

Innovators at Heart

From its beginning in 1986, Ballard Technology has led the avionics databus test and simulation marketplace with innovative thinking, exceptional products, and unsurpassed value. Today, we develop and manufacture advanced board, box, and software solutions for test, simulation, analysis, and embedded applications interfacing with all industry-standard databuses, including MIL-STD-1553, ARINC 429/708/717/664, AFDX®, CSDB, serial, discretes and others. Ballard is widely recognized as a leading developer and manufacturer of Commercial Off-the-Shelf (COTS) avionics databus hardware and software solutions, delivering user-friendly single and multi-protocol products. Our commitment to stocking high-quality, easy-to-use products and exceptional customer support continues to earn Ballard the loyalty of industry, military and government customers worldwide.



Over 20 years of excellence in providing innovative databus solutions



What Makes Us Different...

Customer Focus

As a principal engineer for a leading aerospace manufacturer, Ballard Technology's founder recognized the need for cost-effective databus test and simulation products. With the introduction of the IBM PC in the mid-1980s, Ballard was a pioneer in producing databus interfaces for PCs. Since those early days, our line has expanded to a wide variety of protocols, platforms, and software, including boards and boxes for rugged embedded applications. But our mission remains the same - to equip and empower our customers with quality, long-life COTS products and world-class support.



Quality You Can Count On

At Ballard Technology our passion is quality: quality in design, technology, products and support. Every product is designed to meet or exceed industry specifications, and all products are rigorously tested, validated, and burned-in before delivery. Customers have frequently described Ballard as having "the products that work"...and they keep on working. We expect our commitment to quality to be independently acknowledged with AS9100 certification.

Products When You Need Them

Ballard carries an extensive inventory and ships most products from stock or with minimal final configuration. Because our products are intuitive and easy-to-use, you will be able to put them to work quickly and effectively.



World Class Support

Throughout Ballard, we measure our success by customer satisfaction; our customer support is widely known as the best in the industry. From product selection to application development and problem resolution, you can count on our customer support team for prompt, professional, and personalized service. For customers who prefer to find answers on their own schedule, we offer comprehensive online technical support and resources 24 hours a day.

COTS Solutions

Ballard Technology is committed to Commercial Off-the-Shelf (COTS) products based on open architectures. COTS solutions from Ballard provide value, flexibility, and many alternatives, so you can choose from a wide array of board, box, and software products to optimize your testing, simulation, maintenance and embedded projects. Low cost and short lead times make COTS products from Ballard Technology the logical choice for most projects.

Protocol Options

Ballard offers a wide range of protocols, functionality and channel counts from simple, single-channel, single-protocol products to complex, high channel count, mixed-protocol products. You can specify the combination that uniquely fits your needs, assuring you of the best value. Ballard has products supporting the following major protocols:

- MIL-STD-1553
- ARINC 429
- ARINC 629
- ARINC 708
- ARINC 717
- ARINC 664/AFDX
- RS-232/422/485
- CSDB
- Discrete I/O
- Custom and other

Board Products

From its roots as a pioneer in recognizing and leveraging the power of personal computers for avionics applications, Ballard continues to innovate and expand its product line for numerous backplanes and operating systems, including the following:

- PCI, cPCI, PCIe
- PMC
- PC/104, PC/104+
- PCMCIA
- VME
- Windows
- Linux
- VxWorks
- INTEGRITY
- Others

COTS Hardware Innovation



AB2000

BusBox® Products

A box product from Ballard is called a BusBox – the forward-looking alternative to integrating boards into a computer. In a test or simulation environment a BusBox has all the functionality and can use the same software as a board, with the added benefit of being self-contained and operating through a USB or Ethernet port. BusBox products are portable, won't get lost in a computer, are independent of host computer technology, and can be networked for remote access. With its own built-in user processor and memory, a BusBox can run stand-alone or tethered. A rugged BusBox provides the convenience and rapid deployment of COTS for demanding environments. (see pages 10 and 11)



User-Friendly Software

Typical CoPilot Applications

- Protocol and systems analysis
- Maintenance and debugging
- Product validation and testing
- Equipment and system simulation
- Automated testing and test management
- Conceptual design and prototyping
- Performance and health monitoring

Extensive API Support

Ballard provides an extensive Application Programming Interface (API) for all its hardware products. Software developers use the high level abstract API functions to quickly and easily create custom applications, while having access to a comprehensive library for specialized needs. The unified BTIDriver API supports a variety of protocols and hardware interfaces (boards, boxes, and embedded applications), so an application developed on one platform can be distributed on another. The same API can also be used for various languages (C/C++, LabView, VB, etc.) and operating systems (Windows, Linux, VxWorks, and others).

Powerful CoPilot® Tools

CoPilot is Ballard's market-leading software for databus test and analysis. It is graphical and interactive, allowing for easy setup, and intuitive display and generation of data. You can see and manipulate the protocol data in its raw form, in engineering units, or on virtual instruments. Our latest version extends the capability of CoPilot with a powerful engine for Python scripting and test management, so you can author and distribute standardized test programs. With one CoPilot program you can simultaneously test and analyze all your databuses – MIL-STD-1553, ARINC 429/708/664/AFDX and others. Combine CoPilot with a Ballard hardware interface (card or box) and you have the world's most powerful databus tool for test and analysis. (see pages 12 and 13)





MIL-STD-1553 Overview

Ballard Technology got its start with a very popular, easy-to-use MIL-STD-1553 product for the IBM PC. Since those early days, Ballard has continued to innovate and develop more powerful 1553 designs and to make interface cards available for a wide variety of computer platforms. Today, our 5th generation 1553 architecture captures over two decades of experience, design improvements, and innovative features. From simple, single function, single-channel to advanced, multifunction, multi-channel interfaces we offer a wide selection of 1553 hardware products to meet your needs. Most of our products support CoPilot software (see pages 12 and 13) and can be combined with other protocols. Before deciding on an interface card, consider the advantages of our BusBox products.

1553 Features

- Multiple levels of functionality (single to enhanced multi-terminal)
- Up to eight MIL-STD-1553 dual redundant channels
- BC schedule with conditional branching, calls and triggers
- Monitoring - sequential and RT shadow
- 32/64-bit time-tags with 1 microsecond resolution
- IRIG A/B time-tag synchronization
- Real-time bus playback with RT edit mode
- Protocol error detection & programmable injection
- Adjustable transmit amplitude and zero crossing deviation
- Supports MIL-STD-1553A/B Notice II, 1760 and Link 16
- BC one-shot, framing and aperiodic message insertion
- Up to 4MB memory per channel
- BC/RT multiple data structures
- Real-time triggers
- CoPilot software available
- High-level BTI Driver API libraries

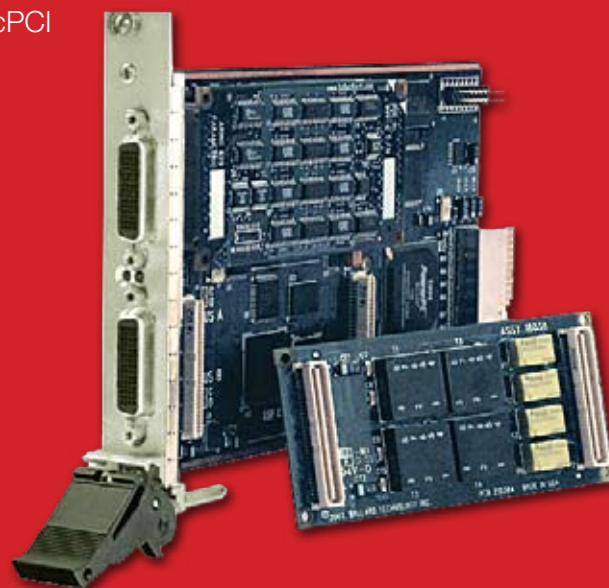
MIL-STD-1553 Interfaces

Ballard offers the widest variety of MIL-STD-1553 products in the industry.

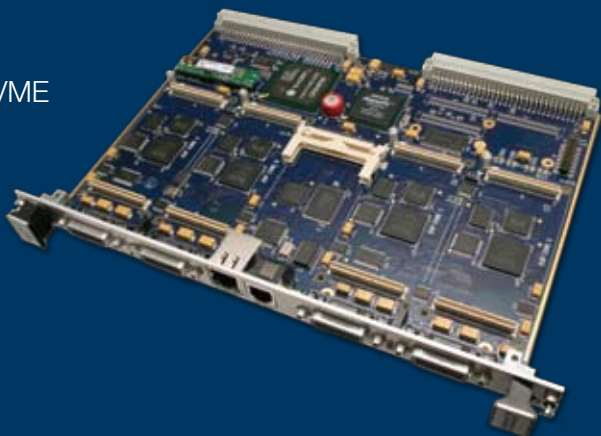
PCI



cPCI



VME



PMC



PCMCIA



Boards

PCI Express, PCI and Compact PCI

- Up to four dual-redundant 1553 channels
- Combine 1553 with other protocols onboard

PMC

- PrPMC compatible, I/O or backup processor
- Conduction or convection cooled

PCMCIA

- Type II and Rugged Type III available
- An excellent portable databus analyzer with CoPilot

VME

- Up to eight dual-redundant 1553 channels
- PowerPC®, CF Storage, Ethernet, PMC slot

PC/104 and PC/104+

- Ideal for embedded applications
- MIL-STD-1760 and configurable discrettes

Boxes

BUSBox

- Small, lightweight and portable
- Versatile and easy-to-use

OmniBusBox

- Rackmount or desktop replacement for boards
- Control through USB or Ethernet

Avionics BusBox

- AB1000 – Lightweight embedded system
- AB2000 – Rugged, DO-160 validated



For a full list of products and features see www.ballardtech.com.



ARINC Overview

Ballard has extensive experience developing and producing products for an assortment of computer platforms to interface with the various commercial avionics databus protocols. Many of these products support mixed protocols, have high channel count, and include other complimentary input/output. A Ballard hardware interface combined with CoPilot software (see pages 12 and 13) is a powerful, easy-use, databus test and analysis tool. Ballard also has products for ARINC 629, CSDB, serial, and avionics discretes. Check out our BusBox products as an alternative to using boards and computers.

ARINC 429 - General Purpose

- Up to 64 channels
- Many configurations to choose from
- Large on-board message buffers and transmit schedules
- Automatic speed detection
- Variable transmission speed control
- Protocol error detection & programmable injection
- Time-tags and IRIG A/B synchronization

ARINC 664 / AFDX - Deterministic Ethernet

- Two ports at 10 or 100 Mbps
- Large transmit, receive and monitor buffers
- Concurrent transmit, receive and monitor operation
- Comprehensive error injection and detection
- Available in PMC, PCI and cPCI configurations

ARINC 708 - Weather Radar

- Configurable frames, repetition rate, bit order
- Monitors concurrently with transmit/receive operation
- Picture Bus compatible and optional parametric outputs
- Time-tags and IRIG A/B synchronization

ARINC 717 - Digital Flight Data Recorder

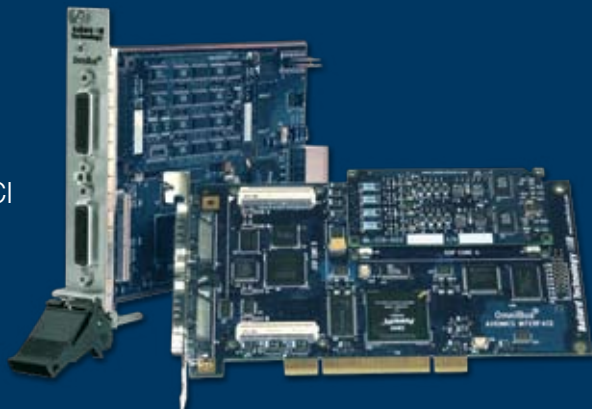
- BiPolar and BiPhase channels
- Autonomous transmit scheduling
- Frames and superframes supported
- Time-tags and IRIG A/B synchronization

Commercial ARINC Interfaces

Ballard sets the industry standard for flexibility, performance, ease-of-use and value.

VME



cPCI
PCI

PC/104+



PMC



BusBox



Boards

PCI Express, PCI and Compact PCI

- Up to 32 ARINC 429 channels
- Many configurations and protocol combinations

PMC

- Conduction or convection cooled
- Front or rear panel I/O

PCMCIA

- ARINC 429 with optional 717 receive channel
- An excellent portable databus analyzer with CoPilot

VME

- Up to 64 ARINC 429 channels
- PowerPC®, CF Storage, Ethernet, PMC site

PC/104 and PC/104+

- Up to 16 ARINC 429 and 4 ARINC 717 channels
- Up to 16 avionics discrete I/O

Boxes

BUSBox

- Small, lightweight and portable
- Versatile and easy-to-use

OmniBusBox

- Rackmount or desktop replacement for boards
- Control through USB or Ethernet

Avionics BusBox

- AB1000 – Lightweight embedded system
- AB2000 – Rugged, DO-160 validated

For a full list of products and features see www.ballardtech.com.

BusBox Applications

- Replace interface cards and computers
- Testers, analyzers, and simulators
- Local, distributed or federated controllers
- Protocol converters
- Networked devices
- Network bridges
- Data recorders and servers
- Health monitors
- Support equipment

BusBox Standard Features

- High channel count
- Single or mixed protocols
- Field upgradeable software
- PowerPC® user processor
- SDRAM and System Flash
- Real-time clock
- Discrete I/O
- USB Ports
- 10/100 Ethernet ports
- RS-232/422/485 serial ports
- IRIG A/B time-tag synchronization
- Compact Flash slot/Mass Storage
- Software support
 - Universal BTIDriver API
 - CoPilot analyzer software
 - SDK for embedded development

The BusBox[®] Advantage

Now you can have a complete, self-contained solution for your databus interface applications. There is no need to integrate cards and computers from different manufacturers. With Ballard's BusBox products your hardware is ready-to-go with a PowerPC processor, memory, multi-protocol IO, networking, and other features. A BusBox can run tethered (controlled by other computers through USB or Ethernet) or stand-alone (automatically executing your application at power-on). Unlike a card, a BusBox is portable, independent of host computer technology, and won't get lost in a computer, providing you with maximum utilization, flexibility, longevity, and easy swapping and sharing. Ballard offers a broad selection of BusBox products for lab and rugged environments, along with powerful, easy-to-use tools for quick and efficient software development.





Avionics BusBox 2000



Avionics BusBox 1000

Whether your applications are in labs or severe environments, tethered or stand-alone, we have BusBox products to meet your needs. Ballard's OmniBusBox is a feature-rich desktop or rackmount unit that is an ideal alternative to databus interface cards for test and simulation in a lab environment. Avionics BusBox products are rugged, compact units for demanding applications.

BusBox Protocols and I/O

- MIL-STD-1553
- ARINC 429
- ARINC 708
- ARINC 717
- CSDB
- RS-232/422/485
- Avionics discrete I/O
- Custom

OmniBusBox

- Ideal for interface card replacement
- Single or multi-protocol (mix and match)
- Large selection of I/O configurations
 - Up to 4 MIL-STD-1553 channels
 - Up to 32 ARINC 429 channels
 - Others
- Control through USB or Ethernet
- Ethernet switch built-in
- Removable Compact Flash slot
- AC power (28 VDC optional)
- Rackmount or desktop

Avionics BusBox 1000 Series

- Small, lightweight – only 22 oz
- Single or multi-protocol
- Ethernet 10/100 and USB 2.0 host ports
- Internal Compact Flash
- 18-75 VDC power

Avionics BusBox 2000 Series

- Rugged DO-160 validated
- Helicopter, fixed wing and ground vehicle rated
- Numerous standard configurations
- Highly customizable
- Ethernet 10/100 and two USB 2.0 host ports
- Conduction-cooled PMC site
- Mass Storage
- 28 volt DC military supply
- Low-power, compact, lightweight – 3.5 lbs

Consult Factory Regarding Custom Configurations

The Ultimate Databus Analyzer

Ballard's CoPilot is the most advanced databus test, simulation and analysis software on the market today. CoPilot, coupled with one or more of Ballard's hardware products, provides a single solution, simultaneously supporting MIL-STD-1553, ARINC 429, ARINC 664/AFDX and ARINC 708 databuses. CoPilot simplifies data analysis and generation with a variety of features, including: engineering unit conversion, data and performance monitoring and logging, graphical displays, and hardware and software playback. Using the auto-detection features and the intuitive and interactive graphical interface, users can quickly and easily evaluate databus activity, view and interact with data, and optimize CoPilot for each application. All configurations and data can be saved for later reuse or analysis by CoPilot or other applications.

Databus Analyzer Features of CoPilot

- Easily monitor, analyze, simulate and replay bus activity across multiple boards and protocols.
- Save/reuse data, projects, conversions, scripts, and layouts.
- Define and examine information through an analyzer view.
- Performance monitor captures and displays error rates and other statistical information.
- Data representation – raw values or engineering units in current values, lists, or graphically.
- Graphical displays – large selection of ActiveX controls including aircraft instruments, strip charts, and moving maps.
- Monitor – sequential recording and time-tagging of all or selective data for real-time display or subsequent analysis.
- Replay monitored data in software (virtually) or by transmitting through hardware.
- Database of message definitions, equipment configurations, data conversions, graphical links, etc. – predefined, user created, or import/export via XML.



CoPilot[®] Software

The industry's leading productivity tool
for avionics databus test and analysis.



Now with ATE

CoPilot not only offers the industry-leading databus analyzer features, it provides a powerful Automated Test Environment (ATE) for test development, test management, and integration with other hardware and software applications. Development and management tools within CoPilot's ATE facilitate the creation, customization, integration, distribution, control, and use of test procedures. With CoPilot's ATE you can develop and debug Python script procedures to configure and control all aspects of the project, including CoPilot itself, the associated hardware, user interface, generation and display of data, and creation of reports. CoPilot can control and can be controlled by other application programs and can pass data using OLE automation. Interfacing other applications with CoPilot in this way makes the best use of the functionality and features of each application. The test manager provides a handy and versatile mechanism for users to organize and execute test routines.

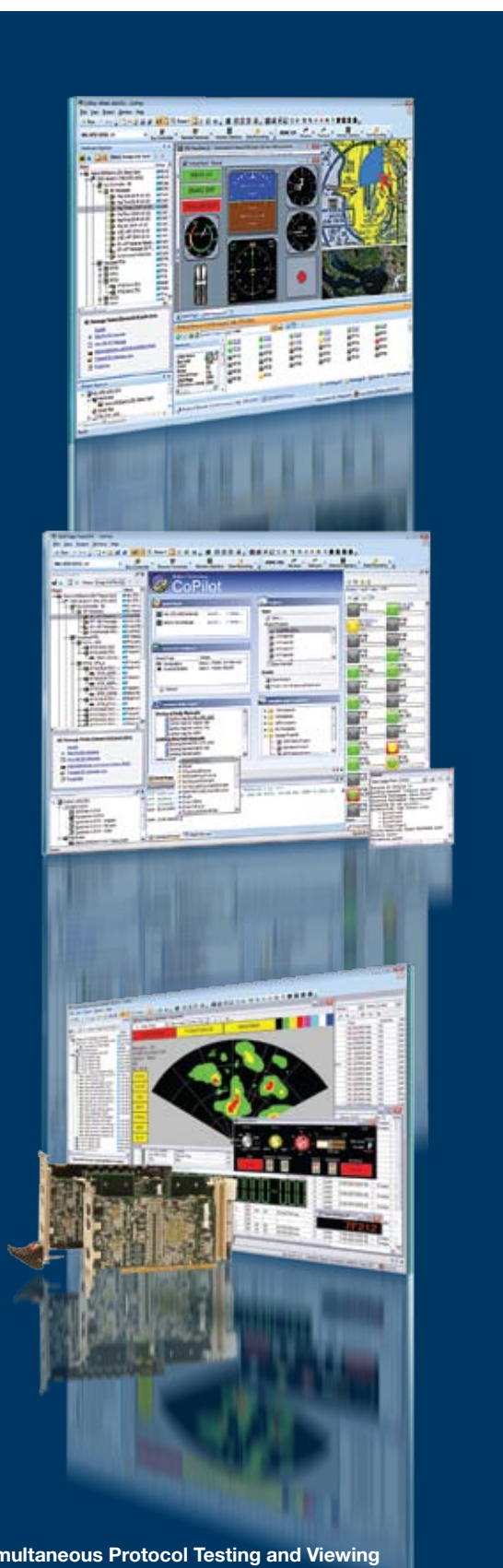
ATE Features of CoPilot

- Scripting – Use Python or VB scripts to expand and customize CoPilot features and functions, and to create complete test procedures.
- Python script development environment – object browser, command prompt window, output pane, macros, etc.
- Python debug tools - breakpoints, step thru, monitor values, etc.
- Test Manager – organize, select, and control the execution of tests.
- OLE automation – integrate control and data communications with other equipment and applications such as MS Word, Excel®, LabView and others.
- Security to user level – control the modification and use of project versions.

Protocols Supported by CoPilot

- MIL-STD-1553
- ARINC 429
- ARINC 708
- ARINC 664- AFDX

Note: Some CoPilot features depend on associated hardware.



Simultaneous Protocol Testing and Viewing

Mature and Legacy Products

Ballard Technology has a commitment and reputation for providing long-term support for its products. We know that aerospace programs typically have a long product life, and our customers count on us for support through the full product cycle. Whether it is follow-on production, spares, replacements, or repairs, we go out of our way to assure that Ballard products will meet your long-term needs. Wherever possible, we mitigate against products obsolescence by providing an upgrade path to our new products.

Contact Customer Services

Please contact Ballard Technology's sales or customer services department.

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Here to Serve

Our management and the entire Ballard Technology team are here to support you, and we are committed to your success. We invite you to join our customers around the world, who for more than 20 years have counted on Ballard for innovative, easy-to-use products, world-class customer support, and exceptional value.



**FPO (card/slits
and pocket die)**

**FPO (card/slits
and pocket die)**



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