



Syrinx-PCI

User Manual

Software Version 2.3x

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Chapter 1 Introduction

1.1 Overview of Syrinx-PCI

The Syrinx-PCI Digital Baseband Demodulator is a DSP (Digital Signal Processing) based multi-mode base-band demodulator designed around the PCI form factor. Built In Test (BIT) feature, with the accuracy of an external calibrator, allows the user to verify demodulator setup and functionality. DSP algorithms are implemented in state-of-the-art FPGAs (Field Programmable Gate Arrays) allowing for rapid enhancements or customization.

Capable of demodulating FM/FM, FM/PCM, FSK, PM, and BPSK, the Syrinx is the most flexible base-band demodulator available. Fully programmable, all IRIG 106-93 CBW and PBW FM sub-carriers are supported as well as non-standard frequencies with a carrier frequency range of 250 Hz to 2.5 MHz (3.5MHz on Syrinx-PCI-10) and a digital output filter frequency range of 1 Hz to 1 MHz. Additional recommended applications of the Syrinx card include tone detection and pre-detection of antenna AGC signals.

By using DSP based algorithms including Finite Impulse Response (FIR) filters, multi-stage recursive decimation filters, Modulated Numerically Controlled Oscillators (MNCO) and DSP implemented Phase-Locked Loops (PLL), the Syrinx eliminates the need for calibration and tuning. User-friendly Windows based Graphic User Interface (GUI) software is supplied for easy product installation into a Windows based host computer system.

The input subcarrier is received in analog form, conditioned with a digital auto gain control circuit, and fed into a sophisticated anti-alias filter prior to a 12-bit digitizer (see block diagram below). The demodulated output is available in both analog and digital formats. The analog data is reconstructed using a programmable reconstruction filter, then normalized to user specified output levels and offsets. The digital data is available through a FIFO circuit for direct storage to the host computer for FFT analysis.

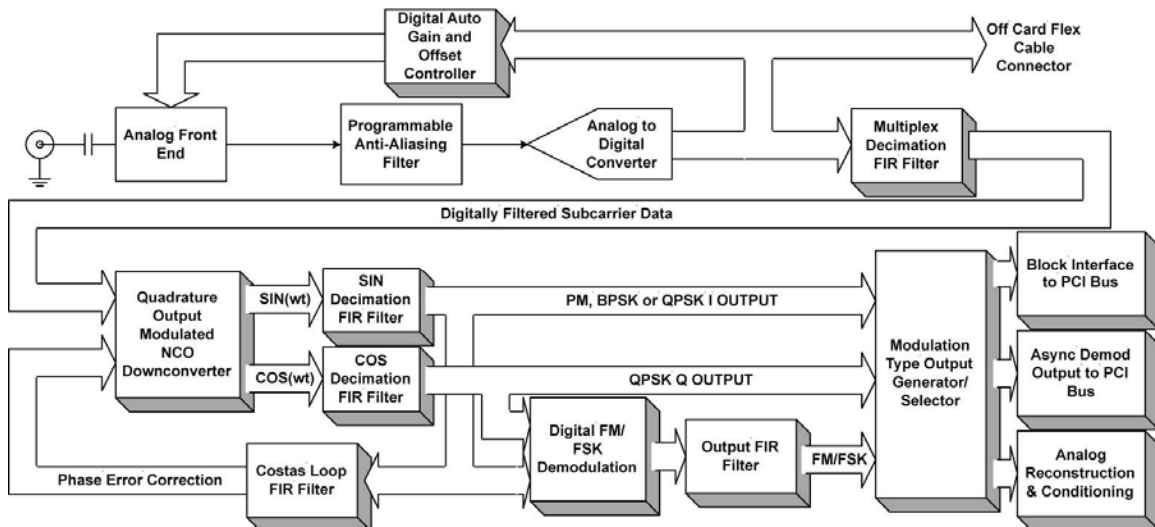


Figure 1 - Syrinx-PCI Block Diagram

1.2 Specifications

Input Specifications

Input Subcarrier Frequency Range 250 Hz to 2.5 MHz, programmable

Input Subcarrier Voltage Range	250 Hz to 3.5MHz for Syrinx-PCI-10
Maximum Safe Input Range	15 mVPP to 4.0 VPP
Input FM Subcarrier Deviation Range	± 35 VDC
Input PM Subcarrier Deviation Range	0.5% to 50.0% of entered center frequency, programmable
Demodulation Modes	0.3 to 2.3 radians, programmable
Input Subcarrier Impedance Matching	FM/FSK/PM/BPSK, selectable
	50, 75 and 10K Ohms shunted by 10pF, jumper selectable

Demodulator Specifications

Output Filtering

There are 3 digital output filter modes that are program selectable:

Analog Mode (Linear Data): The FIR filter is programmed to be flat within 0.1 dB in the programmed pass-band and -60dB attenuation at 2 times the programmed cutoff frequency.

Digital Mode (PCM Data): The FIR filter is programmed to be monotonic in the pass-band with -3 dB attenuation at the programmed cutoff frequency and down -50dB at 2.5 to 3.0 times the programmed cutoff frequency.

Bypass Mode (>1MHz Data): The digital and analog reconstruction filters are bypassed for maximum digital data throughput, up to 2.7 Mbps NRZL. The data frequency throughput is equal to the programmed deviation filter frequency.

Output Data Filter Range	Programmable from 1 Hz to 1 MHz with FM deviation ratios from 1 to 64 of the programmed deviation or from 1.5% to 50% of the subcarrier frequency
Output Linearity	Less than 0.05% of the programmed full deviation bandwidth measured from the best 3-point straight line
Output Harmonic Distortion	All harmonic terms are below -56 dB for FM deviation ratios of 2 and -60 dB for FM deviation ratios greater than 5
Analog Output Level	Programmable from 1.0 VPP to 10.0 VPP with programmable offset from -5 VDC to +5 VDC
Analog Output Noise	Less than 10mVRMS
Deviation Accuracy	0.0244% of the programmed center frequency (32 bit MNCO phase accumulator)
Linear Deviation Range	±125% of the programmed deviation
Loop Bandwidth	Programmable from 0.01% to 5.0% of the programmed subcarrier frequency and limited to 3% to 100% of the Output Data Filter frequency.

Physical Specifications

Form Factor	32 bit PCI form factor, +5 Volt System
Interface Connectors	Subcarrier input and analog outputs are available on BNC connectors. Digitized

Manufacturing

demodulator input data is available on SMT shielded flex ribbon cable connectors for multi-demodulator applications.

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:

Less than 25 Watts total, for all supplies

+5V 3A

+12v 400ma

Ordering Information

<u>Model</u>	<u>Description</u>
Syrinx-PCI-01	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 2.5MHz Bandwidth
Syrinx-PCI-02	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 2.5MHz Bandwidth FIR Low Pass Filter Option
Syrinx-PCI-10	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 3.5MHz Bandwidth
Syrinx-PCI-12	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 3.5MHz Bandwidth FIR Low Pass Filter Option

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 \$500 per unit plus return shipping charges. Equipment must be shipped to the factory with transportation prepaid. Please call the Ulyssix Customer Service Department at 301-846-4800 for a return authorization number and shipping information. All units repaired will be warranted for 90 days from the date of 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 Syrinx-PCI Digital Baseband Demodulator. For optimum performance of the Syrinx-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 Syrinx-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 (Software Version 1.x and 2.x)

1. Boot the machine.
2. **NOTE: If running Windows NT you must log in with administrator privileges.**
3. Install the Syrinx-PCI software onto your computer by inserting the Syrinx-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 (Software Version 1.x)

1. Boot the machine.
2. **NOTE: You must log in with administrator privileges.**
3. Install the Syrinx-PCI software onto your computer by inserting the Syrinx-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(s).
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 the "Found New Hardware Wizard" prompting the user to install a driver for a PCI Bridge card. Click Next.
7. The next window is the "Install Hardware Device Drivers" window.
8. The wizard will indicate "Other PCI Bridge Device". On this screen select "Search for the Suitable Driver for your Device". Click Next.
9. The next window is the "Locate Driver Files" window. Select the "Optional Search Locations" which allows the user to choose the location of the driver. Select "Specify a location" and click "Next".
10. Browse to c:\WINNT\INF and click OK.
11. The installation will return with the message, "Windows was unable to locate a driver for this device. To search another location click Back...". This message is displayed because the Ulyssix driver was not released in the current revision of Windows 2000. This is OK.
12. Check the radio box "Disable the device. The add remove hardware..." Selection. The Syrinx-PCI card is installed and registered in the hardware to the installed slot. Click finish.
13. Windows may ask you to restart your computer prior to using the new card. Click ok. Restart your computer even if Windows does not prompt you to do so.
14. Windows will continue booting as normal. The next time you start your computer, it will bypass the "Found New Hardware" dialog.

2.2.3 Windows 2000 Installation (Software Version 2.x)

1. Boot the machine.
2. **NOTE: You must log in with administrator privileges.**
3. Install the Syrinx-PCI software onto your computer by inserting the Syrinx-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 Disk 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 Syrnix-PCI cards in the future.

2.2.4 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.

2.2.4.1 Uninstalling Hardware – Windows 95/98

It is very important that you do not uninstall required hardware drivers. Do not perform the following process unless you have a thorough understanding of computer hardware.

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!

2.2.4.2 Uninstalling Hardware – Windows 2000

It is very important that you do not uninstall required hardware drivers. Do not perform the following process unless you have a thorough understanding of computer hardware.

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.

2.2.5 Un-Install Software

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

2.2.6 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 Syrinx-PCI Digital Baseband Demodulator 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 Syrinx card indicates which options are installed on that specific unit. Model number definitions are provided in the table below.

Model	Description
Syrinx-PCI-01	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 2.5MHz Bandwidth
Syrinx-PCI-02	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 2.5MHz Bandwidth FIR Low Pass Filter Option
Syrinx-PCI-10	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 3.5MHz Bandwidth
Syrinx-PCI-12	Digital Baseband Demodulator, FM/FSK/PM/BPSK, 3.5MHz Bandwidth FIR Low Pass Filter Option

2.3.2 Serial Number

A unique serial number is assigned to each Syrinx-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 Syrinx-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 Syrinx-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. Four of the five jumpers required are factory set and require no alteration by the user. JP13 is used to set the input impedance of the card. See instructions below for setting JP13.

2.4.3 Setting Input Impedance

The Input Impedance of the Syrinx-PCI is jumper selectable for 50, 75, or 10K Ohms. Cards are shipped from the factory with the jumper in the 10K Ohms position. Special care must be taken in applications where the input signal is connected to multiple Syrinx-PCI cards and the desired input impedance is either 50 or 75 Ohms. Install the jumper in the 50 or 75 Ohm position on **only** one Syrinx-PCI board. Install all other jumpers in the 10K Ohm position. Significant input signal loading will occur if multiple cards have jumpers installed in the 50 or 75 Ohm locations.

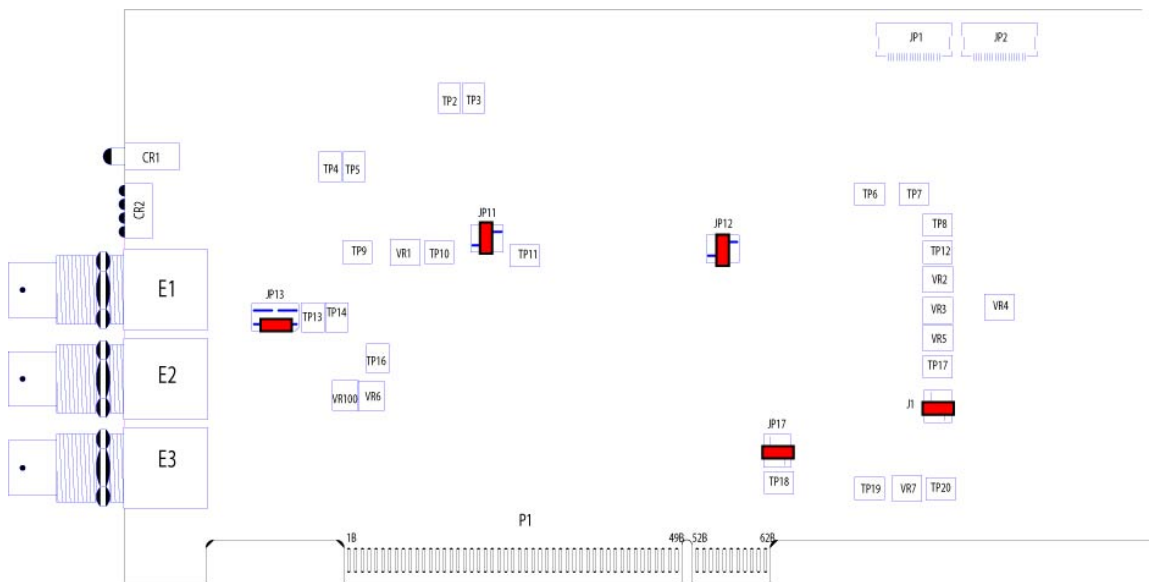


Figure 4 - Jumper Locations

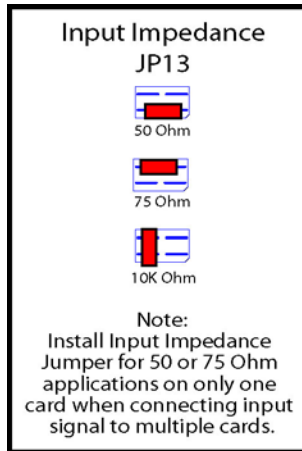


Figure 5 - Input Impedance

2.5 Hardware Installation

The Syrinx-PCI is easily installed into any PC chassis with an available full length PCI slot. The Syrinx-PCI software must be installed before installing the Syrinx-PCI card. Follow the steps below to install the Syrinx-PCI card.

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

1. Make sure the Syrinx-PCI software has been installed before installing any hardware.
2. Turn off power to the computer.
3. Remove the cover of the computer to expose the available PCI slot.
4. 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 Syrinx-PCI card.
5. Install the Syrinx-PCI card in the PCI slot and secure with the screw from the bracket.
6. Return the cover to the computer.
7. 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 Syrinx-PCI cards can be installed into any available full length PCI slot in your computer at any time. Follow the installation instructions above. When you install additional cards into a computer, the PCI bus may assign new Demod 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 Syrinx-PCI cards from your system that you delete the SyrinxCfg.Cfg file from the Program Files/Ulyssix/SyrinxPCI directory. When you re-enter the Syrinx-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 demodulating with your Syrinx-PCI card you must first - 1) install the Syrinx-PCI software onto your computer and 2) install the Syrinx-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 Syrinx-PCI card provide identification and status for each card. The following sections describe the function of each LED.

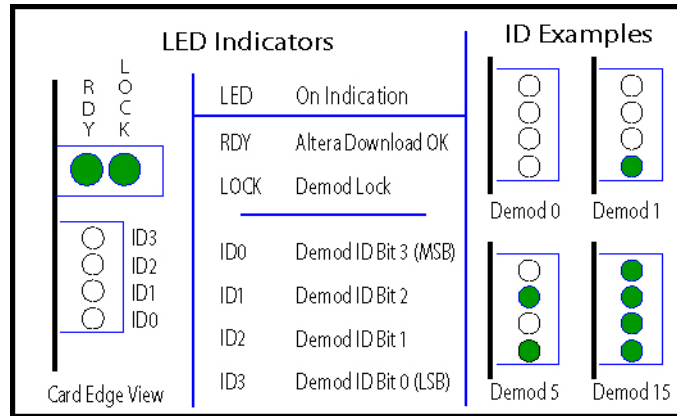


Figure 6 - LED Indicators

3.2.1 Altera Download OK (RDY)

DSP algorithms are downloaded from on-board flash into Altera FPGAs upon power up of the Syrinx-PCI. 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 Demod Lock (LOCK)

The Demod Lock LED, LOCK, will illuminate green when the Syrinx-PCI has detected data within the programmed Subcarrier and Deviation setup parameters. This LED will either illuminate green or flash green during normal operation. Some computer systems do not

support this feature. If the Lock LED is indicating NO LOCK when you expect it should be “locked”, please verify that the board is not demodulating before contacting the factory for support. Review section 3.4.4.11, “Demod Lock LED Sensitivity”, for information about adjusting the sensitivity of the Demod Lock LED.

3.2.3 Demod ID

The Syrinx-PCI software assigns a Demod number to each Syrinx-PCI card detected in the chassis. Note that the Demodulators are numbered 0 through 15. The Demod number appears on all screens of the software to identify setup, status, and data to a specific Syrinx-PCI card. The Demod ID LEDs give a binary representation of the Demod number for each card. Refer to the LED Indicator figure above and the table below to determine the Demod number.

Note: 0 indicates LED off, 1 indicates LED on.

ID3	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
ID2	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
ID1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
ID0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Demod	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 7 - Demod ID Table

3.3 Interconnections

Input and output connections are made to the Syrinx-PCI through BNC connectors on the rear panel. Refer to the Connections Figure below for connector identification.

3.3.1 Subcarrier Input

Connect the signal to be demodulated to the Subcarrier Input Connector, IN. Input Specifications for Syrinx-PCI card are listed in the Specifications Section of this manual. The input impedance for the input to the board is jumper selectable for 50, 75 or 10K Ohms. See the Hardware Setup Section for details on how to select the input impedance.

3.3.2 E2 Output

The E2 Output connector is not currently used.

3.3.3 Demod Output

Demodulated data from the subcarrier is output on the Demod Output Connector, OUT. The output level and offset are programmable from the software.

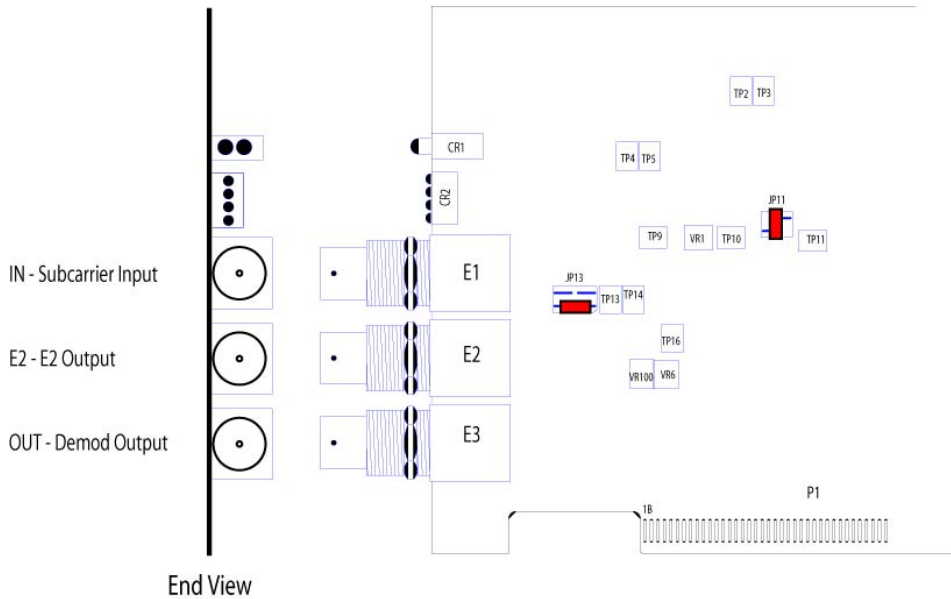


Figure 8 - Connections

3.4 Demodulator Setup and Operation

The following sections describe the various screens of the Windows based Syrinx-PCI software. Please note that you must click the Apply button (Demod Setup Screen) to download any modified settings to the Syrinx card. No changes will be made to the card until Apply has been clicked.

3.4.1 Syrinx-PCI Status Screen

The Syrinx-PCI Status Screen is the first screen you see when the Syrinx-PCI software is launched. The software will open in simulation mode (four Demodulators displayed) if the PCI bus does not detect any Syrinx-PCI cards. In this mode, the words "Simulation Mode" will appear in each Demod Status Block, directly under the Demod Number. Normal mode is displayed if the PCI bus recognizes one or more Syrinx-PCI cards in the chassis. This screen displays a Demod Status Block for each Syrinx-PCI Demodulator detected. 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.

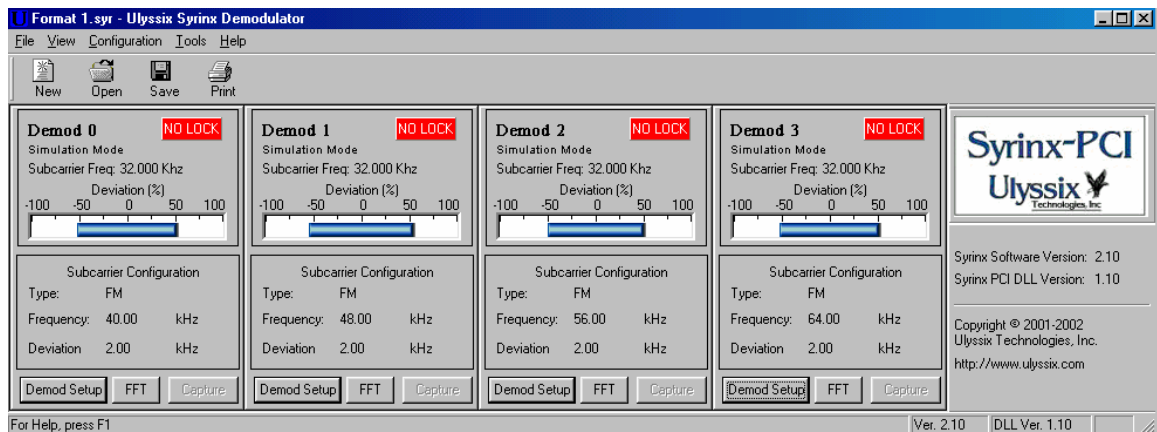


Figure 9 - Syrinx-PCI Status Screen in Simulation Mode

3.4.2 Demod Status Block

A Demod Status Block (See Figure Below) for each Syrinx-PCI Demodulator appears on the Syrinx Status Screen displaying programming and status information for each Demodulator. The fields displayed on the Demod Status Block are explained below.

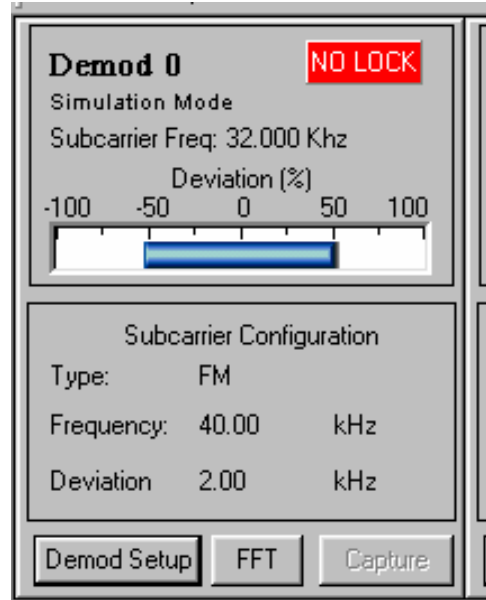


Figure 10 - Demod Status Block

3.4.2.1 Demod Number

The Demod Number in the top left corner of the Demod Status Block corresponds to the Demod ID LEDs on the back of the card (refer to section on LED Indicators). This number assists the user in identifying the various Syrinx-PCI cards in a given chassis. In a chassis with multiple Syrinx-PCI cards installed, the cards will be numbered sequentially from one side of the chassis to the other.

3.4.2.2 Demod Model

The Demod Model appears in the top left corner of the Demod Status Block directly under the Demod Number and reflects the hardware version of that card. If no Syrinx-PCI cards are detected, the words "Simulation Mode" will appear instead of the Model. The various models of the Syrinx-PCI card have slightly different capability and operational limitations. The Syrinx-PCI software will automatically recognize the hardware model.

3.4.2.3 Lock Indicator

The Lock Indicator, located in the top right corner of the Demod Status Block, will be green when subcarrier with data is detected in the programmed channel of interest. Red "NO LOCK" indicates no subcarrier is present. The sensitivity of the Lock Indicator can be adjusted. See the section on Demod Lock LED Sensitivity. Some computer systems do not support this feature. If the Lock LED is indicating NO LOCK when you expect it should be "locked", please verify that the board is not demodulating before contacting the factory for support. Optionally, the Demod Lock Status indicator can be disabled and removed from the main display. See Menu Bar Features/Tools below for more details.

3.4.2.4 Frequency Counter

The Frequency Counter displays the actual frequency of the carrier if the demodulator is locked. This portion of the display can be turned on or off to suit your preference. To change the status of this display, select Configuration from the main screen menu bar and select Freq Subcarrier Counter.

3.4.2.5 Deviation Meter

The Deviation Meter provides a graphical representation of the demodulated data for the programmed channel. The blue indicator shows the percent deviation for the channel. This is useful for pre-test checkout of the system. 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 3.4.3.3.2 for details.

3.4.2.6 Demodulator Type

The Type field indicates the selected demodulation mode for the demodulator. Standard modes include FM, FSK, PM, and BPSK. LOWPASS will be available if the Syrinx-PCI card has the Low Pass Filter Option installed.

3.4.2.7 Frequency and Deviation

The Frequency and Deviation for each Syrinx-PCI are programmed in the Demod Setup Screen.

3.4.2.8 Demod Setup

See Section 3.4.4 for Demod Setup information.

3.4.2.9 FFT

See Section 3.4.5 for FFT information.

3.4.2.10 Capture

The Capture feature stores digital demodulated data directly to a hard disk. The stored data can then be reviewed by using the playback option in the FFT screen or the data can be imported to a third party analysis application. (Refer to capture section below for details).

3.4.3 Menu Bar Features

The menu bar and the toolbar provide access to configuration, status, and help screens, as well as control of standard Windows functions such as file management and printing. The toolbar consists of a group of icons that provide quick access to the file management and print control screens. The specific use of these functions is explained below.

3.4.3.1 File Management

Each time the Syrinx-PCI software is executed, the most recently downloaded set up parameters are loaded into the Syrinx-PCI cards in your chassis. The active file format name (with a .syr extension) will be displayed at the top of the Syrinx-PCI Status Screen (See Figure Below). Available from the Syrinx-PCI Status Screen is the file management menu. Click File at the top left corner of the Syrinx-PCI Status Screen to save, save as, or recall saved program formats (See Figure Below). This feature of the Syrinx-PCI software eliminates the need to re-enter set up information for frequently used channels. The software will ask you if you want to save setup information each time you exit (See Figure Below). You are also able to exit the Syrinx-PCI software from this drop down menu. The following paragraphs describe the functions available from the File dropdown list.

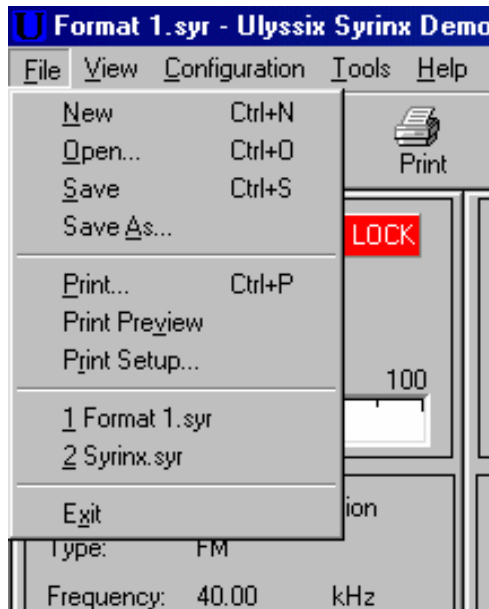


Figure 11 - File Format Screen

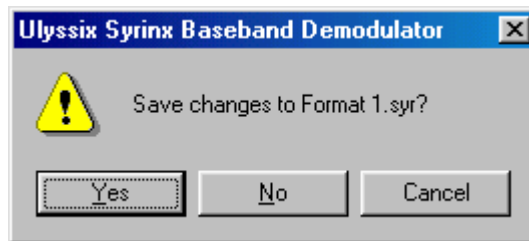


Figure 12 - Edited Without Saving

3.4.3.1.1 New

Click New to create a new configuration file. The default setup parameters will be loaded into the Demod Setup screen. You will be asked if you want to save the existing format file if it has been modified and not saved.

3.4.3.1.2 Open

Click Open to load an existing format file. Valid format files for the Syrinx-PCI software will have a .syr file extension. Select the file name to load and hit Open. The setup parameters will be downloaded to the Syrinx-PCI cards in your chassis. See Figure 13.

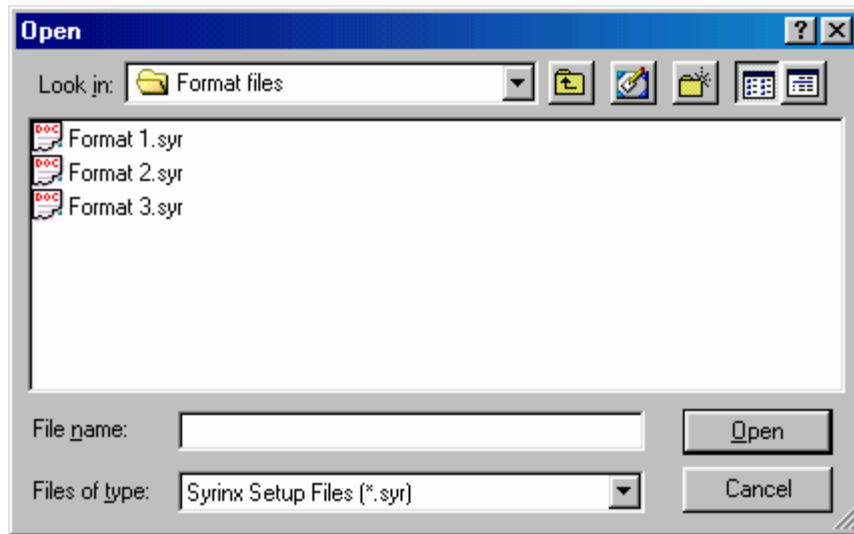


Figure 13 - Open a Format File

3.4.3.1.3 Save

After entering and applying setup configuration parameters to the Syrinx-PCI cards in your chassis, you can save this information for later use. Click on File at the top left corner of the Syrinx-PCI Status Screen and choose Save. The default directory for saved formats is the same directory where the Syrinx-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.

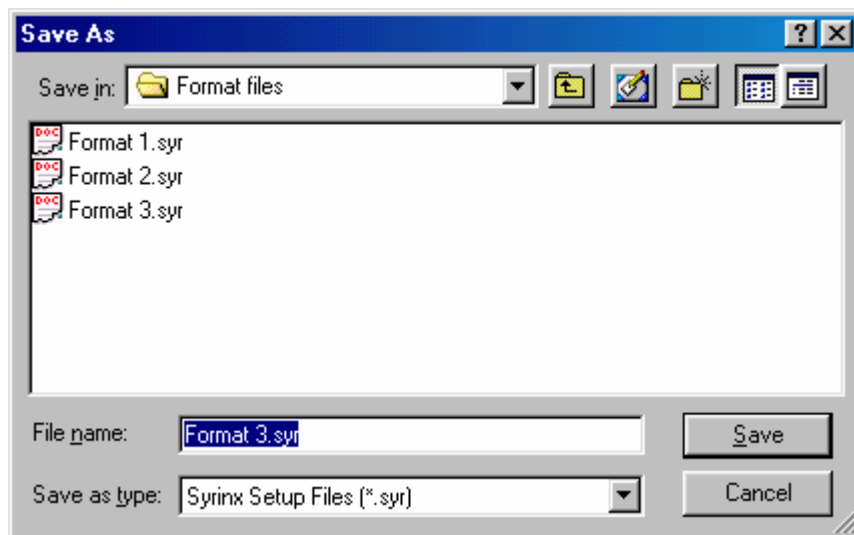


Figure 14 - Saving a Format File

3.4.3.1.4 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.

3.4.3.1.5 Print

A Syrinx 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 Syrinx-PCI cards in your system.

3.4.3.1.6 Print Preview

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

3.4.3.1.7 Print Setup

Print Setup is a standard Windows print setup screen.

3.4.3.2 View

The View drop-down menu (See Figure Below) allows you to display or hide the toolbar and the status bar on the Syrinx-PCI Status Screen. The toolbar is the group of icons including New, Open, Save, and Print. The status bar is the bar of information displayed at the bottom of the screen that displays the software and DLL version information.

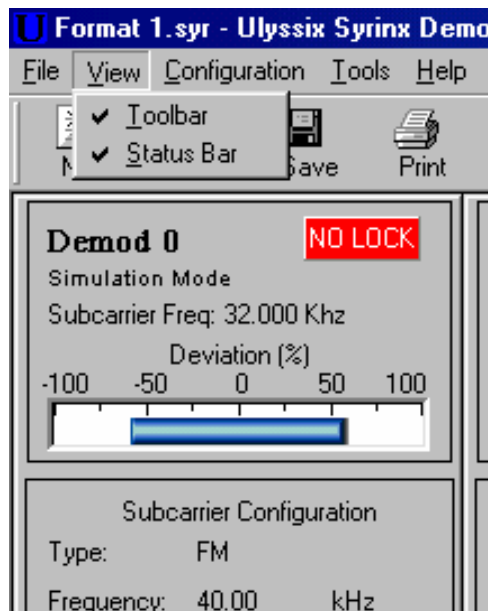


Figure 15 - View

3.4.3.3 Configuration

The Configuration drop-down menu (See Figure 16) allows you to alter several attributes of the main screen.

3.4.3.3.1 Freq Subcarrier Counter

The Demod Status Block for each channel provides a graphical representation of the channel data both in % deviation and Carrier Frequency in kHz. The frequency counter can be turned on or off by selecting or deselecting "Freq Subcarrier Counter" from the configuration drop down menu.

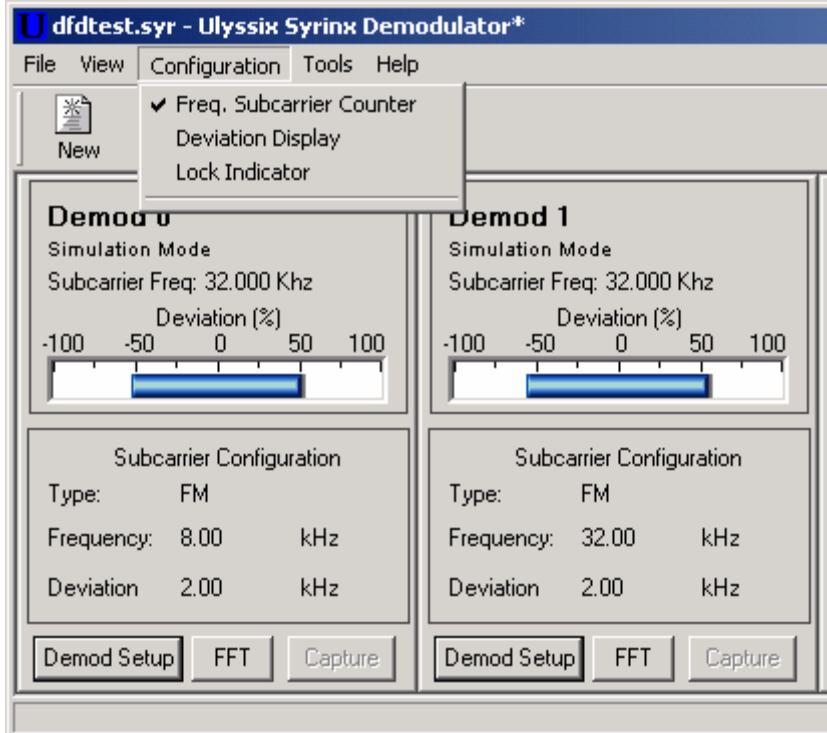


Figure 16 - Configuration Drop Down Menu

3.4.3.3.2 Deviation Display

The data displayed on the Deviation (%) display is derived from a “boxcar” average of several output data values from the digital demodulator. The Syrinx 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 17). Enter a number between 1 and 32. The higher the number, the more data points averaged and the DC offset level of the demodulated data is displayed. The lower the number, the fewer data points averaged, and deviation display represents the AC frequency response of the demodulator output data. The setup on the deviation display does not in any way affect the Demod 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 demodulator.

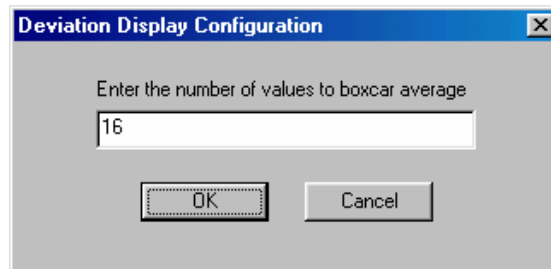


Figure 17 - Deviation Display

3.4.3.3.3 Lock Indicator

The Lock Indicator, located in the top right corner of the Demodulator Status Block, will be green when sub-carrier with data is detected in the programmed channel of interest. The lock

indicator can be turned on or off by selecting or deselecting “Lock Indicator” from the configuration drop down menu.

3.4.3.4 Tools

The Tools dropdown menu allows you to open the Syrinx-PCI software debug screen and the demodulator delay screen.

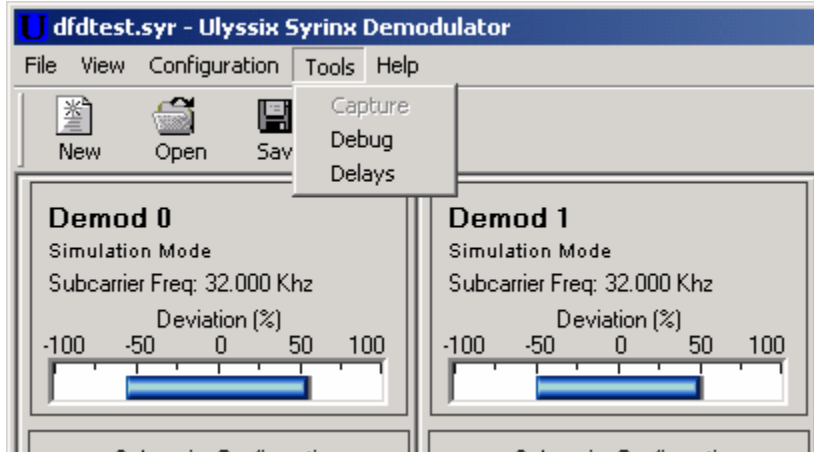


Figure 18 - Tools

3.4.3.4.1 Debug

This screen is used at the factory to access the registers of the Syrinx-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.

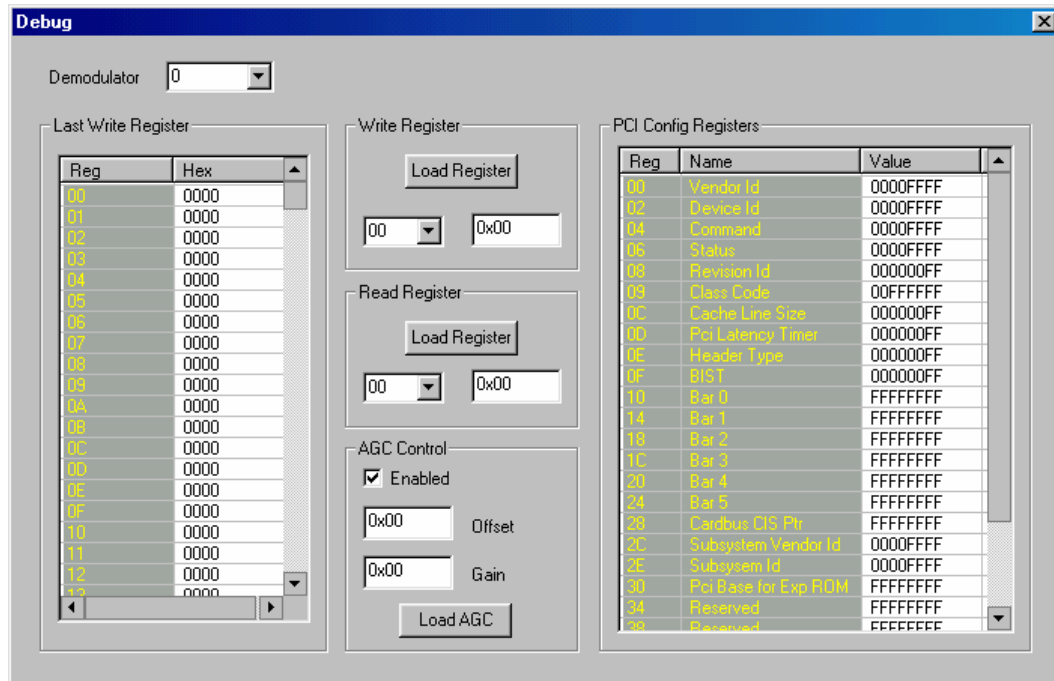


Figure 19 - Debug Screen

3.4.3.4.2 Delay

The Demodulator Delay display indicates data delays through the demodulator circuit. The delays are shown independently for each demodulator channel with the time broken down as digital delay, analog delay and total delay. The delay screen calculates and displays the delays for the current setup. Pressing the print button will generate a hard copy.

Card	Demod	IRIG	Frequency	Deviation	Output Freq.	Digital Delay	Analog Delay	Total Delay
0	1	8A	8.00 kHz	2.00 kHz	1.00 kHz	5.92 ms	355.33 us	6.28 ms
0	2	32A	32.00 kHz	2.00 kHz	1.00 kHz	6.02 ms	361.44 us	6.39 ms
1	1	48A	48.00 kHz	2.00 kHz	1.00 kHz	6.02 ms	361.44 us	6.39 ms
1	2	64A	64.00 kHz	2.00 kHz	1.00 kHz	6.02 ms	360.92 us	6.38 ms

Figure 20 - Demodulator Delay Screen

3.4.3.5 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.

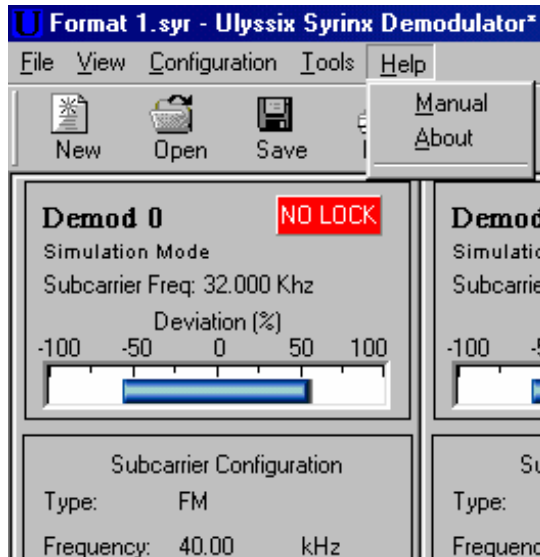


Figure 21 - Help

3.4.4 Demodulator Setup

The Demod Setup Screen allows the user to program specific parameters of the Syrinx-PCI card. The various setup parameters are discussed below. Please note that you must click the Apply button to download any modified settings to the Syrinx card. No changes will be made to the card until Apply has been clicked.

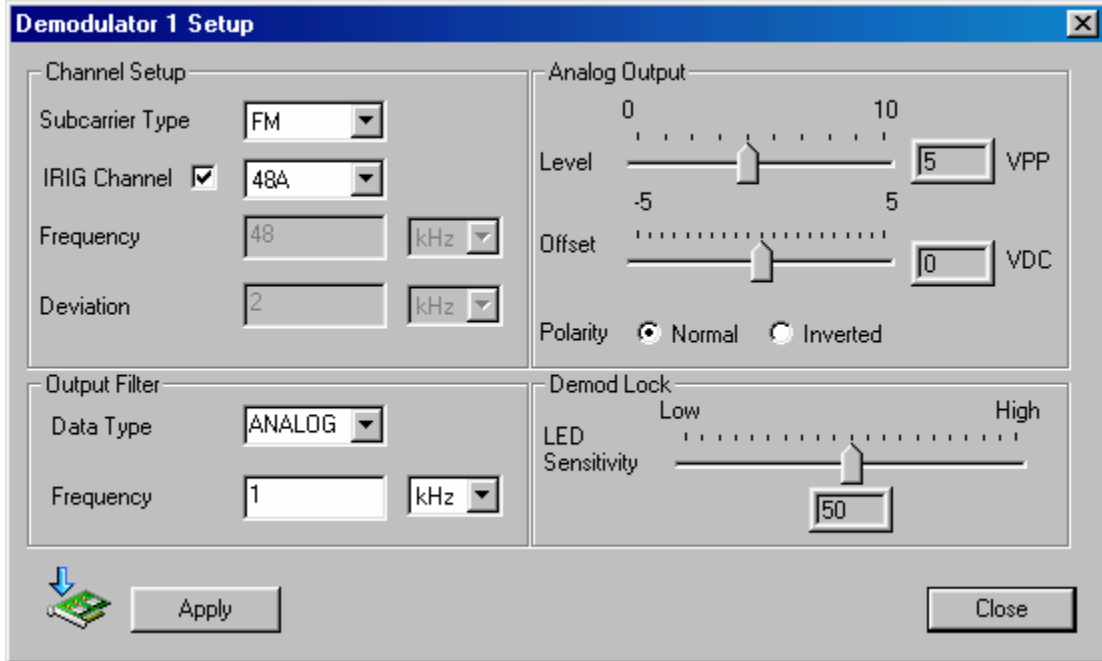


Figure 22 - Demod Setup Screen

3.4.4.1 Subcarrier Type

Select the appropriate demodulation mode for the Syrinx-PCI card from the drop down menu. Choose from FM, FSK, PM, and BPSK. The Syrinx-PCI-02 and Syrinx-PCI-12 cards have the Low Pass Filter Option as described in Section 3.5 of this manual. These two versions of the Syrinx card will have LOWPASS as a choice from this dropdown menu as shown in the following figure. See Section 3.5 for information about the Low Pass Filter Option.

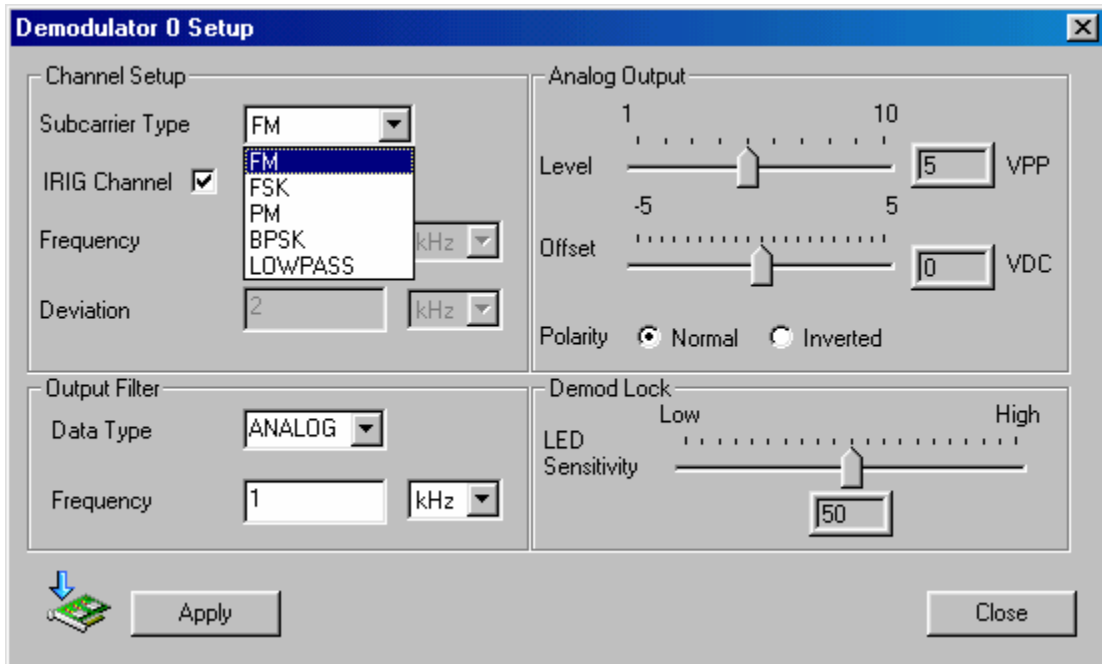


Figure 23 - Subcarrier Type

3.4.4.2 IRIG Channel

When demodulating a standard IRIG channel, click the IRIG Channel box and select the appropriate IRIG channel from the drop down menu. The Frequency, Deviation, and Output Filter will be automatically entered.

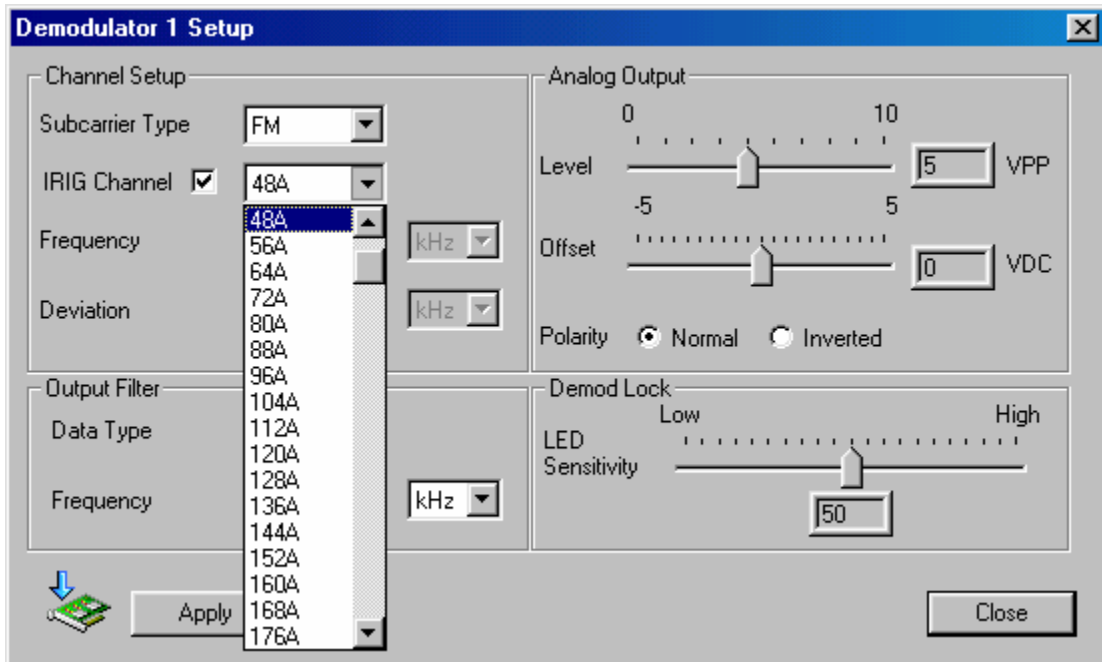


Figure 24 - IRIG Channel

3.4.4.3 Frequency

Enter the subcarrier frequency of the channel to be demodulated. The Syrinx-PCI Digital Baseband Demodulator supports IRIG and non-IRIG sub-carriers from 250 Hz to 2.5 MHz (up

to 3.5 MHz for Syrinx-PCI-10). Select the unit of measure from the drop down menu to the right of the Frequency. Select Hz, kHz, or MHz. An error message will be displayed if a Frequency is entered that is not within the allowable range. The Frequency field is not accessible if you have selected an IRIG channel. It will, however, display the Frequency that corresponds to the selected IRIG channel.

3.4.4.4 Deviation

Enter the Deviation of the channel to be demodulated. The Syrinx-PCI card supports FM deviations from 0.5 to 50% of the entered center frequency. Select the unit of measure from the drop down menu to the right of the Frequency. Select Hz, kHz, or MHz. An error message will be displayed if a Deviation is entered that is not within range. The Deviation field is not accessible if you have selected an IRIG channel. It will, however, display the Deviation that corresponds to the selected IRIG channel.

3.4.4.5 Loop Bandwidth

If the selected demodulation mode is PM or BPSK, the deviation field will change to Loop Bandwidth in %. Enter the desired Loop Bandwidth within a range of 5 to 0.005 %.

3.4.4.6 Output Filter Data Type

Select the desired output filter type from the drop down menu (See Figure 24). Each filter type is explained below.

Analog Mode (Linear Data): The Output FIR filter is programmed to be flat within 0.1 dB to cutoff (programmed output filter frequency) and -60 dB attenuation at 2 times cutoff.

Digital Mode (PCM Data): The Output FIR filter is programmed to be monotonic in the passband with -3 dB attenuation at the programmed cutoff frequency, and down -50 dB at 2.5 to 3.0 times the programmed cutoff frequency.

OFF Mode (>1MHz Data): The digital and analog reconstruction filters are bypassed for maximum digital data throughput, up to 2.7 Mbps NRZL. The data frequency throughput is equal to the programmed deviation frequency.

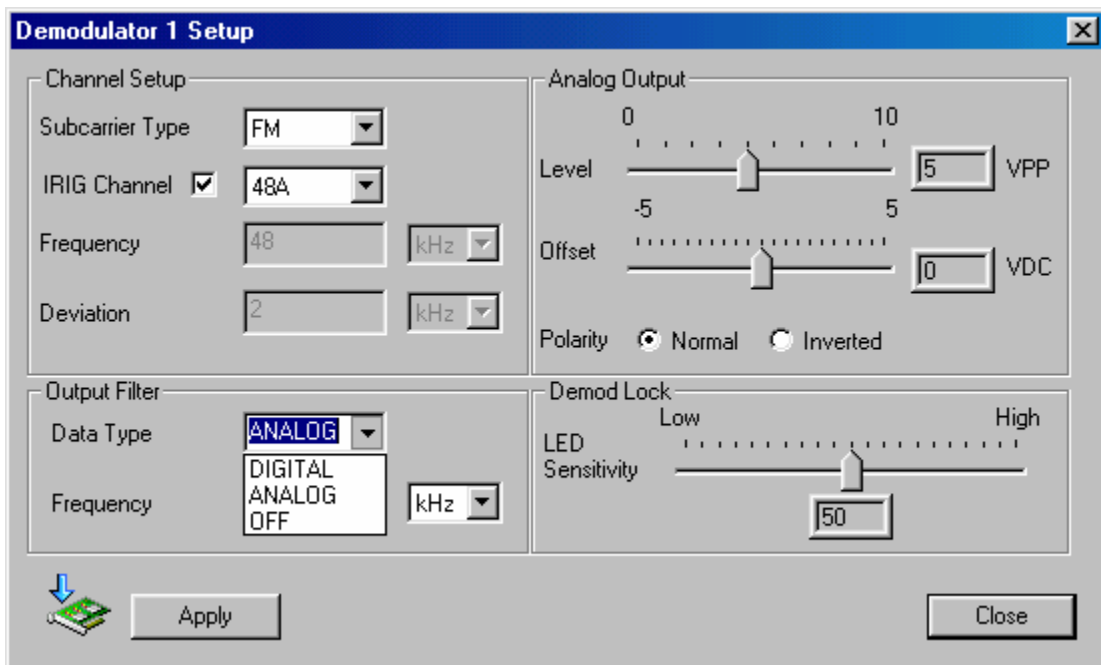


Figure 25 - Output Filter Data Type

3.4.4.7 Output Filter Frequency

The permitted output filter range is determined by the programmed deviation for the channel. Refer to the following tables (note product dash number) to determine the minimum and maximum allowable output filter frequency settings for the programmed deviation.

Syrinx-PCI-01

Programmed Deviation Range		Permitted Output Filter Range	
Deviation >=	Deviation <	Minimum	Maximum
500 kHz	1000 kHz	7812.5 Hz	1000 kHz
250 kHz	500 kHz	3906.3 Hz	500 kHz
125 kHz	250 kHz	1953.1 Hz	250 kHz
62.5 kHz	125 kHz	976.6 Hz	125 kHz
31.25 kHz	62.5 kHz	488.3 Hz	62.5 kHz
15.625 kHz	31.25 kHz	244.1 Hz	31.25 kHz
7812.5 Hz	15.625 kHz	122.1 Hz	15.625 kHz
3906.3 Hz	7812.5 Hz	61.0 Hz	7812.5 Hz
1953.1 Hz	3906.3 Hz	30.5 Hz	3906.3 Hz
976.6 Hz	1953.1 Hz	15.3 Hz	1953.1 Hz
488.3 Hz	976.6 Hz	7.6 Hz	976.6 Hz
244.1 Hz	488.3 Hz	3.8 Hz	488.3 Hz
122.1 Hz	244.1 Hz	1.9 Hz	244.1 Hz
61.0 Hz	122.1 Hz	1.0 Hz	122.1 Hz
30.5 Hz	61.0 Hz	0.5 Hz	61.0 Hz

Figure 26 - Deviation vs. Output Filter Range Table – Syrinx-PCI-01

Syrinx-PCI-10

Programmed Deviation Range		Permitted Output Filter Range	
Deviation >=	Deviation <	Minimum	Maximum
750 kHz	1500 kHz	11718.8 Hz	1500 kHz
375 kHz	750 kHz	5859.4 Hz	750 kHz
187.5 kHz	375 kHz	2929.7 Hz	375 kHz
93.75 kHz	187.5 kHz	1464.8 Hz	187.5 kHz
46.875 kHz	93.75 kHz	732.4 Hz	93.75 kHz
23437.5 Hz	46.875 kHz	366.2 Hz	46.875 kHz
11718.8 Hz	23437.5 Hz	183.1 Hz	23437.5 Hz
5859.4 Hz	11718.8 Hz	91.6 Hz	11718.8 Hz
2929.7 Hz	5859.4 Hz	45.8 Hz	5859.4 Hz
1464.8 Hz	2929.7 Hz	22.9 Hz	2929.7 Hz
732.4 Hz	1464.8 Hz	11.4 Hz	1464.8 Hz
366.2 Hz	732.4 Hz	5.7 Hz	732.4 Hz
183.1 Hz	366.2 Hz	2.9 Hz	366.2 Hz
91.6 Hz	183.1 Hz	1.4 Hz	183.1 Hz
45.8 Hz	91.6 Hz	0.7 Hz	91.6 Hz

Figure 27 - Deviation vs. Output Filter Range Table – Syrinx-PCI-10

3.4.4.8 Analog Output Level

The Analog Output Level setting affects only the analog output of the demodulator as seen on the Output Connector OUT. Click and drag the slide box to adjust the peak-to-peak output voltage level within a range of one to ten volts.

3.4.4.9 Analog Output Offset

The Analog Offset setting affects only the analog offset of the demodulator as seen on the Output Connector OUT. Click and drag the slide box to adjust the analog offset to be applied to the output within a range of -5VDC to $+5\text{VDC}$. The combination of output level and output offset cannot exceed a maximum output rail of $\pm 8\text{VDC}$.

3.4.4.10 Output Polarity

The Output Polarity setting affects only the analog output of the demodulator as seen on the Output Connector OUT. In Normal Mode, a subcarrier deviation of $+100\%$ results in the maximum positive output voltage as determined by the Analog Output Level and Analog Output Offset settings. In Inverted Mode, a deviation of $+100\%$ results in the maximum negative output voltage as determined by the Analog Output Level and Analog Output Offset settings. Select the appropriate radio button.

3.4.4.11 Demod Lock LED Sensitivity

Click and drag the slide box to adjust the sensitivity of the Demod Lock LED indicator. The default value for the sensitivity is 50% . If you have confirmed that the Syrinx-PCI is demodulating properly and the Lock LED is not green, adjust the LED sensitivity by moving the box to the left. If the Lock Light is always green, even when the Syrinx-PCI is not demodulating, adjust the sensitivity by moving the box to the right. This adjustment does not change the sensitivity of the demodulator. It simply adjusts the sensitivity of the LED indicator.

3.4.4.12 Apply

Click the Apply button to download the modified settings to the Syrinx card. No changes will be made to the card until Apply has been clicked.

3.4.4.13 Close

Click the Close button to close the Demod Setup Screen. If you have changed any settings and have not downloaded by clicking the Apply button, your changes will not be lost until you close the program. If you reopen the Demod Setup Screen before you exit the program, the unapplied parameters will still be there.

3.4.5 FFT Screen

The FFT Screen (See Figure Below) allows the user to view demodulated data in both the frequency and time domains.

3.4.5.1 FFT Window

Select the desired FFT window from the drop down menu. Select from Hamming, Hanning, Blackman, and Rectangular.

3.4.5.2 Frequency Domain

Enter the min and max values in dB for the frequency domain display. The display screen will automatically scale. This allows the user to view data in a very specific range.

3.4.5.3 Time Domain

Enter the min and max values in percent deviation for the time domain display.

3.4.5.4 FIFO Dominant Frequency

The displayed dominant data frequency is the largest amplitude frequency term determined by the FFT in kHz.

3.4.5.5 Pause / Resume

The Pause/Resume button allows you to temporarily prevent the display from being updated. Click the button again to resume. This feature allows the user to view and analyze the displayed data.

3.4.5.6 Single New Data

The Single New Data feature captures one 1024-point FFT amount of data. This feature is similar to the single sweep feature on many oscilloscopes.

3.4.5.7 FFT Screen Parameters

The Frequency Domain units of measure are in kHz in the X-Axis and dB in the Y-Axis. The Time Domain units of measure are in msec in the X-Axis and in % Deviation in the Y-Axis.

3.4.5.8 Playback

The Playback button stops the live FFT display and enters a mode that allows viewing of a previously captured data file. (see section 3.4.6 for more information on Capture). The captured data can be re-played as many times as necessary by using controls similar to those of a VCR. The playback controls consist of the following:

Control	Name	Description
<<	Page Back	Moves backward through the file one screen at a time.
<	Step Back	Moves backward through the file one sample at a time.
>	Play Forward	Moves forward through the file continuously one screen at time.
	Pause	Stops Play mode.
>	Step Forward	Moves forward through the file one sample at a time.
>>	Page Forward	Moves forward through the file one screen at a time.

Figure 28 - FFT Playback Controls

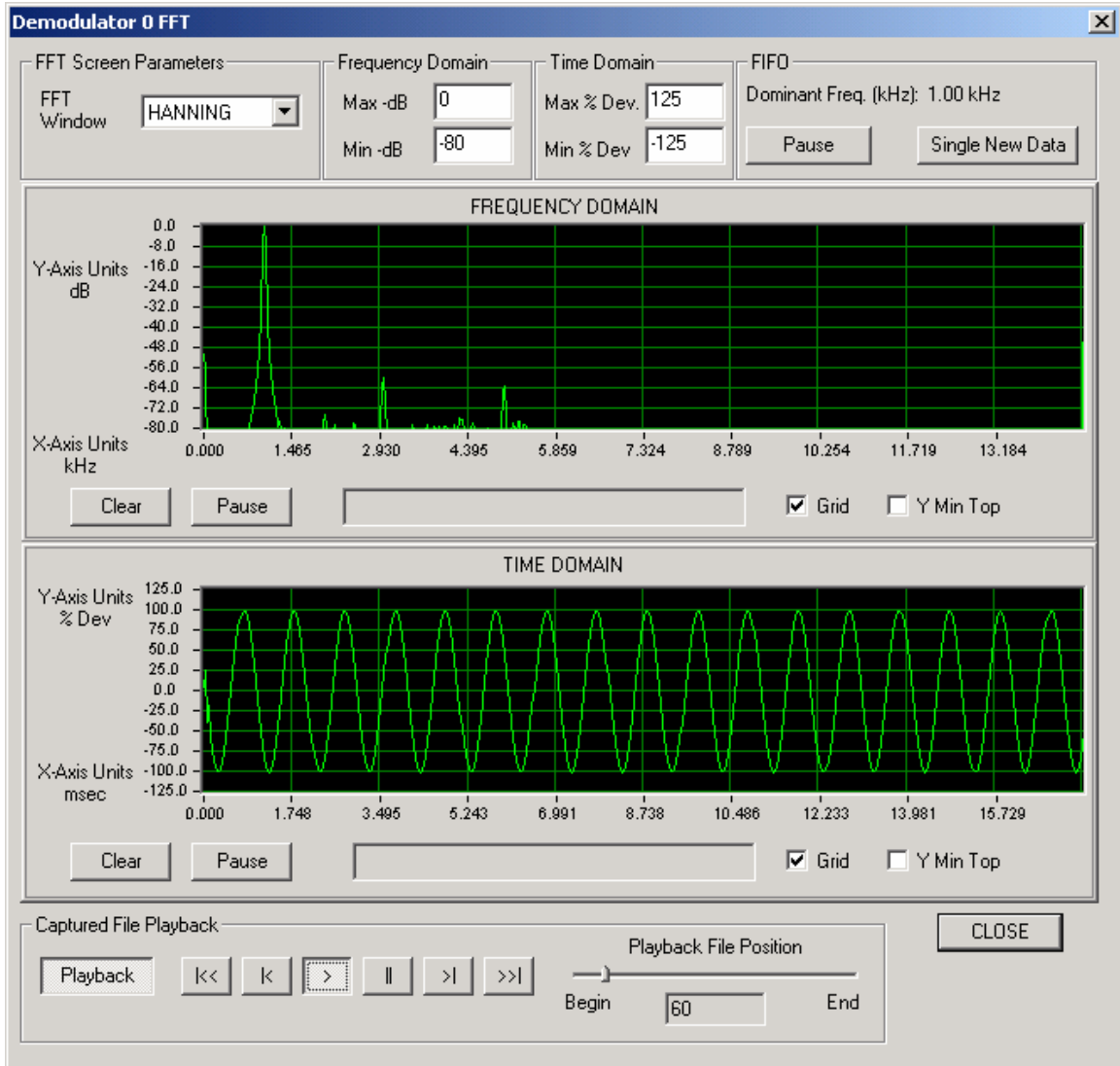


Figure 29 - FFT Screen

3.4.6 Capture

The Capture feature stores digital demodulated data directly to a hard disk. The stored data can then be reviewed by using the playback option in the FFT screen or the data can be imported to a third party analysis application. The following section describes the operation of capture mode and the format of the raw captured data.

3.4.6.1 Status Screen

The capture screen shows the capture status and information of one or more demodulator cards. The information consists of following:

- Demodulator – The demodulator number. If only one Syrinx card is installed, this will always be zero.
- Capture – The state of capture mode, yes for capturing, no for stopped.
- K Samples Saved – The number of kilo samples saved to the file during this capture sequence.

- Overflow – The number of overflows encountered during a capture sequence. (See performance section below for more details.)
- File – The file where the raw data is being store. This file will be **overwritten** during each capture sequence. The file is located in the directory chosen during software installation. Capture data files must be copied from the installed directory to a safe location in order to avoid overwriting. Files are assigned a name based on the demodulator number. For example, the data for demodulator zero will always be stored in Syrinx0.dat, Demodulator one will always be stored in Syrinx1.dat, and so forth.

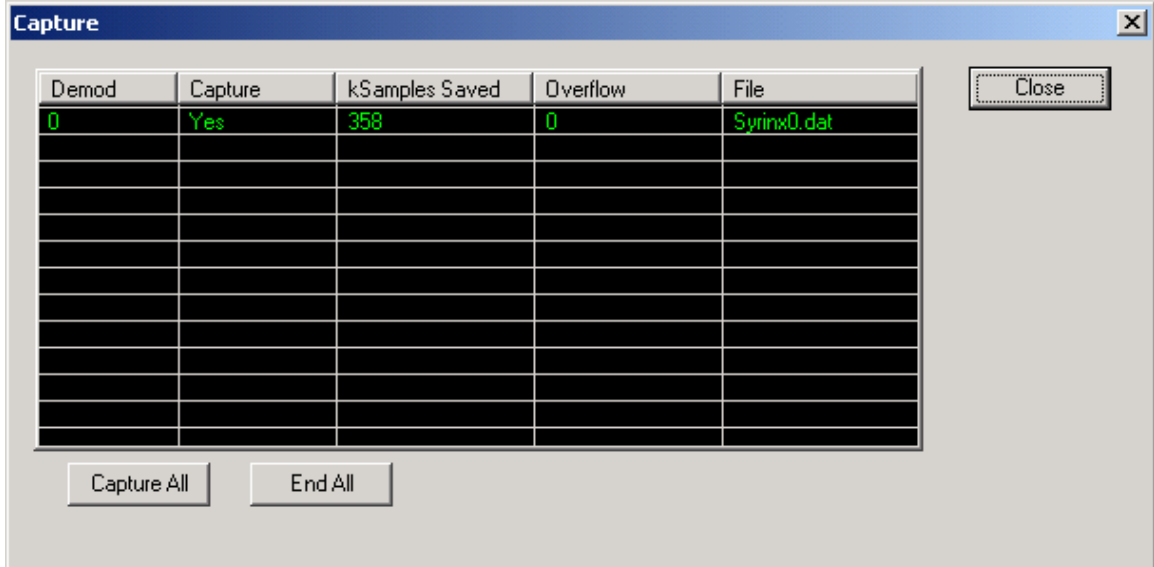


Figure 30 - Capture Status Screen

3.4.6.2 Enable/Disable

A capture sequence is enabled by selecting the capture button on the main screen, or by opening the capture screen using the Tools/Capture menu option and selecting capture all. Individual demodulators can be enabled and disabled while the capture screen is active by clicking the Capture buttons on the main screen. While in a capture sequence the FFT and setup buttons will be disabled. Disabling of a capture sequence is done by clicking the Capture button on the main screen or clicking End All on the capture screen. Disabling capture causes the system to stop storing data to disk and the data file is close.

3.4.6.3 Performance

The performance of capture mode is dependent upon several factors; the speed of the computer system it is running on, the number of other application running, the number of Syrinx cards capturing data, hard drive speed and the operating system. The data stored is digital data sampled at 5 to 10 times the output filter frequency. The Syrinx capture feature uses a combination of high-speed interrupts and DMA transfer, however if the computer system is slow or overloaded, captured data could be lost. Lost data is a result of overflowed buffers. The number of overflows can be monitored during a capture sequence by viewing the capture screen.

Output filter settings of up to 750 kHz have been successfully captured with no overflows running on an ~662 MHz Pentium 3 running on Windows 2000 or Windows NT 4.0 SP 6. Please be aware that capturing data at high rates require sufficient hard drive space.

3.4.6.3.1 Maximum Performance Tips

- On NT 4.0 SP6 Hard drive DMA should be enabled. Please refer to the **Microsoft Knowledge Base Article - Q191774** for more information.
<http://support.microsoft.com/default.aspx?scid=KB;EN-US;q191774&>
- Run capture with a minimum number of active applications.
- Avoid any high graphics operations, for example; closing, opening and moving screens.
- Allow a sufficient amount of de-fragmented hard drive space.

3.4.6.4 Raw Data Format

The format of the captured data is stored as Intel format 16 bit binary data. The data is captured from the Syrinx PCI card using 32 bit DMA Transfers. To maximize performance, the data is captured on card, in two 16 bit parallel FIFOs. The least significant 12 bits represents Syrinx Demodulated data. The most significant bit of the data is used internally and should be ignored.

Bits 14 to 12 represent a synchronous count used to determine the Hi/Low sample order of the FIFO data. The data is formatted as shown below.

MSB															LSB
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ignore	Counter			Syrinx Demodulated Data											

Figure 31 - Captured Data Sample

The data is stored in the Captured data file as continuous 16 bit samples, however the samples may need word reversed depending on the pattern in the 12 through 14 bits. The data could be stored as:

Sample 0, Sample 1, Sample 2, Sample 3
Or
Sample 1, Sample 0, Sample 3, Sample 2

To determine the sampling order, the counter bits must be examined to find the larger count.
For Example:

If the Counter bits are as follows:
0, 1, 2, 3, 4, 5, 6, 7, 0, 1, 2, 3, 4, 5
The data is in the proper order.

If the Counter bits are as follows:
1, 0, 3, 2, 5, 4, 7, 6, 1, 0, 3, 2
The data is sample reversed and must be translated prior to displaying in any third party analysis tool.

3.5 Low Pass Filter (Optional) Setup and Operation

An option to the Syrinx-PCI card is available that allows the card to function as either a Low Pass Filter *or* a Baseband Demodulator. The Low Pass Filter mode is selected from the Subcarrier Type drop down menu on the Demod Setup Screen. The Syrinx-PCI model numbers that have this option are Syrinx-PCI-02 (2.5 MHz demodulator version) and Syrinx-PCI-12 (3.5 MHz demodulator version). The maximum output filter for either model is 1MHz. The following paragraphs are dedicated to the setup and operation of the Syrinx-PCI card in

Low Pass Filter mode. Please refer to Chapter 3.4.1 for standard setup and operation information that is not included in this section of the manual. Connections in and out of the card are the same as they are in demodulator mode.

3.5.1 Syrinx-PCI Status Screen, Low Pass Filter Mode

The Syrinx-PCI Status Screen is the first screen you see when the Syrinx-PCI software is launched. The Status Screen in Standard Demodulator Mode was thoroughly explained in Chapter 3.4.1. The primary difference on the Status Screen in Low Pass Filter mode is the Demod Status Block. Notice on the figure below that Demod 0 is configured for Low Pass Filter mode (Type: LOWPASS.)

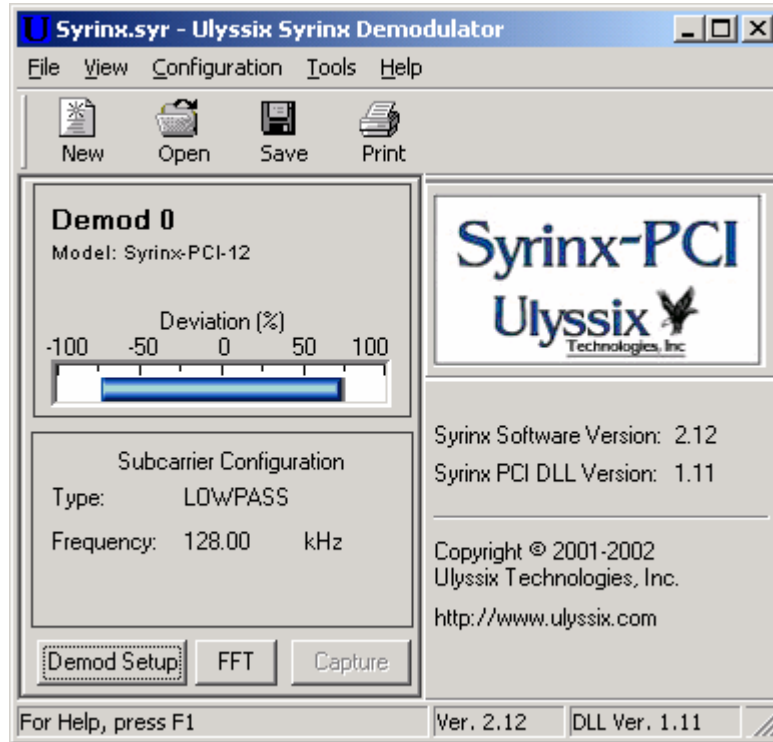


Figure 32 - Syrinx-PCI Status Screen in Low Pass Filter Mode

3.5.2 Demod Status Block, Low Pass Filter Mode

A Demod Status Block (See Figure Below) for each Syrinx-PCI Demodulator appears on the Syrinx Status Screen displaying programming and status information for each card. The fields displayed on the Demod Status Block in Low Pass Filter Mode are very similar to Standard Demodulator Mode and are explained below. The most noticeable difference in Low Pass Filter Mode is the absence of the Lock LED Indicator, the Subcarrier Frequency Counter, and the Deviation setting.

3.5.2.1 Demod Number

The Demod Number in the top left corner of the Demod Status Block corresponds to the Demod ID LEDs on the back of the card (refer to section on LED Indicators). This number assists the user in identifying the various Syrinx-PCI cards in a given chassis. In a chassis with multiple Syrinx-PCI cards installed, the cards will be numbered sequentially from one side of the chassis to the other regardless of Model.

3.5.2.2 Demod Model

The Demod Model appears in the top left corner of the Demod Status Block directly under the Demod Number and reflects the hardware version of that card. "Simulation Mode" will appear instead of the Model if no Syrinx-PCI cards are detected. Syrinx-PCI cards that have the Low Pass Filter option will display either Syrinx-PCI-02 or Syrinx-PCI-12. The Syrinx-PCI software will automatically recognize the hardware model.

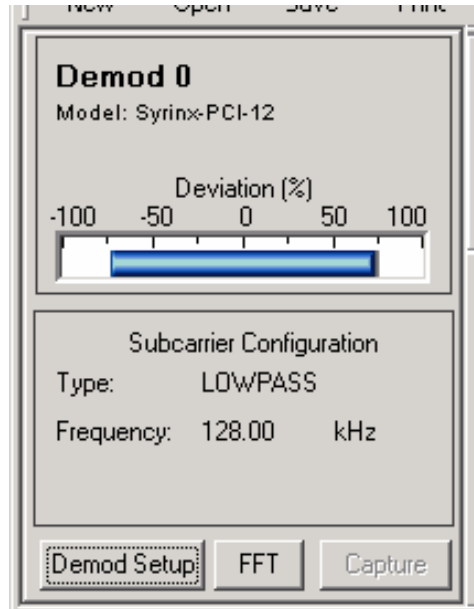


Figure 33 - Syrinx-PCI Status Block in Low Pass Filter Mode

3.5.2.3 Lock Indicator

The Lock Indicator, which is displayed in Standard Demodulator Mode, will not be displayed in Low Pass Filter Mode.

3.5.2.4 Frequency Counter

The Frequency Counter, which is displayed in Standard Demodulator Mode, will not be displayed in Low Pass Filter Mode.

3.5.2.5 Deviation Meter

The Deviation Meter provides a graphical representation of the data coming out of the Low Pass Filter. The blue indicator shows the output level and offset in proportion to the Analog Output Level and Offset that are programmed at the Demod Setup Screen. This is useful for pre-test checkout of the system. 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 3.4.3.3.2).

3.5.2.6 Type

The Type field indicates the selected mode for the Syrinx-PCI card. Choose LOWPASS to select the Low Pass Filter Mode. Other modes available from the Demod Setup Screen include FM, FSK, PM, and BPSK. See section 3.4.4 for full explanation of the standard modes.

3.5.2.7 Frequency

The programmed cutoff frequency for the Low Pass Filter is displayed in this field. This setting is programmed at the Demod Setup Screen. (Frequency and deviation of the demodulator channel will be displayed if not in Low Pass Filter Mode.)

3.5.2.8 Demod Setup

Click the Demod Setup button at the bottom of the Demod Status Block to access the setup screen for the corresponding Syrinx-PCI card.

3.5.3 Low Pass Filter Setup

The Demod Setup Screen allows the user to program specific parameters of the Syrinx-PCI card. When LOWPASS is selected, several of the standard demodulator setup fields will be "grayed out". The following paragraphs explain the active fields for Low Pass Filter Mode only. See section 3.4.4 for full explanation of all fields in standard demodulator mode.

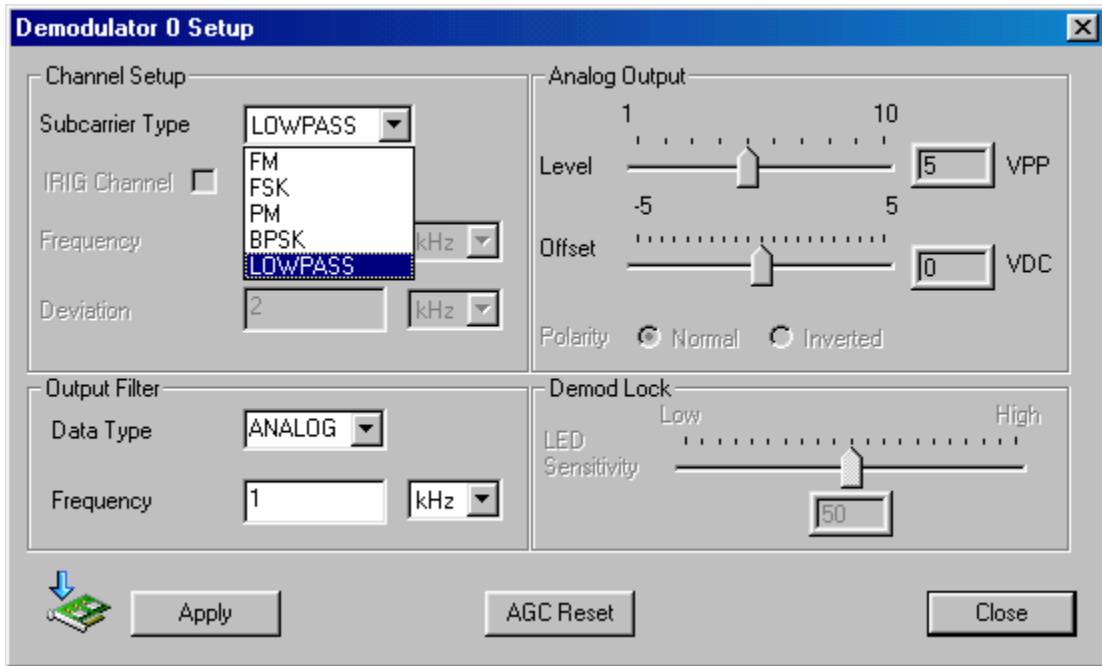


Figure 34 - Demod Setup Screen in Low Pass Filter Mode

3.5.3.1 Subcarrier Type

Select LOWPASS from the drop down menu to select the Low Pass Filter Mode.

3.5.3.2 Data Type

Select the desired output filter type from the drop down menu. Each filter type is explained below.

Analog Mode (Linear Data): The FIR filter is programmed to be flat within 0.1 dB to cutoff (programmed output filter frequency) and -60 dB attenuation at 2 times cutoff.

Digital Mode (PCM Data): The FIR filter is programmed to be monotonic in the passband with -3 dB attenuation at the programmed cutoff frequency, and down -50 dB at 2.5 to 3.0 times the programmed cutoff frequency.

OFF Mode: The FIR filter can be turned completely off if desired.

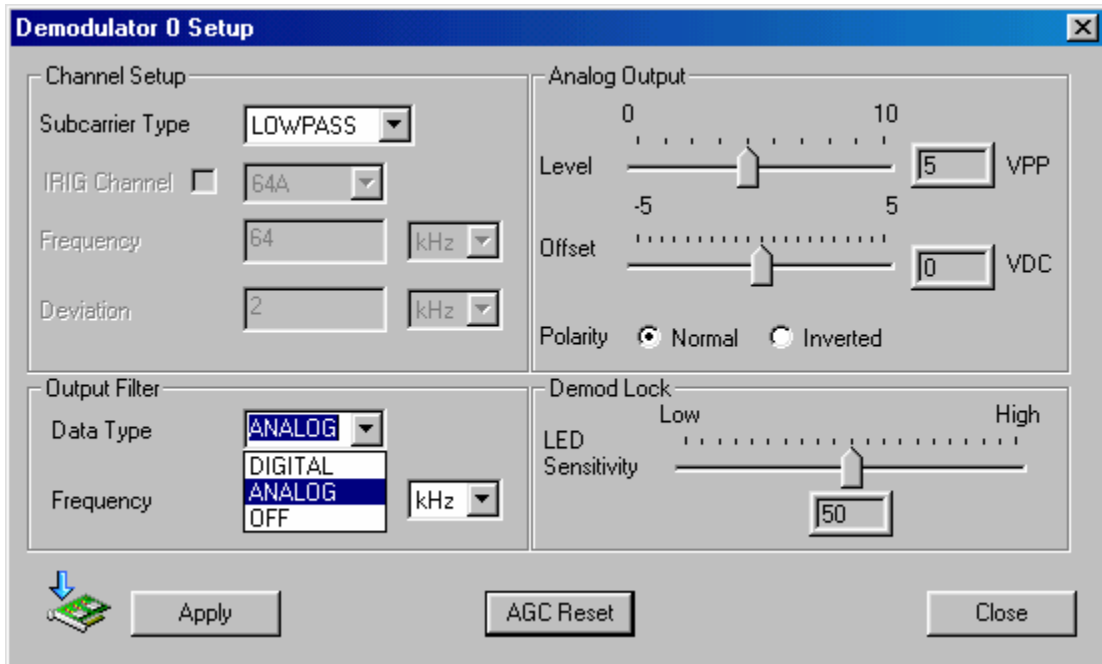


Figure 35 - Output Filter Type in Low Pass Filter Mode

3.5.3.3 Frequency

Enter the desired cutoff frequency between 1Hz and 1MHz.

3.5.3.4 Analog Output Level

The Analog Output Level setting determines the analog level of the Low Pass Filter as seen on the Output Connector OUT (E3). Click and drag the slide box to adjust the peak-to-peak output voltage level within a range of 1 to 10 volts. The actual output voltage in Low Pass Filter Mode will actually be approximately 70% of the programmed output voltage.

3.5.3.5 Analog Output Offset

The Analog Output Offset setting determines the analog offset of the Low Pass Filter as seen on the Output Connector OUT(E3). Click and drag the slide box to adjust the analog offset to be applied to the output within a range of -5VDC to +5VDC. The combination of output level and output offset cannot exceed a maximum output rail of +- 8VDC.

3.5.3.6 AGC Reset

The Syrinx-PCI card has a sophisticated Automatic Gain Control (AGC) circuit to compensate for fluctuations in the amplitude and offset of the input signal. This feature is disabled in Low Pass Filter Mode. The AGC circuit is temporarily enabled when you click the AGC Reset button. This must be done the first time you use the Syrinx-PCI card in Low Pass Filter Mode and when you create a new format file. The expected input signal should be connected to the Input Connector E1 before clicking the AGC Reset button. This process sets the initial gain and offset adjustment. The AGC values are part of the file format information. When you launch the Syrinx-PCI software in Low Pass Filter Mode or open a stored format file, the AGC values that were stored with the file format will be loaded. You can reset the AGC circuit by clicking the AGC Reset button. Click the Save button from the Toolbar if you want to save the new AGC values with the format file. It may be necessary to reset the AGC values if the input level to the card has changed.

3.5.3.7 Apply

Click the Apply button to download the modified settings to the Syrinx card. No changes will be made to the card until Apply has been clicked.

3.5.3.8 Close

Click the Close button to close the Demod Setup Screen. If you have changed any settings and have not downloaded by clicking the Apply button, your changes will not be lost until you close the program. If you reopen the Demod Setup Screen before you exit the program, the unapplied parameters will still be there.

3.5.4 FFT Screen in Low Pass Filter Mode

The FFT Screen in Low Pass Filter Mode will display the filter output data in both the frequency and time domains. Control and display of the FFT display are the same as in Standard Demodulator Mode (See Section 3.4.5.)