Vol. 18 - Oct. 2011

View

Right on Target

AIM - avionics testing for the future - Today

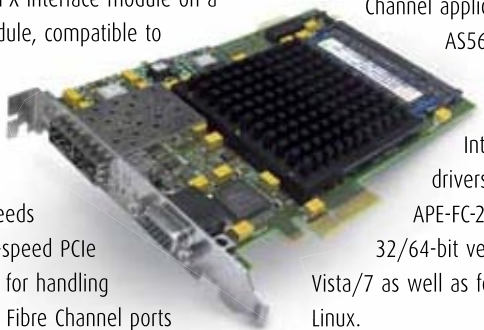## New developments - here comes Fibre Channel APE-FC-2 by Marco Maier

Advanced flexibility with AIM's new Fibre Channel APE-FC-2

The avionic market is rapidly changing and so are the network technologies. Advanced missions demand a high-bandwidth link for flexible usage, supporting multiple protocols running on a single network with high data rates. The Fibre Channel standard is well-suited to offer the flexibility needed for different avionic type applications, such as ARINC818/ FC-AV, High-Speed MIL-STD-1760/ AS5653, FC-AE-1553 or FC-AE-ASM.

To support the latest technology for our customers with their high-bandwidth applications, AIM has developed the APE-FC-2, a 2-Port Fibre Channel Analyser module based on a 4-lane PCIe short-form-factor platform. For common PC systems, AIM is also offering a PCI-X interface module on a PCI short-form-factor module, compatible to the APE-FC-2.

The APE-FC-2 has been developed for 1GFC and will be expanded in future to support link speeds of 2 and 4GFC. The high-speed PCIe bus platform is sufficient for handling two independent Gigabit Fibre Channel ports concurrently. The module is designed to be used with different MSA-compliant SFP modules for optical or electrical interfaces. A 75Ohm coaxial SFP is optionally available for AS5653 (HS-1760) applications. A high-resolution IRIG-B timestamp for incoming and outgoing messages, trigger inputs and outputs and general purpose signals enable the module to inter-operate with other modules in an analyser system.

The large onboard memory of 4GB DDR2-RAM, together with the high bandwidth of the 4-lane PCIe interface, enables the module to monitor and simulate two Fibre Channel ports concurrently. FC-1 and FC-2 level support is fully implemented in programmable firmware and a large customisable FPGA, making the module future-ready for upcoming applications. The operating speed of the 1200MHz Dual-Core-Processor enables the module to operate with minimum host system load. The standard features such as timing measurements and error detection & injection are also available as well as a comprehensive filter and trigger engine with selectable data capture features.

The module is ready to support different Fibre Channel applications – ARINC818/ FC-AV, AS5653, FC-AE-1553, FC-AE-ASM, and others. A full function Application Programming Interface (API) and Software drivers are included with the APE-FC-2 & APX-FC-2 modules for 32/64-bit versions of Windows XP/ Vista/7 as well as for 32/64-bit versions of Linux.

The optional AIM software packages including the PBA.pro™ Databus Test & Analysis Tool enhance the functionality of the module to that of a high-level Avionics Network Analyser.

To see how our Fibre Test Solutions can solve your advanced test, monitoring and simulation applications, please contact your nearest AIM office or a representative.

1989 - 2011 - 22 YEARS
AVIONICS TESTING

A warm welcome to AIM View Vol.18 where we keep you up to date with the latest products and systems solutions to keep you ahead of the avionics test and simulation game!

New product development and product introductions at AIM have been strong this year. We are pleased to have introduced and delivered our new family of PCIe (PCI Express) based products for MIL-STD-1553A/B and ARINC429. These are implemented using our 3rd generation 'Common Core' design. This gives our clients a significant advantage to ensure they have a smooth transition between the generations of the AIM cards and manage any product obsolescence issues. Since we have a fully compatible software interface (API) customers can easily re-use any application specific software. This has been key to our ongoing success and growth and why we have a large and loyal installed customer base world-wide.

With the changing shape of avionics network technologies, particularly in North America, AIM has once more responded with introduction of a high performance, high quality but affordable Fibre Channel test solution. Our PCIe and PCI-X modules coupled with our PBA.pro™ Databus Test and Analysis software offer our clients a stand alone Fibre Channel solution or complimented with any other AIM avionics interfaces (or 3rd party modules) for medium to large test, simulation and monitoring systems. AIM is not new to the Fibre Channel technology and has already delivered PBA.pro™ solutions with Fibre Channel and ARINC818 capabilities.

With the introduction of these new network technologies and rapid introduction of host interface standard and backplanes AIM's goal is to position our clients with the test tools with the necessary performance, quality and reliability to meet these challenges now and into the future. We also realise how important it is to support their legacy databuses/ networks and ensure our product line is current.

We once again take this opportunity to thank you all for your valued contributions to making us what we are today – the market leader and innovator in avionics databus testing and system solutions.

Yours truly,

Douglas Ullah -
Director of Sales & Marketing

The ARINC429 PCI Express has arrived!

by Matthias Mutter

AIM has rolled out a PCIe card based on the 3rd Generation Common Core design for ARINC429. The new and powerful PCIe module - APE429-x - is packed with features to enhance your experience when analysing, testing, simulating and monitoring ARINC429 data buses.

Sixteen programmable ARINC429 channels are integrated with the new design which uses a high speed FPGA with integrated PCI-Express bus (2.5Gb/s rates) and IRIG-B Time Encoder/ Decoder. Autonomous boot up means it is an ideal solution for any and all ARINC429 test applications. Another benefit is the low power consumption due to the very low power ARM processors and the latest FPGA technology.

NEW! PCIe

AIM - APE429-x

4, 8 or 16 channel modules are available: APE429-4/8/16. All channels are software programmable for Receive (Rx) or Transmit (Tx) mode and high/ low bit rates. For the APE429-16 the lower 8 transmit channels provide variable output amplitude, whereas upper 8 transmit channels are of fixed amplitude. APE429-4 and APE429-8 versions provide separate Tx and Rx pins on all channels. Due to the re-use of the PBI (Physical Bus Interface) mezzanine boards of the current APX/ACX429 generation full pin compatibility is given for a smooth transition from PCI/PCI-X to the PCIe form factor. Furthermore the software compatibility on API (Application Programming Interface) level to AIM's family of PCI/ PCI-X, PC/104-Plus, USB, PC-Card/ExpressCard, PMC, cPCI/PXI, VME and VXI ARINC429 cards saves all the investments made into applications for the above

mentioned interfaces and offers easy migration to the new PCIe form factor.

The APE429-x also integrates eight (Avionic Level) General Purpose Discrete I/O (GPIO) signals (accessible through an optional breakout panel) that can be used to generate strobe outputs or to sample external digital inputs as well as hardware in- and outputs.

Common Core Architecture

3rd GENERATION COMMON CORE DESIGN
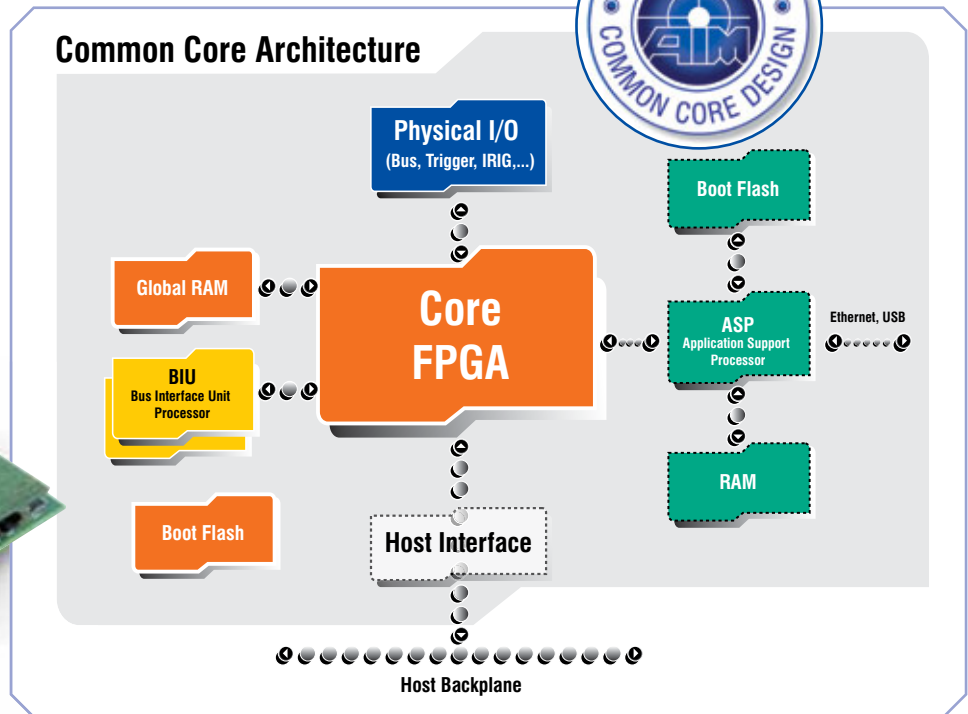
To maximise performance and reliability, a highly integrated design incorporates multiple RISC processors with 128MB of Global RAM and 128MB of ASP RAM. The new design also provides the onboard ASP (Application Support Processor) which

is based on a SOC (System on Chip) hardware device running under Linux OS. This offers a scalable and flexible platform for hosting various onboard applications. An 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 AIM cards.

The Application Programming Interface (API) is bundled into the module price. The driver is compatible with 32/ 64-bit versions of WindowsXP/ Vista/7 and Linux. LabVIEW VIs and LabVIEW RT drivers are included. Host applications can be written in C/C++ or C#. The APE429-x is software compatible with AIM's family of PCI/PCI-X, PC/104-Plus, USB, PC-Card/ExpressCard, PMC, cPCI/ PXI, VME and VXI ARINC429 cards.

The powerful and industry standard PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can also be used in combination with APE429-x cards.
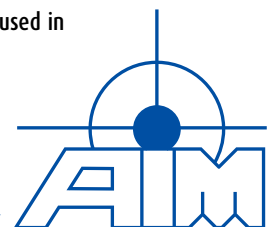
Right on Target

New MIL-STD-1553 PCI Express available Now!

by Frank Scherer

While the parallel databus based PCI standard had been the preferred standard for PCs for several years, new industrial test racks and PCs show a clear trend towards serial databus technology for interface cards.

PCI Express has become the most popular serial high speed interface standard in the PC market and for industrial test racks, hence the introduction of AIM's new and powerful MIL-STD-1553 PCIe module, the APE1553-x. It can be used to analyse, test, simulate and monitor concurrently on up to 4 dual redundant MIL-STD-1553A/B databus streams on a single PCIe card.

The new highly integrated design uses low power RISC processors and a low power high speed

NEW! PCIe
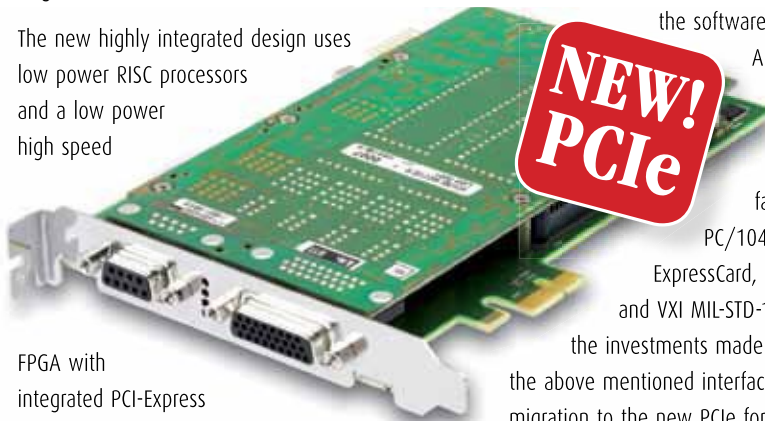
FPGA with integrated PCI-Express bus (2.5Gb/s rates) and IRIG-B Time Encoder/ Decoder. This results in a module power consumption of less than 8W for a four channel module and significantly increases the overall module reliability.

Autonomous boot up makes the APE1553-x an ideal solution for any MIL-STD-1760 embedded test applications.

Full function versions concurrently act as Bus Controller, Multiple Remote Terminals (31), Chronological Bus Monitor/ Mailbox Bus Monitor. Single function or simulator only versions are also available.

Powerful features include full MIL-STD-1553A/B Protocol Error Injection/ Detection (AS4112/ AS4111 Compliant), multi level Triggering and Filtering, Real Time Recording (100% bus loads - all dual redundant channels concurrently) and Physical Bus Replay. The Physical Bus Interface (PBI) provides programmable bus coupling modes and variable output amplitude to the MIL-STD-1553A/B bus. Due to the re-use of the PBI mezzanine boards of the current APX/ACX1553 generation full pin compatibility is given for a smooth transition from PCI/PCI-X to the PCIe form factor. Furthermore the software compatibility on API (Application Programming Interface) level to AIM's family of PCI/PCI-X, PC/104-Plus, USB, PC-Card/ ExpressCard, PMC, cPCI/PXI, VME and VXI MIL-STD-1553 cards saves all the investments made into applications for the above mentioned interfaces and offers easy migration to the new PCIe form factor.

The APE1553-x also integrates eight (Avionic Level) General Purpose Discrete I/O (GPIO) signals that can be used to generate strobe outputs or to sample external digital inputs.

The new hardware design incorporates multiple RISC processors with 128MB of Global RAM and 128MB of ASP RAM. The new design also provides the onboard ASP (Application Support Processor) which is based on a SOC (System on Chip) hardware device running under Linux OS. This offers a scalable and flexible platform for hosting various onboard applications. An 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 AIM cards.

The Application Programming Interface (API) is bundled into the module price. The driver is compatible with 32/ 64-bit versions of WindowsXP/ Vista/7 and Linux. LabVIEW VIs and LabVIEW RT drivers are included.

Host applications can be written in C/C++ or C#. The APE1553-x is software compatible with AIM's family of PCI/PCI-X, PC/104-Plus, USB, PC-Card/ExpressCard, PMC, cPCI/PXI, VME and VXI MIL-STD-1553 cards.

The powerful and industry standard PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can also be used in combination with APE1553-x cards.

Th optional PBA.pro-SCR-PTP-P (SAE AS4112 Protocol Tests) and PBA.pro-SCR-VTP-P (SAE AS4111 Protocol Tests) scripts support all required Protocol Tests in accordance to the SAE AS4112 RT Production and SAE AS4111 RT Validation Test Plan.

In the future the unique and powerful MILScope (MIL-STD-1553 A/B waveform analysis) capability will be also offered with the APE1553-DS-1/2 variants.

A Long Story Short! AIM's Success in the AGE Business
by Manfred Steinke and Diemo Jogwitz

The acronym AGE stands for Aircraft Ground Equipment and at AIM it relates to a robust and rugged Databus Tester for a military aircraft program. The AGE Databus Tester is part of an overall Test Set with aircraft interconnection cables to provide access to each of the on-aircraft data buses according to STANAG3838 (MIL-STD-1553B Bus) and STANAG3910 (Fibre Optic Bus).

All messages conveyed over these databus types can be monitored, analysed and recorded or stimulated to each of the multiple aircraft systems. The aircraft specific parameter data base (ICD) can be imported and interpreted by the AGE Databus Tester to uplift the data message handling based on real world engineering units and graphical displays.

The AGE is built using a fully sealed PC based workstation sufficient for on-aircraft testing and maintenance. Since the AGE Databus Test Sets are operated by the air forces on the flight line in some case with no shelters, it is qualified for operation in extreme environmental conditions according to MIL-STD-810F with approved Electromagnetic Compatibility (EMC) according to EN 55022 and released for operation for potentially explosive atmosphere according to ATEX 94/9/EC. An extensive safety verification and proof of on-aircraft compatibility are pre-conditions which we have performed successfully to get certified for on-aircraft use.

AIM's 1st Generation of AGE Databus Tester was introduced in 2003 based on a Pentium-II PC Workstation supplied by DRS Technology in the UK. It was equipped with one STANAG3910 FO bus interface and one MIL-STD-1553B bus interface in

6U CompactPCI format running Windows-NT. The GUI (Graphical User Interface) was based on the powerful PBA-3910/ParaView Databus Analyser/Visualiser software. The total weight of the over-all Test Set packed in its transit case was 86kg.

The 2nd Generation of AIM's AGE Databus Tester was introduced in 2008 based on a Pentium-M PC Workstation supplied by BELTRONIC in Germany. This unit integrated significant more bus interfaces and was equipped with two STANAG3910 FO Bus interfaces and four MIL-STD-1553B bus interfaces designed using the PCI format running Windows-XP with the PBA-3910/ParaView GUI. The total weight of the over-all Test Set packed in its transit case was 55kg.

AIM is now fully engaged to present **the 3rd Generation of AGE Databus Tester** based on a Core2Duo PC Workstation supplied by GRiD Defence Systems in the UK. It is equipped with two STANAG3910/ EFEX FO Bus interfaces and four MIL-STD-1553B bus interfaces this time in a PCI/ PCI-X format running Windows-7. The GUI is now based on AIM's new generation and the formidable PBA.pro™ Databus Test and Analysis Software. This cutting-edge implementation of an on-aircraft Databus Tester represents a truly open architecture providing a modular and scalable hardware and software approach with the flexibility to customise the PBA.pro™ based GUI for user specific requirements and applications. The unit is being qualified as before in a rugged AGE Databus unit certified for on-aircraft operation in an unsheltered environment. An external and sealed IR-Mouse eases cursor control and a sun hood improves display readability in bright light.

An external Power Brick makes the workstation compatible to most mains power supplies. The total weight of the over-all Test Set is 50kg.

In addition to the Avionics Databus interfaces, the AGE Databus Tester workstation also provides

commercial interfaces via a sealed circular connector for GigaBit-Ethernet, USB-2.0, RS232 ComPort and programmable Discretes I/O. The hardware design contains growth potential for incorporation of any type of a third party PCI/ PCI-X interface module. Significant improvements for the customers are provided by the 3rd AGE Databus Tester Generation including a large 19" TFT display, a removable SATA/ SSD hard disk and built-in UPS and battery.

Similar to the open hardware architecture, the PBA.pro™ databus analyser software provides modularity and flexibility which makes the AGE scalable/ adjustable for customer's needs and applications by offering full Databus Protocol Analysis, Payload Data Visualisation and Automation capabilities.

This extensive 8 year experience with 3 generations of AGE Databus Testers has positioned AIM as an established and recognised supplier to solve the toughest AGE requirements.

The synergy of the upgraded AGE hardware and the integration of the next generation AIM's analyser software PBA.pro™ has created an AGE Databus Tester with exceptional functional features, simplified GUI, inherent growth potential and future supportability for both the hardware and software. The ability to create test scripts, automatic test routines and emulate real aircraft displays will allow the operators to work quickly and easily interact with the aircraft and system under test in a way never possible before!

# PBA.pro Updates: Even more exciting features:

The latest release of the PBA.pro™ (V02.35) comes with lots of new and interesting improvements and features to simplify your work and increase efficiency!

Visualising parameters in engineering units with V02.35 enables the user to add and define parameters from the resource raw data buffer level such as a MIL-STD-1553 buffer, ARINC429 label or AFDX message 'on the fly' with just one mouse click.

A pre-configured database can be used to setup and prepare a resource and its data buffer automatically without the need for an explicit interaction in the resource tree.

The Bus Monitor (BM) which records any bus traffic has been revised to a new, single, structured and easy to use BM recording display containing all recorded and loaded streams and event markers of the resource with the possibility to:

- Perform and display online filtering of bus traffic during recording
- Get additional information of the recorded traffic
- Create a graphical Time Plot of selected parameters from a recording
- Add parameters as additional columns via drag and drop

The Assign display comes with 'tab support' for a more organised arrangement of displayed information. A parameter alarm or condition can be configured and displayed and added to a separate alarm window which will automatically pop up if the first alarm condition is added and becomes active.
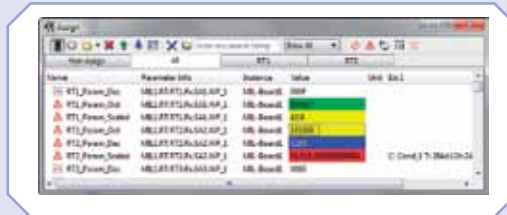
AIM has also introduced a so called 'System States' capability providing comparable functions to a state machine. Just define your predefined states and configuration options which can be executed fully automated or on demand via one mouse click.
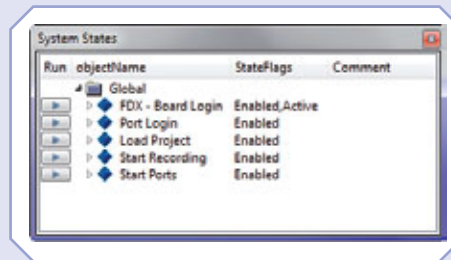
A state is defined as any action like loading a project or designer template file, execution of a script, setting one or multiple properties or calling slots of any object can be used.

The Designer component has been extended to provide additional displays for visualisation and control of information and data:

- A new set of utility widgets - select an object open/ load or even switch between existing displays on the fly without using any scripting
- Moving Map display - enables the user to display a moving target with its coordinates on a moving map

- Widgets for visualisation of parameter values
- Enhanced Time Plots
- Bar Graphs
- Pie Charts

For scripting users the latest PBA.pro™ provides handy new features too:

- Auto code completion of the built in script command Script Line - showing auto complete e.g. properties or slots of a specified object
- Multiline Text Edit
- Simple browser window to display/ get information of all currently available python items
- Unicode support
- Support of Python 2.7
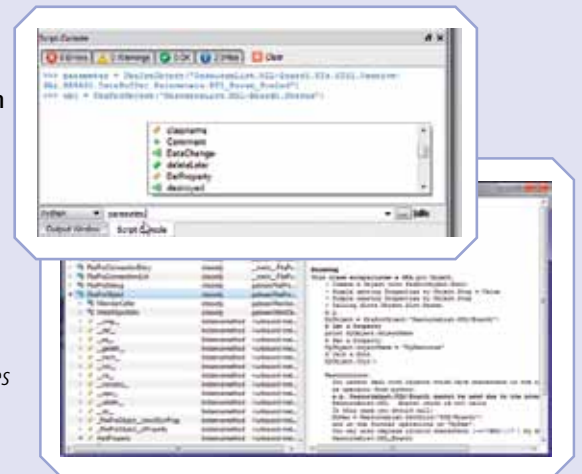
For registered users the latest version PBA.pro™ V02.35 is available now for free download and update from the powerful AIM website download area!
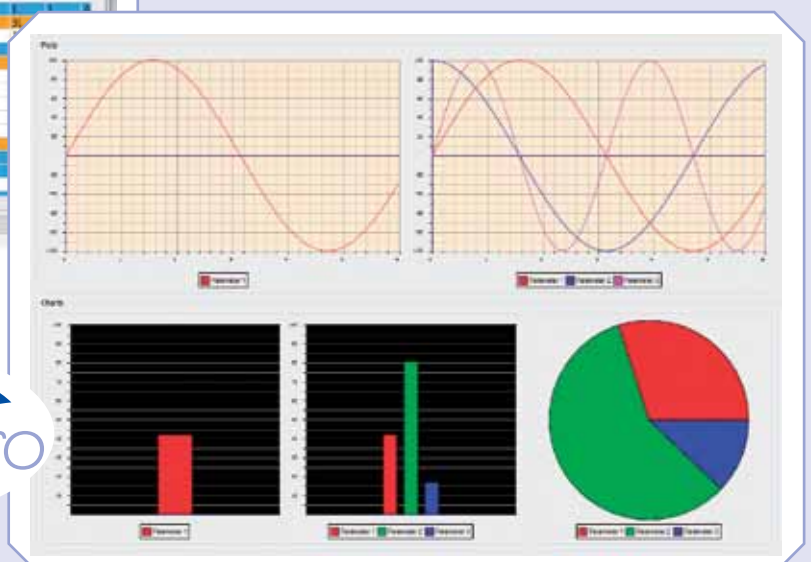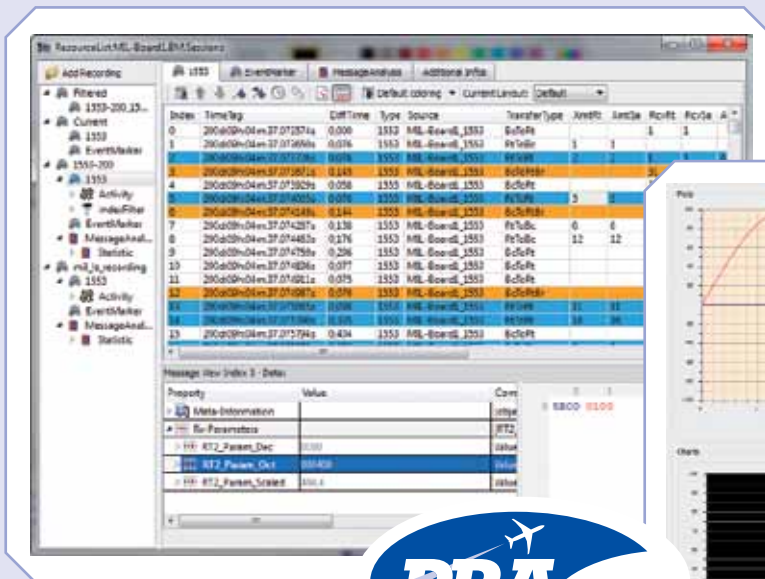
AIM-USA - moves into its 2nd year by Bill Wargo

This has been an exciting first year for AIM-USA. We have already established a solid reputation with the customer base of AIM products by being responsive to any customer need and providing on-time delivery of our products at a fair price. We continue to build new relationships as we work with the engineers who use our products and help them develop innovative solutions to their test and simulation needs. This next year promises to be even better, with a top-notch team and new products in place.

AIM-USA has become known not only for supplying board and box level products, but also for providing customized systems and engineering development. We have supplied a number of these systems to Boeing Defense, Boeing Commercial, Boeing Satellite and Northrop Grumman.

These systems support multiple avionics databuses and provide functions ranging from analysis/ testing to real-time data visualization in the air as well as post-flight analysis.

Our latest project is to import IRIG-106 Chapter 10 data directly from a recorded data file into our PBA.pro™ software, which allows telemetry users to automatically use all of the advanced analysis features of our software.

AIM continues to introduce new products at a rapid pace, to assure that we provide solutions for the latest platforms.

The company has introduced a complete line of PCI Express products in recent months to support MIL-STD-1553 and ARINC429. A Fibre Channel product is slated for release this fall (see detailed articles in this issue).

The AIM-USA technical team is here to answer your questions and provide application support with direct contact to the hardware and software engineering teams.

Please be sure to visit us in Booth 227 at the International Telemetering Conference at Bally's Hotel in Las Vegas. The conference runs from October 24th-27th, 2011. We will have our latest product offerings on display and will have technical personnel from the engineering teams available to answer any questions and to give product demonstrations. **Hope to see you there!**
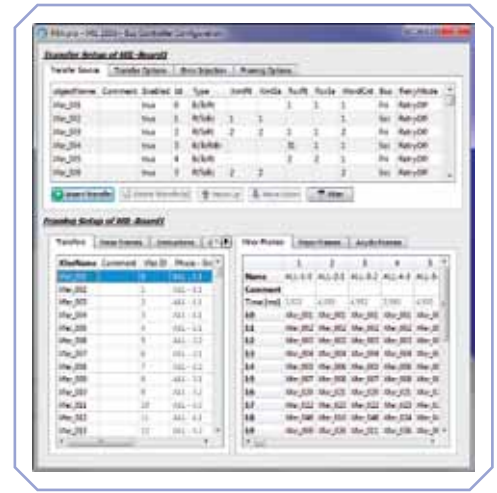
PBApro™ Light
by Andreas Küchlin
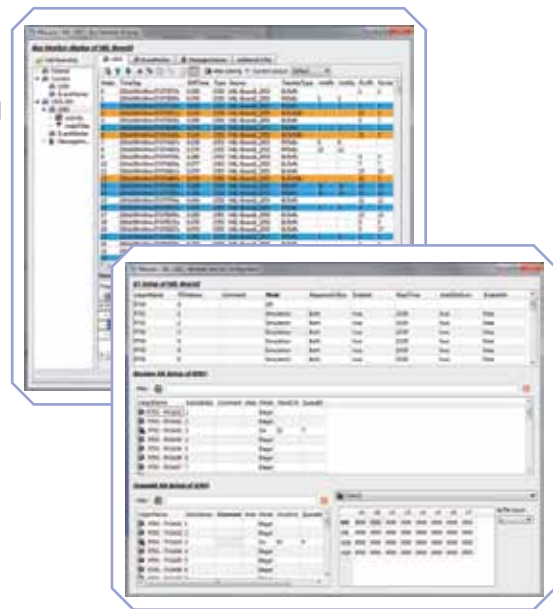
Click-and-Go PBA.pro™ (simple analyser features)

As the name implies the PBA.pro™ Light is a reduced function option for the PBA.pro™. The 'cut back' version has been deployed to realise simple or reduced application and system needs. Pre-configured displays and scripts are offered to visualise and control the essential information and data of interest providing only a subset of the full PBA.pro™ functionality.

The PBA.pro™ Light is the simple to use, quick and easy, one click solution covering many typical user cases with the underlying core features of the PBA.pro™. Upgrades to the full PBA.pro™ functionality is possible at any time.

The main features of the PBA.pro™ Light include:

- *One click solution solves typical user cases like:*
  - *Basic Resource resp. Interface Board setup*
  - *Basic Resource resp. Interface Board control*
  - *Data Monitoring and Recording*
  - *Data Replay*
  - *Data Visualisation*
- *No in depth PBA.pro™ knowledge needed for fast and effective solutions*
- *Performance remains the same - reduced function set only*
- *Look and feel of the displays just like the PBA.pro™ full version for an easy upgrade to the full version*
- *Can be further customised*
- *Upgrade to full version available*