

# USB 429 ARINC 429/717 Interface

USB Interface to  
ARINC 429 and 717



## Features

- Up to 16 ARINC 429 Channels
- Up to 4 ARINC 717 Channels
- 8 Avionics Discrete I/O
- IRIG A/B PWM and AM
- USB 2.0 Bus Powered
- 32 MB Data Memory
- Small, Portable, and Rugged

## Description

The USB 429 series of products are pocket-sized USB adapters that enable computers to interface with ARINC 429 and ARINC 717 avionics databuses. Having extensive functionality, they are used to communicate with, simulate, test, and monitor ARINC 429/717 equipment and systems. Several models are available with different channel counts and capabilities.

Being a USB peripheral, the USB 429 is compatible with virtually all modern PC laptop, desktop, tablet, and netbook computers. Plug and Play and Hot Swap features make it easy to install and move between computers. The USB 429 supports maximum data throughput on all ARINC channels and has a large 32 MB built-in memory. With all its capability and versatility the USB 429 is suitable for a wide range of applications in the lab and in the field.

## Hardware

The USB 429 is small, lightweight, and rugged. All power necessary for operation is provided via the single USB port. The number and combination of ARINC 429 and 717 channels depends on the hardware model. All models include eight avionics level input/output discretes and IRIG time synchronization/generation. In addition, the USB 429 provides useful non-standard functionality, such as a range of data rates, use of parity as data, and error injection.

Once configured, the USB 429 hardware performs all the protocol processing. It manages the reception, transmission, error checking, time-tagging and buffering of messages. This frees the software to focus on high-level user-specific processing.

## Software

Users can develop their own software applications with the included BTIDriver API. With only a few function calls a program can operate the USB 429 and process messages to and from the avionics databuses. Functions include routines for transmitting, receiving, scheduling, recording, time-tagging, and manipulating data. The USB 429 can use applications developed for other Ballard devices. Code migrates seamlessly from BTIDriver compatible devices or through a translation driver from older Ballard devices.

Alternatively, Ballard's optional CoPilot software provides easy-to-use, interactive tools for ARINC 429 test, analysis, and simulation. CoPilot simplifies project development and provides added productivity through virtual instrument displays, flexible monitoring and analysis tools, and a powerful scripting engine.

## ARINC 429

- Full ARINC 429 functionality
- Mix of receive and transmit channels
- Handles periodic and transfer protocols
- Message filters and schedules
- Standard and non-standard bit rates
- Error detection and selective injection
- Variety of syncs and triggers
- Several message buffering schemes
- ARINC 575 support
- LEDs indicate bus traffic

## Software

- Universal BTIDriver™ API compatible
- Efficient DMA monitoring
- Compatible with other Ballard hardware
- Translator for older Ballard devices
- CoPilot® software (optional)

## Benefits

- Portable, versatile, and durable
- Easy Plug and Play installation
- No external power supply needed
- Powerful protocol engine
- Secure locking connectors
- Free customer support for product life
- 3-year limited warranty standard
- FCC, CE and RoHS compliant

## Applications

- 429/717 analysis, test, and simulation
- Data loading
- Flightline and AOG support
- In the lab or in the field
- Replace plug-in cards

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# USB 429 ARINC 429/717 Interface

## ARINC 429 Features

### General

Numeric and file transfer protocols  
 Standard and custom bit rates  
 12.5 and 100 kb/s standard  
 Configurable per channel  
 Wide range of custom bit rates  
 Set parity per channel (odd/even/data)  
 Sync output on all or selected messages  
 Internal self-test bus

### Message Data

Buffering schemes facilitate data handling:  
 Guaranteed data integrity  
 Current value buffers (default)  
 Circular lists transmit a repeated pattern  
 FIFO list buffers for sequential data  
 Asynchronous list buffers  
 Message record contains the ARINC word,  
 time-tag, channel, speed, error data,  
 min/max elapsed time, hit counter,  
 and/or gap time

### Receivers

Automatic bit rate detection  
 Receive message filtering (Label/SDI)  
 Current value and list buffers  
 Error detection: gap, timing, length, parity  
 Log and/or interrupt on errors

### Transmitters

Single, scheduled, and asynchronous messages  
 Tag messages for error injection, sync out, and logging/interrupts  
 Error injection: parity, inter-message gap  
 Externally trigger all or selected messages

### Transmit Schedules

Schedules: automatic or explicit  
 Automatic based on repetition rates  
 Contain messages (labels), gaps, and controls for pausing, halting, pulsing discrete outputs, and event logging  
 Modes: Continuous or single step for debugging

## Other Features

### Base Configuration

- Model dependent 429/717 capability
- USB 2.0 interface
- 8 Avionics Discrete I/O
- IRIG A/B input and output
- 2 LED indicators
- 32 MB on-board memory

### Sequential Monitor

A time-tagged record of selected activity on ARINC 429, 717, and discrete I/O  
 Filter 429 data by channel/label/SDI  
 Includes ARINC data, channel, speed, errors, and time-tag  
 Efficient DMA monitor pipe to host

### ARINC 717

Software selectable biphase/bipolar  
 Sub-frame and super-frame support  
 Data rates: 64, 128, 256, 512, 1024, 2048, 4096, 8192 words per second  
 ARINC 717 Monitor Utility software

### Avionics Discrete I/O

8 programmable inputs/outputs  
 Can be used as syncs and triggers  
 Output: Open/Gnd, 35 VDC, 200 mA (max), self monitoring, inductive load protected  
 Log transitions to sequential record

### Time-tag/IRIG

48-bit hardware time-tag (1 us resolution)  
 IRIG A or B, AM, PWM and PPS modes  
 Generate or synchronize (AM input only)  
 Synchronize hardware time-tags

### Specifications

Component temperature: -40 to + 85 deg C  
 Storage temperature: -55 to +100 deg C  
 I/O Connector: HD44F D-Sub  
 Dim: 3.0 x 4.45 x 0.97 inch (76 x 113 x 25 mm)  
 Weight: under 5 oz (140 g)  
 Power: USB bus-powered (325 mA max)  
 MTBF: 1,200,000 hours

## Software

Universal BTIDriver API for C/C++, C#, VB, VB.Net, and LabVIEW™  
 MS Windows® and Linux® OS drivers  
 Translation DLLs for older Ballard devices  
 Williamsburg protocol library  
 ARINC 717 Monitor Utility  
 CoPilot analysis and test software (optional)  
*Call for latest language and OS support.*

## Interrupts/Logging

Poll or use interrupts  
 Configurable event log  
 Programmable event logging/interrupts from messages, tx schedules, and buffers

## Ordering Information

### USB Hardware

Part No.	ARINC 429	ARINC 717
UA1410	1R1T	–
UA1420	4R2T	–
UA1440	12R4T	–
UA1401	–	2R2T
UA1431	8R4T	2R2T

$nR$  = number of receive channels  
 $nT$  = number of transmit channels  
 Case color option: Black is standard. Add “/FTO” suffix for Flight Test Orange

### CoPilot Systems

To include CoPilot put “CP-” before the above Part No.  
 Example: CP-UA1431

### Accessories (Included)

USB cable with screw-locks (5 ft)  
 Mating HD44P D-Sub I/O connector  
 Manuals and software CD

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