



# AR-IQ-II

PC control, I/Q recording & playback  
for AR2300/5001D

## Software installation & Operating manual

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Authority On Radio Communications

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## **1. Introduction**

Thank you for purchasing the AR2300/AR5001D receiver with the optional **IQ5001 I/Q** board and **AR-IQ-II** software.

To obtain the best possible results from your receiver, we strongly recommend that you read this manual and familiarize yourself with the receiver. Every effort has been made to make this manual correct and up to date. Due to continuous developments of this receiver and its options, we acknowledge that there might be some errors or omission anomalies.

### **1-1. Software description**

The AR-IQ-II software allows direct control of the AR2300/AR5001D receiver through a graphical interface. The I/Q digital output of the IQ5001 board represents the actual signal used after digital processing in the receiver. The digital I/Q output interface streams I/Q data to the PC through USB2.0 isochronous mode, at 72Mbit/sec with a sampling rate of 1.125Msample/sec. All commands are sent to the AR2300/AR5001D through the receiver's remote control USB port.

Compared to a regular AF, which only allows recording one frequency at a time, I/Q allows you to store and playback a full 0.9MHz bandwidth with no loss of quality!

This 0.9MHz bandwidth can be anywhere within the receiving range of the AR2300/AR5001D, between 25MHz and 3.15GHz.

Off-line, you can listen and decode within the recorded 0.9MHz range, tuning any frequency as you would in real time. You can even loop a particular time frame to listen repeatedly to a signal received in difficult conditions, or search for and analyze hard to catch signals bursts.

It is also possible to move the I/Q data to another PC and to listen/decode it off line, provided the other PC has AR-IQ-II software installed.

### **1-2. PC requirements**

The following minimum PC requirements are only an indication. Even for a given set of specifications, the "real" performance of a PC can vary depending on the brand of different key elements (CPU, hard disk, RAM, operating system, installed software & drivers) and the general health/age of your system. Please understand that for these reason, there might be cases where AR-IQ-II might not function properly even though your PC is technically meeting the required specifications.

**"Live" decoding and recording: Make sure to connect the I/Q stream USB cable to a direct USB socket connection on your PC. Do not use a USB hub, considering the high speed data rate originating from the receiver.**

**Data off-line playback: Playback will only work properly if the data is read off an internal hard drive. It is**

**unlikely to work off a USB key, external DVD, external hard-drive or any networked storage device.**

**In any case: Make sure you have plenty of free space on your hard drive!**

**Minimum requirements:**

2.8GHz Dual core processor (or 2.3GHz Quad-core)

1GHz RAM

Two available USB 2.0 (480 Mbit/s) ports

16 bit AC-97 compatible audio board

1024x768 resolution video board and monitor

2 button mouse with wheel

10 GB or more internal hard-disk

Supported OS: Win XP (32bit)

Win Vista (32 & 64bit)

Win 7 (32 & 64bit)

### **1-3. CD contents**

In addition to the pdf version of this manual, the supplied CD

Contains the following software and firmware files.

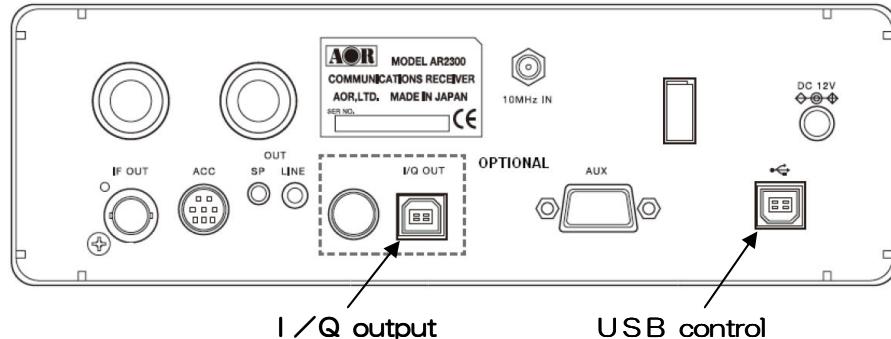


Folder & subfolder name	Explanation	File name	File type
ar-iq-ii-v10	AR-IQ-II software	ar-iq-ii.exe	AR-IQ executable file
		ar2300usb.dll	DLL file
Driver	IQ driver	IQ driver, 32 bit	AORAlpha.sys
			AorAlpha.inf
	IQ Driver64	IQ driver, 64 bit	AORAlpha.sys
			AorAlpha.inf
			aoralpha.cat
	CMD 20802 WHQL Certified	USB connection driver	Various USB driver files & release notes. Content depending on version. Made by <a href="http://www.ftdichip.com">www.ftdichip.com</a> .

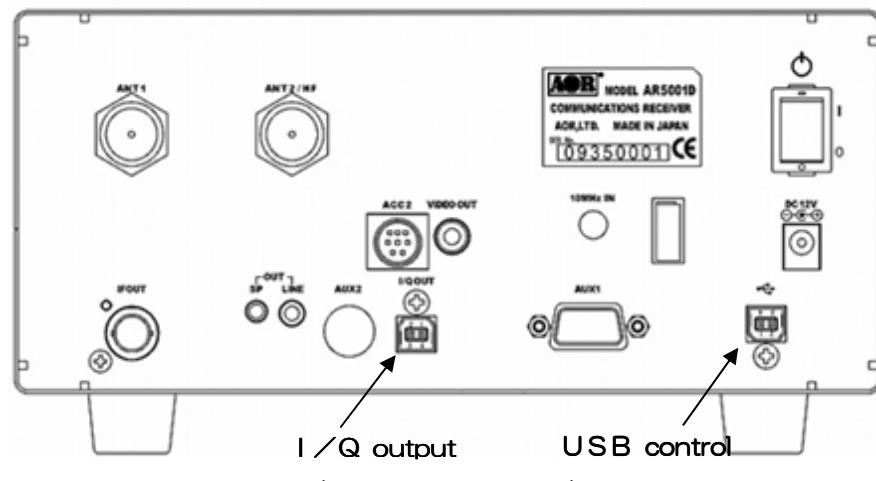
## 1-4. Driver and software installation

Two (supplied) USB cables will be necessary for setting up the system. One for the I/Q data output and one for the receiver control.

\* \* \* Do not connect the USB cables yet. \* \* \*



(AR2300 rear panel)



(AR5001D rear panel)

- (1) Insert the supplied CD into the PC's CD/DVD drive. If you are using files downloaded on internet, copy these to your PC's desktop.
- (2) Power the receiver ON.

The following PC messages and windows during setup may vary depending on the Windows version you are using.

### 1-4-1. USB driver installation

The following procedure is the same on 32 bit and 64 bit machines.

Do not connect anything yet to the receiver's I/Q output socket!

- ① Connect one USB cable to the receiver's USB control socket on one side, and to an available USB socket on the PC side. (Do not use a USB hub)
- 

Depending on your windows version and its service pack installed, it is possible that Windows automatically installs the USB driver for you. In that case there is a message appearing on the bottom right of your screen saying "Installing device driver for new device" followed by "The new device driver has been installed successfully". You can then proceed directly with the installation of the I/Q driver in chapter 1-4-2.

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These screenshots were made using Windows XP.

Windows detects the new hardware and begins the driver installations procedure.



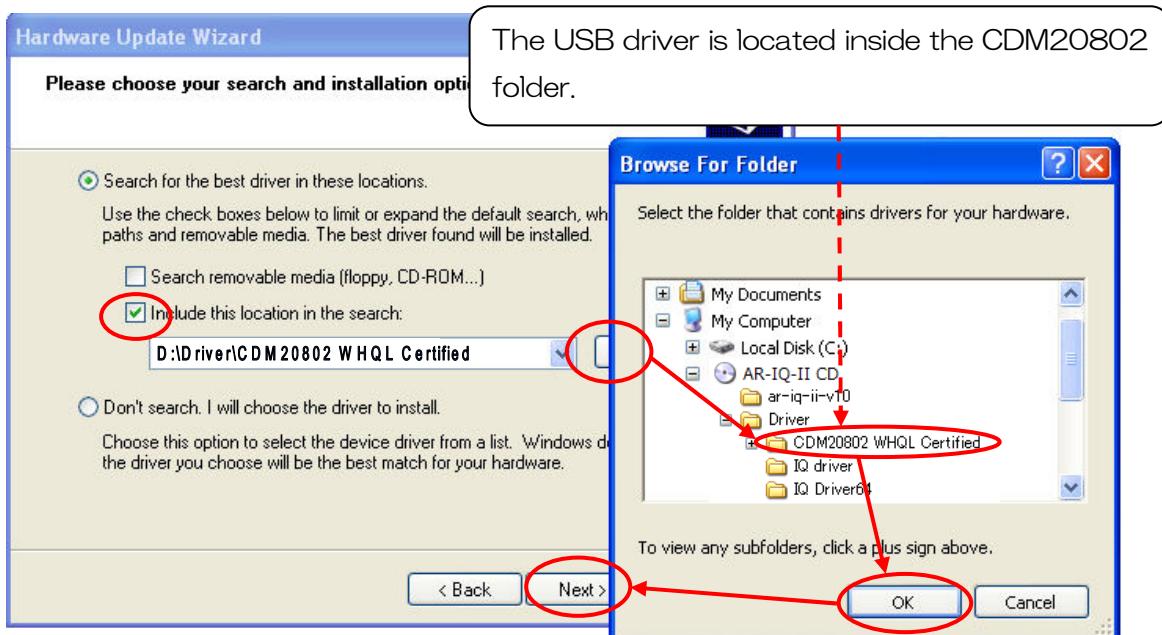
Windows is asking to connect to Windows Update to search for software.

- ② Select "No, not this time" and click NEXT.



③ Select the box “Install from a list or specific location” and click on NEXT.

④ Locate the folder CDM20802 containing the USB driver by clicking on BROWSE and validate with OK, then NEXT.



Note: A newer USB driver might be available from the following URL: <http://www.ftdichip.com/ftdrivers.htm>  
Click “VCP Drivers”, then select the device number “FT232B”. In that case, download the zip file and unzip it to the folder of your choice. This is then the folder you have to locate in the hardware update wizard.

Windows informs the user about the status of the Windows Logo testing of this USB driver.



- ⑤ Click CONTINUE ANYWAY.

Last window of the installation wizard:



- ⑥ Click FINISH. The USB driver is now installed.

## 1-4-2. I/Q driver installation

The driver and driver installation procedure are different on 32 bit systems and 64 bit systems.

Supported OS: Win XP (32bit)  
Win Vista (32 & 64bit)  
Win 7 (32 & 64bit)

If you are unsure whether your system is 32 bit or 64 bit, you can check it out as follows:

- ① Left click on START > right click on MY COMPUTER > left click on PROPERTIES  
The bit type is under “System”.  
XP: no mention = 32bit  
XP: “x64 Edition” = 64bit  
Vista / 7: It is mentioned clearly “32 bit operating system” or “64 bit operating system”
- ② Make sure the receiver is still ON. Now connect one USB cable to the receiver’s I/Q OUT socket on one side, and to an available USB socket on the PC side. (Do not use a USB hub)

Note: These messages may differ slightly depending on which version of the Windows operating system is used.  
These screenshots were made using Windows XP.



**64bit:** Windows although detecting the USB connection, will fail to automatically install the I/Q driver. You will need to install it manually as follows:

Go to START > COMPUTER > PROPERTIES > DEVICE MANAGER, search for “unknown device” or “Digi-receiver”. Right click on it, select UPDATE DRIVER. Windows will then ask you to choose between automatic and manual installation. Select “manual” and continue with step ⑤.

Windows is asking to connect to Windows Update to search for software.

- ③ Select “NO, NOT THIS TIME” and click “Next”.



- ④ Select the box "Install from a list or specific location" and click on NEXT.

**Hardware Update Wizard**

Please choose your search and installation options.

Search for the best driver in these locations.  
Use the check boxes below to limit or expand the default search, which includes paths and removable media. The best driver found will be installed.

Search removable media (floppy, CD-ROM...)  Include this location in the search: **D:\Driver\IQ driver**

Don't search. I will choose the driver to install.  
Choose this option to select the device driver from a list. Windows drivers are the best match for your hardware.

**64bit:** The driver is located in the "IQ Driver64" folder.

**Browse For Folder**

Select the folder that contains drivers for your hardware.

My Computer  
Local Disk (C:)  
AR-IQ-II CD  
ar-iq-ii-v10  
Driver  
CDM20802 WHQL Certified  
IQ driver  
IQ Driver64

To view any subfolders, click a plus sign above.

**OK** (circled in red) **Cancel**

- ⑤ Locate the folder containing the I/Q driver by clicking on "Browse", and validate with "OK".  
In case Windows informs you about the status of the Windows Logo testing of this I/Q driver, Click CONTINUE ANYWAY.

**64bit:** Windows will ask you if you want to install this device, click INSTALL.



- ⑥ Click FINISH. The I/Q driver is now installed.

### 1-4-3. AR-IQ II software installation

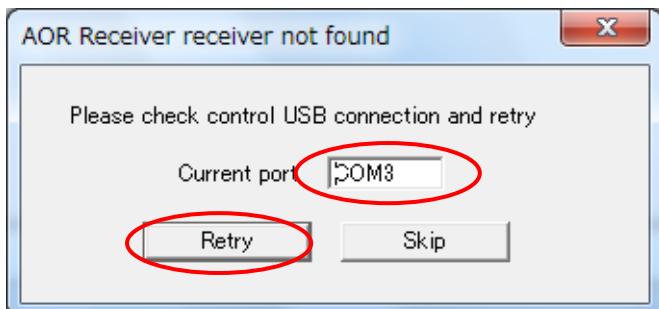
There is no executable file to install the AR-IQ II software on the PC.

- ① Simply copy the “ar-iq-ii-v10” folder on to your computer’s hard drive. The software will run from any location on your hard drive.

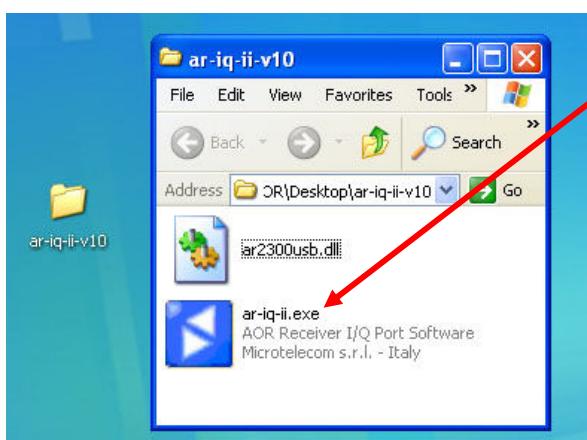
(On Windows Vista and 7, for security reasons the operating system might prohibit the copying of this folder to some locations such as PROGRAM FILES.)

When you start the software for the first time, Windows will ask you to which COM PORT the device (receiver) is connected. Providing the correct number is entered, it will be saved in the registry, therefore you should not need to enter it again.

Nevertheless, after connecting the receiver to a different USB port on your PC, the COM port number will change. If the com port number you entered is incorrect, the following error message will appear:



- ② To check the COM PORT number to which the receiver is connected, click on:  
START > CONTROL PANEL > SYSTEM > HARDWARE > DEVICE MANAGER and search for COM & LPT PORTS. Click on the + sign to extend the directory.
- ② Look for USB SERIAL PORT (COMX) where X is the com port number you need to enter.
- ② Validate with the RETRY button.



② This is the file you need to double click to start the AR-IQ-II software.

Depending on your security settings, Windows might ask you to confirm the execution of this file.  
For unregistered AR-IQ-II, a message will indicate the remaining days of the 30 days trial.  
Registration is free but necessary to use the software after the trial period. Consult chapter 3 regarding the registration procedure.

## **2. AR-IQ II software's main features**

The AR-IQ-II software allows direct control of the AR2300/AR5001D receiver through a graphical interface. The digital I/Q output interface streams I/Q data to the PC through USB2.0 isochronous mode, at 72Mbit/sec with a sampling rate of 1.125Msample/sec. I/Q allows you to store and playback a full 0.9MHz bandwidth with no loss of quality!

This 0.9MHz bandwidth can be anywhere within the receiving range of the AR2300/AR5001D, between 25MHz and 3.15GHz.

- 0.9MHz spectrum display in real time
- Tune to a frequency by clicking directly on the spectrum
- Record entire 0.9MHz bandwidth on the hard disk.
- Playback the 0.9MHz bandwidth, apply filters, listen and decode without loss of quality,
- Waterfall display
- Excellent dynamic range thanks to zero IF system
- Antenna selection (two for AR2300/AR5001D, four for AR5001D with the optional AS5001 antenna selector)

### 3. Software registration

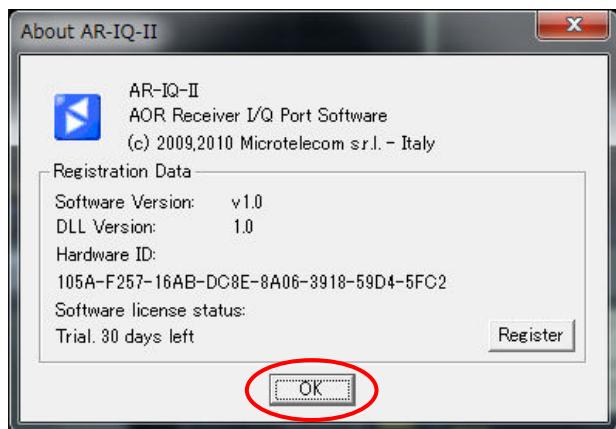
The license is hardware locked. A different license file is needed for every computer on which the software is run.

After 30 days, it will be necessary to register the product to enable further use.

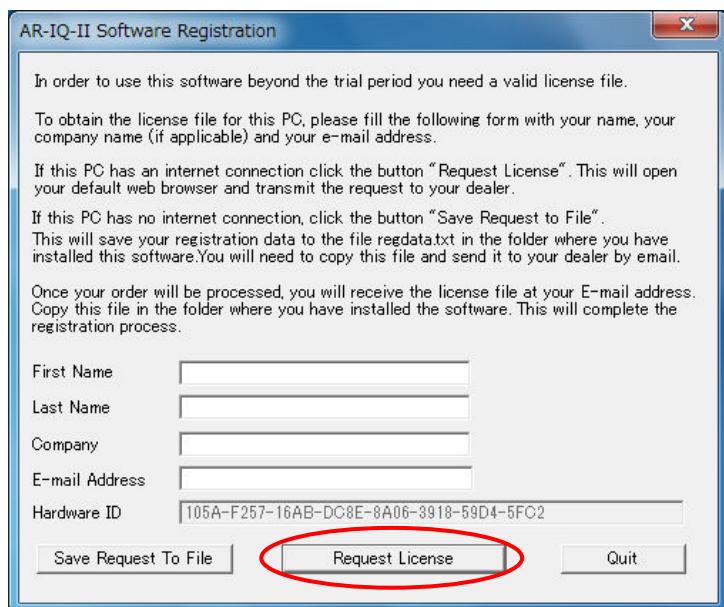
- ① To show the registration form, left-click the blue icon in the top left corner of the application



The following window will pop-up:



- ② Click on REGISTER.



- ③ All fields should be filled with the requested data.

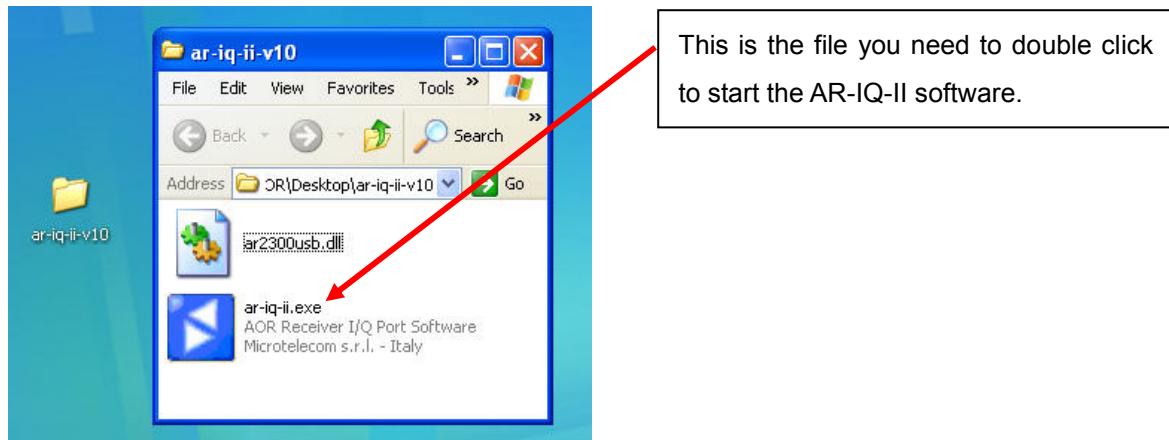
- ④ Clicking on the "REQUEST LICENCE" button, an e-mail will be sent for the license generation process. Users will receive the license file in the supplied mailbox within a few days. If no Internet connection is available, the "SAVE REQUEST TO FILE" button should be used, thus creating a text file (regdata.txt) that must be

manually sent via email to the dealer for the activation process.

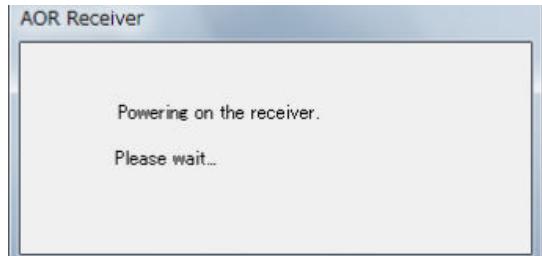
After receiving a confirmation e-mail, users should save the mail attachment in the same folder where the AR-IQ-II software is located. The license is hardware-locked, therefore a different license file is needed for every computer on which the software is run.

## 4. AR-IQ II software operation

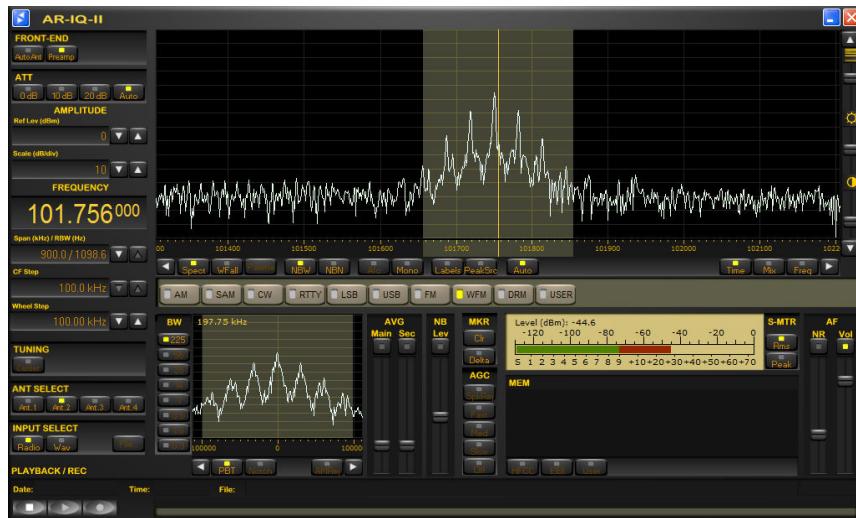
Software description is based on version 1.0. Content may vary on future versions.



Providing the drivers have been installed correctly (chapters 1-4-1, 1-4-2), and the COM PORT number is correct (chapter 1-4-3), this is the screen you should see for a few seconds while the receiver is initializing.



AR-IQ-II interface:



(Closing the software window does also power off the receiver and save the last settings you used into the registry. At the next power on, the receiver and software will be in the same state than just before shut down. See chapter 8 on how to edit the registry)

## 4-1. Frequency tuning

### 4-1-1. Frequency tuning with mouse wheel

Tuning with mouse wheel while hovering on the digits of the frequency indicator panel. The digit of the currently tuned frequency will be shifted upwards or downwards depending on wheel rotation direction.

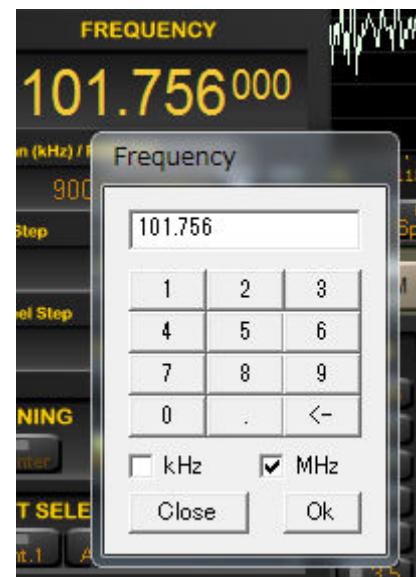
Example: Let's say you are tuned to 201.756 MHz and you hover the mouse over the digit "1". Then by scrolling up or down you will change the tuned frequency of 1 MHz for each scroll increment.

If you wish to tune by increments of 100 kHz, hover the mouse over the digit "7". Then by scrolling up or down you will change the tuned frequency of 100 kHz for each scroll increment.

To tune by increments of 10 kHz, hover the mouse over the digit "5". Then by scrolling up or down you will change the tuned frequency of 10 kHz for each scroll increment.



(Frequency indicator panel)



(ten-key window)

### 4-1-2. Frequency tuning by ten-key input

Double click on the above frequency indicator panel to display the ten-key window. This allows direct frequency input.

Dial the desired frequency by clicking on the digits of the ten-key, including the [.] if necessary, select [kHz] or [MHz] and validate with OK.

The receiver will then be tuned to this frequency.

#### 4-1-3. Frequency tuning by CF step

Clicking on the buttons with the white triangle, on either side of the main spectrum control bar does increment or decrement the frequency by the step size set in the CF STEP indicator panel.



The CF step value is locked to 100 kHz, no matter the frequency.



(Span, CF Step, Wheel Step indicator panel)

#### 4-1-4. Frequency tuning with the frequency bar

- A) Drag the frequency bar left or right while pressing the left mouse button.



- B) Hover with the mouse over the frequency bar and scroll the mouse wheel up or down, at increments as set in the WHEEL STEP indicator panel.

#### 4-1-5. Frequency tuning with the secondary spectrum window

Allows to fine-tune the filter passband in 3 modes: PBT, NOTCH and AMREJ.

##### a) PBT mode (Passband tuning)

- (1) Centers the carrier frequency you have double clicked on the secondary spectrum.
- (2) Press the left mouse button while dragging left or right does retune the center frequency.
- (3) Adjust the filter bandwidth with the mouse scroll. (55 Hz to 225 kHz, IF mode and BW dependent.)
- (4) Drag either filter edge. Hover with the mouse over the filter edge until a horizontal double arrow appears, then drag the filter edge while left-clicking.
- (5) Clicking on the white arrows does increase/decrease the frequency by the value set in WHEEL STEP.
- (6) Shift the entire filter by dragging it left or right, while pressing the right mouse button. This is an actual software emulation, therefore the received frequency and the frequency on the frequency panel do not change. Convenient for co-channel interference removal.



(PBT mode)

##### b) Notch mode (not active in WFM mode)

The notch function is effective for cycle noise on the receive signal.

To activate it, double click the offending signal on the spectrum.

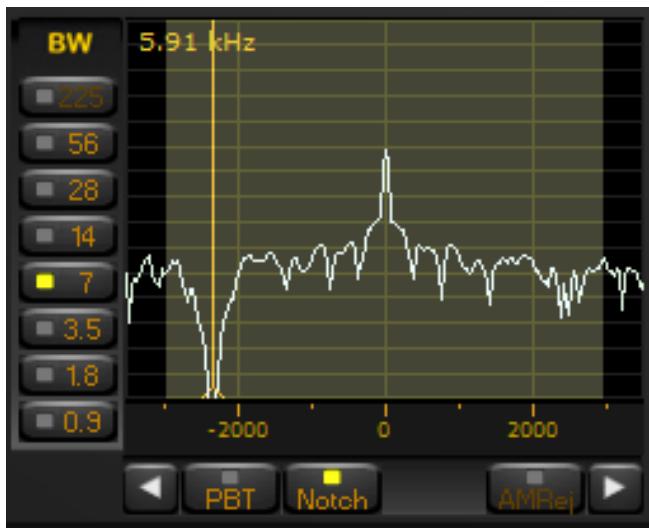
Attenuation is tunable using the mouse wheel.

Filter signal can be dragged with the left mouse button.

The notch function is also accessible in the PBT mode, by pressing the CTRL key.

Deactivate the notch by right clicking on it.

The vertical yellow bar does mark the place where the notch has been applied. The frequency is displayed at the top of the bar (5.91 kHz in this example)



(Notch function)

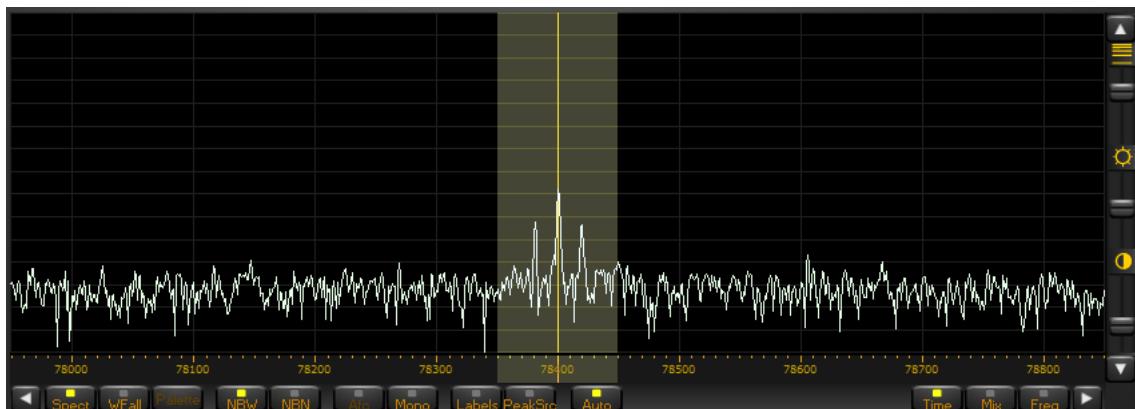
### c) AM Splatter Rejection

The greyed out “AMRej” button is not active in this version.

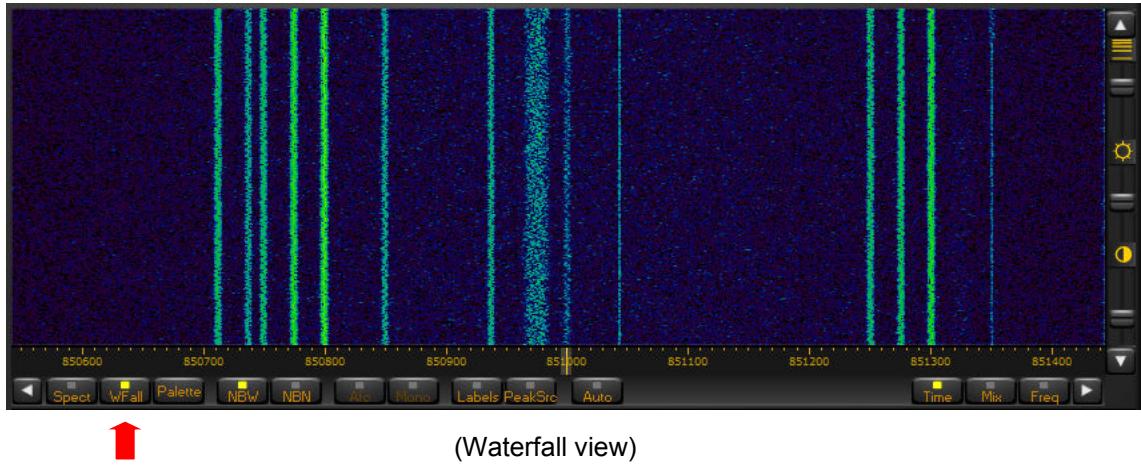
## 4-2. The main spectrum / waterfall window

Displays the spectrum with a bandwidth of up to 900 kHz. (+/- 450 kHz around the center frequency). The reception mode does not affect these displays visually

You can chose between spectrum view and waterfall view.



(Main spectrum view)



#### 4-2-1. Wheel step



This is the value by which the spectrum will be shifted by scrolling the mouse wheel, when the mouse is hovered anywhere over the spectrum or waterfall.

Possible steps are:

500kHz, 300, 240, 200, 125, 100, 50, 25, 20, 12.5, 10, 9, 8, 6.25, 5, 4, 1kHz, 500Hz, 100, 50, 10Hz.

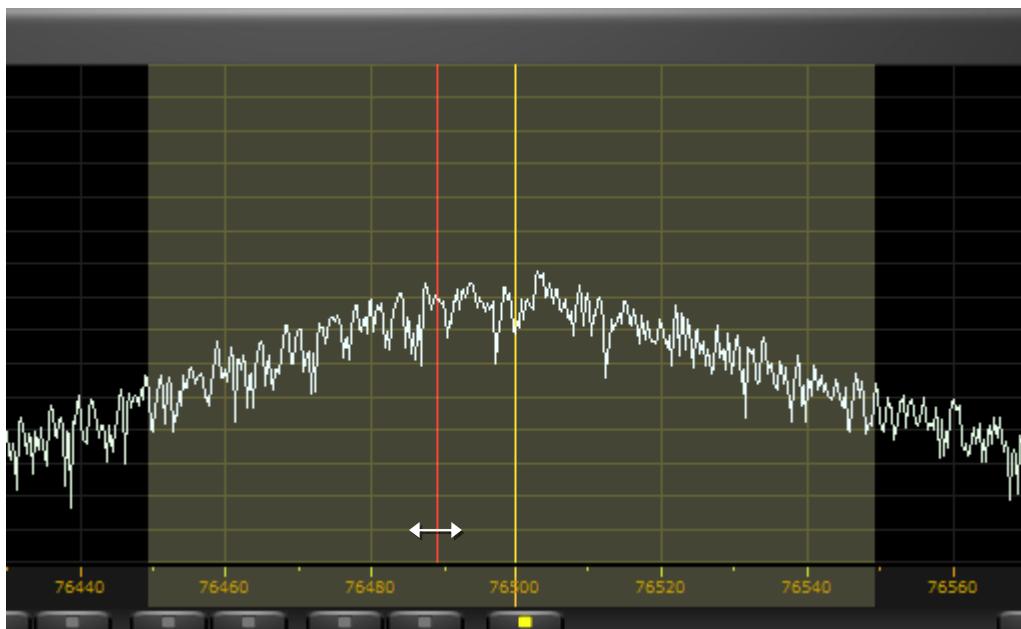
#### 4-2-2. Frequency tuning by double click on spectrum

It is possible to "visually" decide to which frequency you would like to tune the receiver by double-clicking directly on the spectrum or waterfall. The minimum resolution is 1 kHz.

#### 4-2-3. Frequency tuning by mouse drag on spectrum

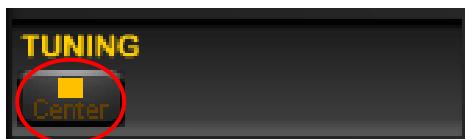
Note: CENTER button in IF FILTER panel must be unchecked.

A faster way to quickly change frequencies "visually" on the spectrum is to hover your mouse inside the grayed out range of the IF filter until the mouse pointer changes to a horizontal double arrow, then drag the mouse either left or right on to the spectrum while pressing the left mouse button.



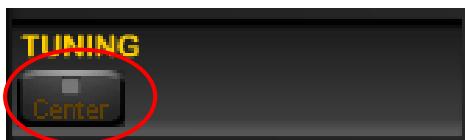
(Tuning by mouse drag)

#### 4-2-4. Frequency tuning with “center” button ON.

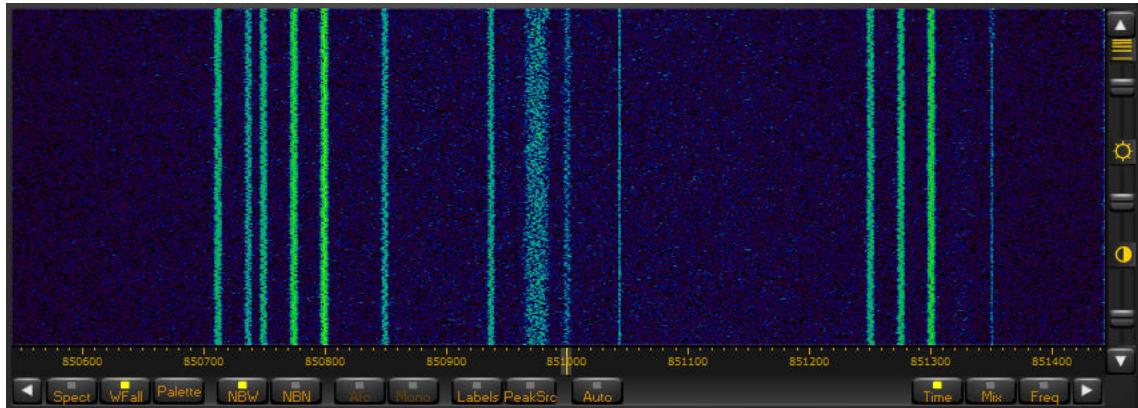


With this setting, the yellow tuning dial line will always represent the center of the frequency scale. Double clicking somewhere on the spectrum will shift the whole spectrum to the double-clicked frequency being the new center of the frequency scale. Doing so while in waterfall mode, will be the easiest way to understand the procedure.

#### 4-2-5. Frequency tuning with “center” button OFF.



With this setting, the spectrum remains fixed, whereas the yellow tuning dial will jump to whatever frequency you double clicked on the spectrum. This mode is convenient if you want to search through frequencies between a fixed start and end frequency. Also, in the waterfall mode (see image below), you can keep track of active frequencies (vertical lines) no matter what frequency you are actually listening to.



(Waterfall mode)

#### 4-2-6. Span

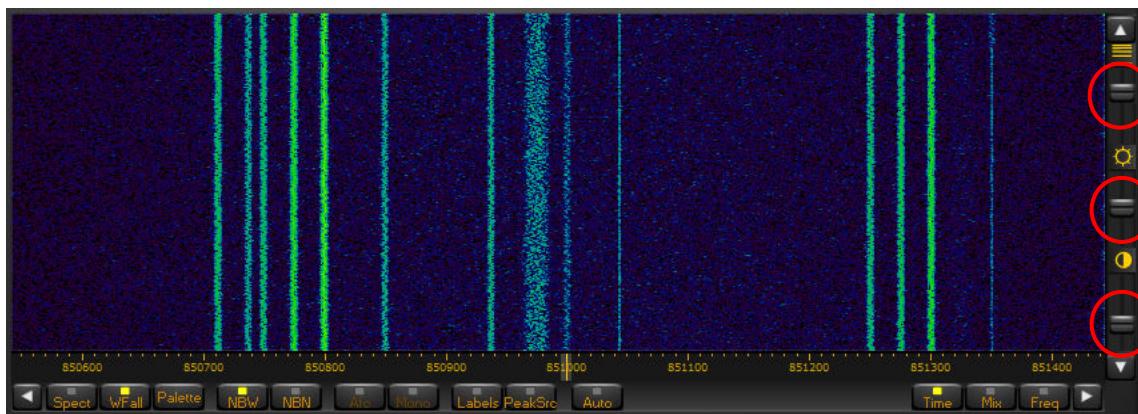


The span is the width of the main spectrum window. You can chose between 900kHz, 450kHz, 225kHz, 112.5kHz, 56.3kHz, 28.1kHz, 14.1kHz, 7.0kHz, 3.5kHz.

Used in both live reception and playback.

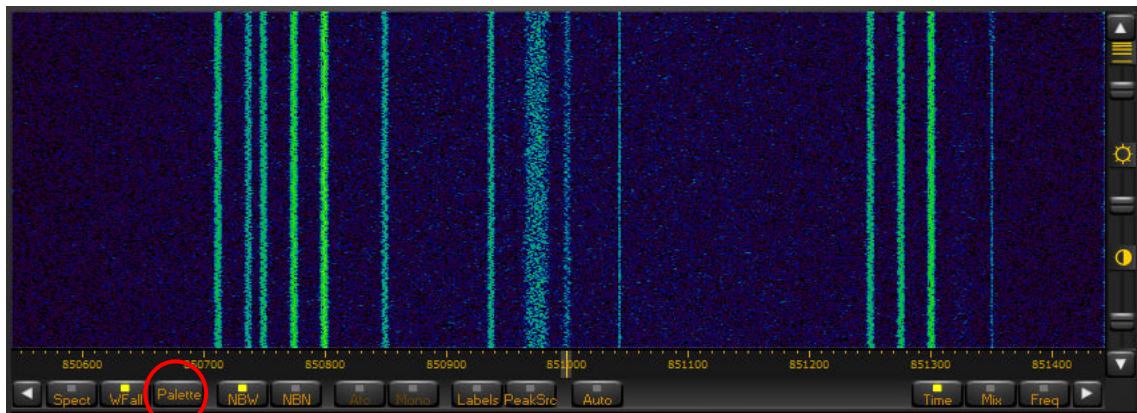
#### 4-2-7. Waterfall control

##### a) Speed, brightness, contrast



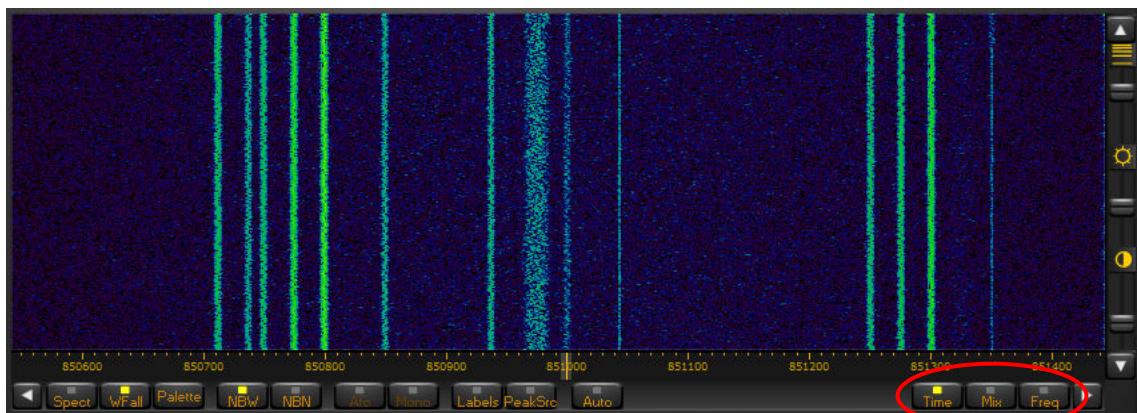
The 3 sliders on the far right side of the spectrum window allow adjusting of the waterfall's speed, brightness and contrast for optimal viewing.

### b) Color palette



Here you can decide which colors are displayed depending on the signal strength. Not active for regular spectrum view.

### c) FFT resolution



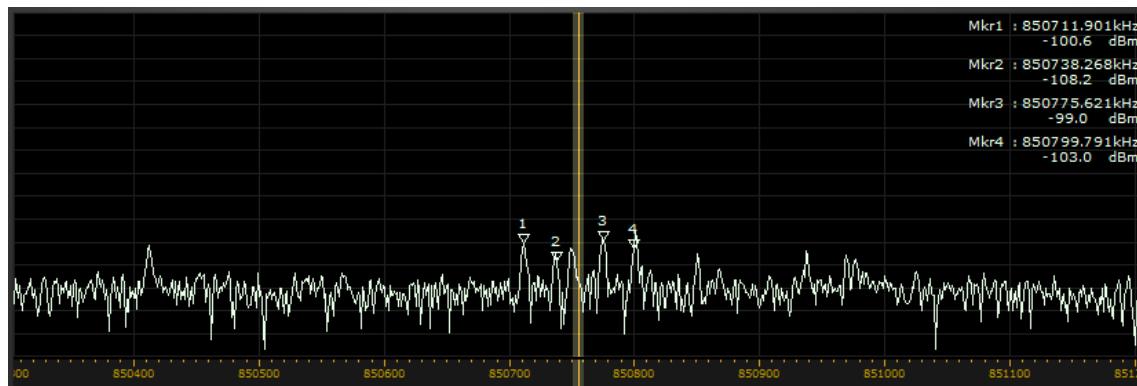
The FFT sharpness (spectral resolution) can be improved at the expense of refresh rate. This function is particularly useful when analyzing strong carrier signals and carrier feed-through on adjacent bins has to be reduced at minimum.

- ◎ **Freq:** offers the best performance at the expense of a slight degradation of the signal amplitude accuracy and refresh rate.
- ◎ **Time:** Selects the FFT algorithm of previous software versions (FFT with Hann window)
- ◎ **Mix & Freq:** select a polyphase FFT analysis with increasing window length (Polyphase FFT with quasi-flat-top amplitude response)

## 4-3. Marker

A right mouse click feature is available within the spectrum / waterfall panel. Right click on up to four frequencies, and a small arrow appears. In waterfall mode, the arrow is situated where the signal waveform

would be on the spectrum view. On the spectrum view, the arrows are located where the mouse was right clicked. The screenshot below shows the numbered arrows, relating to Mkr1-Mkr4 in small text on the top right. The frequency and signal in dBm is also given.

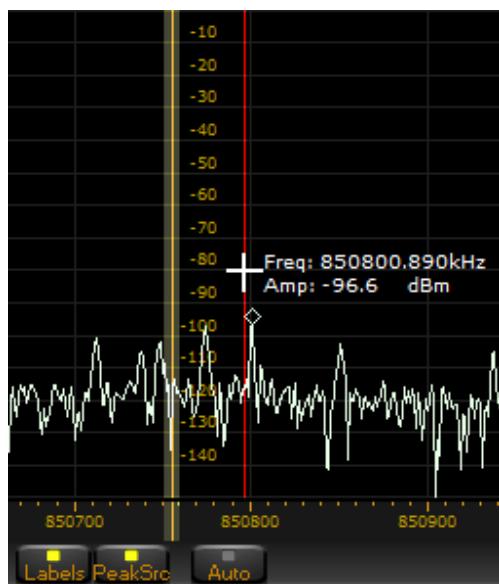


(Spectrum view with MARKER function enabled)



【Clr】 button: Clears the marker arrows from the spectrum / waterfall display.

【Delta】 button: This button changes the values from the markers 2, 3 and 4 to delta values (different to MRK 1)



【Labels】 button: Activates a vertical scale at the center of the spectrum window. When the scale is activated, the value of the frequency and of the amplitude of the signal at the frequency pointed by the mouse (indicated by the reference red line) will be shown.

【PeakSrc】 button: When activated, the frequency and the amplitude of the signal peak nearest to the reference line will be shown.

#### 4-4. Spectrum average (AVG)



**AVG Main:** Stabilizes the spectrum waveform in the main spectrum / waterfall display. Will also stabilize the waterfall mode. The main spectrum average function and its slider control are active only when the enable button above the slider is enabled.

**AVG Sec:** Stabilizes the spectrum waveform in the secondary “bandwidth” display/ panel. The secondary spectrum average function and its slider control are active only when the enable button above the slider is enabled.

### 5. I/Q recording & playback

AR-IQ II allows to record 900kHz of the RF spectrum directly to the PC's hard drive, and to play back the file at a convenient time, with all the desired features of the receiver still available to optimize reception, such as bandwidth, mode, passband tuning, etc...

The software will automatically divide the recording into “wav” files of approx. 2GB, which corresponds to 224 seconds of recording. Although a recording is divided into multiple files, the playback will be without any interruptions.

Every 224 seconds, a new .wav file will be created of which the 3 last digits will be automatically incremented.

For example:

XXXXXX\_000.wav

X is the file name you can chose

After 224 seconds, the next file will be:

XXXXXX\_001.wav

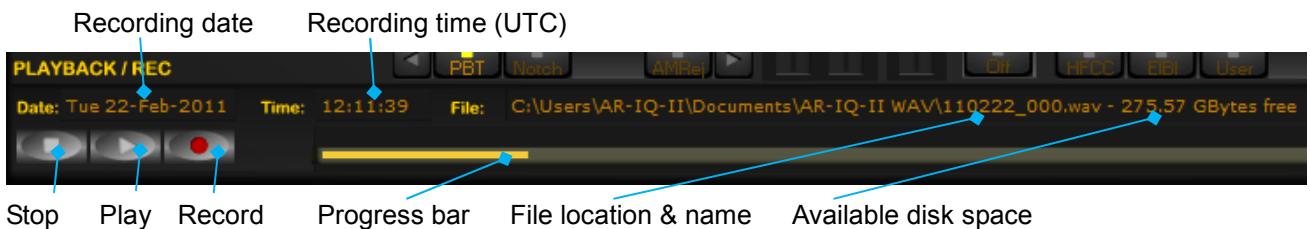
And then every 224 seconds:

XXXXXX\_002.wav

XXXXXX\_003.wav    etc...

The resulting .wav file can only be played back with the AR-IQ II software! It will not work in other media player software.

### Controls:



The recording date and time is based on your PC's system date and time. If adjustments are necessary, these have to be done in your PC.

## 5-1. Recording

To record, first select the center frequency of your choice.

Click on the record button at the bottom left of the window..

A new window pops up asking for a user defined file name and folder location to store the file. For ease of use it is advised to create a file name which includes the date, such as 110510 for May 10, 2011. The software will amend this file name with \_000 to become 110510\_000.

Note: During recording and playback, the frequency range (start and end frequency) cannot be changed.

## 5-2. Playback

To play back a file which has been recorded at an earlier time, click on the "Wav" button, within the "INPUT SELECT" panel.



The receiver stops receiving live signals and the "Wav" and "File" buttons are now activated. Click "File" and browse on the PC to the location of the pre-recorded file(s). Then simply press the PLAY button (button with white triangle).

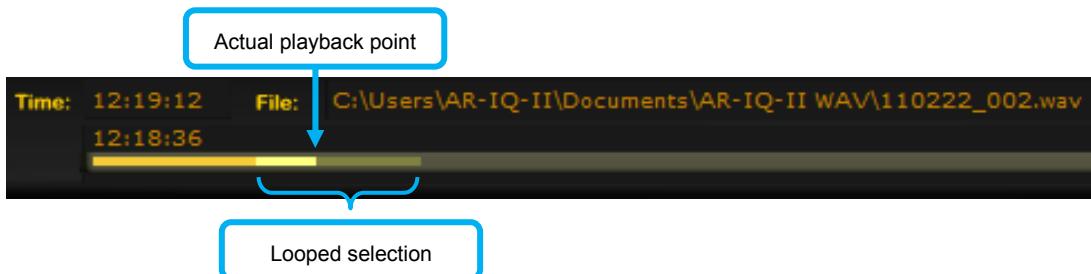
If your previous recording has created numerous automatically named files, the software will playback the whole series of files if required. This playback should be continuous and flawless, even during track / file change. The software will playback .wav files which have been copied to a DVD equally as flawlessly.

During playback, the software will display date and time in the same format as during recording. Therefore as long as the PC clock has been kept accurate during recording, so will the playback time.

Note: Playback of a .wav file will also work if the receiver is not connected to the PC.

### 5-3. Fast forward & rewind

Single left click anywhere on the progress bar to advance to a chosen point of the recording.



To loop the playback over a smaller selection, simply left click and hold at the desired spot on the progress bar. Drag the mouse pointer along to the right to create a new line, which will be a much paler shade of yellow. Release the mouse button to start playback immediately from the new desired spot. This should be flawless and instant. The player will repeat the new selected section only over and over until manually stopped. This may be useful if the user wishes to repeat a possible station ID over and over again.

A left click on the line cancels the new selection, and returns the playback to the beginning of the file.

Note: The progress bar differs slightly in operation from common progress bars in WINAMP or WINDOWS MEDIA PLAYER for example.

**Troubleshooting:** If the user fails to create a new line, but only "clicks" to attempt to advance playback by a few minutes, the software may seem to "stick". The player is probably only playing back a very small selected area over and over again, hence the impression of "stuttering and jamming".

## 6. Other controls

### 6-1 Antenna input

Allows manual antenna selection.



Ant.3 and Ant.4 do only function if the receiver is AR5001D and the optional AS5001 antenna selector is used.



Automatic antenna selection is possible by clicking the "AutoAnt" button in the FRONT-END section of the screen.

## 6-2 Pre-amp



Switches the receiver's front-end pre-amplification on. When in the ON position, the attenuator level is set to 0dB.

## 6-3 Attenuator

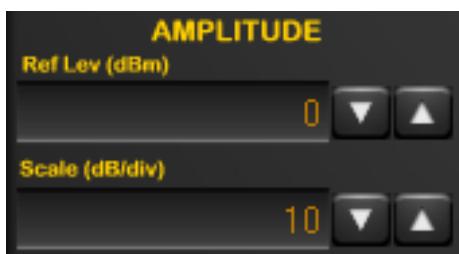
Like on a conventional receiver, the attenuator reduces signal input. This may be useful if a user has problems with strong local signals appearing on frequencies other than their own

Possible selections: 【0dB】【10dB】【20dB】【Auto】

Whichever selected, the "Pre-amp" is switched off.



## 6-4 Amplitude (reference level & scale)



Both "ref level" and "scale" alter the height and position of the spectrum waveform displayed when the Spectrum mode on the main panel is selected as well as the spectrum waveform in the secondary "bandwidth" window.

## 6-5 Demodulation modes

The following modes can be used:

AM, SAM (SYNC AM), CW, RTTY, LSB, USB, FM, WFM, USER



(DRM is not used)

When "Auto" is selected, the system will automatically select the demodulation mode, depending on the selected receive frequency.

**USER demodulator:** When the user demodulator is selected the receiver VAC (Virtual Audio Cable) output is fed with zero-IF IQ samples, filtered with the selected bandwidth and normalized in amplitude with the selected AGC setting. This mode is useful when a third party application wishes to process the zero-IF data stream at the selected frequency.

## 6-6 AFC (automatic IF filter frequency control)

AFC does only work in NFM mode with a filter setting up to 30kHz.

It does NOT automatically retune the receiver to the nearest strong signal.

Real function of AFC: It tunes the IF filter's frequency automatically when an unstable frequency is received. It does not change the receive frequency. Since only IF is changed, there is no "visual" change on the control program's spectrum or frequency display. The change can only be heard on "audio".

It only works if the sending station's frequency shifts are within the selected IF filter's bandwidth.

Example: IF=15kHz >> +/-7kHz, IF=30kHz >> +/-15kHz

## 6-7 Volume & mute

Volume control is on the bottom right of the software, though many users prefer to use the volume on their external amplifiers. The button above the Volume slider enables the audio output and mutes it when disabled.

## 6-8 Noise reduction

The NR control reduces background noise and is activated by the button above its slider control. The NR slider controls the amount of noise reduction. The noise reduction can be activated in all modes except with the USER demodulator.

## 6-9 Noise blanker (NB)

The NB control reduces impulsive noise and is activated by the button above its slider control. The NB slider sets the threshold of the noise blanker. Care should be exercised when strong signals are present in the band where the receiver is tuned. A too low NB threshold (NB slider at or near its maximum position) may affect the quality of the tuned signal and introduce intermodulation distortions.

Two noise blankers can be selected with the two buttons "NBW" (Wide) and "NBN" (Narrow).



The Narrow NB, operates on the bandwidth selected with the BW buttons (56 kHz, 28 kHz, 14 kHz, etc).

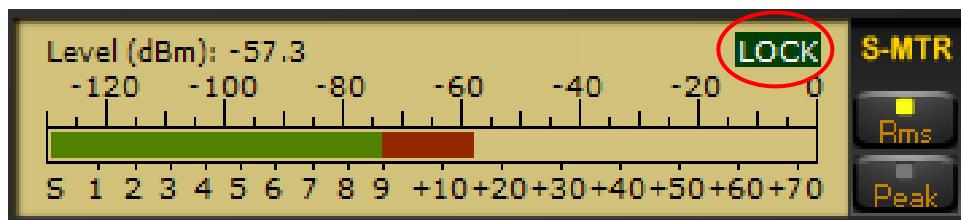
The Wide NB is more effective when there are no strong signals in the bandwidth the DDC is tuned to.

The Narrow NB is more effective in all other cases.

## 6-10 S-meter

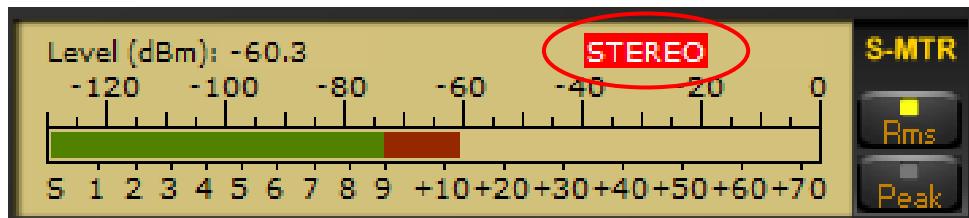
The signal strength meter (S meter) is marked in both S points and dBm (S9=-73 dBm input). The S meter response is very linear thorough all its scale and accurate to within less than 1 dB across the range.

**LOCK indication:** When operating in Sync AM mode (SAM), a small "LOCK" display appears at the top right of the meter, when the demodulator locks on to the AM carrier.

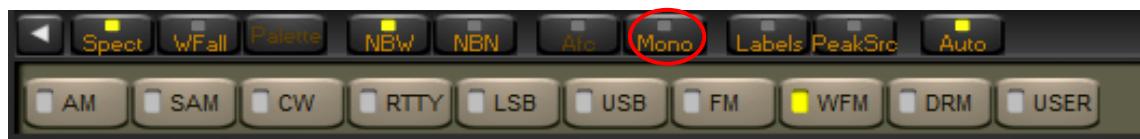


### STEREO indication:

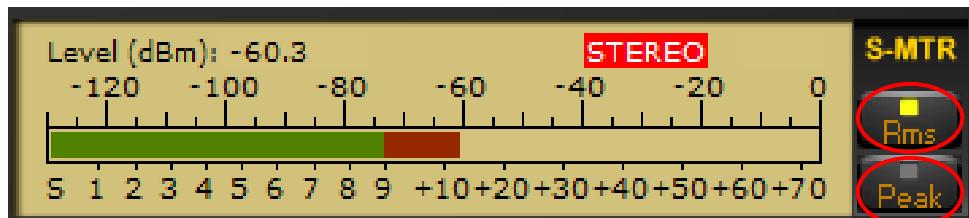
Whenever a stereo signal is decoded in WFM mode, a small "STEREO" display appears at the top right of the S-meter.



You can also force MONO reception by clicking the "Mono" button as follows:



The S meter can be operated in RMS mode (input signal RMS power displayed) or in Peak mode (input signal peak power displayed) clicking the "RMS" or "Peak" at the right side of the S-meter.



## 6-11 Squelch & auto-mute

Squelch and Auto-Mute threshold levels can be controlled clicking the desired value in the S-Meter bar with the left button of the mouse.

The Auto-Mute function works in the opposite way of the squelch block. It mutes the audio when the RF input level is GREATER than the desired threshold and can be used to mute the receiver automatically when a transmitter or a transceiver (with proper antenna switching circuits) is activated.

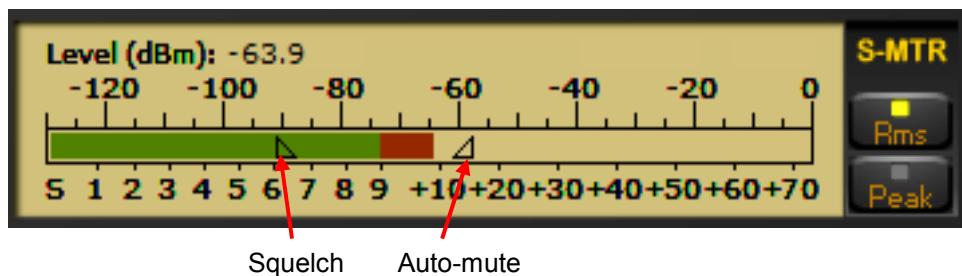
The squelch level is set clicking the S-Meter bar in the S1-S9 zone. A triangle with a left oriented vertical side in the S-Meter bar indicates the selected squelch threshold.

The Auto-Mute level is set clicking the S-Meter bar in the S9 - S9+70 zone. A triangle with a right oriented vertical side in the S-Meter bar indicates the selected Auto-Mute threshold.

To disable the squelch and/or the Auto-Mute functions, right click the appropriate S-Meter zone.

The hysteresis of the squelch and Auto-Mute functions is approximately 6 dB.

The selected thresholds are peak values.



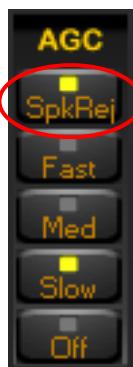
## 6-12 AGC (automatic gain control)



The Automatic Gain Control keeps the audio output at a constant output level, disregarding the input signal power. Three time decay constants can be selected with the buttons “Fast”, “Med”, and “Low” in the AGC control bar.

The AGC can be excluded with the “Off” button. In this case the audio output level is controlled by the VOLUME slider. When the AGC is off, large input signals can cause the saturation of the audio output.

## 6-13 AGC spike rejection



The Spike Rejection function emulates the behavior of the AGC of old analog receivers with a relatively long attack time constant. When this function is selected the AGC circuit is much less sensitive to impulse noise which can completely close the receiver gain and affect negatively the receiver performance.

(For more details, read Rob Sherwood's "Dsp Radio not perfect" at <http://www.sherweng.com/documents/Dayton2007w.pdf> )

The time constant over which the impulse noise power is averaged, can be set by the user by editing a registry key. (see chapter 8 for details)

NOTE: The Spike Rejection function introduces a small amount of (soft) audio distortion which is tolerable in SSB/CW communications and should not be activated for digital modes which may be far more sensitive than human hear to nonlinear distortions. Use this function only when required.

## Memory window (MEM)

Not used in this version.

## 7. RESET

The software stores all the user settings in the Windows registry.

To reset the software to its factory default, you need to delete the key stored in the Windows registry by the software as follows:

### CAUTION!

Incorrectly editing the Windows registry or mistakenly erasing a Windows system file may make your PC unusable! Do only proceed with the following instructions if you are confident about what you are doing.

AOR Ltd. cannot be held responsible if something goes terribly wrong.

1) Close the software.

2) Type "regedit" in the Windows Start/Run menu and browse the registry tree for the key:

/HKEY\_CURRENT\_USER/Software/Microtelecom s.r.l./ar-iq-ii

3) Delete the folder "v1.0" to reset the software version v1.0 settings to its factory default (the folder name may vary depending on the software version)

4) Restart the software. (Default software values will be saved to the registry at that time)

## 8. Editing the registry

The following set values used in this software (version V1.0) can be changed by the Windows registry editor.  
(Please note that for future versions, the content is subject to change without previous notice. )

### **CAUTION!**

Incorrectly editing the Windows registry or mistakenly erasing a Windows system file may make your PC unusable! Do only proceed with the following instructions if you are confident about what you are doing.

AOR Ltd. cannot be held responsible if something goes terribly wrong.

You must close the software before editing the Windows registry!

- 1) Close the software.
- 2) Type "regedit" in the Windows Start/Run menu and browse the registry tree for the key:

¥HKEY\_CURRENT\_USER¥Software¥Microtelecom s.r.l.¥ar-iq-ii¥v1.0¥

(all editable registry key are inside this folder)

#### - AGCRiseTime\_ms

The time constant over which the impulse noise power is averaged.

AGC\_RiseTime\_ms defaults to 25 (25 ms).

Values between 5 and 100 (decimal) are accepted.

#### - AudioLatency

It indicates the desired fill level of the output audio buffer's queue.

The default value is 9 and should be good for most systems. Users suffering interruptions in the audio output (whether in real-time or playback mode) can increment this parameter up to a value of 20 (decimal) until a reliable audio output is produced.

#### - AutoModeCountry

Adjusts the band plan according to one of the 3 following world regions:

0 U.S.A

1 Japan

2 Europe

#### - LevelBarPos

The main window levels bar position can be tweaked upon user preferences.

0 Left side of spectrum view

1 Center of spectrum

2 Right side of spectrum

- MouseWheelReverse

Scrolling of the main display and/or of the frequency pane digits is now possible in the user preferred direction.

1 Opposite direction

0 Default

- PowerOffOnExit

Receiver on/off behavior when the software is closed.

1 When the software is closed, the receiver is automatically powered off.

0 When the software is closed, the receiver stays on.

- VComPort

The COM port the software listens to for incoming CI-V commands, can now be configured via the key.

Possible range: 1 – 255

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