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Software User's Manual
for the DD-42977S0
ARINC 429 LabVIEW Library
for the DD-42916, PMC Card Family

MN-42977S0-002

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RECORD OF CHANGE

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HOW TO USE THIS MANUAL

This manual uses typographical and iconic conventions to assist the reader in understanding the content. This section will define the text formatting and icons used in the rest of the manual. This manual is formatted with a 'Scholar Margin' where many tips, symbols or icons will be located.

Text Usage

BOLD–text that is written in bold letters indicates important information and table, figure, and chapter references.

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<…> - Indicates user entered text or commands.

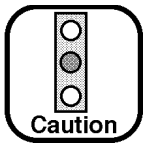
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The Idea/Tip icon will be used to identify a handy bit of supplementary information that may be useful to the user.



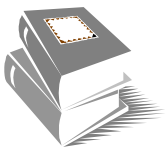
The Note icon signifies important supplementary information that will be useful to the user.



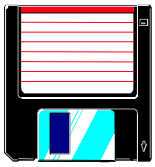
The Caution icon identifies important information that presents a possibility of damage to the product if not heeded.



Much stronger than a Caution, the Warning icon presents information pertaining to hazards that will cause damage to the product and possible injury to the user.



The Reference icon indicates that there is related material in this manual or in another specified document.



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INTRODUCTION

This document describes the **DD-42977S∅** LabVIEW software, designed for use with the DD-42916C1, DD-42916I3, and DD-42916/32V3 cards herein referred to as the PMC Card. The following describes how to utilize the card from LabVIEW (ver. 5.1 or later). For more information on the PMC Card, including instructions on installing the card and running diagnostics, please refer to your card user's manual.

The DDC PMC Card LabVIEW Libraries allow a programmer access to the following DDC PMC Card features in a simple, easy to understand format:

Transmitting

- Queued FIFO transmission to any channel
- Scheduled label and SDI rate transmission to any channel
- Scheduled major/minor frames transmission to any channel.

Receiving

- "Mailbox" type reception from any channel
- Queued FIFO reception from any channel
- Filtering of received labels
- Time stamping of received data

Discrete I/O

- Discrete input reading
- Discrete output writing

Miscellaneous

- Configurable Interrupts
- Programmable ARINC bus speed (High or Low)
- Supports up to eight PMC cards per PC

The LabVIEW package allows a programmer to program the card without writing any C code. The LabVIEW interface will use the card's dynamic link library of functions to allow the host to program the card from a LabVIEW library environment.

What is included in this manual?



This manual contains a detailed guide for the **DD-42977SØ** LabVIEW software. This manual contains an overview of how the VIs (Virtual Instruments) relate to one another, card operation, alphabetical listing of all the VIs for the card, how to use them, what parameters are passed to them, what errors can occur, and helpful notes. This manual will provide sufficient detail to allow a user to start programming the card. This manual also contains information about the example VIs that combine several of the driver VIs to perform simple transmitting and receiving of ARINC 429 data.

System Requirements

An IBM compatible PC with a Pentium processor or better, is required for operation. The PC must be configured with the Windows 95, 98, NT, or 2000 operating system, National Instruments LabVIEW Version 5.1 or later, math co-processor, and disk drive as required by the software. At least one PMC Card from Data Device Corporation is required for communications. The software for the PMC Card is the DD-42977SØ for Windows 95/98/2000 and software for Windows NT is also required.

GETTING STARTED

This section provides an overview of all the card's functions, how they relate to each other, what initialization is necessary, and the order in which some functions must be used. It is recommended that you read this chapter in its entirety before trying to use any of the card's functions.

PMC CARD

The PMC Card is a single processor design that provides reliable high-performance ARINC 429 reception and transmission. The PMC Card communicates to the host via 512 Kbytes of Dual-Port RAM, a Command FIFO, a Response FIFO, and optional interrupts. The Command FIFO is used to communicate commands to the card from the host. Any response to a command is sent back to the host through the Response FIFO. The 512 Kbytes of Dual-Port RAM is used primarily to communicate large volumes of ARINC 429 data. The interrupts are used to indicate to the host that an important event warranting immediate attention has just occurred.

When transmitting, the host can request that the card send data sequentially from a First-In-First-Out (FIFO) queue, or can request that the card automatically send scheduled data and allow the host to update the data asynchronously.

When receiving, the host can get data sequentially from a FIFO, or get the most recent data for any label/SDI combination from a "mailbox" slot. The data placed in the receive FIFO can optionally be stamped by the card, if the host wishes to do so.

The user can configure the size of the transmit and receive FIFOs stored in the card's memory through the use of the **Define Tx Channel** and **Define Rx Channel VI's.**

Figure 1 shows a block diagram of the 16-channel PMC Card.

For a more detailed description of the PMC Card please see the Hardware/Software Users Manual for the *DD-42916C1-300* ARINC 429 PMC Card.

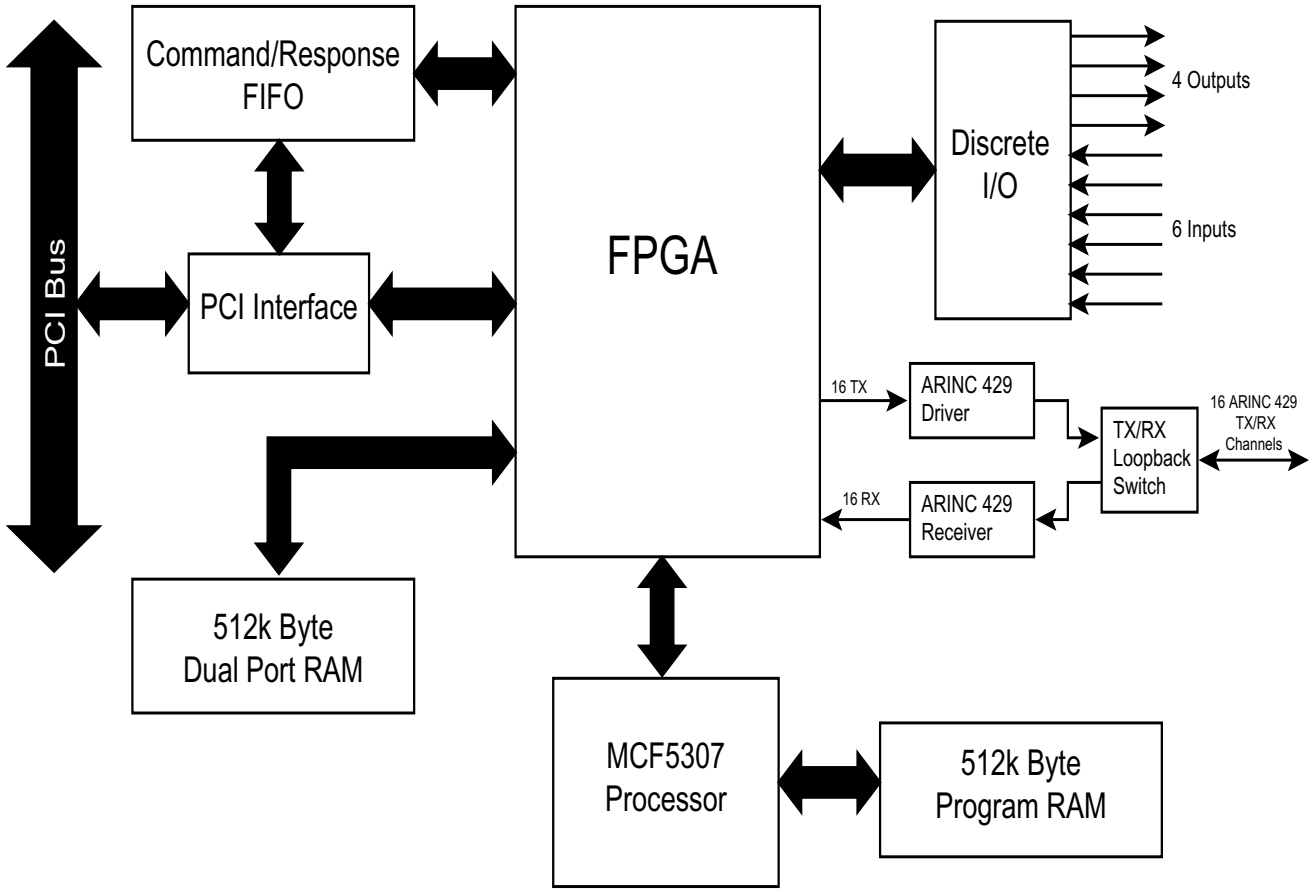


Figure 1. DD-42916C1-300 16-Channel ARINC 429 PMC Card Architecture

HOST VI FUNCTIONS

The following section lists all of the Virtual Instruments that are contained within each library. A description on initializing, transmitting, and receiving on the card is given in this section.

CHANNEL.LLB

- Enable SSM Filter
- Get Channel Type
- Get Clock Time
- Get Label Rate
- Get Number in FIFO
- Get Scheduled Rate
- Get Size Of FIFO
- Get State Of FIFO
- Halt Channel
- Load Engineering Conversion Table
- Set Filter Enabling
- Start Channel

DISCRETE.LLB

- Read Input Discrete
- Write Output Discrete

EXAMPLE.LLB

- FIFO Loopback Test
- PMC Interrupts
- PMC Rx FIFO

- PMC Tx FIFO
- PMC Tx Schedule Rates
- PMC Tx Schedule Table
- Tx Rx Loopback Test

RECEIVE.LLB

- Define Rx Channel
- Define Rx Filter Words
- Define Rx Interrupt Filter
- Get Rx Filter
- Modify Rx Channel
- Read Mailbox
- Receive FIFO

SUPPORT.LLB

This library contains lower level Virtual Instruments that are used within the higher level Virtual Instruments that are contained in the other libraries. The user does not need to access this library.

SYSTEM.LLB

- About 429 PMC LabVIEW Interface
- Append Error
- Card Initialization
- Dequeue Errors
- FIFO Loopback
- Free Card
- Get Free Memory

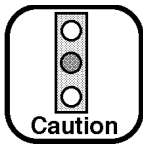
- Get Interrupt Source
- Get Memory Address
- Get Number Of Free Timers
- Initialize
- Query IRQ Handler
- Reset Card
- Reset Clock
- Set Interrupt Conditions
- Software Version
- Start IRQ Handler
- Stop IRQ Handler
- Tx/Rx Loopback

TRANSMIT.LLB

- Define Tx Channel
- Define Tx Schedule Rates
- Define Tx Schedule Table
- Define Tx Schedule Update Rates
- Modify Tx Channel
- Set Precise Tx Timer Mode
- Transmit FIFO
- Transmit Scheduled
- Update Tx Schedule Rates

INITIALIZATION

When the card is first powered up, it automatically runs through its Power-On-Self-Test (POST) functions, and places the results in the Response FIFO. This appears to the host as though a **Reset Card** command was initiated.



The host should never attempt to place any commands in the Command FIFO, or write any data into the Dual-Port RAM until an "OK" response to the **Reset Card** command is received in the Response FIFO.



In order to program a card, the first function call to the device **must** be the **Card Initialization** VI. This VI allocates system resources, allowing the user to access the card through the use of the API. This VI must be called for each *DD-42916C1* PMC Card device in a system. Upon termination of a cards use, the **Free Card** VI may be called to de-allocate any previously allocated resources.

In order for the card to function as desired, some initialization must be performed. The user must choose how each channel is to operate. Channels must be configured to function as a transmitter or receiver, the speed at which it will operate, and how the card will process the data for a channel. To configure a receiver channel, the **Define Rx Channel** VI is used. To configure a transmitter channel, the **Define Tx Channel** VI is used.

After all channels have been configured, the **Get Memory Address** VI can be used to determine the starting addresses, in Dual-Port RAM, for the FIFOs and Mailboxes. To start a channel operating, the **Start Channel** VI must be used, as the channels default to the "halted" state following a "Define" command. The **Halt Channel** VI is used to turn the channel off again. The **Load Engineering Conversion Table** VI allows the user to define ARINC 429 word types and scale factors for each label/SDI combination for each separate channel.

TRANSMITTING

Before trying to transmit on the *DD-42916C1* PMC Card, the user should first configure the channel with the **Define Tx Channel** VI. Once a channel has been configured it must be started with the **Start Channel** VI.

The *DD-42916C1* PMC Card is capable of transmitting in two modes: FIFO and Scheduled. When FIFO mode is selected through the **Define Tx Channel VI**, a First-In-First-Out queue is created in Dual-Port RAM, in which the host can place ARINC 429 data to be transmitted. This data will be transmitted in the exact order in which it is placed in the queue. When Scheduled mode is selected through the **Define Tx Channel VI**, a Dual-Port RAM queue is created in which the user can place "new" ARINC 429 data that is transmitted when scheduled. The size of the FIFO and Schedule data queue are selectable and can be set within the range of 16 to 32,767 32-bit words. The **Define Tx Channel VI** returns the byte offset in Dual-Port RAM for the start of the FIFO and Scheduled data queues. If both FIFO and Scheduled modes are selected, the scheduled data always takes priority over the FIFO data. FIFO data words "fill-in" the gaps between the scheduled data.

FIFO data can be sent to the card's Dual-Port RAM to be transmitted onto the data bus by calling the Transmit FIFO VI. Once this VI is called the ARINC data will be written to the card's Dual-Port RAM. The software will write all of the data to the Dual-Port RAM and then update the card's end pointer so that the data can get transmitted onto the data bus in the same order in which it was entered by the host. The Start Channel VI should have been previously called in order for the data to get transmitted onto the data bus.

Scheduled data can be sent to the card's Dual-Port RAM to be transmitted onto the data bus by calling the Transmit Scheduled VI. Once this VI is called the ARINC data will be written to the card's Dual-Port RAM. The software will write all of the data to the Dual-Port RAM and the PMC card will transmit the data at the selected rate input by the host or will transmit a previously defined scheduled frame.

After the channel has been defined once, the user can reconfigure the channel's parity and transmission speed using the **Modify Tx Channel VI**.

Transmission Schedules

If scheduled data is to be transmitted, the user must select Scheduled mode through the **Define Tx Channel VI**. There are two ways to schedule a transmission, by Table or by Rate. The **Define Tx Schedule Table** or **Define Tx Schedule Update Rates** VI's are used, respectively, to configure scheduled transmissions. Following defining a scheduled transmission, the **Start Channel** VI may now be used.

The **Define Tx Schedule Rates** VI allows the host to define a schedule that will continuously transmit up to 10 Label/SDI combinations at a fixed rate on any given channel.

The Define Tx Schedule Update Rates VI allows the host to update an already defined transmission schedule. The user must have already created the schedule via the Define Tx Schedule Rates VI. When a schedule needs to be updated for changes in the transmission rate, or to enable/disable a particular label/SDI combination the DefineTx Schedule Update Rates VI should be used.

The **Define Tx Schedule Table** command allows the host to define a table of scheduled data that will continually be transmitted by the designated channel.

The **Define Tx Schedule Table** VI schedule table organizes a user-defined number of "minor frames" into a "major frame." The card will transmit each minor frame in sequence until all the minor frames have been transmitted. This cycle of minor frames comprises one major frame. Once the major frame has been transmitted, the card will start over again with the first minor frame.

The user must list all the label/SDI combinations to be transmitted at the rate at which they will be transmitted. If the user wishes to distinguish only by label and not label and SDI then the set SDI must be set to a value of 15. The rate is the number of 1 ms ticks between transmissions, if the card is in default timer mode.

The user defines which ARINC 429 words (as defined by label/SDI combinations) are transmitted as part of each minor frame. Defining the minor frame interval, frame size, and a number of minor frames, which compose the major frame, configures the schedule table. The minor frame interval is the number of 1 ms ticks in a minor frame. The frame size is defined as the maximum number of transmitted words in any one minor frame.

For example, if the number of minor frames is three, and the minor frame size is four, then after the three minor frames are transmitted once, they will repeat in sequence as shown in Figure 2.

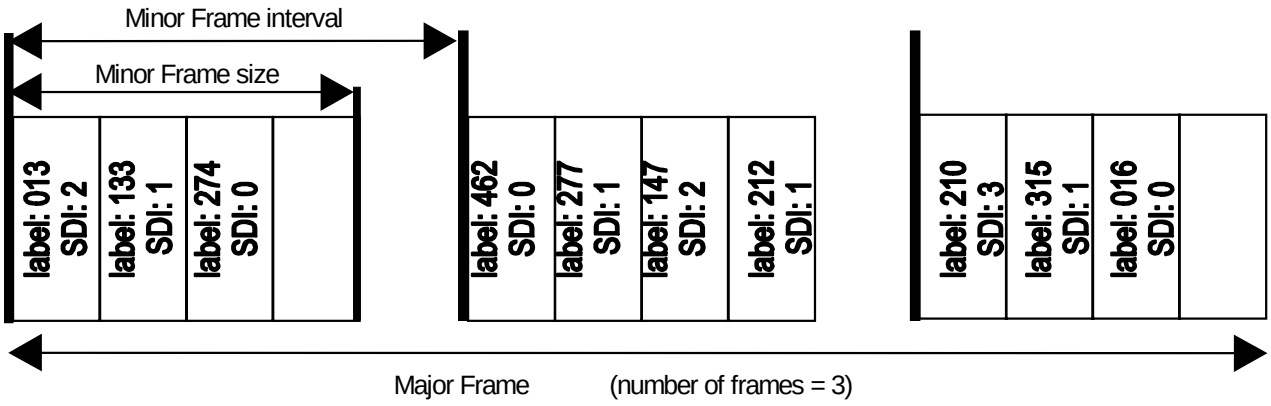


Figure 2. Transmission Schedule Table

RECEIVING

Before trying to receive on the PMC Card, the user must configure the channel with the **Define Rx Channel VI**, and then start the channel operating with the **Start Channel VI**.

The PMC Card is capable of receiving in two modes: FIFO and Mailbox as shown in Figure 3. When FIFO mode is selected through the **Define Rx Channel VI**, a First-In-First-Out queue is created in Dual-Port RAM, from which the host can read the received ARINC 429 data and time stamps in the exact order in which the words are received. The time stamps have a 1 µs resolution. The size of the FIFO is selectable and can be anywhere from 16 to 32,767 32-bit words.

When Mailbox mode is selected through the **Define Rx Channel VI**, a Dual-Port RAM "Mailbox" is created from which the host can read the most current data for a particular label/SDI combination. Both FIFO and Mailbox modes can be used simultaneously.

When using the FIFO mode, a filter is available to restrict which label/SDI combinations are to be placed into the FIFO. Filter values are defined using the **Define Rx Filter Words VI**. The default of all filter values is enabled, which will allow Rx channels to receive all words until the first **Define Rx Filter Words VI** is received. From that point on, the channel receives only the words defined by this command.

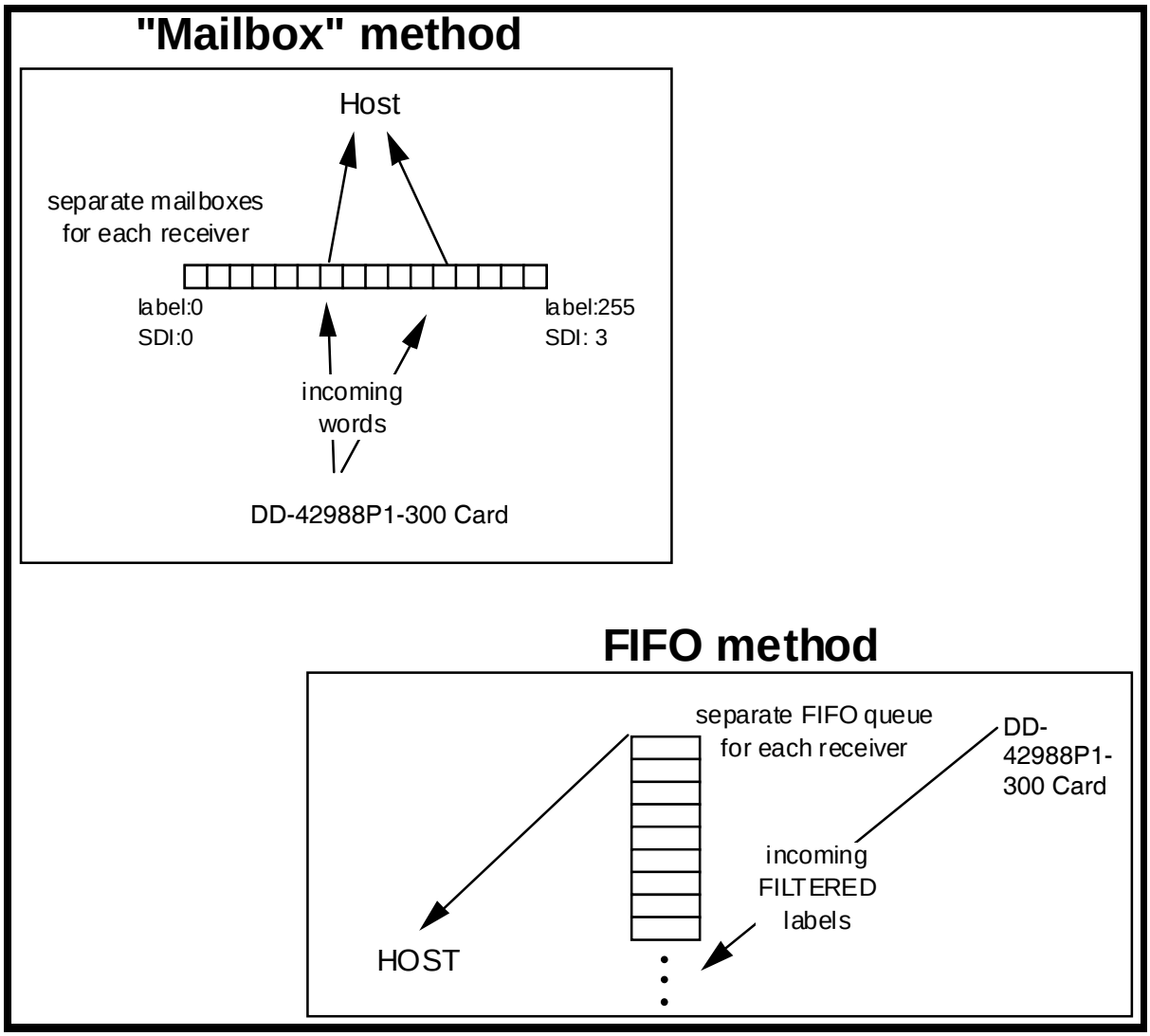


Figure 3. Receiver Methods

Reading and Writing Discretes

There are two basic commands for handling the card's discrete inputs and outputs. The **Write Output Discrete VI** is used for setting the value of all discrete outputs on the *DD-42916C1* PMC Card, and the **Read Input Discrete VI** is used for reading the discrete inputs.

Timers and Time Stamps

There is a timer that is used to time stamp the ARINC-429 words as they are received. The timer is initially set to zero when the card is first powered-up, or the **Reset Card VI** is issued. The **Reset Clock VI** can be used to reset the timer without resetting the card and all its configured channels. Time Stamps have 1 µs resolution. Therefore, a time stamp of 10 would be 10 µs. Time Stamps are 32 bits of unsigned data. Therefore, the time stamp will "rollover" approximately every 71.6 minutes of operation.

Generating Interrupts

The *DD-42916C1* PMC Card is capable of generating interrupts to the host. Interrupts can be generated when an ARINC 429 word is received, receive error occurs, changes in transmit or receive FIFO status, or at the end of a major frame. There is a structure in Dual-Port RAM that allows the host to determine the cause(s) of an interrupt generated by the card. For a detailed description of this structure please see the Hardware/Software Users Manual for the *DD-42916C1-300* ARINC 429 PMC Card.

A user defined interrupt handler function may be used in programming.

If a handler function is required, it can be passed to the DLL through the **Set Interrupt Conditions VI**.

Diagnostic Functions

The **FIFO Loopback Test VI** takes a string of data and wraps it from the Command FIFO to the Response FIFO. This command can be used to determine whether host communication has been established.

Following a **Reset Card VI** the Card will be reset to its power-up state. It automatically runs the Power-On-Self-Tests (POST), and returns a list of failures. Self-test covers Processor test, Dual-Port RAM test, Receiver High and Low speed test.

The **Reset Card VI** is implicit on power-up. The OK response and list of POST failures is placed in the Response FIFO each time the card is powered-up, without an explicit host command. The host must wait for this response in the Response FIFO before sending the card any commands, or placing any data in

Dual-Port RAM. It takes approximately 3.5 seconds for all tests to complete and for a response to appear in the respnse FIFO.

The **Tx Rx Loopback** function allows the user to transmit a data word through a channel transmitter and back into its receiver. The received data word is checked for parity and short word errors.

Diagnostic LED's

Diagnostic LED's are provided as a visual aid to indicate proper card initialization, and to show channel activity. On power-up, or following a **Reset Card** command, the green LED located on the front panel of the card, will turn off until the card is initialized. If the *DD-42916C1* PMC Card fails any POST. diagnostics, the LED will flash five times before turning solid green. If the card initialized properly, this LED will immediately switch to solid green.

There are also 16 red miniature LED's located on the upper left side of the printed circuit card. Each of these LED's indicates activity on a channel. LED's will turn on during any transmission or reception of ARINC data.

Error Handling

The card keeps track of how many errors of a particular kind have occurred for each channel. This includes the number of receive parity errors and the number of short word receive errors. The **Dequeue Errors** command allows the host to retrieve the current error counts for all these error types. After the **Dequeue Errors** command is called, the error counts are all cleared to zero.

Utility Functions

There is a single utility function that allows the user to determine the version number of the card's firmware. This command is called **SoftwareVersion**, and it returns three digits that determine the version "X.Y.Z."

Command Status Error Handling

Errors that are detected due to the application setting up the card incorrectly, passing a bad parameter to the card, trying to

use too much memory, etc., are considered Command Response Status errors, since the application is trying to operate the card in an invalid fashion and receives a Response Status value other than OK. These errors are determined by evaluating the returned Command Status output from the VI. The Command Status errors are listed in Table 1.

Table 1. Command Status Error Messages (Continued)

Response Status	Description	Value
OK	The command was successfully executed as commanded by the host	7
BAD PARAMETER	One or more of the parameters passed as part of the command was not a legal value	8
CHANNEL IN USE	Error generated when host tries to re-define a channel using **Define Tx Channel** or **Define Rx Channel** when the channel has been previously defined	9
CHANNEL NOT DEFINED	Error generated when the host tries to use a channel that has not yet been defined	11
CHANNEL NOT FIFO	Error generated when the host tries to setup filtering labels using the **Define Rx Filter Words** VI when the channel was not configured as a FIFO receive channel using the **Define Rx Channel** command	12
CHANNEL NOT RX	Error generated when the host tries to use a receive channel command (such as **Define Rx Filter Words**) and the channel was configured as a transmitter using the **Define Tx Channel** command	13
CHANNEL NOT SCHEDULED	Error generated when the host tries to use the **Define Tx Schedule Table** command when the transmit channel was not configured for scheduled transmission using the **Define Tx Channel** command	14
CHANNEL NOT TRANSMIT	Error generated when the host tries to use a transmit channel command (such as **Define Tx Schedule Table**) and the channel was configured as a receiver using the **Define Rx Channel** command	15
UNDEFINED ERROR	Error generated when an unrecognized command is sent by the host	17
MEMORY ERROR	Error generated when there is not enough Dual-Port RAM remaining to configure the FIFOs or Mailboxes requested by either the **Define Tx Channel**, or **Define Rx Channel** command	18
UNDEFINED ERROR	Error generated when an unrecognized command is sent by the host	19

Table 1. Command Status Error Messages (Continued)		
Response Status	**Description**	**Value**
UNDEFINED ERROR	Error generated when an unrecognized command is sent by the host	20
UNDEFINED ERROR	Error generated when an unrecognized command is sent by the host	21
RESET ERROR	This response indicates that an error has occurred in one or more of the diagnostic tests that are run at reset.	25
CARD NOT RESPONDING	This error indicates that part of a command was received and then one second elapsed, causing the command to timeout. This can be returned from any command. This is usually caused when the Command FIFO overflows and part of a command is lost.	6
DATA LOST	Error generated when the host does not read the data from the FIFO fast enough, and a FIFO overflow has occurred	5
INTERNAL ERROR	An error internal to the card has occurred	4
CHANNEL NOT MAILBOX	Error generated when the host tries to use a receive channel command (such as **Read Mailbox**) and the channel was configured as a transmitter using the **Define Tx Channel** command	3
BUFFER NOT EMPTY	An error has occurred during configuring a queue because a value that exceeded the minimum remaining queue size was used.	2
BUFFER TOO SMALL	An error has occurred during configuring a queue because a value less than the minimum queue size was used.	1
SERIAL NOT CONFIGURED	An error was generated because during attempts to transmit the FIFO never became less than 1/2 full, because during attempts to receive no data was available in the FIFO, or an unexpected opcode returned during attempts to read the FIFO.	0

ENGINEERING UNITS

The **Load Engineering Conversion Table** VI allows the user to define word types and scale factors for each label on each separate channel. The ARINC 429 data type specified in the **Load Engineering Conversion Table** VI will effect the representation of the incoming and outgoing data in the four transmission and reception VIs (**Transmit FIFO, Transmit Scheduled, Receive FIFO** and **Read Mailbox**).

If the ARINC data type specified is Alpha-Numeric, BCD Raw, Discrete, or Undefined, then the data being sent and received will be represented only as U32. If the ARINC data type specified is Binary Coded Decimal, or Binary, then the data being sent and received will be represented as both a raw U32 word and as an SGL floating point value.

For example, if a specific label has been defined as BCD, then when it is sent using the **Transmit FIFO** VI, the user must place the desired data to be sent into the Engineering Unit Data (SGL) field, not the Raw 429 Data field.

If the ARINC 429 data type is Alpha-Numeric, then the three seven-bit data characters are represented as eight-bit bytes with the high order byte of the U32 being unused. The next byte represents data word #3 and the low order byte represents data word #1.

32 25,	24 17,	16 9,	8 1
Unused	Data word #3	Data word #2	Data word #1

VI DEFINITIONS

This section contains detailed descriptions of all the VIs in the DDC LabVIEW Virtual Instruments (VI) Library for ARINC-429. Each VI description contains information about the VI's functionality, the controls passed, and the indicators returned.

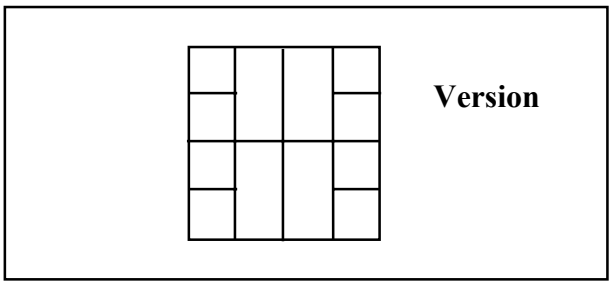
Each control or indicator description in this manual displays an icon before the name to designate its data type. These icons are illustrated and defined in Table 2.

Table 2. Control and Indicator Icons

CONTROL	INDICATOR	DATA TYPE
		Char
		Array of Char
		Integer
		Long Integer
		Unsigned Integer
		Unsigned Long Integer
		IEEE Standard Single Floating Point Value
		IEEE Standard Double Floating Point Value
		String
		Boolean
		Array of Unsigned Integer
		Array of Cluster
		Cluster
		File Path

ABOUT 429 PMC LABVIEW INTERFACE

The **About 429 PMC Labview Interface VI** will display a dialog showing the copyright and version information of the LabVIEW driver. This should not be confused with the version number returned by the **Software Version** VI which returns the card's firmware version and library version. Selecting the OK button will close this dialog.



INDICATORS	VALID VALUES
abc Version	X.Y.Z.

SEE ALSO:

Software Version

APPEND ERROR

The **Append Error** VI appends an error to the standard error out cluster. The parameters passed into the VI will be added to the error in and reported in the error out. The error code will be set to the value of the Error # Base logically OR'ed with the Error # Offset. This will overwrite the current error code in the error cluster. The Error Text will be appended to the source field. A VI Name can be provided for reporting the VI where the error was detected. This will be added to the source text.

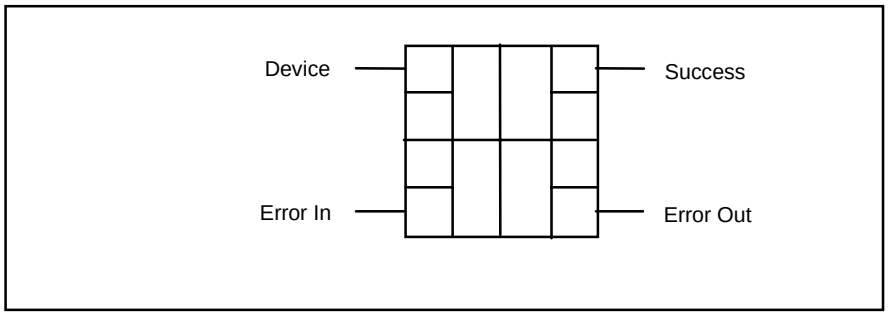
CONTROLS	VALID VALUES
Error # Base	-32768..32767
Error # Offset	-32768..32767
Error Text	ASCII characters
VI Name	Path
Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS	VALID VALUES
Error Out	Contains error information

CARD INITIALIZATION

The **Card Initialization** VI allows the card to be assigned a device number so that it can be used. The VI also initializes all global system resources required for the card operation.

The user only needs to pass the logical device number of the card that the user wishes to initialize. This VI must be issued before any other VI can be used. The user can call the Initilize VI, which includes a call to this VI instead. After calling either the initialize VI or the card Initialization VI, the Reset Card VI should be called.



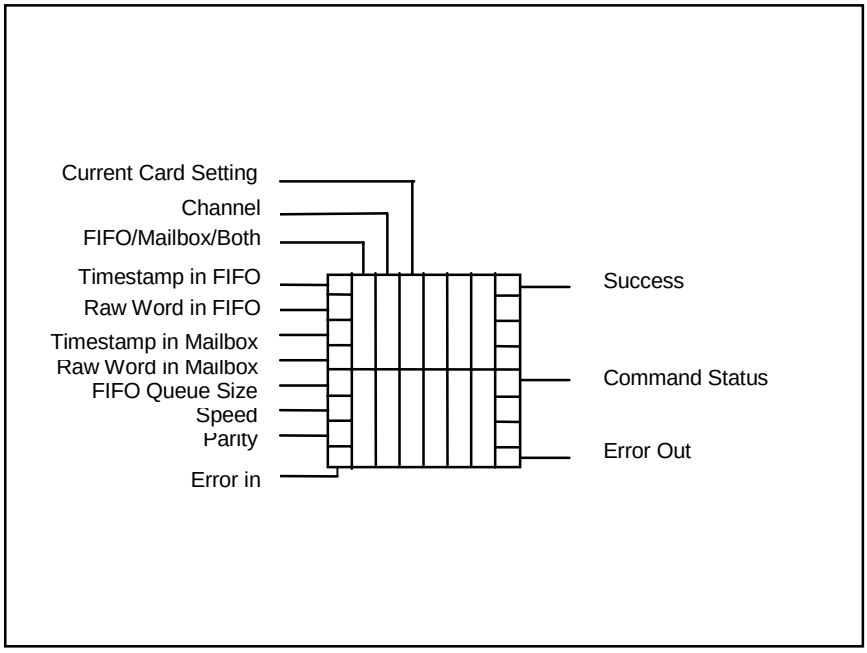
CONTROLS		VALID VALUES
U16	Device	The logical device number. (1…8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
	Error Out	Contains error information

SEE ALSO:

Free Card Initialize
Reset Card

DEFINE RX CHANNEL

The **Define Rx Channel** VI allows the user to configure a receive channel. When the **Define Rx Channel** is complete, the channel is in the "halted" state, and must be started using the **Start Channel** VI.





Note: When configuring a queue size, the user must add a buffer of one byte to the queue. i.e., if the desired queue size is "1024", the configured queue size must be "1025."

CONTROLS		VALID VALUES
U16	Current Card	The logical device number (1..8)
U16	Channel	The desired channel number to be configured as a receiver (0..15)
U16	FIFO/SCHED/BOTH	0=FIFO 1=MAILBOX 2=BOTH
U16	Parity	0=NONE 1=EVEN 2=ODD

U16	Speed	0=LOW 1=HIGH
TF	Timestamp in Mailbox	ON=1, OFF=0
TF	Raw Word in Mailbox	ON=1, OFF=0
TF	Timestamp in FIFO	ON=1, OFF=0
TF	Raw Word in FIFO	ON=1, OFF=0
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words (16..32,767).
error	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Memory Error, Channel In Use, Card Not Responding
error	Error Out	Contains error information



Note: The FIFO Queue Size parameter does not represent the number of ARINC data words to be received. This value represents the number of 32-bit long words placed in the FIFO when one ARINC data word is received. The number of 32-bit long words needed for one received ARINC data word varies from two to four depending on how the “Timestamp, in FIFO” and “Raw Word in FIFO” parameters are set. If both parameters are set to on, then four 32-bit long words are placed in FIFO for each received ARINC data word in mailbox mode is automatically calculated by the cards firmware so the user can input the number of ARINC data words for this parameter if in mailbox mode.

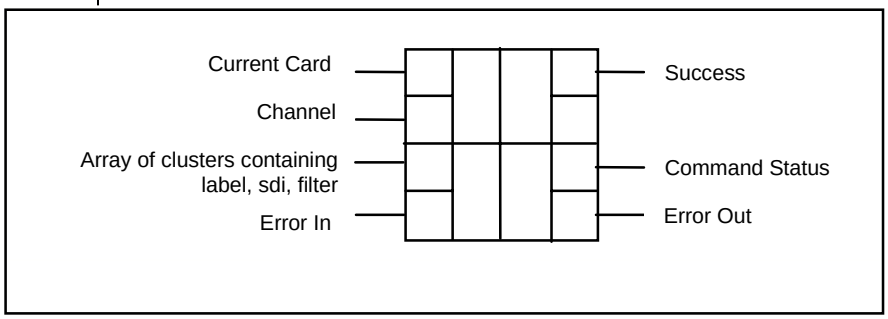
SEE ALSO:

Card Initialization
Define Rx Filter Words
Modify Rx Channel
Define Rx Interrupt Filter

DEFINE RX FILTER WORDS

The **Define Rx Filter Words** VI allows the card to filter incoming data, based on label/SDI combinations. It is not mandatory to use this function when receiving data (the default mode is to receive all data that occurs on the bus), but this function can be used to reduce the total amount of data passed from the card to the PC by filtering out unnecessary or irrelevent data that occurs on the 429 bus. Once the card receives the **Define Rx Filter Words** command, the specified channel receives only those words defined by the VI. **Define Rx Filter Words** can be called before or after the channel has been started.

The user only needs to pass the label/SDI filters it wishes to change via the **Define Rx Filter Words** VI. Any previously set filters will not be affected.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired channel number to be configured as a receiver. (0..15)
[ ]	Array of clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 data word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
TF	Filter	0=FILTERS DISABLED 1=FILTERS ENABLED
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Receive, Channel Not FIFO, Card Not Responding
	Error Out	Contains error information

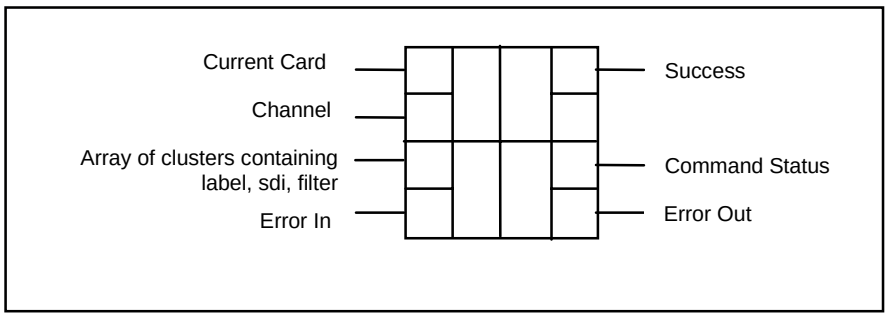
SEE ALSO:

Define Rx Channel
Define Rx Interrupt Filter
Set Rx Filter Enabling
Modify Rx Channel
Get Rx Filter

DEFINE RX INTERRUPT FILTER

The **Define Rx Interrupt Filter VI** allows the host to select a subset of label/SDI combinations that will generate interrupts. The **Set Interrupt Condition VI** must be used to enable the "word received" interrupt for a particular channel in order for the card to generate any hardware interrupts. When the "word received" interrupt is configured, all words received and placed in the Receive FIFO generate an interrupt.

If the **Define Rx Interrupt Filter** VI is not used, and **Set Interrupt Conditions** is enabled, all words received and placed in the receive FIFO will generate an interrupt.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired channel number to configure. (0..15)
[ ]	Array of clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
TF	Filter	0=FILTERS DISABLED 1=FILTERS ENABLED
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

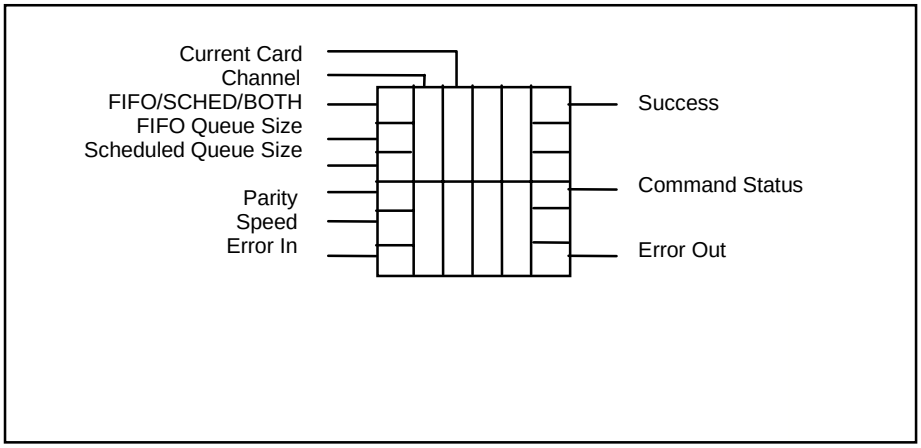
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Receive, Channel Not FIFO, Card Not Responding
error	Error Out	Contains error information

SEE ALSO:

Define Rx Channel
Define Rx Filter Words
Modify Rx Channel
Set Interrupt Conditions

DEFINE TX CHANNEL

The **Define Tx Channel VI** allows the user to configure a transmit channel. When the **Define Tx Channel VI** is complete, the channel is in the “halted” state, and must be started using the **Start Channel VI**.





When configuring a queue size, the user must add a buffer of one byte to the queue. i.e., if the desired queue size is “1024”, the configured queue size must be “1025.”

CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The channel number to be configured as a transmitter. (0..15)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
U16	FIFO/SCHED/BOTH	0=FIFO 1=SCHEDULED 2=BOTH
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32,767)
U16	Scheduled Queue Size	Scheduled queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32,767)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Memory Error, Channel In Use, Card Not Responding
	Error Out	Contains error information

FIFO data can be sent to the card's Dual-Port RAM to be transmitted onto the data bus by calling the Transmit FIFO VI. Once this VI is called the ARINC data will be written to the card's Dual-Port RAM. The software will write all of the data to the Dual-Port RAM and then update the card's end pointer so that the data can get transmitted onto the data bus in the same order in which it was entered by the host. The Start Channel VI should have been previously called in order for the data to get transmitted onto the data bus.

Scheduled data can be sent to the card's Dual-Port RAM to be transmitted onto the data bus by calling the Transmit Scheduled VI. Once this VI is called the ARINC data will be written to the card's Dual-Port RAM. The software will write all of the data to the Dual-Port RAM and the PMC card will transmit the data at the selected rate input by the host or will transmit a previously defined scheduled frame.

SEE ALSO:

Card Initialization
Define Rx Filter Words
Define Rx Interrupt Filter
Modify Rx Channel
Modify Tx Channel

DEFINE TX SCHEDULE RATES

The **Define Tx Schedule Rates** VI allows the host to define a schedule that will continuously transmit Label/SDI combinations at a fixed rate on any given channel.

The user must list all the label/SDI combinations to be transmitted at the rate at which they will be transmitted. There are two timing options for transmitting scheduled data. The default timing mode allows for 1ms resolution on transmitted data.

The **Set Precise Tx Timer Mode** VI can be used to change the timer resolution from 1ms to 100µs mode. This command must be called before any timers are defined (either label/rate or schedule table).

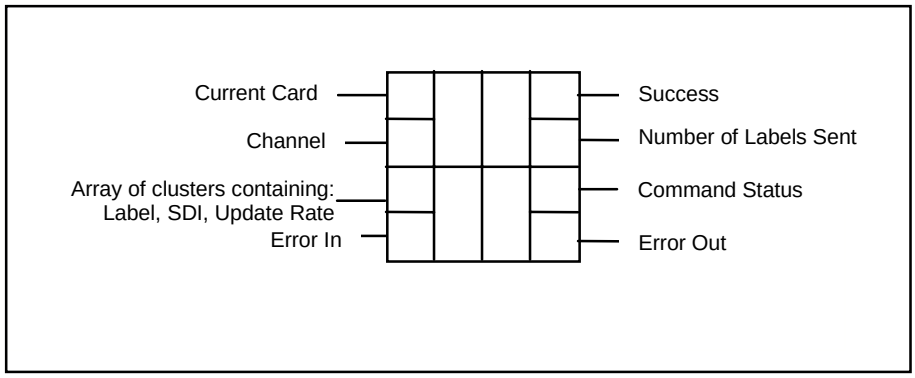
When in the default 1ms resolution mode, there are 200 timers available for use on scheduled transmissions. Precise mode, offering 100µs resolution, allows for 50 timers to be used for scheduled transmissions. Each Label/SDI transmitted Rate uses a single timer. The **Get Number of Free Timers** command can be used to return the number of all unused timers.

If the user wishes to distinguish only by label and not label and SDI then the set SDI must be set to a value of 15. The rate is the number of 1 ms ticks (default mode) between transmissions.

The data that is transmitted is not part of this command. The scheduled data is placed in the scheduled data FIFO, through the Transmit Scheduled VI.



Duplicate label/SDI entries into the list will have the effect of overwriting the previously entered values of Label/SDI combinations.



	CONTROLS	VALID VALUES
U16	Current card	The logical device number. (1..8)
U16	Channel	The desired transmit channel number to be configured. (0..15)
[TF]	Array of clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
U32	Rate	The number of 1ms (default mode) or 100µs (precise mode) clock ticks between transmissions of the label/SDI value. (1..0xFFFFFFFF)
TF	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
	Success	0=FAILURE 1=SUCCESS
	Number of Labels Sent	Contains a count of the number of labels that was contained in the array of clusters.
	Command Status	OK, Bad Parameter, Channel Not Transmit, Channel Not Scheduled, Memory Error, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Define Tx Channel
Define Tx Schedule Update Rates
Update Tx Schedule Rates
Define Tx Schedule Table
Transmit Scheduled

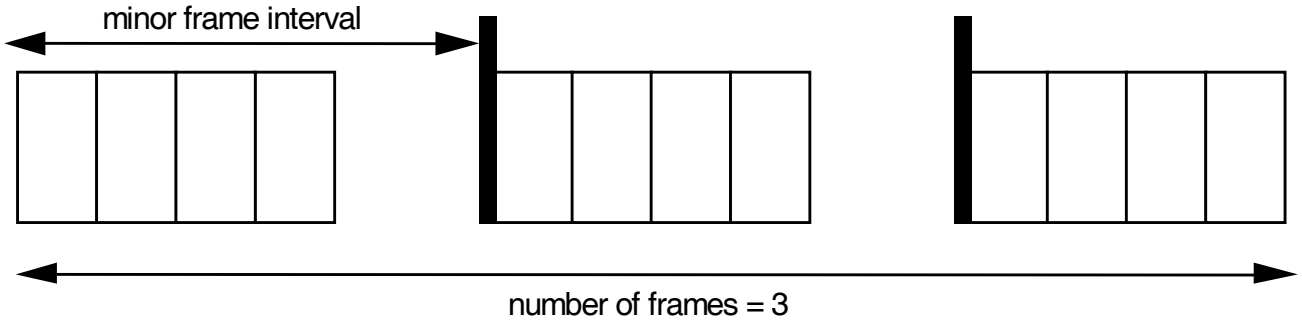
DEFINE TX SCHEDULE TABLE

The **Define Tx Schedule Table** VI allows the user to define a schedule that will continually be transmitted by the card.

The schedule table organizes a user defined number of “minor frames” into a “major frame”. The card will transmit each minor frame in sequence until all the minor frames have been transmitted. This cycle of minor frames comprises one major frame. Once the major frame has been transmitted, the card will start over again with the first minor frame.

The user specifies which ARINC 429 words (as defined by label/SDI combinations) are transmitted as part of each minor frame. The schedule table is configured when the user defines the minor frame interval, frame size, and a number of minor frames which compose the major frame. The minor frame interval is the number of 1µs (default mode) or 100µs (precise mode) ticks in a minor frame. The frame size is defined as the maximum number of transmitted words in any one minor frame.

For example, if the number of minor frames is three, and the minor frame size is four, then after the three minor frames are transmitted once, they will repeat in sequence as shown below.



The data for scheduled transmission is sent as part of the **Transmit Scheduled** VI.

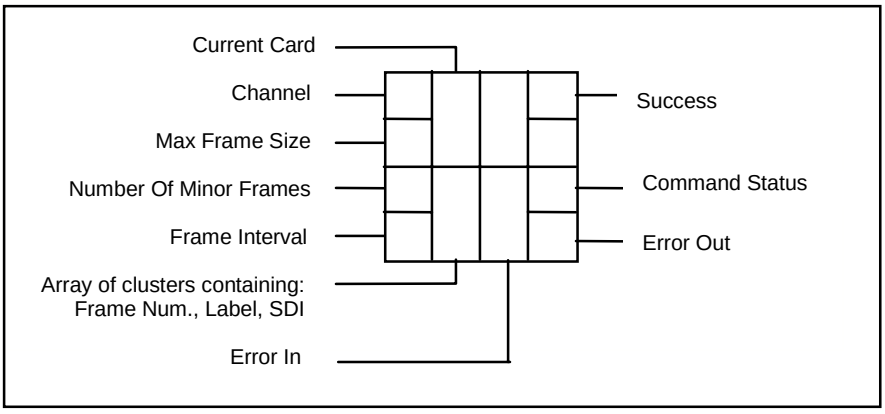
It is possible to define a schedule table that is too large to fit in the channel processor’s memory. If this occurs, a Memory Error is returned. The number of minor frames multiplied by the maximum minor frame size cannot exceed 10,240.

The label/SDI combinations are placed in each minor frame in the order in which they are received via the **Define Tx Schedule Table** VI.

The **Set Interrupt Conditions** VI allows the user to enable interrupts from the card at the start of each major frame.

The proper sequence for using this function is to first call the **Define Tx Channel** VI to set the channel up for transmitting. Next, call the **Define Tx Schedule Table** VI to define the schedule. Then call the **Start Channel** VI to activate the transmit channel. Finally, call the **Transmit Scheduled** VI to specify the data values for each label that is contained in the schedule. Only when all of these things have been done in the proper sequence will data appear on the bus.

When using scheduled transmissions, it is necessary to run one or the other of **Define Tx Schedule Rates** or **Define Tx Schedule Table,** but not both**. Define Tx Schedule Rates** is simple to use, but schedule complexity is limited. **Define Tx Schedule Table** can be used to create very complex schedules, but is more difficult to use.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel number to be configured. (0..15)
U16	Max Frame Size	The maximum size of a minor frame. (maximum number of labels in any given array, 1..4096)
U16	Number Of Minor Frames	The number of minor frames contained in a major frame. (1..4096)
U16	Frame Interval	The minor frame interval. Intervals are the number of 1ms (default mode), or 100μs (precise mode), ticks per minor frame. (3..32767)
[ ]	Array of clusters containing:	
U8	Frame Num.	The current frame. (1..4096)
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
TF	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

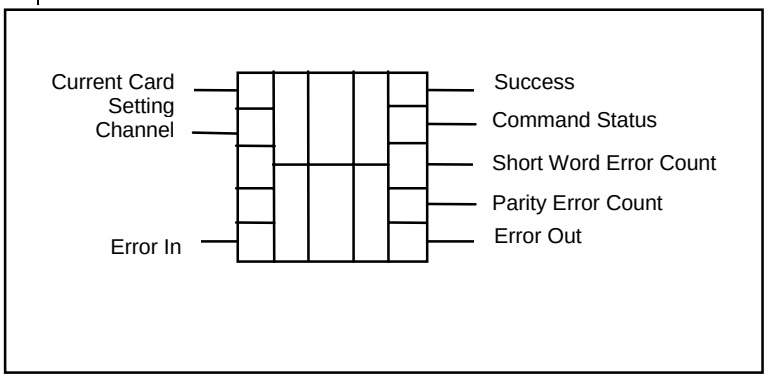
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Transmit, Channel Not Scheduled, Memory Error, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Define Tx Channel
Define Tx Schedule Update Rates
Update Tx Schedule Rates
Define Tx Schedule Rates
Modify Tx Channel
Set Interrupt Conditions

DEQUEUE ERRORS

The **Dequeue Errors** VI allows the user to determine how many errors have occurred since the last time the command was issued. Each time the **Dequeue Errors** VI is sent, the card resets all the error counts to zero.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired channel's error queue to be read. (0..15)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

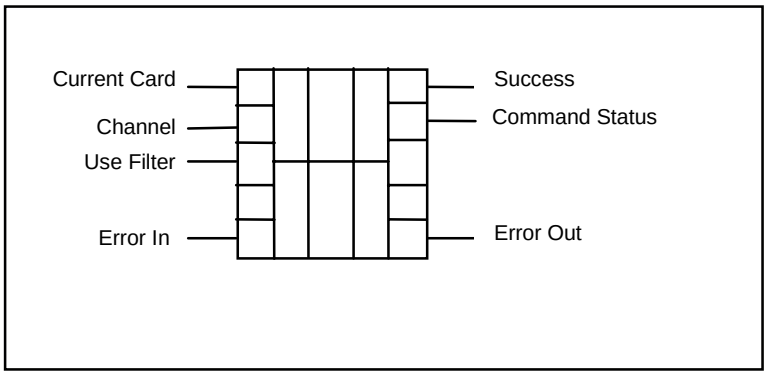
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Card Not Responding, Undefined Error
U16	Parity Error Count	The number of parity errors that have been received. (0..32767)
U16	Short Word Error Count	The number of incorrect word length errors that have been received. (0..32767)
	Error Out	Contains error information

SEE ALSO:

Define Rx Channel
Define Rx Filter Words
Modify Rx Channel
Define Rx Interrupt Filter

ENABLE SSM FILTER

The **Enable SSM Filter** VI enables or disables the mailbox SSM filtering. When this filtering is turned on, the module will not place BNR or BCD words into the mailboxes when the SSM indicates the data is not valid.



CONTROLS		VALID VALUES
U16	Current card	The logical device number. (1..8)
U16	Channel	The desired receive channel's mailbox filter to be modified. (0..15)
TF	Use Filter	0=FILTERS DISABLED 1=FILTERS ENABLED
ERR	Error In	Describes Error conditions that occur before this VI executes. The default input is no error.

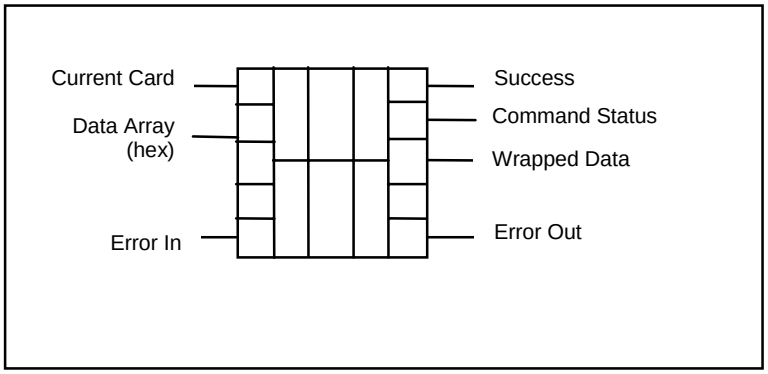
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Undefined Error
ERR	Error Out	Contains error information

SEE ALSO:

Define Rx Channel
Define Rx Filtering
Modify Rx Channel
Define Rx Interrupt Filter

FIFO LOOPBACK

The **FIFO Loopback** VI allows the user to set up a specific card with specific data to loop back. This is accomplished by placing the data into the Command FIFO and wrapping it back into the Response FIFO.

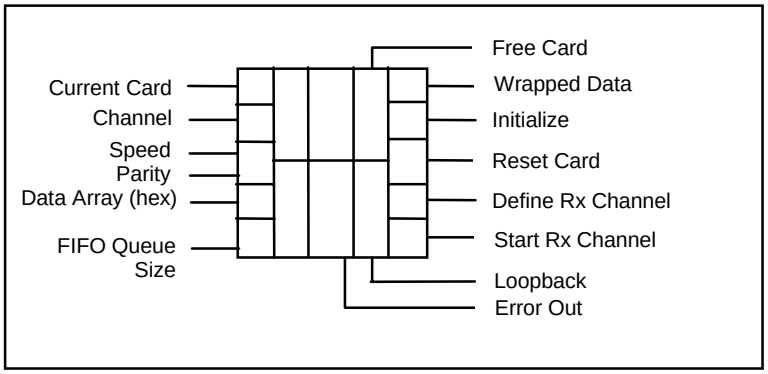


CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U8	Data Array (hex)	Array containing the data that is to be sent through the Command FIFO. (0…255)
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Undefined Error
U16	Wrapped Data	0…65,535
ERR	Error Out	Contains error information

FIFO LOOPBACK TEST

The **FIFO Loopback Test** VI uses sub-VI's to perform a loopback test on the specified card and channel at the specified speed and parity. This test will first call the initialize VI. Once this VI is successfully completed the reset VI is called to reset the card. The channel is then defined and started with the Define Rx Channel VI and the Start Channel VI respectfully. The FIFO loopback VI is then called to place the data into the channel FIFO and internally loop it back to the response FIFO. The free card VI is then called to release any resource that were allocated to the card.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1.. 8)
U16	Channel	The desired receive channel. (0..15)
U16	Speed	0=LOW 1=HIGH
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32767)
U8	Data Array (hex)	Array containing the data that is to be sent through the Command FIFO. (0…255)

INDICATORS		VALID VALUES
U16	Wrapped Data	The data that was looped back into the Response FIFO. (0…65535)
TF	Initialize	0=FAILURE 1=SUCCESS

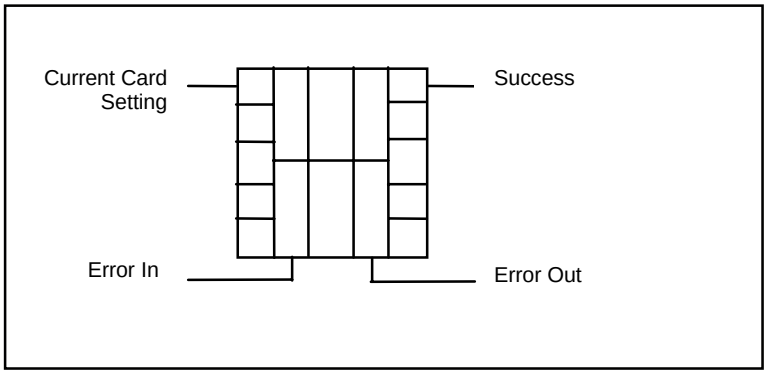
	Reset Card	0=FAILURE 1=SUCCESS
	Define Rx Channel	0=FAILURE 1=SUCCESS
	Start Rx Channel	0=FAILURE 1=SUCCESS
	Loopback	0=FAILURE 1=SUCCESS
	Free Card	0=FAILURE 1=SUCCESS
	Error Out	Contains error information

SEE ALSO:

Tx Rx Loopback

FREE CARD

The **Free Card** VI releases all of the resources that the current card is using.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
906	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

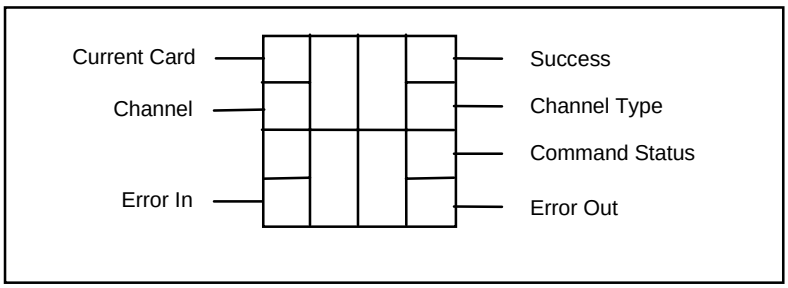
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
906	Error Out	Contains error information

SEE ALSO:

Card Initialization

GET CHANNEL TYPE

The **Get Channel Type** VI is used to determine if a channel is set for a transmit or receive operation.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	Specifies which channel will be checked. (0..15)
5Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

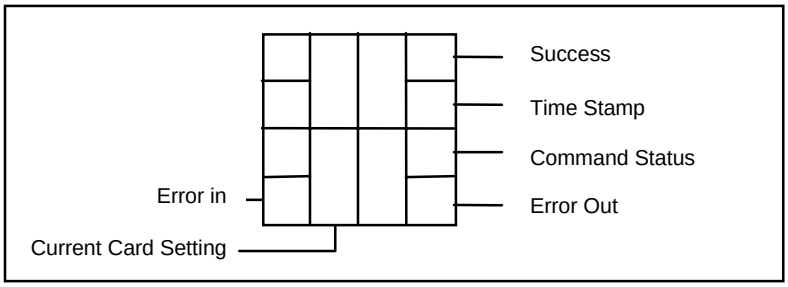
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Channel Type	0=UNDEFINED 1=RECEIVE 2=TRANSMIT
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Channel Not Transmit, Channel Not Scheduled, Undefined Error
5Ob	Error Out	Contains error information

SEE ALSO:

Define Rx Channel
Define Tx Channel

GET CLOCK TIME

The **Get Clock Time** VI will read the timestamp clock value for the specified channel. The value returned is the number of 1μs clock ticks that have occurred since the clock was started, or the last **Reset Clock** or **Reset Card VI** command was initiated.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
906	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success—requested operation successful	0=FAILURE 1=SUCCESS
U32	Timestamp	Contains the current timestamp value
U16	Command Status	OK, Bad Parameter, Card Not Responding
906	Error Out	Contains error information

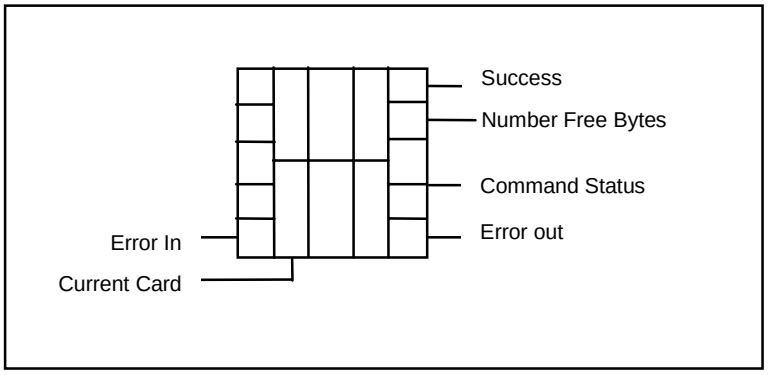
SEE ALSO:

Reset Clock

Reset Card

GET FREE MEMORY

The **Get Free Memory** VI will return the amount of unused (not yet defined for use) Dual-Port memory on the card.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
2Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U32	Number Free Bytes	The number of bytes remaining free in Dual-Port RAM. (0..0x40000)
U16	Command Status	OK, Bad Parameter, Card Not Responding, Undefined Error
2Ob	Error Out	Contains error information

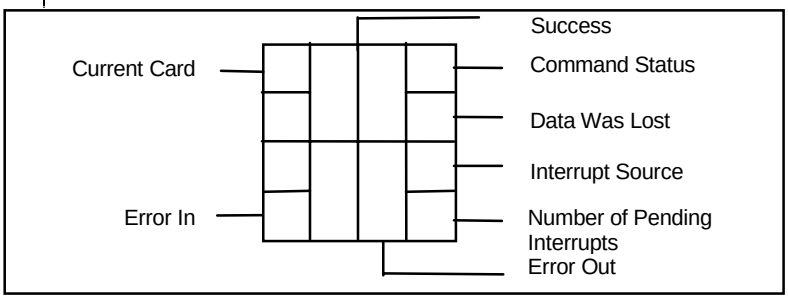
SEE ALSO:

Get Memory Address

GET INTERRUPT SOURCE

The **Get Interrupt Source** VI will indicate the reason for an interrupt from the card. The interrupt source corresponds to the numbers configured through to the **Set Interrupt Conditions** VI. For example, a 7 tells the user that the interrupt sent was for a word received on channel 7. See the **Set Interrupt Conditions** section of this manual for details.

If three interrupts have been received since the last **Get Interrupt Source** VI was sent then the next **Get Interrupt Source** VI will return the source of the first interrupt. Subsequent **Get Interrupt Source** VIs will return the remaining interrupt source codes.



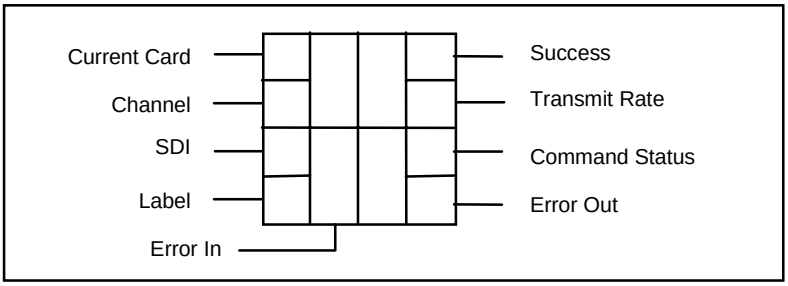
CONTROLS		VALID VALUES
U16	Current card	The logical device number. (1..8)
9Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
TF	Data Was Lost	0=FALSE 1=TRUE
[U16]	Interrupt Source	The list of pending interrupt sources. (0..96)
U16	Number of Pending Interrupts	Specifies the number of pending interrupt sources that have been received. (0..128)
U16	Command Status	OK, Bad Parameter, Data Lost
9Ob	Error Out	Contains error information

SEE ALSO:
Set Interrupt Conditions

GET LABEL RATE

The **Get Label Rate** VI will return the scheduled transmission transmit rate for the specified label/SDI on a selected channel. If the label/SDI does not exist, then the rate will be returned as 0. The value returned in rate represents the number of 1ms delays between transmissions in default mode or 1µs delays in precise mode.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel's scheduled rates to obtain. (0..15)
U16	Label	The label is made up of bits 1..8 of the ARINC 429 word.(0..255)
U16	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

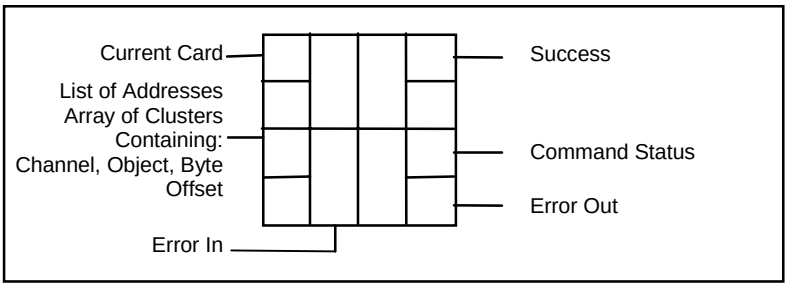
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U32	Transmit Rate	The currently scheduled rate for the Label/SDI combination. If Label/SDI is undefined, rate is returned as 0. (0..0xFFFFFFFF)
U16	Command Status	OK, Bad Parameter, Channel Not Transmit, Channel Not Scheduled, Memory Error, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Define Tx Channel
Define Tx Schedule Rates
Define Tx Schedule Table
Define Tx Schedule Update Rates
Get Scheduled Rate

GET MEMORY ADDRESS

The **Get Memory Address** VI allows the host to retrieve the starting byte offsets in Dual-Port RAM for the various FIFO's, mailboxes, and other data structures that have been configured in the PMC Card.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
[U16]	List of Addresses Array of Clusters Containing:	
U16	Channel	The desired transmit channel's scheduled rates to obtain. (0..15)
U16	Object	0=Rx FIFO 1=Rx Mailbox 2=Tx FIFO 3=Tx Schedule
U32	Byte Offset	Dual-Port RAM byte offset. (0…512KB)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Undefined Error
	Error Out	Contains error information

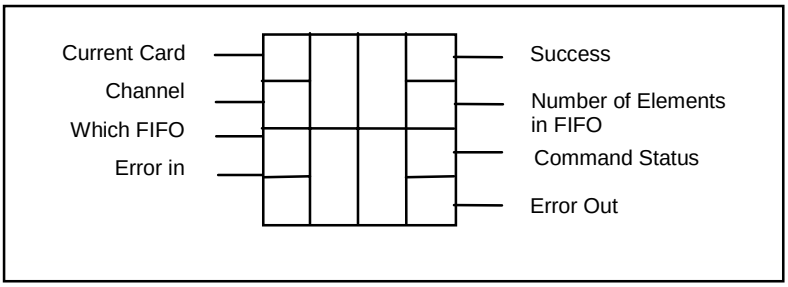
SEE ALSO:

Get Free Memory

GET NUM IN FIFO

The **Get Num In FIFO** VI returns the number of 32 bit elements in the specified queue. An element does not represent an ARINC word.

The queue for each channel can contain two or more 32-bit elements for each ARINC word to be received or transmitted. For more information about these 32-bit elements and the card transmit and receive queue structures please see the Hardware/Software Users Manual for the DD-42916C1-300 ARINC 429 PMC card (MN-42916C1-001).



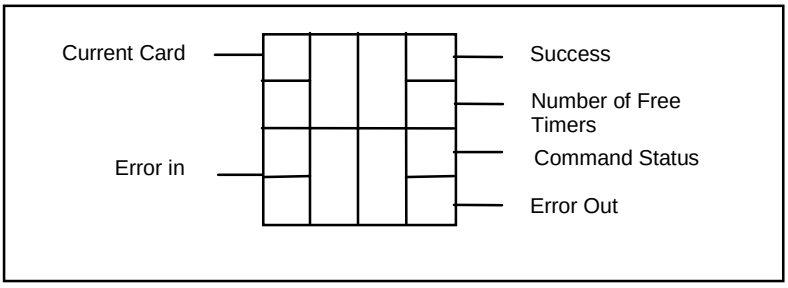
CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel's transmit queue to obtain. (0..15)
U16	Which FIFO	0=Rx FIFO 1=Tx FIFO 2=Tx Schedule FIFO
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Number of Elements in FIFO	0..16384
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Channel Not Transmit, Channel Not Scheduled, Undefined Error
ERR	Error Out	Contains error information

GET NUMBER OF FREE TIMERS

This VI allows the host to retrieve the number of unused timers that are available for use on scheduled transmissions.

When in the default 1ms resolution mode (see **Set Precise Tx Timer Mode**), there are 200 timers available for use on scheduled transmissions. Precise mode, 100µs resolution, offers 50 allowable timers for scheduled transmission use. Each transmitted Rate (see **Define Tx Schedule Rates**) uses a single timer. Each transmitted table (see **Define Tx Schedule Table**) also uses a single timer.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
9Os	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

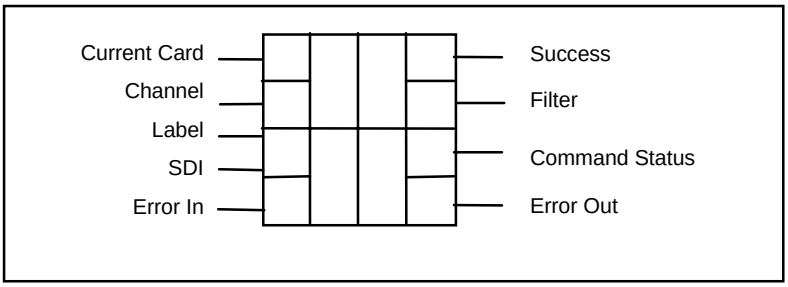
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Undefined Error
U16	Number Of Free Timers	The number of free timers available. (0..200)
9Os	Error Out	Contains error information

SEE ALSO:

Define Tx Schedule Rates
Define Tx Schedule Table
Set Precise Tx Timer Mode

GET RX FILTER

The **Get Rx Filter** VI allows the user to determine the state of a particular filter for a specified channel.



CONTROLS		VALID VALUES
U16	Current Card	The Typical device number. (1..8)
U16	Channel	The desired receiver channel's filter to obtain. (0..15)
U16	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U16	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
9Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

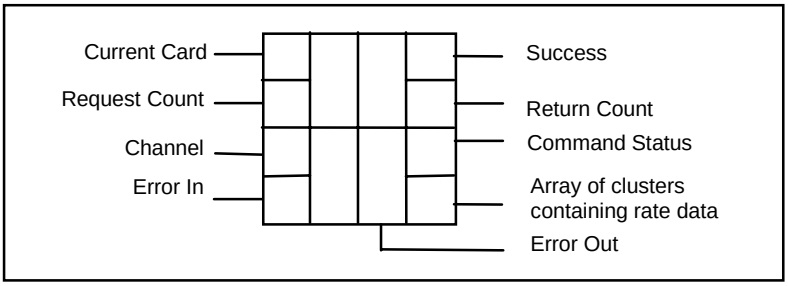
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U8	Filter	0=FILTERS DISABLED 1=FILTERS ENABLED
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Card Not Responding, Undefined Error
9Ob	Error Out	Contains error information

SEE ALSO:

Define Rx Filter Words
Modify Rx Channel
Define Rx Interrupt Filter
Define Rx Channel
Set Filter Enabling

GET SCHEDULE RATE

The **Get Schedule Rate** VI returns the current schedule rates for a specified channel. The value returned in the rate parameter represents the number of 1ms clock ticks between scheduled transmissions in default mode and the number of 1µs clock ticks between scheduled transmissions in precise mode.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel's scheduled rates to obtain. (0..15).
U16	Request Count	Specifies the number of items to return. (0..200)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Return Count	Specifies the actual number of items that were returned. (0..200)
[ ]	Array of clusters containing the following:	Each cluster element contains the Label, SDI, and associated rate.
U32	Rate	The rate represents the number of clock ticks between transmissions of this Label/SDI word.
U16	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U16	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)

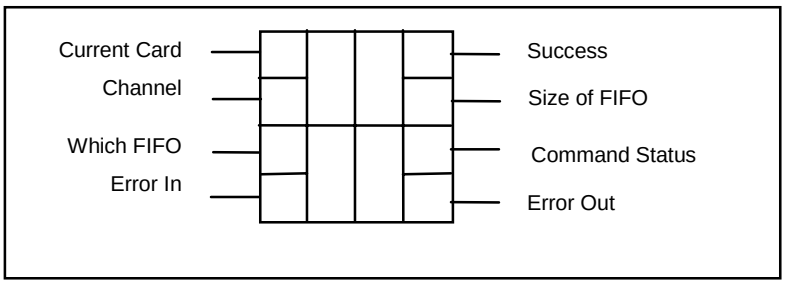
Command Status	OK, Bad Parameter, Channel Not Transmit, Channel Not Scheduled, Card Not Responding, Undefined Error
Error Out	Contains error information

SEE ALSO:

Define Tx Channel
Define Tx Schedule Rates
Define Tx Schedule Update Rates
Define Tx Schedule Table
Get Label Rate

GET SIZE OF FIFO

The **Get Size of FIFO** VI returns the size of the specified queue. This is the number that was used when the channel was defined.



CONTROLS		VALID VALUES
U16	Current Card	The typical device number. (1..8)
U16	Channel	The desired transmit channel's scheduled rates to obtain. (0..15)
U16	Which FIFO	0=Rx FIFO 1=Tx FIFO 2=Tx Schedule FIFO
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

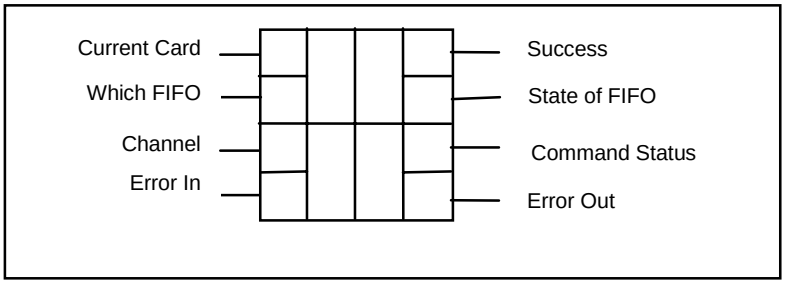
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Size of FIFO	0..16384
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Channel Not Transmit, Channel Not Scheduled, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Get State Of FIFO

GET STATE OF FIFO

The **Get State of FIFO** VI returns the state of the specified FIFO. Since the transmit queue can vary in the number of 32-Bit elements required for a complete ARINC transmission (depending on whether discretes are packed into the word, or if delays are used), this VI may return a full state when the queue is not yet quite full.



CONTROLS		VALID VALUES
U16	Current Card	The typical device number. (1..8)
U16	Channel	The desired transmit channel's scheduled rates to obtain. (0..15)
U16	Which FIFO	0=Rx FIFO 1=Tx FIFO 2=Tx Schedule FIFO
901	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

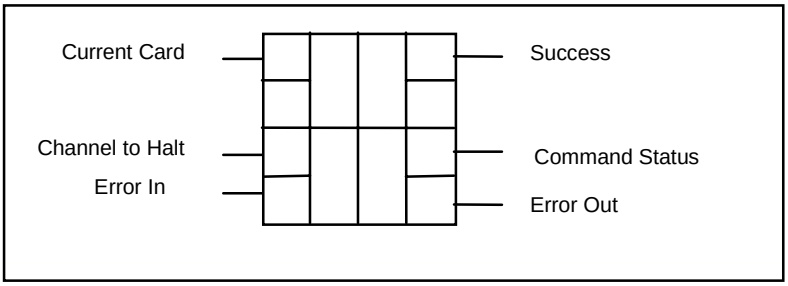
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	State of FIFO	0=FIFO IS EMPTY 1=FIFO IS FULL 2=FIFO IS LESS THAN HALF FULL 3=FIFO IS MORE THAN HALF FULL
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Channel Not Transmit, Channel Not Scheduled, Card Not Responding, Undefined Error
901	Error Out	Contains error information

SEE ALSO:
Get Size Of FIFO Get Num In FIFO

HALT CHANNEL

The **Halt Channel** VI will halt a channel after it has been started using the **Start Channel** VI. When halted, the channel configuration will not change.

The **Halt Channel** VI will not reset the receive or transmit FIFOs or receive mailboxes in Dual-Port RAM. It is the user's responsibility to clear the receive FIFO of "old" data. The transmit FIFO's will pick up where they stopped when the next **Start Channel** VI is issued.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel To Halt	The desired channel to be halted. (0..15)
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

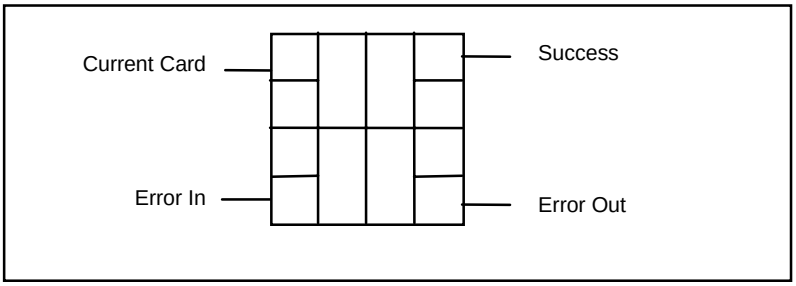
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Card Not Responding
ERR	Error Out	Contains error information

See also:

Start Channel

INITIALIZE

The **Initialize** VI *must* be issued before any other VI can be used. This VI will call the Card Initialization VI which assigns the card a logical device number and initializes global system resources required for card operation. After calling this VI the Reset Card VI should be called.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
901	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
901	Error Out	Contains error information

See also:

Free Card Card Initialization
Reset Card

LOAD ENGINEERING CONVERSION TABLE

The **Load Engineering Conversion Table** VI allows the user to load a conversion table that the card can use to convert the raw ARINC 429 words to engineering units. The **Define Rx Channel** or **Define Tx Channel** VI must be run for a channel before the **Load Engineering Conversion Table** VI can be used. After an engineering conversion table has been loaded, the data sent to or received from the card is always the converted data in the format shown in Table 3.

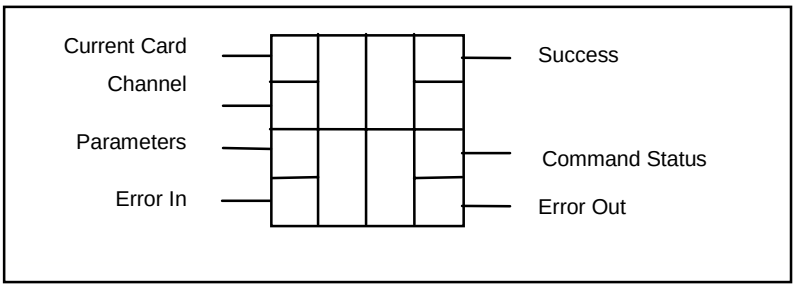
The user can define any mix of word types, (i.e., some words can be BCD, some BNR, and some UNDEF). Similarly the user does not need to define conversions for all possible label/SDI combinations on a particular channel. The user needs only to define conversions for those words the user plans to use. Before using the **Load Engineering Conversion Table** VI, all label/SDI combinations are set to UNDEF.

Table 3. Engineering Units Conversion Table

Word Type	Input/Output Format	ARINC 429 Word Format (Attachment 6)	# SSM bits
Alpha-Numeric	Three bytes of alpha numeric data	Alpha/Numeric (ISO Alphabet No. 5) Data - Intermediate Word Format	2
Binary	IEEE Standard Floating Point Format	Generalized BNR Word Format	3
Binary Coded Decimal (BCD)	IEEE Standard Floating Point Format	Generalized BCD Word Format	2
BCD Raw	ARINC 429 Raw Word (Hexadecimal representation)	Generalized BCD Word Format	2
Discrete	19 bits of extracted discrete data – (Bits 11 through 29 of the raw ARINC 429 word) (Hexadecimal representation)	Discrete Word Format	2
Latitude/ Longitude	IEEE Standard Floating Point Format	BCD Encoding of Latitude and Longitude	2
Undefined (UNDEF)	ARINC 429 Raw Word (Hexadecimal representation)	None	2

If the user tries to transmit data that exceeds the maximum value that can be transmitted based on the resolution of an ARINC 429 word, the truncated value is transmitted, but no indication is given to the user that an overflow occurred.

If the parity defined through **Define Rx Channel** or **Define Tx Channel** VIs is “NONE”, the **Load Engineering Conversion Table** VI cannot be used for that channel. This means all words on that channel must be “Undefined” so that the parity bit can be chosen by the user for each data word.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
U16	Channel	The desired channel to use. (0..15)
[ ]	Parameters Array of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	Word Type	0=UNDEFINED 1=DISCRETE 2=BCD 3=BNR 4=ALPHA 5=BCD_RAW
U16	Significant Digits	BCD has 1..6 significant digits, BNR has 7..20 significant digits, not applicable for other types.
SGL	Resolution	IEEE Standard Single Floating Point Value
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

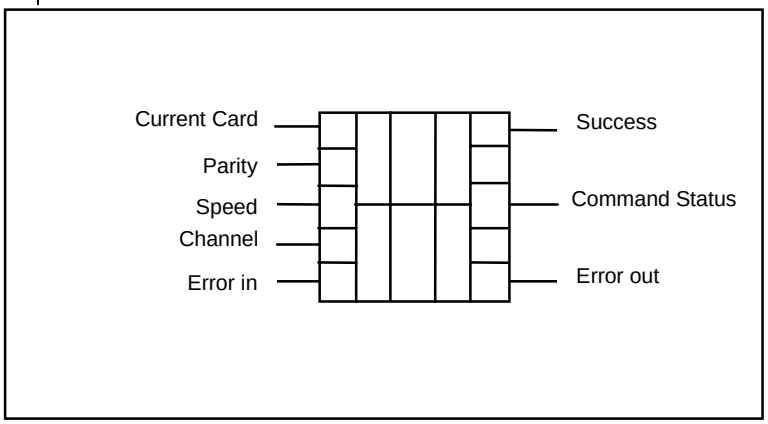
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Card Not Responding, Undefined Error
	Error Out	Contains Error Information

SEE ALSO:

Define Tx Channel Define Rx Channel

MODIFY RX CHANNEL

The **Modify Rx Channel** VI allows the user to reconfigure a receive channel, after it has already been defined.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The receiver channel to be modified. (0..15)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

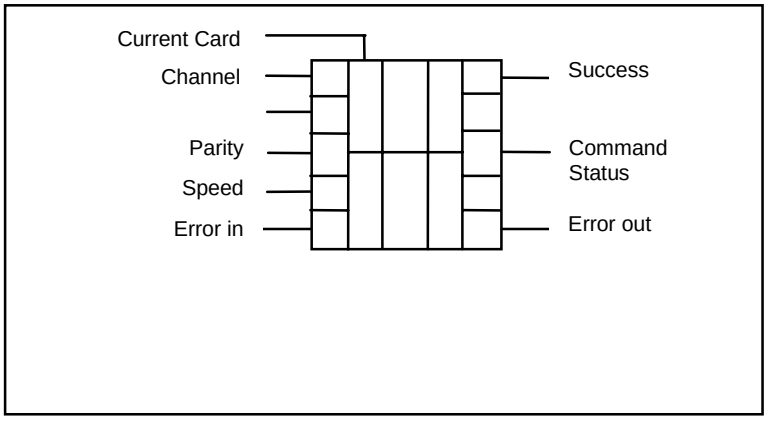
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Receive, Card Not Responding, Undefined Error
ERR	Error Out	Contains error information

SEE ALSO:

Define Rx Channel

MODIFY TX CHANNEL

The **Modify Tx Channel** VI allows the user to reconfigure a transmit channel, after it has already been defined.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1...8)
U16	Channel	The transmitter channel to be modified. (0..15)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

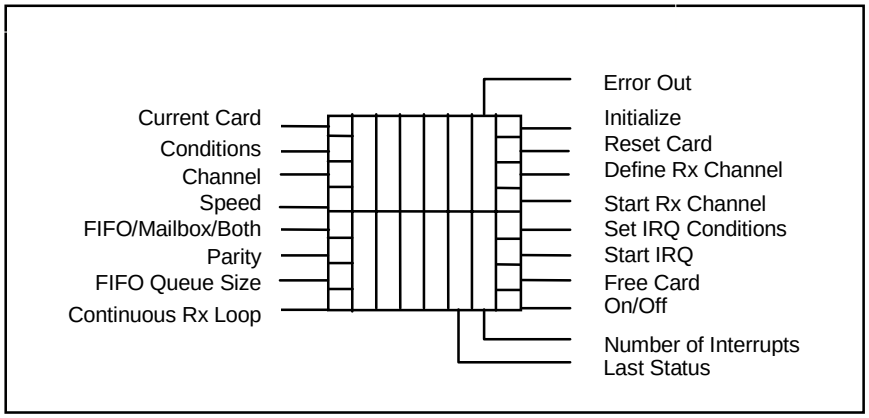
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Transmit, Card Not Responding
ERR	Error Out	Contains error information

SEE ALSO:

Define Tx Channel

PMC INTERRUPTS

The **PMC Interrupts** VI, calls other VI's to show an interrupt example. The Iniailize VI is called to initialize the card and setup any global variables needed to exercise the card. After this VI completes successfully, the Reset Card VI is called to reset the card and perform a series of self-tests on the card. A receiver channel is then defined by calling the Define Rx Channel VI. The Set Interrupt Conditions VI is called followed by the Start Channel VI. The Start IRQ Handler VII is then called followed by the Query IRQ Handler VI. The Query IRQ Handler VI will run continuously as long as the Continuous Rx Loop parameter is set to ON. Once this parameter is set to OFF, the Free Card VI will execute to free any resources that the card is using and the PMC Interrupts VI will terminate.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
U16	Channel	The channel to use. (0…15)
U16	Conditions	The list of interrupt conditions to enable. (0…96)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
U16	FIFO/Mailbox/Both	0=FIFO 1=MAILBOX 2=BOTH

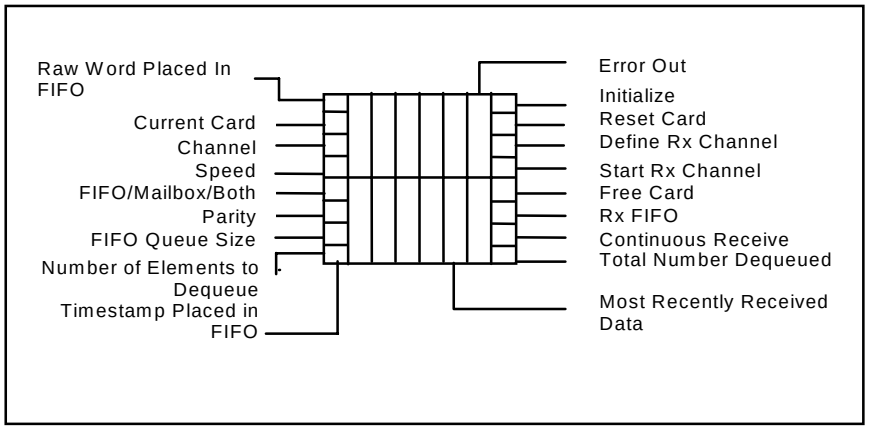
TF	Continuous Rx Loop	0=DISABLED 1=ENABLED
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32767)

.

INDICATORS		VALID VALUES
TF	Initialize	0=FAILURE 1=SUCCESS
TF	Reset Card	0= FAILURE 1= SUCCESS
TF	Define Rx Channel	0= FAILURE 1= SUCCESS
TF	Start Rx Channel	0= FAILURE 1= SUCCESS
TF	Set IRQ Conditions	0= FAILURE 1= SUCCESS
TF	Start IRQ	0= FAILURE 1= SUCCESS
TF	Free Card	0= FAILURE 1= SUCCESS
TF	Continuous Rx Loop	0=OFF 1=ON
TF	Too Many Elements	0=FALSE 1=TRUE
U16	Number of Interrupts	The number of interrupts received. (0…65535)
U16	Last Status (hex)	The last IRQ status. (0…65535)
ERR	Error Out	Contains error information

PMC RX FIFO

The **PMC Rx FIFO** VI calls other VI's to show an example of a FIFO reception. The Initialize VI is called to initialize the card and set up any global variables needed to exercise the card. After this VI completes successfully, the Reset Card VI is called to reset the card and perform a series of self-tests on the card. A receiver channel is then defined and started by calling the Define Rx Channel and Start Channel VI respectively. The receive FIFO VI is then called to receive any data that exists in the defined receivers FIFO queue. This VI will execute continuously for as long as the Continuous Receive parameter is set to ON. Once this parameter is set to OFF, the Free Card VI will execute to free any resources that the card is using and the PMC Rx FIFO VI will terminate.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired receiver channel to be used. (0…15)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
U16	FIFO/Mailbox/Both	0=FIFO 1=MAILBOX 2=BOTH

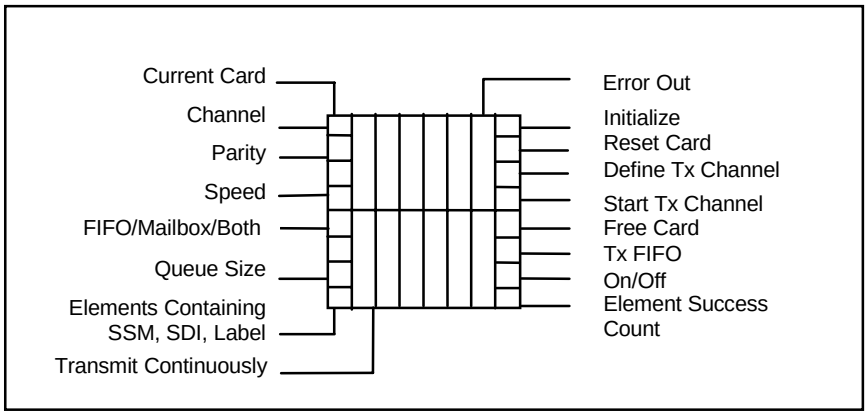
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32767)
TF	Continuous Receive	0=FALSE 1=TRUE
TF	Timestamp Placed In FIFO	0=FALSE 1=TRUE
TF	Raw Word Placed In FIFO	0=FALSE 1=TRUE
U16	Number Of Elements To Dequeue	The number of receiver elements to dequeue from the FIFO. (1..65535)

INDICATORS		VALID VALUES
TF	Initialize	0=FAILURE 1=SUCCESS
TF	Reset Card	0= FAILURE 1= SUCCESS
TF	Define Rx Channel	0= FAILURE 1= SUCCESS
TF	Start Rx Channel	0= FAILURE 1= SUCCESS
TF	Free Card	0= FAILURE 1= SUCCESS
TF	Rx FIFO	0= FAILURE 1= SUCCESS
TF	Continuous Receive	0=FALSE 1=TRUE
U16	Total Number Dequeued	The total number of data words dequeued from the receiver FIFO. (0..65535)
[ ]	Most Recently Received Data Array of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The SSM part of the received ARINC 429 word. (0..7)
U32	Data Raw	The raw data contained in the received ARINC 429 word. (0…0xFFFFFFFF)
SGL	Engineering Unit Data	IEEE Standard Single Floating Point Value.

U32	Timestamp	Contains the current timestamp value in 1ms time ticks (default mode) or 1µs clock ticks (precise mode).
U32	Data Raw	The raw data contained in the received ARINC 429 word. (0…0xFFFFFFFF)
TF	Parity Error	0=FALSE 1=TRUE
TF	Use Engineering Unit Data	0=FALSE 1=TRUE
TF	Short Word Error	0=FALSE 1=TRUE
TF	Data Lost	0=FALSE 1=TRUE
	Error Out	Contains error information

PMC TX FIFO

The **PMC Tx FIFO** VI calls other VI's to show an example of a FIFO transmission. The Initialize VI is called to initialize the card and set up any global variables needed to exercise the card. After this VI completes successfully, the reset card VI is called to reset the card and perform a series of self tests on the card. A transmitter channel is then defined and started by calling the Define Tx Channel and Start Channel VI Respectively. The Tx FIFO VI is then called to transmit the data. This VI will be called continuously as long as the Transmit Continuously parameter is set to on. Once the transmit continuously parameter is set to off, the free card VI is called to free any resources that the card is using and the PMC Tx FIFO VI will terminate.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel to be used. (0…15)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH

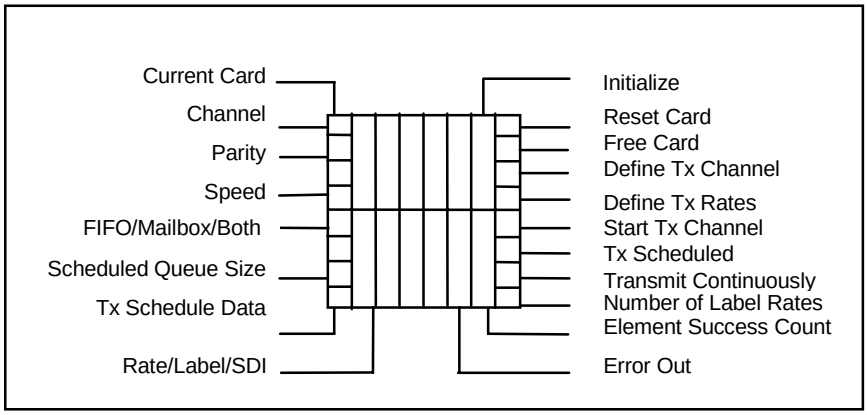
U16	FIFO/Schedule/Both	0=FIFO 1=Schedule 2=BOTH
U16	FIFO Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32768)
[ ]	ElementsArray of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The SSM part of the received ARINC 429 word. (0..7)
U32	Data Raw	The ARINC raw data. (0…0xFFFFFFFF)
SGL	Data SGL	IEEE Standard Single Floating Point Value
U32	Mask Word	The mask word will be logically "OR'ed" with the data word
U32	Delay	Number of clock ticks the module will wait before transmitting the next word in the FIFO. A FIFO delay will not affect the timing of any scheduled transmissions. In default timer mode, one clock tick is 1ms. In precise timer mode, one clock tick is 1us.
TF	Transmit Continuously	0=FALSE 1=TRUE

INDICATORS		VALID VALUES
TF	Initialize	0=FAILURE 1=SUCCESS
TF	Reset Card	0=FAILURE 1=SUCCESS
TF	Free Card	0=FAILURE 1=SUCCESS
TF	Define Tx Channel	0= FAILURE 1= SUCCESS
TF	Start Tx Channel	0= FAILURE 1= SUCCESS
TF	Tx FIFO	0= FAILURE 1= SUCCESS

	Element Success Count	The number of successful transmissions completed with the TX FIFO VI. (0..65535)
	Error Out	Contains Error Information

PMC TX SCHEDULE RATES

The **PMC TX SCHEDULE RATES** VI demonstrates a scheduled transmission. The Initialize VI is called to initialize the card and set up any global variables needed to exercise the card. After this VI completes successfully, the Reset Card VI is called to reset the card and perform a series of self test's on the card. A transmitter channel is then defined by calling the Define Tx Channel VI. The Rate/Label/SDI Array of Clusters parameter is then input into the Define Tx Schedule Rates VI which is called next. The channel is then started by calling the Start Channel VI . The transmit Scheduled VI is then called to transmit any scheduled data. Once this scheduled data is set up, it will be transmitted at the schedule rate. If the Transmit continuously parameter is on, then the Transmit Scheduled VI will be called continuously. Each time this VI is called the transmission schedule will start all over. If the Transmit Continuously parameter is off, the Free Card VI is called to free any resources that the card is using and the PMC Tx Schedule Rates VI terminates.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel to be used. (0…15)
U16	Parity	0=NONE 1=EVEN 2=ODD

U16	Speed	0=LOW 1=HIGH
U16	FIFO/Schedule/Both	0=FIFO 1=Schedule 2=BOTH
U16	Schedule Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32767)
[ ]	Tx Schedule Data Array of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The SSM part of the received ARINC 429 word. (0..7)
U8	Disable	The disable/enable part of the data is used to enable or disable Label/SDI scheduled combinations. 0=DISABLED 1=ENABLED
U32	Data Raw	The ARINC raw data. (0…0xFFFFFFFF)
SGL	Data SGL	IEEE Standard Single Floating Point Value
U32	Mask Word	The mask word will be logically "OR'ed" with the data word
[ ]	Rate/Label/SDI Array of Clusters Containing:	
U16	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U16	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U32	Rate	The number of 100µs clock ticks between transmissions of the label/SDI value. (1..0xFFFFFFFF)

INDICATORS		VALID VALUES
TF	Initialize	0=FAILURE 1=SUCCESS
TF	Reset Card	0= FAILURE 1= SUCCESS

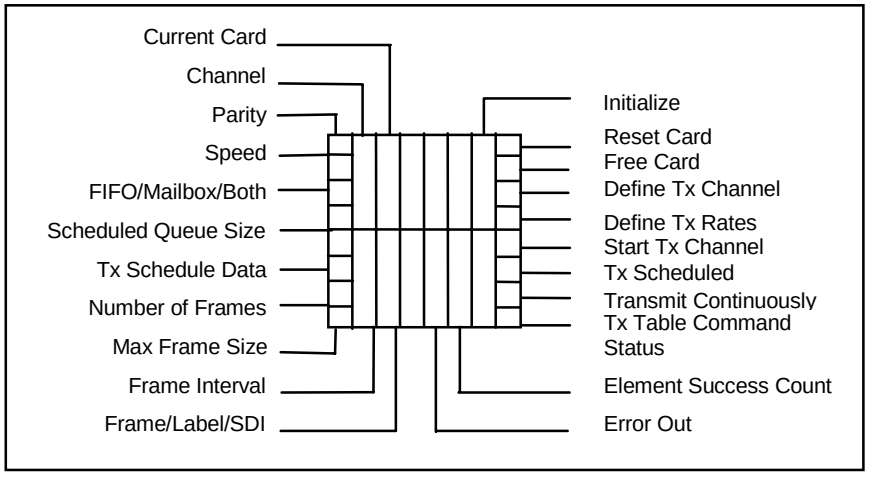
TF	Free Card	0= FAILURE 1= SUCCESS
TF	Define Tx Channel	0= FAILURE 1= SUCCESS
TF	Define Tx Rates	0= FAILURE 1= SUCCESS
TF	Start Tx Channel	0= FAILURE 1= SUCCESS
TF	Tx Scheduled	0= FAILURE 1= SUCCESS
TF	Transmit Continuously	0=FALSE 1=TRUE
U16	Number of Label Rates Sent	The number of label rates added into the schedule queue. (0..65535)
U16	Element Success Count	The number of label rates successfully added into the schedule queue. (0..65535)
205	Error Out	Contains Error Information

SEE ALSO:

Initialize
Define Tx Channel
Start Channel
Free Card
Reset
Define Tx Schedule Rates
Transmit Scheduled

PMC TX SCHEDULE TABLE

The **PMC Tx Schedule Table** VI demonstrates a sample scheduled transmission using the table method. The Initialize VI is called to initialize the card and set up any global variables needed to exercise the card. After this VI completes successfully, the Reset Card VI is called to reset the card and perform a series of self-tests on the card. A transmitter channel is then defined by calling the Define Tx Channel VI. The Frame/Label/SDI arrays of clusters parameter is input to the Define Tx Schedule Table VI which is called next. The channel is then started by calling the Start Channel VI. The Transmit Scheduled VI is then called to transmit any scheduled data. Once this scheduled data is set up, it will be transmitted continuously by transmitting all the frames and then starting over again. If the Transmit continuously parameter is on, then the Transmit Scheduled VI will be called continuously. Each time this VI is called the transmission schedule will start all over again. Once the Transmit Continuously parameter is set to off, the free card VI is called to free any resources that the card is using and the PMC Tx Schedule Rates VI terminates.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel to be used. (0…15)
U16	Parity	0=NONE 1=EVEN 2=ODD

U16	Speed	0=LOW 1=HIGH
U16	FIFO/Schedule/Both	0=FIFO 1=Schedule 2=BOTH
U16	Schedule Queue Size	FIFO queue size in Dual-Port RAM represented by the number of 32-bit words. (16..32767)
[ ]	Tx Schedule Data Array of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The SSM part of the received ARINC 429 word. (0..7)
U8	Disable	The disable/enable part of the data is used to enable or disable Label/SDI scheduled combinations. 0=DISABLED 1=ENABLED
U32	Data Raw	0…0xFFFFFFFF
SGL	Data SGL	IEEE Standard Single Floating Point Value
U32	Mask Word	The mask word will be logically "OR'ed" with the data word
U8	Number Of Frames	The number of minor frames. (1..4096)
U8	Max Frame Size	The maximum size a minor frame can be. (1..4096)
U16	Frame Number	The minor frame interval measured in number of ticks per minor frame, 1ms for normal mode, and 100µs for precision mode. (3..32767)
[ ]	Rate/Label/SDI Array of Clusters Containing:	
U16	Label	The label is made up of bits 1..8 of the received ARINC 429 word. (0..255)
U16	SDI	The SDI is made up of bits 9 and 10 of the received ARINC 429 word. (0..3, 15=Don't Care)
U32	Rate	The number of 100µs clock ticks between transmissions of the label/SDI value. (1..0xFFFFFFFF)

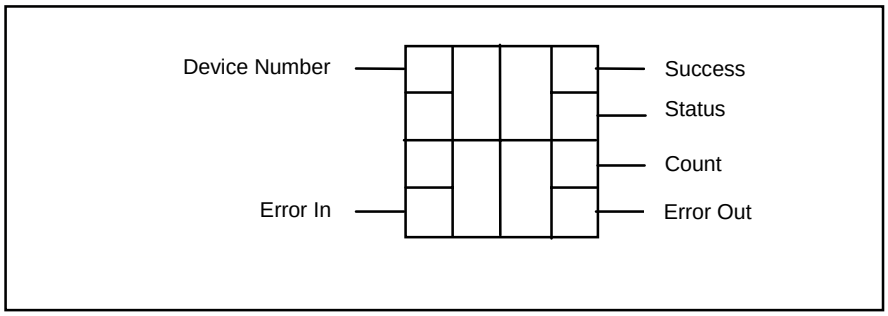
INDICATORS		VALID VALUES
TF	Initialize	0=FAILURE 1=SUCCESS
TF	Reset Card	0= FAILURE 1= SUCCESS
TF	Free Card	0= FAILURE 1= SUCCESS
TF	Define Tx Channel	0= FAILURE 1= SUCCESS
TF	Define Tx Rates	0= FAILURE 1= SUCCESS
TF	Start Tx Channel	0= FAILURE 1= SUCCESS
TF	Tx Scheduled	0= FAILURE 1= SUCCESS
TF	Transmit Continuously	0=FALSE 1=TRUE
U16	Tx Table Command Status	The command status of the **Define Tx Schedule Table** VI.
U16	Element Success Count	The number of label rates successfully added into the schedule queue. (0..65 535)
2Os	Error Out	Contains Error Information

SEE ALSO:

Initialize
Define Tx Channel
Start Channel
Free Card
Reset
Define Tx Schedule Rates
Transmit Scheduled

QUERY IRQ HANDLER

The **Query IRQ Handler** VI, will return the number of times an interrupt has occurred and the last status word on the IRQ handler for this device.

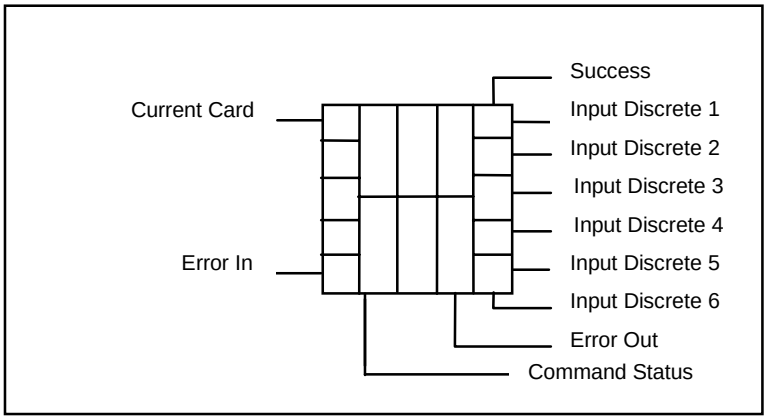


CONTROLS		VALID VALUES
U16	Device Number	This field is commonly called "Current Card" and is used to specify the cards logical device number. (1..8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U32	Status	The last status word for the IRQ handler on this device. (0..0xFFFFFFFF)
U16	Count	The number of times an interrupt has occurred. (0..65535)
	Error Out	Contains error information

READ INPUT DISCRETE

The **Read Input Discrete** VI reads the values for all six of the input discretes.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
9Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
TF	Input Discrete 1	0=OFF 1=ON
TF	Input Discrete 2	0=OFF 1=ON
TF	Input Discrete 3	0=OFF 1=ON
TF	Input Discrete 4	0=OFF 1=ON
TF	Input Discrete 5	0=OFF 1=ON
TF	Input Discrete 6	0=OFF 1=ON
9Ob	Error Out	Contains error information
U16	Command Status	OK, Bad Parameter, Data Lost, Card NOT Responding, Undefined Error

SEE ALSO:
Write Output Discrete

READ MAILBOX

If configured through the **Define Rx Channel** VI, there will be a segment of memory that contains a mailbox "slot" for each label/SDI combination for any receive channel. The user can read the "latest" data from a mailbox slot when it is convenient. The DD-42916C1-300 card writes the data to the mailbox whenever it is received. The **Read Mailbox** VI returns the contents of the specified mailbox.

Within any 32 bit raw (UNDEF) ARINC 429 word, the parity bit (bit #32) will contain the following depending on what parity the channel was configured for:

EVEN/ODD Parity error flag 0=OK

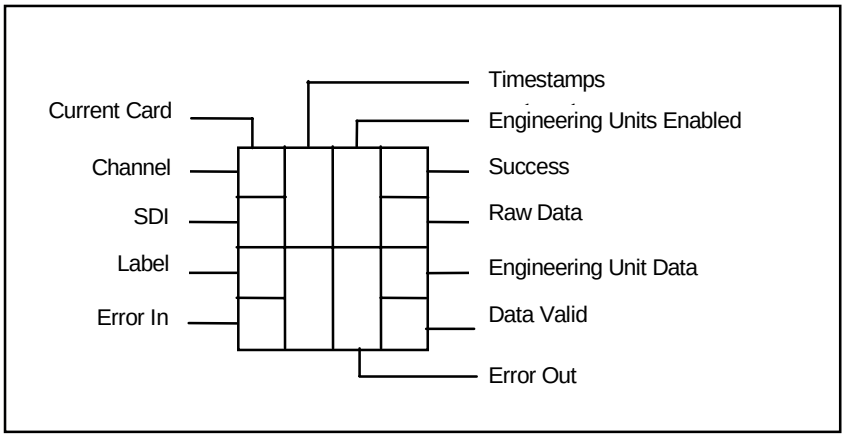
NONE Raw parity bit

The RAW 429 Data will contain the raw word if the mailbox was configured for raw words in addition to engineering converted words at the time that the **Define Rx Channel** VI was run.

If no engineering unit conversion was defined through the **Load Engineering Conversion Table** VI (i.e. the word is UNDEF), the data contained in the RAW 429 Data indicator should be used. If the word is a BNR, BCD, DISCRETE, or ALPHA, the Engineering Units Data indicator should be used. For BNR and BCD words, the Engineering Units Enabled indicator will be set to 1 (true). For DISCRETE and ALPHA words, the Engineering Units Enabled indicator will be set to 0 (false).



If the parity or short word error occurs on a word, that word will not be placed in the mailboxes.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel to be used. (0..15)
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
TF	Data Valid	0=FALSE; The data was already read and is now invalid. 1=TRUE; The VI returned updated data.
TF	Engineering Units Enabled	0=DISABLED 1=ENABLED
U32	Raw Data	The ARINC raw data. (0..0xFFFFFFFF)
U32	Timestamp	The time value in clock time ticks
SGL	Engineering Unit Data	IEEE Standard Single Floating Point Value
U16	Command Status	OK, Bad Parameter, Channel NOT Receive, Channel Not Mailbox, Internal Error, Undefined Error
ERR	Error Out	Contains error information

SEE ALSO:
Define Rx Channel

RECEIVE FIFO

The **Receive FIFO** VI removes the specified number of elements from the requested reception queue. If there are less than the required number of elements specified in the queue, then all elements in the queue will be dequeued and returned. In this case, the success flag will be false since this operation was not able to complete the users request.

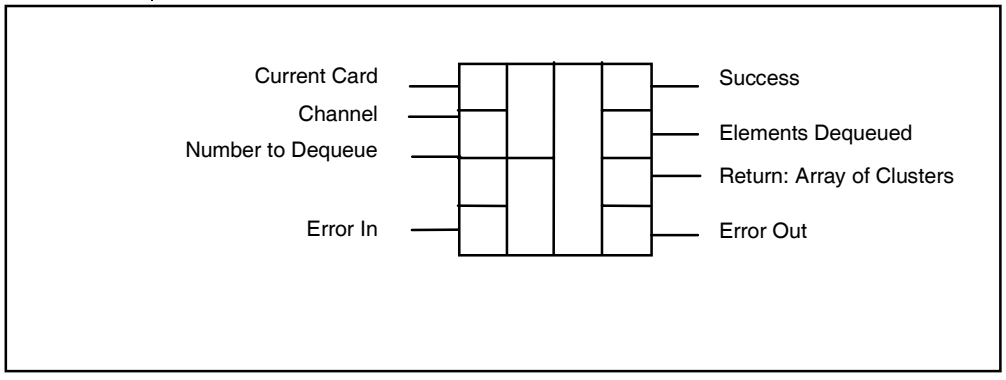
The timestamp element is optional. It is only part of the response if the timestamp parameter passed to the **Define Rx Channel** VI was "ON".

The SSM is only calculated by the card for binary, BCD, BCD Raw, and lat/long data words as defined by the **Load Engineering Conversion Table** VI.

The "data was lost flag" indicates whether the card's internal receive FIFO overflowed and received data was lost. This generally occurs when the user does not dequeue data often enough.

Within the "data long" (UNDEF ARINC 429) word, the parity bit (bit #32) will contain the following depending on what parity the channel was configured for:

EVEN/ODD	Parity error flag 0=OK, 1=ERROR
NONE	Raw Parity bit



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired receiver channel to be used. (0..15)

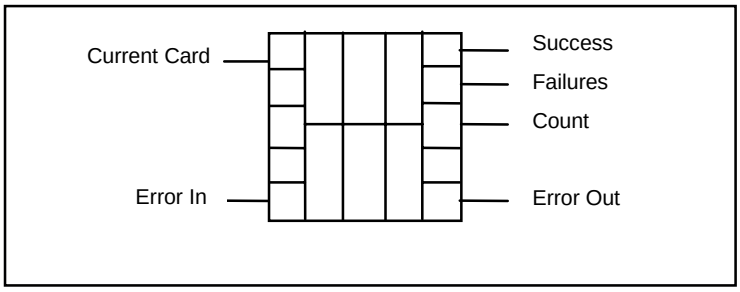
U16	Number to Dequeue	The number of 32-bit elements to read from the FIFO queue. (2..32767)
error	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Elements Dequeued	The number of elements that were actually dequeued.
[error]	Return array of clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The SSM part of the ARINC 429 word. (0..7)
U32	Data Long (If ARINC 429 type is UNDEF or DISCRETE or ALPHA.)	The raw data part of the received ARINC word.
SGL	Engineering Unit Data (If ARINC 429 Data type is BCD or BNR.)	IEEE Standard Single Floating Point Value
U32	Time Stamp (If enabled in the **Define Rx Channel** VI.)	The number of clock ticks. (0..0xFFFFFFFF)
U32	Raw 429 Data (If enabled in the **Define Rx Channel** VI)	The raw data part of the received ARINC data word. (0..0xFFFFFFFF)
TF	Short Word Error	0=FALSE 1=TRUE
TF	Parity Error	0=FALSE 1=TRUE
TF	Data Was Lost	0=NO DATA WAS LOST 1=DATA WAS LOST
TF	Engineering Units Enabled	0=FALSE 1=TRUE
error	Error Out	Contains error information

SEE ALSO:
Transmit FIFO

RESET CARD

The Reset Card VI resets the PMC card to its power-up state. It automatically runs through Power-On-Self-Test (POST) diagnostics, and reburns a list of failures. The Reset Card VI is implicit on power-up. After power-up, the OK response and list of POST failures is placed in the cards Response FIFO.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
5Ob	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

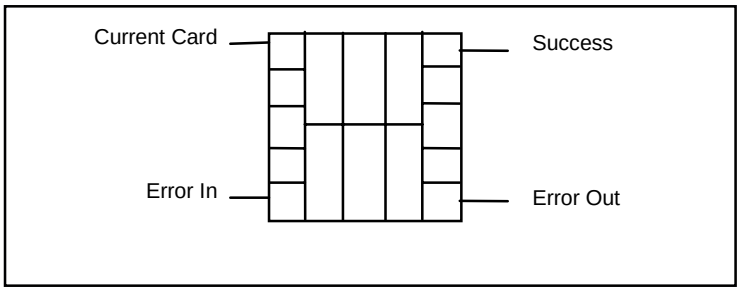
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
[U16]	Failures List	An array that will contain the Power On Self Test failures, if any exist
U16	Failure Count	The number of Power On Self Test failures that have occurred. (0..65535)
5Ob	Error Out	Contains Error Information

SEE ALSO:

Reset Clock

RESET CLOCK

The **Reset Clock** VI resets any or all of the timers that timestamp received data.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
901	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

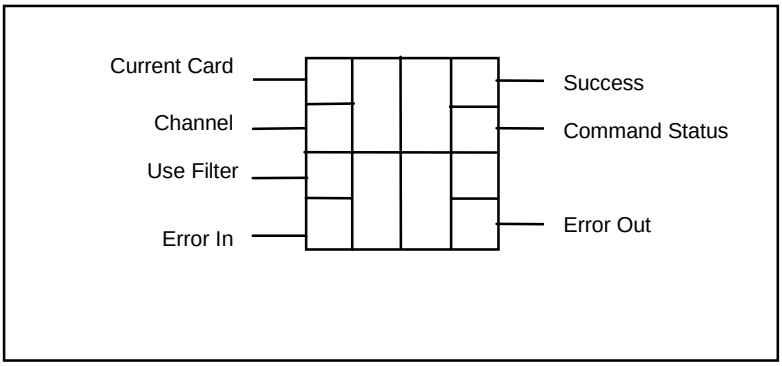
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Card Not Responding, Undefined Error
901	Error Out	Contains error information

SEE ALSO:

Reset Card

SET FILTER ENABLING

The **Set Filter Enabling** VI enables the channel to use filters that have been assigned to it with the **Define Rx Filter Words** VI. If a filter is disabled, then all received data words on the given channel, will be received and stored in Dual-Port RAM. If this VI is called with the filter parameter enabled and no filters have been defined with the **Define Rx Filter Words** VI, then no received words will be stored in Dual-Port RAM until a label/SDI filter is defined as enabled.



CONTROLS

		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired channel to set up. (0…15)
TF	Use Filter	0=DISABLE FILTERS 1=ENABLE FILTERS
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Channel Not Receive, Channel Not FIFO, Card Not Responding, Undefined Error
	Error Out	Contains error information

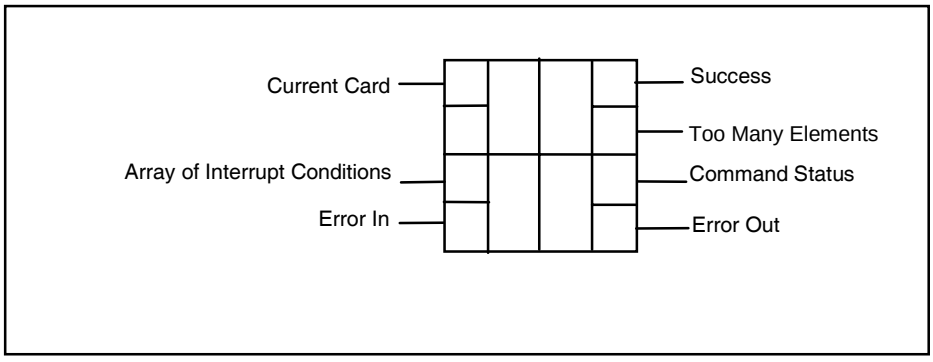
SEE ALSO:

Define Rx Filter Words	Get Rx Filter
Define Rx Interrupt Filter	Define Rx Channel
Modify Rx Channel	Set Interrupt Conditions

SET INTERRUPT CONDITIONS

The **Set Interrupt Conditions** VI allows the user to specify under what conditions the card will generate an interrupt. The list of interrupt conditions that is passed as a parameter to this VI must be the complete list, as this VI resets the entire list each time it is used. The **Get Interrupt Source** VI allows the user to determine which of the conditions generated the interrupt.

The interrupt for received words is generated only after a word is placed in the Rx FIFO. So label/SDI combinations that are being filtered out of the receive FIFO will never cause an interrupt. In addition, the **Define Rx Interrupt Filter** VI will allow the user to select a subset of label/SDI combinations that will generate interrupts when a receive word is placed in the receive FIFO.



Valid values

0 = word received on ch 0 FIFO
1 = word received on ch 1 FIFO
2 = word received on ch 2 FIFO
3 = word received on ch 3 FIFO
4 = word received on ch 4 FIFO
5 = word received on ch 5 FIFO
6 = word received on ch 6 FIFO
7 = word received on ch 7 FIFO
8 = word received on ch 8 FIFO
9 = word received on ch 9 FIFO
10 = word received on ch 10 FIFO
11 = word received on ch 11 FIFO
12 = word received on ch 12 FIFO
13 = word received on ch 13 FIFO
14 = word received on ch 14 FIFO
15 = word received on ch 15 FIFO

16 = Rx Error Occurred ch 0
17 = Rx Error Occurred ch 1
18 = Rx Error Occurred ch 2
19 = Rx Error Occurred ch 3
20 = Rx Error Occurred ch 4
21 = Rx Error Occurred ch 5
22 = Rx Error Occurred ch 6
23 = Rx Error Occurred ch 7
24 = Rx Error Occurred ch 8
25 = Rx Error Occurred ch 9
26 = Rx Error Occurred ch 10
27 = Rx Error Occurred ch 11
28 = Rx Error Occurred ch 12
29 = Rx Error Occurred ch 13
30 = Rx Error Occurred ch 14
31 = Rx Error Occurred ch 15

64 = Rx FIFO half-full ch 0
65 = Rx FIFO half-full ch 1
66 = Rx FIFO half-full ch 2
67 = Rx FIFO half-full ch 3
68= Rx FIFO half-full ch 4
69 = Rx FIFO half-full ch 5
70 = Rx FIFO half-full ch 6
71 = Rx FIFO half-full ch 7
72 = Rx FIFO half-full ch 8
73 = Rx FIFO half-full ch 9
74 = Rx FIFO half-full ch 10
75 = Rx FIFO half-full ch 11
76 = Rx FIFO half-full ch 12
77 = Rx FIFO half-full ch 13
78 = Rx FIFO half-full ch 14
79 = Rx FIFO half-full ch 15

Valid values

32 = Tx FIFO Empty ch 0
33 = Tx FIFO Empty ch 1
34 = Tx FIFO Empty ch 2
35 = Tx FIFO Empty ch 3
36 = Tx FIFO Empty ch 4
37 = Tx FIFO Empty ch 5
38 = Tx FIFO Empty ch 6
39 = Tx FIFO Empty ch 7
40 = Tx FIFO Empty ch 8
41 = Tx FIFO Empty ch 9
42 = Tx FIFO Empty ch 10
43 = Tx FIFO Empty ch 11
44 = Tx FIFO Empty ch 12
45 = Tx FIFO Empty ch 13
46 = Tx FIFO Empty ch 14
47 = Tx FIFO Empty ch 15

48 = Major frame occurred ch 0
49 = Major frame occurred ch 1
50 = Major frame occurred ch 2
51 = Major frame occurred ch 3
52 = Major frame occurred ch 4
53 = Major frame occurred ch 5
54 = Major frame occurred ch 6
55 = Major frame occurred ch 7
56 = Major frame occurred ch 8
57 = Major frame occurred ch 9
58 = Major frame occurred ch 10
59 = Major frame occurred ch 11
60 = Major frame occurred ch 12
61 = Major frame occurred ch 13
62 = Major frame occurred ch 14
63 = Major frame occurred ch 15

80 = Rx FIFO not empty ch 0
81 = Rx FIFO not empty ch 1
82 = Rx FIFO not empty ch 2
83 = Rx FIFO not empty ch 3
84 = Rx FIFO not empty ch 4
85 = Rx FIFO not empty ch 5
86 = Rx FIFO not empty ch 6
87 = Rx FIFO not empty ch 7
88 = Rx FIFO not empty ch 8
89 = Rx FIFO not empty ch 9
90 = Rx FIFO not empty ch 10
91 = Rx FIFO not empty ch 11
92 = Rx FIFO not empty ch 12
93 = Rx FIFO not empty ch 13
94 = Rx FIFO not empty ch 14
95 = Rx FIFO not empty ch 15

96 = Response to Command
Now Available in FIFO

CONTROLS (CONT.)		VALID VALUES
U16	Current Card	The logical device number. (1..8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.
U16	Array of Interrupt Conditions	Possible Conditions. (0…96)

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

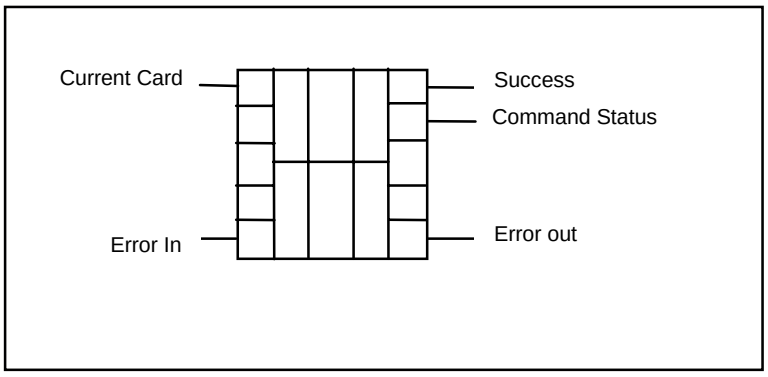
Get Interrupt Source

SET PRECISE TX TIMER MODE

This routine changes the default timer resolution, used for scheduling transmissions, from 1ms to 100µs mode. This command must be called before any timers are defined (either label/rate or schedule table).

When in the default 1ms resolution mode, there are 200 timers available for use on scheduled transmissions. Precise mode, 100µs resolution, offers 50 allowable timers for scheduled transmission use. Each transmitted Rate, see **Define Tx Schedule Rates,** uses a single timer. Each transmitted table, see **Define Tx Schedule Table,** also uses a single timer. The **Get Number Free Timers** VI can be used to return the number of unused timers.

To return the card back to 1ms default mode, the **Reset Card** VI must be issued.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

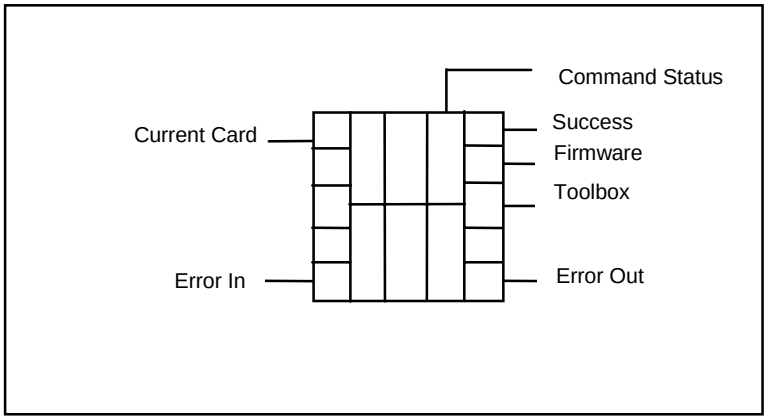
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Define Tx Schedule Rates
Define Tx Schedule Table
Get Number Of Free Timers

SOFTWARE VERSION

The **Software Version** VI returns the version of the card's firmware and software library to the user.

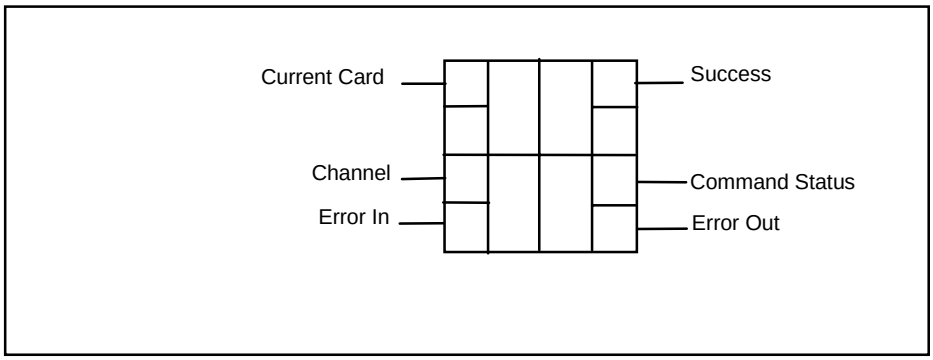


CONTROLS		**VALID VALUES**
U16	Current Card	The logical device number. (1..8)
90	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success—requested operation successful	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Card Not Responding, Undefined Error
abc	Firmware	The firmware version.
abc	Toolbox	The software library version.
90	Error Out	Contains error information

START CHANNEL

The **Start Channel** VI starts a channel operating after it has been halted. Note that the channels default to the halted state after they have been configured.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The channel you want to use. (0..15)
ERR	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

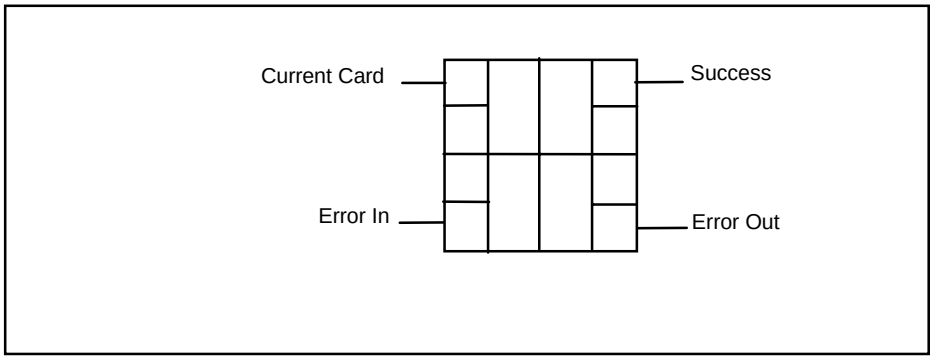
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Channel Not Defined, Card Not Responding, Undefined Error
ERR	Error Out	Contains error information

SEE ALSO:

Halt Channel

START IRQ HANDLER

The **Start IRQ Handler** VI will start the handler for the specified card.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

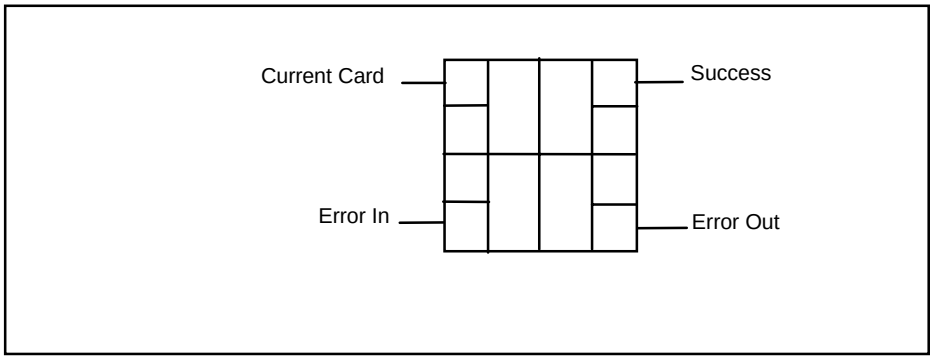
INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
	Error Out	Contains error information

SEE ALSO:

Stop IRQ Handler

STOP IRQ HANDLER

The **Stop IRQ Handler** VI will stop the handler for the specified card.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
	Error Out	Contains error information

SEE ALSO:

Start IRQ Handler

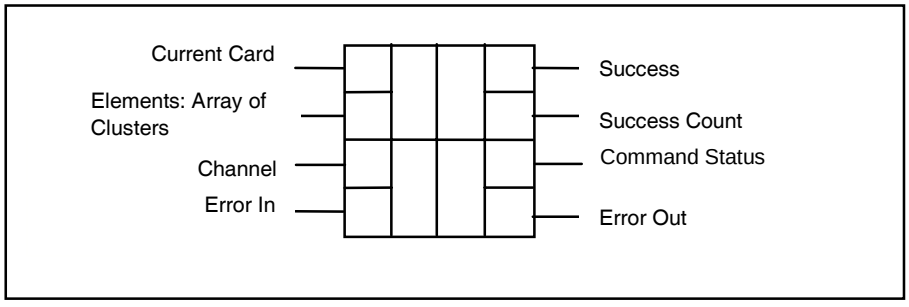
TRANSMIT FIFO

The **Transmit FIFO** VI will enqueue a list of Tx elements into the transmission queue. If the transmission queue becomes full while being enqueued, the VI will return with the **success** flag set to false, and the elements enqueued indicating how many elements were successfully enqueued. The elements enqueued will be the first ones in the input array. The application will probably want to call the **Transmit FIFO** again with the remaining elements if this occurs.

If the SSM = 0xFF, the SSM is calculated by the card from the data for binary, BCD, BCD Raw, and lat/long data words as defined by the **Load Engineering Conversion Table** VI. For UNDEF words, the label, SDI, and SSM in the VI are ignored. The 32 bits of ARINC 429 Data are transmitted exactly as the user specifies. However, the parity bit is still calculated by the card as defined by the **Define Tx Channel** VI.

If the data type being transmitted is BCD or BNR, then place the data into the Data SGL field of the cluster. If the data is any other type, place it into the Data Raw field.

The mask word contains a 32-bit mask that will be logically "OR"ed with the data word after converting it from engineering units. This allows the user to make use of the unused bits in a BCD or BNR word. This is commonly known as packed discretes.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The channel number used to transmit the FIFO data. (0..15)
[ ]	Elements Array of clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The Sign Status Matrix part of the ARINC 429 word. (0..7)
U32	Data Raw	The raw data part of the received ARINC data word. (0..0xFFFFFFFF)
SGL	Data SGL	IEEE Standard Single Floating Point Value
U32	Mask Word	In non-zero, then the mask word will be "OR"ed with the data word. (0..0xFFFFFFFF)
U32	Delay	Number of 100µs clock ticks the module will wait before transmitting the next word in the FIFO. A FIFO delay will not affect the timing of any scheduled transmissions.
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Success Count	The number of ARINC words that were successfully sent.
U16	Command Status	OK, Bad Parameter, Channel Not FIFO, Undefined
	Error Out	Contains error information

SEE ALSO:

Transmit Scheduled
Receive FIFO
Define Tx Channel
Load Engineering Conversion Table

TRANSMIT SCHEDULED

The **Transmit Scheduled** VI is used to update the data for scheduled transmission. This element will then be transmitted in accordance with the schedule defined in the **Define Tx Schedule Table** VI.

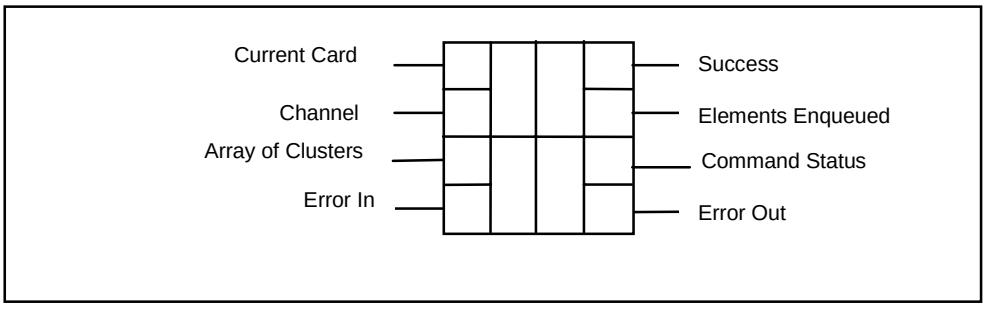
If the SSM = 0xFF, the SSM is calculated by the card from the data for binary, BCD, BCD Raw, and lat/long data words as defined by the **Load Engineering Conversion Table** VI.

For UNDEF words, the ARINC 429 word will be transmitted exactly as placed in the “Data” portion of the command. The label and SDI will only be used to determine in which schedule frames the word should be transmitted. However, the parity bit is still calculated by the card as defined by the **Define Tx Channel** VI.

Scheduled data is configured through the **Define Tx Schedule Table** VI. When the channel is first started, and the user has not yet placed data in the scheduled data FIFO, nothing will be transmitted, even though the schedule has been defined. As the user places data words in the scheduled data FIFO, those words will begin to transmit as scheduled data.

If the data type being transmitted is BCD or BNR, then place the data into the engineering unit data field of the cluster. If the data is any other type, place it into the Raw 429 Data field.

The mask word contains a 32-bit mask that will be logically "OR"ed with the data word after converting it from engineering units. This allows the user to make use of the unused bits in a BCD or BNR word. This is commonly known as packed discretes.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The channel number used to transmit the scheduled data. (0..15)
[ ]	Array of Clusters containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	Disable	The disable/enable part of the data is used to enable or disable Label/SDI scheduled combinations. 0=DISABLED 1=ENABLED
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
U8	SSM	The Sign Status Matrix part of the ARINC 429 word. (0..7)
U32	Data Raw	The ARINC raw data. (0..0xFFFFFFFF)
SGL	Data SGL	IEEE Standard Single Floating Point Value
U32	Mask Word	In non-zero, then the mask word will be "OR"ed with the data word. (0..0xFFFFFFFF)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Success Count	The number of ARINC words that were successfully sent.
U16	Command Status	OK, Bad Parameter, Channel Not Scheduled, Channel Not Transmit, Undefined Error
	Error Out	Contains error information

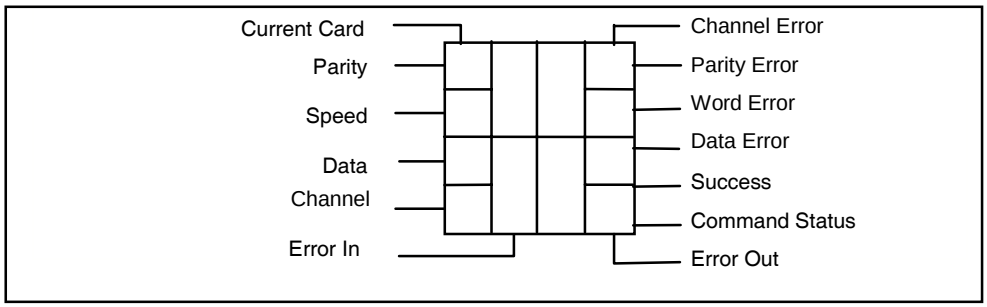
SEE ALSO:

Define Tx Channel
Transmit FIFO
Load Engineering Conversion Table
Receive FIFO

TX RX LOOPBACK

The **Tx Rx Loopback** VI allows the user to test the loopback capabilities of the card using the internal loopback feature of the card.

You must run the **Initialize** and **Reset Card** VIs before you run **Tx Rx Loopback**. The **Tx Rx Loopback Test** VI already does all necessary initialization for you so you can run the loopback test right away.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
U32	Data	Data to be looped back.
TF	Channel	0=CHANNEL INACTIVE 1=CHANNEL ACTIVE The channel used to loopback the data. (0..15)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Channel Error	0=NO ERROR 1=ERROR OCCURRED An error occurred on the specified channel during a loopback. (0..15)

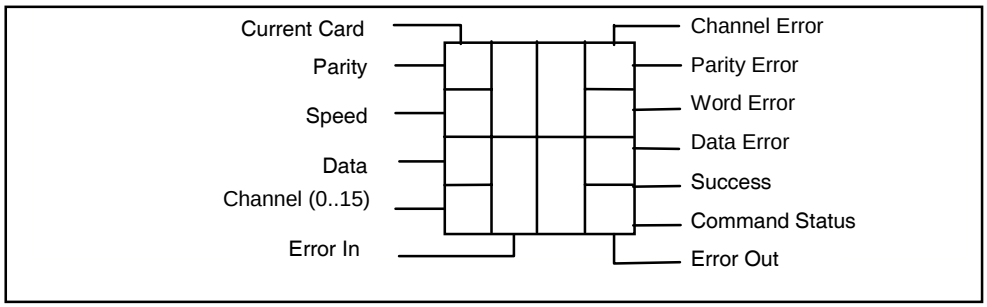
TF	Parity Error	0=NO ERROR 1=ERROR OCCURRED A parity error occurred on the specified channel during a loopback. (0..15)
TF	Word Error	0=NO ERROR 1=ERROR OCCURRED A word error occurred on the specified channel during a loopback. (0..15)
U32	Data Error	Contains a failed data word if a failure occurred on the specified channel. (0..15)
TF	Success	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Card Not Responding, Undefined Error
	Error Out	Contains error information

SEE ALSO:

Tx Rx Loopback Test
Initialize
Reset Card

TX/RX LOOPACK TEST

The **Tx Rx Loopback** VI allows the user to test the loopback capabilities of the card using the internal loopback feature of the card, by calling a series of VI's. The Initialize VI is called to initialize the card and set up any global variables needed to exercise the card. After this VI completes successfully the Reset Card VI is called to reset the card and perform a series of self-tests on the card. The Tx/Rx Loopback VI is called to loop back data. Finally the Free Card VI is called to free any resources that the card is using and the Tx/Rx Loopback Test VI will terminate.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Parity	0=NONE 1=EVEN 2=ODD
U16	Speed	0=LOW 1=HIGH
U32	Data	Data to be looped back.
TF	Channel	0=CHANNEL INACTIVE 1=CHANNEL ACTIVE The channel used to loopback the data. (0..15)
	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Channel Error	0=NO ERROR 1=ERROR OCCURRED An error occurred on the specified channel during a loopback. (0..15)
TF	Parity Error	0=NO ERROR 1=ERROR OCCURRED A parity error occurred on the specified channel during a loopback. (0..15)
TF	Word Error	0=NO ERROR 1=ERROR OCCURRED A word error occurred on the specified channel during a loopback. (0..15)
U32	Data Error	Contains a failed data word if a failure occurred on the specified channel. (0..15)
TF	Initialize	0=INITIALIZE VI FAILED 1=INITIALIZE VI PASSED
TF	Reset Card	0=RESET VI FAILED 1=RESET VI PASSED
TF	Loopback	0=LOOPBACK VI FAILED 1=LOOPBACK VI PASSED
TF	Free Card	0=FREE CARD VI FAILED 1=FREE CARD VI PASSED
U16	Command Status	OK, Bad Parameter, Channel Not FIFO, Undefined Error
ERR	Error Out	Contains Error Information

SEE ALSO:

Tx Rx Loopback Test
Card Initialization
Reset Card
Initialize
Reset Clock

UPDATE TX SCHEDULE RATES

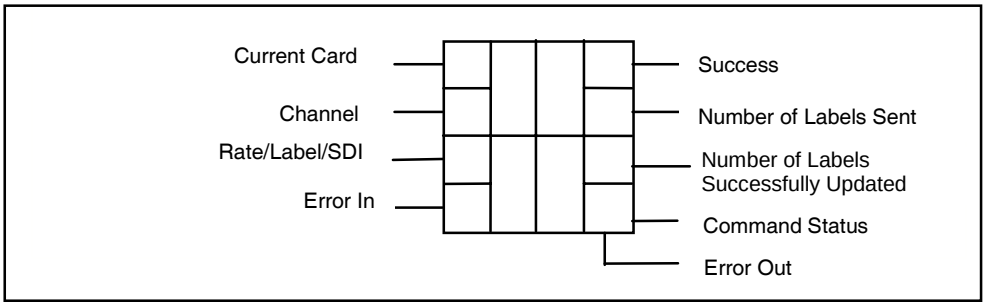
The **Update Tx Schedule Rates** VI allows the host to update an already defined transmission schedule.

The user must have a schedule already created via the **Define Tx Schedule Rates** VI. When a schedule needs to be updated for changes in the transmission rate, or to enable/disable a particular Label/SDI combination the **Update Tx Schedule Rates** VI should be used.

If the user wishes to distinguish only by label and not label and SDI then the set SDI must be set to a value of 15. The data that is transmitted is not part of this command. The scheduled data is placed in the scheduled data FIFO.



Duplicate label/SDI entries into the list will have the effect of overwriting the previously entered values of a Label/SDI.



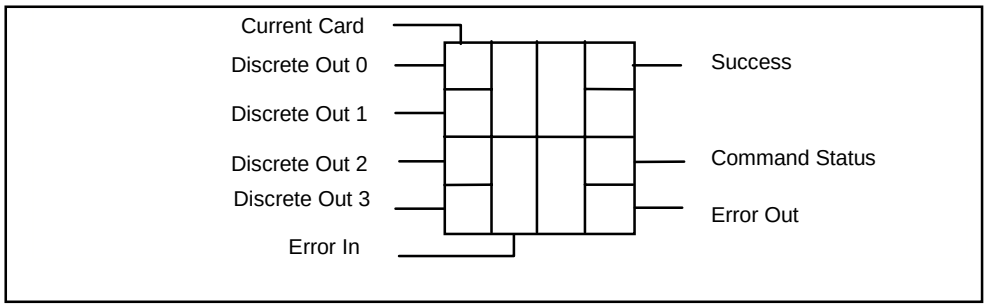
CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1..8)
U16	Channel	The desired transmit channel to be used. (0..15)
[U8]	Rate/Label/SDI Array of Clusters Containing:	
U8	Label	The label is made up of bits 1..8 of the ARINC 429 word. (0..255)
U8	SDI	The SDI is made up of bits 9 and 10 of the ARINC 429 word. (0..3, 15=Don't Care)
U32	Rate	The number of clock ticks between transmissions of the label/SDI value. (1..0xFFFFFFFF)

	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success	0=FAILURE 1=SUCCESS
U16	Number Of Labels Sent	The number of Label/SDI combinations to be placed in the schedule table.
U16	Number Of Labels Successfully Updated	Number of labels sent.
U16	Command Status	OK, Bad Parameter, Channel Not Transmit, Channel Not Scheduled, Memory Error, Card Not Responding, Undefined Error
	Error Out	Contains error information

WRITE OUTPUT DISCRETE

The **Write Output Discrete** VI sets the value of all four of the user controllable discrete outputs. There are a total of four discrete outputs. All four discrete outputs are available on the front panel connector.



CONTROLS		VALID VALUES
U16	Current Card	The logical device number. (1…8)
TF	Discrete Out 0	0=OFF, 1=ON
TF	Discrete Out 1	0=OFF, 1=ON
TF	Discrete Out 2	0=OFF, 1=ON
TF	Discrete Out 3	0=OFF, 1=ON
2D6	Error In	Describes error conditions that occur before this VI executes. The default input is no error.

INDICATORS		VALID VALUES
TF	Success—requested operation successful	0=FAILURE 1=SUCCESS
U16	Command Status	OK, Bad Parameter, Card Not Responding, Undefined Error
2D6	Error Out	Contains error information

SEE ALSO:

Read Input Discrete

ACRONYMS

The following are some acronyms and terms often used in this manual:

A429	ARINC 429
ADC	Analog-to-Digital Converter
BCD	Binary Coded Decimal
BNR	Binary
CH	Channel
CSP	Configure Serial Port
DAC	Digital-to-Analog Converter
DER	Dequeue Errors
DIR	Data In Ready
DOR	Data Out Ready
DRC	Define Rx Channel
DTC	Define Tx Channel
DTST	Define Tx Schedule Table
ERR	Error message request
EXT	Extension
FI	FIFO
FIFO	First-In First-Out
HA	Halt Channel
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers
K	Kilo
KByte	Kilo-Byte
KHz	Kilo-Hertz
LECT	Load Engineering Conversion Table
LED	Light Emitting Diodes
MHz	Mega-Hertz
MRC	Modify Rx Channel
ms	Millisecond
MTC	Modify Tx Channel
POST	Power On Self Test
RAM	Random Access Memory
RC	Reset Clock
REC	Receive FIFO

RES	Reset Card
RFW	Define Rx Filter Words
RID	Read Input Discrete
RM	Read Mailbox
ROM	Read Only Memory
Rx	Receive
S/W	Software
ST	Start Channel
SDI	Source/Destination Indicator
SR	Serial Receive
SRAM	Static Random Access Memory
SSM	Sign/Status Matrix
STR	Serial Transmit
STX	Start of Text
SYST	System
TRA	Transmit FIFO
TS	Transmit Scheduled
Tx	Transmit
UNDEF	Undefined
VER	Software Version
VI	Virtual Instrument
VXI	VMEbus Extensions for Instrumentation
WOD	Write Output Discrete
µs	Microsecond

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