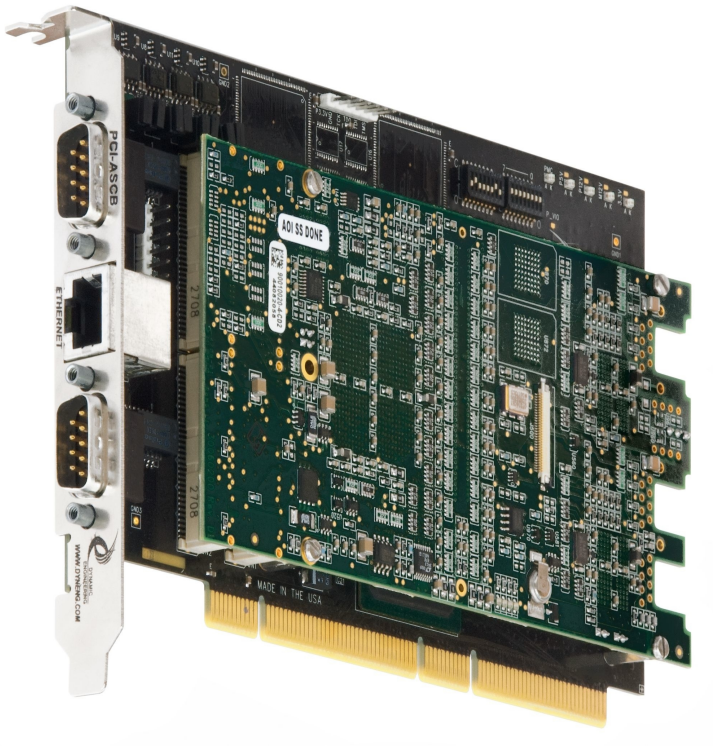

ASCB-D Goebel NIC simulation interface

Hardware Manual

The Goebel Company

Revision: 0.2.1-a **8/27/2013**

Purpose

This manual describes the Goebel NIC, a test resource for exercising ASCB-D interface bus on Honeywell EPIC programs.

Notice

Information in this manual has been carefully reviewed and is believed to be accurate. The Goebel Company shall not be liable for errors contained herein. The Goebel Company reserves the right to make changes or additions to the software described herein.

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1 Introduction

This manual describes the Goebel NIC or GNIC, a test resource for exercising Honeywell's ASCB-D bus on EPIC and APEX programs. GNIC is a new generation of test equipment designed specifically for simulation. Previous cards base on flight hardware components restrict the user to flight hardware capabilities. By designing GNIC specifically for simulation additional features and flexibility are possible. A single card can transmit on both left and right ASCB-D busses contrasted with two cards based on flight hardware. A single GNIC can emulate multiple NICs including timing NICs. Previous cards required reconfiguring to combine all simulation variables into a single NIC id. With the GNIC, the NICs being emulated can be enabled or disabled independently without reconfiguring. These features and more are fully supported in Honeywell's TIU software. TIU software automatically loads NIC schedules to the Goebel NIC on startup, eliminating the problems of inconsistent configurations. Bus statistics are readily available to diagnose and trouble shoot bus and wiring problems.

1.1 Hardware architecture

The Goebel NIC leverages considerable experience in intelligent interfaces by combining a COTS CPU with a custom IO PCI card with ASCB-D interfaces. A long history of expertise in time critical firmware programming is crucial in implementing the time scheduled ASCB-D protocol. This approach has been implemented successfully on multiple programs and bus interfaces, including Airbus AFDX, Boeing 787 Arinc 664, Boeing 787 Flight Control bus, and NASA CEV.

1.1.1 CPU PMC

The CPU PMC (See Figure 3) on the ASCB test resource utilizes the low power IBM/AMCC PowerPC 440GX embedded Processor. With integrated PCI-X, DDR SDRAM, SRAM and Ethernet interfaces, the 440GX offers a high performance solution for general computing applications. A SO-DIMM DDR SDRAM memory slot and socketed boot flash provide flexible field upgradeability.

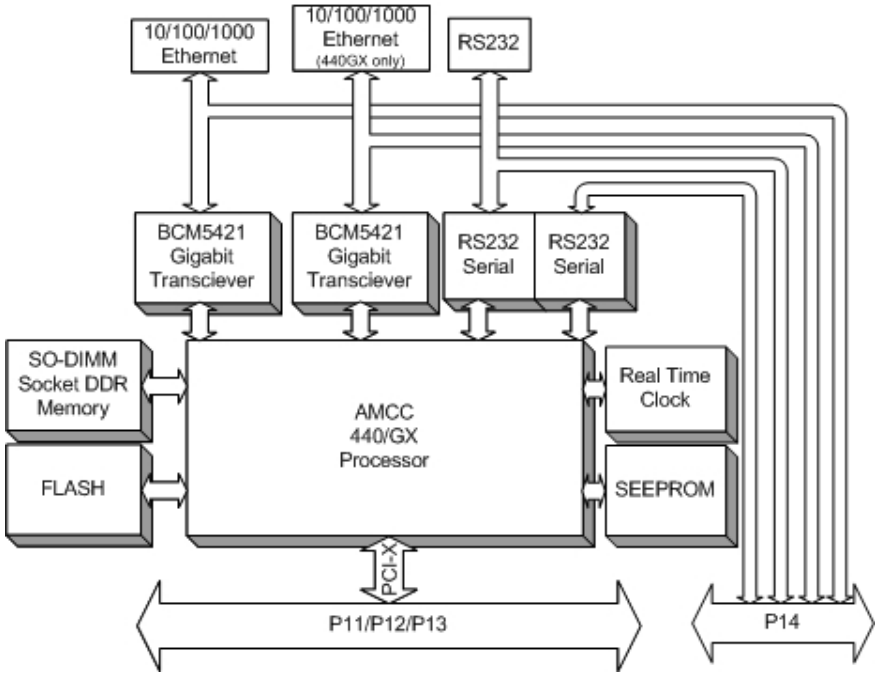

Figure 1 PrPMC

The CPU PMC provides the platform for firmware which handle timing and protocol processing of the ASCB-D bus. The DMA capability controlled by firmware dramatically reduces host CPU overhead.[1]

1.1.2 PCI ASCB with CPU PMC slot

The PCI ASCB base card utilizes a Xilinx FPGA and RS 485 drivers to produce low level encoding of ASCB-D. The Xilinx is on a local PCI bus which communicates between the CPU and Host. This isolates the Xilinx control from any Host PCI traffic.

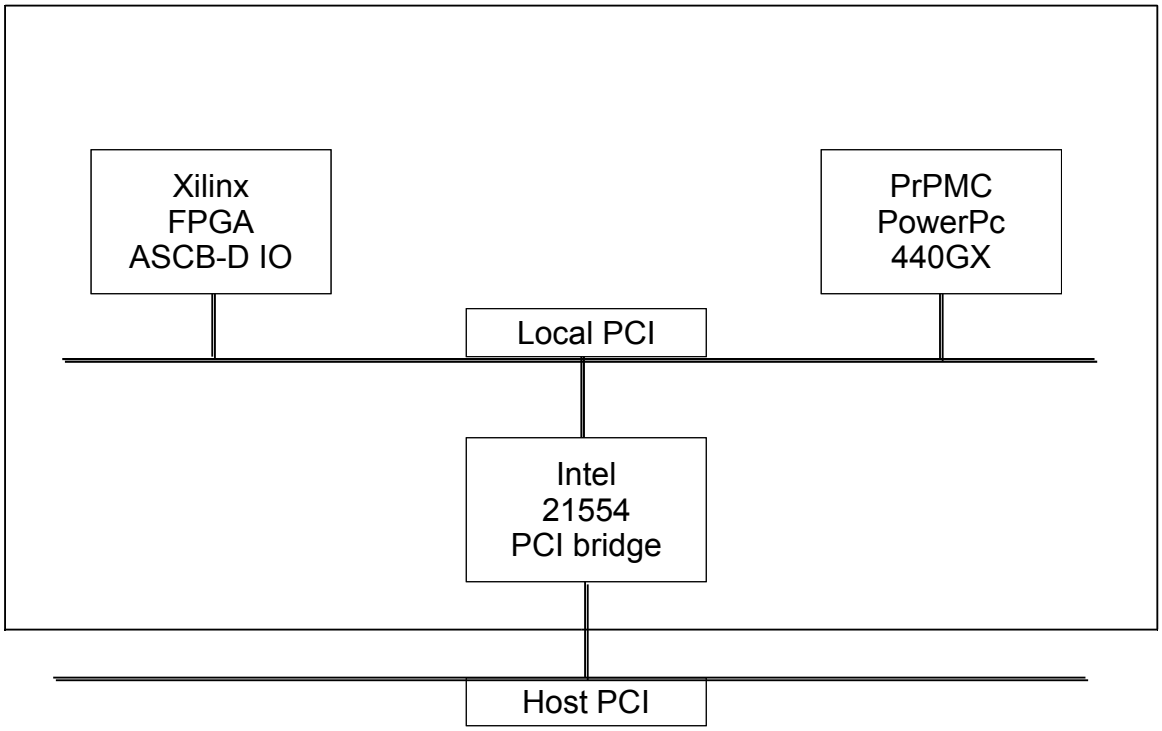

Illustration 1: PCI ASCB-D block diagram

1.2 Enhanced ASCB

Honeywell's enhanced ASCB provides increased data capacity on the bus compared to previous versions. The Goebel ASCB-D simulation interface card supports enhanced ascb in release ASCB-0.1.4-g and later versions.

Detection of Enhanced ASCB is transparent to the user. Loading the proper NIC.le_reg file is all that is required to insure proper use of Enhanced mode.

1 CPU overhead reduction of 75% has been noted.

1.3 Hardware versions and Enhanced ASCB support

Hardware is versioned with a PCB version number, and possibly a hardware rev level. PCB versions are noted on the back of the card, and are of the form 10-2008-12XX. Hardware rev levels are noted with a small square sticker with the rev number on it. FPGA rev levels can be read via the "ascb id" command. Firmware version can be read via the "ascb firmware" command.

PCB version	Hardware rev	Description	E-ASCB support	FPGA rev	Firmware rev
10-2008-1201		Initial version	No		
10-2008-1202		Second production run	No		
10-2008-1202	3	Improve signal shape for E-ASCB	Yes	>= 15	>= 1.4-g
10-2008-1203		Third production run, supports software load of FPGA	No		
10-2008-1203	3	Improve signal shape for E-ASCB	Yes	>= 15	>= 1.4-g
10-2008-1204		Fourth production run, Increase drive strength to 6.5v	Yes	>= 15	>= 1.4-g
10-2008-1204	1	Improve signal shape for E-ASCB	Yes	>= 15	>= 1.4-g
10-2008-1205		Fifth production run, Increase drive strenght to 8.5v	Yes	>= 19	>= 2.1-a
10-2008-1206		Sixth production run Support parametric testing with variable voltage capability	Yes	>= 19	>= 2.1-a

1.4 GNIC PCINIC comparison

1.4.1 Cable concerns

GNIC drives both busses, left and right from a single card. Take care when replacing PCINIC to only connect the upper bus cables from PCINIC. The lower cable only has the cross side primary bus wired, and will not be able to fully support GNIC.

1.4.2 NIC.le_reg loading

GNIC loads the NIC.le_reg or NIC.be_reg files over PCI and does not need to load over ethernet. TIU software loads the proper registry on startup. Custom user software must insure the proper registry is loaded via the API over PCI. The RJ45 connector on the front of the board is only used for factory installation of software and does not perform a LAN function in production configurations.

1.4.3 Timing NIC via GNIC

NIC IDs 1,2,33,34 are reserved for timing NICs. These NICs supply timing synchronization data on the bus. With PCINIC a special load was required to enable timing NIC capability. GNIC has timing NIC capability built in, and does not need special loading.

1.4.4 TIU considerations

Honeywell's TIU software fully supports GNIC hardware. When configuring TIU server one normally has GNIC drive a NIC ID on each bus. For example on many systems NIC IDs 6 and 38 are configured for TIU simulation, and are both driven by a single GNIC card. To have the GNIC transmit for a given NIC ID select “Goebel NIC” in TIU server. GNIC can transmit for any or all NICs. As a test configuration, select “Goebel NIC” for all NIC IDs, turn off avionics and all bus traffic will be driven by TIU server.

2 PCI interface card

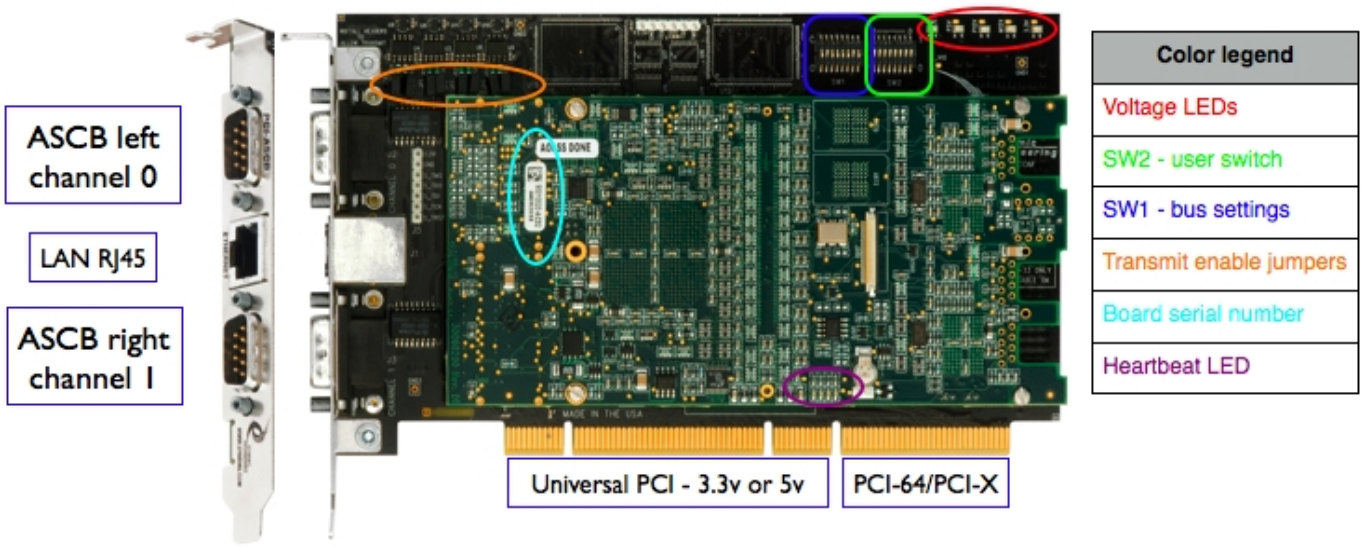

Figure 2:

2.1 Card features

2.1.1 ASCB front bezel connections

The ASCB hardware (See Figure 2) consists of a PMC module, hosted on a half length PCI card. The card has 2 ASCB-D channels routed out the front via dual DB9 male connectors. The top connector is for ASCB left (channel 0) and the bottom connector if for ASCB right (channel 1). In addition an RJ45 ethernet connection is provided for EPIC LAN access. The processor PMC is on the PMC slot of the ASCB card, and does not require any cable connections. The carrier is universal type compatible with legacy 5V PCI as well as 3.3v PCI or PCIX. Note, for insertion on 32/33 PCI slots refer to the host hardware requirements.

DB9 Pin	Signal name	Signal description
1	PRI+	Primary ASCB-D, positive polarity
2	PRITXDIS	Primary tx is dasabled when shorted to ground
3	BKPTXDIS	Backup tx is disabled when shorted to ground
4	BKP+	Backup ASCB-D, positive polarity
5	TRIG	Start of frame pulse
6	PRI-	Primary ASCB-D, negative polarity
7	GND	Ground
8	BKP-	Backup ASCB-D, negative polarity
9	GND	Ground

Table 1: DB9 ASCB-D pinouts

2.1.2 Transmit enable jumpers

To enable or disable transmit a set of enable jumpers is found in the upper left oval. To disable transmit, remove all eight of these jumpers. With the jumpers removed, the transmit drivers are physically disconnected from the bus.

The table below indicates the jumper association to channel. Note the table is ordered as the jumpers are ordered on the card from left to right.

Pin	Side, Channel	Primary/Backup
JP3, JP4	Left, 0	Backup
JP1, JP2	Left, 0	Primary
JP7, JP8	Right, 1	Backup
JP5, JP6	Right, 1	Primary

Table 2: Transmit Enable Jumpers

Note pins 2 and 3 control transmit disable of the busses via FPGA disable. The busses are still physically connected to the drive electionics which are disabled via FPGA programming when pins 2 and 3 are grounded.

2.1.3 Universal PCI 3.3v or 5v signaling

The presence of the front and rear keyway indicates a universal PCI card. That is it fits in both legacy 5v PCI slots which have the rear key present, and it fits in 3.3v PCI slots which have the front key present. Note that 3.3v PCI is required to run at 66 MHz. PCI 5v slots are limited to 33 MHz.

2.1.4 PCI 64 PCI-X

The ASCB-D PCI cards is compatible with 64 bit PCI or PCI-X at 66 Mhz. The rear tab of the PCI card carries the upper 32 bits of the 64bit signaling. Note that the rear tab need not have a corresponding socket position to fit into. It may remain unconnected on 32 bit PCI slots. Note that a 32 bit PCI slot must have no obstruction to the rear of the connector which would interfere with the rear tab.

2.1.5 Voltage LEDs

The LEDs along the top rear of the card show the status of the various supply voltages. From left to right they show PMC, plus 5v, plus 12v, minus 12v, and 3.3v. Voltage LEDs are green when proper voltage is present, and not lit otherwise.

2.1.6 SW1 PCI bridge settings

The firmware requires specific settings of the PCI bridge to operate properly. Switch settings in the up position are 1 (switch closed) and the down position is 0 (switch opened). The following table shows the switch settings required.

Bit (left to right)	Setting	Description
1	down	PMC clock disable in power down state
2	down	66 Mhz enable
3	down	Unused
4	down	Unused
5	down	Unused
6	up	ASCB INTA connected to PMC
7	down	ASCB INTA not connected to PCI
8	down	Monarch mode disabled for PMC

2.1.7 SW2 user settings

There are no user settings defined for SW2 at this time.

2.1.8 Board serial number

The board serial number is found on the CPU PMC. This serial number can also be read via software either from the ControlPanel, or via the command “ascb sn”.

2.1.9 Heartbeat LED

While the ASCB firmware is in a started state, the heartbeat LED will change approximately once a second.

3 Installation

3.1 Static protection

1. Do not open static bag until in a static safe environment.
2. Use a static safe workstation, with grounding provisions.
3. Ground the computer system in which the card is to be installed.
4. Insure power is removed from the computer system.
5. Ground yourself with a static protection wrist strap.
6. Open the static bag and remove the board.
7. Secure the PCI card in an appropriate PCI slot.
8. Insure PCI card is fully seated.
9. Fasten screw through PCI front bezel slot to chassis.
10. Reassemble computer and restart.

3.2 PCI slots allowed

3.2.1 Legacy 5v PCI slot

On legacy 5v PCI slots insure the area behind the slot (to the left in this picture) does not obstruct the rear tab of the card.

3.2.2 PCI-X or PCI-64 slots

PCI-X or PCI-64 slots allow all 4 tabs of the card to be inserted in the slot.

3.3 ASCB cable connections

The ASCB card has connections for two ASCB busses connected via DB9 connector. The two busses are described as left and right, or 0 and 1. Each bus has a primary and backup. Normally both primary and backup are wired to each DB9 connector. In circumstances where only primary or backup are wired, bus selection should be instituted by software.

ASCB cabling specifications provided by Honeywell should be rigorously followed. Failure to follow specifications can result in data reliability issues.

3.4 Software Installation

3.4.1 Windows

Upon completion of boot, a window appears indicating new hardware is found. Follow the installation instructions with the software CD.

3.4.2 Linux

Upon completion of boot install the RDC and ASCB RPMs according to the installation instructions included with the software CD.

3.5 Host system requirements

3.5.1 3.3 volt supply

The ASCB-D card utilizes the 3.3 volt supply of the host backplane. Motherboards or backplanes supporting PCI 2.0 or higher will provide the 3.3v supply.

3.5.2 Host cooling

The host computer must have active PCI cooling capability. This generally takes the form of a fan near the rear of the PCI cards blowing air toward the PCI cards.

4 Goebel Company Hardware Warrantee

Limited Warranty On New Hardware

The Goebel Company will provide repairs, or, at The Goebel Company's sole option, replacements to new hardware equipment during the WARRANTY PERIOD (as defined below) in accordance with the following terms, conditions, and limitations.

Repairs Covered. This warranty covers repairs to correct hardware equipment defects related to material or workmanship noted during the WARRANTY PERIOD. Such repairs will be made at The Goebel Company's expense provided that you comply with the terms and conditions of this warranty.

Warranty Period. The WARRANTY PERIOD begins on the date of shipment for new hardware equipment and ends at the expiration of twelve (12) months from the date of first shipment of computer boards or systems supplied by The Goebel Company.

What Is Not Covered.

(a) Software or software media products.
(b) Consumables, such as batteries, printer ribbons, or paper.
(c) Defects caused by accident, electrical or temperature stress, abuse, misuse, or misapplication of the equipment.
(d) Equipment that has been modified without the express written permission of The Goebel Company or on which the serial number has been removed, tampered with, or defaced.
(e) Revisions due to design changes or changes in components not authorized by The Goebel Company.
(f) Products or components of systems not supplied by The Goebel Company.

Other Terms.

(a) The Goebel Company may from time to time improve, enhance, or modify the design of the hardware equipment covered by this warranty pursuant to general engineering change orders (ECOs). The Goebel Company will have the right but not the obligation, at its discretion, to apply general ECOs to the warranted equipment returned for repair without your request or notice to you.
(b) The Goebel Company reserves the right to use re-manufactured, refurbished, or used parts and modules in making warranty repairs.
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