BlueView®
TECHNOLOGIES

ProViewer Software Handbook

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BlueView Technologies has made every effort to ensure the accuracy and completeness of this document; however, because ongoing development efforts are made to continually improve the capabilities of our products, we cannot guarantee the accuracy of the contents of this document. We disclaim liability for errors, omissions, or future changes herein.

Warranty Information:

The sonar is backed by a standard 12-month parts and labor warranty policy.

For more information on safety and/or maintenance issues please call BlueView Technologies at 206.545.7260.

Chapter 1: Welcome

This manual describes the features of ProViewer from BlueView Technologies. ProViewer is used to view and record live imagery from a forward looking imaging sonar as well as open source data files. At BlueView, we strive to produce an easy to use sonar and software package. If you feel ProViewer can be improved, please don't hesitate to contact us.

System Requirements

ProViewer requires a system that meets or exceeds the following requirements for optimum performance.

   ➢ Windows 2000, XP, or Vista operating system
   ➢ 750MHz or faster processor
   ➢ 512MB or more of RAM
   ➢ 20MB or more of free disk space
   ➢ CD-ROM drive for installation

Additionally, if you will be connecting to a BlueView sonar you will need a free Ethernet port, and if you will be connecting to a Pan/Tilt unit, you will need either a serial port or USB port (for a USB to Serial adapter) free.

Installation

To install ProViewer, just insert the ProViewer CD into your computer's CD-ROM drive and follow the instructions to complete the installation. You may also launch the installation by double clicking on setup.exe in the CD's root directory.

When you start ProViewer, if you have a personal firewall enabled, you may receive a warning message saying that ProViewer is attempting to connect to the network. BlueView recommends that you select the option that will always allow ProViewer to access the network (which it needs to do to communicate with sonar). For example, in the image below, click Unblock.

Technical Support

BlueView is committed to providing industry leading customer service and technical support for all of our products. For technical assistance with ProViewer or your BlueView sonar please email your questions to support@blueviewtech.com, or contact our customer service department at 206-545-7260 between the hours of 8am and 5pm Pacific Time, or visit our website at: http://www.blueview.com

License Agreement

The accompanying Software and Documentation hereinafter referred to as "ProViewer" are proprietary products owned by BlueView Technologies, Inc., and protected under U.S. and international copyright law. Except as authorized under this License Agreement, the Software may be used only on computers owned, leased, or otherwise controlled by you. You may not reverse assemble, reverse compile, or otherwise translate ProViewer.

Chapter 2: Understanding Imaging Sonar

Many people are familiar with scanning type sonar and radar, which work by mechanically rotating a single beam over an imaging area. These work well when used on stationary platforms and/or when imaging static targets. They become much less useful when working from a moving platform and/or trying to image moving targets, such as divers, since any motion can cause errors in the final image.

By comparison, imaging sonar are multi-beam sensors, which form many small acoustic beams at once. This allows them to work well from both stationary and moving platforms. An imaging sonar can produce several high quality images per second, making it possible to get movie-like imagery from the sonar. BlueView sonar are imaging sonar.

Interpreting Sonar Images

Imagine a flashlight lying on a table and an object, such as a coffee cup, located in front of the flashlight. If you look directly down from above this scene, you will see a bright area where light is reflecting off the face of the coffee cup. You will also see a dark shadow behind the coffee cup where light is unable to reach.

The same idea can be applied to imaging sonar by replacing the light source with a sound source. Bright areas on the sonar image are the result of objects reflecting sound, while dark areas are acoustic shadows resulting from an object blocking the sound. The image below provides an example of how a scene would appear when viewed visually and with imaging sonar.
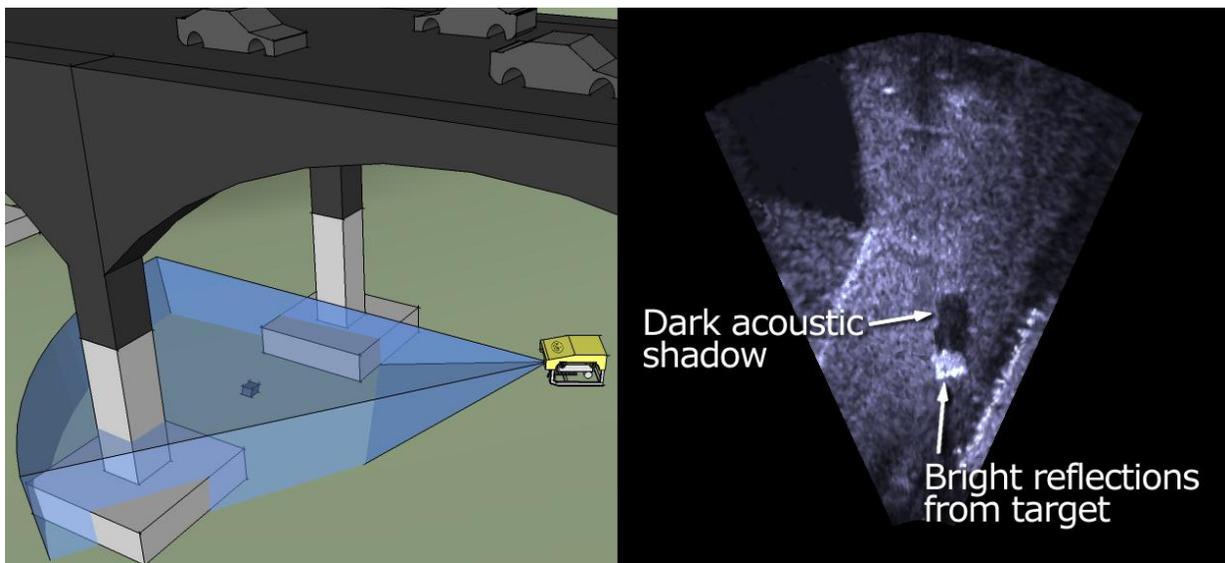
Chapter 3: Connecting to a Sonar

Setup

Begin by installing the ProViewer Software provided on the included CD as described previously in this manual.

Using the provided test cables, connect the sonar to the external PC's Ethernet port through the POE box as shown below. For more information, see the quick start guide included with your BlueView sonar.

> **NOTE**: This description assumes the sonar is still set up as shipped from the factory. For other sonar networking options, please see Appendix B.

Typical BlueView Sonar Test Setup

User Computer

Sonar

110 – 240 VAC

Power Over Ethernet (POE)

Standard Ethernet Cable

Sonar Test Cable
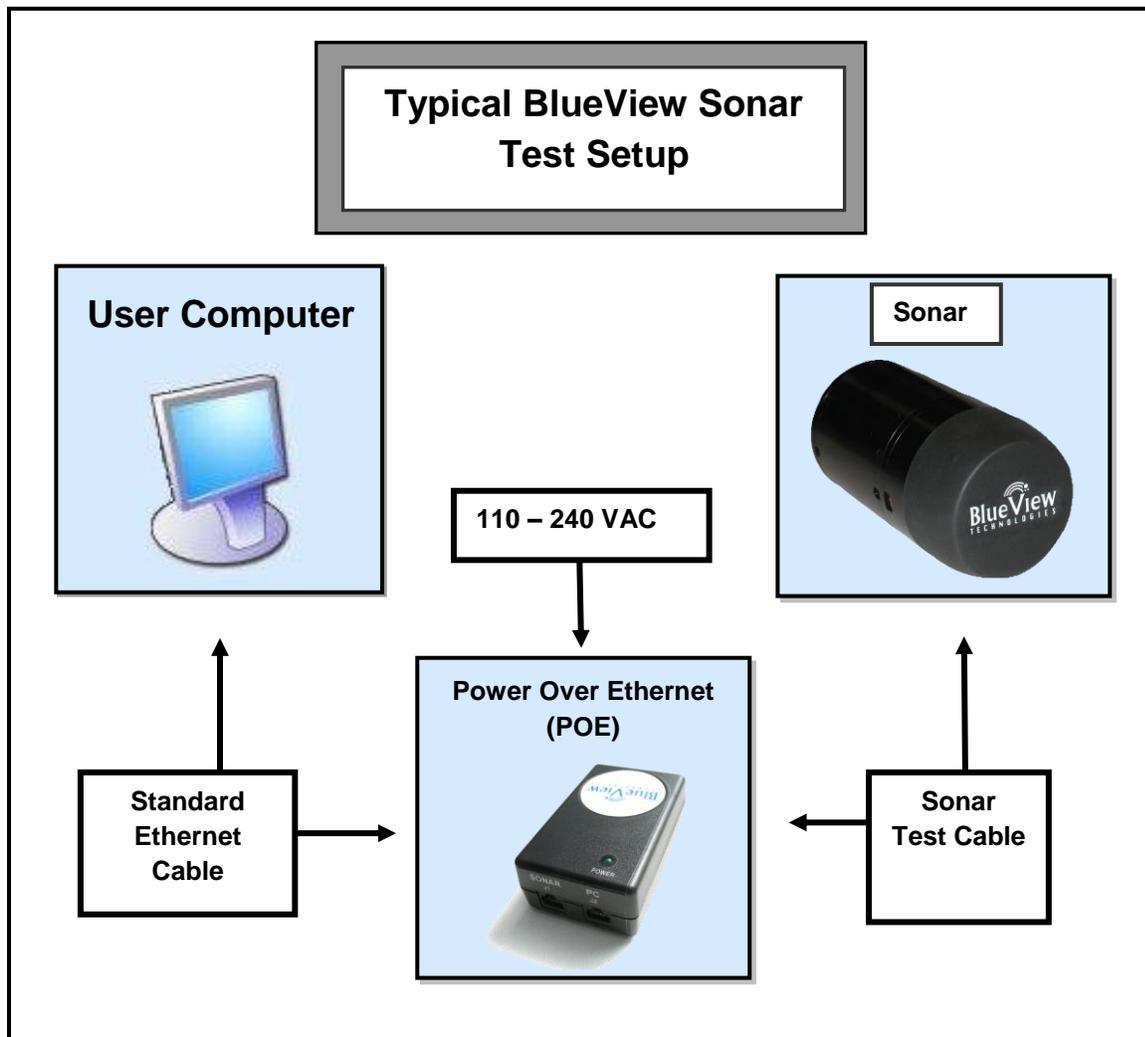
The IP address for the Ethernet port on the PC which is connecting to the sonar will need to be set to a static IP: 192.168.1.3.

Windows XP

To access a PC's IP address in Windows XP, click **Start → Control Panel → Network Connections** and double-click on the computer's Ethernet port (usually Local Area Connection 1). Right click and select 'Properties' then double click on 'Internet Protocol (TCP/IP)' in the list of components. Make sure the IP address is set as shown below:
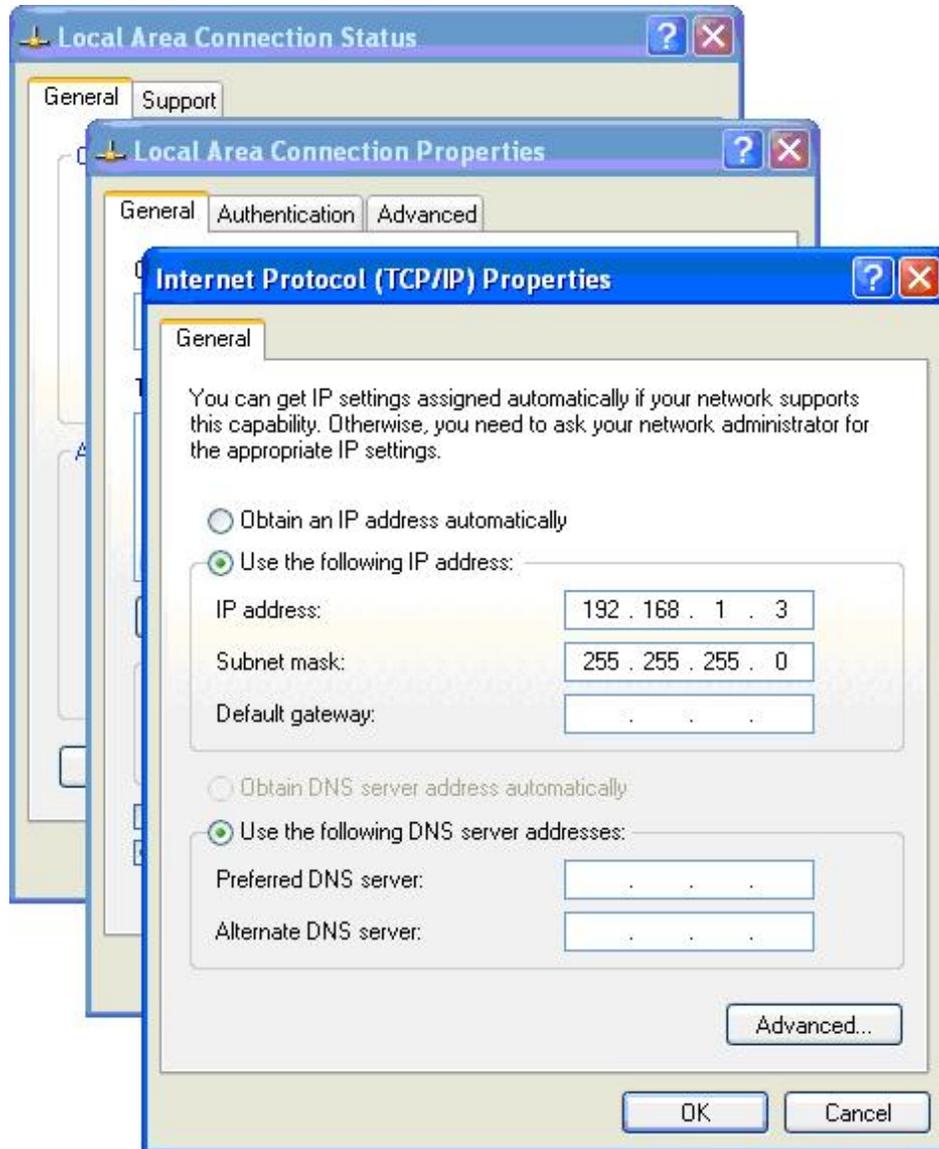
Windows Vista

To access a PC's IP address in Windows Vista, click Start → Control Panel → Network and Internet → Network and Sharing Center → Manage network connections.

Right click the connection that should be changed, and click Properties. You may be asked for an administrator password.

Click the Networking tab. Under This connection uses the following items, click Internet Protocol Version 4 (TCP/IPv4), then click Properties.

As described in the previous section, set the IP address to 192.168.1.3, and the subnet mask to 255.255.255.0.

Connecting

Once the network settings are properly configured, open the ProViewer Software on the User Computer and click on the connect button, as shown below. (note that if the sonar has just received power, it will take some time to boot and be ready for a connection)
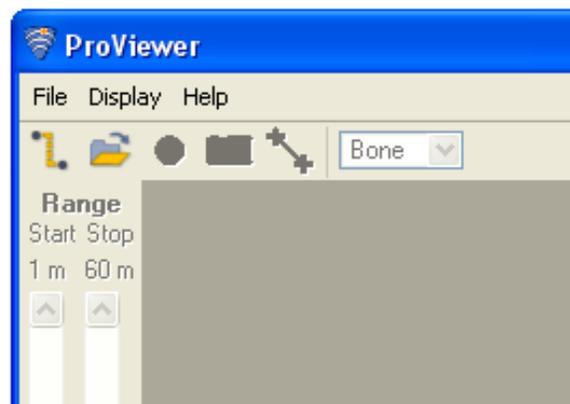
When the connect button is pressed, the ProViewer software will automatically connect to a sonar when only one sonar is present. If more than one sonar is present, or a sonar with multiple heads is present, ProViewer displays the available sonar heads to connect to.
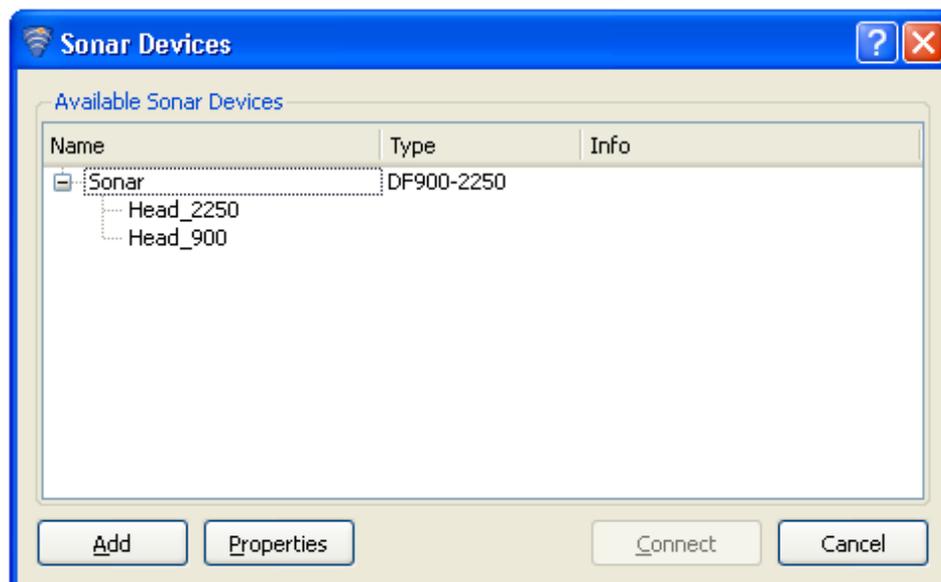
This window can also be accessed through the **File → Connect** menu item.

Select the desired sonar head and click Connect, or just double click the desired head.

If a sonar head still does not appear **when used in stand alone mode**, click the **Add** button and type 192.168.1.45, the default Sonar IP address for all BlueView sonar systems, as shown below:
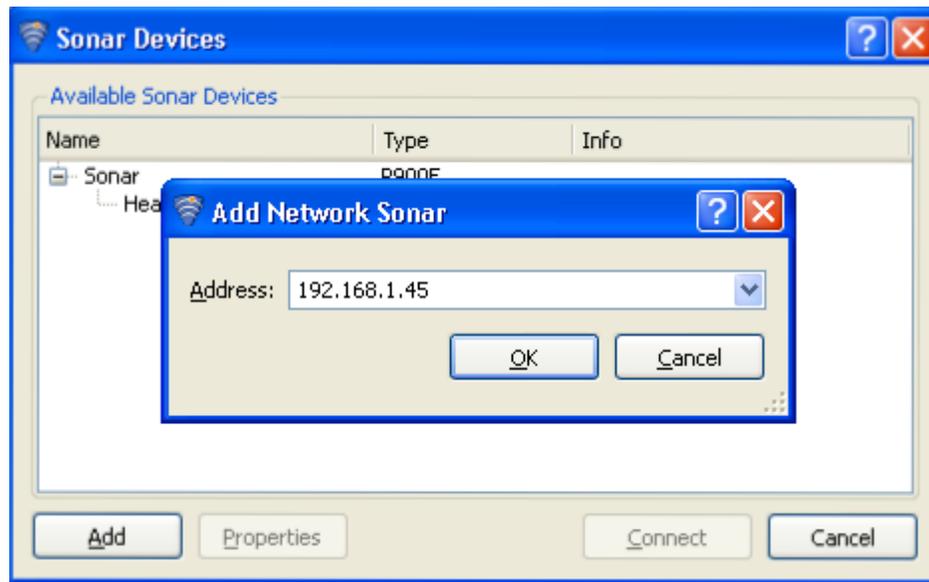
If you still cannot connect, please see the troubleshooting section of this manual.

Chapter 4: Software Basics

Typical Screenshot
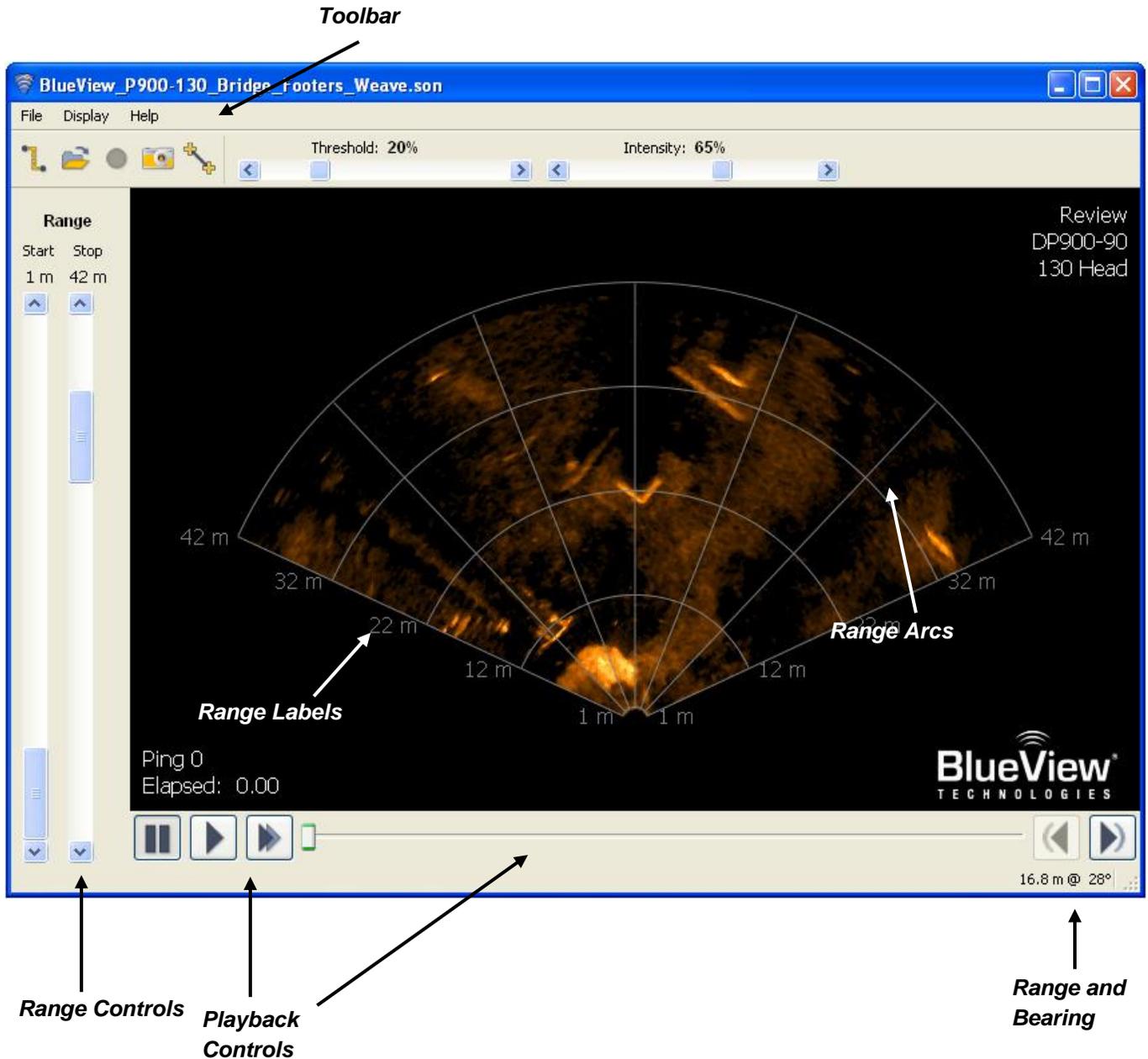
Dual Frequency Sonar

Some BlueView products operate at more than one center frequency. Those sonar are called 'multi-head' sonar. When connecting to a multi-head sonar, the 'Sonar Devices' window will show you all the sonar heads available to connect to:
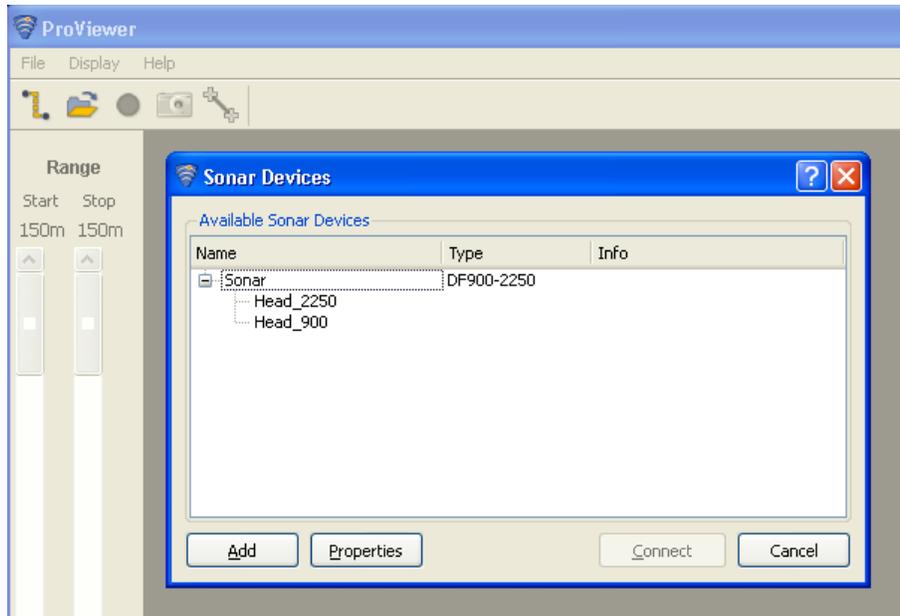
Simply double-click the head you want to use, or select the head and click the 'connect' button. If already connected to a sonar head, you can switch which head you are using with the 'Head' drop-down menu:
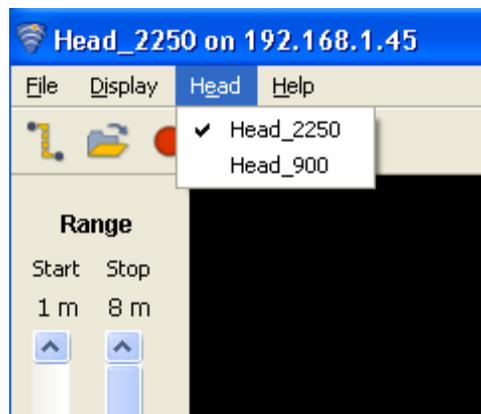
Run the two heads simultaneously by running two instances of ProViewer and selecting a different head for each instance.

Shutdown

To disconnect from the sonar, close the "Sonar Window" by selecting Disconnect from the File menu. Be sure to save and close any data files in use. It is now safe to power down the sonar or disconnect the Ethernet cable from the computer.

Toolbar

The toolbar provides quick access to several commonly used sonar functions.

Opening a File

Each time you open a sonar file or connect to a sonar unit, ProViewer replaces the current sonar display with your selection. If you would like to open a file, but not replace the current display, choose "Open In New.." from the File menu.

Connecting to a Sonar

To connect to a sonar, simply click the connect icon on the toolbar. If ProViewer only finds a single sonar head, it will connect to that head automatically. If ProViewer finds multiple heads, it displays the connection dialog asking the user to choose a head. You can force the connection dialog to be shown at any time by choosing **File → Connect**.

Recording Live Sonar Data

ProViewer uses a proprietary file format that can be used to save sonar data into compressed records that are stored in a single file during collection. The sonar data in these files can then be accessed at a later time and exported into a variety of standard formats. While viewing live sonar, click the Record button on the toolbar to start recording. After a second press, recording will stop and you will be prompted for a location to save the file. The default file name is the current date and time with a .son extension.

Snapshot

Snapshot allows you to save the current image to a JPEG, PNG, or BMP file. The actual image size is the same as the image in ProViewer. Therefore, increasing the ProViewer window size will increase the size of the saved image. In addition to the toolbar button, snapshot is also available under **File → Export**.

Length Measurement

ProViewer provides a simple length measurement tool. To activate this tool, click the measurement button on the toolbar. Next, click the location where you want to start the measurement. ProViewer then draws a dotted line between that point and the mouse cursor. Click a second time to freeze the current measurement. A third click sets the starting point for a new measurement.

The length of the dotted line is displayed just to the left of the cursor location in the lower right of the ProViewer window. To clear the measurement line, click on the Measurement button a second time, click the right mouse button, or click the Escape key on your keyboard. Clicking on the Measurement button toggles the measurement mode on and off.

Length Measurement

Range Controls

The sonar range sliders (along the left side of the ProViewer window) allow you to change both the start and stop range. The Stop Range selects how far out the sonar is looking, whereas the Start Range selects the point where the sonar starts acquiring data. By using both controls you can zoom in on a target. However, note that zooming in too far can create a degraded picture because not enough data is available to fill the screen pixels, resulting in pixilation. (Just leaving the Start Range at zero is often the best choice…)

Range and Bearing

The current range and bearing of the cursor is displayed in the lower right corner of the ProViewer window. The Units section of the Settings window has options to change the units and precision of the readout.

Playback Controls

When a file is loaded, the playback controls appear at the bottom of the window. The table below describes the different controls available. Also available between the previous ping and next pin buttons is the time slider. It shows the current location inside the file. You may click on it to jump to a new location or simply drag the marker back and forth to quickly scan through a file.

Function	Icon	Description
Pause	❚❚	Pause playback at the current ping
Play	▶	Resume playback
Fast-Forward	▶▶	By clicking this multiple times, the playback can be increased up to 64X
Previous Ping	◀◀	Go to the previous ping
Next Ping	▶▶	Go to the next ping
Slider Bar	▭	Manually advance through pings

Image Text

By default, several important pieces of information are superimposed on the image. Range arcs and labels provide a visual indication of how far objects are from the sonar. Both can be toggled on or off by selecting the appropriate option under the Display - Grid menu. For files, the time when the ping was taken is displayed in the lower left corner. The format of the time (elapsed, local, or UTC) is selectable in Units section of the Settings window. The current ping number is always displayed in the lower left of the image, above the time.

Image Calibration

If an image looks broken or misaligned, CTRL-J will bring up the Image Calibration dialog.
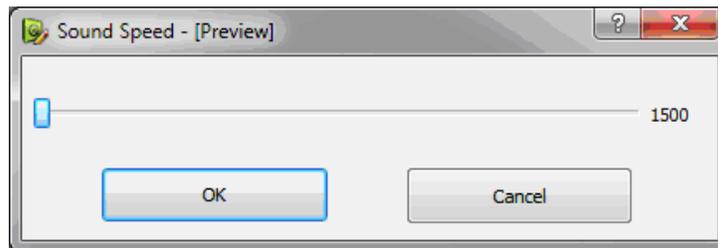
On older sonar, the dialog looks like this:
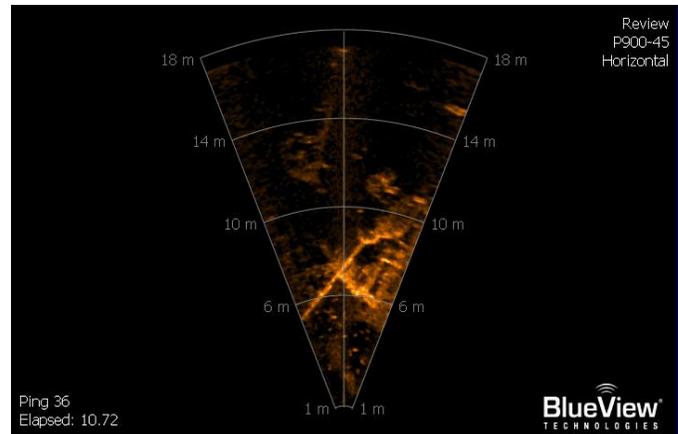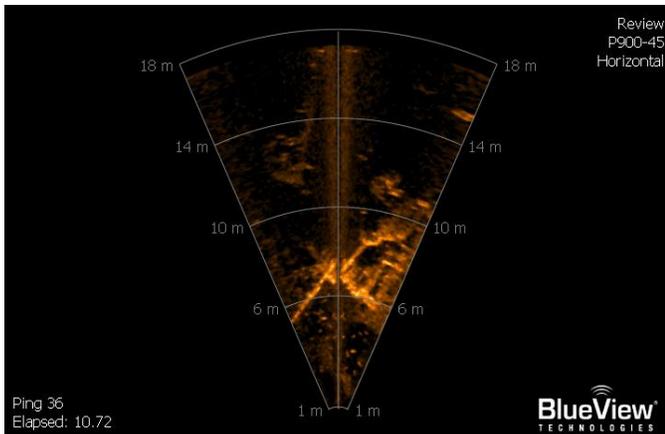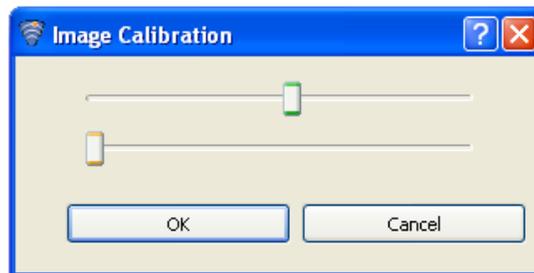
The top slider aligns the center of the image, and the bottom aligns the outer edges.

Chapter 5: Display Menu
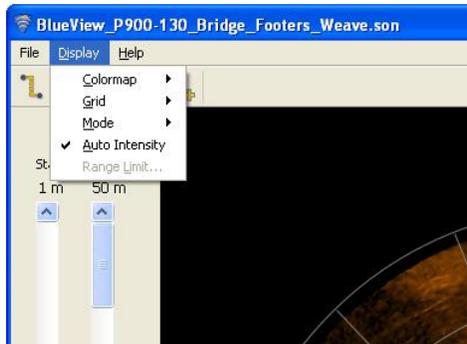
Colormap

The colors used in displaying the sonar image are referred to as the colormap. The selected colormap for the image is displayed in a drop down box on the toolbar. To choose different colormaps, click on the drop down box and select a colormap from list. The following list describes the available colormaps and their characteristics. We recommend that you experiment with the different color maps to best understand their individual strengths and weaknesses.

Colormap	Characteristics
Bone	Best image definition, but low contrast makes it hard to use in bright sunlight conditions
Cool	Softer colors that work well in low light conditions
Copper	Great image definition and contrast. Best general purpose colormap
Green	Good image definition with high visibility. Good for bright light conditions
Hot	Good image definition and contrast. Good general purpose colormap
Jet	High contrast with low image definition. Jet is ideal for quickly spotting targets in bright light conditions

Grid

This menu item allows the user to toggle both Range Arcs and Range Labels on and off.

Range Limits

The Range Limit menu item allows the user to set a maximum value for the Stop Range Slider bar. This optimizes the range control sensitivity for a given range window. Once set, all sonar connected will conform to this limit.
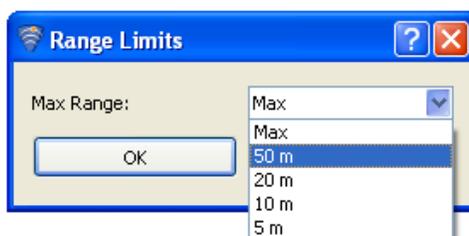
Mode

ProViewer has several choices for setting the rotation of the display under **Display → Mode**. These modes mostly are needed when the sonar is mounted on a Pan and Tilt module, and the relative position of the sonar is changing.

Heads Up

When Heads Up is selected, the sonar image rotates according the pan angle of the sonar. This allows for the current position of the sonar to be quickly determined. (See Chapter 7 for more information on the Pan and Tilt option)

Sonar Up

When Sonar Up is selected, the sonar image stays locked in a vertical orientation. This setting is more appropriate for a ROV (Remotely Operated Vehicle) mounted installation.

Fixed Angle

Fixed Angle mode allows you to set a specific image rotation angle. This is useful when the sonar is mounted in a fixed angle or vertical orientation, and you prefer to see it at a different angle. Once Fixed Angle is selected, the Set Angle option becomes available, so the angle can be changed without having to disable and re-enable the Fixed Angle option.

Auto Intensity

By default, ProViewer automatically adjusts the image intensity to produce an optimum image for most situations. However, there are some cases where you may want to disable this feature. You can do so by un-checking Auto Intensity under the Display menu. With auto-intensity disabled, ProViewer shows the horizontal Threshold and Intensity sliders in the toolbar.

Lowering the threshold will allow more of the background to be displayed in the image. Increasing the threshold will suppress background noise, increasing the contrast of the image. The intensity control affects the brightness of the image. This is similar to brightness controls on a camera. Setting the intensity too low or too high will make the image dim or blown out respectively, making image details difficult to see.

Note that the intensity adjustments are ***completely independent of the data being saved to a file***, so you can make image adjustments for better viewing at any time.

For more information, see Advanced Image Controls under Application Settings in Chapter 7 of this manual.

NOTE: Increasing the threshold too far may make some types of targets hard to track. Similarly, increasing the intensity too far will cause much of the image to saturate, making target tracking impossible.

Chapter 6: Exporting Data

ProViewer provides options for exporting previously saved sonar data into several useful data formats. To use the export data, first load a file into ProViewer and then select one of the export options under File → Export. The following sections describe these export options.

Movie

This option exports saved sonar data into an AVI movie file. Selecting this option brings up a dialog box that allows the user to select a range of pings to export. Next, ProViewer displays a list of available compression types. Note that many of the codecs listed are not available for encoding/writing files (only reading/decoding).

Care should be taken to choose a compression format that is supported by the system where the AVI will be viewed. For AVI files, the "Microsoft Video 1" is often the best choice. Data can also be exported as an uncompressed AVI if necessary.

Snapshot

Snapshot allows you to save the current image to a JPEG, PNG, or BMP file. The actual image size is the same as the image in ProViewer. Therefore, increasing the ProViewer window size will increase the size of the saved image. In addition to the menu selection under File -> Export, the Snapshot function is also available using the toolbar button with the image of a camera.

XML

This option allows the user to export a series of sonar pings for importing into third party software packages. Each ping is saved as a separate file and stored in the selected location with an accompanying XML file titled meta.xml. This file contains a list of information about each of the pings such ping number, byte order, and the time the ping was taken. For more detailed information on this export option, see Appendix A.

Subset

The subset export option allows the user to export a range of pings into a separate .son file. This smaller file can be loaded by ProViewer at a later date. This allows the user to 'edit' a data set.

Chapter 7: ProViewer Settings

ProViewer has a number of user customizable settings that can be accessed by selecting Settings under the File menu. The following sections describe the settings menus in detail.

Application Settings

The Application section in the Settings window (File → Settings) contains several options that might be useful to advanced users.
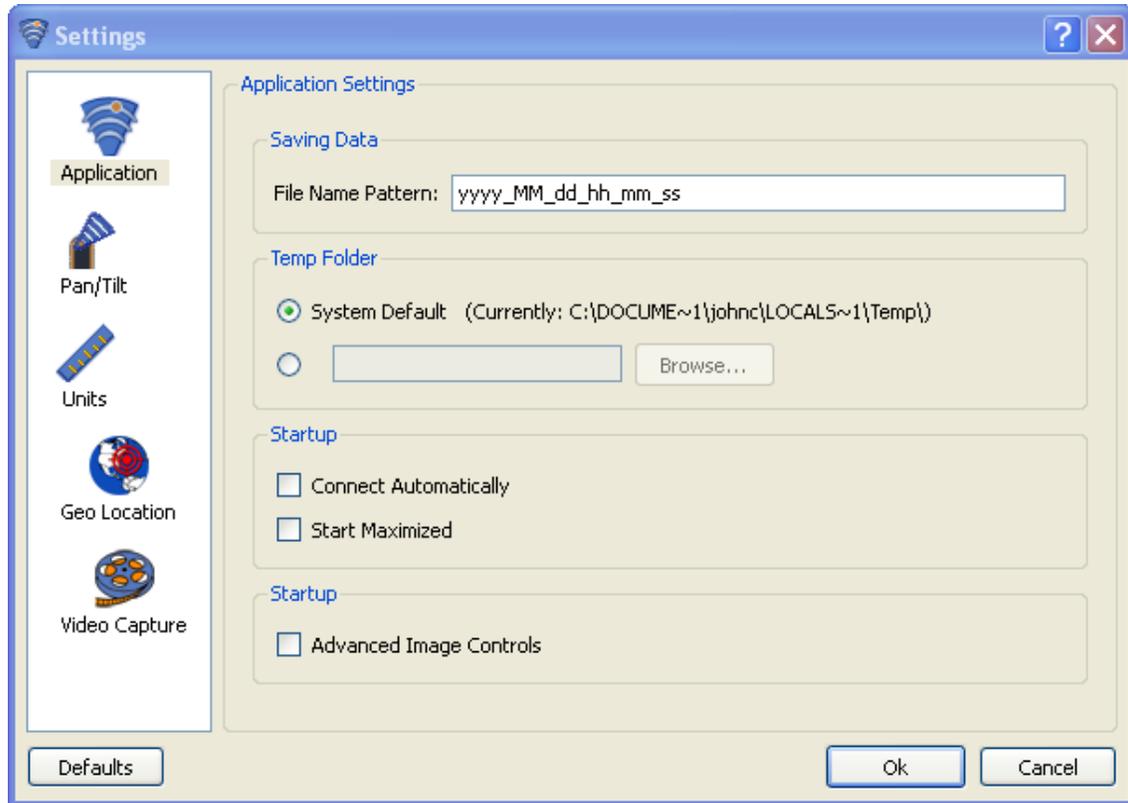
File Name Pattern

The file name pattern is used to generate the default names for recording files as well as taking snapshots. It's made up of a text string with embedded format 'codes' as listed below:

Code	Description
d	Day as number without a leading zero (1-31)
dd	Day as number with a leading zero (01-31)
ddd	Abbreviated day name (e.g. 'Mon', 'Sun')
dddd	Long day name (e.g. 'Monday', 'Sunday')
M	Month as number without a leading zero (1-12)
MM	Month as number with a leading zero (01-12)
MMM	Abbreviated month name (e.g. 'Jan', 'Dec')
MMMM	Long month name (e.g. 'January', 'December')
yy	Year as two digit number (00-99)
yyyy	Year as four digit number (1752-8000)
h	Hour without a leading zero (0-23 or 1-12 if AM/PM display)
hh	Hour with a leading zero (00-23 or 01-12 if AM/PM display)
m	Minute without a leading zero (0-59)
mm	Minute with a leading zero (00-59)
s	Second without a leading zero (0-59)
ss	Second with a leading zero (00..59)
AP	Replaced by either 'AM" or 'PM". Also switches h and hh to 12hr mode.
ap	Replaced by either 'am" or 'pm". Also switches h and hh to 12hr mode.

For example, yyyy_MM_dd_mm_ss will produce a file name similar to 2006_05_15_13_45 corresponding to 1:45PM on June 15th, 2006.

> **NOTE**: The time used for the file name is the system's local time.

Temp Folder

When you start recording, ProViewer initially creates the data file in this location. After you stop recording, ProViewer prompts you to save it. By default, this is the computer's temp directory. However, you can click the Browse button to change it.

If either the computer or ProViewer happen to crash while recording, the file will be left in this directory. If you try to open that file, ProViewer will detect that it is corrupt and will attempt to recover what it can. For large files, this process could take a long time.

Startup Options

When the Connect Automatically check box is checked, ProViewer connects to the first available sonar when the program is started. Start Maximized tells ProViewer to show its window maximized on startup. These features are useful for systems that have a relatively fixed configuration and you want to minimize user interaction.

Advanced Image Controls

By default, ProViewer shows image controls that are designed to be easy to use. However, in some circumstances, advanced users may want to turn on Advanced Image Controls in the Application section of the Settings window (File → Settings). These advanced controls display their values in dB instead of percent. Also note that the intensity control appears to be reversed. This is done so that large dB values appear on the right side. The threshold and intensity controls set the lower and upper histogram thresholds, respectively. The colormap ramps between those two histogram thresholds. For example, when the threshold and intensity values are close together, the colormap transitions from dark to bright over a small range of actual pixel values. This results in a high contrast image.
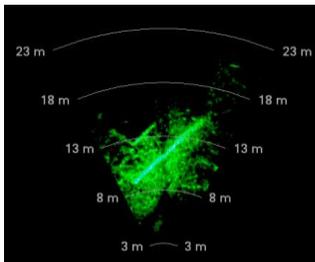
Threshold Raised to 65dB   Auto-Intensity Enabled   Intensity Lowered to 65dB
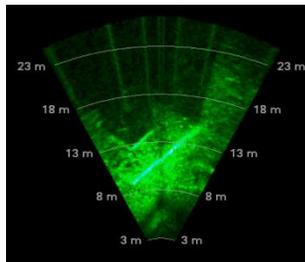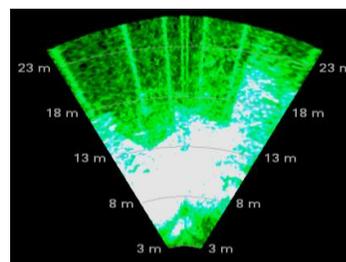
NOTE: Increasing the threshold too far may make some types of targets hard to track. Similarly, increasing the intensity too far will cause much of the image to saturate, making target tracking impossible.

Pan and Tilt Setup

The following sections describe how to configure and use a digital pan & tilt unit from Remote Ocean Systems (ROS) with ProViewer. If you do not have this unit, you can skip this section.
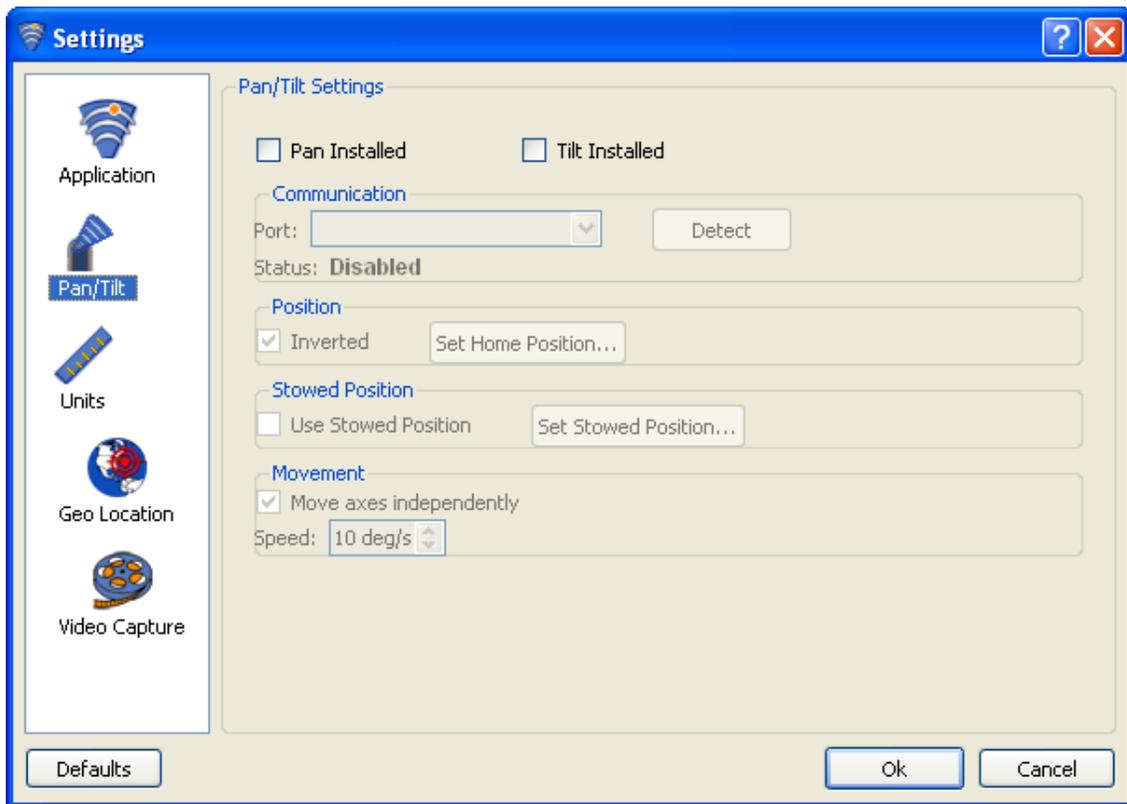
> **NOTE**: Pan & Tilt settings are only available when you are not currently connected to a sonar. Please close the sonar first, and then return to the Settings window.

If your unit is capable of rotation in both axes, check both the Pan Installed and the Tilt Installed check boxes. If it's only capable of rotating on a single axis, check only the appropriate box.

Next, either select the proper com port from the list or click the Detect button. If your pan/tilt unit is inverted, (i.e. the Pan & Tilt hangs upside down from the surface) then check the Inverted check box.

> **Warning**: The auto-detection process will probe for a pan/tilt unit on each of your computer's serial ports. This process might confuse other attached serial devices. Please make sure that they are disconnected or turned off prior to clicking the Detect button.

Home Position

Once the Pan & Tilt unit and sonar are mounted, it is important to set the 'home' position. This serves as the zero point for both pan and tilt. To set the 'home' position, click the Set Home Position button. Using the pan and tilt buttons in the dialog, align the sonar to the desired position and click Save.

With a home position set, at any point in the operation of the Pan and Tilt, the Home button can be pressed in the ProViewer window to return the Pan and Tilt to the set position.
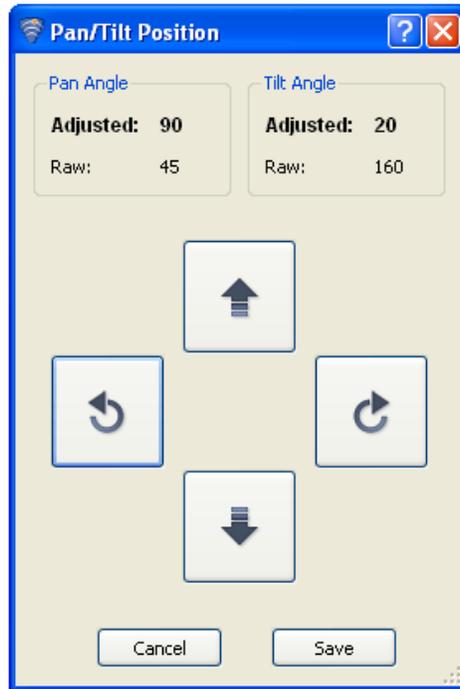
Stowed Position

The optional 'stow' position allows you to specify a storage position for the sonar. If the 'stow' position is enabled, ProViewer asks if you want to stow the sonar when connecting. To enable it, first check the Use Stow Position check box. Then, click the Set Stow Position button.

Operation

ProViewer displays the sonar position control on the right side of the screen. Use the directional buttons to move the pan and tilt. To move to either the 'home 'or 'stow' positions, click on the corresponding buttons.

Above the position controls, an indicator provides a graphical indication of the current tilt angle, as well as text indicators for both pan and tilt angles.
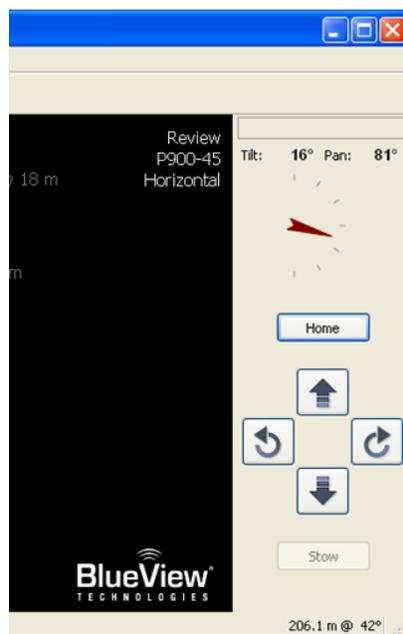
Units

The following sections describe how to set the default units displayed in the sonar window. These unit settings are for display only, and do not affect how the data is saved in the file.
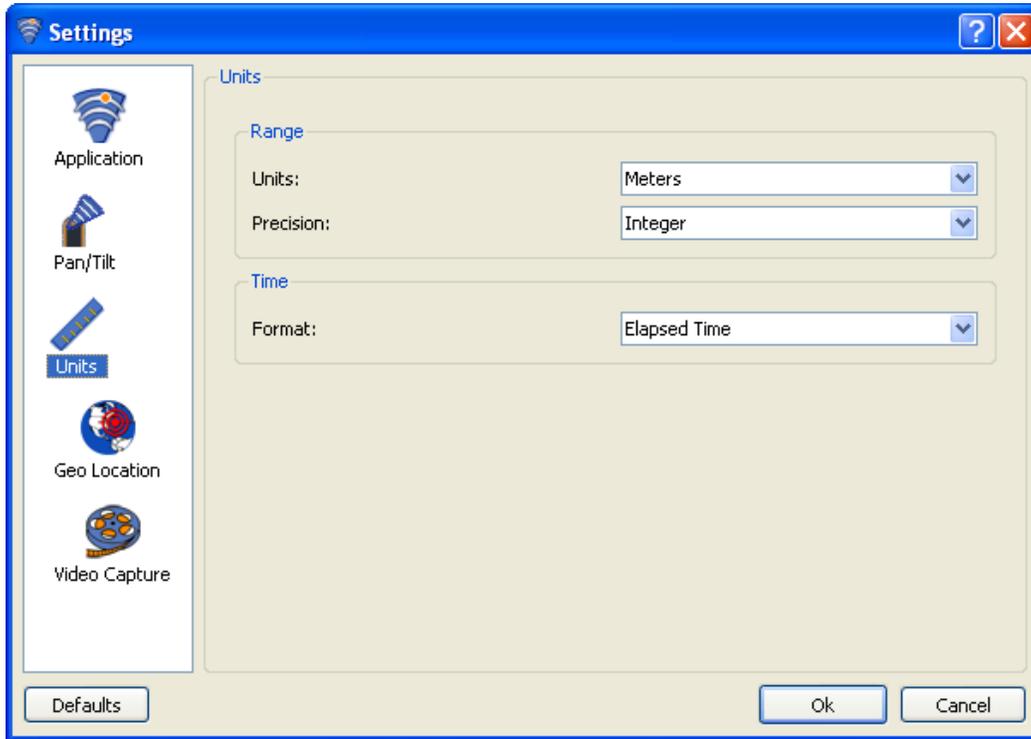
Units

This allows the user to change between meters, feet, or yards for the display window. This will change all instances of length in ProViewer including Start and Stop ranges, Range Arcs, and the Measurement Tool.

Precision

This allows the user to change the precision of the values used in the display including Range and Bearing, Length, and Range Labels. It does not affect the Range Sliders, which always use whole meters.

Time Format

This control allows the user to change the format of the time displayed on the lower left hand corner of the ProViewer window. When data is recorded, the UTC time is always saved in the file, along with the time zone information. So UTC can be selected later for display, to give a definite time when the data was recorded, regardless of the time zone at that location.

> **NOTE**: For files, the Local Time option is based on the time zone of the computer when the file was recorded. This ensures that if you recorded the file at 9AM in Seattle, ProViewer will slow 9AM even when you play it back in Boston. To see an absolute time, use the UTC option.

Geo Location

The following section describes how to configure the Geo Location options, which allow ProViewer to accept input from GPS, compass, and depth sounder devices, using the industry standard NMEA protocol. Values captured from such devices will be saved in the .son file while recording, and will be displayed on the screen both on playback and during live viewing.
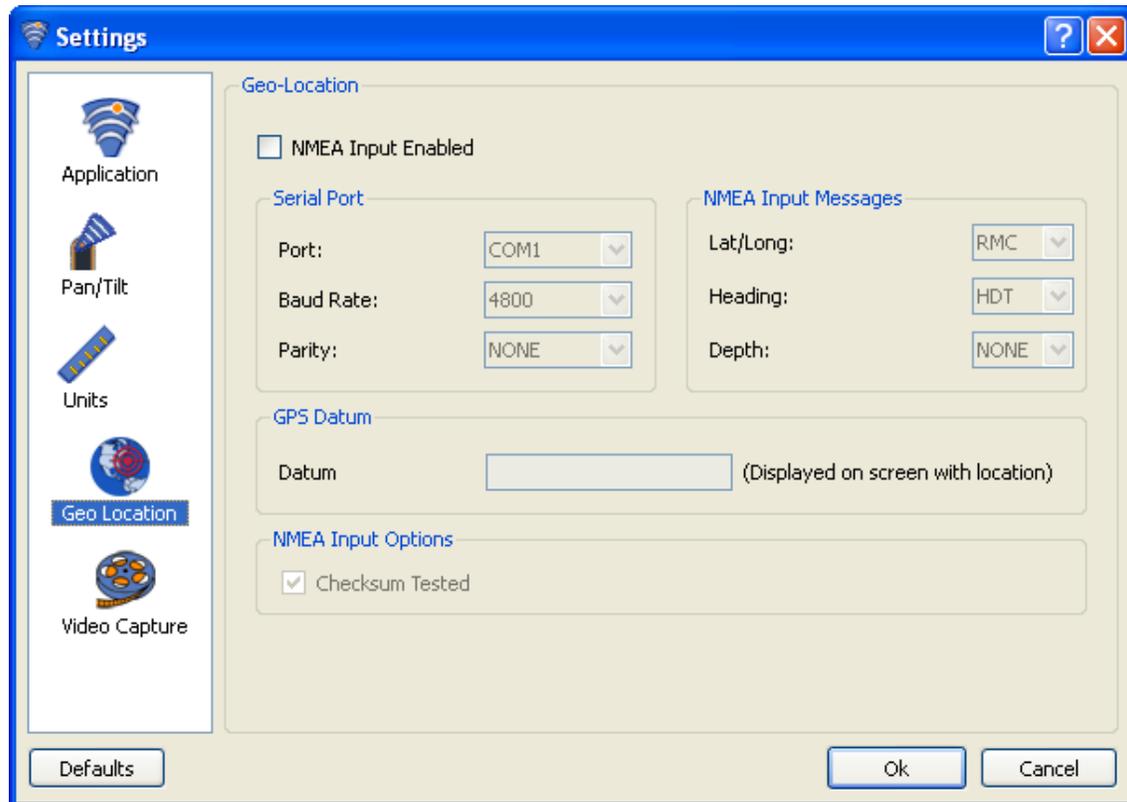
Enabling NMEA Input

Check the box to enable the input of any of the NMEA message types. Note that ProViewer supports the NMEA 0183 standard.

Serial Port

Choose the serial port connected to the NMEA bus. The official NMEA setup is 4800 baud, 8 bits, no parity, one stop bit. Some newer devices use faster baud rates. Note that the current setup only supports a situation where all NMEA devices are consolidated to a single connection.

NMEA Input Messages

Choose the NMEA message being sent for the particular type of data. Each of the data types has a choice of "NONE" available. The most common messages are set by default, as shown above.

Note that only the 3 letters indentifying the message type is used. The first two letters (out of 5) in the full message identifies the "talker" and may be manufacturer specific, so they are effectively ignored for the purposed of choosing which messages to listen for.

The Heading options are designed for compass source. However, ProViewer does provide the RMC GPS option. This is really not a heading, but Course Over Ground. It is only provided as a worst case fallback in order to record some idea of the boat heading. Selecting this option will cause a warning dialog to be displayed.

GPS Datum

This option allows the entry of a text string identifying the geodetic datum used in the data collection. This string will be saved in the .son file and shown on the screen on playback, if there is other Geo Location data available. The string is optional, and the "WGS84" shown above is an example of a common datum.

NMEA Input Options

At this time, there are no user changeable NMEA input options. Valid checksums on the NMEA messages are required, or the messages will be ignored.

Geo Location Screen Display

To the right is an example of the screen display of Geo Location data, which will be located in the upper left corner of the display. Latitude and Longitude are displayed in whole degrees, plus fractional minutes of arc.
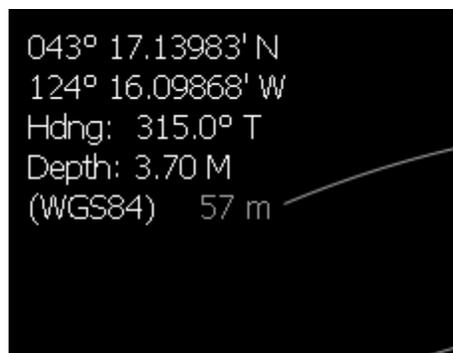
Video Capture

ProViewer is capable of capturing and syncing standard video with sonar data. When a Windows "Video Capture Device" is connected to the computer and video capture is enabled in ProViewer's settings, an .avi file with the same name as its corresponding .son file will be saved in the same directory.
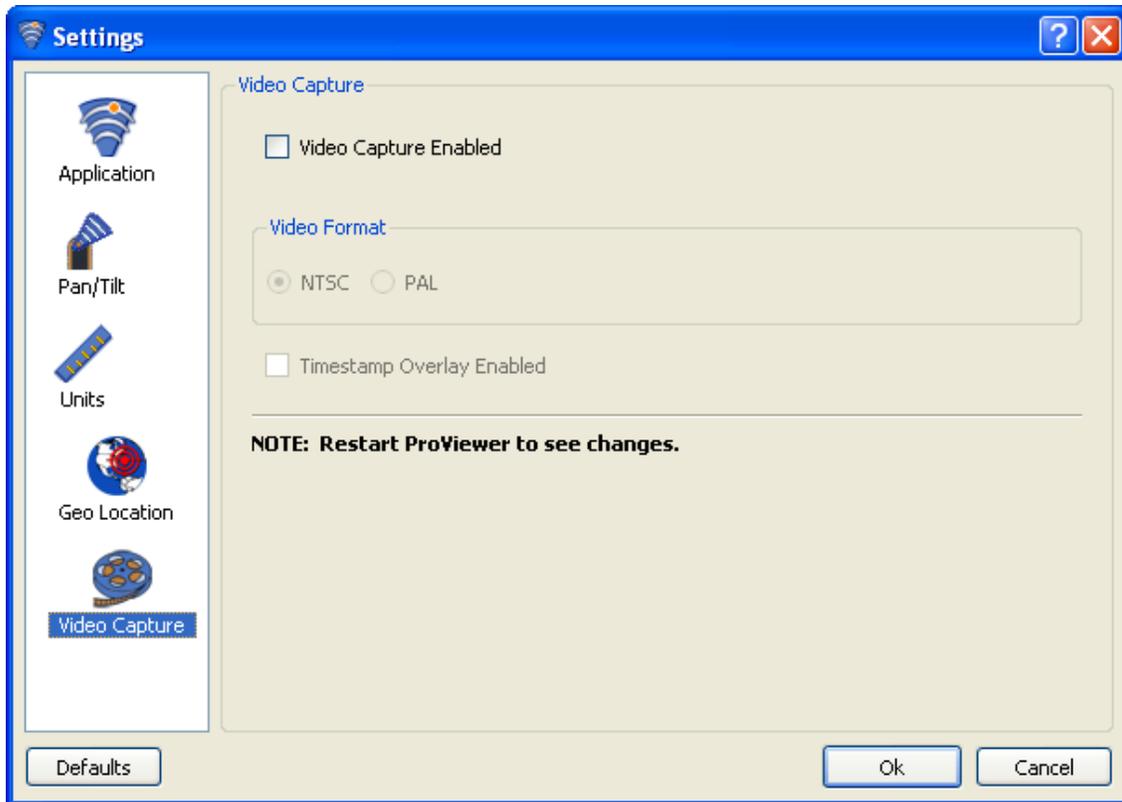
> **NOTE**: To avoid lag while saving captured video, make sure ProViewer's temp directory and final save location are on the same hard drive. Otherwise the video file's transfer can cause a bottleneck, and slow down ProViewer.

Video Format
Choose which format captured video should be saved in. North America and Asia tend to use NTSC, while European countries most often use PAL.

Timestamp Overlay
If enabled, ProViewer's timestamp will be embedded in the top left corner of the captured video. An example is pictured below.

24 Nov 2009   12:59:59

Appendix A: Troubleshooting

This section is designed to help you quickly identify and solve issues dealing with the inability to connect to a BlueView sonar from a PC. While the basic connection between sonar and computer is straight forward, things can get very confusing once integrated into a delivery system.   The approach we will use attempts to test different potential causes in a way that optimizes the debugging process. The following steps are recommended to identify and possibly fix issues you may be having:

> ➢ Rerun ProViewer Software
> ➢ Reboot PC and Sonar
> ➢ Check Network Settings
> ➢ Check Connectors
> ➢ Check Power
> ➢ Test Sonar
> ➢ Common Communication Link Issues

Rerun ProViewer Software

ProViewer searches for sonar on the local network when the software is initially opened. If a sonar did not complete its boot process before ProViewer was opened, it may have missed that sonar. Rerunning the software can fix this.

If ProViewer still does not see the sonar, try manually adding the sonar by clicking the "Add" button under the "Sonar Devices" window that should automatically open when a sonar is not found. Enter the sonar's IP address (factory set to 192.168.1.45) and click enter.

If you where not able to connect to the sonar, go on to the next section "Reboot PC and Sonar"

Reboot PC and Sonar

Power down both the sonar and computer and wait ten seconds. Turn on the computer first, letting it boot up completely before turning on the sonar. This can solve network configuration problems that may have come about. The sonar takes 35 seconds to boot up (with a static IP address, and about 100 seconds otherwise), so do not be surprised at sporadic network connectivity during this boot up process. Once everything is back up and running, open the ProViewer software and try to connect to the sonar. If you were not able to connect to the sonar, go on to the next section "Check Network Settings."

Check Network Settings

For proper connection and operation of BlueView sonar, the control PC should be set to a static IP address of 192.168.1.3 as shown in Chapter 3 – Connecting to a Sonar of this manual.

While changes to the network settings can be done without restarting the PC, a quick power down can solve many network problems that can arise during network setup. With that in mind, power down both the sonar and computer, wait 10 seconds, then power everything up. This can solve network configuration problems that may have come about. Once

everything is back up and running, open the ProViewer software and try to connect to the sonar.

> **NOTE**: The sonar takes up to 35 seconds to boot up, so do not be surprised at sporadic network connectivity during this boot up process.

If you where not able to connect to the sonar, go on to the next section "Check Connectors"

Check Connectors

It is not uncommon for topside connectors to get pulled out of their ports or subsea connectors to get corroded. Power-down the sonar, and check the condition and proper seating of all connectors in the system. Once you have verified condition and proper seating of all connectors, re-power the Sonar, wait 35 seconds, then try to reconnect to the sonar from ProViewer software.

If you where not able to connect to the sonar, go on to the next section "Check Power"

Check Power

If the sonar does not receive the correct DC voltage on the correct pins, it can not operate properly. Faulty power supplies, tripped breakers, and damaged cables can all be the source of this problem. The best way to verify proper voltage is by measuring the voltage at the sonar connector using a multimeter. Refer to the hardware manual for your specific sonar for detailed connector/pin information. If you where not able to connect to the sonar, go on to the next section "Check Sonar"

Check Sonar

In most cases, the cause of the problem is not a faulty sonar, but before you start tearing apart your system looking for a problem, it is worth taking a quick second to verify that the sonar is working properly. This is accomplished by setting up a bench-top test using the test cables and AC power supply that came with the sonar. This test will quickly tell us whether the problem is with the sonar/PC or with the rest of the system. Use the following instructions to setup and test your sonar.

Bench-Top System Assembly Instructions

After installing the software found on the included CD, the sonar can be connected for use. See the hardware manual that shipped with the sonar for further instructions.

Troubleshooting Table

Below is a problem solution table for some of the common problems encountered during the bench-top test setup.

Sonar does not connect:

Possible Cause	Possible Solution
No Power	Confirm that the POE box is plugged into a standard 120VAC outlet and that the small green LED on the POE box is glowing. Also check that the Sonar Test Cable is plugged into the SONAR J1 port on the POE box.
Over current	A short in the sonar cable or sonar could result in an over current condition which is indicated by a blinking LED on the POE box.
Improperly connected	In addition to the connections described above, verify that you have a good cable between the computer Ethernet port and the PC J2 port on the POE box.
Bad State	Reset the sonar by removing the POE box AC power cord for 10 seconds. The sonar takes 35 seconds to reboot after power is re-applied.
Dirty connectors	Make sure that all connector pins are clean and corrosion free.
Improper Ethernet cable	The sonar cabling is conveniently designed so that you can connect your POE box to a PC with a standard Ethernet cable. The price for this convenience is paid when connecting your POE box to a network hub. In this case, you will need to use a crossover Ethernet cable unless your network hardware is capable automatically handling crossed Ethernet cables.

PC networking software is confused	Restart the networking software. There are several ways to do this, depending on your particular operating system. On Windows, you can open do this via the desktop notification area icon (lower right of your desktop) and right click on the Ethernet connection. Select Repair, or disable then enable. You can also simply restart the computer. Depending on your particular situation, it may also be helpful to cycle the power on the sonar. In this case, be sure to leave the sonar power disconnected for a full 10 seconds before restoring power.
IP subnet masks don't match	Make sure the subnet mask is the same on both PC and sonar. For the factory default Class C network configuration, the subnet mask is 255.255.255.0. The 255 part of the mask defines the network part of the IP address. The 0 part of the mask defines the device part of the IP address.
IP network addresses don't match.	Make sure the IP network portion of the IP address is the same on both the sonar and the computer. In the factory default case, this is the first 3 numbers in the IP address: 192.168.1.
IP network device addresses are the same.	The device part of the IP address must be different for every device on the network. In the factory default case, the sonar is set to 45 and the PC is normally set to 2. Don't use 255, as it's reserved for broadcast use.
PC 'ARP' table is stale.	In the ProViewer Sonar Devices window, click the ADD button and enter the IP address you think the sonar is set to respond to, then click 'OK'. The sonar should respond within several seconds. You may also need to cycle the PC power to refresh the ARP table.
Poor connection quality	Use an ohmmeter to verify Tx and Rx line connectivity between the Ethernet connector that plugs into the PC and the 10 pin connector that plugs into the sonar. Refer to the sonar hardware manual that came with your sonar for information on pin to pin connection information.

You suspect you've misconfigured the sonar IP address	To connect with the sonar, its IP address must be compatible with the network or computer to which it is attached. If you misconfigure the sonar's network settings and are unable to connect to it, follow this procedure to re-establish communications with the sonar: 1. Connect the sonar communication cable directly to a Windows XP computers network interface card. 2. As described below in the 'Running the sonar on a network' section, open the 'Internet Protocol (TCP/IP) Properties window for the network interface card you plugged the sonar into. Under the 'General' tab, select 'Obtain an IP address automatically'. Under the 'Alternate Configuration' tab, select 'Automatic private IP address' and click OK. 3. Close the rest of the windows folders you opened. 4. Cycle the sonar power off (for at least 10 seconds), then turn the sonar back on. 5. After about 100 seconds, the Widows PC and the sonar should have negotiated 'link local' IP address (in the range of 169.254/16). 6. Using the ProViewer software, 'connect' normally and reconfigure the sonar's network settings to be compatible with its intended network.

If the image looks broken or misaligned:

Possible Cause	Possible Solution
Image Calibration	Type CTRL-J to bring up the Image Calibration dialog, and re-align the sonar image as needed. See pg. 14 for an illustration.

If the image updates seem slow:

Possible Cause	Possible Solution
Ethernet Congestion	Shut down other computers or services that are consuming the Ethernet network bandwidth. The Sonar requires about 30 Mbps of network bandwidth to operate optimally. The sonar hardware supports 10 and 100 Mbps network cards and network routers and switches. (the sonar itself has a 100 Mbps network interface)
Range settings	When your sonar 'pings', it has to wait for the echo to return from a distant object; long 'range' settings directly cause slow updates. Reduce the 'Range Stop' distance to increase the update rate.
GUI window size	The larger the displayed sonar image is, the longer it takes for the ProViewer software to construct the image. To increase the image display update rate, decrease the size of the sonar image display window by grabbing one of sides or corner of the GUI and dragging it towards the center of the GUI window. Also, old video cards may have a limited ability to update the display quickly, which can cause the window size to be even more of an issue. PCI (not PCI Express) cards can have this problem.

At this point, if you where able to connect to your sonar, you can assume your sonar is working properly and that the PC is set up correctly.

Still not working?

Please contact us:

BlueView Technologies Customer Support

www.blueview.com

206-545-7260

8am – 5pm PST Mon through Fri

Appendix B: Sonar Networking Options

BlueView sonar are designed to operate either attached directly to your PC, or attached to a common Ethernet network. To configure the sonar's network options, start by selecting 'Connect' under the 'File' menu. Then select the Sonar 'Head' and click the 'Properties' button, then select the 'Network' tab. The display should now look like this:
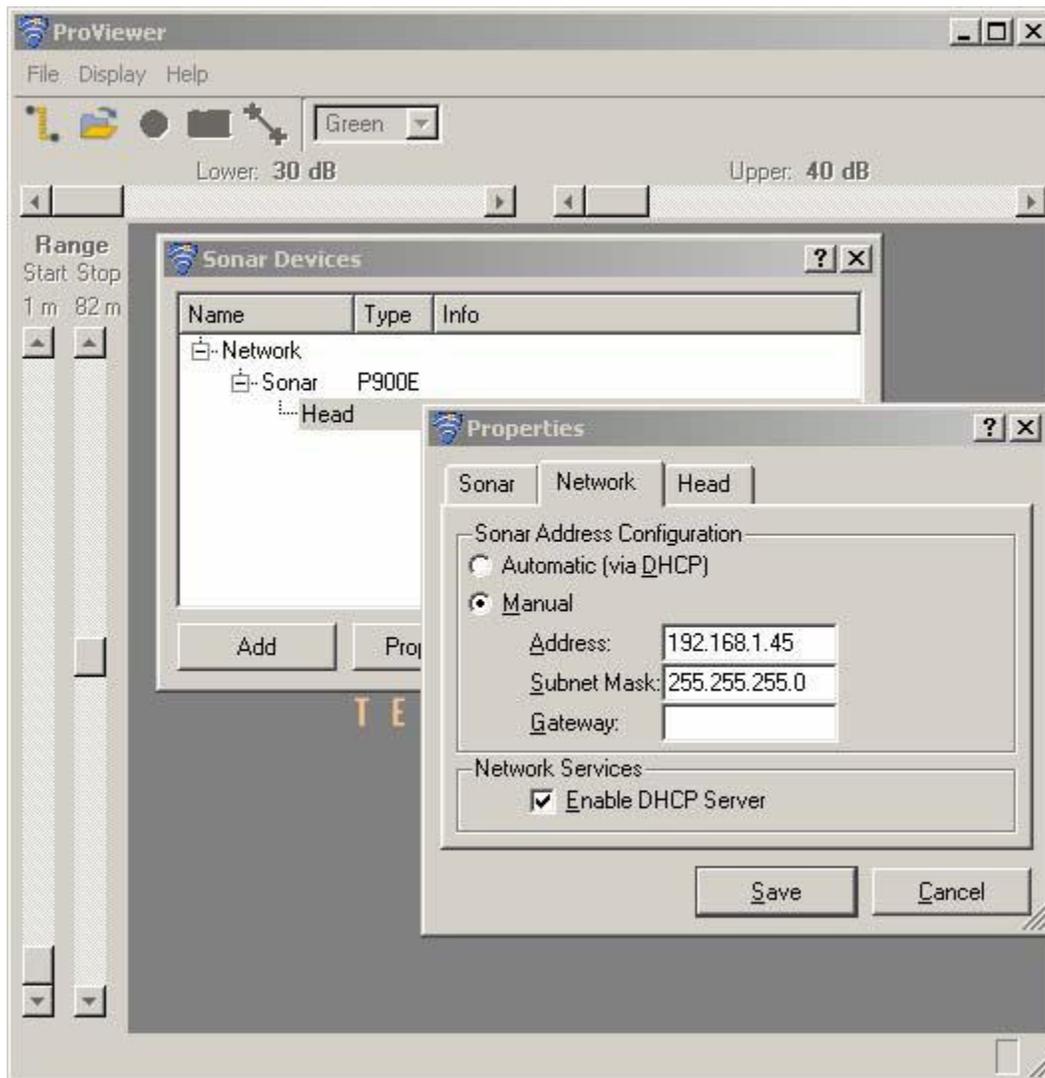
Refer to the following sections for information about sonar networking configuration options.

Sonar Factory Default:

The sonar ships from the factory with this default configuration:

- ➢ Static IP address: 192.168.1.45
- ➢ Subnet Mask: 255.255.255.0
- ➢ DHCP server: enabled.

NOTE: With the onboard DHCP server enabled, you should not connect the sonar to a computer network that has its own DHCP service enabled.

To operate a BlueView sonar configured with the factory defaults, you must configure your PC network card TCP/IP properties appropriately. On the windows platform, open the control panel. Double click the 'Network connections' tool. In Network Connections, select the network interface (probably 'Local Area connection') that is connected directly to the sonar.

The Windows TCP/IP Properties window looks like this:
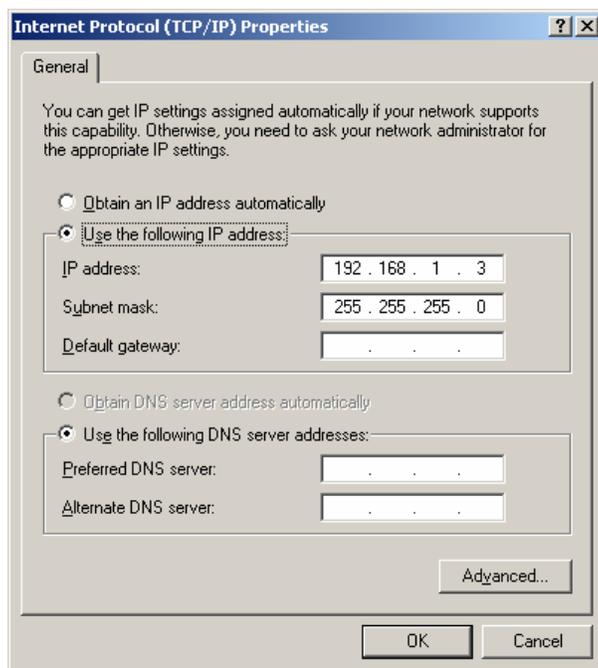
If you choose 'Use the following IP address' as shown above, the PC will connect to the sonar in about 35 seconds. (shortly after the sonar finishes its boot process)

If you select 'Obtain an IP address automatically', the PC will get its IP address from the DHCP server running on the sonar. It may take up to 100 seconds for the PC to get its IP address from the sonar. The PC's networking software may briefly report 'limited or no connectivity' while acquiring an IP address from the sonar. Once the sonar is finished

booting, this process of the PC acquiring an IP address can usually be sped up by opening a "DOS Window" (Command Prompt), and running the command: "ipconfig /renew".

Warning: By factory default, the sonar provides DHCP service to the computer or network it is attached to. If your network has a DHCP server operating, you should disable the sonar DHCP server before hooking it up to the new network.

Instead of connecting the sonar directly to your computer, you may communicate with it via a common Ethernet network (using either a network hub or switch). In this case, you must configure your PC's Local Area Network TCP/IP properties, and your sonar network properties in a compatible fashion:

- ➢ The masked portion of the sonar IP network and the PC IP network must match (in the factory default case, a subnet mask of 255.255.255.0 means that the first three sections of the IP address, such as 192.168.1, must match between the sonar and the PC).
- ➢ Each sonar's device number within the network must be unique and different than the PC's device number. For example, you could set the PC's device number to '3', the first sonar to '45', a second sonar to '46', etc. (for instance: PC = 192.168.1.3, sonar 1 = 192.168.1.45, sonar 2 = 192.168.1.46)
- ➢ Both the sonar and the PC must have the same subnet mask (in this case 255.255.255.0)
- ➢ The PC 'Default gateway' and 'DNS server addresses' must be set appropriately to enable the PC to communicate with devices outside the 192.168.1 network. If you only have sonar attached to the PC network, you don't need to set the gateway or DNS server addresses.

Multiple sonar devices can be placed on the same network, as long as only one has its DHCP server enabled.

Note: The sonar Ethernet wiring is designed to connect directly to a PC network card. Generally, to connect the sonar to a network hub or switch, you need to use a 'cross-over' Ethernet cable. However, many modern network hubs and switches are designed to 'auto sense'. You can connect your sonar to an 'auto sensing' network device with the same cable you use to attach to a PC.

Appendix C: XML Export Format

ProViewer provides an option for exporting sonar data in a format that is accessible by third party software applications. When a series of pings are exported using this option, ProViewer creates a group of files in the user specified output location. Each ping of the series is saved as a file with a .raw file extension. Additional information associated with the data series is stored in an XML file named meta.xml. Meta.xml contains information about the exported data set, such as range settings, number of pings, etc. An example of this file can be found below. The file consists of a sonar element followed by a series of ping elements.

Sonar Element

The sonar element describes the sonar and its settings when the file was exported. The sonar element will have a head element for each head available on the sonar. In most cases, there will be a single head. Each head will have a settings element that contains the range settings, sound speed, etc.

Ping Element

Each ping in the export gets a ping element. The time attribute contains the date time (UTC) when the ping was captured in the format specified by ISO 8601. utcoffset stores the number of seconds to be subtracted from time to get the local time when and where the file was recorded (assuming the recording system was configured with the correct time zone).

Each ping also contains an image element containing information about the image captured. At the time of this writing, there is only one type defined, RAW. This file contains the raw, uncompressed image in row-major order with the specified width and height. Each pixel is represented by depth bits with a byte order specified by the byteorder attribute. The text inside the image element is the filename for that image.

The image element has three attributes that allow you to locate the image relative to the sonar head. The first, range res is the 'size' of each pixel in meters. Origin_row and origin_col specify 'where' the sonar head is located in pixels. This is effectively the 'origin' location. In most cases, origin row will be larger than height. The following equations give the location relative to the head for a given pixel.

$$x = (origin\_row - row) \times range\_res$$

$$y = (origin\_col - col) \times range\_res$$

x and y are the range and cross-range location of the pixel (relative to the sonar head) in meters. To get range and bearing:

$$range = \sqrt{x^2 + y^2}$$

$$bearing = \arctan\frac{c}{r}$$

XML Example

```
1  <export>
2    <sonartype ="P450E" serialnumber ="00112">
3          <name>BlueView Sonar</name>
4         <revision firmware="2830" FPGA="0" />
5         <head type="DEFAULT" id="0" serial number="0" centerfreq="450000">
6                <name>Head</name>
7                <settings
8                    windowstart="1.239892"
9                    windows top="60.000000"
10                   gain="2.000000"
11                   tvg="0.000000"
12                   soundspeed="1540"/>
13        </ head>
14   </sonar>
15   <ping head="0" number="0" time ="2006-11-30T17:39:45.763Z" utcoffset="28800">
16         <image type="RAW"
17                width="332"
18                height="426"
19                depth="16"
20                range_res="0.137597"
21                origin_row="433"
22                origin_col="166"
23                byteorder="BIG_ENDIAN">
24                 img-h0-p000000.raw
25         </image>
26   </ping>
27   <ping head="0" number="1" time ="2006-11-30T17:39:46.123Z" utcoffset="28800">
28         <image type="RAW"
29                width="332"
30                height="426"
31                depth="16"
32                range_res="0.137597"
```

```
33              origin_row="433"
34              origin_col="166"
35              byteorder="BIG_ENDIAN">
36               img-h0-p000001.raw
37          </image>
38  </ping>
39 </export>
```

Image Reconstruction

With the information found in the XML file, each .raw file can be mapped back into an image. In the above example, each pixel in the sonar image is represented by 2 bytes (16 bits), and each row contains 332 pixels. Therefore, by breaking the .raw file into rows 664 bytes wide (332 pixels times 2 bytes per pixel) an image can be created that is 336 pixels wide by 426 pixels tall. This is also illustrated in the diagram below.