The SDR Control software – short user manual.

1. Generic information about software.

The SDR Control software it is program that allows user to control over next parameters of AFEDRI SDR:

- Central receive frequency

- "Digital" (decimation) gain of Digital Down Converter channel (DDC)

- Gain of input Variable Gain Amplifier (VGA).

- To display real receive frequency in the case of using SDR together with external transverter adapter.

Also software allows to save in SDR's internal EEPROM next "default" parameters :

- Central RX frequency after Power Up of SDR

- Gain of input VGA.

- Digital gain of DDC.

After default parameters was saved in EEPROM and the SDR was reconnected to Personal Computer (PC), SDR is starting with saved in EEPROM default parameters.

This option allows, in some cases, to use AFEDRI SDR without need to run SDR Control. For example, in the case when AFEDRI SDR is used as panoramic adapter for brand name transceiver, in this case it is enough to run SDR Control only once – to save needed default parameters.

2. **Installation and running of SDR Control software**

2.1.Installation of software under Windows

It is possible to download latest version of SDR Control software (also source code is available) on web site http://4z5lv.net . The software can be used both or independently, or as plug-in for different SDR software, like Winrad, HDSDR other "clones" that are using ExtIO_ interface for Winrad.

The next file is included in downloaded archive file:

- ExtIO_AFEDRI_SDR.dll – it is Windows dll that contain plug-in and user interface.

- SDR_Control.exe – it is additional program that is running SDR Control software independently of external software (without Winrad or so).

- QtCore4.dll –dll from Qt development tools

- QtGui4.dll – dll from Qt development tools

- libgcc_s_dw2-1.dll – dll from MinGW package (Windows version of gcc compiler)

- mingwm10.dll – dll from MinGW package (Windows version of gcc compiler)

2.1.1.   *Using SDR Control with Winrad – like software, as plug-in*

To use SDR Control software as plug-in, you need extract files included in archive that was downloaded from my site, in same directory where Winrad is installed. Further you need continue according Winrad (or other software) instructions.

2.1.2.   *Running SDR Control standalone.*

To run SDR Control software standalone, i.e. without running Winrad (for example for some experiments or to use SDRControl with different software that does not support plug-in interface), you need to extract file archive to any folder you like and run executable - SDR_Control.exe.

2.1.3.   *Using SDR Control with Linrad*

It is possible to use SDR Control software together with Linrad software in two modes

2.1.3.1.   Running SDR Control standalone, according paragraph 2.1.2

2.1.3.2.   Running SDR Control together with Linrad as a plug-in – in this case SDR Control will start automatically after Linrad starts. To use SDR Control software as Linrad plug-in, you need:

- Download http://www.sm5bsz.com/linuxdsp/linrad.htm file archive containing Linrad source code.

- Extract archive in personal folder

- Download from my site file wusers_hwaredriver.zip, and copy source file wusers_hwaredriver.c to same folder where Linrad sources are located.

- Go to Linrad sources folder and run script - configure.bat

- If everything is OK, run make.bat (please read Linrad readme files for more options and recommendation)

More information about Linrad compilation, can be found on SM5BSZ web pages http://www.sm5bsz.com/linuxdsp/linrad.htm.

You can also to try precompiled version of Linrad, that can be found on my web site, in http://4z5lv.net in Downloads section.

3. Graphical User Interface (GUI)

SDR Control software contains four Tab screens:

- SDR Control (Frequency Control in old versions)

- Command shell

- Filter tools

- About

Desired tab screen can be chosen pressing according tab in upper part of application window.

3.1.   SDR Control tab

You can see screenshot of SDR Control tab screen on Figure 1 .

Functional description of tab screen is listed below:

3.1.1. Indication gadget "FE Frequency"- shows real frequency of internal NCO of Front End chip (AFEDRI8201).

3.1.2. Indication gadget "Central (LO) Frequency" – shows central **receive** frequency of SDR. In regular mode it is same, as "FE Frequency", or can be different, if the SDR is configured to work in transverter or alias modes (transverter and alias modes are described below).

3.1.3. Indication gadget "Tune frequency" – shows information about frequency of "software" receive frequency. This information is sent to SDR Control from external software (Winrad, HDSDR, Linrad) using plig-in interface. The displayed number on this gadget is valid only, when SDR Control software is running in plug-in mode. When SDR Control is running standalone, the gadget «Tune frequency» shows «0».
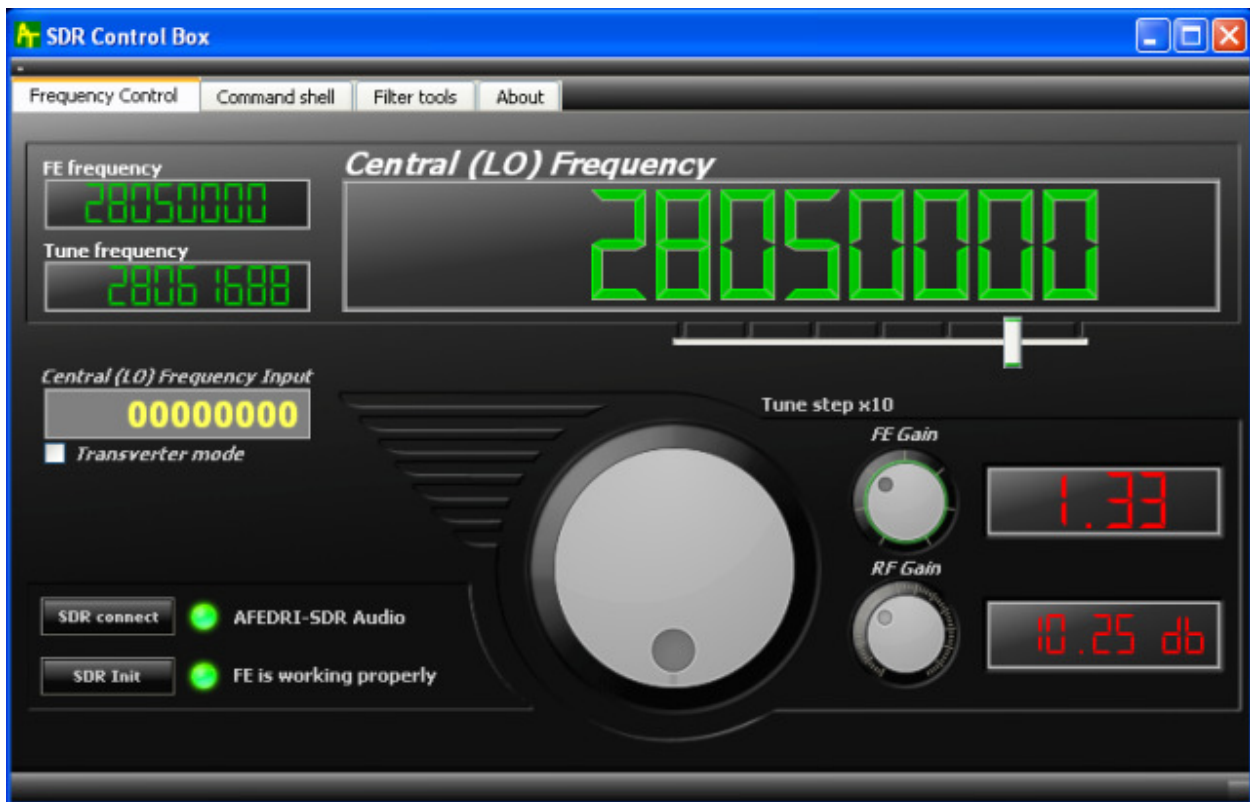

Figure 1 SDR Control tab screen

3.1.4. Slider "Tune step x10" - defines minimal tune step, when the tuning is done by virtual tune knob (located in central bottom part application window, described below). The current tune step is displayed in text form «Tune step x10…» or alternatively it defined by position of slider under according number position of «Central (LO) Frequency» Indication gadget.

3.1.5. Text input gadget «Central (LO) Frequency input» - allows quick keyboard input of receive frequency from. To change frequency, user must input desired frequency and press key "Enter".

3.1.6. Button «SDR connect» - when pressed, provides reconnection to AFEDRI SDR using USB interface and processes software "reset" of SDR hardware. In latest SDR Control software version this procedure is done automatically when PC finds, that SDR was connected (reconnected) to USB. I.e. software is scanning USB ports, testing for AFEDRI SDR existence, when SDR connection was found software is beginning "SDR Connect" procedure. Used need use this button also, to reload the new parameters, that was saved before in internal SDR's EEPROM, this process is done from "Command shell" tab (see below).

3.1.7. Virtual LED indicator (green/red) and text message (on right side of button «SDR connect») – shows initialization status of SDR. If SDR was found and firmware started successfully, then indication color is - green and text message is a name of USB device, that was found (for example – "AFEDRI-SDR Audio"). If the SDR is not connected to the PC or there is some fault, the indicator color will be red and error message will be shown (see. Figure 2.).

Figure 2 SDR Control screen when AFEDRI SDR disconnected from PC

3.1.8. Button «SDR Init» - when it is pressed, SDR provides re-initialization of Front End chip (AFEDRI8201).

3.1.9. Virtual LED indicator (green/red) and text message (on right side of button «SDR Init») – shows initialization status of Front End chip inside of SDR. If Front End was initialized successfully, the indicator color is green and there is a text message on right side of the indicator. If a fault occurs in the time of Front End initialization, the indicator color is red, and error message is shown (см. Figure 2.).

3.1.10.   Tuning knob – is used to change central RX frequency of SDR, with minimal step, that is defined by "Tune step x10" slider.

3.1.11.   "FE Gain" knob – is controlling "digital" gain of DDC (inside AFEDRI8201 chip). It has regulated range from 1 to 4. Indication gadget on right side shows current digital gain value.

6

3.1.12. "RF Gain" knob – is controlling gain of input Variable Gain Amplifier (VGA) of SDR. Indication gadget on right side shows current gain of VGA in dB.

3.1.13. Check Box – "Transverter mode", if this Box is checked - transverter mode is enabled. Transverter mode means next: central RX frequency that displayed in indication gadget "Central (LO) Frequency" is calculated with addition of 1-st heterodyne frequency (frequency shift). When "Transverter mode" is checked, additional Test Box is shown - "1-st Heterodyne Frequency".

3.1.14. Text Box – "1-st Heterodyne Frequency", shows and allows keyboard input of 1-st heterodyne frequency. By default it is 1268000000 Hz (to use with 1296MHz/28MHz transverter).

Figure 3 Transverter mode

3.2. "Command shell" Tab

Screenshot of "Command shell" tab is shown on Figure 4.

3.2.1. Check Box "Route console output to HID interface" – is not used in current version.

3.2.2. Text Box "Command Input" - is not used in current version.

3.2.3. Text Box "Main clock Input" – is used to input main clock oscillator frequency of AFEDRI SDR, after program start and SDR reconnection it contains value that is saved in EEPROM of SDR.

3.2.4. Button "Change Main clock" – when this button is pressed, the software sends new main clock frequency value (read from "Main clock Input Text Box") to SDR, and SDR saves this value in internal EEPROM.

Attention!!! User need to check the real frequency of oscillator that is used in AFEDRI-SDR (oscillator U5 - assembled on SDR PCB). It is recommended to change this frequency, only in situation, when crystal oscillator of different frequency was replaced on PCB. The main clock frequency of SDR can have different value.

3.2.5. Central Text Box is used to print debug messages.

3.2.6. Button "Save defaults" – when this button is pressed by user the software sends to SDR command to save current working parameters to internal EEPROM, as default parameters. The SDR saves in EEPROM next parameters:

- Central RX (LO) frequency

- Variable Gain Amplifier's (VGA), default gain

- Digital gain of DDC

SDR will use those saved parameters as "default", after power up or software reset, when SDR is connected to Personal Computer using USB cable.
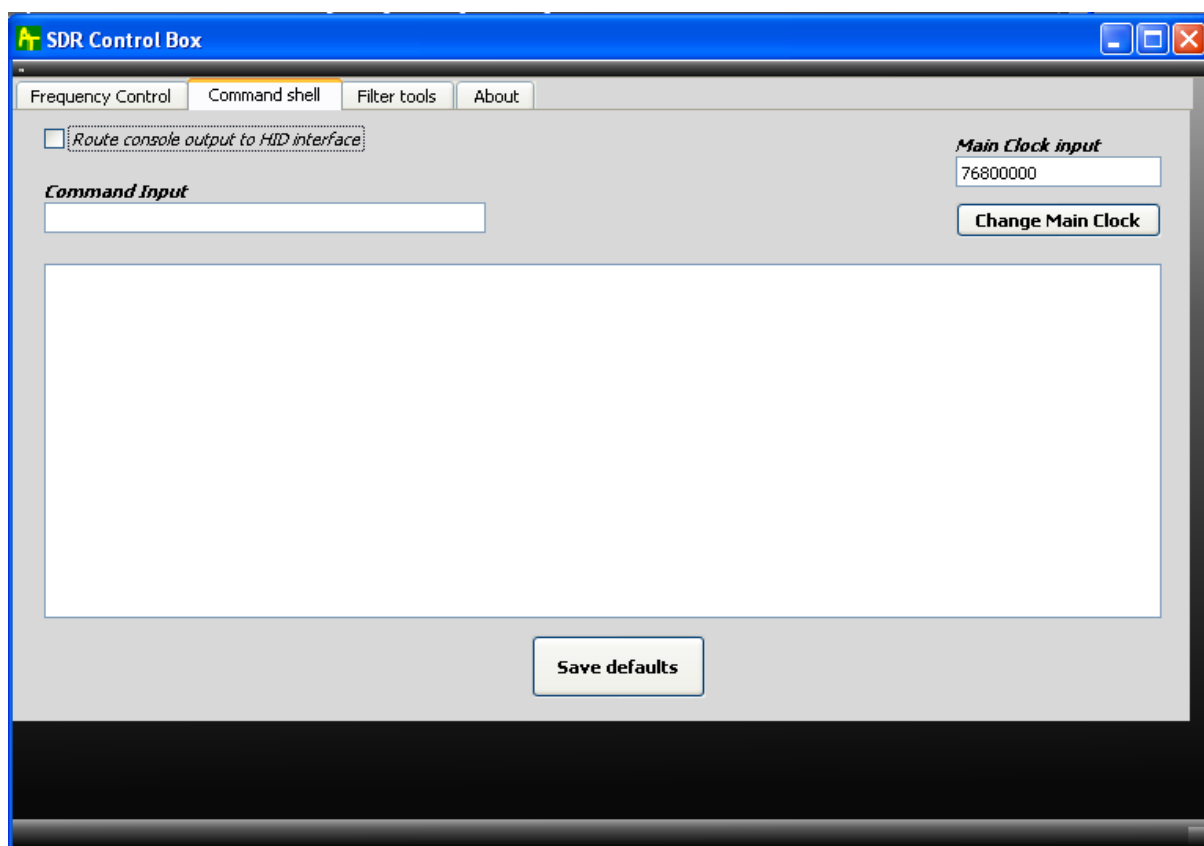
Figure 4 Command shell tab

3.3.   "Filter tools" tab

It is not used in current version (TBD).

3.4.   "About" tab

Shows only information received from AFERDI-SDR (см. Figure 5.),

• Shows firmware version, that programmed in AFEDRI SDR

• Shows main clock frequency of AFEDRI SDR, this is the value that was read from EEPROM after SDR reboot (power up).
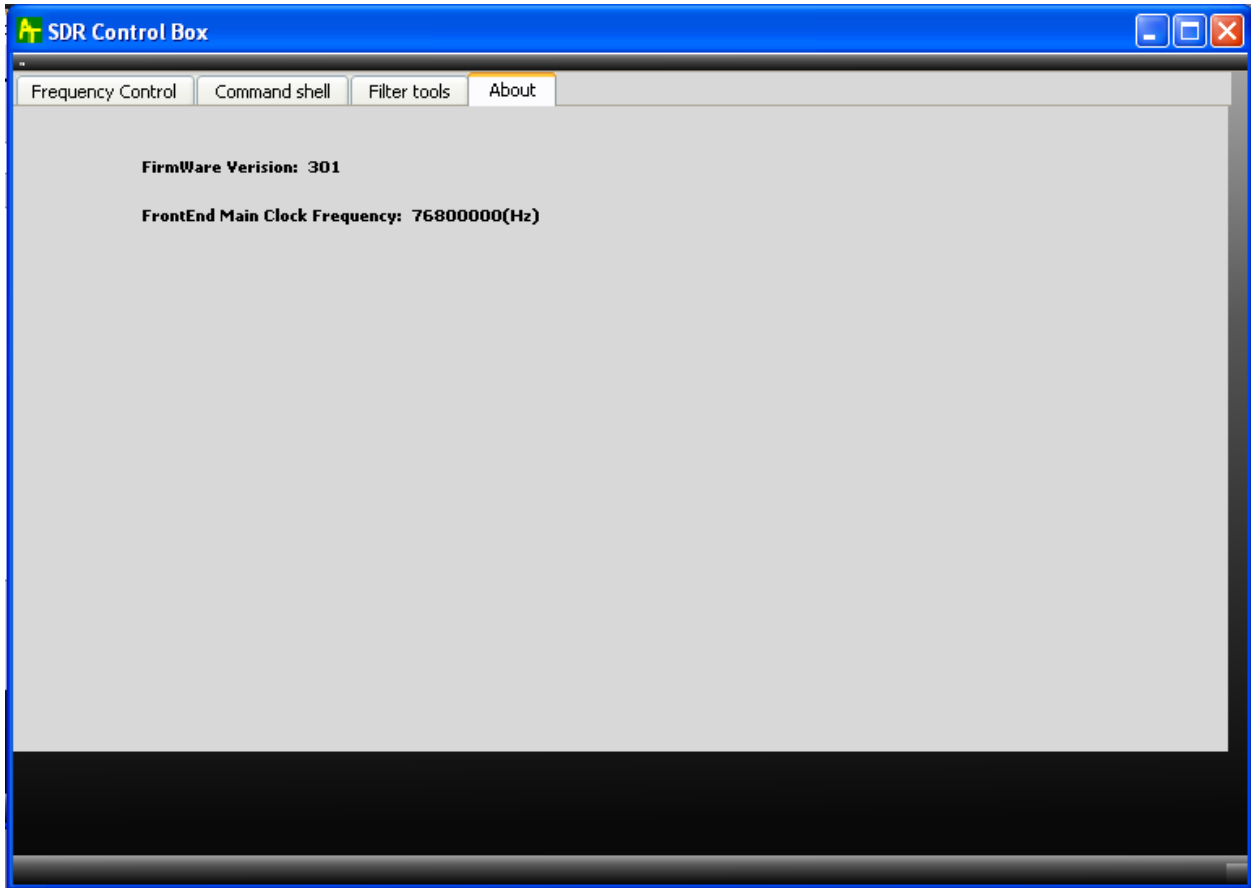
Figure 5 About tab