Using A717 with Alta A429 Boards
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Alta A429 products can be configured to operate in A717 mode, either with Harvard Bi-Phase (HBP) or Bi-Polar Return to Zero (BPRZ) encoding.

REFER TO THE HARDWARE MANUAL FOR YOUR SPECIFIC BOARD TYPE – the Hardware Manual provides the specific jumpers, connectors, and pin-outs for the signals discussed here.

This document will refer to the pin-outs used on the PCI-A429 product, which is the same for the PMC-A429, CPCIC3-A429, CPCIC6-A429 and PCIE4L-A429 products.

Banks and Channels on Alta A429 Devices

Alta A429 devices are available in a variety of channel configurations. These devices can have one or two "Banks" where each **Bank** contains multiple **receive and transmit Channels**. Each Bank is an independent logical device – the software controlling the device will have a separate Device ID for each Bank and will control each Bank separately. This is similar to 1553 channels on our 1553 boards, where each 1553 channel on the board is an independent device controlled through a unique Device ID.

Here are some examples:

A **PCI-A429-4** board has **one bank** of 4 A429 channels, where the 4 channels are shared RX and TX.

A **PCI-A429-8** board has **one bank** of 8 A429 channels, where the 8 channels are shared RX and TX.

A **PCI-A429-16** board has **one bank** of 16 A429 channels, where the first 8 channels are shared RX and TX and the remaining 8 channels are RX only.

A **PCI-A429-30** board has **two banks**. The first bank has 16 A429 channels, where the first 8 channels are shared RX and TX and the remaining 8 channels are RX only. The second bank has 14 A429 channels, where the first 8 channels are shared RX and TX and the remaining 6 channels are RX only. Note that the reason we have one bank with 16 channels and another bank with 14 channels, rather than two banks of 16 channels, is the limited number of pins on the connector – not enough pins for 32 channels.

The pin-out used for **A429 operation** on the PCI-A429, PMC-A429, CPCIC3-A429, CPCIC6-A429 and PCIE4L-A429 is shown below (from the PCI-A429 Hardware Manual):

Table 6. J1- 68-pin SCSI Connector

J1 Pin#	Signal	J1 Pin#	Signal
1	RX1+/TX1+	35	RX1-/TX1-
2	RX2+/TX2+	36	RX2-/TX2-
3	RX3+/TX3+	37	RX3-/TX3-
4	RX4+/TX4+	38	RX4-/TX4-
5	RX5+/TX5+	39	RX5-/TX5-
6	RX6+/TX6+	40	RX6-/TX6-
7	RX7+/TX7+	41	RX7-/TX7-
8	RX8+/TX8+	42	RX8-/TX8-
9	RX9+	43	RX9-
10	RX10+	44	RX10-
11	RX11+	45	RX11-
12	RX12+	46	RX12-
13	RX13+	47	RX13-
14	RX14+	48	RX14-
15	RX15+	49	RX15-
16	RX16+	50	RX16-
17	RX17+/TX17+	51	RX17-/TX17-
18	RX18+/TX18+	52	RX18-/TX18-
19	RX19+/TX19+	53	RX19-/TX19-
20	RX20+/TX20+	54	RX20-/TX20-
21	RX21+/TX21+	55	RX21-/TX21-
22	RX22+/TX22+	56	RX22-/TX22-
23	RX23+/TX23+	57	RX23-/TX23-
24	RX24+/TX24+	58	RX24-/TX24-
25	RX25+	59	RX25-
26	RX26+	60	RX26-
27	RX27+	61	RX27-
28	RX28+	62	RX28-
29	RX29+	63	RX29-
30	RX30+	64	RX30-
31	AV Trig In1	65	AV Trig Out1
32	RS-485 - 1+	66	RS-485 – 1 -
33	IRIG In	67	IRIG GND
34	TTL I/O	68	GND

A429 RX channels 1-16 and A429 TX channels 1-8 are on Bank 1 – the software indexes these channels as Bank 1 RX channels 0-15 and TX channels 0-7. A429 RX channels 17-30 and A429 TX channels 17-24 are on Bank 2 – the software indexes these channels as Bank 2 RX channels 0-13 and TX channels 0-7.

When the device is used for A717 operation, some of these A429 channels/pins are reconfigured for use in A717 mode.

A717 Operation with Harvard Bi-Phase Encoding

The most commonly used A717 encoding is Harvard Bi-Phase.

A717 Channels and Pin-Outs

As mentioned above, A717 operation reconfigures some of the A429 channels on the board. Again, we are using the pin-outs for the PCI-A429, PMC-A429, CPCIC3-A429, CPCIC6-A429 and PCIE4L-A429 products. The table below shows how the pins are used for A717 HBP encoding:

	TRANSMIT			RECEIVE			16 Channel	30 Channel
	Tx717	Pin#	Chan #	Rx717	Pin#	Chan #	16 Channel	30 Channel
Bank 1	Tx1+	1	0	Rx1+	1	0	PCI-A429-16	PCI-A429-30
	Tx1-	2		Rx1-	35			
	Tx2+	3	2	Rx2+	2	1		
	Tx2-	4		Rx2-	36			
Bank 2	Tx3+	17	0	Rx3+	17	0		
	Tx3-	18		Rx3-	51			
	Tx4+	19	2	Rx4+	18	1		
	Tx4-	20		Rx4-	52			

This shows the signals available for boards with one Bank (PCI-A429-16) or two Banks (PCI-A429-30). Note that each Bank has two A717 transmit channels and two A717 receive channels. **However, not all of these A717 channels can be used at the same time because of the pins used**. On Bank 1, you cannot use A717 TX channel 1 and A717 RX channel 2 simultaneously because they both use the same pin (pin 2 is both TX1- and RX2+). Likewise on Bank 2, you cannot use A717 TX channel 3 and A717 RX channel 4 simultaneously because they both use the same pin (pin 18 is both TX3- and RX4+).

Therefore, a given BANK can either use **one A717 TX channel and two A717 RX channels**, or it can use **two A717 TX channels and one A717 RX channel**.

AltaAPI Example Programs

The example program **ADT_L1_A429_ex_717rxtx1.c** demonstrates transmitting and receiving A717 with HBP encoding. Note that the "Chan #" shown in the table above is the TX or RX channel index used by the software to specify the channel to use, as seen in the example program.

A717 Operation with Bi-Polar Return to Zero Encoding

Some systems need to use BPRZ encoding. This is the same encoding used for A429.

A717 Channels and Pin-Outs

As mentioned above, A717 operation reconfigures some of the A429 channels on the board. Again, we are using the pin-outs for the PCI-A429, PMC-A429, CPCIC3-A429, CPCIC6-A429 and PCIE4L-A429 products. The table below shows how the pins are used for A717 BPRZ encoding:

		TRANSMIT			RECEIVE		16 Channel	30 Channel
	Tx717	Pin#	Chan #	Rx717	Pin#	Chan #	16 Channel	30 Channel
Bank 1	Tx1+	1	0	Rx1+	1	0	PCI-A429-16	PCI-A429-30
	Tx1-	35		Rx1-	35			
	Tx2+	2	1	Rx2+	2	1		
	Tx2-	36		Rx2-	36			
Bank 2	Tx3+	17	0	Rx3+	17	0		
	Tx3-	51		Rx3-	51			
	Tx4+	18	1	Rx4+	18	1		
	Tx4-	52		Rx4-	52			

For A717 BPRZ encoding, the pin-outs are the same as for A429 operation. Therefore you do not have the pin/channel conflict seen with the HBP configuration. The table above shows only two A717 channels, but **you can use ANY of the A429 TX channels as A717 BPRZ transmit**. The same does not apply to A717 BPRZ receive channels – **only the first two receive channels (of each bank) can be used for A717 BPRZ** because only these channels have the additional logic needed to decode A717 signals, detect sync words, etc. The example program discussed below uses TX channel 3 to send A717 BPRZ and uses RX channel 1 to receive A717 BPRZ.

AltaAPI Example Programs

The example program **ADT_L1_A429_ex_717rxtx1_bprz.c** demonstrates transmitting and receiving A717 with BPRZ encoding. This example program transmits on TX channel 3 (index 2) and receives on RX channel 1 (index 0).