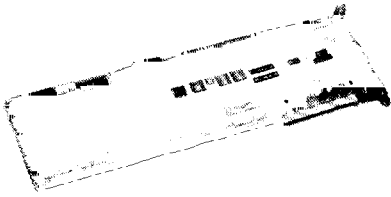


ARINC 429 FULL-SIZE PC INTERFACE CARD



DESCRIPTION

The DD-429XRP1-300 is a full-size PC (IBM/AT Type, ISA/EISA compatible) interface card which provides an intelligent communications link between a host personal computer and an ARINC 429 data bus. The card adheres strictly to the ARINC 429 specification by using the DDC chip set (DD-03282).

The card also conforms to the Mark 33 Digital Information Transfer System 429-14 specifications and will communicate with the following ARINC specifications: 419, 429, 568, 575, 582, 717, 724.

LRU developers find that these cards provide easy access for simulating and/or testing new systems prior to use with actual flight systems.

Avionics maintenance and validation teams can perform end-item testing in the laboratory and, by using portable or rack-mount PCs, they can continue testing in an aircraft environment.

The DD-429XRP1-300 Card has an on-board Intel 80C186 processor, which off-loads much of the low-level data processing from the host PC. The host PC easily transfers DD-429XRP1-300 receive and transmit data to and from the card through the 16 KBytes of on-board dual-port RAM.

The DD-429XRP1-300 Cards are available with one, two, four, or eight transmitters, and two or four receivers, all of which can be operated at either high or low speed.

FEATURES

- **One, Two, Four or Eight Transmit Channels**
- **Two or Four Receive Channels**
- **High or Low Speed**
- **On-Board Intel 80C186 Microprocessor (12.5 MHz)**
- **16 Kbytes Dual Port RAM**
- **Five-In/Five-Out TTL Discrettes**
- **Configurable PC Memory and I/O Addresses**
- **Programmable Interrupts to the Host PC**
- **Up to Four Cards Per PC**

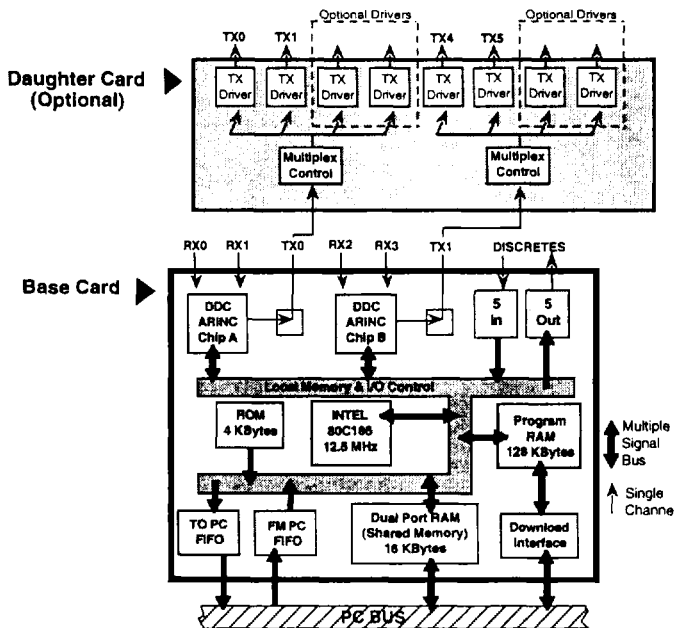


FIGURE 1. CARD FUNCTIONAL BLOCK DIAGRAM

TABLE 1. DD-429XRP1-300 GENERAL SPECIFICATIONS

ELECTRICAL	
Operating Voltage: + 5 VDC @ 400 mA maximum ± 12 VDC @ 20 mA maximum	
ENVIRONMENT	
Operating Temperature: 0 – 50 °C at no more than 95% relative humidity	
PHYSICAL CHARACTERISTICS	
Standard Size: 3.9" (9.9 cm) x 13.3" (33.8 cm) (XT Size)	
IO Connector: DB-37	
Daughter Card: 6.09" (15.5 cm) x 3.05" (7.8 cm)	
IO Connector: DB-25	

TECHNICAL OVERVIEW

The card is user programmable with an Intel 80C186 processor and 128 KBytes of program memory (which can be written by the host PC when the 80C186 processor is stopped). There are 4 KBytes of ROM that contain software that "boots" the card so programs can be downloaded. The ROM code also aids in diagnostic testing.

There are 16 KBytes of dual-port RAM that can be accessed by both the PC and the card's 80C186 processor. This dual-port RAM is used to transfer ARINC 429 receive and transmit data to and from the card. Two on-board 512 Byte FIFOs communicate commands and responses to and from the card.

The DD-429XRP1-300 Card is configurable from 1TX / 2RX to 8TX / 4RX and all transmitters and receivers can be operated at either high or low speed. In addition to the ARINC 429 transmitters and receivers, the card has five input and five output TTL discretes which provide the capability to control external devices or indicate external events.

CARD FEATURES

I/O ADDRESSING

The DD-429XRP1-300 Card has two jumpers that configure the I/O address at which the PC accesses the card. There are four possible address ranges: 300-306 Hex, 310-316 Hex, 340-346 Hex, and 350-356 Hex. Each card placed in a PC must be configured to use a separate address, allowing up to four cards to be placed in a single PC.

DUAL-PORT MEMORY ADDRESSING

The card has two rotary switches that configure the starting address at which the PC accesses the 16 KByte dual-port memory window. Valid settings are from A000:0000 to FC00:0000.

PROGRAM MEMORY ADDRESSING MODES

The PC accesses the program memory through a single 64 KByte window that can be switched between the first and second "halves" of the total 128 KByte program memory. The card has one rotary switch that configures the starting address at which the PC accesses the 64 KByte program memory window. Valid settings are from A000:0000 to F000:0000. The program memory window can "overlap" the dual-port memory window, and memory windows of other DD-429XRP1-300 Cards in the PC.

INTERRUPTS

There are six jumpers on the card that selects which IRQ line the card uses to send interrupts to the PC. The valid settings are IRQ 2, IRQ 3, ..., IRQ 7, or none.

In addition, there are four jumpers on the card which connect the DDC receiver channels to interrupt lines on the 80C186 processor. This allows users who are writing their own software for the 80C186 to enable or disable these receive interrupt lines.

DISCRETES

Each DD-429XRP1-300 Card provides five TTL compatible discrete inputs and five TTL compatible discrete outputs. Each output can provide up to 35 mA of source current at +5 volts.

ROM FEATURES

The software in ROM, which starts executing when the PC is first powered up, responds to a number of commands that are placed in the FROM-PC FIFO.

The ROM commands include the following built-in-test functions: generate a PC interrupt, fill dual-port with decrementing values, fill the first page of program RAM with NOPs, turn on all the discrete outputs, and loop FROM-PC FIFO to TO-PC FIFO.

In addition, there are commands that cause the card to jump to a certain address and begin executing, which are used by software developers to run newly loaded programs.

ARINC 429 INTERFACE

Each receiver channel will buffer two words which can be read by the 80C186 processor. Each transmitter channel will buffer eight words which will be transmitted with the minimum 4 bit gap when the transmitter is enabled. Status bits which can be read by the 80C186 processor indicate the current status of the receive and transmit buffers.

Received words are automatically checked for expected parity, which can be set to even or odd. Proper parity (even or odd as specified by the application) is automatically generated for all transmitted words.

Any receiver or transmitter can be either high or low speed. On the receive channels, data can be filtered by the hardware based on the SDI (bits 9 and 10).

INCLUDED SOFTWARE

PROGRAMMER'S TOOLBOX (DD-42991S0-300)

The Programmer's Toolbox is a library of driver functions included with all DD-429XRP1-300 PC Cards that allows a user to develop PC software without knowledge of the card's architecture, and will support up to four cards simultaneously.

The Toolbox is made up of three parts: (1) The "HEX" file that contains the Toolbox executable code that runs on the card, and is automatically loaded when the user software is initialized; (2) the header files used to develop software for the Toolbox which contain function prototypes and structure definitions; and (3) the library itself which can be supplied in a Microsoft® Visual C™, a Borland C, or as a Windows™ DLL. The C Libraries have been developed for use with any memory model.

The Toolbox supports two modes of transmission: Scheduled, and FIFO (First-In-First-Out queue). The Scheduled transmission

TABLE 2. EXAMPLES OF STANDARD TOOLBOX FUNCTIONS

<ul style="list-style-type: none"> • CONFIGURATION Initialize, OpenChannel, SetChannelSpeed, Shutdown • MULTIPLE CARD SUPPORT FUNCTIONS SetCurrentCard, GetCurrentCard • TRANSMITTING Transmit_FIFO, Transmit_FIFO_Block, Kill_Scheduled, Transmit_Scheduled, EnableParityAsData • RECEIVING AddLabel, Receive_Mailbox, Receive_FIFO, Receive_FIFO_Block, Clear_FIFO 	<ul style="list-style-type: none"> • STATUS INQUIRY GetChannelStatus, GetChannelSpeed, GetPendingArincWords, GetScheduledLabelValue, GetTimerResolution • TIME CALCULATION Get429AbsoluteTime, SetInitialAbsoluteTime, Get429TimeDifference, ZeroCardClock • INTERRUPTS EnableGlobalCardToPcInt, ClearPCInterrupt • ALSO READING/WRITING DISCRETES, DIAGNOSTICS, MESSAGE DISPLAY, ERROR HANDLING & UTILITY FUNCTIONS
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allows the user to configure the card to automatically transmit labels on a particular channel at regular intervals. The FIFO transmission allows the user to transmit a series of words in sequence. FIFO and Scheduled transmissions can be intermixed on a single channel.

The Toolbox supports two modes of reception: Mailbox and FIFO. The Mailbox reception allows the user to retrieve the "latest" copy of data received on a particular label. This mode would be used when the user is only interested in the most recently received data. The FIFO reception allows the user to dequeue words in the same sequence as they were received on the channel. The words placed in the receive FIFO can be filtered by their label and time stamped.

The Toolbox also supports the input and output discrettes on the card by allowing the user's software to request the current state of the input discrettes, and change the state of the output discrettes.

DIAGNOSTIC SOFTWARE

The diagnostic software provided with each DD-429XRP1-300 Card verifies that the card is installed and operating properly. This is useful when a card is first installed in a PC in order to verify that the card and PC are communicating, i.e., that the card has been configured correctly for a particular PC.

The diagnostic software verifies the operation of the command/response FIFOs, the dual-port and program RAM, the input and output discrettes, the PC interrupts, the ARINC receive/transmit hardware, as well as the ARINC transmit drivers.

OPTIONAL SOFTWARE

DATA BUS ANALYZER (DD-42901S0-300))

Menu-driven, easy-access-to-data analysis of ARINC 429 bus traffic. Features include filtering, and triggering with real-time raw data conversion in user definable engineering units.

PROTOCOL INTERFACE TESTER (DD42903S0-300)

Allows development of high-level scripts to transmit ARINC 429 data on multiple high- or low-speed transmit channels simultaneously. This software can transmit data based on the contents of received data, therefore simulating complex ARINC 429 protocol scenarios.

ARINC 615 (603) DATA LOADER (DD-42905S0-300)

Performs all functional requirements of a portable or airborne ARINC 615 (603) data loader.

WILLIAMSBURG PROTOCOL (DD-42904S0-300)

Monitors and simulates protocol used for file transfer of binary or character-oriented file data between airborne systems such as ACARS.

ORDERING INFORMATION

MODEL NUMBER DD-42912P1-300

The 1x2 card supports one transmitter and two receiver channels. This card is designed to support users looking for a low-cost solution for test environments where few channels are needed. The 1x2 card can be upgraded to a 2x4, 4x4, or 8x4 should additional channels be required.

MODEL NUMBER DD-42924P1-300

The 2x4 card supports two transmitter and four receiver channels. This is DDC's most popular model which has the best price/performance ratio. The 2x4 card can be upgraded to a 4x4 or a 8x4 card with the addition of a multiplexer daughter card.

MODEL NUMBER DD-42944P1-300

The 4x4 card supports four transmitter and four receiver channels. These additional transmit channels are gained through use of a multiplexer daughter card requiring a second PC slot. The multiplexer card takes the output from the two transmitters on the 2x4 base card and multiplexes each of them to two transmit channels. Only one transmitter from each multiplexed pair can be transmitting at a time.

MODEL NUMBER DD-42984P1-300

The 8x4 card supports eight transmitter and four receiver channels using the multiplexing process described above for the 4x4 card.

SELECTABLE OPTIONS

Card jumpers control PC interrupts. Card switches and jumpers control PC memory address and card I/O addresses.

DOCUMENTATION

Detailed installation instructions and user documentation are provided with all products.



SUPPORT

ILC Data Device Corporation is committed to providing unsurpassed customer support. All hardware has a two-year

limited warranty, software has a 90-day limited warranty. For this warranty period, all software updates are free.

DD-429XRP1-300

