Lucy II
User Guide

Version 1.0.3
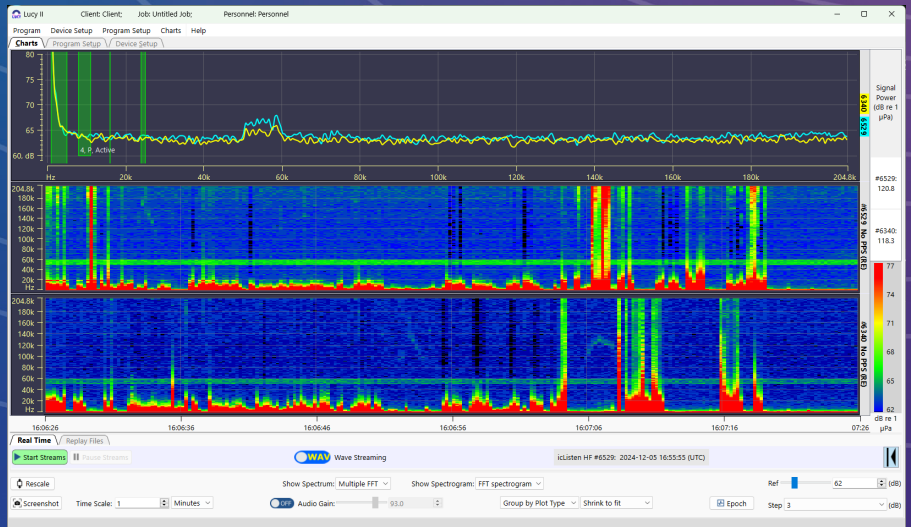
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Giving Our Oceans a Voice

Contents

Introduction

Lucy II is a PC software program from Ocean Sonics that aims to build and improve upon the original Lucy software application. Lucy II has been designed for the use with multiple hydrophones and allows users to stream data from hydrophone arrays. Currently, Lucy II is in its first release, created to provide the basic functionality of the previous Lucy software and can be used to set-up, stream, record, and process icListen hydrophone data. The program presents data to the operator in a graphical and numerical format designed for field operations personnel, making it highly task focused.

With the release of this version of the software, we will continue the development of new features and improve upon the current interface and functionality. Please send any issues, comments, or suggestions to Ocean Sonics Support (*support@oceansonics.com*).

This document outlines the operation of the **Lucy II software v1.0.3** released in **December 2024.**

1 Getting Started

This section will describe how to download the software, start the program, connect to the devices, set up the sampling and stream the data. For more information or if you have questions after completing the initial setup, see each Features section for the Device Setup, Lucy Setup and Charts.

1.1 Download the Software

1. To get started with Lucy II, download the software program from our resources site: *Users Software - Ocean Sonics –> Lucy II*

1.2 Start the Program

2. To start the program, you can open the application from your computer's **Start Menu** or the **Desktop Shortcut.**

When **Lucy II** is launched for the first time, the start-up window will provide options for the program setup on the **"Program Initialization"** window (Figure 1-1).
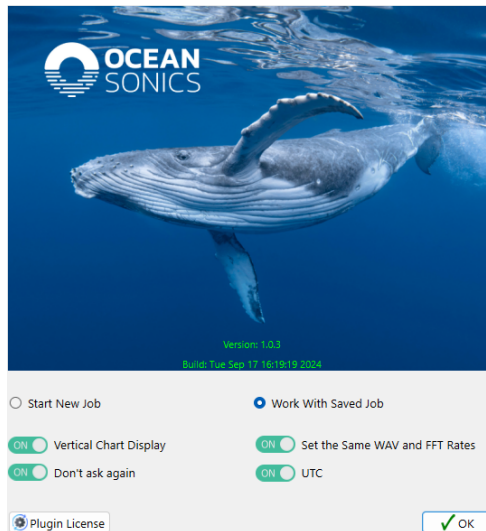
Figure 1-1 Program Initialization Window

3. For the first-time setup:
   a. Check the box for **Vertical Chart Display.**
   b. Click **"OK"**.

- **Start New Job:** Sets program to always require adding devices to the setup each time it opens.
- **Work With Saved Job:** Will open the preset on Lucy, connecting to the previous list of hydrophones and setting sampling rates for streaming.
- **Vertical Chart Display:** Sets the charts to display in a vertical direction. If the box is not checked, the charts will be displayed horizontally.
- **Set the Same WAV and FFT Rates:** Sets the program to change the sampling rate of the FFT and WAV data to the same rate, useful in array setup.
- **Do not ask again:** will stop this pop-up window every time you start the program.

- **UTC:** Lucy will operate in UTC time.
- **Plugin License:** Show "**Work with Plugin License**" dialog (**Load Plugin License**).

1.3   Connect to the Devices

The main Device Setup display will be presented, this is where you can connect to icListen devices.

4. Connect the icListen hydrophone(s) to power and a connection to the computer or network.
    a. For a single hydrophone connection, you can use the ***Users Guides - Ocean Sonics*** (icListen_UserGuide.pdf (oceansonics.com)) to connect the power and the test cable to the computer or network.
    b. For an array setup, use the setup required for your deployment.

5. Select tab **"Device Setup"**, then **"Device Link"** (Figure 1-2).

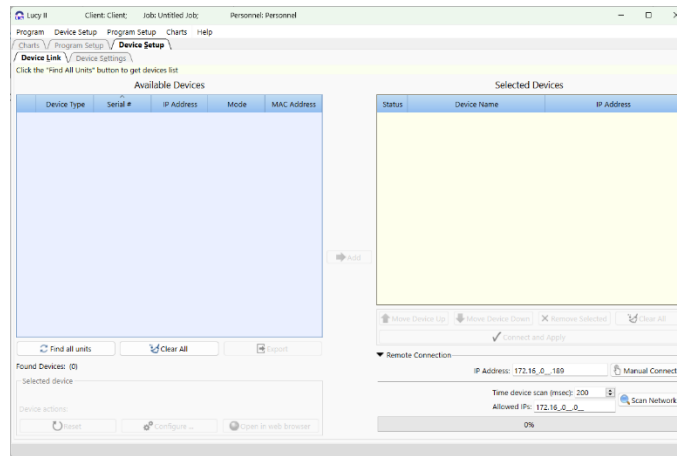*Figure 1-2 Device Setup – Device Link Tab*

6. Click on the **"Find all units"** button (Figure 1-2) to retrieve a list of the devices on the network. If you need to access to remote devices, see section on: "**Remote Device Connection**".

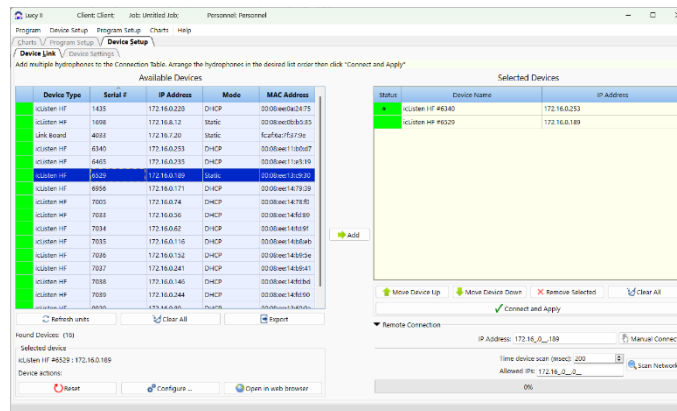7. Select a device from the device list (left table, available devices) (Figure 1-3).

Figure 1-3 Device Link – Selecting an Available Device to Connect

8. Click on the **"Add"** button or *double click left mouse button* on the hydrophone row. The device will be added to right table (Selected Array Devices) (Figure 1-3).

9. In the Selected Device Table, arrange the hydrophones using the Up and Down arrows to the device order for your array. The hydrophone at the top of the list will have a star (*) in the green box, indicating it is the *Primary hydrophone*.

NOTE: The *Primary hydrophone* will set the sampling rates for the waveform and FFT data and epoch settings for all hydrophones added in the Select Device Table automatically after click on the button "Connect and Apply".

10. Click on the button **"Connect and Apply"** (Figure 1-3). The program will open to the **Device Settings** Tab to select and update settings for your deployment (Figure 1-4).

You will not need to setup new devices every time you open Lucy II – the program will remember your last devices list and it can be loaded in if the "**Work with Saved Job**" option is checked (Program Initialization).
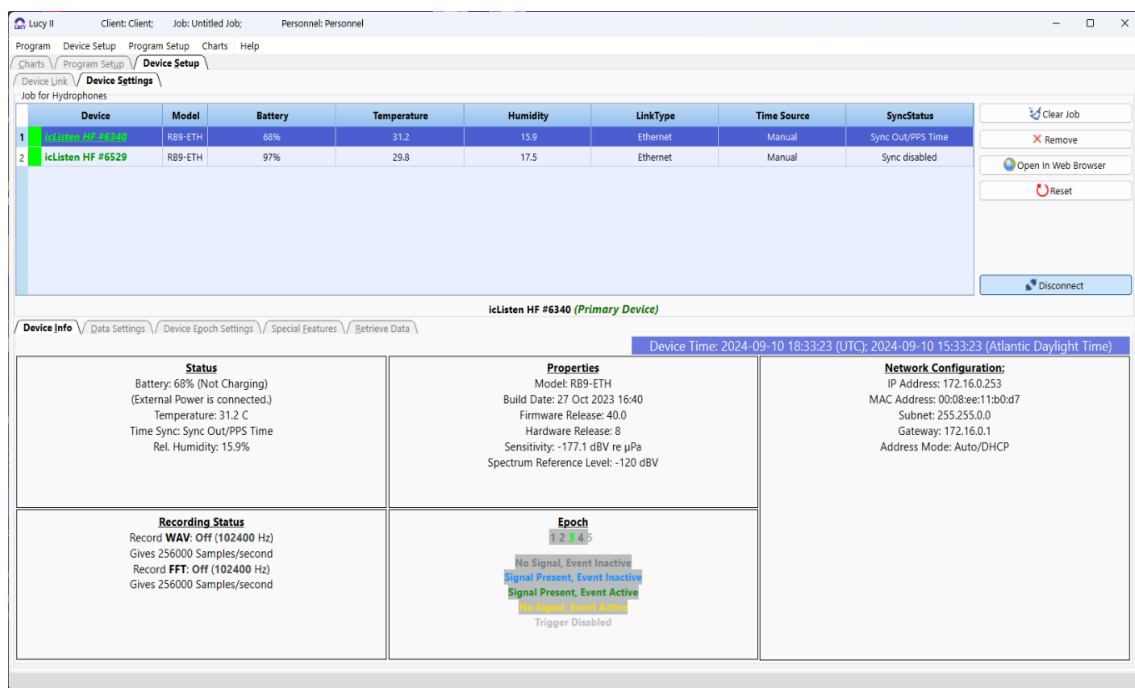
Figure 1-4 Device Setup – Device Settings

1.3.1   Setup the Device Data Settings

Data Settings panel displays the current configuration of device and allows this configuration to be updated (Figure 1-5).

The Primary icListen settings for the **Waveform and Spectrum (FFT) Sampling Rates [Bandwidth]** and epoch trigger settings are applied to all other secondary hydrophones (all hydrophones added to the Device list).
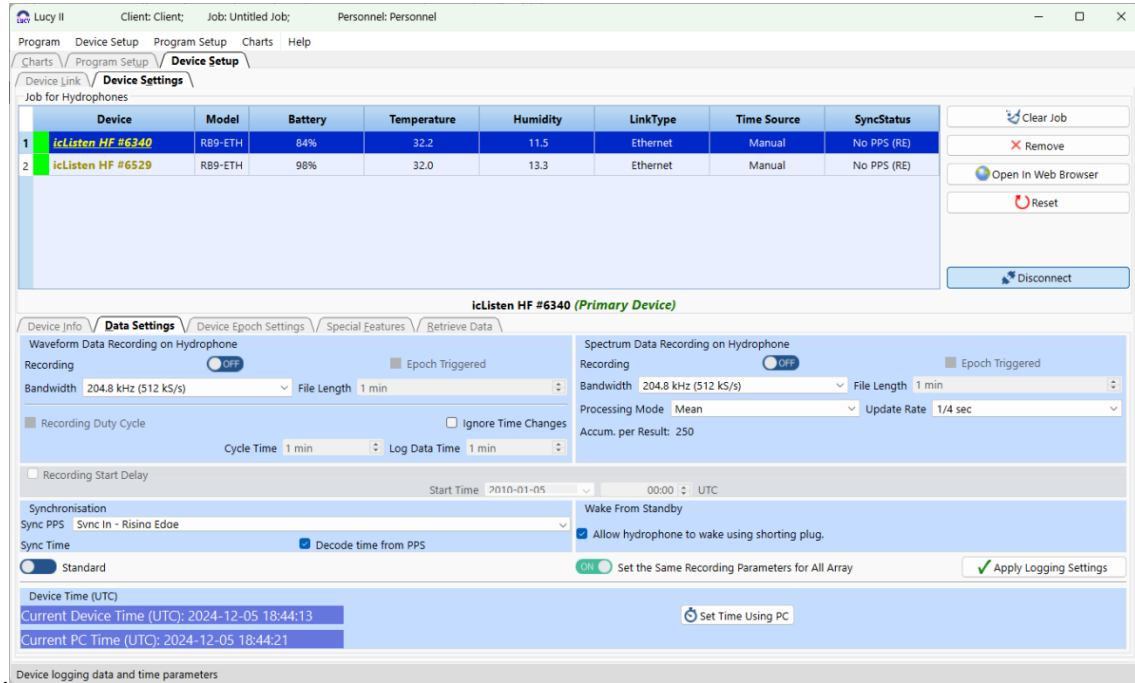
Figure 1-5 Data Settings

All other device settings can be set up independently for recording on the icListen hydrophone's internal memory. All Local recording on the computer will use the same hydrophone data settings set in this tab.

1.4 Lucy - Job Setup

To setup streaming and recording to your computer, go to the tab "Lucy Setup".

Figure 1-6 Lucy Setup – Job Setup Details

10. Add the Job Setup Details: **Job Name, Operator, Client, Personnel, Description** (Figure 1-6).

11. Under the Program Logging on computer tab, Set logging settings for Lucy Logging on Computer. Turn WAV and FFT Logging to ON position to have all data recorded to your computer locally while streaming on Charts section (if required):

Waveform Data (Time Series)

Spectrum Data (FFT)

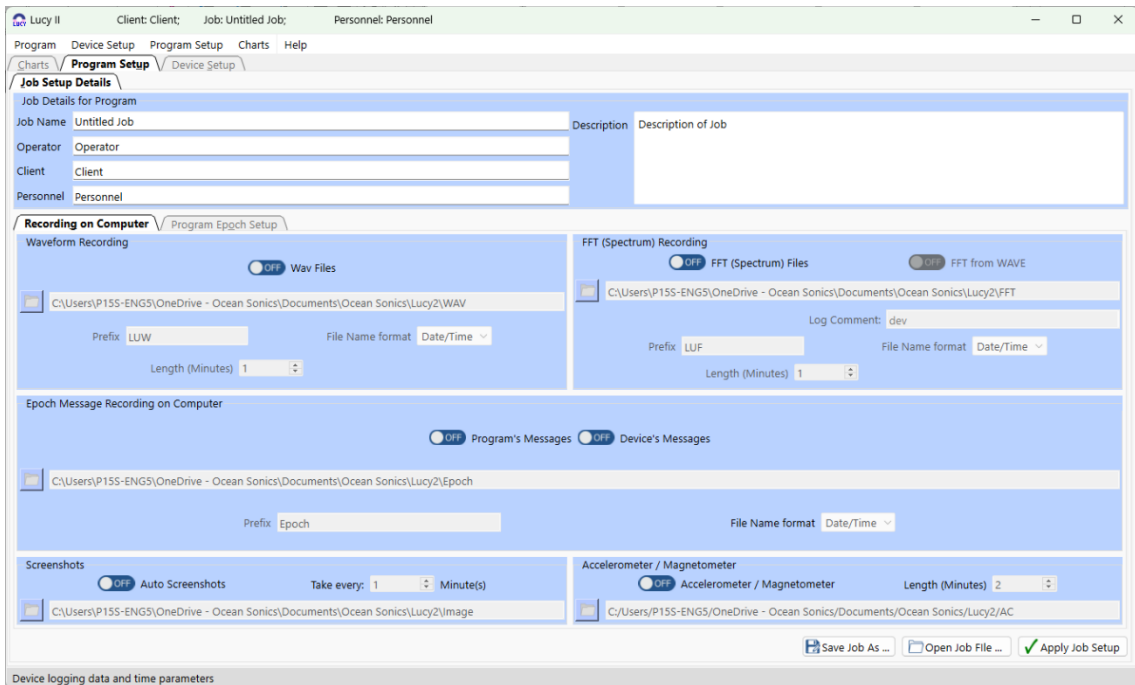12. Under the Program Epoch Setup Tab, set any Epoch event detection triggers on Lucy (if required).

13. Click on the button **"Apply Job Setup"** (Figure 1-6).

14. The program will return to the **"Device setting"** tab (Figure 1-4).

15. Review the hydrophones in the Device List ensuring they are all connected and have green boxes, with the proper synchronisation.

Note: Lucy II will automatically remember and load your last setup every time you run the program, when '**Work with Saved Job**' is selected in the Program Initialization Window (Program Initialization). You can also save your setting in a CONFIG file ("**Save Job As …**" button on **Lucy Setup – Job Setup Details**) that can be loaded into Lucy II ("**Open Job File …**" button on **Lucy Setup – Job Setup Details**) for future setups.

1.5   Start Streaming Data - Charts

1. Select tab **"Charts"** (Figure 1-7).
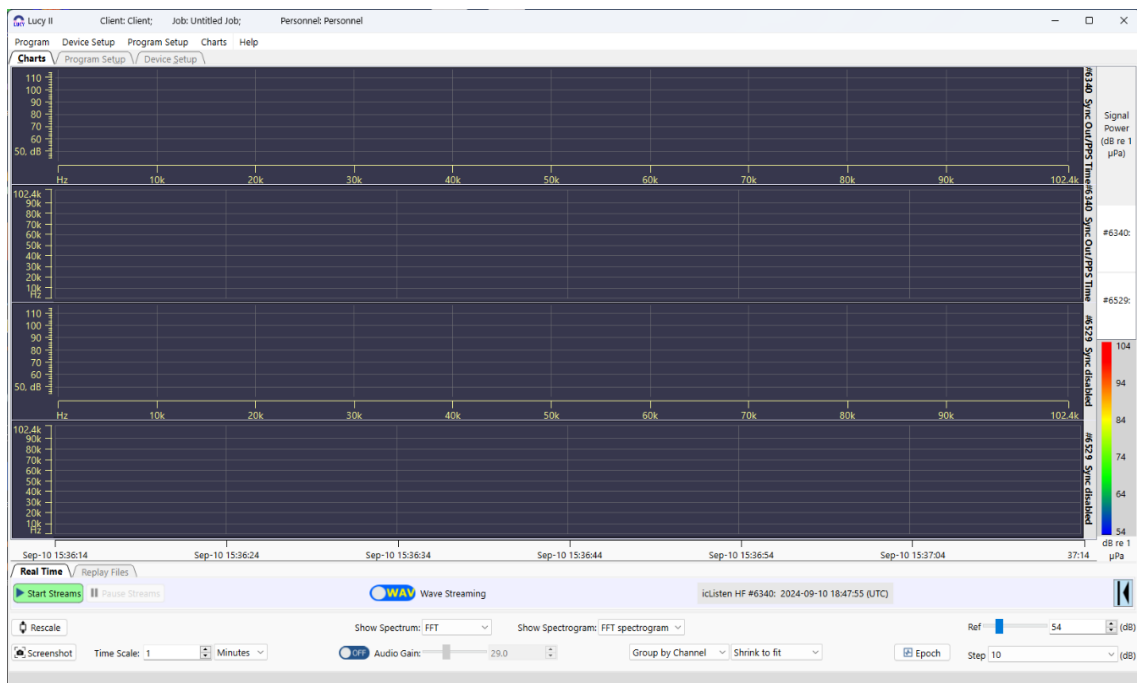
Figure 1-7 Charts – Start Streams

2. Click on the button **"Start Streams"** to start streaming data (Figure 1-7).

3. Choose the options for streaming WAV/FFT depending on your data streaming requirements.
    a. Streaming WAV data requires more bandwidth and processing for Lucy II.
    b. Switching between the WAV and FFT streams will end the current recording of waveform and FFT files on the computer. It is recommended to only switch between the two streams when needed, otherwise many files will be created (if recording data on the computer is turned on).

4. Choose the charts and adjust for best view of the hydrophone streams.

2 Device Setup Features

2.1 Device Link

The **"Device Link"** tab shows the available devices that can be connected to stream data in Lucy as an individual hydrophone or multiple hydrophones as an array.

2.1.1 Available Devices - Finding and Checking Status of the Hydrophones

The table on the left shows the **Available Devices**, connected to the computer or network (Figure 2-1). The available tools for the Device Link - Available Devices table include '**Find all units**', '**Refresh**', '**Clear**' and '**Export**'. By clicking on a hydrophone, you can access the **Device Actions** to '**Reset**', '**Configure…**' and '**Open the Web Browser**'. See below for more details.
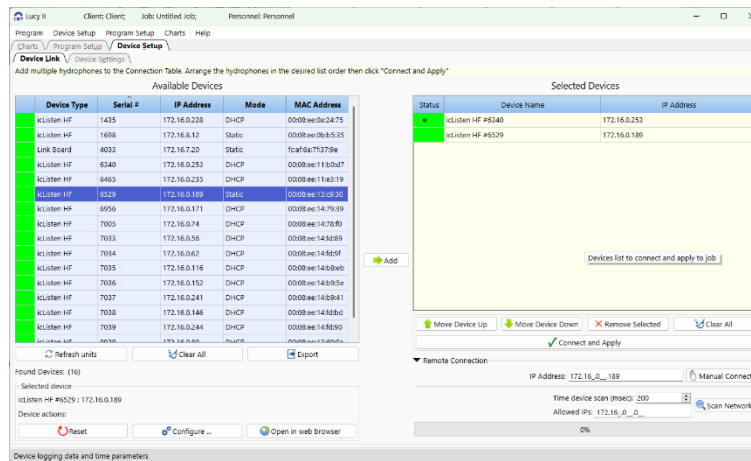

Figure 2-1 Device Link – Finding Hydrophones

Available Tools:
- **Find all units** – provides a list of the devices on the network or connected to computer.
- **Refresh** - Updates the status of the hydrophone(s).
- **Clear All** - Removes all devices from the list. Click '**Find all units**' to bring back the current devices connected.
- **Export** - Will save a list of the devices to your computer in .csv format.

Device Actions

Reset - Resets the icListen hydrophone. A reboot is performed on the Linux system inside the hydrophone. This puts the hydrophone into standby and then turns the hydrophone back on. The hydrophone will buzz then double buzz. If the hydrophone does not have power supplied during the **Reset**, it will go into standby mode. To turn back on from standby mode plug in the power on the test cable.

Open in Web Browser - Opens the hydrophone web page in default web browser.

Configure… - Allows the user to make changes to the IP Addressing of the icListen hydrophone (Figure 2-2). See (**Configure icListen - Device Link Options**) for further information on configuring the icListen IP address.
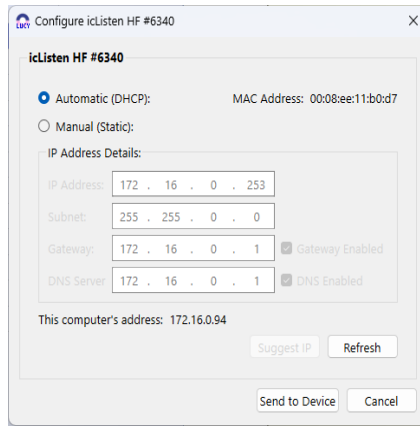
Figure 2-2 Configure Device Dialog – Automatic (DHCP)

Available Devices table has popup menu (Figure 2-3):
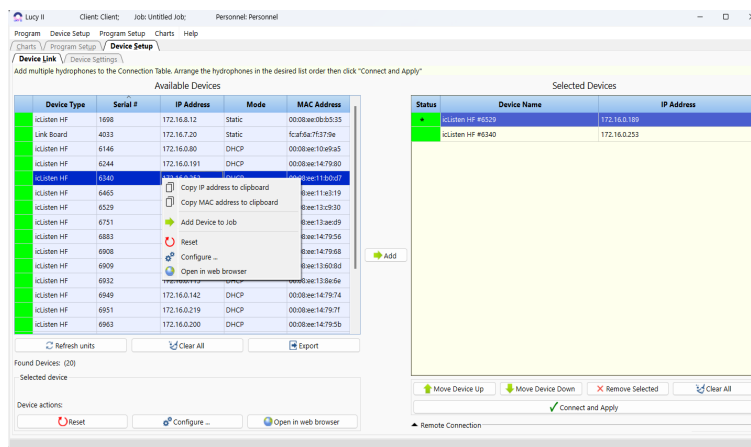
Figure 2-3 Available devices popup menu

Popup menu available items:

- **Copy IP address to clipboard** – copies IP address of the selected device to the window clipboard.
- **Copy MAC address to clipboard** – copies MAC address of the selected device to the window clipboard.
- **Add Device to Job** – adds selected device to the **Selected Devices** table.
- **Reset** - Resets the icListen hydrophone. A reboot is performed on the Linux system inside the hydrophone. This puts the hydrophone into **STANDBY** and then turns the hydrophone back on. The hydrophone will buzz then double buzz. If the hydrophone does not have power supplied during the '**Reset**', it will go into **STANDBY** mode. To turn back on from **STANDBY** mode plug in the power on the test cable
- **Configure ...** - Allows the user to make changes to the IP Addressing of the icListen hydrophone (Figure 2-2). See (**Configure icListen - Device Link Options**) for further information on configuring the icListen IP address.
- **Open in Web Browser** - Opens the hydrophone web page in default web browser.

2.1.2 Connecting to Selected Hydrophones

The table on the right is the Selected Hydrophones List (Figure 2-4). These hydrophones will be added to job. To add a hydrophone to the '**Selected Devices List**' click on the '**Add**' button or *double click left mouse button* on the hydrophone row (or use command '**Add**' from **Available Devices** table popup menu (Figure 2-3)). This list can be used to order the hydrophones in the array using the Up and Down buttons as well as adding and removing hydrophones as needed. See the additional details of the Available tools for this list below.
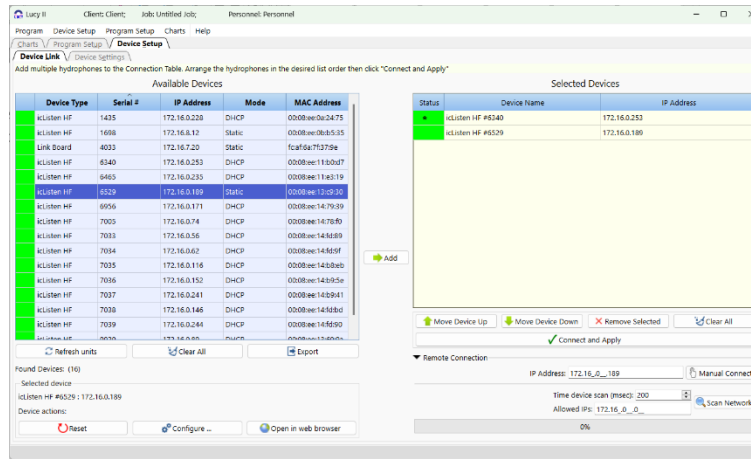
Figure 2-4 Device Link – Hydrophones List to Connect

Available Tools:

- **Move Device Up –** Move the selected hydrophone up in the list (and in the position on array accordingly).
- **Move Device Down** - Move the selected hydrophone down in the list (and in the position on array accordingly).
- **Remove Selected Device** - Remove the selected hydrophone from the list.
- **Clear All** - Removes all devices from the list.
- **Connect and Apply** – Connect to all hydrophones in the list and work with them in the charts tab. This list of the hydrophones will save and will load next time the program will run, if in the initialization dialog will set "**Don't ask again**" option in the Program Initialization dialog.

Note: **"Manual Connect"** and **"Scan Network"** commands are described in the **"Remote Device Connection"** topic.

Selected Devices table (Figure 2-4) has popup menu (Figure 2-5):
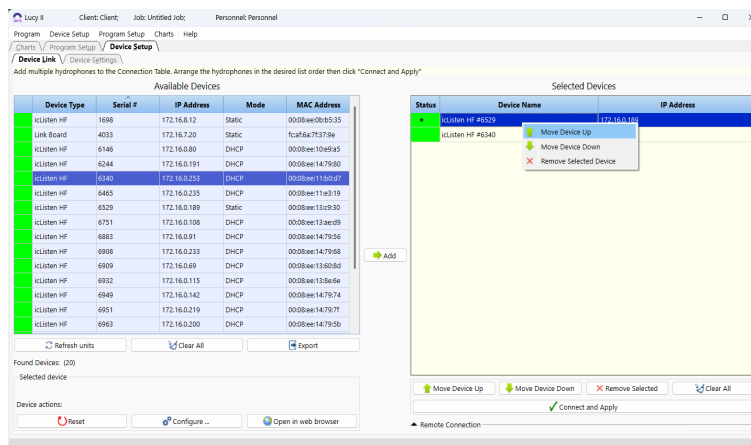

Figure 2-5 Selected devices popup menu

Popup menu available items:

- **Move Device Up –** Move the selected hydrophone up in the list (and in the position on array accordingly).
- **Move Device Down** - Move the selected hydrophone down in the list (and in the position on array accordingly).
- **Remove Selected Device** - Remove the selected hydrophone from the list.

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2.2   Device Settings

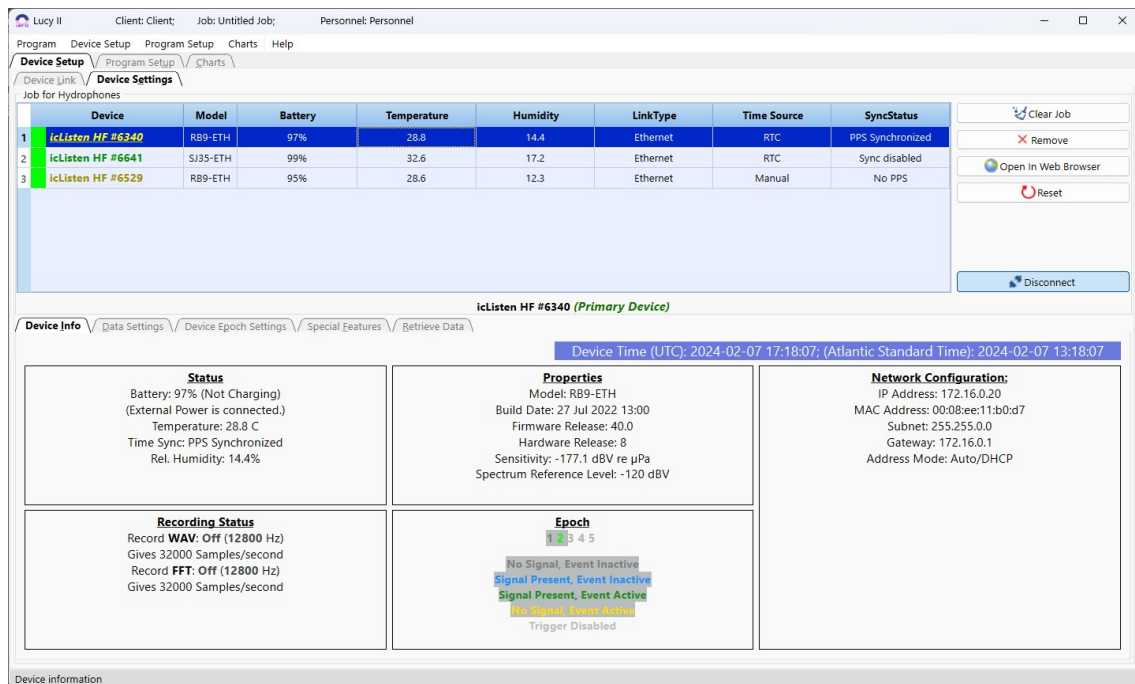Contains the list of the connected devices (Figure 2-6).

Figure 2-6 Device Settings

Available Tools:

- **Clear Job** – Removes all devices from the list.
- **Remove** - Remove the selected hydrophone from the list.
- **Open in Web Browser** - Opens the hydrophone web page in default web browser.
- **Reset** - Resets the icListen hydrophone.
- **Connect** – Connect to all hydrophones in the list and work with them in the charts tab. This list of the hydrophones will save and will load next time the program will run, if in the initialization dialog will set "**Don't ask again**" option (Program Initialization).
- **Disconnect** – Disconnect to all hydrophones in the list.

The icListen **Device Settings** panel is split into 5 tabs. These tabs are available when there are hydrophones connected on the **Device Settings** Tab (Figure 2-6) and the hydrophone is available to stream data.

2.2.1   Device Info

The **Device Info** tab only displays information about the selected hydrophone (Figure 2-6). The Device Info includes the current state and properties on the icListen hydrophone.

2.2.2   Data Settings

The **Data Settings** tab displays the current configuration of device and allows this configuration to be updated (Figure 2-7). The Data settings tab configures the internal recording on the hydrophones. The logging refers to any data that is logged to the hydrophone's internal memory and must be downloaded from the hydrophone.
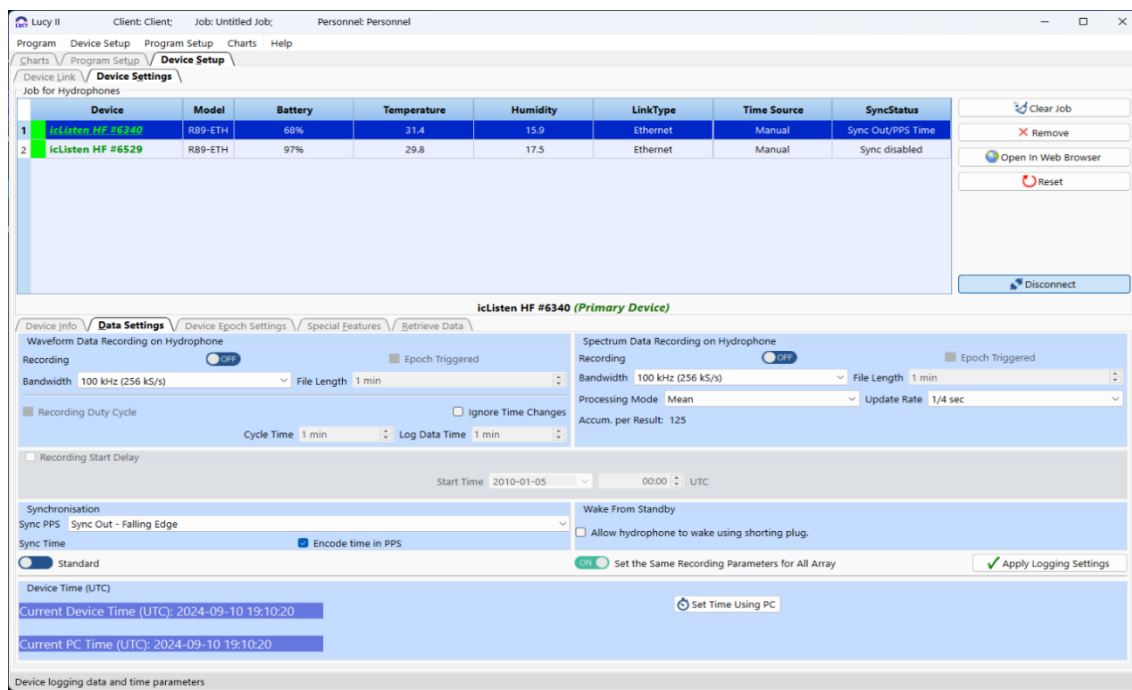
Figure 2-7 Data Settings

While connected to more than one hydrophone, in Array Mode, the Primary icListen (the first hydrophone on the list) must be configured to set the Bandwidth - Sampling Rates for the Waveform and Spectrum data for **all** hydrophones. When the sampling rates are updated on the Primary hydrophone, all hydrophones will be set to the same settings. This doesn't include advanced settings and PPS.

Other than the sampling rate all other icListen settings can be changed including:

- Data Logging Mode (depends on "**Set the same Recording Parameters for All Array**" option).
- Log File Length (depends on "**Set the same Recording Parameters for All Array**" option).
- Internal time ("**Set Time Using PC**" command).
- Duty Cycling.
- Spectrum Processing.
- Logging Delay.
- Advanced Features: Data Format, Gain, Spectrum Reference Level.

If "**Set the same Recording Parameters for All Array**" option will be ON – program will automatically update recording mode (WAVE and FFT) for all hydrophones in array, OFF – recording parameters may be different for each device.

2.2.2.1   Data Logging on Hydrophone

Available options •
- **Logging OFF**
  - ▪ *Data will not be logged on the icListen internal memory.*
- **Log ON**
  - ▪ *Available for both waveform and spectrum data.*
  - ▪ *Data is logged on the icListen internal memory.*
- **Log Duty Cycle**

- ▪ *Only available for waveform data.*
- ▪ *Data is logged internally for the duration of the 'Log' cycle.*
- **Epoch**
  - ▪ *Available for both waveform and spectrum data.*
  - ▪ *Data is logged based on epoch trigger settings.*
- **Epoch & Log Duty Cycle**
  - ▪ *Available for waveform data only.*
  - ▪ *Data is logged based on epoch triggers and the duty cycle. This means data will be logged both during the cycle time, and if a trigger occurs.*

Note: Simultaneous streaming and logging of waveform data above 50 kHz can cause issues due to the device processors. We suggest recording waveform data locally if you would like to stream the wav data on Lucy II at the same time. The recording on the internal memory of the hydrophone will take priority and cause gaps in the data stream on Lucy.

Bandwidth - The bandwidth is the range of frequencies available.

Log File Length - This feature allows the user to configure the length (in minutes) of files internally logged by the icListen unit.

Recording Duty Cycle - Duty cycling is available when waveform data is being logged.
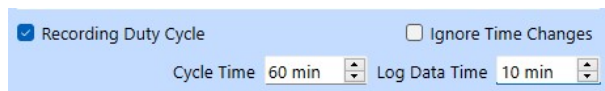

Figure 2-8 Recording Duty Cycle

The logging cycle used is determined by the **Cycle Time** and **Log Data Time** fields. Data will be logged for the first **Log Data Time** minutes of the complete **Cycle Time**.
In the screenshot above (Figure 2-8), this means that the first 10 minutes will be logged, and the next 50 minutes will not, for the total of a 60-minute cycle. This cycle will be repeated continuously.

Advanced Setting - Gain - In icListen AF/HF, the configurable gain setting applies digital gain to the waveform data. **Gain** is adjustable in steps of 6 dB, ranging from 0 dB to 48 dB. This setting can only be adjusted for 16bit data, where it can be used to increase the sensitivity of the unit to compensate for the reduced resolution.

2.2.2.2 Spectrum Data Logging

The processing performed on frequency domain data can be configured by adjusting the processing mode, and the spectrum update rate. Three types of FFT processing are available to icListen: "Mean", "Peak", and "Filter". Lucy will adjust the processing settings based on the update rate. For a detailed description of how the FFT processing works, please refer to the https://oceansonics.com/users-guides/ https://oceansonics.com/documents/icListen_Log_File_Formats.pdf.

Advanced Setting - Spectrum Reference Level
The hydrophone will show spectral data relative to the Spectrum Reference Level, which is equal to the minimum spectral density measurement icListen can return. Valid values are between -120 and - 180 dBV. **Ocean Sonics recommends maintaining this at -120 dBV, unless making low noise/ low amplitude measurements.**

2.2.2.3   Recording Start Delay

The logging delay is used to set the time at which logging is started. This is applied to both waveform and FFT data logging (including triggered logging). If **Recording Start Delay** is not checked, data logging starts immediately.

2.2.2.4   Synchronisation

The synchronisation options are used to configure icListen to synchronise with other icListen devices or devices producing a Pulse Per Second (PPS) output. If you would like icListen to be a **PPS leader** (primary) and synchronise other units to this icListen, select "Sync Out". If you would like icListen to be a PPS follower and synchronise to an existing source/another icListen, select "Sync In" and the correct polarity (Rising Edge/Falling Edge) of the signal. Select "Sync Disabled" if you would like no synchronisation. icListen may also be configured to Decode the time from the PPS signal. This is done with the **Decode (Encode) time from PPS** checkboxes.

2.2.2.5   Wake from Standby

The Wake from Standby option is used to configure an icListen to wake from standby mode when the shorting plug is connected. When this option is enabled, the unit may also be woken by driving the sync line low.

2.2.2.6   Device Time (UTC)

Using the **Set Using PC button**, the internal time of the icListen can be set to match that of the PC running Lucy.

2.2.3   Device Epoch Settings

Device Epoch Settings display epoch triggers that are configured from the Epoch setup tab. Epoch trigger files may also be loaded or saved for device (Figure 2-9).

Figure 2-9 Device Epoch Settings

In Epoch mode, icListen can be configured to detect specific signals in the real-time data and perform several tasks based on those signals. icListen can each check the data with up to 5 independent triggers.

This section will cover the setup and removal of epoch triggers from icListen or Lucy.
For the icListen any trigger out of frequency range will be disabled, all others will be adjusted for the new settings automatically, to maintain the same trigger.

Note: Lucy may round entries to the nearest values supported by icListen.

The **Device Epoch Settings** tab is divided into 5 rows, with each row representing an epoch trigger.

2.2.3.1   Trigger Conditions

The trigger conditions section is where users set up the details of a particular epoch trigger. These settings are what icListen/Lucy checks the new data against to decide if an event has occurred (Figure 2-10).

Trigger				
Frequency (Hz)		Test	Threshold (dB µPa)	Duration (Wave: (Spectrum:
Min	Max			
100	150	>	55	1
200	250	>	60	3

Figure 2-10 Trigger Conditions

The frequency range is the range in Hz over which the data is checked.

The signal conditions are the amplitude of the signal to check against (in dB re µPa), the duration that the signal must be present/gone for (in seconds), and the test field (whether we are checking for a signal to become present (Greater) or disappear (Lower)).

2.2.4   Special Features

Special Features panel works with the Network Settings, Reset\Standby, Web Login Security (Figure 2-11).
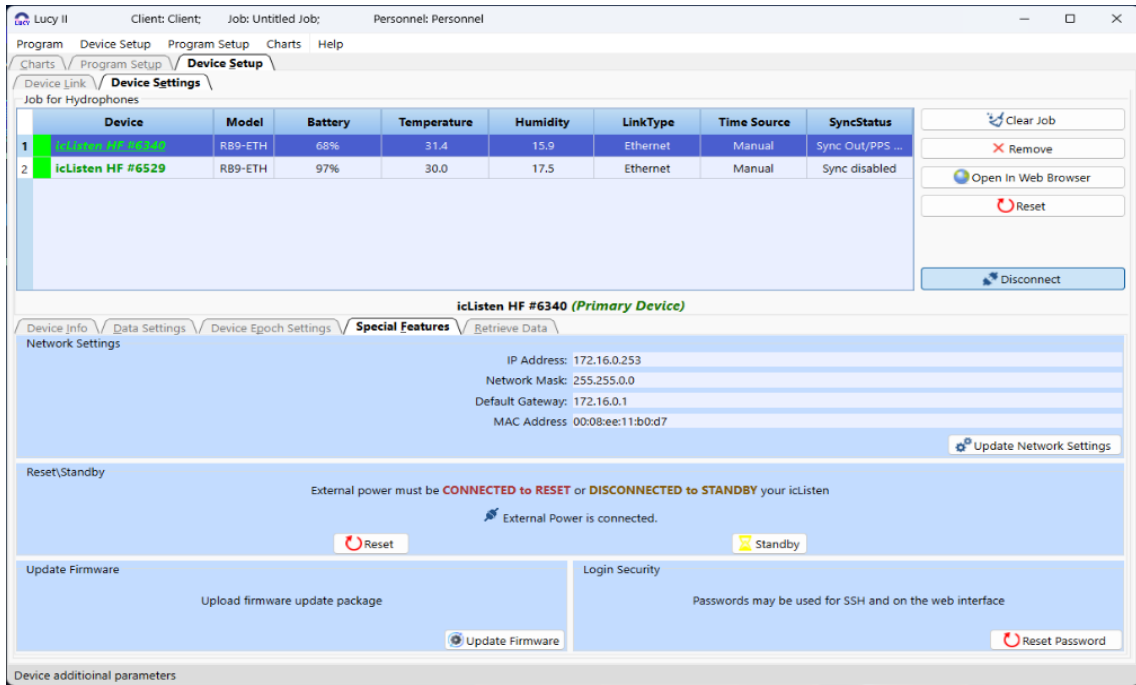
Figure 2-11 Special Features

Network Settings – The icListen hydrophone IP address can be set manually through the Network Settings. More about setting DHCP and Static IP addresses for the hydrophones is in the **Configure icListen - Device Link Options**.

Reset\Standby
Reset – When external power is connected it resets the icListen hydrophone.
Standby – When external power is disconnected it puts the hydrophone into a low power mode, called standby mode. When the hydrophone has Wake from Standby enabled the shorting plug can be used to turn on the hydrophone.

Login Security
Reset Passwords – reset passwords for web connection.

2.2.4.1   icListen AF/HF Firmware Update

An icListen AF/HF is updated by uploading the update (.icu) file to the "update" folder on the hydrophone. This is done in Lucy by pressing the Update button and selecting the correct file. Once the file is successfully uploaded, the hydrophone must be rebooted. About 5 minutes after the reboot, the unit will be ready to use with its new firmware. **Note**: Updating an icListen AF/HF will clear all data logged internally on the hydrophone. Ensure any desired data has been retrieved before performing the update. More information about update firmware process is in the **Appendix D. icListen Firmware Update**.

2.2.5   Retrieve Data

The **Retrieve Data** tab will show the current files stored on the icListen's internal memory and allow the user to download files from hydrophone to the computer (Figure 2-12).
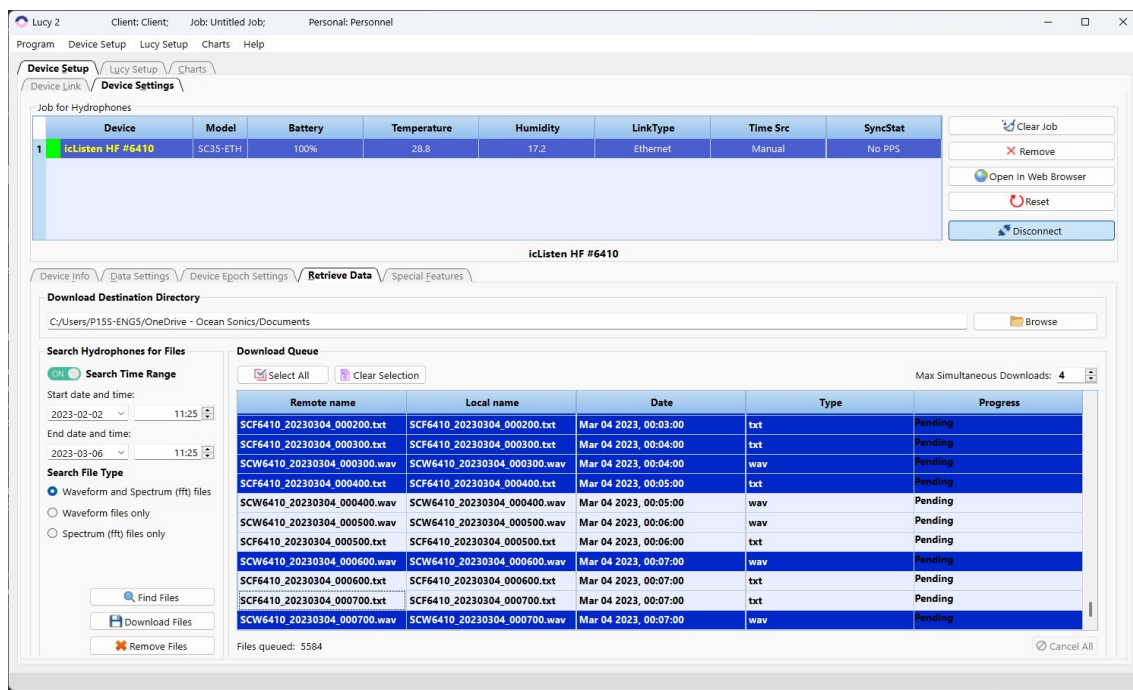
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Figure 2-12 Retrieve Data

Available Tools:

- **Download Destination Directory** – folder where the files will be saved.
- **Search Time Range / All the Data** – searching files in the given time range or obtain all existed data.
- **Search File Type** – choose type file: WAV, FFT txt or both.
- **Find Files** –searches for the files in the range provided.
- **Download Files** – download selected files on the computer into given folder.
- **Remove Files** – delete selected files from the hydrophone storage.
- **Select All** – select all files.
- **Clear Selection** – deselect all files.
- **Max Simultaneously Downloads** – number of files simultaneously saving on the computer (number of threads).

3 Lucy Setup Features

3.1 Program Initialization

"**Program Initialization**" window (Figure 3-1).
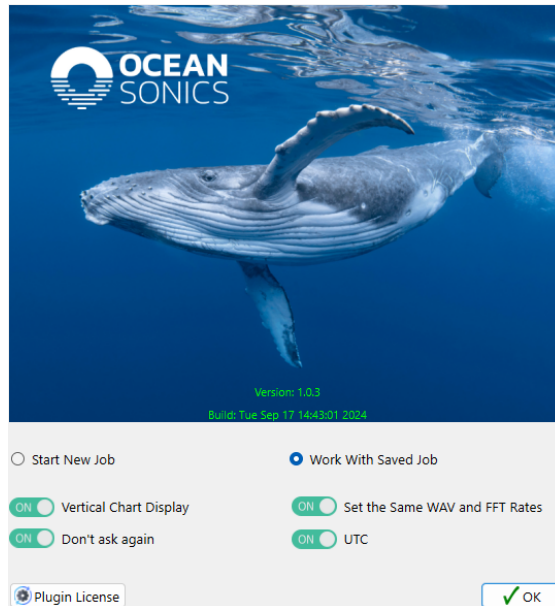

Figure 3-1 Program Initializing Dialog

- **Start New Job:** Sets program to always require adding devices to the setup each time it opens.
- **Work With Saved Job:** Sets program to start with the previously added devices from the last job setup.
- **Vertical Chart Display:** Sets the charts to display in a vertical direction. If the box is not checked, the charts will be displayed horizontally.
- **Set the Same WAV and FFT Rates:** Sets the program to change the sampling rate of the FFT and WAV data to the same rate, useful in array setup.
- **Do not ask again:** will stop this pop-up window every time you start the program.
- **UTC:** Lucy will operate in UTC time.
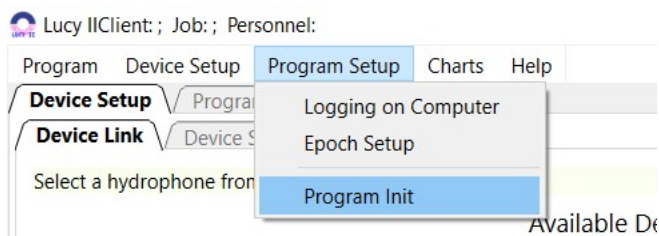- **Plugin License:** Show "**Work with Plugin License**" dialog (see **Load Plugin License**).

Figure 3-2 Main menu to call "Program Init" dialog

If you wish to change these settings in the future, you can access this window under **Program Setup** > **Program Init** (Figure 3-2).

3.2   Program Setup

The **Program Setup** tab is responsible for the program configuration and configuration of logging data from the hydrophone stream(s) to your computer. The setup is configured as a Job Setup, with the details added to the header of the files. Below the **Job Setup details**, you can also set up logging of the streamed waveform and FFT data to your computer.

3.3   Job Setup Details

The job details consist of the **Job Name, Operator, Client, Personnel,** and **Description** of the job (Figure 3-3). The details can be found along the top of the main display.
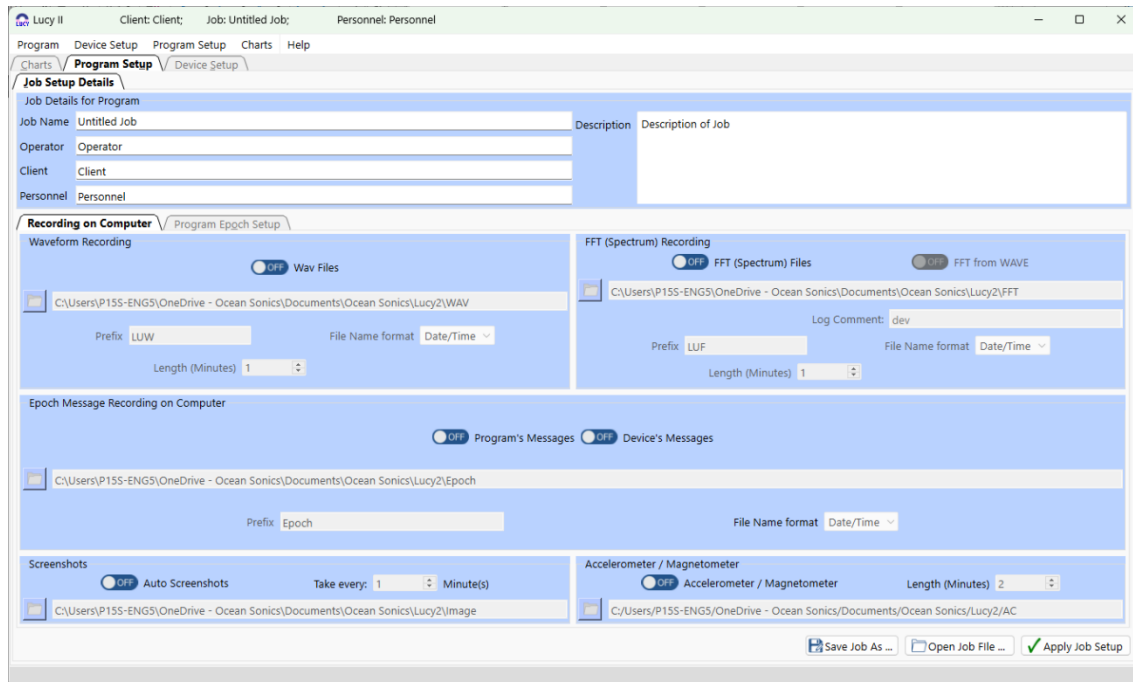

Figure 3-3 Job Setup Details and Recording on Computer tab

3.3.1   Lucy Logging on Computer

The Logging options relate to Lucy logging only. For instrument logging options see **Lucy Setup -> Job Setup Details -> Lucy Logging on Computer** tab (Figure 3-3).

Lucy can perform these two types of logging simultaneously:
- Waveform Data (Time Series)
- Spectrum Data (FFT)

Data for icListen and Lucy FFT logging stores data in a readable TXT log format, which can be imported into a spreadsheet. These files also include temperature, and humidity data.

Waveform data is logged as standard WAV audio files. These files are playable in any standard audio player or editor, such as Audacity. (*It is better to use a local disk to store WAV files on the computer, especially for high frequencies (the amount of WAV data depends on the frequency) and/or recording WAV data to the computer from several hydrophones at the same time. Cloud storage has data transfer speed limits, and Windows may temporarily block all network connections while using cloud storage. This may cause the hydrophone to disconnect from the program and cause data loss.*)

Lucy can also record the Epoch Message logs from Lucy and the icListen. 5 independent triggers can be set on each and you can choose to record the messages on your computer as below.

There is a possibility to make auto screenshots and save them to the computer.

Program can create FFT data from WAV data for WAV files that are replaying. For this user can turn on "FFT (spectrum) Files" recording and "FFT from WAVE".

TXT (FFT, Epoch, Impulses, Sound Exposure, Accelerometer and magnetometer) log files are stored in tab separated value (CSV) format. These files can be viewed by a spreadsheet viewer (such as Excel) as well as through Lucy. When replayed (FFT data), the data is displayed as it was when initially received.

Certain settings (such as chart scaling) are viewing aids only and are not stored with the data.

The FFT TXT log files contain FFT (Spectrum) data. This data comes from hydrophone.

Program can create and save screenshots. If auto screenshots are enabled, screenshots will be taken of the main display at the configured rate (set in minutes).

The Accelerometer/Magnetometer data can be recorded in the txt file (text CSV format). This data contains the x, y and z components of both Acceleration (in g) and the Magnetic Field (in nT).

3.3.1.1   Epoch Message Logging

Epoch Message Log files will only be created if there are detected events - Epochs while streaming data. More information about Epoch Messages and Logs found in Appendix C.
- Program's Messages: ON/OFF – will log all Epoch messages from the Lucy Program event detection triggers, measured events, and all activity changes of the event triggers.
- Device's Messages: ON/OFF – will log when the hydrophone's triggers are active (event detected) and inactive, once the trigger is no longer present in the detected signal.

Note: If there are multiple hydrophones streaming data on Lucy, a separate file will be created for each hydrophone with the serial number and prefix in the file name, example (for epoch): Lucy_Epoch_6529_DATE_TIME.txt.

3.3.2   Lucy Program Epoch Setup

When streaming or replaying data, Lucy can be configured to detect specific signals called events, detection triggers or epochs. Lucy and icListen can each check the data with up to 5 independent triggers (Figure 3-4). Triggers configuration is very similar to the device triggers configuration.

To configure the Lucy Program Epoch Setup for Event Trigger Detection:
1. Enable the Epoch trigger by checking the box next to the event number.
2. Input the minimum and maximum Frequency Range in Hz.
3. Input the trigger Test, < (less than) or > (greater than) the threshold level.
4. Input the Threshold signal level in dB re µPa.
5. Input the Duration of the trigger signal.
6. Input the Event Hold: Pre-Event and Post-Event in seconds.

7. Save Epoch and Save Job File Config for future deployments in appropriate folders.
8. Click Apply Job Setup.
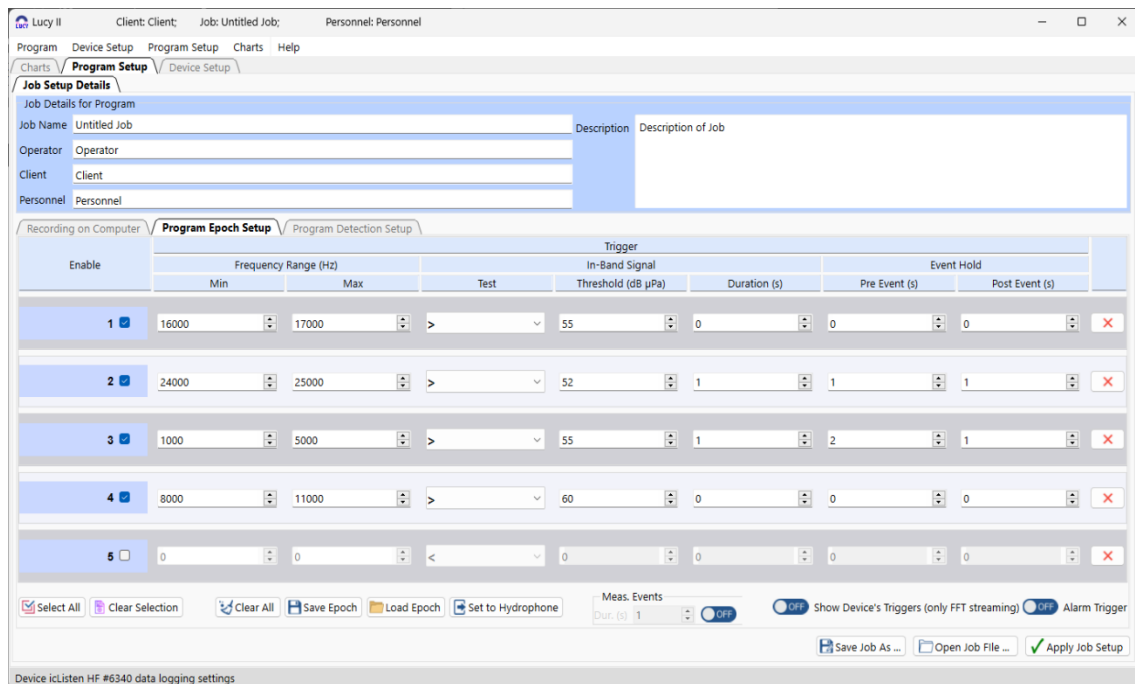9. Choose Charts Tab and click Start stream.

Figure 3-4 Lucy Program Epoch Setup

3.3.2.1   Available Selection Tools and Configuration Settings

- **Select All** – selects (checks) all boxes with predefined event triggers input.
- **Clear Selection** –deselects (unchecks) all boxes with event trigger input.
- **Clear All** - clears all triggers data input in all boxes, a pop-up window will appear to ensure you wish to clear all the data from the table.
- **Save Epoch** – saves a TriggerSetup.cfg file, this file can be loaded in any LucyII Program setup to load the same epoch trigger configuration for future deployment setup.
- **Load Epoch** – loads a previously saved TriggerSetup.cfg file.
- **Set to Hydrophone** – will apply all epoch triggers configured in Lucy to the current hydrophone. A pop-up window will ask you to confirm.
- **Meas. Events** - measures the amount of time an event trigger was active over a given duration set; the output is given as a percentage. To use this feature, turn Measured Events ON and choose a Duration in seconds for the calculated measurement. The output will be logged in the EpochLog.txt and the data stream will show in the Epoch window on the Lucy Program.
- **Show Device's Triggers** – Turning this feature ON will allow you to see the icListen device epoch triggers while streaming FFT data and viewing the FFT Chart only. This data will not be displayed on the Multiple FFT Chart for several devices, in this case it would be difficult to understand what device is active in the trigger.
- **Alarm Trigger** – will set the program to play the windows default sound when a trigger is active notifying the user the epoch was triggered.

To apply any changes, click button "**Apply Job Setup**".

4   Charts Features

4.1   Charts Tab

The **Charts** Tab displays hydrophone waveform and spectral data while streaming in real-time or when replaying previously logged data. The **Real Time** tab is used for real-time streaming and the **Replay Files** Tab is used for the Replay Mode.

To select and control the chart displays there are various drop-down menus and chart options. The charts are separated into two main groups. The first group of charts: **Spectrum**, can be set to the following displays: FFT, Multiple FFT, PkRMS and Wave. The second group of charts, **Spectrogram**, are set to a waterfall display for the streaming or replaying of data. If a group of charts is set to off, the other group will fill the display.

The Charts displays can be resized (as well as the panel for Replay Files Tab) (Figure 4-1).
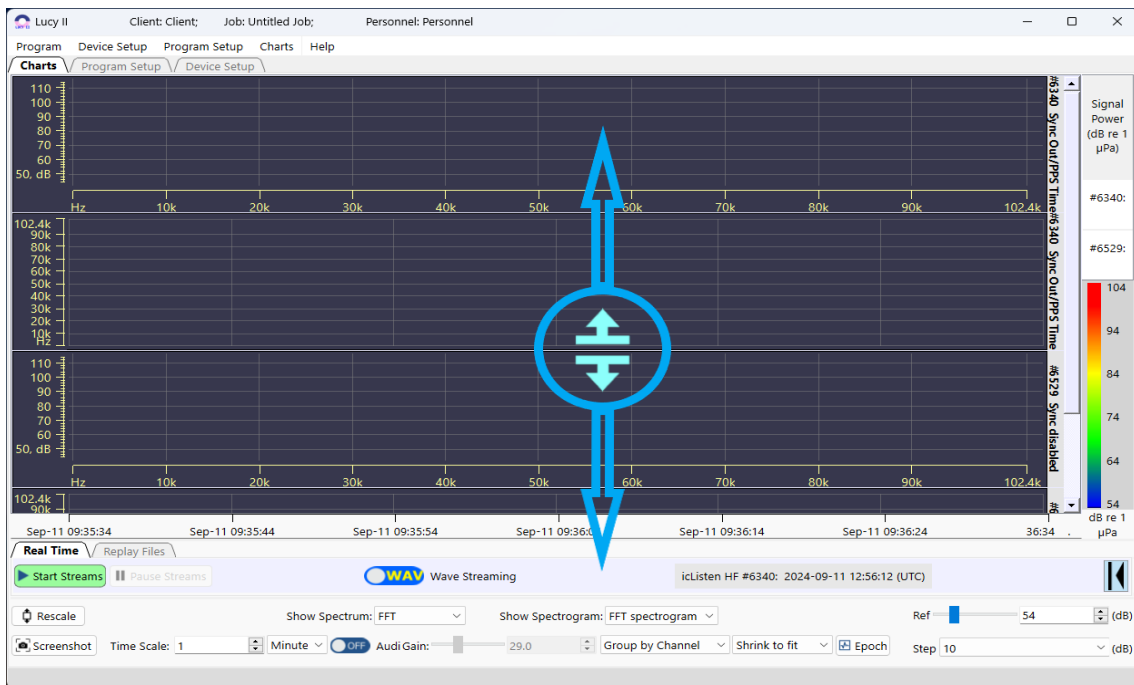
Figure 4-1 Charts Splitters

The **Charts** tab has two modes:
- **Real Time:** Live data streaming from hydrophones.
- **Replay Files:** Replaying saved files.

Both modes have the similar main options tools.

4.1.1 Vertical Chart Display vs. Horizontal Chart Display

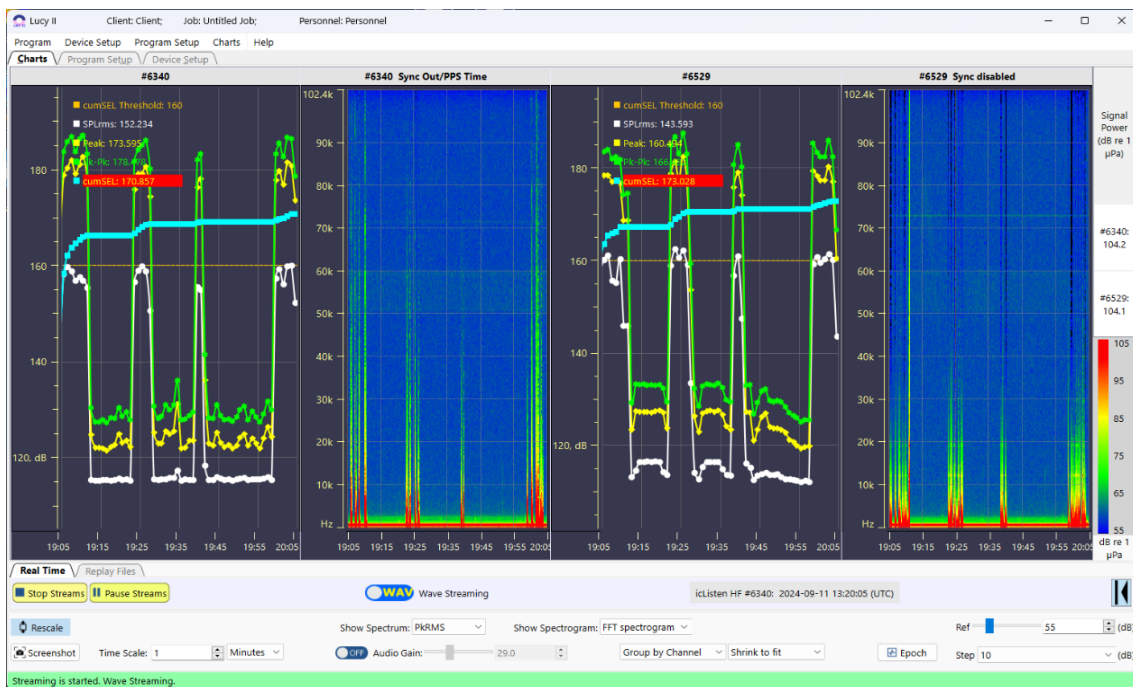*Figure 4-2 Charts: Vertical Chart Display of 2 icListen hydrophones*

Figure 4-3 Charts: Horizontal Chart Display of 2 icListen hydrophones

4.1.2 Chart Zoom

The chart can be zoomed in real-time to see exact values.

Zoom In: To **zoom in** on a chart, push mouse button and drag on a selected area of the chart. The selected area of the chart will enlarge.

Zoom Out: To **zoom out** of the chart, right click on the chart display. To return to original view (zoom out completely), you can right click while holding the CTRL (Control) key.

4.2   Live Data Streaming from Hydrophones

4.2.1   Spectrogram Charts Group

4.2.1.1   Single FFT Chart

The Single FFT chart displays the most recently received FFT data (Figure 4-4).
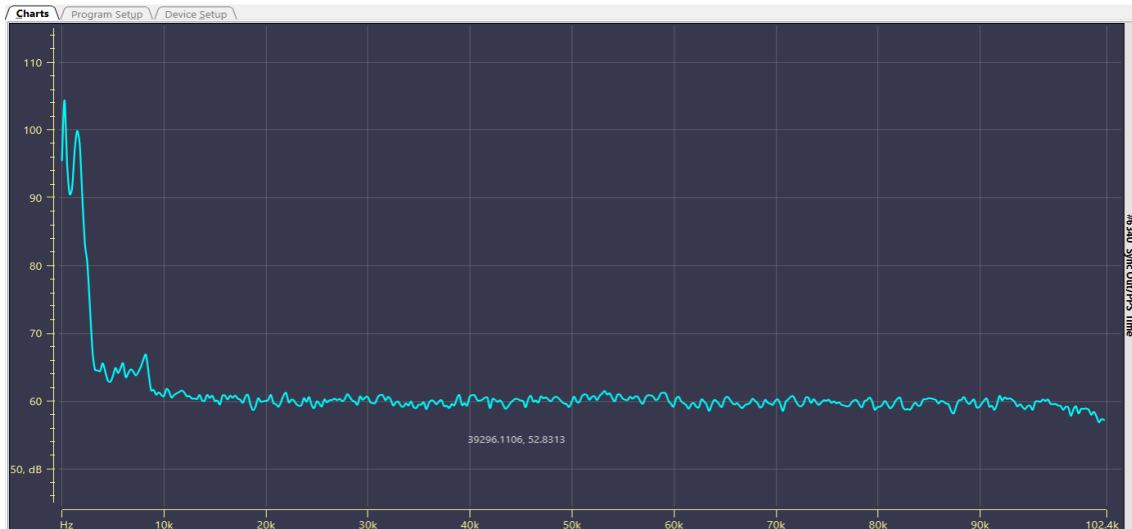
Figure 4-4 Single FFT Chart

This data corresponds to the most recent data on the Spectrum Chart.

The x-axis of this chart is the frequency range, which varies based on the sample rate selected. Frequency may also be plotted on a logarithmic scale, by using the log scale option in the "**Charts Additional Options dialog**" (Figure 4-21).

The y-axis of the chart is the amplitude. This is scaled using the reference scaling options in the lower left of the display.
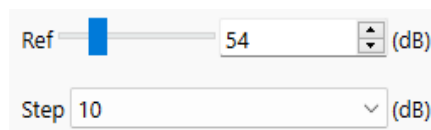
Figure 4-5 Reference scaling options

These scaling options are detailed in the Spectrum Reference section (Figure 4-5).

4.2.1.2   Multiple FFT Chart

Multiple FFT chart shows the most recently received FFT data from all connected devices on one chart simultaneously (Figure 4-6).
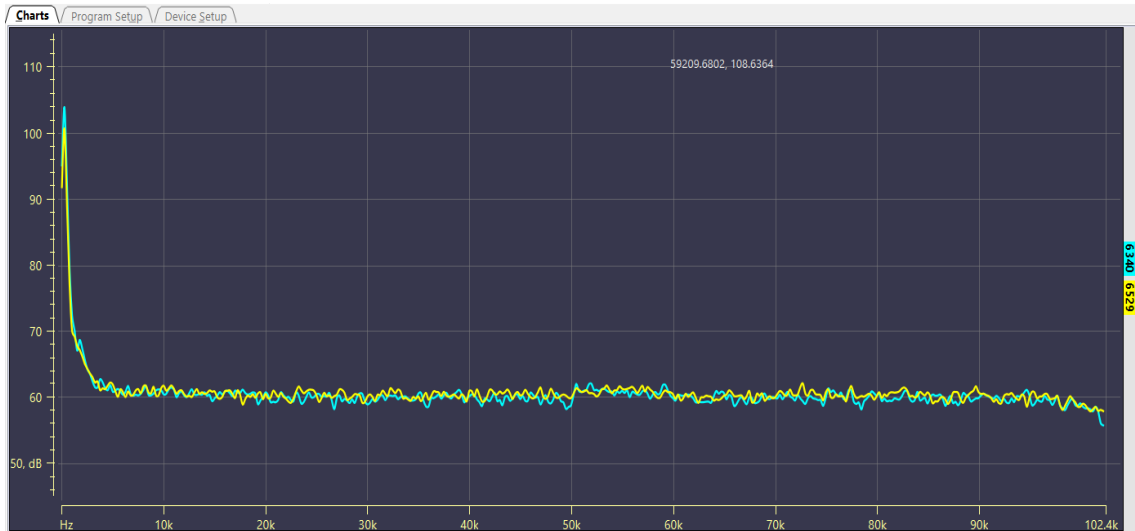
Figure 4-6 Multiple FFT chart

The axes are the same as the single FFT chart.

4.2.1.3   PkRMS Chart

The PkRMS chart shows the RMS (Root-mean-square), Peak (0-pk), Peak to Peak (pk-pk) and SEL (sound exposure level) of the waveform data (Figure 4-7).
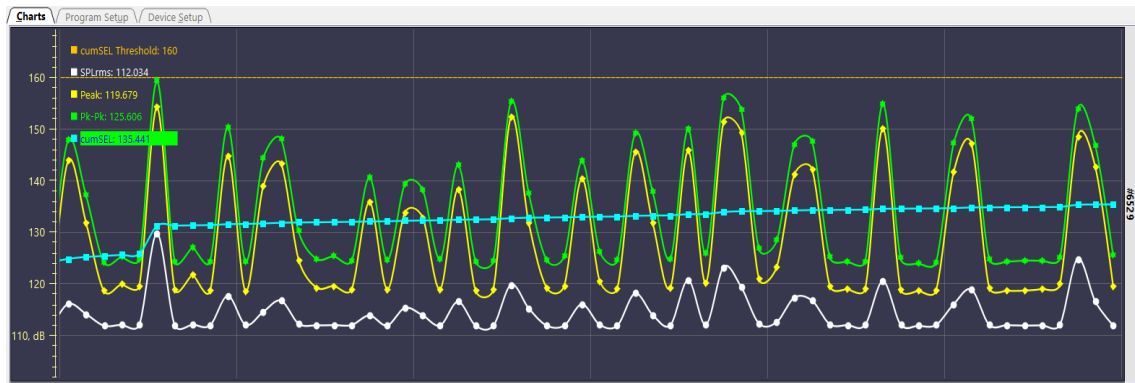

Figure 4-7 PkRMS chart

The data is displayed in dB relative to the spectrum reference as detailed in the Spectrum Reference section (Figure 4-5).

The x-axis is time and is aligned with the spectrum chart.
The Y-axis scales automatically.
The data displayed on the charts corresponds to the sound level output of the waveform data, updated per second.

Note 1: The PkRMS is calculated for 1 second (by default) and display will only show the values in the chart for two hours of data total. After the two hours of data is displayed, the oldest values will disappear.

Note 2: The cumulative SEL (sound exposure level) is calculated for 120 second (2 minutes by default).

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Program uses high pass filter 20 Hz for these calculations by default (Figure 4-9). To turn on/off filtering use main menu (Figure 4-8) and dialog "**Sound Exposure Settings**":
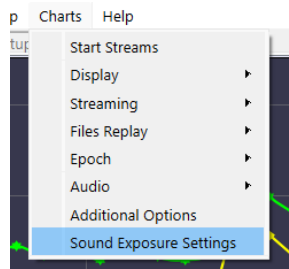

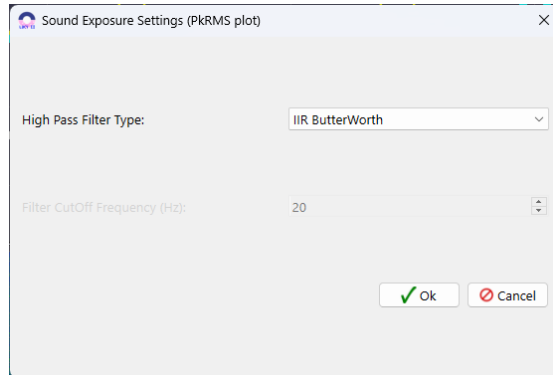*Figure 4-8 Main menu to call the "Sound Exposure Settings" dialog*

Figure 4-9 "Sound Exposure Setting" dialog

4.2.1.4   Waveform Chart

The waveform chart shows recent waveform data in volts (Figure 4-10). The waveform corresponds to the sound pressure sensed at the hydrophone.
The Y-axis scales automatically. The advantage of auto scaling is that the displayed data is never clipped, though it can also make interpreting the data difficult, since the scale may change every time, the display is refreshed.
The length of the waveform may be changed from 1 to 10 seconds int the "**Charts Additional Options dialog**" (Figure 4-21).
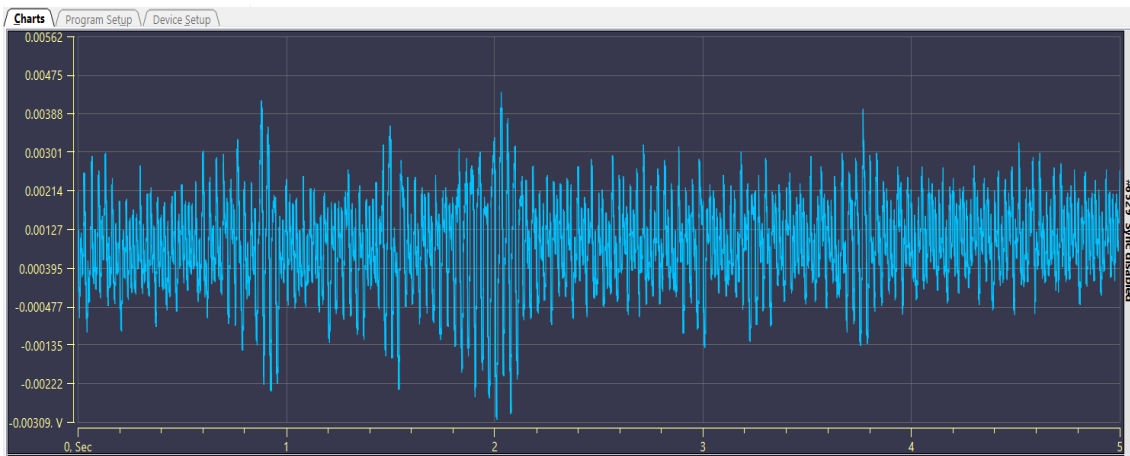

Figure 4-10 Waveform Chart

4.2.1.5 Spectrum Chart

The Spectrum chart is a waterfall display of the power spectrum data returned by icListen (Figure 4-11).
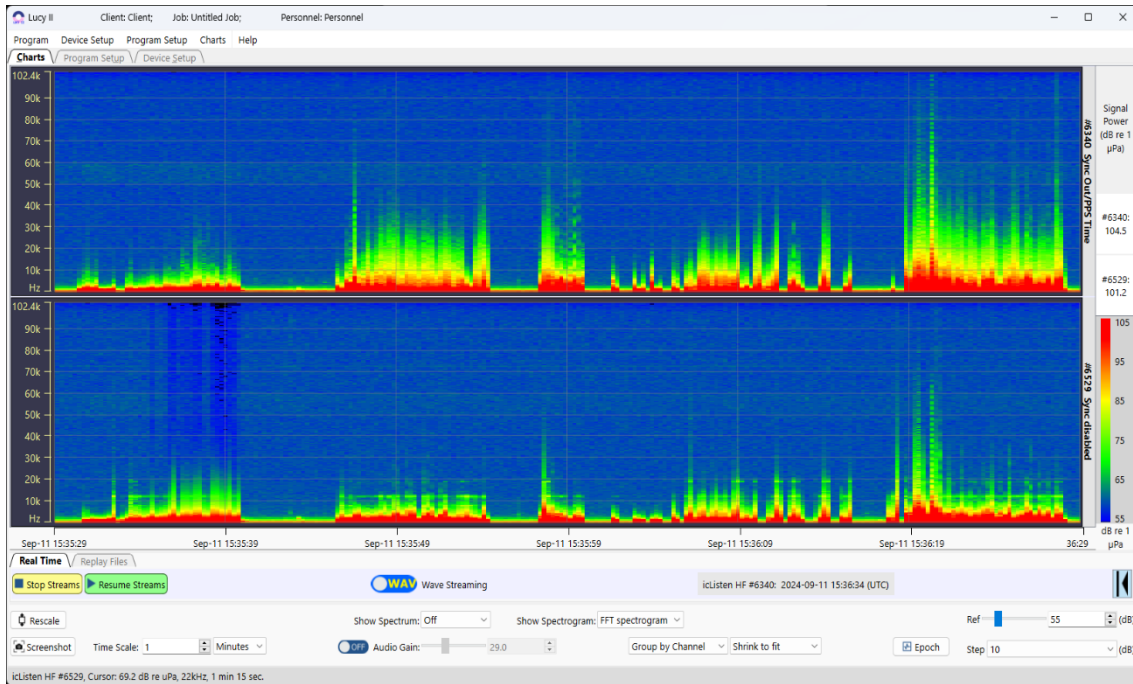

Figure 4-11 Spectrum Chart

This chart shows time on the x-axis, frequency on the y-axis, and intensity (as colour) of the signal on the z-axis.

The Signal Power is calculated by combining the spectral data for each sample over the full spectrum. This represents the total power over any sample.

4.3 Spectrum Streaming Settings

The Charts tab contains the controls needed for both mode operations of real-time streaming and replaying data (Figure 4-12).

Available Tools:

- **Start Streams / Stop Streams.**
- **Pause Streams / Resume Streams.**
- **Spectrum Reference.**
- **Time Scale.**
- **Streaming Type.**
- **Devices Control Panel.**

Figure 4-12 Controls for Streaming Settings

Devices control panel may be collapsed or expanded.

The data collection process begins when the Start Streams button is clicked. Note that whenever scanning starts, the charts are cleared.

When scanning is inactive, the "**Start Streams**" button is active, and the "**Pause/Resume**" buttons are inactive. When scanning is active, the Pause/Resume button is active.

Spectrum Reference - The Spectrum chart lets the operator make detailed measurements from the display. The chart can display spectral data in dB re V or dB re μPa, and as spectral density data in dBV2/Hz and dB μPa2/Hz (Figure 4-13).
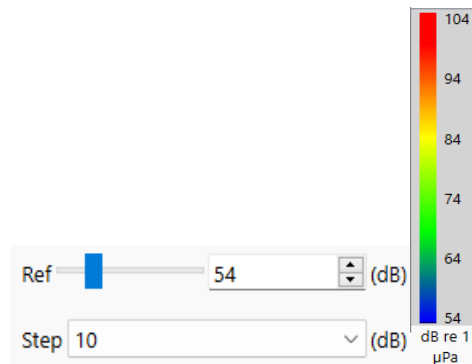

Figure 4-13 Spectrum Reference Options

The baseline reference can be adjusted to avoid cluttering the display with data below the noise floor. The stepper adjusts by the colour step size, and specific values may be typed in.

Time Scale - The x-axis (time axis) of the spectrum chart is controlled by the Time Scale control, at the bottom of the chart (Figure 4-14).

Figure 4-14 Time Scale Control

There are 2 settings for the scale: the resolution of the axis (Minutes, Hours, or Days), and the amount of data shown at the selected resolution. Data is averaged to allow the longer durations to be displayed.
The maximum size for this value varies depending on the FFT averaging settings and the sample rate, to a maximum of 2 hours of data. After the two hours of data is displayed, the oldest values will disappear.

Selecting the **"Wave Streaming"** or **"FFT Streaming"** options will cause Lucy to receive live real-time streamed data of the enabled type (Figure 4-15).
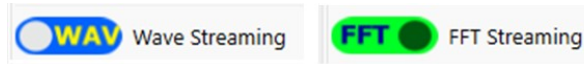
Figure 4-15 Streaming checkbox

Audio - Lucy can output real-time audio from streamed and replayed waveform data. Audio playback can be enabled by clicking the **"Audio"** check box. Audio playback in Lucy is always 16- bit, regardless of the original waveform data resolution. The volume of the audio playback is controlled by the Gain Settings (Figure 4-17).
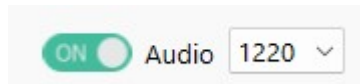

Figure 4-16 Audio checkbox

When Audio is ON, a selection box appears with the active hydrophone that will output audio (Figure 4-16). You can choose one hydrophone to output sound or while using the Array Mode, select 'All' to output a combined audio stream that will out sound from all active streaming hydrophones.
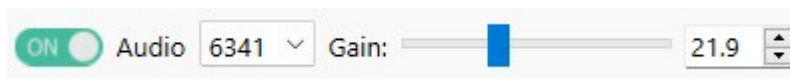

Figure 4-17 Gain Settings

To adjust the audio output from the computer, first adjust the speaker volume to 50% or more. If you can not hear the hydrophone audio output Gain can be applied. The slider bar or up and down arrows can be used to adjust the Gain on the audio output (Figure 4-17).

4.4   Epoch Display on Charts

The device Epoch event triggers will be displayed on the Single FFT chart while streaming or replaying data to visualize when the events are being detected. The Epoch triggers can be displayed from the Lucy Program = "Program" or "P" and from the icListen = "Device" or "U". Each trigger will be displayed as a box on the FFT display with basic information: Epoch Trigger #, P (Program) or U (icListen Device), Active/Inactive (Figure 4-18).
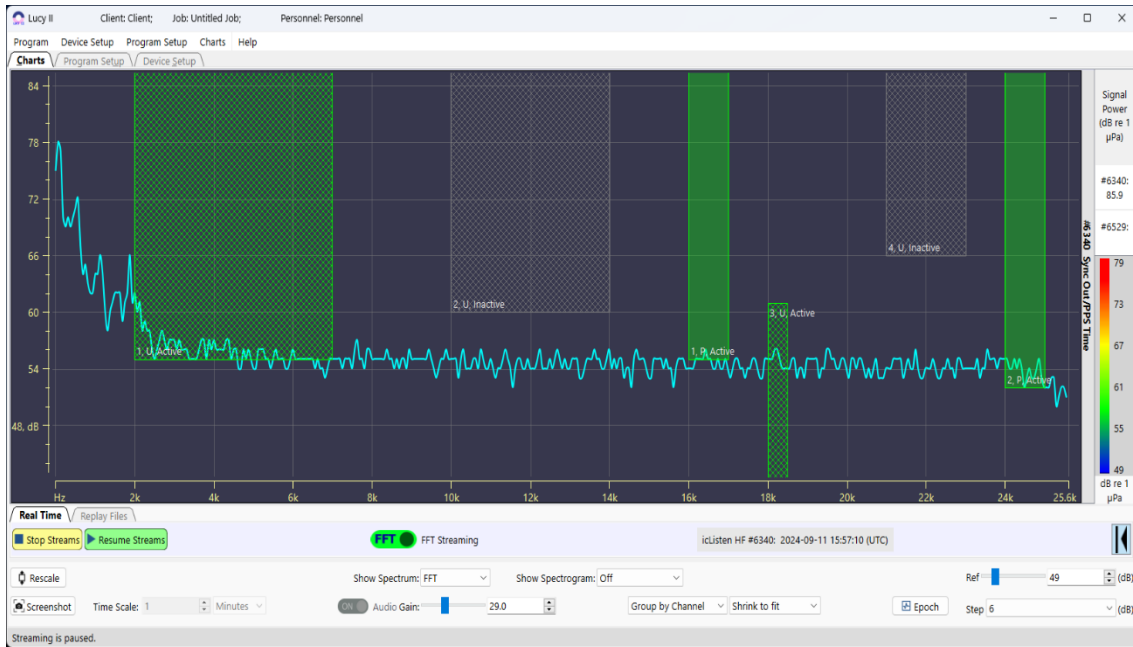
Figure 4-18 Epoch triggers displayed on Single FFT Chart Display

The **Lucy Program** Epoch triggers will be displayed on the **Single FFT** chart while streaming **FFT or WAV** data. The Lucy Program's triggers have a Solid Pattern design.

The **icListen Device** Epoch triggers will be displayed on the **Single FFT** chart while **streaming FFT data ONLY:**

 and checkbox on the **Program Epoch Setup** panel is ON (Figure 3-4 Lucy Program Epoch Setup).

The icListen Device's triggers have **Diagonal Cross Pattern** design.

4.4.1   Epoch Trigger Colour Display

Lucy Program's triggers:
gray – no signal, event inactive.
blue – signal present, event inactive [PreTrig].
green - signal present, event active.
yellow – no signal, event active [AfterTrig].

icListen Device's triggers:
gray – no signal, event inactive,
green - signal present, event active (event).

4.4.2   Replay Files

Lucy provides the operator with the ability replay previously logged files including:
- Files created by icListen in WAV, or FFT TXT format.
- Files created by Lucy while collecting real-time data from icListen.

The format of all these files can be found in the icListen Log File Formats document.

Select the **Replay Files** tab from the Lucy **Charts** panel to work with the replay process (Figure 4-19).

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Figure 4-19 Replay Files

Multiple files may be selected. The files will be played in the order shown in the selection window. Files of different types may be played in the same sequence, but the screen will be cleared when switching between file types or time from the files will have gap.

Load Files command opens standard dialog for files loading. The list of all selected files will be saved and loaded next time the program run. A previously replayed files can be viewed once more by clicking the **Play** button, using the same settings.

The speed of the replay is set with the **Replay Rate** field. This ranges from **"Real Time"** to **"Max"** with 2 speeds in between. The display is still updated at the set refresh rate during replay; however, the amount of new data per refresh is changed by the replay rate. **"Real Time"** is the rate which the data was initially displayed at, and the speeds increase respectively from there. When a file is replaying, it may be paused or stopped using the controls.

4.5   Charts Additional Options dialog

"Charts Additional Options" dialog (Figure 4-21) has a selectable type of the reference to pressure, an auto-scale option, a log-scale option and time length value for wave chart.
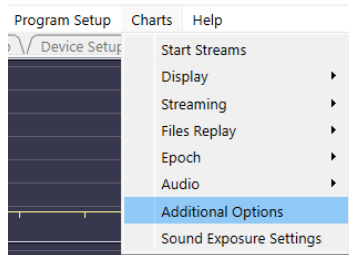

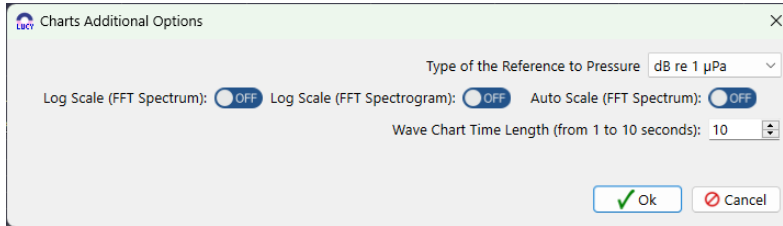*Figure 4-20 Main menu to call "Charts Additional Options" dialog*

Figure 4-21 "Charts Additional Options" dialog

4.6   Audio Filter Settings dialog

Program has "**Audio Filter Settings"** dialog (Figure 4-23) with the parameters for IIR and FIR filter. It gives possibility to turn off filtering as well. Sometimes it's difficult to orient in sound filtering so dialog has button "**Set Default**" to restore all default parameters automatically.
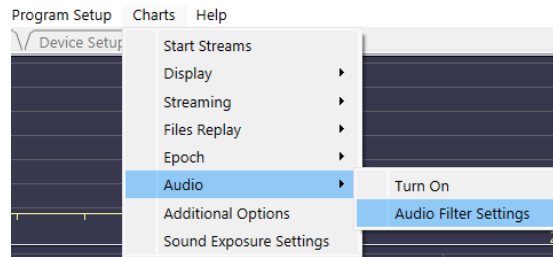

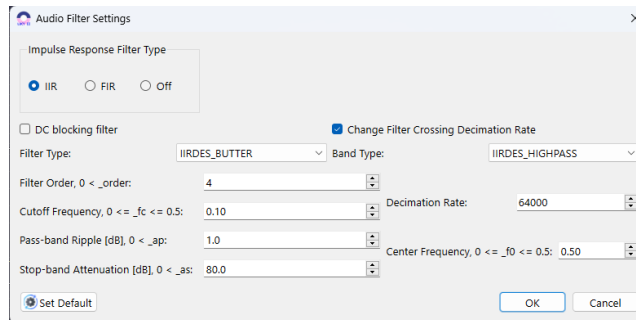*Figure 4-22 Main menu to call "Audio Filter Settings" dialog*

Figure 4-23 Audio Filter Settings

4.7   Accelerometer/Magnetometer

The Accelerometer/Magnetometer data (Figure 4-25) is accessed using the main menu of Lucy (Figure 4-24). This data contains the x, y and z components of both Acceleration (in g) and the Magnetic Field (in nT). Each graph shows 20 seconds of history for each value.
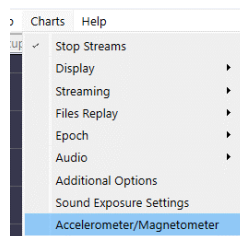

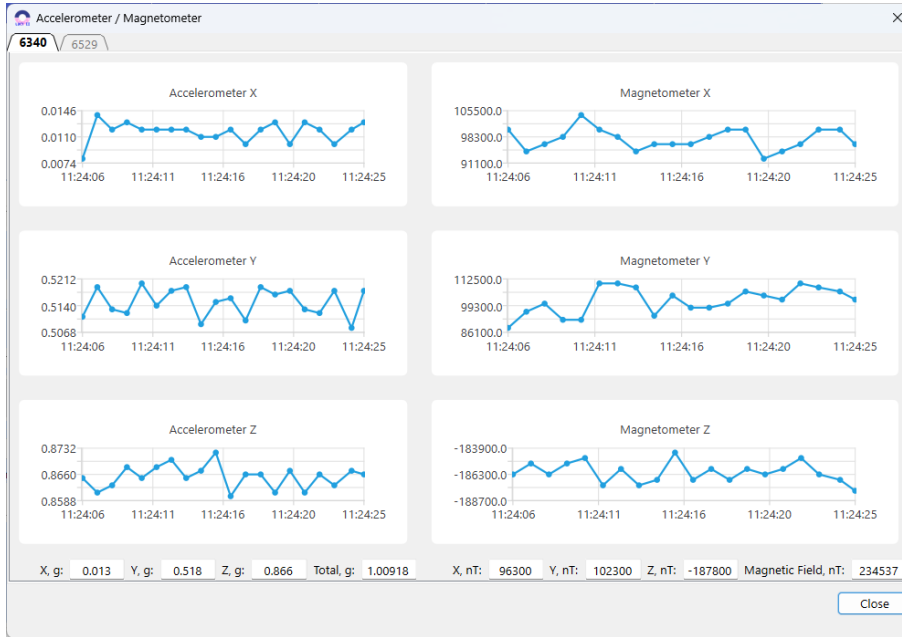*Figure 4-24 Main menu to access "Accelerometer/Magnetometer" charts*

Figure 4-25 Accelerometer/Magnetometer charts

5   Sound Exposure Plugin

Sound Exposure plugin purpose is to work with sound exposure parameters and impulses. This option is available under the license. It gives possibility to work with the "**Sound Exposure Settings**" dialog in full options and **Impulses** charts.

5.1   Load Plugin License

To load license for sound exposure plugin call "**Work with Plugin License**" (Figure 5-1) (button **"Plugin License"** from the **"Program Initialization"** window (Figure 3-1)).
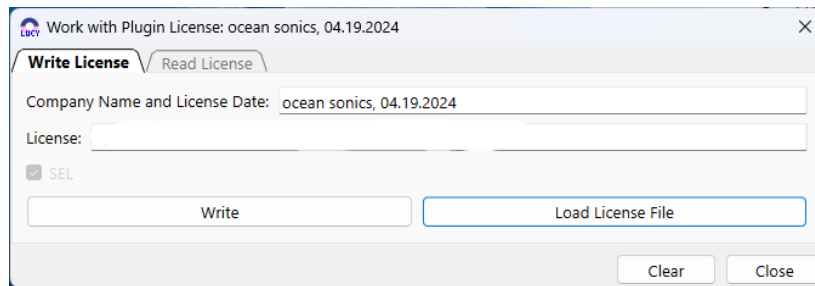

Figure 5-1 "Work with Plugin License" window

Button "**Load License File**" calls "**Open License File**" dialog (Figure 5-2).
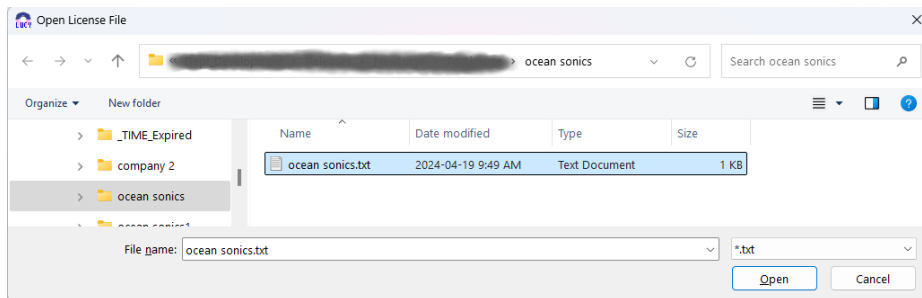

Figure 5-2 "Open License File" dialog

Button "**Write**" writes license to the user's computer. Program will show information message (Figure 5-3):
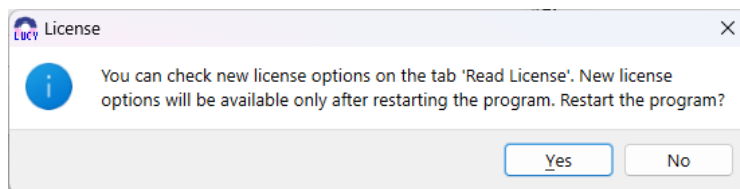

Figure 5-3 Information message about new plugin license

New options will be available after restarting the program.

5.2   Sound Exposure Recording

Recording settings control the logging of sound exposure data (Figure 5-4). Sound Exposure files are logged as text in a similar format to the FFT logging files.
- **Sound Exposure (checkbox): -** turns logging on and off.

- **Log file path**: - the directory on the computer (or network or removable storage) where the logged files will be stored.
- **Prefix**: - this text will be pre-pended to the name of each impulse log file.
- **Length (minutes)**: - the time length each file will contain before starting a new log file.
- **File Name Format**: - **Date/Time** - file names encode the date and time.

The output can be logged to a text file which contains a header similar to the FFT text file format. Each line in the data portion of the sound exposure log file contains the time splRMS, Peak and PeakToPeak level, as well as the cumulative SEL for the logging session up to that point.
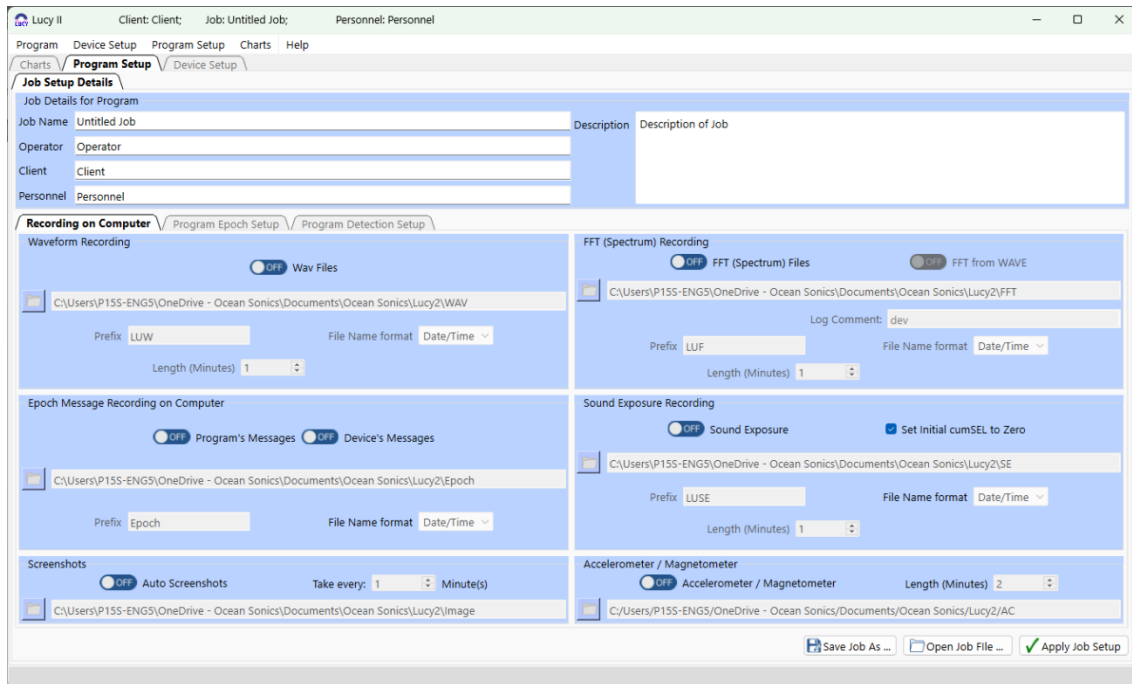

Figure 5-4 Sound Exposure Recording on computer

5.3   Sound Exposure Settings

To call "**Sound Exposure Settings**" dialog use main menu (Figure 4-8).
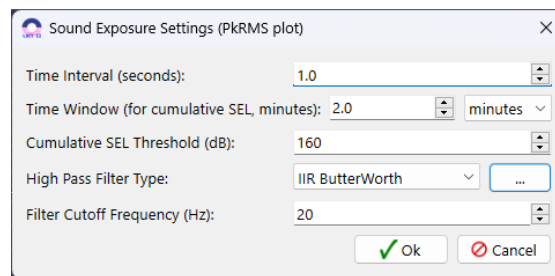

Figure 5-5 "Sound Exposure Settings" dialog

It contains:
- **Time Interval (seconds)** – time interval to calculate RMS sound pressure.
- **Time Window (for cumulative SEL).**
- **Cumulative SEL Threshold (dB)** – threshold that will be displayed on the PkRMS chart.
- **High Pass Filter Type**.

- **Filter Cutoff Frequency** – cutoff frequency for high pass filter.
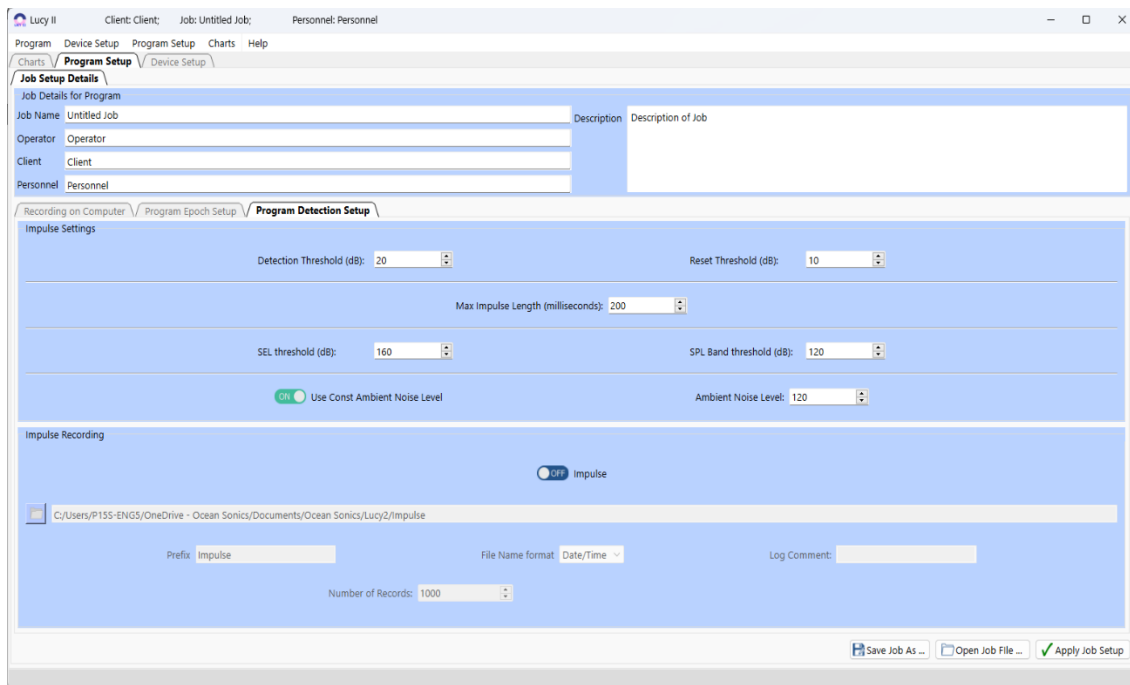
5.4   Program Detection Setup

Figure 5-6 Program Detection Setup

The "Program Detection Setup" tab (Figure 5-6) of the Lucy Setup panel is split into two sections:

5.4.1   Impulse Settings

These settings control if Impulse detection is performed on an incoming wav stream, sets the sensitivity of the detector, and controls what is recorded as part of the impulse.

- **Detection Threshold (dB)**: The level in dB above the ambient noise level that will be considered an impulse. If a peak is encountered in the wav stream that is above the ambient noise by more than this level, an impulse will be detected and analysed.
- **Reset Threshold (dB)**: The level in dB above the ambient noise level beyond which the impulse sound must drop to mark the end of the impulse. Once a sound (impulse) level has exceeded the **Detection Threshold** to begin an impulse, the impulse sound level must drop below the **Reset Threshold** to end the impulse detection.
- **Max Impulse Length (milliseconds)**: - max time for impulse that will be proceed by the program. If the impulse length will be more than this value, program will warn the user.
- **SEL threshold (dB)**: - threshold for cumulative sound exposure level for impulses charts.
- **SPL Band Threshold (dB)**: - the user can set this level to show a threshold line across the **1/3 Octave Band** chart.

5.4.2   Impulse Recording

Recording settings control the logging of impulse data. Impulse files are logged as text in a similar format to the FFT logging files.

- **Impulse (checkbox): -** turns logging on and off.

- **Log file path**: - the directory on the computer (or network or removable storage) where the logged files will be stored.
- **Prefix**: - this text will be pre-pended to the name of each impulse log file.
- **Log Comment**: - text comment that will be added to the log file.
- **Number of Records**: - the number of records each file will contain before starting a new log file.
- **File Name Format**: - **Date/Time** - file names encode the date and time.

The output can be logged to a text file which contains a header similar to the FFT text file format. Each line in the data portion of the impulse log file represents one detected impulse and contains the SEL, RMS Sound Pressure Level (SPL), and Peak level for the impulse, as well as the cumulative SEL for the logging session up to that point and the 1/3 Octave results.

5.4.3   Impulses dB chart

Impulses dB chart (Figure 5-7) displays the Cumulative SEL, Sound Pressure from hydrophone (in dB) and impulses detected by program. When the Cumulative SEL exceeds the threshold at the dashed orange line, the CSEL value on the panel will turn red.
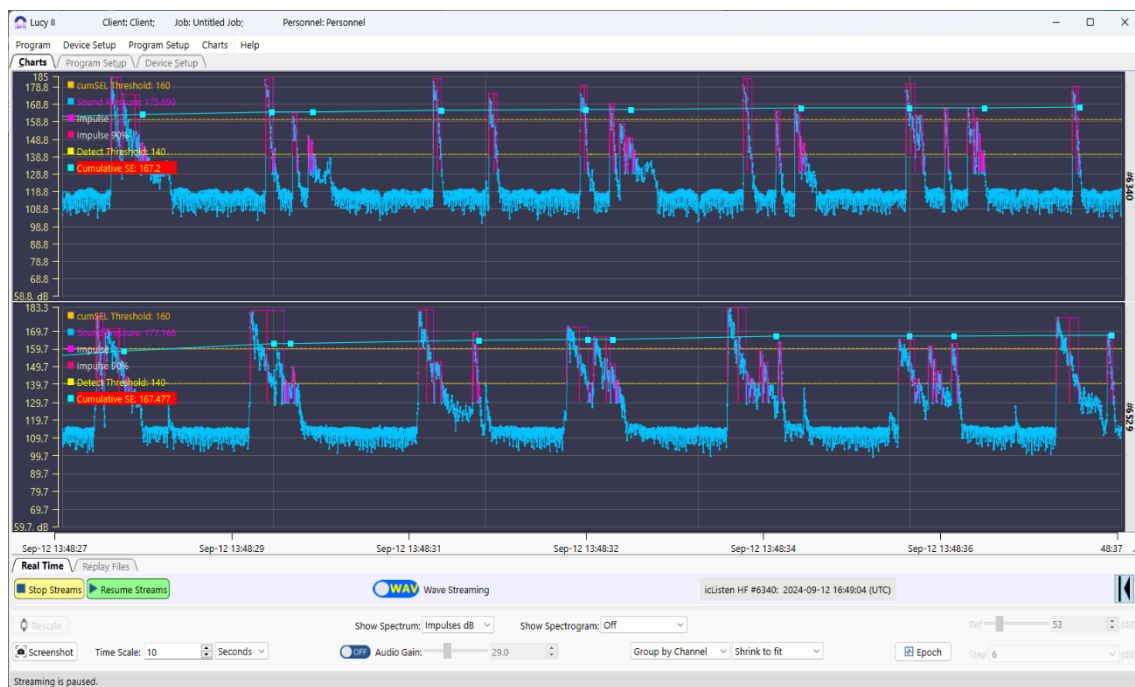

Figure 5-7 Impulses dB chart

According to the ISO 2017, the pulse duration shall be calculated as the percentage energy signal duration based on 90% energy percentage. Therefore, the program calculates 100% impulse length and 90% impulse length (Figure 5-8).
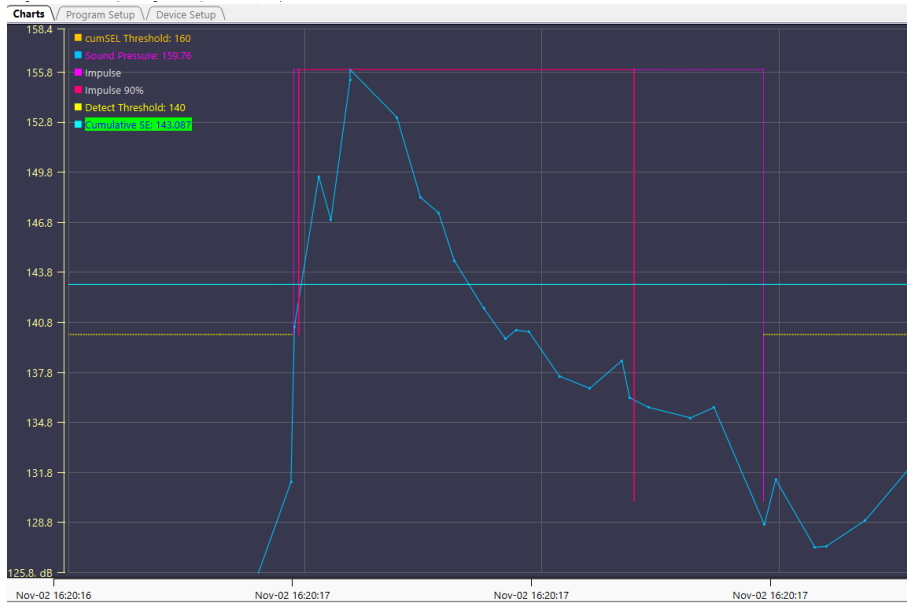
Figure 5-8 Impulse: 100% impulse length and 90% impulse length

5.4.4   Impulses µPa chart

Impulses µPa chart (Figure 5-9) displays Sound Pressure from hydrophone (in µPa) and impulses detected by program.
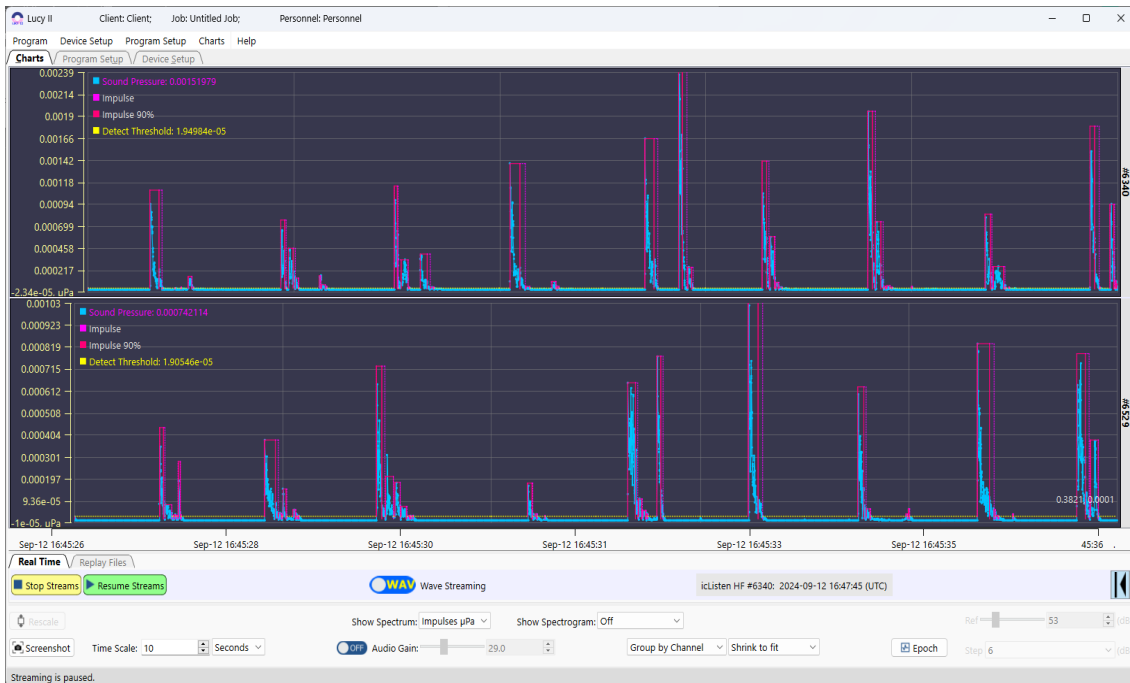

Figure 5-9 Impulses µPa chart

5.5   1/3 Octave Chart

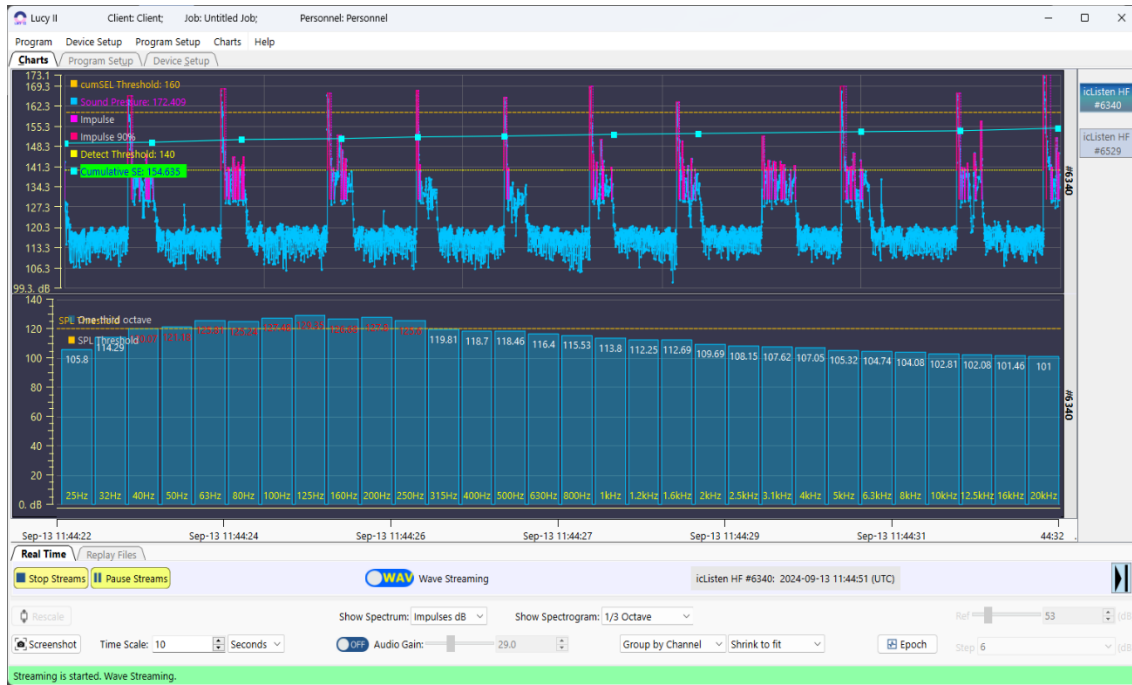1/3 Octave chart shows the 1/3 octave band analysis of the detected impulse (Figure 5-10).

Figure 5-10 1/3 Octave chart

6   Additional Advanced Operations

6.1   Remote Device Connection

1. Launch **VPN** and **"Lucy"**.
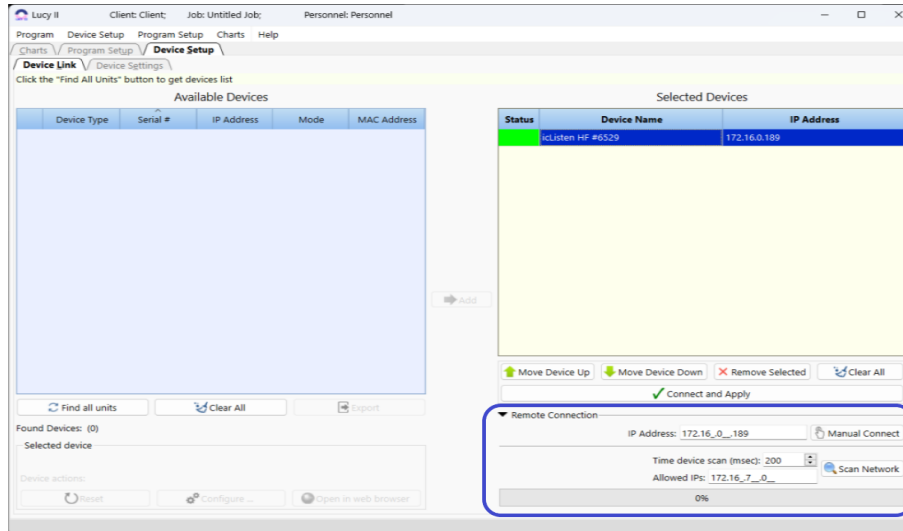2. Select **"Lucy Setup"**, then **"Link Setup"** (Figure 6-1).

Figure 6-1 Remote Connection panel

3. Expand Remote Connection panel.
4. If IP address of the hydrophone is given - just fill it in the IP Address field and push Manual Connect button (repeat if there are several hydrophones).
5. If not (IP address is unknown) or to get the list of all available hydrophones - fill Allowed IPs.
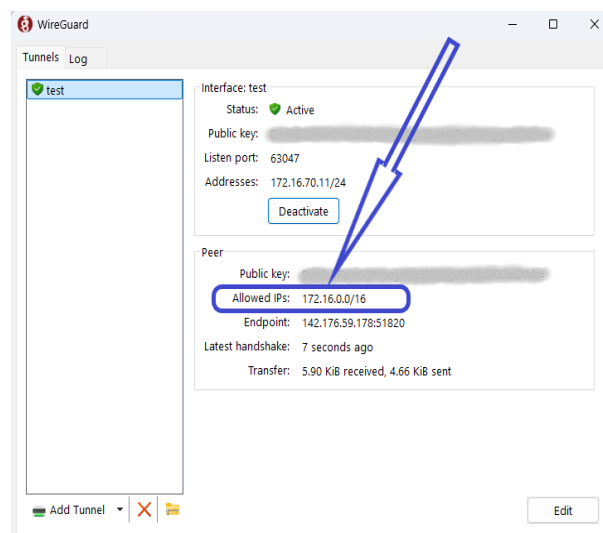6. Allowed IPs are in the **"WireGuard"** (Figure 6-2).

Figure 6-2 WireGuard Allowed IPs

7. Click **"Scan Network"** button (Figure 6-1).
8. Go to the **"Connect to the Devices"** part.

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6.2   FCR connection

To connect to FCR program uses UDP protocol. To work with the UDP connection to device through IP address we need to give access to the application to work with the internet (to private network to work in the net and to local network to work directly) in the **Windows Defender Firewall**.

To add program to the allowed list run **Windows Defender Firewall** and select "Allow an app and feature through Windows Defender Firewall" (Figure 6-3).
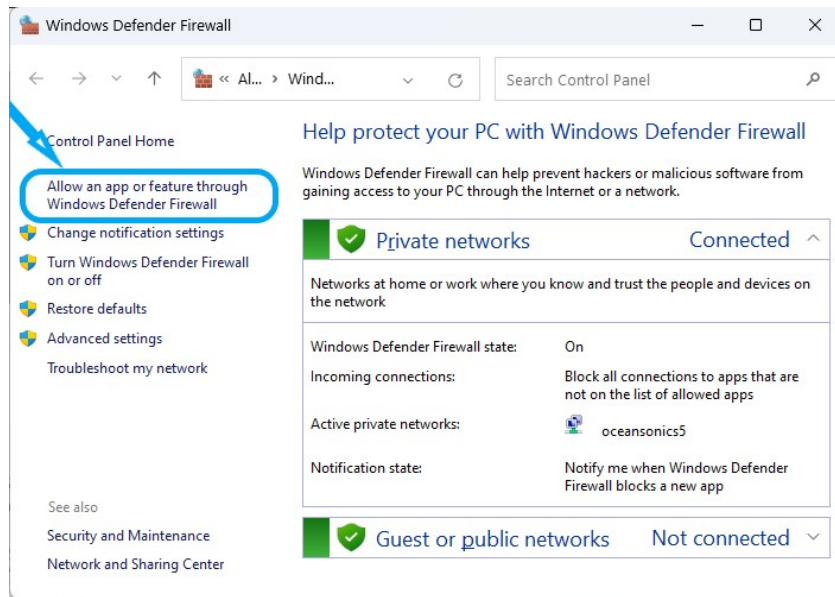

Figure 6-3 Windows Defender Firewall

Then select "Change settings", then – "Allow another app …" and add Lucy II program into the allowed list.
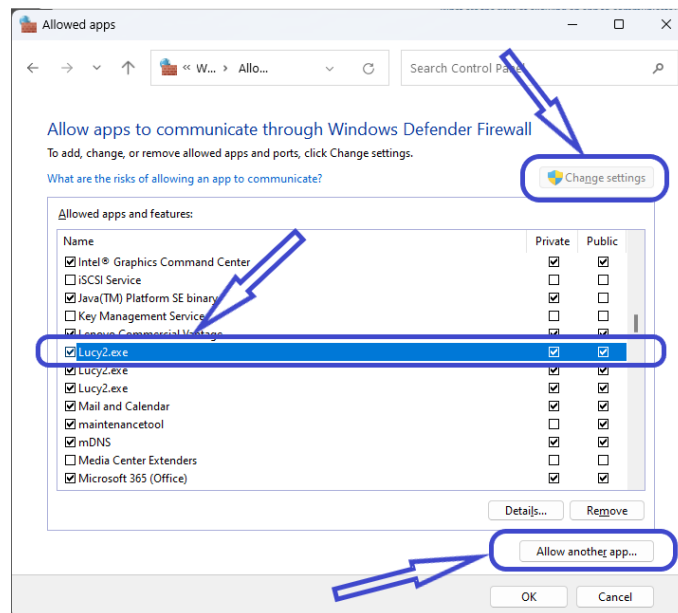

Figure 6-4 Allowed apps window

7   Appendices

7.1   Appendix A - Troubleshooting

Troubleshooting connection to hydrophone

> *The hydrophone isn't showing up on program devices list.*
> *The hydrophone is showing up periodically.*
> *The hydrophone has a grey block.*
> *The hydrophone is showing up with a yellow or red block.*

The hydrophone isn't showing up in program devices list.
To begin the troubleshooting perform these steps in the following order:
1. Clear and **Refresh** devices list.
2. Turn hydrophone power off and on again (using power down tool or Launch Box). **Refresh** devices list.
3. While turning on the hydrophone ensure it buzzes once and then buzzes twice.
   a. If it does not buzz or buzzes continuously, contact Ocean Sonics Support.
   b. If it buzzes but still does not show up in the program after refreshing continue to nextstep.
4. Check the cabling to ensure there is no damage.
5. Check the firewalls on your network if you are using a limited access computer (some workplaces have firewalls installed on company owned work-computers).
6. Check to see if you have automated IP addressing on your computer.
7. If you are using the Launch Box or wireless communications to the hydrophone, ensure your Wi-Fi is turned on, connected to the Launch Box, and is close enough to detect the signal.

Have you powered up your hydrophone?
- The icListen will not turn on until it is powered (plugged into a power source).
- You should hear the icListen buzz once and then buzz twice.
- After the second buzzes it should appear in program devices list.

If the hydrophone buzzes three (or more) times, it was not able to power on and there is an error. Please contact Ocean Sonics Support if you have an error buzz, this indicates an internal issue.

Do you have firewalls preventing the hydrophone from showing up on the network? Some workplaces have firewalls that will prevent the icListen from connecting. Contact your network administrator to configure your computer to allow the icListen to connect on your network.

Have you changed your IP addressing on your computer/server?
- If your computer does not have automatic IP addressing turned on, the hydrophone can not find an automatic IP address based on your computer settings.
- Choose Manual (static) IP Address and use a suggested IP address for your computer.

The hydrophone is showing up periodically:
- The hydrophone can not obtain a proper IP address.
- Check the connection of the hydrophone, cables, and power.
- If you are using other equipment with the hydrophone, it could be interfering.

If there are other DHCPs or IP addressing protocols on your server, it could be trying to readdress the hydrophone. This is sometimes a problem when using a smart cable for the first time with a WiFi network such as the Launch Box.

When setting up a Launch Box with a smart cable, plug the cable in first, then plug in the smart cable with 1 hydrophone. If the hydrophone does not show up, unplug the cable and plug back in with the hydrophone connected. Once the first hydrophone has established a connection with an IP address, plug in the second hydrophone. Once they both have IP addresses continue to add the hydrophones one by one. After the first time configuring the IP addresses of the hydrophones for the Launch Box it does not appear to be a problem when plugging the hydrophones in again with the smart cable unless their IP addresses were changed.
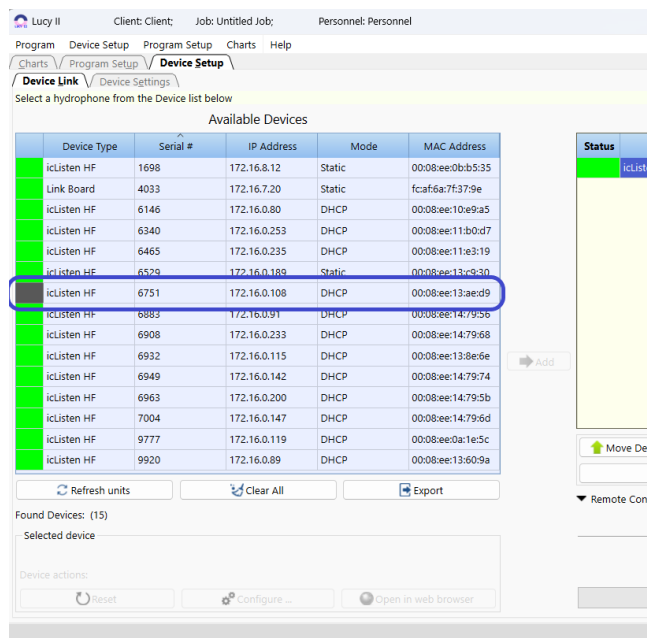
The hydrophone has a grey block:

Figure 7-1 Grey block

If a hydrophone is removed from a network, the settings have changed, or it doesn't respond in time to the enquired message when program devices list is Refreshed it will appear grey.

If the list is cleared and then refreshed it will only show hydrophones and devices that are currently available on the network.

The hydrophone is showing up with a yellow or red block:
If your hydrophone shows up a red block in program devices list, the IP address is not compatible with your network. You need to change the IP address of the hydrophone to **Automatic (DHCP)** or suggest a new manual address (see **Manual (Static)**) or check the connection to hydrophone.

7.2 Appendix B - IP Network Settings:

7.2.1 Configure icListen - Device Link Options

7.2.1.1 Automatic (DHCP)

This is the default addressing for the hydrophones. The IP address will be given to the hydrophone based on the available IP addresses on your network. This setting is suggested for most deployments, especially when using a Wi-Fi product from Ocean Sonics such as the Launch Box or Wi-Fi Buoy.

The Dynamic Host Configuration Protocol (DHCP) is a network management protocol where the DHCP server dynamically assigns IP addresses and other network configuration parameters to each device on a network so they can communicate with other IP networks.
If your server has DHCP, the hydrophone will use this to find an IP address. If your hydrophone is not connected to a DHCP server, the hydrophone will find the IP addressing of your network and find an available address.

7.2.1.2 Manual (Static)

The hydrophone can be given a static IP address that will not change. The IP address must be allocated by the user, so it does not interfere with other IP addresses on the network. The IP address must be valid with the network the user is connected to (Figure 7-2).

Figure 7-2 Configure Device Dialog – Manual (Static)

To find a Static address on your network:
1. Click on **Suggest IP.**
2. Check the boxes (Gateway Enabled / DNS Enabled) as applicable.
3. Click on **Send to Device.**
4. Wait for the hydrophone to receive the new IP address (up to 2 minutes).
5. The box beside the hydrophone should change from Red to Green. You can update the status of the hydrophone by clicking the **Refresh** button on the **Device Link** page.
6. If the box does not turn green within a minute, try another IP address, and repeat Steps 1-4.

7.3   Appendix C. Epoch Stream - Messages

The epoch stream is a message stream which sends an **ASCII** string every time an event is triggered. A panel to view the epoch stream messages can be found under the Charts display Tab Epoch button, which appears on the right side of the main display. This feature is available for **icListen AF/HF** and during file replay in **Program**.
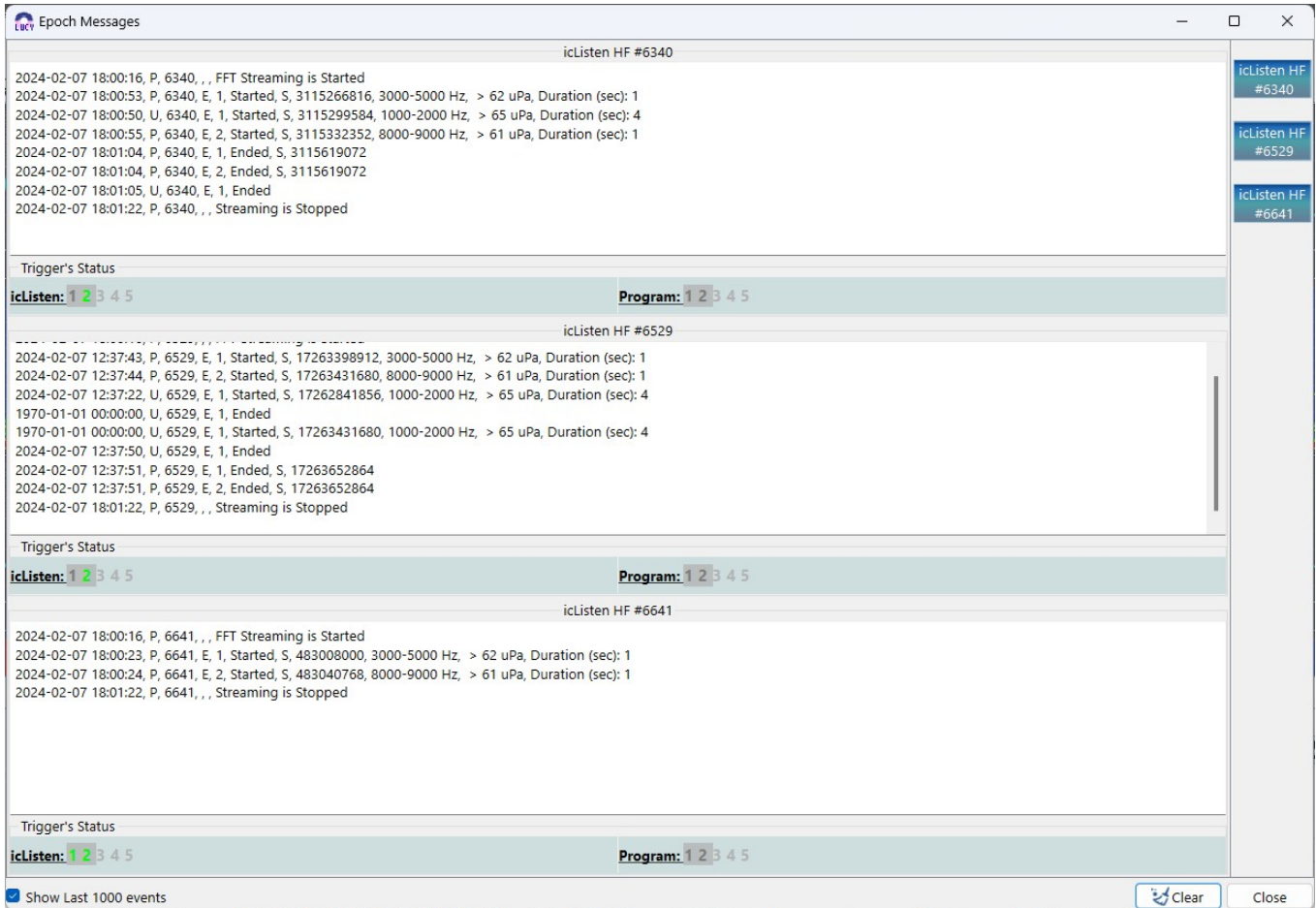

Figure 7-3 Epoch Message Window from Lucy II Charts Section - shows icListen devices and program epoch streams

The returned string includes:

The timestamp in the format **YYYY-MM-DD HH:mm:SS**, which is Y=year, M=month, D=day, H=hour, m=minutes, S=seconds.

The unit's serial number is identified by the "**U, ####**", where # is the serial number, or "**P, ####**" if the trigger was in **Program**.

The number of the Epoch which triggered is identified by **Epoch # or E**, where # is the trigger number. The data sequence number is identified by **Seq #** or S, where # is the sequence number of the data point at which the trigger occurred.

The frequency range, test, amplitude, and duration being checked by the trigger are shown at the end of the line. The test is ">" (greater than), or "<" (less than).

When Lucy or HF/AF (R28+) epoch detection is being used, there are epoch status indicators in the bottom of the Epoch Message panel for each hydrophone. These indicators are numbers for each epoch which change colour for the status of the trigger.

7.4 Appendix D. icListen Firmware Update

Care is required when updating the instrument firmware. First ensure that only valid icListen firmware is used during the update. Power must not be removed from the instrument during the update process.
Program gives access to icListen firmware update from program amin menu: **Device Setup – Device Settings – Special Features – Update Firmware** (Figure 7-4).
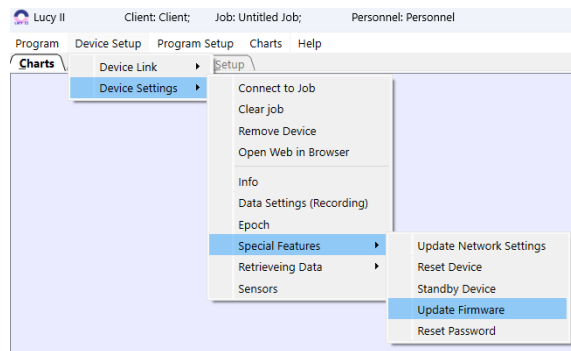

Figure 7-4 Update Firmware menu item

Or command "**Update Firmware**" on the **Special Features** tab (Figure 7-5).
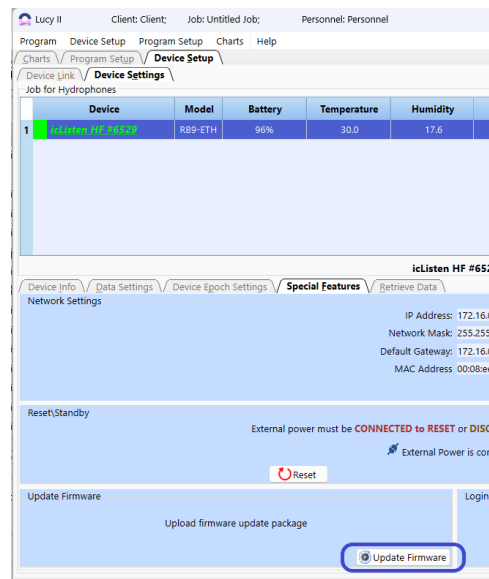

*Figure 7-5 **Update Firmware** command on the **Special Features** tab*

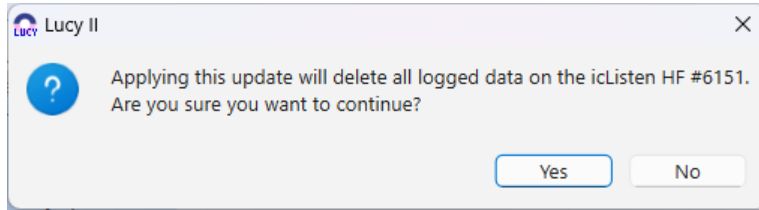Before the final update step, there is a final warning and chance to cancel.

Figure 7-6 Update Firmware warning

Select file for updating in the "Select Update File" dialog window (Figure 7-7).
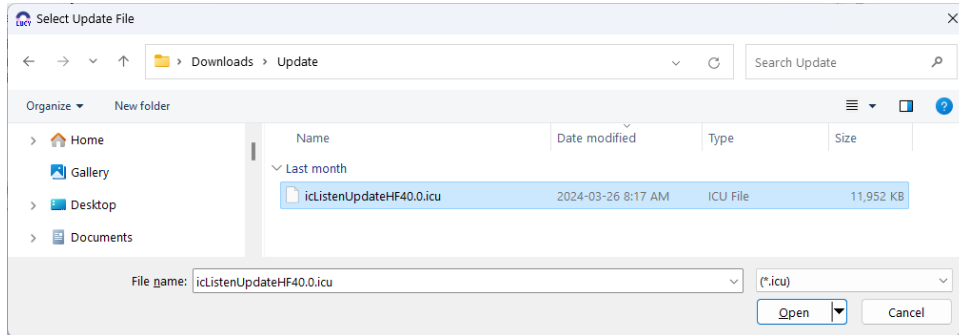

Figure 7-7 Select file to update firmware

Once the file is accepted a critical operation occurs in the icListen LF, and confirmation of completion is displayed. To have the update apply, the icListen LF unit must be power cycled (unplug, wait 10 seconds, plug back in). Note that a reset is not sufficient; the unit must be powered off (unplugged). Once the icListen LF boots, an enquire command should list the new firmware version.