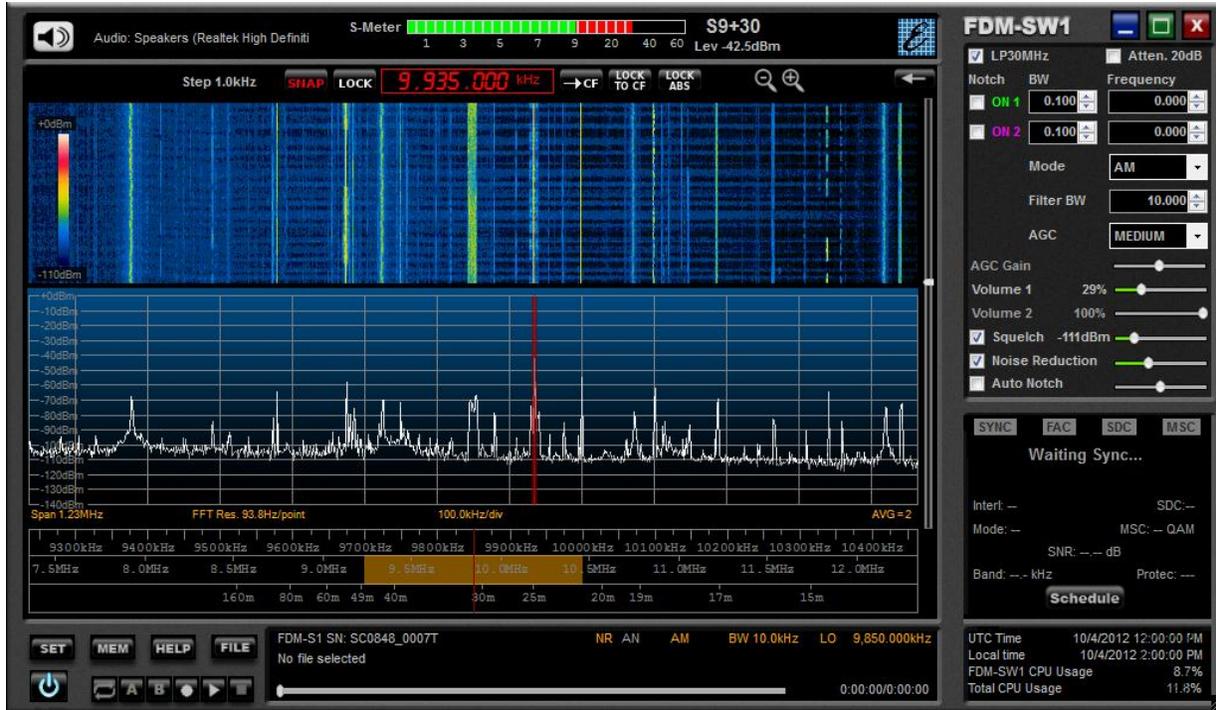


# ELAD FDM-SW1



# USER MANUAL

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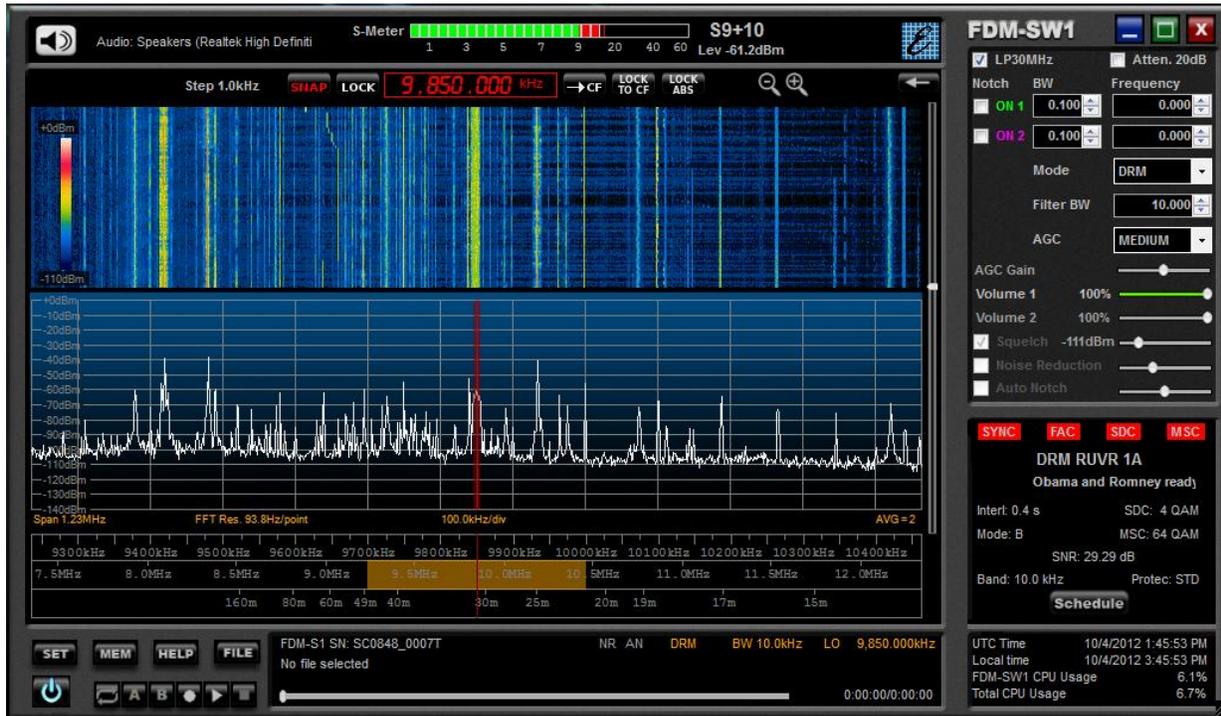
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# 1 FDM-SW1 Overview



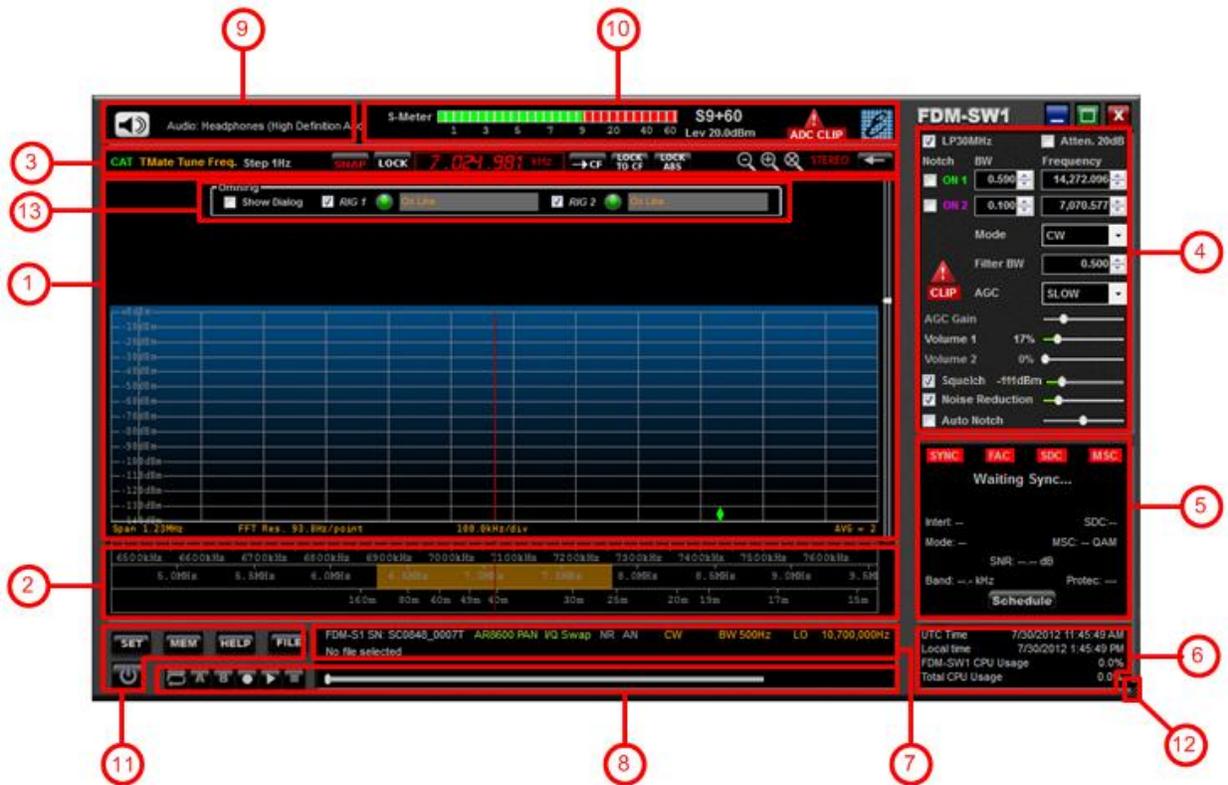
Elad FDM-SW1 is a SDR (Software Defined Radio) software that is intended to be used with the Elad FDM-Sx Receiver family.

Please check out the latest update of this document at [www.eladit.com](http://www.eladit.com).

Note: this manual is based on FDM-SW1 ver. 3.04.

## 2 Graphical User Interface (GUI)

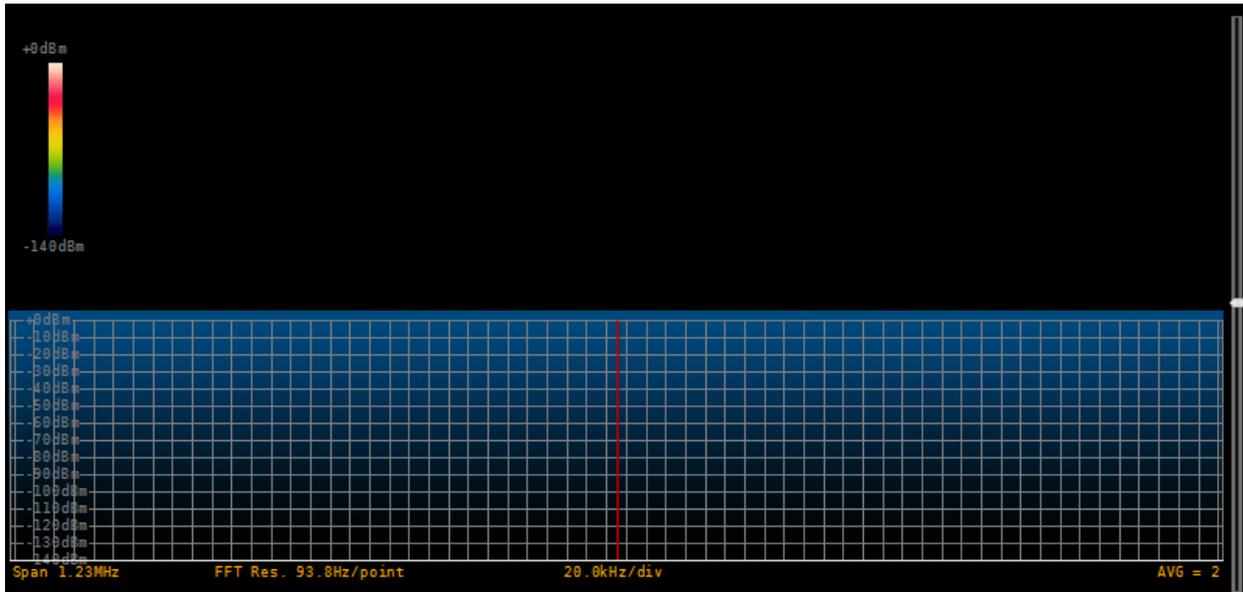
The screen shot below shows the main screen (the cockpit) of the Graphical User Interface.



The GUI consists of 12 parts:

1. Display Window;
2. Tuning Bars;
3. Tuning Commands Panel;
4. Receiver Commands Panel;
5. DRM/RDS Info Panel;
6. System Info Panel;
7. Status Bar;
8. Player/Recorder;
9. Mute Control;
10. Signal Control Display;
11. Main Setting Buttons;
12. Resize Corner.
13. Omnirig control panel

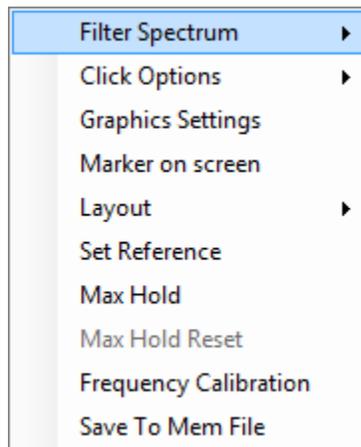
## 2.1 Display Window



The “Display Window” displays the Spectrum and the Waterfall of input signal. The sliding bar on the right side allows the user to change the area portions assigned to the two types of graphics.

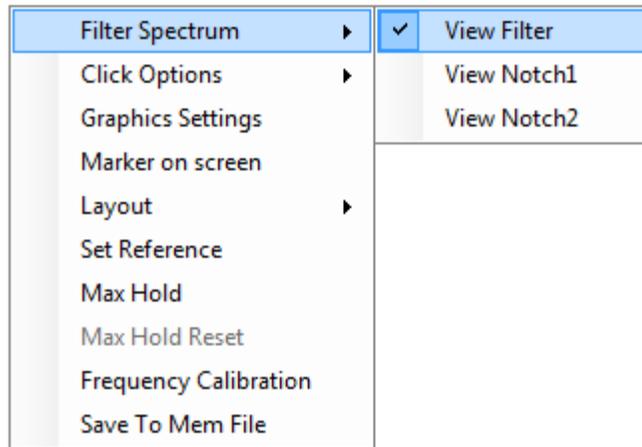
On the lower part, information about the current setting of “Span”, “FFT Res”, “kHz/div” and “AVG” is displayed.

When right-click is performed on the “Display Window” the software displays a pop-up menu that contains advanced options.



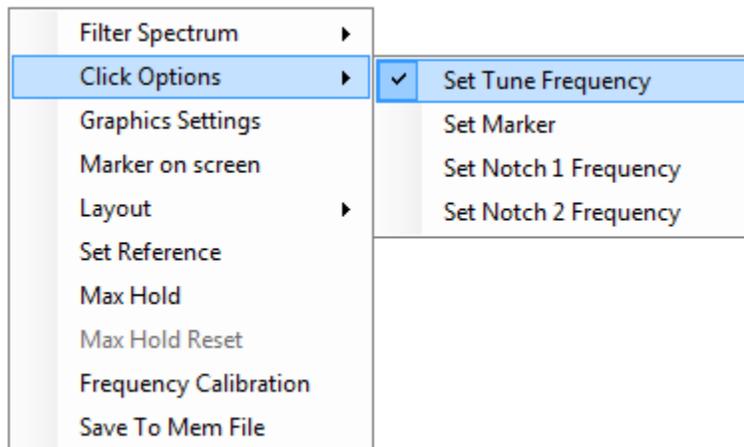
### 2.1.1 Filter Spectrum

Allows the user to select which information is displayed on the spectrum area.



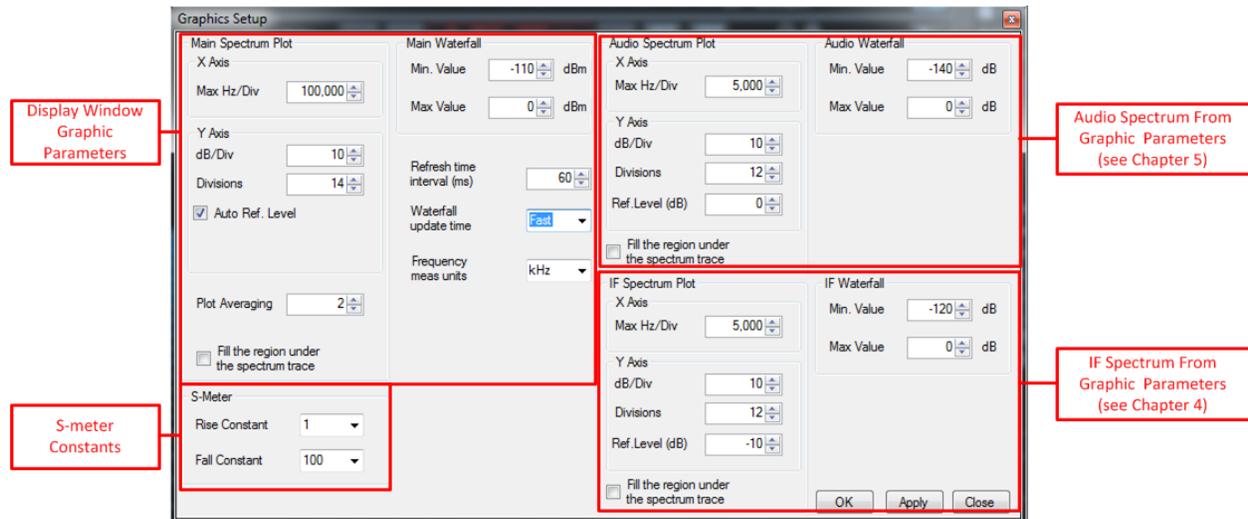
### 2.1.2 Click Options

Allows the user to select which kind of operation can be done when left-click is performed on the Spectrum area.



### 2.1.3 Graphics Setup

When this option is selected, the “Graphics Setup” form is displayed. This form allows the user to configure the parameters of the Spectrum/Waterfall graphics displayed in the “Display Window”. Moreover, in this form the user can customize the visualization of the “Audio Spectrum” form (see Chapter 5) and the “IF Spectrum” form (see Chapter 4) and the S-meter rise and fall time constants.

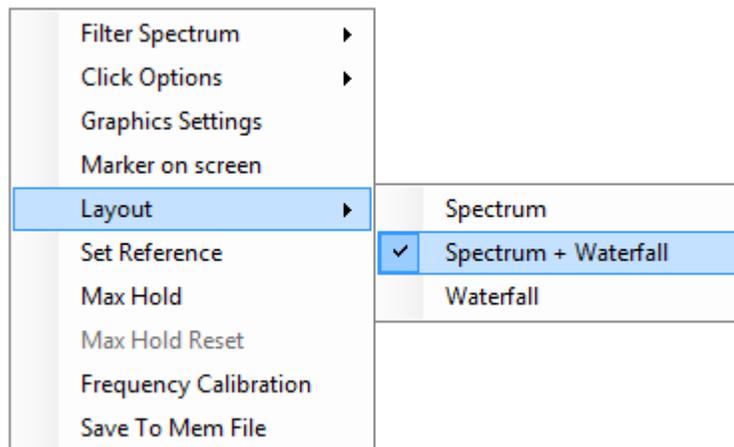


### 2.1.4 Marker on screen

This option enables the visualization of the marker on the Spectrum. The amplitude value (dBm) of the selected frequency is displayed on top-right corner of the “Display Window”.

### 2.1.5 Layout

Allows the user to select the visualization mode.



### 2.1.6 Set/Reset Reference

When “Set Reference” is selected, the software displays as a reference curve the input spectrum available at the moment of the selection. “Reset Reference” disables the visualization of the reference curve.

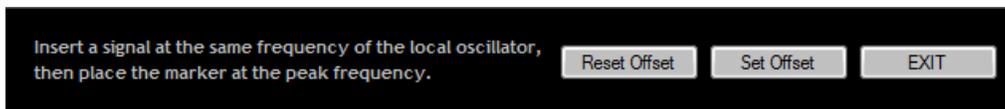
### 2.1.7 Max Hold

When “Max Hold” is selected, the software displays the max hold of the input spectrum together with the real-time input spectrum trace. Click “Max Hold Reset” to reset the max hold trace.

### 2.1.8 Frequency Calibration

This option allows the user to modify the factory sampling frequency offset of the Elad FDM-Sx Receiver family.

Normally this operation is not needed.



As described in the pop-up above, a reference signal at the same frequency of the L.O., has to be provided at the antenna input of the receiver to perform the frequency calibration. Then, place the marker on the reference (peak), press  and then .

Clicking on  button, the software resets the sampling frequency offset to zero.

#### NOTE:

**This operation will cause the loss of the factory calibration. Perform this operation only if you are sure to accomplish the operation in the right way and to use a precise frequency reference.**

### 2.1.9 Save To Mem File

When “Save To Mem File” is clicked, the “Add to Memory File” Form is displayed.

This form allow to add a new station in station memory file (See paragraph 3.7). The user can select the memory file and save the frequency, name and a default demodulation mode for the station.

## 2.2 Tuning Bars



These innovative tuning bars (Patent Pending) allow the user to perform fast tuning over the whole receiver bandwidth. Each bar is characterized by different frequency spans. By performing drag-and-drop over the different bars, the user can easily select the desired frequency using the lower bar to select the frequency band, the middle bar to make a rough tuning and the higher bar to do fine positioning.

The span of the higher bar corresponds to the frequency range of the spectrum, and can be modified using the zoom buttons in the “Tuning Commands Panel”.

The frequency step of the higher bar (displayed in the “Tuning Commands Panel”) can be changed using the ← → arrows on the PC keyboard, while ↑ ↓ keys increase or decrease the tuning frequency by one step respectively (see Chapter 3.2 for keyboard shortcut configuration).

The yellow segment on the middle bar represents the portion of the spectrum displayed by the software in the “Display Window”.

## 2.3 Tuning Commands Panel



The main function of this panel is to display the tuning frequency.

Double click on the frequency display or press space bar (  ) to insert manually the desired value using the PC keyboard (Note: “+” key allow to insert “000”).

If the “LOCK TO CF” button is selected (  ) the tuning frequency corresponds to the center frequency of the Spectrum (that is the L.O. frequency), otherwise it’s possible to select different demodulation frequencies by clicking on the desired point on the Spectrum/Waterfall or using the mouse scroll wheel over the Spectrum/Waterfall area. If the “LOCK ABS” button is selected (  ) the tuning frequency remains constant even if the local oscillator frequency is changed (until the tuning frequency falls within the selected frequency span; otherwise the tuning frequency will be set according to the frequency span limits).

If the “LOCK” button is selected (  ), all the settings except the volume controls are disabled.

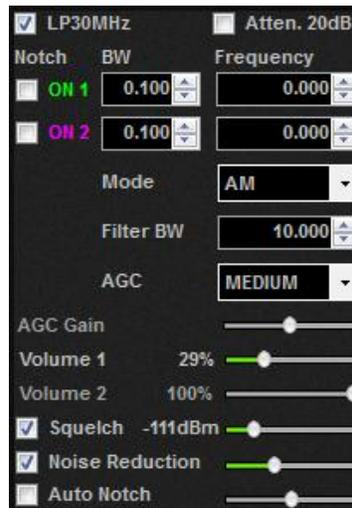
Clicking on  button the software forces the L.O. frequency to be equal to the current demodulation frequency.

Use the “SNAP” button (  ) to enable/disable the rounding of the tuning frequency at multiples of the frequency step.

Buttons    implement “zoom in”, “zoom out” and “zoom reset” respectively. Use the arrows   that appear on the “Display Window” when zoom function is active to move left/right the visualization.

Moreover, the “Tuning Commands Panel” shows the label  when a Tmate is connected and the label  when the CAT protocol is enabled.

## 2.4 Receiver Commands Panel



This panel allows the user to:

- Switch On/Off the anti-aliasing filter (30 MHz Low Pass);
- Switch On/Off the 20 dB attenuator;
- Switch On/Off the two notch filters (at IF stage) and set their parameters (frequency and bandwidth);
- Select the demodulation mode (CW, CW SH+, CW SH-, USB, LSB, DSB, AM, SAM,FM, WB FM Stereo, DRM);
- Set the bandwidth of the demodulation filter;
- Set the AGC type
  - if “AGC OFF” is selected, the user could adjust the AGC Gain manually;
  - if “AGC OFF” is selected, the software displays a warning  when audio clipping is detected;
- Set the volume of the two selected soundcards;
- Switch On/Off the squelch and set its level;
- Switch On/Off the “Noise Reducer” and modify its speed;
- Switch On/Off the “Auto Notch” reducer and modify its speed;

## 2.5 DRM/RDS Info Panel



If DRM is selected as demodulation mode, the “DRM Info Panel” is activated. It displays some information about the DRM transmission. Clicking on **Schedule** button, if an internet connection is available, the software automatically downloads and displays the last DRM schedule from <ftp://216.92.35.131>.

Start/Stop Time UTC	Days	Frequency	Target	Power	Programme	Language	Site	Country
0459-0758	Daily	13730	Pacific	25	RNZI	English	Fangitaki	New Zealand
0500-0530	Daily	17870	China	90	RRI	Chinese	Tiganesti	Romania
0500-0700	Daily	1296	Europe	35	BBC WS	English	Orfordness	Great Britain
0500-0800	Daily	3955	Europe	100	BBC WS	English	Skelton	UK
0500-0900	Daily	9780	Europe	100	REE	Spanish	Noblejas	Spain
0530-0600	Daily	6175	E Europe	90	RRI	Russian	Tiganesti	Romania
0600-0630	Daily	9650	Europe	90	RRI	French	Galbeni	Romania
0600-1000	Daily	11635	Europe	40	VoR	R/E	Taldom	Russia
0630-0700	Daily	9600	Europe	90	RRI	English	Galbeni	Romania
0700-0730	Daily	9450	Europe	90	RRI	German	Tiganesti	Romania
0700-0800	Daily	5875	Europe	40	BBC WS	English	Moosbrunn	Austria
0700-0800	---	6015	Europe	60	TDPrado	English	Issoudun	France
0700-1610	--TWTF--	1611	Europe	25	Vatican Radio	various	Santa Maria	Vatican
0759-1058	Daily	9870	Pacific	25	RNZI	English	Fangitaki	New Zealand
0800-0900	--T---	6015	Europe	60	TDPrado	English	Issoudun	France
0800-0900	Daily	5790	Europe	100	BBC WS	English	Skelton	Great Britain
0800-0900	Daily	5875	Europe	100	BBC WS	English	Woolfferton	Great Britain
0800-1000	Daily	7325	Europe	15	VoR	R/E	Bolshakovo	Russia
0900-1000	--W--	6015	Europe	60	TDPrado	English	Issoudun	France

If WB FM is selected as demodulation mode, the “RDS Info Panel” is activated. It displays the decoding of some RDS information.

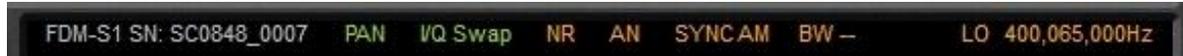


## 2.6 System Info Panel



This panel displays the system time (UTC and local) and the CPU usage.

## 2.7 Status Bar



The “Status Bar” displays the following information:

- Serial number of the connected Elad FDM-Sx Receiver;
- L.O. Frequency;
- Selected demodulation mode and filter bandwidth;
- Status of the “Noise Reducer” and “Auto Notch” (On or Off);
- Status of the “Panadapter Mode” (see Chapter 3.6)
  - If “Panadapter Mode” is activated, the **PAN** label is showed;
  - If AOR AR8600 Control is activated the **AR8600** label is showed;
  - If “Swap I/Q” option is selected, the **I/Q Swap** label is showed;
- Status of the “Downconverter Mode” (see Chapter 3.6)
  - If “Downconverter Mode” is activated, the **DW CONV** label is showed;
  - If “Swap I/Q” option is selected, the **I/Q Swap** label is showed;

## 2.8 Player/Recorder



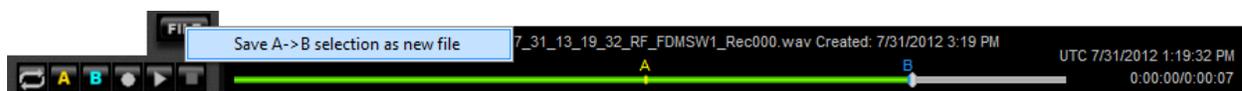
FDM-SW1 embeds an advanced player/recorder.

When the recorder is activated, the RF input signal or the audio output signal is stored in a .wav file (see Chapter 3.8). Some information regarding the settings used during the recording (file creation date, L.O. frequency, demodulation frequency, demodulation mode, filter bandwidth, etc.) is stored in the file’s header.

When the file is played, the stored information is loaded by the software. When the playback is finished, last demodulation settings (demodulation frequency, demodulation mode and filter bandwidth) are stored again in the .wav header.

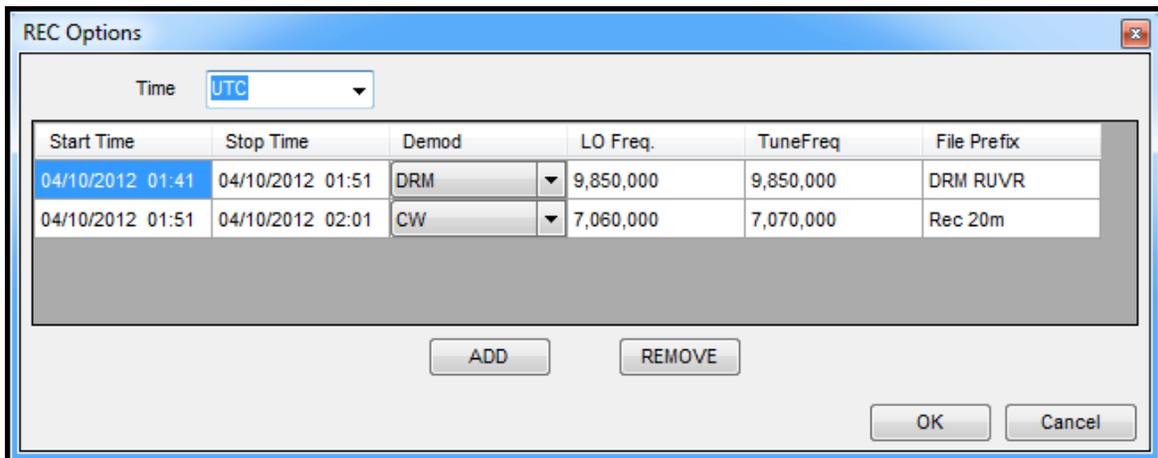
Six button function are available (Loop, A, B, Rec, Play/Pause, Stop).

After placing “A” and “B” (when the reproduction is stopped), user can create a new file with the samples included between the two markers by right-clicking the **FILE** button and then click the Save A->B selection as new file label.



### 2.8.1 Recording Scheduler

When a right-click is performed on the Rec button, the “Rec Option Form” is displayed



This form allow the user to schedule the recording of the input spectrum or the audio output signal. The user can set the start and stop time of recording (UTC Time or Local Time), the demodulation mode, the local oscillator frequency, the tuning frequency and the file name prefix.

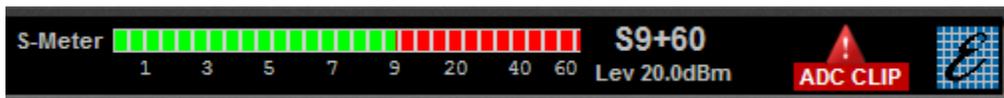
### 2.9 Mute Control



In this area, the DFM-SW1 software shows the name of the selected primary sound card (Sound Card 1).

Use the button to activate or deactivate the Mute function.

### 2.10 Signal Control Display



In this area, the DFM-SW1 software displays the level of the input signal.

### 2.11 Main Setting Buttons

- Button switches on/off the demodulation.
- Button opens the “Setup” form.
- Button opens the “Station List” form.
- Button opens the FDM-SW1 Guide. Refer this guide to know useful shortcut key functions.
- Button opens the Windows dialog box to allows the user to select the file to play.

## 2.12 Resize Corner

Drag-and-drop the bottom-right corner to resize the “**Graphical** User Interface”.

## 2.13 Omnirig Control Panel



This panel is displayed when the Omnirig control is active.

The  **Show Dialog** check box allow to show / hide the Omnirig configuration window and the others checkboxes allow to enable the management of the two rigs. In the others controls, are displayed the two rigs status.

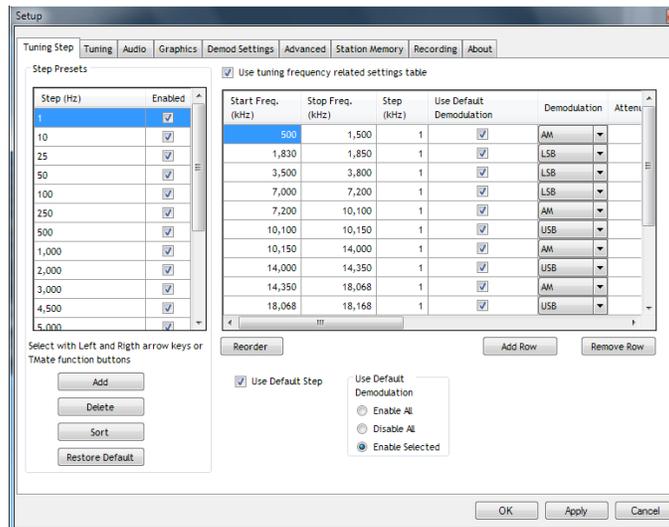
## 3 Setup Form

When the  **SET** button is clicked, FDM-SW1 displays the “Setup” form. This form contains several settings that control the behavior of the software.

The “Setup” form consists of 9 tabs:

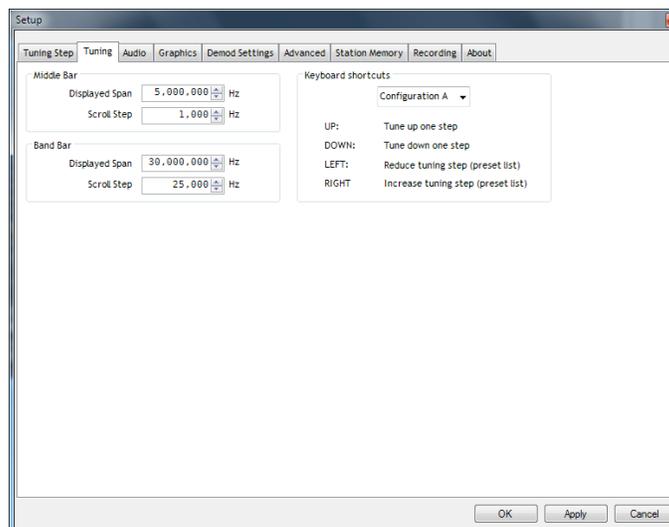
- 1 “Tuning Step” tab;
- 2 “Tuning” tab;
- 3 “Audio” tab;
- 4 “Graphics” tab;
- 5 “Demod Settings” tab;
- 6 “Advanced” tab;
- 7 “Station Memory” tab;
- 8 “Recording” tab;
- 9 “About” tab;

### 3.1 Tuning Step Tab



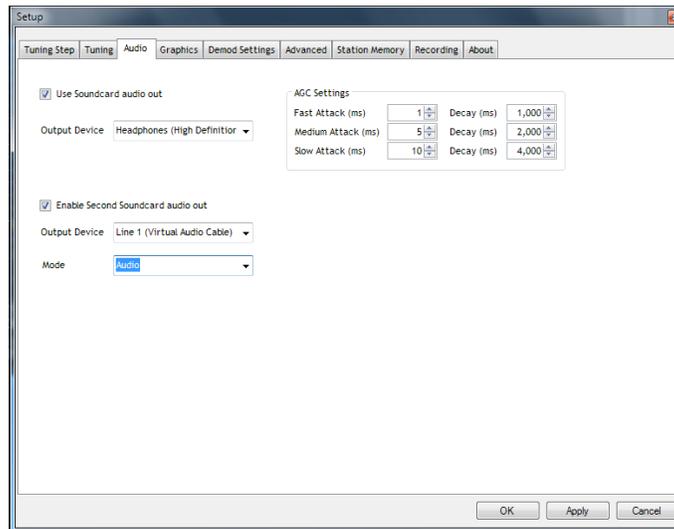
In the “Tuning Step” tab the user can configure the frequency steps that the software sets when the ← → arrows on the PC keyboard are pressed; these frequency steps are configurable under “Step Preset” area. Moreover, the user can compile a table containing custom setting (frequency step, demodulation mode, attenuator, low pass filter, Ext I/O, down converter mode) that the software automatically applies if the tuning frequency falls within the user-defined frequency ranges: to make this, check “Use tuning frequency related settings table” on the top of the tab.

### 3.2 Tuning Tab



The “Tuning” tab allows the user to customize the frequency span of the “Middle” and “Band” (lower) tuning bars and the keyboard shortcuts configuration.

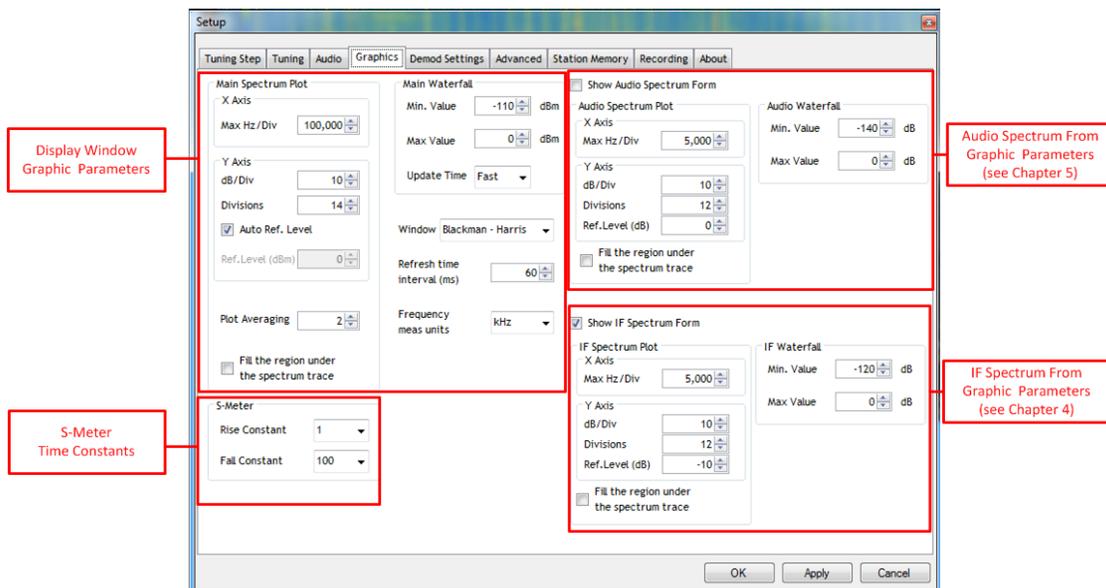
### 3.3 Audio Tab



The “Tuning” tab allows the user to select the soundcards and to set the AGC parameters. When the second soundcard is enabled, the user can select the data type that will be reproduced on this device:

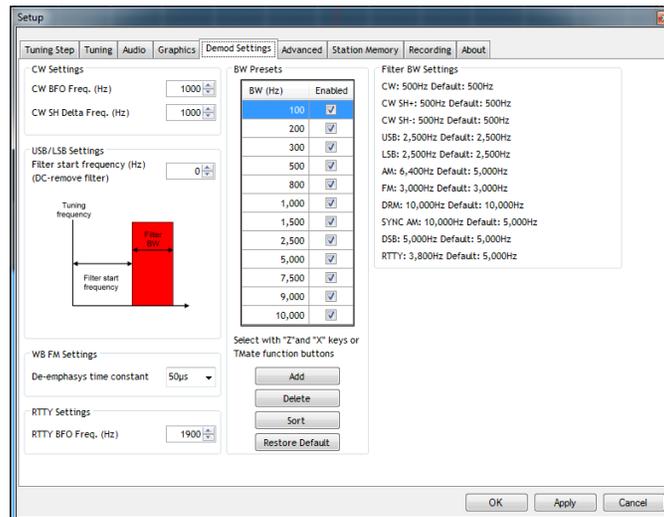
- Audio (48 kSamples/sec)
- IF (192 kSample/sec)
- IF (48 kSample/sec)

### 3.4 Graphics Tab



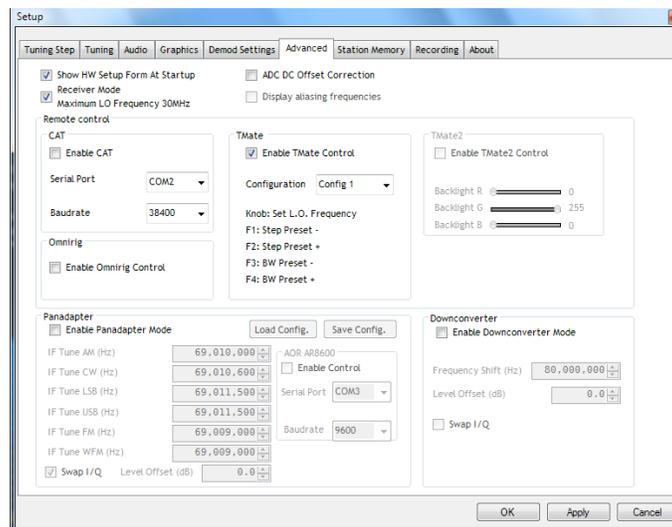
The “Graphics” tab allows the user to customize several parameters related to the “Display Window” visualization. Moreover, in this tab the user can enable and customize the visualization of the “Audio Spectrum” form (see Chapter 5), the “IF Spectrum” form (see Chapter 4) and the S-meter time constants.

### 3.5 Demod Settings Tab



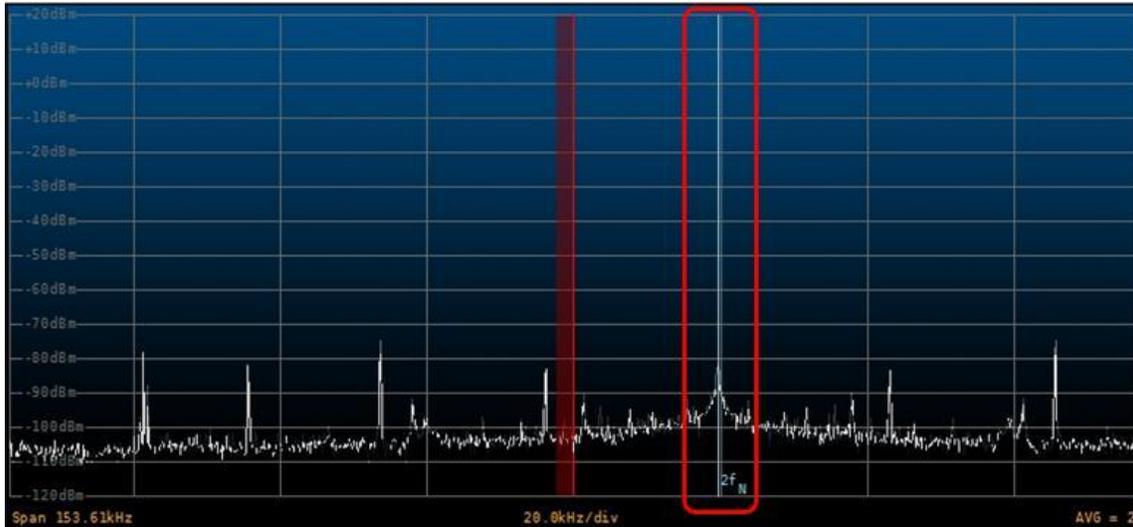
The “Demod Settings” tab allows the user to customize several parameters related to the demodulation algorithms. In the “Filter Bw Settings” panel, the software summarizes the current values of the filter’s bandwidth for each type of demodulation mode (a default value is displayed as suggestion).

### 3.6 Advanced Tab



In this tab, the user can select the advanced options of the software.

If the  Receiver Mode  Maximum LO Frequency 30MHz checkbox is selected (default), the software operates in “Receiver Mode” and limits the maximum tunable frequency at the Nyquist frequency (half of the ADC sampling rate). If the checkbox is deselected, the software operates in “Sampler Mode” and unlocks the limitation. If the “Sampler Mode” is activated, the user can force the software to highlight the multiples of the Nyquist frequency on the Spectrum by checking the  Display aliasing frequencies checkbox.



Checking the  Show HW Setup Form At Startup Receiver Mode checkbox, the “FDM-SW1 Hardware Setup” form is loaded at software startup (see Chapter 6).

To enable the DC offset correction feature of the ADC, check the  ADC DC Offset Correction checkbox; this option removes ADC offset at 0 Hz.

### 3.6.1 CAT

When the CAT control is active, the “Tuning Commands Panel” displays the **CAT** label. In the “CAT Panel” the user can configure the serial communication settings.

The FDM-SW1 implements the command set of the “Yaesu Ft897” transceiver.

### 3.6.2 Omnirig

When the  Enable Omnirig Control is checked, the FDM-SW1 software can control two transceivers using the Omni-Rig technology.

Please go to website <http://dxatlas.com/OmniRig/> for more information about Omni-Rig.

**Note:** Omnirig must be installed in your PC.

### 3.6.3 Tmate

If a Tmate is connected, the “Tmate Panel” is activated. In this panel, the user can choose among the proposed configurations of Tmate’s button functions. When the Tmate control is active, the “Tuning Commands Panel” displays the following labels:

- **TMate: Set LO** if **LOCK TO CF**;
- **TMate: Set Tune** if **LOCK TO CF** or **LOCK ABS**

### 3.6.4 Panadapter

If “Panadapter Mode” is activated (the “Status Bar” displays the **PAN** label), the user can configure the IF frequency for the different demodulation modes and the amplitude offset that allows the right visualization. Moreover, the spectrum flip around L.O. frequency can be enabled by check “Swap I/Q”

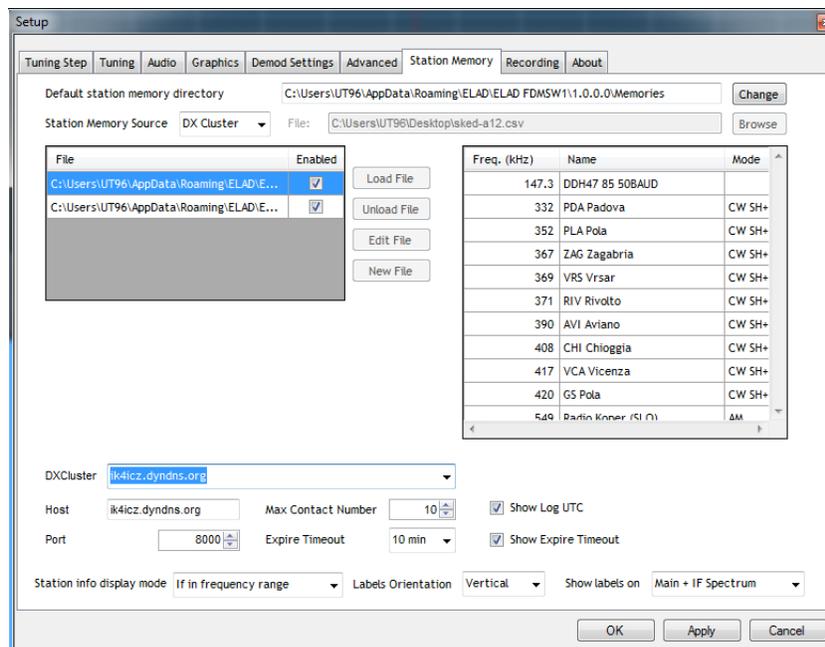
option (the “Status Bar” displays the **I/Q Swap** label). This configuration parameters can be saved/loaded using the buttons **Save Config.** and **Load Config.** respectively.

Enabling the AOR AR8600 Control (the “Status Bar” displays the **AR8600** label), the SW can directly control this Radio through serial communication.

### 3.6.5 Downconverter

If “Downconverter Mode” is activated (the “Status Bar” displays the **DW CONV** label), the user can configure the IF frequency shift of the downconverter and the amplitude offset that allows the right visualization. Moreover, the spectrum flip around L.O. frequency can be enabled by check “Swap I/Q” option (the “Status Bar” displays the **I/Q Swap** label).

## 3.7 Station Memory Tab



In the FDM-SW1, three types of memory source are available:

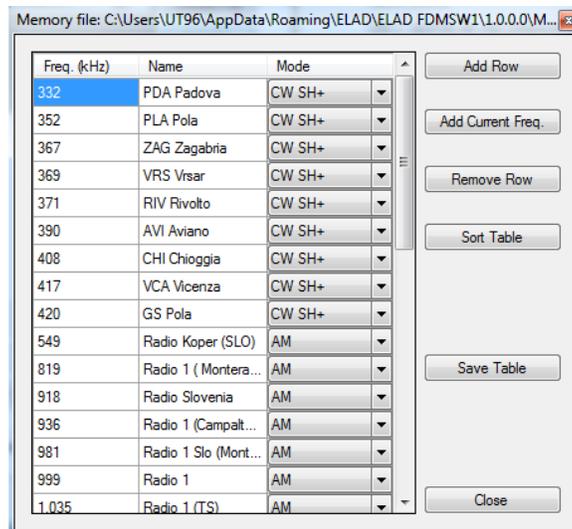
- Xml memory file;
- DX Cluster Connection;
- EIBI Database.

### 3.7.1 Xml memory file

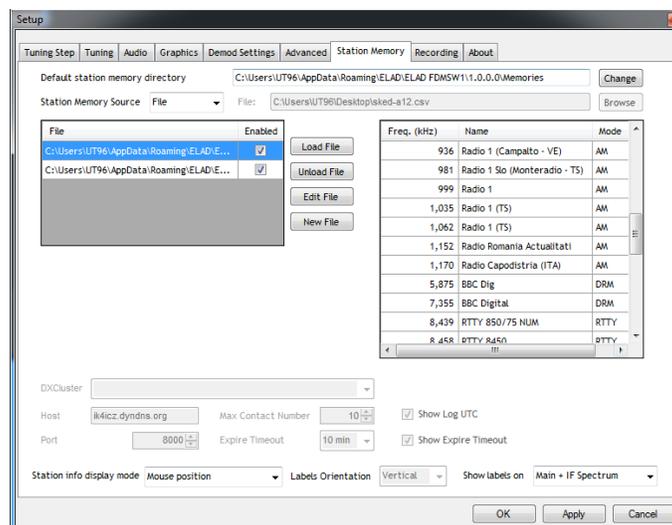
Select "File" as Station Memory Source.

Press **New File** button to create a new memory file.

When a new file is created or when **Edit File** button is pressed, FDM-SW1 visualizes an "Edit" form (represented in the figure below): user can add or delete stations from the editor to create or change a memory file.



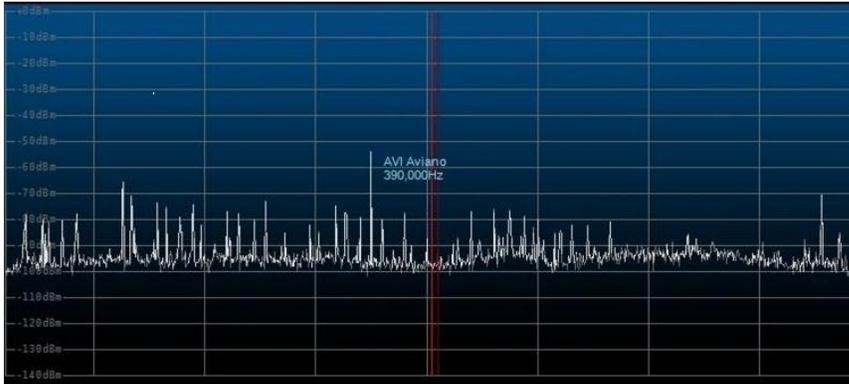
Press **Load File** or **Unload File** button to load or unload a memory file respectively (more than one memory file can be loaded at the same time).



The table on the right side of the tab displays all the stations that are stored in the selected memory files.

The “Station info display mode” combo-box allows the user to choose 4 types of memories visualization on the Spectrum graphic:

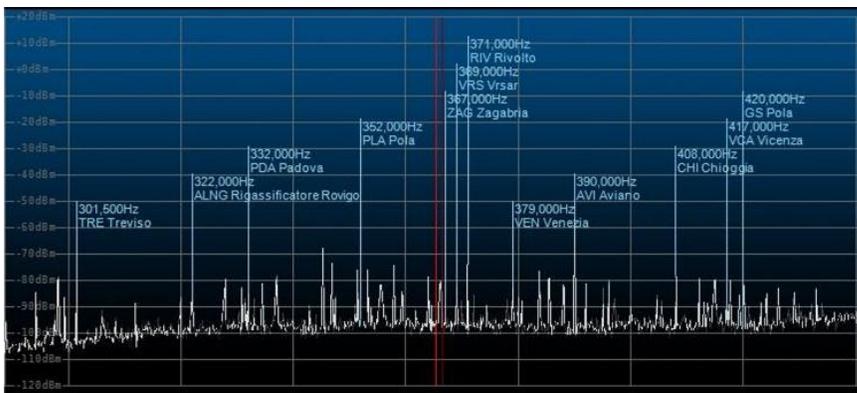
- “None”;
- “Mouse position”: a label containing the station info is displayed when the mouse is positioned over a frequency included in the selected memory files;



- “L.O. Frequency”: a label containing the station info is displayed when the L.O. frequency corresponds to a frequency included in the selected memory files;



- “If in frequency range”: a label containing the station info is displayed for each frequency included in the selected memory files that falls within the Spectrum frequency range.



If the option “If in frequency range” is selected, the “Labels orientation” combo-box, allow the user to select three types of visualization:

- Horizontal
- Oblique
- Vertical

Finally, the combo-box “Show labels on”, allow the user to enable the station memory label display on main spectrum window, on IF spectrum or on both the windows.

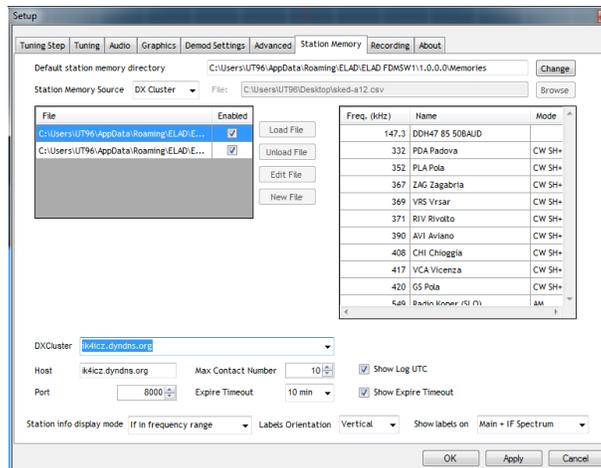
When the  button is clicked, FDM-SW1 displays the “Station List” form. Clicking on a line of the table implies that the receiver is tuned at the selected frequency and the mode is set at the value saved in the file.



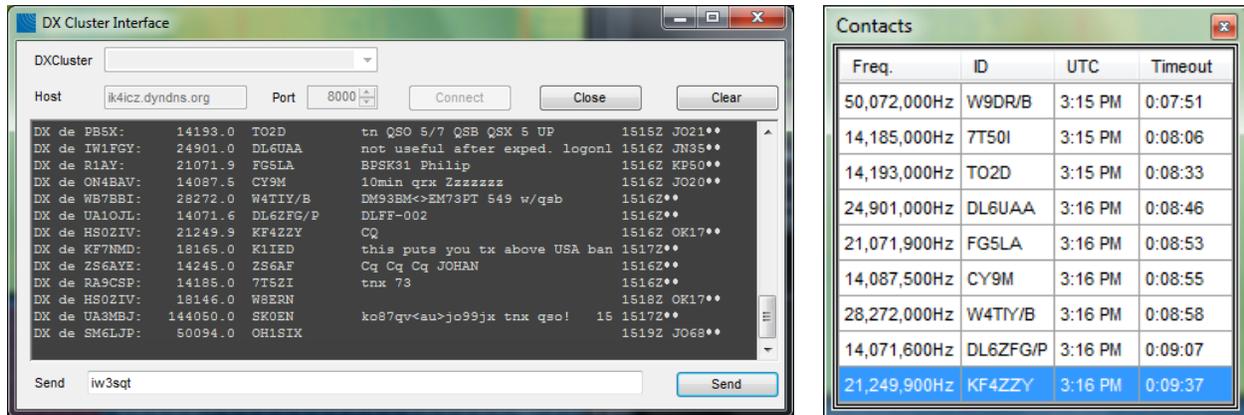
Freq. (kHz)	Name	Mode
367	ZAG Zagabria	CW SH+
369	VRS Vrsar	CW SH+
371	RIV Rivolto	CW SH+
390	AVI Aviano	CW SH+
408	CHI Chioggia	CW SH+
417	VCA Vicenza	CW SH+
420	GS Pola	CW SH+
549	Radio Koper (SLO)	AM
819	Radio 1 (Monteradio - TS)	AM
918	Radio Slovenia	AM
936	Radio 1 (Campalto - VE)	AM
981	Radio 1 Slo (Monteradio - TS)	AM
999	Radio 1	AM
1,035	Radio 1 (TS)	AM
1,062	Radio 1 (TS)	AM
1,152	Radio Romania Actualitati	AM
1,170	Radio Capodistria (ITA)	AM
5,875	BBC Dig	DRM

### 3.7.2 DX Cluster connection

Select “DX Cluster” as Station Memory Source: all options for “DXCluster” source are available on the bottom area of the tab. Select a cluster from the “DXCluster” combo-box or insert manually the cluster settings. The “Station info display mode” combo-box displays the same options described in the previous paragraph.



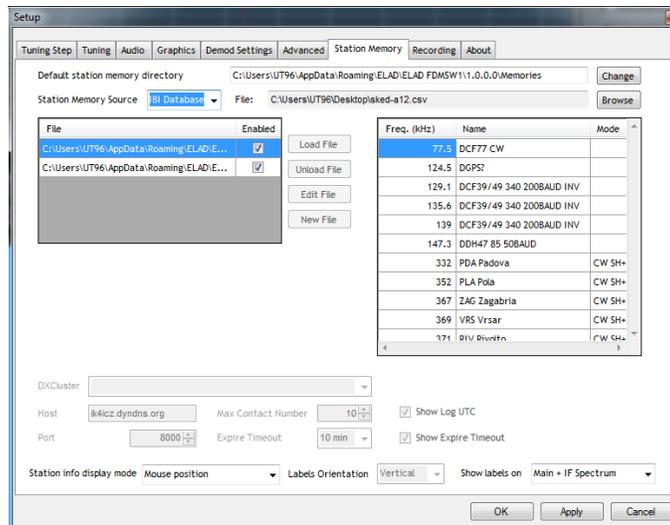
When the **MEM** button is clicked, FDM-SW1 displays the “DX Cluster Interface” form and the “Contacts” form.



Press **Connect** or **Close** button of the “DX Cluster Interface” form to open or close the link with the Cluster, and use **Send** to send the string entered in the “Send” area. The “Contacts” form displays the users connected to the cluster. Double-clicking on a line of the table implies that the L.O. is tuned at the selected frequency. Use the “Show Log UTC” and “Show Expire Timeout” checkboxes to enable or disable the visualization of this information in the “Contacts” form.

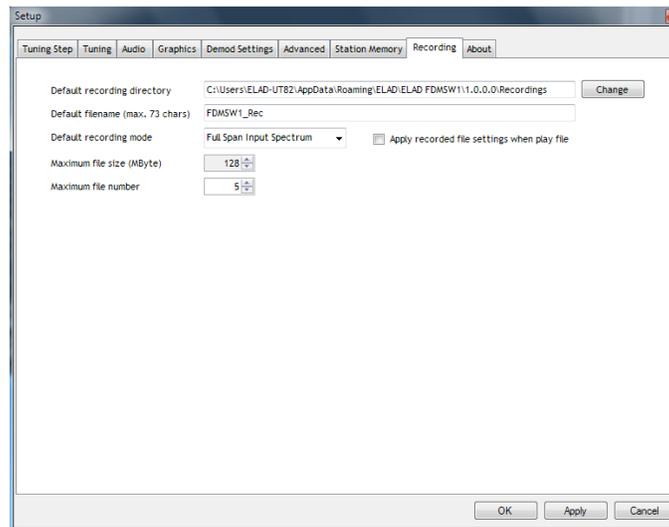
### 3.7.3 EIBI Database

Select “EIBI Database” as Station Memory Source. The “Station info display mode” combobox displays the same options described in the previous paragraphs.



Download the CSV database file from [www.eibispace.de](http://www.eibispace.de). Click the **Browse** button and select the downloaded .csf file.

### 3.8 Recording Tab



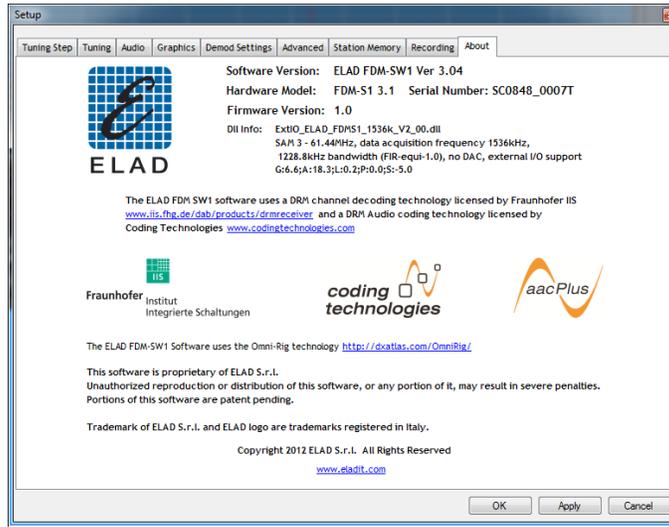
The “Recording” tab allows the user to configure:

- default directory for the recorded .wav files;
- default filename. The SW automatically appends to the filename a prefix containing the date-time information (yyyy-mm-dd-hh-mm-ss) plus the data type (RF for “Full Span Input Spectrum” or AF for “Audio Frequency”) and a suffix “RecXXX” that represents the incremental index within a recording section;
- default recording mode:
  - Full Span Input Spectrum (the sampling rate of the RF I/Q datastream depends on the HW configuration DII loaded; see Chapter 6);
  - Audio Frequency;
- maximum allowed size for each recorded .wav files;
- maximum allowed number of .wav file for each recording session.

As explained in chapter 2.8, some information regarding the settings used during the recording and the playback (demodulation frequency, demodulation mode and filter bandwidth) of a .wav file is stored in its header.

If the  **Apply recorded file settings when play file** checkbox is checked, the stored information is automatically loaded by the software at the beginning of the playback of every file even though the files belong to the same recording session. This may cause an unwanted change of configuration in the transition between a file and the subsequent. If the checkbox is unchecked, the software loads the information stored in the header of the first file of the recording session and keeps this configuration unchanged until the end of the reproduction of the whole session.

### 3.9 About Tab



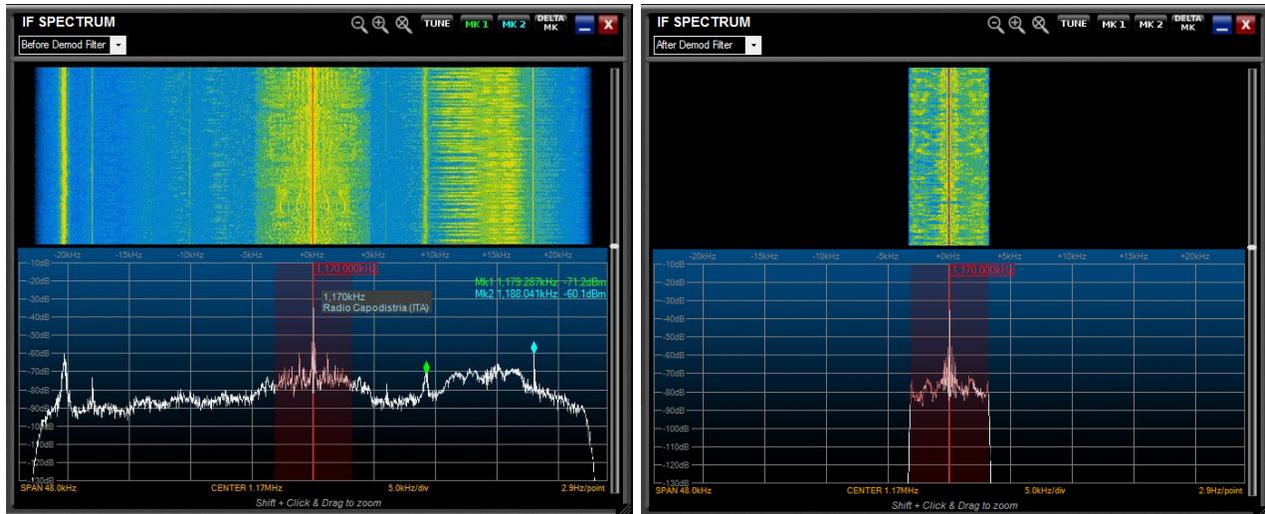
The “About” tab displays useful information about Software and Hardware.

## 4 IF Spectrum Form

If the  **Show IF Spectrum Form** checkbox of the “Graphics” tab is selected (see Chapter 3.4), the “IF Spectrum” form is automatically loaded when the  button is pressed.

This form displays the Spectrum/Waterfall of the IF frequency of the software. The frequency span is set to 192 kHz when the “WB FM” demodulation mode is selected, 48 kHz for the other modes.

The user can select to visualize the Spectrum/Waterfall of the IF signal “Before Demod Filter” or “After Demod Filter”.



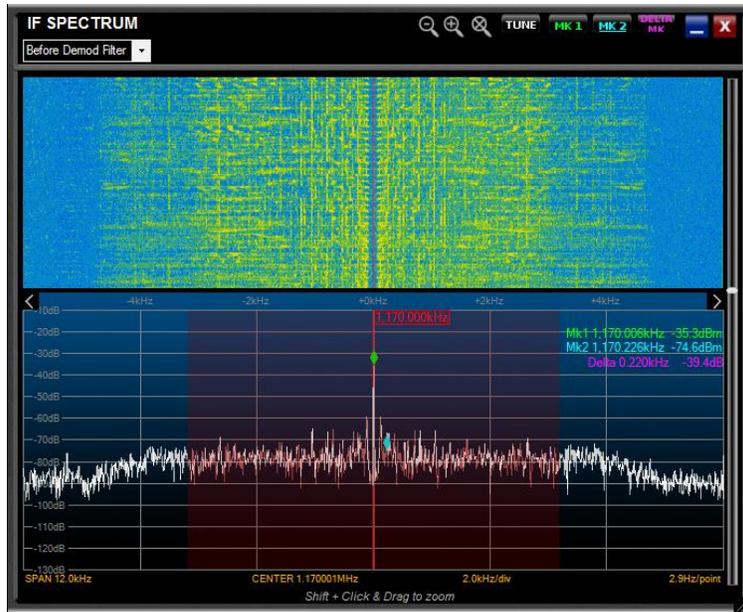
To zoom in/out the area of the tuning frequency, click on the  /  button.

To zoom a desired area, press the “Shift” button of the keyboard while operating the drag-and-drop action over the Spectrum. Use the arrows   when zoom function is active to move left/right the visualization and click the  button to reset the zoom.

User can perform three types of click function:

- set tuning to the selected frequency if **TUNE** is selected;
- set “Marker 1” if **MK 1** is selected (Note: the label is green (**MK 1**) when the “Marker 1” is enabled while is green and underlined (**MK 1**) when the click function is active);
- set “Marker 2” if **MK 2** is selected (Note: the label is cyan (**MK 2**) when the “Marker 2” is enabled while is cyan and underlined (**MK 2**) when the click function is active);

If both markers are enabled, user can activate the **DELTA MK** function that displays the frequency and amplitude difference between the markers.

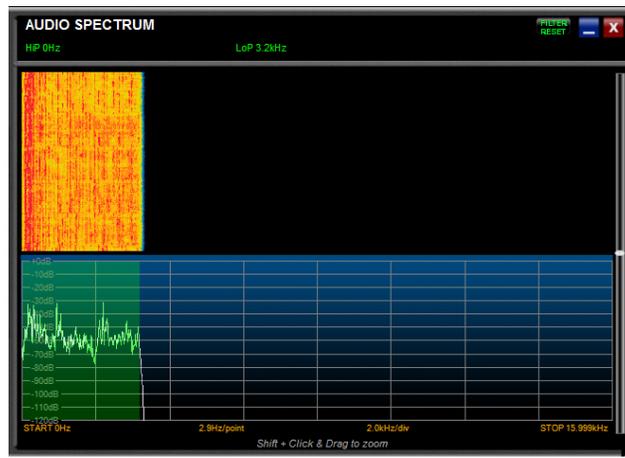


Drag-and-drop the bottom-right corner to resize the “IF Spectrum” form.

## 5 Audio Spectrum Form

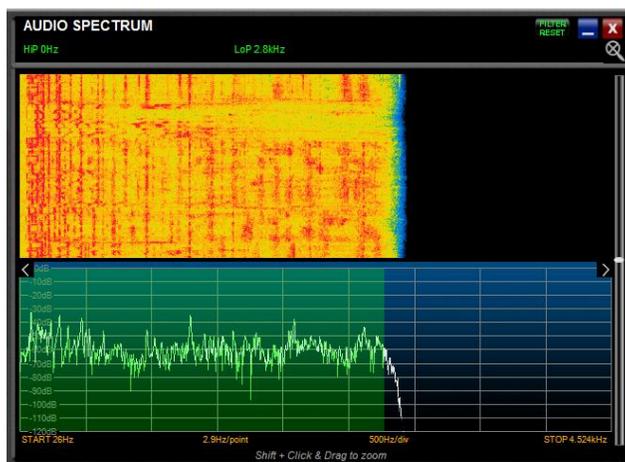
If the  **Show Audio Spectrum Form** checkbox of the “Graphics” tab is selected (see Chapter 3.4), the “Audio Spectrum” form is automatically loaded when the  button is pressed. Furthermore, this form is loaded by default when the player is active and the data type of the reproduced .wav file is “Audio Frequency” (see Chapter 3.8).

The frequency span is set to 16 KHz for all demodulation modes.



To zoom a desired area, press the “Shift” button of the keyboard while operating the drag-and-drop action over the Spectrum. Use the arrows   when zoom function is active to move left/right the visualization and click the  button to reset the zoom.

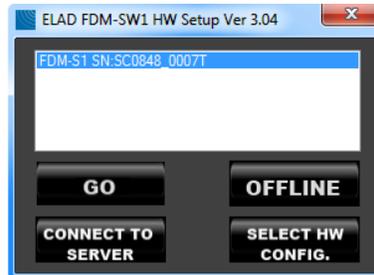
In CW, CW SH+, CW SH-, USB, LSB, AM, FM, SYNC AM and DSB mode an audio filter is inserted at the end of the demodulation chain (audio filter is omitted in WB FM and DRM demodulation). This filter is represented by the green area drawn over the audio Spectrum. User can modify the bandwidth of the audio filter by drag-and-drop the borders of this area (Note: the higher frequency of the audio filter is limited to the bandwidth of the demodulation filter).



Drag-and-drop the bottom-right corner to resize the “Audio Spectrum” form.

## 6 FDM-SW1 Hardware Setup Form

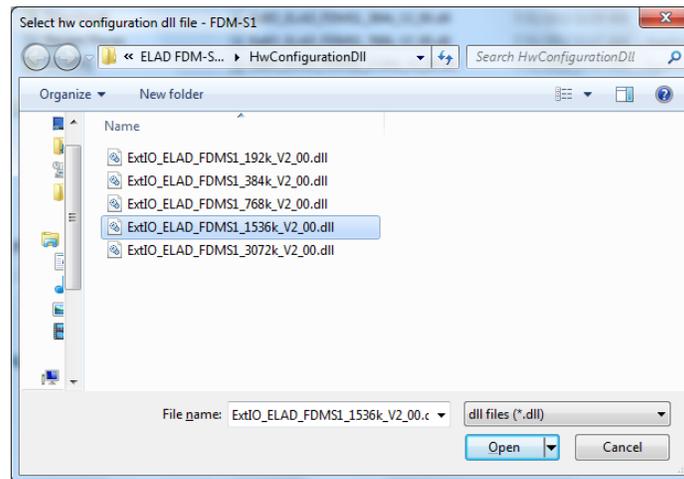
If the option  Show HW Setup Form At Startup Receiver Mode of the “Advanced” tab is selected, the “FDM-SW1 Hardware Setup” form is loaded at software startup (see Chapter 3.6).



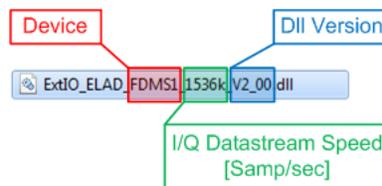
Press **GO** button to start the FDM-SW1.

Press **OFFLINE** button to start the FDM-SW1 in “OFFLINE Mode” (see Chapter 7).

Since the FDM-SW1 is a general purpose software that works with the entire FDM-Sx Receiver family, the hardware configuration corresponding to the connected HW has to be selected. This operation is accomplished by clicking the **SELECT HW CONFIG.** button: a Windows dialog box is opened to allow the user to select the hardware configuration file (named ExtIO\_ELAD\_FDMSx\_yyy.dll)



The previous figure shows a directory containing five configuration DLLs for the FDM-S1 device. The filename code is explained in the following figure.

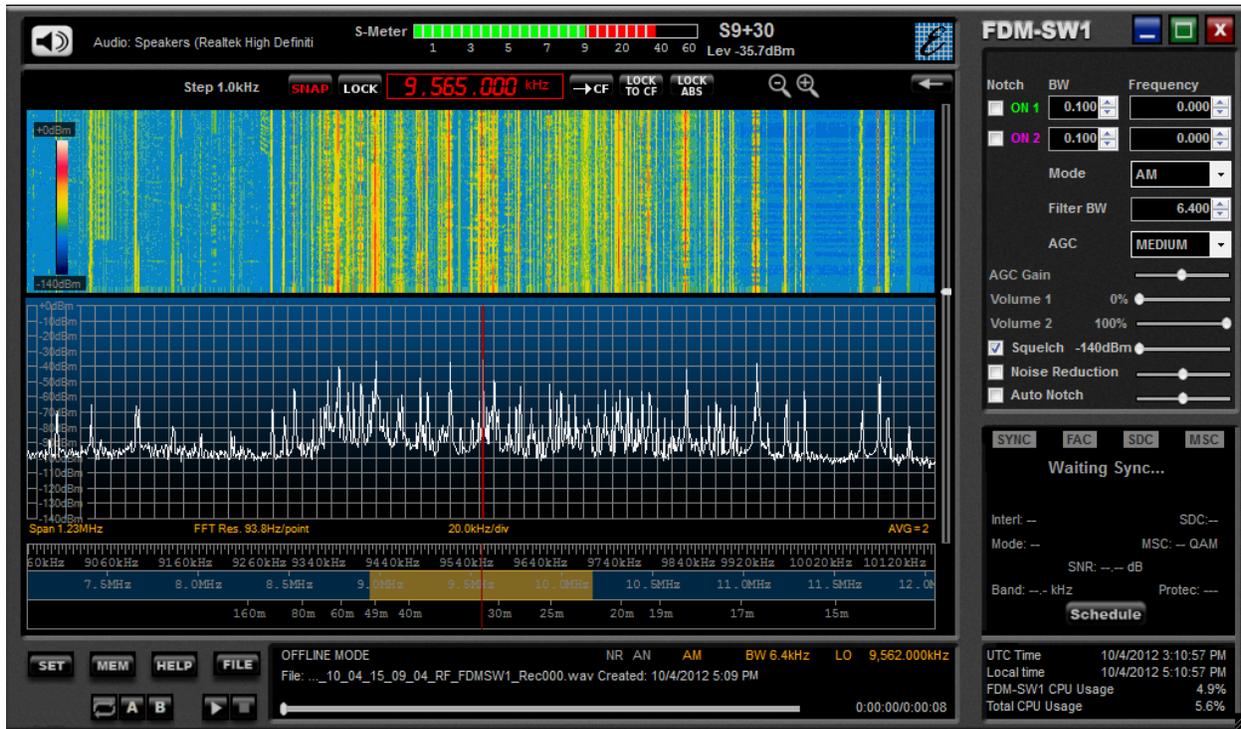


**NOTE:**

Please check out the latest update of your hardware related .dll file at [www.eladit.com](http://www.eladit.com).

## 7 Offline Mode

If the **OFFLINE** button of the “FDM-SW1 Hardware Setup” form is pressed, FDM-SW1 starts in “OFFLINE Mode”. In this case, no connection with the hardware is established and only the playback of recorded files is available.



## 8 Connect to Server

Press the **CONNECT TO SERVER** button to connect the software to a remote FDM-Sx device through a server software (at the moment the server software is under development).

## Annex A

### ELAD FDM-SW1 CAT Protocol

The FMD-SW1 implements a subset of the CAT commands of the Yaesu FT-897 transceiver. The parameters of the serial port are listed in the following table.

Baud rate	38400
Data Size	8
Parity	None
Start Bits	1
Stop Bits	2

The command sent to FDM-SW1 consists of 5 bytes and is structured as follows:

Data 1	Data 2	Data 3	Data 4	Command
--------	--------	--------	--------	---------

FDM-SW1 software implements the following commands derived from the command set of FT-897:

Command Description	Data 1	Data 2	Data 3	Data 4	Command	Remarks
Set LO Frequency	100/10MHz	1MHz/100kHz	10/1kHz	100/10Hz	0x01	This commands sets the current frequency (see following command description)
Set operating mode	Mode Byte	X	X	X	0x07	See following command description
Read Receiver Status	X	X	X	X	0xE7	This command returns one byte containing receiver status (see following command description)
Read Frequency and mode	X	X	X	X	0x03	This command returns five bytes (see following command description)
Read EE prom Data	Address MSB	Address LSB	X	X	0xBB	This command causes <b>two</b> bytes of EEPROM data to be returned, beginning with the address in data bytes 1 and 2. (Approximately 6.25k of EEPROM data may be accessed - see following command description)
Read TX Metering	X	X	X	X	0xBD	This command returns one byte (00) when in receive. When in transmit, this command returns <b>two</b> bytes (in BCD format) indicating Forward power, VSWR, ALC, and Modulation.
Read Transmitter status	X	X	X	X	0xF7	This command returns one byte containing transmitter status (see following command description)
Set PTT ON	X	X	X	X	0x08	This "keys" the FT-817. In CW, this sets the radio to transmit mode, but does key the transmitter. Keying and unkeying the PTT line will cancel the transmit mode (i.e. put it back into receive.) This command returns 00 if the '817 was unkeyed, and F0 if already keyed.
Set PTT Off	X	X	X	X	0x88	This command puts the FT-817 into receive mode. This command returns 00 if the '817 was keyed, and F0 if already unkeyed.

## Command Description

**Command 0x01 - Set local oscillator frequency:** the local oscillator frequency is set by the transmission of 4 Binary Coded Decimal (BCD) bytes. For example, to set the frequency at 435.12345 MHz the bytes to be sent are: **[43][51][23][45]** followed by the byte command **[01]**.

The command returns 1 byte set to **[00]**.

**Command 0x03 - Read local oscillator frequency and mode:** this command returns 5 bytes. The first four bytes contain the local oscillator frequency in the same format of the command **0x01** (4 BCD bytes), while the last byte contains the operating mode encoded as follows:

Mode	Value
LSB	0x00
USB	0x01
CW, CW SH+, CW SH-	0x02
AM, SYNC AM	0x04
FM, WB FM	0x06
DRM	0x07

**Command 0x07 - Set operation mode:** the first byte contains the operating mode that is encoded as follows:

Mode	Value
LSB	0x00
USB	0x01
CW	0x02
AM	0x04
WB FM	0x08
FM	0x88

The command returns 1 byte set to **[00]**.

**Command 0xBB - Read EEPROM Data:** this command returns 2 bytes. To simulate the behavior of the FT-897, the software replies to “Eeprom read” request as follows

Address	Data 1	Data 2
0x006A	0xC4	0x20
0x00A9	0x00	0x05
0x006B	0x20	0x59
0x008C	0x00	0x00
0x00A8	0x00	0x18
0x008E	0x40	0x00

For example, if the software receive the command **[00] [6A] [00] [00] [BB]** the answer must be **[C4] [20]**.

**Command 0xBD - Read TX Metering:** This command returns 1 byte set to **[00]** when receive mode is enabled, while it returns 2 byte set to **[00] [00]** when transmit mode is enabled.

**Command 0xE7 - Read Receiver Status:** This command returns 1 byte. The 4 least significant bits indicate the current reading of S-METER. Some examples are reported in the following table

Returned Byte	S-METER
0x00	S0
0x04	S4
0x09	S9
0x0A	S9+10
0x0B	S9+20
0x0F	S9+60

**Command 0xF7 - Read Transmitter Status:** This command returns 1 byte. If “keyed” the byte is set to [7f] otherwise [ff].

In addition to the controls derived from the command set of FT-897, the CAT protocol include specific commands for the FDM-SW1:

Command Description	Data 1	Data 2	Data 3	Data 4	Command	Remarks
Set operating mode SW1	Mode Byte	X	X	X	0xC7	See following command description
Read Tuning Frequency and mode	X	X	X	X	0xC8	This command returns five bytes (see following command description)
Set Tuning Frequency	100/10MHz	1MHz/100kHz	10/1kHz	100/10Hz	0xC9	This commands sets the current frequency (see following command description)
Read Locked Mode	X	X	X	X	0xCA	See following command description
Set Locked Mode	Locked Mode Byte	X	X	X	0xCB	See following command description
Read FDM-SW1 Status	X	X	X	X	0xCF	This command returns 10 bytes containing the FDM-SW1 status. (See following command description)

**Command 0xC7 - Set operating mode SW1:** the first byte contains the operating mode that is encoded as follows:

Mode	Value
CW	0x00
CW SH+	0x01
CW SH-	0x02
USB	0x03
LSB	0x04
AM	0x05
FM	0x06
DRM	0x07
WBFM	0x08
SYNC AM	0x09
DSB	0x0A

The command returns 1 byte set to [00].

**Command 0xC8 - Read tuning frequency and mode:** this command returns 5 bytes. The first four bytes contain the tuning frequency in the same format of the command **0x01** (4 BCD bytes), while the last byte contains the operating mode encoded as in command **0xC7**.

**Command 0xC9 – Set Tuning frequency:** the tuning frequency is set by the transmission of 4 Binary Coded Decimal (BCD) bytes For example, to set the frequency at 435.12345 MHz the bytes to be sent are: **[43][51][23][45]** followed by the byte command **[C9]**. The command returns 1 byte set to **[00]**.

**Command 0xCA – Read Locked Mode:** this command returns 1 byte containing the receiver locked status

Mode	Value
Unlocked	0x00
Locked to CF	0x01
Locked ABS	0x02
LOCK	0x03

**Command 0xCB – Set Locked Mode:** this command returns 1 byte.

Mode	Value
Unlocked	0x00
Locked to CF	0x01
Locked ABS	0x02

**Command 0xCF - Read Global Status FDMSW1:** this command returns 10 bytes containing the status of the FDM-SW1

- **Byte 0:** Locked Mode (encoded as in command **0xCA**)
- **Byte 1 – Byte 4:** LO Frequency (4 BCD)
- **Byte 5 –Byte 8:** Tuning frequency (4BCD)
- **Byte 9:** Operating mode (encoded as in command **0xC7**)

## Annex B

### Restore to Factory Default

The FDM-SW1 software settings are stored in some files:

- **FDMSW1MainSetup**: contains FDM-SW1 general settings like main windows position and size, graphics settings, default directory for save the recordings ...
- **FDMS1Settings\_XXXXX** (where XXXXX is the FDM-Sx serial number): contains specific receiver settings like Tune Frequency, LO Frequency, operating mode, filter BW etc...
- **FDMS1Settings\_Offline**: specific settings for the “Offline Mode”
- **FDMS1Config.xml**: frequency related settings

If the files are corrupted or contains invalid data, the software can stop working correctly. However it is possible to restore the FDM-SW1 software in a stable state.

- Enable the visualization of the hidden files, folder and drives
- Close the FDM-SW1 Software
- Open the FDM-SW1 configuration file directory: the location is depending from the operating system:
  - Windows 7:  
“Local Drive”:\Users\“Your username”\AppData\Roaming\ELAD\ELAD FDM-SW1\1.0.0.0
  - Windows XP:  
“Local Drive”:\Documents and Settings\“Your username”\Application Data\ELAD\ELAD FDM-SW1\1.0.0.0
- Move the following files in another directory: FDMS1Config.xml, FDMS1Settings\_Offline, FDMS1Settings\_XXXXX and FDMSW1MainSetup.  
**Attention: by moving these files, you will lost all the user settings as last tuning frequency, demodulation mode, frequency related settings etc...**
- Restart the software