

**RESON
6046 Software**

USER'S MANUAL



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Printing History

RESON strives to maintain up-to-date information and may, as necessary, review and revise this manual. The printing history is as follows:

November, 2004	Manual Version 3.00
January, 2003	Manual Version 2.00

Electronic File Version

This manual is available from RESON in the Adobe® Acrobat® Portable Document Format (PDF). The selected PDF process preserves the interactive index and cross-reference features of the original Microsoft Word document.

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1.1 Product Overview

1.1 Product Overview

The RESON 6046 Data Acquisition Software package consists of two separate components: the Payload Controller (PLC) and the Data Visualization Utility (DVU).

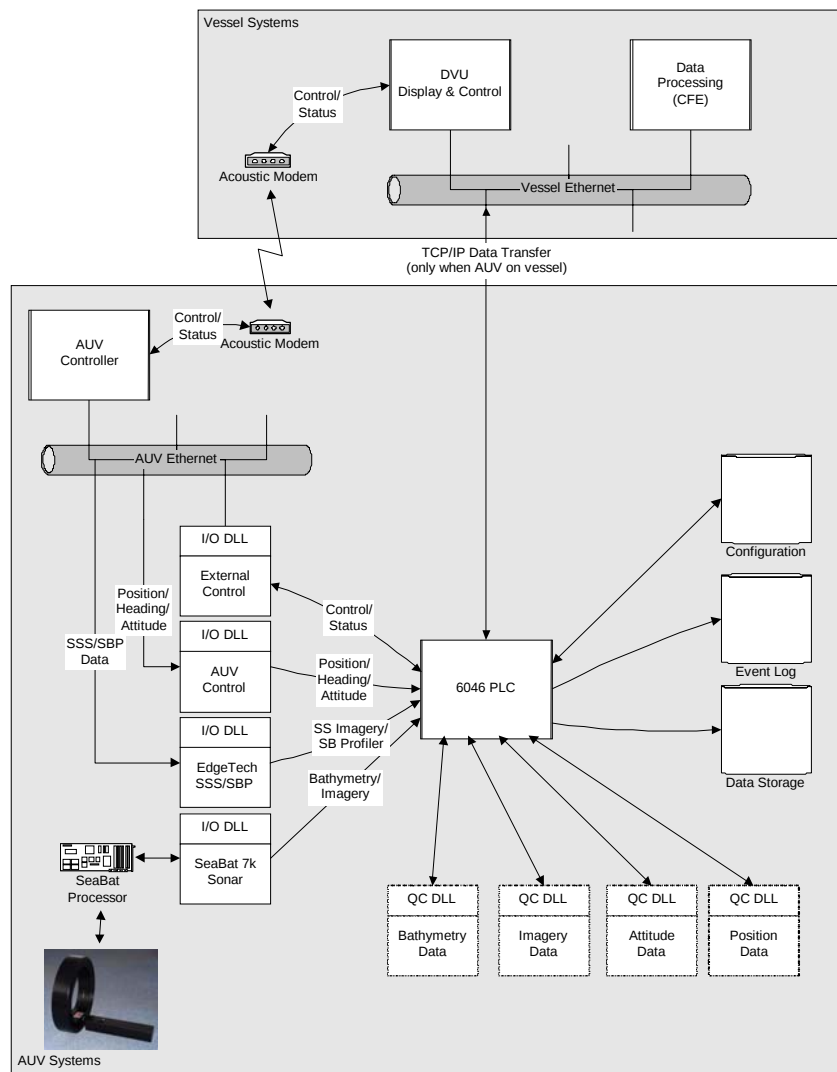


Figure 1: RESON 6046 System Block Diagram



1.1.1 Payload Controller

The RESON 6046 Payload Controller (PLC) resides within the sub-surface unit's on-board computer system. It is designed to run autonomously, using specific configuration files and system settings to collect and log data and to provide remote control capability to its suite of integrated sensors.

In the most common AUV arrangement, the vehicle controller supervises the PLC. However, if an adequate TCP/IP communications link exists between the PLC and the DVU systems, the DVU may be used to control the PLC and to view the sensor data as it is collected.

1.1.1.1 Supported Sensors

The list of sensors supported by the PLC periodically changes. Check with your local RESON office if the sensors you require are not listed below.

The following sensors are supported:

- SeaBat™ 7000 Series Sonar Systems
- EdgeTech FSDW system consisting of the following subsystems:
 - o Sub-Bottom Profiler (SBP);
 - o Low Frequency Side Scan Sonar (SSS LF);
 - o High Frequency Side Scan Sonar (SSS HF).
- BlueFin Vehicle Control Computer or compatible.

The present version of the EdgeTech FSDW module supports only coupled internal triggering mode where the SSS LF is the master subsystem. As a result, all three subsystems are currently required to be active for data to be collected from this system.

1.1.2 Data Visualization Utility

The 6046 Data Visualization Utility (DVU) software resides on a dedicated top-side PC and allows control of the PLC software during pre- and post-deployment as well as maintenance and testing. The DVU may also be used to view (replay) data collected during preceding missions.

1.2 How to Use this Manual

This manual is designed to accommodate both the first time user, who needs detailed instructions, and the experienced technician, who only requires a

reference tool. It provides detailed procedures for the correct installation and operation of the **6046 Software**.

1.2.1 Document Conventions

The following information will make it easier for the reader to interpret the text presented in this manual:

Table 1: Document Conventions

Convention	Definition
RESON Product	Indicates the name of a RESON product.
<i>Hyperlink</i>	Indicates a hyperlinked cross reference. Click the word to be taken to the specified reference point.
Glossary Term	Uncommon Terms and Acronyms defined in the Glossary will be represented with initial capital letters.
Ctrl + C	Indicates a particular key on the computer keyboard. Example: " Ctrl + C " indicates that the user should press the "Control" key and the "C" key simultaneously.

1.2.2 Notes and Warnings

All notes and warnings will be shown in the following format:

NOTE:

This is a note. It indicates information that might be useful to the user, but is not necessarily vital to the operation of your system.

ATTENTION!

This is a warning box. It indicates important information with regards to your SeaBat™ system. Disregarding these warnings could result in accidental misuse or damage to your SeaBat™ system or computer.

1.2.3 Chapter Arrangement

All RESON software manuals are designed with the same basic structure. Only the Appendices will change from one document to the next, depending on the nature of the product for which the manual has been written.

The following information is present in every RESON manual:

- **Introduction:** This section provides a short summary of your RESON software package, as well as information as to how the manual may best be interpreted.
- **Installation:** This section provides detailed installation instructions for your RESON Software.
- **Program Operation:** This section provides detailed instructions for the operation of the software.

In addition to the above sections, the following Appendices have been included for reference:

- **Glossary of Terms:** Definitions of acronyms and technical terms used in this manual.

If you require additional information or need clarification of any part of this document, please contact RESON Customer Support for assistance.

1.3 Reference Documentation

The data format and protocol used by the PLC to communicate with remote clients (such as the DVU or vehicle controller) are defined by the following documents:

- **Ref 1:** RESON SeaBat 7k Data Format Definition, Volume I.
- **Ref 2:** RESON SeaBat 7k Data Format Definition, Volume III.

These documents are available from RESON upon request.

2 INSTALLATION

2.1 Chapter Overview

This chapter outlines basic installation instructions for the **RESON 6046 Software**. The **RESON 6046** Data Acquisition software, supporting documentation (including an electronic copy of this manual), and various utilities are provided on the installation CD-ROM. The following sections describe the installation and setup process.

In the most common arrangement, the Payload Controller (PLC) is hosted on proprietary hardware supplied by RESON to be located in the vehicle. Once configured, the PLC requires no further operator intervention.

The Data Visualization Utility (DVU) can be installed on any computer that meets the minimum hardware requirements and is configured to allow access to the vehicle's on-board computer via a TCP/IP-based network connection.

NOTE:

BEFORE YOU BEGIN:

Because these programs access critical system resources, the user who installs and runs the **RESON 6046** software must have administrative privileges for the computer on which the software resides. Attempting to install without administrative privileges will result in incorrect installation and operation.

2.2 Minimum Hardware Requirements

Minimum hardware requirements for this system are:

Table 2: Minimum Hardware Requirements

Component	Requirement
Operating System	Windows 2000 Professional or Windows XP Professional
Processor Speed	500 MHz
RAM	512 MB
Capacity	Minimum 1280 x 1024 Screen Resolution and an OpenGL-compatible graphics card.
Networking	Network Interface Card (supporting TCP/IP Protocol)

The PLC also requires that a valid HASP security key be attached to the computer on which it is installed. Configured keys are only available from RESON, and can be delivered in either USB or Parallel Port configurations (see *Figure 2*).



Figure 2: HASP Security Keys

2.3 Installing the Software

The **RESON 6046** Software CD-ROM contains installation programs for the following software components:

- HASP Driver.
- Adobe® Acrobat® Reader.
- 6046 Payload Controller (PLC) and Data Visualization Utility (DVU).
- VNC Remote Control and Viewer.

NOTE:

While the software may run on Windows NT 4.0 Workstation, the installation program will only work with Windows 2000 Professional or Windows XP Professional. If you wish to install the RESON 6046 software on a different version of Windows, please contact RESON Customer Support for assistance.

2.3.1 HASP Security Key Installation

In order to run the PLC, the HASP security key and its drivers must be installed on the host PC. The HASP security key installation program is located on the installation CD-ROM, in the folder “HASP Driver”.

To execute an unattended installation of the driver:

- Click the “Start” button, then select “Run”

- Enter the fully-qualified path to the “HASP Driver” folder on the 6046 Software CD, then type the following: “haspdinst –install.” *For other command line options, type “haspdinst -?”.*
- Click “OK.”

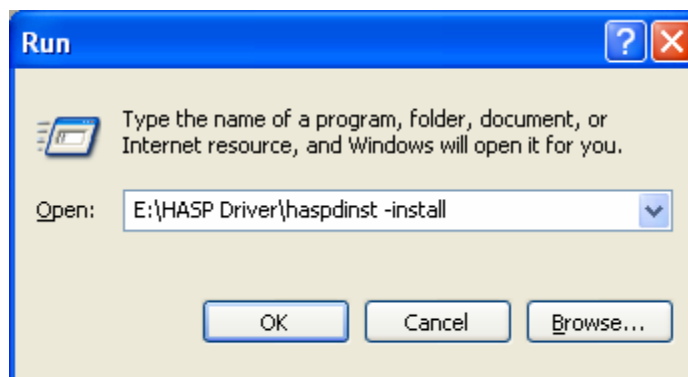


Figure 3: Sample Command Line Entry for HASP Installation

NOTE:

This program should be used in preference to older versions (provided in the sub-folder 'Obsolete' for reference purposes), as it contains fixes to allow the HASP security key to be accessed by the software when using Windows XP Professional with Service Pack 2.

2.3.2 Adobe Acrobat Reader Installation

For your convenience, Adobe® Acrobat® Reader, version 6.00, has been provided on the installation CD-ROM. Acrobat® Reader is required for viewing the electronic version of this user manual. If you do not wish to view online documentation, then installation of the Acrobat® Reader is not required.

To begin installation of Acrobat® Reader, navigate to the “Adobe Acrobat Reader” folder on the CD and execute the program “AdbeRdr60_enu_full.exe”. Follow the instructions provided in the installation program.

NOTE:

Additional information, support, and program updates for the Adobe® Acrobat® Reader are available at <http://www.adobe.com>.

2.3.3 RESON 6046 Installation

The **RESON 6046** installation program should launch automatically when the CD is placed in the CD-ROM drive. If the program does not launch automatically, follow the steps below to launch the program manually:

1. Browse the CD-ROM by double-clicking the “My Computer” icon and selecting the CD-ROM drive from the resulting window.
2. Double-click “setup.exe”.

When the setup program begins, you will see the following screen while the InstallShield Wizard configures the program for installation.

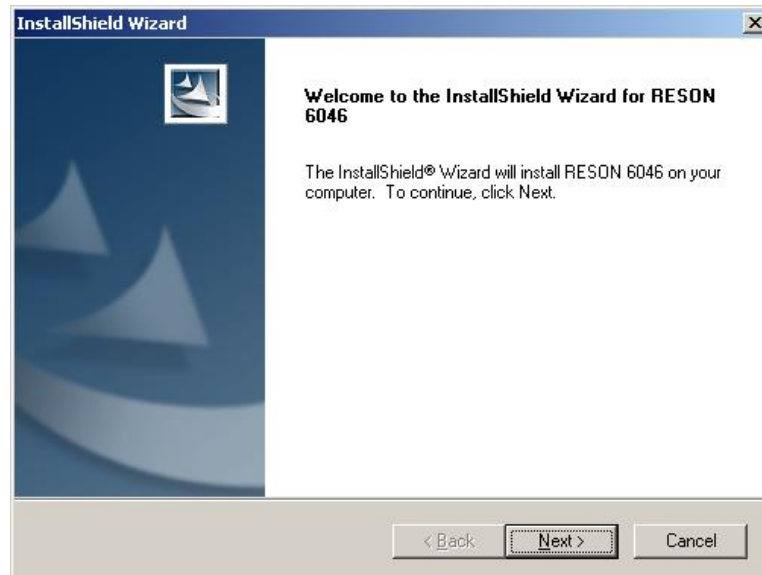


Figure 4: InstallShield Setup

When the preparation to install is completed, you will be presented with the following window. Click “Next” to continue with the installation process.

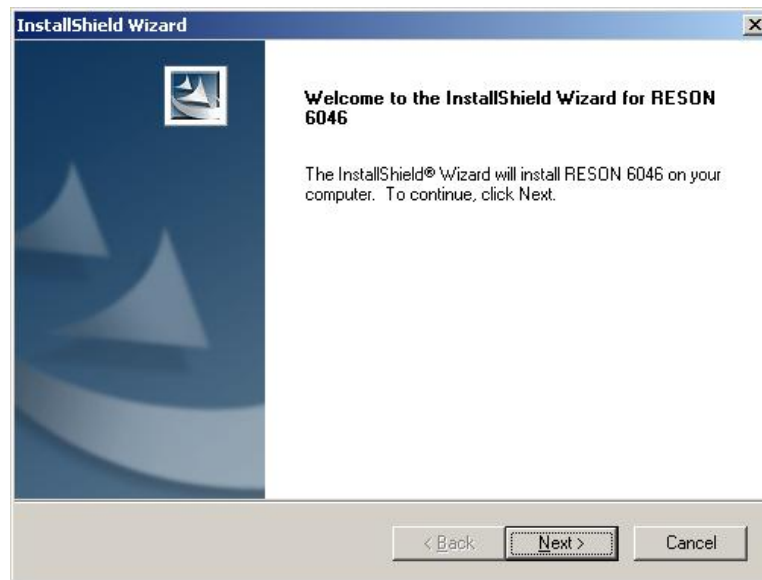


Figure 5: Welcome Dialog

The following license agreement page will be displayed. Read the agreement and indicate whether or not you accept the terms by clicking the “Yes” or “No” button. Choosing “No” will cause the installation program to terminate.



Figure 6: License Agreement Dialog

Choose the destination folder for the 6046 files. The default folder is “C:\Program Files\RESON\6046\”. This path may be changed by clicking the “Browse” button and selecting a new destination folder.

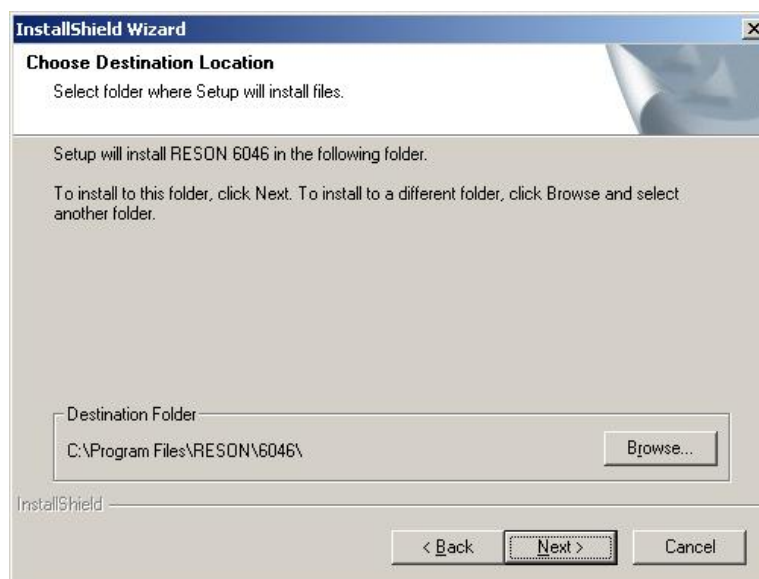


Figure 7: Choose Destination Location Dialog

Choose the components to install. The following modes apply:

- **Typical:** installs the 6046 Payload Controller (PLC), Data Visualization Utility (DVU) and documentation.
- **Compact:** installs only the 6046 Payload Controller.
- **Custom:** allows the selection of any or all of the components that are listed in the typical setup.

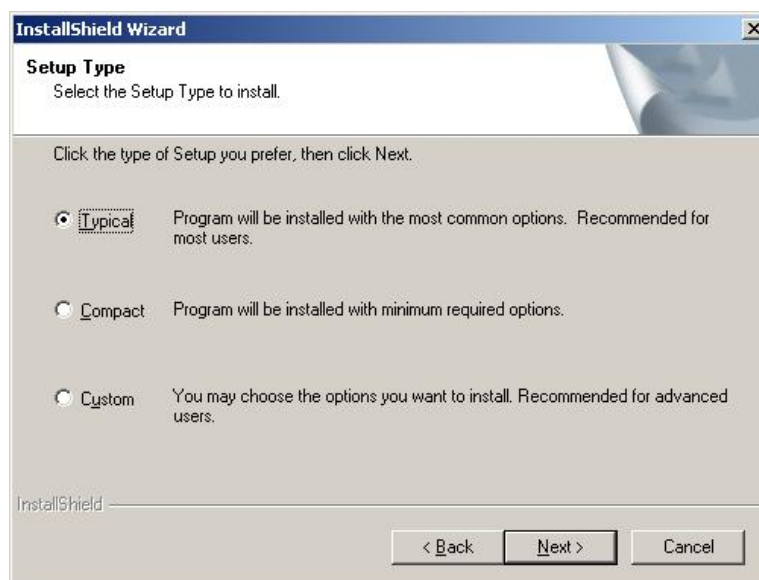


Figure 8: Setup Type Dialog

While the InstallShield Wizard copies files to your computer's hard drive, the following "Setup Status" will appear and will display progress information.

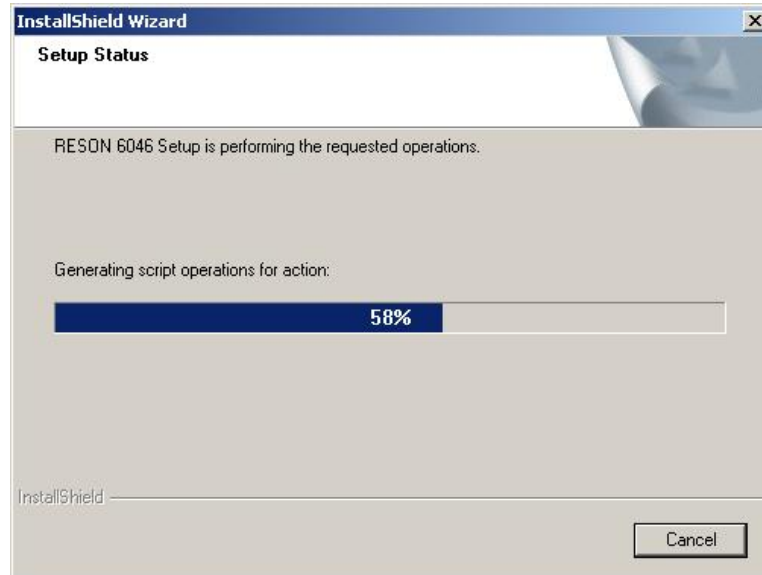


Figure 9: Setup Status

When the installation is complete, the "Setup Complete" window will appear. Click the "Finish" button to complete the installation. The installation of the RESON 6046 software is now complete. See *3 Program Operation* for information on operating the system.

2.3.3.1 Payload Controller Configuration

The 6046 installation program (described above) installs the PLC both as a console program and as an NT service in the standard RESON account (if available).

If the NT service is successfully installed in the standard RESON account, the PLC will be registered with the system's Service Control Manager (SCM) and will appear as "6046 PLC" with a description of "RESON 6046 Payload Controller" in the SCM's list of services. If it does not appear in the list of services, check for problems (for example, verify that you are logged on with administrative privileges and that the RESON account exists and is properly configured).

The service will be installed with a startup type of "Manual," however, an administrator may change this to "Automatic"¹ if desired.

The PLC service may be manually installed or removed by an administrator using the command line switches "6046 -i" and "6046 -r" respectively. Using the "-i"

¹ Automatic startup means the operating system will start the service after the boot process has completed and without operator intervention. If the service is left at "Manual," an operator with sufficient privilege must start the program from the SCM's control panel.



software switch allows the service to be setup in cases where the standard RESON account is not being used.

When manually installing the PLC service, it is important to use the SCM's control panel to change the "Log on" account to a local system account that has administrator privileges. This can be done by using the "Properties" setup page of the SCM (see *Figure 10*).

NOTE:

The "Local System account" does not offer sufficient privilege to allow the PLC to run correctly.

ATTENTION!

Manually changing the control set of the registry should be performed with extreme care. Corruption or accidental changes could render the operating system non-operational.

If the RESON 7k Center program has been installed as a service (applicable to the SeaBat™ 7000 Series sonar systems) prior to the RESON 6046 installation program having been run, the service will be configured with a startup dependency on the 7k Center.

An administrator may manually remove this dependency by deleting the "DependOnService" entry under the registry key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\6046. This can be accomplished by using regedit.exe or another suitable tool. Confirmation of removal can be made through the "Dependencies" dialog tab in the SCM's interface for the RESON 6046 PLC service.

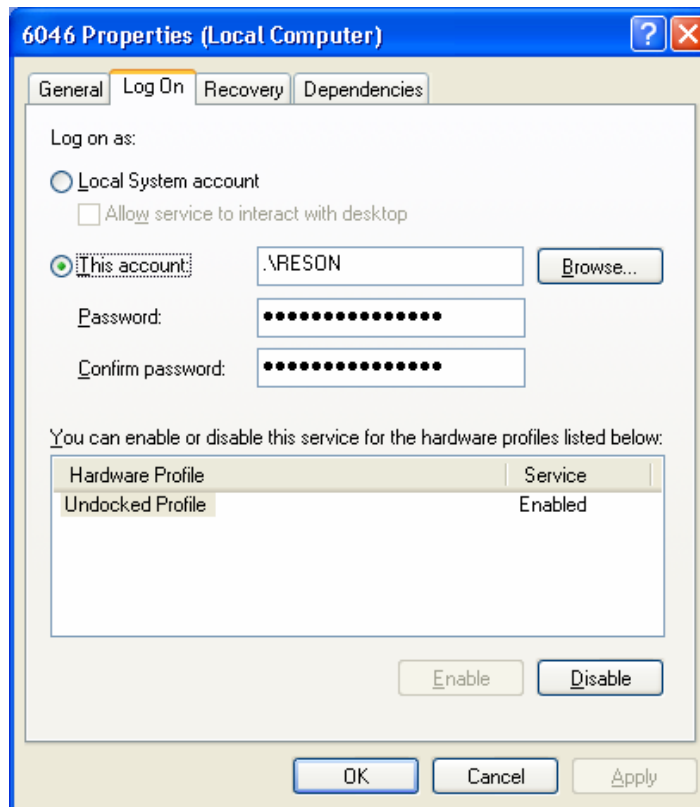


Figure 10: SCM Log On Properties Dialog

NOTE:

1. To run the PLC in console mode, specify the command line "6046 -c" at run time. During installation, shortcuts on the desktop and start menu will be created for this purpose.
2. Only one instance of the PLC is permitted to run at a given time. Therefore care should be taken to ensure the PLC service is inactive when attempting to run the program in console mode; otherwise the console program will abruptly terminate, and an entry will be placed in the Survey Event Log indicating the cause.

2.3.3.1.1 Configuration XML File

The file "PLCConfiguration.xml" contains information regarding the sensor modules that will be recognized by the PLC and the sensor configuration to be activated after the PLC starts. It directly replaces the 6046.sav file in older versions of the program. This file must reside in the same folder as 6046.exe (the PLC).

The following sections apply:

- **InterfaceList:** The list of interface modules (DLLs) known and loaded by the PLC upon start. Each module is described by an identifier, description, and module name.
- **SensorList:** The sensor entries on a per device (subsystem) basis, number of sensors to be started and an association to its corresponding module identifier.

The sensor list is read sequentially based on the specified number of sensors to load. The following subfields are applicable:

- **ModuleId:** Identifier relating the sensor to the corresponding module.
- **SubsystemId:** Subsystem-specific identifier only used by the EdgeTechFSDW subsystems.
- **StartDelay:** The number of seconds after which individual sensors may be scheduled to start once the PLC has completed its start up and initialization. This parameter is useful when delaying startup of subordinate sensors that are not immediately available for connection.
- **DeviceId and Enumerator:** Device specific identifier and instance counter for multiple devices of the same type respectively. Similar in concept to the SubsystemId. Only used by the SeaBat™ 7000 Series sonar devices.

NOTE:

The DeviceId and Enumerator are only applicable to the SeaBat™ 7000 series sonar's to date and must match the corresponding registry entries for the sonar device in order for the PLC to recognize and collect the sensor's data.

Running the PLC may require a startup delay for each sensor to be configured separately. This startup delay may not be necessary where the boot period of the RESON system is delayed relative to the dependent sensor suite so that the sensors are guaranteed to be available during the first attempt at connection. *Figure 11* shows an example of a typical "PLCConfiguration.xml" file.

```

- <RESONPayloadController>
- <InterfaceList>
  <Modules Number="3">Number of sensor interface modules in listed sequence</Modules>
  <Module0 Id="0" Name="EdgeTechFSDW.dll">EdgeTech FS-DW System</Module0>
  <Module1 Id="1" Name="RESON7kSonar.dll">RESON 7k Sonar</Module1>
  <Module2 Id="2" Name="BlueFinVC.dll">BlueFin Vehicle Controller</Module2>
  </InterfaceList>
- <SensorList>
  <Sensors Number="2">Number of sensors to load in listed sequence</Sensors>
  <Sensor0 ModuleId="1" SubsystemId="0" StartDelay="0" DeviceId="7125"
    Enumerator="0">RESON 7k Sonar System</Sensor0>
  <Sensor1 ModuleId="2" SubsystemId="0" StartDelay="0">Bluefin Vehicle
    Controller</Sensor1>
  <Sensor2 ModuleId="0" SubsystemId="0" StartDelay="0">EdgeTech FS-DW Subbottom
    Profiler</Sensor2>
  <Sensor3 ModuleId="0" SubsystemId="20" StartDelay="0">EdgeTech FS-DW Sidescan Sonar
    (Low Frequency)</Sensor3>
  <Sensor4 ModuleId="0" SubsystemId="21" StartDelay="0">EdgeTech FS-DW Sidescan Sonar
    (High Frequency)</Sensor4>
  </SensorList>
</RESONPayloadController>

```

Figure 11: Sample PLCConfiguration.xml File

2.3.3.1.2 Registry Configuration

During normal installation, the following default PLC registry entries will be created. Depending upon the sensor suite, these registry entries may need to be changed.

The core registry key is "HKEY_USERS\DEFAULT\Software\RESON\6046". Attributes under this key generally govern the behavior of the PLC itself.

NOTE:

Shut down the PLC before changing these settings. Changes will take effect when the PLC has been restarted.

Table 3: Default PLC Registry Settings

Key	Type	Default	Description
ActivateOnStart	REG_DWORD	0	Do not begin recording data (0) or begin recording (1) upon sensor startup. For active devices, (1) also indicates that pinging will begin on startup.
AutoHealthCheckEnable	REG_DWORD	0	Enable (1) or disable (0) periodic health checking.
AutoHealthCheckPeriod	REG_DWORD	30000	Automatic sensor health-check period in milliseconds, if enabled.
DataPath	REG_SZ	"c:\DataStore6046\"	The default folder for logged 7k data files. This folder will be created by the installation program but may be redirected as necessary. The folder must be valid.

Key	Type	Default	Description
DiagnosticMode	REG_DWORD	0	An optional field. If set to non-zero, enhanced diagnostics output will appear in the Survey Event Log (6046.log).
MaxFileSizeInMBytes	REG_DWORD	200	Maximum approximate file size in MB of a 7k data file before the next file in a sequence is generated. File names will be time based, using a pre-defined nomenclature described in Ref 1.
RecordOverlap	REG_DWORD	100	The number of 7k data records that will be duplicated at the end of one data file and the beginning of the next.
RemoteControlPort	REG_DWORD	6046	The TCP/IP port number for which the PLC will listen for connecting clients. If this entry is not present, 6046 is assumed.
RoutingEnable	REG_DWORD	0	Enables (1) or disables (0) routing of valid 7k records that are non-PLC commands to the specified sensor.
RoutingIndex	REG_DWORD	0	PLC relative index to which 7k messages will be routed.
SessionId	REG_DWORD	0	7k file header session field – see Ref 1.
TimeMessageEmission	REG_DWORD	0	Enables (1) or disables (0) periodic time synchronization mode.
TimeSyncMode	REG_DWORD	0	Stand alone (0) or slaved (1) time synchronization mode.
UserName	REG_SZ	“RESON 6046 User”	User name that appears in the 7k data file header – see Ref 1.
UserNotes	REG_SZ	“RESON 6046 Payload Controller”	User notes that appear in the 7k file header – see Ref 1.

The following tables describe the default registry settings for subordinate sensor modules currently supported by the PLC.

Table 4: PLC Sub-Key BlueFin Defaults

Key	Type	Default	Description
Address	REG_SZ	“127.0.0.1”	This non-empty field is currently needed but ignored by the PLC.
Port	REG_DWORD	3100	UDP port over which broadcast Vehicle Control messages will be received.

Table 5: PLC Sub-Key EdgeTech FSDW Defaults

Key	Type	Default	Description
Address	REG_SZ	192.9.0.101	IP address of where EdgeTech's sonar.exe server program resides.
AutoShutdown	REG_DWORD	0	Enables (1) or disables (0) automatic shutdown of the EdgeTech system when the PLC shuts down all subsystems. Requires v8.1 or higher of EdgeTech's sonar.exe program.



Key	Type	Default	Description
Command	REG_DWORD	1700	TCP/IP command port that the EdgeTech server is configured to listen for connecting clients.
Data	REG_DWORD	1701	TCP/IP data port that the EdgeTech server is configured to listen for connecting clients.

Table 6: PLC Sub-Key EdgeTechFSDW\SBP Defaults

Key	Type	Default	Description
Default	REG_SZ	"SubBottom Profiler"	None.
SubsystemId	REG_DWORD	0	Subsystem identifier for the Sub-Bottom Profiler. Must match the EdgeTech sonar.ini file.

Table 7: PLC Sub-Key EdgeTechFSDW\SSSHF Defaults

Key	Type	Default	Description
Default	REG_SZ	"Side Scan Sonar (High Frequency) "	None.
SubsystemId	REG_DWORD	21	Subsystem identifier for the high-frequency Side Scan Sonar. Must match the EdgeTech sonar.ini file.

Table 8: PLC Sub-Key EdgeTechFSDW\SSSLF Defaults

Key	Type	Default	Description
Default	REG_SZ	"Side Scan Sonar (Low Frequency) "	None.
SubsystemId	REG_DWORD	20	Subsystem identifier for the low frequency Side Scan Sonar. Must match the EdgeTech sonar.ini file.

Table 9: PLC Sub-Key RESON7kGeneric Defaults

Key	Type	Default	Description
Default	REG_SZ		None.

Table 10: PLC Sub-Key RESON7kGeneric Interface_N Defaults

Key	Type	Default	Description
Default	REG_SZ		None
Address	REG_SZ	127.0.0.1	Address on which to listen for incoming data.
Name	REG_SZ	Interface 0, 7k Generic	Reserved.
Port	REG_DWORD	4888	Port on which to listen for incoming data.
Source Address	REG_SZ	127.0.0.1	Reserved.
Source Port	REG_DWORD	10000	Reserved.

Table 11: PLC Sub-Key RESON7kSonar Defaults

Key	Type	Default	Description
AutoShutdown	REG_DWORD	0	If non-zero, the PLC will issue a shutdown command to the sonar after the last device shuts down.
MessageRouting	REG_DWORD	0	If non-zero, valid routed 7k commands to the sonar will be passed on to the sonar.
ParameterRouting	REG_DWORD	0	Reserved.

For each RESON device connected, there must be a separate sub-key under RESON7kSonar. The name of the Sub-Key must be “Device_[SeaBat Model]_[Enumerator].” For example, an entry for a single SeaBat 7125 sonar would appear as follows: “Device_7125_0”. The name of this entry must match the corresponding sensor entry in the PLCConfiguration.xml file.

Table 12: PLC Sub-Key RESON7kGeneric Device Defaults

Key	Type	Default	Description
Default	REG_SZ		None.
Address	REG_SZ	127.0.0.1	Reserved
Collection Mode	REG_DWORD	15	Bit mask indicating which data types are to be collected from the device. Values can be bit-wise or'ed together to enable multiple modes. Bit values in hexadecimal are: 0x01 – Generic sensors (record 1000 to 1999). 0x02 – Beam data (record 7008 and 7000 to 7005). 0x04 – Bathymetric data (record 7006 and 7000 to 7005). 0x08 – Backscattered imagery (record 7007 and 7000 to 7005).
InPort	REG_DWORD	0	Reserved.
Interface Type	REG_DWORD	0	Local (0) or Remote (1). Only local is supported currently.
OutPort	REG_DWORD	0	Reserved.

2.3.4 VNC Remote Control and Viewer

VNC for the Windows platform is provided as a courtesy to those customers who require remote control of the operating system on which the PLC is installed. The most current version of this program and its reference material may be downloaded from the following site: <http://www.realvnc.com>.

3 PROGRAM OPERATION

3.1 Chapter Overview

The **RESON 6046** software package has two components: the Payload Controller (PLC) and the Data Visualization Utility (DVU). The PLC software resides in the vehicle's on-board computer and runs autonomously based on mission-specific configuration files. The DVU resides on a topside PC and requires operator intervention.

3.2 Data Visualization Utility Operation

The DVU application may be used to view real-time data as it is being collected, to control certain PLC application functions, and to replay data collected by the PLC during previous missions.

3.2.1 Getting Started

Three configuration steps are required to view data in real-time in the DVU:

1. Connect to the remote host (PLC) by using the Setup Tab to specify the appropriate IP address and port.
2. Select the display data to be viewed using the Displays Tab, which subscribes to the PLC for specific messages. Use the "Available Sensors" list box to select any, or all, installed sensors.
3. Activate the applicable waterfall display window by using the Sonar Displays feature.

3.2.2 Program Features

The following text and figures describe each application function.

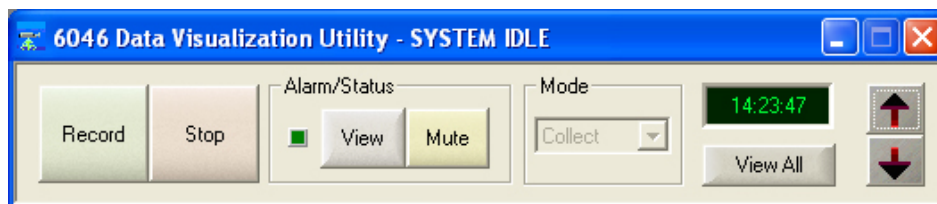


Figure 12: Main Application Window, Collapsed View

3.2.3 Play/Record/Stop Function

These buttons control data logging and playback. In the “Collect” mode, the “Record” and “Stop” buttons are visible. If the mode is changed to “Playback”, the “Record” button will disappear, with the “Play” button taking its place.

3.2.4 Alarms

The “Alarm/Status” function allows the operator to view alarm, warning and status information message received from the PLC.

If there is no alarm or warning condition, the LED to the left of the “View” button will be green. If the PLC reports an alarm condition, the LED to the left of the “View” button will flash red, and (if the host computer has a functioning sound card and speakers) a siren will sound. In a warning condition, the LED will be yellow.

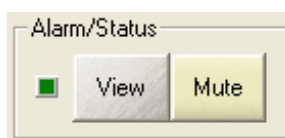


Figure 13: Alarm / Status Button

- **View:** Click the “View” button at any time to see a list of messages.
- **Mute:** Click the “Mute” button to silence the alarm. (This will NOT disable or correct the alarm condition. It is only a sound control.)

3.2.4.1 Alarm/Status/Info Display

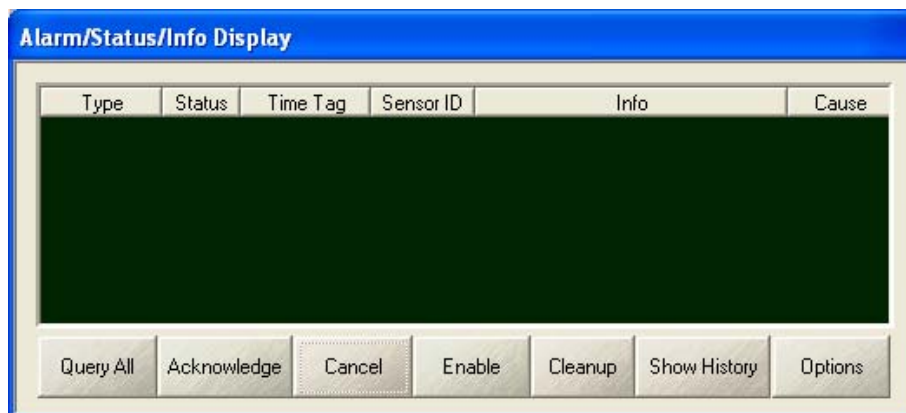


Figure 14: Alarm/Status/Info Display

The messages in the “Alarm/Status/Info Display” are presented in reverse chronological order. The following information is displayed in the window:



- **Type:** Identifies the message as “Alarm”, “Warning” or “Status”
- **Status:** Indicates whether the message is “OK”, “Acknowledged”, “Active” or “Disabled.”
- **Time Tag:** Shows the time the message was generated.
- **Sensor ID:** Shows the sonar sensor related to the message (if applicable).
- **Info:** Information as to the subject of the message.
- **Cause:** Indicates the cause of the alarm, if that information is available.

The buttons along the bottom of the window allow the operator to interact with the messages as follows:

- **Query All:** Request updated information from the PLC.
- **Acknowledge:** Indicates that the operator is aware of the alarm, but does not want it turned off. (Changes status to “Acknowledged.”)
- **Disable:** Disables the alarm for the duration of that DVU session. (Changes status to “Disabled.”)
- **Enable:** Removes the “Disabled” condition from an alarm.
- **Cleanup:** Clears the screen (but does not delete history) of Status messages and Acknowledged or Disabled alarms. Active alarms will remain visible.
- **Show History:** Displays all previous messages.
- **Options:** Allows the operator to set the system monitoring options.
 - o **Query All Messages On Connect:** Query the status of the PLC upon connection and update the alarm list.
 - o **Perform Auto Health Check:** Automatically query the status of the PLC at a specified time interval.
 - o **Auto Health Check Interval:** Determines the number of seconds between automatic health checks.

NOTE:

The “Acknowledge,” “Enable,” and “Disable” functions **only** affect the DVU functions. Changing the status of an alarm condition in the DVU will affect the status of the PLC.



3.2.5 Mode

The “Mode” feature is a pull-down menu from which the operator may choose to run the DVU in either “Collect” mode or “Playback” mode. The “Collect” mode is used to view real-time data that is being collected by the PLC. “Playback” mode is used to view data collected during previous missions.

The interface changes slightly when “Playback” is selected. If the DVU window is maximized, an additional “Playback Tab” will appear in the lower half of the window.

NOTE:

The Playback feature can only be activated when the PLC is not connected to a sensor. If a sensor is connected, click the “Disconnect” button on the “Setup” tab. When all sensors are disconnected, the “Mode” feature will be made available.

3.2.6 Time Display Window

The Time Display Window displays the system time of the topside host computer.

3.2.7 View All Button

The “View All” button allows the user to automatically bring the DVU and all of its sub-windows to the front. This helps prevent windows from being “lost” under other open windows on the operator’s desktop.

3.2.8 Shrink/Expand Buttons

This feature allows the visible portion of the main application window to be reduced to save screen space. Click the “Up” arrow to collapse the window, and the “Down” arrow to expand the window.

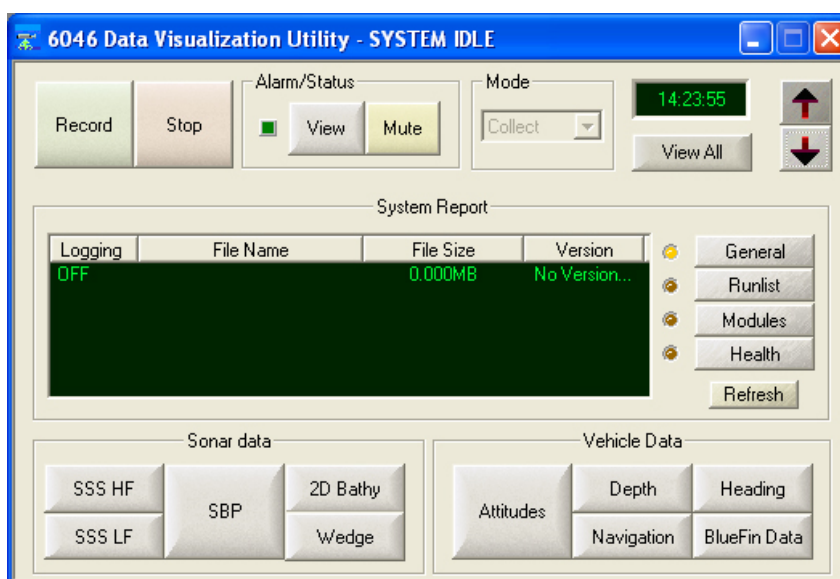


Figure 15: Main Application Window, Partially Expanded

3.2.9 System Report Display

This window shows the status of currently enabled program features. Click the applicable button to display the status of that function.

- **General:** This is the default at startup. It displays the version, status, filename and size of the destination file during logging.
- **Runlist:** Displays the PLC-mapped sensor suite on the vehicle, including name, index, port and subsystem id's.
- **Modules:** Displays the currently available sensor modules on the system, including version and ID Number.
- **Health:** Indicates the status of each sensor module along with the Sensor ID number.
- **Refresh:** Updates the fields in the System Report Display.

NOTE:

When the system is in the "Record" mode, the File Name column shows the destination/source file path and file size in the vehicle's computer. Use the Refresh button to update this information, as it will **not** update automatically unless the "Sync Interval" is selected on the "Setup" tab. See 3.2.11 "Setup Tab".

3.2.10 Displays

Each display button calls up a new window to display a different kind of data. There are three waterfall displays, as well as five general displays. All display buttons are “toggles.” Click once to show the desired window, then click again to hide the window.

3.2.10.1 Sonar Displays

There are five sonar displays: High-Frequency (SSS HF), Low-Frequency (SSS LF), Sub-Bottom Profiler (SBP), Bathymetric Display (2-D Bathy) and Wedge Display (Wedge). All five windows, or any combination thereof, can be opened at once.

Each sonar display can be moved on the desktop by clicking anywhere in the display and dragging it to a new location. The SSS HF, SSS LF, and SBP displays have the following control menus:

- Image – allows the operator to set brightness and contrast.
- Palette – offers a choice of colors.
- Scaling – offers a choice of “Mean”, “Peak” or “RMS” scaling. (This menu item is not available in the Sub-Bottom Profiler Display).

The Settings menu in the 2D Bathy display allows the user to change colors of the points.

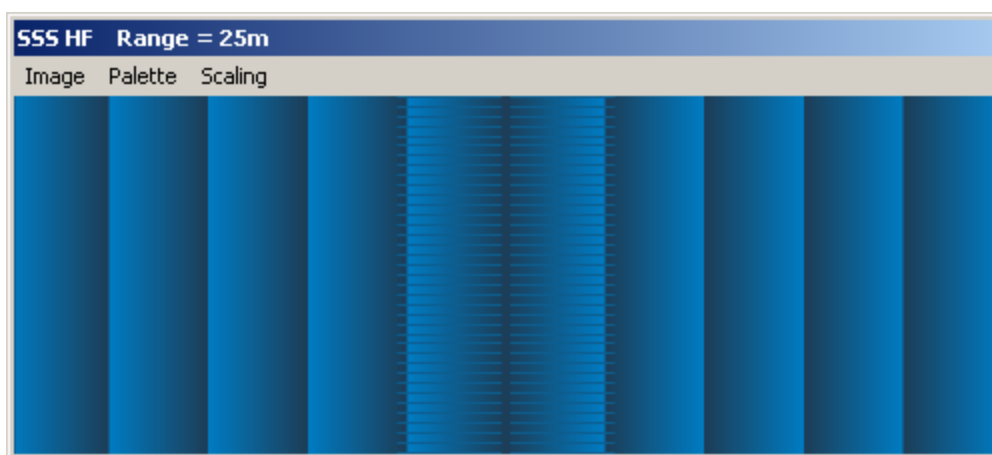


Figure 16: SSS HF Display

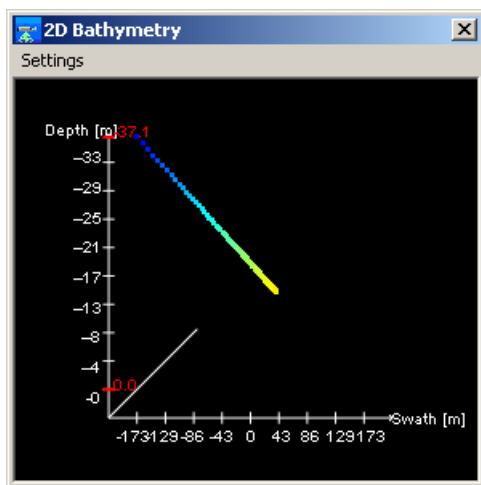


Figure 17: 2D Bathymetry Display

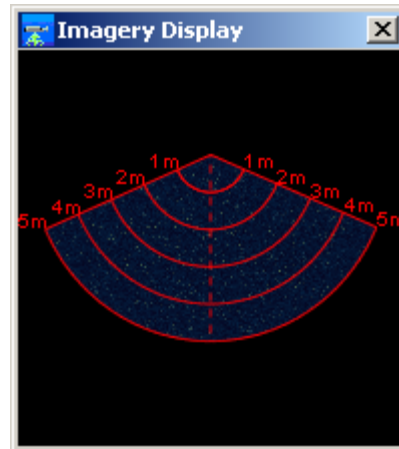


Figure 18: Wedge Display

3.2.10.2 Vehicle Data Displays

There are five “Vehicle Data” displays: “Attitudes,” “Depth,” “Position,” “Heading,” and “Data Table”. Each of these is updated by information collected from the PLC. Each display can be moved on the desktop by clicking anywhere in the display and dragging it to a new location.

3.2.10.2.1 Attitude Time Series Display

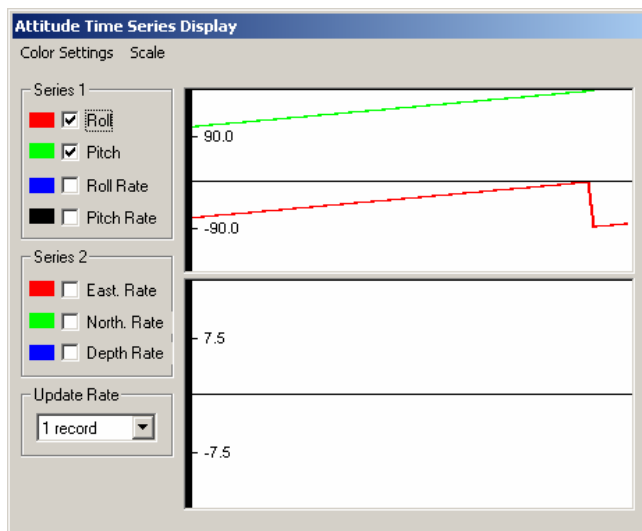


Figure 19: Attitude Time Series Display

The “Attitude Time Series” display appears as a horizontal line that scrolls from right to left. Select check boxes to add items to the graph. Lines will appear in colors corresponding to those beside the items.

This window may be re-sized by floating the mouse cursor over the edge of the dialog box until it becomes a two-pointed arrow, then dragging the box to the desired size.

In addition, the bar between the “Series 1” and “Series 2” windows may be moved up or down to accommodate a larger or smaller display in either.

3.2.10.2.2 Depth Timeseries Display

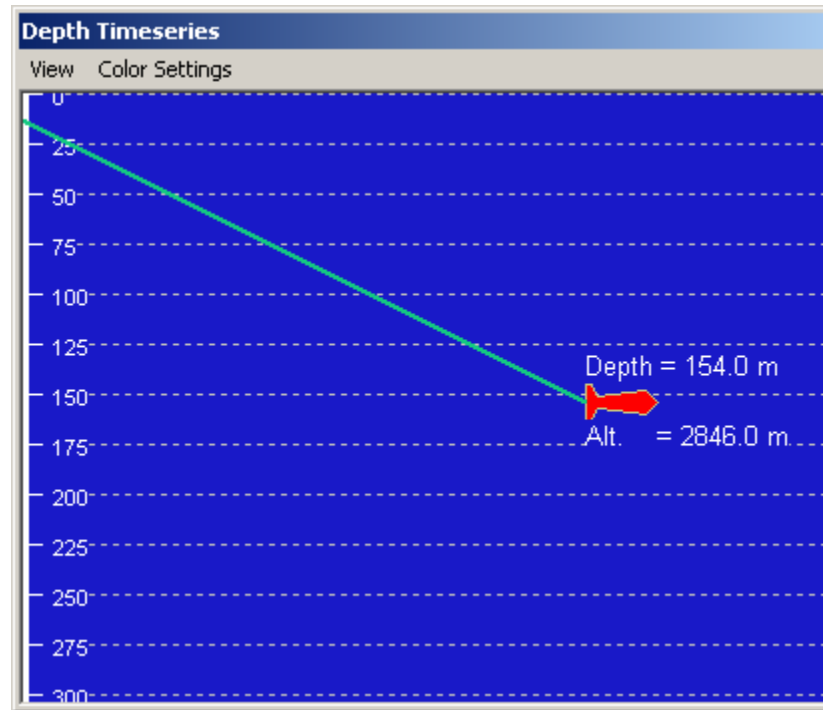


Figure 20: Depth Time Series Display

The “Depth Timeseries” display indicates the vehicle depth as relayed by the PLC. This window may also be resized by floating the mouse cursor over the edge of the dialog box until it becomes a two-pointed arrow, then dragging the box to be the appropriate size.

3.2.10.2.3 Position Display

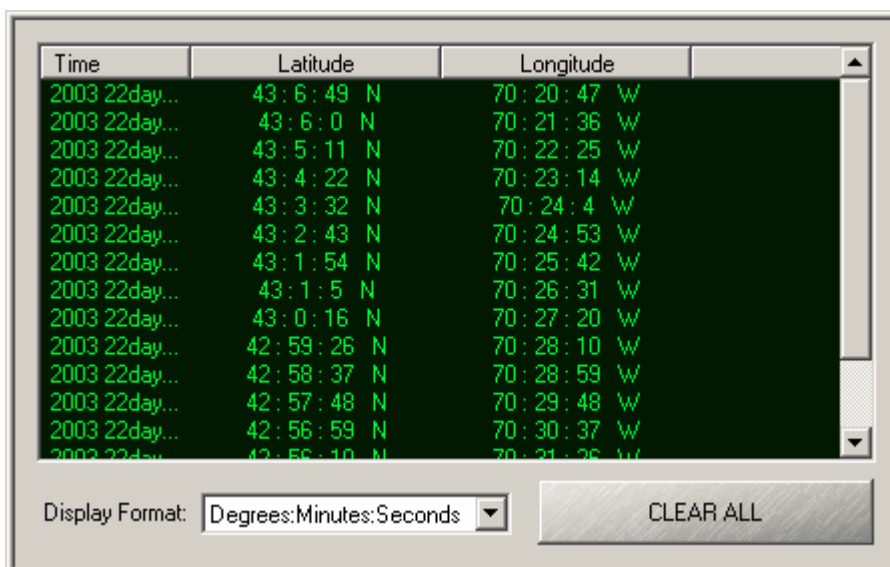


Figure 21: Position Display

The “Position” display shows the time, latitude, and longitude reported by the PLC. The “Display Format” dropdown menu allows the user to select the format in which information is displayed.

3.2.10.2.4 Heading Display

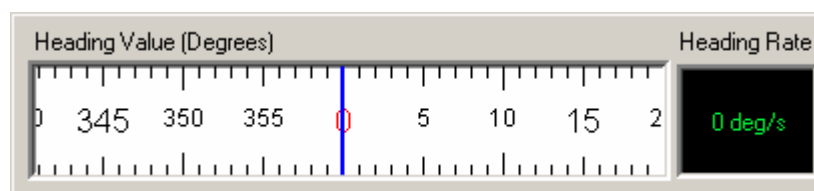
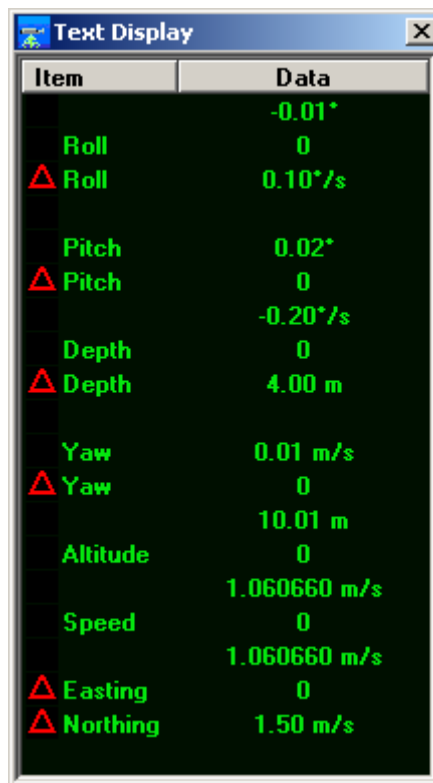


Figure 22: Heading Display

The “Heading” display indicates the “Heading” value reported by the PLC.

3.2.10.2.5 Data Table Display



Item	Data
	-0.01°
Roll	0
Δ Roll	0.10°/s
Pitch	0.02°
Δ Pitch	0
	-0.20°/s
Depth	0
Δ Depth	4.00 m
Yaw	0.01 m/s
Δ Yaw	0
	10.01 m
Altitude	0
	1.060660 m/s
Speed	0
	1.060660 m/s
Δ Easting	0
Δ Northing	1.50 m/s

Figure 23: Data Table Display

The “Data Table” display shows the vehicle data values in a simple alphanumeric format.

3.2.11 Setup Tab

Configuration of the 6046 program starts with this tab.

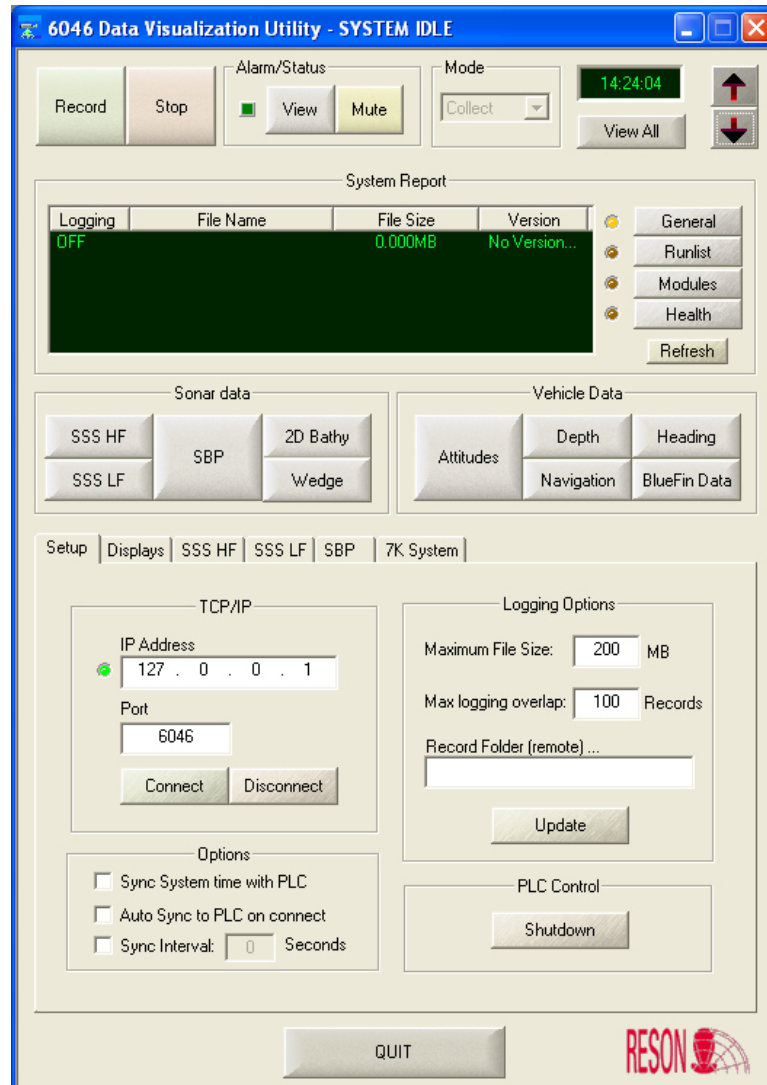


Figure 24: Main Application Window, Expanded

3.2.11.1 TCP/IP

- IP Address: Enter the address of the host computer on which the Payload Controller resides.
- Port: Enter a connection port number (the default port is 6046).
- Click the “Connect” button to start the connection.
- Click the “Disconnect” button to break the connection.

NOTE:

Network access between PCs using the TCP/IP network protocol suite is a prerequisite for successful connection to the PLC. When the connection is made, the IP Address LED will change to Green. If the connection fails, the LED will flash Red (on/off) twice and return to Red.

3.2.11.2 Options

- **Sync System time with PLC:** Synchronizes the system time of the DVU host computer with that of the PLC host computer.
- **Auto Sync to PLC on connect:** Check this box to automatically refresh the system information that appears in the DVU when you connect to the PLC.
- **Sync Interval:** Check this box to automatically refresh the "System Report Display" window at a specified interval (default = 10 seconds).

NOTE:

The Sync Interval Value may only be modified if the "Sync Interval" check box is unchecked. The minimum value is 10 seconds.

3.2.11.3 Logging Options

A maximum file size of approximately 200MB has been chosen as the default for logged data. When the logged data file exceeds this size, a new file is created and the original is saved. To assist with post-processing, an overlap is maintained between files.

- **Maximum File Size:** Specify the maximum size for a single data file. When the file reaches this limit, an additional data file will be created.
- **Max Logging Overlap:** Specify the amount of data (number of records) you wish to have overlapped in subsequent data files.
- **Record Folder (remote):** Specify the file location in which to store the log files.

Click the "Update" button to accept changes.

3.2.11.4 PLC Control

The "Shutdown" button allows the operator to shut down the PLC. When this button is selected, the operator is prompted to shut down the PLC host computer's operating system as well.

- Answering NO shuts down the PLC and leaves the PLC host computer running.
- Answering YES shuts down the PLC and then the PLC host computer.

3.2.12 Displays Tab

The Displays tab allows the operator to select what data should be displayed, as well as any scaling that is needed.

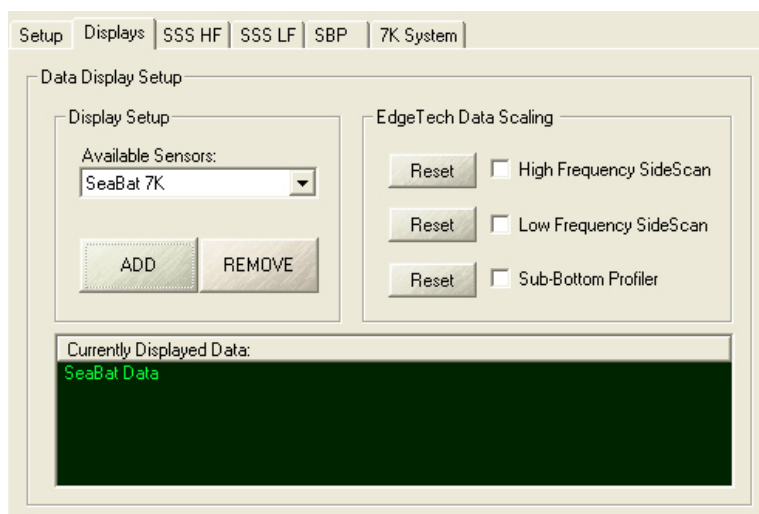


Figure 25: Displays Tab

3.2.12.1 Display Setup

The Available Sensors drop-down list allows the operator to select individual sensors for data display. To add additional sensors, select an option from the available sensors list and click the “Add” button.

As each sensor is added, it appears in the “Requested Display Data” window. When a sensor is added, its data will be seen in the corresponding waterfall display. (See “3.2.10.1 Sonar Displays” for information on how to show and hide waterfall displays.)

3.2.13 EdgeTech Data Scaling

The “EdgeTech Data Scaling” section applies the EdgeTech-supplied scaling parameters to the waterfall data. This scaling may have a noticeable effect on the applicable waterfall display.

NOTE:

The data collected by the Payload Controller does not have scaling applied; this is a visualization process only.

3.2.14 SSS HF and SSS LF Tabs

The High Frequency Side Scan (SSS HF), Low Frequency Side Scan (SSS LF), and Sub-Bottom Profiler (SBP) tabs have been provided to allow control of the EdgeTech subsystems.

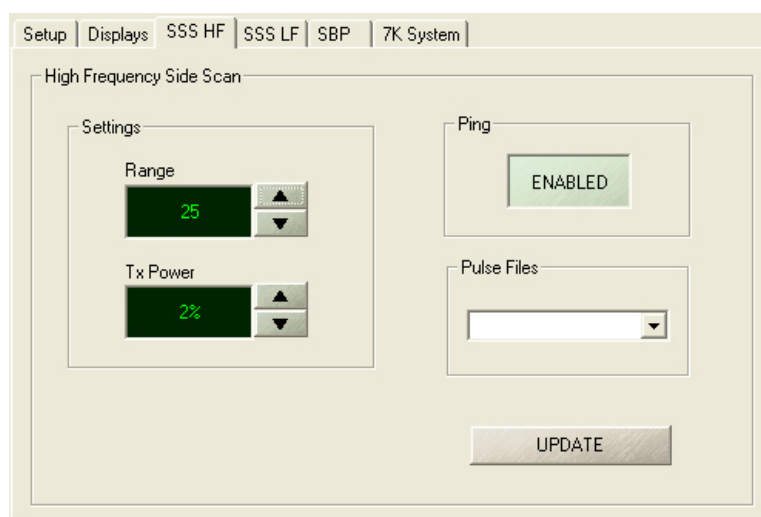


Figure 26: HF Side Scan Tab

- **Settings**
 - o **Range:** Sets range scale for the selected side scan unit.
 - o **Tx Power:** The arrows change the transmit power for the selected side scan unit from 0% to 100% in 1% steps. (Depressing the “Ctrl” key changes this rate in 10% steps.)
- **Ping:** Click this button to enable or disable pinging of the subsystem.
- **Pulse Files:** Select the appropriate EdgeTech pulse file.
- **Update:** Click UPDATE to send any changes to the PLC.

3.2.15 SBP Tab

The Sub-Bottom Profiler (SBP) tab functions in a similar fashion to the “SSS HF” and “SSS LF” tabs.

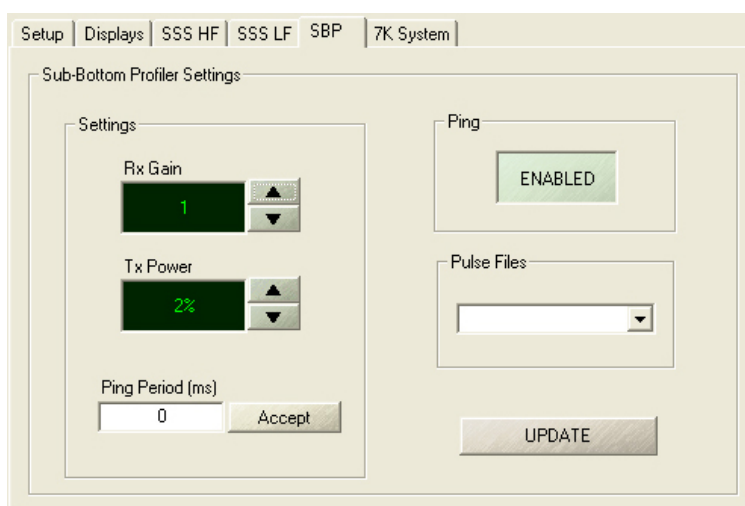


Figure 27: Sub-Bottom Profiler Tab

- **Settings**
 - o **Rx Gain:** The arrows change the receiver gain values for the Sub-Bottom Profiler. Each time the arrow is clicked, the previous setting is doubled (or halved) to a maximum of 2048. (i.e. 1, 2, 4, 8, 16... 2048)
 - o **Tx Power:** The arrows change the transmit power for the Sub-Bottom Profiler from 0% to 100% in 1% steps. (Depressing the “Ctrl” key changes this rate in 10% steps.)
- **Ping Period:** Set the number of milliseconds that should elapse between pings.
- **Ping:** Click this button to enable or disable pinging of the subsystem.
- **Pulse Files:** Select the appropriate EdgeTech pulse file.
- **Update:** Click UPDATE to enter any changes.

NOTE:

In the case of all Side Scan tabs (“SSS HF,” “SSS LF,” and “SBP”), newly entered commands are not sent to the PLC until the UPDATE button has been pressed. This avoids unnecessary network traffic when bandwidth is limited; for example, when using an acoustic modem in the AUV context.

3.2.16 7K System Tab

The “7K System” tab has been provided to allow control of the SeaBat 7000 Series subsystem.

3.2.16.1 Sonar Settings I

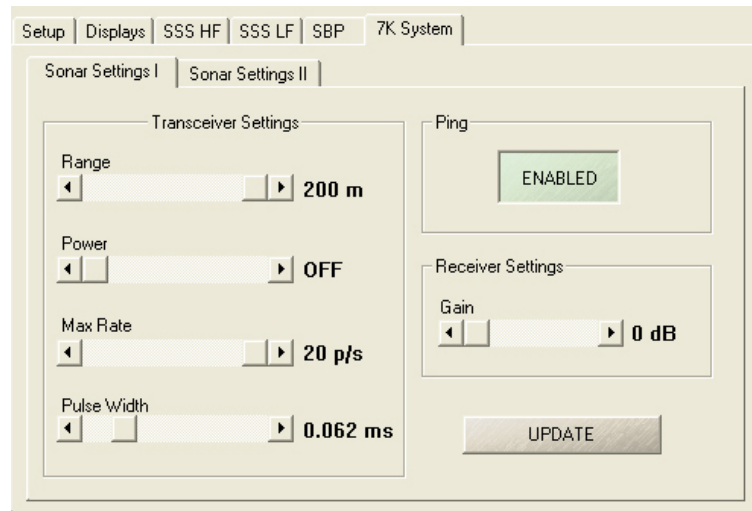


Figure 28: 7K System Tab, Sonar Settings I

- **Transceiver Settings**
 - o **Range:** Adjust the Range setting for the subsystem.
 - o **Power:** Adjust the Transmit Power for the subsystem.
 - o **Max Rate:** Set the Maximum Ping Rate for the subsystem.
 - o **Pulse Width:** Set the Pulse Width for the subsystem.
- **Ping:** Click this button to enable or disable pinging of the subsystem.
- **Receiver Settings**
 - o **Gain:** Make changes to the Receiver Gain setting.
- **Update:** Click UPDATE to send any changes to the PLC.

NOTE:

Available settings will vary based on the type of SeaBat 7000 Series device that has been selected.

3.2.16.2 Sonar Settings II

The Sonar Settings II tab allows for the creation of Depth and Range Filters.

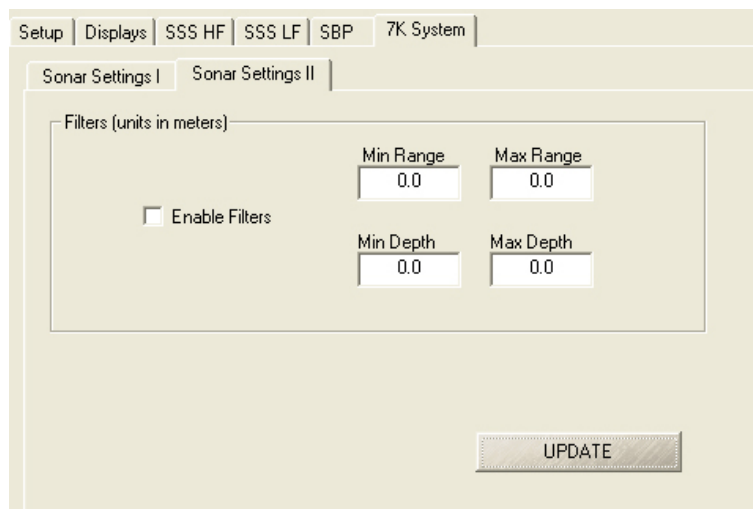


Figure 29: 7k System Tab, Sonar Settings II

3.2.16.3 Apply a Filter

The operator may apply range and/or depth filters (Depth Gates) to the bottom-detect process to aid in noise reduction.

The options are:

- **Range:** Applies minimum and maximum Range values as entered in the “Min Range” and “Max Range” fields. Only bottom returns within these range limits will be used in the bottom detection process.
- **Depth:** Applies the minimum and maximum depth values as entered in the “Min Depth” and “Max Depth” fields. Only bottom returns within these depth limits (Depth Gates) will be used in the bottom detection process. Use of a motion sensor is required to maintain constant depths during the ship’s normal pitch and roll action.

Click the “Enable Filters” check box to enter the ranges and/or depths for the filters. Click the “Update” button to finalize changes.

3.2.17 Playback Tab

The “Playback” tab is visible only if the “Playback” mode has been selected in the “Mode” list box.

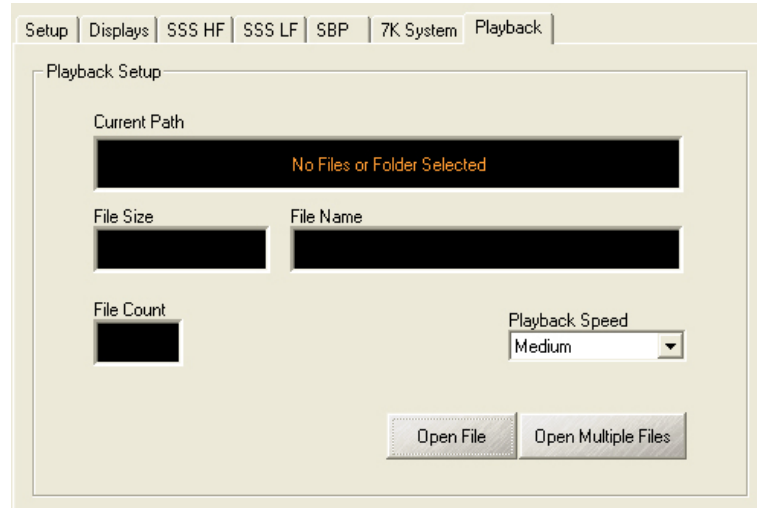


Figure 30: Playback Tab

- **Current Path:** Displays the path of the selected playback file.
- **File Size:** Displays the size of the selected playback file.
- **File Name:** Displays the name of the selected playback file.
- **File Count:** Indicates how many files are in the grouping.
- **PlayBack Speed:** Select the scrolling speed for the playback waterfall displays:
 - o **Fastest**
 - o **Fast**
 - o **Medium**
 - o **Slow**
 - o **Slowest**
- **Open File:** Click this button and browse to select a file for playback.
- **Open Folder:** Click this button and browse to select multiple files for playback.

3.3 Payload Controller Operation

3.3.1 Overview

The Payload Controller (PLC) software is designed to control and collect data from multiple sensors in a manned or unmanned environment. Each sensor, or set of related sensors, is coordinated by a given module that is responsible for



the control and acquisition of data from its associated sensor(s). A variety of communications types and protocols are available for use with different sensors.

The PLC coordinates the acquisition of data from all sensors and is responsible for logging the acquired data.

Remote control of the PLC is achieved via a dedicated network interface through which one or more clients may communicate (the DVU and vehicle control computers are examples of such clients).

3.3.2 Program Execution

The PLC may be run either in console mode or as an NT service.

- To run the PLC in console mode, append a “-c” switch to the command line thus “6046 -c”. A desktop shortcut is typically used for this purpose.
- When installed as an NT service, the PLC may be started by the operating system after the boot process has completed.

NOTE:

If desired, copying the 6046 console mode shortcut to the user's startup folder will start the PLC after the user has logged on, thus emulating the behavior of an NT service. In this case, the user account should be configured to log on automatically.

Whether running as a service or console program, the PLC must run in the context of an account with administrator privilege to ensure necessary resources are accessible during operation.

See 2.3.3.1 *Payload Controller Configuration* for more information regarding setting the PLC up as a NT service.

3.3.3 Survey Event Log

The PLC writes messages to a Survey Event Log (6046.log) that details significant system or sensor events such as alarms or fail conditions. This log is located in the same folder as the PLC executable file (6046.exe).

This file is maintained for post-mission review, and each entry is time-stamped to assist in this process. If the 6046.log file exists when the PLC starts, the data will be appended to the existing file. If the 6046.log file does not exist, the PLC will create a new one.



3.3.4 Logging File Format

Data files automatically created by the PLC use the following naming convention:

“YYYYMMDD_HHMMSS.s7k”

Here, “YYYYMMDD” represents the UTC Date, and “HHMMSS” represents the UTC System Time. Logged data is in the RESON 7k format and is described by Ref 1 and Ref 2.

A maximum file size of approximately 200MB has been chosen as the default for recorded data. When the recorded data file exceeds this size, a new file is created and the original is saved. To assist with post-processing, an optional overlap of records is maintained between files.

The maximum file size and overlap size may be configured in the DVU (see *3.2.11.3 Logging Options*) or directly in the Registry (see *Table 3: Default PLC Registry Settings*).

3.3.5 Remote Control

The PLC supports a comprehensive range of commands for the purposes of data logging and control of both the PLC and its subordinate sensor suite. The communications format and protocol are available upon request for the purposes of interfacing to specific vehicle controllers. The details are beyond the scope of this manual and can be found in Ref 1 and Ref 2.

APPENDIX A - GLOSSARY OF TERMS

The following terms and acronyms are used frequently in this manual and are defined here for your convenience:

Term	Definition
AUV	Autonomous Underwater Vehicle
DVU	Data Visualization Unit (software)
LED	Light Emitting Diode
MB	Megabytes
PLC	Payload Controller
Rx	Receiver
SBP	Sub-Bottom Profiler
SCM	Service Control Manager (a Microsoft operating system component)
SSS HF	SideScan Sonar High Frequency
SSS LF	SideScan Sonar Low Frequency
Tx	Transmitter
UTC	Coordinated Universal Time
XML	Extensible Markup Language

6046 Software
User's Manual

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Drawing Number 11339
Part Number 86010031