AMBus HD

Apogee AMbus Expansion Card

User's Guide
V1.0 - March 2005

Apogee
Sound Amazing

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SOUND AMAZING

Warnings

FCC warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to take whatever measures necessary to correct the interference at his own expense.

Copyright Notice

The Apogee AMBus HD card is a computer-based device, and as such contains and uses software in ROMs. This software, and all related documentation, including this User's Guide contain proprietary information which is protected by copyright laws. All rights are reserved. No part of the software and its related documentation may be copied, transferred, or modified. You may not modify, adapt, translate, lease, distribute, resell for profit or create derivative works based on the software and its related documentation or any part thereof without prior written consent from Apogee Electronics Corporation, U.S.A.

Trademark Acknowledgements

Digidesign, Pro Tools|HD, 192 I/O, SYNC I/O and digiLink are trademarks of Digidesign, a division of Avid Technology, Inc. Prism is copyrighted by Prism Media Products Ltd.

Declarations of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation.
This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inteference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Re-orient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a different circuit from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

NOTE: The use of non-shielded cable with this equipment is prohibited.
CAUTION: Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

Apogee Electronics Corporation, 3145 Donald Douglas Loop South, Santa Monica, CA 90405.
Betty Bennett, CEO.

Industry Canada Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matérial brouilleur du Canada.

Declaration of Conformity – CE

Apogee Electronics Corporation hereby declares that the product, the AMBus HD card, to which this declaration relates, is in material conformity with the following standards or other normative documents:

- EN50081-1/EN55022; 1995
- EN50082-1/IEC 801-2, 3, 4; 1992
  following the provisions of:
- 73/23/EEC – Low Voltage Directive
- 89/336/EEC – EMC Directive

Declaration of Conformity – Japan

Apogee Electronics Corporation hereby declares that the AMBus HD card, to which this declaration relates, is in material conformity with the VCCI Class A standard.

Declaration of Conformity – Australia

Apogee Electronics Corporation hereby declares that the AMBus HD card is in material conformity with AN/NZS standard requirements.

Registration and Warranty Information

Be sure to register your AMBus HD card, either by filling in the enclosed Registration Card or by completing the on-line registration form at our Web site: http://www.apogeedigital.com/support/. If you do so, Apogee can contact you with any update information. As enhancements and upgrades are developed, you will be contacted at the registration address. Firmware updates are free for the first year of ownership unless otherwise stated. Please address any inquiries to your dealer or directly to Apogee at:

APOGEE ELECTRONICS CORPORATION,
3145 Donald Douglas Loop South, Santa Monica, CA 90405, USA.
TEL: (310) 915-1000, FAX: (310) 391-6262
email: support@apogeedigital.com. Web: http://www.apogeedigital.com/

APOGEE ELECTRONICS CORPORATION warrants this product to be free of defects in material and manufacture under normal use for a period of 12 months. The term of this warranty begins on the date of sale to the purchaser. Units returned for warranty repair to Apogee or an authorized Apogee warranty repair facility will be repaired or replaced at the manufacturer's option, free of charge.
ALL UNITS RETURNED TO APOGEE OR AN AUTHORIZED APOGEE REPAIR FACILITY MUST BE PREPAID, INSURED AND PROPERLY PACKAGED, PREFERABLY IN THEIR ORIGINAL BOX. Apogee reserves the right to change or improve design at any time without prior notification. Design changes are not implemented retroactively, and the incorporation of design changes into future units does not imply the availability of an upgrade to existing units.

This warranty is void if Apogee determines, in its sole business judgment, the defect to be the result of abuse, neglect, alteration or attempted repair by unauthorized personnel.

The warranties set forth above are in lieu of all other warranties, expressed or implied, and Apogee specifically disclaims any and all implied warranty of merchantability or of fitness for a particular purpose. The buyer acknowledges and agrees that in no event shall the company be held liable for any special, indirect, incidental or consequential damages, or for injury, loss or damage sustained by any person or property, that may result from this product failing to operate correctly at any time.

USA: Some states do not allow for the exclusion or limitation of implied warranties or liability for incidental or consequential damage, so the above exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Service Information

The AMBus HD card contains no user-serviceable components: refer to qualified service personnel for repair or upgrade. Your warranty will be voided if you tamper with the internal components. If you have any questions with regard to the above, please contact Apogee.

In the event your AMBus HD card needs to be upgraded or repaired, it is necessary to contact Apogee prior to shipping, and a Return Materials Authorization (RMA) number will be assigned. This number will serve as a reference for you and helps facilitate and expedite the return process. Apogee requires that shipments be pre-paid and insured — unless otherwise authorized in advance.

IMPORTANT: ANY SHIPMENT THAT IS NOT PRE-PAID OR IS SENT WITHOUT AN RMA NUMBER WILL NOT BE ACCEPTED.

OWNER'S RECORD

The serial number is located on the rear panel of the unit. We suggest you record the serial number in the space provided below. Refer to it whenever you call an authorized Apogee Electronics repair facility or the manufacturer. Please be sure to return your completed warranty card immediately!

AMBus HD card Serial No._____

Purchase Date_____

Dealer_____

Phone_____

Address_____

CAUTION:
Any changes or modifications not expressly approved by APOGEE ELECTRONICS CORPORATION could void your authority to operate this equipment under the FCC rules.

Please register this unit by filling in the included registration card, or registering online at http://www.apogeedigital.com/support/register.php Please read this manual – if you call for technical support, we'll assume that you have. There will be a quiz.

AMBus HD

User's Guide

Table of Contents

Introduction 2
Getting Started Quickly 2
Connecting AMBus HD equipped Apogee Interfaces 3
- Incorporating a Sync I/O 4
- Clock Configurations 4
- Digilink Connections 5

Configuring Digidesign Pro Tools 6
- Hardware Setup 6
- I/O Setup 7

Interface Connections Chart: Standard Routing 8-12
Configuring the AMBus HD card 13
Installing the AMBus HD Card 14

Introduction

The Apogee AMBus HD expansion card allows Apogee hardware interfaces to connect directly to Digidesign HD Core, Process and Accel PCI cards directly, with no other hardware needed. Now you can add the quality of Apogee's Trak2 and AD-8000 to your Digidesign Pro Tools HD system.

Getting Started Quickly

1 **Install/Configure the AMBus HD card :**
If the AMBus HD card is not installed in your Apogee interface, please see pages 13-14 for installation instructions

2 **Determine proper order of interfaces :**
From the Interface Connections Chart on pages 13-14 , locate the entry that corresponds to the set of interfaces you wish to connect. This entry will indicate the proper order to connect Apogee, Digidesign and Prism hardware interfaces to one PCI card. *When using Digidesign or Prism interfaces, please note that they must be connected first in the Digilink chain.*

3 **Connect Clock and DigiLink cables :**
Refer to page 3 to determine the correct clock configuration for the set of interfaces you wish to connect. Also indicated on this page is general information on connecting Digilink connections, once the proper order has been determined. *Please note that the Primary Port on the AMBus HD card is the LEFT connector when looking from the back of the unit.*

4 **Power On the Hardware Interfaces :**
Power on all connected interfaces, *and ensure that all Apogee devices have a valid clock source and are locked.*

5 **Configure HARDWARE SETUP :**
Boot up the computer and Pro Tools, select Setups>Hardware Setup in Pro Tools, and verify that interfaces are detected correctly as indicated in the Interface Connections Chart. Select each "192 I/O" displayed under Peripherals and click the Set to Default button. See page 6 for more details.

6 **Configure I/O SETUP :**
In Pro Tools, select Setups>I/O Setup, In the I/O Setup page, select the Input, Output, and Insert selection one at a time and press the Default button after each selection. Next, refer to the Interface Connections Chart to determine the actual paths being used by the connected Apogee hardware. In order that I/O settings in the Pro Tools mixer are as clear as possible, delete unused paths and rename remaining paths to precisely indicate the hardware connection – for example, AD-8000 A In 8, to indicate input channel 8 on the first AD-8000. See page 7 for more details.

Connecting AMBus HD Equipped Apogee Interfaces

Clock Connections

Apogee has conducted considerable research on the clocking of digital systems, resulting in the development and production of our Big Ben Master Clock. With vanishingly low jitter and enough clock outputs to connect several slave interfaces directly to one master, Big Ben is always the best solution for clocking any digital system, including AMBus HD equipped Apogee interfaces.

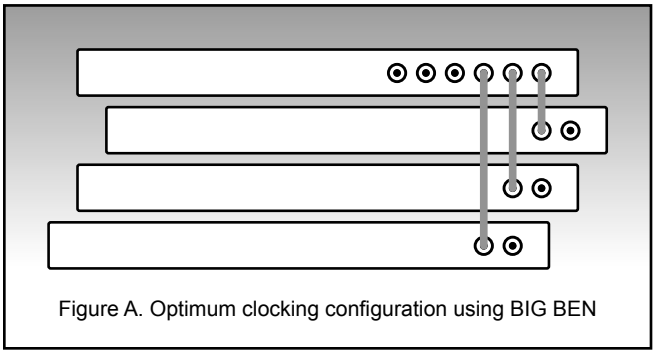


Figure A. Optimum clocking configuration using BIG BEN

In lieu of Big Ben, we recommend connecting the master device's clock output to the slave devices using BNC "T" connectors as illustrated in the connection diagrams shown to the right. Terminate the last Word Clock input with a 75 ohm load

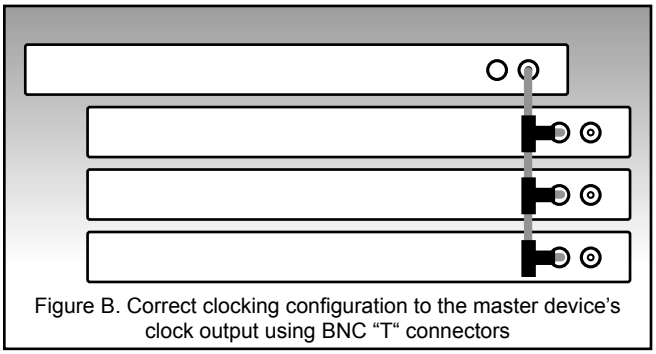


Figure B. Correct clocking configuration to the master device's clock output using BNC "T" connectors

We recommend against any clocking scheme where the clock output of one device is connected to the clock input of the next, that unit's clock output is connected to a third's clock input, and so on. By thus "reclocking" at each interface, additional phase lock loops (PLLs) are introduced into the clock chain, resulting in the accumulation of jitter.

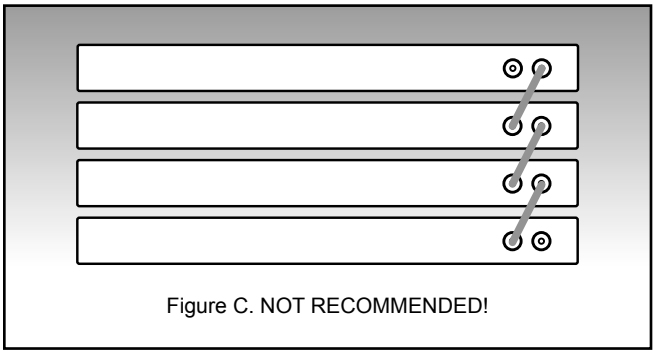


Figure C. NOT RECOMMENDED!

Incorporating a SYNC I/O

There are 3 configuration possibilities for incorporating a SYNC I/O into the HD system : using a Master Clock, SYNC I/O as master, and HD-equipped Apogee interface as master.

Using a Master Clock – Once again, the use of a Master Clock such as Big Ben greatly simplifies clock configuration. Simply connect one of Big Ben's outputs to a SYNC I/O clock input, and set the SYNC I/O's clock source to the appropriate setting. Be sure to set the Big Ben's sample rate to correspond to the sample rate of the Pro Tools session.

SYNC I/O as master – In certain situations (for example, when locking Pro Tools to time code from an analog tape machine), the SYNC I/O must be the clock master. In this case, we highly recommend inserting a Big Ben Master Clock between the SYNC I/O's word clock output and the word clock inputs of the audio interfaces for jitter attenuation.

HD-equipped Apogee interface as master, SYNC I/O slave – Due to automatic switching of clock sources in Pro Tools, it is not practical to lock one of the connected audio interfaces internally while the SYNC I/O is locked to word clock. It IS possible, by using the SYNC I/O's Loop Sync In and setting the Apogee interface's Word Clock Ratio setting so the sample rate of the interface is at the desired setting while the clock system runs at a 44.1/48k multiple.

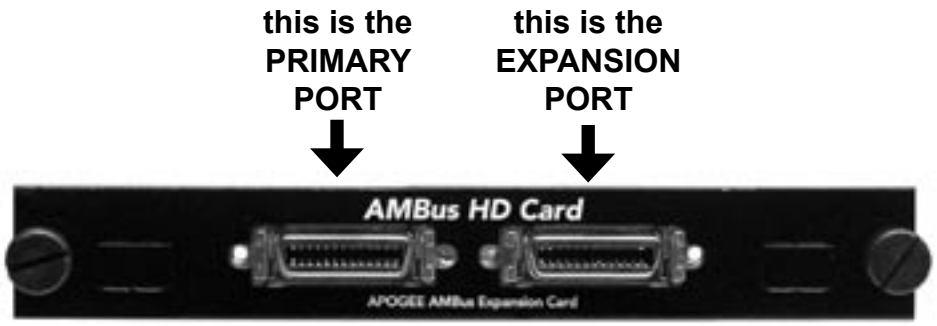
Clock Configuration (when incorporating Digidesign or Prism HD Interfaces)

Again, making clock connections when incorporating a Digidesign or Prism interface is simplified by using a Master Clock, so direct connections may be made between the Master Clock and each interface.
We know, we're starting to repeat ourselves, but that's how useful a Master Clock is.

If a Master Clock is not employed, keep in mind that the word clock input of Digidesign interfaces is internally terminated; thus it's not possible to employ BNC "T"s to distribute clock.

Digilink Connections

Like Digidesign interfaces, the AMBus HD card is equipped with two ports, Primary and Expansion. *Please note that the Primary Port on the AMBus HD card is the LEFT connector when looking from the back of the unit.*



The proper order to connect Apogee, Digidesign and Prism hardware interfaces may be determined by locating the entry on pages 13-14 that corresponds to the set of interfaces you wish to connect. *When using Digidesign or Prism interfaces, please note that they must be connected first in the Digilink chain.*

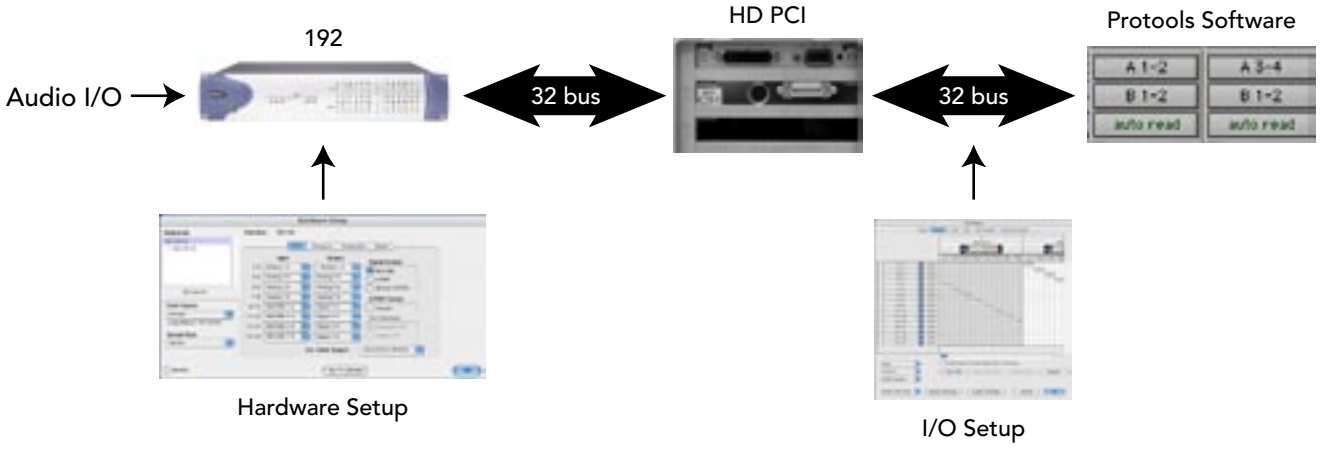
Connect a Digilink cable from the HD Core, Process or Accel card to the Primary port on interface #1, from interface #1's Expansion port to interface #2's Primary port, from interface #2's Expansion port to interface #3's primary port, and so on until all interfaces are connected. *Use only 18" Digilink cables to make connections between hardware interfaces.*

After all clock and Digilink connections have been made, ensure that all devices are locked to a valid clock before booting the computer.

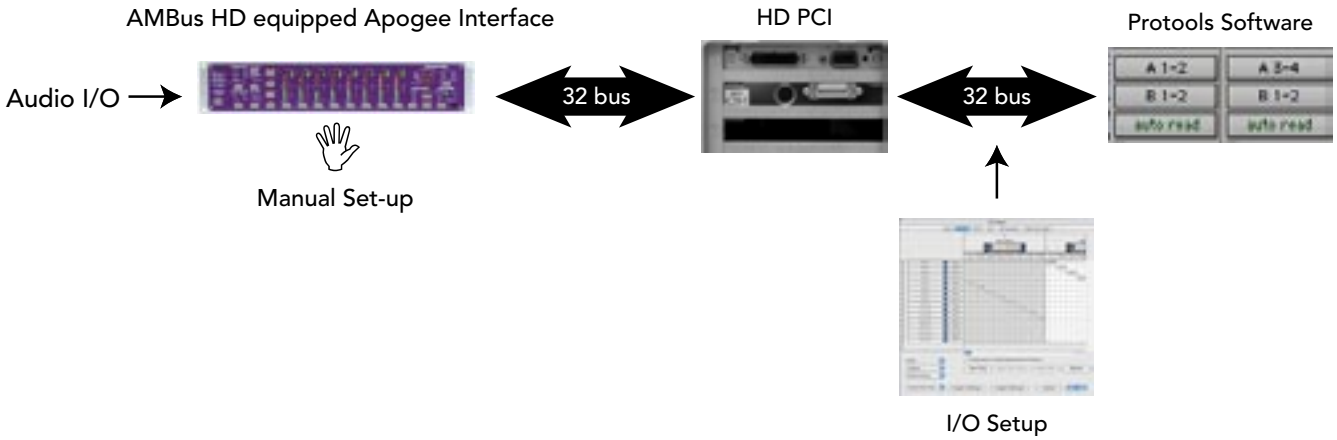
Configuring Digidesign Pro Tools®

Hardware Setup

The Hardware Setup and I/O Setup dialogs are the two primary tools within Pro Tools software used to configure hardware. The Hardware Setup dialog serves to define which physical I/O connections on detected hardware are routed to the 32 I/O busses available through each HD PCI card (on the DigiLink cable), while the I/O Setup dialog serves to label and map the manner in which these 32 busses appear in Pro Tools software.



As the audio I/O of Apogee interfaces differs from that of a 192 I/O, a connected Apogee interface will ignore all settings in the Hardware Setup which pertain to audio I/O on the hardware. To define how audio I/O on an Apogee interface is routed to the 32 I/O busses (through the AMBus HD card), settings should be configured from the unit's front panel.



Hardware Setup

1. In Pro Tools, select Setups>Hardware
2. From the Peripherals list on the left side of the Hardware Setup dialog, verify that Apogee interfaces have been detected correctly (as indicated in the Interface Connections Chart found on pages 9-12).
3. If all interfaces have been correctly detected, select each instance of "192 I/O" displayed, and click on the "Set to Default" button.

Peripherals – All Apogee interfaces are detected in the Peripheral list as "192 I/O", as indicated by the Interface Connections Chart on pages 9-12.
Clock Source – The Apogee interface connected directly to the HD Core card will respond to the Clock Source setting, when the Clock Source selection made in Pro Tools corresponds to a clock source setting on the Apogee interface.
Sample Rate – Before a Pro Tools session has been opened, it is possible to change the Sample Rate of the Apogee interface connected directly to the HD Core card if the interface is clocked internally or to a SYNC I/O. Once a session is opened, the sample rate of interfaces is determined by the session. Again, Apogee interfaces will follow session sample rates if the Core card interface is locked internally or to a SYNC I/O. When Apogee hardware is locked to an external clock source such as Big Ben, be sure to set the hardware clock rate to correspond to the session sample rate.
Port Settings – If this parameter is not greyed out, it must be set to Expansion I/O to detect multiple Apogee interfaces.
Main tab – These settings are ignored by Apogee interfaces, but it is essential that each buss (1-16) is set to a unique setting. This is most easily accomplished by following the steps above.
Analog In, Analog Out, Digital tabs – These settings are ignored by Apogee interfaces.

I/O Setup

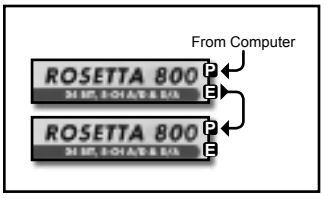
1. Once Hardware Setup has been configured, select Setups>I/O Setup.
2. Select the Input tab and press Default
3. Select the Output tab and press Default
4. Select the Insert tab and press Default

The steps above will create a set of signal "paths" based on the number of "192 I/O"s detected in the Hardware Setup>Peripherals list. Refer to the Interface Connections Chart to determine the actual paths being used by the connected Apogee hardware, and rename them to more clearly reflect the connected Apogee interface(s). Delete unused signal "paths".

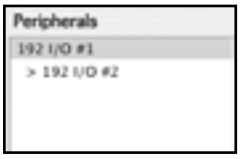
For example, 1 Trak2 will be detected as 1 192 I/O in the Hardware Setup>Peripherals list, resulting in paths A1-16 to be created in the Input, Output and Insert tab pages. On the Input page, re-label paths A1-8 as Trak2 In 1-8; On the Output page, re-label paths A1-8 as Trak2 Out 1-8; delete paths A9-16 on each page, as they are not active paths.

Interface Connections Chart: Standard Routing
(per Digidesign Core, Process or Accel card)

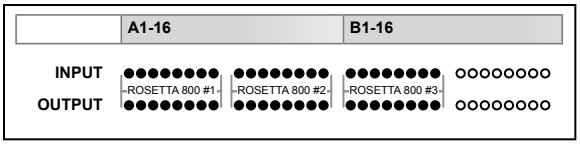
The following chart displays connection specifics for all possible combinations of HD compatible interfaces that may be connected to one HD Core, Process or Accel PCI card. There is no limit to the number of PCI cards used beyond those limits imposed by the Digidesign system itself.



In the leftmost column, a set of interfaces is depicted in the required order.



The middle column indicates the manner that such a set should appear in the Pro Tools Hardware Setup dialog; note that in many cases two Apogee interfaces will appear as only one 192 I/O.



The third column indicates which of the 32 possible I/O busses (per HD PCI card) is in use. For example, three Rosetta 800s appear in the Hardware Setup as two "192 I/Os" but only I/O channels 1-24 are used.

NOTE TO AMBus HD CARD USERS

In the following connection charts a Rosetta 800 symbol :

Represents a Trak2 or AD-8000 with an AMBus HD card installed

Important Configuration Notes:

- Be sure to connect interfaces in the order indicated.
- With the AMBus HD card, the AD-8000 can interface directly with Pro Tools at sample rates up to 48k. The Trak2 can interface with Pro Tools at sample rates up to 96k.
- The Prism ADA-8 is equivalent to a Digidesign interface, and must be placed first in the chain of interfaces.
- Later versions of "DigiSetup" include a hardware interface loop-through test. The following error message is encountered with Apogee interfaces : "Peripheral Digital Loop Back Test; 1-16 failed". This does not affect correct operation of the interface.

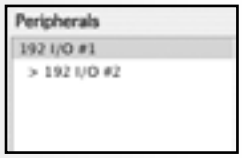
INTERFACE SET	APPEARS AS... in Hardware Setup	CHANNELS IN USE
ROSETTA 800 (or Trak2 or AD-8000)		
From Computer → ROSETTA 800	Peripherals 192 I/O #1	A1-16 | B1-16 INPUT ●●●●●●●● ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ (ROSETTA 800 #1) OUTPUT ●●●●●●●● ○○○○○○○○ ○○○○○○○○ ○○○○○○○○
From Computer → ROSETTA 800 → ROSETTA 800	Peripherals 192 I/O #1	A1-16 | B1-16 INPUT ●●●●●●●● ●●●●●●●● ○○○○○○○○ ○○○○○○○○ (ROSETTA 800 #1) (ROSETTA 800 #2) OUTPUT ●●●●●●●● ●●●●●●●● ○○○○○○○○ ○○○○○○○○
From Computer → ROSETTA 800 → ROSETTA 800 → ROSETTA 800	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 | B1-16 INPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ○○○○○○○○ (ROSETTA 800 #1) (ROSETTA 800 #2) (ROSETTA 800 #3) OUTPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ○○○○○○○○
From Computer → ROSETTA 800 → ROSETTA 800 → ROSETTA 800 → ROSETTA 800	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 | B1-16 INPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ●●●●●●●● (ROSETTA 800 #1) (ROSETTA 800 #2) (ROSETTA 800 #3) (ROSETTA 800 #4) OUTPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ●●●●●●●●
AD-16X & DA-16X		
From Computer → AD-16X	Peripherals 192 I/O #1	A1-16 | B1-16 (AD-16X #1) INPUT ●●●●●●●● ●●●●●●●● ○○○○○○○○ ○○○○○○○○ OUTPUT ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ ○○○○○○○○
From Computer → AD-16X → AD-16X	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 | B1-16 (AD-16X #1) (AD-16X #2) INPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ●●●●●●●● OUTPUT ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ ○○○○○○○○
From Computer → DA-16X	Peripherals 192 I/O #1	A1-16 | B1-16 INPUT ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ (DA-16X #1) OUTPUT ●●●●●●●● ●●●●●●●● ○○○○○○○○ ○○○○○○○○
From Computer → DA-16X → DA-16X	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 | B1-16 INPUT ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ ○○○○○○○○ (DA-16X #1) (DA-16X #2) OUTPUT ●●●●●●●● ●●●●●●●● ●●●●●●●● ●●●●●●●●

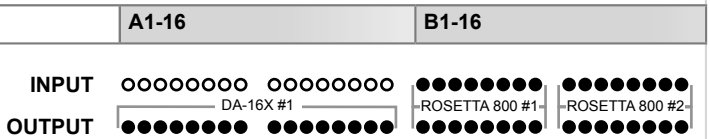
INTERFACE SET	APPEARS AS... in Hardware Setup	CHANNELS IN USE
AD-16X & DA-16X *continued*		
From Computer → AD-16X → DA-16X	Peripherals 192 I/O #1	A1-16 / B1-16 INPUT: AD-16X #1 OUTPUT: DA-16X #1
From Computer → AD-16X → DA-16X → AD-16X	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: AD-16X #1, AD-16X #2 OUTPUT: DA-16X #1
From Computer → AD-16X → DA-16X → DA-16X	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: AD-16X #1 OUTPUT: DA-16X #1, DA-16X #2
From Computer → AD-16X → DA-16X → AD-16X → DA-16X	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: AD-16X #1, AD-16X #2 OUTPUT: DA-16X #1, DA-16X #2
AD-16X, DA-16X & ROSETTA 800 (or Trak2 or AD-8000)		
From Computer → AD-16X → ROSETTA 800	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: AD-16X #2 OUTPUT: ROSETTA 800 #1
From Computer → AD-16X → ROSETTA 800 → ROSETTA 800	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: AD-16X #2 OUTPUT: ROSETTA 800 #1, ROSETTA 800 #2
From Computer → DA-16X → ROSETTA 800	Peripherals 192 I/O #1 > 192 I/O #2	A1-16 / B1-16 INPUT: ROSETTA 800 #1 OUTPUT: DA-16X #1

INTERFACE SET	APPEARS AS... in Hardware Setup	CHANNELS IN USE

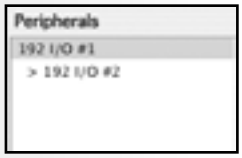
AD-16X, DA-16X & ROSETTA 800 (or Trak2 or AD-8000) *continued*

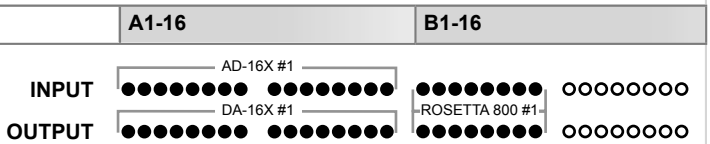
From Computer → DA-16X → ROSETTA 800 → ROSETTA 800



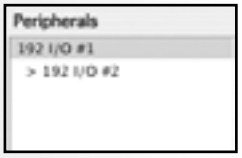


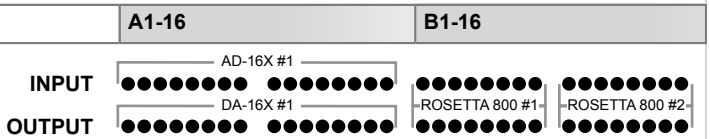
From Computer → AD-16X → DA-16X → ROSETTA 800





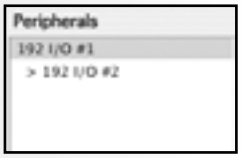
From Computer → AD-16X → DA-16X → ROSETTA 800 → ROSETTA 800

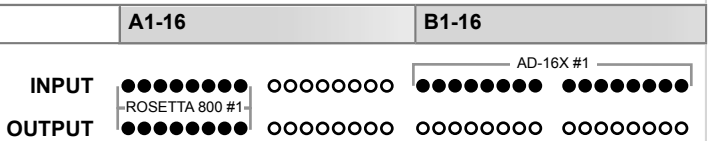




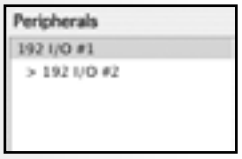
ROSETTA 800 (or Trak2 or AD-8000) and AD-16X & DA-16X

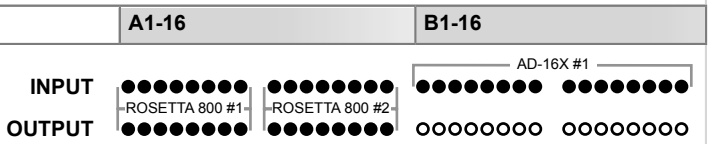
From Computer → ROSETTA 800 → AD-16X



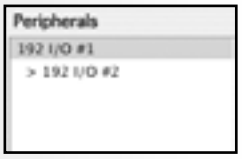


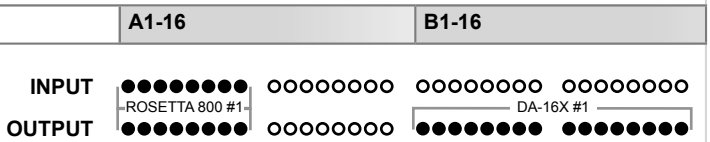
From Computer → ROSETTA 800 → ROSETTA 800 → AD-16X



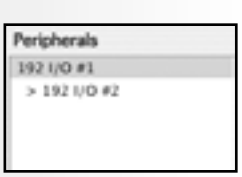


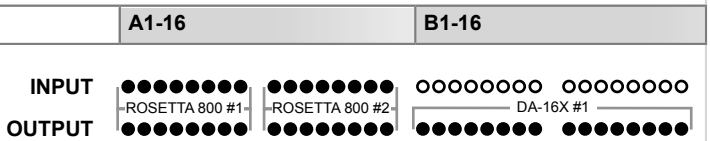
From Computer → ROSETTA 800 → DA-16X





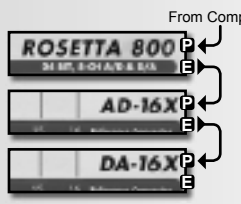
From Computer → ROSETTA 800 → ROSETTA 800 → DA-16X

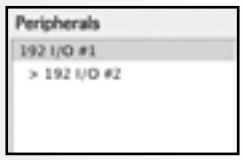


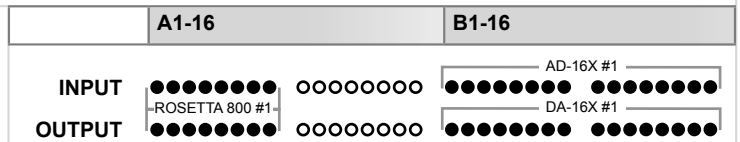


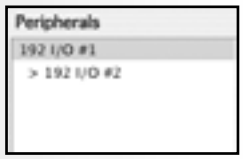
INTERFACE SET	APPEARS AS... in Hardware Setup	CHANNELS IN USE

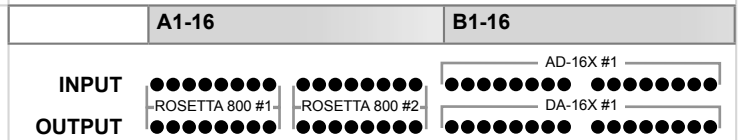
ROSETTA 800 (or Trak2 or AD-8000) and AD-16X & DA-16X *continued*



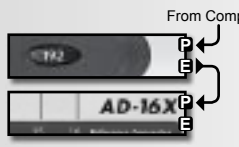


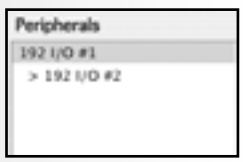


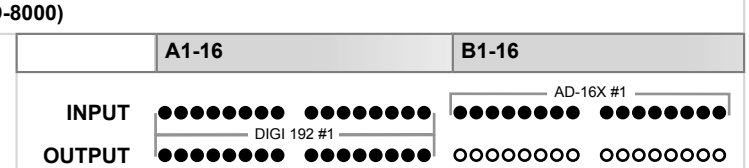


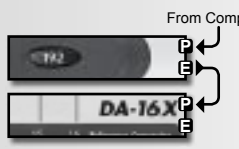


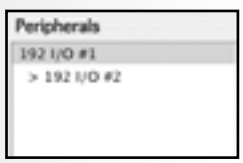
DIGI, AD-16X, DA-16X & ROSETTA 800 (or Trak2 or AD-8000)

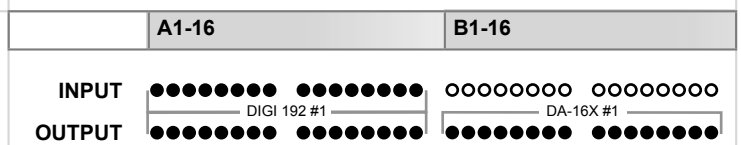


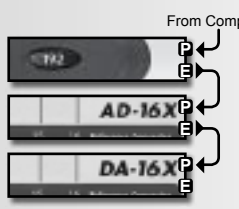


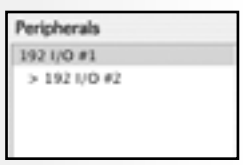


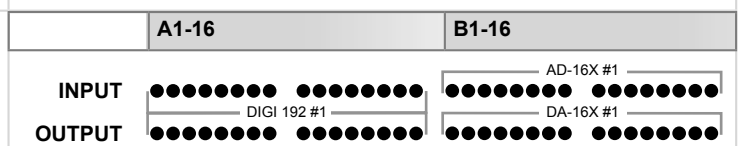


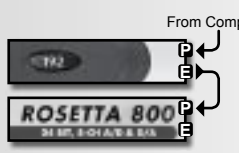


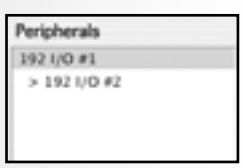


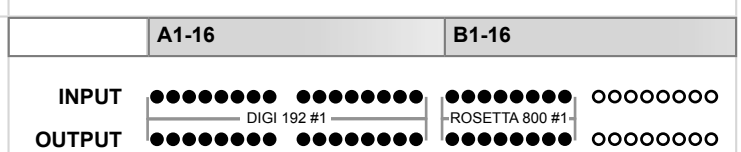


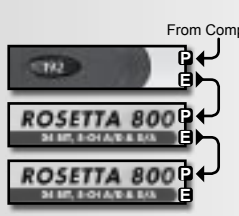


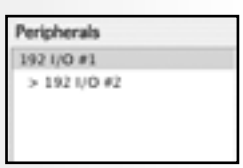


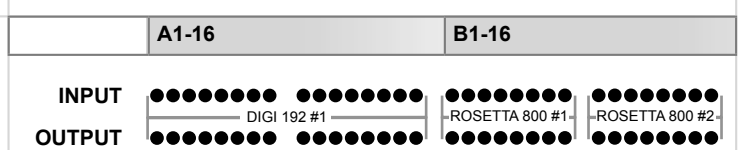






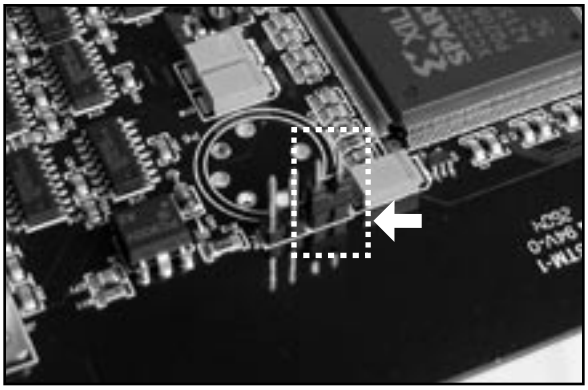






Configuring the AMBus HD Card

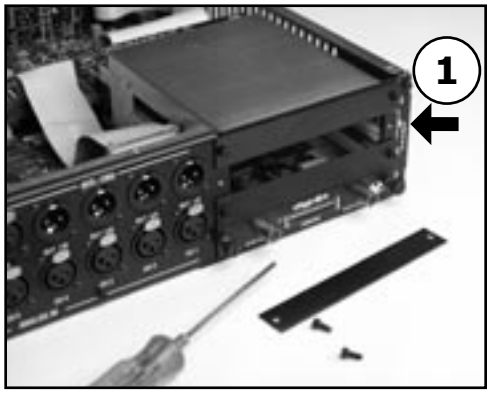
P15 Jumper Settings

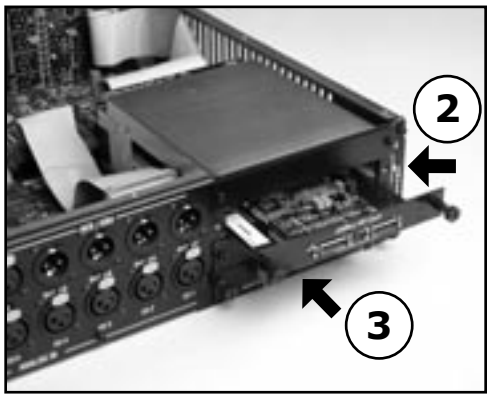


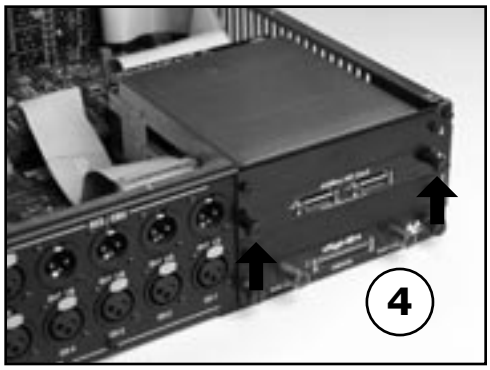
The AMBus HD card is shipped with Jumper P15 installed. This jumper insures that an AD-8000 connected first in a series of interfaces will follow the sample rate set by Pro Tools. This function is useful if an AD-8000 will be master clock for the additional interfaces. In instances where an AD-8000 will be clocked via a master clock, the unit must be set manually to lock to WC. Additionally, the P15 jumper should be removed (see photo). Doing so tells the AD-8000 to ignore any sample rate information sent by Pro Tools.

Note that the state of jumper P15 does not affect the behavior of a Trak2 equipped with an AMBus HD card.

Installing the AMBus HD Card







Your AMBus HD card should include the following:

1 AMBus HD card
1 user's guide

1 Remove the plate cover of an available Ambus slot.

2 Locate the card between the guides.

3 Gently press on the back panel of the card until you feel it mate with the AMBus connector.

4 Fasten the card in place with the included screws.

A NOTE ABOUT UPDATING THE AMBUS HD CARD
Due to the space constraints associated with AMbus card slots, the MIDI connector necessary for performing firmware upgrades on the AMBus HD card was removed prior to shipping. Please contact Apogee in the event that you need to update your card. Additionally, do not forget to register your AMBus HD card so that you may be notified of any updates.

AMBus HD card USER'S GUIDE - v1.0 - March 2005

Text conceived *and* delivered by: Roger Robindore
Graphics and illustrations by: Sean McArthur

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