SW2013 User's Guide

(Instructions for those who are sitting at the valcoder of this beauty for the first time!)

He still didn't believe, tried not to believe, that the whole walkie-talkie was here, the whole thing ... But what now lay on his spacious desk left no doubt. A walkie-talkie! A real, tiny radio.

B. Zhukov, D. Isakov
"The North" is getting in touch

I look at the transceiver in front of me with approximately the same feelings. This is, as pilots say, the "extreme" variant of the SW** transceiver range - SW2013 v.5.

The main characteristics of the transceiver can be found in Appendix **1**, but for now we will try to look inside the transceiver.

On the left side, just behind the false panel, there is a synthesiser panel. **Gennady Zavidovsky, UA1ARN**, put his soul into it (literally and figuratively). We will talk about its qualities a little later. I mean the synthesiser ☺

On the right is the power amplifier board. On the left side of the main board you can see two quartz filters, in the lower right part of the main board there is a power amplifier for VHF.

The first thing that catches the eye is the absence of any harnesses, long wires across the board and other "tails" inherent in other designs. Secondly, there is no usual clutter of input and output filter circuits. This is explained by the fact that the transceiver works on the principle of "up conversion": its first intermediate frequency is 45 MHz, which allows to get rid of mirror channels without bandpass filters. And the power amplifier has a high enough linearity so that the level of side emissions does not exceed the permissible limits without LFF. All these are peculiar "highlights" from the developer of this series of transceivers - **Alexander Shatun, UR3LMZ**.

It should be noted that the new version of the transceiver has many improvements. In particular, an arrester is installed to protect the transceiver's input circuits from high-voltage impulse hitting the antenna connector; an 8-crystal telegraph filter is installed; a VSWR meter is introduced (see photo). The full list of innovations can be found in Appendix **2**.

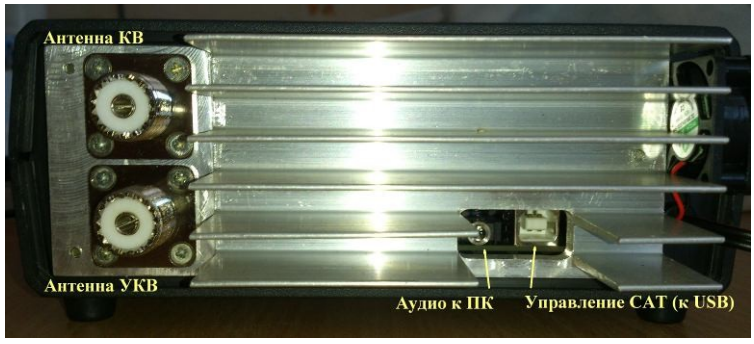
Looking ahead, I will say that the output transistors are not afraid of either short circuit or antenna breakage. Tested personally ☺

Carefully close the box, which is not very difficult: the two halves of the case are simply connected with four self-tapping screws.

There is nothing else interesting in the bottom except for drilled holes under the speaker mounting place and ventilation slots.

The case has a sufficient margin of safety. There is a video on the Internet where one of the users stomped on it with his feet. However, the transceiver did not suffer any injuries incompatible with life ☺

Further acquaintance with the transceiver I suggest to continue "looking under its tail"☺ . The antenna of shortwave The antenna of shortwave bands is located on the top left, VHF (usually 144 MHz) - on the bottom left. On the right bottom there is a two-core power cable where the plus wire is marked in red colour.

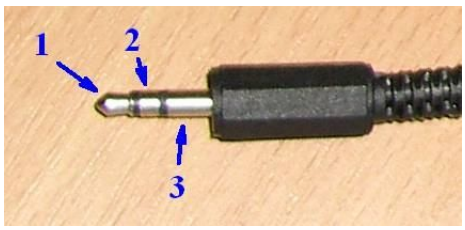


Always check the polarity before connecting!

In the lower part of the reinforced heatsink there are audio connector and CAT-interface connector. For connection it is convenient to use USB cable for printer. This interface is used to dock the transceiver with a computer and allows you to work with digital types of communication, transfer data about frequency and type of operation to the hardware log programme.

The audio jack is used to connect the transceiver to your computer's sound card. The audio cable sends the signal from the transceiver's line output to and from the computer. This is necessary for digital communications and, for example, for recording a correspondent's signal from the transceiver's line output.

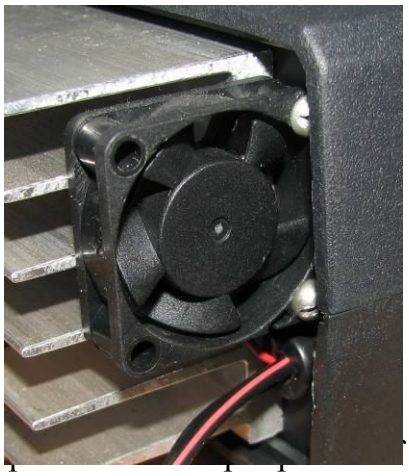
For convenience, here is a diagram of the plug that connects to the transceiver:



1. Line **input of** the transceiver, from it the wire goes to the output of the sound card.
2. Linear **output** of the transceiver, the corresponding wire goes to the microphone input of the sound card.
3. Common wire

The cable splits and ends with two plugs that connect to the input and output of your computer's sound card. In order not to disconnect this cable every time (for example, when you need to talk on Skype or listen to music), I advise you to connect a second simple sound card to your computer.

Connecting the transceiver to the computer is, of course, best left for later. In the meantime, carefully check the polarity and connect the transceiver to a power source. It is desirable not to forget to connect the antenna ☺



This version of the transceiver has one more pleasant innovation: the output stage is not only equipped with a heat sink, but also with a small fan. This fan is automatically switched on when the transceiver goes into transmit mode, but can run continuously if desired.

Such a decision is due to the fact that in the transceiver, along with the lightweight mode, the transceiver is realised in the high power mode. For this purpose, a voltage converter is placed on the main board, which allows to supply the output stage with double supply voltage.

The light mode will be referred to as **LP** - from "Low Power". It [illegible] 15-18 watts. The enhanced, or full mode is called **HP** - from "High Power". It allows you to achieve an output power of 50-60 watts.

It should be borne in mind that while the current consumption for light duty operation is 3-4 amperes, this will not be sufficient for boost operation. A current of more than 15 amperes must be provided, as the voltage converter requires at least double the current of the output stage to operate.

It should not be forgotten that the **HP** mode is implemented for the radio amateur to be able to swing an external power amplifier. In everyday work, the difference between the power of 20 watts and 60 watts (if they will reach these 60 watts) is 4.77 db. That is, for your correspondent, there will be less than a one point (6 db) difference in signal levels when switching from **LP** to **HP.**

Think for yourselves, decide for yourselves whether or not to it ☺

Before turning on the transceiver, let's look at one more side of the transceiver. The side. No, not the upper or lower lateral. side. ☺

All connections in the transceiver are successfully brought to one side.

The first thing to do is to connect the tangent. I advise you to give up the idea of replacing the standard tangent with something super-expensive. Subjected to a small modification by the author, in combination with a successful circuit solution, it works perfectly on the air. And not due to any specific effect as, for example, in DEMSH capsule (if someone still remembers what it is☺), but due to a very decent frequency response. When working on the transceiver, I specially approached well-known experts of studio sound on the air, secretly wishing to "run into" criticism. And I never once managed to hear that, say, there is not enough bass or that it is necessary to change the microphone to a **firm** one.

The author advises to take high impedance headphones: *"Don't forget that there is a powerful amplifier here, and connected low impedance headphones will hear even the footsteps of a fly stomping on the case. Headphones should be high impedance, or with regulator on the cord (e.g. SVEN GD-900) or you should include a selected resistor in the gap of headphones. And on the device give the necessary volume for comfortable work"* (*UR3LMZ).*

I can add that when working with a narrow band telegraph with low impedance headphones on, you should not set the maximum volume: an unpleasant whistling noise will appear. It doesn't sound like a fly stomping, but it's still unpleasant ☺

An external electret microphone can also be connected to the transceiver.

Connection of the telegraph key is no different: if we connect a manipulator for the built-in electronic key, we use all three contacts of the plug. If we connect a conventional "hammer" or the output of our own electronic key, we use the common wire and one of the plug contacts. Do not forget to select the type of key to be used in the menu.

In addition to its direct purpose, the pedal connection socket can be used to control an external power amplifier (for short, a **PA**).

To control an external amplifier, a "zero" is applied to the "Control UM" pin. It is desirable not to forget that this is only the transistor drain and the maximum current through it should not exceed 0.18A, and the voltage should not be more than 12 V.

to this terminal!

By the way, about connection of an external UM. The circuit solution of the transceiver is such that there are no low-pass filters at the output. The transceiver was originally conceived as a camping transceiver. Nevertheless, the power amplifier has been brought to such a level of linearity that out-of-band emissions do not exceed the permissible values. When connecting the transceiver to the "helper" make sure that your neighbours do not have irons singing with morse code, do not run waves across the TV screens, and the neighbours-radio amateurs have not gone to the storeroom to look for a "hatchet" ☺ It is better to make a simple VLF at the UM input.

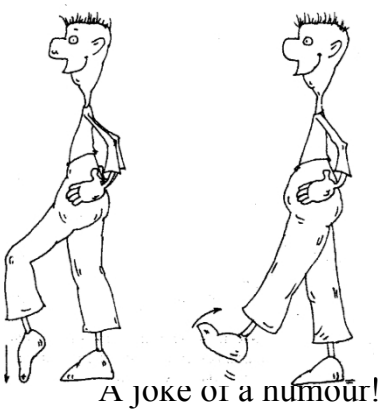
Also! Pay attention to quality grounding of the external UM and its reliability. Very often it is the "helper" that is out of order that causes the SW-card to fail.

And a bit of positivity ☺ Programmers have such a concept - "fool-proofing". This is without any personal attacks. It means that a good programmer must foresee all accidents that may occur when working with a programme. Well, the cat jumped on the keyboard, the grandson decided to play "piano" ☺ In our case, the transceiver provides that:

- first the external UM is switched on for transmission and only then the RF signal from the transceiver is fed in. Have you seen at night how sparks fly in a light switch? Soin our case the switch (i.e. the relay of the external UM) will switch on first, and then the current will flow through the wires:

- When switching to reception, first transmission will stop, and then the relays of the UM will work out their batch.

It seems simple. But that's the beauty of this solution!



A joke of a humour! ©

Yes, the only thing to consider is the so-called "human factor". It is very hard to protect yourself against the case when you are still passing the last dash and you release the pedal with your foot. A smart programme will protect your technique, but the last dash, alas, will be cut off.

There is, of course, a way out. You just need to do an exercise in the morning: take your hand off the key - let go of the pedal. Pressed the pedal - hand to the key. Take your hand off, let go of the pedal. So, until perfection is achieved. ☺

And now face to face ... the transceiver. ☺

The modern version of the transceiver is distinguished from its older brethren not only by its software and circuitry, but also by its appearance. Milled front panel with laser engraved inscriptions, pearlescent, no, pardon me, white buttons lined up in two rows. A kind of a gentleman in a dinner jacket ☺

Once again check the polarity of the transceiver connection to the power supply and, having prayed, switch on the transceiver by turning the "VOLUME" knob clockwise. We calm the trembling in our knees when we see the soft glow of the screen.

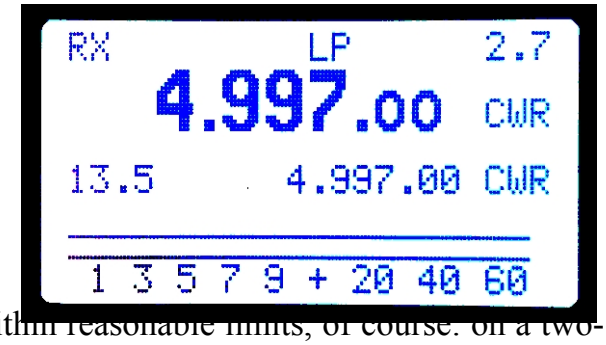
Under the volume knob, on the bottom left, we have the "RF PWR" output power control. Although the output stage of our transceiver is afraid of antenna breakage or short circuit, let's put it in the middle position for now.

On the right side of the screen is the TUNE knob. Turn it smoothly and start travelling along the airwaves. Unless, of course, you forgot to connect the antenna . ☺

The shaft encoder in the branded (meaning made by Alexander Shatun, UR3LMZ) transceiver is optical. That is, you can't twist it. But thanks to the magic of Gennady Zavidovsky, UA1ARN, who has written and is constantly improving the software for the SW20** series of transceivers, the valcoder has some intelligence: the longer you turn it, the faster the frequency tuning goes. So just by turning it slowly, we can easily adjust to the desired frequency. At the same time, after turning the Valkoder a little faster for some time, we find out that we are already far outside the range. And we immediately realise how many minutes of life will now be saved by retuning! ☺

An important note on this subject. In addition to the standard amateur bands, the transceiver has two intermediate bands (one above and one below 15 MHz) in which any frequency can be set. This is due to a feature of the software that allows continuous tuning from 1 to 30 MHz.

In reality it looks as follows. By pressing the **UP** (up) and **DN** (down) buttons we switch between the bands. The default layout is as follows (frequencies at the start of the bands are indicated): 1810, 3500, **4997**, 7000, 10100, 14000, 18068, **19000**, 21000, 24890, 28000, 28500, 29600, 144000, 144500,145500. Note that the ten-metre and two-metre bands are split into three sections each for convenience.

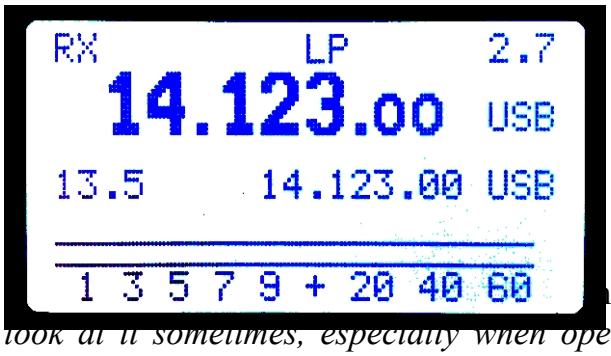


Any frequency can be set on any of the bands. Within reasonable limits, of course. On a two-metre band you cannot set the frequency of the KV band ☺ . However, if you go out of the amateur band and forget to tun back in or switch to another band, you will have an additional frequency at that place. And then, switching between bands, you will seefor example: 1810, 3500, 7000, **7240**, 10100, 14000,
144200, 18068, 21000, 24890, 28000,..

Don't panic. That's the way it should be. If it is inconvenient and you really want it, sit down and turn the shaftcoder. By turning the frequency from 7240 to 4997 and 14420 to 19000, you will get a familiar sequence.

Once you get used to not running out of bands, the first of these additional frequencies is conveniently tuned to 4997 kHz. This is the frequency of the reference station and can be useful for tweaking the transceiver. The second one, which is higher
15 MHz, you can tune in, for example, to broadcast stations. AM stations can be heard quite well in SSB mode when tuned to zero beats.

Now let's have a quick look at the information on the display. We will learn everything in more detail a little later from the description of all menu functions.



At the bottom of the display you can see a strip of the VSWR meter. If in the previous versions I would call it a "pointer", in this version of the transceiver the readings are already accurate.

In transmit mode, this area of the display shows the VSWR and output power level. More on this later.

dicates: power supply voltage (I *strongly advise you to look at it sometimes, especially when operating* on *battery*); tuning on; second frequency (*when "SPLIT" mode is off, it is equal to the main frequency*) and the operating mode for this frequency.

The next, main line shows the current frequency and operating mode.

The upper line on the left shows the transceiver status: "**RX**" - receiving, "**TX**" - transmitting. A little to the right, when the tuning mode is switched on, the abbreviation "**TUN**" will appear. Near the middle of the display, depending on the selected mode, you can see "**ATT**" - attenuator on, "**PRE**" - preamplifier on or nothing - the transceiver works in normal mode.

Further spaces are provided for indication of transmission mode (**LP** or **HP**), locking of the shaftcoder (**LOCK**), bandwidth (**2.5** or **0.5**)

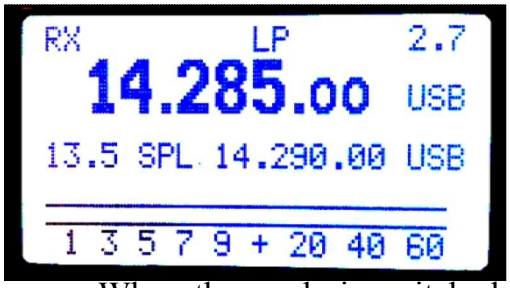
We've heard the live broadcast, turned the shaftcoder, looked at the display. Now it's time to deal with the pearl buttons. Pardon me, the buttons ☺

Let's have a quick run through the keys. Which keys.

UP - next range
DN - previous
SPL (split) distortion, spaced frequencies
PWR - output power switching
PRE - switch on/off UHF and attenuator, long press - tuning mode
FUN - switching the filter band and entering the menu
MOD - switching of operation mode: LSB/SSB-CW/CWR-DGU/DGL
LOC - locking the shaftcoder.

From top to bottom and from left to right. That's the way we're going to do it.

We have already mentioned the first two buttons **UP** and **DN**: they are used to switch between ranges. **UP** - next range, **DN** - previous range.



The next button is **SPL** (split), which means split frequency operation.

More precisely it is a mode of operation on spaced frequencies, but for convenience we will leave the usual name "upset", bearing in mind that the value of upset can be very large ☺

When the mode is switched on, the corresponding abbreviation - **SPL** - will appear in the second line from the bottom.

It is worth noting that there are no restrictions on frequency and type of operation when tuning is enabled. You can work not only with the tuning, but also in "cross-band" mode (receive on one band, transmit on another). Therefore, if you forget to switch off the tuning, you may be surprised to find you are trying to transmit on a band with who have long gone ☺ . It is clear that the display on the left tuning (**SPL**). But who looks there when there is a marvellous passage in the air ☺

The tuning mode is activated **by briefly** pressing the **SPL** button.

If you press longer, the clever programme will immediately indicate in the bottom line the frequency 1 kHz higher in CW mode and 5 kHz higher in SSB mode.

When tuning is enabled, the bottom line will display the second frequency that the transceiver will switch to in TX mode.

A short press on the **SPL** button swaps these frequencies. This is done in order to listen to the frequency on which *you* will be transmitting later *(maybe there are a lot of people there without you and it makes sense to move back a little*) and then press SPL again to switch back.

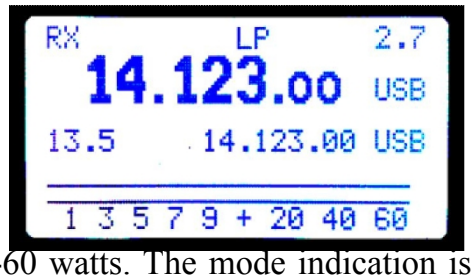
In the same way, the tuning mode can be used to control two frequencies: sit back and listen when one of the two DXs has a wave of eager listeners or while a neighbour in the eastern or northern hemisphere comes up on one of the predetermined frequencies .☺

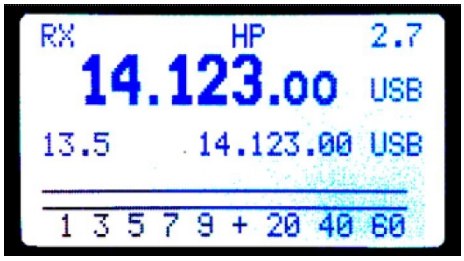
Both frequencies can be set to their own operating mode (CW, SSB, etc.). When you change frequencies, the mode of operation remains linked to the frequency.

[illegible] by long pressing the **SPL** button. In this case the lower frequency will take the value of the upper one. As well as the operating mode for the lower line will be set as it was for the upper line of the frequency meter.

PWR - button for switching the output power.

We've already mentioned that the transceiver features two modes of operation - **LP** - from "Low Power" which provides output power 15-18 watts, and

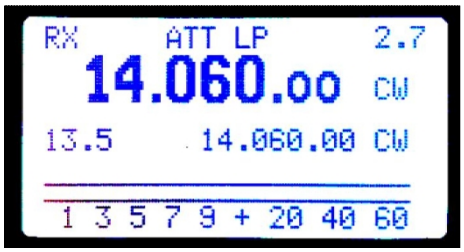


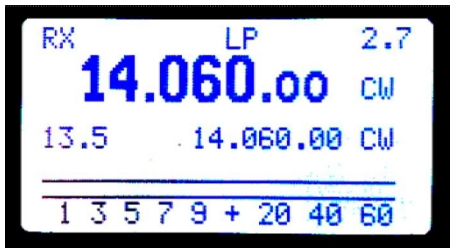


enhanced, or full, **HP** mode - from "High Power", allowing you to achieve an output power of 50-60 watts. The mode indication is visible in the middle part of the top line of the display.

Do not forget about the voltage indication ☺

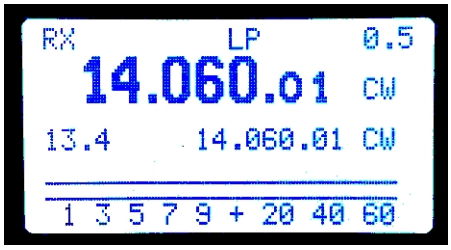
The second row starts with the **PRE** button. It is intended for switching the following modes in a circle: "attenuator on" - "all off" - "UHF on" - "all off", etc. The mode indication is to the left of the power mode.





Long press the **PRE** button to switch the transceiver into the tuning mode (the *transceiver is switched on and a continuous tone signal is emitted into the air*). Pressing it again for a long time switches off the tuning mode. It is desirable to take pity on your transceiver and not to bring it to melting of the plastic case in the area of the radiator☺ . And about the tuning mode itself - in the next section.

FUN button. A short press changes the bandwidth from 2.7 to 0.5 kHz and back again. For each of the modes (CW, SSB, DIGI) a different bandwidth is memorised and remains unchanged when moving from band to band. A long press on the **FUN** button takes us to the transceiver menu. We will refer to it below. For now

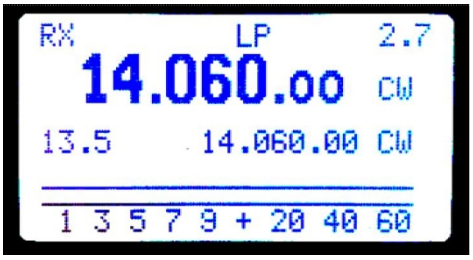


remember only that the exit from the menu is the same long (more than 0.6 sec) pressing of the **FUN** button. The IF bandwidth is indicated in the upper right corner.

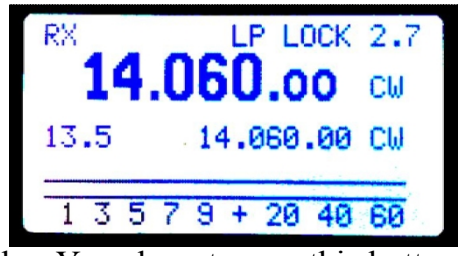
By pressing the **MOD** button we switch the operating modes: LSB-CW-DGU (microphone - telegraph - digital) in a circle.

If you hold this magic button longer, the mode will change to the opposite: LSB to USB (maybe someone will want to chat on the unconventional sideband☺), CW to CWR (very convenient to get rid of interference or a kilowatt station sitting nearby).

s an eye on the frequency. If you reverse the mode, you will hear the meter reading will change. A long press again will return the mode to the previous position.



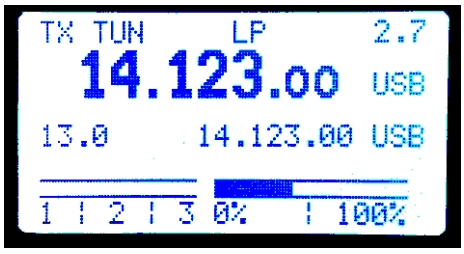
Just in case I remind you of the operating modes implemented here: **LSB** - lower sideband, **USB** - upper sideband, **CW** - telegraph, **CWR** - inverse telegraph (reference oscillator switched to the opposite roll-off), **DGU/DGL** - for digital species operation.



The **LOC** button completes the row. It locks the shaftcoder (**LOCK** will appear on the display). Sometimes it is useful. You are waiting, for example, for a neighbour to appear on the frequency, and then your children and grandchildren say: "Let me turn it!". How can you refuse?! Blocked the shaftcoder and let them spin it☺ As long as they don't cry☺ And how to
If they calm down, we press the **LOC** button again and take the helm. Yes, do not press this button for a long time! You will learn why on the next page ☺

Get on the air!

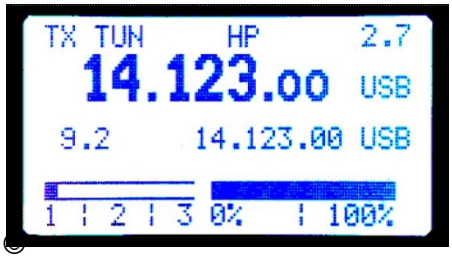
The "young fighter" course is over! Now you can pull the trigger. I mean the tangent key or the telegraph key. Who's trained for what ☺



First of all, we set the **LP** mode. So as not to torture the guinea pig too much. It (the transceiver, not the rabbit) will still be useful to us. Now let's check the alignment of the transceiver output with the load and set the power level. To do this, press and hold the **PRE** button until the abbreviation TUN appears on the display.

At once we can see that the signal level band has been replaced by two bands. On the left side the VSWR level is indicated, on the right side - the output power level. Use the RF PWR output power level regulator to set the level close to 100%. It is not necessary to turn the regulator "all the way"! For good signal quality in **LP** mode it is recommended to set the power to about 75%.

If there is a desire, you can believe the transceiver operation in full power mode - **HP**. Don't forget that you need a good power supply to achieve full power! Take a look at the picture. Nothing confuses you about it? Because of a weak power supply, the supply voltage in **HP** mode has "dropped" to 9.2 volts!



Learn from other people's mistakes! Your transceiver will be ☺

If you have carefully read the previous pages, tried all the modes, made exercises on coordination of hand and foot movements, then we can consider that the task set before us is fulfilled. The transceiver will be your obedient and faithful friend.

It remains to tell you about the sensitive points of this soulful creature. I am referring to

the transceiver settings, accessible via the menu ☺

So: MENU.

As a rule, together with the transceiver, the author provides a brief description of the menu functions for a particular version of the transceiver. I will only mention a few points. Make it a habit to write down all changes you make to the menu. Some records may be meaningless (brightness and contrast level of the display, etc.), but it is better to record more than to reset to initial settings and painfully remember what was done, for what purpose and what it yielded.

Enter the transceiver menu by pressing the **FUN** button for a long time (about a second). The display will show the name of the menu item and its value. Press the **UP** and **DN** buttons to move from item to item. The value is selected by turning the shaft encoder. Then either search for another menu item or long press the **FUN** button to exit the menu.

> *In the current version there is an undocumented option: you can enter the menu by long pressing the **LOC** button☺ . Do not be frightened by this. You can exit the menu in the same traditional way: by long pressing the **FUN** button.*

The normal input gives access to the basic 20 menu items. To access the advanced menu, switch the transceiver off and switch it on again with the **FUN** button pressed. This gives you access to the so-called fine settings of the transceiver, which in everyday operation do not need to be changed quickly.

Appendix **3** contains a table of menu functions obtained from the author of the transceiver, with comments. Due to the fact that transceiver software is constantly being improved, some menu items may change. Therefore, in appendix **4** you will also find a complete reference list of possible functions.

Let's try to examine in detail some items of the main menu that need explanation.

The first menu items do not need any special explanations: changing the brightness and contrast of the display; the time of switching on the "duty", dim backlight of the display; the tone of the "squeaker" when pressing the buttons... It's all simple.

The F04 - IF SHIFT function is also logically understandable. By shifting the IF frequency, we get different timbre colouring of the sound. When I was a kid, I remember I liked to look inside an old tube radio: when turning the tone knob, flags went in and out of the aluminium housings of the IF circuits. This was just such a way of adjusting the tone by changing the IF frequency setting.

Let's pass quietly by the setting of the self-control tone when working with telegraph and the speed of the inbuilt automatic key. The latter, by the way, is displayed in WPM (words per minute).

> *For those who have not heard of it before, I will explain that it is nothing more than the number of words of Paris that can be transmitted in one minute. This value is very different from our usual notions of "characters per minute" or "groups per minute". But it is quite convenient for determining the speed of transmission, since the set of transmitted characters remains unchanged.*

Function **F08 KEYER**. Here we have the choice of connecting an ordinary mechanical key to the transceiver or the output of our own electronic key (**OFF** mode) or connecting a manipulator to work with the built-in automatic key. In the latter case, we have three options: a) we ask for an automatic pause between characters (**ACS** mode); b) we say that we have a moustache ourselves and it is not the first time we work on a key (**ELE** mode); c) we fan our fingers and try to work on the virtual vibroplex (also known as "bug"): we form the dots automatically, but we tap each dash on the manipulator ourselves (**BUG** mode).

In the latter case, the item **F07 VIBROPLEX** will help us. Values other than **0** (function disabled) regulate the value of acceleration of the point transmission speed (as in a real, mechanical vibroplex).

> *My attempts to ride the vibroplex ended in a complete fiasco! I was not able to beat dashes quickly on the manipulator, nor to choose correct pauses☺ As well as to cope with **ACS** mode: at slow speed the programme understood me, but at higher speeds we started to speak different languages☺ Having decided that "the best is the enemy of the good!", I set F07 to 0 and F08 to ELE.*

Software change of places of contacts of dots and dashes, adjustments of duration of dashes and pauses are intuitive. Skip.

Let's focus a bit on the **F12** function **- BREAK-IN**. **The ON** value means that the transceiver will automatically switch to transmission as soon as the signal from the manipulator is received. Naturally, if the CW mode is switched on☺ . But the **OFF** value is for gourmets: the transceiver will switch to transmission only when the pedal is pressed. This makes it possible not only to eliminate accidental key presses, but also to control, for example, a separate power amplifier using the pedal.

The value of the **F13 CW DELAY** function allows you to adjust the delay time for the transition from transmit to receive after the last parcel in the telegraph.

The range of permissible values is from 0 to 1.6 sec. Adjustment step - 0.05 sec

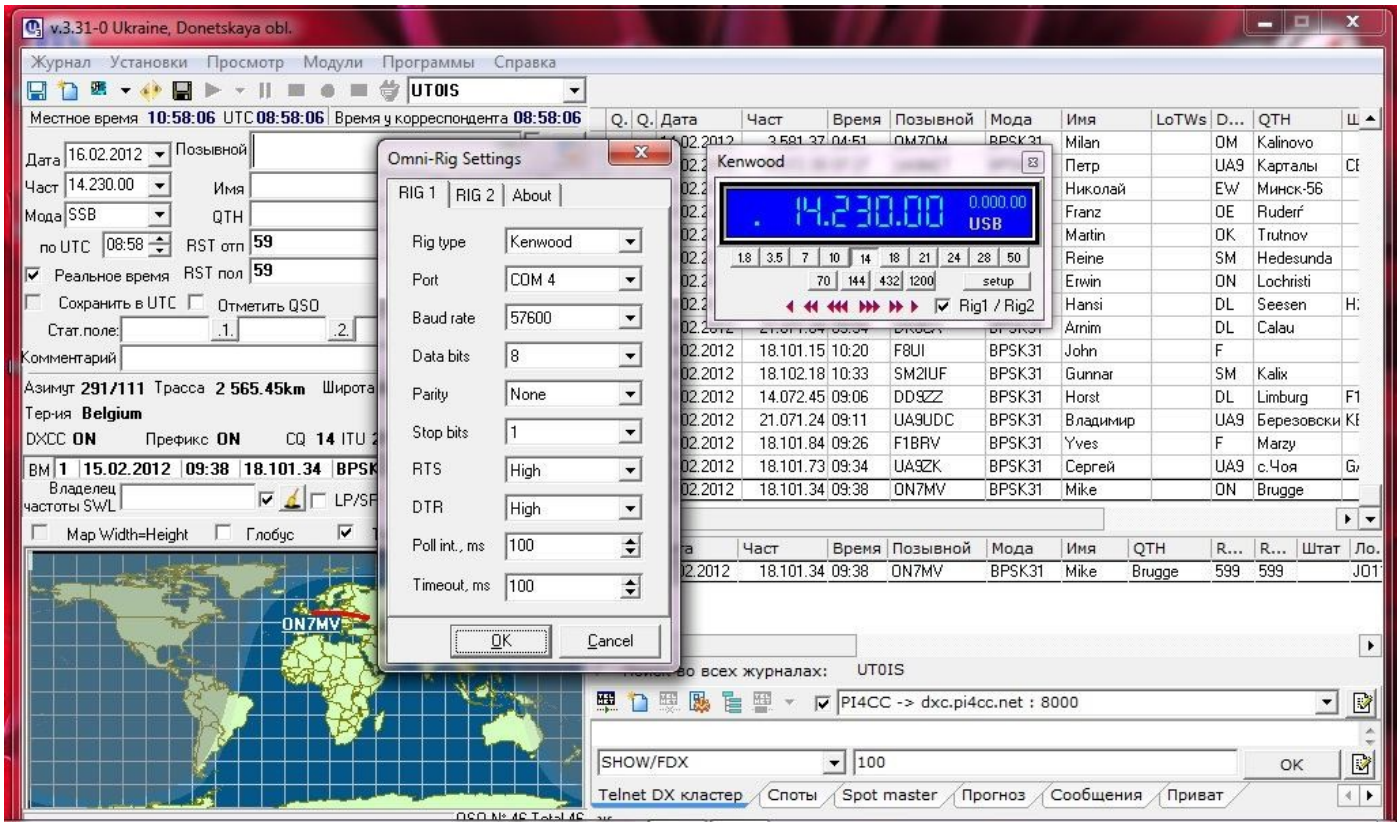
From personal experience, I can recommend a delay of 0.25 sec.

Disabling the microphone path - **F14 MUT ALL** - is used when working with digital communications in SSB mode, not DIGI, as common sense demands☺ The necessity of disabling is caused by the fact that in SSB mode both digital signal from the computer and noise from the microphone will go into the air.

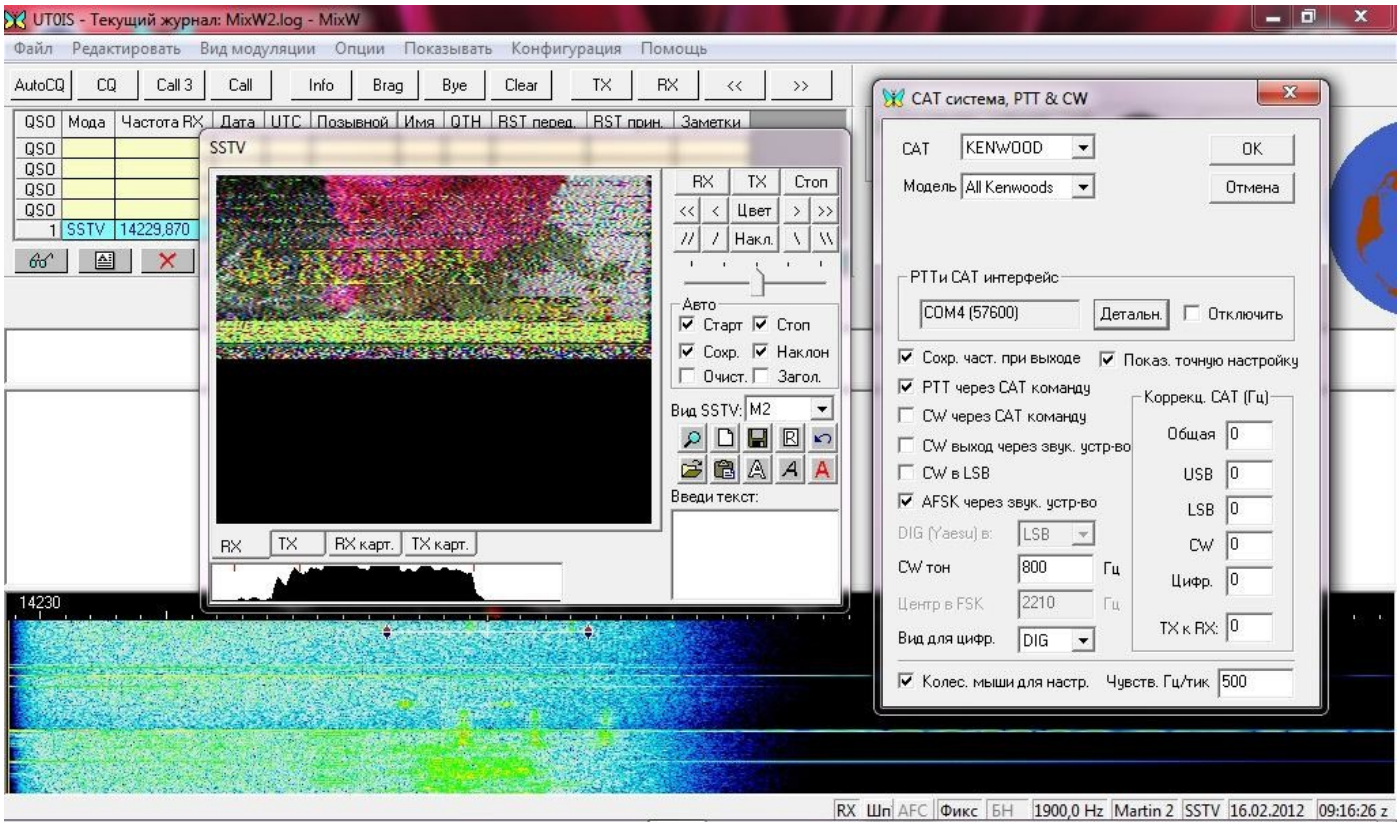
Reducing the shaft encoder sensitivity does not need any comments. But the function **F16 BIG STEP** for the author's version of the transceiver should be disabled! It may be needed only in the case of self-made transceivers when using encoders with a small number of pulses per revolution.

The last of the main items to pay attention to is item **F18 CAT SPID**. The default value of this item is set to 57 600. The same value should be set in your programmes to work with the transceiver through the CAT interface.

Below are the settings for the UR5EQF_Log hardware log programme and the MixW digital views programme recommended by Sergey **UT0IS**.



In the hardware log UR5EQF_Log find the settings of Omni_Rig, select the type of communication protocol - Kenwood, find the item "Ports (COM and LPT)" in the "Device Manager" of your computer, in it search (with the transceiver connected and switched on!) the value for USB Serial Port. Now, for example, I have COM10 there. The same port number is entered in the Omni_Rig settings. And there we set the Baud rate to 57 600. That is exactly the same value that is set in our **F18 CAT SPID** settings. The other values are set as shown in the figure.



The CAT system settings for the MixW programme are carried out in the same way.

Let's start again!

There are times in life when you want to start all over again. As they say - "from scratch". Just like that. - press a button and everything starts all over again.

I don't know about life, but the transceiver has this option. If you accidentally changed settings in the menu and the transceiver stopped working for some reason or started working incorrectly, you can reset all parameters to "default" values. Or, as they say, "factory reset" .☺

To do this, switch on the transceiver with the SPL (Split) button pressed. The display will prompt you to confirm that all parameters should be reset to default values. This is confirmed by pressing the **SPL** button again. If the entry to this state is incorrect, simply switch off the power supply. The other buttons are ignored.

Before doing such a reset, it is strongly recommended to consider: have all the changes you made earlier to the transceiver's function settings been recorded? Maybe it makes sense, before everything is erased, to go through the menu again and record the current data?

I'll you to it. As the Indians say-- How! I'm ☺

I apologise for possible free will or unwitting repetition of known truths, but I wanted it to be clear even to a novice user.

From the bottom of my heart I express gratitude to the author of the transceiver Alexander Shatun, UR3LMZ, and the developer of software for devices of this series Gennady Zavidovsky, UA1ARN.

Respectfully,

Vladimir, UR0ET

General Characteristics:

Frequency range: SW 1-30 MHz

Operating modes: LSB, USB, CW, CWR, DGU, DGL

Output power across all bands in light mode (LP) 15-18 W, *in full mode* 40-50 W (HP)

Power adjustment from 0 to 100%

VHF 144, 50 or 70 MHz *(one to choose from)*

Output power on VHF 8-10 W *in light mode (LP) and* 18 W *in full mode (HP) Sensitivity on HF without UHF not worse than* 0,5 μV, *with UHF* 0,25 μV

Sensitivity at VHF better than 0.1 μV

Dynamic range on blocking on SW above 100 db

Carrier suppression over 70 db

First IF 45 MHz with 15 kHz bandwidth

Second IF 6 MHz with bandwidth 2.7 kHz or 0.5 kHz *(bandwidth switchable in either mode)*

Built-in telegraph key with programme adjustments RF feed-release control
during the receive-transmit transition Tuning mode and control of an external
UM

Idle current consumption in receiving mode at 13.5 V power supply - 460 mA

Current consumption when transmitting on KV 3-4 A *in light mode (LP), and* 8-10 A *in full mode (HP) Current when transmitting in silent mode* - 1.2 A

Dimensions 175 X 185 X 67 mm

Weight about 1 kg.

The most significant differences from previous versions

The **SW2013** transceiver is a modernised version of previous versions. The changes are aimed at improving the linearity of the transmission path and achieving a good output waveform.

When working on my SW2011-RDX I could not achieve good VSWR on the low frequency bands. Well, my "rope" does not build and that's it! The new transceiver allowed me to match everything easily and simply. Antenna - the same, tuner - the same, VSWR-meter - also the same. What's the matter? It turned out that in the old version the output stage was far from perfect linearity. And these, though small, out-of-band emissions were driving the VSWR-meter out of itself☺ In the sense of influencing its readings.

Increased the output stage power to 50-60 watts. Introduced 2 power modes. Light - LP and full mode - HP. For the HP mode a step-up voltage converter is used.

Full mode was introduced at the request of radio amateurs using transceivers of this series to enable the use of external power amplifiers. In stationary conditions the HP mode allows to work with higher power. In the field, however, it is necessary to take care of a good power supply.

The power adjustment range from zero to maximum has been extended.

It's a nice "feature". On the one hand, you can work on the key without actually going on the air. For example, to debug the operation of the manipulator or to try out various settings of the built-in telegraph key. On the other hand, QRPP enthusiasts can easily set the output power to a fraction of a watt.

Improved AGC and C-meter operation.

AGC really works almost perfectly! In previous versions AGC also looked decent, but there were roughnesses when very strong impulse interference appeared. Now there are no complaints about AGC!

Additional measures are taken to protect circuit elements when a high-voltage pulse hits the antenna socket.

The transceiver now has an arrester next to the antenna socket. Now you don't have to look for Validol when looking at lightning and knowing that you didn't disconnect the antenna from the transceiver ☺

The stability of the CAT system has been improved.

This nuance is felt literally after the first connection of the transceiver to the computer. In the past, you had to switch the transceiver on and off several times to get it recognised as a USB Serial Port. Now there are no problems during connection.

Added number of buttons for easier access to functions.

Added power selection and shaftcoder lock buttons.

Instead of a monochrome display, a colour display with a much higher display quality has been used.

> *The monochrome display, familiar to many users of SW** transceivers from pre-2012 versions, is once again a joy to behold. The colour display may be visually more beautiful, but you have to pay for everything. In the case of the colour display in the transceiver, the noise characteristics were somewhat worse, in direct sunlight the colour display became almost unreadable. In addition, the transition to a monochrome display was caused by the discontinuation of production of colour displays, which could be used without radical modification of the transceiver's design, circuitry and software.*

The firmware introduces an additional 70 MHz band in addition to 144 and 50 MHz.

> *Initially the transceiver had only one band - 144 MHz. Then, at the request of radio amateurs, the possibility of building the transceiver with other bands at choice: 144 or 70 or 50 MHz was introduced.*

The transceiver introduces a silent switching mode when switching from receiving to transmitting and vice versa.

> *Unpleasant clicks accompanying RX- TX switching have been eliminated. Work became much more comfortable.*

By users' requests, a VSWR meter has been added to the SW power amplifier.

> *Moreover, the display also shows the power output level. This is very convenient when working in the field. At least one less instrument (VSWR meter) is needed.*

A more powerful heatsink with a fan mounted on it is used.

> *It is now allowed to run in gear for long periods of time at full power of 40-50 watts. The fan operates only when transmitting, but can be switched to continuous operation. It does not interfere with reception.*

Compared to versions from SW2011-RDX and older, an 8-chip telegraph filter has been introduced instead of a 4-chip sweep filter.

> *For those who honour the telegraph, this is a super prize! Still, the 700 Hz sweep filter did not do its job very well. The 8-crystal filter at 500 Hz, switched on instead of the standard one at 2.7 kHz, makes the reception of morse code much more comfortable. And if necessary, on a separate request, the transceiver can be made with an 8-crystal filter at 300 Hz. But it is already, as they say, "Your Galia is spoilt!"* ☺

Added option to switch the display backlight to "standby mode".

> *This is very convenient when working in the field. In the menu you can set the time during which the operator does not use the transceiver controls and after which the display backlight becomes less bright. This allows you to save battery power.*
>
> *And if we continue to work on air without touching the valcoder or buttons, the backlight remains dimmed.*

List of SW2013 transceiver setup menu items

This is for the current firmware version. Changes are possible.

F00	LCD CONT		Indicator contrast
F01	LCD LIGH		Indicator brightness
F02	DIMM TIM		Time for the indicator brightness to decrease when inactive
F03	KEY BEEP		Button confirmation tone
F04	IF SHIFT		Receive tone (IF shift)
F05	CW PITCH		CW control tone
F06	CW SPEED.		CW speed
F07	VIBROPLX		Vibroplex for CW
F08	KEYER		Key type
F09	CWKEYREV		Swap the dots and dashes contacts on the transponder key
F10	CWWEIGHT.		The ratio of the dash duration to the dot duration
F11	SPACEWGH		The ratio of the duration of the pause between elements to the duration of the point
F12	BREAK-IN		Keyed transmission control
F13	CW DELAY		Delay in switching to reception after the last parcel in the telegraph office
F14	MUTE OLL		Switching off the microphone path
F15	ENC DIVS.		Decreasing encoder sensitivity
F16	BIG STEP		Resolution of large step **NO**
F17	CAT ENAB		Enabling CAT operation
F18	CAT SPD		CAT **57600** speed.
F19	CAT RTS		Transmit transition control from the RTS signal of the CAT interface
F20	CAT DTR		Manipulation control from the DTR signal of the CAT interface
ADDITIONAL MENU FUNCTIONS			
F21	REF FREQ		Real frequency of the reference oscillator 38994 - 39002 (**turn until the operating frequency is exactly same as the display**)
F24	BAT CALI		Calibrating the voltmeter
F25	SWR cali		Calibrating the VSWR meter
F26	FWD lowr		Code from the direct wave ADC of the VSWR meter, from which the calculation starts to work VSWR.
F27	PWR cali		Power meter calibration 100
F28	RXTX dly		HF transmission delay
F29	TXRX dly		Delay of switching to reception after clearing an HF transmission
F30	BFO USB		USB third heterodyne frequency **6003.20**
F31	BFO LSB		LSB third heterodyne frequency **5999.30**
F33	CNTR 0.5		CW centre frequency **5999.40**
F35	S9 LEVEL		S-meter calibration parameter - signal level S9 **120**
F36	S9 DELTA		S-meter calibration parameter - level range from S0 to S9 **70**
F37	+60 DELTA		S-meter calibration parameter - level range from S9 to S9+ 60 dB **40**
F45	ENC RES		Encoder Type. **Set 64**
F46	ENC DYN		Dynamic encoder mode **ON**

To enter the advanced menu, switch on the power while the FUN button is pressed.

Calibration of the accuracy of readings is performed in the extended mode. To do this, it is necessary to tune to a previously known frequency, put on the indicator its required exact value. Then enter the menu by long pressing on FUN, use UP, DN buttons to select F21 - clock frequency 39 MHz, and by rotating the encoder to achieve correct reception. The same can be done when transmitting using the control device, adjusting the frequency by zero beats. When leaving the menu, the value will be memorised and the readings will be correct on all bands.

If necessary, the transceiver synthesiser allows you to change the frequency of the 3rd heterodyne relative to the IF filter. The operating frequency does not change. It may be useful if you want to adjust the colouring of the sound during transmission by changing the frequency of the heterodyne relative to the IF filter. For this purpose in the advanced mode select item F30 - USB frequency, F31 - LSB frequency, F33 - centre CW. You can change each value with the encoder. When leaving the menu everything will be memorised.

Reference list of possible menu functions

Due to the fact that the software is constantly being improved, some menu items may be removed from the firmware, some may be added. For your information, here is a generalised reference list of possible menu functions with explanations.

LCD CONT	Indicator contrast (if controllable).
LCD LIGH	Setting the backlight brightness
KEY BEEP	Audio tone by keyboard presses
KBD LIGH	Switching on the keyboard backlight
DIMM TIM	Automatically reduces the backlight brightness to minimum. The user inactivity time is set within 1...240 seconds (in increments of 5 seconds). Parameter value 0 to switch this function off (backlighting does not depend on user activity).
BLUE BG	On a colour display, make the background blue instead of black
PBT	Pass Band Tune - smoothly reduce the bandwidth by reciprocal upsetting heterodynes.
IF SHIFT	Shifting the frequency of the third heterodyne to change the tone of the received signals signals.
RFSG MOD	Signal generator mode
CW PITCH	Tone of self-control
CW SPEED.	Automatic telegraph key transmission speed (WPM according to PARIS system)
VIBROPLX	Speed of acceleration of point sequence transmission (simulation of transmission on the Vibroplex mechanical key). Value 0 - deactivation of this function
MOX	Switching on MOX - automatic switching to transmission in the telegraph when pressing the on the key.
MOXDELAY	Delay in switching to reception after the last parcel in the telegraph office
KEYER	Electronic key type. ACS - with automatic formation of pause between signs, ELE - without it, OFF - simple vertical key connected to any contact of the manipulator connection. BUG - a semi-automatic key - dashes are manual, dots are automatic.
CWKEYREV	Swap the dot and dash contacts on the electronic key
CWWEIGHT.	The ratio of the dash duration to the dot duration
SPACEWGH	The ratio of the duration of the pause between sign elements to the duration of the point.
TX POWER	Transmitter power
MUTE ALL	Disabling the microphone amplifier in all modes
VOX	Switching on VOX
VOXDELAY	Transition delay for VOX reception
VOX LEVL	VOX sensitivity level
AVOX LEV	ANTI VOX sensitivity level
ENC DIVS.	Reducing the sensitivity of the shaft encoder
BIG STEP	Coarse tuning step (50 Hertz for CW and SSB, 1 kHz for AM). Use with shaft encoders with a small number of cycles per revolution - e.g. 24 cycles "with hole-punch shaft encoders.
STAYFREQ	When the operating mode is changed, the tuning frequency is fixed, not corrected to preserve the audible air when switching LSB-CWR and USB-CW.
TX POWER	Transmitter power control
MUTE ALL	In all modes (not just CW) mute the microphone. Used when digital modes in SSB mode.
MIC LEVL	Amplification of the microphone amplifier
CAT ENAB	Resolution of CAT interface operation
CAT RTS	Transmit transition control from the RTS signal of the CAT interface

CAT DTR	Manipulation control from the DTR signal of the CAT interface
DIG MARK	MARK frequency for RTTY operation (corresponds to the tuning frequency on the display)
RXTX dly	RF feed delay when switching to transmission in miliseconds
TXRX dly	Delay in switching to reception after the end of a transmission (e.g. delay in the telegraph signal envelope shaper) in miliskunds
PRETXdly	Delay for switching off the reversible path when switching to transmission - for exceptions to the formation of a short carrier parcel before the first character. in miliskunds
SWR SHOW	Selecting to display SWR instead of power level
SWR cali	Calibration parameter of SWR-meter (set by VSWR=2 to the reference one load) - equalisation of levels from direct and reflected wave sensors.
FWD lowr	The code from the direct wave ADC of the VSWR meter, from which the VSWR calculation starts to work.
PWR cali	Calibration parameter of the PWR meter (ADC code corresponding to fully filled meter scale)
BAT cali	Calibration parameter of the supply voltage meter
DAC LEVL	If the frequency control circuits of the reference oscillator are present - control of this oscillator with tension.
USE TXFL	Selects the filter to use when transmitting. If there is no selection, the following is displayed the only one in use.
REF FREQ	Exact frequency of the reference oscillator (set by zero beats at reception of reference frequencies in CWZ mode).
LFM MODE	Operation in the mode of receiving stations of inclined ionosphere sounding
LFM STRT	Initial frequency
LFM STOP	Final frequency
LFM SPD	Tuning speed (kHz per second)
LFM TIME	Start time (minutes/seconds) of the start of the probing cycle
LO1 LEVEL	Signal amplitude at the DDS output of the first heterodyne generator. 0%..100%
REFSI570	The exact frequency of the Si570 synthesiser's internal reference oscillator (adjustable by by zero beats when receiving reference frequencies in CWZ mode).
BFO USB	Frequency of the third heterodyne in SSB reception mode on the upper sideband (filter roll-off frequency)
BFO LSB	Frequency of the third heterodyne in SSB reception mode on the lower sideband (filter roll-off frequency)
HAVE 0.3	Availability of 0.3 kHz IF filter
CNTR 0.3	Telegraph filter mid-band frequency 0.3 kHz
HAVE 0.5	The receiver has a 0.5 kHz IF filter
CNTR 0.5	Telegraph filter mid-band frequency 0.5 kHz
HAVE 0.3	Availability of 0.3 kHz IF filter
HAVE 6.0	The receiver has a 6.0 kHz IF filter
6K OFFS	Adjusting the centre frequency of the IF filter 6.0 kHz
CAR USB	Frequency of the third heterodyne in SSB transmission mode on the upper sideband (filter roll-off frequency)
CAR LSB	Frequency of the third heterodyne in SSB transmission mode on the lower sideband (filter roll-off frequency)
DC TX	CW transmission signal conditioning without the third heterodyne
LO1DV RX	Indicates to the synthesiser whether there is a divider in the signal conditioning for the first signal of the mixer in receive mode.
LO1DV TX	Indicates to the synthesiser whether there is a divider in the signal conditioning for the first signal of the mixer during transmission.
S9 LEVEL	S-meter calibration parameter - S9 signal level (calibrated first)
S9 DELTA	S-meter calibration parameter - level range from S0 to S9
+60DELTA	S-meter calibration parameter - level range from S9 to S9+ 60 dB
BANDONLY	Rebuilds are limited to the amateur bands
FREQ FPS	Frequency refresh rate of the frequency display

SMTR FPS	S-meter display refresh rate
BAND BC	Memorisation of frequencies within broadcast bands rather than amateur bands
BAND 27	Memory of a single frequency within the CB band
BAND 50	Memory of one frequency within the 50 MHz range
BAND 50	Memory of one frequency within 70 MHz range
BAND144	Frequency memorisation within the 144 MHz band
ENC RES	Selecting the type of shaft encoder (number of slots in the disc)
ENC DYN	Enable dynamic tuning step change mode depending on the the speed of the rotary encoder.
NATV LSB	The sideband change is done by changing the ratio of the frequencies of the signal and the of the first heterodyne (higher or lower) rather than by changing the frequency of the last heterodyne (BFO).