View

the Newsletter of AIM GmbH

Right on Target

AIM - avionics testing for the future - Today

New developments - The very latest 3rd generation Aircraft Ground Equipment - by Diemo Jogwitz

Well Qualified - AGE for ALL!

The very latest Aircraft Ground Equipment was designed and developed for on-aircraft simulation, test, analysis, monitoring, recording and replay of data communication for the STANAG3910/ EFEX and STANAG3838/ MIL-STD-1553B for the EUROFIGHTER 'Typhoon' aircraft databuses.

Based on the AIM systems philosophy, the design was a result of combining the customer specific requirements, AIM's product portfolio, the required environmental conditions and commercially available components.

State of the Art Hardware

The entire AGE test equipment comprises a controller workstation, having an external mains power brick, various accessories, a set of aircraft interconnection cables and a suite of system software. The workstation forms the central controller unit operating multiple aircraft databus physical interfaces and hosting a removable solid state disk for processing the system software.

The key hardware feature set of this AGE unit is:

- *2x STANAG3910/ EFEX plus 4x MIL-STD-1553 provided by AIM APX interface boards for operation on six parallel databuses*
- *State-of-the-art technology 19" display, solid state disk, Windows7 operating system*
- *Full compatibility to already existing expensive aircraft interconnection cable set*

The new design Laptop-like hardware platform includes quite an extensive customer wish-list, making the daily work more efficient, reliable and

AIM - Aircraft Ground Equipment

ergonomic and even more exciting!
In addition to the multiple aircraft interconnections, this workstation is equipped with a very flexible and fully qualified solution for sealed USB, Ethernet, RS-232 connections with spare potential for future upgrades without affecting the qualification.
To perform the development within reasonable costs and time, the hardware was based on the commercially available GRiDCASE 1595 rugged workstation.
This unit had already been certified for flight-line use and service supporting several military projects like the UK Hawk-, Tornado - and the now retired Harrier programme.
AIM has established a new successful partnership with GRiD Defence Systems and appreciated very much their expertise and support on this successful project (www.griduk.com)

continues overleaf:

Welcome to our latest edition of AIM View where we keep you updated and informed as to our very latest product introductions to keep you synchronised with the fast changing avionics databus testing environments.

Noticeably, several new avionics projects are demanding powerful but cost effective test tools for Fibre Channel applications. We at AIM have made some major investments and integrated our FC cards with the PBA.pro™ Databus Test and Analysis Software for Windows and Linux. This offers avionics engineers the ability to uniquely simulate, monitor, record and analyse any number of FC, MIL-STD-1553, ARINC429, ARINC825 (CAN Bus), and AFDX/ARINC664P7 databuses/ networks concurrently within one test system!

Leveraging the latest Common Core Architecture (3rd generation) we will introduce at this years ITC show in San Diego our Ethernet based interface solutions for MIL-STD-1553. These products give our customers the flexibility to simulate and monitor the MIL-STD-1553 bus via Ethernet utilising our popular, de-facto industry standard, PBA.pro™ or to use their own application based on our standard API's. The unrivalled, advanced hardware and software design concept promises further exciting performance extensions in the future.

In this issue you will also read a feature written by our in-house Aircraft Ground Equipment (AGE) Specialist, Diemo Jogwitz. Our 3rd generation AGE solutions are specifically designed for on aircraft testing of aircraft or helicopters which now integrate a highly modular, scalable, flexible and open approach.

As we continue to invest in the design and manufacture of high quality avionics databus solutions we welcome your feedback and comments to help us shape the future of testing solutions to better serve you, our valued customers!

Yours truly,
**Douglas Ullah -
Director of Sales & Marketing**

1989 - 2012 - 23 YEARS AVIONICS TESTING

Well Qualified - AGE for ALL!

continued from front cover:

Latest PBA.pro™ Software

On the software side, the new Aircraft Ground Equipment uses AIM's latest and Industry standard PBA.pro™ Databus Test and Analysis Software.
To easily support the customers' migration from the existing PBA/ ParaView Software used on previous generation AGE, several new and exciting PBA.pro™ enhancements have been introduced such as:

- *Improvements to the User Administration Component, giving the customer the tool to fulfil local IT-security regulations*

- *Improvements to the Test and Script Manager to import all existing PBA/ ParaView setups currently in use for daily in-service activities at the customers site*

- *Automatic and on-the-fly EFA/ EFEX switching capability*

- *Self-Test Scripts to provide a simple to use GO/ NO-GO tester aligned to the customers' acceptance test procedure:*

- *Improvements to the Designer Component enabling the customer to create his/ her own library of powerful aircraft specific widgets:*

Fully Rugged & Qualified Hardware:

There are several rugged PC platforms available on commercial market. To explain, why Aircraft Ground Equipment is the summit of rugged equipment, here are some pictures of the qualification campaign:

- *Vibrations up to 20g*

- *Temperature up to 50°C whilst equatorial sun radiation or up to 100% humidity*

- *Had to be buried under sand and dust*

- *Exposed to rain*

- *Extensive EMC tests*

The new Aerospace Ground Equipment passed all tests and has successfully passed the on-aircraft compatibility test.

For more information with respect to the qualification Tests please contact us directly at AIM.

AIM is pleased to present the new 3rd Generation AGE - fully qualified Aerospace Ground Equipment - available today to meet your toughest mission needs!
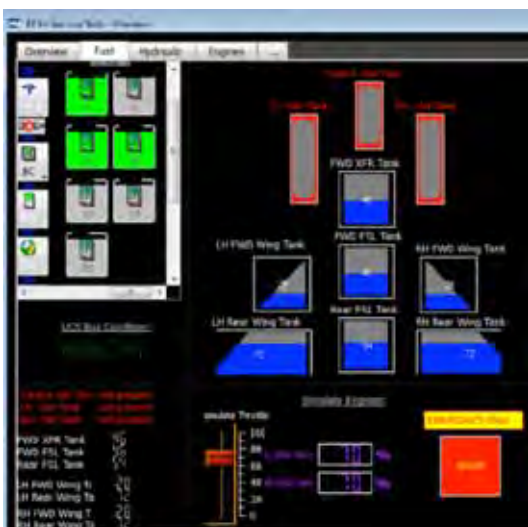

Not only for EUROFIGHTER!

With the qualification for EUROFIGHTER 'Typhoon' aircraft, our platform has proven in almost the worst-case scenario because of the very specific and sophisticated STANAG3910/ EFEX interfaces coupled with the demanding EUROFIGHTER qualification requirements.

However the APX3910 and MIL-STD-1553 interfaces can be simply replaced by any AIM PCI bus interface card for ARINC429, AFDX/ ARINC664P7, ARINC825, Fibre Channel or Panavia for customisation to any other Aircraft (or other Aerospace) applications.

Also available is the potential of sealed and qualified commercial interfaces: RS-232, RS-422, USB, Ethernet or Discretes!

On the other hand, this platform was also designed to match our PBA.pro™ philosophy to be **modular, flexible and open,** therefore PBA.pro™ resource components for other I/F's than the initial ones for the Eurofighter application are available, which can offer - together with further application specific scripting - an efficient customisation to other programs in line with the hardware flexibility.

The above outlined 3rd generation of Aircraft Ground Equipment is the PC-System-Platform for all current and future on-aircraft activities, using AIMs product portfolio and likely matching your aircraft!

Fibre Channel Component - bringing PBA.pro™ to the Fibre Channel World

by Roland Fuchs/ Marco Maier

AIM has introduced some new and exciting Fibre Channel products, where AIM's family of Fibre Channel PCI-Express interface modules meets the industry standard Databus Test and Analysis Software PBA.pro™. The combination of the AIM hardware and software offers a powerful and flexible way of concurrently simulating, testing, and monitoring Fibre Channel data interactively or by using scripts for complete automation.

The PBA.pro™ Fibre Channel Resource Component is designed to troubleshoot, optimise, plan and configure Fibre Channel Networks whilst bringing the advanced capabilities of the PBA.pro™ to the Fibre Channel world. Its low-level (FC2-frame based) and upper layer protocol analysis features work by capturing, filtering and interpreting network traffic and analysing the captured data as an input for several advanced statistics. As the component can generate Fibre Channel traffic in various modes, it is well suited for testing Fibre Channel devices and switches. The software provides a means to alert engineers quickly to potential performance, configuration and physical problems and identify and resolve any problematic network condition. The PBA.pro™ Fibre Channel Resource Component supports two basic operational modes. While the NPort mode supports simulation and testing of Fibre Channel devices in a Switched Fabric or Point to Point Topology, TAP mode is used to passively monitor and forward all Fibre Channel frames through the two ports of the AIM Fibre Channel interface module at the Hardware Level with a very

insignificant latency. The PBA.pro™ Fibre Channel Resource Component reuses well-proven concepts of the PBA.pro AFDX/ ARINC664P7-Component and refines them further. The Login mechanism is used to avoid resource conflicts and the Event-Log collects all relevant information or warnings of one Port put in a clear table along with a timestamp for each message.

The PBA.pro™ features handling of multiple interface types like MIL-STD-1553, AFDX/ ARINC664P7, etc. with a single User Interface, User Defined Display capabilities, Scripting and Remote Control. With the incorporation of Fibre Channel into PBA.pro™ we offer a Software platform fit for the latest development programs as well as legacy communication technology. The time tagging of Fibre Channel data is handled on the hardware interface level and the resolution of the IRIG-B time has been increased to nanoseconds ensuring accurate time-stamping for all Gigabit Fibre Channel frames. The IRIG-B time signal can be generated internally or received externally with the board IRIG Time or any other IRIG Time-source being used to synchronise multiple devices.

The step by step Getting Started guide educates new users with detailed descriptions and sample project files and scripts to easily take full advantage of all the powerful functions and features within PBA.pro™.

To get a quick overview of the current network load, the Runtime-Info provides several live counters and can detect 14 different error-types upon reception. Fibre Channel primitive signals and normal frames are covered by different counters

with all frames received being classified by their frame size. Thanks to the generic PBA.pro™ framework all counters can be visualised in various virtual instruments, time plots or basically any user defined displays!

For traffic generation the Generic Send Mode provides maximum flexibility. This mode operates a frame based transmission sequencer. Each frame provides setup of the relative timing between the frames, error injection and special events like a digital output strobe-signal. The SOF and EOF Delimiters can be controlled and every byte of the frame, including the FC-2 Header, can be modified by the user. With the Acyclic Send function, packets can be sent only once either interactively or by script. If a database is configured via the PBA.pro™ Database Manager (see below) parameters can be used to control Fibre Channel frame data (including-header) by using engineering units. All defaults and the payload values for a new generic frame can be customised and defined in the PBA.pro™ settings.

The Bus Monitor provides powerful capturing and full decoding of the FC-2 Header and all standard PBA.pro™ features like the Message View, Stream Scanners or user defined filters and triggers. All data within a Fibre Channel frame is displayed in engineering units or native raw formats. Multiple capture files can be merged based on the timestamp and exported to various file formats (csv, mysql, pdf, etc.). Each received Fibre Channel frame is accessible from a script. A script procedure can therefore be used to evaluate or even interpret a frame and display the information as an additional column in the chronological display, such that special protocols can be handled in a very flexible way.

Having a look to the PBA.pro™ Database support, the PBA.pro™ Fibre Channel Resource Component introduces a very flexible and new concept to organise parameters associated with Fibre Channel frame data and the payload.

Together with the powerful built-in-parameter
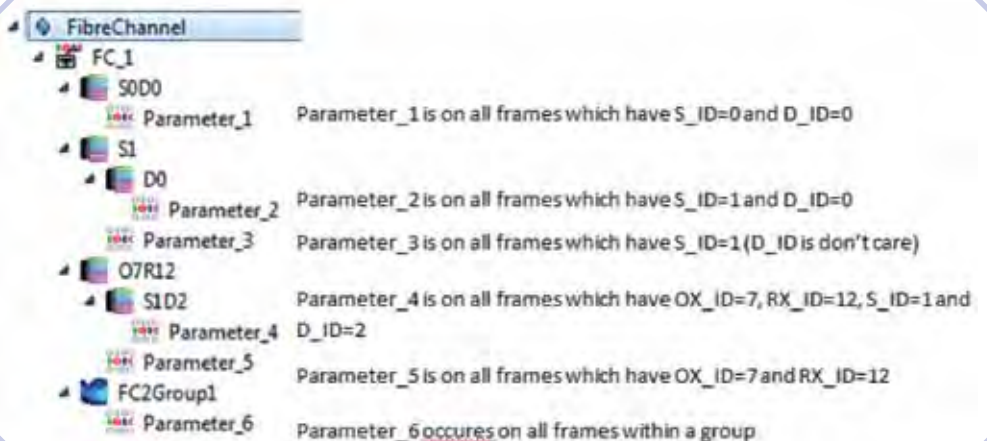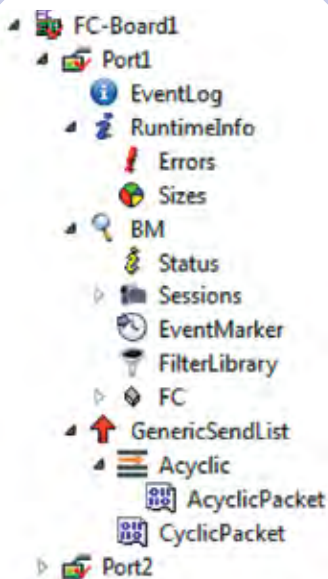
condition feature, the Parameter Database is well prepared to reproduce complex upper layer protocols.

Depending on the capabilities of the hardware interface with respect to the supported Upper Layer Protocols (ULP), the PBA.pro™ provides further protocol specific features like File Transfer for RDMA or Picture/ Frame grabber and generator functionality to support ARINC818.

Taking a look at the different Fibre Channel layers,

the ULPs are sat on top of the Fibre Channel layer model. The PBA.pro™ as well as the AIM Fibre Channel PCI-Express interface APE-FC-2 modules provide flexible ways to simulate, control and monitor data on the ULP and FC-2 layer.

Similar to the OSI model for Ethernet, Fibre Channel has its own communication layer model, which defines services and protocol specific functions to establish a successful communication. For example,

the ULP is the main application and defines application specific protocols like RDMA, ARINC818/ FC-AV, FC-AE-ASM or FC-AE-1553. Below this Fibre Channel defines the layers FC-4 down to FC-0. The lower the layer, the closer to hardware related functions.

Moving away from PBA.pro™ and taking a look at its underlying software and hardware layers, many features of the PBA.pro™ are dependent on the core backbone of the APE-FC-2 hardware.

Starting with the Application Programming Interface (API), the APE-FC-2 supports a flexible way to access the Fibre Channel Network and all its features. Therefore, any user can use the Fibre Channel API on WINDOWS and LINUX to program his/ her application software for special requirements. The API offers functions to setup, control and analyse raw data on the lowest FC-2 layer as well as optional API calls which are special to ULPs. The above-mentioned TAP functionality is also implemented on board-level, hence the Fibre Channel board can be plugged into a Fibre Channel Network link for monitoring, analysing and debugging without disturbing the normal behaviour of the attached FC ports.

The interfaces to the Fibre Channel Network are implemented on the APE-FC-2 in a Field Programmable Gate Array. This FPGA contains all necessary decoder and encoder logic, plus complex DMA machines and timing control units. With an

appropriate setup, the FPGA can operate almost entirely without CPU interaction. For example, it can load autonomous the sender data and store receiver data when having been fully received. It is connected over a powerful internal PCIe link to the onboard Dual-Core Processor. The real time Software running on the two cores is responsible for the protocol analysis, flow control management, and

AIM-APE-FC2
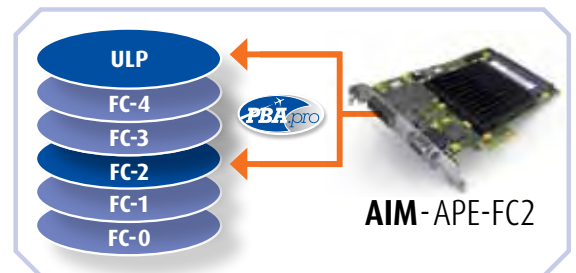
provides assisting functionality for both the host application software and the FPGA. It represents the interface between the higher level software running on the host and the low level hardware interfaces to the Fibre Channel Network.

Offering a total of 4GB RAM, the APE-FC-2 hardware has enough resources to set up and analyse complex applications. With its 2-port 1GFC interface, the APE-FC-2 offers all resources to operate in almost all ULP. The flexible SFP front-end offers a media-independent way to connect to the user's application. All of the hardware communicates to the host system over a 4-lane PCIe bus capable of handling all receiver and transmitter data in real time.

For more information or a product demonstration, please contact your local AIM sales office or a Representative near you!

STANAG3910 NEWS

Support for Electrical Front End (Rafale) for AIM STANAG3910 Modules - by Frank Scherer

AIM has developed a new Physical Bus Interface (PBI) variant for use with its standard STANAG3910 platform types to support the electrical implementation of STANAG3910 for Rafale. Frank Scherer, Product Manager for STANAG3910 and MIL-STD-1553 products, explains: "We only replaced the Fibre Optic Transceiver for Eurofighter with the electrical STANAG3910 Transceiver for Rafale. The rest of the hardware design remains unchanged."

The big advantage of this approach is that the electrical STANAG3910 Front End for Rafale can now be offered across all AIM STANAG3910 standard platforms (APX3910, ACX3910-3U, ACX3910-6U,

AVX3910, etc.), formerly only targeted to Eurofighter STANAG3910 Test and Simulation applications. For these Rafale specific test and simulation modules, a new part number with the extension –EN was created. Examples: APX3910-EN, ACX3910-3U-1-EN, ACX3910-6U-1-EN, AVX3910-2-EN. A new breakout-cable (ACB3910-EN) provides the electrical signals on two BNC connectors for TX and RX. The MIL-STD-1553, Trigger In/Out and IRIG signals are still provided on the D-SUB15 frontend-connector.

New! APE3910
STANAG3910 platform with PCIe-Interface based on the APX3910

AIM's new PCI Express platform APE3910 is based on the well-known APX3910 for PCI/ PCI-X. For 100% compatibility with the existing APX3910 module, only the HOST interface was replaced to support PCIe, the rest of the hardware design

(i.e. digital core with the processors, MIL-STD-1553 interface, Trigger-I/O, etc.) is identical across both platforms. This means the effort for migrating existing customer applications from PCI/ PCI-X to PCIe is kept to a minimum, much appreciated by our large and loyal STANAG3910 customers!
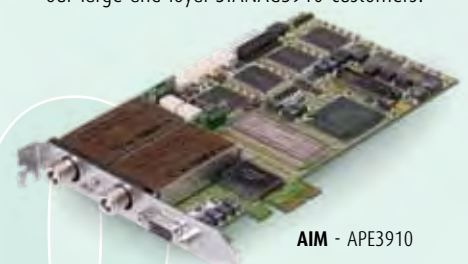
AIM - APE3910

Also available: Variants with onboard Electrical Front End and specific firmware for Rafale (APE3910-EN).

Please contact your local AIM sales office or Representative to get further details or download the data sheet from our web site www.aim-online.com

PCI Express based XMC-Mezzanine Module AXC1553-1T/-2T targeted to MIL-STD-1553 test & simulation applications
by Frank Scherer

AIM has developed a new XMC module based on the ever-popular PMC form factor known commercially as the AXC1553-nT.

Whilst the AXC1553-x (XMC module introduced back in April 2011) has a fixed output amplitude/ coupling targeted at embedded applications, the new AXC1553-nT module has programmable coupling modes (isolated, direct, transformer) and variable output amplitude targeted at test and simulation applications to a single BC or RT device, a very useful feature for the bench testing!

The modules take full advantage of the PCI Express standard providing data rates up to 2.5Gb/s. Up to two independent MIL-STD-1553 streams can operate concurrently at full bus bandwidth on a
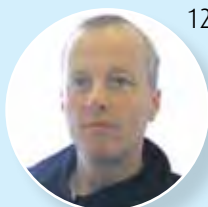
128MB onboard RAM, a high speed FPGA with integrated PCI-Express interface and a time code microcontroller combined with two high performance RISC processors.

The AXC1553-nT concurrently acts as Bus Controller, Multiple Remote Terminals (31) and Chronological/ Mailbox Bus Monitor. Versions with a reduced set of functionality (Single Function or Simulator Only) are also available.

Options for extended temperature range (-40°C to +85°C), conformal coating and rear I/O are available. The carrier connection over the two high-speed XMC connectors (one for PCI-Express and one

for Rear-I/O) can be extended with an optional PMC connector compliant with PMC Rear-I/O.

Programming Interface (API) is included in the module price. The driver is compatible with 32-bit/ 64-bit versions of Windows XP/Vista/7, Linux and Real Time or embedded operating systems such as VxWorks. Host applications can be written in C/ C++ or C#. LabVIEW VI's are included.

The formidable and industry standard PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can also be used in combination with AXC1553-nT cards.

Please contact your local AIM sales office or Representative to see how the AXC1553-nT can support your MIL-STD-1553 applications.

single AXC1553-nT module.

The AXC1553-nT is designed to be installed on either a host carrier board (adapted to buses like standard PCIe, VME/VPX or cPCIe) or on 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 AXC1553-nT cards.

For the maximum in performance and reliability, unique hardware features include

In addition to the MIL-STD-1553 capabilities, up to eight General Purpose Discrete I/O signals and separate Trigger-I/O are provided.

For users to easily connect and write their own applications a full function Application
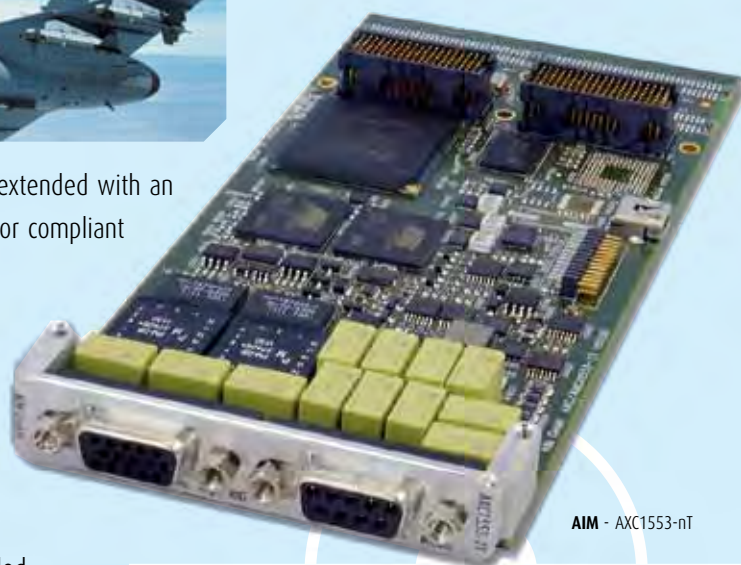
AIM - AXC1553-nT

Data takes the Ether Now!
by Jo Schuler

First Ethernet based interfaces for MIL-STD-1553 will be launched at the International Telemetering Conference in San Diego end of October. After the successful introduction of USB based products some years ago, interfaces with an Ethernet host connection will become available. The underlying hardware concept for these interfaces is the core design of the PCIe based board generation, which has been outlined in various previous issues of the AIM View, especially in Vol.19 where the Ethernet capability has already been described in conjunction with the user programming of the Application Support Processor (ASP) of this core design. The LINUX powered ASP with the Ethernet interface now executes the AIM Network Server (ANS) which allows user applications to employ such an Ethernet interface via the standard API which is basically known and applicable to all AIM interfaces. At initialization time of the API, simply the configured IP address of the interface is given as an additional parameter, then the API functions can be applied like working with a 'local' interface. Not to miss, that of course AIM`s PBA.pro™ will fully support these interfaces.

Due to the flexible S/W architecture with the onboard LINUX, the above described interface type - controlled via the standard API - is only one variant of further product derivatives, based on a common hardware platform. A second product variant will be shown at the International Telemetering Conference as well, featuring an 'embedded' PBA.pro™ executed on the ASP of the interface box. This embedded PBA.pro™ is then driven via the open PBA.pro™ remote control interface over Ethernet. As a special feature, the also available general purpose USB port of the interface box will drive

a COTS USB Wi-Fi stick in order to offer a wireless access. Not too far away with such a flexible S/W concept are Web based applications which may allow usage from any host with browser capability. So the flexible S/W and H/W capabilities of the new AIM Ethernet based interfaces point to new directions and contexts for the usage of interfaces to avionics data buses by addressing today`s means and methods.
So visit us at the International Telemetering Conference in San Diego or contact your local AIM Representative for further information or a Demo.

AIM - APE1553-x

AXC series of XMC modules to fill this need. On the databus interface side, the maturation of Fibre Channel and its protocol standards continue to push the envelope in terms of speed and

AIM-USA Carrying on the Pioneering Spirit by Bill Wargo

As AIM-USA's Philadelphia based, direct operation enters its third year, it is interesting to note the advancements that have been made in the AIM product portfolio in such a short time period. Driven by advances in technology and customer demands for higher performance systems, these last few years have seen the introduction of new product families that can analyze, simulate and monitor databuses at very high speeds and with powerful, but easy to use, tools. The interfaces to both the databuses and the host computers are continuing to evolve with the emphasis on higher data throughputs. AIM is once again leading the pack and keeping pace with these demands by developing for the 'next generation'.

The adoption of the PCI express (PCIe) bus standard among PC manufacturers has been happening at a rapid pace. Developers are anxious to take advantage of the performance improvements that PCIe offers and have been demanding products with this interface. AIM has responded and now offers a full line of APE products for this backplane, which includes MIL-STD-1553, ARINC429, STANAG3910/ EFEX and Fibre Channel. Likewise, users of mezzanine cards have the same requirement and AIM has introduced

performance. Data rates of four Gbps are becoming common. Again, AIM has developed a new generation architecture to meet these demands, with its Fibre Channel product line, which supports all popular protocols including the new video standard ARINC818.

AIM - AXC429

AIM-USA will be displaying its complete product line including the new offerings mentioned above at the International Telemetering Conference in San Diego, CA, which runs from October 22nd to the 25th at the Town & Country Resort and Convention Center. We will have applications engineers available and will be performing live demonstrations of our board and system level products, as well as our innovative PBA.pro™ software that supports all of our products and functions.

One highlight of the International Telemetering Conference will be the product launch of AIM's new Ethernet based interfaces in conjunction with a demonstration of a mobile wireless bus analyser concept based on an embedded PBA.pro™ 'in the box' (see the other article on this issue). **Hope to see you there!**

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