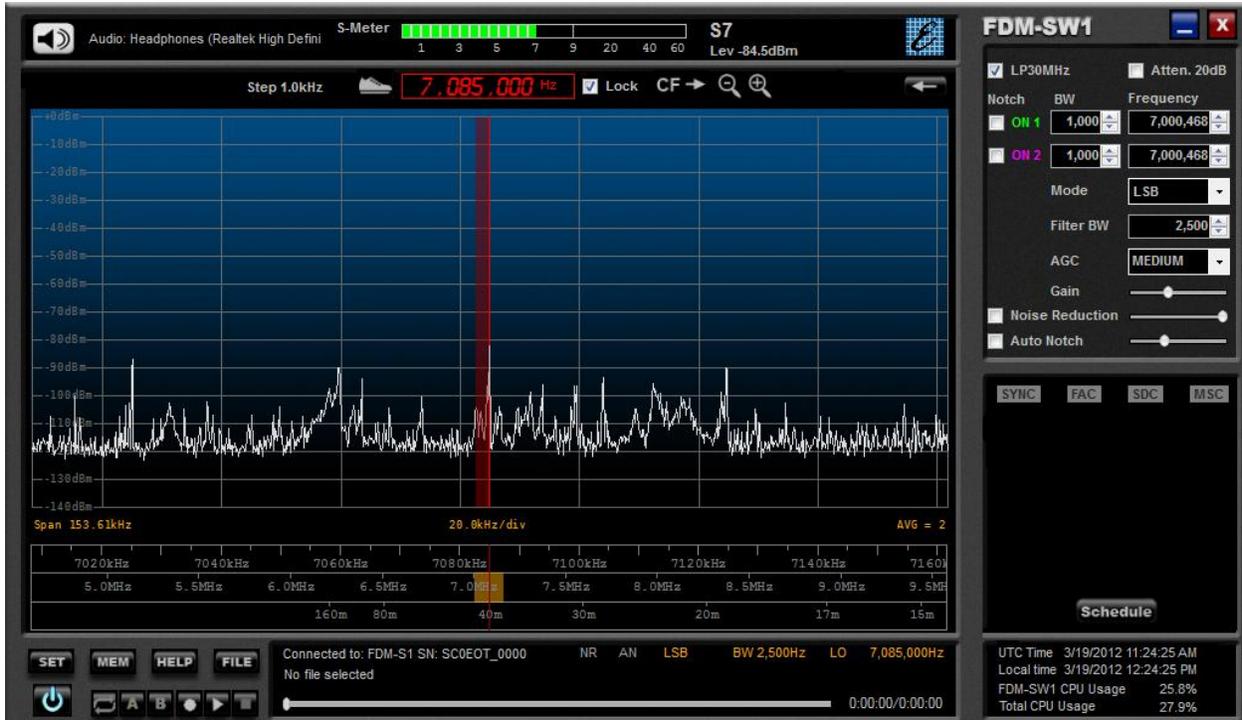


# ELAD FDM-SW1



## USER MANUAL

Ver. 1.0

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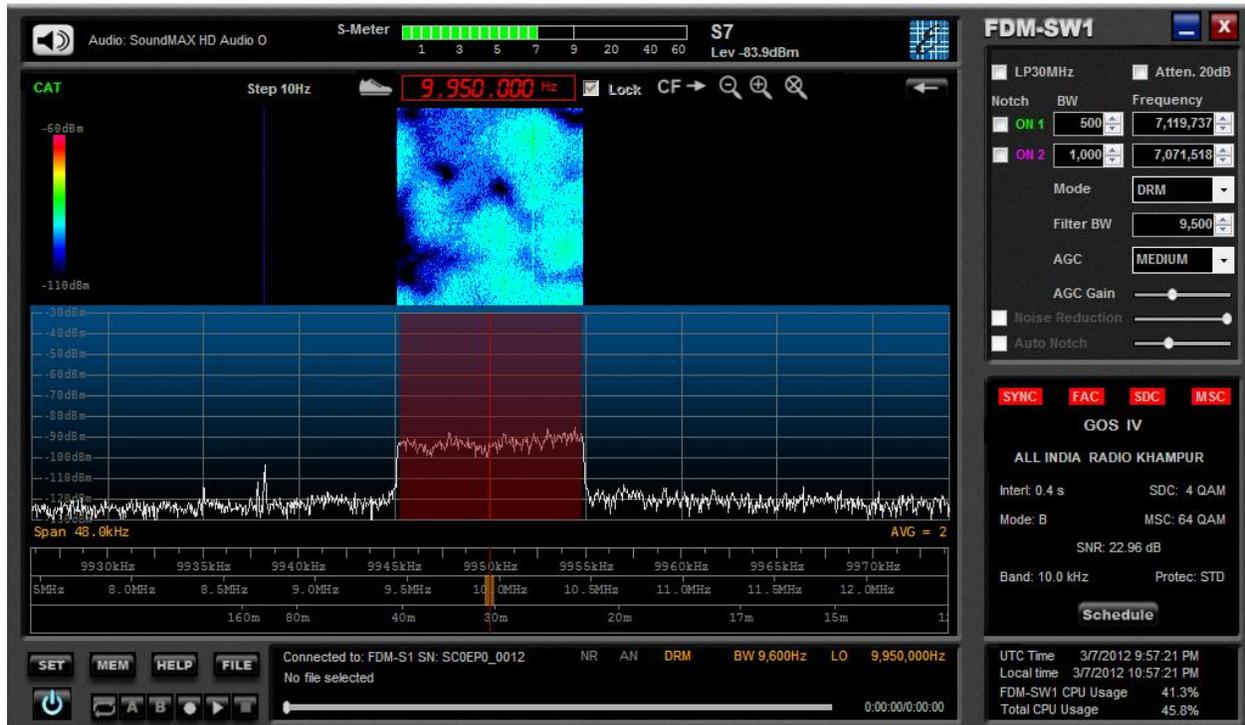
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# 1 FDM-SW1 Overview

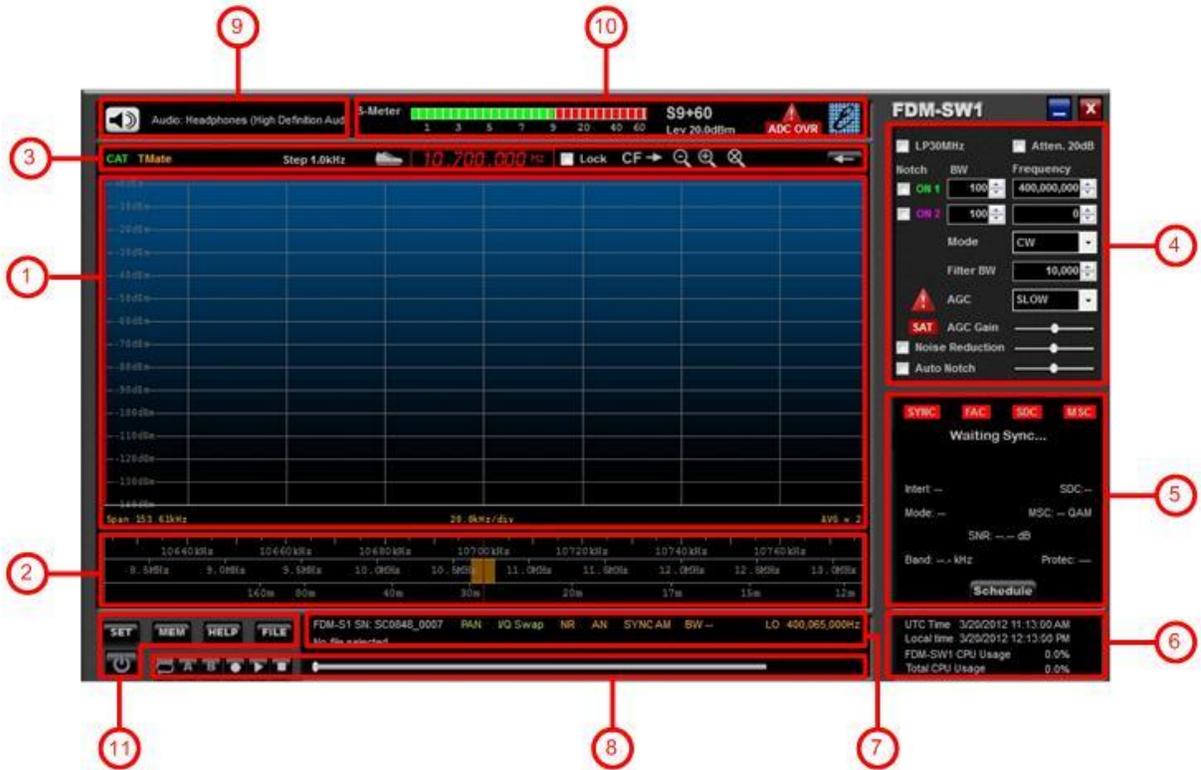


Elad DFM-SW1 is a SDR (Software Defined Radio) software that is intended to be used with the Elad FDM-Sx Receiver family.

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

## 2 Graphical User Interface (GUI)

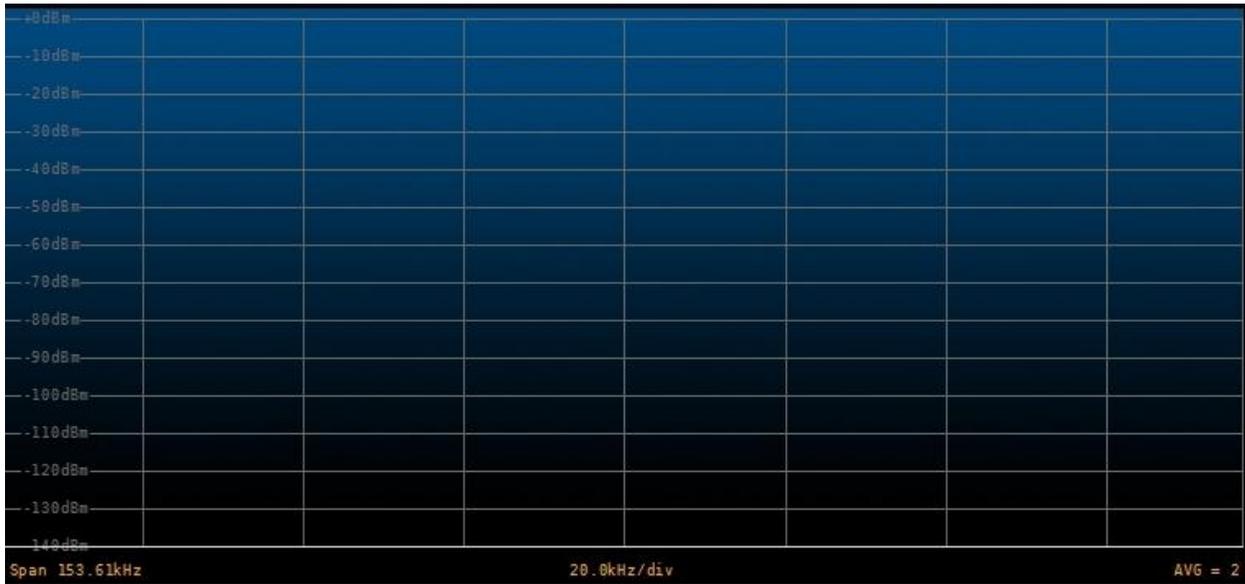
The screen shot below shows the main screen (the cockpit) of the Graphical User Interface.



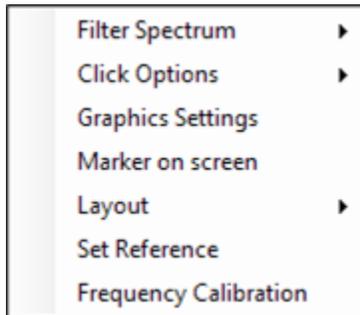
The GUI consists of 11 parts:

1. Display Window;
2. Tuning Bars;
3. Tuning Commands Panel;
4. Receiver Commands Panel;
5. DRM Info Panel;
6. System Info Panel;
7. Status Bar;
8. Player/Recorder;
9. Audio/Squelch Control;
10. Signal Control Display;
11. Main Setting Buttons.

## 2.1 Display Window

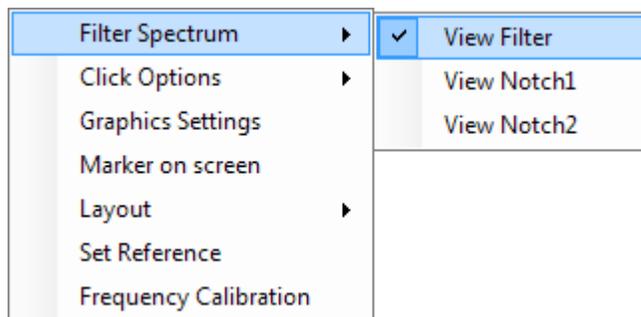


The “Display Window” displays the spectrum of input signal. On the lower part, information about the current setting of “Span”, “kHz/Div” and “AVG” is displayed. When right-click is performed on the “Display Window” the software displays a pop-up menu that contains advanced graphic options.



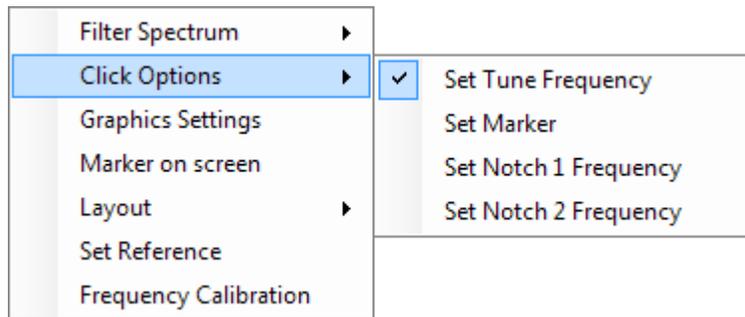
### 2.1.1 Filter Spectrum

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



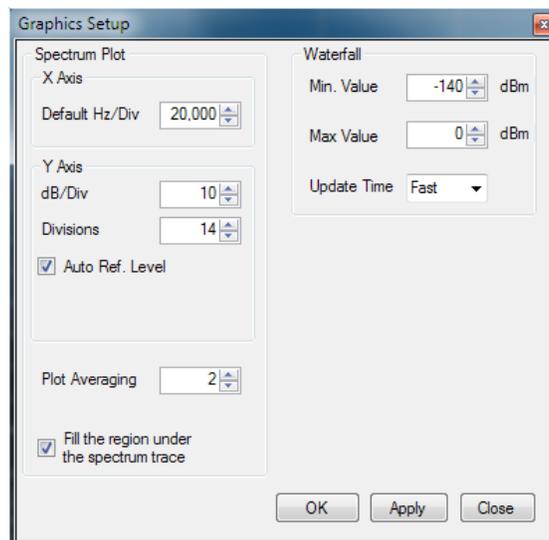
### 2.1.2 Click Options

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 Settings

When this option is selected, the “Graphics Setup” form is displayed. The “Graphics Setup” form allows the user to configure the parameters of the spectrum graph.

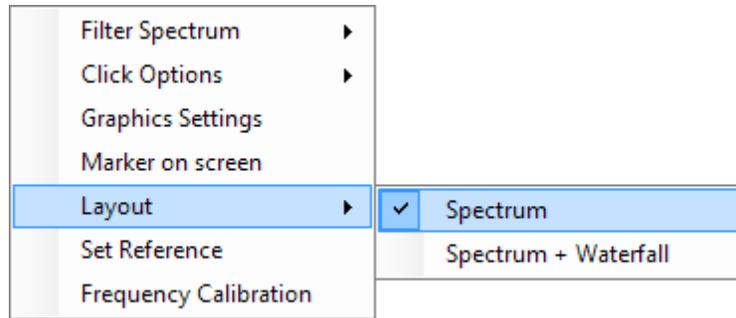


### 2.1.4 Marker on screen

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.



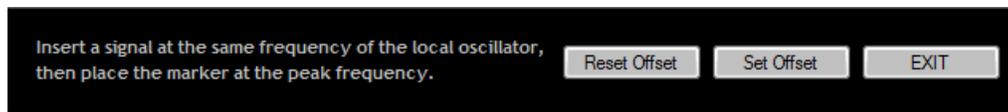
**2.1.6 Set/Reset Reference**

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 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 **Set Offset** and then **EXIT**.

Clicking on **Reset Offset** 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 certain to accomplish the operation in the right way and be sure to use a precise frequency reference.

**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.

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 (  Lock ) to insert manually the desired value using the PC keyboard.

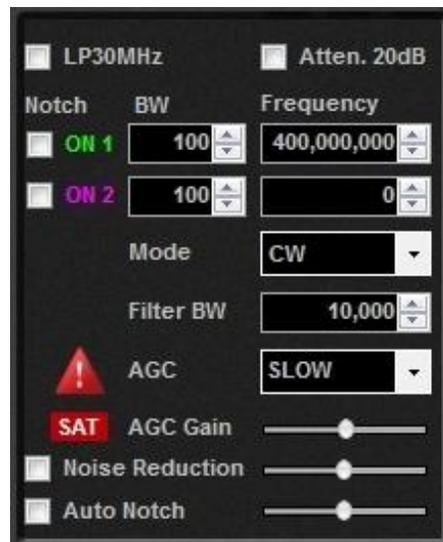
If the “Lock” checkbox is selected (  Lock ) the tuning frequency corresponds to the center frequency of the spectrum (that is the L.O. frequency), otherwise (  Lock ) it’s possible to select different demodulation frequencies by clicking on the desired point on the spectrum. Clicking on  CF → button the software forces the L.O. frequency to be equal to the current demodulation frequency.

Use  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.

Moreover, the “Tuning Commands Panel” shows the label  TMate when a Tmate is connected and the label  CAT 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;
- Switch On/Off the “Noise Reducer” and modify its velocity;
- Switch On/Off the “Auto Notch” reducer and modify its velocity;

## 2.5 DRM 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  button, if an internet connection is available, the software automatically downloads and displays the last DRM schedule from <ftp://216.92.35.131>.

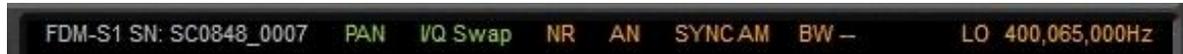
Start/Stop Time UTC	Days	Frequency	Target	Power	Programme	Language	Site	Country
0459-0758	Daily	13730	Pacific	25	RNZI	English	Rangitaki	New Zealand
0500-0530	Daily	17870	China	90	RRI	Chinese	Tiganesti	Romania
0500-0700	Daily	1296	Europe	35	BBC WS	English	Orfordness	Great Britain
0500-0800	Daily	3955	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	TDPradio	English	Issoudun	France
0700-1610	--TWTFS	1611	Europe	25	Vatican Radio	various	Santa Marta	Vatican
0759-1058	Daily	9870	Pacific	25	RNZI	English	Rangitaki	New Zealand
0800-0900	--T----	6015	Europe	60	TDPradio	English	Issoudun	France
0800-0900	Daily	5790	Europe	100	BBC WS	English	Skelton	Great Britain
0800-0900	Daily	5875	Europe	100	BBC WS	English	Woofterton	Great Britain
0800-1000	Daily	7325	Europe	15	VoR	R/E	Bolshakovo	Russia
0900-1000	--W--	6015	Europe	60	TDPradio	English	Issoudun	France

## 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”
  - If “Panadapter Mode” is activated, the **PAN** label is showed;
  - If “Swap I/Q” option is selected, the **I/Q Swap** label is showed;

## 2.8 Player/Recorder



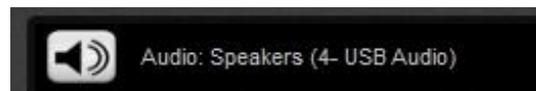
FDM-SW1 embeds an advanced player/recorder.

When the recorder is activated, the IF input signal is stored in a .wav file. Some information regarding the settings used during the recording (file creation date, L.O. frequency, demodulation frequency, demodulation mode, filter bandwidth) is stored in the file’s header.

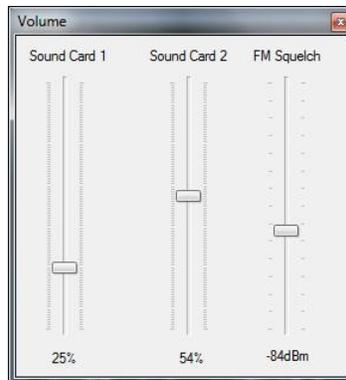
When the file is played, the stored information is loaded by the software. When the playback is finished, last demodulation settings (demodulation frequency, demodulation mode, filter bandwidth) are stored again in the .wav header.

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

## 2.9 Audio/Squelch Control



In this area, the DFM-SW1 software shows the name of the selected primary sound card (Sound Card 1). Clicking on  button, the “Volume” form is displayed.



This form allows the user to set the volume of the two selected soundcards and the level of the FM squelch.

## 2.10 Signal Control Display



In this area, the FDM-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.

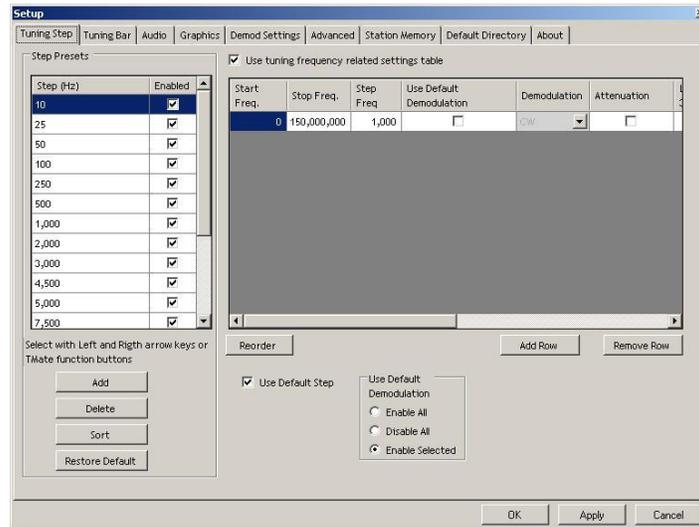
## 3 Setup Form

When the  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:

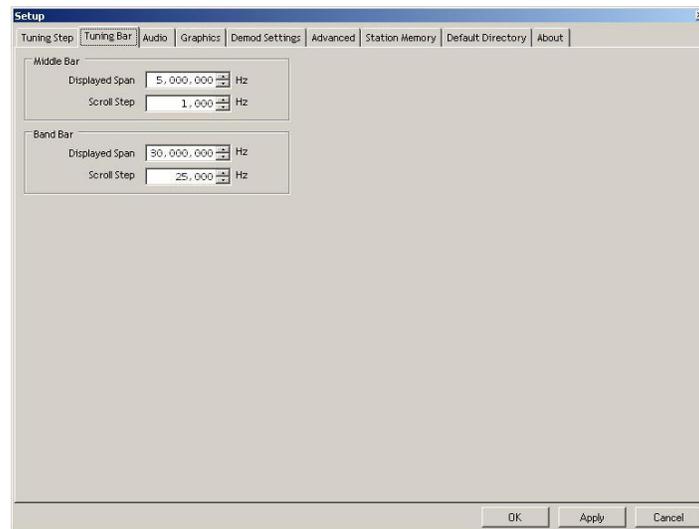
- 1 Tuning Step Tab;
- 2 Tuning Bar Tab;
- 3 Audio Tab;
- 4 Graphics Tab;
- 5 Demod Settings Tab;
- 6 Advanced Tab;
- 7 Station Memory Tab;
- 8 Default Directory Tab;
- 9 About Tab;

### 3.1 Tuning Step Tab



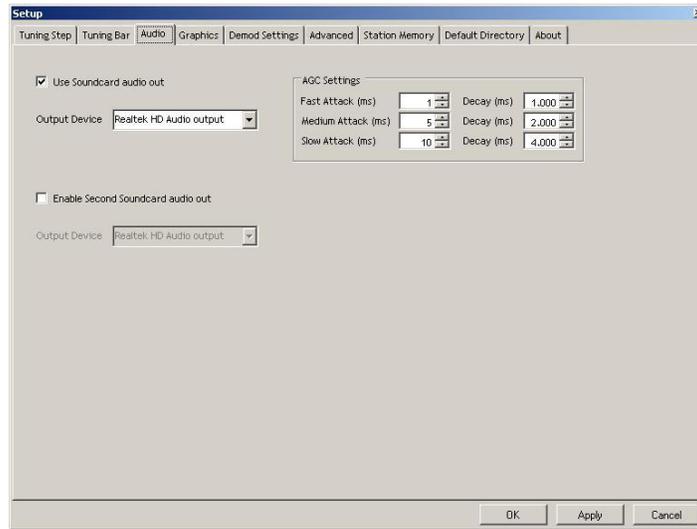
In the “Tuning Step Tab”, the user can configure the frequency steps that the software sets when the ← → arrows on the PC keyboard are pressed. Moreover, the user can compile a table containing custom setting (frequency step, demodulation mode, attenuator, low pass filter, Ext I/O) that the software automatically applies if the tuning frequency falls within the user-defined frequency ranges.

### 3.2 Tuning Bar Tab



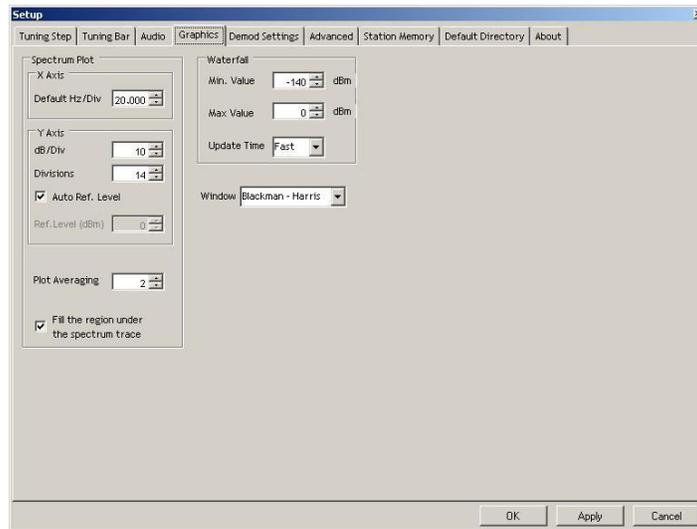
The “Tuning Bar Tab” allows the user to customize the frequency span of the “Middle” and “Band” (lower) tuning bars.

### 3.3 Audio Tab



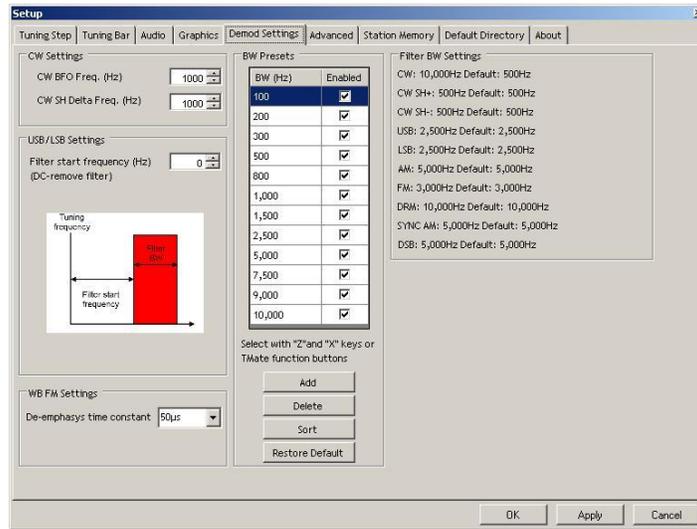
The “Audio Tab” allows the user to select the soundcards and to set the AGC parameters.

### 3.4 Graphics Tab



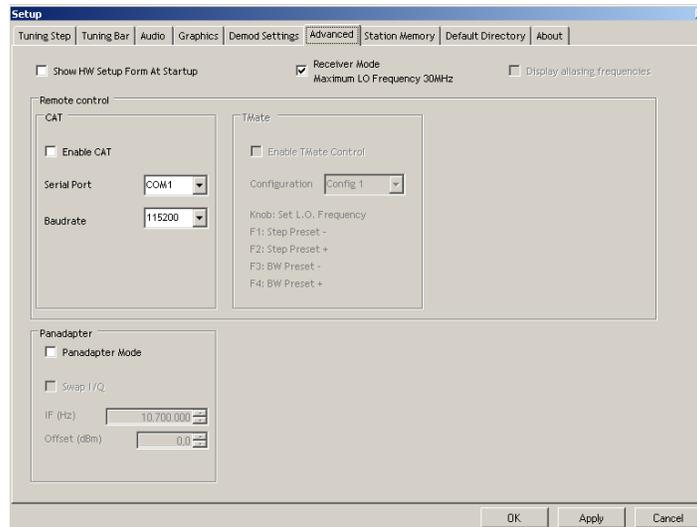
The “Graphics Tab” allows the user to customize several parameters related to the “Display Window” visualization.

### 3.5 Demod Settings Tab



The “Graphics Tab” allows the user to customize several parameters related to the demodulation algorithms. In the “Filter Bw Setting” 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).

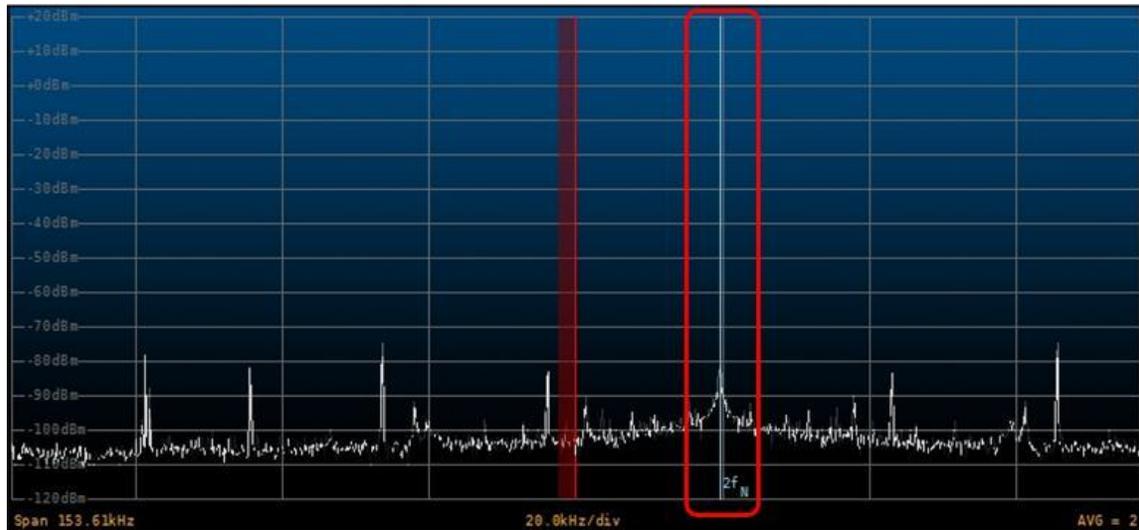
### 3.6 Advanced Tab



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 ( Receiver Mode Maximum LO Frequency 30MHz), 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 checkbox, the “FDM-SW1 Hardware Setup Form” is loaded at software startup.

### 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 Tmate

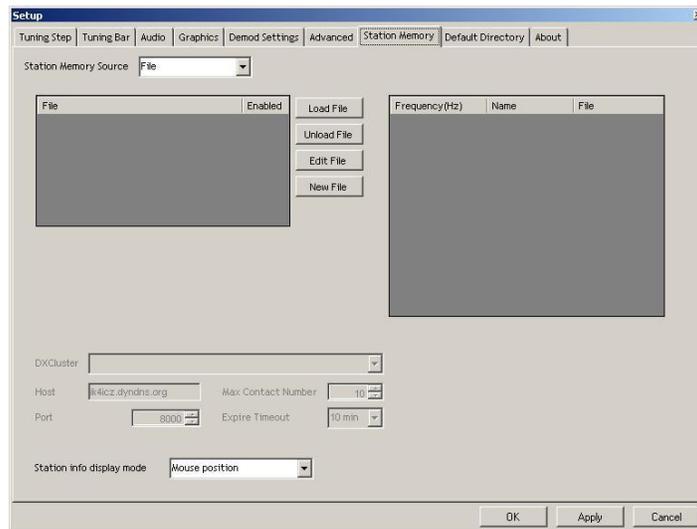
If a Tmate is connected, the “Tmate Panel” is activated. In this panel, the user can choose among the proposed configurations of Tmate’s button functions. When the Tmate control is active, the “Tuning Commands Panel” displays the following labels:

- **TMate: Set LO Freq** if  Lock ;
- **TMate: Set Tuning Freq** if  Lock .

### 3.6.3 Panadapter

If “Panadapter Mode” is activated (the “Status Bar” displays the **PAN** label), the user can configure the IF frequency and the amplitude offset that allows the right visualization. Moreover, the flip of the spectrum can be selected (the “Status Bar” displays the **I/Q Swap** label).

### 3.7 Station Memory Tab



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

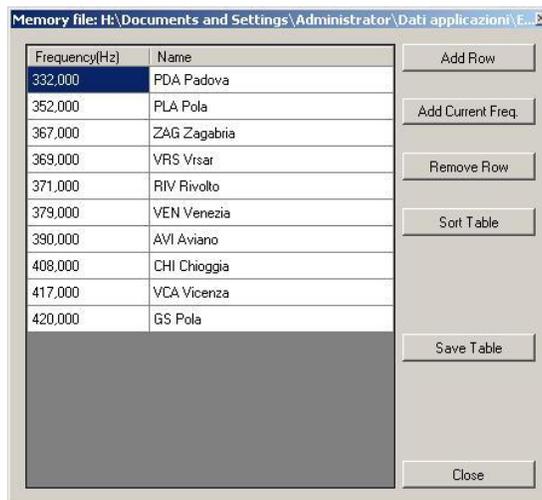
- Xml memory file;
- DX Cluster Connection

#### 3.7.1 Xml memory file

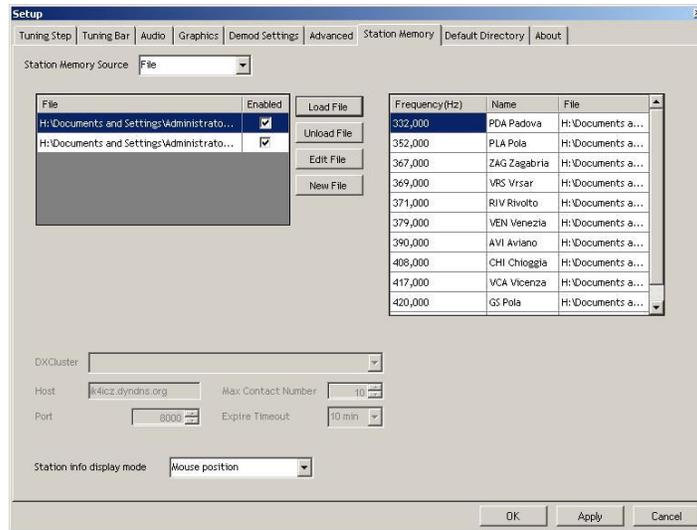
Select "File" as Station Memory Source.

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".

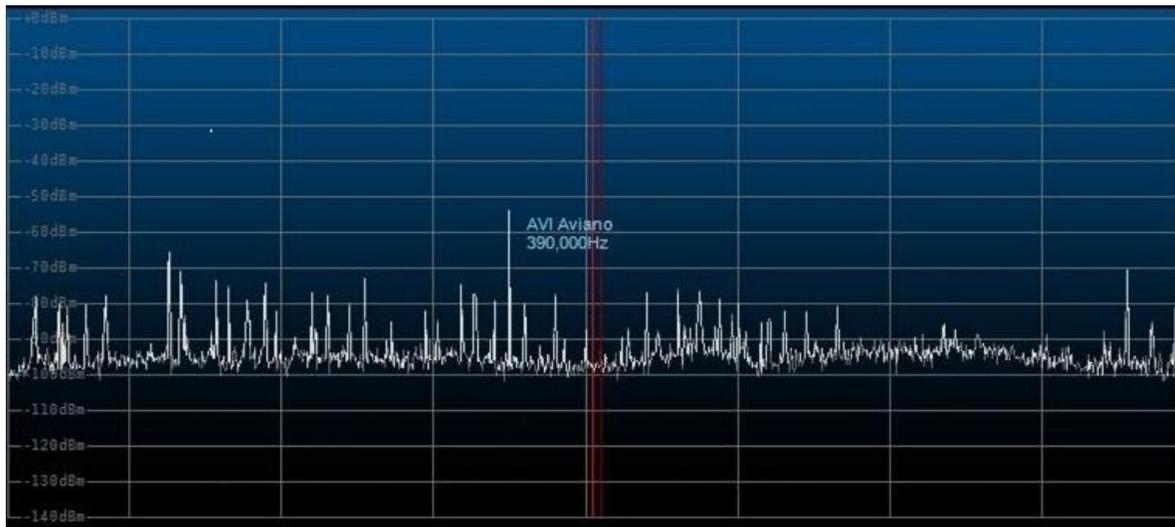


Press **Load File** or **Unload File** button to load or unload a memory file respectively (more than one memory file can be loaded at the same time).

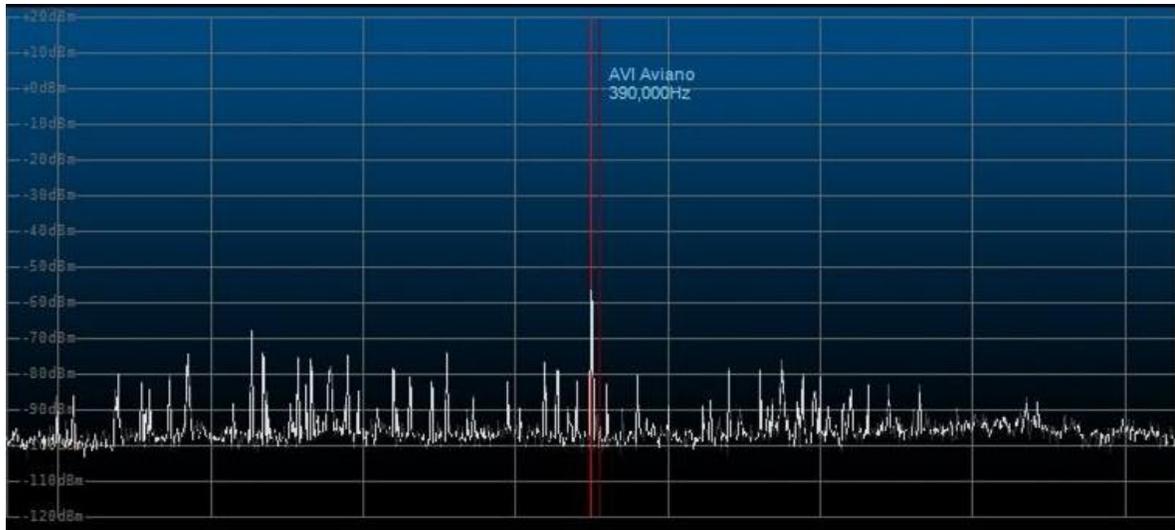


The table on the right displays all the stations that are stored in the selected memory files. The “Station info display mode” combobox allows the user to choose among 4 types of memories visualization on the spectrum graph:

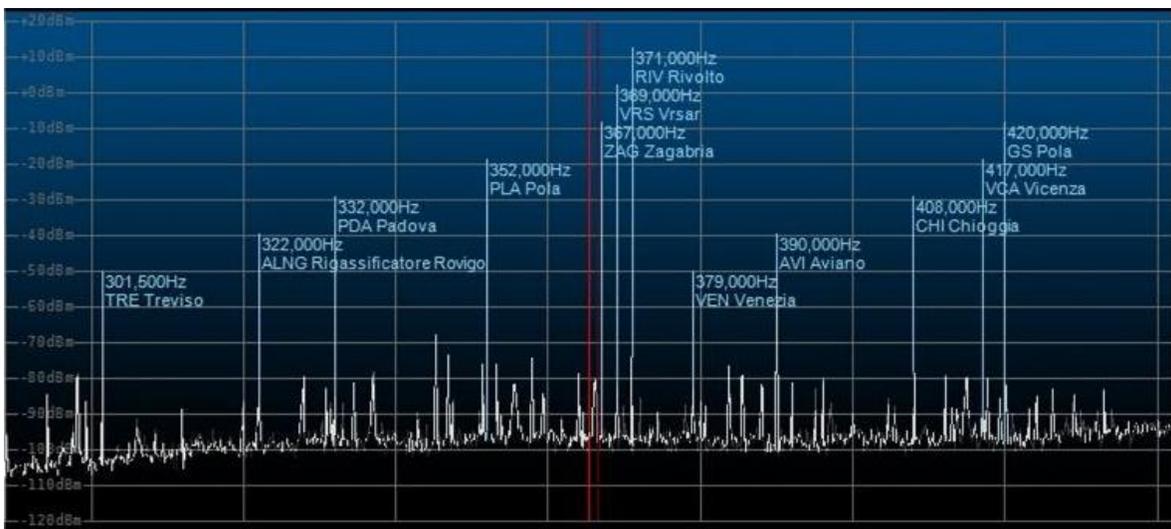
- None;
- Mouse position: a label containing the station info is displayed when the mouse is positioned over a frequency included in the selected memory files;



- 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 fall within the spectrum frequency range.



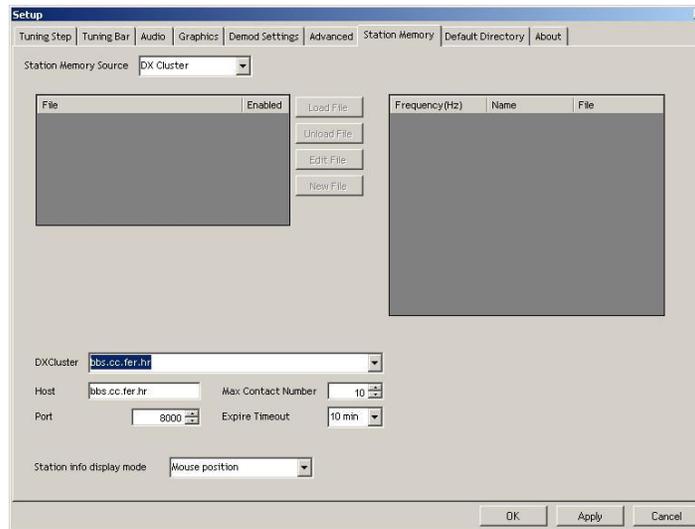
When the **MEM** button is clicked, FDM-SW1 displays the “Station List Form”. Double-clicking on a line of the table implies that the L.O. is tuned at the selected frequency.

Frequency(Hz)	Name
332.000	PDA Padova
352.000	PLA Pola
367.000	ZAG Zagabria
369.000	VRS Vrsar
371.000	RIV Rivolto
390.000	AVI Aviano
408.000	CHI Chioggia
417.000	VCA Vicenza
420.000	GS Pola
156,424,800	Meteo

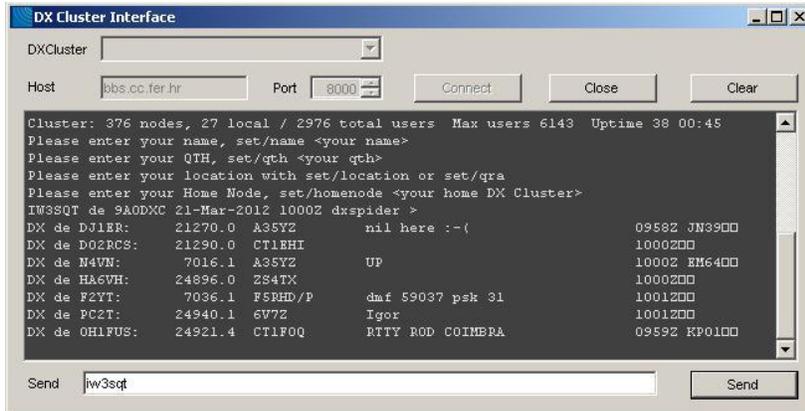
### 3.7.2 DX Cluster connection

Select “DX Cluster” as Station Memory Source.

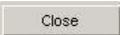
Select a cluster from the “DXCluster” combobox or insert manually the cluster settings. The “Station info display mode” combobox displays the same options described in the previous paragraph.



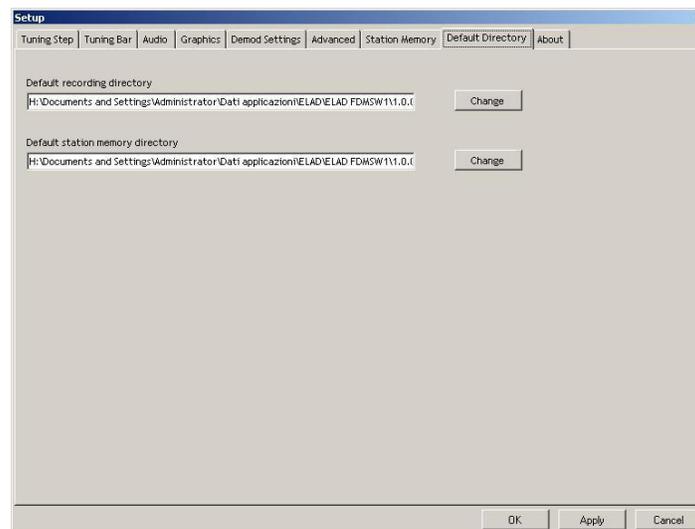
When the  button is clicked, FDM-SW1 displays the “DX Cluster Interface Form” and the “Contact Form”.



Contacts		
7,016,100Hz	A35YZ	10.00
24,896,000Hz	ZS4TX	10.00
7,036,100Hz	F5RHD/P	10.01
24,921,400Hz	CT1FOQ	10.01
24,940,100Hz	6V7Z	10.01
21,270,000Hz	A35YZ	10.01
24,920,000Hz	UA9MHN	10.02
18,069,000Hz	CT9/DL3KWR	10.02
14,195,800Hz	UE85DRK	10.02
7,020,000Hz	V31TE	10.02

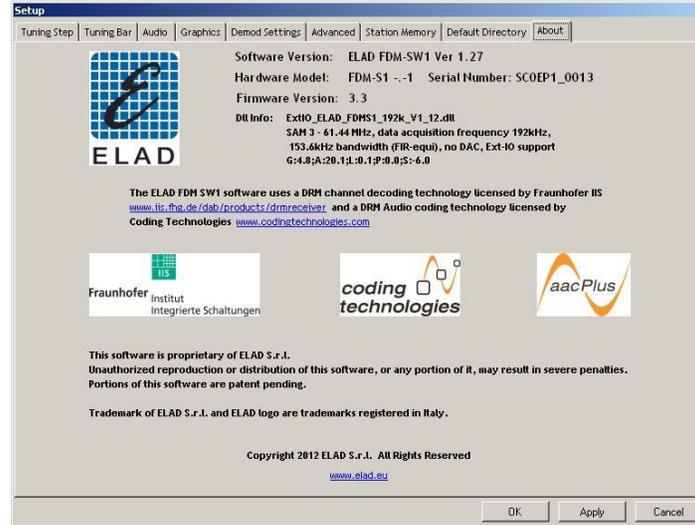
Press  or  button of the “DX Cluster Interface Form” to open or close the link with the Cluster, and use  to send the string entered in the “Send” area. The “Contacts Form” displays the users connected to the cluster. Double-clicking on a line of the table implies that the L.O. is tuned at the selected frequency.

### 3.8 Default Directory Tab



The “Default Directory Tab” allows the user to configure the default directory for the recorded .wav files and the .xml memory files.

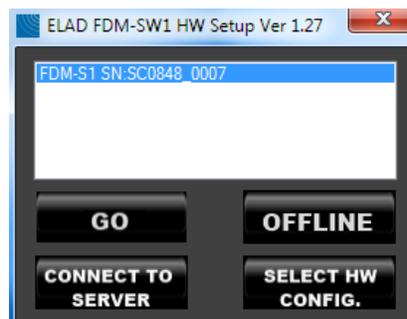
### 3.9 About Tab



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

## 4 FDM-SW1 Hardware Setup Form

If the option  Show HW Setup Form At Startup of the “Advanced Tab” is selected, the “FDM-SW1 Hardware Setup Form” is loaded at software startup.



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

Press **OFFLINE** button to start the FDM-SW1 in “OFFLINE Mode”.

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.**; a Windows dialog box is opened to allow the user to select the hardware configuration file (named ExtIO\_ELAD\_FDMSx\_yyy.dll)

#### NOTE:

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

## 5 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.

