

ELAD FDM-SW1



USER MANUAL

Index

1		FDM	I-SW1	1 Overview
2		Grap	hical	User Interface (GUI)
	2.2	.1 Disp		lay Window6
		2.1.1	L	Filter Spectrum7
		2.1.2	2	Click Options7
		2.1.3	3	Graphics Setup
		2.1.4	1	Marker on screen
		2.1.5	5	Layout
		2.1.6	5	Set/Reset Reference
		2.1.7	7	Max Hold
		2.1.8	3	Frequency Calibration9
		2.1.9)	Save To Mem File
	2.2	2	Tuni	ng Bars10
	2.3	3	Tuni	ng Commands Panel10
	2.4	1	Rece	viver Commands Panel11
	2.5	5	DRN	I/RDS Info Panel12
	2.6	5	Syste	em Info Panel13
	2.7	7	Statı	us Bar13
	2.8	3	Playe	er/Recorder13
		2.8.1	L	Recording Scheduler14
	2.9	Э	Mut	e Control14
	2.2	10	Signa	al Control Display14
	2.2	11	Mair	n Setting Buttons
	2.2	12	Resiz	ze Corner15
	2.2	13	Omr	nirig Control Panel
3		Setu	p For	m15
	3.2	1	Tuni	ng Step Tab16
	3.2	2	Tuni	ng Tab16
	3.3	3	Audi	o Tab17
	3.4	1	Grap	phics Tab
	3.5	5	Dem	od Settings Tab18
	3.6	5	Adva	anced Tab18
		3.6.1	L	CAT



	3.6.2	Omnirig	19
	3.6.3	Tmate	19
	3.6.4	Panadapter	19
	3.6.5	Downconverter	20
3	3.7 Stat	ion Memory Tab	20
	3.7.1	Xml memory file	21
	3.7.2	DX Cluster connection	23
	3.7.3	EIBI Database	24
3	3.8 Reco	ording Tab	25
3	3.9 Abo	ut Tab	26
4	IF Spectro	um Form	27
5	Audio Sp	ectrum Form	29
6	FDM-SW	1 Hardware Setup Form	
7	Offline M	1ode	31
8	Connect	to Server	31
Anı	nex A ELAD	PDM-SW1 CAT Protocol	32
C	Command [Description	33
Anı	nex B Resto	pre to Factory Default	



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 <u>www.eladit.com</u>.

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

+0 dB m							
┥╴ <u>╢</u> ╒┟ <u>╒</u> ┢╴┥╴┥╴┥╴┥╴┥╴┥╴┥╴┥╴┥╴┥╴┥╴┥							
Н-120 ЫВ 📾 — НА СТАЛАЛА							
╫╶ <u></u> ₿╒╫ <mark>╔╶╎╶╎╴╎╴╎╴╎╴╎╴╎╴╎╴╎╴╎╴╎╴╎╴</mark>							
4 0 UB m							
Span 1.23MHz FFT Res. 93.8Hz/point	van 1.23MHz FFT Res. 93.8Hz/point 20.0kHz/div AVG = 2						

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.

Filter Spectrum	۲
Click Options	۲
Graphics Settings	
Marker on screen	
Layout	۲
Set Reference	
Max Hold	
Max Hold Reset	
Frequency Calibration	
Save To Mem File	



2.1.1 Filter Spectrum

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

Filter Spectrum	•	~	View Filter
Click Options	•		View Notch1
Graphics Settings			View Notch2
Marker on screen			
Layout	•		
Set Reference			
Max Hold			
Max Hold Reset			
Frequency Calibration			
Save To Mem File			

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.

Filter Spectrum	•		
Click Options	•	~	Set Tune Frequency
Graphics Settings			Set Marker
Marker on screen			Set Notch 1 Frequency
Layout	•		Set Notch 2 Frequency
Set Reference			
Max Hold			
Max Hold Reset			
Frequency Calibration			
Save To Mem File			





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.

	Graphics Setup	_			
	Main Spectrum Plot	Main Waterfall	Audio Spectrum Plot	Audio Waterfall	
	X Axis	Min. Value -110 🚔 dBm	X Axis	Min. Value -140 🜩 dB	
	Max Hz/Div 100,000 🜩		Max Hz/Div 5,000 🜩		
Display Window		Max Value 0 🚔 dBm	Y Axis	Max Value 0 🚔 dB	Audio Spectrum From
Graphic	Y Axis		dB/Div 10 🚔	· · · · · · · · · · · · · · · · · · ·	Graphic Parameters
Parameters	dB/Div 10 🛬	Refresh time	Divisions 12		(see Chapter 5)
	Divisions 14 🛫	interval (ms) 60 🚔			
	Auto Ref. Level	Waterfall update time	Ref.Level (dB) 0		
		Frequency	Fill the region under the spectrum trace		
		meas units	IF Spectrum Plot	IF Waterfall	
	Plot Averaging 2 🜩		X Axis	Min. Value -120 🚔 dB	
			Max Hz/Div 5,000 🜩		
	Fill the region under		Y Avis	Max Value 0 🚔 dB	IE Spectrum From
	- the spectrum trace		dB/Div 10		Graphic Parameters
	S-Meter		Divisions 12		(see Chapter 4)
S-meter	Rise Constant 1 🗸				
Constants	Fall Constant 100 👻		Ref.Level (dB) -10		
			Fill the region under the spectrum trace	OK Apply Close	

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.

Insert a signal at the same frequency of the local oscillato the place the marker at the peak frequency.			
then place the marker at the peak frequency.	Reset Offset	Set Offset	EXIT

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 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.

1	Add To Memory File			
	File	Frequency	9,850.000 🚔	kHz
	C:\Users\UT96\AppData\Roaming\ELAD\ELAD FDM C:\Users\UT96\AppData\Roaming\ELAD\ELAD FDM	Name	Voice Of Russia	
		Mode	DRM -	
			SAVE	

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

106	40 kHz	10660kHz	10680kHz	10700	kHz	10720kHz	10740kHz	10760kH	Iz
8.5MHz	9.0MHz	9.5MHz	10.0MHz	10.5MH2	11.0MHz	11.5MHz	12.0MHz	12.5MHz	13.0MHz
	10	50m 80m	40m	30m		20m	17m	15m	12m

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 $\leftarrow \rightarrow$ arrows on the PC keyboard, while $\uparrow \downarrow$ 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 (7,024,961 MHz)) to insert manually the desired value using the PC keyboard (Note: "+" key allow to insert "000").

If the "LOCK TO CF" button is selected (**button**) 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 (1993) 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 (**LOCK**), 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 (5000) to enable/disable the rounding of the tuning frequency at multiples of the frequency step.

Buttons \square implement "zoom in", "zoom out" and "zoom reset" respectively. Use the arrows \square 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 ^{IMate} 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 cup 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	Rangitaiki	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 Maria	Vatican
0759-1058	Daily	9870	Pacific	25	RNZI	English	Rangitaiki	New Zealand
0800-0900	-T	6015	Europe	60	TDPradio	English	Issoudun	France
0800-0900	Daily	5790	Europe	100	BBC WS	English	Skelton	Great Britain
0060-0900	Daily	5875	Europe	100	BBC WS	English	Woofferton	Great Britain
0800-1000	Daily	7325	Europe	15	VoR	R/E	Bolshakovo	Russia
0900-1000	W	6015	Europe	60	TDPradio	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

UTC Time 3/20/2012 11: Local time 3/20/2012 12:	13:00 AM 13:00 PM
FDM-SW1 CPU Usage	0.0%
Total CPU Usage	0.0%

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

2.7 Status Bar

FDM-S1 SN: SC0848_0007 PAN VQ Swap NR AN SYNCAM BW -- LO 400,065,000Hz

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 VQ 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 VQ 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

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 same 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

1	REC Options							
	Time	UTC •						
	Start Time	Stop Time	Demod		LO Freq.	TuneFreq	File Prefix	
	04/10/2012 01:41	04/10/2012 01:51	DRM	-	9,850,000	9,850,000	DRM RUVR	
	04/10/2012 01:51	04/10/2012 02:01	CW	•	7,060,000	7,070,000	Rec 20m	
			ADD		REMOVE]		
							OK Canc	;el

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 witches on/off the demodulation.

Button **SETT** opens the "Setup" form.

Button we opens the "Station List" form.

Button where the FDM-SW1 Guide. Refer this guide to know useful shortcut key functions.

Button 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 **settings** 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;
- 5 AUUIO Lau,
- 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

ning Step Tuning Audio	Graphics	0	emod Settings A	dvanced	Station M	emory	Record	ding About				
Step Presets			Use tuning f	requency	related se	ttings ta	ble					
Step (Hz)	Enabled	^	Start Freq. (kHz)	Stop (kHz)	Freq.	Step (kHz)	U: De	se Default emodulation	Demodu	lation	Attenu	^
10	7		50	0	1,500		1	1	AM	-		
25	v		1,83	0	1,850		1	1	LSB	-		
50	v	=	3,50	0	3,800		1	v	LSB	•		E
100	v		7,00	0	7,200		1	v	LSB	•		
250	V		7,20	0	10,100		1	v	AM	-		
500	V		10,10	0	10,150		1	V	USB	-		1
1,000	V		10,15	0	14,000		1	v	AM	-		
2,000	7		14,00	0	14,350		1	v	USB	-		
3,000	V		14,35	0	18,068		1	v	AM	•		
4,500	1		18,06	8	18,168		1	v	USB	•		Ŧ
5.000	J	Ŧ	< [III							•	
elect with Left and Rigth a Mate function buttons	rrow keys	or	Reorder					Add	Row	Rem	ove Row	
Add Delete			V Use Defa	ult Step	Use Demo	efault idulation inable All						
Sort Restore Default) E	isable All inable Sel	l lected					

In the "Tuning Step" tab the user can configure the frequency steps that the software sets when the \leftarrow \rightarrow 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

Setup	
Tuning Step Tuning Audio, Graphics, Demod Settings	as Advanced Station Memory Recording About
- Niddle Par	Claubaard chartauts
Displayed Span 5,000,000 Hz	Configuration A
Scrol Step 1,000 Hz	configuration A
	UP: Tune up one step
Band Bar	DOWN: Tune down one step
Displayed Span 30,000,000 HZ	LEFT: Reduce tuning step (preset list)
Scrol Step 25,000 Hz	RIGHI Increase tuning step (preset list)
	OK Apply Cancel

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

Setup			E
Tuning Step Tuning Audio Graphics Demod Settin	gs Advanced Station Memory	Recording About	
Use Soundcard audio out	AGC Settings		
Output Device Headphones (High Definition 👻	Medium Attack (ms)	1 Decay (ms) 1,000 v 5 Decay (ms) 2,000 v 10 Decay (ms) 4,000 v	
Enable Second Soundcard audio out Output Device Line 1 (Virtual Audio Cable)			
Mode Audio 🗸			
		ОК	Apply Cancel

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

	Setup				1
	Tuning Step Tuning Audio Grap	hics Demod Settings Advanced St	ation Memory Recording About		
Display Window Graphic Parameters	Main Spectrum Plot X Axis Max Hz/Div 100,000 (*) Y Axis dB/Div 10 (*) Divisions 14 (*) Ø Auto Ref. Level Ref. Level (dBm) 0 (*)	Main Waterfall Min. Value -110 dBm Max Value 0 dBm Update Time Fast • Window Blackman - Harris • Refresh time interval (ms) 60 @	Show Audio Spectrum Form Audio Spectrum Riot X Avis Max Hz / Div 5,000 @ Y Avis dB/ Div Divisions Ref.Level (dB) 0@ Fill the region under the spectrum trace	Audio Waterfall Min. Value 140 $\frac{1}{2}$ dB Max. Value 0 $\frac{1}{2}$ dB	Audio Spectrum From Graphic Parameters (see Chapter 5)
	Plot Averaging 2 -	Frequency kHz -	Show IF Spectrum Form IF Spectrum Plot X Axis Max Hz/Div 5,000	IF Waterfall Min. Value -120 (m) dB	IF Spectrum From
S-Meter Time Constants	S-Meter Rise Constant 1 - Fall Constant 100 -		Y Axis dB/Div Divisions Ref.Level (dB) Fill the region under the spectrum trace	Max Value 0 😴 dB	Graphic Parameters (see Chapter 4)
			ОК	Apply Cancel	

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

etup							
Tuning Step Tuning Audio Graphics D	mod Settings Advanced Station	n Memory Recording About					
CW Settings	BW Presets	Filter BW Settings					
CW BFO Freq. (Hz) 1000	BW (Hz) Enabled	CW: 500Hz Default: 500Hz					
CW SH Delta Freq. (Hz) 1000	100 🜌	CW SH+: 500Hz Default: 500Hz					
	200 📝	USB: 2 500Hz Default: 2 500Hz					
USB/LSB Settings	300 💟	I SB: 2 500Hz Default: 2 500Hz					
Filter start frequency (Hz)	500 🔍	AM: 6.400Hz Default: 5.000Hz					
(DC-remove filter)	800 🔽	FM: 3,000Hz Default: 3,000Hz					
Tuning	1,000 🔍	DRM: 10,000Hz Default: 10,000Hz					
frequency	1,500 📝	SYNC AM: 10,000Hz Default: 5,000Hz					
Filter	2,500	DSB: 5,000Hz Default: 5,000Hz					
	5,000	RTTY: 3,800Hz Default: 5,000Hz					
Filter start	7,500						
frequency	9,000						
→	10,000						
	Select with "Z"and "X" keys or						
WB FM Settings	TMate function buttons						
De-emphasys time constant 50µs 👻	Add						
	Delete						
RTTY Settings	Cart						
RTTY BFO Freq. (Hz) 1900 🜩	sort						
	Restore Default						
		OK Apply Cance					

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

Show HW Setup F	orm At Startup	ADC	DC Offset C	orrection			
Receiver Mode	THERCY 30MHz	Disp	lay aliasing t	requencies			
Remote control	dency comme						
CAT		TMate			TMate	2	
Enable CAT		V Enat	ble TMate Co	ntrol	Er	able TMate2 Co	ontrol
Canial Dank							
Serial Port	COM2 -	Configu	ration Co	nfig 1 🛛 🔻	Backli	ght R 😑 🚃	0
Baudrate	38400 -	Knobr Se	at L O. Fred	iency	Backli	ght G	255
		F1: Step	Preset -	Jency (Backli	ght B 😑 💻	0
Omnirig		F2: Step	Preset +				
Enable Omnirig	Control	F3: BW	Preset -				
		F4: BW I	Preset +				
Panadapter					Downc	onverter	
Enable Panadap	oter Mode	Load	conng.	save config.		nable Downcom	verter Mode
IF Tune AM (Hz)	69	,010,000	AOR AR860)			
IF Tune CW (Hz)	69	,010,600	Enable (ontrol	Frequ	ency Shift (Hz)	80,000,000
IF Tune LSB (Hz)	69	,011,500	Serial Port	сомз 👻	Level	Offset (dB)	θ.θ
IF Tune USB (Hz)	69	,011,500					
IF Tune FM (Hz)	69	,009,000 🔶	Baudrate	9600 👻	Sw	ap I/Q	
IF Tune WFM (Hz)	69	,009,000					
Swap I/Q Le	vel Offset (dB)	0.0					
		- · · · ·					

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

If the Receiver Mode If the 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 **P** Display aliasing frequencies checkbox.





Show HW Setup Form At Startup

Checking the 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 <u>http://dxatlas.com/OmniRig/</u> 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
- TMate: Set Tune if to CF or 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 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 **VQ Swap** label).

3.7 Station Memory Tab

Setup						
Tuning Step Tuning Audio Graphics Demod S	ettings Advanced	Station Memory	Recording	About		
Default station memory directory	\Users\UT96\AppData	a\Roaming\ELAD\E	LAD FDMSW	/1\1.0.0.0\Memories	Chang	e
Station Memory Source DX Cluster 👻 F	ile: C:\Users\UT96	\Desktop\sked-a12	2.csv		Brows	e
File	Enabled	Freq	. (kHz)	Name	Mode	~
C:\Users\UT96\AppData\Roaming\ELAD\E	Load Fil	le	147.3	DDH47 85 50BAUD		
C:\Users\UT96\AppData\Roaming\ELAD\E	Unload F	file	332	PDA Padova	CW SH+	
	Edit Eil		352	PLA Pola	CW SH+	
			367	ZAG Zagabria	CW SH+	
	New Fil	le	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 Koner (SLO)	ΔΜ	-
					r	
DXCluster ik4icz.dyndns.org		•				
Host ik4icz.dyndns.org Max 0	Contact Number	10 🜩	Show Log	UTC		
Port 8000 🚔 Expin	e Timeout 10	min 👻 🔽	Show Exp	ire Timeout		
Station info display mode If in frequency range		ientation Vertic	al 👻	Show labels on Main + IF S	pectrum	•
				ОК Арріу		Cancel

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.

Freq. (kHz)	Name	Mode			Add Row
332	PDA Padova	CW SH+	-		
352	PLA Pola	CW SH+	-		Add Current Freq.
367	ZAG Zagabria	CW SH+	-	_	
369	VRS Vrsar	CW SH+	-	=	Remove Row
371	RIV Rivolto	CW SH+	-		
390	AVI Aviano	CW SH+	-		Sort Table
408	CHI Chioggia	CW SH+	-		(
417	VCA Vicenza	CW SH+	-		
420	GS Pola	CW SH+	-		
549	Radio Koper (SLO)	AM	-		
819	Radio 1 (Montera	AM	-		Save Table
918	Radio Slovenia	AM	-		
936	Radio 1 (Campalt	AM	-		
981	Radio 1 Slo (Mont	AM	-		
999	Radio 1	AM	-		

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).

)efault sta	tion memory d	irectory	C:\Users\U	T96\AppDat	a\Roaming\	ELAD\ELAD FDMSV	V1\1.0.0.0\Memories	Chan	ge
tation Mer	nory Source	File	File: C:	\Users\UT96	\Desktop\s	ed-a12.csv		Browse	
File			Enabled			Freq. (kHz)	Name	Mode	^
	JT96\AppData\	Roaming\ELAD\		Load Fi	le	936	Radio 1 (Campalto - VE)	AM	
C:\Users\L	JT96\AppData\	Roaming\ELAD\	E 🔽	Unload F	ile	981	Radio 1 Slo (Monteradio - TS)	AM	
				Edit Fil	•	999	Radio 1	AM	
						1,035	Radio 1 (TS)	AM	
				New Fil	e	1,062	Radio 1 (TS)	AM	=
]		1,152	Radio Romania Actualitati	AM	
						1,170	Radio Capodistria (ITA)	AM	
						5,875	BBC Dig	DRM	
						7,355	BBC Digital	DRM	
						8,439	RTTY 850/75 NUM	RTTY	
						8 458	PTTY 8450	PTTY	Ŧ
)XCluster					Ŧ				
lost	ik4icz.dyndns	.org	Max Contact N	lumber	10	Show Log	2 UTC		
'ort		8000	Expire Timeou	t 10	min 👻	Show Exp	bire Timeout		
	isplay mode	loure parition	_	Labels Ori	entation	Vertical –	Show labels on Main + IE Sp	ectrum	

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.

Station List			×
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	Ш
936	Radio 1 (Campalto - VE)	AM	
981	Radio 1 Slo (Monteradio - TS)	AM	1
999	Radio 1	AM	1
1,035	Radio 1 (TS)	AM	1
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.

ng step	Tuning	AUCIO	Graphics	Democ	Settings	Advanced	Station Me	Recording	ADOUT		_
Default st	ation me	mory d	irectory		C:\Users\U	T96\AppDat	a\Roaming\	ELAD/ELAD FDMSW	/1\1.0.0.0\Memories	Change	
Station M	emory So	urce	DX Cluster	•	File: C	\Users\UT96	3\Desktop\sk	ed-a12.csv		Browse	
File					Enabled]		Freq. (kHz)	Name	Mode 4	
	\UT96\A	pData	Roaming\ELA			Load Fi	ile	147.3	DDH47 85 50BAUD		
C:\Users	UT96\Ap	pData)	Roaming\ELA	D\E	V	Unload F	File	332	PDA Padova	CW SH+	
						Edit El	le	352	PLA Pola	CW SH+	
						Cultin	~	367	ZAG Zagabria	CW SH+	
						New Fi	le	369	VRS Vrsar	CW SH+	
						1		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+	
								5.4 9 ∢	Padio Koper (SLO)	ΔM	
)XCluster Host Port	ik4icz	.dyndn dyndns	s.org I.org 8000 🜩	Max Exp	Contact M	lumber 10	▼ 10 ★) min ↓	Show Log	UTC		
stion info	display r	node I	f in frequenc	y rang	e 👻	Labels Or	ientation	Vertical 👻	Show labels on Main +	IF Spectrum	ance



When the mem button is clicked, FDM-SW1 displays the "DX Cluster Interface" form and the "Contacts" form.

DX Cl	DX Cluster Interface Contacts									
DXClust	er			Y			Freq.	ID	UTC	Timeout
Host	ik4icz.dy	ndns.org	Port	8000 🔺 Connect Close	Clear		50,072,000Hz	W9DR/B	3:15 PM	0:07:51
DX de DX de	PB5X: IW1FGY:	14193.0 24901.0	TO2D DL6UAA	tn QSO 5/7 QSB QSX 5 UP not useful after exped. logonl	1515Z J021••		14,185,000Hz	7T501	3:15 PM	0:08:06
DX de DX de	R1AY: ON4BAV:	21071.9 14087.5	FG5LA CY9M	BPSK31 Philip 10min qrx Zzzzzz	1516Z KP50•• 1516Z JO20••		14,193,000Hz	TO2D	3:15 PM	0:08:33
DX de DX de	WB7BBI: UA10JL:	28272.0 14071.6	W4TIY/B DL6ZFG/P	DM93BM<>EM73PT 549 w/qsb DLFF-002	1516Z•• 1516Z••		24,901,000Hz	DL6UAA	3:16 PM	0:08:46
DX de DX de	HSOZIV: KF7NMD:	21249.9 18165.0	KF4ZZY K1IED	CQ this puts you tx above USA ban	1516Z OK17♦● 1517Z♦●		21,071,900Hz	FG5LA	3:16 PM	0:08:53
DX de DX de	ZS6AYE: RA9CSP:	14245.0 14185.0	ZS6AF 7T5ZI	Cq Cq Cq JOHAN tnx 73	1516Z•• 1516Z••		14,087,500Hz	CY9M	3:16 PM	0:08:55
DX de DX de	HSOZIV: UA3MBJ:	18146.0 144050.0	WBERN SKOEN	ko87qv <au>jo99jx tnx qso! 15</au>	1518Z OK17•• 1517Z•• E		28,272,000Hz	W4TIY/B	3:16 PM	0:08:58
DX de	SW0T95:	50094.0	OHISIX		19197 2068		14,071,600Hz	DL6ZFG/P	3:16 PM	0:09:07
Send	iw3sqt				Send		21,249,900Hz	KF4ZZY	3:16 PM	0:09:37

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.

Default station memory directory C:\Users\UT96\AppData\Roaming\ELAD\ELAD FDMSW1\1.0.0.0\Memories						
tation Memory Source BI Database	File: C:V	Users\UT96\Desktop\	sked-a12.csv		Browse	
File	Enabled		Freq. (kHz)	Name	Mode ^	
C:\Users\UT96\AppData\Roaming\ELAD\	E 🛛	Load File	77.5	DCF77 CW		
C:\Users\UT96\AppData\Roaming\ELAD\	E 🔽	Unload File	124.5	DGPS?		
		Edit Eile	129.1	DCF39/49 340 200BAUD INV		
		Luicine	135.6	DCF39/49 340 200BAUD INV		
		New File	139	DCF39/49 340 200BAUD INV		
			147.3	DDH47 85 50BAUD		
			332	PDA Padova	CW SH+	
			352	PLA Pola	CW SH+	
			367	ZAG Zagabria	CW SH+	
			369	VRS Vrsar	CW SH+	
			371	RIV Rivolto	CM 2H+ _	
			· ·		,	
)XCluster						
lost ik4icz.dyndns.org	Max Contact N	umber 10 🜩	Show Log	UTC		
Port 8000 🛫	Expire Timeout	10 min 👻	Show Exp	bire Timeout		
No. 54 Parts and a			Vartical	Show labels on Main + IE Sn	ectrum	

Download the CSV database file from <u>www.eibispace.de</u>. Click the Browse button and select the downloaded .csf file.



3.8 Recording Tab

Setup								Contraction of the local division of the loc		E
Tuning Step Tuning	Audio	Graphics	Demod Settings	Advanced S	tation Memory	Recording	About			
			5			I				
Default recor	ding direc	tory	C:\Users\ELAD-U	T82\AppData\R	loaming\ELAD\E	LAD FDMSW1	\1.0.0\Recordi	ngs	Chang	e
Default filena	me (max.	73 chars)	FDMSW1_Rec							
Default recor	ding mode		Full Span Input Sp	ectrum 👻	· App	ly recorded f	ile settings when	play file		
Maximum file	size (MBy	te)	128 🜩							
Maximum file	number		5 🜩							
							ОК	App	y C	Cancel

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 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

Setup
Tuning Step Tuning Audio Graphics Demod Settings Advanced Station Memory Recording About
Software Version: ELAD FDM-SW1 Ver 3.04
Hardware Model: FDM-S1 3.1 Serial Number: SC0848_0007T
Firmware Version: 1.0
Dil Info: Extl0_ELAD_FD/IS1_1536k_V2_00.dll
1228.8kHz bandwidth (FIR-equi-1.0), no DAC, external I/O support
ELAD G:6.6;A:18.3;L:0.2;P:0.0;S:-5.0
The ELAD FDM SW1 software uses a DRM channel decoding technology licensed by Fraunhofer IIS
www.iis.fhg.de/dab/products/drmreceiver and a DRM Audio coding technology licensed by
Integrierte Schaltungen technologies
The ELAD FDM-SW1 Software uses the Omni-Rig technology <u>http://dxatlas.com/OmniRig/</u>
This software is proprietary of ELAD S.r.I.
Unauthorized reproduction or distribution of this software, or any portion of it, may result in severe penalties. Portions of this software are patent pending.
Trademark of ELAD S.T.T. and ELAD logo are trademarks registered in Italy.
Copyright 2012 ELAD S.r.I. All Rights Reserved
www.elaoit.com
OK Apply Cancel

The "About" tab displays useful information about Software and Hardware.



4 IF Spectrum Form

If the 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 \bigcirc / \bigcirc 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 \checkmark when zoom function is active to move left/right the visualization and click the \bowtie 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 **MCI** is selected (Note: the label is green (**MCI**) when the "Marker 1" is enabled while is green and underlined (**MCI**) when the click function is active);
- set "Marker 2" if **INC2** is selected (Note: the label is cyan (**INC2**) when the "Marker 2" is enabled while is cyan and underlined (**INC2**) when the click function is active);

If both markers are enabled, user can activate the **markers** 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 web 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.

AUDIO SPECTRUM			
HIP OHz	LoP 3.2kHz		
+0dB			
Портания 			
START OHZ 2.9Hz	/point 2.0k Shift + Click & Drag to zoor	Hz/div n	STOP 15.999kHz

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 \checkmark when zoom function is active to move left/right the visualization and click the \bowtie 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

📝 Show HW Setup Form At Startup

If the option 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** button: a Windows dialog box is opened to allow the user to select the hardware configuration file (named ExtIO_ELAD_FDMSx_yyy.dll)

Sele	ct hw co	onfiguration dll file - FDI	M-S1		-			x
C		🔋 📕 « ELAD FDM-S	HwConfigurationDII	- 4 9	Search HwCo	onfigura	tionDll	Q
C	Organize	 New folder 				•		0
Q		Name StdO_ELAD_FDM StdO_ELAD_FDM StdO_ELAD_FDM StdO_ELAD_FDM ExtlO_ELAD_FDM	S1_192k_V2_00.dll S1_384k_V2_00.dll S1_768k_V2_00.dll S1_1536k_V2_00.dll S1_3072k_V2_00.dll					
		File <u>n</u> ame:	ExtIO_ELAD_FDMS1_1536	(_V2_00.c ▼	dll files (*.dll)	-	Cancel	•

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.





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 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 FDMSW1 consists of 5 bytes and is structured as follows:

Data 1 Data 2 Data 3 Data 4	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
						This commands sets the current
Set LO Frequency	100/10MHz	1MHz/100kHz	10/1kHz	100/10Hz	0x01	frequency
						(see following command description)
Set operating mode	Mode Byte	Х	Х	Х	0x07	See following command description
						This command returns one byte
Read Receiver Status	х	х	Х	х	0xE7	containing receiver status
						(see following command description)
Read Frequency and	v	v	v	~	0,02	This command returns five bytes
mode	^	^	^	^	0x05	(see following command description)
						This command causes <i>two</i> bytes of
						EEPROM data to be returned,
Road EE prom Data	Address	Addross ISP	v	N/	OVER	beginning with the address in data
Read EE prom Data	MSB	Address LSB	^	^	UXBB	bytes 1 and 2. (Approximately 6.25k of
						EEPROM data may be accessed - see
						following command description)
	etering X	x	x	x		This command returns one byte (00)
						when in receive. When in transmit, this
Read TX Metering					0xBD	command returns two bytes (in BCD
						format) indicating Forward power,
						VSWR, ALC, and Modulation.
		x	х	x	0xF7	This command returns one byte
Read Transmitter status	х					containing transmitter status
						(see following command description)
						This "keys" the FT-817. In CW, this sets
						the radio to transmit mode, but does
						key the transmitter.
Set DTT ON	v	v	v	~	0,00	Keying and unkeying the PTT line will
Set PTT ON	^	^	^	^	0x06	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.
						This command puts the FT-817 into
Sot PTT Off	v	v	v	×	0.00	receive mode.
SELFTION	^	^	^	^	0700	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



Retuned Byte	S-METER
0x00	SO
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	х	х	х	0xC7	See following command description
Read Tuning Frequency and mode	х	х	х	х	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	Х	Х	х	Х	0xCA	See following command description
Set Locked Mode	Locked Mode Byte	х	х	х	0xCB	See following command description
Read FDM-SW1 Status	х	х	х	х	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"
- **FDMDS1Config.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 FDMSW1\1.0.0.0 • Windows XP:

- "Local Drive":\Documents and Settings\"Your username"\Application Data\ELAD\ELAD FDMSW1\1.0.0.0
- Move the following files in another directory: FDMDS1Config.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

