3 Software Setup For Operation

This chapter describes how to configure the WinSDR software for long-term seismic recording, real-time display, automatic event detection and automatic FTP upload of data files to remote storage servers. Details of site-specific information initialization, software data filtering, data management and long-term logging of data are among the topics discussed.

3.1 Specify WinSDR Operating Parameters

WinSDR has a variety of parameters that control the operation of the system.

3.1.1 SYSTEM SETTINGS

In the **System Settings** box ([**F6**] or Menu Bar **Settings | System**) each dialog box is used to specify site-specific information. Controls in any of the System Settings boxes generally apply to all channels.

3.1.1.1 General

The **General** tab of the *System Settings* dialog box is used to set the number of channels to record, sample rate and other system wide settings.

System Group Box:

Comm Port Select Box:

Sets the RS-232 communication port that will be used to communicate to the **VolksMeter Interface Board**. If set to *None - Replay Only Mode*, WinSDR will go into a Replay Only mode. In this mode WinSDR can only be used to Replay daily record files generated by another WinSDR system located on a LAN. **This parameter was set in section 2.5.**
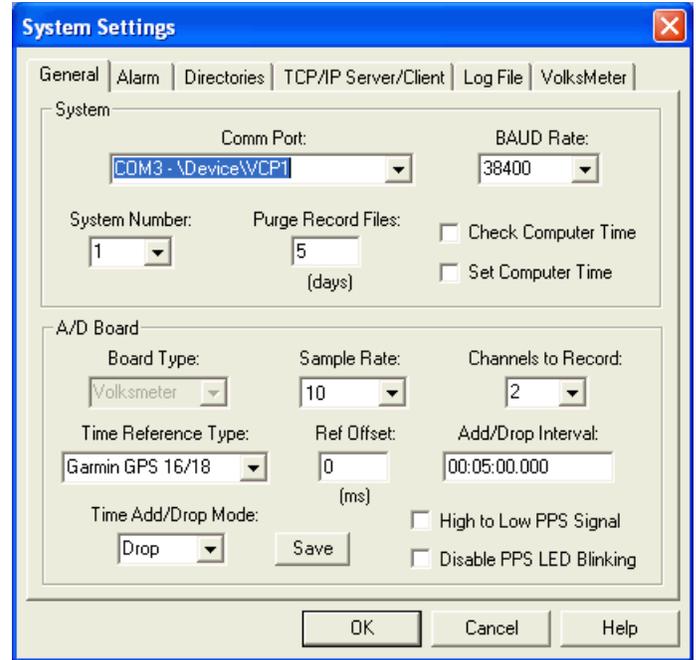
BAUD Rate Select Box:

Sets the RS-232 communication port speed. WinSDR will display an error message if you select a baud rate that is too slow for the number of channels being recorded and the sample rate. **This parameter was set in section 2.5.**

System Number Select Box:

Used if you are running more then one copy of WinSDR. Each WinSDR system, either running on the same computer or on another system located on a LAN, should have a unique system number. **In a typical installation, no change from the default value of 1 is required.**

Purge Record Files Edit Box:

Controls how many days worth of data to save. Data from the **VolksMeter** is saved in a daily record file. WinSDR uses the data in the record files to create PSN formatted event files and for Replay and Real-time window display. The value in this field should be based on how much disk space you would like WinSDR to use. Depending on the sample rate, ADC Bits (resolution)

and number of channels you are recording, the daily record file can be anywhere from a few megabytes to over 80 MB. **With the VolksMeter, the maximum data volume will be with 24-bit resolution, 2 channels and 80SPS. With these settings, the daily raw data file will use about 82MB. Due to noise considerations, you would not normally record 24-bit data at 80SPS. More typically, a system recording 2 channels at 20 bit resolution and 25 SPS will use about 12MB per day. The default value is 5 days. You should select a value that is compatible with the data storage space available on your support computer as well as the length of the historical record of raw data you wish to maintain for review. Note that the Alarm system discussed below will create permanent Event Files automatically when the incoming data meets the alarm trigger parameters you have set. It is also possible to flag these data record files as "NO DELETE". Use menu bar File | Replay | Open to display the current list of record data files, select the file you wish to flag and click the "Set No Delete Flag" button. Files flagged for no deletion will be shown as such on the list.**

Check Computer Time Check Box:

If checked, WinSDR will compare the support computer time with the time on the VolksMeter Interface Board. The time difference will be written to the winsdr.log file and displayed in the Log File Display window every 5 minutes. The line below is an example of the time difference message:

DLL: Time difference between A/D Board and Host Computer=0.026 seconds

The default for this function is unchecked (OFF). Check the box

if you are curious about how the clock on the Interface Board varies with respect to the internal clock of the support computer.

Set Computer Time Check Box:

If checked, WinSDR will set the local computer time if the time difference between the VolksMeter Interface Board and WinSDR gets larger then 250 milliseconds. This check box should be checked if you are using **GPS or WWV** references. This check box will be disabled if you use the *Local* computer as the time reference. **The default is unchecked (OFF).**

A/D Board Group Box:

Board Type List Box:

This list box controls or displays the ADC board type. This list box will be grayed out once WinSDR knows what type of ADC board is connected to the Comm port. If the board type is unknown you can force WinSDR to use either ADC board. **This parameter is set to "VolksMeter" in section 2.5.**

Sample Rate Select Box:

Sets the sample rate that the will be used to convert the incoming analog signal to digital data. This field can be set to 5, 10, 20, 50, 100 or 200 SPS. Note: Version I boards can only record up to 4 channels at 200 SPS. **For the VolksMeter version of WinSDR, the Sample Rate values are 10, 20, 25, 40, 50 and 80 Samples Per Second. This parameter was set to 10 SPS in section 2.5. The long-term sample rate you select will depend on the characteristics of the data you intend to record. There is a trade-off between Sample Rate and bits of resolution. The issues to consider for setting these parameters are discussed in detail in section 3.2.**

Channels to Record Select Box:

Sets the number of channels that WinSDR will record. This field can be set to 1 through 8. Note: Version I boards can only record up to 4 channels at 200 SPS. **The VolksMeter version of WinSDR defaults to 1 and offers choices of 1 or 2. If you have a 2 channel VolksMeter, select 2 (unless you only wish to record channel 1).**

Time Reference Type Select Box:

Controls the time reference source that the VolksMeter Interface Board should use for time keeping. VolksMeter options are: **Computer Time** or **Garmin GPS 16/18.**

The **Computer Time** option uses the time of the support computer that is running WinSDR as the time reference. The WinSDR system should be connected to some type of time reference source. This could be a GPS system or a NTP (Network Time Protocol) program. To use NTP, you must have a full time Internet connection. Windows XP offers an "Internet Time" option in the **DATE and TIME Properties** box

The **Garmin GPS 16/18** option uses a Garmin GPS 16 or 18 OEM antenna/receiver combination for time keeping.

Note: The **Computer Time** option should be selected if no timing reference source is available.

Computer Time is the default. If you have the GPS Time Reference option, this parameter was changed to Garmin GPS 16/18 in section 2.8.

Reference Offset Edit Box:

Used to compensate for the travel time of the radio waves of the WWV/WWVB time standard transmissions and the tone detector's capture time. This number is in

milliseconds. The tone detector has a capture time around 20 to 25 ms. You should add 1 ms for every 300km (186 miles) between you and the transmitting station. GPS users should place a 0 in this field. **The default is 0 and that is appropriate for either Computer Time or Garmin GPS 16/18.**

Add/Drop Interval Edit Box:

Time Adjust Add/Drop Interval time. See below for more information on this setting.

Time Add/Drop Mode List Box:

Time Adjust Add/Drop Interval mode. See below for more information on this setting.

Save Button:

This button saves the new Add/Drop Time Interval and Mode to the time.dat file.

Time Adjust Mode and Time Adjust Interval Information:

The Time Adjust Interval count is used to compensate for the timing reference crystal oscillator on the Serial Output A/D board not being exactly 4.000 MHz (8.0 MHz on the Version II ADC board) . The A/D board uses a 500 us interrupt generated the reference oscillator. If the oscillator is a little fast or slow, the time of day will slowly drift. By adding or dropping 1 millisecond at some interval, it is possible to compensate for the oscillator being off frequency. The Add/Drop number is the number of milliseconds to wait before a millisecond is added to or dropped from the time accumulator. The time adjustment information is stored in a file called *time.dat.* This file is located in the root directory of WinSDR. If you use one of the time reference options (GPS, WWV, WWVB, or Comm Port), WinSDR will calculate the Add/Drop interval number and direction (add or drop) for you. .

High to Low PPS Signal Check Box:

This check box sets the direction of the GPS 1 PPS signal applied to the VolksMeter Interface Board. The Garmin GPS 16/18

models supply a positive signal at the top of the second. **The default is "unchecked" (Low to High) which is appropriate for the Garmin GPS 16/18.**

Disable PPS Led Blinking Check Box:

When checked, the LED on the VolksMeter Interface Board will not blink at the top of the seconds. This feature was added because the 1 PPS signal can show up in the version I A/D boards event files with high gain Amp/ Filter channels. This is not a problem with the version II boards. **The default is "unchecked" (Blinking LED is enabled). This is appropriate for the VolksMeter Interface Board.**

3.1.1.2 Alarm

The **Alarm** tab of the *System Settings* dialog box is used to control the alarm settings. The Alarm functions enable WinSDR to automatically detect seismic "events" using a variety of user specified criteria. An event detection can trigger an audible alarm at the support computer as well as saving the data associated with the "event" in a permanent Event file.
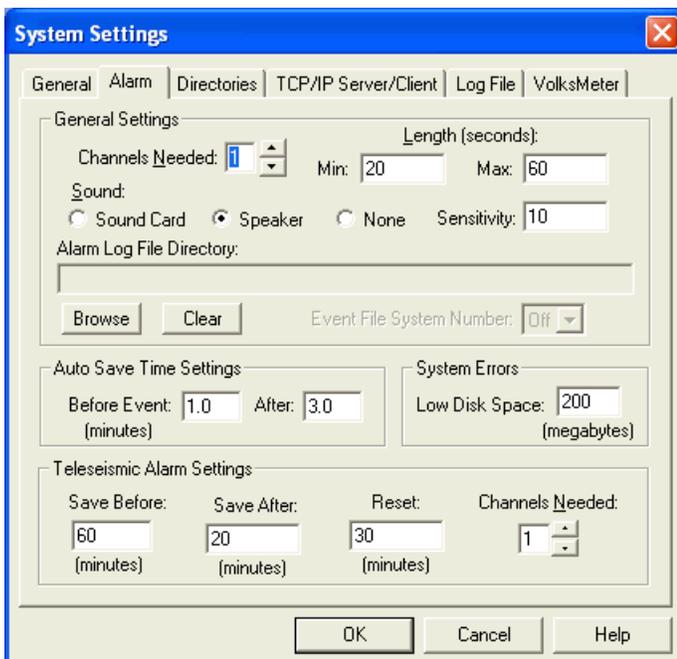
General Settings Group Box:

Channels Needed Edit Box:

The number of channels that must be in a triggered state for the alarm to sound and auto save event to occur.

Length

Min Edit Box:

Minimum time, in seconds, to sound the alarm when an event is detected. WinSDR has a proportional alarm feature. Small events will sound the alarm for a short period of time. Larger events will sound the alarm for a longer period of time.

Max Edit Box:

Maximum time, in seconds, to sound the alarm when an event is detected.

Sound Check Boxes:

Controls what sound device to use or to disable all alarm sounds. Select the ***Sound Card*** option if you have a sound card in the system or select ***Speaker*** to use the internal speaker. Select ***None*** to disable all alarm sounds.

Sensitivity Edit Box:

Used to control the proportional alarm feature. This sets the sensitivity of the alarm tone and length change based on the size of the event. The larger the number the larger the event must be before the sound length will change and the alarm tone to proportionally change.

Alarm Log File Directory:

If a directory is placed in this field, WinSDR will create a file called ALARM.LOG in the directory whenever WinSDR goes into an alarm state. In the ALARM.LOG file WinSDR will place the time that the alarm occurred. The application using the alarm

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log file may delete the file after using it. If the file is already in the directory, WinSDR will append the new alarm time to the end of the file. A typical line in the ALARM.LOG file will look like this:

TRIGGER=12/01/2001 15:04:14

Event File System Number Select Box:

Used to trigger another WinSDR system on the same computer or a computer on a network. Enter the WinSDR system number to trigger in this field. When WinSDR goes into an alarm state it will use the *Event Log File Directory* field to create a ALARM. LOG file that another WinSDR system can use to save Event files.

Auto Save Time Setting Group Box:

Before Event Edit Box:

Sets how many minutes to save before the event trigger time when WinSDR auto saves Event file(s). Number maybe entered as a fraction. Example: 1.5 = 90 seconds.

After Edit Box:

Sets how many minutes will be saved after the event trigger time. Number may be entered as a fraction.

System Errors Group Box:

Low Disk Space Edit Box:

Used to set the number, in megabytes, to test for low disk space. If the free disk space of the drive used to save the daily record files gets below this number WinSDR will sound an alarm. If you enter 0 (zero), no low disk test will take place.

Teleseismic Alarm Settings Group Box:

Save Before Edit Box:

Sets how many minutes to save before the event trigger time when WinSDR auto saves Event file(s).

Save After Edit Box:

Sets how many minutes will be saved after the teleseismic event trigger time.

Reset:

The edit box controls how long WinSDR should wait after a teleseismic event to reset and begin looking for new events.

Channels Needed Control:

This is the number of channels that must be in a teleseismic event alarm condition before WinSDR will save event files and sound the alarm.

3.1.1.3 Directories

On the **Directories** tab, you may specify the locations on your support computer (or on another computer using a LAN and remote drive sharing) where various WinSDR data files are stored.
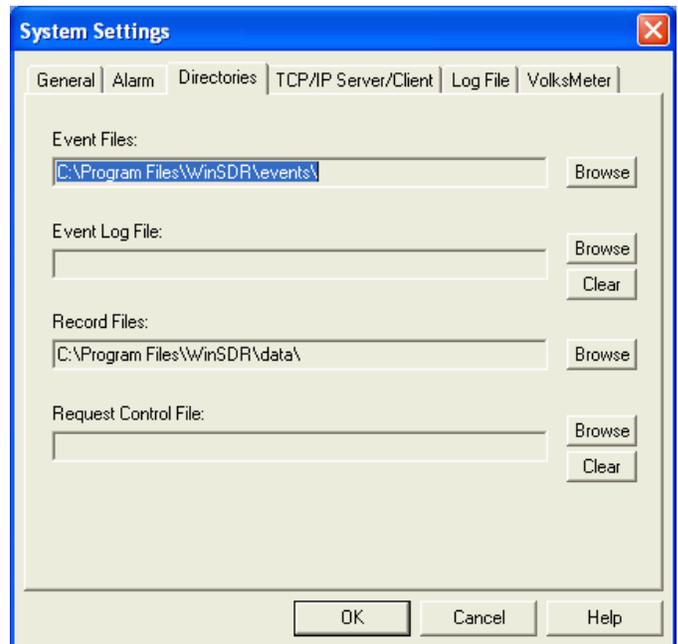
Event Files are user-selected segments of data from any of the WinSDR data display windows (Real-Time, Single Line or Replay) or automatically-selected, when an "Alarm" is

triggered. These data files are in PSN Type 4 format. They can be viewed and analyzed with WinQuake. The default location of the Event File root directory is **C:\Program Files \WinSDR\events**. Event Files are stored in a sub-directory derived from the current year and month(**drive:\Root_Directory\YYMM**). Use the *Browse* button to change or create the new directory. **We suggest that you change the root directory from the Program Files \WinSDR\ folder to a dedicated data storage area on your system (e.g. C:\WinSDR\events).**

Event Log File - If a directory is specified in this field, WinSDR will create a file called EVENT.LOG in this directory whenever WinSDR saves event files. In the EVENT.LOG file, WinSDR will place the UTC time that the files were saved, the number of files saved, the directory where the files were saved, and then the Event file name(s). Fields are delimited by a coma. The application using the event log file may delete the file after using it. If the file is already in the directory, WinSDR will append the new event information to the end of the file. A typical line in the EVENT.LOG file will look like this:

**03/17/02 00:38:06,2,c:\tmp\0203\,lcv.psn,lc8.psn**

Record Files - Specifies the directory location for the daily record file. The daily record file holds ALL the data collected from the VolksMeter. A new record file is created each day at 00:00 UTC. The directory holding the record files should be a drive on the same system that is running WinSDR. Using a LAN network and disk sharing, it is possible to place the record files on another system. The problem with this arrangement is your LAN and remote computer must be working all of the time. If the WinSDR system can not save data to the remote drive, due to the LAN not working or the remote system being down, data will be lost. It will also take longer for the Replay and Real-time windows to read the data from the remote disk.

Use the *Browse* button to change or create the new directory. **The default location is C:\Program Files\WinSDR\data. We suggest that you specify a dedicated data folder (e.g. C:\WinSDR\data).**

Request Control File - Sets the directory that WinSDR will use to monitor for a request file. See Request Event File documentation for more information on this option. Use the *Browse* button to change or create the new directory or the *Clear* button to clear this field.

3.1.1.4 TCP/IP Server/Client

The **TCP/IP Server/Client** tab of the *System Settings* dialog box is used to control the Server/Client TCP/IP settings.
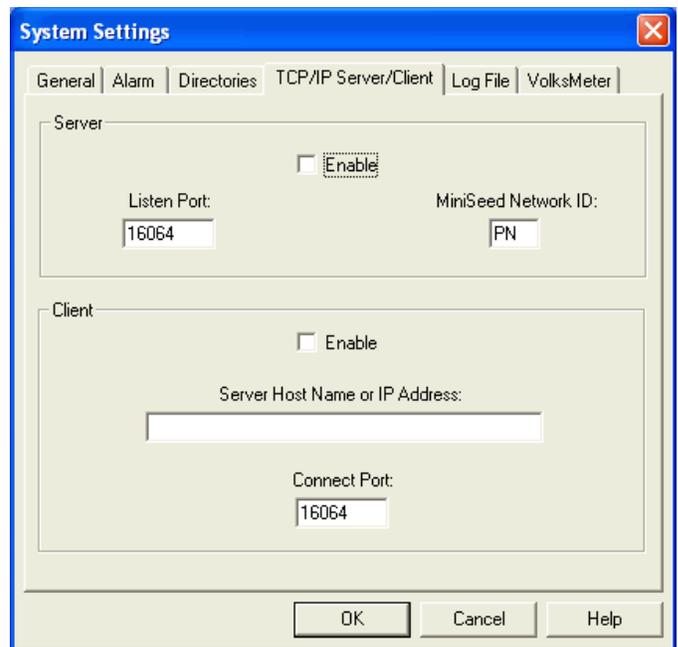
TCP/IP Server Group:
Enable Check Box:

This check box enables the TCP/IP Server feature.

Listen Port Edit Box:

The TCP/IP listen port is the port that WinSDR will listen on for client connections. This number can be in the

range of 1 to 65535.

MiniSeed Network ID:

This two character string will be used when WinSDR saves MiniSeed event files or sends MiniSeed packets to a TCP/IP Client.

TCP/IP Client Group:

Enable Check Box:

This check box enables the TCP/IP Client feature.

Server Host Name or IP Address Edit Box:

This edit box is used to enter the host name (Example: data.mydomain.com) or the IP address (Example: 10.0.0.3) of the WinSDR server system.

Connection Port Edit Box:

The connection port is the TCP/IP port that will be used to connect to the WinSDR server system. This number must match the *Listen Port* number in the Server settings group. This number can be in the range of 1 to 65535.

To use the Server/Client feature the user must have two computers connected together using a LAN or over the Internet. The *server* is the system that connects to the VolksMeter instrument and the *client* receives data over the TCP/IP connection as if it was getting the data from the VM Interface Board directly. The client does not control the server; it just receives the raw data from the server that the server is receiving from the VolksMeter. The user must have a static IP address on the server side for this to work.

The server/client feature is enabled in the Systems Settings dialog box. The user needs to know the IP address of the server so it can be entered in the client system. This can be done by opening a DOS box on the server and typing "ipconfig". This command will display the IP address(es) of the system. On the client side the user enters the IP

address of the server and then enables the client feature. Once the System Settings dialog box is closed the server will wait for a connection from a client system. On the client side, WinSDR will try and connect to the server and once it does it will start to receive, display and store the VM data locally.

Once the client connects to the server the user can transfer the channel information settings from the server by using the **File | Get Remote Channel Information** menu items.

While the details of Internet Protocol and IP address assignment are beyond the scope of this manual, here are a few tips:

If the server is on a LAN, the server **must** be assigned a static IP address. While most LAN's today use DHCP (Dynamic Host Control Protocol) to automatically assign IP addresses when a system on the LAN is booted up, they do allow fixed IP addresses to be reserved and assigned.

If the server is located behind a router (and the client is on a different LAN, elsewhere on the Internet) and that router does Network Address Translation (NAT), the router must be setup to do port forwarding to the server. The default port number is 16064. This value is specified in the dialog boxes for both the client and server (Listen Port on the server side, Connect Port on the client side).

If the server is connected to the Internet through an ISP and the IP address of the connection is "dynamic" , then the requirement for a "static" IP address is not met and the WinSDR Client/Server functionality won't work. There may be ways to work around this, by establishing and constantly maintaining an Internet connection, but this is asking for trouble.

If you wish to control a VolksMeter system remotely, a 3rd-party remote console software application is required: PC Anywhere or Carbon Copy are examples. Windows XP Pro has this function built in. See Appendix 2, Reference List, for more information.