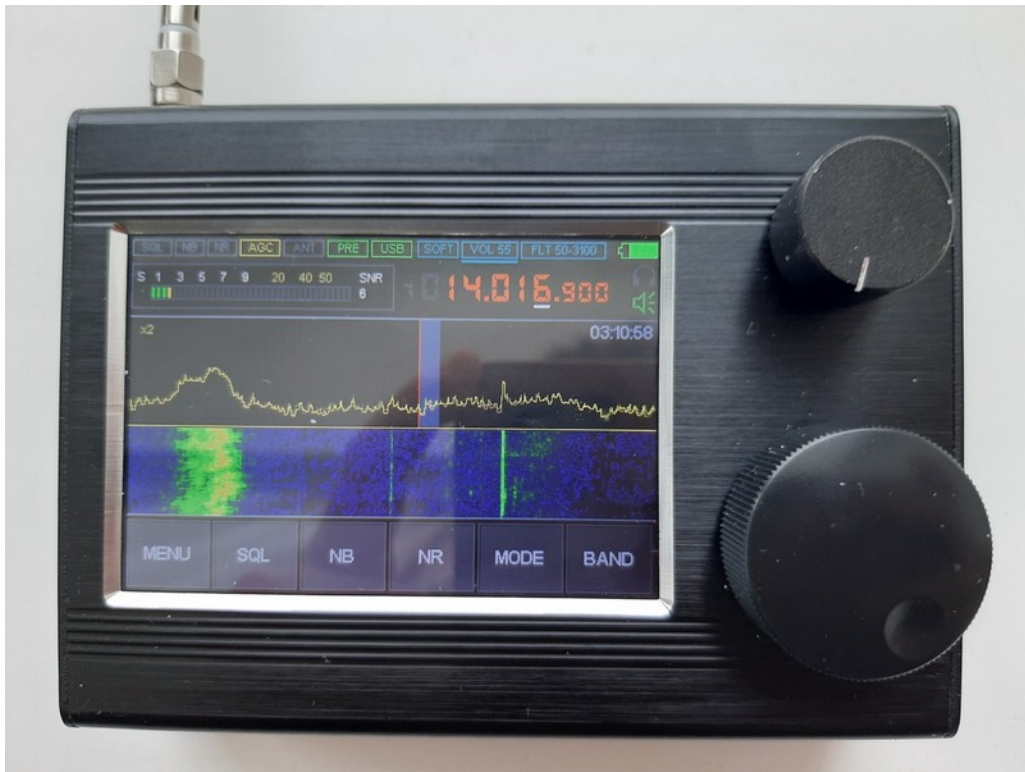# "Malachite- DSP" Radio Receiver

R6DAN (Vladimir Gordienko), R6DCY (Vadim Burlakov),

RX9CIM (Georgy Yatsuk)

English translation by

John - at- Linuxslate.com   2020

Manually translated with help from Yandex Translate.

Table of Contents

1. General information

The receiver was developed with the participation of: RX9CIM (idea, DSP , general scheme), R6DAN (GUI and control), R6DCY (refinement of the circuit, wiring, design) and Igor Naumenko (active participation in the discussion of solutions).

Key Features :

1) The radio is built according to the SDR principle - the functionality is determined by the loaded software

2) Frequency range - from 50 kHz to 250 MHz, from 400 MHz to 2 GHz

3) Types of analog modulations : AM, SSB , NFM , WFM

4) Functionality : variable filter width, adaptive squelch , threshold squelch , Noise Blanker, AGC, Equalizer

5) An inexpensive, but functional MSI001 chip is used

6) Applied powerful STM32H743 with a clock frequency of 480 MHz

7) 3.5-inch display with touchscreen

8) Built-in UHF

9) Controls - 2 encoders with buttons, and a touchscreen

10) Powered from internal battery or USB, with USB charging. The capacity of the built-in battery is at least 1500mA/h.

11) Power consumption - 300mA when listening with headphones.

12) Reception with a built-in telescopic or external antenna. For improved HF reception with a telescopic antenna, there is an additional board , which contains:

- source and repeater with switching elements;

- attenuator, adjustable in the range of 0-30dB with a step of 1dB;

- 4 filters: LPF 500kHz, bandpass filter 500-1500kHz, bandpass filter 1500-4500kHz, HPF 4500kHz

The board is built into the standard receiver design.

13) USB connection to a computer with the ability to transfer SAT, IQ and audio.

14) 160 kHz span with scalability

15) Sensitivity: -0.3 mV at frequencies up to 1 GHz

16) Selectivity: about 85 dB due to the characteristics of the MSI001 chip

17) Aluminum chassis

18) Display backlight control

19) Antenna socket type: SMA

20) Receiver dimensions:120x88x39mm

The receiver settings cannot cause a malfunction the receiver. The user can always reset the software settings to the default state.

Project status - available for self-assembly.

Commercial distribution without the consent of the authors - is prohibited.

With the exception of the test version of the firmware, activation of the receiver is required, for this you need to flash the receiver, turn it on and send the code shown on the screen to: malahit _ sdr @ rambler by e-mail . ru. Then enter the code received in response.

Receiver schematic is at the link :

https://rx9cim.ucoz.ru/load/malakhit_dsp/fajly/skhema_i_bom/9-1-0-46

The firmware can be found at the following link:

https://rx9cim.ucoz.ru/load/malakhit_dsp/8

Instructions: https://rx9cim.ucoz.ru/load/malakhit_dsp/fajly/instrukcija_malakhit_dsp/9-1-0-48

SAT uses the Kenwood TS-480 protocol . Driver for USB SAT connection -

https://rx9cim.ucoz.ru/load/drajver_sat_dlja_usb/1-1-0-41

Attention! For safety reasons, the battery in the receiver must be disconnected before transportation! Therefore, before using the receiver you need to open the receiver and connect the battery! It is not recommended to completely discharge the built-in battery. This will damage the battery.

2. Recommendations for self-assembly.

When using a metal case, it is recommended to ensure contact of the touchscreen with metal. Otherwise, some instances of touches may not work correctly.

The first time you turn on the receiver, you will need to activate the firmware.

A code will appear on the screen in the upper part, which must be sent by e-mail to malahit_activation@rambler.ru. You will be sent a response code which must be entered using the upper encoder and its buttons. After completing the entry, press the button of the lower encoder. If everything is entered correctly, the receiver will enter the main operating mode.
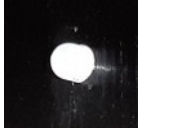
3. External Features and Controls
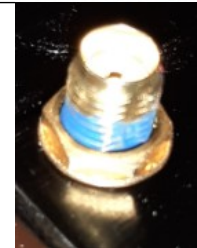
Attention! The views of the receiver screen are given as examples and can change depending on the firmware version that is loaded into the receiver.

Main Controls and Structural Elements:

	LEFT button controls the power. Located on the side cover
	Headphone Jack
	LED charging indicator
	Socket for connecting USB charger and PC
	Encoder 2 and. To control volume, filter, and equalizer settings

	Encoder 1. For frequency control, and audio output
	Display and touchscreen
	SMA antenna connector

4. Turn the receiver on and off

Starting from firmware version 1.0 d the receiver is enabled

by pressing the power management button three times during the interval

time 5 seconds. For older firmware versions enabling the receiver carried out short-term by clicking on button management power supply.

The receiver is turned on by briefly pressing the power control button. Switching off is carried out by long pressing the power control button until the display goes out.

Switching off is performed by long pressing the power button until a series of tones are heard. After the audio signal is heard, and the button is released, the receiver turns off.
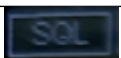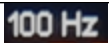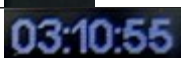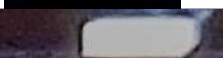
5. User Interface
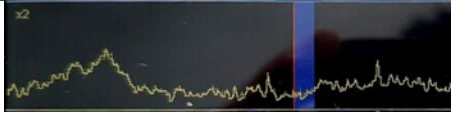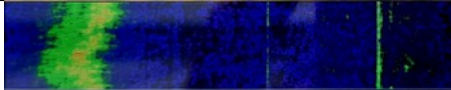
The main receiver window looks like this:

Screen Indicators

Indicator	Function
	Battery Indicator
FLT 50-3100	Filter frequency characteristics: The first number is the lower frequency, second number - high frequency
VOL 55	Volume Level
AGC 20	AGC Level
USB	Modulation Type
PRE	UHF green means "on", gray means "off".
ANT	Indicator of the selected antenna for HF . It is intended for use with an additional receiver board. Gray indicates 50 ohm input, green indicates Hi - Z
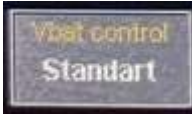
AGC-M	AGC status - Yellow indicates on, gray indicates off.
NR	Adaptive Squelch Status - Green indicates on, gray indicates off.
NB	Noise Blanker Status - Red indicates on, gray indicates off.
SQL	Squelch Status - Red indicates on, gray indicates off.
	Selected audio output indicator — Headphones, Speaker, or Both.
014.019.400 100 Hz	The current receiving frequency. Clicking on this area will enter the direct frequency input mode.
100 Hz	Current Tuning step
SNR 5	Signal to noise ratio indicator
S 1 3 5 7 9 +20 +40	Signal level indicator. When you click on this area, you enter / exit the HARD (Settings) menu.
x2	Spectrum analyzer magnification indicator
03:10:55	Current Time
	Decoder operation indicator
HARD	Button for working with the HARD menu
AUDIO	Button for working with the AUDIO menu
VISUAL	Button for working with the VISUAL menu
NR	Button to enable / disable the Adaptive Squelch
MODE	Button for selecting the type of demodulation
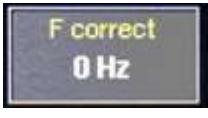
BAND	Button for selecting memories and frequency range
▬	Receiver settings saving indicator. Appears when the receiver settings are changed. When the settings are saved, it turns green and disappears. (Upper Right, near Headphones Indicator.)
	Spectrum analyzer window
13.995 14.005 14.015 14.025 14.035	Frequency scale
	Waterfall window

5.2 HARD Menu

You can enter the HARD menu by clicking the icon labeled HARD. You can exit the HARD menu to the Main Screen by clicking on the HARD button, or by clicking on either of the encoders.

Options in the HARD menu:

Parameter	Function
EN1 reverse Disable	Reverse direction of the ENC_FREQ encoder The parameter toggles when you click on this indicator.
EN2 reverse Disable	Reverse direction of the ENC_VOL encoder. The parameter toggles when you click on this indicator.
Vbat control Standart	Battery voltage monitoring function. Standard – The receiver will power off automatically when the power supply voltage is reduced to 3.3 V. [Recommended].

	LOW – Th receiver continues to work when the power supply voltage decreases. The parameter toggles when you click on this indicator.
SW antenna Hi-Z	Type of receiver input (antenna) impeadance. 50 Ohms – for "large" e.g. outdoor antennas. Hi-Z – for short antennas, such as telescopic ones. Only works if there is an additional card (module). The parameter toggles when you click on this indicator.
PREAMP Disable	Enabling and disabling the built-in UHF. The parameter toggles when you click on this indicator.
ATT 0 dB	Setting of the input RF attenuator. Only works if there is an additional card (module). The parameter is changed by clicking on the Icon and then rotating the ENC_VOL encoder.
RF GAIN 20	Internal msi001 parameter. Responsible for broadband quadrature gain structure internal to the msi001. The parameter is changed by clicking on the Icon and then rotating the ENC_VOL encoder.
LNA / MIX1 GR Disable	Internal msi001 parameter. Gain reduction – Responsible for UHF amplification part of msi001. The value Disable means maximum gain, Enable-gain is reduced.
MIX / MIX2 GR Disable	Internal msi001 parameter. Responsible for the gain of the mixers in the UHF portion of the msi001.
F correct 0 Hz	Correction of the reception frequency error in Hz. The parameter is changed by clicking on the Icon and then rotating the ENC_VOL encoder.

5.3 CLOCK Menu. Setting the Clock.

This page is designed for setting the clock. You can enter this menu by long pressing the HARD button. Setting is performed by using the ENC_VOL and its button. To save, long press the ENC_VOL button until there is a beep sound. Exit by pressing the HARD button. You can exit to the main screen of the receiver by clicking on the the ENC_FREQ button. (The time will not be saved if you exit before saving.)

5.4 VISUAL Menu
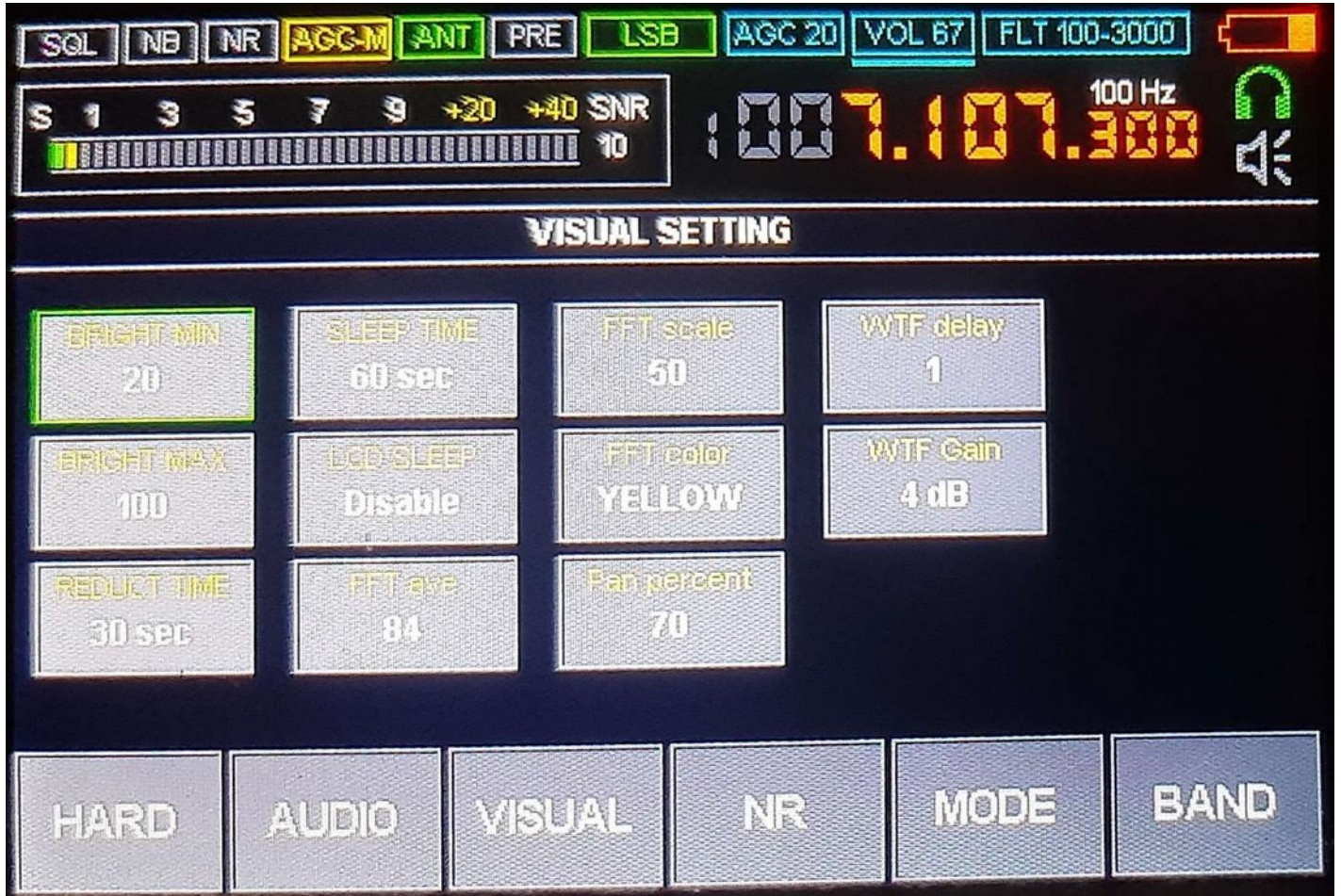
You can move through the menu items by clicking on the touch screen.

You can change the parameters using the ENC_VOL.

Exit the VISUAL menu by pressing the VISUAL button or by clicking on the ENC_VOL encoder button.

Options in the VISUAL menu:

Parameter	Description
BRIGHT MIN 20	The minimum value of brightness of the display. The time Before it decreases to this value is set by the Reduction time.
BRIGHT MAX 100	The maximum value of the brightness of the display.

REDUCT TIME 30 sec	Time after last use of a control or the touchscreen to reduce the brightness of the display.
SLEEP TIME 60 sec	Time after last use of a control or the touchscreen to turn off the LCD display. This parameter is only active when the LCD Sleep function is enabled.
LCD SLEEP Disable	Determines whether to turn off the display or only reduce the brightness of the backlight.
FFT ave 84	Spectrum analyzer FFT averaging speed.
FFT scale 50	Spectrum Analyzer Display Range.
FFT color YELLOW	Spectrum analyzer line color.

5.5 AUDIO Menu
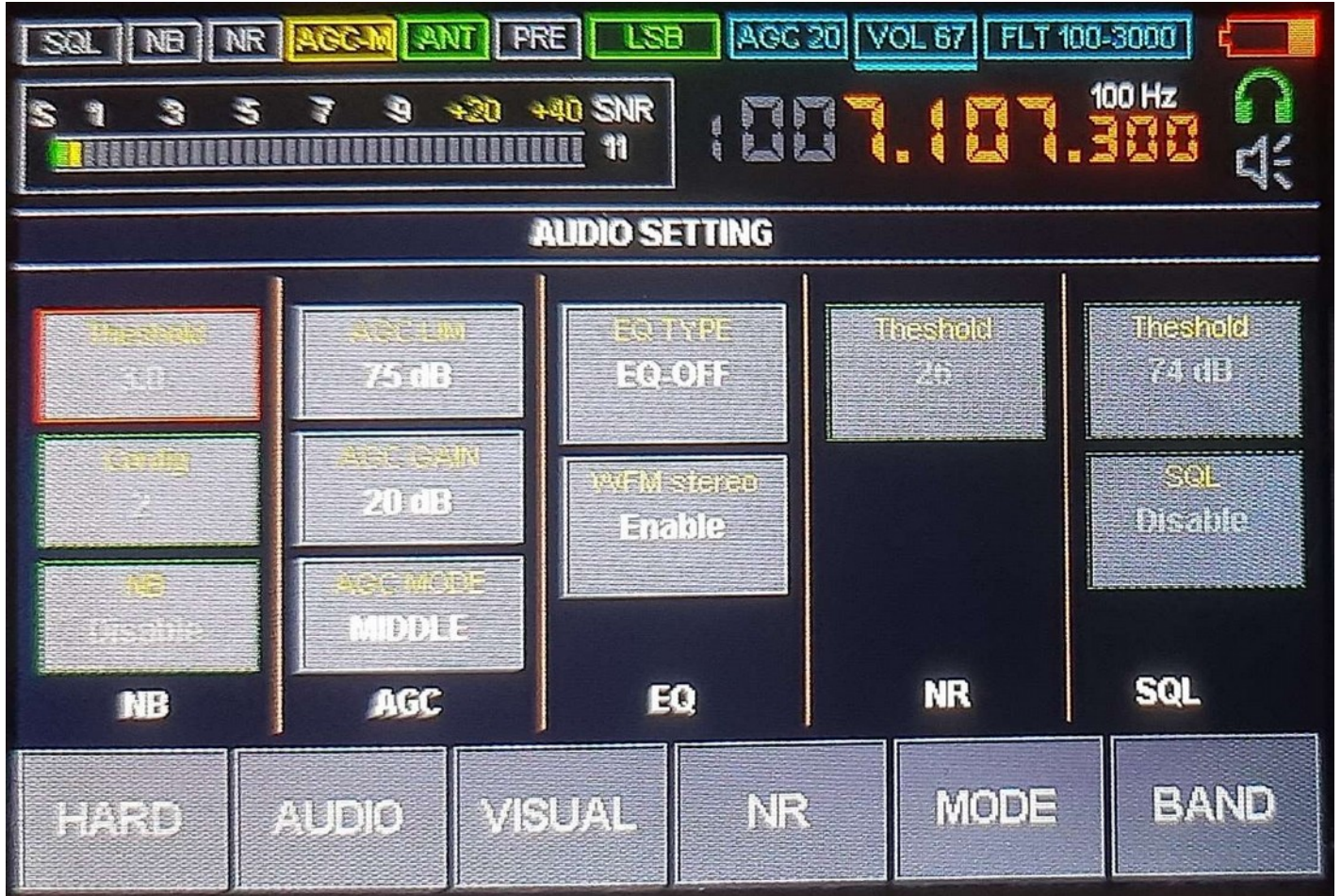
Options in the AUDIO menu:

Parameter	Description
	Noise Blanker Settings: - Threshold – Trigger threshold relative to the average signal level; - Config – Configuration mode of operation of the Noise Blanker - NB – Enable or disable the Noise Blanker

AGC LIM 75 dB AGC GAIN 20 dB AGC MODE MIDDLE **AGC**	AGC settings: - AGC LIM – Maximum audio output level - AGC GAIN – Signal Gain in the AGC loop. When when the AGC is turned off, this indicator is responsible for manual gain value. - AGC MODE – The AGC mode of operation: OFF, FAST, MEDIUM, SLOW, LONG
EQ TYPE EQ-OFF WFM stereo Enable **EQ**	Type of equalizer and stereo mode. (Only applies to WFM mode)
Threshold 17 **NR**	Threshold for adaptive noise reduction.
Threshold 74 dB SQL Disable **SQL**	Threshold (Squelch) noise reduction settings. - Threshold – Threshold for triggering the threshold noise canceler - SQL – Enable or disable threshold noise canceler
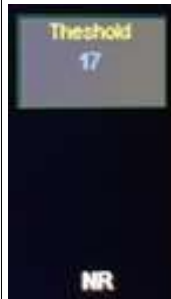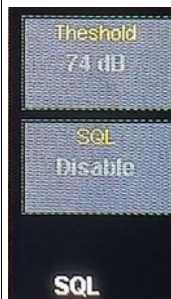
5.6　BAND Menu

The BAND menu is used for selecting (recalling) or saving to a memory location, the current values, (including Frequency, MODE, etc.). Move around the pages by means of the encoder ENC_FREQ. Exit is performed by pressing the BAND button or by pressing the ENC_VOL encoder.

To save (overwrite), long press on a memory location.

5.7 MODE Menu

The MODE menu is used to select the type of modulation and to control decoders (Such as TTY/CW). You can exit by pressing the MODE button or by clicking on the ENC_VOL encoder.

6 Main Functions and Their Use

6.1 Resetting the Receiver Settings

The function is designed to reset all current settings and return them to thier default state. To reset the settings, you must exit all settings menus while the receiver is running. When the main screen is displayed, press both encoder buttons until an audio signal is heard. All user settings, including those saved in memory, will be lost.

6.2 Reverse Encoders

This function is used to change the direction of rotation of encoders for operation. To enable the function, go to the HARD menu by clicking on touch screen select parameters "EN1 reverse" - for encoder reverse ENC_FREQ, or "EN2 reverse" - for ENC_VOL reverse. The parameter toggles when you click on it.

Disable – reverse is disabled

Enable – reverse is enabled.

6.3 Power Supply Voltage Monitoring Function

This function enables the receiver to be turned off when the battery voltage is lower than 3.3V. This function is intended for to save battery life and avoid over discharging the battery or batteries.

To enable or disable the function, go to the HARD menu, and click on the "Vbat control" parameter. Value of the "Vbat control" parameter toggles when you click on it:

- Standard – the function is enabled, the receiver will be disabled automatically when the battery voltage reaches 3.3 V.

- Low – function is disabled, the receiver will work as long as the battery voltage allows.

6.4 Selecting the type of Antenna Input

This function only works if the receiver has an optional board, and only at frequencies up to 50 MHz. To select the type of antenna input, select the HARD menu and click on the "SW antenna" parameter. Value of the "SW antenna" parameter:

- Hi-Z – High impedance antenna input. For working with short antennas like a telescoping antenna or whip antenna.

- 50 Ohm – 50 Ohm antenna input. It is recommended to use with long antennas whose characteristic impedance is comparable to 50 Ohms. (Antennas on a building or vehicle).

6.5 Enabling and Disabling the Built-in UHF

To enable or disable UHF, select the HARD menu, and click on the "PREAMP" parameter.

Value of the "PREAMP" parameter:

- Enable – UHF is enabled.

- Disable – UHF is disabled.

6.6 Working with an Attenuator

This function only works if the receiver has an optional module. To select the value of the attenuator, select the HARD menu, click on the "ATT" parameter and rotate the ENC_VOL encoder to set the desired value.

6.7 Adjusting the Internal Gain of the msi001 Receiving Chip

The msi001 receiving chip allows you to adjust the coefficients of amplification of the built-in mixers and LNA.

The parameters responsible for adjustments are located in the HARD menu:

- RF GAIN – Broadband mixer gain;

- LNA/MIX1 GR – Parameter responsible for enabling or disabling gain reduction. On UHF affects the gain of the built-in LNA, on SW - first mixer;

- MIX/MIX2 GR – parameter responsible for enabling or disabling gain reduction. On UHF affects the gain of the built-in mixer, on SW- the second mixer.

To change the values of these parameters go to the HARD menu and click on the appropriate parameters. Change the RF GAIN parameter using the ENC_VOL encoder when the RF GAIN parameter is selected. The values of the LNA/MIX1 GR and MIX/MIX2 GR parameters are changed by click on the appropriate parameter.

Values of the LNA/MIX1 GR and MIX/MIX2 GR parameters:

- Enable – Enable gain reduction;

- Disable – The gain reduction is disabled.

Recommendations:

1) The LNA/MIX1 GR and MIX/MIX2 GR Parameters essentially work as an attenuator and it is advisable to use them when working with large antennas, or in the case of receiver overload, which is expressed in the form of receiving false stations.

2) It is not recommended to use RF GAIN parameter values of less than 40 for short (telescopic) antennas and not more than 20 for working with large antennas.

6.8 Reception Frequency Correction

This function allows the elimination of errors in the set frequency.

To work with this function, go to the HARD menu and click on

the "F correct" parameter. Rotate the ENC_VOL encoder to set the desired value

value.

6.9 Selecting an Audio Output

This function allows you to select the desired output for listening to audio:

- Headphones;

- Speakers;

- Both speaker and headphones.

You can select the audio output by clicking on the icon on the main screen of the

receiver.

6.10 Pulse Noise Suppressor (Noise Blanker, NB)

This function provides suppression of broadband pulse interference. The function settings are located in the AUDIO menu, selected by clicking on the corresponding parameters in the NB block:

- Threshold – Trigger threshold, selected manually using ENC_VOL encoder to suppress interfering noise. Not recommended set the value to less than 3.

- Config – NB configuration, selected manually using ENC_VOL encoder for interference suppression.

- NB – Enable and disable NB.

NB settings are made by ear, for better suppression of broadband interference.

6.11 Automatic Gain Control (AGC)

This function ensures that the optimal sound level is maintained. The function settings are located in the AUDIO menu, selected by clicking on the corresponding parameters and grouped in the AGC block:

- AGC LIM – maximum signal strength;

- AGC GAIN – gain value of signal;

- MANUAL GAIN – manual gain available when the AGC is turned off;

- AGC MODE – time characteristics of the AGC loop.

AGC MODE has the following values:

- FAST – "fast" AGC reaction time;

- MIDDLE – "average" AGC reaction time;

- SLOW – "slow" AGC reaction time;

- LONG – "long" (very slow) AGC reaction time;

- OFF – the AGC is disabled.

To configure the AGC parameters, select the AUDIO menu and select the corresponding parameter. Setting the value of the corresponding parameter it is performed using the ENC_VOL encoder.

When AGC is turned off, the MANUAL GAIN option is available instead of the AGC GAIN parameter.

The AGC does not work with WFM modulation.

6.12 Equalizer

You can choose the type of audio equalizer, or disable it. Settings the functions are located in the AUDIO menu, selected by clicking on the parameter EQ TYPE, and rotation of the ENC_VOL encoder:

- EQ-OFF – Equalizer is turned off;

- SOFT, LIVE, CLUB, ROCK, BASS, JAZZ, POP, VOICE - type of enabled equalizer.

The Equalizer only applies to WFM mode.

6.13 Stereo Receiver in WFM

Receiver allows implement stereo reception radio stations radio broadcasting FM band. To turn it on or off, select the AUDIO menu and click on the parameter "WFM stereo". Values of the "WFM stereo" parameter:

- Enable – Stereo receiver is enabled;

- Disable – The stereo receiver is turned off.

Stereo reception is possible with a sufficient signal level of the station and only when listening with headphones. If a stereo signal is being received, the indicator the modulation type indicates "WFM-ST" reguardless of the setting of the "WFM stereo" parameter.

6.14 Adaptive Noise Canceller

The receiver has an adaptive noise reduction function that allows you to significantly improve the legibility of the received station under conditions of noise and interference. The noise canceller uses different algorithms depending on the filter bandwidth:

- If the band width is greater than 1 kHz, a noise canceller suitable for speech type signals used.

- If the bandwidth is less than or equal to 1 kHz, a noise canceller suitable for tone type signals (CW) is used.

The algorithm type is selected automatically, depending on bandwidth.

The noise canceller for speech signals has a noise suppression level setting.

To turn the noise canceller on or off, click on the "NR" button. To adjust the level of suppression when receiving speech signals, select the AUDIO menu and click on the "Threshold" parameter in the NR column. Use the ENC_VOL to set the optimal value. The "Threshold" parameter has no effect if the signal bandwidth is less than or equal to 1 kHz.

6.15 Threshold Noise Canceler (Squelch)

The receiver has a threshold noise reduction function (Squelch) – the audio is heard only if the signal level is higher than the selected threshold. To turn the noise canceller on or off, select the AUDIO menu and click on the " SQL " parameter.

Value of the "SQL" parameter:

- Enable – The squelch is enabled.

- Disable – The squelch is disabled.

To select the noise reduction threshold, select the "Threshold" parameter in the SQL column and rotate the ENC_VOL

To adjust the level of noise suppression when receiving speech signals, you must go to the AUDIO menu and click on the "Threshold" parameter in NR column. Use the ENC_VOL encoder to select the optimal value.

6.16 Display Backlight Control

You can adjust the brightness of the display backlight:

The following settings are available:

- Adjust the brightness of the backlight minimum and maximum values.

- Adjust the time after which the illumination level will be reduced to minimum value.

- Adjust the time after which the backlight will be turned off completely.

To change theses settings, select the VISUAL menu and change the values of the parameters using the ENC_VOL.

To set the minimum (dimmed) illumination level, you must select the "BRIGHT MIN" parameter.

To set the maximum (working) value of the illumination level you must select the "BRIGHT MAX" parameter.

To set the time after which the level will change from maximum to minimum illumination, select the option "REDUCE TIME".

To set the time after which the backlight will be turned off, you must select the "SLEEP TIME" parameter. This time is set relative to (after) the "REDUCE TIME" parameter.

Complete dimming of the display is possible only if the backlight is turned off completely. To enable or disable full backlight shutdown, select the "LCD SLEEP" option. The values of the "LCD" parameter are:

- Enable – The backlight can turn off completely;

- Disable – The backlight will not turn off completely.

6.17 Changing the Speed of the Spectrum Display

The receiver has the function of adjusting the speed of the spectrum displayed on the main screen.

To change the setting, select the VISUAL menu and select the "FFT ave" parameter. Changing the parameter values is carried out with help of the ENC_VOL. The higher the parameter value – the more slowly the spectrum image changes.

6.18 Changing the Range of the Spectrum Display

This function allows you to change the value of the maximum spectrum level relative to the noise level.

To change the setting, go to the VISUAL menu and select the "FFT scale" parameter. The parameter value is expressed in decibels. Changes to the parameter values are performed using the ENC_VOL encoder.

Small parameter values allow you to view weak signals in more detail.

6.19 Changing the Color of the Spectrum Display

This function allows you to change the color of the spectrum display.

To change the setting, go to the VISUAL menu and select the "FFT color" parameter.

Changes to parameter values are made using the ENC_VOL encoder.

6.20 Changing the Ratio of the Spectrum and Waterfall Displays

This function allows you to change the ratio of the display allotted to the spectrum or the waterfall.

To change the setting, go to the VISUAL menu and select the "Pan percent" parameter. The parameter value is expressed as a percentage. Parameter values are changed using the ENC_VOL encoder.

6.21 Changing the Speed of the Waterfall Display

This function allows you to change the speed of the waterfall display.

To change the setting, go to the VISUAL menu and select the "WTF delay" parameter. Changes to parameter values are made using the ENC_VOL encoder. The lower the value, the faster the waterfall will move.

6.22 Changing the Brightness of the Waterfall Display

This function allows you to change the brightness of the waterfall depending on signal strength. To change the setting, go to the VISUAL menu and select the "WTF Gain" parameter. Changes to parameter values are made using the ENC_VOL encoder. The lower the value, the dimmer the waterfall display will be.

6.23 Changing the Scale and Type of Spectrum Display

This function allows you to change the bandwidth of the spectrum display. In the WFM mode, you can change the spectrum type.

The current scale and type of spectrum is shown in the left corner of the spectrum. The higher the value, the smaller the displayed bandwidth will be, but the greater the detail.

For SSB, AM, and NFM modulation types, values of 1x, 2x, and 4x are possible. For WFM, possible values are 1 and MPX, where MPX is the spectrum of the modulating signal.

To change the width or type of spectrum, click on the waterfall area of the display.

6.24 Clock Setting

Described in section 5.

6.25 Save settings to a Memory Cell or Recall settings from a Memory Cell

This function allows you to save settings in memory, or recall previously saved settings. (Current settings, including Frequency, MODE, etc., are saved).

To select a memory location, go to the BAND menu and select the desired memory location. The selection is made by pressing the selected cell. Using the ENC_FREQ encoder, you can "scroll" the pages of memory cells.

To save the current settings in a memory cell, you must select the desired memory location and make a long press on the corresponding cell. It is necessary to hold until the a beep is heard or the button outline lights up in red.

6.26 Telegraph (CW/Morse Code) Decoder

This function allows you to decode Telegraph (TTY/CW/Morse Code) signals and display them on the screen. To enable the decoder, go to the MODE menu and click onthe Decoder button. The CW label should appear on the decoder button. For the decoder to work correctly, select the Min SNR parameter. To adjust this parameter, click the Min SNR button and by rotating ENC_VOL set the optimal value. The essence of the Min SNR parameter is to set the trigger threshold of the decoder. If the parameter value is too small or too small or if it is too large, then the decoding will be incorrect. The optimal Min SNR value is selected with the following considerations:

- If there is no TTY signal, the decoder indicator will not light up; - the decoder indicator should flash approximately in time with the TTY signal sound. The decoded signal is displayed as text on the main screen of the receiver. To clear the decoded text, click on the S-meter image.

7. Updating the Software

Firmware updates are possible depending on the revision of the STM32 processor:

- For revision of the Y processor, the firmware is possible only with the use of the STLink programmer;

- For revision V of the processor, the firmware can be updated either by using the programmer or by connecting to a personal computer (PC).

The processor revision must be determined by visual inspection as shown in the figure:

The processor revision is highlighted in red in the figure.

Preparing to download software in DFU mode:

Before downloading, you need to install the DfuSe program. You can download it on the ST website at the link https://www.st.com/en/development-tools/stsw-stm32080.html#getsoftware-scroll or

http://rx9cim.ucoz.ru/load/programma_proshivki_stm32_v_dfu_rezhime/1- 1-0-39.

The last link contains an archive, it must be unpacked before use. The Bin folder contains utilities that are required:

- Dfu file manager;

- DfuSeDemo.

|			
📁 Doc	23.08.2017 20:31	Папка с файлами	
📁 Driver	23.08.2017 20:31	Папка с файлами	
🖼 DfuFileMgr	30.08.2015 22:07	Приложение	49 КБ
▪ DfuSeCommand	30.08.2015 22:07	Приложение	27 КБ
◆ DfuSeDemo	30.08.2015 22:07	Приложение	1 881 КБ
🖼 MCD-ST Liberty SW License Agreement V2	16.11.2011 15:50	Adobe Acrobat D...	18 КБ
readme	30.08.2015 21:42	Текстовый докум...	3 КБ
STDFU.dll	30.08.2015 21:36	Расширение при...	71 КБ
STDFUFiles.dll	30.08.2015 21:50	Расширение при...	33 КБ
STDFUPRT.dll	30.08.2015 22:00	Расширение при...	28 КБ
⚙ STDFUTester	29.09.2012 20:17	Приложение	1 446 КБ
STTubeDevice30.dll	30.08.2015 21:36	Расширение при...	27 КБ
version	30.08.2015 21:41	Текстовый докум...	6 КБ

Run DfuFileMgr. In the window that opens, select the settings in as shown in the following picture:
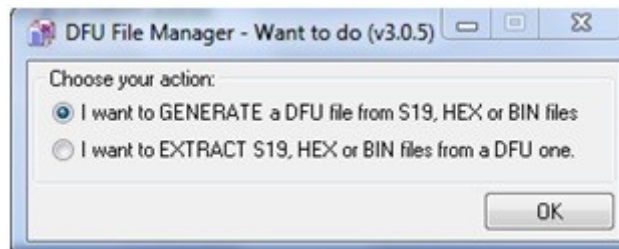
Click OK. A window will open:
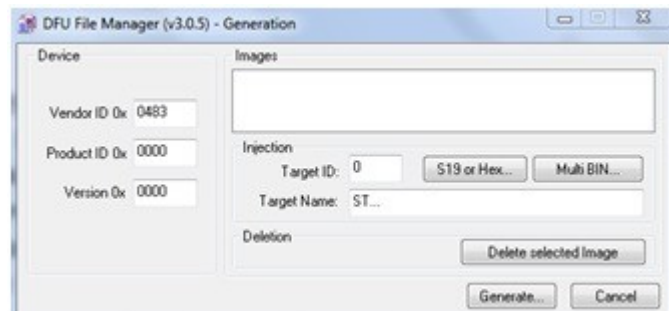
Click on the "S19 or Hex" button, find and select the firmware file Reciever_msi001hex. Press the button "Generate ...". The program will suggest a location to save the file with the .dfu extension. We indicate the desired file name and indicate the path for saving. A message like this will appear:
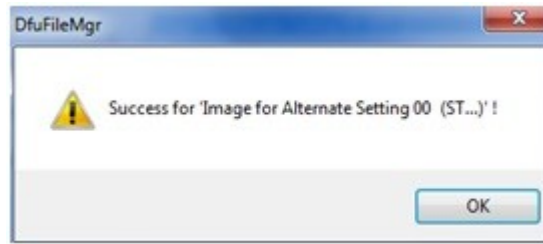
1) If the radio is being flashed for the first time (does not contain the installed firmware), then you must:

- completely de-energize the receiver;

- solder jumpers JP1 and JP3 on the printed circuit board;

- go to step 3.

2) If the radio receiver contains a previously installed firmware, then you must:

- turn off the radio using the existing button;

- hold down the encoder responsible for adjusting the volume;

- go to step 3.

3) connect the radio to the PC via USB. On a radio receiver with a previously installed firmware, press the power button and release the encoder responsible for adjusting the volume;

A device of the type should appear in the list of PC USB devices:
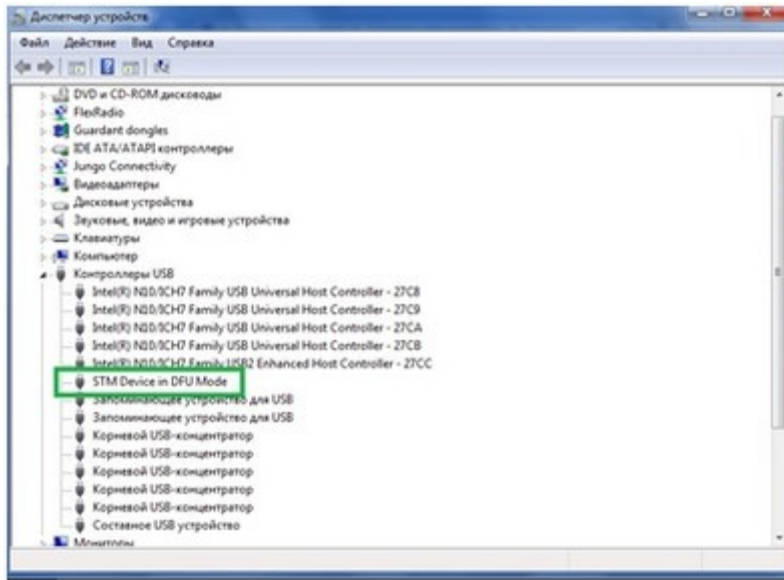
If this device is marked as undefined (with a yellow triangle), then you need to automatically search for drivers on your computer in the DfuSe Demo program folder. Next, you need to run the DfuSe Demo program. The following window will open:
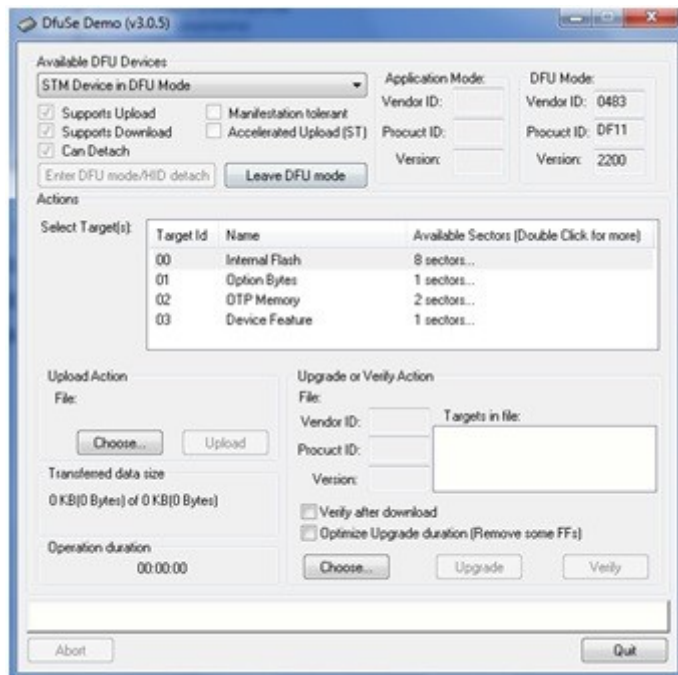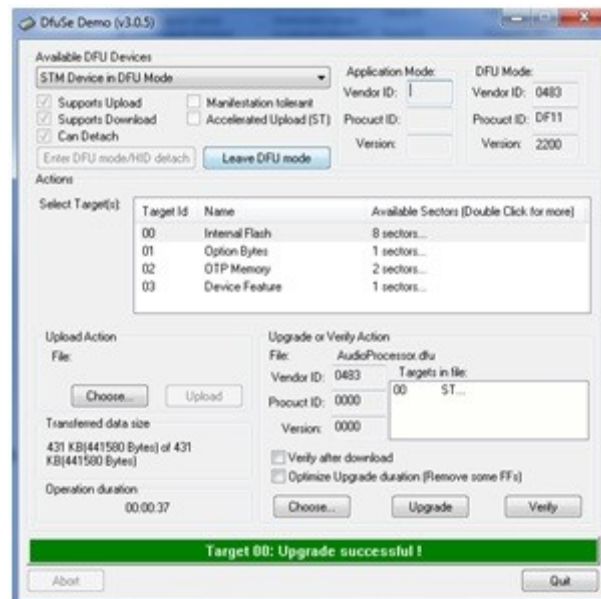

Press the button "Choose…" and select the previously prepared file with the extension .dfu. The window is converted to the form:
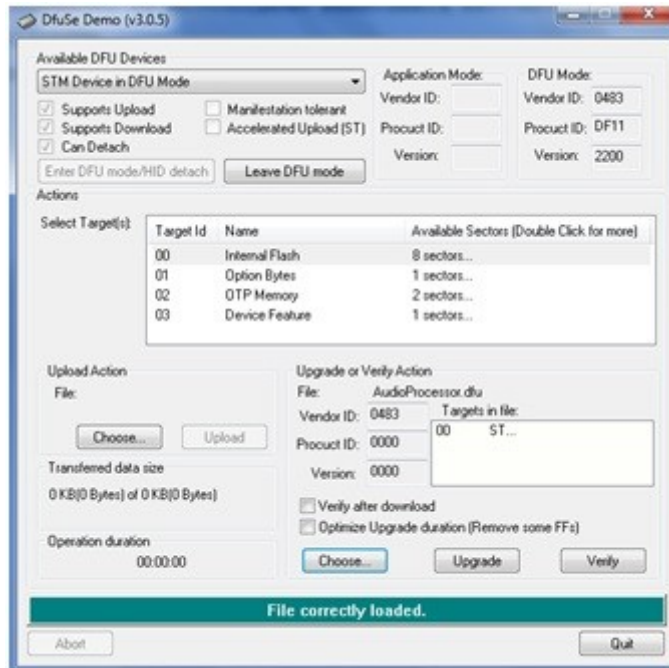
Press the "Upgrade" button. A view window will pop up:
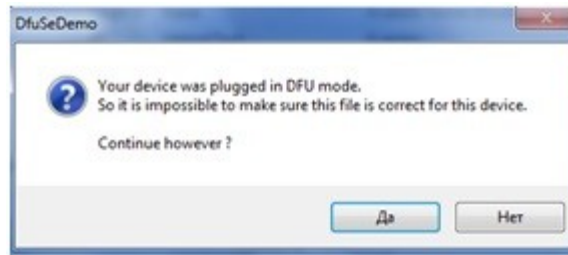
Click "Yes". The software update process starts. We are waiting for the window to transform to the following form:

Be sure to press "Leave DFU mode", then "Quit". All Software is loaded!

If the "Leave DFU mode" button was not pressed, and the DfuSe Demo program was closed, then the receiver must be completely powered off, including disconnecting the battery. Then re-connect the battery back.

If the radio receiver was flashed for the first time, then turn off the power supply and remove the JP1 and JP3 jumpers.
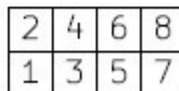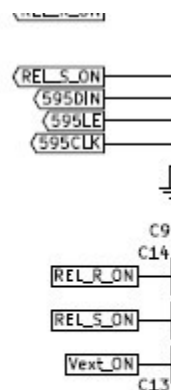
8. Connecting an Additional Board

Additional Board connection diagram:
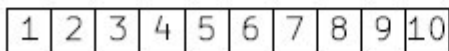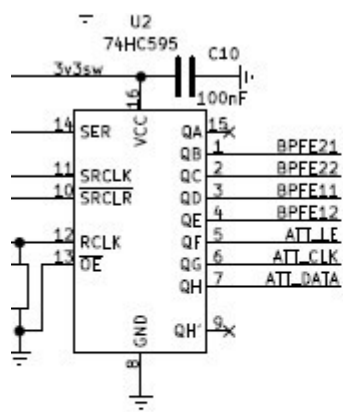
Подключение выводов:
Доп. плата — Осн. плата

1 — +аккум.
2 — 1
3 — 2
4 — NC
5 — NC
6 — 3
7 — 6
8 — 4
9 — 5
10 — GND

The location of contacts is shown as they are seen on the main board. Additional modules may be connected to power and other signals. For example, the C76 capacitor is located near the battery connector. The upper part of C76 is GND, the lower part is "+".