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PBA.pro Getting Started

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List of Abbreviations

AFDX	Avionics Full DupleX Switched Ethernet
API	Application Programming Interface
ARINC429	Aeronautical Radio Incorporated Protocol Standard 429
ARINC664	Aeronautical Radio Incorporated Protocol Standard 664
GCM	Global Connection Manager
GCME	Global Connection Manager Editor
GmbH	Gesellschaft mit beschränkter Haftung
H/W or HW	Hardware
IRIG B	Inter Range Instrumentation Group time code, Format type B
LAN	Local Area Network
MIL-STD-1553	Military Standard 1553
S/W or SW	Software
STANAG3910/EFEX	(Standardisation Agreement 3910, European Fighter Aircraft Bus and European Fighter Aircraft Bus Express
TCL	Tool command language
XML	Extensible Markup Language

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1 General

PBA.pro is a scalable and flexible application framework focusing on Test, Simulation and Integration of Systems based on Avionics Data buses and other peripheral interconnections and hardware.
The PBA.pro core consists of the Framework with Component Explorer and Panel Designer.
Furthermore, basic setup load and save capabilities via XML formatted files are supported by the Framework.
PBA.pro Scalability is given via the Component based approach, implementing functionality in dedicated functional entities.
Additional Components are available for:

- MIL-STD1553 Interfaces
- STANAG3910 EFAbus Interfaces
- STANAG3910 EFEx Interfaces
- ARINC429
- AFDX
- PANAVIA
- RS232 / 422
- Scripting Manager
- Database Manager for Databus Payload decoding
- Analogue/Discrete I/O
- Others t.b.d.

Each PBA.pro component typically implements its functionality in hierarchical manner. While each resource component is usually visualised and controlled via the PBA.pro Resource Manager (which is the main navigation and access window), all other components like the designer or database use their own windows which can be docked individually.
Each PBA.pro component is basically "scriptable" and can be accessed from a PBA.pro Script.
PBA.pro is platform independent and supports Windows and LINUX platforms.

2 PBA.pro System Information

The current PBA.pro System information like H/W and S/W version is available via the \Help\About Menu of the PBA.pro Main menu.

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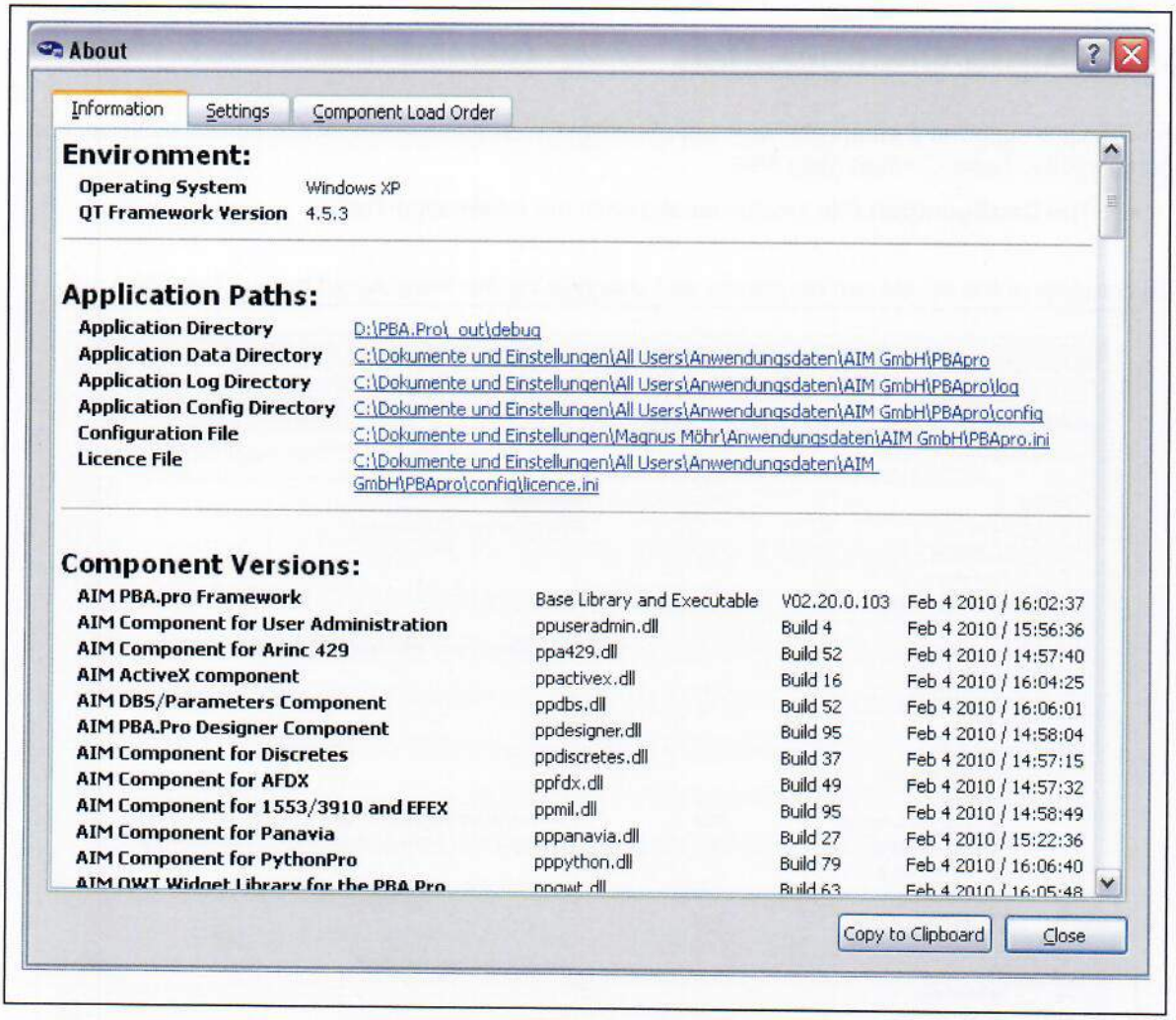


Figure 1: The PBA.pro Information page

The 'Copy to Clipboard' function copies all support relevant information to the clipboard, for pasting e.g. to an E-Mail.

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3 PBA.pro Configuration

The PBA.pro supports a comprehensive set of configuration parameters, which can be statically configured via two basic Configuration files:

- The **Configuration File** located as shown in the Information Tab

The contents of the INI file can be viewed and changed via the \Help\About menu of the PBA.pro.

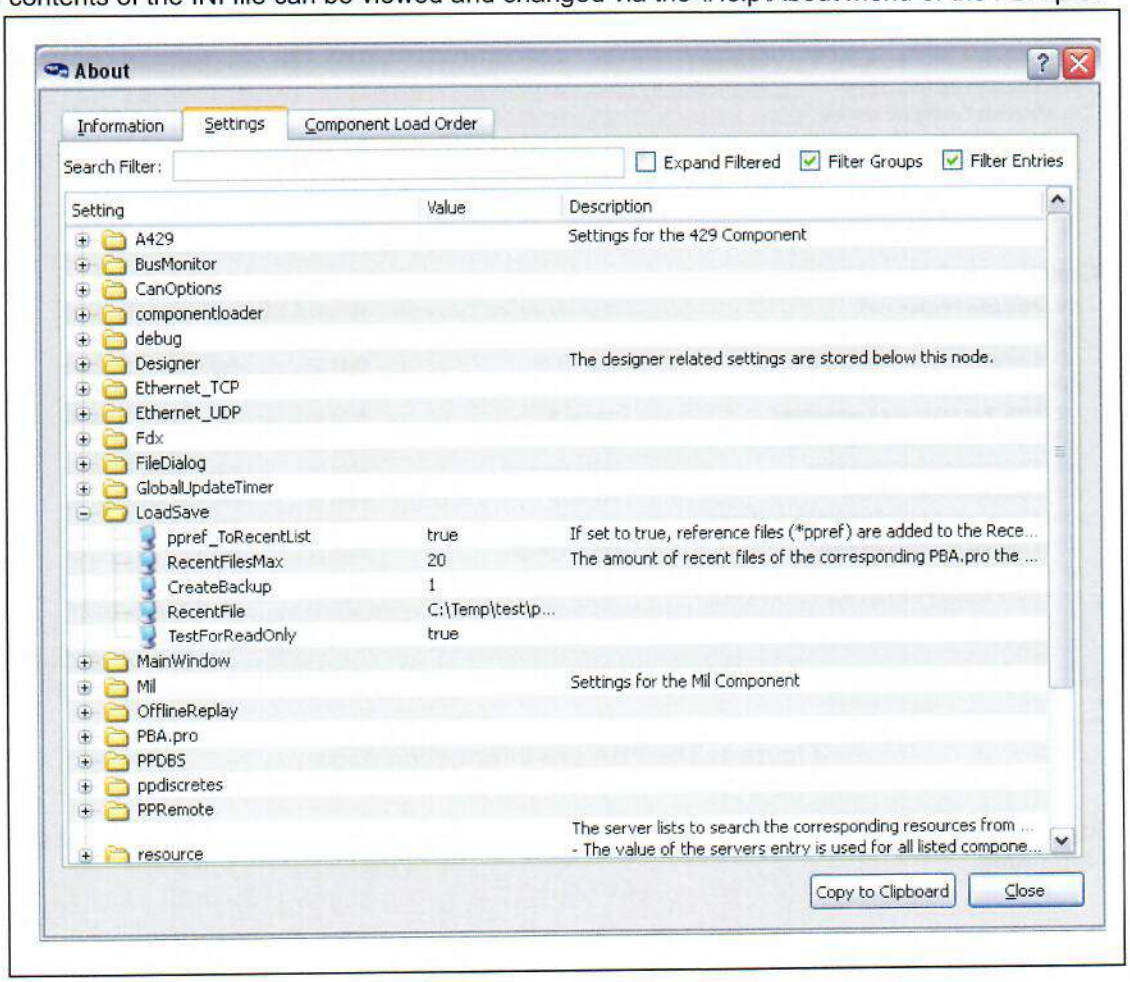


Figure 2: PBA.pro Settings

The “Settings” represents the contents of the Configuration File, which is separate for each user on the PC.
Any PBA.pro component can use the settings, hence the available options for particular components are described in the Description row or in the corresponding manual.
Note:
Many settings take effect only after a restart of the PBA.pro

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The Component Load Order Tab in the About Dialog, allows to enable / disable the dedicated Components. You should only enable the required components. Components which do not have a valid Licence key will not be loaded.
Note:
Changes made in this dialog require a restart of the PBA.pro.

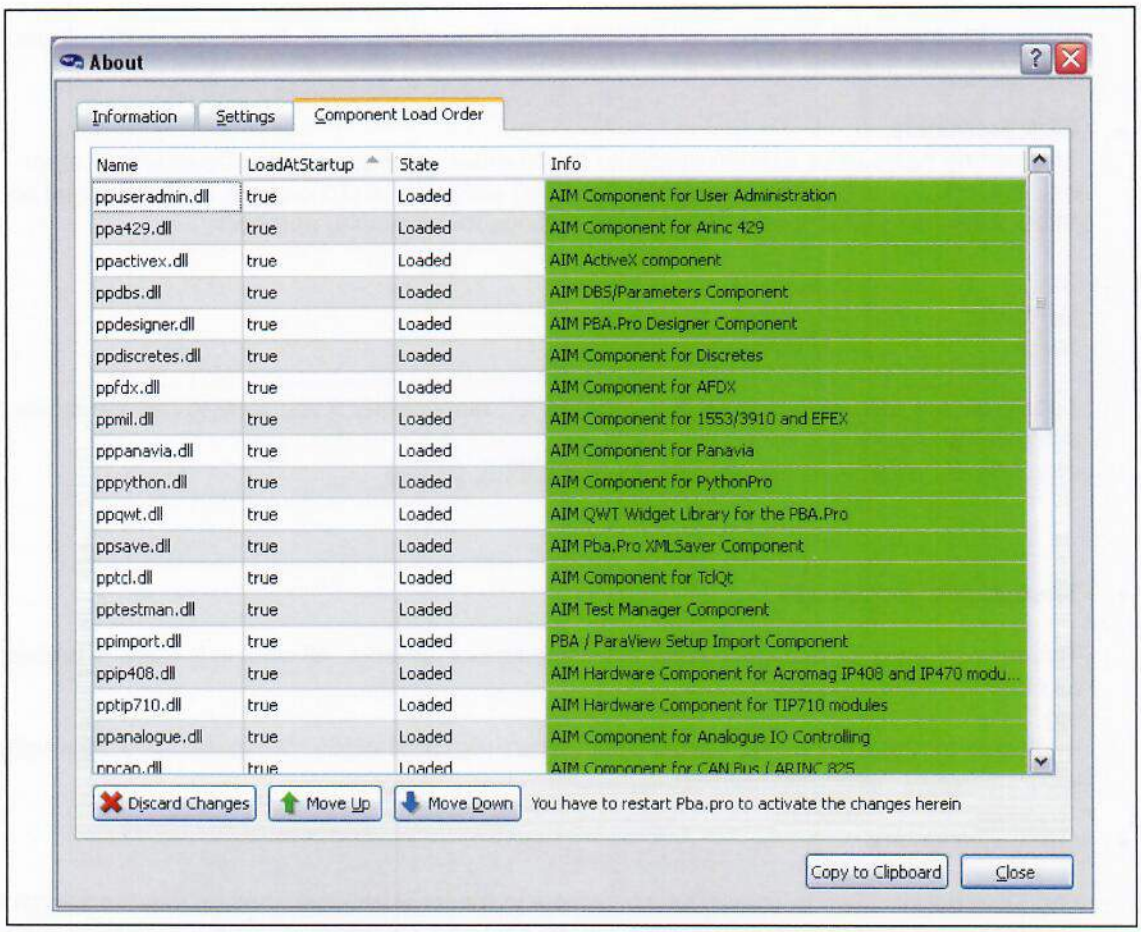


Figure 3: The Component setup page

Note:

You may specify a different name for the INI Files with the command line switch –ini.
e.g.
–inimyconfiguration.ini
uses the INI Files *myconfigruation.ini* instead of *pbapro.ini*.

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3.1 Some Important PBA.pro Settings

- **PBA.pro/No1000GroupsForDouble**

  If set to true, the display of Floating point numbers will have no 1000 separator e.g. 1,000,000.3 will be displayed as 1000000.3

- **PBA.pro/locale**
  This setting has can be used to overwrite the Number settings from the Operating System e.g. In Germany you will have a dot for the 1000 separator and a comma as the decimal separator. Typically PBA.pro uses the System settings for displaying numbers

Uk:	1,000,000.3
Germany:	1.000.000,3
Swiss:	1'000'000.3

  To use always the UK format set the locale to "c", respectively if you want to use the locale of a dedicated county use the country code
  (e.g. http://en.wikipedia.org/wiki/List_of_ISO_639-1_codes)

- **Startup/defaultcmdargs**

  This may be used to pass dedicated command line arguments. All what is in here, is threaded as command line argument:
  e.g.
  -ntg<xxx> for the different No Target Resources (-ntg1553/-ntg3910/-ntgefex/-ntg429/-ntgfdx etc.)

- **resource/servers**

  The Keys herein allow to specify which servers in the local network shall be used to search for the Resources. For this you require a Network Key and a Remote PC with the corresponding resources. You may separate more than one Remote PC with a comma. If you want to search for Remote and Local Resources you also have to specify "local". The *servers* key without a component suffix applies for all resources, the others apply only for the corresponding resource. E.g. If you want to search for Mil Resources on the local PC and the Remote PC's SERVER1 and SERVER2, you have to specify:

  resource/servers/servers_mil = local,SERVER1,SERVER2

  This will trigger the Mil Component to look for MIL Resources on the Local PC, SERVER1 and SERVER2.

- **GlobalUpdateTimer/interval**

  This is the used interval, which is typically used to update the PBA.pro internal data (e.g. Read from Hardware / Displays) etc. The default value is 250 ms. The possible value depends on the amount of resources and objects to update.

- **MainWindow/KeyboardShortCuts**

  You may change some Global Keyboard Shortcuts.

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- **LoadSave**

  See below for the Saver Settings

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4 PBA.pro Framework

The default start-up appearance of PBA.pro will show and provide a Main Menu, a Tool Bar, the 'Resources' and the 'Output Window'. Depending on the installed components, other docking widgets like the Designer or the Parameters are present.

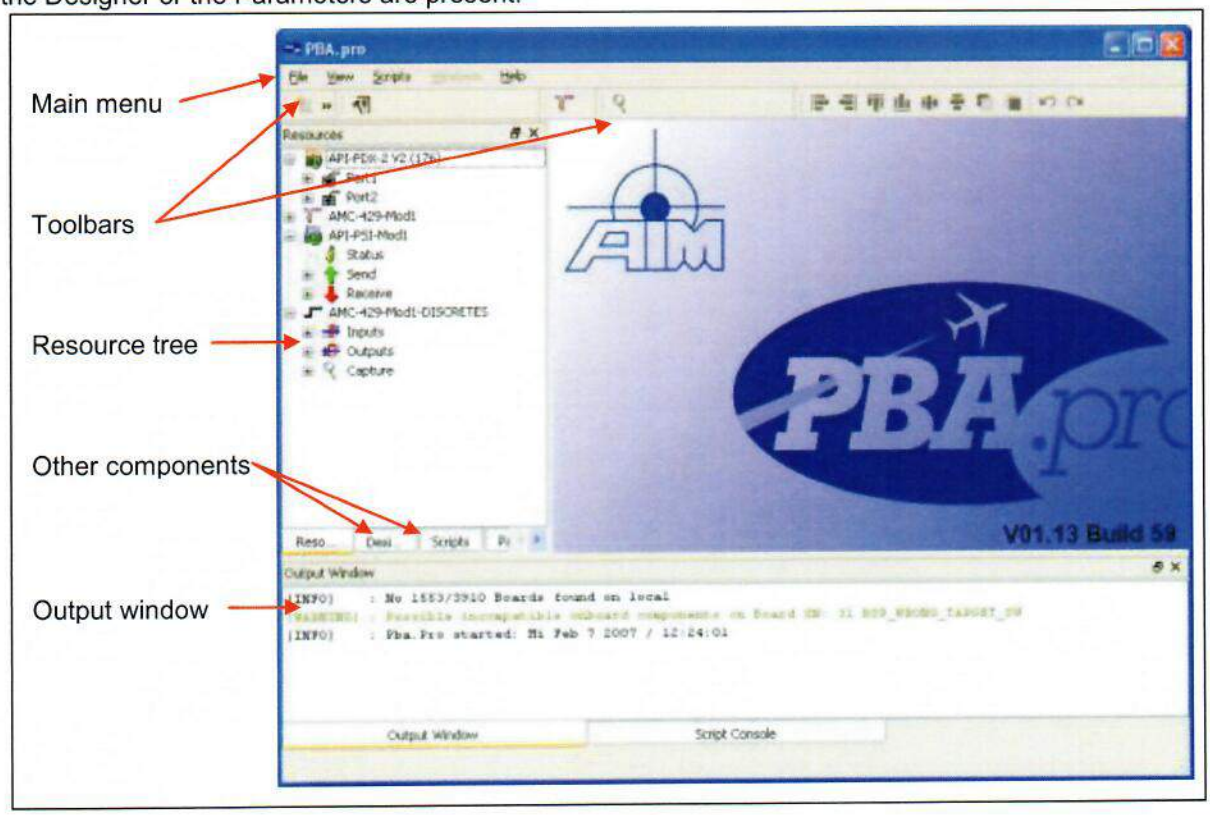


Figure 4: The PBA.pro Main Window

The Main Menu and Toolbars are dynamically extended, dependent on the installed components, offering quick access to dedicated functionality.
The Output Window shows PBA.pro system messages, classified into Information, Warnings and Errors. The displayed information can be copied and used in case of support requests.
In case of an installed Script Manager, the Script Console appears additionally in the Output Window.
The basic Menu Entries of the PBA.pro are

- File
- View
- Window
- Help

All other menu entries are dependent on the loaded components.
The Component dependant windows as well as the Output window or the Resource Manager can either be docked individually on every edge of the PBA.pro main window or used as so called floating windows:

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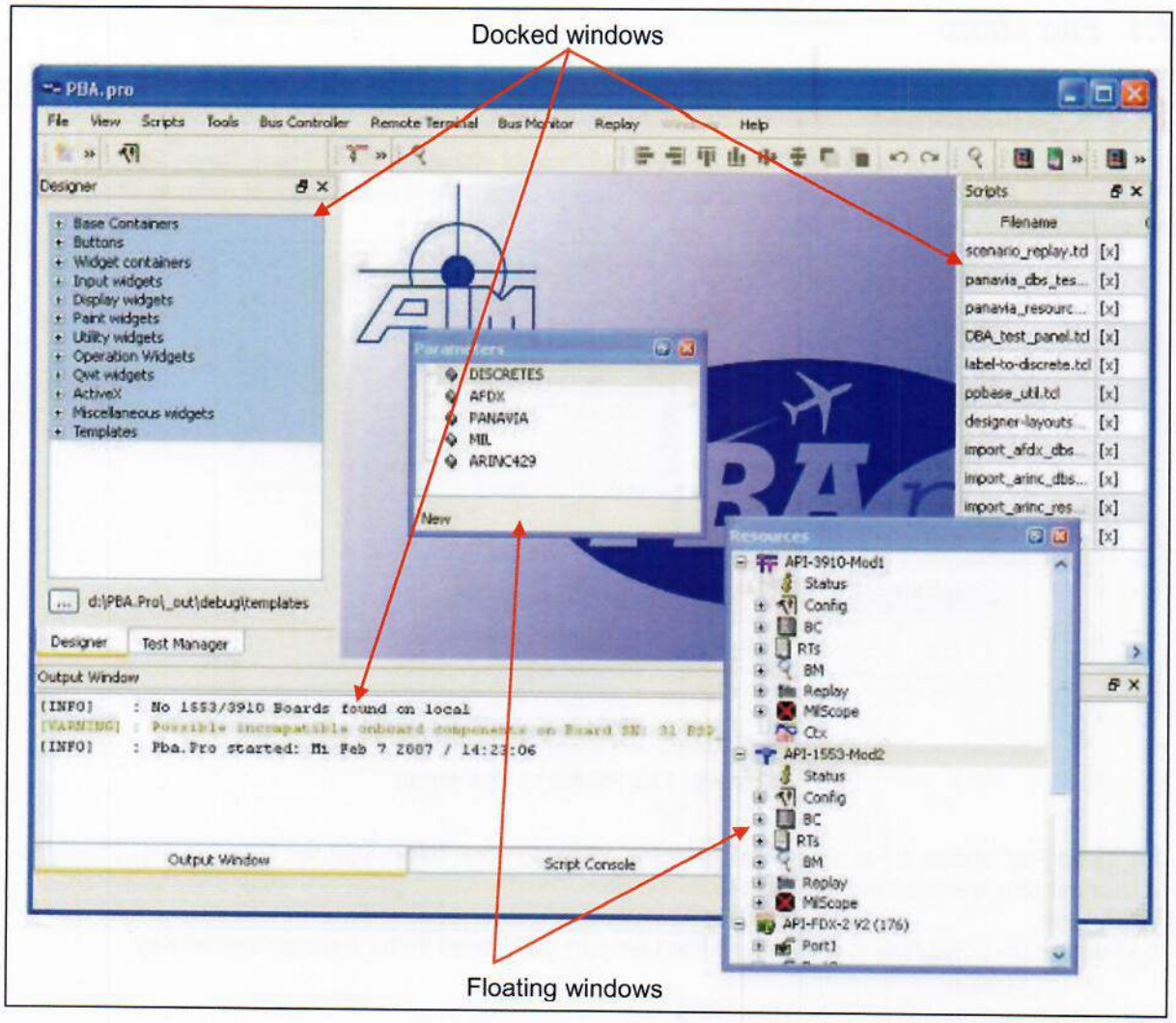


Figure 5: Window types

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4.1 File Menu

4.1.1 Loading Files

The PBA.pro File menu offers functions for PBA.pro Project Handling (New, Load, Save, Save As…). The recently used files can be accessed via the 'Recent Files' menu item. The last recently used project is also got via the Ctrl+1 Hot Key.

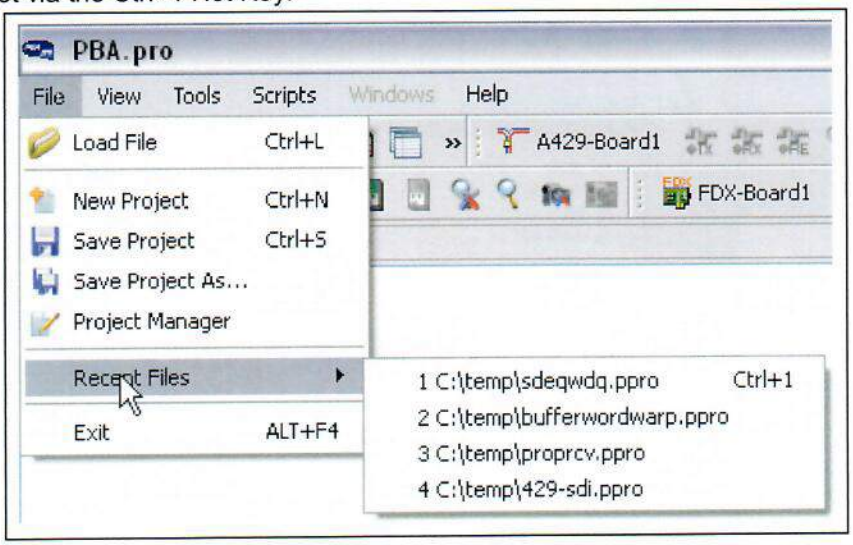


Figure 6: The PBA.pro File menu

The "Load File" shows a File Open dialog, which allows to open any supported PBA.pro file. The related filter may be specified at the file type combo Box. The displayed types are related to the installed components.

The number of recent files in the Recent File List, can be defined in the Settings via the Key:

LoadSave\RecentFilesMax

Furthermore you may specify via the setting

LoadSave\CreateBackup

the behaviour of creating backup files of the projects.

0: No Backup File generated
1: One backup file is generated (*.bak), Default
2: Create a Backup with Date/Time of Save. This creates a different Backup file, each time the project is saved and the file has changed.

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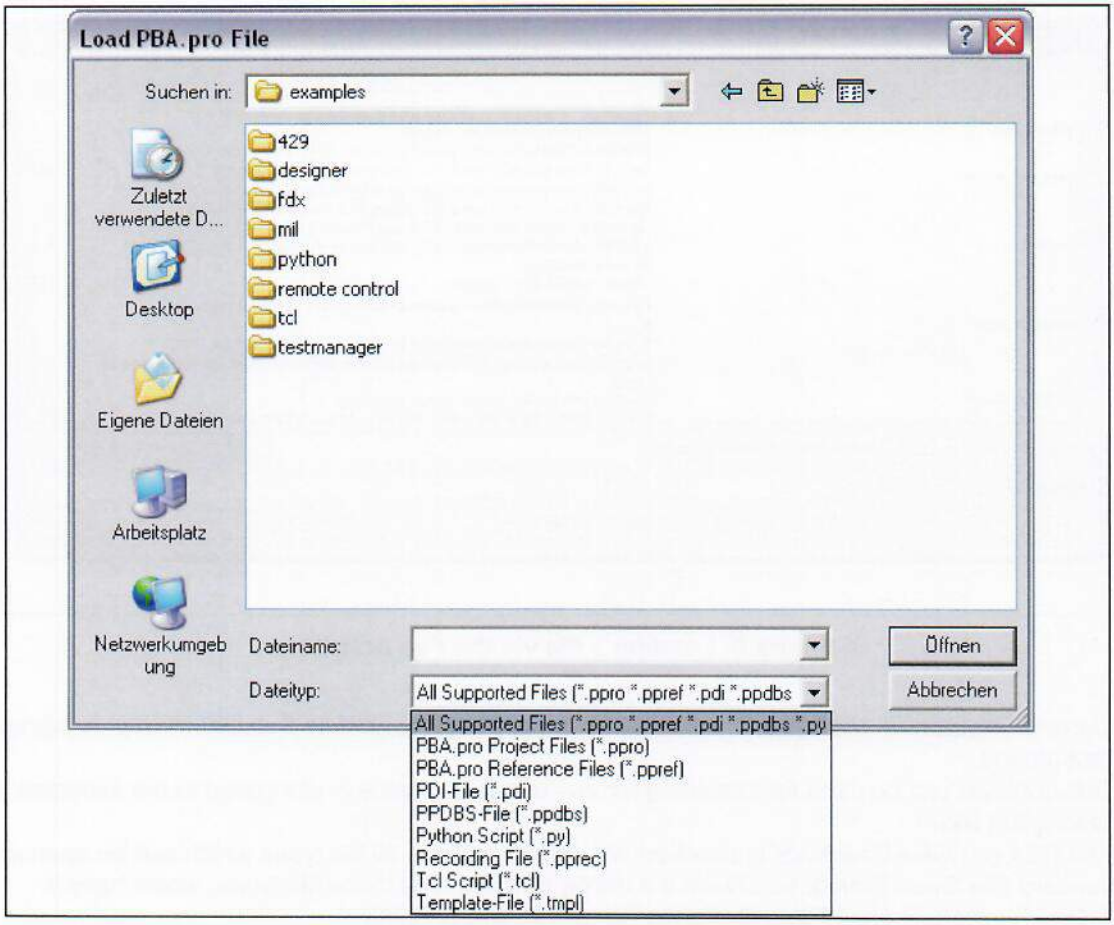


Figure 7: The file selection dialog

The File Menu functions are also available via the Toolbar (see the associated icons)

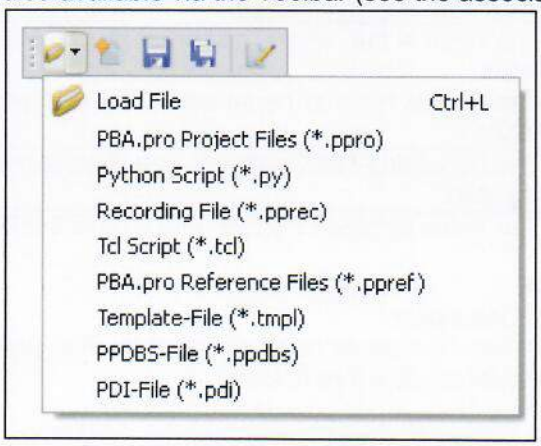


Figure 8: File loading via the provided Toolbar Button

Furthermore a more selective file open dialog may be used if you click to the triangle beside the "Load File" Button. All this file types can also be opened via a drag and drop from the Windows Explorer (or a corresponding Linux File Manager e.g. Konqueror) to the PBA.pro Main Window.

4.1.2 Loading Files via the File Selector

The File selector is available via the File Menu / Select File entry respectively the related shortcut shown in the File Menu.

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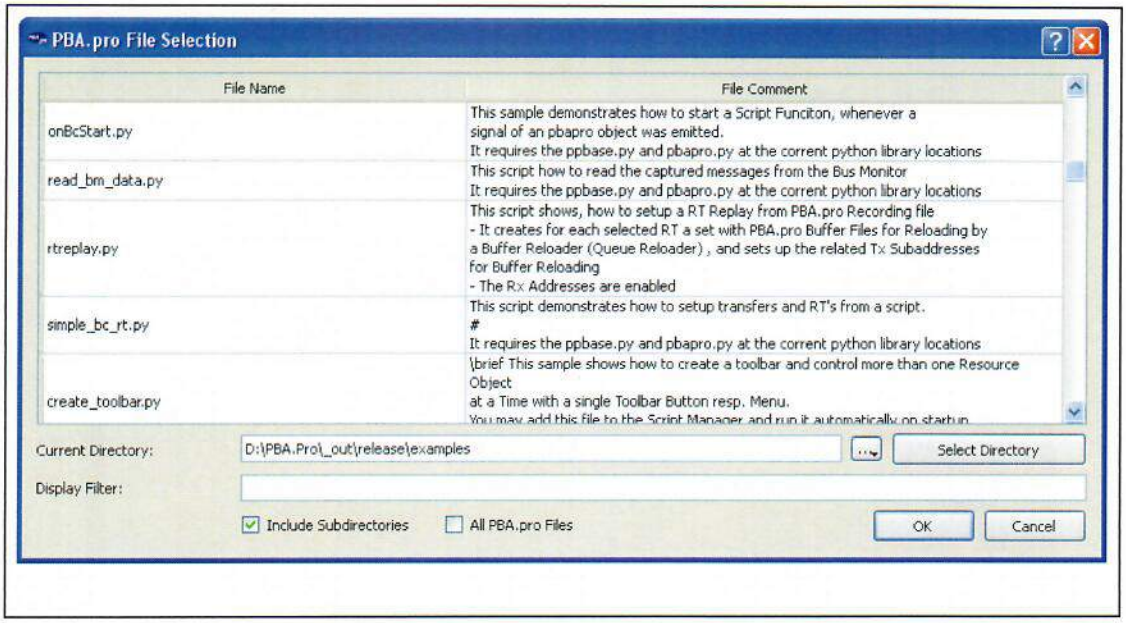
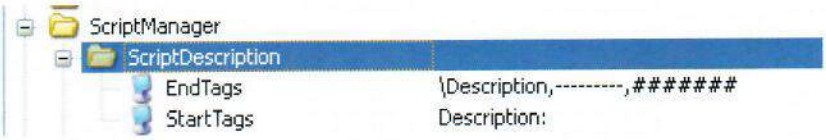


Figure 9: Loading a file via the File Selector

The *Current Directory* is displayed in yellow, as long the directory (and its Sub Directories) is loaded in the Background.
The *Display Filter* can be used for searching for any entry. The value is compared to the Filename and the Description line.
If the *All PBA.pro Files* Checkbox is checked, the dialog displays all file types which can be opened via the standard File Open Dialog, otherwise the dialog displays only those file types, which have a standalone function (Project Files, Designer Templates and Scripts).
The Description displayed as File Comment is:

Project Files (*.ppro)	The Project Comment specified in the Project Manager (see Chapter 4.1.4 The Project Manager)
Designer Panels (*.tmpl)	The value of the "whatsThis" property of the Base Dialog. Note: The Panels have to be saved with a PBA.pro Version Greater or Equal V02.11
Recording Files (*.pprec)	The Recording File Comment, specified at the related property at recording start.
For Scripts and PDI Files (*.py,*.tcl,*.pdi)	The Value between the following tags in the File: # # Description: # *This Text would be displayed in the File Selector Dialog* # *until the End Tag is found* # ---------- # The Start and End Tags can be defined via the settings: ScriptManager/ScriptDescription StartTag and EndTag. Any of the Values defined there (separated by comma) can is used.  The Default Starts at the Tag "*Description:*" and stops if either

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	ment line (without leading '#') is found.

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4.1.3 File extensions

The following list gives an overview of the different file types, which are generated respectively supported by the PBA.pro software. Some of this types are component related and may not be supported, if the related component is not available.

File Type	File Extension	Description
Project file	*.ppro	PBA.pro XML based Project file. This file is used to store and load a setup resp. configuration of the PBA.pro.
Setup sub nodes	*.ppref	This file type is used if Sub-trees e.g. of the resource should be stored. (See section PBA Project Manager for further information)
Recording file	*.pprec	The default PBA.pro Recording File Format. A Format Description is available in the File: BusMonitor_Recording_File_Format.pdf.
Bus Monitor Bookmark file	*.ppbmf	An ASCII or UTF8 coded text file containing post bookmarks of a related recording file
Configuration file	*.ini	Configuration file of the PBA.pro. Note that there exists a global and a local configuration file. (pbapro.ini)
PBA.pro Class Info	*.ppci	This files are located in the \doc\ppci sub directory of the PBA.pro installation and are holding the Object Class Information, which is displayed on F1 respectively shown in Tooltips as Property description etc.
Database file	*.ppdbs	PBA.pro XML based Database File. This file contains the Parameter Information shown in the Parameters Tab. This file is only supported by the Database Component.
PDI-file	*.pdi	Parameter Database Interface File. This database format was used for the previous analyser generations like ParaView. PBA.pro supports an import of these files, but the files cannot be created. This file is only supported by the Database Component.
Dataset File	*.ppds	Parameter Dataset file.
TCL script file	*.tcl	TCL script files used by the TCL Script Component of the PBA.pro
Python script file	*.py	Python script files used by the Python Script Component of the PBA.pro
Designer Template	*.tmpl	PBA.pro XML based Template files description of the templates configured and stored by the PBA.pro designer component (User created Panels).
Widget set	*.wdgs	PBA.pro XML based widget sets of the designer component. A widget set is a set of widgets placed on a common container widget. This set can be stored and loaded from within the PBA.pro designer component.
Documentation file	*.pdf	Standard Getting started files of the different components. Note that each pdf file placed in the *doc* folder of the PBA.pro directory will be accessible via the help menu entry of the PBA.pro.
Mil Buffer queue	*.ppbqf	Is used by the QueueReoader object of the Mil Component, which may be used to Reload Buffer Queues from a Text File.
Other files	*.prc,hrc,xrc *.bcs, *.rts, *.pba	prc: The Raw Stream PBA-2000/3910 recording file format bcs: PBA 2000/3910 BC setup (import only) rts: PBA 2000/3910 RT setup (import only) pba: PBA 2000/3910 project file (import only)

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	*.frs	frs: fdXplorer receive setup file (import only)
	*.ass	ParaView Assign Files (import only)
	*.pvp	ParaView Project Files (import only)

Table 1: PBA.pro File extensions overview

Note:
Some of this file types, can be loaded via the command line of the PBA.pro. If there is already a running instance, the related file is loaded by the running Instance. E.g. If you pass a Project file, the file is loaded, if you pass a Python file, the script is started. If you pass a directory, the File Selection dialog from above is shown.

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4.1.4 The Project Manager

The PBA.pro Project Manager Function is accessed via the 'Project Manager' menu item.
The PBA.pro Project Manager offers support for PBA.pro project organization.

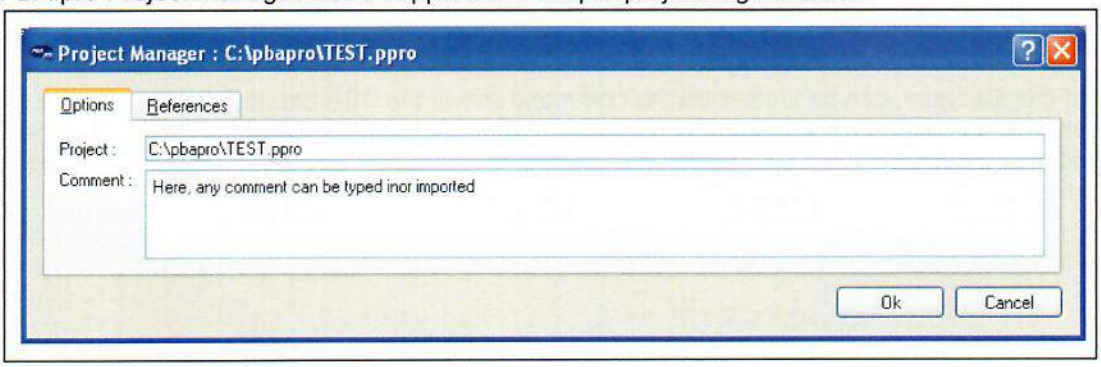


Figure 10: The Project Manager

Per default, all PBA.pro setup information incl. all its components (except Database Manager) is stored in a single project file in XML format.
The 'Options' page of the Project Manager offers entering of user defined project information via the 'Comment' field.
The project can be renamed via the 'Project' Input line.
The 'References' Tab offers support to override the PBA.pro default handling of storing all project information into a single project file and to use separate XML coded files for storing object setup information.

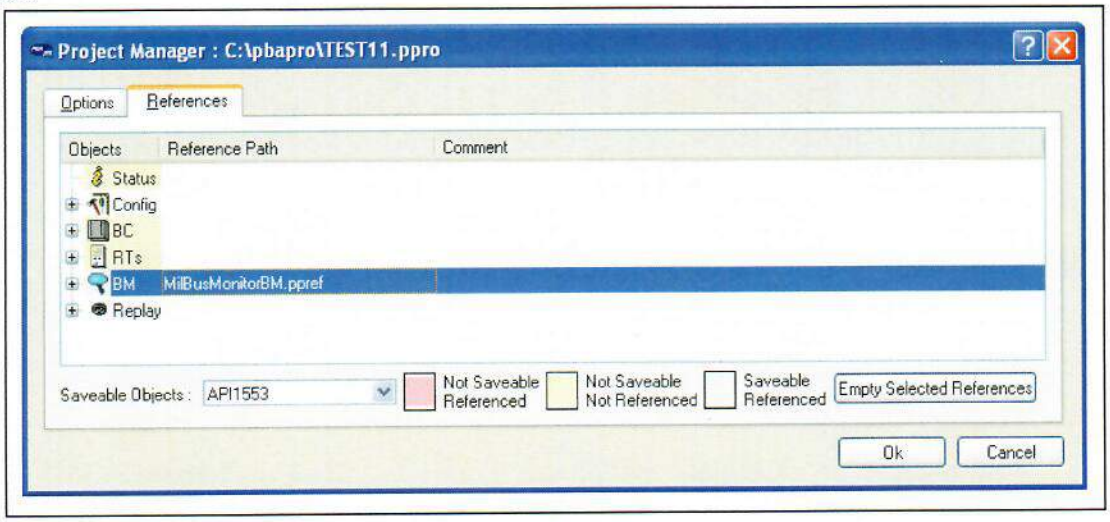


Figure 11: Project Manager - File Reference configuration

The configuration is based on selection of a savable object via the 'Savable Objects' picklist. Dependent on implementation of a object, not all information can be saved in separate files. If supported, a file name can be selected for the corresponding object of the 'Object' column, which is displayed and selected via the 'Reference Path' column. Additionally a comment can be added.

See below for an example of how to store Resource node Setup Information in separate files, apart from the project file:

1. select the corresponding Resource in the "Saveable Objects" Box: e.g. "API3910"

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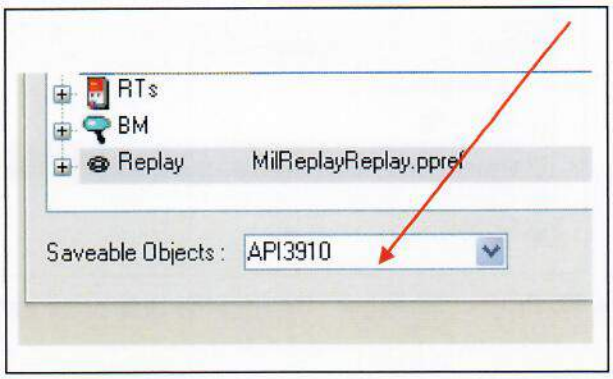


Figure 12: Project Manager - Resource selection

2. Select the BC node with a single mouse click

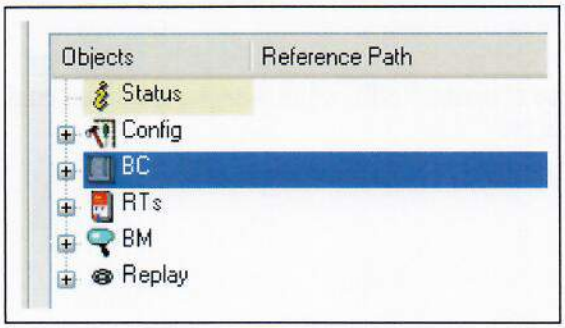


Figure 13: Project Manager - Resource node selection

3. Double Click into the "Reference Path" column of the BC node and the default file name is shown "MilBCSetupBC.ppref".

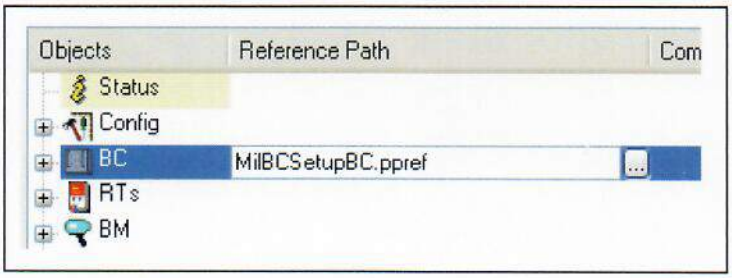


Figure 14: Project Manager - Setting the reference path

4. Enter another file name or select one by pressing the "…" button.

5. Confirm the file name selection by pressing Enter

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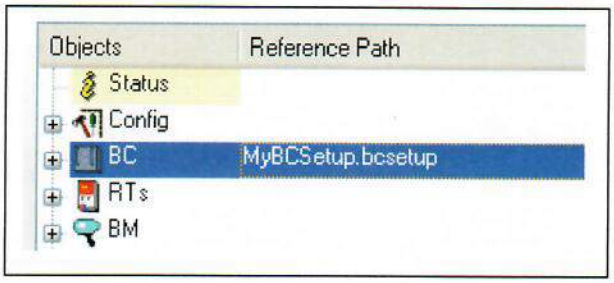


Figure 15: Project Manager - Setting the reference path (2)

6. Repeat these steps for all other saveable components, which are required to be stored in separate files.

Please Note, that in case of missing files, a project cannot be properly loaded!
Hence, for the beginning it is recommended to store all PBA.pro information into a single PBA.pro project file.
Note:
An Engineering Unit Database (*.ppdbs,*.pdi), when working with the Database Manager component, is always stored in a separate file.

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4.2 View Menu

The View menu supports showing/hiding specific PBA.pro Windows

- Output Window
- Component Explorer
- Property Explorer
- Toolbars (dependent on loaded components)

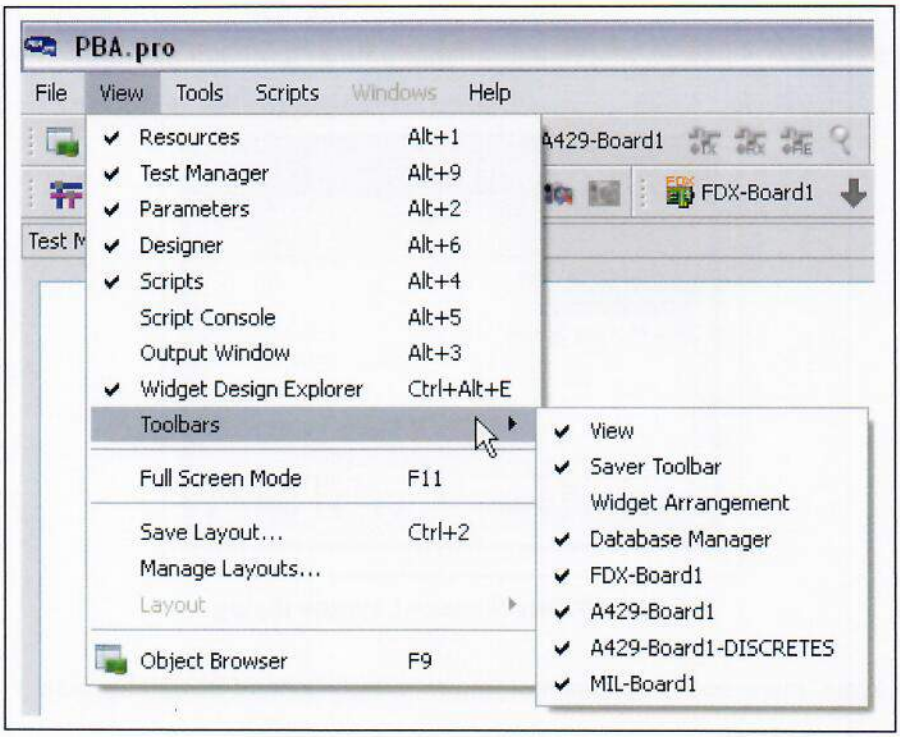


Figure 16: The View Menu

Furthermore, the 'View' menu offers further handling for managing PBA.pro Screen Layouts. The screen Layout functionality supports organising PBA.pro Windows and Panels within the PBA.pro Framework. Screen Layouts are stored within a PBA.pro project.

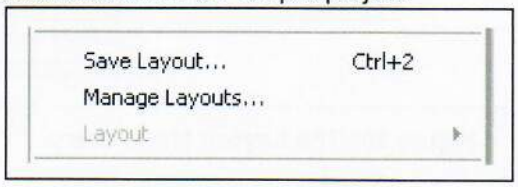


Figure 17: The View Menu layout section

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- "Save Layout" stores an arrangement of PBA.pro Windows under a user configurable name. The layout with the Name "Default", will be loaded at project load.



Figure 18: The Save Layout dialog

- "Manage Layout" supports renaming and deleting existing Screen Layouts

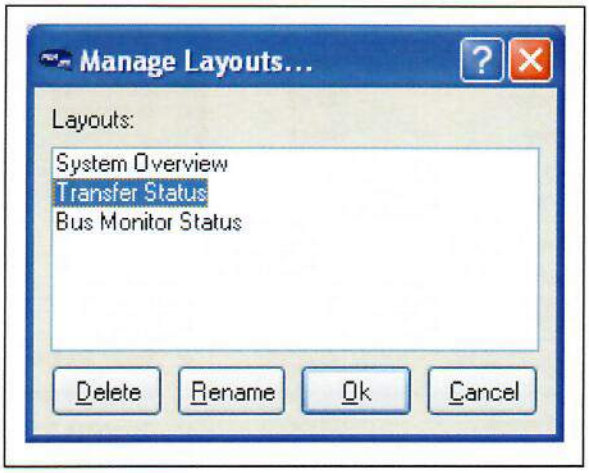


Figure 19: The Manage Layouts dialog

- The "Layout" menu entry supports recalling previously defined Screen Layouts

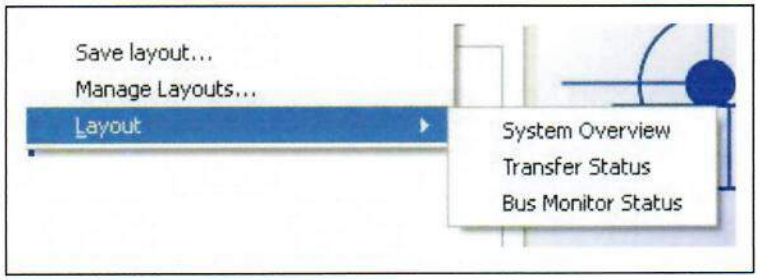


Figure 20: The Layout Menu entry

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4.3 Windows Menu

The Windows menu supports arrangement and access to currently open windows (Windows Standard MDI functionality)

4.4 Help Menu

The Help menu item offers access to the PBA.pro system configuration and system information. See the chapters above for "PBA.pro Configuration" and "PBA.pro System Information". Furthermore the Help Menu allows to show all documentation in PDF Format, which is present in the <PBA.pro Dir>\doc folder.

4.5 Other Menu Items and Toolbar buttons

Dependent on the installed PBA.pro Components, additional Menus and Tool buttons appear. These are described at the corresponding Component section.

4.6 Standard Table Usage

By default two basic Table types for object editing are used within the PBA.pro.

4.6.1 Single Object Table

For single object editing and display the so called vertical property table can be used:

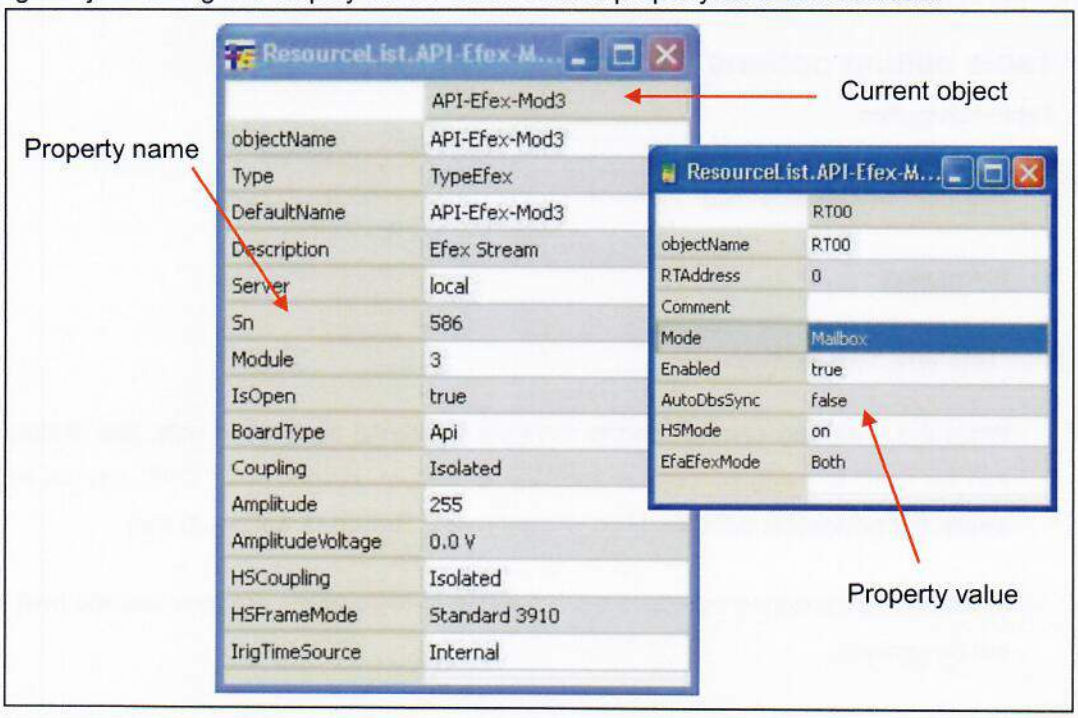


Figure 21: Single Object Table

In this Table the object's properties are displayed vertical where the row headers display the property name and the corresponding column entry the property value.

4.6.2 Multiple Object Table

For multiple object editing and display the so called horizontal property table can be used:

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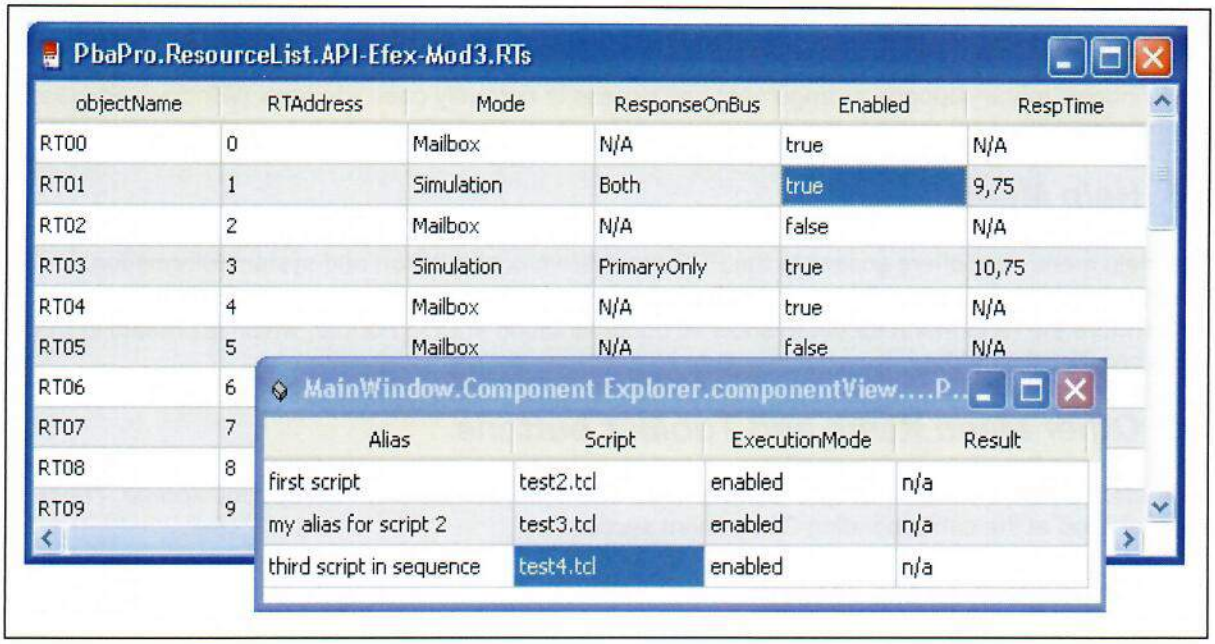


Figure 22: Multiple Object Table

In this Table the object's properties are displayed horizontal where the row headers display the object name and the columns the properties.

4.6.3 Table editing options

- Table Navigation
  - Standard mouse selection
  - Arrow keys
  - "Tab" and "Return" Keys

    While the "Tab" key can be used to navigate horizontal from left to right, the "Return" key can be used to navigate vertical from top to bottom. Holding the "Shift" key as well will switch the navigation direction (Tab → right to left, Return → bottom to top)

    In Edit mode the edited cell value will be written to the object's property and the next editor will be opened.

    Note: The next editor will only be opened if the property is writable and only one cell was selected)

- Cell editing
  - Mouse Double click on a cell
  - Press "Return"

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- Press F2

The object's property value will be set on editor close. To cancel the editing press "Esc" or an Arrow key.

- Multi selection
  - Mouse click on the cell.

    To select multiple cells hold down the left mouse button and drag the cursor offer the cells to select.
  - Selection via "Shift"
  - Selection via "Strg"

    Hold down the "Strg" key and navigate via mouse or arrow keys to the next cell which should be selected. Click on the cell or press the "Space" key to add the cell to the current selection.
- Multi cell editing

  The multi object table supports multi selection resp. property editing. To do a multi selection edit, select multiple cells as explained above. While holding the "Shift" resp. "Strg" key activate an editor for a selected cell. On edit confirm (close the editor) all cells which are in the same column as the editor was, are set to the editor's value.

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4.6.4 Resource Manager

An essential part of the PBA.pro is the Resource Manager which is identified via the 'Resource' window.

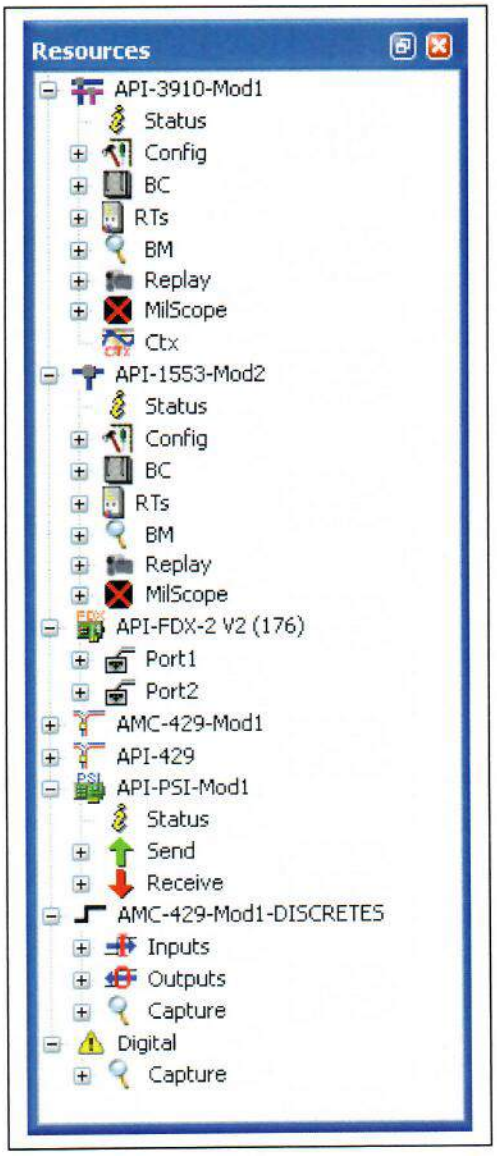
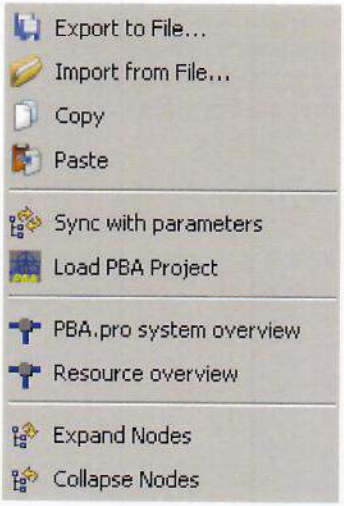


Figure 23: The PBA.pro Resource tree

The Resource Manager handles all resource interface components. An interface component can be understood as a component responsible for controlling an interface board or device.
The interface components for AIM's avionics data bus interface boards like MIL-STD1553, STANAG3910 appear within the Resource Manager. Entire access to an interface component functionality is done per default via the Resource Manager. A resource's functionality is typically reflected in a hierarchical (tree) model of its functionality and described separately. Also multiple resources, respectively boards, of different types are handled via the Resource Manager.

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A right click to the Resource Manager shows the following Menu:



Export/Import File: See below

Allows to Copy and Paste the selected Element in the Resource Manager (only available if the selected object is saveable).

This are Object related entries and may vary from object to object

If more than one View for an Object is present, you may select here the other View (the first view is opened on a double click to a element)

These Entries allow expanding or collapsing all nodes beyond the selected.

Figure 24: The PBA.pro Resource Manager Tree Menu

The *Export to File* function allows to save the selected node to a ppref (PBA.pro Reference) File. These files may contain Parts of a dedicated PBA.pro Project for re-usage on other nodes of the same type.
These files may be either imported by the *Import from File…* action or via the Main Menu *Load File* Functionality. If loaded by the Main Menu, you may be prompted, for the destination Object if more than one matching objects are present.

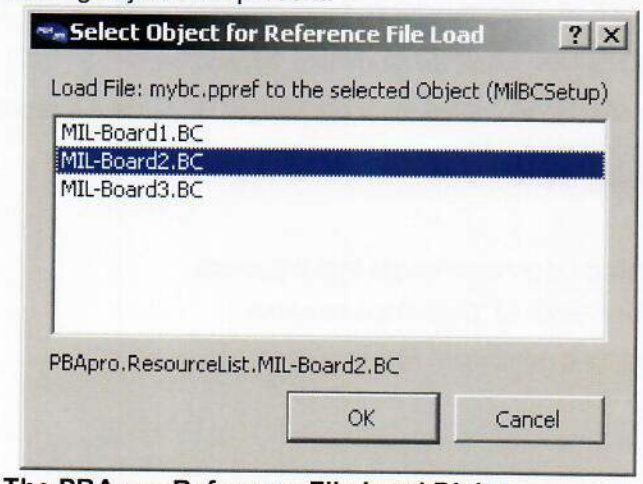


Figure 25: The PBA.pro Reference File Load Dialog

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5 Common PBA.pro Bus Monitor Functionality

This Chapter describes the common features of the PBA.pro Bus Monitor / Capture functionality. The Bus Monitor is used to capture chronologic data from the related recording streams. It is possible to record data to a selectable recording file. A recording stream represents the captured data of the related resource. Currently the PBA.pro provides several components, to record data from the following sources:

- Mil1553 / Stanag 3838 / Efex (ppmil Component)
- AFDX (ppfdx Component)
- ARINC429 (ppa429 Component)
- Serial (RS232) (pprs232 Component)
- Panavia (pppanavia Component)
- CAN/ARINC825 (ppcan Component)
- Discretes (ppdiscretes Component)
- Analogue(ppanalogue Component)
- tbd



This is the common structure of a Bus Monitor object. The **BM** Node allows specifying the recording file name, the output type of the recording. The Recording Streams below the Filter Library are related to the corresponding resource, and will be described in the corresponding Manual.

The *Status* node displays the current recording filename, the recording duration and the amount of recorded data.
The nodes beyond the **Session** node represent the captured data, where the *Current* node holds the currently recorded data.
The *EventMarker* recording stream is common on all resources. It provides functionality to log Events (Text based messages). Log events might be used to mark and find dedicated time sections or events in the recording data.
The *FilterLibrary* node allows to define common filters for searching, filtering etc.

The Bus Monitor can be started with a click on the related tool bar button  or via a right click to the BM Node and select "Start BM on <ResourceName>".
The BM Icon indicates one of the following states:

 BM Off

 BM Started, but no Recording Data received yet (not triggered)

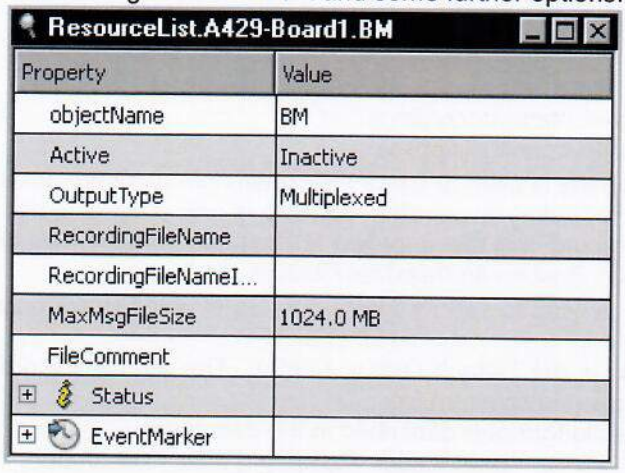
 BM Started, Recording Data received, Data Capture active

 BM has stopped Recording (e.g. Maximum File Size reached)

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5.1 Bus Monitor Setup

Via double click to the BM node in the Resource Manager or by clicking on to the BM Setup Icon in the Toolbar , the BM View is opened. This View provides some properties to specify the Recording File Name, the Output Type, a Recording File Comment and some further options.



Recording File Selection:

If no Recording File Name is selected, the Recording File will be created in the TEMP directory on the PC, where typically the name <ResourceName>.pprec is used. This default created file is overwritten without warning, when the Bus Monitor is started again.

If a Filename is specified, PBA.pro will show a Warning, and ask to overwrite the existing file on Bus Monitor restart. Furthermore it is possible to use one (or more) of the following macros within the file-name to create unique filenames each time the BM is started, without the need to change the filename before recording start.

%d	Replaced by the current Date in the format yyyy-mm-dd
%t	Replaced by the current Time in the format hh-mm-ss
%n	Replaced by a Unique number starting at 001 to 999. Note: This always starts with 1 until a non existing file is found. So if you have already created the files 001 to 009, delete the File Number 003 on the next start the number 003 is used.
%f	The String entered at the Property RecordingFileNameIdentifier. This allows to Define a Filename like the following: RecordingFileName: C:/temp/recording_%f.pprec So you may enter before the start of the recording e.g. "Test_1" to the property RecordingFileNameIdentifier, which results in a recording filename of C:/temp/recording_Test_1.pprec The RecordingFileNameIdentifier property is only visible, when you enter a recording filename containing an %f
%r	The Name of the Resource (e.g. MIL-Board1, FDX-Board1, A429-Board1)
%y	The Included Resource Types.

The current (used) filename can always be seen in the *Status* object.

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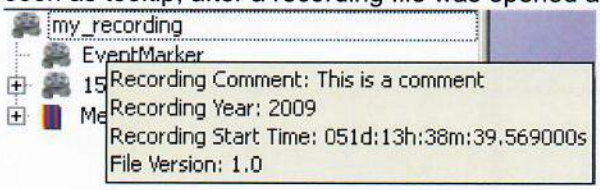
Note:
The Default Filename may be defined in the Settings
BusMonitor/DefRecIniFile
This setting is used, each time the BM is initialized. Furthermore you may specify a default Path with the setting BusMonitor/DefRecIniPath, which may also contain the %d or %r macro, which causes that the related directories are created, if they not exist. If you use the DefRecInitPath setting, the DefRecInitFile Setting must not contain any Path Information. This allows e.g. to record each day to a separate directory.
e.g.
BusMonitor/DefRecIniPath=C:\temp\recordings\%d_%r
BusMonitor/DefRecIniFile=Recording%t.pprec
The **MaxMsgFileSize** property is used to specify the maximum recording file size. When the specified File Size is reached, the Recording is stopped. This size is only used as a hint, when the recording is stopped. Set this to 0, to record until the recording is stopped manually. The Default Value may be set within the global settings at: BusMonitor/MaxMsgFileSize
The property OutputType is used to specify the output format of the Bus Monitor.

Multiplexed	This is the Default Output Format. The all the Recording Data is stored in a single (Multiplexed) file. The file format is described in the document BusMonitor_Recording_File_Format.pdf in the doc folder of the PBA.pro installation
Raw	The recording data is stored in the raw format, as it is delivered from the Resource. If you record to this format, the recording data cannot be viewed directly in the PBA.pro. This format may be used, if you e.g. want to use the recording data within an other application (e.g. PBA for the 1553/3910 or Efex respectively PAA for 429). If you select this format, for each recording stream an own file is generated 1553: Extension prc 3910: Extension hrc Efex: Extension xrc 429: Extension arc Events: Extension erc Else: Extension rec You find a description of the Raw File Format in: BusMonitor_Recording_File_Format.pdf in the doc folder of the PBA.pro installation (Chapter: Stream specific RAW Data)
RawSocket	The recording data is not stored on the disk. The data is send out via a TCP Socket (network) connection to an external application (user written or script). The format is the same like the raw format. If you select this, the *RecordingFileName* Property is expected in the format: <Server>:<port> e.g. 127.0.0.1:1234 On the specified Computer an application must already listen on the related port and read the data. Otherwise a timeout error message is displayed on Bus Monitor start. Note: The first Recording Stream (typically the Event Marker Stream), is send on the specified Port Number, the following Recording Streams (1553/429/AFDX etc) are send on the Port Number plus 1, plus 2 etc according the order in the Bus Monitor.
None	No recording data is stored on the disk. This mode may be used, if you only want to use other (resource specific) functionality of the related resource. e.g. Activity of the Mil Resource, MilScope Trigger.
Online	In this mode, nothing is stored on the disk. The recording data is stored in a ring buffer in memory. PBA.pro holds always the last amount of defined messages in memory and discards the oldest, when new messages arrive. The [illegible]

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lineRingBufferSize, the default setting of the Property with the Setting: BusMonitor/DefaultOnlineRingBufferSize

The *FileComment* property allows to specify an comment for the recording file. The comment can be seen as tooltip, after a recording file was opened again or in the File Selector Dialog.



5.1.1 Using a Custom Timetag format

Per default the Timetag column resp the the IRIG time will be displayed in the Recording views as follows:
012d:34h:56m:12.345678s
To change this default Timetag format to a custom format, the settings entry BusMonitor/CustomIrigTimeString can be used. The options for a custom format are.

%d	This option will be replaced with the corresponding day value
%h	This option will be replaced with the corresponding hour value
%m	This option will be replaced with the corresponding minute value
%s	This option will be replaced with the corresponding second value
%i	This option will be replaced with the corresponding millisecond value
%u	This option will be replaced with the corresponding microsecond value up to 1 millisecond

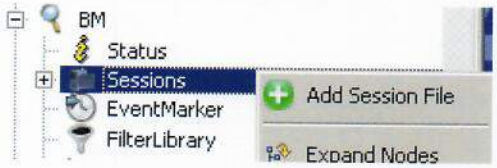
Example:
Setting the CustomIrigTimeString value to "%d days, %h hours, %m minutes, %s seconds and %i%u microseconds" will convert the sample Timetag from above to
012 days, 34 hours, 56 minutes, 12 seconds and 345678 microseconds

5.2 Open Recording Files (Sessions)

Previous recorded recording files can be opened either by the "File Open" functionality of the Main Menu or via Drag and Drop from an external application (e.g. Windows Explorer). This opens a small windows showing the related file hierarchy.



In this case the Recording File view may not display Parameters or Aliases (see below), due to there is no connection to a related resource.

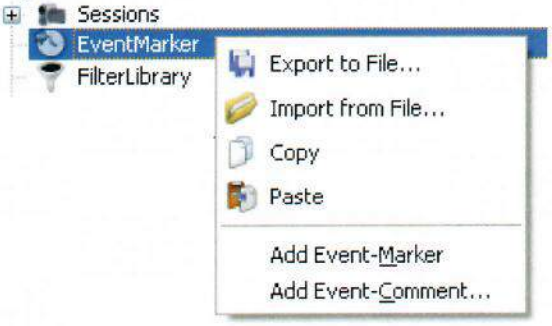


The other way to open a Recording File, if you require a connection to a resource, is to open the recording file via a right click to the **Sessions** node beyond the Bus Monitor, and select "Add Session File" in the local popup menu. The added sessions can be removed with a right click to the related session and select **Remove** in the local popup menu.

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5.3 Event Marker Stream

The Event Marker node supports creation of Event Markers during recording time. The Event Markers stored in the Recording Data as a separate Recording Stream.
A right mouse click on the ***'Event Marker'*** node offers a popup menu, which provides the access to the Event Marker generation.



"Add Event-Marker" generates a default Event Marker named '<EventPrefix><x>'. The <EventPrefix> placeholder will be the DefaultPrefix property value of the EventMarker and <x> an incrementing number. Per default the property DefaultPrefix is set to "Event". This will generate the Event Marker entries Event1, Event2, Event3 if the Add Event-Marker context menu entry is selected three times.
"Add Event-Comment..." generates a Event Marker which can be named by the user.These options are only enabled, when the Bus Monitor is active. Event Markers can also be automatically created by the Event Marker StreamScanner (see below). It is possible to rename Event Markers after the Recording is done, but they cannot be deleted. The maximum length of a Comment is 255 Characters.

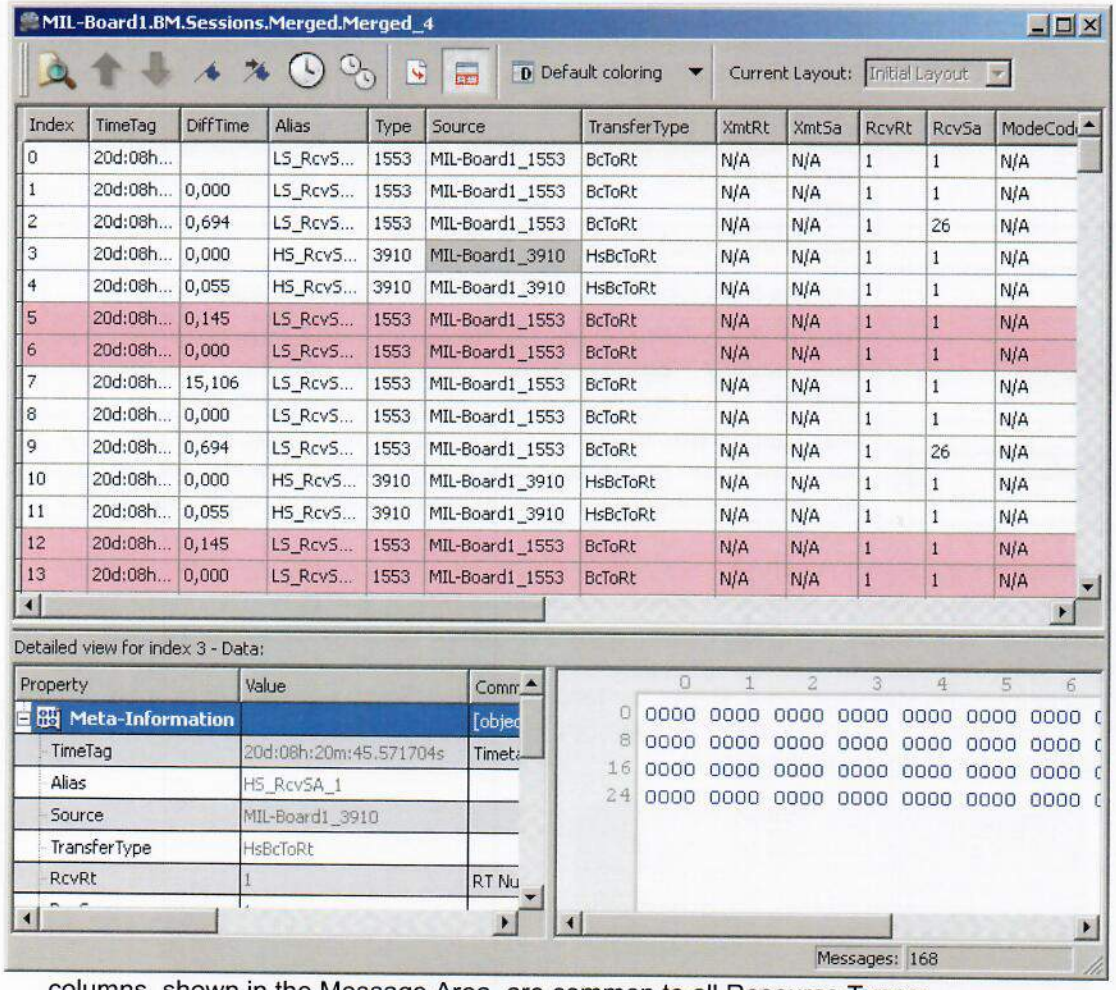
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5.4 Recording File View

5.4.1 Index View

The Recording File View, or Index View, shows the Recorded Data in a Table. The view is shown, when you double click to the related Recording Stream Entry in the Sessions Node. The Recording View shows one line for each message in the recording data. The available columns depend on the Resource Type, which was used to create the recording.

Toolbar



Message Area

Message Detailed View

Status Bar

The following columns, shown in the Message Area, are common to all Resource Types:

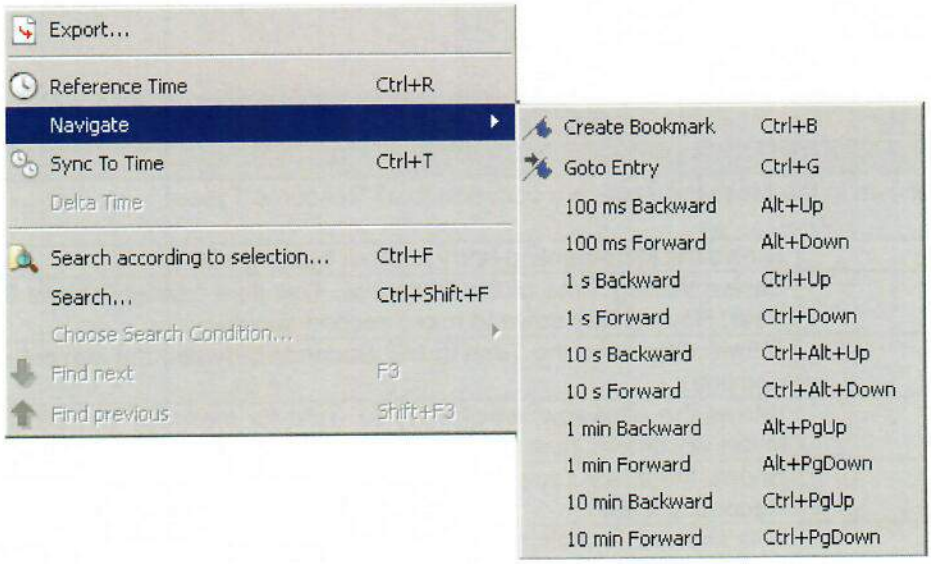
Index	shows the incrementing entry number starting with 0
TimeTag	Shows the Irig Time of the Resource. This time typically shows the Day of the Year, Hour of Day down to micro second accuracy.
DiffTime	Shows difference the Time in Mili Seconds between the current and the previous entry.
Alias	Shows the Alias row, which may be used for message identification. See later in this document, how to populate this row.
Type	Shows the Entry Type. This is helpful, when you merge different types to one Recording View
Source	This shows information about the source, which was used to capture the data
All Other columns	The following columns are specific to the related resource. The description of the Properties is shown in the tooltip, when you move the mouse over the entry, respectively when you press F1 after you have selected an entry.

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The Icons in the Toolbar provide the following functionality

	Allows to start/stop the Bus Monitor from the Index View.
	If this Option is enabled, the index view follows the new entries arriving during recording. This is only visible, when the Bus Monitor is active
	Search According Selection (see below)
	Repeat the Previous Search forward/backward
	Creates a New Bookmark (only visible if the Bus Monitor is stopped)
	Goto dedicated Index Number, Event Marker or Bookmark
	The current selected Message becomes the Reference Time of 0. This has an effect on all open Index Views. To show the original time, press the Button again.
	Select in all other open Recording Views the Time closest to the selected time. This has no effect, if no other Recording Views are open.
	Shows the export dialog (see below)
	Toggles the Visibility of the Integrated Message Detailed View
	Selects the coloring mode for the table. Available options are “Default coloring”, “Stream coloring” and “Alias coloring”. The “Stream coloring” option is only available for merged recording files.
	This Combo Box allows to select one of the available Header Layouts, which can be created after a Right Click to the Header and select “Manage Header Layouts” in the Local Popup menu. See Below

The status bar shows the amount of messages, currently available in the Recording View. The number is displayed in green, as long the Bus Monitor is active, otherwise the value is in grey.
The Message Detailed View, shows more information about the current selected Message. You will find a description of the View below.
A right click to an entry in the Message Area, shows the following Menu. Menu entries with an icon, have the same functionality like the icons in the Toolbar. Some entries show also a keyboard shortcut, which allows faster access to the related functions.



The Time Navigate Menu may be modified within the Settings ViewSettings/PPIndexView/NavigationShortcuts.

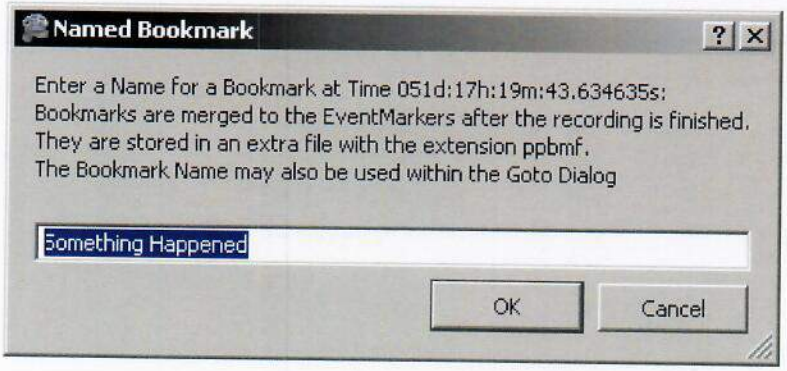
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If you are dealing with big recording files, the Toolbar may show a combo box, which allows select the chunk of data to display. The default chunk size is 5 Million entries. If your recording contains more messages than the chunk size, you have to select the area to display with the provided combo box. Searching works over chunk boundaries. The default chunk size may be changed within the Settings ViewSettings/PPIndexView/MaxRowsToDisplay.

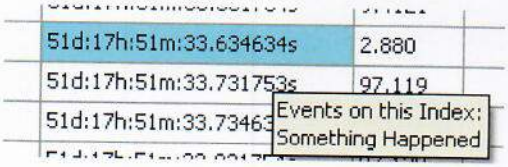


Bookmarks

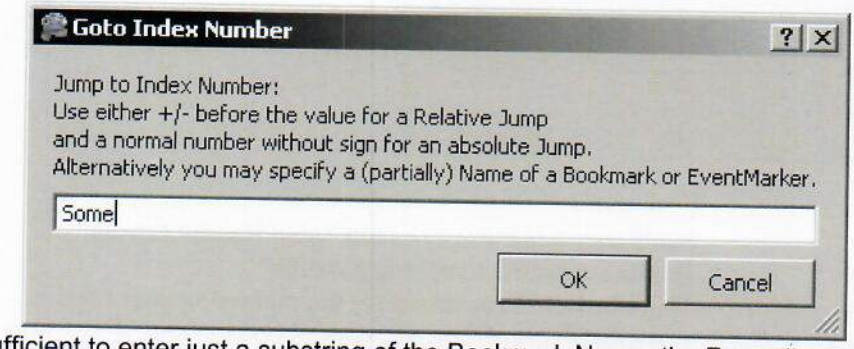
If you create a Bookmark via the related Toolbar Button or menu pick, the following dialog is shown.



You may enter any name for your bookmark. The Bookmarks can be seen in the Event Marker view (see below). The same bookmark name may be used twice.
If an entry has a bookmark, the related time of the entry is shown in light blue, and the tooltip of the time shows the name of the Bookmark.



Furthermore the Bookmarks may be used within the Goto Dialog :

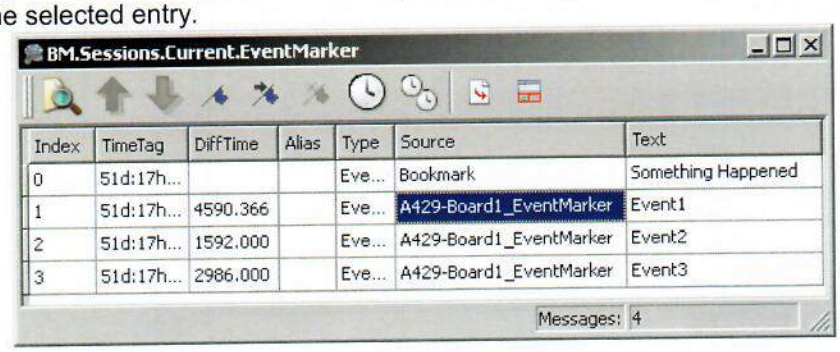


It is sufficient to enter just a substring of the Bookmark Name, the Recording View will go to the first entry matching the substring. If you enter a number, the Index View goes to the related Message number. You may enter also a + or – before the number, which causes a relative jump from the current position. Due to this it is not recommended to create Bookmarks containing only digits, due to they cannot be used within this dialog.

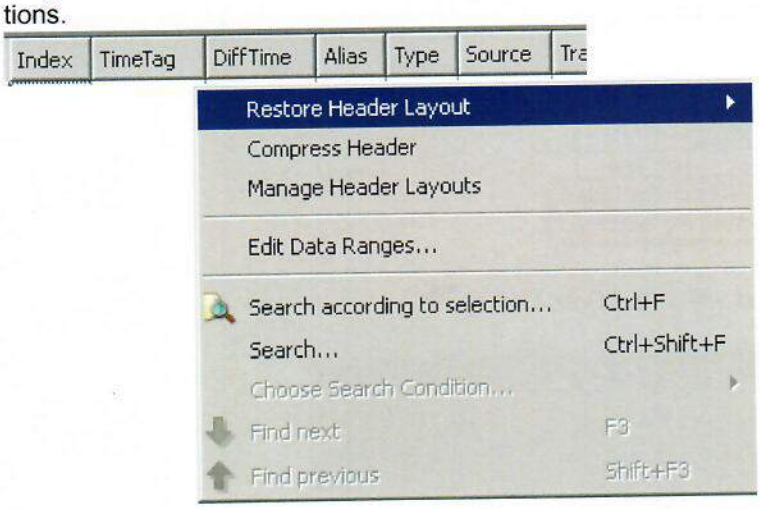
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The Bookmarks are merged to the Event Markers. They are stored in a file, with the same name than the recording file and the extension ppbmf (PBA.pro Bookmark File). This file is a simple Text File, which may also be written from an external application or script. The PBA.pro watches the file for changes, and will merge the new entries to the EventMarkers.
The Event Marker View allows to view the Bookmarks and Events. The Event Marker View is shown when you double click to the EventMarker Stream in the related Session.
The Source column shows the type of the Entry (Bookmark or Event Marker). If the entry is a Bookmark you may delete the Bookmark with the Toolbar Entry.
Bookmarks and EventMarker may be renamed via the Local Popup Menu and select "Change Eventmaker Label".
Furthermore you may select in the Local Popup Menu the entry "Select Messages after Event", which selects the time Range between the selected entry and the next entry within the other open Recording File Views showing the same time area.

A Click to the Button selects in all other open Recording File Views the Message, which time is closest to the selected entry.



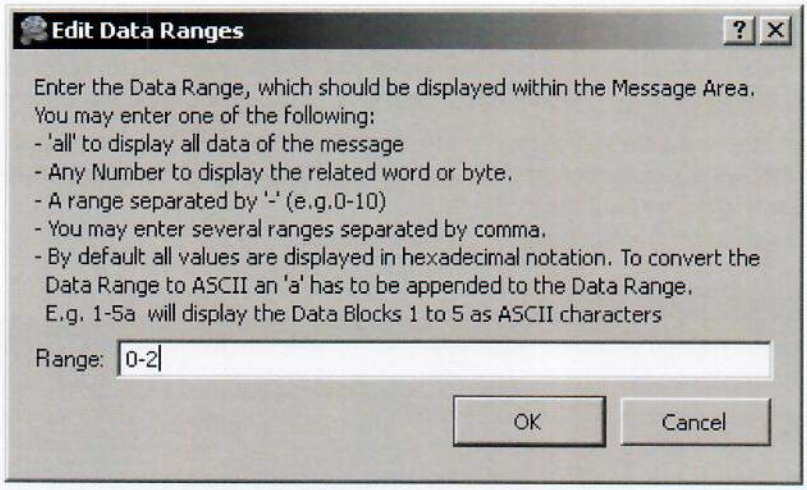
Message Area Header
A right mouse click on the Header of the Messages Area will open a popup menu with various functions.



Restore Header Layout: Re-Stores a previously saved Table Header Layout
Compress Header: Resizes columns to optimized width
Manage Header Layouts: This allows to save or modify the current Header Layout.
The predefined *Initial Layout* contains all available properties and cannot be changed, if you save a layout with the name "Default", it becomes the layout which is restored, when the index view is opened.

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Edit Data Ranges allows to display the Message Data (or parts of it) as an extra column within the Message Area.



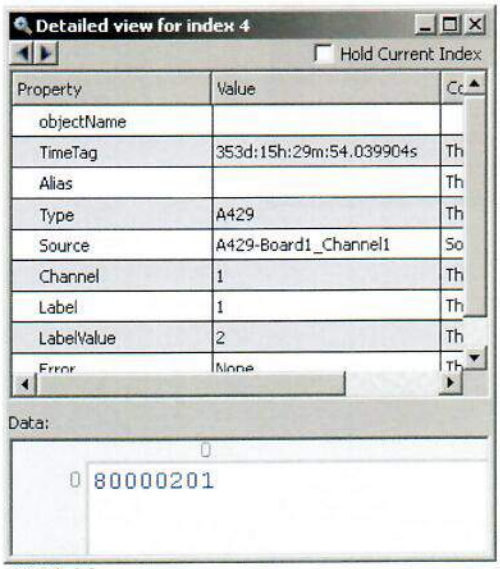
2	WordCnt	D0-D2
	3	BBBB BBBB BBBB
	1	CCCC
	2	AAAA AAAA
	2	AAAA AAAA
	3	BBBB BBBB BBBB
	2	AAAA AAAA
	2	AAAA AAAA
	-	---- ---- ----

To remove the Data Row, set the Range to an empty string and press OK.
The Data Ranges are stored in the Header Layout if saved.

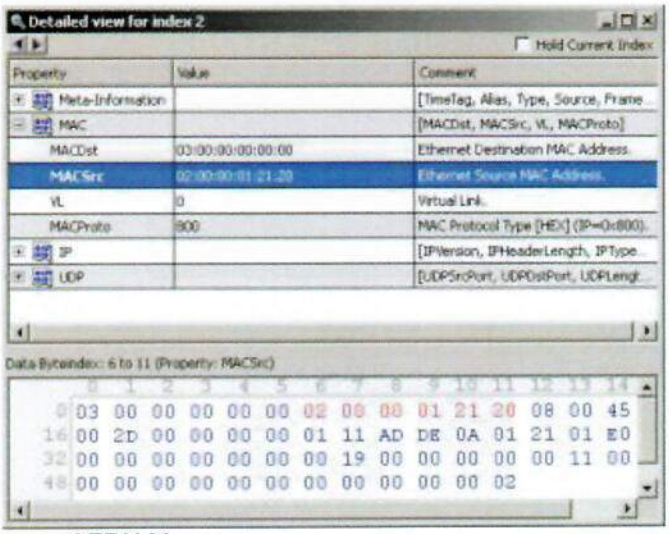
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5.4.2 Message Detailed View

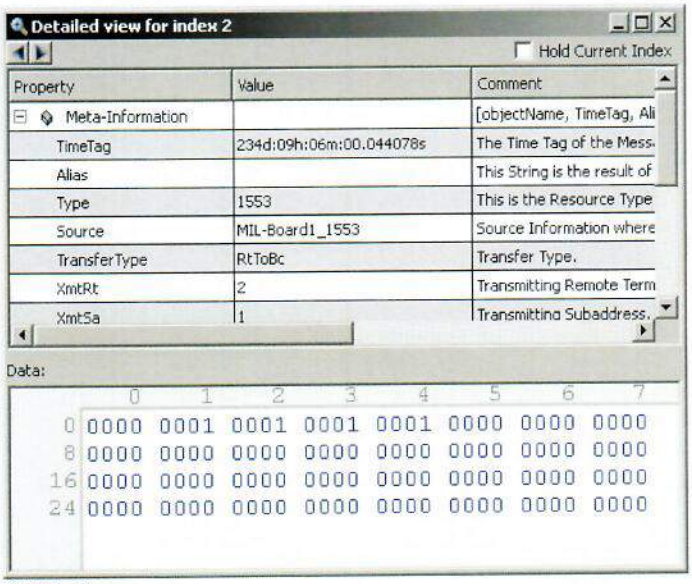
The Message Detailed View is either displayed in the lower part of the Index View, or it can opened via a double click on a dedicated message. The detailed view shows the properties and their description in a hierarchical manner. You may step through the messages with the  buttons at the top. Typically the Detailed View follows the selection in the related Recording File View. This behaviour can be disabled, by checking the “Hold Current Index” checkbox.
The Data area of the message shows the payload of the message.



A429 Message



AFDX Message



1553 Message

You may change several display options in the local popup menu of the data area.

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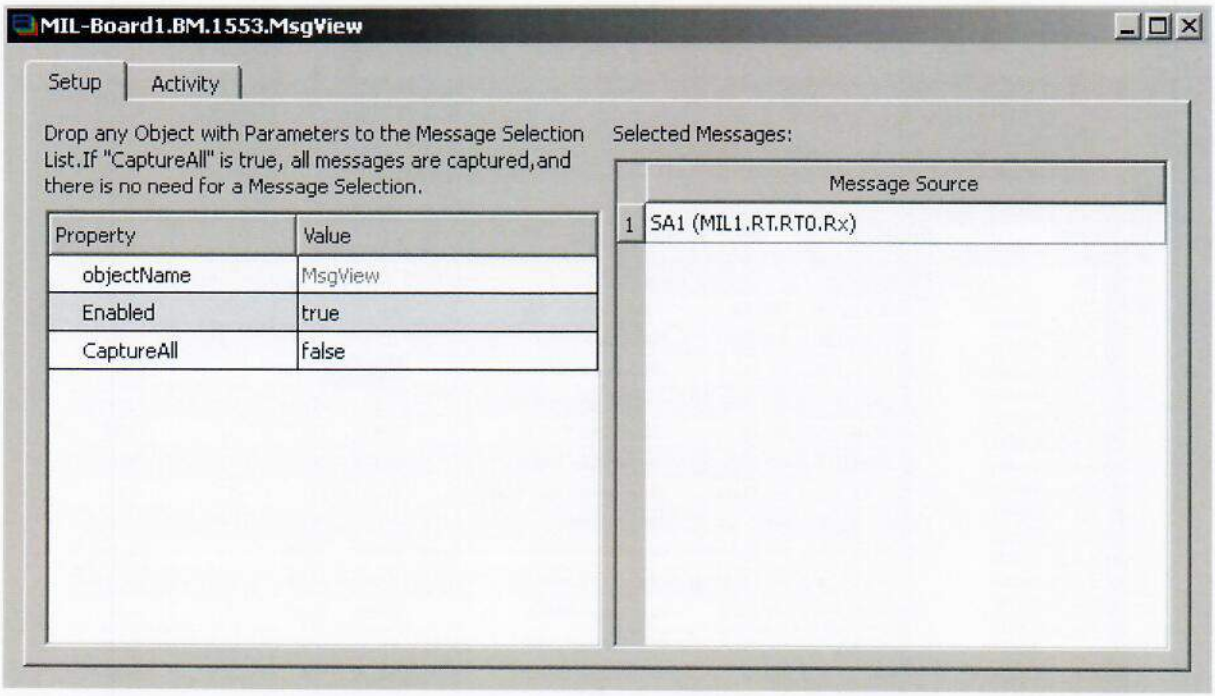
5.5 Bus Monitor Online Message View

Most Recording Streams (1553/3910/Afdx/Arinc 429 etc) provide a Bus Monitor Online Message View Object (MsgView). The Bus Monitor Message Online View is only available, when the Database Component is available.

The Online Message View captures dedicated or all messages, received by the Bus Monitor.

It counts the Message Occurrences and Errors. Furthermore the Online View shows the values and Parameters for each type. The displayed name of the dedicated Messages is derived from the Alias Field of the Messages.





To enable the Message Capturing, set the Property "*Enabled*" to true.

When you require only dedicated messages set the Property "*CaptureAll*" to false, and drop parameters from the Database Manager to the Message source field.

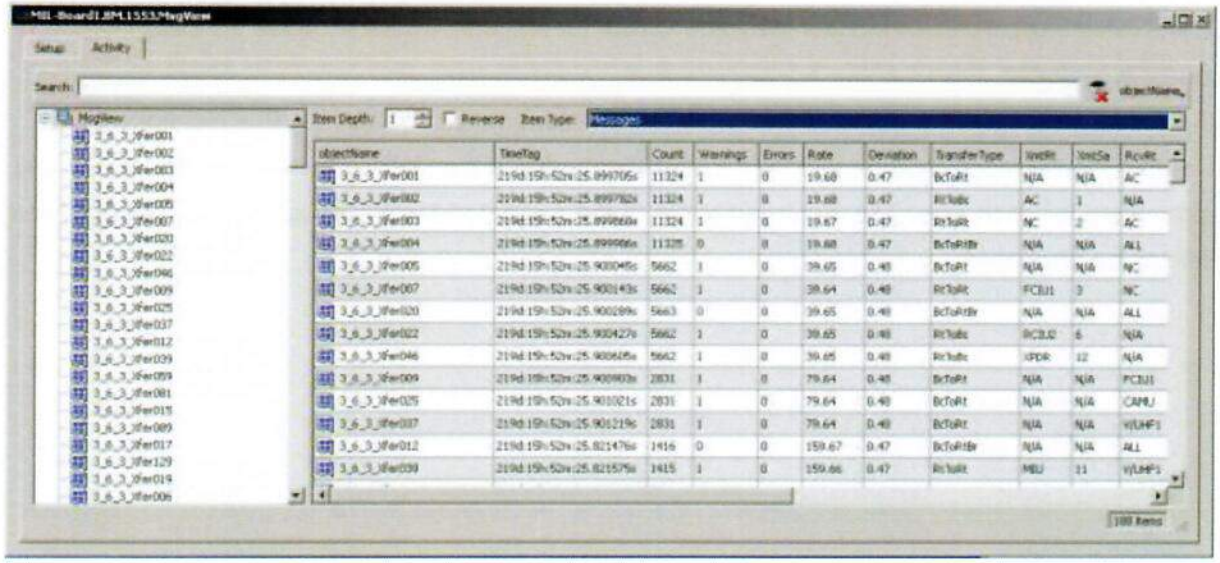
If you intent to capture all messages, you can set the Property "*CaptureAll*" to true. In this case the messages are stored as they are received by the Bus Monitor.

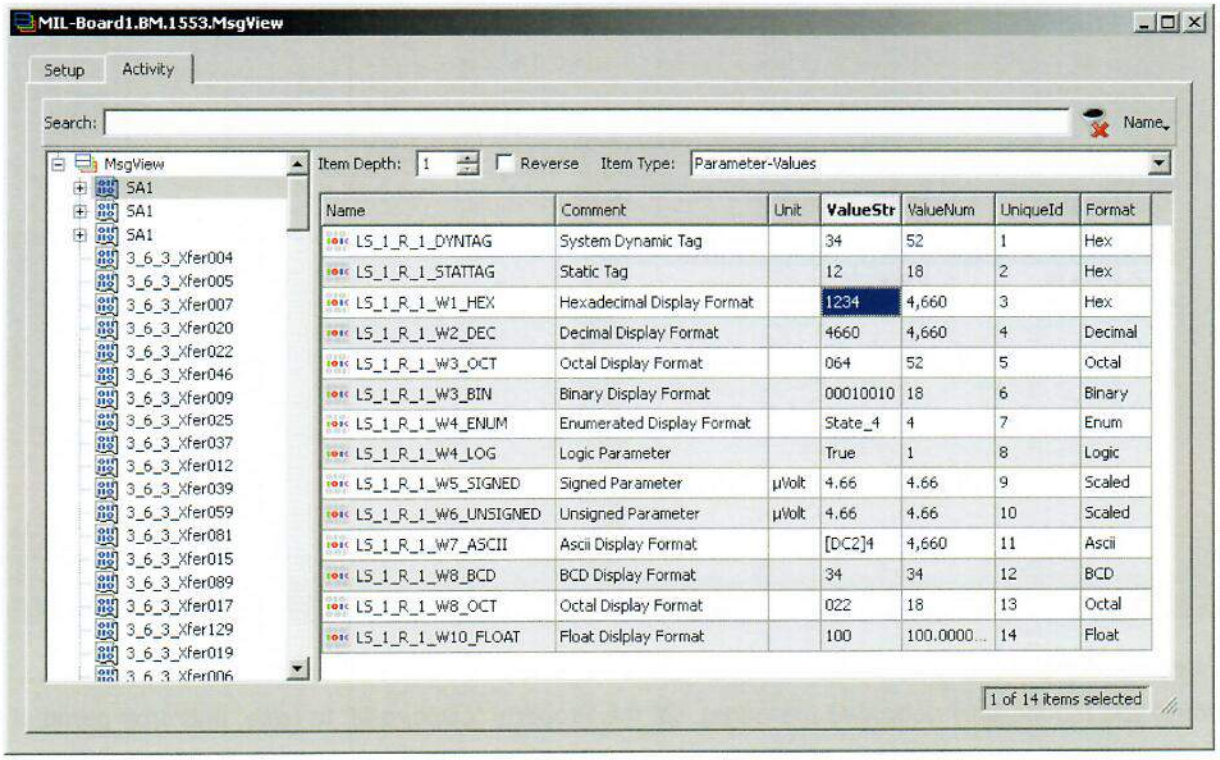
Due to it is possible to handle all received Messages, it is possible with the Online View to capture single events values with aid of Condition Parameters or with the Assign.

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The Activity Page shows you all the received messages.

You may either show the properties of the single messages or the parameters, located on the messages. Those options are selectable via the “Item Type” Selector.





Note:
The Displayed Names of the Messages are derived from the Alias Property of the related message. If the Alias property is not populated, the messages are numbered in the order they arrive.

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5.6 Conditions

The PBA.pro allows to create conditions, which can be used for several purposes.

- Searching in the Capture Windows
- Definition of Message Alias for Payload Decoding
- Offline Message filtering
- Online Stream Scanners definition for
  - Recording Start Trigger condition
  - Recording Stop Trigger condition
  - Online Recording Filter definition
  - Online Display conditions
  - Frame Counter conditions
  - Event Marker Generation

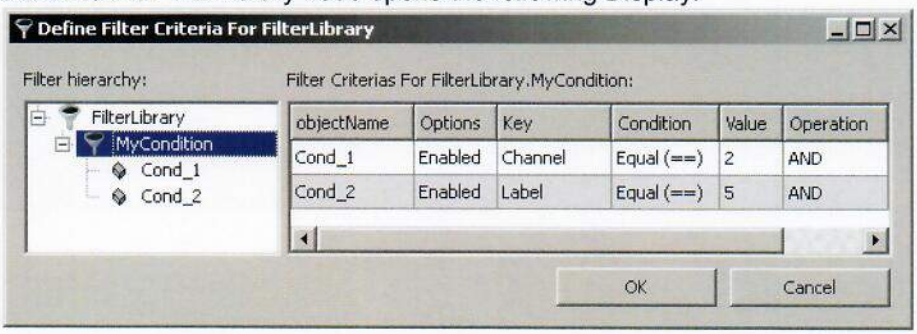
A Condition typically consists of a combination of a Message Property, a Compare Operator (equal, greater, lower etc) and a Value. A Filter consists of the combination of one or more Conditions.

5.6.1 FilterLibrary



The Filter Library on the Bus Monitor can be used to save often used Filters and Conditions within the project. These Conditions can be used for searching or filtering messages in the Recording File view.

A double click to the FilterLibrary node opens the following Display:



New Filters or Conditions can be created by a right click to a node in the Filter Hierarchy tree.
A single 'Filter' can contain multiple 'Conditions' or further 'Filters'. The available Properties, selectable for the Key of the Condition, depend always on the Message Types related to the Resource Type of the Bus Monitor.
The Example above will Evaluate

MyCondition = Cond_1 AND Cond_2
= (Channel == 2) AND (Label == 5)

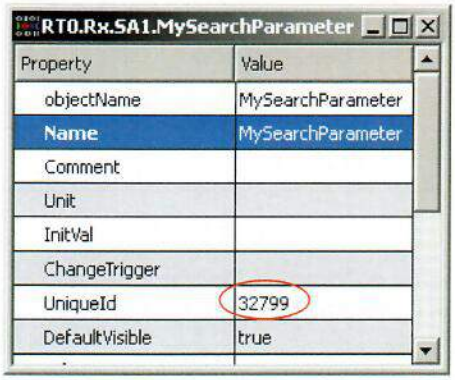
Searching for Raw Data:
Typically each message has also a Property "Data", which may be selected as key for the condition. If you do so, the Data condition may be used as follows:

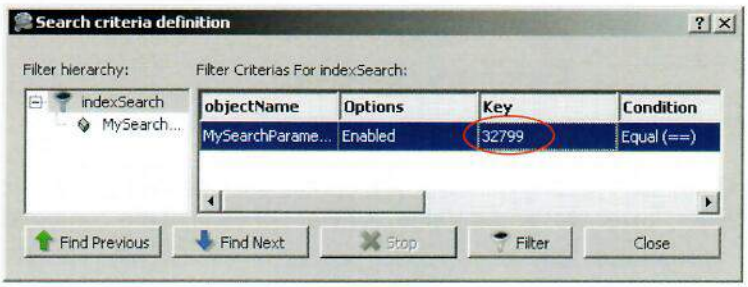
<Pos>,<Mask>,<Value>

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Cond_1	Enabled	Data	Equal (==)	0,FFFF,0000	AND

This allows to enter the search for a dedicated Byte/Word value at the given (Byte/Word) position. The Mask value is applied to the raw data. So it is possible to search for any bit combinations within the Payload of the Message.
e.g.
Search for Word 17 equal to 0x4 -> 17,FFFF,4
You may also create a Parameter Condition (if the database component is available). This can be done via a right click to a Filter, and select "Add a Parameter Condition", or you drag and drop a parameter e.g. from the Database Manager to the Filter Dialog. On a Parameter Condition the Key Value represents the UniqueId Property of the Parameter.





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