

**5005 Dual Synthesizer  
Configuration  
Manager Program**

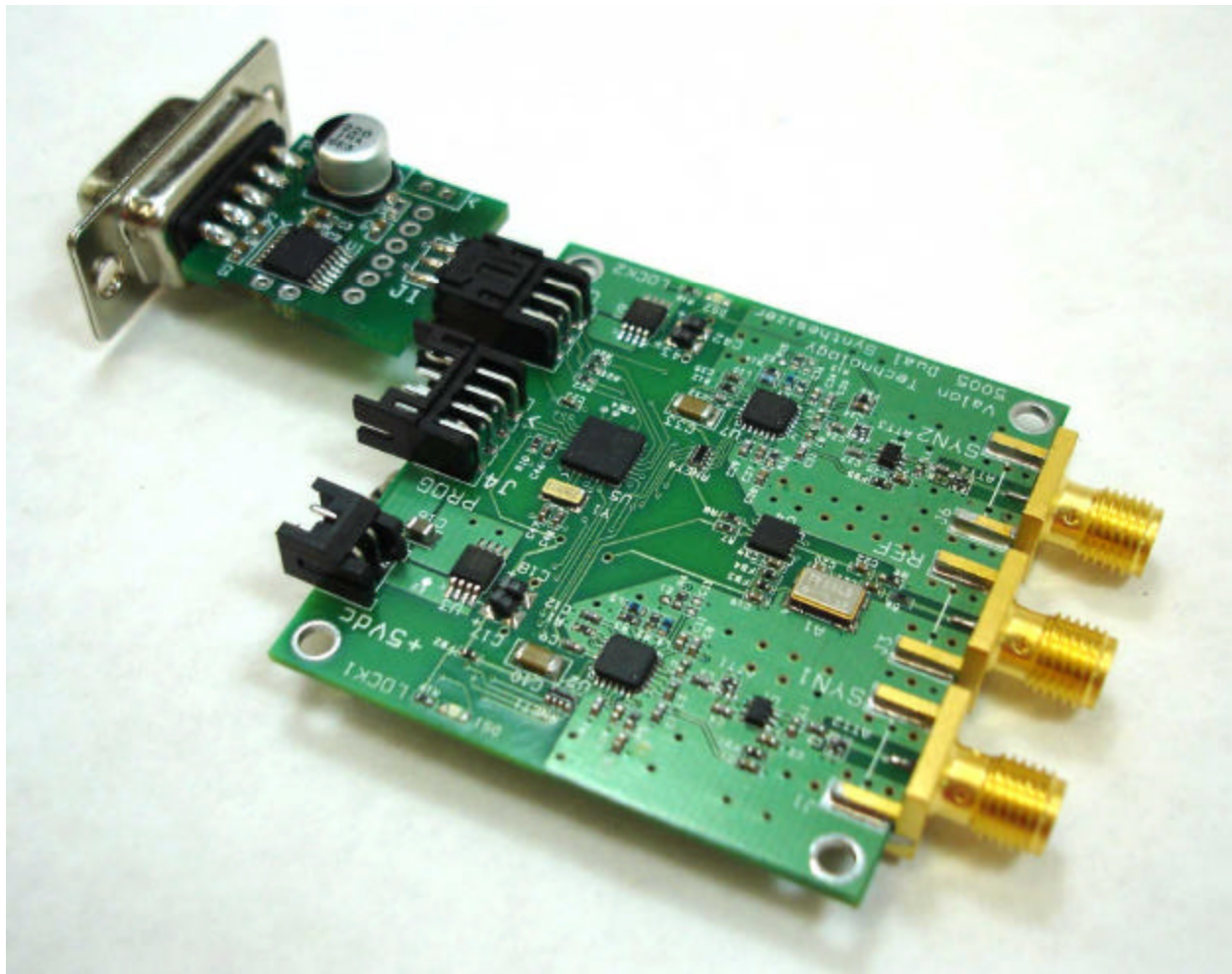
**Version 2.0.1**



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**5005 Dual Synthesizer Module  
with 122006 RS232-3VTTL serial adapter attached**



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## **1. Overview**

The **Configuration Manager Program** is an easy to use software tool that enables the user to set the registers in the **Valon Technology 5005 Dual Frequency Synthesizer Board** in order to produce the desired output signals.

The **Configuration Manager Program** works in conjunction with the microcontroller on the **5005 Dual Frequency Synthesizer Board** to read and write the contents of the control, N-counter and R-counter registers in the two integrated synthesizer devices on the dual synthesizer board. Once the user is satisfied with the register settings and output signals, the **Configuration Manager Program** is used to send a command to the synthesizer board to copy the register settings to the non-volatile flash memory in the microcontroller.

In addition to the synthesizer register data, the **Configuration Manager Program** will read and write label, frequency offset and reference oscillator frequency data. Like the synthesizer register data, this information can be copied to the non-volatile flash memory in the microcontroller.

The **Configuration Manager Program** will validate all of the frequency values entered by the user according to the specifications for the synthesizer device being used.

A user defined set of synthesizer parameter values and related data may be saved in a disk file and retrieved at a later time.

When exiting (using **File/Exit**) the **Configuration Manager Program**, the current set of set of synthesizer parameter values and related data will be saved automatically. The next time that the **Configuration Manager Program** is run, the values and data will be restored automatically.

### **1.1 Platform**

The **Configuration Manager Program** will run on any Windows / Intel hardware platform and is compatible with the Windows 2000, Windows XP, Windows Vista, and Widows 7 operating systems.

### **1.2 Communications**

The **Configuration Manager Program** communicates with the **5005 Dual Frequency Synthesizer Board** via either a serial data communications adapter or a USB adapter. All data transfers include a checksum byte to prevent transmission errors from going undetected.

#### **Valon Technology communications port adapters:**

122006 RS-232 9-pin adapter.

122008 Mini-USB adapter.

Either are available from Valon Technology.

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## **2. Getting Started**

### **2.1 Connect The Hardware**

Before installing and/or running the **Configuration Manager Program**, it is necessary to connect one of the serial data communications ports on the computer where the **Configuration Manager Program** will be run (the host computer) to the serial data communications port on the **5005 Dual Frequency Synthesizer Board**. **To do this you will also need the Valon Technology 122006 RS232-3VTTL adapter module. This module plugs into the 6-pin USER connector. This adapter module is powered from the synthesizer module. Best phase noise is obtained with adapter module disconnected.**

### **2.2 Power Up The Board**

Apply 5 VDC (160mA) to the **5005 Dual Frequency Synthesizer Board**.

### **2.3 Install The Software**

The **Configuration Manager Program** is shipped on a CD-ROM. To install the program on the host computer, follow the instructions below.

- a. Insert the Valon Technology CD-ROM in the CD/DVD drive in your system.
- b. Using the **MyComputer** utility in Windows, open the CD-ROM named "**Valon Technology**" and click on the "**setup.exe**" file. The installation program will start by displaying the **Installation Options Window** as shown in Figure 2-1 below.

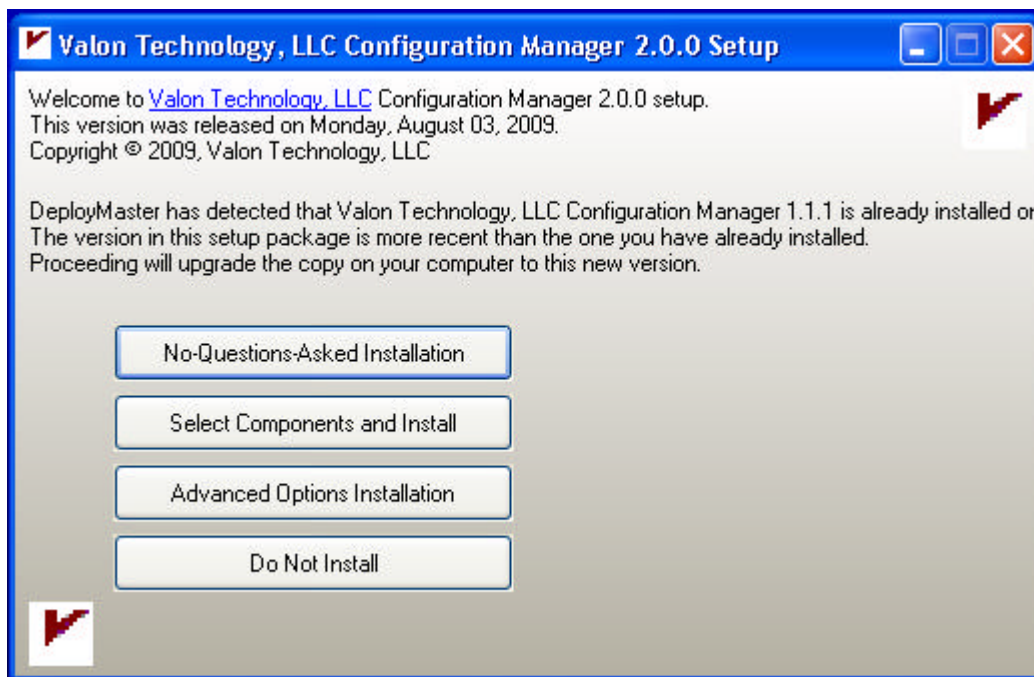


Figure 2-1 Installation Options Window

- c. If you want to install the **Configuration Manager Program** in the C:\Program Files folder on your computer, click on the **No-Questions-Asked Installation** button in the installation window.
- d. If you want to install the **Configuration Manager Program** in some other folder on your computer, click on the **Advanced Options Installation** button in the installation window. Enter the names of the folders where you want the **Configuration Manager Program** installed.
- e. Once you have selected the installation option, **Installation License Window**, as shown in Figure 2-2 below, will be displayed.

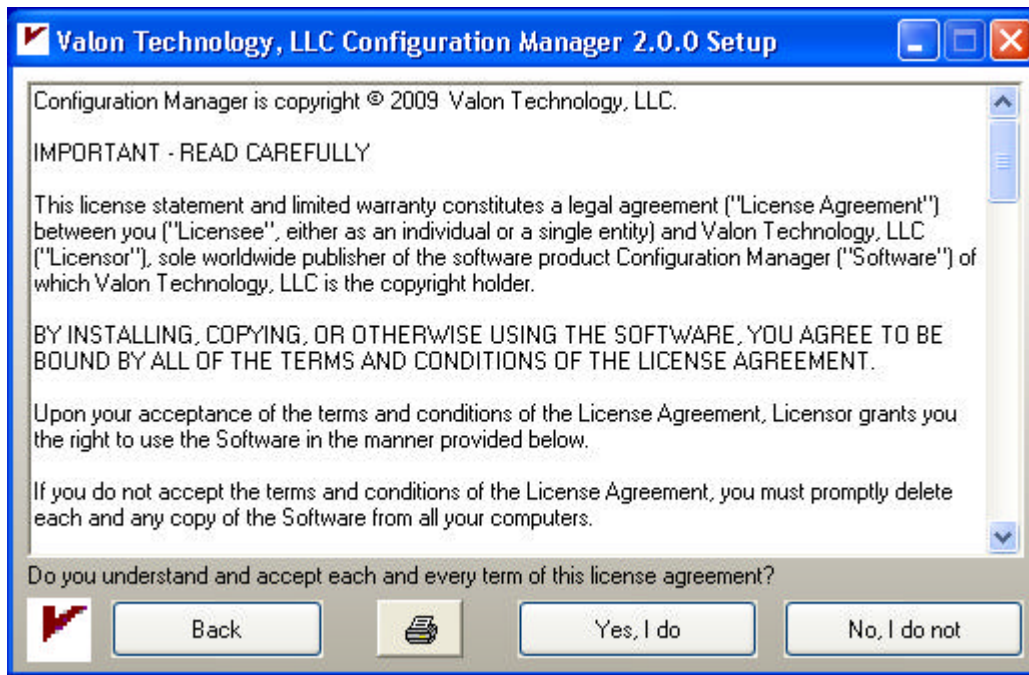


Figure 2-2 Installation License Window

- f. Read the license agreement and click on the **Yes, I Do** button.
- g. The **Installation Identity Window**, as shown in Figure 2-3 on the following page, will be displayed.
- h. Enter your name and the name of your company in the appropriate fields. Click on the **Proceed** button.
- i. The Configuration Manager Program will be installed on your system and the **Installation Completed Window**, as shown in Figure 2-4 on the following page, will be displayed.

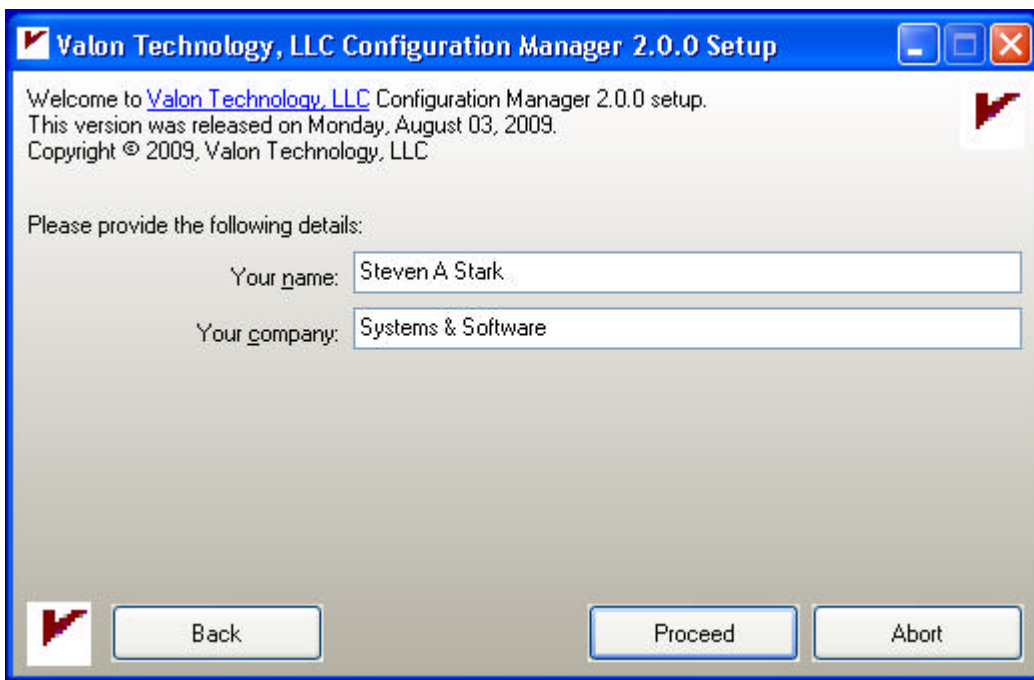


Figure 2-3 Installation Identity Window

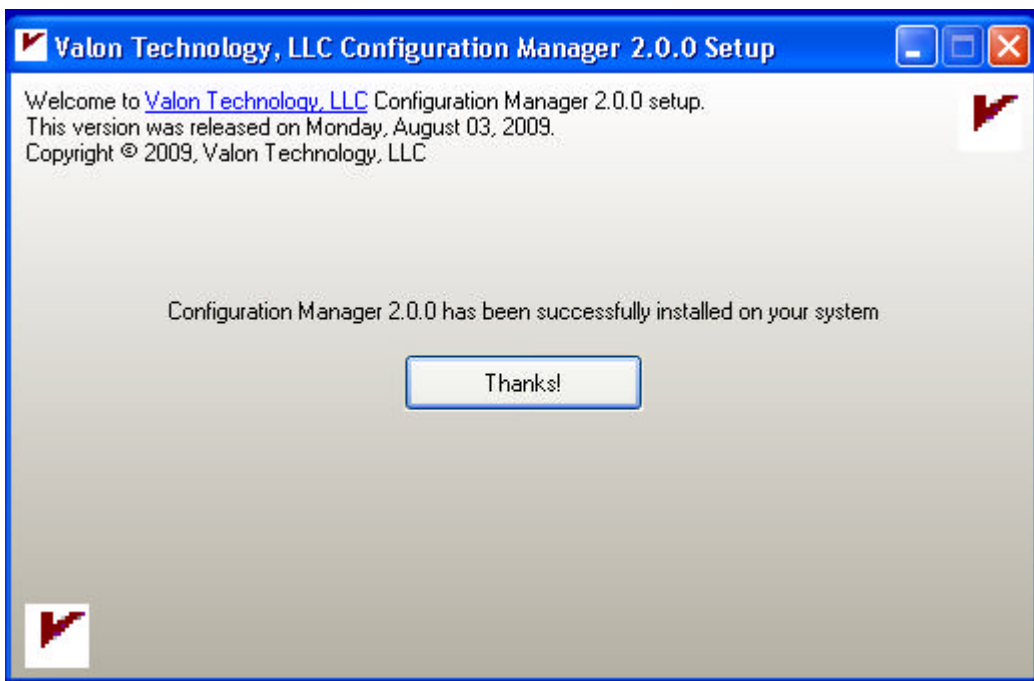


Figure 2-4 Installation Completed Window

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### 3. Main Window

The **Main Window**, as shown in Figure 3-1 below, is displayed when the **Configuration Manager Program** is started. The buttons and the list selection boxes in the window are used to set and/or modify many of the synthesizer operating parameters. ([Get started by using File/Read Registers to see your synthesizer's default settings](#)).

The auto-update feature of the **Configuration Manager Program** will automatically update the registers in the synthesizers on the **5005 Dual Frequency Synthesizer Board** whenever a setting is changed. Thus, the registers on the board will always be in sync with the parameters displayed in the **Main Window**.

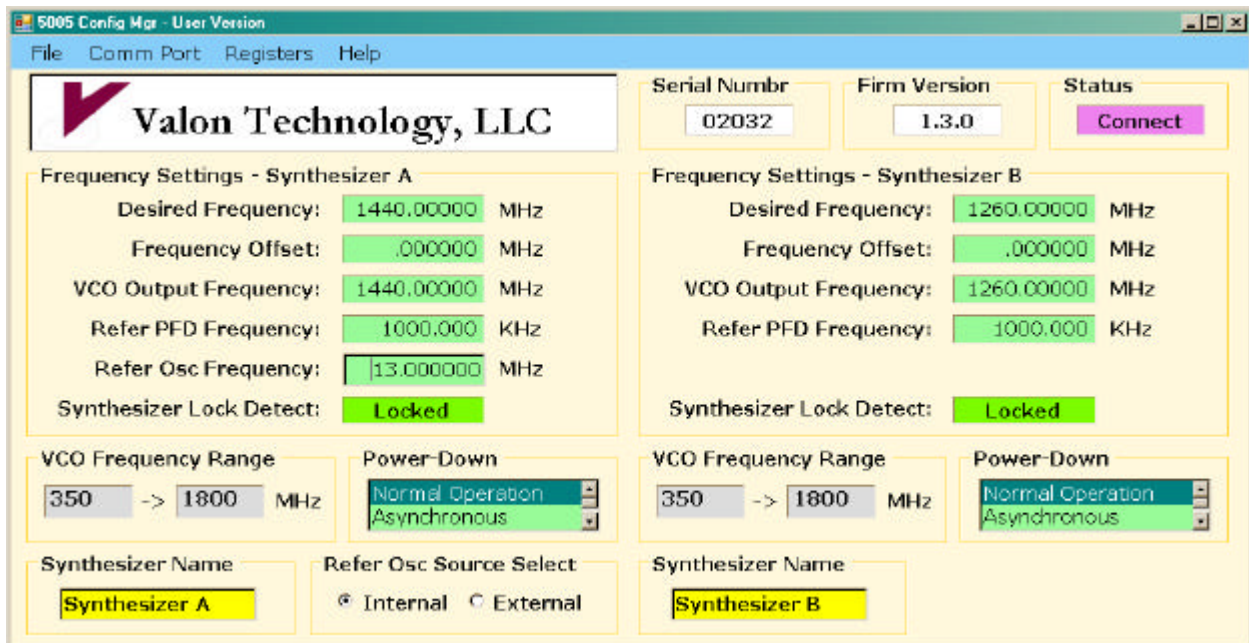


Figure 3-1 Main Window

#### 3.1.2 Serial Numbr

The **Serial Numbr** field is a read-only field showing the serial number of the synthesizer board.

#### 3.1.3 Firm Version

The **Firm Version** field is a read-only field showing the version of the firmware that is installed in the synthesizer board.

### 3.1.4 Status

The **Status** field is a read-only field showing the status of the connection between the host computer and synthesizer board. If the status is **Connect**, the host computer is able to communicate with the synthesizer board to read and write register data. If the status is **Unconn**, the host computer is not able to communicate with the synthesizer board to read and write register data.

## 3.2 Frequency Settings

There are two groups of fields, titled "Frequency Settings", showing the various frequencies for the two synthesizer devices (initially referred to as "A" and "B") on the board. The following text is applicable to both groups of fields unless otherwise noted.

### 3.2.1 Desired Frequency

The **Desired Frequency** is a read-only field that shows the desired output frequency of the corresponding synthesizer. The **Desired Frequency** should not be confused with the **VCO Output Frequency**. Clicking on this field will cause the **Set Frequencies** dialog box to be displayed enabling the user to set and/or modify the **Desired Frequency**.

### 3.2.2 Frequency Offset

The **Frequency Offset** is a read-only field that shows the frequency offset of the corresponding synthesizer. The **Frequency Offset** is added (if a positive value) or subtracted (if a negative value) from the **Desired Frequency** in order to calculate the required **VCO Output Frequency**. Clicking on this field will cause the **Set Frequencies** dialog box to be displayed enabling the user to set and/or modify the **Frequency Offset**.

Frequency offset is a useful when using the synthesizer as a local oscillator in a heterodyning system.

### 3.2.3 VCO Output Frequency

The **VCO Output Frequency** is a read-only field that shows the output frequency of the VCO of the corresponding synthesizer. The value of this field is calculated as shown below:

$$VCO\ Output\ Freq = (Desired\ Freq + Freq\ Offset) \times Div\ By\ Factor$$

Where the *Div By Factor* is the VCO output divide-by factor which is equal to 1 or 2. For example, if the **Desired Frequency** is 300.000 MHz, the **Frequency Offset** is +10.700 MHz and the **Div By Factor** is set to 2, the resulting VCO Output Frequency will be:

$$VCO\ Output\ Freq = (300.000 + 10.700) \times 2 = 621.400\ MHz$$

### 3.2.4 Refer PFD Frequency (Channel step size)

The **Refer PFD Frequency** is a read-only field that shows the input frequency of the phase frequency detector of the corresponding synthesizer. Clicking on this field will cause the **Set Frequencies** dialog box to be displayed enabling the user to set and/or modify the **Refer PFD Frequency and set the channel step size**. **Warning; the 5005 synthesizer loop filters have been optimized for the PFD that was set at the time of manufacture. Using other PFD frequencies may cause higher phase noise or spurs.**

### 3.2.5 Refer Osc Frequency

The **Refer Osc Frequency** is a read-only field that shows the input frequency of the reference oscillator. Clicking on this field will cause the **Set Frequencies** dialog box to be displayed enabling the user to set and/or modify the **Refer Osc Frequency**. Because the reference oscillator is common to both synthesizers, there is only one field for this parameter and it is included in the Synthesizer A settings group.

### 3.2.6 Internal Divide By 2

The **Internal Divide By 2** button controls the frequency that is fed to the input of the prescaler. When the **Internal Divide By 2** is selected, the VCO output frequency divided by 2 is fed to the prescaler input. When the **Internal Divide By 2** is not selected, the VCO output frequency of the corresponding synthesizer is fed to the prescaler input. For example, if the **Internal Divide By 2** is not selected and the PFD frequency is 200 kHz, the user needs a value of  $N = 5,500$  to generate 550 MHz. With the **Internal Divide By 2** selected, the user may keep  $N = 2,750$ .

## 3.3 VCO Frequency Range

The **VCO Frequency Range** text fields are read-only fields that show the minimum and maximum frequencies representing the range of the VCO output frequency. The **VCO Frequency Range** information is used to validate the resulting VCO output frequency entered in the **Set Frequencies** dialog box.

### 3.3.1 Minimum

The minimum frequency is the lowest VCO output frequency (in MHz) that may be set.

### 3.3.2 Maximum

The maximum frequency is the highest VCO output frequency (in MHz) that may be set.

## 3.4 Power-Down

The **Power-Down** controls the power-down modes. When the **Asynchronous** power-down is selected, the device will immediately power down after selection. When the **Synchronous** power-down is selected, the device power-down is gated by the charge pump to prevent unwanted frequency jumps. When the **Normal Operation** is selected, the device is powered up.

It is extremely important to set the **Power-Down** mode to **Normal Operation** before writing the register data to the flash memory. If the **Power-Down** mode is not set to **Normal Operation**, the corresponding synthesizer on the **5005 Dual Frequency Synthesizer** board will not function.

### **3.5 Synthesizer Name**

The **Synthesizer Name** field is a text field containing the name of the synthesizer. The default names are "Synthesizer A" and "Synthesizer B". The default names may be overwritten by the user. The maximum length of the name is 16 characters. When changing the name, it may be necessary to first delete the existing characters before entering the new characters of the name.

### **3.6 Synthesizer Lock Detect**

Each synthesizer has a read-only field that displays the status to the synthesizer lock. This field is updated automatically any time the synthesizer is accessed the configuration manager. This field will not be updated if an state changes between configuration manager operations, that is, you won't know if the synthesizer is locked or unlocked unless you read or write to the registers.

## 4. Set Frequencies Dialog Box

The **Set Frequencies Dialog Box**, as shown in Figure 4-1 below, is displayed when the user clicks in the **Desired Frequency**, **Frequency Offset**, **Refer PFD Frequency** or **Reference Osc Frequency** fields. The numeric fields and buttons in the dialog box are used to set and/or modify the frequencies in the synthesizer.

The auto-update feature of the **Configuration Manager Program** will automatically update the registers in the synthesizers on the **5005 Dual Frequency Synthesizer Board** whenever a setting is changed. Thus, the registers on the board will always be in sync with the parameters displayed in the **Set Frequencies Dialog Box**.

The screenshot shows the 'Configuration Manager Program - Set Frequencies' dialog box. It is divided into several sections:

- Synthesizer Frequency:** Contains four input fields: 'Enter the desired output frequency:' (1440.000000 MHz), 'Enter the frequency offset:' (.000000 MHz), 'Enter the reference PFD frequency:' (1000.000 KHz), and 'Resulting VCO output frequency:' (1440.000000 MHz). A blue button labeled 'Out/1 Selected' is positioned below these fields.
- Single Channel Jump:** Contains two cyan buttons: 'Increment By One Channel Space' and 'Decrement By One Channel Space'.
- N Divider:** Contains five input fields: 'Inp Dividr:' (1), 'N:' (1440), 'P:' (8), 'B:' (180), and 'A:' (0).
- R Counter:** Contains one input field with the value 13.
- Close:** A red button located at the bottom right of the dialog box.

Figure 4-1 Set Frequencies Dialog Box

## **4.1 Synthesizer Frequency**

### **4.1.1 Desired Output Frequency**

The **Desired Output Frequency** field is used to specify the desired output frequency. Pressing the **Enter** key or the **Tab** key after changing the **Desired Output Frequency** will cause the registers in the synthesizer to be updated and the new frequency generated. The resulting **VCO Output Frequency** must be within the range specified in the **VCO Frequency Range** fields (see section 3.3).

The resulting **VCO Output Frequency** is calculated as shown below:

$$\text{VCO Output Freq} = (\text{Desired Freq} + \text{Freq Offset}) \times \text{Div By Factor}$$

Where the *Div By Factor* is the VCO output divide-by factor which is equal to 1 or 2 (see section 4.1.4 below). For example, if the **Desired Frequency** is 300.000 MHz, the **Frequency Offset** is +10.700 MHz and the **Div By Factor** is set to 2, the resulting VCO Output Frequency will be:

$$\text{VCO Output Freq} = (300.000 + 10.700) \times 2 = 621.400 \text{ MHz}$$

### **4.1.2 Frequency Offset**

The **Frequency Offset** field is used to specify the desired frequency offset. Pressing the **Enter** key or the **Tab** key after changing the **Frequency Offset** will cause the registers in the synthesizer to be updated and the new output frequency generated. The resulting **VCO Output Frequency** must be within the range specified in the **VCO Frequency Range** fields (see section 3.8).

### **4.1.3 Reference PFD Frequency**

The **Reference PFD Frequency** field is used to specify the PFD reference frequency. Pressing the **Enter** key or the **Tab** key after changing the PFD reference frequency will cause the registers in the synthesizer to be updated. **Warning; the 5005 synthesizer loop filters have been optimized for the PFD that was set at the time of manufacture. Using other PFD frequencies is not recommended.**

### **4.1.4 Output Divide By 2**

The **Output Divide By 2** button controls the output frequency. When the **Output Divide By 2** is selected, the VCO output frequency is divided by 2. When the **Output Divide By 2** is not selected, the VCO output frequency is not divided by 2.

## **4.2 Reference Oscillator Frequency**

The **Reference Oscillator Frequency** field is used to specify the reference oscillator frequency. Pressing the **Enter** key or the **Tab** key after changing the reference oscillator frequency will cause the registers in the synthesizer to be updated.

### **4.3 Single Channel Jump**

The **Single Channel Jump** buttons are used to increase or decrease the VCO output frequency by the PFD reference frequency. Pressing the **Increment** or **Decrement** button will cause the registers in the synthesizer to be updated.

### **4.4 N Divider**

#### **4.4.1 Inp Dividr**

The **Inp Dividr** field shows the Internal Divide By 2 value.

#### **4.4.2 N (Counter)**

The N field shows the N-counter value.

#### **4.4.3 P (Prescaler)**

The P field shows the Prescaler value.

#### **4.4.4 B (Counter)**

The B field shows the B-counter value.

#### **4.4.5 A (Counter)**

The A field shows the A-counter value.

### **4.5 R Counter**

The R Counter field shows the R-counter value.

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## **5. Commands**

### **5.1 File**

#### **5.1.1 Get Configuration**

The **Get Configuration** command will retrieve a previously saved set of synthesizer parameters. When the **Get Configuration** command is invoked, the **Get Configuration File** dialog box, as shown in Figure 5-1 below, will be displayed. Click on the desired configuration file. The dialog box will disappear and all of the synthesizer parameters in the Configuration Manager Program will be set to the values in the file.

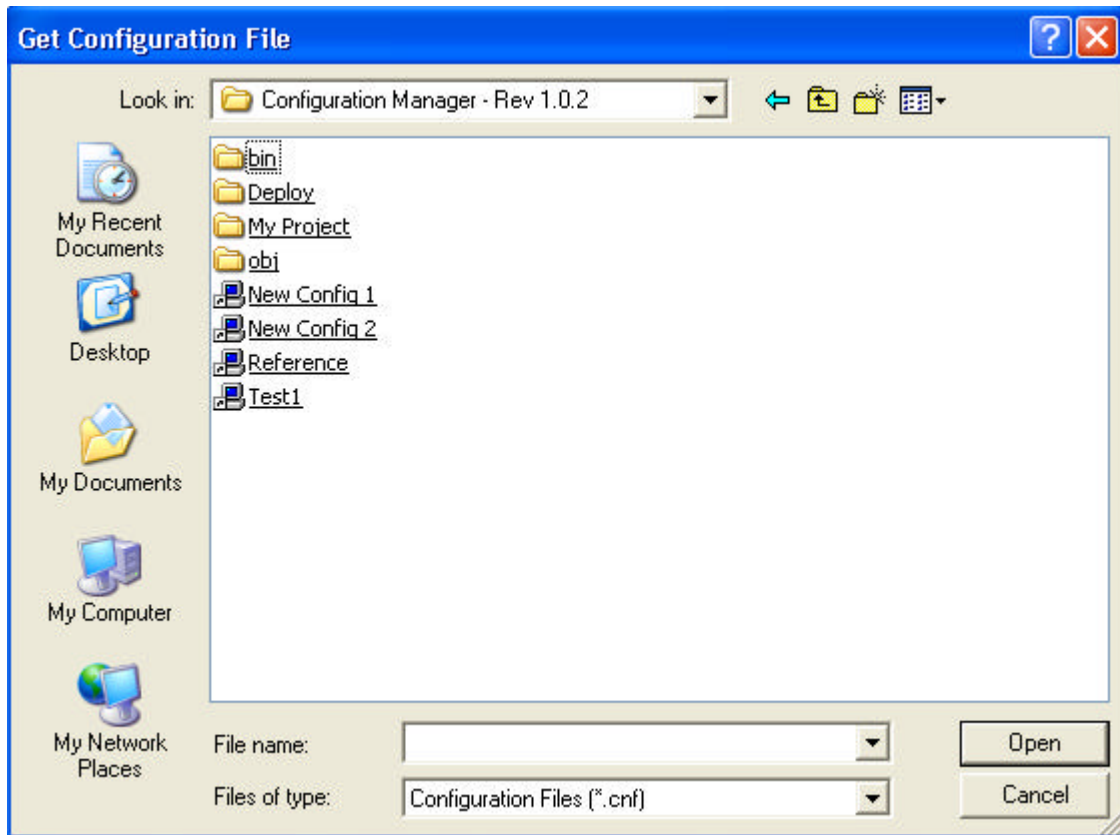


Figure 5-1 Get Configuration Dialog Box

#### **5.1.2 Save Configuration**

The **Save Configuration** command will save the current set of synthesizer parameters. When the **Save Configuration** command is invoked, the **Save Configuration File** dialog box, as shown in Figure 5-2 below, will be displayed. Enter the name of the file to be saved in the File Name: field and click on the Save button. All of the synthesizer parameters in the Configuration Manager Program will be saved in the file and the dialog box will disappear.

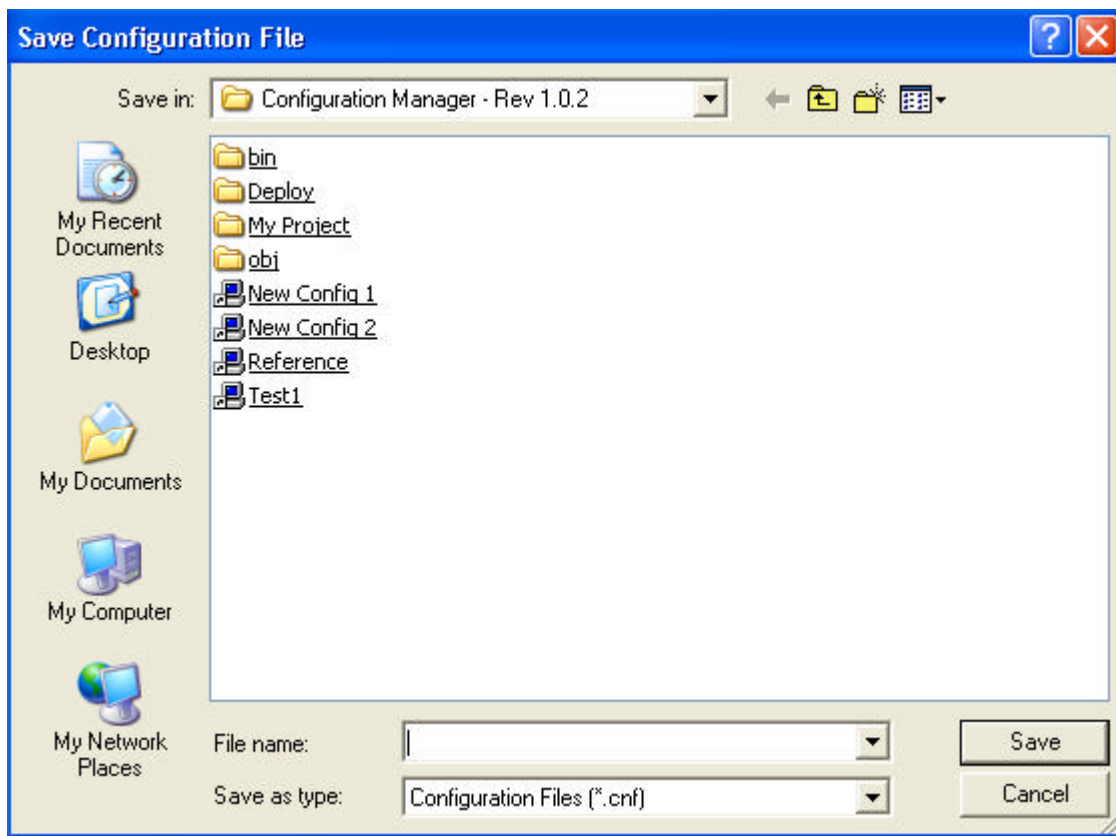


Figure 5-2 Save Configuration File Dialog Box

### 5.1.3 Write Registers

The **Write Registers** command will update the registers in the **5005 Dual Frequency Synthesizer Board** with the current set of synthesizer parameters. This command is only used when the current set of synthesizer parameters have been retrieved from a configuration file. This is because, in normal use, whenever an individual synthesizer parameter is changed, the auto-update feature of the **Configuration Manager Program** will automatically update the corresponding registers in the board.

### 5.1.4 Read Registers

The **Read Registers** command will read the registers in the **5005 Dual Frequency Synthesizer Board** and translate them to the current set of synthesizer parameters in the **Configuration Manager Program**.

### **5.1.5 Write Flash**

The **Write Flash** command will copy the data in the registers in the **5005 Dual Frequency Synthesizer Board** to the non-volatile flash memory in the microcontroller in the board. If the board is powered down before a **Write Flash** command is issued, all of the data in the registers will be lost. The next time that the board is powered up, the registers will be set to the values in the non-volatile flash memory.

If the **Configuration Manager Program** detects that a setting is incorrect, an error message will be displayed identifying the incorrect setting and the command will be ignored.

### **5.1.6 Exit**

The **Exit** command will terminate the **Configuration Manager Program**. If any of the register data has been changed during the current session, a message box will be displayed asking you if you want to copy the data in the registers in the **5005 Dual Frequency Synthesizer Board** to the non-volatile flash memory in the microcontroller in the board. If you want to copy the data to the flash memory, click on **Yes**. If you want to maintain the original contents of the flash memory, click on **No**.

If the **Configuration Manager Program** detects that a setting is incorrect, an error message will be displayed identifying the incorrect setting and the **Exit** command will be ignored.

## **5.2 Comm Port**

The **Comm Port** commands will set the serial data communications port on the host computer to be used to communicate with the **5005 Dual Frequency Synthesizer Board**.

## 5.3 Registers

### 5.3.1 Display Registers

There are two **Display Registers** commands, one for each synthesizer. Selecting either command will cause the **Registers** window, as shown in Figure 5-4 below, to be displayed.

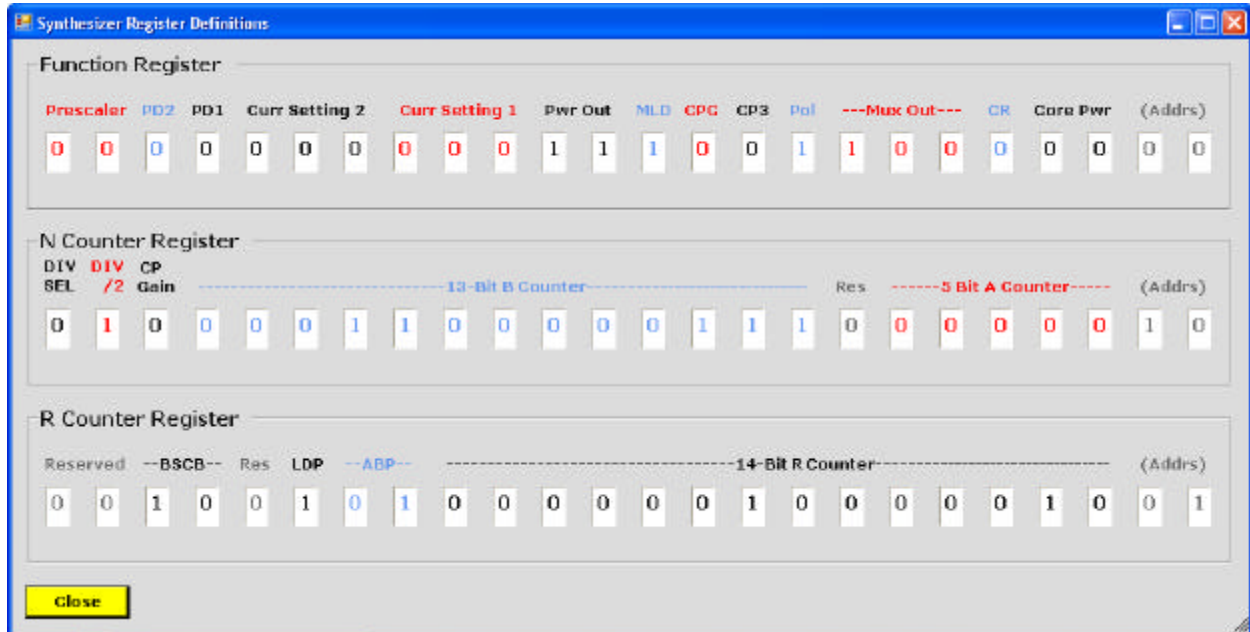


Figure 5-4 Synthesizer Register Definitions

## 5.4 Help

The Help command will display information about the **Configuration Manager Program**.

For even more help, Contact:

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