



ELAD

Apparecchiature elettroniche professionali
Professional electronic devices



All Mode SDR Receiver 10 KHz ~ 65 MHz



Operating Manual

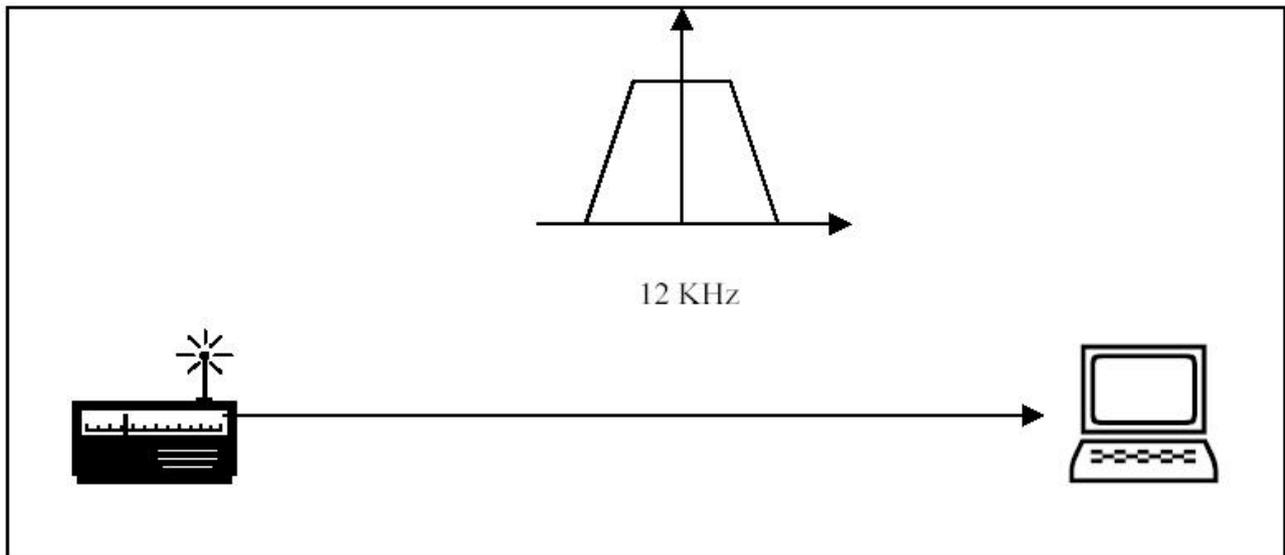
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1 Overview.

1.1 Introduction

The FDM-77 is conceived as a SDR (Software Defined Radio). This approach means that the receiving set is composed of a Hardware RF front-end and a PC with an ELAD Software Radio.

The Software Radio is the operator's main interface (GUI) for the control of the radio (Input, Tuning, Setup, Mode, Display and AF) and is also used to decode and reproduce the audio through the PC soundcard.



There are two outputs from the Hardware RF front-end toward the PC:

A). The 12 KHz IF (intermediate frequency) output is connected with the PC sound card for the purpose of decoding and audio reproduction. Please refer to section 5 of this manual for the correct setting of the sound card mixer.

B). The main output is connected with the USB port for the purpose of control (Frequency selection, Input, Setup, etc.)

1.2 Configuration of FDM-77



The FDM-77 set includes :

- RF front-end (The Gray box on the right side)
- ELAD software radio (CD ROM)
- Power supply (The black box on the left side)
- Audio cable
- USB cable

Personal Computer is not included.

1.3 Front & Rear Panel

The front panel of the Hardware RF front-end includes:

- A POWER ON LED
- A MONITOR LED to show the communication established between the Hardware RF front-end and the PC.
- A 7 LEDs BAR to show the presence and relevant strength of a signal at the input of the receiver.



The rear panel includes:

- A SO 239 socket for the connection of an external antenna.
- A BNC socket for the connection of an indoor antenna.
- A SPDPT switch for 12KHz out level (Hi / Lo).
- A 3 mm Stereo socket for the connection of the PC sound card
- A 6 mm socket for the connection of the external power supply.
- A USB socket for the main connection with the PC.
- A Hi_Lo switch for the 12 KHz output level.
- A Power on/off switch



1.4 Installation and Power Supply

Hardware installation

- Position your FDM-77 front-end in a place with sufficient room to allow a good ventilation and a proper heat dissipation.

- Connect the external antenna through a good quality RG 8 coax cable fitted with a PL 259 Plug or the indoor antenna through the BNC socket. Best performances are obtained with a good external antenna. If an external antenna is not available we recommend the use of the whip antenna offered as optional, but every indoor antenna provided with a BCN plug is suitable.
- Through the supplied shielded cable fitted with 3.5 mm stereo plugs connect the 12 KHz output of FDM-77 with the line (or microphone) input of the sound card installed in your PC.
- Through the supplied USB 2.0 cable connect the main output of FDM-77 with the USB port of your PC.
- Connect a 12 V DC power supply to the 6 mm socket (+ is the central pin) .

Software installation.

PC and System requirements.

- Windows 2000 or Windows XP
- AT-compatible PC
- 700 MHz Intel Pentium processor or equivalent. (Best performances are obtained with Pentium 4 and 1.2 GHz processor).
- 128 MB RAM
- 50 MB free disk space
- 16-bit SoundBlaster (or compatible) soundcard supporting full duplex at 48 KHz sampling rate for input and output. The sound card input (Line or Microphone) must be without AGC.
- USB port 2.0
- LAN card (only for remote control of the radio).
- Display and graphic control: 1024 X 768 pixel with 65.536 (16 bit) colours.

PC settings.

- All power management in the BIOS and Windows must be disabled
- USB legacy support disabled in BIOS

Installing the software.

The installation of the software is straightforward . Insert the supplied CD ROM in the drive of your PC. Double click the System Resources icon and then enter the CDROM disk. A full path will be displayed with the FDM77setup.exe file. Double click the <FDM77_setup.exe> file to start the installation procedure. During the first installation the FDM77 HF RX must be switched off or alternatively the USB cable disconnected from the PC. At the end of the installation of the FDM77-ELAD Software Radio also the USB driver must be installed.

For more detailed installation procedures please refer to the <install_it.pdf> or <install_en.pdf> file included in the CD ROM.

1.5 Accessories

Your FDM-77 is supplied complete of the following accessories:

- A mini 1/8" 3.5mm stereo plug male to male cable (L = 2m).
- A MH USB 2.0 cable A to B (L = 1.8m)
- A 230 V AC / 12 V DC power supply



Optional accessories:

- Rechargeable Battery pack
- Whip indoor antenna



1.5 Controls and Functions

1.5.1 Graphical user Interface (GUI).

Main screen

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



In the upper left side there is a window dedicated to:

display the operating frequency, mode (CW, LSB, USB, AM, FM, DRM), VFO (variable frequency oscillator) , MEM and CH to select the operating frequency .

In the upper right side there is the window dedicated to:

display the signal strength of the received station (S-Meter) .

In the lower side there are four windows dedicated to:

setting up the front-end input operating conditions, the tuning, the mode selection and the AF (audio) setting up.

2 Operation of the Receiver – Basic

2.1 Switching on/off the FDM – 77

Insert the 12V DC plug cable into the DC socket and push on/off the switch on the rear panel of the radio. Power on will be indicated also through the “power on” led on the front panel. In order to avoid blocking of the software the following sequences must be followed.

Switching on:

1. Connect the 12 V DC and switch on the power on/off switch
2. Connect the USB cable from de PC to the RF front-end.
3. Enter the FDM-77 software radio.

Switching off:

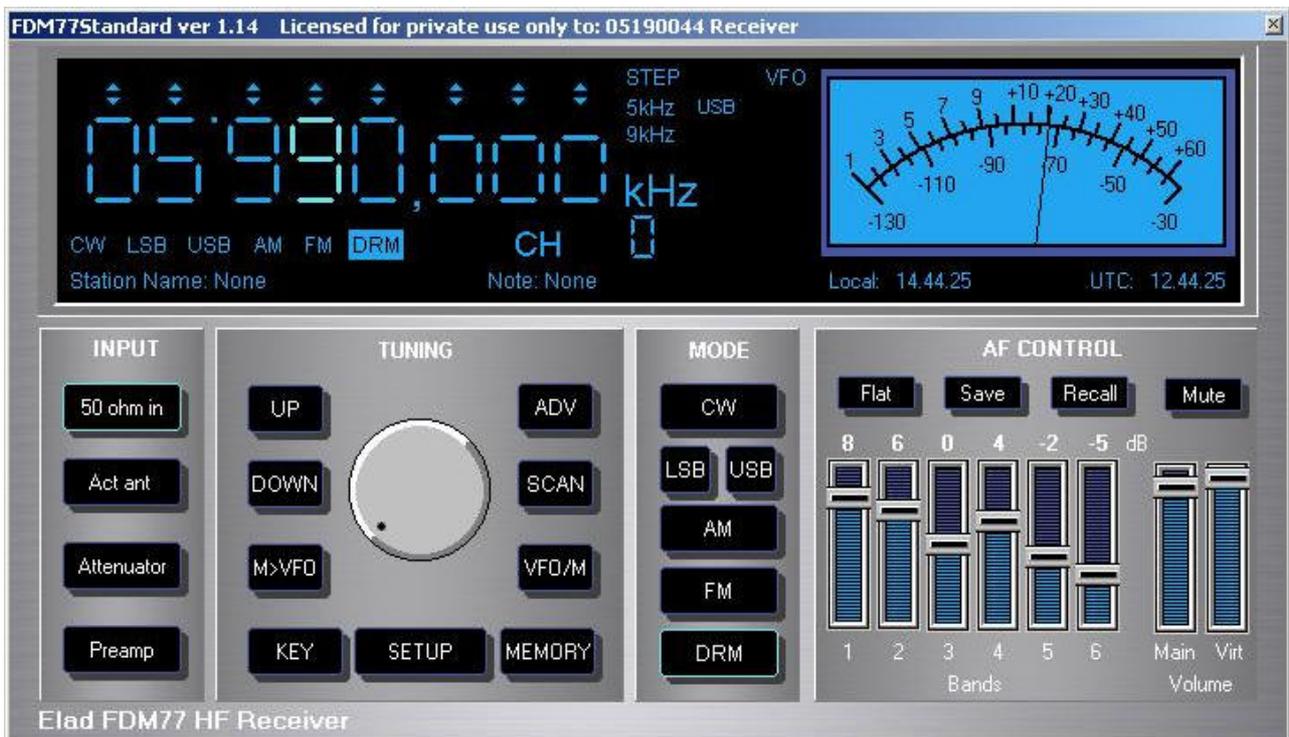
1. Shut down the FDM-77 software radio
2. Switch off the power on/off switch.
3. Remove the USB cable (if you want to remove the PC).

2.2 Selection of the front-end input set-up.

Left Click with your mouse the “50 ohm in” or “Act ant” button to choose which kind of antenna you want to receive with.

Left click the “Attenuator” or “Preamp” button to select the sensitivity of you FDM-77 . Note that the two buttons are toggle type (on - off) and that a label “Att” or “Pre” will appear in the display window to show the selection.

With “Pre” activated you can get the max. sensitivity and with “Att” activated a 20 dB attenuator is inserted in the signal path to the front-end input.



2.3 Frequency selection

There are two main modalities to choose the operating frequency: VFO and MEMORY.

2.3.1 Selection of the operating frequency through the main shuttle knob.

Click the VFO button (the VFO label is activated in the Frequency window) if you want to browse the frequency range trough the main shuttle knob as in a traditional way. This is the free VFO control.



2.3.2 Selection of the operating frequency through the memory.

Click the VFO/M button (the MEM label is activated in the Frequency window), then rotate the main shuttle knob if you want to browse the frequencies stored in the memory. When browsing the memory with the knob the Channel number “CH “ will be shown on the frequency window. The FVO/M button is a toggle allowing a quick change between VFO and MEM modality. Moreover you can also select a previously stored frequency by clicking the MEMORY button. By clicking the MEMORY button a new window will open (table format) allowing you to select among the previously stored frequencies . Just click on the row of station/frequency the you want to recall, close the window and the selected station/frequency will be recalled on the cockpit’s main screen.

2.3.3 Selection of the frequency through the UP and DOWN buttons.

When the control of the operating frequency through the VFO is selected, you can change the frequency also clicking the UP and DOWN buttons. In doing so you can choose the UP and DOWN step by clicking on one of the digit of the frequency display (the selected digit will change colour to show the selection). **The same frequency change can be obtained with the mouse wheel. Or the arrows \uparrow and \downarrow on the PC keyboard. With the small buttons at the top of each digit of the frequency display a single digit can be changed independently of the selected tuning**

step. A shortcut for changing a single digit can be activated through the “Q”, “W”, “E”, “R”, “T”, “Y”, “U”, “I” keys (increment) and “A”, “S”, “D”, “F”, “G”, “H”, “J”, “K” (decrease). The “I” and “K” keys move 1 Hz digit and up to 10 MHz the “Q” and “A”. Note that the arrows on the PC keyboard control the frequency only if the window of the cockpit is active (i.e. the upper bar of the window must be blue and not gray).

Any frequencies outside the receiver limits (10 KHz – 65 MHz) will be ignored and reverted to the limit frequency.

2.3.4 Selection of the frequency through the Keyboard.

When the control of the operating frequency through the VFO is selected, you can choose to input the tuning frequency directly through the PC keyboard. To input directly the operating frequency through the PC keyboard, just click on the KEY button and a new window will open. Type on the keyboard of your PC the frequency (the selected frequency will appear in the lower left side of the windows) and confirm with 8 key. If a keyboard is not available you can input the frequency also Clicking with your mouse the button on the TUNING window.

2.3.5 Selection of the frequency’s unit of measure.

The default setting of the unit of measure is KHz, but the user can change the unit to MHz or Hz simply clicking with the mouse over the unit at the right side of the frequency read out. This is a toggle control allowing to pass from KHz to MHz and Hz.

2.4 Tuning Steps

The default tuning step is set to 1 Hz, but other steps can be selected to match the operator’s preferences. Simply click on one of the digit of the frequency display or on the 5 KHz / 9KHz labels to select the desired step or use the ← → arrows on the PC keyboard. The selected digit will change colour to show the selection and all the frequency control (shuttle knob, up and down buttons, # 3 arrows of the PC keyboard) will work with the new selected step.



2.5 Mode Selection

Conventional modes (CW, LSB,USB,AM,FM) are simply selected by clicking on the relevant buttons in the MODE window of the cockpit.

DRM mode is selected through the DRM SET button. By clicking on the DRM SET button a new DRM Setting window will open allowing to choose the preferred DRM application to be used to decode the digital signal. There are two options:

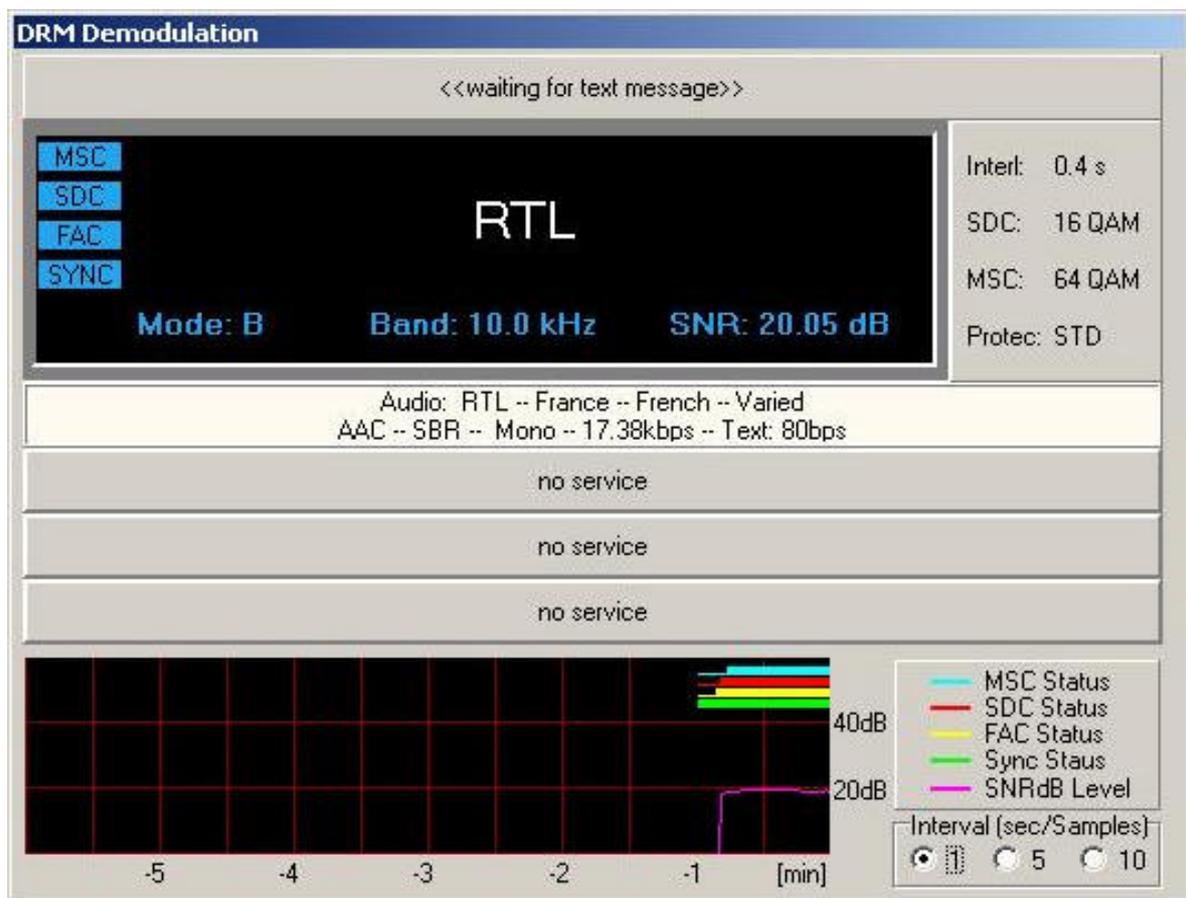
If DRN Int. is selected the DRM signal is processed through the optional Channel Decoder and Audio Decoder integrated in the ELAD FDM-77 Software Radio.

If DRM Ext. is selected the DRM signal is processed through the DRM software preferred by the operator. The complete path of the directory where this software is installed must be specified on the application path windows through the browse button.

After having done the selection close the window with OK.

2.5.1 DRM reception status window.

After having completed the main setup you can access the DRM mode by clicking the DRM button in the “MODE” window. Doing so a new window will popup allowing the monitoring of the decoding status of the DRM channel with all the relevant parameters. The decoding process can be observed through the SYNC ; FAC ; SDC and MSC sequence. Only when all the labels (including MSC) will lite-on, the voice and/or sound will be decoded and reproduced by the PC loudspeakers.



Example of DRM signal reception.

2.6 Band Selection.

No band selection is required to explore the whole range of frequencies. Simply select, with the VFO, Keyboard and/or Memory the desired frequency.

The internal pre-selector filter will be automatically activated in the RF Hardware front-end.

3 Operation of the receiver – Advanced

The set up of the RF front-end input has a strong impact on the quality of the reception. In particular the use of the preamplifier and of the attenuator should be used in the proper way.

3.1 Preamplifier

Operating your FDM-77 with the “Pre” activated while receiving strong in-channel or adjacent channel signals, as in the very crowded HF bands, can lead to severe distortions of the audio due to interfering signals or clipping and inter-modulation caused by input levels out of the linear dynamic range of the RF front-end. Therefore the use of the “Pre” is recommended with weak signals in the upper HF bands.

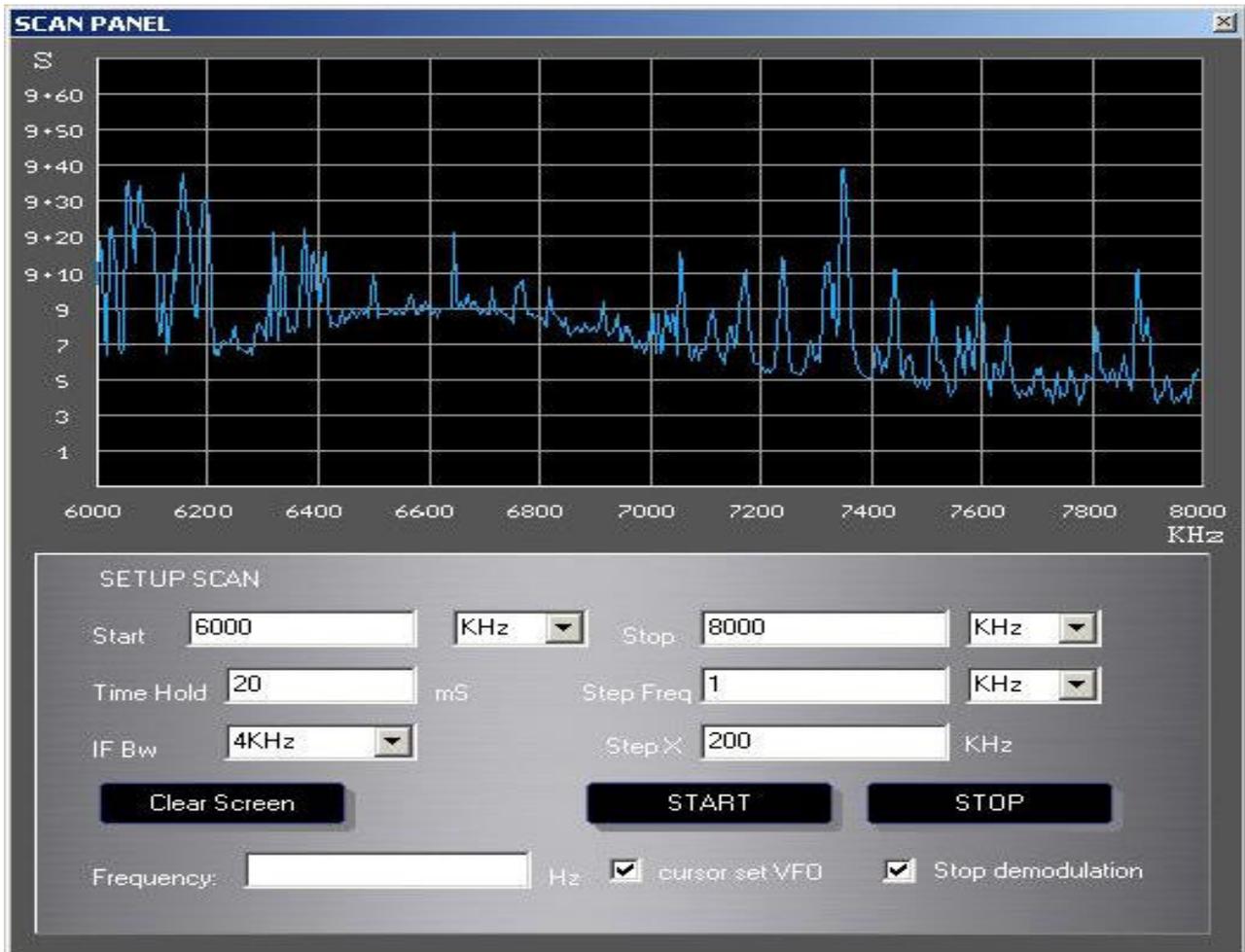
3.2 Attenuator

While receiving in low HF bands, where very strong signals are possible operating with big external antennas, the use of the attenuator could bring best performances.



3.3 Frequency scanning

By clicking the SCAN button the scan panel will popup . Before starting the scan Start and Stop frequencies must be selected together with the Time hold (200 mS is the default) , Step frequency and Step X (of the frequency axis).

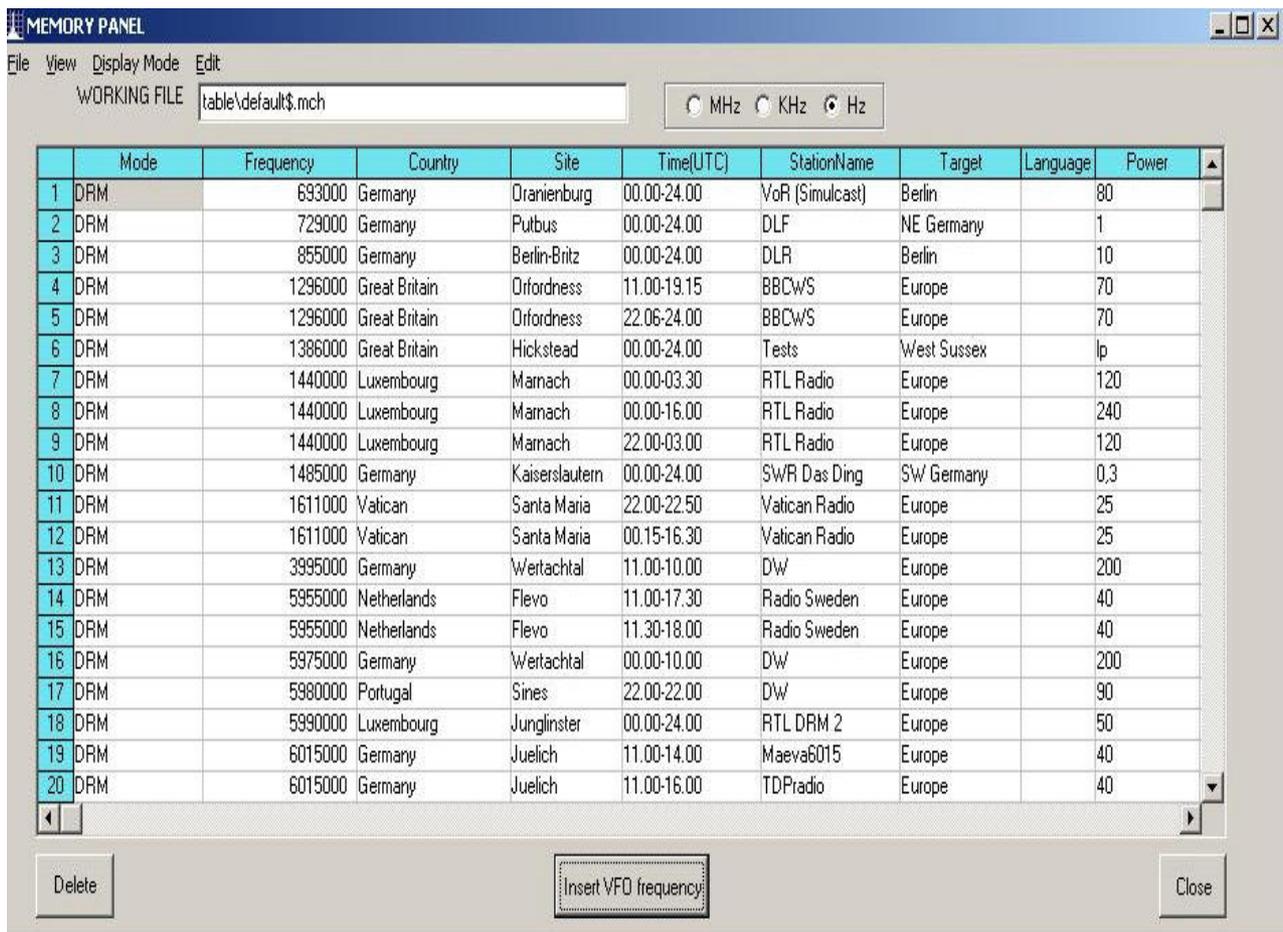


At the end of the scanning process a diagram with S-meter level and frequencies will be displayed. Passing with the mouse over the diagram the relevant frequencies will be displayed on the frequency windows located on the left bottom side. Left clicking with the mouse on a point in the diagram a red mark can be inserted and the relevant frequency will be tuned and displayed on the cockpit.

3.4 Memories

3.4.1 Saving a station/frequency in the memory.

When the desired station/frequency is tuned simply click the memory button to open the MEMORY file. Click on the “Save in Mem” Button and the data will be inserted in the table. Click Close to exit.



The screenshot shows the MEMORY PANEL window with a menu bar (File, View, Display Mode, Edit) and a WORKING FILE field containing 'table\default\$.mch'. There are radio buttons for MHz, KHz, and Hz, with Hz selected. Below is a table with 20 rows of station data. At the bottom are buttons for Delete, Insert VFD frequency, and Close.

	Mode	Frequency	Country	Site	Time(UTC)	StationName	Target	Language	Power
1	DRM	693000	Germany	Oranienburg	00.00-24.00	VoR (Simulcast)	Berlin		80
2	DRM	729000	Germany	Putbus	00.00-24.00	DLF	NE Germany		1
3	DRM	855000	Germany	Berlin-Britz	00.00-24.00	DLR	Berlin		10
4	DRM	1296000	Great Britain	Orfordness	11.00-19.15	BBCwS	Europe		70
5	DRM	1296000	Great Britain	Orfordness	22.06-24.00	BBCwS	Europe		70
6	DRM	1386000	Great Britain	Hickstead	00.00-24.00	Tests	West Sussex		lp
7	DRM	1440000	Luxembourg	Marnach	00.00-03.30	RTL Radio	Europe		120
8	DRM	1440000	Luxembourg	Marnach	00.00-16.00	RTL Radio	Europe		240
9	DRM	1440000	Luxembourg	Marnach	22.00-03.00	RTL Radio	Europe		120
10	DRM	1485000	Germany	Kaiserslautern	00.00-24.00	SWR Das Ding	S/W Germany		0,3
11	DRM	1611000	Vatican	Santa Maria	22.00-22.50	Vatican Radio	Europe		25
12	DRM	1611000	Vatican	Santa Maria	00.15-16.30	Vatican Radio	Europe		25
13	DRM	3995000	Germany	Wertachtal	11.00-10.00	DW	Europe		200
14	DRM	5955000	Netherlands	Flevo	11.00-17.30	Radio Sweden	Europe		40
15	DRM	5955000	Netherlands	Flevo	11.30-18.00	Radio Sweden	Europe		40
16	DRM	5975000	Germany	Wertachtal	00.00-10.00	DW	Europe		200
17	DRM	5980000	Portugal	Sines	22.00-22.00	DW	Europe		90
18	DRM	5990000	Luxembourg	Junglinster	00.00-24.00	RTL DRM 2	Europe		50
19	DRM	6015000	Germany	Juelich	11.00-14.00	Maeva6015	Europe		40
20	DRM	6015000	Germany	Juelich	11.00-16.00	TDPradio	Europe		40

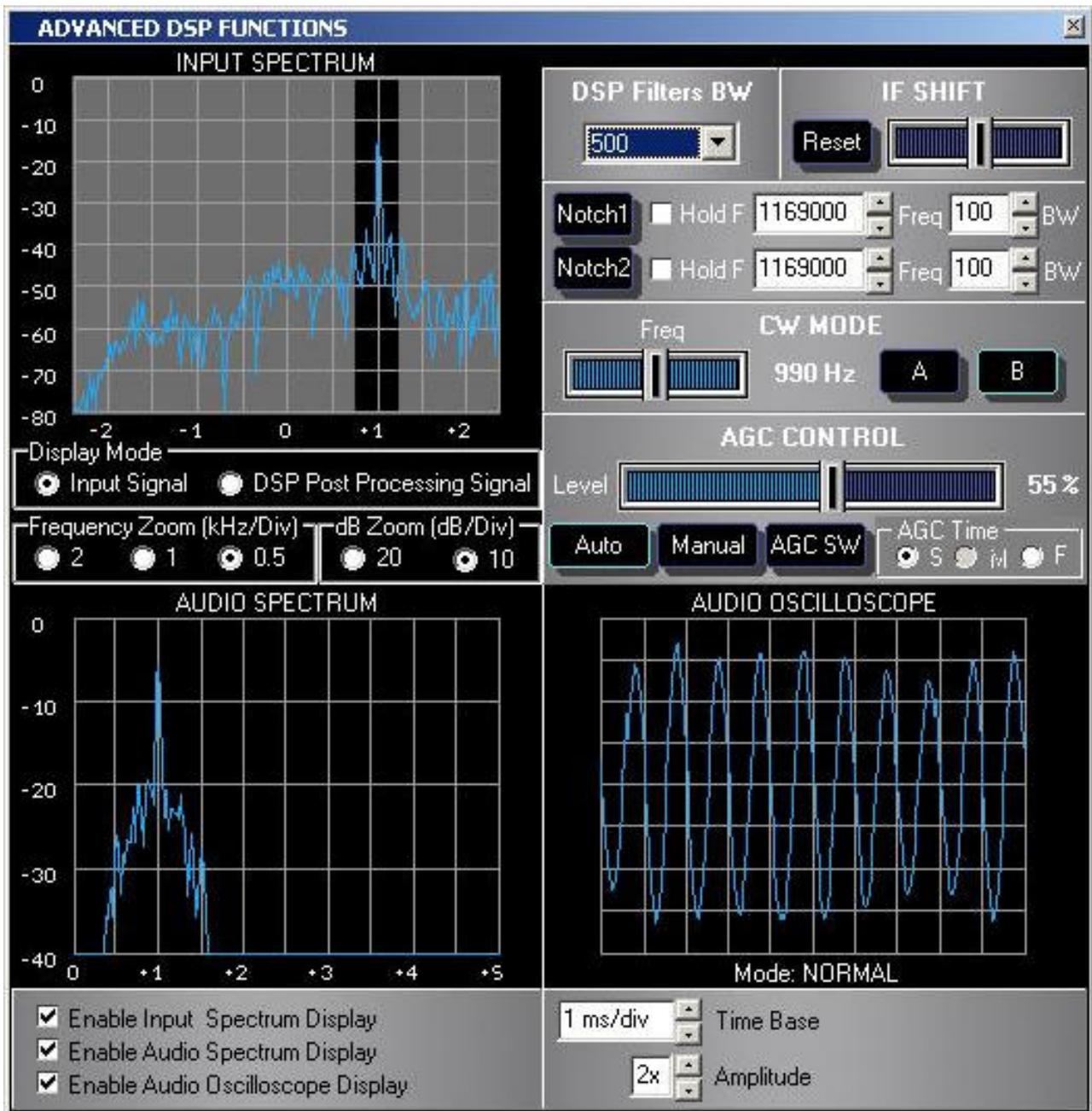
3.4.2 Recalling a station/frequency from the memory.

Open the MEMORY table and then double click on the row with the station/frequency you want to recall and the new frequency will appear on the display . Exit with close button.

3.5 Advanced controls.

In the TUNING window an ADV button is included.

Clicking on this button a new ADVANCED window will pop-up showing the DSP function and controls. The advanced window includes: Input Spectrum, Audio Spectrum, Audio Oscilloscope, DSP Filter BW, IF SHIFT, CW MODE and AGC CONTROL.



3.5.1 Input Spectrum.

A Low Frequency real time spectrum diagram is available in the upper left side of the window . In the diagram the 12 KHz signal level at the input of the soundcard is displayed in dB and the frequency in KHz. Zoon function is also available for both the level and frequency.

The signal pass-band is showed with black/dashed area together with two notch filters if enabled. Once the ADVANCED window is made active (eventually by clicking on the upper bar) the PB filter width can be varied also with the **↑** and **↓** arrows on the PC keyboard.

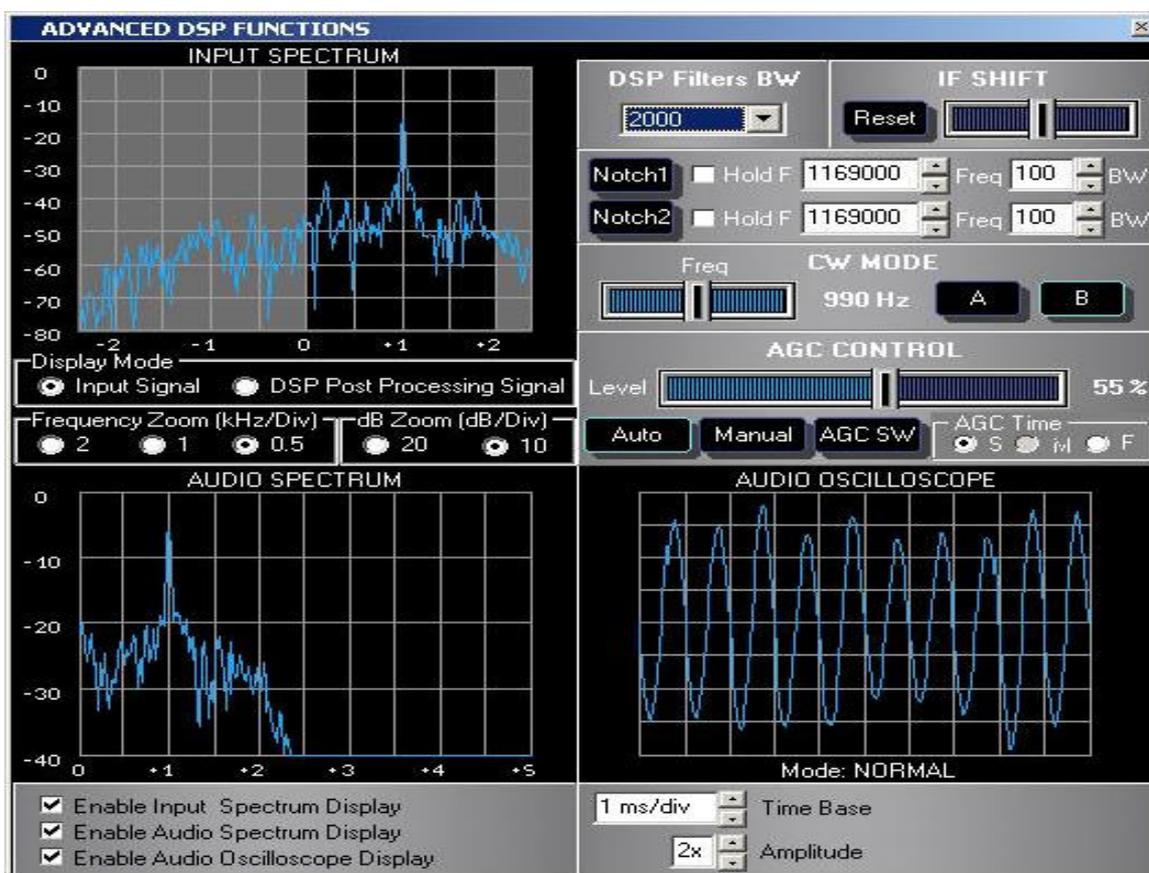
A facility to help the operator to fast tuning a signal displayed on the spectrum is provided.

To use it simply move the cursor over the signal and hold Shift + left click mouse.

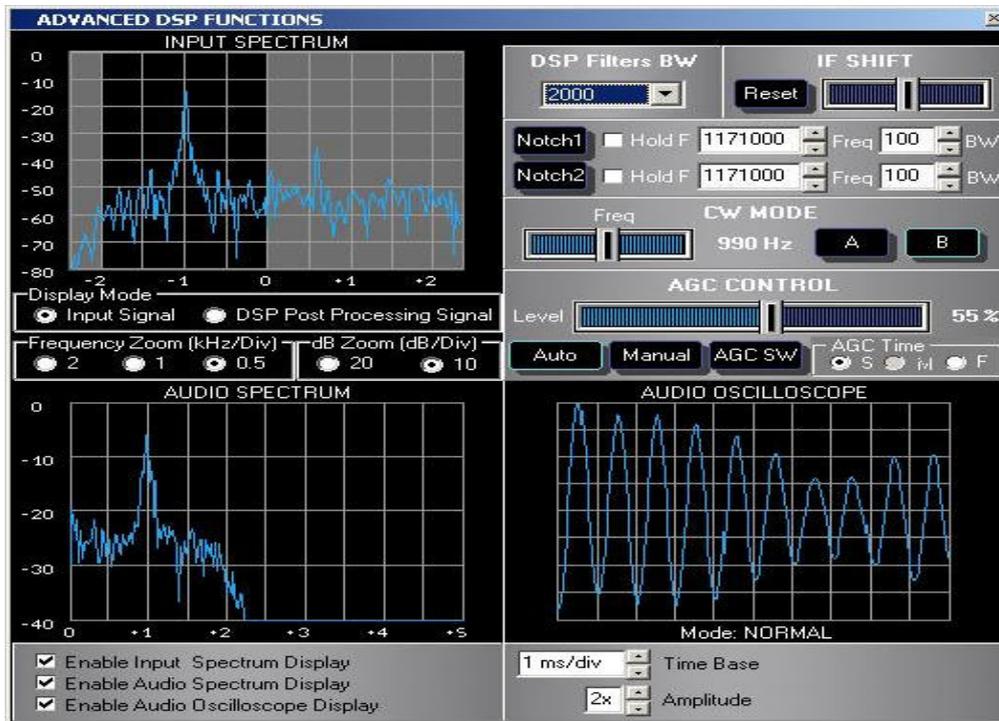
Moreover the operator is allowed to choose the input rough signal display or the DSP post-processed signal.

3.5.2 Band Pass & Selectivity selection

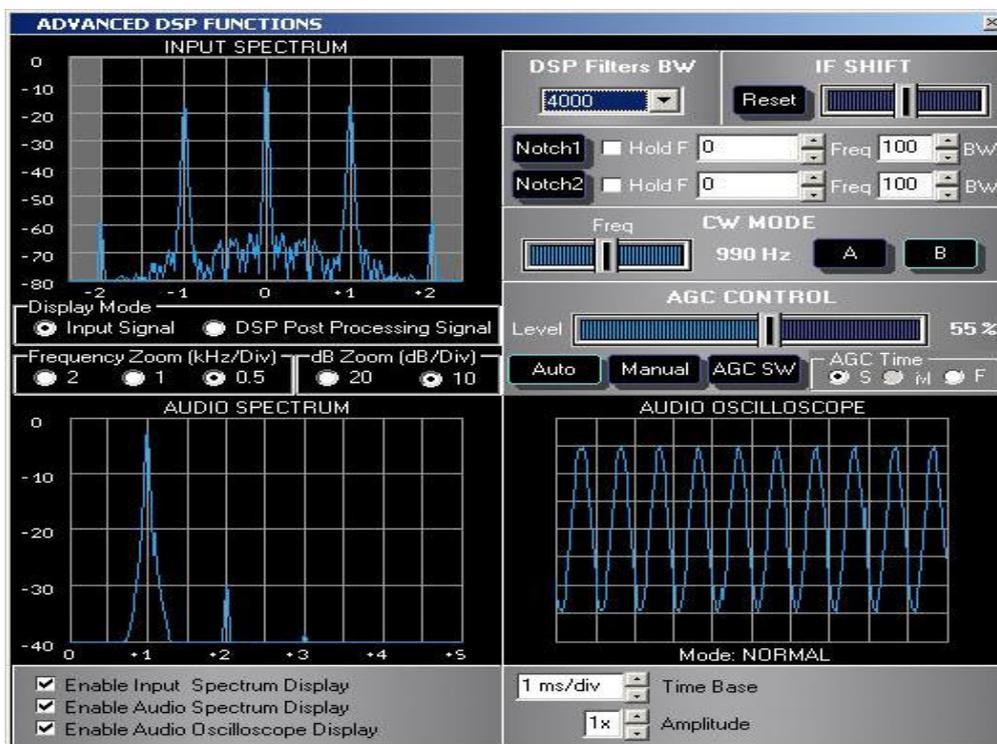
In the upper right side of the ADVANCED window the filter control section is available, where DSP filters Bandwidth can be selected from 250 Hz up to 10.00 KHz. Use the proper BW that best match the mode and channel to be received. The default BW is: CW = 100Hz; SSB=2750Hz; AM/FM=4000Hz; DRM=10000Hz.



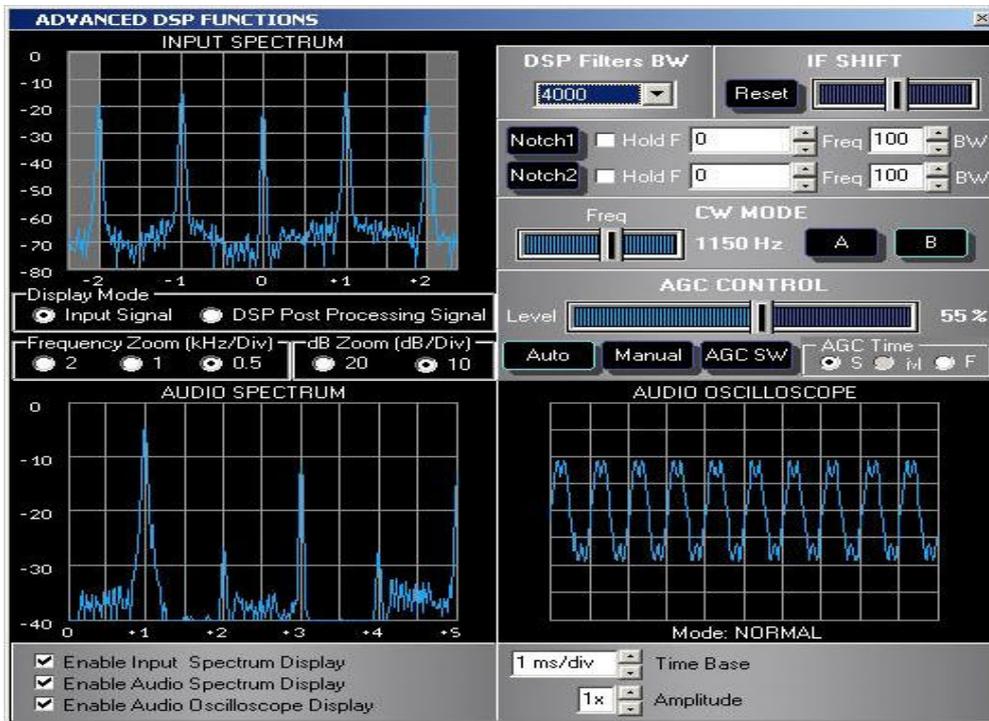
USB signal received with 2.5 KHz BW DSP filter



LSB signal received with 2.5 KHz BW DSP filter



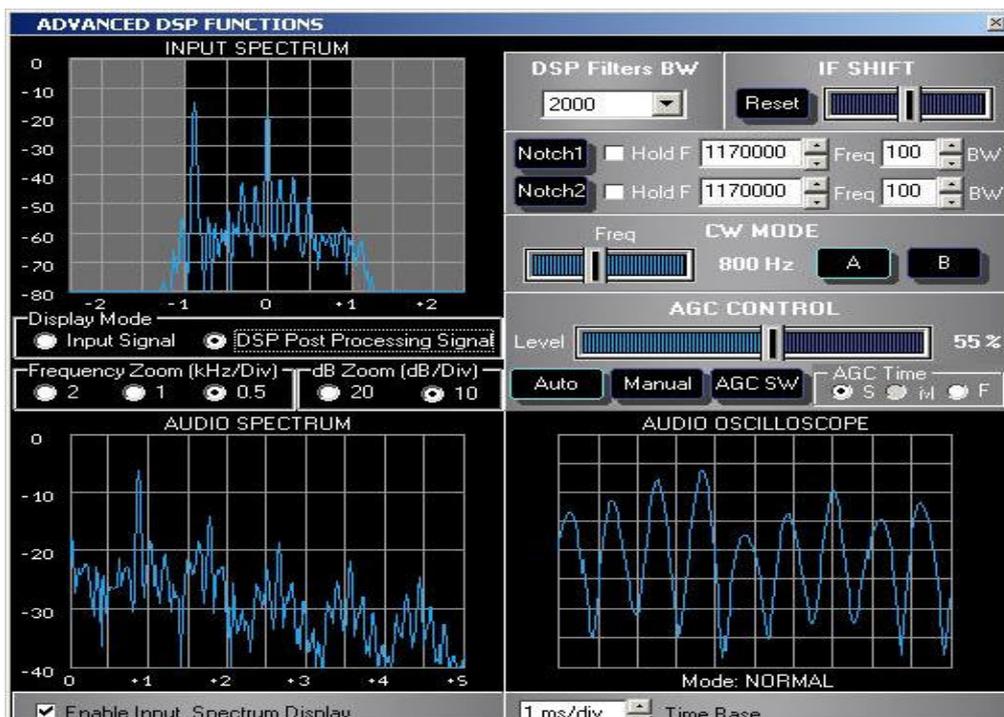
AM signal received with 4.0 KHz BW DSP filter



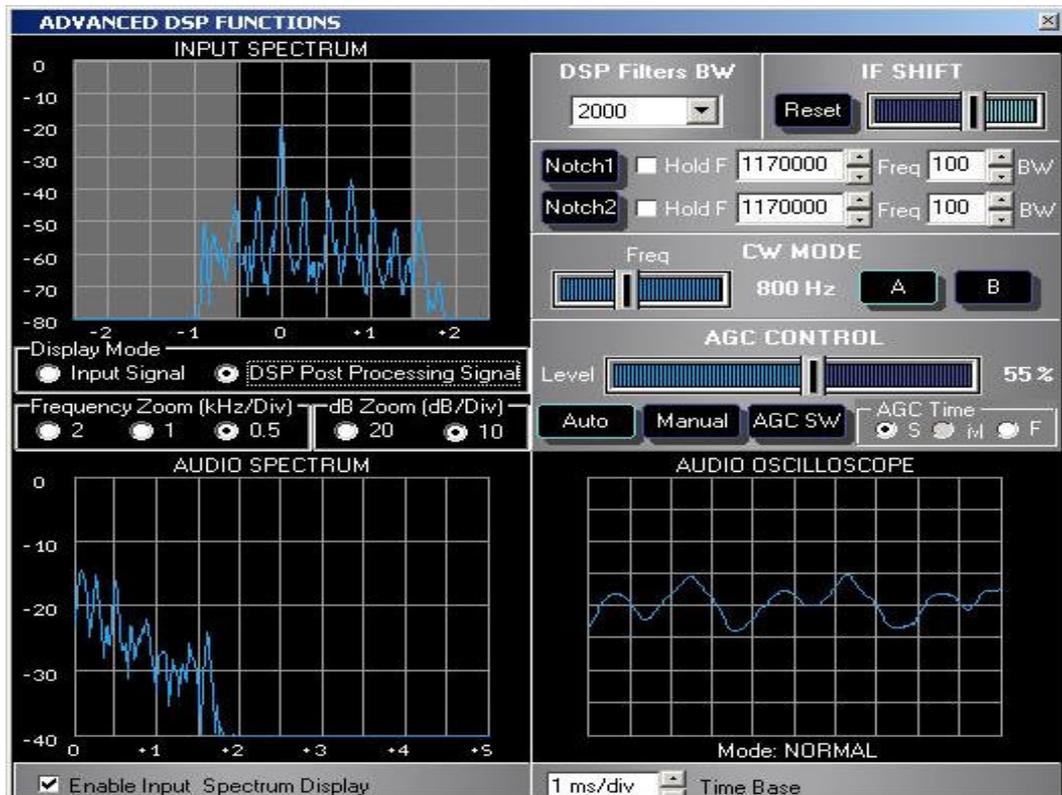
FM signal received with 5.0 KHz BW DSP filter.

3.5.3 IF Shift control.

This control allow the operator to move the 455 IF band pass filter with reference to the tuned signal in order to attenuate an on band interfering signal.



Display of the tuned AM signal together with a CW interfering signal. (Interfering signal 1Khz down of the carrier frequency)



IF band pass filter shifted 500 Hz up to attenuate the CW interfering signal.

3.5.4 CW MODE

In the middle right side a CW mode filter control is available with several operative mode.

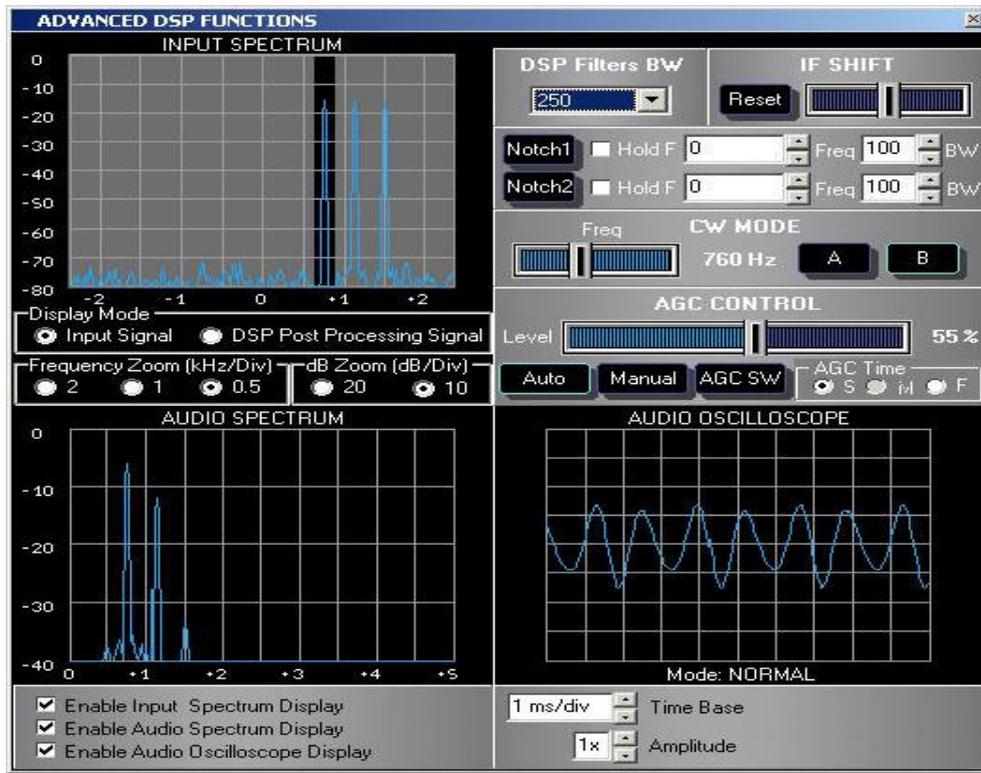
Mode A : This operative mode is very similar to old style radio receivers provided with the BFO control. Move the frequency slide to choose the tone of CW signal that best conform to your preferences. In this way you don't need to move the main tuning to change the tone. The frequency of the decoded tone can be observed on the spectrum scope. The default of this mode is 800 Hz tone. Note that in this mode the filter PB is kept fixed and the decoded tone is varied through the BFO frequency.

Mode B : In this mode the FIR CW filter centre frequency is moved from 0 to 1200 Hz while keeping fixed the BFO frequency.

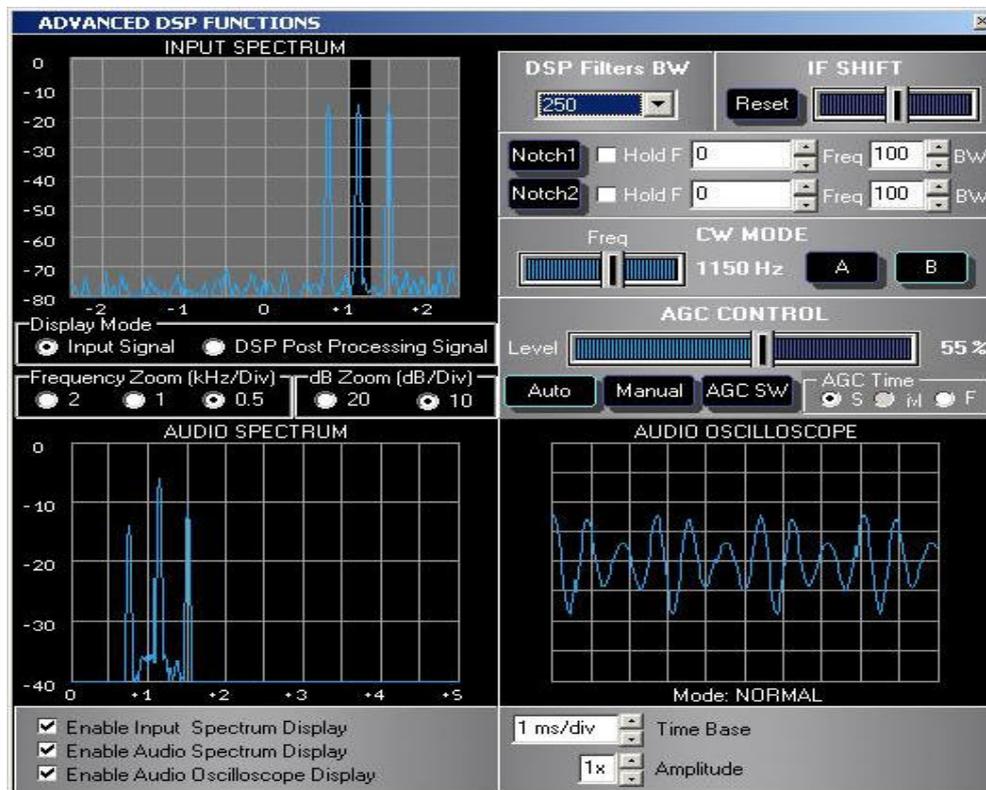
The down conversion from 12KHz to 0- 1.200 Hz is made variable.

It's expected that the operator choose the centre frequency of the filter and then to tune the receiver with the VFO to have the tone down-converted inside the PB of the filter.

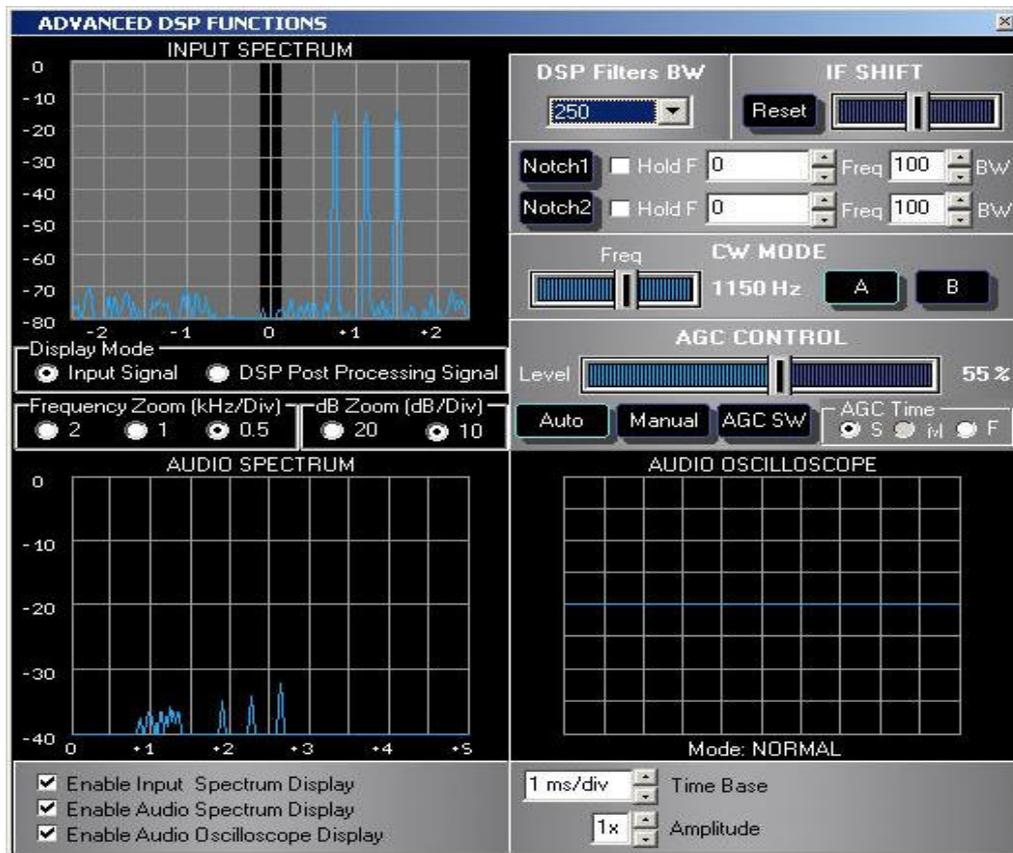
When a slow speed CW signal is being received the Dit and Dash code can be displayed in the Audio Oscilloscope to help the decoding.



Mode A CW demodulation using BFO for 800 Hz audible tone.



Mode A CW demodulation using BFO for 1.100 Hz audible tone.



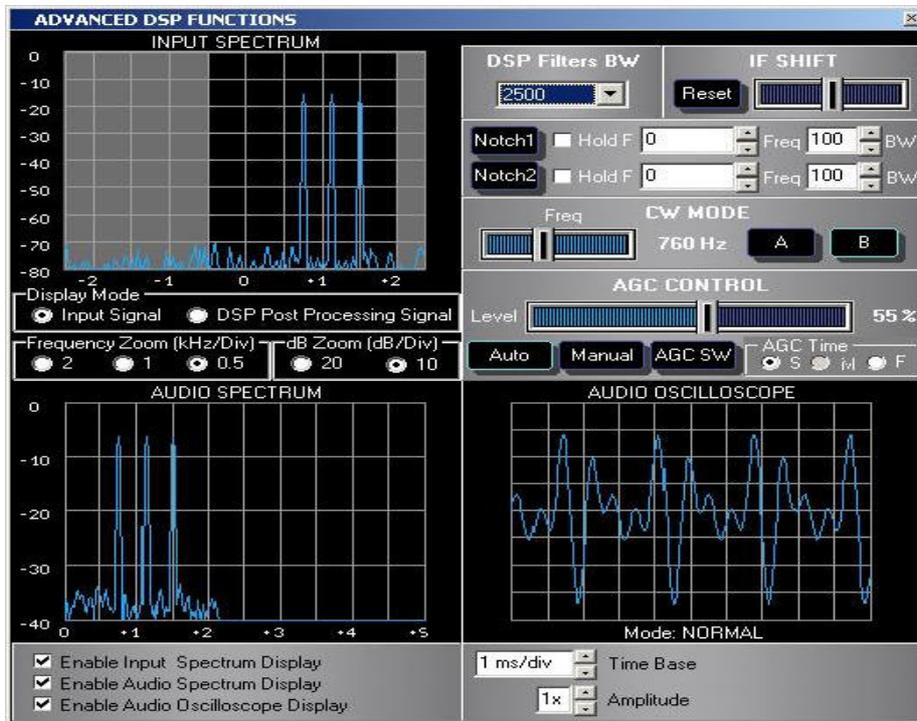
Mode B CW demodulation with fixed BFO and Zero beat. To hear the 800 Hz Audible tone a different VFO tuning will be required.

3.5.5 AGC Operation & Control

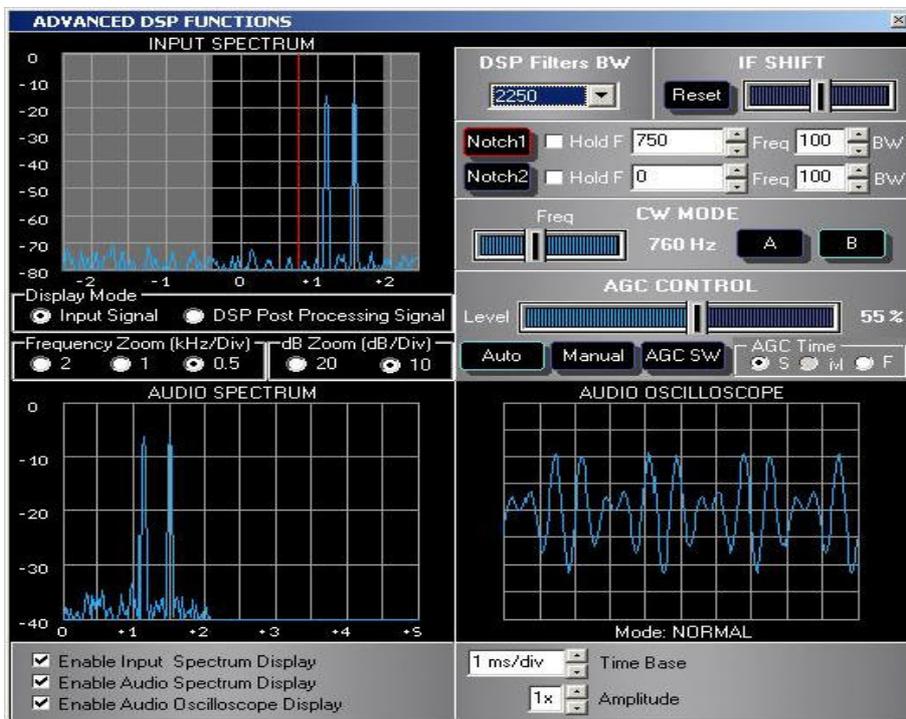
The operator is allowed to work with Automatic AGC (Slow or Fast) or with Manual AGC. When working with Manual AGC the gain is varied through the slide bar control.

3.5.6 Using the Notch function.

The filter control section includes the possibility to use two notch each one with the a variable BW. Each notch is selectable by clicking on the relevant button. Notch 1 is placed on the pass band by left clicking with the mouse on the spectrum scope and notch 2 by right clicking. Fine tuning of the notches position is allowed through the up and down little arrows at the right side of the notch buttons.

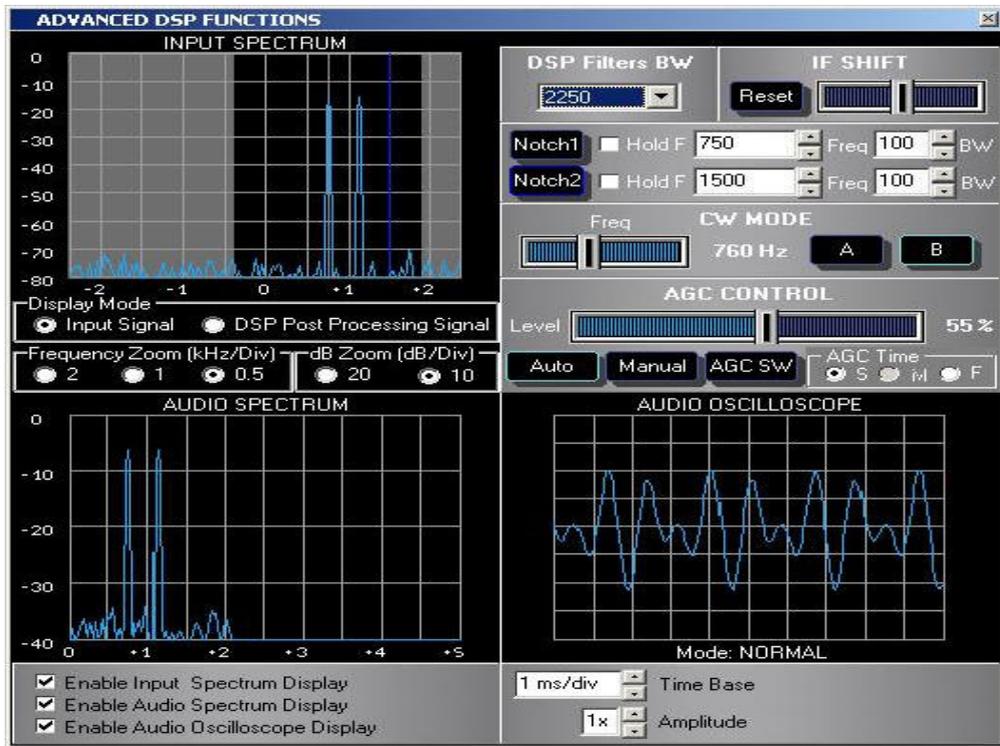


Desired signal at 1.125 HZ with two interfering tones (750 Hz and 1.500 Hz).

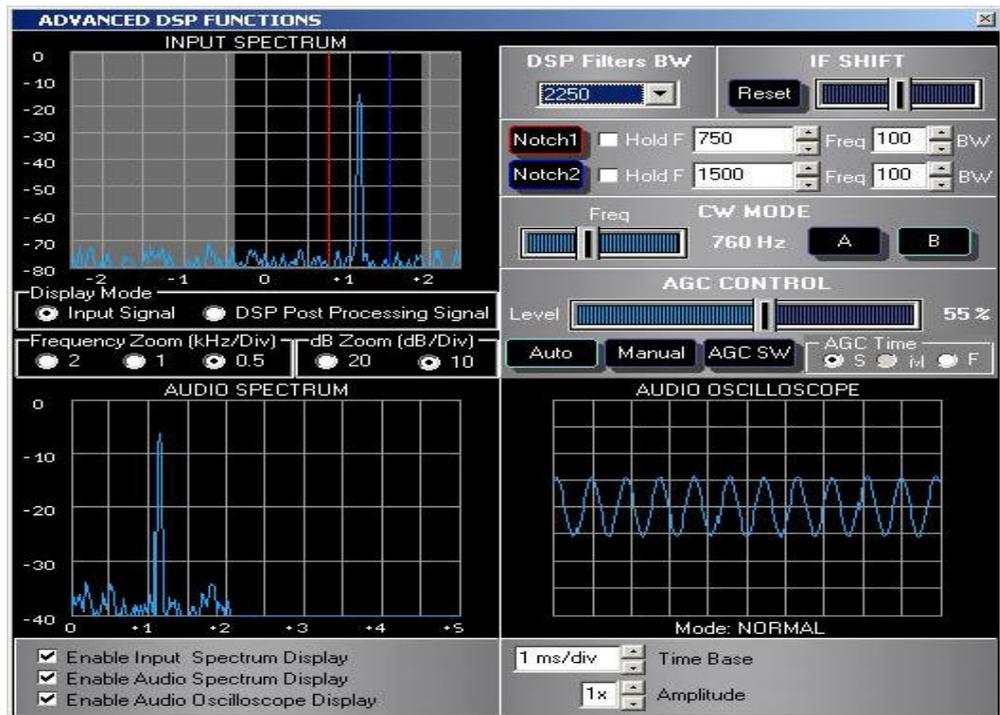


Thanks to filter notch 1 the interfering signal at 750 Hz has been eliminated.

Using the notch filters.



Thanks to filter notch 2 the interfering signal at 1.500 Hz has been eliminated.



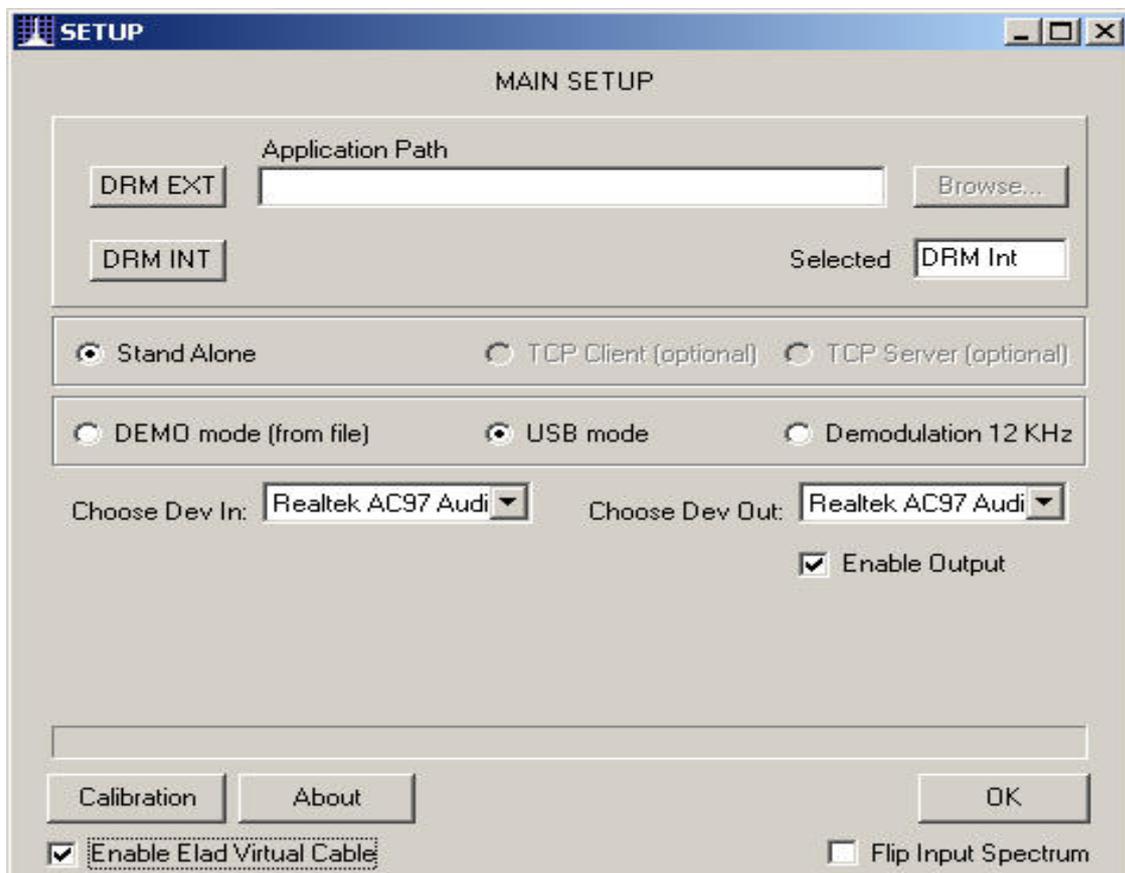
Both interfering signals have been eliminated using notch 1 and 2

3.5.7 Audio spectrum and audio oscilloscope.

In addition to the 12KHz input signal also the demodulated audio signal can be displayed on a level/frequency diagram in the lower left side of the advanced window and in a level/time diagram in the lower right side.

3.6 Main SETUP

In the window TUNING of the cockpit the button SETUP allow to enter the MAIN SETUP function. Just click the SETUP button and a new window “MAIN SETUP” will popup to allow the setting of :



Stand Alone operation of FDM-77. (This is the normal operating condition)

TCP Client/Server. This mode allow the remote control of FDM-77. The PC where ELAD software is installed can be configured as server (with the FDM77 connected) or client (as remote station).

DEMO mode operation of FDM-77. It's a demonstration mode to show the main features of the ELAD software radio even if the Hardware RF front-end is not available). When using the demo mode some test signals can be selected through the “Choose File” windows.

USB mode. (This is the normal operating condition with the Hardware RF front-end connected to the PC through the USB port).

Demodulation 12 KHz. Check this option only if you want to use the software with down-converters to 12 KHz (as the ELAD 45512 or 10712 models).

Choose Dev In/Out. If you have two sound cards installed in your PC the selection of the card you want to use as input (Recording mixer) and output (Speaker Mixer) device is allowed.

Choose file. The selection of a test signal to be used in demo mode is allowed.

Flip input spectrum. To be used with down-converters only and when a spectrum inversion is observed on the Spectrum & Scope Viewer. Not checked is the Default .

Calibration. This is a facility provided to help the operator in setting the correct input level of the sound card. Please refer to section 5 of this manual to understand the use of this facility.

Enable ELAD Virtual Cable. If you want to use third party application to decode special modes that use a sound card as decoder you should enable this function. In the normal operation with FDM77 the PC sound card is used to filter and demodulate the received signals and can't be used also to decode RTTY, HamDRM or CW with dedicated applications as CWget, MMTTY, Jfax . Thanks to the ELAD virtual cable driver (supplied with ELAD Software radio) the signal demodulated through the PC sound card is then fed to the ELAD virtual cable (WINDOWS see this driver as a sound card) to be decoded with the above mentioned external applications. Of course the external application should be configured with the ELAD virtual cable as recording device in the Mixer setting.

Enable output. To disable the output from the sound card to the speakers. The default of this is enabled. If you foresee to use third party application to decode special mode (for example Hamdream or Windrm) you should disable this function in order not to have the electrical sound of the demodulated signal reproduced by the speakers.

Colour. (to choose the colour of the cockpit).

Important Note: With WIN2K operating system and when decoding the DRM signals with an external application you must close the external application before changing the reception mode. This is due to the limitation of WIN2K in handling two applications running on the same sound card. If you use the DRM internal application closing it to change the reception mode is not necessary.

3.7 AF Control.

In the lower right side of the cockpit the AF CONTROL window allow to set up the sound reproduction that best conforms the operator preferences. The AF frequency spectrum is divided in 6 octaves with high/low tone slide bar controls. Moreover volume control is added with mute control (toggle button). This volume controls the out level to the sound board. The operator should set the speaker volume through the WINDOWS mixer control of the sound card.



The Pag↑ and Pag↓ keys on the PC keyboard can be used as a shortcut to control the out level to the sound card.

4. Remote control of FDM-77.

This function is not released so far. It consists of an option (not included in the FDM77, but available as separate option) to allow the remote control of a receiving station equipped with FDM77 (Server station) through internet (TCP/IP) simply using a PC with the ELAD Software radio installed (Client station).

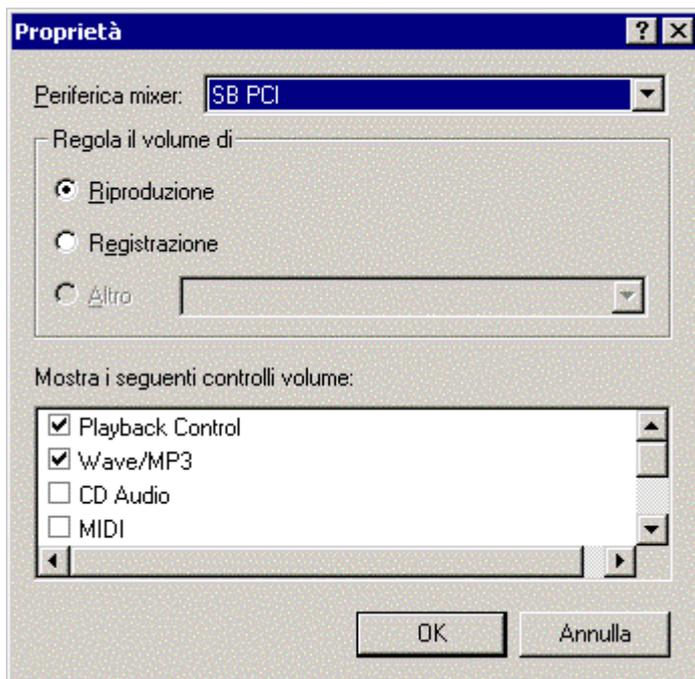
The client station can control the remote receiver and have the audio stream reproduced simply using WINAMP.

More details will be available later on our site www.eladit.net

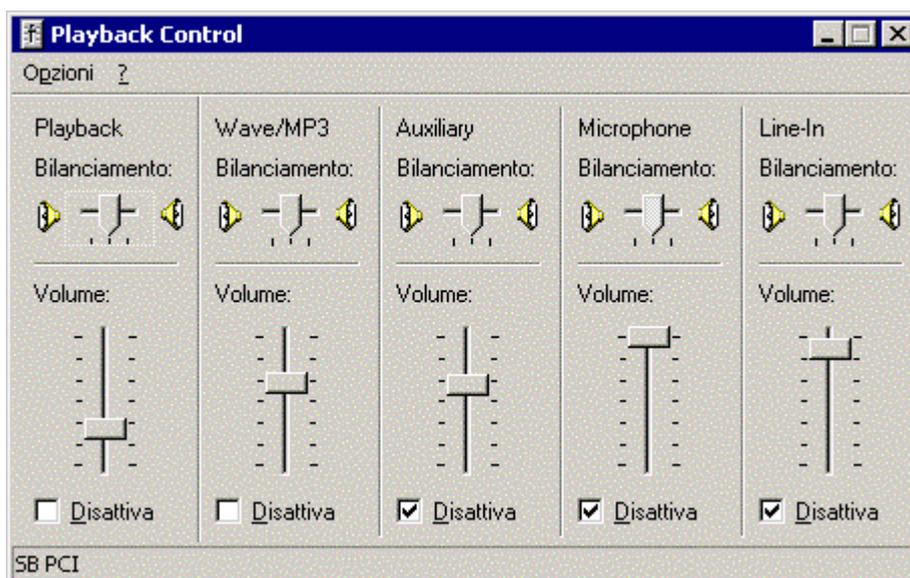
5. PC sound card mixer setting.

In order to get the best performances a proper setting of the sound card Mixer must be done.

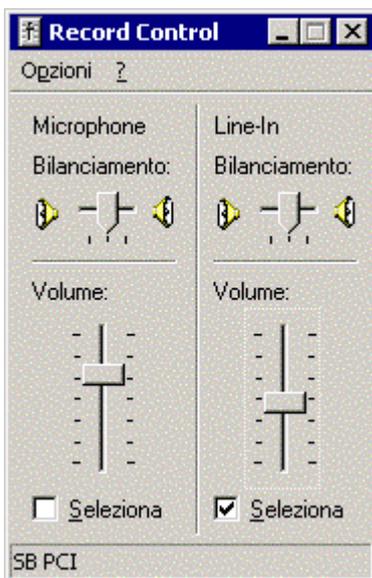
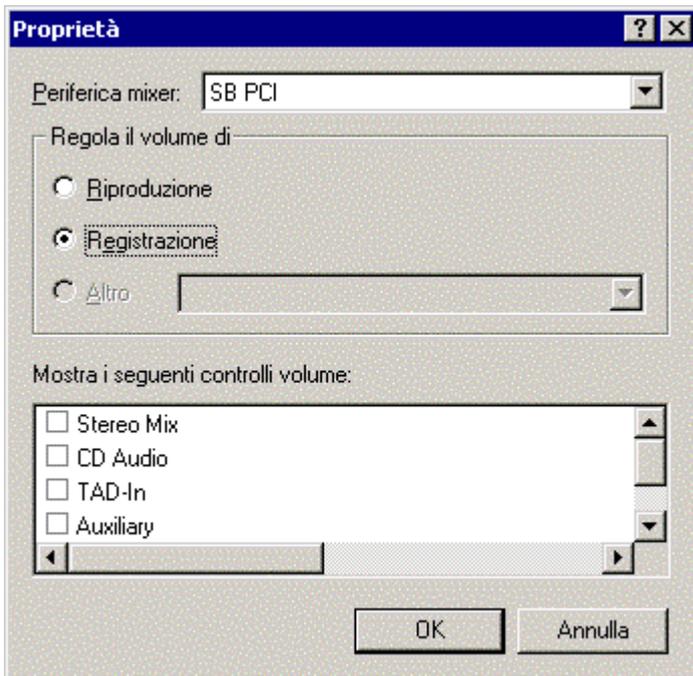
Open the mixer and disable the mike and line as inputs for the speakers.



Wave and Volume only should be enabled for sound reproduction.

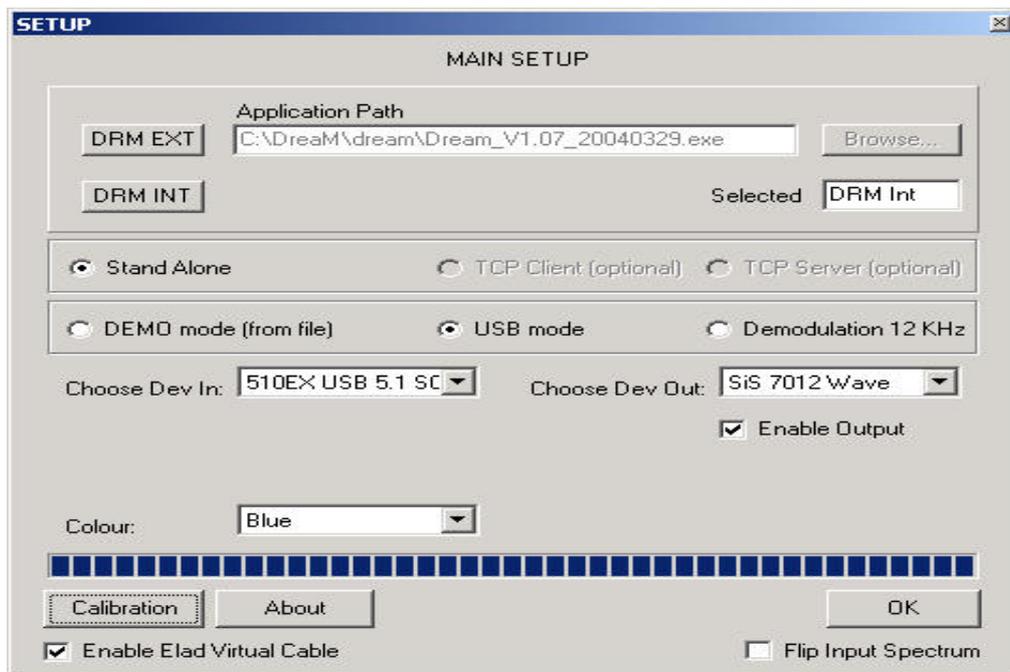


Open the mixer and enable as recording input the line input.

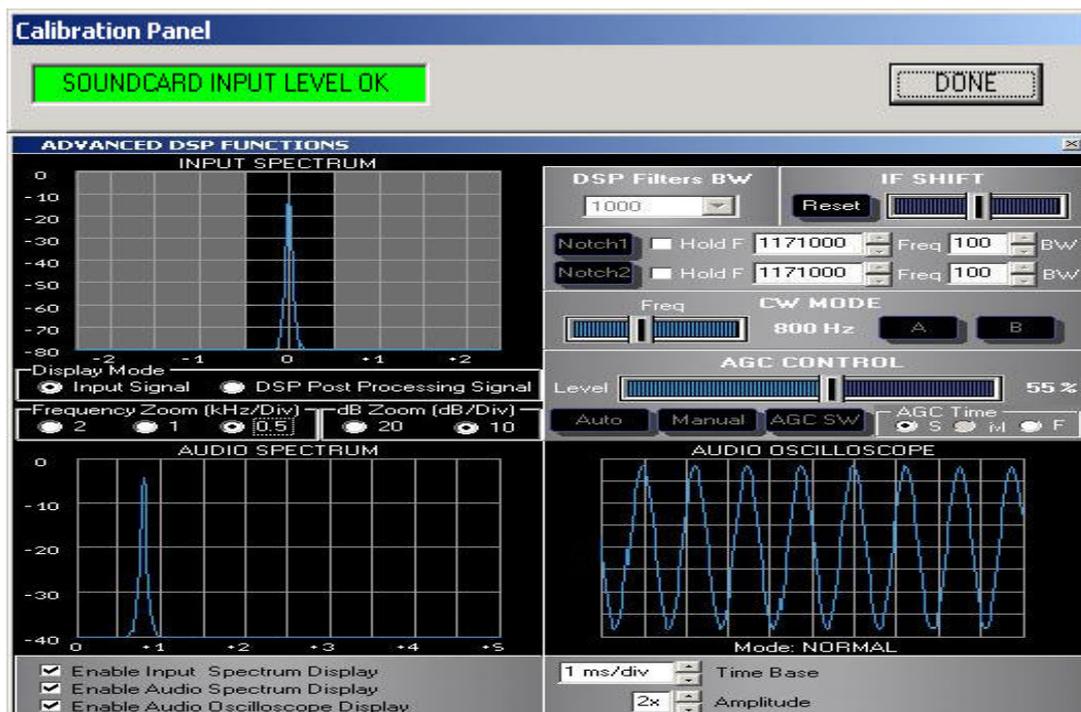


The recording level must be adjusted carefully in order to have a good decoding of DRM and all the analogical mode CW, SSB, AM and FM.

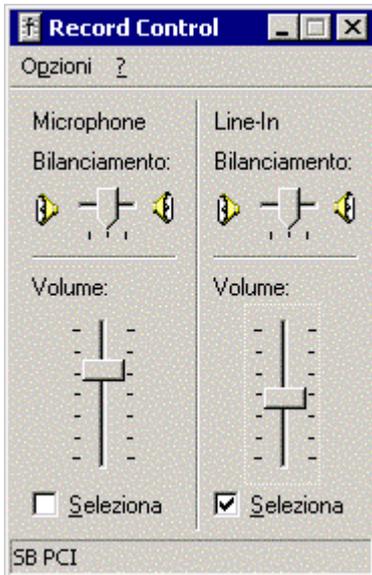
The level of the 12 KHz output has been adjusted at the factory, but some more adjustment could be needed to adapt the level with the sound card installed into your PC.
 A fine adjustment of the level with your sound card you should enter the MAIN SETUP of the FDM77 clicking the SETUP button in the cockpit.



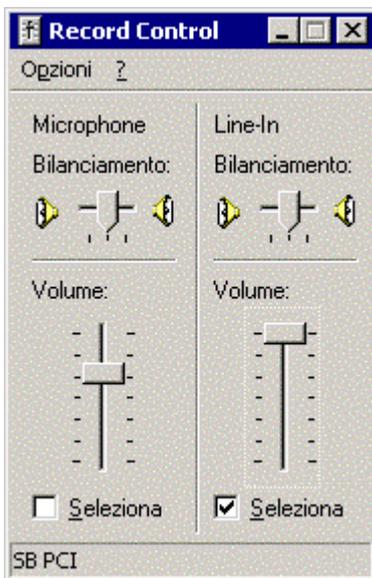
With the MAIN SETUP wizard open click the calibration button. A new panel will popup



Set the level of the of the line input of the recording mixer until the message “**sound card input level OK**” appear on the upper left side of the panel.



In case the fine adjustment is reached with the highest position of the sliding bar



set the Hi-Lo switch located on the rear panel of FDM77 to Hi position and repeat the adjustment.

6 Specifications

<i>Specification</i>	<i>Value</i>	<i>Remarks</i>
Operating ranges	A: 10 kHz – 30 MHz B: 48 MHz – 60 MHz	A: 10 KHz to 100 KHz B: 55 MHz to 60 MHz With reduced performances
Frequency resolution	1 Hz	Min.
Frequency stability	2 ppm after 15 min. warm-up	
Modes	USB, LSB, CW, AM, FM, DRM	
Antenna connector 1	SO-239 (+ 10 V DC feedthr.)	External antenna
Antenna connector 2	BNC	Indoor active antenna
Input impedance 1	50 ohm	SO-239
Input impedance 2	100 kohm // 10 pF	BNC , indoor antenna
Output connector	Jack mono 3,5 mm	Freq. out :12 KHz
General configuration	Superheterodyne	Three conversions
RF input switching	Antenna1 / Antenna 2	Software controlled
Front-end configuration	0 dB / + 10 dB / - 15 dB	Direct / Preamp. / Atten.
Preselectors Filters	1. 0,1 – 0,5 MHz 2. 0,5 – 1,6 MHz 3. 1,6 – 5,0 MHz 4. 5,0 – 9,0 MHz 5. 9,0 – 16,0 MHz 6. 16,0 – 30,0 MHz 7. 48,0 – 55,0 MHz	PIN diodes and relè
Input's level	2,0 uV ÷ 300 mV 0,5 uV ÷ 30 mV	Direct input SO 239 Indoor antenna input.
IP3 (input)	+ 15 dBm	Direct input
AGC	PIN DIODES on 1 st IF FET on 2 nd IF	Auto / Man
IF	1 st IF 70 MHz; 2 nd IF 455 kHz	
Output level	110 dBuV (350 mV rms)	F out :12 KHz
Sensitivity	5 uV (1,5 uV with preamp. on)	10 dB S / N mode SSB
Sensitivity	2 uV (0,8 uV with preamp. on)	10 dB S / N mode CW
Sensitivity	10 uV (3,5 uV with preamp. on)	10 dB S / N mode AM
Sensitivity	10 uV (3,5 uV with preamp. on)	12 dB SINAD mode FM
Sensitivity	30 uV (10 uV with preamp. on)	BER 10E-3 mode DRM
Selectivity (SSB,CW)	2,5 kHz a – 6 dB 5,0 kHz a – 60 dB	PC Software filter off
Selectivity (AM, FM, DRM)	9 kHz a – 6 dB 15 kHz a – 60 dB	PC Software filter off
Spurs & Image Rejection	> 55 dB	
Power Supply	+ (11 ÷ 15) V DC; 500 mA	Negative Ground
Operating temperature	+5 / +45° C	
Dimensions and weight	(200 X 60 X 190) mm ; 1 Kg	

7 About

- Windows 2000 and Windows XP are registered trade mark of Microsoft Corporation
- USB 2.0 is a registered trade mark of USB IF
- ELAD software radio of FDM product line is a proprietary software developed by ELAD srl (<http://www.eladit.net>) and integrating software modules for :
- “DRM Channel Decoding technology licensed by Fraunhofer IIS” (<http://www.iis.fhg.de/dab/products/drmreceiver>)

and software modules for

- “DRM Audio coding technology licensed by CODING TECHNOLOGIES” . (<http://www.codingtechnologies.com>)
- DRM is the only universal, non-proprietary digital AM radio system with near-FM quality sound available to markets worldwide. (<http://www.drm.org>)

Declaration of Conformity

The device name

Software Defined Radio HF Receiver FDM- 77

made by **ELAD S.r.l.**

Address: Via Col De Rust, 11
33070 Sarone di Caneva (PN)
ITALY

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC,92/31/EEC,93/68/EEC)

The following standards and/or technical specifications have been applied:

ETSI EN 301 783-1 V1.1.1

Electromagnetic compatibility and Radio Spectrum Matters (ERM);

Land Mobil Service;

Commercially available amateur radio equipment;

PART 1: Technical characteristics and methods of measurement

ETSI EN 301 783-2 V1.1.1

Electromagnetic compability and Radio Spectrum Matters (ERM);

Land Mobil Service;

Commercially available amateur radio equipment;

PART 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive;

ETSI EN 301 489-15 V1.2.1

Electromagnetic compability and Radio Spectrum Matters (ERM);

Electromagnetic Compatibility (EMC) standard for radio equipment and services;

PART 15: Specific conditions for commercially available amateur radio equipment;

Date: 7 May 2005

President:
Milan Franco

