text: \\xxx.xxx.xxx.xxx\c$ where the x's are replaced by the IP number of the remote computer. In this example the c-drive is selected, to select an other drive replace the c by the drive letter wanted.

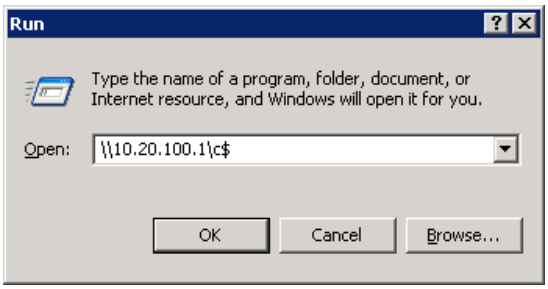


Figure 6-50: Run dialog - remote disk

It can be needed to log on to the remote computer by using a User name and Password

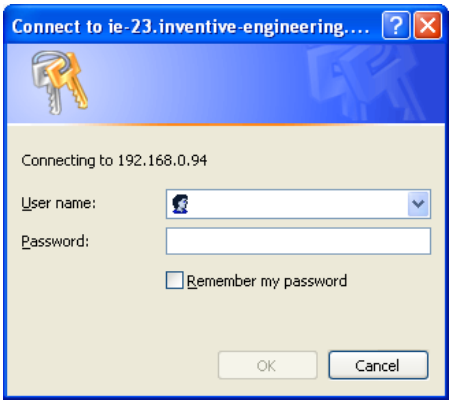


Figure 6-51: Log on

6.2 Open a remote desktop connection

Open the **Remote Desktop Connection** dialog

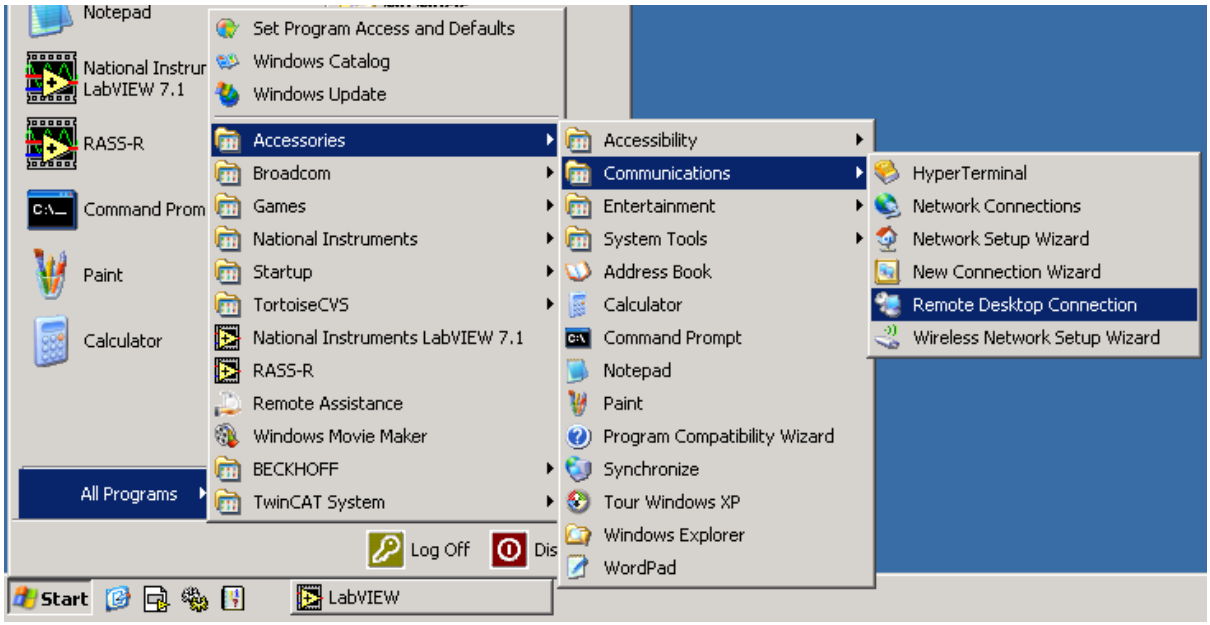


Figure 6-52: Remote desktop connection dialog

Type in the IP address of the computer of which you want to open the desktop

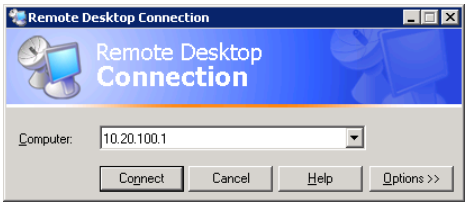


Figure 6-53: Remote desktop connection computer

When you want to establish a remote desktop connection to a remote pc, this remote pc must permit that somebody has remote access to it. This can be set in the System Properties (Start – Settings – Control Panel – System):

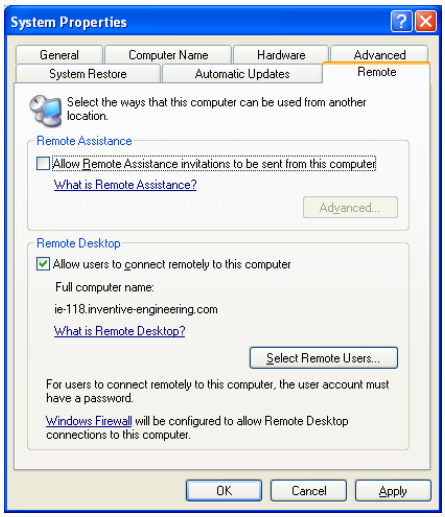


Figure 6-54: Allow remote desktop