



Matthias Mutter - New ARINC429 XMC/PMC modules from AIM!



Joachim Schuler - run your Application on the ASP of PCIe modules!



Python PBA.pro Object - Helping programmers to integrate PBA.pro!



Andreas Küchlin - PBApro™ is now the industry standard for avionics testing!



Bill Wargo - PBApro™ shows its true value to test engineers in 'Chapter 10'!



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Right on Target



View

the Newsletter of AIM GmbH

AIM - avionics testing for the future - Today

New developments - AXC429-x and new PMC AMCX429-x Modules for ARINC429 applications by M. Mutter

PCI Express based XMC-Mezzanine

AIM has just introduced an exciting new family of XMC modules based on the ever popular PMC form factor. The AXC429-x XMC module takes full advantage of the PCI Express standard with a single lane (PCIe x1) interface providing data rates up to 2.5 Gb/s. At the same time the predecessor board AMC429-x PMC modules is being replaced with a pin and software compatible successor model known as AMCX429-x.



The new designs feature the ability to support a 32-channel version with all channels software programmable for Receive (Rx) and Transmit (Tx) operation.

Both cards offer full function Test, Simulation, Monitoring and Databus Analyser functions for various ARINC429 applications. Each of the independent ARINC429 channels are fully software programmable for Receive (Rx) or Transmit (Tx) mode and configurable for high/ low bit rates.

All channels operate concurrently at full bus bandwidths for the most demanding simulation and monitoring applications.

The AXC/AMCX429-x is designed to be installed on either a host carrier board (adapted to buses like standard PCIe, VME/VPX or cPCIe) or an embedded host computer. The onboard IRIG-B time encoder/ decoder provides a sinusoidal output and 'free wheeling' mode for time tag synchronisation on the system level when using one or more AXC/AMCX429-x or other AIM databus and network interfaces.

For best performance and reliability the new design has some unique hardware features including 128MB onboard RAM, a high speed FPGA with integrated PCI-Express interface, time code

microcontroller combined with a high performance RISC processor.

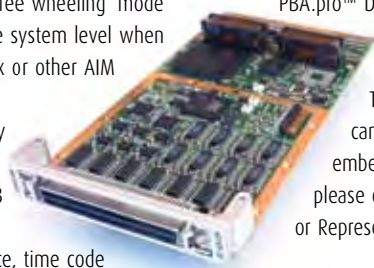
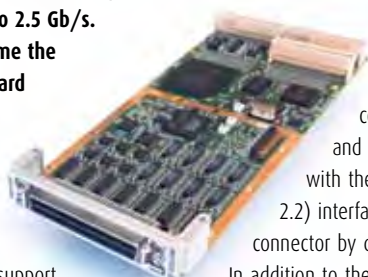
Conformal coating and rear I/O options are available for embedded applications.

The AXC429-x host interface is via two high-speed XMC connectors, one for PCI-Express and one for Rear-I/O. For the AMCX429-x these can be extended with an optional PMC connector compliant with PMC Rear-I/O and host interface being compliant with the 32-bit/ 66MHz PCIbus (Rev. 2.2) interface and using the PMC Rear-I/O connector by default.

In addition to the ARINC429 capabilities, up to eight General Purpose Discrete I/O (GPIO) signals and separate Trigger-I/O are provided for the 4/8/16 channel variants.

Autonomous boot up by the onboard Flash Memory after power-on makes the AXC/AMCX429 suitable for quick and autonomous initialisation after power-up. The module price includes Board Software Packages with drivers compatible with 32-bit/ 64-bit versions of WindowsXP/Vista/7, Linux and Real Time or embedded Operating Systems such as VxWorks. Host applications can be written in C/ C++ or C#, based on a full function Application Programming Interface (API) which is also part of the Board Software Package as are LabVIEW/VI's and LabVIEW/RT drivers. The formidable and Industry standard

PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can be used with AXC/AMCX429-x cards. To see how AIM's AXC/AMCX429-x can solve your test, simulation or embedded ARINC429 applications, please contact your local AIM sales office or Representative.



Once again we welcome you to another edition of AIMView. In this issue we are showcasing several new products and informing you of the latest developments which will keep you ahead of all your avionics databus testing & simulation needs - current and future!

Having the right solutions for our customers is king. In today's world we must offer even smarter solutions to give our clients a clear advantage. In this respect, AIM has been working on some new technology and concepts leveraging upon our unique and powerful 3rd generation Common Core hardware design.

The concept to have customer applications running right on the avionics interface is not new for AIM, but with our latest design PCIe cards we open up your world of avionics testing with the use of Ethernet and industry standard Linux based development tools.

Another first for Avionics Databus Testing market is the use of 'Apps' available for download from our web site to solve customer specific databus analyser functions. Again, leveraging from the unique component based and open system software design of our formidable PBA.pro™ Databus Test & Analysis Software has been the key. Both these applications clearly show how AIM discriminates itself in the market and how our customers can take full advantage of their investments with AIM solutions. These revolutionary developments are the basis for the introduction of our new family of Ethernet based

Test & Simulation products which will change the face of databus test, monitoring and simulation from now and long into the future!

We once again thank all our valued customers for their support and making us their first choice for all your avionics databus test and simulation needs.



Yours truly,
Douglas Ullah -
Director of Sales & Marketing

Get on Board!

Run Your Application on the ASP of new generation PCIeExpress based interfaces! by J. Schuler

For previous generations of AIM Interface boards the so called ADK's (ASP Software Development Kits) have been offered for specialist real time applications. This offered our customers the capability to write applications right on the board using an ASP (Application Support Processor) as a unique feature in the market. The main purpose of such an application was to offer the customer application access to the data bus interface functionality without any interference with other host applications or OS (Operating System) dependencies.



With the new APE board generation for MIL-STD-1553 and ARINC429 which has our 3rd Generation Common Core plus ASP

Section, our capabilities for Application Development on the interface board have just reached new heights.

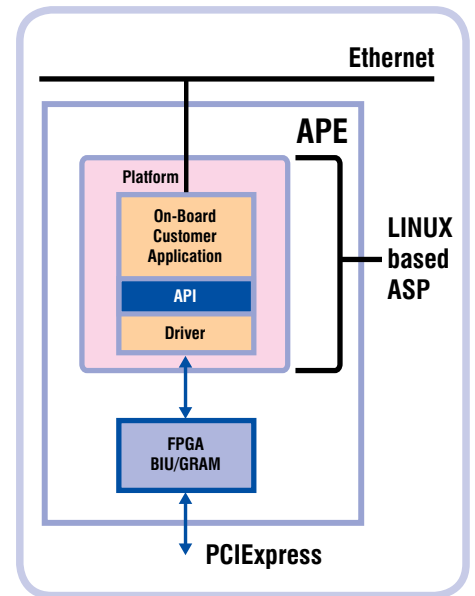
APE1553-x Block Diagram with new Common core (blue elements) and ASP section (pink elements)

The Common Core elements (blue) implement all the MIL-STD-1553 protocol and hard real time related functionality of a MIL-STD-1553 Interface (Bus Interface Units - BIU) known from the previous generations of AIM Interface boards. The 'Global



RAM' operates essentially as a shared memory between the Interface board and the 'traditional' device driver and API which is residing on the hosting platform and accessed via the PCI/PCIe host interface.

New for the APE design is the fact that the ASP Section has an Ethernet capability embedded on System-on-Chip architecture of the processor. Using an optional standard Ethernet RJ-45 connector the



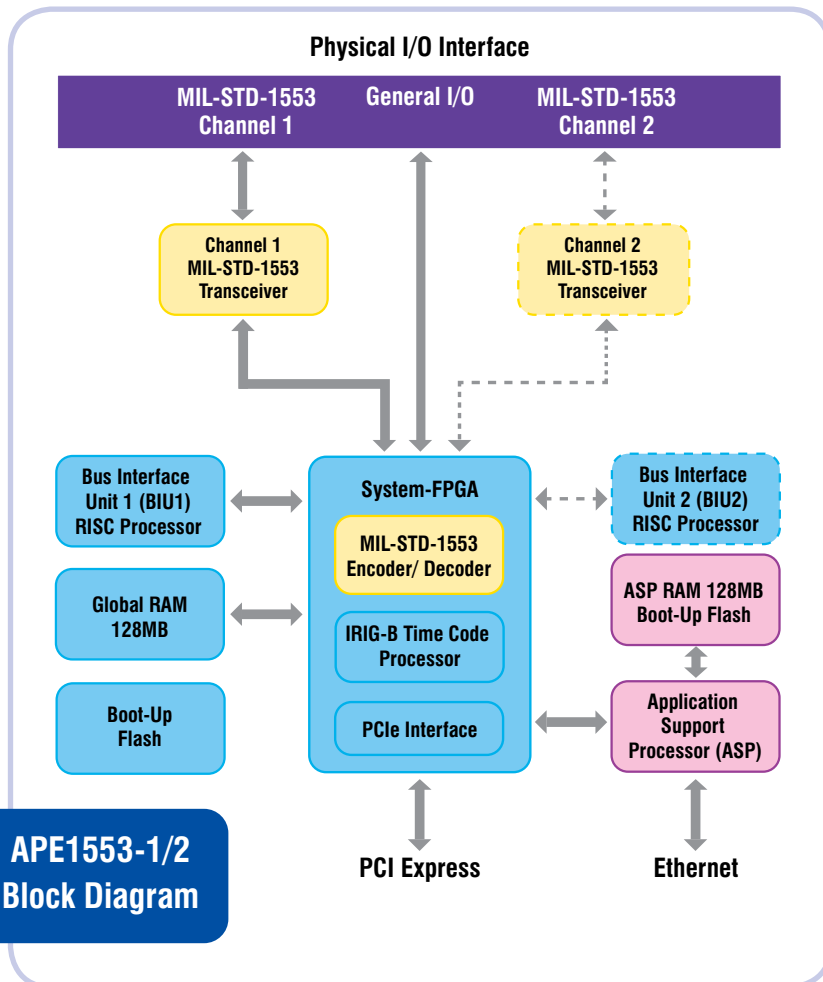
Simplified APE S/W Architecture

ASP can be connected to Standard 10/100Mbit/s Ethernet. The ASP section consists of 128MB RAM and a Boot-up Flash for autonomous boot of the Onboard Operating System and further applications. The ASP executes an Onboard LINUX Operating System. Therefore well known functionalities and development tool chains for LINUX application development are available Off-The-Shelf (GNU-C Compiler and Linker, GNU C-Library). Support for building a corresponding tool chain as well as examples are included in an ADK.

Specifically handling of functionality over standard Ethernet Network e.g. TCP or UDP sockets is supported and a very practical and useful feature for our clients to take full advantages. The programming model for a LINUX onboard application is based on an API, which is basically equivalent to the Standard Driver Software C-API of the boards (see Reference Manual for MIL-STD-1553 Interface Modules). An underlying LINUX onboard device driver implements the interface to the BIU via the Global RAM.



With the LINUX based ASP plus the Standard Ethernet capability for the AIM APE platform, a well known and very flexible solution can be offered to support fully customised application development on Interface Board Level.



APE1553-1/2 Block Diagram

'App-to-Date'

PBA.pro™, the platform for your applications! by J. Schuler

The trend to have 'Apps' for different tasks, especially on today's devices like Smartphones, Tablets and even on the PC Desktop gave us the idea for an approach to have 'Apps' running on AIM's successful Application Software Framework for Avionics Databus/ Network Simulation and Testing - the PBA.pro™.



In a broader scope, this approach outlines a new dimension added to the traditional view of using a Bus Analyser or Application Framework like the PBA.pro™.

'Applications' so far have been achieved by simply creating setups for particular use cases and invoking them from the HMI with the tool's display and GUI capabilities interactively. The 'App' concept based on PBA.pro™ moves a step further to implement dedicated GUIs targeted to a particular user case or cases being easily invoked by an icon on the desktop of the host machine.

The PBA.pro™ software and concept was introduced to the market back in 2006 and been systematically extended by new functionality based on internal and external customer requirements. We now have successful PBA.pro™ implementations in the field covering a wide and varied range of applications. With the release in February 2012 of the PBA.pro-LIGHT, the first PBA.pro™ based 'Apps' have been made available to the market. These have been specifically focused on easy to use MIL-STD-1553 and ARINC429 Databus Analyser applications. Soon to follow will be a PBA.pro-LIGHT 'App' for AFDX/ ARINC664P7.

The PBA.pro™ 'App' concept is based on the capability of PBA.pro™ to operate as a platform to create customised User Interfaces created entirely by the PBA.pro™ Designer, developed by the PBA.pro™ users or offered upfront by the AIM PBA.pro™ 'Apps' group as a costed option.

Such 'Apps' offer PBA.pro™ users solutions for standard user cases as well as for application specific cases without having to touch the comprehensive features of PBA.pro™ in first instance. Furthermore and due to the approach of having the 'Apps' based on PBA.pro™ Designer functionality, users/ owners of full PBA.pro™ licenses can extend, modify, and adapt such 'Apps' on their own, as required. These two main aspects highlight the unique advantage and awesome powerful and flexibility of the PBA.pro™ concepts.

These 'Apps' can be executed on minimal configurations consisting of the PBA.pro-FD (Framework and Designer core) plus the optional resource components for corresponding AIM and/ or 3rd Party interface boards. In fact, basic handling of standard interfaces like RS-232 COM Ports and TCP/UDP Socket connections is already built-in into the PBA.pro-FD. More comprehensive applications may require the PBA.pro-TSM (Test and Script Manager) for maximum of flexibility.



Part of the 'Apps' concept is a dedicated download area on the AIM Website, accessible via registration which offers free-of-charge download of the 'newly' available PBA.pro™ 'Apps' (as well as some other PBA.pro™ Goodies).

Today, the PBA.pro-LIGHT-'Apps' for MIL-STD-1553 and ARINC429 are available for download for all existing PBA.pro™ full license users. Further 'Apps' will follow, like a simple 'Recording Panel', 'BusView' and 'MILScope'. Many other application specific 'Apps' like a simple 'GO-NOGO' Tester, 'Self-test Panels' and others are possible as well! The concept to open the AIM tools and products for the 'Apps' trend will be reflected by the capability to easily execute LINUX based applications on the Application Support Processor of the new AIM APE1553/429 PCIExpress based board hardware (see Get on Board article in this issue) and the new Ethernet based products!



PBA.pro LIGHT control screen



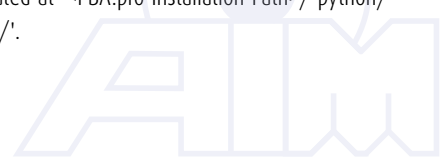
The Python PBA.pro Object

The Test & Script Manager Component of PBA.pro™ offers the ability to access internal objects by script commands. Many routine and recurring tasks can be automated easily i.e. complex scenarios can be set up and controlled in a very effective and powerful way.

In this context, the PBA.pro Object python class provides full access to a real object of the PBA.pro™ and helps programmers to integrate PBA.pro™ seamlessly into scripts using the typical python syntax. Creation and definition is performed by simply specifying an object by hierarchical path. In PBA.pro™ a path to an object is usually reflected by a tree, where each node represents one level of the hierarchy. As example, addressing an AIM ARINC429 Board the syntax would be: myBoard = PbaProObject ('ResourceList.A429-Board1'). To ease creation of such PBA.pro Objects, any node can be dragged and dropped to the python Script Console line, which will create the corresponding script line automatically. Properties can be read (and write) as they would be python object attributes.



Fast access from such an object to a real PBA.pro™ object is guaranteed by storage of the related object addresses rather than its name and path. Furthermore, programmers can use this class to create new objects in the PBA.pro™ or to extend the functionality of a real PBA.pro™ object by adding 'virtual' properties to any object. Further details can be found in the 'ppbase.py' module located at '<PBA.pro Installation Path>/ python/ libs/'.



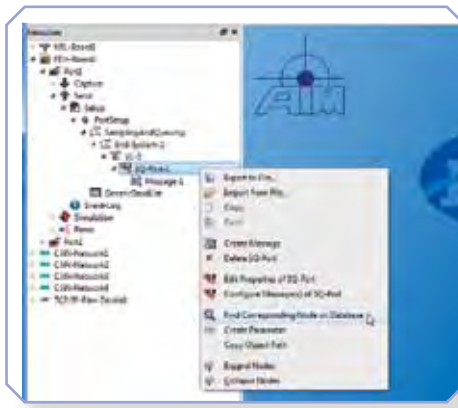
Finding Corresponding Nodes/ Create Parameters

There is a strong relationship between objects in the resource tree and objects in the parameters tree. To define a



parameter on a certain message, the parameter needs to be

placed below a certain amount of hierarchical nodes providing detailed information about the message or data buffer, the parameter is used for. As soon as a message or buffer of the resource side matches such a definition, the PBA.pro™ will create parameter instances of the parameter definition and place them below the buffer. Accordingly, many nodes of the resource tree are related to a 'Buddy' on the parameters definition side, as they hold the same message meta information. To quickly highlight such a 'Buddy' of the resource tree in the parameters tree or vice versa, each node which might have such a 'Buddy' offers the context menu entry 'Find Corresponding Node on Resource' or 'Find Corresponding Node on Database'.

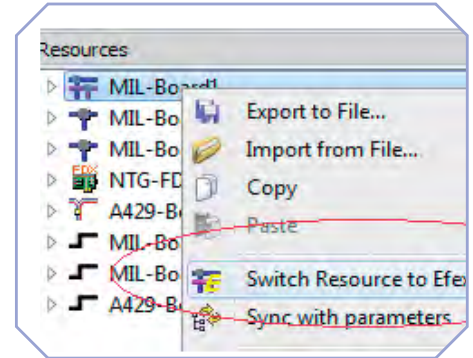


If enough information can be collected from an object node of the resource the 'Create Parameter' entry is offered in the context menu. This allows users to quickly create parameters, because all intermediate nodes on the database side are created fully automatically.



EFA/ EFEX Switching

The new PBA.pro™ version allows switching from EFA to EFEX and vice versa on the fly without the need to restart the PBA.pro™ or even reboot the PC.



EFA/ EFEX Switching is very easy and can be accessed interactively by Context Menu of the Resource or by script on just calling the corresponding slot Switch Board Type of the STANAG3910 Board. Furthermore, switching is possible by command line option which will be interpreted on PBA.pro™ start-up. The current type can be stored in the project as well and therefore, if stored, will be restored if the project is re-loaded.

DID YOU KNOW?

all the very latest News from AIM

- **AIM now provides full driver support for all boards on Windows 32-bit and 64-bit systems. This covers Windows XP, Windows Vista and Windows 7 systems in 32-bit mode and also Windows 7 systems in 64-bit mode.**
Within this support all Windows System Drivers of AIM were fully reworked under the new Windows Driver Foundation (WDF) as Kernel Mode drivers. With this solution we have a powerful replacement for the legacy driver which originated from a WindowsNT driver to a WDM driver. This puts us in a strong position to get any new drivers for new boards in a fast and effective way for 32-bit and 64-bit platforms.
- **C# support for Application Programming is now also available as a .NET assembly.**
The C# Application Programming Interfaces of AIM's MIL-STD-1553, ARINC429 and also for



AFDX/ ARINC664P7 boards is still available and is now packed to a .NET assembly. Each BSP comprises a subdirectory 'Add-Ons' where the .NET assembly is located with a C# programming sample. The .NET assembly can also be used with Visual Basic.

● **AIM is planning to have a new Driver DVD which will be the resource for all boards to get running.**

The DVD will comprise the full range of drivers covering all protocols and all platforms we support. The DVD will be designed and structured just like the well-known Download Area pages of our AIM Web site so our customers can easily find the relevant information (BSP, Drivers & Manuals).



- **The new PBA.pro™ accessories download section**

With the introduction of the new PBA.pro LIGHT, its predefined dialogs - completely created with the PBA.pro™ designer component - are also available for users holding a PBA.pro™ full license. To provide these dialogs and other useful PBA.pro™ related utilities and information to all registered PBA.pro™ users, an accessories section has been created. Please visit www.aim-online.com and log in to our download area to get direct access to the PBA.pro™ Accessories.

- Ask us about our new PCIe and PXI: STANAG3910 Test solutions for Rafale (with Electrical Front End)
- New: Fibre Channel RDMA protocol support - now available for AIM's Fibre Channel modules APE/ APX-FC-2 for PCIe/ PCI-X.

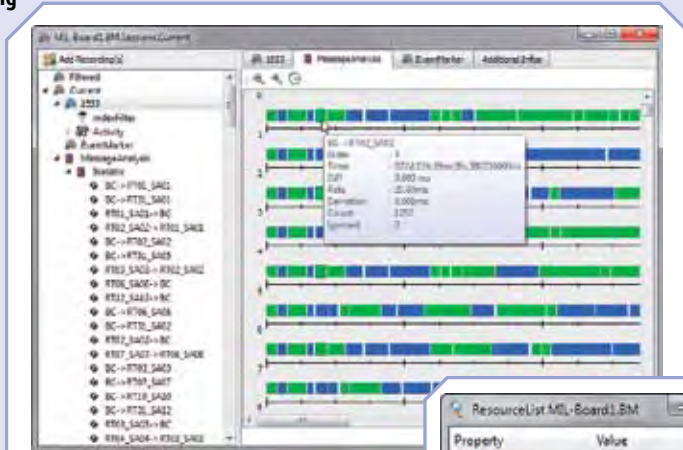
New PBA.pro™ features:

Improved PBA.pro™ recording Analysis & Visualisation by Andreas Küchlin

Due to the fact that the PBA.pro™ has become a kind of industry standard tool in various areas like avionics testing, automation and analysis of multiple types of bus traffic, the latest development of the PBA.pro™ has focused on improving and easing the bus analysis and visualisation of online and recorded data and parameters.



The powerful recorder function, so called Bus Monitor, has been extended to have a common recording window. All basic traffic and analysis functions like loading recorded files, searching, filtering or exporting data of a recording file can be accessed and performed by simple mouse click within this dialog. The Bus Monitor now not only records data, but also provides further simple and easy to use solutions to filter the bus traffic offline or even online during a recording. To filter a recording just select a message in the recording window and select the 'Filter on BM' action. The very same option is available in the resource tree, where such a filter can be applied by context menu e.g. to a MIL-STD-1553 Remote Terminal, one of its Sub Addresses, a Transfer of the Bus Controller, a Virtual Link of AFDX/ARINC664 or a Label of an ARINC429 message. The filter is applied to the recording and will generate a second recording display holding only the filtered messages.



Fast Search

Even the analysis of existing recording files can benefit from this. The analysis is saved to disk as recording analysis file and needs to be performed only once for such recordings as well. This saves time and provides further information to the already present data and basic message information.

AIM previously introduced the concept of colouring on error, stream or customised conditions. The conditions have been optimised to support high level logic and fast condition search via parameter conditions and functions. In addition the graphical analysis portion has been extended by a very powerful time plot, where traffic can be visualised by a multi parameter time plot as well. The plot supports various information and display possibilities and can be used online during a simulation, recording and for already available recording files. Parameters can be added to the plot by a simple pick list e.g. of the assign window by context menu or drag and drop.

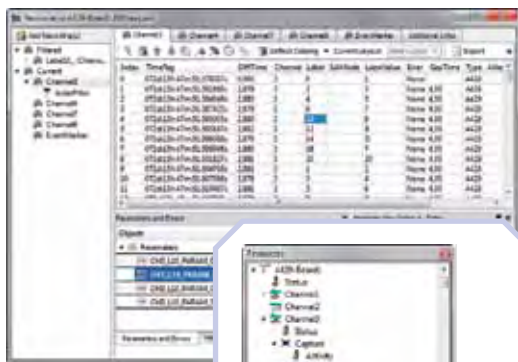
The time plot displays all values of the selected parameters by time and value and provides extended features including:

- Specify the range manually or do an auto scaling of the value axis according to the minimum and maximum value
- Share the time axis over multiple charts
- Zoom in/ out of a plot
- Add custom text boxes to the chart (text boxes can be used for comments or to display a parameter value)
- Completely customisable properties - colouring or axis naming
- Vertical line plot markers to:
 - Select/ highlight all parameter values at a certain time
 - Synchronise the recording display to the time plot relative to the current marker position
 - Automatically calculate time and value delta of two positions in the time plot

Property	Value
objectName	BM
Active	Inactive
OutputType	Online
RingBufferRecordi...	false
OnlineRingBufferS...	100
EvalMode	EvaluationDuringRecording
MsgFilterRec	NoEvaluation
MsgFilterRecCount	EvaluationAfterRecording
Status	
EventMarker	

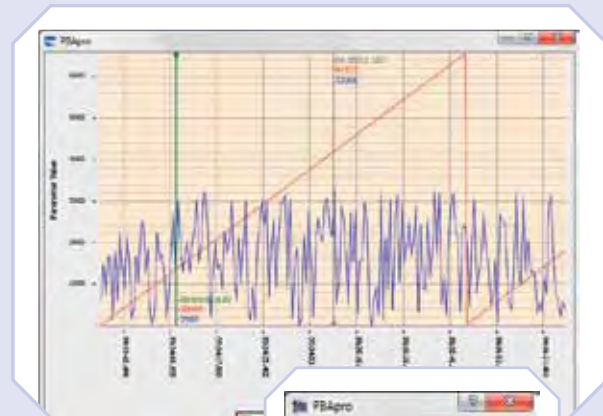
File Export

PBA.pro™ offers various formats to which recording files can be exported. These export formats have been enhanced to offer more export options. In addition to export 'by row', the export of time slices has now been introduced. To reduce the amount of exported data and the file size, export modes like 'export on Parameter' or 'raw Data change' and 'export on minimum time interval' are included. Furthermore, parameters of interest can be exported to one common export file or each parameter to a separate export file.

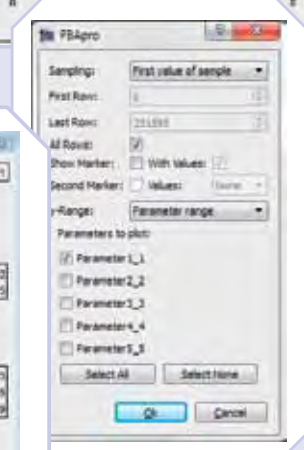


Common Record Block

Bus analysing and correlation tasks (like correlating Low Speed and High Speed traffic of STANAG3910 messages) which have been performed as post processing steps thus far, can now be performed during recording. There is no need to wait for the message analysis after the bus monitor has been stopped.



Extended Time Plots



AIM-USA Starts a New 'Chapter-10'

by Bill Wargo

The words 'Chapter 10' are immediately recognized by our customers who are involved in flight test instrumentation. You do not even have to mention which document that is being referenced, they all know that it is the IRIG (Inter Range Instrumentation Group) -106. This is the governing document for interoperability of all aeronautical test ranges in the

United States.

Chapter 10 of this standard defines the digital data recording format for all aircraft test data. Over the last several years, this standard has become widely accepted by the user community. For the first time, the industry has the ability to select from a broad range of tools to use in supporting their flight test operations.

It is no longer necessary to encode avionics data bus data into PCM format or use a vendor proprietary format.



test community for the first time. Data from multiple buses and multiple bus types can be simultaneously displayed and analyzed while maintaining time correlation between all recorded parameters. The software allows the user to combine data from all parameters to develop and generate displays for a complete view of all aircraft systems.

With the addition of an AIM avionics bus simulator product, the user can produce a physical reconstruction and playback of the avionics bus traffic recorded during the flight, including the exact timing of all bus traffic. This feature can prove itself invaluable in re-creating scenarios that have been encountered in real life flight situations. To fully round out the capability, our software can import sets of parameters and display and/or export the engineering unit converted data.

This feature minimizes the amount of work necessary to quickly view and analyze the data of interest. Once a set of parameters is defined, that data never needs to be entered again.

PBA.pro™ reads and extracts all of the information automatically.



This is where AIM's PBA.pro™, a powerful suite of bus analyser and display tools, shows its value to the flight test engineer. Utilizing enhancements in our software developed under contract from and in collaboration with a major US aircraft manufacturer, AIM now accepts and processes Chapter 10 MIL-STD-1553, ARINC429 and Ethernet data files for playback and analysis. This gives access to the most advanced set of analysis and visualization tools to the flight



The power of AIM has finally been brought to the flight test world, thanks to advances made in recording technology and the adoption of standards. For further information and application support, please contact your local AIM office or nearest Representative office near you.



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AIM-GmbH at the ETC2012 Conference

by Hubert Waldmann

The European Telemetry & Test Conference, 12-14 June 2012, BMW Welt Munich.



etc2012 will spotlight the most recent innovations in methods, systems, and instrumentation from industry, researchers and laboratories all around the world. The European Telemetry and Test Conference will showcase original technical papers and innovative ideas in Test, Telemetry, Telecontrol, Instrumentation and Recording technologies for industrial, automotive, scientific, aerospace, space, naval and military applications.



AIM is very pleased to exhibit at etc2012 and present the latest developments for Avionics Databus and Network Testing. AIM will also support the conference with a technical paper:

- 'Conversion and Post processing of IRIG106 Chapter 10 formatted Recording Data'

This paper is based on AIM's well known and powerful PBA.pro™ Databus Test & Analysis Tool for Windows and Linux.

Don't miss the date to meet us at the BMW Welt, Munich! Please visit www.etc2012.de for further information.

www.aim-online.com