



HalluxPCM-PCI

User Manual

Software Version 1.2x

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Chapter 1 Introduction

1.1 Overview of HalluxPCM-PCI

The HalluxPCM-PCI PCM Frame Generator creates an NRZ-L or Randomized RNRZ-L PCM frame encoded with up to eight channels of pre-conditioned analog data. Designed to be a companion product to the Ulyssix Syrinx-PCI Digital Baseband Demodulator, the HalluxPCM-PCI card allows the user to input analog data from multiple Syrinx cards (or other preconditioned sources) and output a digital PCM stream for digital retransmission or storage. The DSP (Digital Signal Processing) based design is implemented in state-of-the-art FPGAs (Field Programmable Gate Arrays) allowing for rapid enhancements or customization.

Analog input signals are digitized by eight independent analog to digital converters. For each channel, the user selects the sample rate, the input voltage level and input offset. The HalluxPCM-PCI automatically creates a bandwidth efficient PCM frame to a user defined output level and offset. Analog Input, PCM Data and PCM Clock are available on BNC connectors.

The user-friendly Windows based Graphic User Interface (GUI) software allows for simple setup and operation of the HalluxPCM-PCI card. A Windows based DLL is also available for customer specialization.

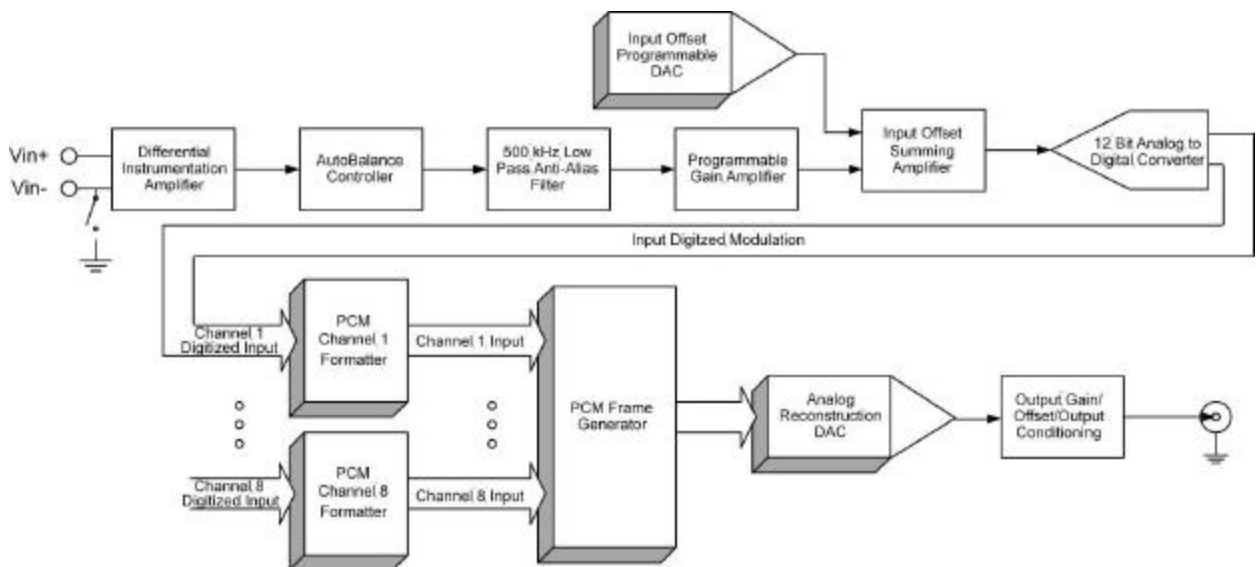


Figure 1 - HalluxPCM-PCI Block Diagram

1.2 Specifications

Product Specifications

PCM Output Format	NRZ-L or Randomized RNRZ-L PCM data and clock 0° or 180° bit clock, program selectable
Maximum Output Bit Rate	10 Mbps
Word Size	16 bits per word, 32 bit sync pattern
Max Frame Size	2048 words
Output Bit Rate	Binary sub-multiples of 80MHz clock, 10 Mbps max
Data Sample Frequency	User selectable, binary divisions of the 80 MHz System Clock, 156kHz max
Analog Inputs per card	Eight (8)
Independent Digitizers per card	Eight (8)
PCM Output Level	Standard TTL, 50Ohm Output Driven
Input Configuration	Single ended or differential using BNC connectors, Jumper selectable
Input Voltage Range	0.5 VPP to 5.0 VPP, selectable
Maximum Safe Input	± 40 VDC

Operation

The PCM Generator automatically builds a PCM frame containing data from up to eight individual analog inputs. The bit rate of the PCM output is determined by the sample rates of each data channel. The sample rate for each channel is determined by the programmed maximum data frequency.

Physical Specifications

PCI Form Factor	32 bit PCI form factor, +5 Volt System
Interface Connectors	DB25 connector with breakout cable to individual BNC connectors for Analog Input, PCM Out, and PCM Clock
Manufacturing	The design utilizes Surface Mount Technology (SMT), manufactured with robotic assembly techniques to IPC-610B Class 2 manufacturing standards
Temperature Range	Operating: 0°C to 50°C Storage: -20°C to 60°C
Power Consumption:	+5V 1.0 Amp +12V 0.9 Amp -12V 0.0 Amp

Ordering Information

HalluxPCM-PCI-01	PCM Frame Generator
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1.3 Warranty

Ulyssix Technologies, Inc. warrants its products to be free from defects in material and workmanship, under normal use and service, for one year from the date of shipment to the original purchaser. The equipment must be returned transportation prepaid to the factory, and if found to be defective, at the Company's option, will be repaired or replaced free of charge and returned transportation prepaid. If inspection by Ulyssix does not disclose any defect in material or workmanship, Ulyssix standard repair service charge will apply. This warranty does not extend to any products that have been subject to misuse, negligence, modifications or abnormal operating conditions or cover expendable items such as lamps, batteries, fuses, etc. Customer furnished equipment and hardware purchased for resale included in systems are covered by the original manufacturers warranty. Ulyssix makes no

express or implied warranties beyond those described herein, and in no event will Ulyssix be responsible for consequential damages of any nature arising out of or connected with the use of its products.

1.4 Repair Service Charges

The minimum service charge for non-warranty repair of individual units, accomplished at our factory is \$250 per unit plus return shipping charges. Equipment must be shipped to the factory with transportation prepaid. Please call the Ulyssix Customer Service Department at 301-371-4800 for a return authorization number and shipping information. All units repaired will be warranted for 90 days from the date of the said repair.

Chapter 2 Installation

2.1 System Requirements

The following table contains the preferred and minimum computer configuration requirements for installing and operating the HalluxPCM-PCI PCM Frame Generator. For optimum performance of the HalluxPCM-PCI product, please install into a computer that meets or exceeds the Preferred Configuration Specifications.

Parameter	Preferred Configuration	Minimum Configuration
Processor Speed	500 MHz or Higher	300 MHz Minimum
RAM	128 MB or Higher	64 MB Minimum
Available Hard Drive Space	15 MB	10 MB Minimum
Operating System	Windows 2000	Windows '95, '98, 2000, NT
Power Supply	25 Watts available power per PCI card installed	25 Watts Available Power per PCI Card Installed
Chassis	1 Full Length PCI Slot is required for each PCI card installed	1 Full Length PCI Slot is required for each PCI Card Installed
Drives	CD ROM	CD ROM or 3.5 Inch Floppy

Figure 2 - Minimum System Requirements Table

2.2 Software/Hardware Installation

The Windows Based HalluxPCM-PCI software can operate on computers with Windows 95, Windows 98, Windows NT, or Windows 2000 operating systems. Ulyssix strongly recommends that you install the software before installing the Ulyssix cards into your PCI chassis. The required drivers and .INF files are installed with the software. Follow the appropriate instructions.

2.2.1 Windows 95/98/NT Installation

1. Boot the machine.
2. **NOTE: If running Windows NT you must log in with administrator privileges.**
3. Install the HalluxPCM-PCI software onto your computer by inserting the HalluxPCM-PCI software CD into your CD drive then running the setup.exe Install Shield script. The software, the required driver and the required .INF file will be installed. You will be prompted to reboot. Select Yes. The machine will reboot.
4. After reboot, shutdown the computer and install the card.
5. Turn on the computer.
6. At Windows start up, your computer will detect a new card installed on the PCI bus and then start "Add New Hardware Wizard" prompting the user to install a driver for a PCI Bridge card. The window should display "Ulyssix PLX_9080 Driver" as the new driver. Click Next.
7. The next window will be displayed prompting how Windows searches for the new hardware driver. Select "Search for the best driver for your device". Click Next.
8. The next window allows the user to choose the location of the driver. Select "Specify a Location" and browse to c:\WINDOWS\INF and hit next. The installation will find the Ulyssix PLX_9080 Driver file in your Windows\INF directory and assign it to your card. Hit Next.
9. The next window shows the Ulyssix PLX_9080 Driver. Click Finish.
10. Windows will continue booting as normal. The next time you start your computer, it will bypass the detected new hardware dialog.

2.2.2 Windows 2000 Installation

1. Boot the machine.
2. **NOTE: You must log in with administrator privileges.**
3. Install the HalluxPCM-PCI software onto your computer by inserting the HalluxPCM-PCI software CD into your CD drive then running the setup.exe Install Shield script. The software, the required driver and the required .INF file will be installed. You will be prompted to reboot. Select Yes. The machine will reboot. After reboot, shutdown the computer and install the card.
4. Turn on the computer.
5. At Windows start up, your computer will detect a new card installed on the PCI bus. A "Found New Hardware" message will appear while the "Found New Hardware" Wizard is coming up. Click Next.
6. The Install Hardware Device Drivers screen will come up and say "This wizard will complete the installation for this device: Ulyssix Technologies, Inc. PLX9080 PCI Card Generic Bus Interface". On this screen select "Search for the Suitable Driver for my Device". Click Next.
7. The next window allows you to direct the wizard to search for a suitable driver in a specific location. Select "Specify a Location". Click Next.
8. The Found New Hardware Wizard will ask you to insert the manufacturer's installation disk into the drive selected. This is not necessary.
9. Type c:\\WINNT\\inf into the browse location and hit Enter.
10. The wizard will display the Driver Files Search Results screen. The wizard will display "The wizard found a driver for the following device: Ulyssix Technologies, Inc. PLX9080 PCI Card Generic Bus Interface." Click Next.
11. The wizard will display the Insert Dsk screen asking you to "Insert the Compact Disc labeled 'Win Driver Installation Disk' into your CD-ROM drive." You do not have to install the CD. Click OK.
12. The wizard will display the Files Needed screen.
13. Browse to c:\\WINNT\\System32\\drivers and click OK.
14. Select wdpnp.sys.
15. The selected path will display. Click OK.
16. Completing the Found New Hardware Wizard screen will display. Click Finish.
17. Windows may ask you to restart your computer prior to using the new card. Hit ok. Restart your computer even if Windows does not prompt you to do so.
18. Windows will continue booting as normal. The next time you start your computer, it will bypass the "Found New Hardware" dialog.

Note: Steps 11-15 of the install process will be skipped if you install additional HalluxPCM-PCI cards in the future.

2.2.3 Installing Cards in a Previously Used PCI Slot

When a PCI card is installed into a Windows 95/98/2000 computer (install new hardware wizard), the driver for that card is assigned to that specific slot of the computer. The computer will look for only that type of card and if another type of card is later installed in that slot, the computer will not recognize it nor will it launch the "install new hardware" wizard. This will prevent proper installation of the Ulyssix card. If you have problems getting the PCI computer to recognize that you are installing new hardware you may have to clear out the registry for the previously installed card. Follow the steps below to uninstall the unwanted card. This is not necessary if you are running Windows NT.

2.2.3.1 Uninstalling Hardware – Windows 95/98

It is very important that you do not uninstall required hardware drivers. The following process should only be executed by hardware knowledgeable individuals.

1. Click the Start Button and go to Settings / Control Panel / System.
2. Click the Device Manager tab.
3. Click the radio button to select "View device by connection".
4. Select the group "Advanced Configuration and Power Interface (ACPI) BIOS".
5. Double Click "PCI Bus". This will list the installed PCI device drivers.

6. Highlight the device that you want to Uninstall and click the Remove button. Make sure you know which device to uninstall!

2.2.3.2 Uninstalling Hardware – Windows 2000

It is very important that you do not uninstall required hardware drivers. The following process should only be executed by hardware knowledgeable individuals.

1. Click the Start Button and go to Settings / Control Panel / Add/Remove Hardware.
2. The Add/Remove Hardware Wizard will launch. Click Next.
3. The “Choose a Hardware Task” screen will come up.
4. Click the radio button to select “Uninstall/Unplug a Device”.
5. The “Choose a Removal Task” screen will come up.
6. Click the radio button to select “Uninstall a Device”.
7. The “Installed Devices on Your Computer” screen will come up. Click the “Show Hidden Devices” box to show all installed devices.
8. Double click the device that you want to Uninstall. Make sure you know which device to uninstall!
9. The “Uninstall a Device” screen will come up. This screen identifies the device you have chosen to uninstall.
10. Click the radio button to select “Yes, I want to uninstall this device.”
11. Click “Next” and follow the instructions on the screen to complete the removal.

2.2.4 Un-Install Software

You can un-install the HalluxPCM-PCI Software from your desktop. Click the Start Button. Go to Settings / Control Panel and double click the Add / Remove Programs icon. Highlight HalluxPCM-PCI and click the Add/Remove Programs button. Uninstalling the software does not remove the Ulyssix hardware from the Windows registry.

2.2.5 Power Cycling Guidelines

Ulyssix Technologies’ PCI board level products are easily installed into almost any PCI computer chassis. Unfortunately, all computers do not behave identically in regard to the amount of time for the PCI bus and the ATX power supply to settle after power down. The electronics on the Ulyssix boards require that the bus and power supply are fully settled before re-applying power to the system. We recommend that you wait a minimum of 30 seconds after you power down before you restart your computer. This will ensure that the system has had time to settle and the Ulyssix cards will start up properly.

2.3 Product Identification

Every HalluxPCM-PCI PCM Frame Generator card is assigned a unique serial number before shipment from the factory. This number, as well as the unit’s model and revision are clearly marked on the reverse side of the PC board. Refer to the following figure.



Figure 3 - Product Identification

2.3.1 Model Number

The model number of the Hallux card indicates which options are installed on that specific unit. Model number definitions are provided in the table below.

Model	Description
HalluxPCM-PCI-01	Standard 8 Input PCM Frame Generator

2.3.2 Serial Number

A unique serial number is assigned to each HalluxPCM-PCI board. Reference this number to identify the specific unit during any communications with the factory.

2.3.3 Revision Numbers

The REV number indicates the assembly revision level of the unit.

2.4 Hardware Setup

2.4.1 General

The HalluxPCM-PCI is a sophisticated electronic device. Damage can occur if the product is not handled and used properly. Care should be taken not to expose the unit to physical abuse, moisture, Electrostatic Discharge (ESD), or other potentially harmful conditions. Carefully unpack the board in an ESD safe location and check the product for physical damage from shipment. Factory installed modification wires and components will be secured to the board with adhesive to prevent damage. If there is any question about the condition of your board upon receipt, contact the factory.

2.4.2 Jumpers

Once the HalluxPCM-PCI is unpackaged and no damage is apparent, check the unit to confirm that all required jumpers are present. Refer to the figure below for jumper locations. The seventeen jumpers required are factory set and require no alteration by the user. The exception to this statement is when you want to change the Input Mode to differential. See section 2.4.2.1 for details.

2.4.2.1 Input Mode

Each channel's input mode can be set for single ended or differential. Single ended mode is set by placement of the mode jumper on the board. Set to differential mode by removing the appropriate jumper. Jumpers JP12, 13, 15, 16, 18, 19, 21 and 22 correspond to input mode select for inputs 1 to 8 respectively. The HalluxPCM-PCI is shipped with jumpers set for single ended mode.

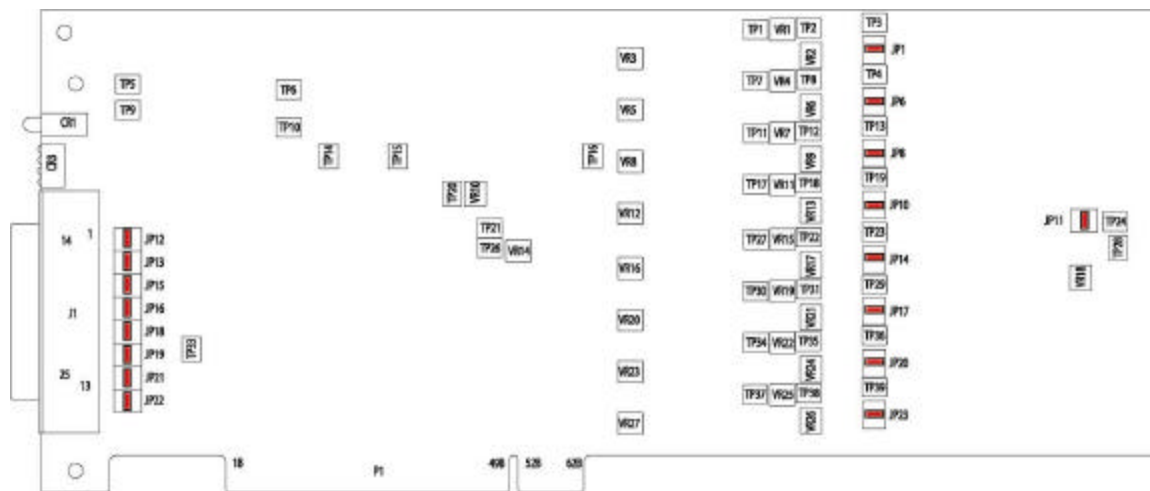


Figure 4 - Jumper Locations

2.5 Hardware Installation

The HalluxPCM-PCI is easily installed into any PC chassis with an available full length PCI slot. The HalluxPCM-PCI software must be installed before installing the HalluxPCM-PCI card. Follow the steps below to install the HalluxPCM-PCI card. Up to 4 HalluxPCM-PCI cards can be installed into a single chassis.

WARNING: SERIOUS DAMAGE WILL RESULT IF YOU DO NOT TURN POWER OFF BEFORE INSTALLING THE HALLUXPCM-PCI CARD.

11. Make sure the HalluxPCM-PCI software has been installed before installing any hardware.
12. Turn off power to the computer.
13. Remove the cover of the computer to expose the available PCI slot.
14. Remove the blank bracket on the back of the computer that is covering the opening to the available PCI slot. Retain the screw to secure the HalluxPCM-PCI card.
15. Install the HalluxPCM-PCI card in the PCI slot and secure with the screw removed from the bracket.
16. Return the cover to the computer.
17. Turn on power to the computer.

2.5.1 Adding Cards to an Existing System

Before adding any Ulyssix PCI cards to an existing system it is important to verify that the host computer's power supply has adequate surplus power for the total number of installed cards. Calculate the total amount of power required by the PCI cards by adding the individual card power requirements as noted on the product data sheets. Contact the factory if you need assistance.

Additional HalluxPCM-PCI cards can be installed into any available full length PCI slot in your computer at any time. Up to 4 HalluxPCM-PCI cards can be installed into a single chassis. Follow the installation instructions above. When you install additional cards into a computer, the PCI bus may assign new Card ID numbers for existing and/or new cards depending upon the slot you install the card into and the configuration of the PCI bus for your specific computer. If this happens, the configuration files will be corrupted and will not program the hardware properly.

Ulyssix recommends that when you add or remove HalluxPCM-PCI cards from your system that you delete the HalluxPCMCfg.Cfg file from the Program Files/Ulyssix/HalluxPCM directory. When you re-enter the HalluxPCM-PCI Software, all cards will be loaded with default values.

2.5.2 Power Cycling Guidelines

Ulyssix Technologies' PCI board level products are easily installed into almost any PCI computer chassis. Unfortunately, all computers do not behave identically in regard to the amount of time for the PCI bus and the ATX power supply to settle after power down. The electronics on the Ulyssix boards require that the bus and power supply are fully settled before re-applying power to the system. We recommend that you wait a minimum of 30 seconds after you power down before you restart your computer. This will ensure that the system has had time to settle and the Ulyssix cards will start up properly.

Chapter 3 Operation

3.1 General

Before using your HalluxPCM-PCI card you must first - 1) install the HalluxPCM-PCI software onto your computer and 2) install the HalluxPCM-PCI card into an available PCI slot. Upon power up you should verify proper LED indication and connect the input and output cables to the card. LED indicators and Interconnections are explained in the following sections.

3.2 LED Indicators

LED Indicators on the rear panel of the HalluxPCM-PCI card provide identification and status for each card. The following sections describe the function of each LED.

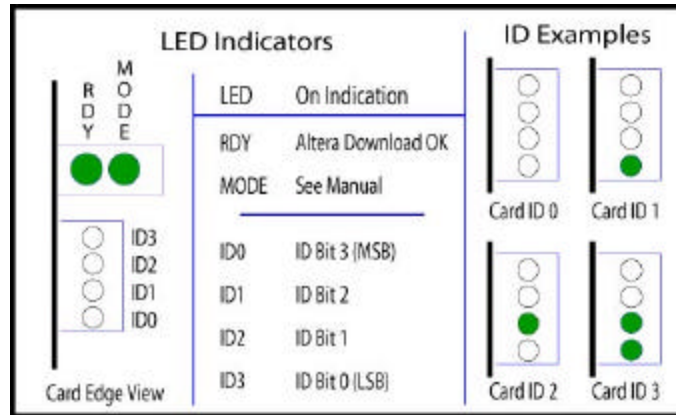


Figure 5 - LED Indicators

3.2.1 RDY - Altera Download OK

DSP algorithms are downloaded from on-board flash into Altera FPGAs upon power up of the HalluxPCM-PCI card. RDY, the Altera Download OK light, will illuminate after power up once the Altera FPGAs have successfully received the download. This LED will be illuminated during normal operation. If the Altera Download OK light is not illuminated after power up, contact the factory for assistance.

Note

If the RDY light is not on after power up, it may be because of improper power cycling. Unfortunately, all computers do not behave identically in regard to the amount of time for the PCI bus and the ATX power supply to settle after power down. The electronics on the Ulyssix boards require that the bus and power supply are fully settled before re-applying power to the system. We recommend that you wait a minimum of 30 seconds after you power down before you restart your computer. This will ensure that the system has had time to settle and the Ulyssix cards should start up properly.

3.2.2 Mode

Ulyssix produces several products that utilize the HalluxPCM printed circuit card. These products are similar in appearance, especially when installed in a chassis. The MODE LED will be on if the card is configured as a HalluxPCM-PCI card.

3.2.3 Card ID

The HalluxPCM-PCI software assigns a Card ID number to each HalluxPCM-PCI card detected in the chassis. Note that the Cards are numbered 0 through 3. The ID number appears on all screens of the software to identify setup, status, and data to a specific HalluxPCM-PCI card. The Card ID LEDs

on the back panel give a binary representation of the Card ID number for each card. Refer to the LED Indicator figure above to determine the Card ID number.

3.3 Interconnections

Input and output connections are made to the HalluxPCM-PCI through a breakout cable from the 25 Pin PC board mounted DIN connector to 10 individual BNC connectors (See Figure 6 below). Each BNC connector is labeled to identify its function. Refer to the following sections for connector identification. Screw locks are located on each side of the 25-Pin connector. Ulyssix strongly encourages you to use the screw locks to secure the connector to the HalluxPCM-PCI card.

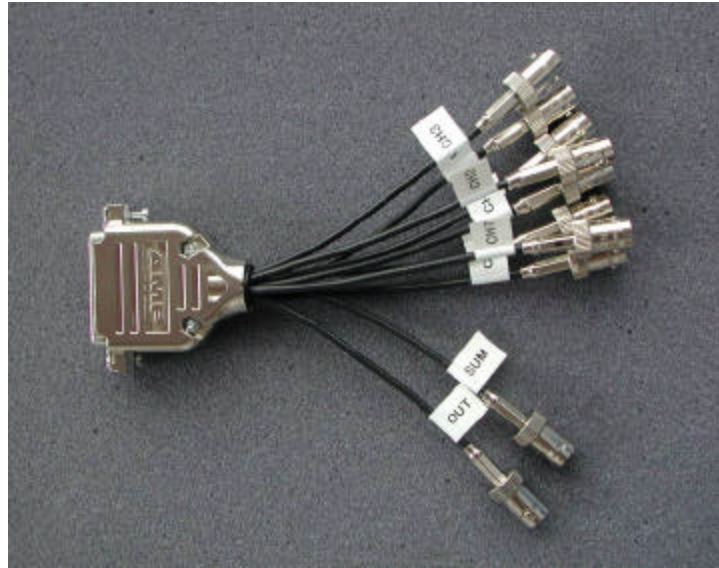


Figure 6 - HalluxPCM-PCI Breakout Cable

3.3.1 Analog Inputs

Connect the analog input data signal for each PCM input channel to the appropriate input BNC connector. Each input connector is labeled CH1, CH2, etc. Analog inputs can be configured as either single ended or differential. See Section 2.4.2.1 for details. Select the input peak-to-peak value and offset from the drop down menu on the Input Setup Screen for each channel.

3.3.2 PCM Output

The HalluxPCM-PCI card automatically configures and outputs an NRZ-L or RNRZ-L data stream encoded with selected analog input data. This output is available on the BNC connector labeled OUTPUT.

3.3.3 PCM Clock

The PCM Clock output provides 0° or 180° bit clock (program selectable) for the PCM output. The PCM Clock output is available on the BNC connector labeled PCMCLK.

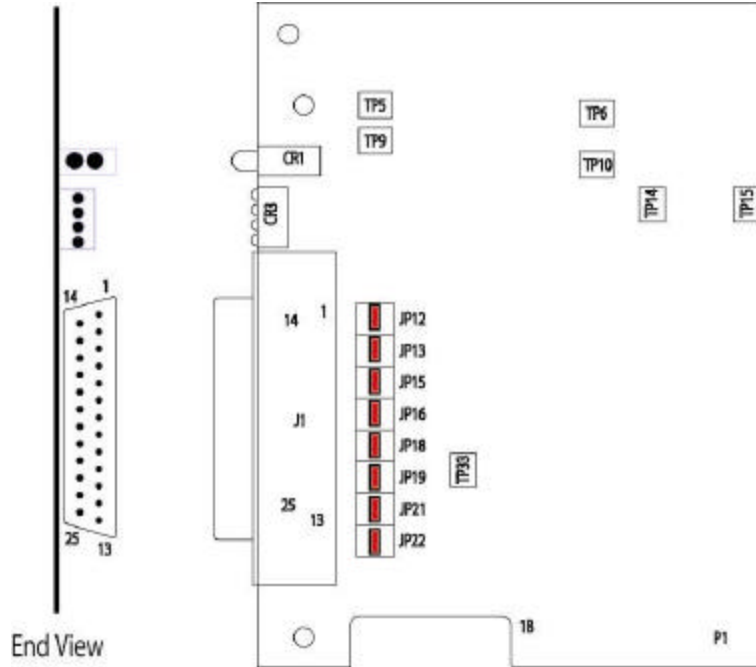


Figure 7 - Connections

JP1 Pin	Description	Label
1	PCM Clock +	PCMCLK
2	No Connection	
3	Analog Channel 1 Input +	CH1+
4	Analog Channel 2 Input +	CH2+
5	Analog Channel 3 Input +	CH3+
6	Analog Channel 4 Input +	CH4+
7	Analog Channel 5 Input +	CH5+
8	Analog Channel 6 Input +	CH6+
9	Analog Channel 7 Input +	CH7+
10	Analog Channel 8 Input +	CH8+
11	No Connection	
12	PCM Output +	OUTPUT
13	No Connection	
14	PCM Clock -	PCMCLK
15	No Connection	
16	Analog Channel 1 Input -	CH1-
17	Analog Channel 2 Input -	CH2-
18	Analog Channel 3 Input -	CH3-
19	Analog Channel 4 Input -	CH4-
20	Analog Channel 5 Input -	CH5-
21	Analog Channel 6 Input -	CH6-
22	Analog Channel 7 Input -	CH7-
23	Analog Channel 8 Input -	CH8-
24	No Connection	
25	PCM Output -	OUTPUT

Figure 8 - J1 Connector Pin-out

3.4 PCM Generator Setup and Operation

The following sections describe the various screens of the Windows based HalluxPCM-PCI software. Please note that you must click the Apply button on any setup screen to download any modified settings to the HalluxPCM card. No changes will be made to the card until Apply has been clicked.

The HalluxPCM-PCI was not designed to provide all of the flexibility and features of a high-end airborne PCM encoder. Instead, it was designed to provide a quick, easy, and economical solution for applications that require basic PCM encoding in a non-ruggedized setting. Some basic guidelines to get the most out of your HalluxPCM card are: 1) keep sample rates the same from channel to channel whenever possible; 2) keep sample rates as low as possible to reduce bit rate; and 3) turn off any unused inputs.

3.4.1 HalluxPCM-PCI Status Screen

The HalluxPCM-PCI Status Screen is the first screen you see when the HalluxPCM-PCI software is launched. A Channel Status Block will be displayed for each of the eight channels for the selected HalluxPCM-PCI card. Up to four HalluxPCM-PCI cards can be installed into a single PCI chassis. The software will open in simulation mode if the PCI bus detects no HalluxPCM-PCI cards. In this mode, the words "Simulation Mode" will appear in each Input Status Block, directly under the Input Number. Software and DLL version numbers are displayed to the right of the screen. Several drop down menu options are available and are discussed later in the manual.

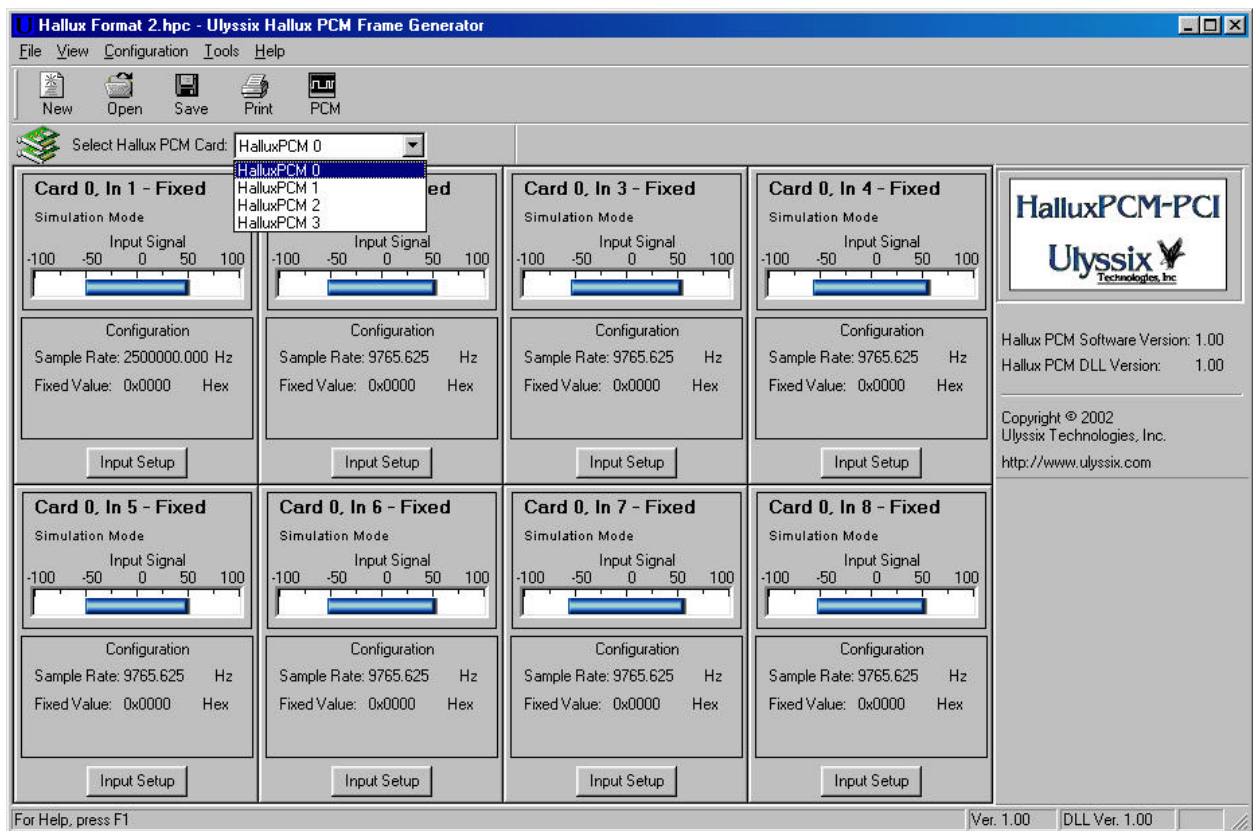


Figure 9 - HalluxPCM-PCI Status Screen in Simulation Mode

3.4.2 Select HalluxPCM Card

Up to four HalluxPCM-PCI cards can be installed into a single computer chassis. The individual cards will be given a "Card ID" number by the software (Card 0, Card 1, Card 2, and Card 3.) Four LEDs on the back panel identify the card for connection purposes (See Figure 5.) The HalluxPCM-

PCI Software displays the status and programming screens for one card at a time to avoid confusion. Select the desired card from the drop down menu located at the top left corner of the main screen, just under the toolbar. All setup and status screens identify the related Card and Input numbers.

3.4.3 Input Status Block

An Input Status Block (Figure 10) for each HalluxPCM-PCI Input Number appears on the Hallux Status Screen displaying programming and status information. The HalluxPCM-PCI software assigns a Card number to each HalluxPCM-PCI card detected in the chassis. Up to 4 HalluxPCM Cards can be installed in a single PCI Chassis. Note that the cards are numbered 0 through 3. The card and input number appear on all screens of the software to identify setup, status, and data to a specific HalluxPCM-PCI card and Input. Card ID LEDs on the back of the card give a binary representation of the card number. Refer to the LED Indicator figure above and the table below to determine the Hallux Card number. The fields displayed on the Channel Status Block are explained below.

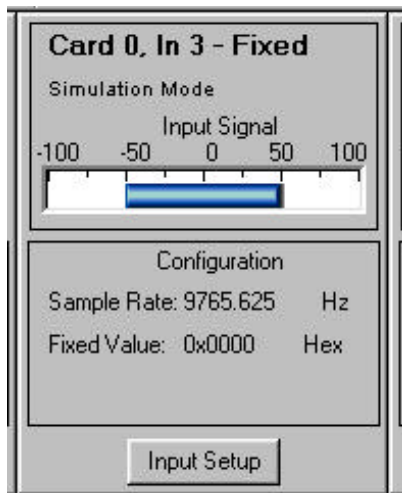


Figure 10 - Input Status Block

3.4.3.1 Card Number

The HalluxPCM-PCI software assigns a Card number to each HalluxPCM-PCI card detected in the chassis. Select which card to view or modify from the "Select HalluxPCM Card" drop down menu from the main status screen. Up to 4 HalluxPCM Cards can be installed in a single PCI Chassis. Note that the cards are numbered 0 through 3. The Card number corresponds to the Card ID LEDs on the back of the card (refer to section 3.2 on LED Indicators).

3.4.3.2 Input Number

Each HalluxPCM card has eight analog inputs that correspond to eight input BNC connectors. Each Input is configurable from the corresponding Input Setup Screen as described below.

3.4.3.3 Input Mode

Each of the eight inputs is configurable for Fixed Word or for analog input data. Choose the mode from the Input Setup screen. The mode setting will be displayed next to the Card and Input number. If the Input is set to "ON", the analog input connected to the corresponding BNC connector will be present. If the Input is set to "Fixed", the entered 16 bit hex value will be present.

3.4.3.4 HalluxPCM Model

The HalluxPCM Model appears in the top left corner of the Status Block directly under the Card Number and reflects the hardware version of that card. If no HalluxPCM-PCI cards are detected, the words "Simulation Mode" will appear instead of the Model. The standard model number of the HalluxPCM-PCI card is the HalluxPCM-PCI-01. The HalluxPCM-PCI software will automatically recognize the hardware model.

3.4.3.5 Deviation Meter

The Deviation Meter provides a graphical representation of the analog input data or the Fixed Value for each input. The blue indicator shows the percent deviation for the input. The Deviation Meter is updated based on a “boxcar” average of multiple data points. The number of data points averaged for the display is selectable to allow the user to adjust the response. See section 3.4.5.4.1 for more details.

3.4.3.6 Input Setup / Configuration

The displayed Configuration Information is set up at the Input Setup screen. See section 3.4.6 for Setup information. Click the Input Setup button to open the setup screen.

3.4.4 Tool Bar Features

The toolbar is a group of icons at the top of the screen that provides short-cut access to configuration and status screens, as well as control of standard Windows functions such as file management and printing. The specific use of these functions is explained below.



... creates a new file format file. Default settings are loaded.
See Section 3.4.5.1.1.



... loads an existing format file.
See Section 3.4.5.1.2.



... saves a new or modified format file.
See Section 3.4.5.1.3.



... prints the configuration file that summarizes all card setup parameters.
See Section 3.4.5.1.5



... select input channels and configure the PCM output.
See Section 3.4.7

3.4.5 Menu Bar Features

The menu bar provides access to configuration, status, and help screens, as well as control of standard Windows functions such as file management and printing. The specific use of these functions is explained below.

3.4.5.1 File Management

Each time the HalluxPCM-PCI software is executed, the most recently downloaded set up parameters are loaded into the HalluxPCM-PCI cards in your chassis. The active file format name (with a .hpc extension) will be displayed at the top of the HalluxPCM-PCI Status Screen. You are able to create and save setup configurations for common applications. This is done from the file drop down menu or from the toolbar.

Available from the HalluxPCM-PCI Status Screen is the file management menu. Click File at the top left corner of the HalluxPCM-PCI Status Screen to save, save as, or recall saved program formats

(Figure 11). This feature of the software eliminates the need to re-enter set up information for frequently used setups. The software will ask you if you want to save setup information each time you exit. You are also able to exit the HalluxPCM-PCI software from this drop down menu. The following paragraphs describe the functions available from the File dropdown list.

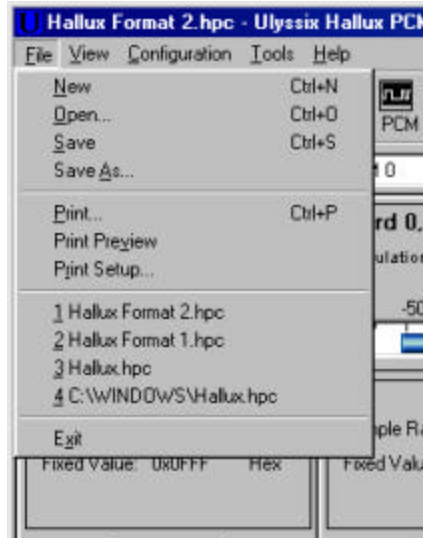


Figure 11 - File Format Screen

3.4.5.1.1 New

Click New to create a new configuration file. The default setup parameters will be loaded. You will be asked if you want to save the existing format file if it has been modified and not saved. Go to the setup screen and configure the Hallux card or cards as desired. Go to File/Save to name and save the new format file. Identify file formats with a name that will be easily recognized for future loading.

3.4.5.1.2 Open

Click Open to load an existing format file. Valid format files for the HalluxPCM-PCI software will have a .hpc file extension. Select the file name to load and click Open. The setup parameters will be automatically downloaded to the HalluxPCM-PCI cards in your chassis.

3.4.5.1.3 Save

After entering and applying setup parameters to the HalluxPCM-PCI cards in your chassis, you can save this information for later use. Click on File at the top left corner of the HalluxPCM-PCI Status Screen and choose Save. The default directory for saved formats is the same directory where the HalluxPCM-PCI program resides but you can store them in any location on your hard drive. Identify the file format with a name that will be easily recognized for future loading.

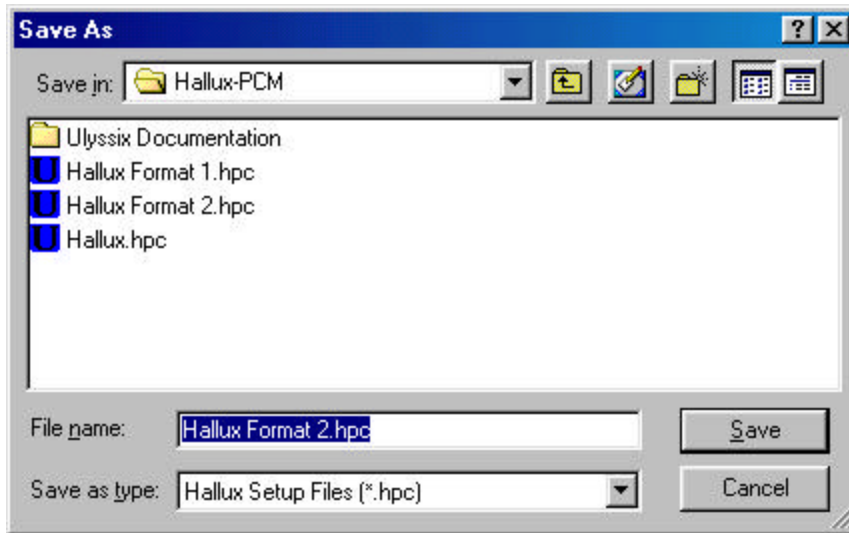


Figure 12 - Saving a Format File

3.4.5.1.4 Save As

Use the “Save As” option to copy the format to another name for modification. You can also use the Save As option if you have made changes to an existing format but want to retain the original format for future use.

3.4.5.1.5 Print

A HalluxPCM Configuration Report can be printed either by selecting print from the File dropdown menu or by clicking the Print icon from the toolbar. The printed document will contain all setup information for all detected HalluxPCM-PCI cards in your system.

3.4.5.1.6 Print Preview

Print Preview allows you to view the Hallux Configuration Report on your computer screen. The HalluxPCM Configuration document will contain all setup information for all detected HalluxPCM-PCI cards in your system.

3.4.5.1.7 Print Setup

Print Setup is a standard Windows print setup screen.

3.4.5.1.8 Exit

Exit allows you to close the HalluxPCM-PCI software.

3.4.5.2 View

The View drop-down menu (See Figure 13) allows you to display or hide the main Toolbar, the Status Bar, or the Card Selection Toolbar on the HalluxPCM-PCI Status Screen. The main Toolbar is the group of icons including New, Open, Save, Print, and PCM. The status bar is the bar of information displayed at the bottom of the screen that displays the software and dll version information. The Card Selection Toolbar allows you to choose the specific HalluxPCM card that you want to modify. All detected HalluxPCM cards will appear in the drop down menu.

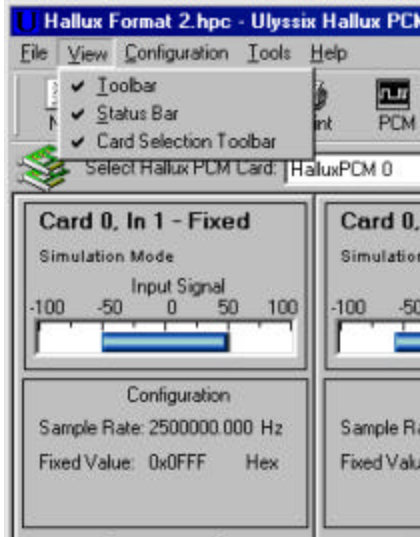


Figure 13 - View

3.4.5.3 Card Selection Toolbar

Up to four HalluxPCM-PCI cards can be installed into a single computer chassis. All detected HalluxPCM cards will appear in the “Select HalluxPCM Card” drop down menu. The individual cards will be given a “Card ID” number by the software (Card 0, Card 1, Card 2, and Card 3.) Four LEDs on the back panel identify the card for connection purposes (See Figure 5.) The Hallux PCM Software displays the status and programming screens for one card at a time to avoid confusion. Select the desired card from the Card Selection Toolbar located at the top left corner of the main screen, just under the toolbar. All setup and status screens identify the related Card and Input numbers.

3.4.5.4 Configuration

The Configuration drop-down menu (See Figure Below) provides access to the PCM Frame Generator set up screen (see section 3.4.7) and allows you to alter the deviation display on the main screen.

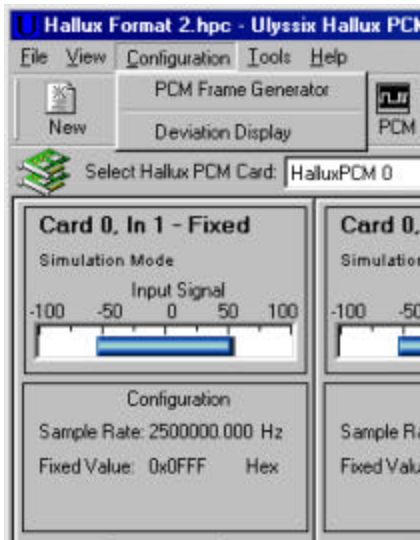


Figure 14 - Configuration Drop Down Menu

3.4.5.4.1 Deviation Display

The data displayed on the Deviation (%) display is derived from a “boxcar” average of several input data values. The HalluxPCM software averages from 1 to 32 data values then updates the display. The oldest value is then discarded and replaced by the newest available data in a first in first out process. The number of values to be averaged is selectable by clicking on “Deviation Display” from the Configure drop down menu (See Figure Above). Enter a number between 1 and 32. The higher the number, the more data points averaged and the DC offset level of the input data is displayed. The lower the number, the fewer data points averaged, and deviation display represents the AC frequency response of the input data. The setup on the deviation display does not in any way effect the PCM Generator operation; it is merely there to allow the user to change the update rate of the deviation display to quick view either the AC or DC response of the data.

3.4.5.5 Tools / Debug Screen

The Tools dropdown menu allows you to open the HalluxPCM-PCI software debug screen. The debug screen is used at the factory to access the registers of the HalluxPCM-PCI board. Typically a user will not access the debug screen. In some instances, however, there may be a need to open the debug screen for troubleshooting purposes. Ulyssix recommends that you not attempt to use the debug screen without consulting the factory.

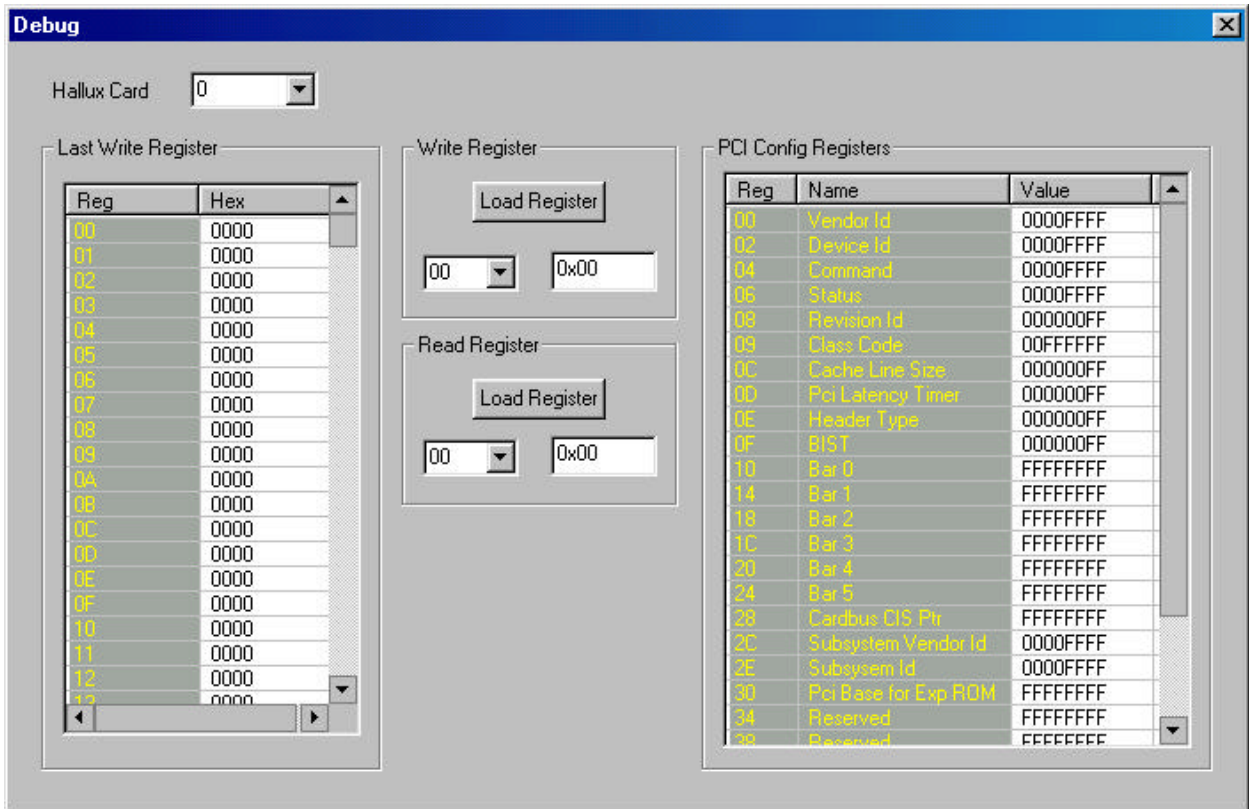


Figure 15 - Debug Screen

3.4.5.6 Help

Select “Manual” from the Help drop down menu to view the User Manual. Adobe Acrobat Reader version 4.0 or above is required to view the manual. Select “About” from this drop down menu to view the Software version and release date.

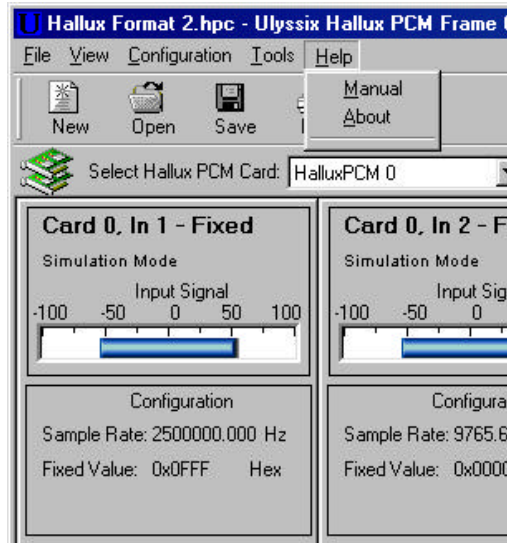


Figure 16 - Help Drop Down Menu

3.4.6 Input Setup

Click the Input Setup button at the bottom of the Status Block for the Input you want to configure. The Input Setup Screen allows you to configure each of the eight analog inputs to the HalluxPCM-PCI card. Each selection of this screen is explained below.

NOTE: The HalluxPCM-PCI was not designed to provide all of the flexibility and features of a high-end airborne PCM encoder. Instead, it was designed to provide a quick, easy, and economical solution for applications that require basic PCM encoding in a non-ruggedized setting. Some basic guidelines to get the most out of your HalluxPCM are: 1) keep sample rates the same from channel to channel whenever possible; 2) keep sample rates as low as possible to reduce bit rate; and 3) turn off any unused inputs.

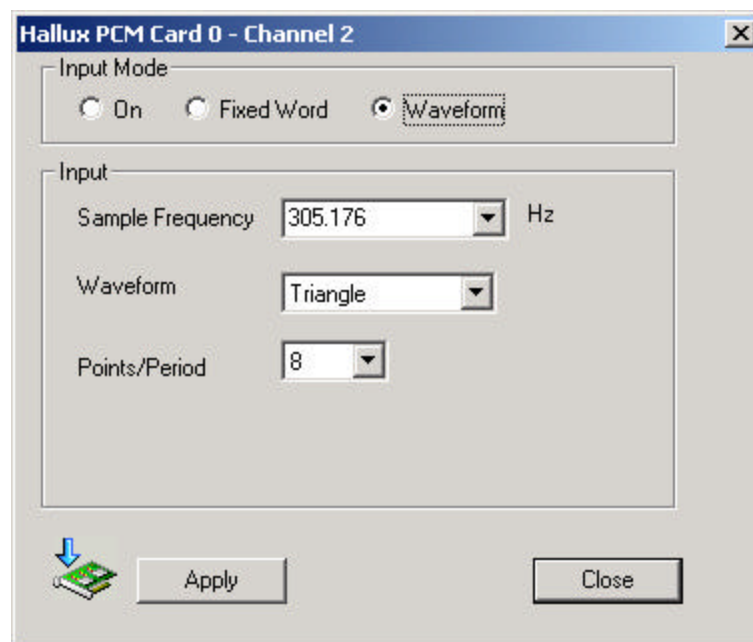


Figure 17 - Input Setup Screen

3.4.6.1 Input Mode

Each input can be configured for either analog input data (On), Fixed Word Value (Fixed) or a simulated waveform (Waveform). Click the desired radio button to change modes.

3.4.6.1.1 On Mode

In the “On” mode the data from the input connector is sampled and inserted into the PCM frame. In this mode you must select the Sample Frequency, Input Level, and Offset.

3.4.6.1.1.1 Sample Frequency

Select the desired sample frequency for this input. The sample frequency is the rate at which the analog to digital converter samples the input data. The choices are submultiples of the system clock from a maximum of 156250 Hz to a minimum of 19.073 Hz. Ulyssix recommends that you program the sample frequency to be 4 to 5 times the maximum expected data frequency. The law of sampling requires a minimum of 2.5 times the maximum data frequency. In “Fixed Word” mode the Sample Frequency setting does not effect the data but is used to configure the PCM frame.

3.4.6.1.2 Analog Input Level

The input data channels must be configured for a specific peak-to-peak input level. This setting determines what input voltage coincides with plus and minus 100% deviation of the channel. Select the desired Peak-to-Peak input level from the drop down menu. Choose from 0.5, 1.0, 2.5, and 5.0 VPP. If 5.0 VPP is selected, a –2.5 VDC input will move the sub-carrier to lower band edge and a +2.5 VDC input will move the subcarrier to upper band edge providing that 0.0 VDC input offset is selected.

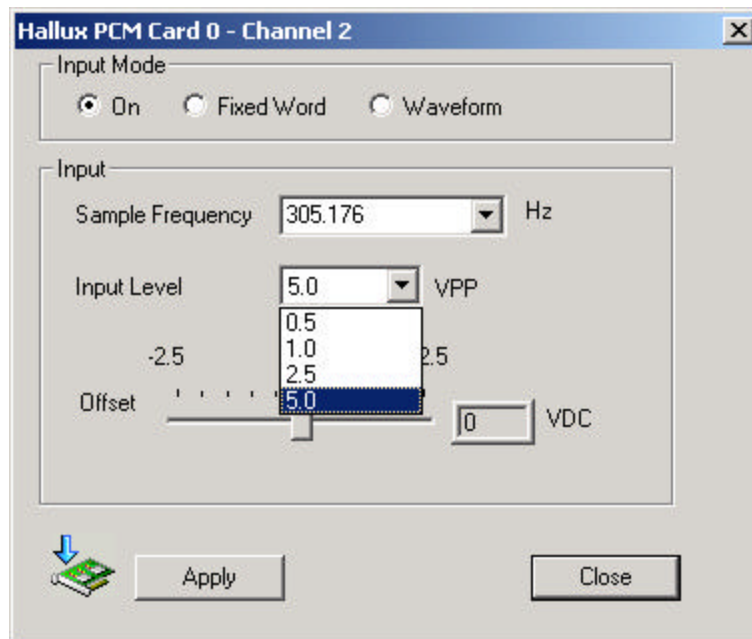


Figure 18 - Input Level

3.4.6.1.3 Analog Input Offset

The HalluxPCM-PCI card has an offset adjustment for input data that is not balanced around 0 VDC. The programmed offset voltage is applied to the input signal to create a bipolar input symmetrical around 0 VDC. Click and drag the slide button to program a

value from +2.5 VDC to -2.5 VDC in 0.1 V increments. You can also click to the left or right of the button to change the value in 0.5V steps.

Example: If the input signal is 0.0 VDC to 5 VDC, set your input level to 5.0 VPP and set the input offset to -2.5 VDC. The programmed -2.5 VDC value will compensate for the +2.5 VDC offset on the input.

3.4.6.1.4 Fixed Word Mode

In Fixed Word mode you must enter the Sample Frequency and the desired Fixed Word Value. These additional fields are explained below.

3.4.6.1.4.1 Sample Frequency

The Sample Frequency setting does not affect the data but is used to configure the PCM frame.

3.4.6.1.4.2 Fixed Word Value

The fixed word value is a 16 bit data value that will be inserted into the PCM frame at locations based on the Sample Frequency. To enter the value in Hexadecimal, prefix the value with "0x".

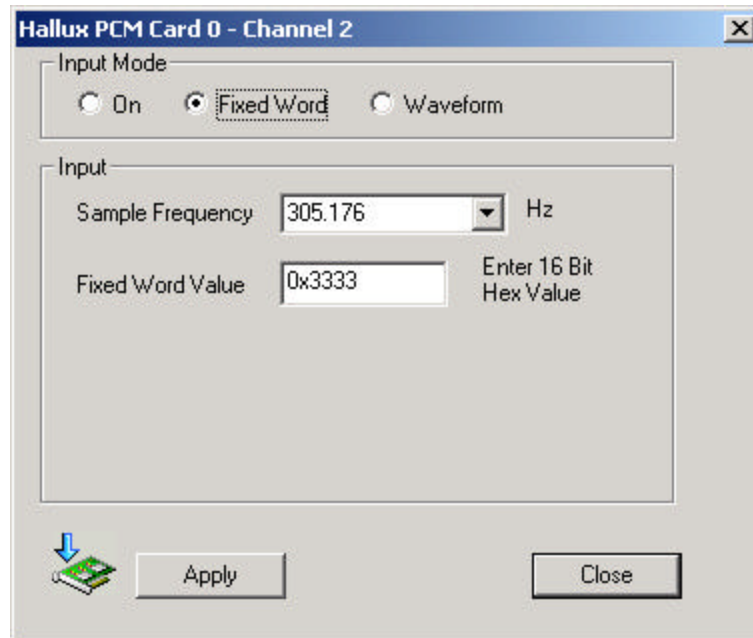


Figure 19 - Fixed Word Mode

3.4.6.1.5 Waveform Mode

In waveform mode a simulated waveform is created and inserted into the PCM stream. The sample frequency, waveform type and points per period must be selected. These additional fields are explained below.

3.4.6.1.5.1 Sample Frequency

The Sample Frequency setting set the frequency of the waveform selected.

3.4.6.1.5.2 Waveform

The waveform selection box sets the data pattern to be inserted into the PCM stream. The available types are sine wave, square Wave, saw tooth wave and triangle wave.

3.4.6.1.5.3 Points per Period

The points per period set the number of samples in the PCM stream for one cycle of the waveform selected. The actual number of points per period will be the value selected or greater depending on the frequency of other channels selected to be included in the PCM frame.

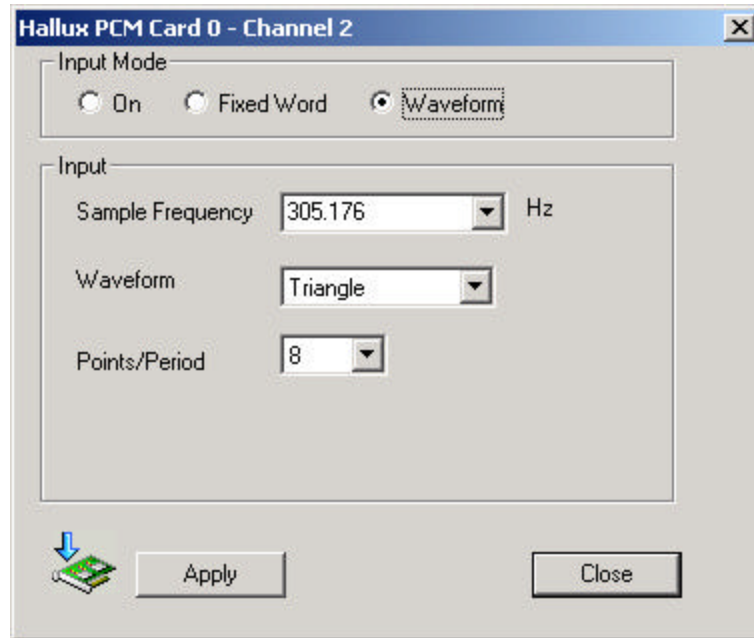


Figure 20 - Waveform Mode

3.4.7 PCM Frame Generator

The HalluxPCM-PCI PCM Frame Generator creates an NRZ-L or RNRZ-L serial PCM data stream containing data from multiple analog inputs. The various fields of the PCM Frame Generator Screen are explained in the following paragraphs.

The HalluxPCM-PCI was not designed to provide all of the flexibility and features of a high-end airborne PCM encoder. Instead, it was designed to provide a quick, easy, and economical solution for applications that require basic PCM encoding in a non-ruggedized setting. Some basic guidelines to get the most out of your HalluxPCM are: 1) keep sample rates the same from channel to channel whenever possible; 2) keep sample rates as low as possible to reduce bit rate; and 3) turn off any unused inputs.

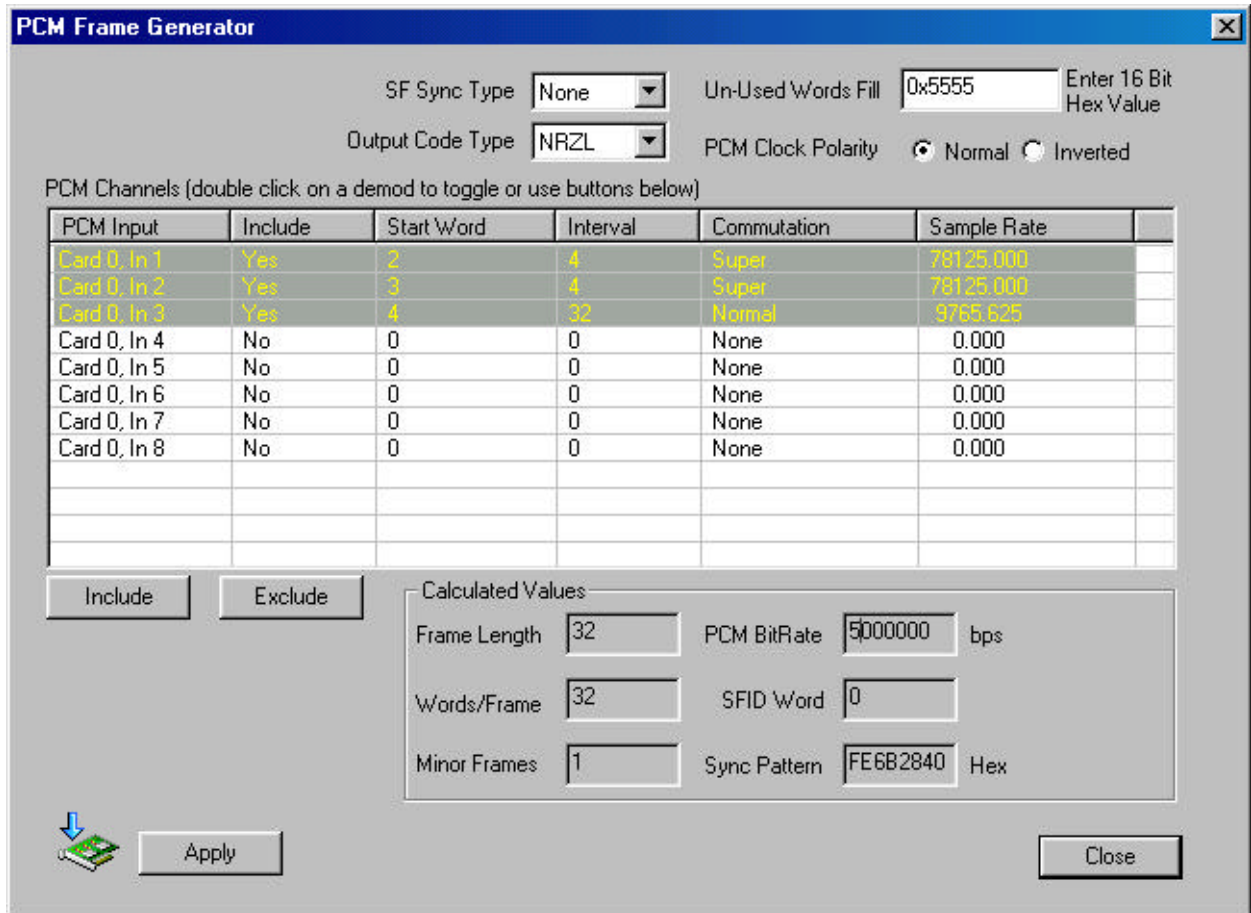


Figure 21 - PCM Frame Generator Screen

3.4.7.1 SF Sync Type

Select the desired Sub Frame Sync Type from the drop down menu. Select from Sub Frame ID (SFID), Frame Code Compliment (FCC), or None. The SF Sync allows you to identify the minor frames in the major frame.

3.4.7.1.1 SFID

Sub-Frame ID mode (SFID) inserts an SFID word in the PCM frame that identifies each sub-frame. The value of the SFID word increments through all sub-frames then resets to zero after the last minor frame.

3.4.7.1.2 FCC

Frame Code Compliment mode (FCC) identifies the last minor frame of the major frame by inverting each bit of the Frame Sync Pattern.

3.4.7.2 Output Code Type

Select the desired Output Code Type from the drop down menu. Select from Non Return to Zero (NRZ-L) or Randomized Non Return to Zero (RNRZ-L).

3.4.7.3 Un-Used Words Fill

The PCM Frame Generator allows you to insert a specific value for all unused words in the PCM frame. Enter a 16 bit hex value.

3.4.7.4 PCM Clock Polarity

The HalluxPCM generates PCM Output and PCM Clock. Select Normal (0 degree or PCM clock rising edge corresponds to data bit rising edge) or Inverted (180 degree PCM clock falling edge corresponds to data bit rising edge) PCM Clock by clicking the corresponding radio button.

3.4.7.5 Include / Exclude

Select the analog inputs to include in the PCM stream. You can either include / exclude by double clicking the desired input or by highlighting the desired input and clicking either the Include button or the Exclude button. Click the Apply button to download the configuration to the PCM Generator.

3.4.7.6 PCM Frame Configuration Information

The PCM Frame Generator automatically creates an optimized PCM frame based on the sample rates of the selected inputs and the presence or absence of SFID. The table at the top of the screen gives you information about which analog inputs have been included, the start word for each input, the interval, commutation type (normal, sub-commutation, super-commutation), and the sample rate for each input. The Calculated Values table, located at the bottom right side of this screen, gives you a summary of the PCM frame configuration to use when setting up your decommutator. This table includes Frame Length, Words per Frame, Number of Minor Frames, PCM Bit Rate, SFID Word, and the Sync Pattern. The PCM frame information can be printed as part of the HalluxPCM Configuration Report. Go to the HalluxPCM Status Screen and select Print from the File drop down menu. Click the Print button to print the PCM Frame Configuration information. Each of these fields is explained below.

Figure 20 gives an illustration of a theoretical PCM frame consisting of Frame Sync Pattern (FSYNC), Sub-Frame ID (SFID) and three data words.

SubFrame	WORD IN MINOR FRAME							
	1	2	3	4	5	6	7	8
1	FSYNC	FSYNC	SFID	Data 1 Super	Data 2 Normal	Data 3 Sub		Data 1 Super
2	FSYNC	FSYNC	SFID	Data 1 Super	Data 2 Normal			Data 1 Super
3	FSYNC	FSYNC	SFID	Data 1 Super	Data 2 Normal			Data 1 Super
4	FSYNC	FSYNC	SFID	Data 1 Super	Data 2 Normal			Data 1 Super

Figure 22 - Sample Frame Configuration

3.4.7.6.1 PCM Input

PCM Input identifies the Card Number and the Input Number.

3.4.7.6.2 Include

Inputs selected to be included in the PCM frame will be identified with Yes. Otherwise No will appear. You can either include / exclude by double clicking the desired Input or by highlighting the desired input and clicking either the Include button or the Exclude button.

3.4.7.6.3 Start Word

The Start word is the first word in the PCM frame that contains the data from this Input. Words 0 and 1 are always reserved for the Frame Sync Words. SFID appears in Word 2 when used. All words in the PCM Frame are 16 bits.

3.4.7.6.4 Interval

The Interval field specifies how frequently the Input appears in the Major Frame. If the Interval is 4 and the Start Word is 2, then the data will appear on words 2, 6, 10, etc. of the PCM Major Frame.

3.4.7.6.5 Commutation

This field identifies the commutation type for the Input. The three choices are explained below.

3.4.7.6.6 Super-Commutation

Super-Commutated Words appear more than one time in each minor frame.

3.4.7.6.7 Sub-Commutation

Sub-Commutated Words appear at least one time per major frame but less than one time per minor frame.

3.4.7.6.8 Normal Commutation

Normal Words appear one time per minor frame.

3.4.7.6.9 Sample Rate

Sample Rate is set in the Input Setup Screen. The sample rate is the rate at which the analog to digital converter samples the input data. Ulyssix recommends that you program the sample frequency to be 4 to 5 times the maximum expected data frequency. The law of sampling requires a minimum of 2 times the maximum data frequency.

3.4.7.6.10 Frame Length

The Frame Length is the total number of words in the major frame. If minor frames are present, the Frame Length will be the number of minor frames multiplied by the Words/Frame. Words/Frame is actually the number of words in a minor frame.

3.4.7.6.11 Words/Frame

Words/Frame is the number of words in each **Minor** Frame. If there are no minor frames in the major frame, the Words/Frame is the number of words in the major frame.

3.4.7.6.12 Minor Frames

Minor frames are sometimes generated depending upon the combination of SF Sync Type and the Sample Rates for the Included Inputs. The Minor Frames field specifies the number of minor frames in the major frame.

3.4.7.6.13 PCM Bit Rate

PCM Bit Rate is the number of bits per second and is two times the frequency of the PCM Clock.

3.4.7.6.14 SFID Word

The SFID Word field specifies the word in the minor frame that contains the SFID Word. This is only relevant if SFID has been selected from the SF Sync Type drop down menu. The SFID value identifies each individual minor frame contained in the major frame and will always appear in Word 2 of the minor frame.

3.4.7.6.15 Sync Pattern

The Sync Pattern (Frame Sync) is a 32-bit pattern that identifies the beginning of each minor frame. The HalluxPCM card uses the IRIG standard value of FE6B2840h as the Frame Sync Pattern.