



# AP104-1553-x



Single, Dual or Quad Stream  
MIL-STD-1553A/B  
Test & Simulation Module  
for PC/104-Plus



## General Features

The AP104-1553-x is a member of AIM's new family of advanced PC/104-Plus bus modules targeted to embedded MIL-STD-1553A/B applications. The AP104-1553-x Full Function version concurrently act as the Bus Controller, Multiple Remote Terminals (31) and Chronological/Mailbox Bus Monitor. Versions with reduced set of functionality (Single Function or Simulator Only) are available as well as extended temperature range variants. All AP104-1553-x cards have the capability to handle eight General Purpose Discrete I/O (GPIO) signals and also offer Trigger I/O.

A full range of MIL-STD-1553 protocol errors can be injected/ detected. The AP104-1553-x modules can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy. The AP104-1553-x offers an interface for 1, 2 or 4 dual redundant bus streams. The PC/104-Plus module is designed to be installed on either a host carrier board to adapt to buses like standard PCI, VME or cPCI or on an embedded host computer with PC/104-Plus ports.

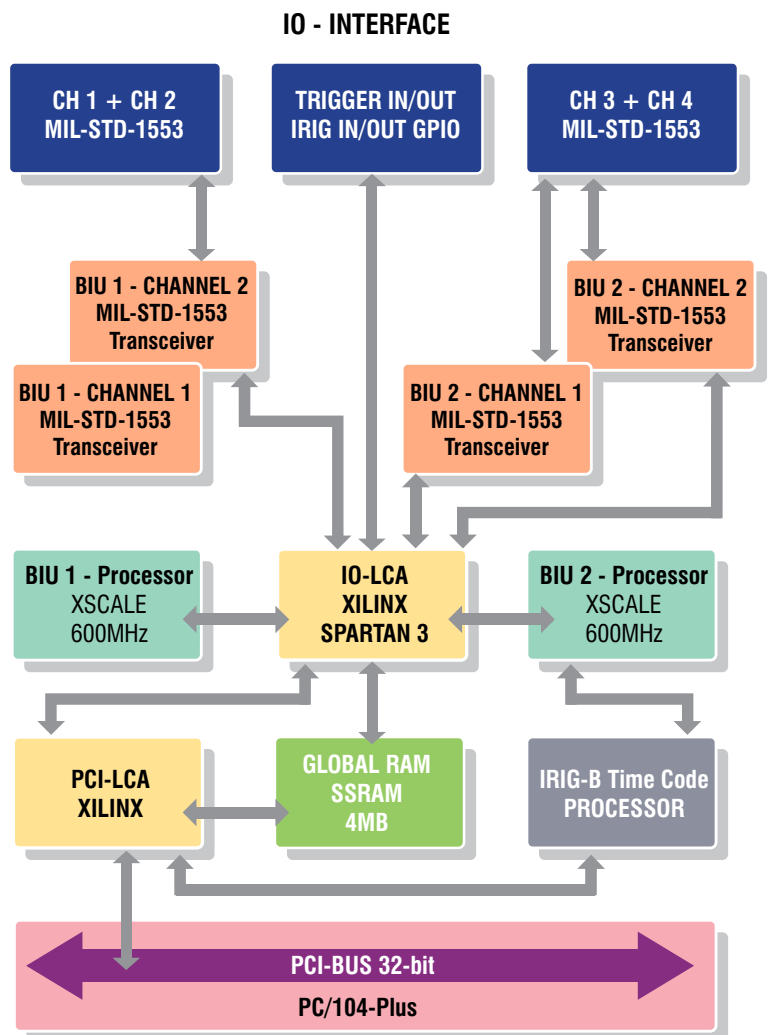
The AP104-1553-x card uses two high performance RISC processors, each of them supporting one Dual Channel Bus Interface Unit (BIU), each implementing two independent MIL-STD-1553A/B channels. The AP104-1553-x offers transformer coupling to the MIL-STD-1553A/B Databus.

An onboard IRIG-B time encoder/ decoder is included with sinusoidal output and 'free wheeling' mode for time tag synchronisation on the system level using one or more AP104-1553-x cards. The Physical Bus Interface (PBI) provides transformer bus coupling and fixed output amplitude to the MIL-STD-1553A/B bus.

Full function driver software is delivered with the AP104-1553-x cards in comprehensive Board Software Packages (BSP's) for different Operation Systems. The optional PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) and PBA-2000/ ParaView Databus Analyser/ Visualiser Software (for Windows) can also be purchased for use with AP104-1553-x modules.

Off the shelf test scripts are available to support the automatic execution of the 'AS4112 RT Production Test Plan' Protocol Tests.

**AP104-1553-4**  
Block Diagram



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## Bus Controller

The AP104-1553-x provides real time Bus Controller (BC) functions on all dual redundant MIL-STD-1553A/B buses concurrently with Multiple RT (31) and Chronological Monitor operation. Two 600MHz RISC processors, one for each dual channel Bus Interface Unit (BIU), provides true simulation of Bus Controller operations without host computer interaction.

Key features of the Bus Controller Mode include:

- *Autonomous operation including sequencing of Minor/ Major Frames*
- *Acyclic message insertion/ deletion*
- *Programmable BC Retry without host interaction*
- *Full Error Injection down to word and bit level*
- *Multi-Buffering with Real Time Data Buffer Updates*
- *Synchronisation of BC operation to external Trigger Inputs*
- *4µs Inter Message Gap*
- *Start on external Trigger Input or Digital Input*



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## Multiple Remote Terminal

The AP104-1553-x can simulate up to 31 Remote Terminals on each MIL-STD-1553A/B bus stream including all sub-addresses concurrently with BC and Chronological Monitor. Each of the 31 Remote Terminals can operate in a message orientated 'Mailbox Monitor Mode' to monitor non simulated RT's.

Key features of the Remote Terminal Mode include:

- *Programmable Response Time for each RT with fast RT Response at 4µs*
- *Programmable & Intelligent Response to Mode Codes*
- *Full Error Injection down to word and bit level*
- *Multi-Buffering with Real Time Data Buffer Updates*

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## Chronological Bus Monitor

The AP104-1553-x provides full bus monitoring and analysis with time tagging of all bus traffic to 1µs and response time and inter message gaps to 250ns. Bus Monitor Mode can operate concurrently with BC and RT simulation modes.

Key features of the Chronological Bus Monitor include:

- *100% Data Capture on all streams at full bus rates*
- *Autonomous message synchronisation and Full Error Detection*
- *Two Dynamic Complex Trigger with sequencing*
- *Message Filter and Selective Capture*
- *Bus Activity recording independent from trigger and capture mode*
- *External Trigger Outputs*
- *Programmable Response Timeout*



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## Physical Bus Replay

The AP104-1553-x modules can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553 bus with excellent timing accuracy. Record files can be selected for Bus Replay. The additional capability to disable any or all RT responses from the MIL-STD-1553A/B replay enables smart systems integration and test to be performed.

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## IRIG-B Time Encoder/ Decoder

AP104-1553-x modules include an onboard IRIG-B time encoder/ decoder with sinusoidal output and 'free wheeling' mode for time tag synchronisation. This allows synchronisation of multiple AP104-1553-x cards to one common external IRIG-B time input source or to the onboard time code generator of one AP104-1553-x card as the reference for the correlation of data across multiple MIL-STD-1553A/B streams.

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## MIL-STD-1553A/B Physical Bus Interface

The Physical Bus Interface (PBI) provides transformer bus coupling and fixed output amplitude to the MIL-STD-1553A/B bus.

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## General Purpose Discrete I/O

The AP104-1553-x provides eight General Purpose Discrete I/O's (GPIO). The GPIO's can be used as simple discrete inputs or outputs to generate strobes (e.g. to another AP104-1553-x card) or to sample external digital input signals (e.g. from another AP104-1553-x card).

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## Driver Software Support

A full function Application Programming Interface (API) is provided compatible with Windows XP/XPembedded/Vista and Linux for IA32/x86 platforms. Drivers for other Operating Systems especially used in embedded applications are available upon request. Please contact the factory for further details on driver availability for a particular Operating System and host platform. Host Applications for the AP104-1553-x can be written in C and C++. For Windows based systems LabView Virtual Instruments (VI's) are available. Drivers for LabViewRT can also be provided.

# AP104-1553-x

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MIL-STD-1553A/B  
Test & Simulation Module  
for PC/104-Plus

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## Technical Data

**System Interface:** PC/104-Plus, Version 2.3 compliant; 32-bit/ 33MHz PCIbus (Rev. 2.2) compliant; 3.3V, 5V tolerant IO's;

Burst operation on PCI for efficient data transfer; One interrupt output to PCIbus

**Processors:** Two 32-bit 600MHz RISC Processors

**Memory:** Up to 4MB Global Static RAM

**Encoder/ Decoder:** Up to four MIL-STD-1553A/B Encoder and Decoder with full error injection & detection

**Time Tagging:** 46-bit absolute IRIG-B Time with 1 $\mu$ s resolution, sinusoidal IRIG-B output and 'free wheeling' mode

**Trigger:** One trigger input and one trigger output for each channel (to be used for BC or BM)

**Physical Bus Interface (PBI):** 1, 2 or 4 dual redundant, MIL-STD-1553B trapezoidal transceivers with transformer coupled stub and fixed output amplitude

**Connectors:** Standard PC/104-Plus stackable PCI and ISA connectors, up to four 6-way crimp connectors for MILbus connections, 20-way ribbon cable connector for Trigger I/O, GPIO and IRIG-B signals, separate 6-way IRIG-B ribbon cable connector

(for mating connectors please refer to the AP104-1553-x Hardware Manual)

**Dimensions:** 95.9mm x 90.2mm

**Supply Voltage:** 3.3V - 5V

**Power Consumption:** AP104-1553-1/2: 4W (Idle Mode), 6W (100% Bus Operation)  
AP104-1553-4: 4W (Idle Mode), 8W (100% Bus Operation)

**Operating Temp. Range:** Standard 0°C... +70°C, Extended -40°C... +85°C ambient

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

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

## Ordering Information

### AP104-1553-1

Single Stream, Dual Redundant MIL-STD-1553A/B PC/104-Plus Module:  
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Encoder/Decoder, 2MB Global RAM, 8 General Purpose Discrete I/O's

### AP104-1553-2

Dual Stream, Dual Redundant MIL-STD-1553A/B PC/104-Plus Module:  
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Encoder/Decoder, 2MB Global RAM, 8 General Purpose Discrete I/O's

### AP104-1553-4

Quad Stream, Dual Redundant MIL-STD-1553A/B PC/104-Plus Module:  
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Encoder/Decoder, 4MB Global RAM, 8 General Purpose Discrete I/O's

Simulator Only Versions available

BC, Multi-RT simulator with Mailbox Monitor

Single Function Versions available

Chronological Monitor and Mailbox Monitor OR Bus Controller OR Multi-RT and Mailbox Monitor