

# ACX3910-3U-1



**Single Stream  
STANAG3910/ EFEX  
Test & Simulation Module for  
CompactPCI/ PXI (3U)**



General Features

The ACX3910-3U-1 is a member of AIM's new fourth generation family of advanced cPCI/ PXI (3U) bus modules for analysing, simulating, monitoring and testing STANAG3910/ EFEX databuses. The ACX3910-3U-1 module concurrently acts as the Bus Controller, Multiple Remote Terminals (31) and Chronological/ Mailbox Bus Monitor.

The ACX3910-3U-1 provides one fully independent Dual redundant STANAG3910 High Speed and Low Speed interface on a single cPCI/ PXI (3U) card form factor.

The ACX3910-3U-1 can be used for Protocol Testing and Simulation of STANAG3910 LS/HS Bus Controller, Multiple Remote Terminals and Chronological Monitoring at full bus loads.

All BC/RT/BM operations are performed concurrently with no degradation in performance in any operational LS/HS mode. The HS section of the ACX3910-3U-1 supports EFABus Direct Digital Links (DDL) and Fibre Optic DDL (FODDL) acquisition. EFABus Express (EFEX) extensions to the STANAG3910 protocol are fully supported and both protocols are co-resident and accessible by a software switch. The ACX3910-3U-1 incorporates full protocol error injection and detection and allows the reconstruction and replay of previously recorded electrical/ optical STANAG3910 bus traffic to the LS/HS databus with excellent timing accuracy. The ACX3910-3U-1 provides a single 3U slot solution with all the Databus Electrical & Optical signals accessible on a single front

panel. The module can be used in standard cPCI (3U) slots, legacy PXI slots and PXI hybrid slots. If installed in a PXI slot, PXI Trigger I/O and a PXI System Reference Clock (10MHz) based time tag mode are supported.

The ACX3910-3U-1 card uses AIM's 'Next Generation Common Core' (NCC) hardware design utilising multiple RISC processors with 16MB of Global RAM and 64MB of ASP RAM. An Application Support Processor (ASP) that executes the Driver Software onboard minimises the load on the host processing system. The onboard processing and large memory provided allows autonomous operation for real time applications and reduces interaction with the host processing system.

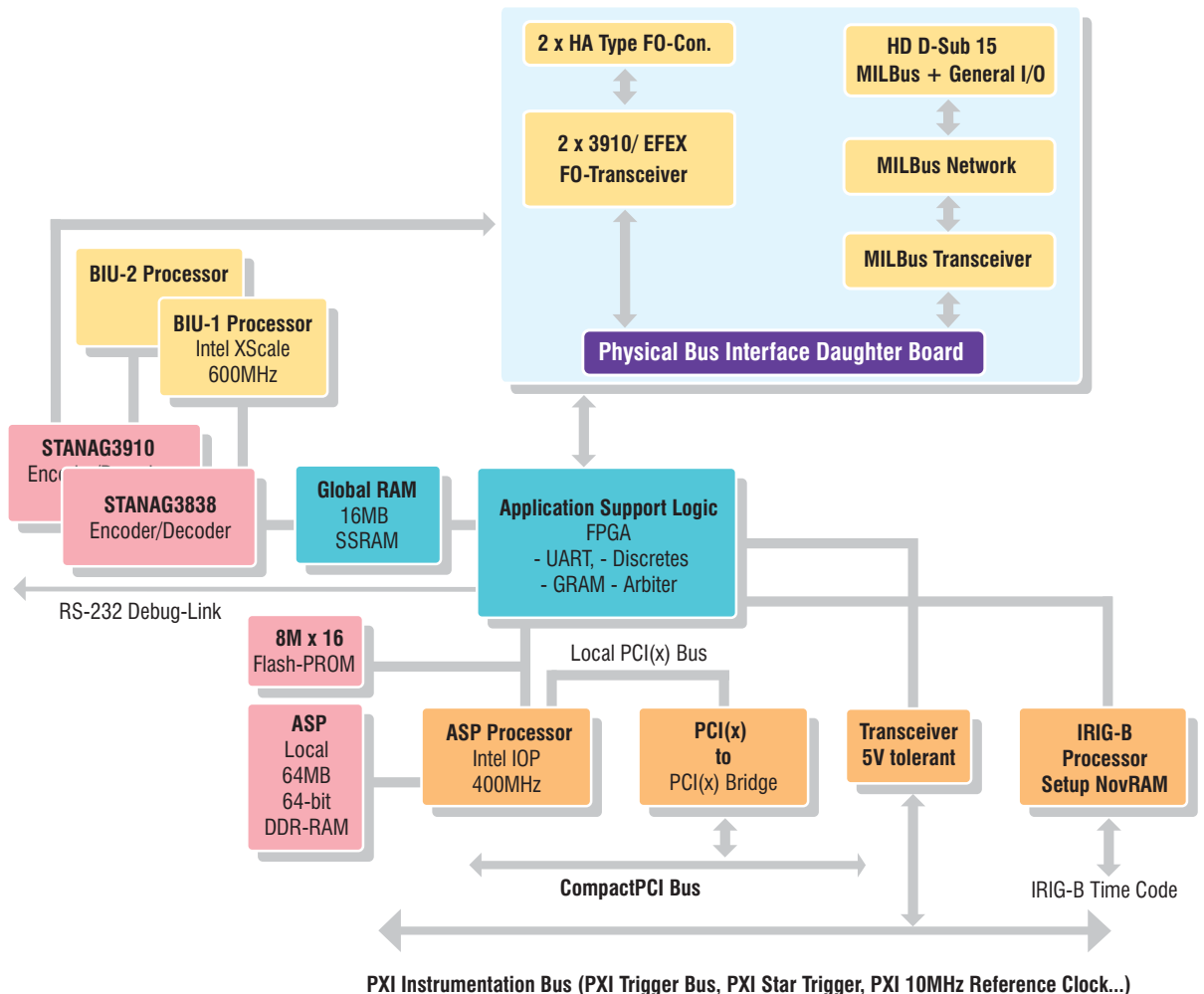
An IRIG-B time encoder/ decoder that provides both sinusoidal and a free wheeling mode is included for time tag synchronisation at the system level for single or multiple ACX3910-3U-1 modules.

Full function driver software is delivered with the ACX3910-3U-1 card in a comprehensive Board Software Package (BSP). The optional PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) and PBA-3910/ ParaView Databus Analyser/ Visualiser Software (for Windows) can also be purchased for use with the ACX3910-3U-1 card.

A special PBA.pro™ script package is available for supporting the SAE AS4112 RT Production Test Plan (protocol tests only).



ACX3910-3U-1 Block diagram



## Bus Controller

The ACX3910-3U-1 provides real time Bus Controller (BC) functions for the dual redundant STANAG3910 LS/HS databus system including data buffer queues for generation of dynamic data functions such as EFABus Dynamic Tags for LS/HS messages.

Key features of the Bus Controller Mode include:

- Autonomous operation including sequencing of LS Minor/ Major Frames
- Acyclic message insertion/ deletion
- Programmable BC Retry without host interaction
- Programmable HS Transmitter Initialise Time & HS Receiver Timeout
- Full LS/HS Error Injection down to word and bit level
- Supports EFABus Message Multiplexing
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronisation of BC operation to external (frontpanel) or PXI Trigger Inputs
- LS Bus 4µs Inter Message Gaps

## Multiple Remote Terminal

The ACX3910-3U-1 can simulate up to 31 LS/HS Remote Terminals with all sub-addresses each providing individually programmable Response Time. Each HS RT simulates all 128 Message Identifiers (MID). LS/HS RT's can be programmed in 'Mailbox Monitor Mode' for non-simulated RT's. The interface provides data buffer queues allowing the generation of dynamic data functions such as EFABus Dynamic Tags for LS/HS messages.

Key features of the Remote Terminal Simulation Mode include:

- Programmable Response Time for Each RT with fast RT Response at 4µs
- Multi-Buffering for each simulated RT, Sub-Address and MID
- Full LS/HS Error Injection for each simulated RT, Sub-Address and MID down to word and bit level
- Programmable & Intelligent Response to Mode Codes
- Multi-Buffering with Real Time Data Buffer Updates
- Supports EFABus Message Multiplexing

## Chronological Bus Monitor

The ACX3910-3U-1 includes a powerful LS/HS Chronological Bus Monitor and analysis function with multiple trigger and programmable capture capabilities. Accurate time tagging of both LS and HS messages, inter message gaps, response time and transmitter initialise time is supported. LS/HS messages are time tagged to a 1µs resolution. LS response time and inter message gaps as well as HS transmitter initialise time are measured down to 0.25µs.

Key features of the Chronological Bus Monitor include:

**Multi Level Complex Sequence Trigger on:**

- LS/HS Error, LS/HS Word
- LS/HS Data Word in Limits

**Monitor and Bus Traffic Capture:**

- 16MB of Onboard Memory for LS/HS Messages
- Trigger on Start, Centre and End
- LS/HS Message Counters

## Physical Bus Replay

The ACX3910-3U-1 module can reconstruct previously recorded STANAG3910/ EFEX data bus traffic to both the LS Electrical and HS Optical data bus simultaneously with excellent timing accuracy. Recorded data files can be selected for Physical Bus Replay. The additional capability to disable any or all RT responses from the STANAG3910 replay enables smart systems integration and test to be performed.

## EFABus Express(EFEX) Functionality

The ACX3910-3U-1 module supports EFABus Express (EFEX) protocol in all operating modes and at full bus rates. EFEX functionality is co-resident with STANAG3910 protocol to support either Tranche I or Tranche II Typhoon aircraft standard. Selection of STANAG3910 or EFEX mode is via a software switch.

Key functions of the EFEX mode operation include:

**EFEX Bus Control**

- EFEX Bus Controller Simulation of all Transfer types
- Control, Status & Status/ Data Command Frame Control
- Simulation of Gap and Wait Time Setting Control
- EFEX Mode Code support
- Error Injection/ Detection
- EFEX Mixed Mode Simulation & Monitoring

**EFEX RT Simulation**

- EFA/ EFEX Dual Mode RT Simulation for all EFEX BC Commands
- EFEX HS RT Response Time Setting Control for SD & S Frame
- HS Mode Code Simulation for EFEX RT's
- Error Injection

**EFEX Bus Monitoring**

- Chronological & Mailbox Bus Monitoring of EFEX Bus Traffic
- Capture & Decoding of CC/MC, SD/S Frames with Time Tag
- Monitor Trigger on Command, SD/S Frame, ADW & DSI
- EFEX Transfer Error Detection
- Monitor Trigger on HS Frame Bus Errors
- EFEX Bus Recording & Replay at full bus rates

**EFEX Bus Analyser Software**

AIM provides Bus Analyser Software specially extended to support EFEX data bus testing applications offered as PBA.pro™ Test and Analysis Tool (for Windows & Linux) and PBA-3910-XP/ ParaView-3910 Databus Analyser/ Visualiser Software (for Windows).

## PXI Instrumentation Bus

The PXI Hardware Specification adds electrical features for instrumentation by providing additional triggering and system clock capabilities. The ACX3910-3U-1 is compliant with the PXI Specification Revision 2.2 providing additional triggering and system clock capabilities on the Instrumentation Bus:

- BC, RT and BM Trigger Inputs/ Outputs available on the PXI Trigger Bus (software programmable)
- PXI System Reference Clock synchronous Time Tag Mode
- Time Tag Clear via PXI STAR Trigger Input

The ACX3910-3U-1 is a hybrid slot compatible peripheral module.

## Application Support Processor

The onboard Application Support Processor (ASP) offers processing functions typically provided by the host processor system.

Operational features include:

- Driver Software Execution onboard
- Dynamic Data Generation
- Possibility of Customer Specific Programming of the ASP
- Runs under Nucleus + Operating System

## IRIG-B Time Encoder/ Decoder

ACX3910-3U-1 modules include an onboard IRIG-B time encoder/ decoder with a sinusoidal output and a 'free wheeling' mode for time tag synchronisation. This allows synchronisation of multiple ACX3910-3U-1 cards to one common IRIG-B time input source or to the onboard time code generator of one ACX3910-3U-1 card as the reference for the correlation of data across multiple STANAG3910/ EFEX streams. If installed in a PXI slot the input source can alternatively be switched from IRIG-B to the PXI System Reference Clock (10MHz) on the Instrumentation Bus to have a Time Tag synchronous to the PXI System Reference Clock.



# ACX3910-3U-1

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Right on Target

## Physical Bus Interface

The Physical Bus Interface (PBI) including Fibre Optic Front End (FOFE) and 1553 transceiver is implemented completely on a single board. Bus Interface Unit (BIU) processors support the encoder/decoder functions for 3910/ EFEX and STANAG3838 protocols. The ACX3910-3U-1 main board also supports both High Speed (HS) and MIL-STD-1553B Low Speed (LS) bus connections including a resistive terminated bus network as well as I/O connections for Frontpanel Triggering and IRIG-B signals. Coupling to an external data bus system is software programmable.

## Driver Software Support

The Driver Software resides on the ACX3910-3U-1 module. A full function Application Programming Interface (API) is provided compatible with Windows 2000/XP/Vista and Linux. Host Applications can be written in C++, LabWindows/CVI etc. A LabView/VI application interface as well as LabViewRT drivers are provided.

## Technical Data

**Sub-System Interface:** cPCI/ PXI Bus Master & Slave, compliant with PCI-Standard Revision 2.3 and PXI-Specification Revision 2.2 (ECN 1), 33/66 MHz, 32-bit, 5V & 3.3V compatible

**Processors:** Two 32-bit 600MHz XScale Processors for 1553 & 3910 BIU, 64-bit 400MHz Intel IOP for ASP

**Memory:** Global RAM: 16MB; ASP RAM: 64MB

**Encoder/ Decoder:** STANAG3910 and STANAG3838 Encoder/ Decoder with full error injection & detection

**Time Tagging:** 46-bit absolute IRIG-B Time with 1µs resolution, sinusoidal IRIG-B output and 'free wheeling' mode; PXI System Reference Clock time tag mode

**PXI Instrumentation Bus:** PXI Trigger Bus port, PXI STAR Trigger Input, PXI System Reference Clock Input (10MHz)

**Physical Bus Interface (PBI):** Physical Bus Interface (PBI) including Fibre Optic Front End and 1553 Transceiver; Dual MIL-STD-1553B Transceiver with Variable Output Amplitude, Programmable Bus Coupling modes with onboard terminated Bus Network

### Connectors:

#### STANAG3910/ EFEX connections

2 HA06-N Aircraft style Fibre Optic Connectors with normal orientation

#### STANAG3838/ MIL-STD-1553B connections

High Density D-Sub 15-way Connector including 3910/1553 TTL-Trigger I/O, RS-232 Maintenance port, IRIG-B Time Code I/O Signals and one General Purpose Discrete I/O Signal

#### PXI Module connections

J1 Connector for standard 32-bit PXI/ cPCI-Bus address, data, control signals

XJ4 (eHM) Connector for instrumentation signals (Trigger Bus, Star Trigger Input, 10MHz System Reference Clock)

**Dimensions:** 100mm x 160mm - cPCI/ PXI Standard 3U card

### Power Consumption:

13.5W typical @ +5VDC

2W typical @ +12VDC

0.5W typical @ -12VDC

**Operating Temp. Range:** Standard 0°C...+45°C Extended -15°C...+60°C ambient

**Storage Temp. Range:** -40°C...+85°C ambient

**Humidity:** 0 to 95% non-condensing

## Ordering Information

**ACX3910-3U-1** Single Stream, Dual Redundant cPCI/ PXI (3U) to STANAG3910/ EFEX Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor, IRIG-B Encoder/ Decoder, 16MB Global RAM, 64MB ASP RAM, 1 General Purpose Discrete I/O on Front-I/O; onboard Dual Redundant Fibre Optic Front End (FOFE)

**Simulator Only** version available: BC, Multi RT Simulator with Mailbox Monitor

**Monitor Only** version available: Chronological Monitor only

**ACB-HD15-1** Ready Made Adapter Cable (2.0 m):

From 15-pin HD D-Sub to two Twinax Connectors; for all variants of ACX3910-3U-1 cards

**ACB-HD15-1-F** Ready Made Adapter Cable (2.0 m):

From 15-pin HD D-Sub to two Twinax Connectors and 9-pin D-Sub Connector for Trigger I/O, IRIG-B and Discrete I/O's; for all variants of ACX3910-3U-1 cards

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